

# ***Michigan's 2015 Ambient Air Monitoring Network Review***



Michigan Department of Environmental Quality  
Air Quality Division  
July 1, 2014

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## **Introduction:**

The purpose of this document is to examine Michigan's ambient air monitoring network in operation during 2014 and recommend changes based on monitor history, population distribution, and modifications to federal monitoring requirements under the Clean Air Act (CAA), 40 Code of Federal Regulations (CFR) Part 58. Recommended changes to this network will be implemented during the 2015 calendar year, contingent upon adequate levels of funding.

## **Federal Changes**

There have been a number of changes at the federal level that have impacted the design of Michigan's monitoring network. These changes include revisions to the National Ambient Air Quality Standard (NAAQS) for PM, Pb, NO<sub>2</sub>, SO<sub>2</sub>, CO and secondary NAAQS for NO<sub>2</sub> and SO<sub>2</sub>. In addition, the review of the ozone NAAQS is on-going.

On November 12, 2008, the U.S. Environmental Protection Agency (EPA) modified the lead NAAQS by reducing the level of the standard from a maximum quarterly average of 1.5 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to 0.15  $\mu\text{g}/\text{m}^3$ , as a three-month rolling average.

On February 9, 2010, the EPA changed the NO<sub>2</sub> NAAQS and required the deployment of a two-tiered NO<sub>2</sub> monitoring network consisting of near-roadway and community monitors. The design of the new NO<sub>2</sub> monitoring network is discussed in this network review. These NO<sub>2</sub> monitors have a deployment deadline of January 1, 2013.

On November 16, 2009, the EPA proposed to modify the SO<sub>2</sub> NAAQS and proposed the creation of a two-tier monitoring network based on SO<sub>2</sub> emissions, requiring a total of 12 SO<sub>2</sub> stations in Michigan. The SO<sub>2</sub> NAAQS became final on August 23, 2010. The network design was modified to a single tier requiring a total of five SO<sub>2</sub> monitors in Michigan. The changes to the SO<sub>2</sub> monitoring network are discussed in this network review. The changes to the SO<sub>2</sub> network are required to be implemented before January 1, 2013.

On August 13, 2011, the EPA proposed to retain the CO NAAQS level, while adding additional monitoring requirements. The EPA proposed that CO monitors be added to the near-roadway sites. These CO monitors have a deployment deadline of January 1, 2014.

A secondary NAAQS for NO<sub>2</sub> and SO<sub>2</sub> was proposed on February 12, 2010 and the final rule will be effective June 4, 2012. The EPA chose to retain the standards, while adding additional monitoring requirements.

On January 15, 2013 the PM NAAQS was revised and the EPA lowered the PM<sub>2.5</sub> annual average to 12.0  $\mu\text{g}/\text{m}^3$ .

**The MDEQ cannot implement all of the new monitoring requirements described above without new funding and a concomitant reduction in other monitoring requirements due to financial and staffing limitations. Although EPA has requested funding to support these endeavors, it is unknown if adequate funds will be made available. As a result, the State and Local air agencies in Region 5 with assistance from the Lake Michigan Air Directors Consortium drafted a proposal to identify which monitoring activities can be implemented and which are too costly. As funding becomes available or as changes to the NAAQS are finalized, the MDEQ may be able to gradually implement more of the requirements.**

## **Recommendations for Michigan's Air Monitoring Network in 2015**

The following changes will be made to Michigan's ambient air monitoring network during 2015. If funding cuts occur, additional changes to the network may have to be implemented.

After January 1, 2015 the MDEQ is planning to remove the following monitors:

1. PM<sub>10</sub> and TSP at Vassar (261570001)
2. TSP at Belding – Merrick St (260670003)
3. PM<sub>2.5</sub> Speciation (SASS) at Fort St (SWHS) - Detroit (261630015)
4. SASS at Sterling State Park (261150006)
5. SASS at Tecumseh (260910007)
6. SASS at Houghton Lake (261130001)
7. SASS at Port Huron (261470005)

By January 1, 2015 the MDEQ is planning to start up the following sites:

1. West Olive (26139xxxx) – SO<sub>2</sub> monitoring site
2. Livonia Near Road (26163xxxx) – Near Road site – including NO<sub>2</sub>, CO, and PM<sub>2.5</sub>

## **Network Review Goals**

The Michigan Ambient Air Monitoring Network Review will describe the ambient air monitoring network, show how the network meets the EPA's monitoring regulations, discuss the public comment procedure, summarize recent changes to the network and address potential impacts of other actions in greater detail. All discussions of air monitors reference a unique nine-digit site identification code to remove all ambiguity regarding the monitor location.

## **Public Comment Process**

The EPA requires that the MDEQ document the process for obtaining public comments and include any comments received through the public notification process. As such the DEQ Calendar issued on May 19, 2014 announced that this network review document was placed on the Air Quality Division (AQD) section of the MDEQ Internet homepage to solicit comments from the general public and stakeholders. Reviewers are given 30 calendar days from the date that the draft network review report is posted to provide written comments. Written comments are accepted either by e-mail or by parcel post (verbal comments were are not accepted) and should be sent to:

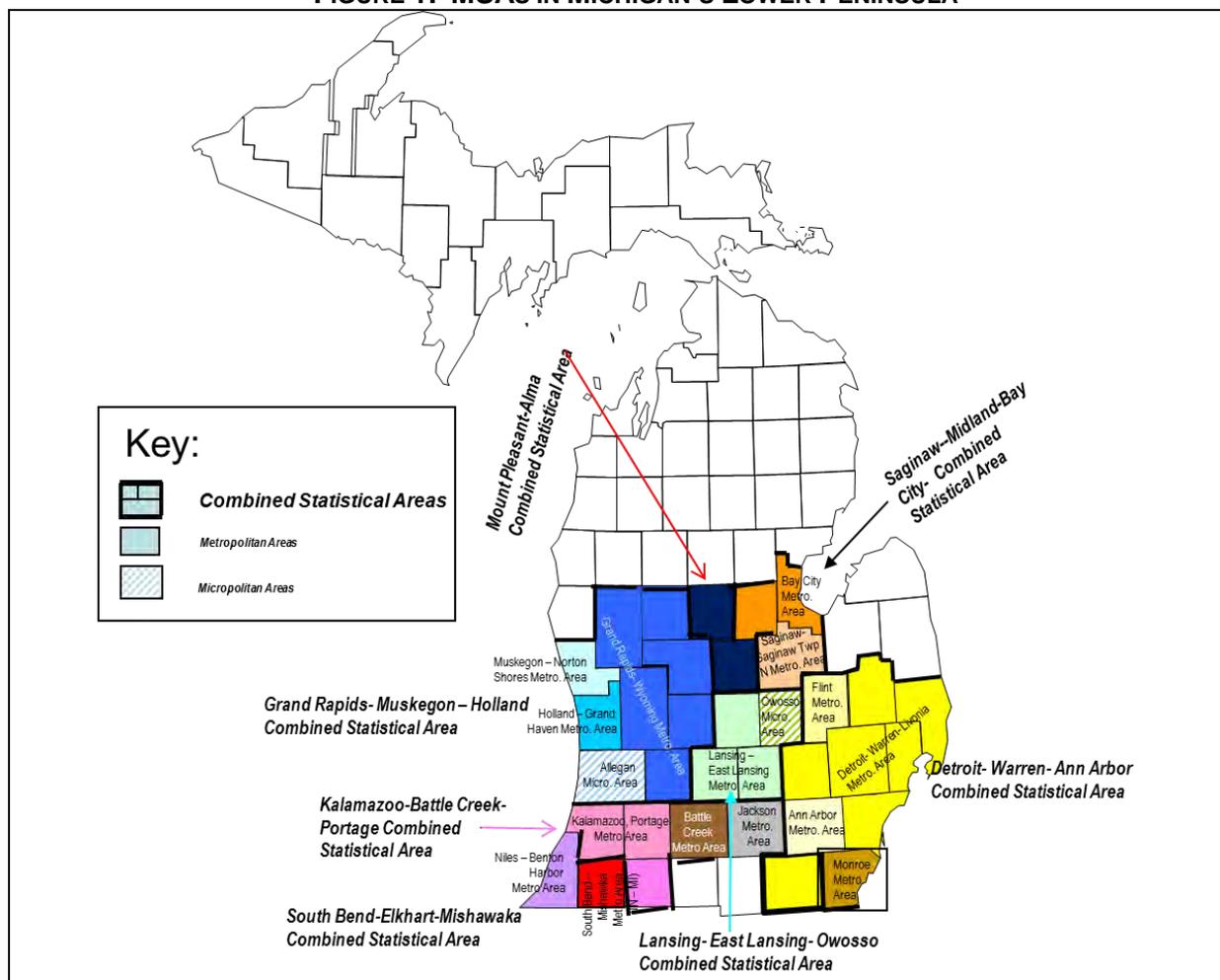
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All written comments that are received will be organized by topic, summarized, and addressed in the final version of the Michigan Ambient Air Monitoring Network Review. The final document will be placed on the AQD section of the MDEQ Internet homepage and sent to EPA Region 5 for approval. Hardcopies of the final version will be available for inspection free of charge at the MDEQ AQD offices located in Lansing (525 West Allegan Street) or Detroit (3058 West Grand Boulevard, Suite 2-300). Requests for hard copies of the plan may incur a nominal fee to cover copying and/or mailing costs. These requests should be directed to Mr. Craig Fitzner, AQD, 517-373-7044, [fitznerc@michigan.gov](mailto:fitznerc@michigan.gov).

**Ambient Air Monitoring Network Requirements:**

The minimum network design criteria for ozone, PM<sub>2.5</sub> (particulate matter with an aerodynamic diameter less than or equal to [≤] 2.5 micrometers) and PM<sub>10</sub> (≤10 micrometers) are based on the 2000 Metropolitan Statistical Area (MSA) geographical borders, population totals, and historical concentrations. The MSA outlines for Michigan's Lower Peninsula, shown in **Figure 1** have not changed from the 2000 to 2010 census.

**FIGURE 1: MSAs IN MICHIGAN'S LOWER PENINSULA**



MSAs must have an urban core population totaling at least 50,000 people in the most recent decennial census. The MSAs as so defined are shown in **Figure 1**. MSAs are one or more counties that have a sizeable urban cluster or have a high level of commuting to or from an urban cluster. MSAs and/or micropolitan areas are grouped to form consolidated statistical areas (CSAs), also shown in **Figure 1**. Note: Only those micropolitan areas that are part of larger CSAs are shown in **Figure 1**. The CSA is defined as a geographical area consisting of two or more adjacent Core-Based Statistical Areas (CBSA) with employment interchange of at least 15%. A CBSA is defined as an entity consisting of the county or counties associated with at least one urbanized area/urban cluster of at least 10,000 in population, plus adjacent counties having a high degree of social and economic integration. Changes to the metropolitan and micropolitan areas as a result of the 2010 Census were released in 2013. The areas that will

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be affected include Midland, Hillsdale, Three Rivers, Ludington, and Whitehall. However, the remainder of MSAs in the State were unaffected by the 2010 census.

The specific counties that make up each MSA or micropolitan area in Michigan are listed in **Table 1**.<sup>1</sup> These geographical areas, coupled with their population totals and historical ambient monitoring data, were used to develop the minimum monitoring network design for ozone, PM<sub>2.5</sub>, and PM<sub>10</sub>. **Table 1** shows the 2010 population totals.

**TABLE 1: COMPOSITION OF CORE-BASED STATISTICAL AREAS IN MICHIGAN**

CORE BASED STATISTICAL AREA	2010 POPULATION	URBAN CORE	CENTRAL METROPOLITAN COUNTIES	OUTLYING METROPOLITAN COUNTIES
Ann Arbor	344,791	Ann Arbor Urbanized Area	Washtenaw	
Battle Creek	136,146	Battle Creek Urban Area	Calhoun	
Bay City	107,771	Bay City Urbanized Area	Bay	
Detroit-Warren-Livonia*	4,296,250	Detroit Urbanized Area	Macomb, Oakland, Wayne	
		Port Huron Urbanized Area	St. Clair	
		Lapeer Urban Cluster		Lapeer
		South Lyon- Howell- Brighton Urbanized Area	Livingston	
Flint	425,790	Flint Urbanized Area	Genesee	
Grand Rapids-Wyoming	774,160	Grand Rapids Urbanized Area	Kent	Barry, Montcalm, Ottawa
Jackson	160,248	Jackson Urbanized Area	Jackson	
Kalamazoo-Portage	326,589	Kalamazoo Urbanized Area	Kalamazoo	
		Paw Paw Urban Cluster		Van Buren
Lansing-East Lansing	464,036	Lansing Urbanized Area	Clinton, Eaton, Ingham	
Midland	83,629	Midland	Midland	
Monroe	152,021	Monroe Urbanized Area	Monroe	
Muskegon-Norton Shores	172,188	Muskegon Urbanized Area	Muskegon	
Niles-Benton Harbor	156,813	Benton Harbor – St Joseph Urbanized Area	Berrien	
Saginaw-Saginaw Twp. North	200,169	Saginaw Urbanized Area	Saginaw	
South Bend-Mishawaka Indiana-Michigan (IN-MI)	52,293	South Bend, IN-MI Urbanized Area (part)	Cass	

\* The Detroit-Warren-Livonia MSA is subdivided into the Detroit-Livonia-Dearborn Metropolitan Division (Wayne Co.) and the Warren-Farmington Hills-Troy Metropolitan Division (Lapeer, Livingston, Macomb, Oakland and St. Clair Counties).

Some proposed monitoring requirements are based on micropolitan statistical areas with an *urban cluster* of at least 10,000 but less than 50,000 people. The total population in micropolitan areas in Michigan is shown in **Table 2**.

<sup>1</sup> Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2009 (CBSA-EST2009-1) Source U. S. Census Bureau, Population Release Date March 2010.

**TABLE 2: COMPOSITION OF MICROPOLITAN STATISTICAL AREAS IN MICHIGAN**

MICROPOLITAN AREA	URBAN CORE	MICROPOLITAN AREA POP <sup>2</sup>	COUNTIES
Traverse City	Traverse City Urban Cluster	143,372	Grand Traverse, Benzie <sup>3</sup> , Kalkaska <sup>3</sup> , Leelanau <sup>3</sup>
Allegan	Plainwell-Otsego Urban Cluster	111,408	Allegan
Adrian	Adrian Urban Cluster	99,892	Lenawee
Midland	Midland Urban Cluster	83,629	Midland
Mount Pleasant	Mount Pleasant Urban Cluster	70,311	Isabella
Owosso	Owosso Urban Cluster	69,232	Shiawassee
Marquette	Marquette Urban Cluster	67,077	Marquette
Ionia	Ionia Urban Cluster	63,941	Ionia
Sturgis	Sturgis Urban Cluster	61,295	St. Joseph
Cadillac	Cadillac Urban Cluster	47,584	Wexford, Missaukee <sup>3</sup>
Hillsdale	Hillsdale Urban Cluster	46,229	Hillsdale
Coldwater	Coldwater Urban Cluster	45,248	Branch
Big Rapids	Big Rapids Urban Cluster	42,798	Mecosta
Alma	Alma Urban Cluster	42,476	Gratiot
Houghton	Houghton Urban Cluster	38,784	Houghton, Keweenaw <sup>3</sup>
Sault Ste. Marie	Sault Ste. Marie Urban Cluster	38,520	Chippewa
Escanaba	Escanaba Urban Cluster	37,069	Delta
Alpena	Alpena Urban Cluster	29,598	Alpena
Iron Mountain	Iron Mt-Kingsford WI U. Cluster	26,168	Dickinson
Ludington	Ludington Urban Cluster	28,680	Mason
Marinette	Marinette WI Menominee	24,029	Menominee

**Other Monitoring Network Requirements**

National Core (NCORE) sites provide a full suite of measurements at one location. NCORE stations collect the following measurements: ozone, SO<sub>2</sub> (trace), CO (trace), NO<sub>y</sub>, PM<sub>2.5</sub> FRM, continuous PM<sub>2.5</sub>, speciated PM<sub>2.5</sub>, wind speed, wind direction, relative humidity, and ambient temperature. In addition, filter-based measurements are required for PM coarse (PM<sub>10-2.5</sub>) on a once every three day sampling frequency. A minimum of ten NCORE sites nationwide measure lead, but the EPA has proposed that NCORE stations house the non-source-oriented lead monitors. The NCORE stations in Michigan, located at Grand Rapids – Monroe St (260810020) and Allen Park (261630001) became operational January 1, 2010, one full year ahead of schedule.

State and Local Air Monitoring Stations (SLAMS) monitors will supplement the network and improve spatial coverage. Specific network design criteria are contained in the monitoring regulations that describe the SLAMS monitoring networks for criteria pollutants. These requirements are discussed in detail in the remainder of this review.

<sup>2</sup> 2010 census data  
<sup>3</sup> Outlying Micropolitan County

## **Network Review Requirements**

According to 40 CFR, an air monitoring network review should:

- Be conducted at least once a year.
- Determine if the system meets the monitoring objectives stated in Appendix D of 40 CFR, Part 58 "Network Design Criteria for Ambient Air Quality Monitoring."<sup>4</sup>
- Determine if the system meets the appropriate spatial scales and monitoring objectives, population-driven requirements, and the minimum number of stations that are required, based on the likelihood of exceeding the NAAQS.
- Identify needed modifications to the network including termination and relocation of unnecessary stations.
- Identify any new stations that are necessary.
- Correct any inadequacies identified previously.
- Be used as a starting point for five-year regional assessments.

Elements that must be included in the network review are:

- the EPA's Air Quality System (AQS) site identification number,
- site locations including coordinates and street address,
- sampling and analysis methods,
- operating schedule,
- monitoring objective and spatial scales,
- identification of those sites that are suitable and not suitable for comparison to the NAAQS (for PM<sub>2.5</sub> only),
- the MSA, CBSA, or CSA represented by each monitor,
- evidence that the siting and operation of the monitor meets 40 CFR Part 58, Appendices A (quality assurance requirements), C (ambient air quality monitoring), D (network design criteria) and E (probe and monitoring path siting criteria).

For Michigan, the site-specific data is summarized in various tables throughout the review.

The modifications to the network should address:

- new census data.
- changes in air quality levels.
- changes in emission patterns.

The time frame for implementation of modifications is one year from the time of the previous network review. Changes will be made on a calendar year basis whenever possible.

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<sup>4</sup> "Environmental Protection Agency Ambient Air Quality Surveillance Regulations." 40 CFR Part 58 Appendix D, October 17, 2006.

### **Monitor Deployment By Location**

**Table 3** summarizes the distribution of ambient air monitors by pollutant in operation in Michigan during 2014. The purpose of including information about the shelter type (building or trailer) is to show the possible availability of space for monitors that require a temperature controlled environment. Although most monitors are located at a building, access to the interior for more monitor deployment may not be possible. In these instances where access is not guaranteed, no shelter is shown. The distinction is made between building and trailer to indicate differences in floor space and temperature control, information useful in planning deployment of new monitors. This review summarizes the purpose behind the continued operation of each monitor, by pollutant and discusses plans for network operations.

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**TABLE 3: MONITOR DISTRIBUTION THROUGHOUT THE 2014 NETWORK IN MICHIGAN**

Site Name	AQS ID	O <sub>3</sub>	PM <sub>2.5</sub>	PM <sub>2.5</sub> TEOM	Speciation	PM <sub>10</sub>	PM Coarse	CO	trace CO	NO <sub>2</sub>	NO <sub>y</sub>	SO <sub>2</sub>	trace SO <sub>2</sub>	Metals (TSP)	VOCs	Carbonyls	PAHs	Meteorological	Building/Trailer
Holland	260050003	x	x															x	T
Bay City	260170014		x	x														x	T
Benzonía (Frankfort)	260190003	x																	T
Coloma	260210014	x	x															x	T
Cassopolis	260270003	x																x	B
Sault Ste. Marie +	260330901	x	x	x <sup>b</sup>														x	
Rose Lake	260370001	x																	B
Flint	260490021	x	x	x														x	T
Otseville	260492001	x																x	T
Harbor Beach	260630007	x																x	T
Belding - Reed St	260670002													Fb & 4				x	B
Belding - Merrick St	260670003													Fb & 4					
Lansing	260650012	x	x	x						x		x						x	T
Kalamazoo	260770008	x	x	x														x	T
Gr.Rapids-Wealthy St	260810007		x																
Gr.Rapids-Monroe St	260810020	x	x	x	x	x	x		x		x		x	b & 4				x	T
Evans	260810022	x																x	T
Tecumseh	260910007	x	x	x	x													x	T
New Haven	260990009	x	x															x	T
Sterling Hts/Freedom Hill	260990021																	x	
Warren	260991003	x																	T
Manistee +	261010922	x	x															x	B
Scottville	261050007	x																x	T
Houghton Lake	261130001	x	x	x	x					x								x	T
Sterling State Park	261150006		x		x							x						x	T
Muskegon-Green Ck Rd	261210039	x																x	T
Oak Park	261250001	x	x															x	T
Pontiac	261250011																	x	
Rochester	261250012																	x	
Jenison	261390005	x																x	T
Port Huron	261470005	x	x	x	x							x						x	T
Port Huron Rural St	261470031													Fb & 4					
Seney	261530001	x		x														x	T
Vassar	261570001													Fb & 4					
Ypsilanti	261610008	x	x	x														x	T
Allen Park	261630001	x	x	x	x	x	x		x		x		x	b & 4				x	T
River Rouge	261630005					x								4		x		x	T
Fort St (SW HS)-Detroit	261630015		x		x	x						x		4	x	x		x	B
Linwood	261630016		x																B
E 7 Mile - Detroit	261630019	x	x							x								x	B
Livonia	261630025		x															x	T
Joy Rd - Detroit	261630026																	x	
S Delray/ Jefferson	261630027													4					T
Dearborn	261630033		x	x	x	x								x	x	x	x	x	B
Wyandotte	261630036		x																
FIA/Ambassador Bridge	261630039		x	x														x	T
Eliza Howell #1	261630093							x		x								x	T
Eliza Howell #2	261630094							x		x								x	T
<b>Total</b>		<b>27</b>	<b>25</b>	<b>14</b>	<b>8</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>5</b>	<b>2</b>	<b>4</b>	<b>2</b>	<b>10</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>38</b>	
		+ = Tribal monitor																	
		b = BAM Unit																	
		4 = Metals suite reduced to Mn, As, Cd, Ni																	

## **Quality Assurance (QA)**

The MDEQ has an approved Quality Management Plan (QMP). In turn, the Air Monitoring Unit (AMU) has a Quality Assurance Project Plan (QAPP), which covers the operation of the ambient air network. This document addresses criteria pollutants, air toxics, metals, and particulates including the EPA PM<sub>2.5</sub> Speciation Trends Network (STN). Separate QAPPs exist for the National Air Toxics Trend Site (NATTS) and National Core Monitoring sites (NCore). Special purpose monitoring projects also have dedicated QAPPs. Lastly, the AMU has approved standard operating procedures, standardized forms and documentation policies, and a robust audit and assessment program to ensure high data quality.

As part of the network review process, it is important to ensure that each monitor meets the specific requirements in 40 CFR Part 58, Appendix A governing proper calibration and operation of each monitor, proper probe height and monitor path length. In addition, the site itself must meet specific criteria governing distances from large trees and buildings, exhaust vents, highways, etc. To address the adequacy of these operational parameters, various types of audits are performed.

Audits are conducted by the AMU's Quality Assurance (QA) Team, which has a separate reporting line of supervision. The audits are conducted on the particulate-based monitors every six months (PM<sub>2.5</sub> FRM, continuous PM<sub>2.5</sub> TEOM, BAM, PM<sub>2.5</sub> Speciation, High Volume TSP [total suspended particulate], and PM<sub>10</sub>) and the gaseous monitors (CO, SO<sub>2</sub>, ozone, and NO<sub>2</sub>) at least once a year. All audit results are reported to AQS quarterly. The toxics monitors (volatile organic compounds [VOCs], carbonyl compounds, and poly-aromatic hydrocarbons [PAH]) are also audited once a year and the aethalometers are audited every six months by the QA Team. These audits are conducted with independent equipment and gases, which are only used for quality assurance. The AMU's QA Coordinator reviews the results from all audits.

External audits are conducted annually by the EPA. The EPA conducts Performance Evaluation Program (PEP) audits for PM<sub>2.5</sub> samplers (eight sites a year) and National Performance Audit Program (NPAP) for the gaseous monitors (20% of the sites per year) using a Thru-the-Probe audit system. The EPA also conducts program-wide Technical Systems Audits every three years to evaluate overall program operations, and assess adequacy of documentation and records retention. External audits are also conducted on the laboratory operations for air toxics (VOCs and carbonyls) and metals through the use of performance evaluation samples. The concentrations of the audit samples are unknown to both the AQD staff and the MDEQ Environmental Laboratory staff.

## **Lead Monitoring Network:**

### **Background**

On December 14, 2010, the EPA revised the ambient monitoring requirements to better address possible exposures to lead<sup>5</sup>. Monitoring is required for point sources that emit 0.5 tons of lead per year or more, if modeling indicates that the maximum concentration is more than half of the level of the air quality standard. If modeling indicates that there is little likelihood of violating the NAAQS, a waiver from monitoring may be obtained from the regional administrator. These new monitoring stations had to be operational by December 27, 2011.

The final component of the 2010 revisions to the monitoring regulations includes the addition of population-oriented lead monitors at NCore stations that are located in CBSAs with populations greater than 500,000. These monitors needed to be in place by January 1, 2012.

Sampling that is implemented as a result of these changes needs to conform to practices currently in use in the rest of the lead network. Namely, sampling will be conducted on a once every six day schedule and employ a high volume TSP sampler. The filters will be analyzed by the MDEQ laboratory using inductively coupled plasma/mass spectrometry (ICP/MS).

To place these new monitoring requirements into context, the 2008 lead NAAQS is reviewed below as are changes already implemented in the lead network.

### **The 2008 Lead NAAQS**

The 2008 lead NAAQS reduced the level of the standard from a maximum quarterly average of 1.5 ug/m<sup>3</sup> to 0.15 ug/m<sup>3</sup> as a rolling three-month average. To determine if the primary NAAQS is met, the maximum three-month average within a three-year period is compared to the level of 0.15 ug/m<sup>3</sup>.

In addition to changing the level and form of the standard, the 2008 NAAQS also changed monitoring requirements. The EPA required that ambient monitoring be performed downwind of point sources emitting one ton or more per year of lead, unless modeling proved that the sources didn't pose a health risk.

The NAAQS retained the TSP size fraction of lead, but acknowledged that agencies may, under certain conditions, measure lead as PM<sub>10</sub>, if low volume sampling devices are used. Currently, the MDEQ is using high volume TSP samplers to measure lead and will continue to do so for compliance with the NAAQS and consistency with historical data. The NAAQS requires that lead sampling be conducted on a once every six day schedule. The filters are analyzed by the MDEQ laboratory using ICP/MS.

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<sup>5</sup> "Environmental Protection Agency National Ambient Air Quality Standards for Lead; Final Rule." 40 CFR parts 50, 51, 53 and 58, November 12, 2008.

## **Point Source-oriented Monitoring**

For 2014, there were no new facility that required an investigation with regards to the lead NAAQS requirements. However, there are some issues that need to be discussed. First, MDEQ is planning on petitioning for attainment status for the current lead nonattainment area in Belding, Michigan. If data continues to show attainment at the Reed St. monitor (260670002), September 2014 will mark three years of clean data. At this time, MDEQ would be in a position to ask for reclassification to attainment. When the area is reclassified, MDEQ would like to shut down one of the two existing monitors. The Merrick St (260670003) monitor was established first and has not had a violation since October of 2010, the Reed St. monitor was added later when the stack height was raised and new modeling showed point of highest impact in a new location. Therefore, MDEQ would like to keep the Reed St monitor for maintenance purposes and shut down the Merrick St monitor on January 1, 2015 or when the area is reclassified as attainment, whichever comes later.

Second, Metavation Vassar, LLC, formerly known as Grede Foundries is located at 700 E Huron Ave in Vassar in Tuscola County. MDEQ started monitoring in Vassar on 9/30/2011. In October of 2013 the plant shutdown and all permits were voided on March 6, 2014 at the request of the company. There has never been a recorded three month rolling average over ½ the standard. The MDEQ would like to shutdown this monitoring site January 1, 2015, since the source of the lead emissions no longer exists.

## **Non-source-oriented/NCore Monitoring Network Design**

According to the November 12, 2008 lead NAAQS, each core based statistical area (CBSA) with a population equaling or exceeding 500,000 people shall have a lead monitoring station to measure neighborhood scale lead in the urban area.

When the monitoring requirements to the lead NAAQS became final on December 14, 2010, the EPA replaced this monitoring requirement with one calling for monitoring at NCore sites in CBSAs with populations greater than 500,000 by January 1, 2012.

According to the 2010 census, there are two CBSAs in Michigan with population levels exceeding 500,000. Both of these CBSAs contain an NCore station as is shown in **Table 4**.

The MDEQ deployed the TSP lead sites to the NCore stations before January 1, 2010 for a variety of reasons:

- The changes in the monitoring regulations did not result in a difference in the network design.
- The MDEQ desired to have a population-oriented lead site near the point source monitoring site in Belding for comparative purposes, so lead was added to the Grand Rapids NCore site (260810020).
- The MDEQ was already collecting trace metals at the Allen Park NCore site (261630001). The addition of lead to the list of elements reported was a minimal expense and provided comparisons to the other NCore site.

**TABLE 4: CBSAs WITH MORE THAN 500,000 PEOPLE<sup>6</sup>**

<b>CBSA</b>	<b>2010 Population</b>	<b>Counties</b>	<b>Existing NCore Sites</b>
Detroit-Warren-Livonia Metro Area	4,296,250	Macomb Oakland Wayne Lapeer St Clair Livingston	Allen Park (261630001)
Grand Rapids-Wyoming Metro Area	774,160	Kent Barry Newaygo Ionia	Grand Rapids-Monroe St (260810020)

### **Lead Co-location Requirements**

If a primary quality assurance organization (PQAO) has a mixture of source and non-source-oriented lead sites, the number of co-located lead sites is equal to 15% of the total number of these lead sites. **Table 5** described the deployment schedule for various components of the lead network and shows the calculations for determining the number of co-located lead sites that are required.

As shown by the table, only one co-located monitoring station is required under any of the scenarios for Michigan's lead network. Currently, the co-located site is at Dearborn. According to the *Federal Register*, the co-located site should be at the location with the highest lead concentrations, which would be at Belding (260670003). However, this is impossible because the station occupies a minimal footprint located in the right of way of the road. In addition, MDEQ expects lead impacts in Belding to decrease significantly due to adopted abatement strategies. Mueller Industries increased their stack heights on 1/21/2012. For these reasons, the MDEQ seeks a waiver from the co-location requirement at Belding from the Regional Administrator.

The MDEQ prefers to leave the co-located lead site at the National Air Toxics Trend Site (NATTS) at Dearborn (261630033), which is located close to many industrial processes including a steel mill, a rail yard and an incinerator. The station is sited at Salina School. Typically, NATTS sites determine lead as PM<sub>10</sub> using a high volume sampler and thus do not meet the monitoring requirements, which specify the use of a high volume TSP sampler or a low volume PM<sub>10</sub> sampler under certain instances. However, the MDEQ opted to collect co-located lead measurements as both TSP and PM<sub>10</sub> at the Dearborn site to continue generating trend data (TSP – Pb), promote comparability with other NATTS sites in the nation (PM<sub>10</sub> – Pb) and to determine precision for both size fractions. In addition, a Met One SASS monitor supports the measurement of lead as PM<sub>2.5</sub>, rounding out the suite of various particle sizes. As long as the total number of lead sites in Michigan is less than ten, the co-located TSP samplers at Dearborn also fulfill the 15% co-location requirement for the lead network.

<sup>6</sup> 2010 census data.

**TABLE 5: DEPLOYMENT SCHEDULE FOR LEAD SITES AND CALCULATION OF THE TOTAL NUMBER OF CO-LOCATED LEAD SITES**

<b>Site Name &amp; ID</b>	<b>Site Purpose</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Dearborn (261630033)	NATTS; co-located site	operational	operational	operational	operational	operational
Grand Rapids- Monroe St. (260810020)	NCore Non- Source- oriented	operational	operational	operational	operational	operational
Allen Park (261630001)	NCore Non- Source- oriented	operational	operational	operational	operational	operational
Belding (260670003)	Source-oriented	operational	operational	operational	operational	discontinued
Belding-Reed St (260670002)	Source-oriented	operational	operational	operational	operational	operational
Vassar (261570001)	Source-oriented	operational	operational	operational	operational	discontinued
E Jordan (260290011)	Source-oriented	operational	operational	discontinue	discontinue	discontinued
Oakland Co Airport (261250013)	Source-oriented	operational	operational	discontinue	discontinue	discontinued
Port Huron, Rural St. (261470031)	Source-oriented			startup	start-up	operational
<b>Total No. Sites</b>		<b>8</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>5</b>
<b>No. Co-Located Sites Required</b>		<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

**Table 6** summarizes the lead monitoring site information for the Michigan lead network. **Figure 2** shows monitoring site locations in the 2014 and 2015 network.

TABLE 6: LEAD MONITORING NETWORK

Operating Schedule: 1:6 days  
 Method: High Volume Sampler & ICAP Spectra

### Point Source Oriented Sites - 2014

Monitoring Sites			Part. Size	Latitude		Longitude		Sampling Frequency Purpose		Scale	County	Date Estab.	Facility Name	Est Emissions Tons/yr
Site Name	AQS Site ID	Address		Latitude	Longitude	Latitude	Longitude	Frequency	Purpose					
Belding - Merrick St	260670003	509 Merrick	TSP	43.09984	-85.22163	43.09984	-85.22163	1:6	max conc	Neighborhood	Ionia	1/1/10	Mueller Industries	0.9 - 1.0
Vassar	261570001	98 Divison St	TSP	43.3686	-83.5691	43.3686	-83.5691	1:6	max conc	Neighborhood	Tuscola	11/5/11	Metavation	0.5-1.0
Port Huron	261470031	324 Rural St	TSP	42.98209	-82.44923	42.98209	-82.44923	1:6	max conc	Neighborhood	St. Clair	1/1/13	Mueller Industries	0.75
Belding - Reed St	260670002	545 Reed St	TSP	43.101944	-85.22000	43.101944	-85.22000	1:6	max conc	Neighborhood	Ionia	7/2/11	Mueller Industries	0.9 - 1.0

### Area Source Oriented Sites 2014 & 2015

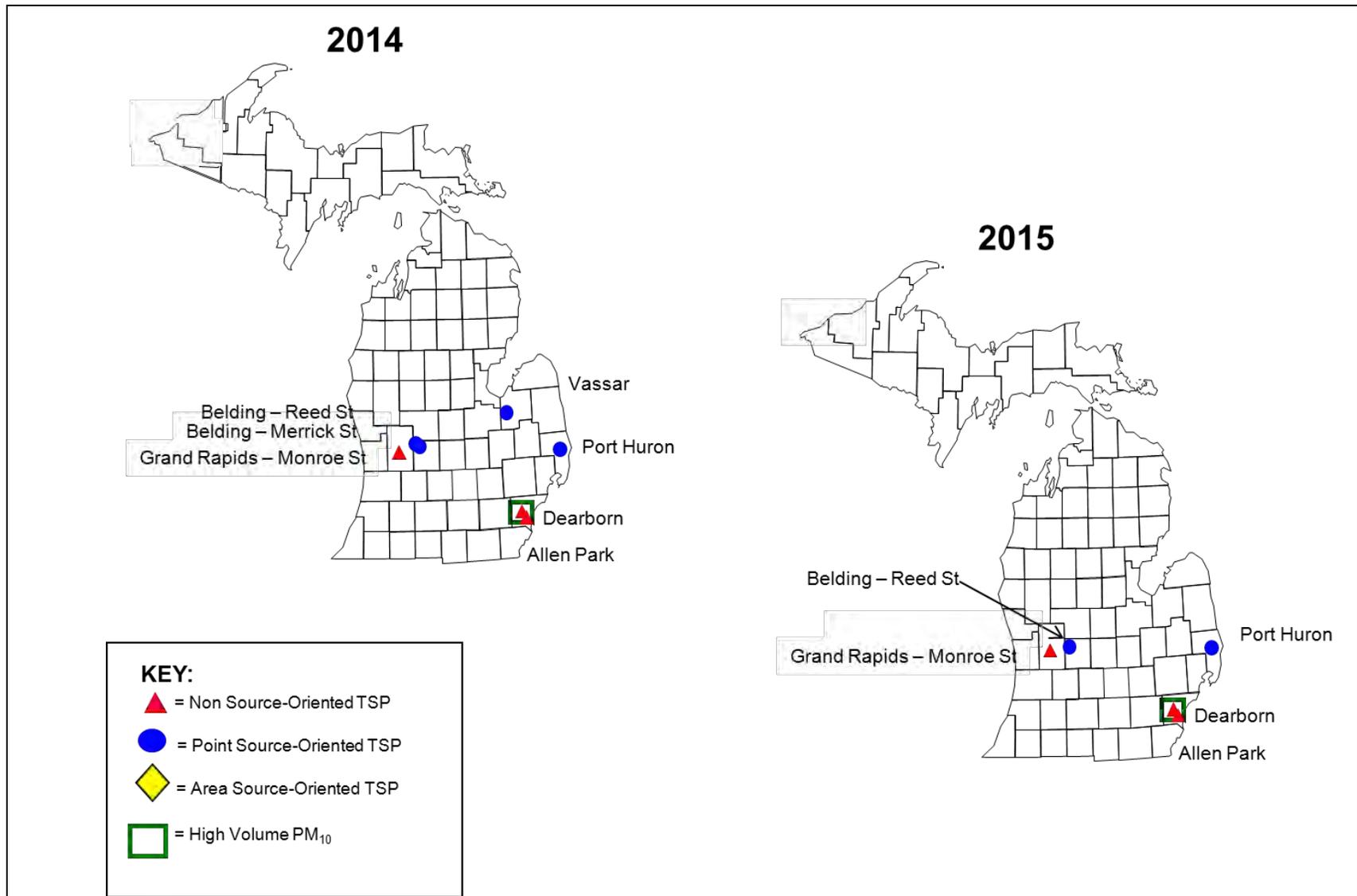
Monitoring Sites			Part. Size	Latitude		Longitude		Sampling Frequency Purpose		Scale	County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID	Address		Latitude	Longitude	Latitude	Longitude	Frequency	Purpose					
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW	TSP	42.984167	-85.67139	42.984167	-85.67139	1:6	pop. exp.	Neighborhood	Kent	1/8/10	GW	774,160
Allen Park	261630001	14700 Goddard	TSP	42.228611	-83.20833	42.228611	-83.20833	1:6	pop. exp.	Neighborhood	Wayne	1/2/10	DWL	4,296,250
Dearborn	261630033	2842 Wyoming	TSP	42.306666	-83.14889	42.306666	-83.14889	1:6	max conc	Neighborhood	Wayne	6/1/90	DWL	4,296,250
Dearborn	261630033	2842 Wyoming	TSP	42.306666	-83.14889	42.306666	-83.14889	1:6, co-loc	max conc	Neighborhood	Wayne	6/1/90	DWL	4,296,250
Dearborn	261630033	2842 Wyoming	PM 10	42.306666	-83.14889	42.306666	-83.14889	1:6	max conc	Neighborhood	Wayne	6/1/90	DWL	4,296,250
Dearborn	261630033	2842 Wyoming	PM 10	42.306666	-83.14889	42.306666	-83.14889	1:6, co-loc	max conc	Neighborhood	Wayne	6/1/90	DWL	4,296,250

### Point Source Oriented Sites - 2015

Monitoring Sites			Part. Size	Latitude		Longitude		Sampling Frequency Purpose		Scale	County	Date Estab.	Facility Name	Est Emissions Tons/yr
Site Name	AQS Site ID	Address		Latitude	Longitude	Latitude	Longitude	Frequency	Purpose					
Port Huron	261470031	324 Rural St	TSP	42.98209	-82.44923	42.98209	-82.44923	1:6	max conc	Neighborhood	St. Clair	1/1/13	Mueller Industries	0.75
Belding - Reed St	260670002	545 Reed St	TSP	43.101944	-85.22000	43.101944	-85.22000	1:6	max conc	Neighborhood	Ionia	7/2/11	Mueller Industries	0.9 - 1.0

<sup>1</sup> CBSA Key:  
 DWL = Detroit-Warren-Livonia Core Based Statistical Area  
 GW = Grand Rapids-Wyoming Core Based Statistical Area

FIGURE 2: MICHIGAN'S LEAD MONITORING NETWORK



### **Waiver(s) From Lead Monitoring**

In the Network Review that was due July 1, 2009, waivers from monitoring were sought for point sources where modeling indicated there was little likelihood to violate the NAAQS. According to the waiver process, new waivers from monitoring for these sources need to be applied for five years after the first waiver was obtained. Therefore, the MDEQ will seek a waiver renewal in July 2014.

### **Lead Quality Assurance (QA)**

The site operator conducts a precision flow check each month. The flow check values are sent to the QA coordinator each quarter. An independent audit is conducted by a member of the AMU's QA Team every six months. The auditor is in a separate line of reporting authority from the site operator and uses independent, dedicated equipment to perform the flow rate audit. The auditor also assesses the condition of the monitor and siting criteria. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files. The audit results are uploaded to the EPA's AQS database each quarter.

The MDEQ Laboratory participates in an external performance testing programs that is administered by the EPA. External lead PEP audits are conducted annually by the EPA. For this audit, the EPA sends a filter strip that is spiked with a known concentration of lead. The laboratory reports the result to the EPA and it is compared to the "true" value. A co-located lead filter is sent to the EPA Region 9 Lab once per quarter to assess laboratory precision.

### **Plans for the 2015 Lead Monitoring Network**

In 2015, the MDEQ is planning to continue to collect lead measurements using high volume TSP samplers at the NCore sites in:

- Grand Rapids–Monroe St. (260810020)
- Allen Park (261630001)

High volume TSP lead measurements will continue to be collected at the NATTS site:

- Dearborn NATTS site (261630033)
- Co-located Dearborn NATTS (261630033)

The MDEQ is also planning to continue the collection of co-located PM<sub>10</sub> lead at the Dearborn (261630033) NATTS site during 2015.

In 2015, the MDEQ is planning to continue lead measurements at:

- Belding–Reed St. (260670002) TSP lead monitoring
- Port Huron (261470031) TSP lead monitoring

In 2015, the MDEQ is planning to discontinue lead measurements at:

- Vassar (261570001) TSP lead monitoring
- Belding–Merrick St. (260670003) TSP lead monitoring

## **NCORE Monitoring Network:**

The purpose of the NCore stations is to collect a variety of air quality measurements that can be used to provide an integrated approach to air quality management. Collection of a suite of measurements at a single site improves our understanding of how concentrations of various pollutants are inter-related and can evaluate the effectiveness of control programs. Data from NCore sites is also used for the determination of air quality trends, for model evaluation and for attainment purposes. Reference or equivalent methods must be used.

### **Network Design**

Neighborhood and urban scale measurements are to be made at one NCore site per state. Some states, including Michigan, have more than one major population center or multiple airsheds with unique characteristics, so two to three NCore stations are required to adequately characterize air quality. Sampling at NCore sites should use a spatial scale of neighborhood (up to 4 km) or urban (4 km to 50 km).

There are a limited number of rural NCore stations. These NCore sites are located away from the influences of major sources, are sited in areas of relatively homogeneous geography and should sample on a regional scale or larger. There are no rural NCore sites in Michigan.

Whether urban or rural, the *Federal Register*<sup>7</sup> specifies the minimum parameters that each NCore site must measure:

- Continuous PM<sub>2.5</sub>
- 24-hr PM<sub>2.5</sub>
- Speciated PM<sub>2.5</sub>
- PM<sub>10-2.5</sub>
- Ozone
- SO<sub>2</sub>
- CO
- NO/NO<sub>y</sub>
- Wind speed
- Wind direction
- Relative humidity
- Outdoor temperature
- Lead (at 10 NCore sites nationwide)

### **Michigan NCore Sites**

The MDEQ's NCore sites are located at Grand Rapids-Monroe St. (260810020) in the Grand Rapids-Wyoming CBSA and at Allen Park (261630001) in the Detroit-Warren-Livonia CBSA. Details were provided in the 2010 Network Review.

**Tables 7 and 8** list the parameters measured at Grand Rapids-Monroe St. (260810020) and Allen Park (261630001), respectively. Start dates are also shown.

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<sup>7</sup> "Environmental Protection Agency National Ambient Air Quality Standards for Lead; Final Rule." 40 CFR Parts 50, 51, 53 and 58, November 12, 2008.

## **MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

The speciation samplers at the MDEQ NCore stations sample on a once every three day sampling schedule to meet the NCore monitoring requirements.

Low volume PM<sub>10</sub> was added to the Grand Rapids–Monroe St. (260810020) site on January 14, 2010 and was added to the Allen Park (261630001) site on January 8, 2010. Lead was added to both sites in January 2010. Humidity was added to the Grand Rapids–Monroe St. (260810020) NCore station on March 3, 2010.

Site specific data for Michigan's NCore network is summarized in **Table 9**. A map showing the locations of NCore sites is displayed in **Figure 3**.

### **NCore Quality Assurance**

The MDEQ's NCore stations contain a variety of monitors that are required to meet the federal requirements for NCore stations. Quality assurance is discussed for each type of monitor in the appropriate section of the network review.

### **Plans for 2015 NCore Monitoring Network**

In 2015, the MDEQ is planning to continue to collect the measurements required for the NCore program at the following sites:

- Grand Rapids–Monroe St. (260810020)
- Allen Park (261630001)

**TABLE 7: MEASUREMENTS COLLECTED AT THE GRAND RAPIDS - MONROE ST. (260810020) NCore SITE**

PARAMETER	DESIGNATION	SPATIAL SCALE	SAMPLING FREQUENCY	INSTRUMENT TYPE	METHOD	EXISTING MONITOR START UP DATE	NEW MONITOR ANTICIPATED START UP DATE	COMMENTS
PM <sub>2.5</sub> continuous	NCore/AQI	Neighborhood	Continuous	R & P TEOM 1400 a	tapered element oscillating microbalance	11/4/99	---	<i>DOES NOT meet FEM or ARM requirements</i>
PM <sub>2.5</sub> FRM mass	NCore	Neighborhood	1:3 days	R & P Partisol plus 2025	manual collection, gravimetric analysis	10/23/98	---	---
PM <sub>2.5</sub> Speciation	NCore	Neighborhood	1:3 days	Met One SASS + URG 3000N	manual collection, laboratory analysis*	6/1/02 at 1:6 sampling frequency	---	Freq. changed to 1:3 on 1/1/2011
Trace CO	NCore/AQI	Neighborhood	Continuous	API 300 eu/TECO 48 i	non-dispersive infra red	4/25/07	---	probe height 5 m
Trace SO <sub>2</sub>	NCore/AQI	Neighborhood	Continuous	API 100 eu/TECO 43i	UV fluorescence	4/1/08	---	probe height 5 m
NO <sub>y</sub>	NCore/AQI	Neighborhood	Continuous	TECO 42C	chemiluminescece	4/1/08	---	external converter installed at 10 m probe height 5 m
Ozone	NCore/AQI was NAMS	Neighborhood	Continuous	API 400 A1E	UV absorption	4/24/80	---	Year round
Lead	Non source	Neighborhood	1:6 days	General Metal Works Hi Vol filter based	manual collection, ICP/MS analysis	1/8/10	---	---
PM <sub>10-2.5</sub> mass	NCore	Neighborhood	1:3 days	R & P Partisol plus 2025	manual collection, gravimetric analysis	7/16/10	---	---
PM <sub>10-2.5</sub> Continuous	---	---	---	---	---	---	---	Not planned
WS	NCore	---	Continuous	R. M. Young Prop. Anemom. & vane	Vector summation	1/1/88	---	At 10 m
WD	NCore	---	Continuous	R. M. Young Prop. Anemom. & vane	Vector summation	1/1/88	---	At 10 m
Relative Humidity	NCore	---	Continuous	R. M. Young	resistance hygrometer	3/3/10	---	> 4 m
Outdoor Temperature	NCore	---	Continuous	R. M. Young	thermometer	7/15/93	---	> 4 m
Sigma Theta	SLAMS	---	Continuous	ESC Data Logger	calculation	1/16/01	---	optional
Barometric Pressure	SLAMS	---	Continuous	R. M. Young	electronic pressure sensor	7/15/93	---	optional
PM <sub>10</sub>	SLAMS	Neighborhood	1:6 days	Hi-vol	manual collection, gravimetric analysis	1/1/85	---	---

\* Laboratory analysis consists of ion chromatography, X-Ray Fluorescence (XRF) and thermal optical analysis for ions, trace metals and forms of carbon, respectively.

**TABLE 8: MEASUREMENTS COLLECTED AT THE ALLEN PARK (261630001) NCore SITE**

PARAMETER	DESIGNATION	SPATIAL SCALE	SAMPLING FREQUENCY	INSTRUMENT TYPE	METHOD	EXISTING MONITOR START UP DATE	NEW MONITOR ANTICIPATED START UP DATE	COMMENTS
PM <sub>2.5</sub> continuous	NCore/AQI	Neighborhood	Continuous	R & P TEOM 1400 a	tapered element oscillating microbalance	2/1/01	---	<i>DOES NOT meet FEM or ARM requirements</i>
PM <sub>2.5</sub> FRM mass	NCore	Neighborhood	1:1 day	R & P Partisol plus 2025	manual collection, gravimetric analysis	5/12/99	---	---
PM <sub>2.5</sub> Speciation	NCore	Neighborhood	1:3 day	Met One Super SASS + URG 3000N + IMPROVE carbon channel	manual collection, laboratory analysis*	12/1/00	---	---
Trace CO	NCore/AQI	Neighborhood	Continuous	API 300 eu/TECO 48 i	non-dispersive infra red	6/1/07	---	4 m probe ht
Trace SO <sub>2</sub>	NCore/AQI	Neighborhood	Continuous	API 100 eu /TECO 43 i as	UV fluorescence	4/1/08	---	4 m probe ht
NO <sub>y</sub>	NCore/AQI	Neighborhood	Continuous	TECO 42C	chemiluminescece	4/1/08	---	external converter installed at 10 m 4 m probe ht
Ozone	NCore/AQI was NAMS	Neighborhood	Continuous	API 400 A	UV absorption	1/1/80	---	Year round 4 m probe ht
Lead	Non source	Neighborhood	1:6 days	General Metal Works Hi Vol filter based	manual collection, ICP/MS analysis	3/2/01 to 3/31/07; 1/2/10	---	---
PM <sub>10-2.5</sub> mass	NCore	Neighborhood	1:3 days	R & P Partisol plus 2025	manual collection, gravimetric analysis	7/16/10	---	---
PM <sub>10-2.5</sub> Continuous	---	---	---	---	---	---	---	Not planned
WS	NCore	---	Continuous	R. M. Young Prop. Anemom. & vane	Vector summation	10/18/81	---	At 10 m
WD	NCore	---	Continuous	R. M. Young Prop. Anemom. & vane	Vector summation	10/18/81	---	At 10 m
Relative Humidity	NCore	---	Continuous	R. M. Young	resistance hygrometer	1/1/00	---	> 4 m
Outdoor Temperature	NCore	---	Continuous	R. M. Young	thermometer	1/1/00	---	> 4 m
Sigma Theta	SLAMS	---	Continuous	ESC Data Logger	calculation	9/1/01	---	optional
Barometric Pressure	SLAMS	---	Continuous	R. M. Young	electronic pressure sensor	1/5/71	---	optional
Black Carbon	SLAMS	---	Continuous	Magee large spot AE2100	optical absorption	12/19/03	---	Not Req by NCore
PM <sub>10</sub> Hi-vol	Was NAMS	Neighborhood	1:6 days	Hi-vol	manual collection, gravimetric analysis	9/12/87	---	---

\* Laboratory analysis consists of ion chromatography, X-Ray Fluorescence (XRF) and thermal optical analysis for ions, trace metals and forms of carbon, respectively.

**TABLE 9: N CORE NETWORK IN MICHIGAN**

Monitoring Sites										Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>	
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW,	42.98417	-85.6714	Pop. Exp.	Neighborhood	Kent	1/1/10	GW	774,160
Allen Park	261630001	14700 Goddard	42.22861	-83.2083	Pop. Exp.	Neighborhood	Wayne	1/1/10	DWL	4,296,250

<sup>1</sup> CBSA Key:  
 DWL = Detroit-Warren-Livonia Core Based Statistical Area  
 GW = Grand Rapids-Wyoming Core Based Statistical Area

**FIGURE 3: MICHIGAN'S N CORE MONITORING NETWORK**



**Ozone Monitoring Network:**

As a result of the October 17, 2006 monitoring regulations, the minimum number of required ozone sites in an MSA were changed. In addition, due to the 2000 census, MSA boundaries were modified and population totals tied to measurements of ambient air quality were increased. A monitor with a design value (using the most recent three years of data) that is  $\geq 85\%$  of the ozone NAAQS has a higher probability of violating the standard. Therefore, the EPA requires more monitors in these MSAs. In other instances, the number of monitors may be reduced if the design value is greater than 115% of the NAAQS.<sup>8</sup> Note: background and transport ozone monitors are still required, but are not shown in **Table 10**.

**TABLE 10: SLAMS MINIMUM OZONE MONITORING REQUIREMENTS**

<b>MSA POPULATION<sup>1,2</sup></b>	<b>MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS <math>\geq 85\%</math> OF ANY OZONE NAAQS<sup>3</sup></b>	<b>MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS <math>&lt; 85\%</math> OF ANY OZONE NAAQS<sup>3,4</sup></b>
> 10 million	4	2
4 - 10 million	3	1
350,000 - < 4 million	2	1
50,000 - < 350,000 <sup>5</sup>	1	0

- <sup>1</sup> Minimum monitoring requirements apply to the MSA.
- <sup>2</sup> Population based on the latest available census figures.
- <sup>3</sup> The ozone NAAQS levels and forms are defined in 40 CFR Part 50.
- <sup>4</sup> These minimum monitoring requirements apply in the absence of a design value.
- <sup>5</sup> MSA must contain an urbanized area of 50,000 or more population.

Applying the requirements described in **Table 10** to Michigan's MSAs, population totals and the most recent 3-year design values results in a minimum ozone network design summarized in **Table 11**<sup>9</sup>. All monitors in Michigan are within 85% of the ozone NAAQS of 0.075 ppm.

**Figure 4** illustrates changes in the 3-year averages of the fourth highest ozone values, called design values, from 2009 to 2013. When contemplating changes to the ozone network, it is important to consider changes in design values in nonattainment areas. However, the level of the NAAQS may become more stringent, and until we know the impact of these possible changes, the MDEQ is reluctant to alter the ozone network. Individual monitors and attainment status are discussed below.

<sup>8</sup> Table D-2 of Appendix D to Part 58.

<sup>9</sup> The proposed changes to the ozone NAAQS have changed the data handling procedures. Instead of truncating any numbers to the right of the third decimal place, values are to be rounded. **Table 19** retains the truncation convention because the proposed change hasn't been finalized yet.

**MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

**Table 11: Application of Minimum Ozone Requirements in the October 17, 2006 Final Revision to the Monitoring Regulation to Michigan's Ozone Network**

**Table 17: Application of Minimum Ozone Monitoring Requirements in the October 17, 2006 Final Revision to the Monitoring Regulation to Michigan's Ozone Network**

NAAQS: 0.075 ppm

> = 85% 0.063 ppm

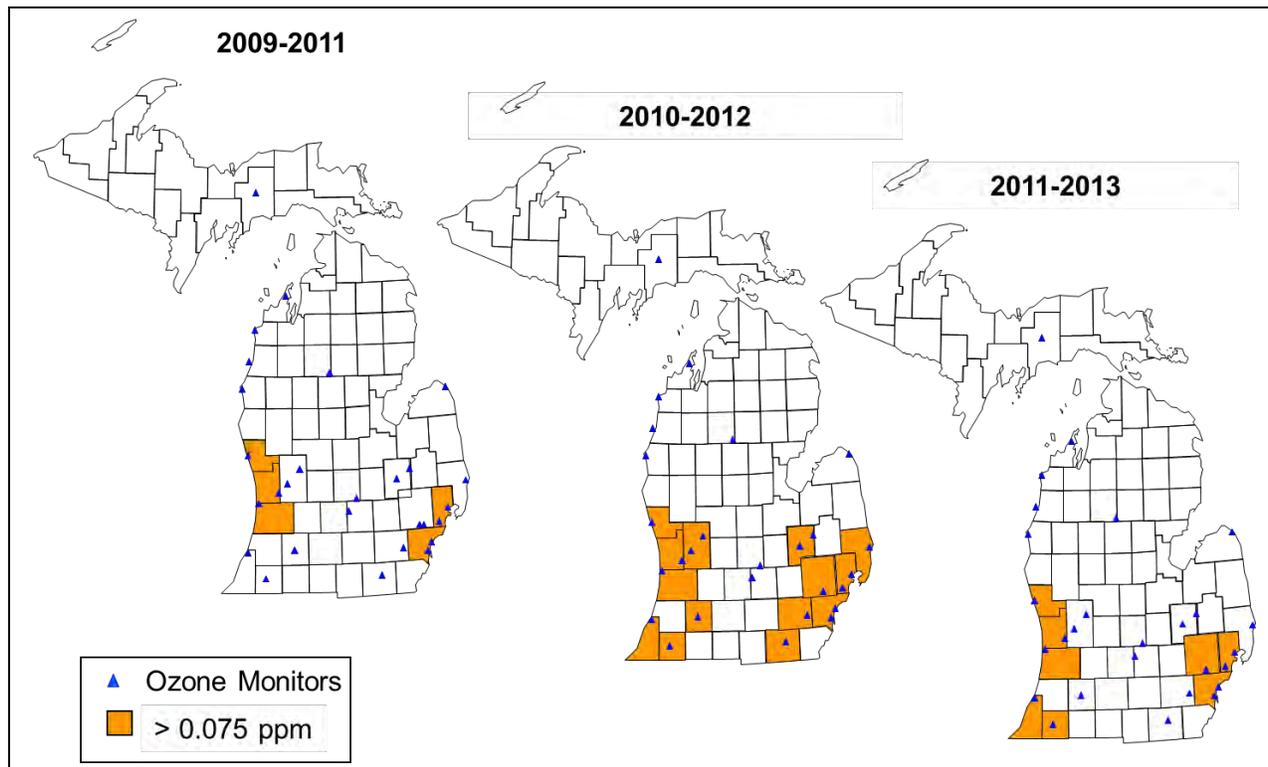
Decimals to the right of the third decimal place are truncated.

The 3-year O3 average at the MSA Design Value site is shown in bold.

Values for sites >= 85% NAAQS are in red.

CBSA	2010 Population	Counties	Existing Monitors	2011-2013 most recent 3-year O3 design value	Min No monitors Required
Detroit-Warren-Livonia Metro Area	4,296,250	Macomb	New Haven	0.077	3
			Warren	0.077	
		Oakland	Oak Park	0.076	
			Wayne	Allen Park	
		Lapeer	Detroit - E 7 Mile	0.077	
			---	---	
			St Clair	Port Huron	
Flint Metro Area	425,790	Genesee	Flint	0.074	2
			Otisville	0.074	
Monroe Metro Area	152,021	Monroe	---	---	---
Ann Arbor Metro Area	344,791	Washtenaw	Ypsilanti	0.075	1
			Grand Rapids - Monroe St	0.074	
Grand Rapids-Wyoming Metro Area	774,160	Kent	Evans	0.074	2
			---	---	
		Barry	Newaygo	---	
			Ionia	---	
Holland-Grand Haven Metro Area	263,801	Ottawa	Jenison	0.077	1
Muskegon-Norton Shores Metro Area	172,188	Muskegon	Muskegon - Green Creek Rd	0.081	1
Lansing-East Lansing Metro Area	464,036	Clinton	Rose Lake	0.071	2
			Ingham	Lansing	
		Eaton	---		
Bay City Metro Area	107,771	Bay	---	---	---
Saginaw-Saginaw Twp N Metro Area	200,169	Saginaw	---	---	---
Kalamazoo-Portage Metro Area	326,589	Kalamazoo	Kalamazoo	0.075	1
			Van Buren	---	
Niles-Benton Harbor Metro Area	156,813	Berrien	Coloma	0.082	1
Jackson Metro Area	160,248	Jackson	---	---	---
Battle Creek Metro Area	136,146	Calhoun	---	---	---
South Bend Mishawaka Metro Area IN/MI	52,293	Cass	Cassopolis	0.078	1
<b>Other areas:</b>	<u>Comments</u>				
	<i>transport site</i>	Lenawee	Tecumseh	0.075	
		Benzie	Frankfort	0.074	
		Huron	Harbor Beach	0.072	
		Allegan	Holland	0.086	
	<i>background site</i>	Missaukee	Houghton lake	0.070	
		Mason	Scottville	0.075	
		Schoolcraft	Seney	0.072	
	<i>tribal site</i>	Manistee	Manistee	0.074	
		Chippewa	Sault Ste. Marie	0.067	

**FIGURE 4: COMPARISON OF 4<sup>TH</sup> HIGHEST 8-HOUR OZONE VALUES AVERAGED OVER THREE YEARS 2009-2011, 2010-2012 AND 2011-2013**



In Southeast Michigan, New Haven (260990009) has been the design value site for many years, measuring maximum ozone concentrations downwind from Detroit. However, in 2009, the Detroit-E 7 Mile (261630019) location became the new design value site for the Detroit- Warren-Livonia MSA. The 2011-2013 data shows Detroit-E 7 Mile to be the design value site, however Warren (260991003) and New Haven have equal three year averages. The location of the maximum ozone concentration has moved about 19 miles closer to the urban center city area, possibly due to changes in the amount, type and location of ozone precursor emissions. Both the New Haven (260990009) and Detroit-E 7 Mile (261630019) sites are now violating the 0.075 ppm 8-hour ozone NAAQS. Allen Park (261630001) is upwind of the central business district and is an NCore site for the Detroit-Warren-Livonia MSA. As such, the MDEQ is required to measure ozone over the entire year at the Allen Park (261630001) site, instead of only during the April through September ozone season in Michigan. Although three ozone sites have been identified for the Detroit-Warren-Livonia MSA, EPA Regional staff have indicated that Warren (260991003) may be becoming the new design value site for that area, which is also violating the 0.075 ppm 8-hour ozone NAAQS. The Oak Park (261250001) and Port Huron (261470005) monitors are the only ozone sites in Oakland and St. Clair Counties, respectively, while Oak Park is violating the 0.075 ppm 8-hour ozone NAAQS and Port Huron is not.

Two monitors are required in the Ann Arbor MSA and consist of the Ypsilanti monitor (261610008) and the downwind monitor in Oak Park (261250001), only Oak Park is violating the 0.075 ppm 8-hour ozone NAAQS. The urban center city location coupled with a downwind maximum concentration site is a carry-over from the defunct NAMS network. There is not sufficient space in Washtenaw County to site a downwind monitor to measure maximum ozone concentrations, so Oakland County houses the downwind site although it is outside of the boundary of the Ann Arbor MSA. The upwind/downwind configuration will be retained wherever possible to preserve historical trend data.

## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

Two monitors are required in the Flint MSA and consist of the urban center city site in Flint (260490021) and the downwind site at Otisville (260492001).

Two ozone monitors are also required in the Grand Rapids-Wyoming MSA and consist of the urban center city site in Grand Rapids on Monroe St. (260810020) and the downwind site at Evans (260810022).

Two monitors are required in the Lansing-East Lansing MSA and consist of the urban center city site in Lansing (260650012) and the downwind Rose Lake (260370001) location.

A single ozone monitor is required in the MSAs of Holland-Grand Haven, Muskegon-Norton Shores, Kalamazoo-Portage, Niles-Benton Harbor, and South Bend-Mishawaka. The Jenison (261390005), Muskegon-Green Creek Rd. (261210039), Kalamazoo (260770008), Coloma (260210014) and Cassopolis (260270003) monitors fulfill these requirements, respectively. All of these monitors, except Kalamazoo (260770088), are violating the 0.075 ppm 8-hour ozone NAAQS.

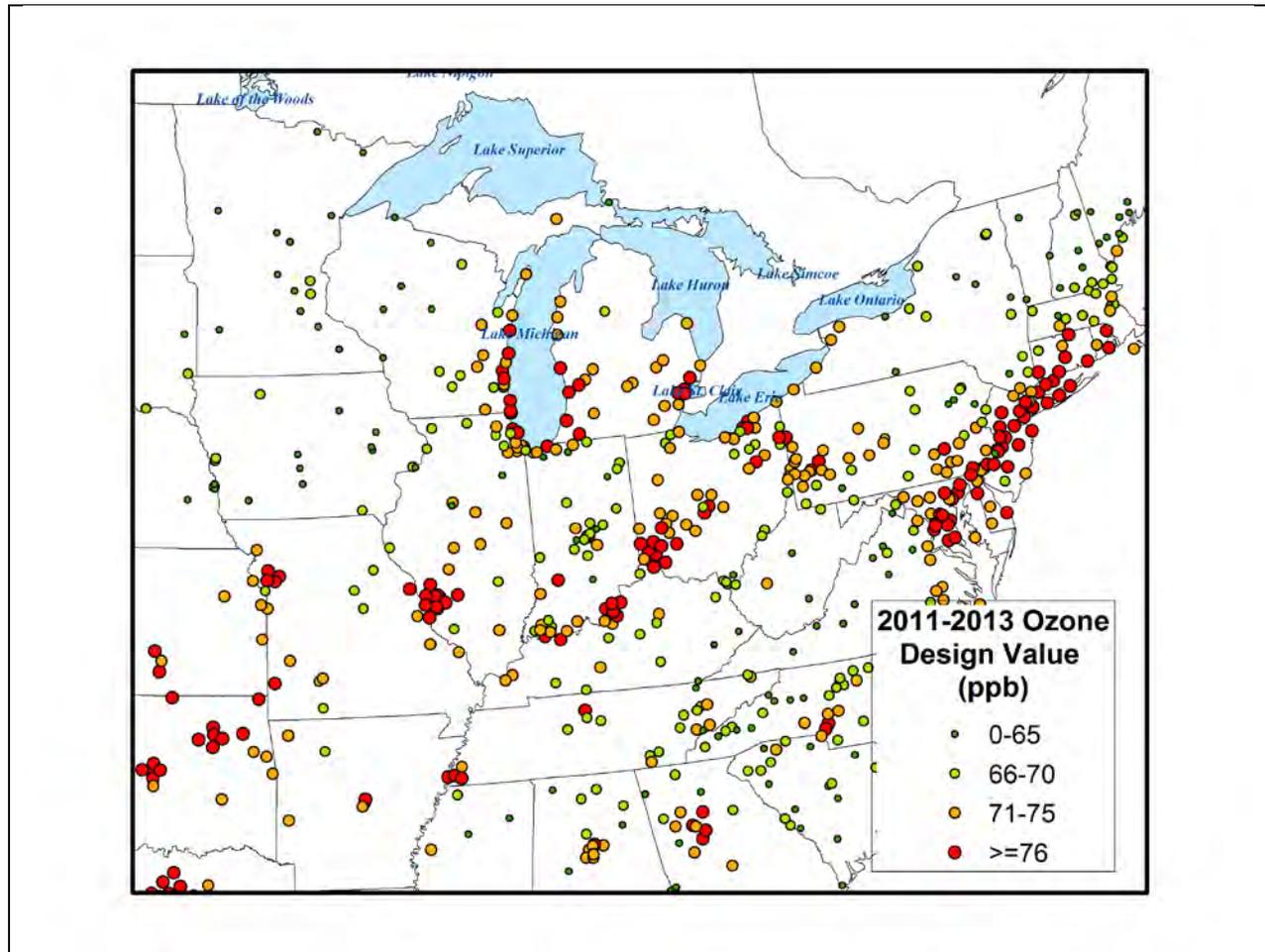
The ozone monitor in Holland (260050003) is in Allegan County and now violating the 0.075 ppm 8-hour ozone NAAQS. This site continually measures the highest ozone values in the state and had historically been the highest in the region.

The Lake Michigan Air Directors Consortium (LADCO) created the map shown in **Figure 5** comparing ozone concentrations across the region.

Tecumseh (260910007) measures ozone transport into southeast Michigan and is required by Michigan's maintenance plan. Harbor Beach (260630007) measures transport out of southeast Michigan under southwesterly winds. Scottville (261050007) and Benzonia (260190003) are sited to measure transport of ozone along Lake Michigan and have been in operation for eight and 14 years, respectively. These two sites are also an important part of Michigan's maintenance plan. Houghton Lake (261130001) and Seney (261530001) measure background ozone levels in the Lower and Upper Peninsulas, respectively.

To the best of our knowledge, the tribal ozone sites in Manistee (261010922) and in Sault Ste Marie (260330901) will continue to operate.

**FIGURE 5: OZONE DESIGN VALUES 2011 – 2013<sup>10</sup>**



**Table 12** summarizes the ozone monitoring site information for sites that were in existence in 2014 and are planned to be operational in 2015. **Figure 6** illustrates the geographical distribution of this network.

<sup>10</sup> Map provided by D. Kenski, Lake Michigan Air Directors Consortium

# MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

## TABLE 12: MICHIGAN'S OZONE MONITORING NETWORK

Operating Schedule Hourly, April 1 to September 30; *NCore operate hourly all year*  
 Houghton Lake and Lansing operate hourly all year  
 Method: Ultra Violet Absorption Continuous Monitor

Former NAMS sites are shown in bold.

### SLAMS Stations

Monitoring Sites				<i>NCore sites are shown in italics</i>							Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Rose Lake	260370001	8562 E Stoll Rd	42.7983	-84.39389	max conc	urban	Clinton	6/7/79	LEL	464,036	
Flint	260490021	Whaley Park, 3610 Iowa	43.0472	-83.67028	pop exp	nghbrhd	Genesee	6/16/92	F	425,790	
Otisville	260492001	G11107 Washburn Rd	43.1683	-83.46167	max conc	urban	Genesee	5/13/80	F	425,790	
Lansing	260650012	220 N Pennsylvania	42.7386	-84.53472	pop exp	nghbrhd	Ingham	9/5/80	LEL	464,036	
<i>GR - Monroe St</i>	<i>260810020</i>	<i>1179 Monroe NW</i>	<i>42.9842</i>	<i>-85.6714</i>	<i>pop exp</i>	<i>nghbrhd</i>	<i>Kent</i>	<i>4/24/80</i>	<i>GW</i>	<i>774,160</i>	
Warren	260991003	29900 Hoover	42.5133	-83.00611	max conc	urban	Macomb	1/1/77	DWL	4,296,250	
Holland	260050003	966 W 32 <sup>nd</sup> St	42.7678	-86.14861	max conc	regional	Allegan	8/25/92	A	111,408	
Frankfort / Benzonia	260190003	West St., Benzonia Tw p.	44.61694	-86.10944	max conc	regional	Benzie	7/28/92	Not in CBSA	N/A	
Coloma	260210014	Paw Paw WWTP, 4689 Defield Rd., Coloma	42.1978	-86.30972	max conc	regional	Berrien	8/3/92	NBH	156,813	
Cassopolis	260270003	Ross Beatty High School, 22721 Diamond	41.8956	-86.00167	pop exp	urban	Cass	5/16/91	SBM	52,293	
Harbor Beach	260630007	1172 S. M.25, Sand Beach Tw p.	43.8364	-82.64306	backgrd	regional	Huron	4/1/94	Not in CBSA	N/A	
Kalamazoo	260770008	Fairgrounds, 2500 Lake St	42.2781	-85.54194	pop exp	nghbrhd	Kalamazoo	6/1/92	KP	326,589	
Evans	260810022	10300 14 Mile Road, NE	43.1767	-85.41667	max conc	urban	Kent	4/1/99	GW	774,160	
Tecumseh	260910007	6792 Raisin Center Highway	41.9956	-83.94667	up wind backgrd	regional	Lenawee	7/6/93	Not in CBSA	N/A	
New Haven	260990009	57700 Gratiott	42.7314	-82.79361	max conc	urban	Macomb	7/14/80	DWL	4,296,250	
Houghton Lake	261130001	1769 S Jeffs Road	44.3106	-84.89194	background	regional	Missaukee	4/1/98	Not in CBSA	N/A	
Scottville	261050007	525 W US 10	43.9533	-86.29444	max conc	regional	Mason	4/1/98	Not in CBSA	N/A	
Muskegon - Green Ck	261210039	1340 Green Creek Road	43.2781	-86.31111	pop exp	regional	Muskegon	5/1/91	MNS	172,188	
Oak Park	261250001	13701 Oak Park Blvd.	42.4631	-83.18333	pop exp	urban	Oakland	1/9/81	DWL	4,296,250	
Jenison	261390005	6981 28Th Ave. Georgetown Tw p.	42.8944	-85.85278	pop exp	regional	Ottawa	4/1/89	HGH	263,801	
Port Huron	261470005	2525 Dove Rd	42.9533	-82.45639	pop exp	regional	Saint Clair	2/28/81	DWL	4,296,250	
Seney	261530001	Seney Wildlife Refuge, HCR 2 Box 1	46.2889	-85.95027	bkgd	regional	Schoolcraft	1/15/02	Not in CBSA	N/A	
Ypsilanti	261610008	555 Tower Ave	42.2406	-83.59972	pop exp	nghbrhd	Washtenaw	4/1/00	AA	344,791	
Allen Park	261630001	14700 Goddard	42.2286	-83.2083	pop exp	nghbrhd	Wayne	1/1/80	DWL	4,296,250	
Detroit - E 7 Mile	261630019	11600 East Seven Mile Road	42.4308	-83.00028	max conc	nghbrhd	Wayne	4/11/77	DWL	4,296,250	

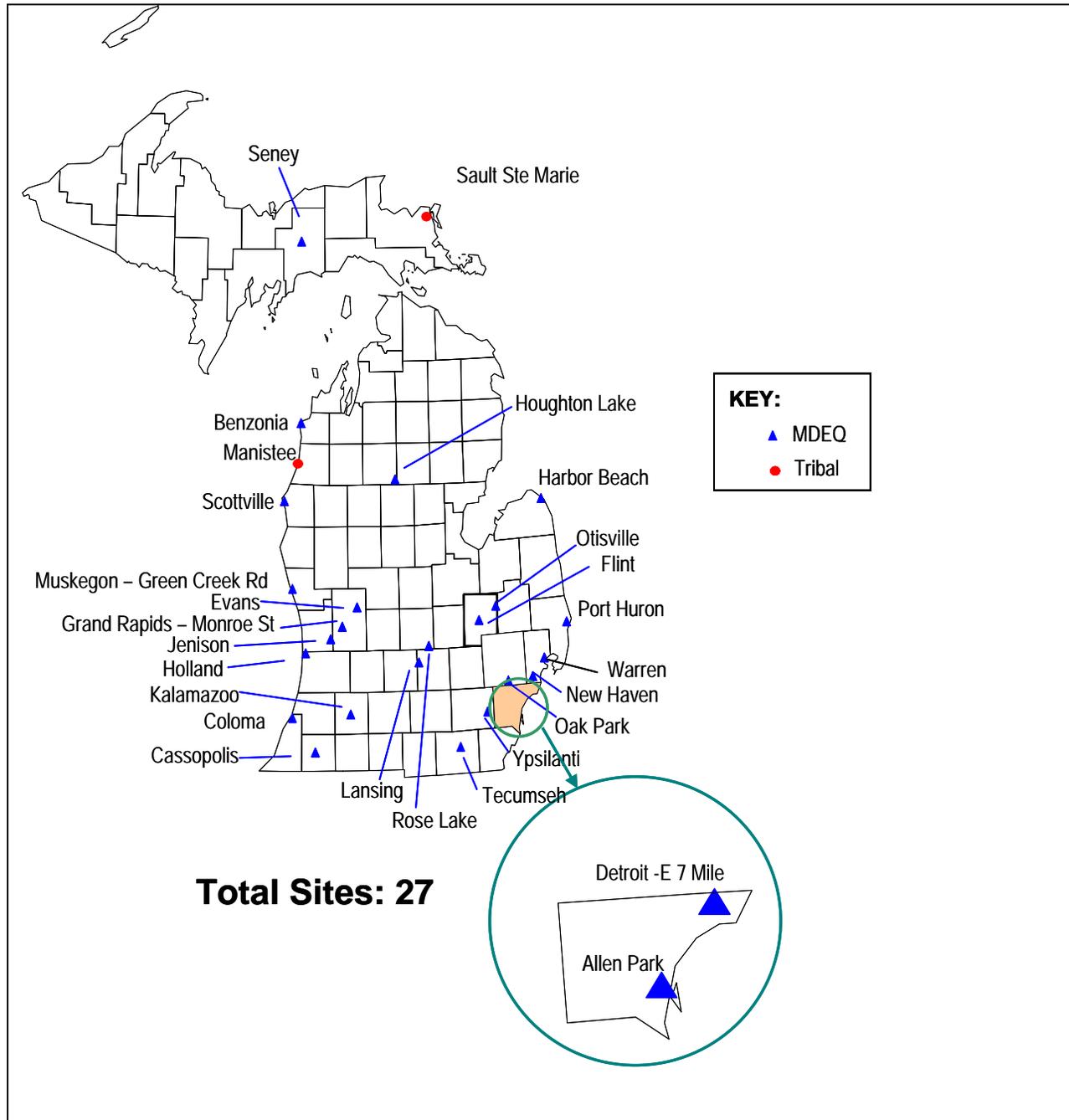
### Tribal Stations

Monitoring Sites											Pop (2010 Census)
Site Name	AIRS Site ID	Address	Latitude	Longitude	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Manistee	261010922	3031 Dornres Rd	44.307	-86.24268	transport	regional	Manistee	4/1/06	Not in CBSA	N/A	
Sault Ste. Marie	260330901	650 W Easterday Ave	46.4936	-84.3641	transport	regional	Chippewa	1/1/12	Not in CBSA	N/A	

#### <sup>1</sup> CBSA Key:

- A = Allegan Micropolitan Area
- AA = Ann Arbor Metro. Area
- DWL= Detroit-Warren-Livonia Metro. Area
- F = Flint Metro Area
- GW=Grand Rapids-Wyoming Metro. Area
- HGH = Holland-Grand Haven Metro. Area
- KP= Kalamazoo-Portage Metro. Area
- LEL= Lansing-E. Lansing Metro. Area
- MNS = Muskegon-Norton Shores Metro. Area
- NBH = Niles-Benton Harbor Metro. Area
- SBM= South Bend-Mishawaka Metro. Area (IN/MI)

**FIGURE 6: MICHIGAN'S OZONE NETWORK**



## **Ozone Season & Modeling**

With the enactment of the 0.075 ppm 8-hour primary NAAQS, the length of the ozone season was modified in some areas. While there were no changes to Michigan's ozone season, which extends from April 1 through September 30, if the EPA promulgates a more stringent ozone standard, the length of Michigan's ozone season may have to be re-evaluated.

With the new 1-hour NO<sub>2</sub> NAAQS, modeling conducted as part of the permitting process for new source review (NSR) has indicated that many facilities in Michigan could violate the standard. More refined modeling is an option using the Ozone Limiting Method or Plume Volume Molar Ratio Method (PVMRM), but more site-specific 1-hour NO<sub>2</sub> background levels as well as year around ozone values are necessary. Specifically, modeling staff need five years of both ozone and NO<sub>2</sub> data collected in small cities, urban and rural areas. While Allen Park (2616309001) and Grand Rapids–Monroe St. (260810020) generate ozone values in urban areas throughout the year, levels in smaller cities and rural areas was not available. Therefore, beginning October 1, 2010, the MDEQ began to monitor for ozone throughout the year at the Lansing (260650012) and Houghton Lake (261130001) stations. The collection of additional NO<sub>2</sub> data to support NSR modeling is discussed in the NO<sub>2</sub> section.

## **Ozone Quality Assurance**

Site operators conduct precision checks on the monitors every two weeks. The results of the precision checks are sent to the QA Coordinator for review each quarter. Each ozone monitor is also audited annually by the AMU's QA Team. The audit utilizes a dedicated ozone photometer to assess the accuracy of the station monitor. The auditor also assesses the monitoring system (inspecting the sample line, filters, and the inlet probe), siting, and documentation of precision checks. The results of the ozone audits and precision checks indicate whether the monitor is meeting the measurement quality objectives. The AMU uploads the results of the precision checks and audits to the EPA's AQS database each quarter. The QA Coordinator reviews all audits and hard copies are retained in the QA files.

The EPA conducts thru-the-probe audits of 20% of the MDEQ's ozone monitors each year. The audit consists of delivering four levels of ozone to the station monitor through the probe. The percent difference that is measured by the auditor's monitor is compared to the station monitor. The auditor also assesses station and monitoring siting criteria. The EPA auditor provides the AMU with a copy of the audit results and uploads the audit data to AQS.

## **Plans for the 2015 Ozone Monitoring Network**

Beginning October 1, 2009, the MDEQ began collecting ozone measurements all year at the NCore sites and plans to continue through 2015:

- Grand Rapids–Monroe St. (260810020)
- Allen Park (261630001).

To support NSR modeling projects, the MDEQ will continue to collect ozone measurements all year through 2015:

- Lansing (260650012)
- Houghton Lake (261130001) (special purpose monitor)

The current ozone network meets the minimum design specifications in 40 CFR Part 58. No ozone site reductions are planned at this time. The following monitors are planned to be retained as part of the 2015 ozone network; operating April 1 through September 30:

- Holland (260050003)
- Frankfort/Benzonia (260190003)
- Coloma (260210014)
- Cassopolis (260270003)
- Rose Lake (260370001)
- Flint (260490021)
- Otisville (260492001)
- Harbor Beach (260630007) (downwind monitor)
- Kalamazoo (260770008)
- Evans (260810022)
- Tecumseh (260910007) (background monitor)
- New Haven (260990009)
- Warren (260991003)
- Scottville (261050007)
- Muskegon–Green Creek Rd. (261210039)
- Oak Park (261250001)
- Jenison (261390005)
- Port Huron (261470005)
- Seney (261530001)
- Ypsilanti (261610008)
- Detroit-E 7 Mile (261630019)

To the best of our knowledge, these tribal monitors will also continue to operate in 2015:

- Manistee (261050922) (tribal monitor)
- Sault Ste. Marie (260330901) (tribal monitor)

**PM<sub>2.5</sub> FRM Monitoring Network:**

The January 15, 2013 revision to the PM NAAQS lowered the PM<sub>2.5</sub> annual average from 15.0 µg/m<sup>3</sup> to 12.0 µg/m<sup>3</sup>. All sites in Michigan are currently meeting this standard.

The October 17, 2006 changes to the monitoring regulations impacted the minimum number of PM<sub>2.5</sub> sites in an MSA as shown in **Table 13**.<sup>11</sup> In addition to these minimum requirements, background and transport monitors are required.

Although speciation monitoring is required, details specifying the exact number of sites and their sampling frequency were not stated in the October 17, 2006 regulations. However, the continued operation of the speciation trends site Allen Park (261630001) on a once every three day sampling schedule is required.

The regulations also allow states to discontinue FRM monitors if they can operate continuous samplers in a way that qualifies them to be Approved Regional Method (ARM) or Federal Equivalent Method (FEM) samplers. Due to the high levels of nitrate and humidity in the Midwest, the continuous monitors used by the MDEQ (TEOMs), as well of many of the other monitors operated by the states in the Midwest show a bias. Therefore, the MDEQ will avoid deploying any continuous monitors that have ARM or FEM status until at least the EPA revises the PM<sub>2.5</sub> NAAQS

Michigan does not spatially average PM<sub>2.5</sub> values from multiple sites to determine attainment with the annual PM<sub>2.5</sub> NAAQS. Therefore, if a PM<sub>2.5</sub> monitor that is violating the NAAQS must be removed due to loss of access or funding, a replacement site need not be found, if the annual and/or 24-hour design value site(s) in that MSA are still operational. The attainment status of the area is dependent upon the design value sites.

**TABLE 13: PM<sub>2.5</sub> MINIMUM MONITORING REQUIREMENTS**

<b>MSA POPULATION<sup>1,2</sup></b>	<b>MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS ≥ 85% OF ANY PM<sub>2.5</sub> NAAQS<sup>3</sup></b>	<b>MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS &lt; 85% OF ANY PM<sub>2.5</sub> NAAQS<sup>3,4</sup></b>
> 1,000,000	3	2
500,000 – < 1,000,000	2	1
50,000 - ≤ 500,000 <sup>5</sup>	1	0

<sup>1</sup> Minimum monitoring requirements apply to the MSA.

<sup>2</sup> Population based on the latest available census figures.

<sup>3</sup> The PM<sub>2.5</sub> NAAQS levels and forms are defined in 40 CFR Part 50.

<sup>4</sup> These minimum monitoring requirements apply in the absence of a design value.

<sup>5</sup> MSA must contain an urbanized area of 50,000 or more.

The regulations also state that any FRM monitors that are within ± 5% of the level of the 24-hour NAAQS must sample on a daily sampling frequency. The monitoring regulations also state that 50% of all required FRM sites must co-locate continuous PM<sub>2.5</sub> measurements.

Applying **Table 13** to Michigan's MSAs, population totals and most recent three-year design values results in **Table 14**. Design values that are shown in bold represent the controlling site in each MSA, which is also called the design value site.

<sup>11</sup> Table D-5 of Appendix D to Part 58.

# MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

**TABLE 14: APPLICATION OF THE MINIMUM PM<sub>2.5</sub> MONITORING REQUIREMENTS IN THE OCTOBER 17, 2006 FINAL REVISION TO THE MONITORING REGULATION TO MICHIGAN'S PM<sub>2.5</sub> FRM NETWORK**

*The annual avg & 24-hr avg are rounded to 1 and 0 decimal points respectively.*

MSA	2010 Population	Counties	Existing Monitors	annual	24-hr	5% of the 24-Hr NAAQS	Min No monitors Required	Comments
				85% of 12 ug/m3 10.2	85% of 35 ug /m3 30	33-37 = 5% NAAQS		
The 3-year PM <sub>2.5</sub> average at MSA Design Value site is shown in bold.								
				2011-2013	2011-2013			
				most recent 3- year PM <sub>2.5</sub> design value (annual)	most recent 3- year PM <sub>2.5</sub> design value (24- Hr)			
Detroit-Warren-Livonia Metro Area	4,296,250	Macomb Oakland Wayne	New Haven	8.5	22	3		
			Oak Park	9.0	23			
			Allen Park	10.0	24			daily
			Detroit-SW HS	<b>10.7</b>	24			
			Detroit - Linwood	9.6	23			
			Detroit - E 7 Mi	9.3	26			
			Livonia	9.3	22			
			Dearborn	<b>11.4</b>	<b>26</b>			
			Wyandotte	8.7	20			
			Detroit-FIA/Lafayette	10.0	24			daily- special study
		Lapeer	---					
		St Clair	Port Huron	9.0	22			
		Livingston	---					
Flint Metro Area	425,790	Genesee	Flint	<b>8.0</b>	<b>20</b>	<b>0</b>		
Monroe Metro Area	152,021	Monroe	Sterling State Park	not enough data to calculate		<b>0</b>		
Ann Arbor Metro Area	344,791	Washtenaw	Ypsilanti	<b>9.2</b>	<b>22</b>	<b>0</b>		
Grand Rapids-Wyoming Metro Area	774,160	Kent	GR - Monroe St	9.1	22	<b>1</b>		
			GR - Wealthy St	<b>9.4</b>	<b>24</b>			
			Barry	---				
			Newaygo	---				
		onia	---					
Holland-Grand Haven Metro Area	263,801	Ottawa	Jenison	<b>8.7</b>	<b>23</b>	<b>0</b>		
Muskegon-Norton Shores Metro Area	172,188	Muskegon	Muskegon - Apple St (closed)			<b>0</b>		
Lansing-East Lansing Metro Area	464,036	Clinton	---					
			Ingham	Lansing	<b>8.3</b>	<b>21</b>	<b>0</b>	
			Eaton	---				
Bay City Metro Area	107,771	Bay	Bay City	<b>7.6</b>	<b>20</b>	<b>0</b>		
Kalamazoo-Portage Metro Area	326,589	Kalamazoo	Kalamazoo	<b>8.9</b>	<b>22</b>	<b>0</b>		
			Van Buren	---				
Niles-Benton Harbor Metro Area	156,813	Berrien	Coloma	<b>8.5</b>	<b>20</b>	<b>0</b>		
Jackson Metro Area	160,248	Jackson	---					
Battle Creek Metro Area	136,146	Calhoun	---					
South Bend-Mshawaka Metro Area IN/MI	52,293	Cass	---					
<b>Other areas</b>								
		Allegan	Holland	8.3	22		<i>metropolitan area</i>	
		Missaukee	Houghton Lake	5.9	17			
		Manistee	Manistee	6.7	18			
		Tecumseh	Lenawee	8.8	22			
		Sault Ste. Marie	Chippewa	not enough data to calculate				

The reduced concentrations of PM<sub>2.5</sub> measured since 2010 have caused the 2011-2013 design values to drop markedly in many MSAs. The minimum number of monitoring sites in Monroe, Ann Arbor, Holland-Grand Haven, Muskegon-Norton Shores, Lansing-East Lansing, Bay City, Kalamazoo-Portage, Flint and Niles-Benton Harbor has fallen from one site to zero sites. Using the most recent data, only a single site is required in the Grand Rapids-Wyoming MSA, instead of two.

Only three PM<sub>2.5</sub> FRM monitors are required in the Detroit-Warren-Livonia MSA. Dearborn (261630033) has historically been the highest annual design value site. Allen Park (261630001)

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is the population-oriented trend site, and as such, is also required to collect speciated PM<sub>2.5</sub> samples on a once every three day schedule.

The Wyandotte site (261630036) has the lowest design values in Wayne County. The Linwood site (261630016) is also located in Wayne County between the Dearborn (261630033) and E7Mile (261630019) sites. The MDEQ will continue to operate these sites.

The Detroit-SWHS site (261630015) is the second highest site in the Detroit-Warren-Livonia MSA. Also, there are plans to make a second International crossing near this site. The MDEQ will continue to operate this site.

Detroit-FIA/Lafayette (261630039) was a special purpose monitors that have been located to measure impacts from diesel powered mobile sources and from the international border crossing at the Ambassador Bridge. The MDEQ will continue to operate this site.

The E7Mile site (261630019) is near the border of Wayne and Macomb counties. MDEQ will continue to operate this site.

The sites at New Haven (260990009) and Oak Park (261250001) are the only sites in Macomb and Oakland Counties, respectively. MDEQ will continue to operate these.

The Livonia site (261630025) is in western Wayne County and is near the new Livonia Near Road site that will be established this year. A second PM<sub>2.5</sub> monitor will be added to the Livonia Near Road site by January 1, 2015.

Through a cooperative grant project with EPA Region 5 and the EPA's Office of Research and Development (ORD), the MDEQ deployed a special purpose PM<sub>2.5</sub> FRM sampler to Tecumseh (260910007) in Lenawee County on April 1, 2008. Other special measurements that were added to the Tecumseh site include PM<sub>2.5</sub> speciation and continuous EC/OC. The MDEQ will continue to collect FRM measurements at Tecumseh as the upwind background site near the Detroit-Warren-Livonia MSA.

In the past, two monitors were required in the Grand Rapids-Wyoming MSA, the site at Monroe St. (260810020) and at Wealthy St. in Wyoming (260810007). Now that the design value has been reduced, only a single site is required in the Grand Rapids-Wyoming MSA. The Grand Rapids – Monroe St (260810020) is an NCore Site and is therefore, required to retain the PM<sub>2.5</sub> monitor. At this time, MDEQ will continue to operate both monitors.

Due to the reduction in fine particulate values, a monitor is no longer required in the Monroe MSA. The Sterling State Park Site (261150006) is in Monroe County and the MDEQ will continue to operate it.

As shown in **Table 14**, using the most recent three years of data, the Flint (260490021) monitor has an annual and a 24-hour design value equaling 8.7 and 24 µg/m<sup>3</sup>, respectively. Both of these values are less than 85% of their respective NAAQS. Therefore, a PM<sub>2.5</sub> monitoring site is no longer required in the Flint MSA, but no changes are suggested at this time.

Fine particulate concentrations have dropped below 85% of the level of the NAAQS in the Ann Arbor MSA, so a monitor is no longer required. The Ypsilanti site (261610008) is located in a ZIP code with some of the highest incidences of asthma in Michigan. A co-located monitor is also located at this site to determine precision. No changes are suggested at this time.

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The annual and 24-hour PM<sub>2.5</sub> design values at the Lansing monitor (260650012) are no longer greater than 85% of the NAAQS, indicating that monitoring is no longer required. The MDEQ will continue to operate the monitor.

The Saginaw MSA is required to have a PM<sub>2.5</sub> FRM site. The EPA Regional Administrator granted a waiver allowing for the Bay City site (260170014) to fulfill this requirement. The 24-hour PM<sub>2.5</sub> design value of the monitor in Bay City is less than 85% of the NAAQS, indicating that monitoring is no longer required. The MDEQ will continue to operate the monitor.

The Kalamazoo monitor (260770008) fulfilled the requirement that the Kalamazoo-Portage MSA have one FRM sampler. Both the most recent 24-hour and annual design value at the Kalamazoo monitor are now less than 85% of the respective NAAQS, indicating that one site is no longer necessary in this MSA. However, the MDEQ will continue to operate the monitor.

Coloma (260210014) fulfilled the requirement for the Niles-Benton Harbor MSA. The 24-hour PM<sub>2.5</sub> design value at this site is no longer greater than 85% of the NAAQS, indicating that a monitor is no longer required, but the MDEQ will continue to operate the monitor.

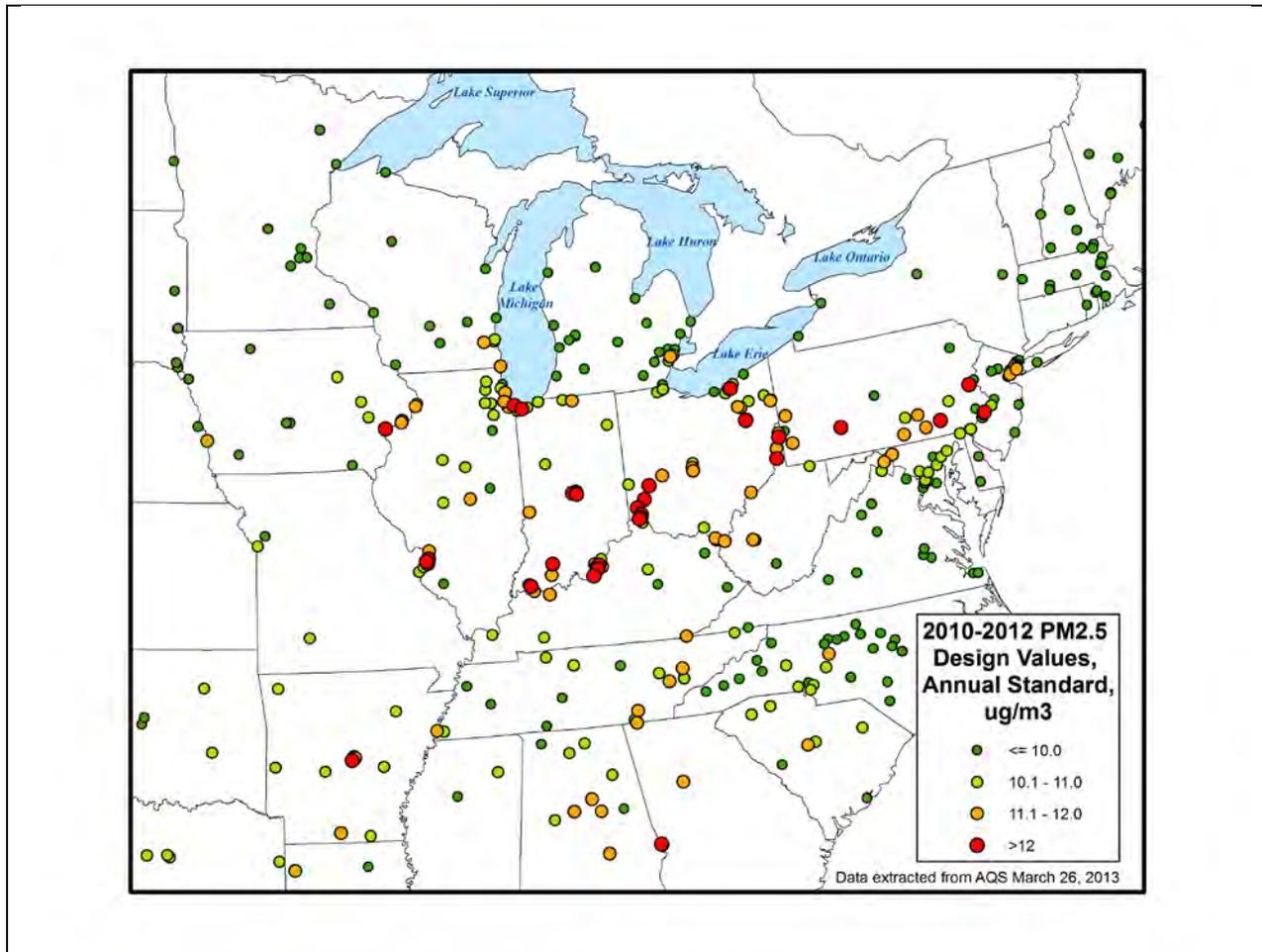
The PM<sub>2.5</sub> monitor in Holland (260050003) in Allegan County is a micropolitan area. The monitor's design value is no longer within 5% of the NAAQS. Now that concentrations have fallen, it may be possible to discontinue monitoring at Holland, but the MDEQ will continue to operate the monitor.

Houghton Lake (261130001) is the background PM<sub>2.5</sub> FRM site in Michigan.

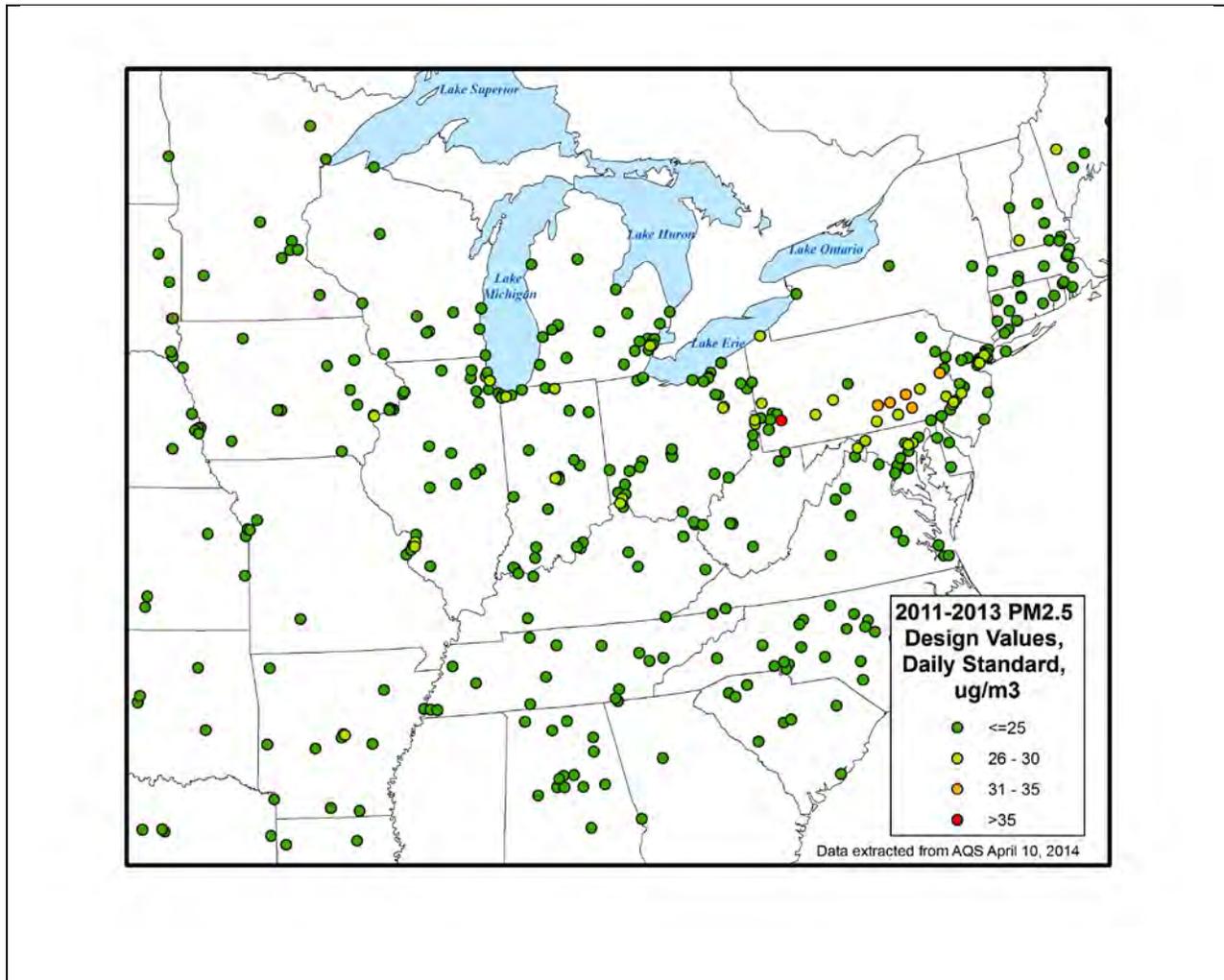
There are two tribal PM<sub>2.5</sub> monitoring sites located in Michigan, one in Manistee (261010922) and a co-located pair in Sault Ste Marie (260330901).

The Lake Michigan Air Directors Consortium (LADCO) created the maps shown in **Figure 7 and Figure 8** comparing PM<sub>2.5</sub> concentrations across the region.

**Figure 7: 2011-2013 PM<sub>2.5</sub> Design Values, Annual**



**Figure 8: 2011-2012 PM<sub>2.5</sub> Design Values, Daily**



**Table 15** summarizes the PM<sub>2.5</sub> FRM monitoring site information for 2014 and 2015. **Figure 9** illustrate the geographical distribution of PM<sub>2.5</sub> FRM monitors for 2014 and 2015.

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**TABLE 15: PM<sub>2.5</sub> FRM NETWORK IN MICHIGAN**

Operating Schedule: Once every 6 days, once every 3 days or daily see below  
 Method: Partisol 2025 Rupprecht & Patashnick Samplers

**SLAMS Network**

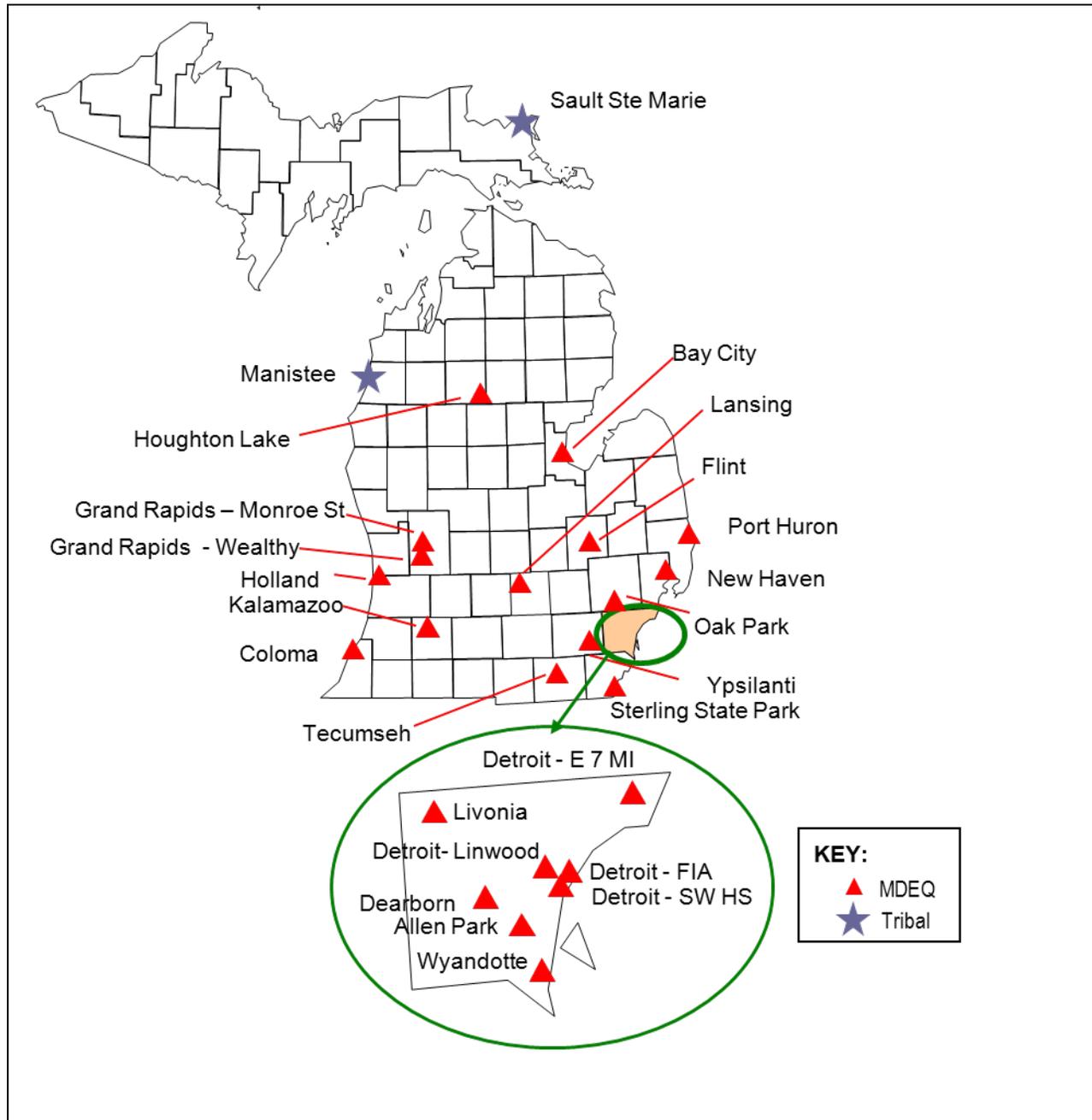
Monitoring Sites		Address	Latitude	Longitude	Sampling Frequency	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID										
Holland	260050003	966 W. 32 <sup>nd</sup> , Holland	42.768	-86.14861	1:3	Pop. Exp.	Neighborhood	Allegan	10/31/98	A	111,408
Bay City	260170014	1001 Jennison St	43.571	-83.89083	1:3	Pop. Exp.	Neighborhood	Bay	8/24/00	BC	107,771
Coloma	260210014	4689 Defield Rd., Paw Paw WWTP	42.198	-86.30972	1:3	Transport	Regional	Berrien	11/7/98	NB	156,813
Flint	260490021	Whaley Park, 3610 Iowa St., Flint	43.047	-83.67028	1:3	Pop. Exp.	Neighborhood	Genesee	12/16/98	F	425,790
Lansing	260650012	220 N. Pennsylvania Fairgrounds, 1400 Olmstead Rd	42.739	-84.53472	1:3	Pop. Exp.	Neighborhood	Ingham	11/7/98	LEL	464,036
Kalamazoo	260770008	1400 Olmstead Rd	42.278	-85.54194	1:3	Pop. Exp.	Neighborhood	Kalamazoo	11/19/98	KP	326,589
Grand Rapids-Wealthy St	260810007	507 Wealthy St	42.956	-85.67917	1:3	Pop. Exp.	Neighborhood	Kent	1/1/07	GW	774,160
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW,	42.984	-85.67139	1:3	Pop. Exp.	Neighborhood	Kent	10/23/98	GW	774,160
Tecumseh	260910007	6792 Raisin Center Highway	41.996	-83.94667	1:3	up wind backgrd	regional	Lenaw ee	7/6/93	Not in CBSA	NA
New Haven	260990009	57700 Graftott	42.731	-82.79361	1:3	Pop. Exp. Max. Conc.	Neighborhood	Macomb	12/22/98	DWL	4,296,250
Houghton Lake	261130001	1769 S Jeffs Rd	44.311	-84.89194	1:3	Background	Regional	Missaukee	2/8/03	Not in CBSA	NA
Sterling State Park	261150006	2800 Sate Park Rd.	41.924	-83.34586	1:3	Transport	Regional	Monroe		M	152,021
Oak Park	261250001	13701 Oak Park Blvd.	42.463	-83.18333	1:3	Pop. Exp.	Urban	Oakland	12/25/98	DWL	4,296,250
Port Huron	261470005	2525 Dove Rd.	42.953	-82.45639	1:3	Pop. Exp.	Regional	Saint Clair	2/11/99	DWL	4,296,250
Ypsilanti	261610008	555 Tow ner Ave	42.241	-83.59972	1:3	Pop. Exp.	Neighborhood	Washtenaw	8/4/99	AA	344,791
Allen Park	261630001	14700 Goddard	42.229	-83.20833	1:1	Pop. Exp.	Neighborhood	Wayne	5/12/99	DWL	4,296,250
Detroit - SW HS	261630015	SW Highschool, 150 Waterman	42.303	-83.10667	1:3	Pop. Exp. Max. Conc.	Neighborhood	Wayne	2/26/99	DWL	4,296,250
Detroit - Linwood	261630016	2451 Marquette, McMichael School	42.358	-83.09617	1:3	Pop. Exp.	Neighborhood	Wayne	5/12/99	DWL	4,296,250
Detroit - E 7 Mile	261630019	11600 E. 7 Mile, Osborne School	42.431	-83.00028	1:3	Pop. Exp.	Neighborhood	Wayne	4/30/00	DWL	4,296,250
Livonia	261630025	38707 Seven Mile Rd	42.423	-83.42639	1:3	Pop. Exp.	Neighborhood	Wayne	8/21/99	DWL	4,296,250
Dearborn	261630033	2842 Wyoming, Salina School	42.307	-83.14889	1:3	Pop. Exp. Max. Conc.	Neighborhood	Wayne	2/5/99	DWL	4,296,250
Wyandotte	261630036	3625 Biddle, Wyandotte	42.187	-83.15404	1:3	Pop. Exp.	Neighborhood	Wayne	2/20/99	DWL	4,296,250
Detroit - FIA/Lafayette St	261630039	2000 W Lafayette	42.323	-83.06861	1:1	Source Oriented	Neighborhood	Wayne	8/26/05	DWL	4,296,250

**Special Purpose and Tribal PM<sub>2.5</sub> Monitors in Michigan**

Monitoring Sites		Address	Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID											
Sault Ste Marie	260330901	650 W Easterday Ave	46.492	-84.36513	1:3	Tribal	Tribal	Regional	Chippewa	1/1/11	Not in CBSA	N/A
Manistee	261010922	3031 Domres Rd	44.307	-86.24268	1:3	Tribal	Tribal	Regional	Manistee	4/2/06	Not in CBSA	N/A

<sup>1</sup> CBSA Key: A = Allegan Micropolitan Area  
 AA = Ann Arbor Metro. Area  
 DWL= Detroit-Warren-Livonia Metro. Area  
 F = Flint Metro Area  
 GW=Grand Rapids-Wyoming Metro. Area  
 HGH = Holland-Grand Haven Metro. Area  
 KP= Kalamazoo-Portage Metro. Area  
 LEL= Lansing-E. Lansing Metro. Area  
 M = Monroe Metro. Area  
 MNS = Muskegon-Norton Shores Metro. Area  
 NBH = Niles-Benton Harbor Metro. Area  
 SBM= South Bend-Mishawaka Metro. Area (IN/MI)

**Figure 9: Michigan's PM<sub>2.5</sub> FRM Monitoring Network**



## **PM<sub>2.5</sub> Quality Assurance**

The PM<sub>2.5</sub> program has a fully approved Quality Assurance Project Plan (QAPP). The MDEQ operates four co-located PM<sub>2.5</sub> FRM samplers, meeting the precision monitoring requirement of 15%. The sampling frequency of the precision samplers at Grand Rapids–Monroe St. (260810020), Kalamazoo (260770008), Ypsilanti (261610008), and Dearborn (261630033) is once every six days. In addition, a tribal co-located FRM is operated in Sault Ste Marie (260330901).

The MDEQ's station operators conduct flow checks every four-weeks to ensure the flow rate is meeting the measurement quality objectives. The results from these flow checks are submitted to the PM<sub>2.5</sub> auditor each month for review. Every six months, each PM<sub>2.5</sub> sampler is audited by a member of the AMU's QA Team. The auditor has a separate line of supervision from the site operator and uses dedicated equipment for audits. The audit assesses the accuracy of the flow, as well as the monitor sampling and siting criteria. Every flow audit is reviewed by the QA Coordinator, copies are retained in the QA files, and the audits are uploaded to the EPA's AQS database. The AMU's auditor also performs a systems audit for each sampler. The systems audit evaluates the siting criteria, condition of the sampling site/station, and other parameters. Copies of the systems audit forms are reviewed by the QA Coordinator and are retained in the QA central files.

The MDEQ participates in the EPA's Performance Evaluation Program (PEP) audits at eight sites each year. The EPA auditor sets up a PM<sub>2.5</sub> monitor to run side-by-side with the station PM<sub>2.5</sub> sampler on a run day. The filter from the PEP audit is sent to an independent laboratory for analysis. Once the MDEQ filter weight is entered into the EPA's AQS database, the audit filter weight is entered by the EPA whereby the concentrations are compared between the PEP audit filter and the station filter. The EPA auditor also assesses the station and monitor siting criteria to evaluate adequacy of the location, including distances from trees, exhaust vents, and large buildings. Probe heights and separation distances are also assessed.

## **Plans for the 2015 PM<sub>2.5</sub> FRM Monitoring Network**

The following PM<sub>2.5</sub> monitors will be retained as part of the 2015 network:

- The one in three day PM<sub>2.5</sub> FRM monitor in Holland (260050003)
- The one in three day PM<sub>2.5</sub> FRM monitor in Bay City (260170014)
- The one in three day PM<sub>2.5</sub> FRM monitor in Coloma (260210014) transport
- The one in three day PM<sub>2.5</sub> FRM monitor in Flint (260490021)
- The one in three day PM<sub>2.5</sub> FRM monitor in Lansing (260650012)
- The one in three day PM<sub>2.5</sub> FRM monitor in Kalamazoo (260770008)
- The one in three day PM<sub>2.5</sub> FRM monitor in Grand Rapids - Wealthy (260810007)
- The one in three day PM<sub>2.5</sub> FRM monitor in Grand Rapids - Monroe St. (260810020)
- The one in three day PM<sub>2.5</sub> FRM monitor in Tecumseh (260910007)
- The one in three day PM<sub>2.5</sub> FRM monitor in New Haven (260990009)
- The one in three day PM<sub>2.5</sub> FRM monitor in Houghton Lake (261130001) background
- The one in three day PM<sub>2.5</sub> FRM monitor in Sterling State Park (261150006)
- The one in three day PM<sub>2.5</sub> FRM monitor in Oak Park (261250001)
- The one in three day PM<sub>2.5</sub> FRM monitor in Port Huron (261470005)
- The one in three day PM<sub>2.5</sub> FRM monitor in Ypsilanti (261610008)
- The daily PM<sub>2.5</sub> FRM monitor in Allen Park (261630001)
- The one in three day PM<sub>2.5</sub> FRM monitor at Detroit-SWHS (261630015)
- The one in three day PM<sub>2.5</sub> FRM monitor at Detroit- Linwood (261630016)
- The one in three day PM<sub>2.5</sub> FRM monitor at Detroit-E 7 Mile (261630019)
- The one in three day PM<sub>2.5</sub> FRM monitor in Livonia (261630025)
- The one in three day PM<sub>2.5</sub> FRM monitor in Dearborn (261630033)
- The one in three day PM<sub>2.5</sub> FRM monitor in Wyandotte (261630036)
- The daily PM<sub>2.5</sub> FRM monitor in Detroit – FIA (261630039)

The following precision monitors will continue operation contingent upon adequate funding:

- The one in six day PM<sub>2.5</sub> FRM monitor in Kalamazoo (260770008).
- The one in six day PM<sub>2.5</sub> FRM monitor at Grand Rapids-Monroe St. (260810020).
- The one in six day PM<sub>2.5</sub> FRM monitor in Ypsilanti (261610008).
- The one in six day PM<sub>2.5</sub> FRM monitor in Dearborn (261630033).

To the best of our knowledge, the following tribal FRM monitors will continue operation:

- A one in three day PM<sub>2.5</sub> FRM tribal monitoring site in Manistee (261010922), contingent upon the Little River Band of Ottawa Indians' plans for 2015.
- A one in three day PM<sub>2.5</sub> FRM tribal monitoring site in Sault Ste. Marie (260330901), and a co-located one in six day precision monitor, contingent upon the Inter-Tribal Council's plans for 2015.

By January 1, 2015, the MDEQ will have established the Livonia Near Road site and a one in three day PM<sub>2.5</sub> FRM monitor will be placed there.

### **Continuous PM<sub>2.5</sub> Monitoring Network:**

According to the October 17, 2006 changes to the monitoring regulations, 50% of the minimum number of required FRM sites must be co-located with a continuous PM<sub>2.5</sub> monitor. The 13 continuous monitors operational in the state exceed the minimum number that are required.

In 2014, the MDEQ operated Rupprecht & Patashnick TEOM samplers to supply continuous fine particulate data at 14 monitoring sites, as shown in **Table 16**. The MDEQ currently is meeting the minimum 50% co-location requirement. **Figure 10** illustrates the geographical distribution of the continuous monitoring network. In the event that another TEOM needs repair, the unit at the Detroit-FIA/Lafayette site will be deployed to the site lacking a functional TEOM. Therefore, incomplete data may be generated at the Detroit-FIA/Lafayette (261630039) site due to repair issues. The MDEQ continues field testing a MetOne Beta Attenuation Monitor (BAM) at Detroit-FIA/Lafayette (261630039) to assess data comparability between the BAM, the TEOM and the FRM. The FRM at Detroit-FIA/Lafayette is operating on a daily basis.

Michigan's NCore stations are required to operate continuous PM<sub>2.5</sub> samplers. Both Grand Rapids–Monroe St. (260810020) and Allen Park (261630001) currently have PM<sub>2.5</sub> TEOMs, meeting the requirement for continuous PM<sub>2.5</sub> measurements.

The MetOne BAM operated by the Inter-Tribal Council, Sault Ste. Marie (2960330901) is currently operated in a non-regulatory mode and as such should not be used to compare to the NAAQS.

The MDEQ operates the TEOMs from April through September with an inlet temperature of 50°C. Once the ozone season is over, starting October 1, the MDEQ reduces the inlet temperature to 30°C in the winter months to minimize loss of nitrates. Operating the TEOMs in this way maximizes comparability with the FRMs. The PM<sub>2.5</sub> TEOM sites operate to support AIRNOW real time data reporting and to provide adequate spatial coverage. This will continue as long as adequate levels of funding are received.

TABLE 16: MICHIGAN'S CONTINUOUS PM<sub>2.5</sub> MONITORING NETWORK

Operating Schedule: continuous

Method: Rupprecht & Patashnick Tapered Element Oscilating Microbalance (TEOMS) Samplers

Monitoring Sites											
Site Name	AQS Site ID	Address	Latitude	Longitude	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)	
Bay City	260170014	1001 Jennison St	43.571	-83.89083	Pop. Exp.	Neighborhood	Bay	11/19/05	BC	107,771	
Flint	260490021	Whaley Park, 3610 Iowa St., Flint	43.047	-83.67028	Pop. Exp.	Neighborhood	Genesee	5/23/02	F	425,790	
Lansing	260650012	220 N. Pennsylvania	42.739	-84.53472	Pop. Exp.	Neighborhood	Ingham	12/1/99	LEL	464,036	
Kalamazoo	260770008	Fairgrounds, 1400 Olmstead Rd	42.278	-85.54194	Pop. Exp.	Neighborhood	Kalamazoo	8/17/00	KP	326,589	
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW,	42.984	-85.67139	Pop. Exp.	Neighborhood	Kent	11/4/99	GW	774,160	
Tecumseh	260910007	6792 Raisin Center Highway	41.996	-83.94667	up wind backgrd	regional	Lenaw ee	6/1/09	Not in CBSA	N/A	
Houghton Lake	261130001	1769 S Jeffs Rd	44.311	-84.89194	Background	Regional	Missaukee	10/9/03	Not in CBSA	N/A	
Port Huron	261470005	2525 Dove Rd.	42.953	-82.45639	Pop. Exp.	Regional	Saint Clair	9/18/03	DWL	4,296,250	
Seney	261530001	Seney Wildlife Refuge, HCR 2 Box 1	46.289	-85.95027	Background	Regional	Schoolcraft	1/1/02	Not in CBSA	N/A	
Ypsilanti	261610008	555 Tower Ave	42.241	-83.59972	Pop. Exp.	Neighborhood	Washtenaw	2/24/00	Not in CBSA	N/A	
Allen Park	261630001	14700 Goddard	42.229	-83.20833	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming, Salina School	42.307	-83.14889	Pop. Exp. Max. Conc.	Neighborhood	Wayne	9/26/03	DWL	4,296,250	
Detroit - FIA/Lafayette St	261630039	2000 W Lafayette	42.323	-83.06861	Source Oriented	Neighborhood	Wayne	8/20/05	DWL	4,296,250	

Method: MetOne Beta Attenuation Monitor (BAM)

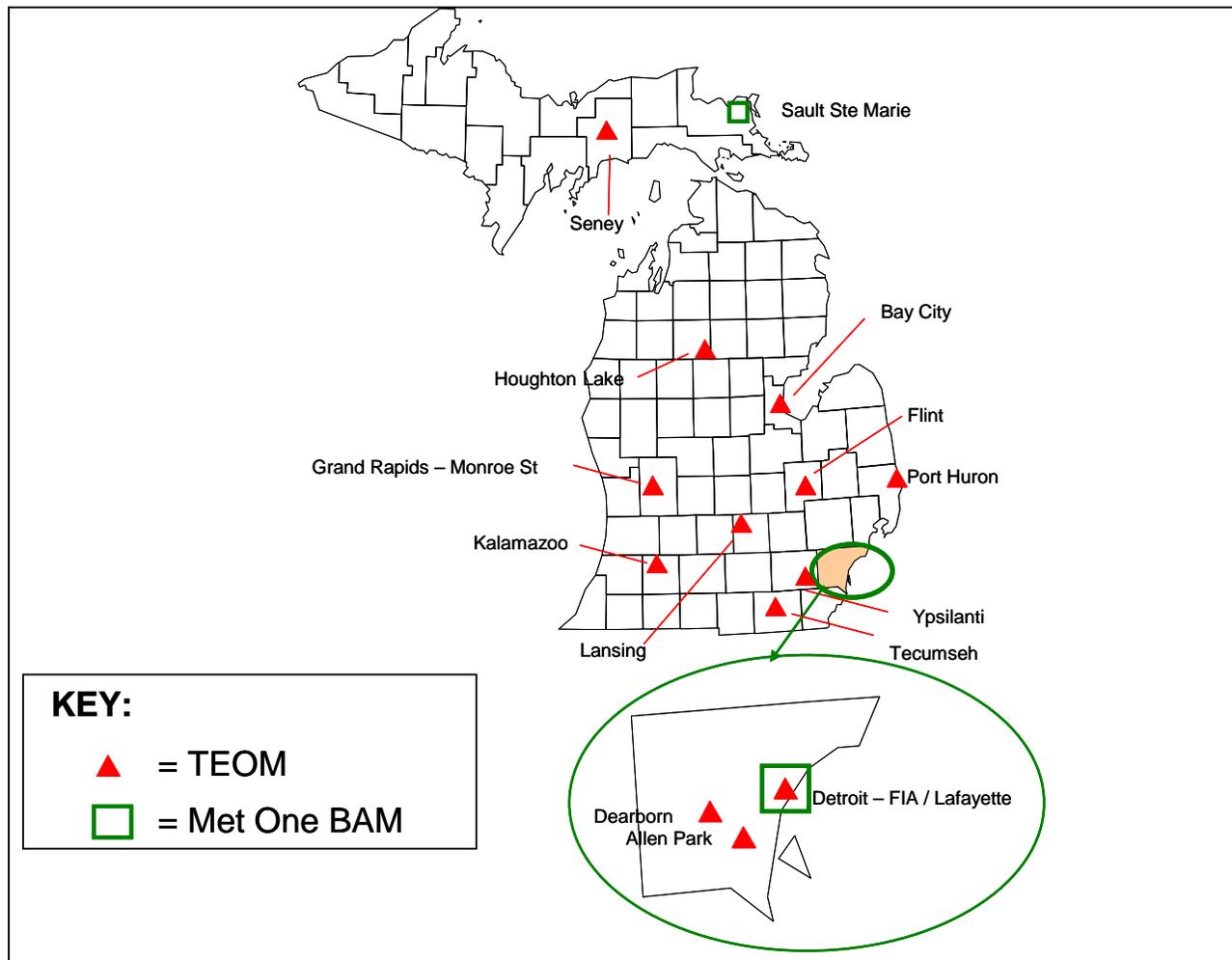
Sault Ste. Marie	260330901	650 W Easterday Ave	46.49366	-84.36416	Tribal	Regional	Chippewa	1/1/2012	Not in CBSA	N/A
Detroit - FIA/Lafayette St	261630039	2000 W Lafayette	42.323	-83.06861	Source Oriented	Neighborhood	Wayne	10/1/09	DWL	4,296,250

<sup>1</sup> CBSA Key:

BC = Bay City Metro. Area  
 DWL= Detroit-Warren-Livonia Metro. Area  
 F = Flint Metro Area

GW=Grand Rapids-Wyoming Metro. Area  
 KP= Kalamazoo-Portage Metro. Area  
 LEL= Lansing-E. Lansing Metro. Area

**FIGURE 10: MICHIGAN'S CONTINUOUS PM<sub>2.5</sub> NETWORK**



## **PM<sub>2.5</sub> TEOM Quality Assurance**

The site operator conducts flow checks for precision every four weeks. The results from the precision checks are sent to the auditor for review each month. An independent flow rate audit is conducted by a member of the AMU's QA Team every six months. During the flow rate audit, the auditor assesses the condition of the station, sample probe, and siting criteria. The QA Coordinator reviews all audit results and hard copies of the results are retained in the QA files.

## **Plans for the 2015 PM<sub>2.5</sub> TEOM Network**

There are no changes planned for the PM<sub>2.5</sub> TEOM network, but if the EPA cuts funding, operation of some additional TEOMs may need to be discontinued in 2015. Continued operation of the PM<sub>2.5</sub> TEOMs at Dearborn (261630033), Allen Park (261630001), and Grand Rapids-Monroe St. (260610020) will be given the highest priority. The Dearborn (261630033) monitor measures the highest concentrations of PM<sub>2.5</sub> in Michigan and is needed for the development of attainment strategies, AIRNOW reporting, diurnal profiling and estimation of risk. The Allen Park (261630001) monitor is needed to provide a counterpoint to the measurements taken at Dearborn. Allen Park is a population-oriented site designated as the trend site for Michigan. Dearborn is the maximum concentration site, so comparisons between these sites are important to characterize point source impacts on ambient air quality. Also, the PM<sub>2.5</sub> TEOMs at Grand Rapids-Monroe St. (260810020) and Allen Park (261630001) need to continue operation due to the NCore requirement for continuous fine particulate measurements.

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to operate PM<sub>2.5</sub> TEOM monitors at:

- Bay City (260170014)
- Flint (260490021)
- Lansing (260650012)
- Kalamazoo (260770008)
- Grand Rapids–Monroe St. (260810020)
- Tecumseh (260910007)
- Houghton Lake (261130001)
- Port Huron (261470005)
- Seney (261530001)
- Ypsilanti (261610008)
- Allen Park (261630001)
- Dearborn (261630033)
- Detroit – FIA/Lafayette (261630039) - TEOM and BAM

Considering the cost of replacement parts, age of the equipment and the frequency of repairs, if any TEOM monitors would need to be shut down, the highest priority would be given to retaining the Grand Rapids–Monroe St. (260810020), Allen Park (261630001) NCore and Dearborn PM<sub>2.5</sub> TEOMs.

During 2014, to the best of our knowledge, the Inter Tribal Council is planning to continue to operate a PM<sub>2.5</sub> BAM monitor at Sault Ste. Marie (260330901).

### **Speciated PM<sub>2.5</sub> Monitoring Network:**

Continued operation of the speciation trend site network is required on a national level and these sites sample on a sampling frequency of once every three days. The speciated trend site in Michigan is located at Allen Park (261630001). All remaining supplemental speciation sites operate on a once every six day schedule, except for the NCore site at Grand Rapids–Monroe St. (260810020), which has a sampling frequency of once every three days. The speciation network is described in **Table 17**. **Figure 11** illustrates the current coverage across Michigan.

USEPA has been conducting an assessment of the Chemical Speciation Network (CSN) in an effort to optimize the network and create a network that is financially sustainable going forward. As a result of this assessment, USEPA is recommending defunding a number of monitoring sites, eliminating the CSN PM<sub>2.5</sub> mass measurement, reducing the frequency of carbon blanks, and reducing the number of icepacks in shipment during the cooler months of the year. Should these recommendations become final, the state of Michigan will be affected at all funded CSN sites. The state of Michigan will also be affected at the following sites that are recommended for defunding: SWHS (261630015), Sterling State Park (261150006), Port Huron (261470005), Tecumseh (260910007), and Houghton Lake (261130001). The state is currently soliciting feedback regarding the OAQPS recommendations. The CSN PM<sub>2.5</sub> mass measurement is recommended for elimination in July 2014 and all other changes are recommended to take place in January 2015.

Note that Allen Park (261630001) contains a suite of carbon channel samplers: an IMPROVE, a Met One SASS and an URG 3000 N. The MDEQ will continue to operate the three different carbon samplers to support EPA OAQPS inter-sampler comparability studies.

### **Continuous Speciation Measurements**

In addition to the speciated measurements integrated over a 24-hour time period described above, Michigan operates continuous monitors for carbon black and EC/OC. Two large spot aethalometers from Magee Scientific operate at Dearborn (261630033) and Allen Park (261630001). These units measure carbon black, which is very similar to and correlates well with elemental carbon.

A continuous EC/OC monitor from Sunset Laboratories was deployed at the Detroit - Newberry site (261630038) site to determine diurnal variation in elemental carbon and organic carbon. This EC/OC is currently on reserve as a backup due to the loss of site access at Detroit Newberry. To help in the development of attainment strategies, the Southeast Michigan Council of Governments purchased a second Sunset EC/OC unit that is deployed at Dearborn (261630033). Last, an additional EC/OC unit is deployed at Tecumseh (260910007) to characterize levels upwind from Detroit.

### **Speciation Quality Assurance**

The MDEQ has adopted and follows the EPA's QAPP for the speciation trends network. The site operator conducts flow checks for precision every four weeks. The results from the precision checks are sent to the auditor for review each month. The QA team conducts flow rate audits on the PM<sub>2.5</sub> speciation monitors every six months. The auditor also assesses the monitoring station and siting criteria to ensure it continues to meet the measurement quality objectives. The audit results are reviewed by the AMU's QA Coordinator. The audit data is also uploaded to the EPA's AQS database using the RTI interface. The EPA periodically conducts technical systems audits and instrument audits for the speciation network. The EPA also conducts audits of RTI National Laboratory, which supplies speciation analysis services for the entire nation.

**TABLE 17: MICHIGAN'S PM<sub>2.5</sub> SPECIATION NETWORK**

Current Speciation Sites for 2014

Operating Schedule: Once Every 3 days (Allen Park), once every 6 days all others  
 Method: Met One SASS and URG 3000 N units to collect organic & elemental carbon

Monitoring Sites		Address	Latitude	Longitude	Sampling Frequency	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)	Comments
Site Name	AQS Site ID											
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW,	42.984	-85.67139	1:3	Pop. Exp. up w ind backgrd	Neighborhood	Kent	11/4/99	GW	774,160	
Tecumseh	260910007	6792 Raisin Center Highway	41.996	-83.94667	1:6		regional	Lenaw ee	4/6/08	Not in CBSA	N/A	SPM
Houghton Lake	261130001	1769 S Jeffs Rd	44.311	-84.89194	1:6	Background	Regional	Missaukee	10/9/03	Not in CBSA	N/A	
Sterling St. Park	261150006	2800 State Park Rd.	41.924	-83.34586	1:6	Transport	Regional	Monroe	12/17/99	M	152,021	
Port Huron	261470005	2525 Dove Rd.	42.953	-82.45639	1:6	Pop. Exp.	Regional	Saint Clair	7/5/08	DWL	4,296,250	
Allen Park	261630001	14700 Goddard SW Highschool,	42.229	-83.20833	1:3	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	4,296,250	
Detroit - SW HS	261630015	150 Waterman St	42.303	-83.10667	1:6	Pop. Exp. Max. Conc.	Neighborhood	Wayne	11/2/08	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming, Salina School	42.307	-83.14889	1:6	Pop. Exp. Max. Conc.	Neighborhood	Wayne	9/26/03	DWL	4,296,250	

Continuous Speciation Measurements for 2014

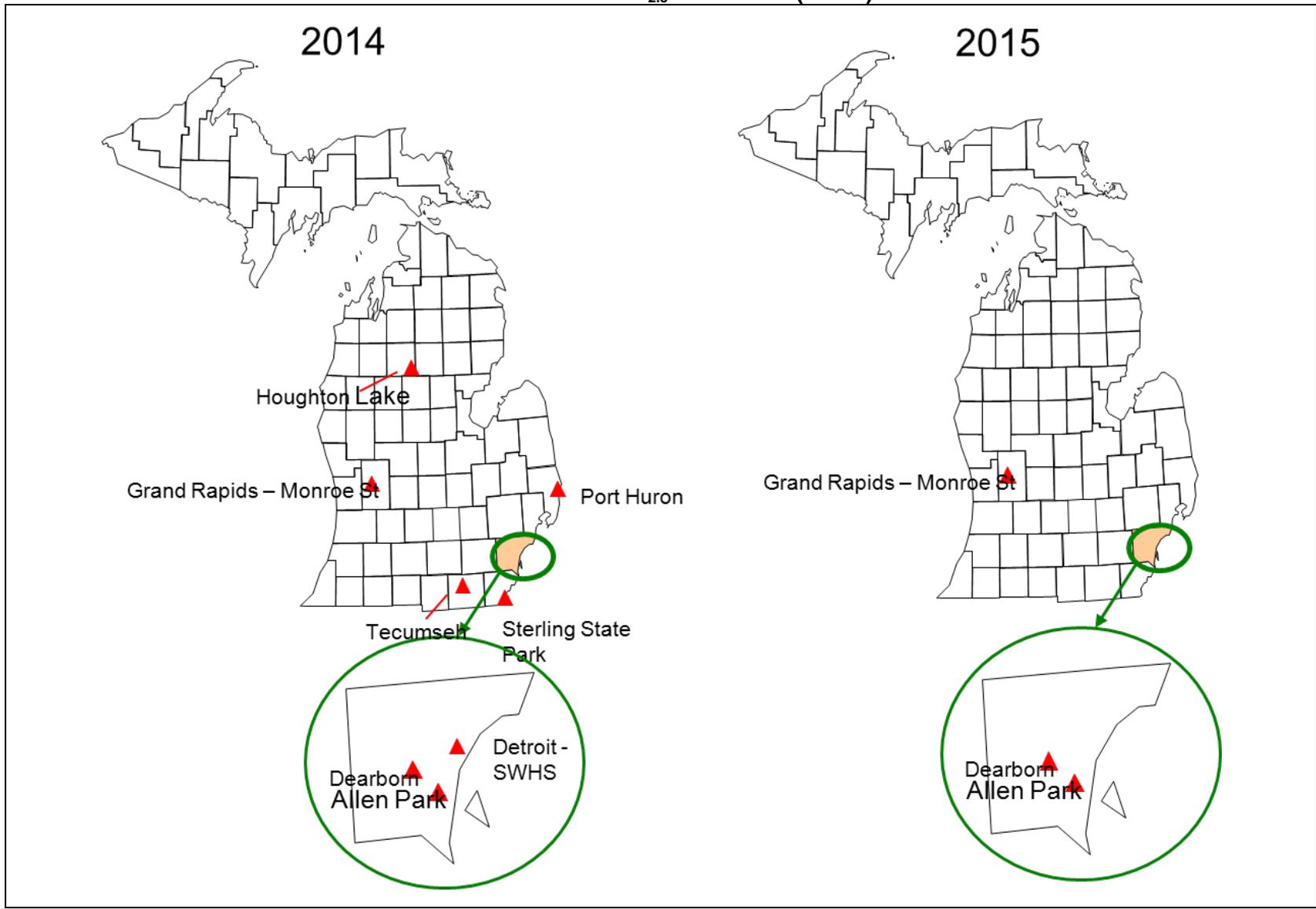
Monitoring Sites		Address	Latitude	Longitude	Sampling Method	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)	Comments
Site Name	AQS Site ID											
Allen Park	261630001	14700 Goddard	42.229	-83.20833	McGee large spot Aethalometer (carbon black)	Pop. Exp.	Neighborhood	Wayne	1/1/04	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming, Salina School	42.307	-83.14889	McGee large spot Aethalometer (carbon black)	Pop. Exp. Max. Conc.	Neighborhood	Wayne	12/19/03	DWL	4,296,250	
Tecumseh	260910007	6792 Raisin Center Highway	41.996	-83.94667	Sunset EC/OC	Pop. Exp. up w ind backgrd	regional	Lenaw ee	3/31/08	Not in CBSA	N/A	SPM
Dearborn	261630033	2842 Wyoming, Salina School	42.307	-83.14889	Sunset EC/OC	Pop. Exp. Max. Conc.	Neighborhood	Wayne	6/11/07	DWL	4,296,250	

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area      SPM = Special Purpose Monitor  
 GW=Grand Rapids-Wyoming Metro. Area  
 M = Monroe Metro. Area

Proposed Speciation Sites for 2015

Monitoring Sites		Address	Latitude	Longitude	Sampling Frequency	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)	Comments
Site Name	AQS Site ID											
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW,	42.984	-85.67139	1:3	Pop. Exp.	Neighborhood	Kent	11/4/99	GW	774,160	
Allen Park	261630001	14700 Goddard	42.229	-83.20833	1:3	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming, Salina School	42.307	-83.14889	1:6	Pop. Exp. Max. Conc.	Neighborhood	Wayne	9/26/03	DWL	4,296,250	

**FIGURE 11: MICHIGAN'S PM<sub>2.5</sub> SPECIATION (SASS) NETWORK**



**Plans for the 2015 PM<sub>2.5</sub> Speciation Monitoring Network**

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to operate 24-hour PM<sub>2.5</sub> SASS speciation monitors at:

- Grand Rapids-Monroe St. (260810020) operating once every three days
- Allen Park (261630001) operating once every three days
- Dearborn (261630033) operating once every six days

At the request of the EPA, the MDEQ is going to shut down the following 24-hour PM<sub>2.5</sub> SASS speciation monitors at:

- Tecumseh (260910007) operating once every six days
- Houghton Lake (261130001) operating once every six days
- Sterling State Park(261150006) operating once every six days
- Port Huron (261470005) operating once every six days
- SWHS (261630015) operating once every six days

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to operate hourly Sunset EC/OC monitors at:

- Dearborn (261630033)
- Tecumseh (260910007)

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to operate hourly Magee aethalometer monitors at:

- Dearborn (261630033)
- Allen Park (261630001)

**PM<sub>10</sub> Monitoring Network:**

The October 17, 2006 monitoring regulations modified the minimum number of PM<sub>10</sub> samplers required in MSAs. Since then, further revisions have occurred, relaxing the numbers of sites required in high population areas with low concentrations of PM<sub>10</sub>, as shown in **Table 18**.<sup>12</sup>

**TABLE 18: PM<sub>10</sub> MINIMUM MONITORING REQUIREMENTS (NUMBER OF STATIONS PER MSA)<sup>1</sup>**

POPULATION CATEGORY	HIGH CONCENTRATION <sup>2</sup>	MEDIUM CONCENTRATION <sup>3</sup>	LOW CONCENTRATION <sup>4,5</sup>
> 1,000,000	6-10	4-8	2-4
500,000 – 1,000,000	4-8	2-4	1-2
250,000 – 500,000	3-4	1-2	0-1
100,000 – 250,000	1-2	0-1	0

<sup>1</sup> Selection of urban areas and actual numbers of stations per area within the ranges shown in this table will be jointly determined by EPA and the State Agency.

<sup>2</sup> High concentration areas are those for which ambient PM<sub>10</sub> data show ambient concentrations exceeding the PM<sub>10</sub> NAAQS by 20% or more.

<sup>3</sup> Medium concentration areas are those for which ambient PM<sub>10</sub> data show ambient concentrations exceeding 80% of the PM<sub>10</sub> NAAQS.

<sup>4</sup> Low concentration areas are those for which ambient PM<sub>10</sub> data show ambient concentrations < 80% of the PM<sub>10</sub> NAAQS.

<sup>5</sup> These minimum monitoring requirements apply in the absence of a design value.

Applying **Table 18** to Michigan's urban areas, population totals and historical PM<sub>10</sub> data results in the design requirements that are shown in **Table 19**.

According to the tables, two to four PM<sub>10</sub> sites are required in the Detroit-Warren-Livonia Metropolitan Area. Currently, there are three sites in operation; one at Allen Park (261630001), one at Detroit-SWHS (261630015) and the design value site at Dearborn (261630033).

The PM<sub>10</sub> monitoring requirements specify that one to two PM<sub>10</sub> sites are required in the Grand Rapids-Wyoming MSA. There is site currently in operation in Grand Rapids, Monroe St. (260810020).

According to the requirements, either no or one PM<sub>10</sub> monitors are required in the Flint MSA. In 2006, the MDEQ operated a PM<sub>10</sub> sampler in Flint (260490021) but as a result of budget cuts, PM<sub>10</sub> sampling was discontinued on April 1, 2007.

As part of a special study investigating the concentrations of manganese (Mn) in the Detroit urban area, a PM<sub>10</sub> high volume unit started sampling at River Rouge (261630005) on January 25, 2009. The PM<sub>10</sub> filters at River Rouge (261630005), Allen Park (261630001), Detroit-SWHS (261630015) and Dearborn (261630033) are analyzed for Mn and compared with the TSP concentrations of Mn. An added benefit of this study is the collection of levels of PM<sub>10</sub> at River Rouge (261630005). The Manganese Work Group will be analyzing the data on a yearly basis. Decisions about future monitoring for Mn in Southeast Michigan will be made by the work group.

As part of the lead network, as TSP site was added in Vassar (261570001). High levels of Mn were detected on some of the TSP filters. Therefore, a PM<sub>10</sub> sampler was deployed to Vassar (261570001) to determine if the PM<sub>10</sub> Mn values were over the health-benchmark. Since the

<sup>12</sup> Table D-4 of Appendix D to Part 58.

**MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

plant generating the emissions was shut down, the MDEQ would like to shut down this monitor (see Lead Monitoring section for details).

PM coarse measurements are required at NCore sites. One acceptable technology is to use two R & P Partisol Plus 2025 units equipped with a PM<sub>2.5</sub> head and a WINS impactor and the second with a PM<sub>10</sub> head and a down tube. PM coarse is determined by subtracting the fine particulate from the PM<sub>10</sub>. Therefore, to meet the NCore requirements, a Partisol sampler equipped with a PM<sub>10</sub> head and a down tube was deployed to Grand Rapids–Monroe St. (260810020) and Allen Park (261630001).

**Table 20** summarizes the PM<sub>10</sub> monitoring site information for sites in operation in 2014. **Table 21** summarizes the PM<sub>10</sub> monitoring site information of the proposed 2015 sites. **Figure 12** compares the PM<sub>10</sub> network for 2014 and 2015.

**TABLE 19: APPLICATION OF THE MINIMUM PM<sub>10</sub> MONITORING REGULATIONS IN THE APRIL 30, 2007 CORRECTION TO THE OCTOBER 17, 2006 FINAL REVISION TO THE MONITORING REGULATION TO MICHIGAN'S PM<sub>10</sub> NETWORK**

Design value sites are in bold				2011-2013		
MSA	2010 Population	Counties	Existing Monitors	most recent 3-year PM10 design value (24-Hr)	Conc. Class.	Min No monitors Required
Detroit-Warren-Livonia Metro Area	4,296,250	Macomb	---	---		2-4
		Oakland	---	---		
		Wayne	Allen Park	36	low	
			Detroit -SW HS	44	low	
			Dearborn	<b>50</b>	low	
			River Rouge	38	low	
		Lapeer	---			
St Clair	---					
Livingston	---					
Flint Metro Area	425,790	Genesee	Flint	---	low	0 -1
Monroe Metro Area	152,021	Monroe	---	---		
Ann Arbor Metro Area	344,791	Washtenaw	---	---		
Grand Rapids-Wyoming Metro Area	774,160	Kent	GR - Monroe St	29		1-2
			GR- Wealthy	<b>38</b>	low	
		Barry	---			
		Newaygo	---			
		Ionia	---			
Holland-Grand Haven Metro Area	263,801	Ottawa	---	---		
Muskegon-Norton Shores Metro Area	172,188	Muskegon	---	---		
Lansing-East Lansing Metro Area	464,036	Clinton	---	---		
		Ingham	---	---		
		Eaton	---	---		
Bay City Metro Area	107,771	Bay	---	---		
Saginaw-Saginaw Twp N Metro Area	200,169	Saginaw	---	---		
Kalamazoo-Portage Metro Area	326,589	Kalamazoo	---	---		
		Van Buren	---	---		
Niles-Benton Harbor Metro Area	156,813	Berrien	---	---		
Jackson Metro Area	160,248	Jackson	---	---		
Battle Creek Metro Area	136,146	Calhoun	---	---		
South Bend-Mishawaka Metro Area IN/IM	52,293	Cass	---	---		
Not in CBSA	N/A	Tuscola	Vassar	48		0

# MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

## TABLE 20: MICHIGAN'S PM<sub>10</sub> MONITORING NETWORK

Method: Manual High Volume Sampler (Dearborn also uses a R&P TEOM to make continuous measurements)

Monitoring Sites													Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	1:6	High Vol	pop exp	nghbrhd	Wayne	9/12/87	DWL		4,296,250
Detroit - SWHS	261630015	150 Waterman	42.3028	-83.10667	1:6	High Vol	max conc	nghbrhd	Wayne	3/27/87	DWL		4,296,250
Dearborn	261630033	2842 Wyoming	42.3067	-83.14889	1:6	High Vol	max conc	nghbrhd	Wayne	6/12/90	DWL		4,296,250
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.67139	1:6	High Vol	pop exp	nghbrhd	Kent	3/20/87	GW		774,160
Vassar	261570001	874 E Huron	43.3686	-83.5691	1:6	High Vol	pop exp	nghbrhd	Tuscola		Not in CBSA		NA
River Rouge	261630005	315 Genesee	42.2672	-83.13222	1:6	High Vol	pop exp	nghbrhd	Wayne	1/25/09	DWL		4,296,250
Dearborn	261630033	2842 Wyoming	42.3067	-83.14889	1:12	High Vol for precision	max conc	nghbrhd	Wayne	6/12/90	DWL		4,296,250
Dearborn	261630033 continuous	2842 Wyoming	42.3067	-83.14889	continuous	R&P PM10 TEOM	max conc	nghbrhd	Wayne	4/1/00	DWL		4,296,250

**NCore Low Volume PM Coarse Sites**

Method: Low volume Partisol 2025 Sampler with down tube and PM<sub>10</sub> head co-located with low volume Partisol 2025 PM<sub>2.5</sub> Sampler. PM<sub>coarse</sub> determined by difference.

Monitoring Sites													Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.67139	1:6	Low Vol Partisol	pop exp	nghbrhd	Kent	7/16/11	GW		774,160
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	1:6	Low Vol Partisol	pop exp	nghbrhd	Wayne	7/16/11	DWL		4,296,250

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area  
GW=Grand Rapids-Wyoming Metro. Area

## TABLE 21: MICHIGAN'S PROPOSED PM<sub>10</sub> MONITORING NETWORK

Method: Manual High Volume Sampler (Dearborn also uses a R&P TEOM to make continuous measurements)

Monitoring Sites													Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	1:6	High Vol	pop exp	nghbrhd	Wayne	9/12/87	DWL		4,296,250
Detroit - SWHS	261630015	150 Waterman	42.3028	-83.10667	1:6	High Vol	max conc	nghbrhd	Wayne	3/27/87	DWL		4,296,250
Dearborn	261630033	2842 Wyoming	42.3067	-83.14889	1:6	High Vol	max conc	nghbrhd	Wayne	6/12/90	DWL		4,296,250
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.67139	1:6	High Vol	pop exp	nghbrhd	Kent	3/20/87	GW		774,160
River Rouge	261630005	315 Genesee	42.2672	-83.13222	1:6	High Vol	pop exp	nghbrhd	Wayne	1/25/09	DWL		4,296,250
Dearborn	261630033	2842 Wyoming	42.3067	-83.14889	1:12	High Vol for precision	max conc	nghbrhd	Wayne	6/12/90	DWL		4,296,250
Dearborn	261630033 continuous	2842 Wyoming	42.3067	-83.14889	continuous	R&P PM10 TEOM	max conc	nghbrhd	Wayne	4/1/00	DWL		4,296,250

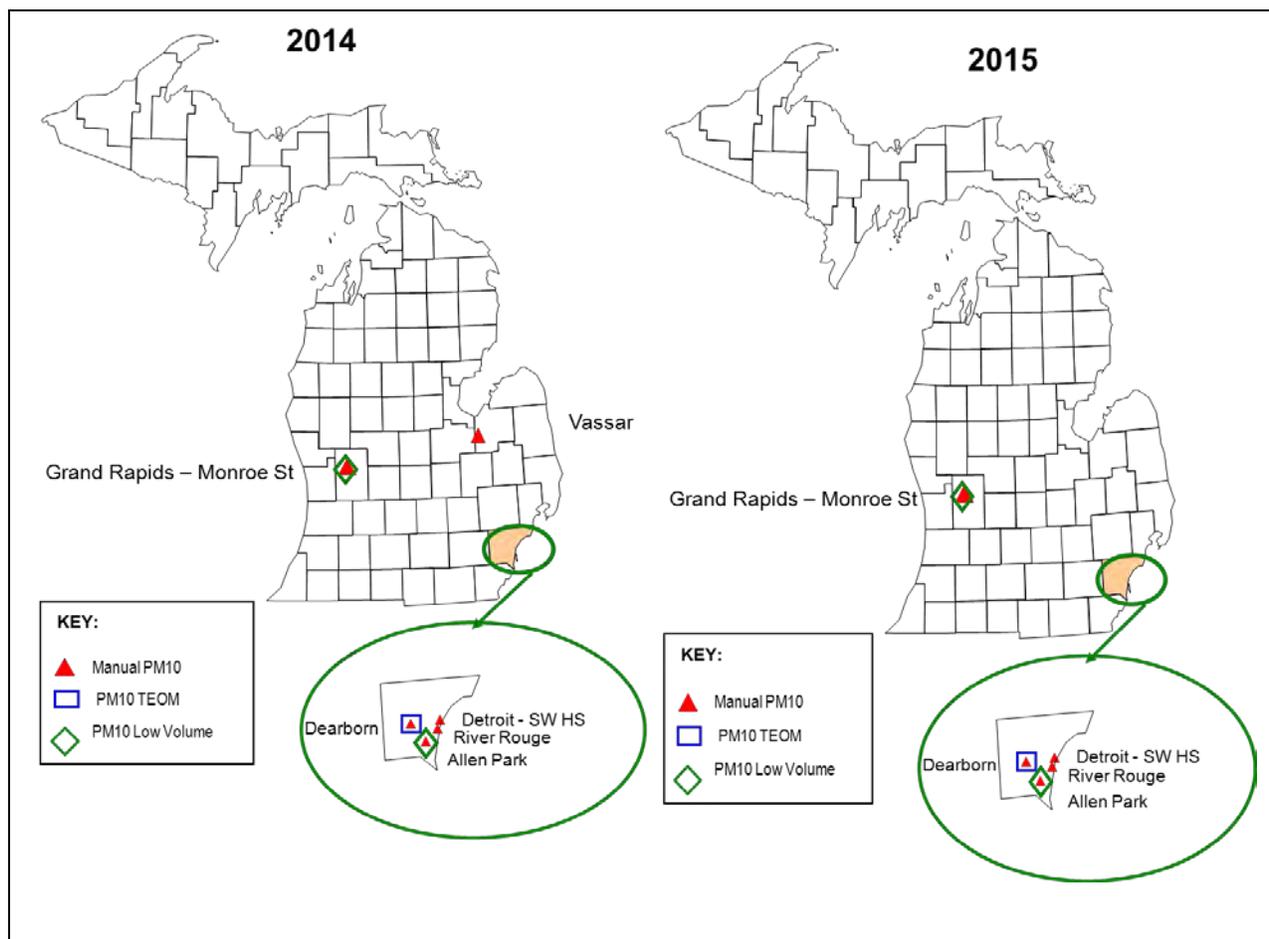
**NCore Low Volume PM Coarse Sites**

Method: Low volume Partisol 2025 Sampler with down tube and PM<sub>10</sub> head co-located with low volume Partisol 2025 PM<sub>2.5</sub> Sampler. PM<sub>coarse</sub> determined by difference.

Monitoring Sites													Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.67139	1:6	Low Vol Partisol	pop exp	nghbrhd	Kent	7/16/11	GW		774,160
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	1:6	Low Vol Partisol	pop exp	nghbrhd	Wayne	7/16/11	DWL		4,296,250

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area  
GW=Grand Rapids-Wyoming Metro. Area

**FIGURE 12: MICHIGAN'S PM<sub>10</sub> MONITORING NETWORK**



**PM<sub>10</sub> Quality Assurance**

The site operator conducts a flow check once a month. The flow check values are sent to the QA Coordinator each quarter. An independent audit is conducted by a member of the AMU's QA Team every six months. The auditor is in a separate line of reporting authority from the site operator and uses independent dedicated equipment to perform the flow rate audit. The auditor also assesses the condition of the monitor and siting criteria. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files. The audit results are uploaded to the EPA's AQS database each quarter.

### **Plans for the 2015 PM<sub>10</sub> Monitoring Network**

During 2015, contingent upon adequate levels of funding, the MDEQ is planning to operate high volume PM<sub>10</sub> monitors sampling over 24-hrs at:

- The PM<sub>10</sub> monitor at Monroe Street in Grand Rapids (260810020) on a once every six day schedule
- The PM<sub>10</sub> monitor in Allen Park (261630001) on a once every six day schedule
- The PM<sub>10</sub> monitor in Detroit–SWHS (261630015) on a once every six day schedule
- The PM<sub>10</sub> monitor in Dearborn (261630033) and the co-located PM<sub>10</sub> monitor on a once every twelve day schedule.

The MDEQ is planning to operate low volume PM<sub>10</sub> monitors co-located with low volume PM<sub>2.5</sub> monitors to calculate PM<sub>10-2.5</sub> at the following NCore sites:

- The low volume PM<sub>10</sub> monitor at Monroe St in Grand Rapids (260810020) on a once every six day schedule.
- The low volume PM<sub>10</sub> monitor at Allen Park (261630001) on a once every six day schedule.

The MDEQ also planning to operate:

- The PM<sub>10</sub> monitor at River Rouge (261630005) on a once every six day schedule
- The special purpose monitor PM<sub>10</sub> TEOM at Dearborn (261630033) on an hourly schedule.

The MDEQ will shut down the following monitor on January 1, 2015:

- Vassar (261570001) – see Lead Monitoring section for details

## **Carbon Monoxide (CO) Monitoring Network:**

Prior to the latest CO NAAQS review, the MDEQ operated trace CO monitors at Grand Rapids–Monroe St. (260810020) and Allen Park (261630001) as part of NCore.

On Aug 31, 2011,<sup>13</sup> the EPA finalized the new CO NAAQS and retained the level and form of the CO NAAQS but revised the design of the ambient monitoring network for CO to be more focused on heavily traveled urban roads. In the rule, CBSAs with population totals equal to or greater than one million people would be required to add CO monitors to near-roadway monitoring stations that are required in the NO<sub>2</sub> network design. The MDEQ already has CO monitors in the two Eliza Howell near roadway sites (261630093) and (261630094). The MDEQ will add a CO monitor to the new Livonia Near Road (26163xxxx) site (see the NO<sub>2</sub> Monitoring section for details).

**Table 22** summarizes the CO monitoring site information for sites that were in existence in 2013. **Figure 13** shows the distribution of CO monitors across the state of Michigan.

### **CO Quality Assurance**

The site operator performs a precision check of the analyzer every two weeks. Results of precision checks are sent to the QA Coordinator each quarter. Each monitor is audited annually by the AMU's QA Team. The auditor has a separate reporting line of authority from the site operator. The auditor utilizes dedicated gas calibrator and calibration gases that are only for audits. The independent audit challenges the accuracy of the station monitor. The auditor also assesses the monitoring system (inspecting the sample line, filters, and inlet probe), siting, and documentation of precision checks. The results of the audits and precision checks indicate whether the monitor is meeting the measurement quality objectives. The AMU uploads the results of the precision checks and audits to the EPA's AQS database each quarter. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files.

External audits are conducted by the EPA's thru-the-probe audit procedure for regular and trace level CO monitors. The EPA reports the results to AQS.

### **Plans for the 2015 CO Monitoring Network**

During 2015, contingent upon adequate levels of funding, Michigan plans to continue to operate trace level CO monitors to support NCore operations:

- Grand Rapids-Monroe St. (26810020)
- Allen Park (261630001)

During 2015, contingent upon adequate levels of funding, Michigan plans to continue to operate CO monitors to support the near-roadway network:

- Eliza Howell #1 (261630093)
- Eliza Howell #2 (261630094)
- Livonia Near Road (26163xxxx)- to be established by 1/1/2015 (see Nitrogen Dioxide Monitoring Section for details)

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<sup>13</sup> Environmental Protection Agency, "National Ambient Air Quality Standards for Carbon Monoxide," 40 CFR parts 50, 53 and 58, proposed rule January 28, 2011.

**TABLE 22: MICHIGAN'S CO MONITORING NETWORK**

Operating Schedule: Continuous  
 Method: Gas Filter Correlation Analyzer- CO & Trace CO

Monitoring Sites												Pop (2010)
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Date	CBSA <sup>1</sup>	Census	
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.67139	trace	pop exp	nghbrhd	Kent	1/1/08	GW	774,160	
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	trace	pop exp	nghbrhd	Wayne	1/1/08	DWL	4,296,250	

**Tier 1: Near Roadway Sites 2014**

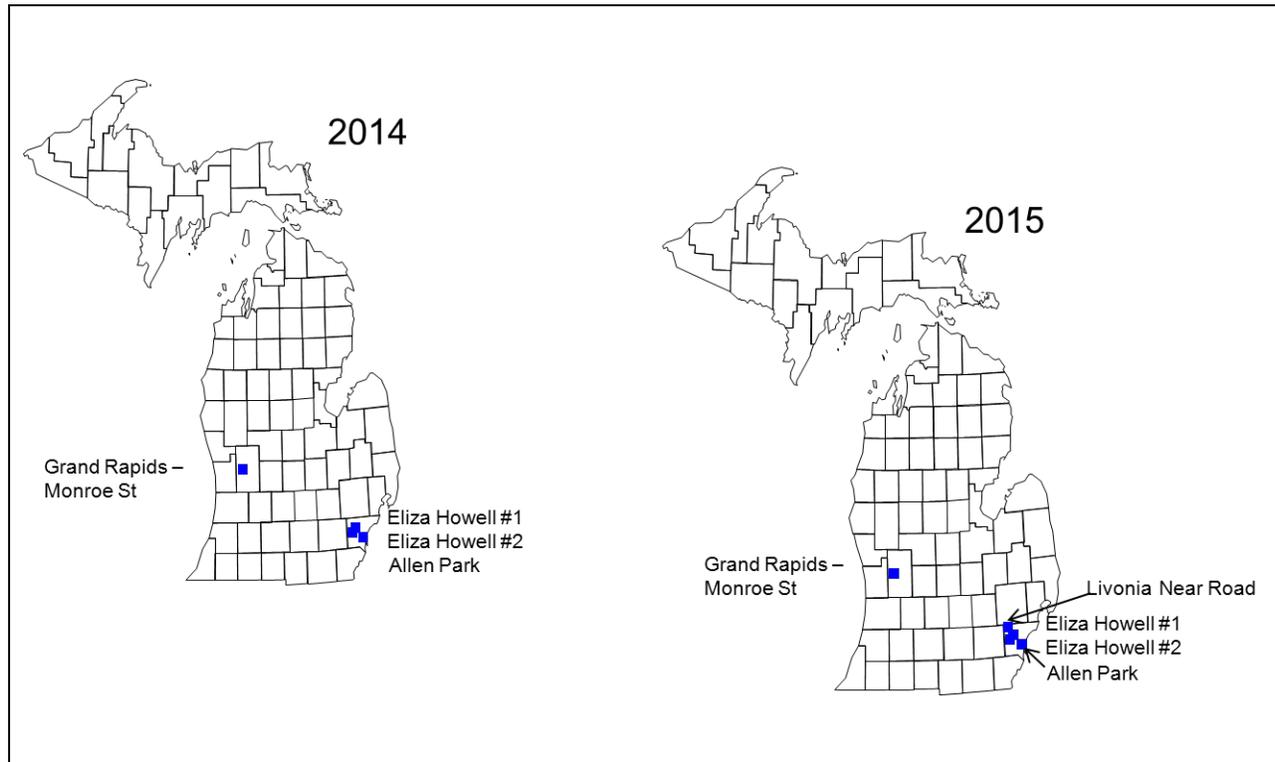
Monitoring Sites												Pop (2010)
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Date	CBSA <sup>1</sup>	Census	
Eliza Howell #1	261630093	Service Road I-96 & Telegraph	42.38599	-83.26632	CO	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250	
Eliza Howell #2	261630094	Eliza How ell Park	42.3868	-83.270637	CO	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250	

**Tier 1: Near Roadway Sites 2015**

Monitoring Sites												Pop (2010)
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Date	CBSA <sup>1</sup>	Census	
Eliza Howell #1	261630093	Service Road I-96 & Telegraph	42.38599	-83.26632	CO	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250	
Eliza Howell #2	261630094	Eliza How ell Park	42.3868	-83.270637	CO	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250	
Livonia Near Road	26163xxxx				CO	Near Road	nghbrhd	Wayne	1/1/15	DWL	4,296,250	

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area      GW=Grand Rapids-Wyoming Metro. Area

**FIGURE 13: MICHIGAN'S CO MONITORING NETWORK**



## **Nitrogen Dioxide (NO<sub>2</sub>) and NO<sub>y</sub> Monitoring Network:**

On February 9, 2010, the EPA modified the NO<sub>2</sub> NAAQS. Prior to this date, there was a single form of the standard; the annual average concentration of NO<sub>2</sub> could not be greater than 53 parts per billion (ppb). The EPA has added an hourly level of 100 ppb to the NAAQS.

Along with modifications to the standard, changes to the design of the ambient monitoring network also occurred. A three-tiered monitoring network for NO<sub>2</sub> will focus on near roadway monitoring as well as monitoring at ambient locations. The minimally required components of the network are:

### **Tier 1: Near Roadway Monitors**

1. Every CBSA with a population greater than or equal to 500,000 people must have a microscale NO<sub>2</sub> monitor located within 50 meters of a major roadway.
2. An additional near roadway site is required in CBSAs with populations of 2,500,000 or more.
3. An additional near roadway site is required for any roadway segment with 250,000 or more annual average daily traffic (AADT) totals.

### **Tier 2: Area-wide Monitors**

1. One NO<sub>2</sub> monitor in every CBSA with a population equal to or greater than 1,000,000 people. This monitor should be located in an area with an expected high concentration of NO<sub>2</sub> and should use a neighborhood or larger scale. Emission inventory data should be used to make this selection.

### **Tier 3: Regional Administrator Required Monitors**

1. The EPA Administrator must require a minimum of 40 NO<sub>2</sub> monitors nationwide in locations with "susceptible and vulnerable" populations.

The network design described above shall use the latest available Census figures. The new monitoring stations must be deployed and operational by January 1, 2013<sup>14</sup>. Because of budgetary constraints, the EPA has developed a build-and-hold system for implementing the new monitoring locations. One of the Detroit area monitoring sites is in the first deployment schedule. At this time, the Grand Rapids monitoring site is not listed for deployment by the EPA.

**Table 23** summarizes the monitoring requirements for NO<sub>2</sub> according to the various tiers for all CBSAs in Michigan. As shown by the table, one monitor is required in Grand Rapids-Wyoming MSA and three monitors are required in the Detroit-Warren-Livonia MSA.

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<sup>14</sup> "Primary National Ambient Air Quality Standards for Nitrogen Dioxide", EPA, 40 CFR Parts 50 and 58. February 9, 2010.

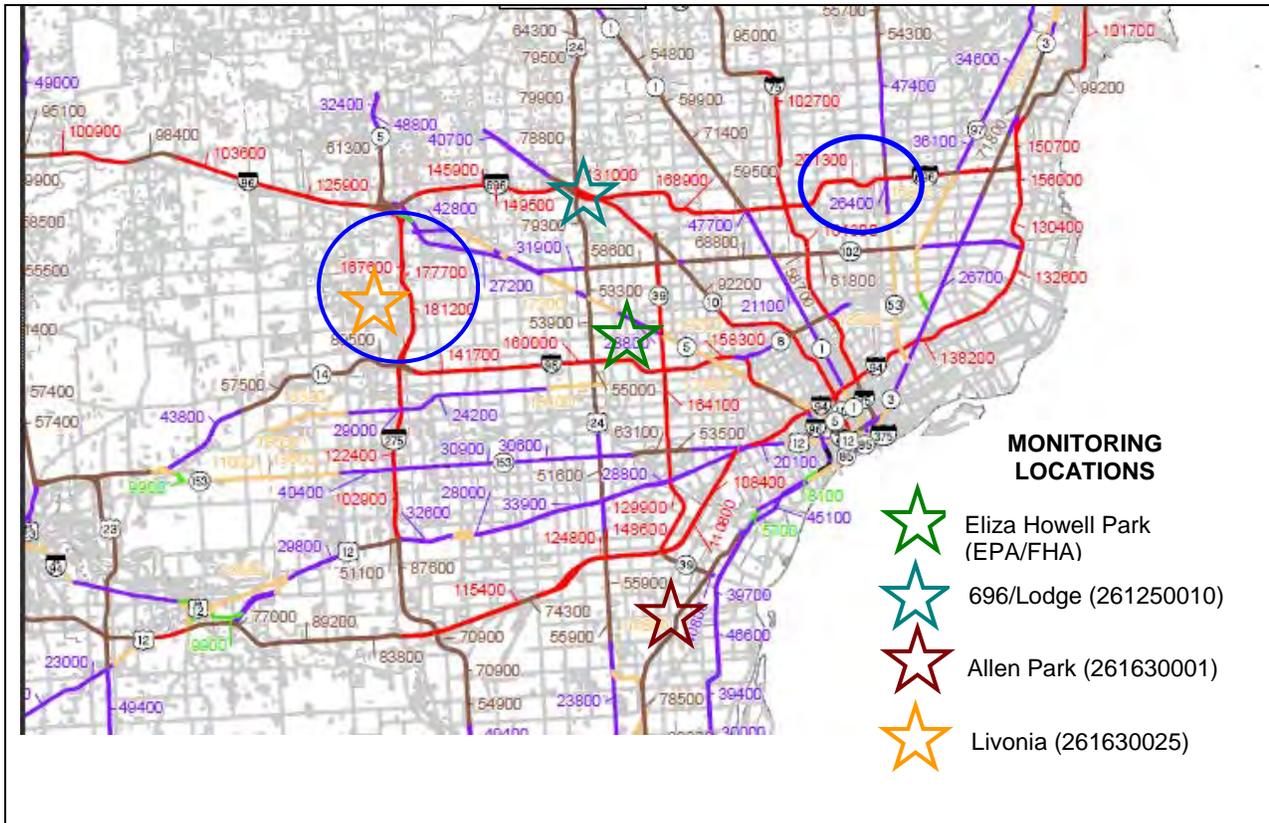
**Table 23: NO<sub>2</sub> Network Design**

MSA	Counties	2010 Population	Near Roadway Monitors Req'd	Additional Near Roadway Site	250,000 AADT?	Community Wide Monitor	EJ Monitor
Detroit-Warren-Livonia Metro Area	Macomb	4,296,250	1	1		1	
	Oakland						
	Wayne						
	Lapeer						
	St Clair						
	Livingston						
Flint Metro Area	Genesee	425,790					
Monroe Metro Area	Monroe	152,021					
Ann Arbor Metro Area	Washtenaw	344,791					
Grand Rapids-Wyoming Metro Area	Kent	774,160	1				
	Barry						
	Newaygo						
	Ionia						
Holland-Grand Haven Metro Area	Ottawa	263,801					
Muskegon-Norton Shores Metro Area	Muskegon	172,188					
Lansing-East Lansing Metro Area	Clinton	464,036					
	Ingham						
	Eaton						
Bay City Metro Area	Bay	107,771					
Saginaw-Saginaw Twp N Metro Area	Saginaw	200,169					
Kalamazoo-Portage Metro Area	Kalamazoo	326,589					
	Van Buren						
Niles-Benton Harbor Metro Area	Berrien	156,813					
Jackson Metro Area	Jackson	160,248					
Battle Creek Metro Area	Calhoun	136,146					
South Bend Mishawaka Metro Area IN/MI	Cass	52,293					

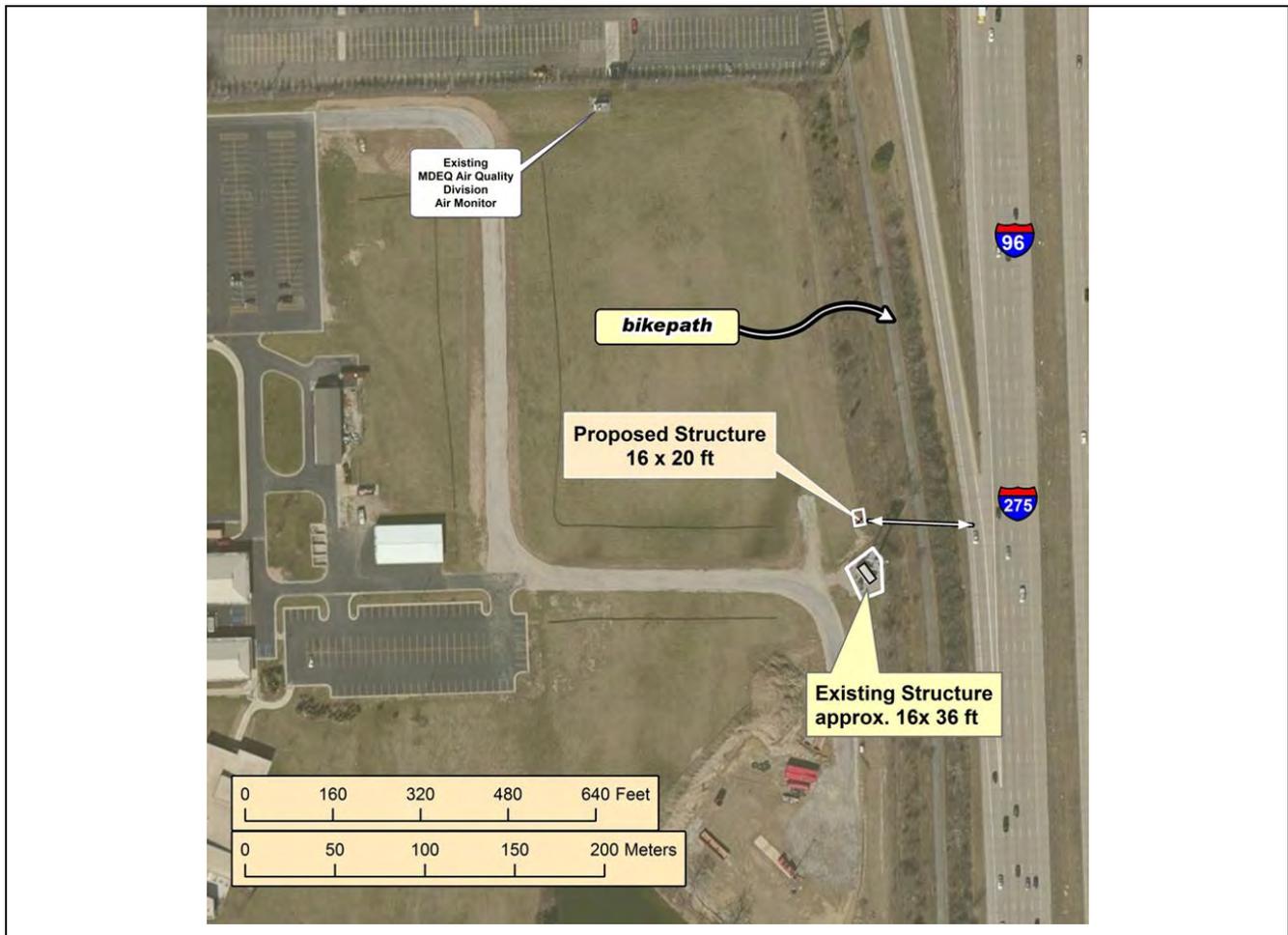
**Tier 1: Near Roadway NO<sub>2</sub> Monitors – Phase 2**

The second Near-Roadway Site is for the Detroit-Warren-Livonia MSA is due by January 1, 2015. Currently, the MDEQ is working with Schoolcraft Community College to move the Livonia Site closer to I-275. MDEQ has received verbal permission from the College to move the monitor about 450 feet from its current location, which would put the monitoring site within 50 meters of I-275 between 7 Mile and 6 Mile Roads. This is the heaviest traveled traffic segment in the Detroit-Warren-Livonia MSA, see yellow star on **Figure 14**. The new monitoring site proposed location can be seen in **Figure 15**. This figure shows the relationship to the old monitoring site and to expressway.

**FIGURE 14: COMPARISON OF ELIZA HOWELL PARK LOCATION WITH OTHER AIR MONITORING STATIONS AND ROADWAY SEGMENTS WITH THE HIGH TRAFFIC COUNTS**



**FIGURE 15: LOCATION OF NEW LIVONIA NEAR ROADWAY MONITORING SITE**



### **Tier 2: Area-wide NO<sub>2</sub> Monitors**

Area-wide monitoring is required in every CBSA with 1,000,000 or more people. The Detroit-Warren-Livonia CBSA is the only CBSA having this requirement in Michigan. The MDEQ is currently operating an NO<sub>2</sub> monitor at the Detroit-E 7 Mile site (261630019) in northeast Detroit, which is downwind from the urban core and located in a residential neighborhood expected to have high NO<sub>2</sub> levels. An NO<sub>y</sub> monitor is currently operational at the Allen Park NCore site (261630001), which is sandwiched between a residential neighborhood and I-75. Either of these locations would be a suitable area-wide monitoring site.

### **Tier 3: NO<sub>2</sub> Monitors for Susceptible and Vulnerable Populations**

The final tier of the new NO<sub>2</sub> monitoring network could include an environmental justice component as determined by the EPA Administrator. Forty additional monitoring sites will be deployed throughout the nation to meet the environmental justice component of the network design. At this time, the MDEQ is not planning on deploying any of these monitors.

## **NO<sub>2</sub> Monitoring for NSR**

Recent modeling projects for new source review have shown that there is a possibility that the new 1-hr NO<sub>2</sub> NAAQS could be violated using the very conservative estimates in the current techniques. More refined modeling that would provide a more accurate picture of the impact from new sources could be performed; however, the MDEQ lacked ambient data required for use in the models. At least five years of NO<sub>2</sub> data are required in both urban and rural locations. Therefore, on July 1, 2010, the MDEQ began collecting NO<sub>2</sub> measurements at Houghton Lake (261130001) and at Lansing (260650012).

Trace NO<sub>y</sub> monitors for the NCore sites at Grand Rapids–Monroe St. (260810020) and Allen Park (261630001) have been operational since December 2007.

**Table 24** summarizes the NO<sub>2</sub> and NO<sub>y</sub> monitoring site information for sites that are in existence in 2014 and will be added 2015. **Figure 16** shows the NO<sub>2</sub> and NO<sub>y</sub> monitoring network operated by the MDEQ in 2014 and 2015.

## **NO<sub>2</sub> and NO<sub>y</sub> Quality Assurance**

The site operator performs a precision check of the analyzer every two weeks. The precision checks are sent to the QA Coordinator each month. Each monitor is audited annually by the AMU's QA Team, which has a separate reporting line of authority from the site operator. The auditor utilizes dedicated gas calibrator and calibration gases that are only for audits. The independent audit challenges the accuracy of the station monitor. The auditor also assesses the monitoring system (inspecting the sample line, filters, and inlet probe), siting, and documentation of precision checks. The results of the audits and precision checks indicate whether the monitor is meeting the measurement quality objectives. The AMU uploads the precision check results and audit results to the EPA's AQS database each quarter. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files.

For conventional (non-trace level) NO<sub>2</sub> monitors, the EPA conducts thru-the-probe audits at 20% of the monitors each year. The audit consists of delivering four levels of calibration gas to the station monitor through the probe. At this time, the EPA is not conducting thru-the-probe audits for the NO<sub>y</sub> monitors.

## **Plans for the 2015 NO<sub>2</sub> and NO<sub>y</sub> Monitoring Network**

During 2015 contingent upon adequate levels of funding, the MDEQ is planning to operate NO<sub>2</sub> at:

- Lansing (260650012)
- Houghton Lake (261130001)
- Detroit-E 7 Mile (261630019)
- Site #1 Eliza Howell Park (261630093)
- Site #2 Eliza Howell Park (261630094)

Also contingent upon adequate funding, the MDEQ will continue to operate trace level NO<sub>y</sub> monitors at the NCore sites:

- Grand Rapids–Monroe St. site (26810020)
- Allen Park site (261630001)

By January 1, 2015, the MDEQ will have setup the new Livonia Near Road (26163xxxx) site.

TABLE 24: NO<sub>2</sub> AND NO<sub>y</sub> SITES IN MICHIGAN

Operating Schedule: Continuous  
 Method: Chemiluminescence

**NCore Sites**

Monitoring Sites		Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID										
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.671389	NO <sub>y</sub>	pop exp	nghbrhd	Kent	1/1/08	GW	774,160
Allen Park	261630001	14700 Goddard	42.2286	-83.208333	NO <sub>y</sub>	pop exp	nghbrhd	Wayne	1/1/08	DWL	4,296,250

**Tier 1: Near Roadway Sites 2014**

Monitoring Sites		Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID										
Eliza Howell #1	261630093	Service Road I-96 & Telegraph	42.386	-83.26632	NO <sub>2</sub>	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250
Eliza Howell #2	261630094	Eliza How ell Park	42.3868	-83.270637	NO <sub>2</sub>	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250

**Tier 2: Community Sites**

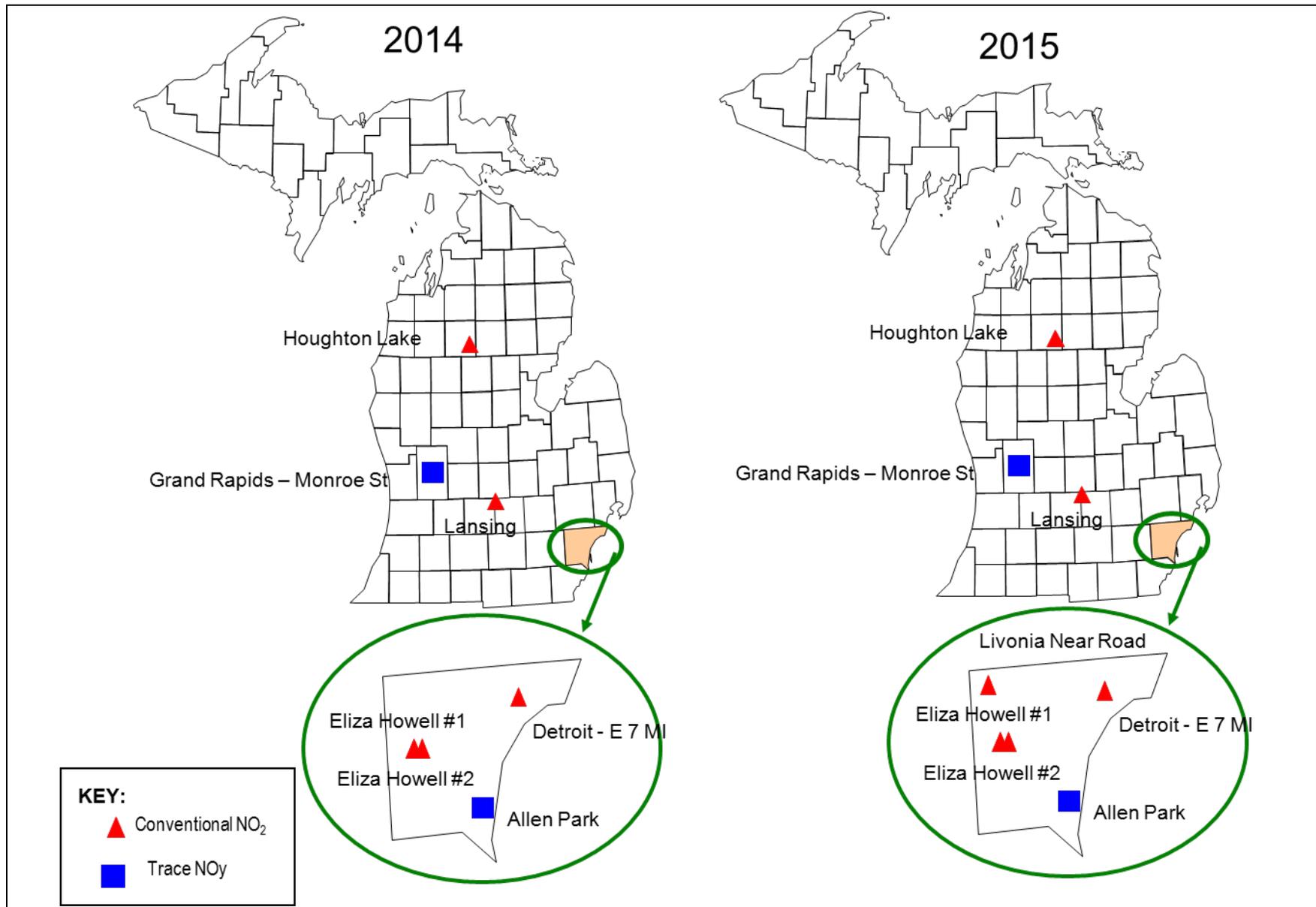
Monitoring Sites		Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID										
Detroit - E 7 Mile	261630019	11600 East Seven Mile Road	42.4308	-83.000278	NO <sub>2</sub>	pop exp	urban	Wayne	12/1/90	DWL	4,296,250
Lansing	260650012	220 N Pennsylvania	42.7386	-84.534722	NO <sub>2</sub>	pop exp	nghbrhd	Ingham	9/5/80	LEL	464,036
Houghton Lake	261130001	1769 S Jeffs Road	44.3106	-84.891944	NO <sub>2</sub>	background	regional	Missaukee	4/1/98	Not in CBSA	N/A

**Tier 1: Near Roadway Sites 2015**

Monitoring Sites		Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID										
Eliza Howell #1	261630093	Service Road I-96 & Telegraph	42.386	-83.26632	NO <sub>2</sub>	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250
Eliza Howell #2	261630094	Eliza How ell Park	42.3868	-83.270637	NO <sub>2</sub>	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250
Livonia Near Road	26163xxxx				NO <sub>2</sub>	Near Road	nghbrhd	Wayne	1/1/15	DWL	4,296,250

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area  
 GW=Grand Rapids-Wyoming Metro. Area  
 LEL= Lansing-East Lansing Metro. Area

**FIGURE 16: MICHIGAN'S NO<sub>2</sub> AND NO<sub>y</sub> MONITORING NETWORK**



**Sulfur Dioxide (SO<sub>2</sub>) Monitoring Network:**

On June 2, 2010, the EPA made the SO<sub>2</sub> NAAQS more stringent by changing the current standard from a 24-hour and an annual average to an hourly measurement that can not exceed 75 ppb. The form of the standard is now a 99<sup>th</sup> percentile form averaged over three years. The secondary standard has not been changed<sup>15</sup>.

To design a monitoring network, the EPA created the Population Weighted Emissions Index (PWEI) that is calculated by:

$$(CBSA\ population^{16}) * (total\ SO_2\ emissions\ in\ that\ CBSA\ in\ tpy) / 1,000,000 = PWEI$$

The PWEI value for each CBSA is compared to the threshold values shown in **Table 25** to determine the number of monitoring sites that are required:

**Table 25: Population Weighted Emission Index Based Monitoring Requirements**

<b>Population Weighted Emissions Index Value</b>	<b>Number of Sites</b>
Greater than or equal to 1,000,000	3
Greater 100,000 but less than 1,000,000	2
Greater than 5,000	1

The PWEI monitors serve a variety of purposes including assessing population exposure, determining trends and transport as well as ascertaining background levels.

The EPA allows agencies to count the NCore SO<sub>2</sub> monitors as part of these new requirements. Also, because the new SO<sub>2</sub> monitors are not single source-oriented, existing infrastructure can be used to select locations for expansion of the SO<sub>2</sub> network.

If **Table 25** is applied to the PWEI calculations for the CBSAs in Michigan, the number of monitors that are required is shown in **Table 26**. The data in the table uses the 2010 Census data and the most recent version (2008) of the National Emissions Inventory data.

<sup>15</sup> Primary National Ambient Air Quality Standards for Sulfur Dioxide; Final Rule, 75 *Federal Register* 35520 (June 22, 2010).

<sup>16</sup> According to the latest Census Bureau estimates

**TABLE 26: POPULATION WEIGHTED EMISSIONS INDEX TOTALS FOR CBSAs IN MICHIGAN**

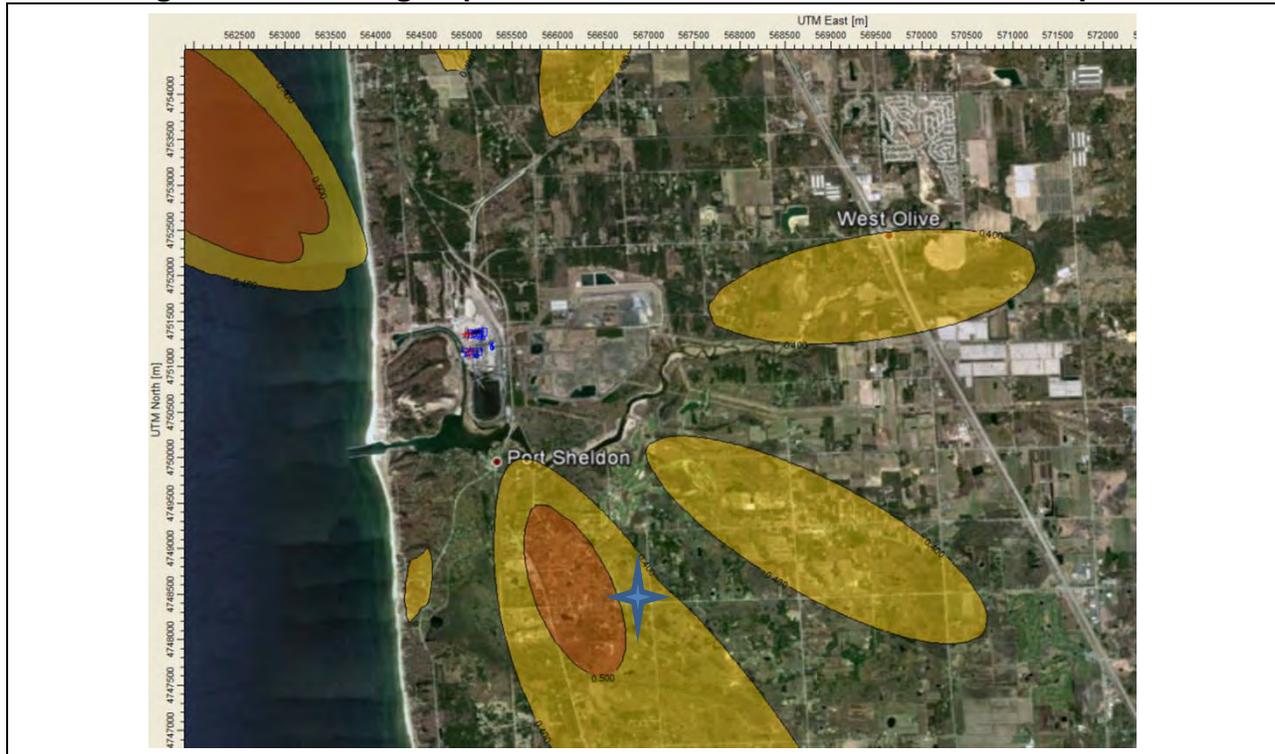
MSA	Counties	2008 NEI	2008 NEI	2010	2008/2010	Monitors
		Download: Total	SO <sub>2</sub> Total			
		County SO <sub>2</sub>	Emissions,	Population	NEI PWEI	Required 2008
		Emissions, tpy	tpy			El & 2010
						Census
Detroit-Warren-Livonia Metro Area	Macomb	1,367.46	124,738	4,296,250	535,905	2
	Oakland	2,780.69				
	Wayne	55,790.51				
	Lapeer	152.87				
	St Clair	64,388.92				
	Livingston	257.45				
Flint Metro Area	Genesee	538.38	538	425,790	229	0
Monroe Metro Area	Monroe	135,799.72	135,800	152,021	20,644	1
Ann Arbor Metro Area	Washtenaw	530.36	530	344,791	183	0
Grand Rapids-Wyoming Metro Area	Kent	1,539.62	1,843	774,160	1,427	0
	Barry	116.40				
	Newaygo	75.23				
	Ionia	111.60				
Holland-Grand Haven Metro Area	Ottawa	39,664.67	39,665	263,801	10,464	1
Muskegon-Norton Shores Metro Area	Muskegon	11,611.80	11,612	172,188	1,999	0
Lansing-East Lansing Metro Area	Clinton	141.76	14,184	464,036	6,582	1
	Ingham	10,546.34				
	Eaton	3,496.12				
Bay City Metro Area	Bay	19,073.08	19,073	107,771	2,056	0
Saginaw-Saginaw Twp N Metro Area	Saginaw	821.42	821	200,169	164	0
Kalamazoo-Portage Metro Area	Kalamazoo	1,672.04	1,810	326,589	591	0
	Van Buren	138.04				
Niles-Benton Harbor Metro Area	Berrien	384.68	385	156,813	60	0
Jackson Metro Area	Jackson	293.11	293	160,248	47	0
Battle Creek Metro Area	Calhoun	666.26	666	136,146	91	0
South Bend Mishawaka Metro Area IN/MI	Cass	98.09	98	52,293	5	0

Based on the 2008 emissions data and 2010 population estimates, the Detroit-Warren-Livonia CBSA needs two SO<sub>2</sub> monitoring sites, while the Holland-Grand Haven Metropolitan Area, Lansing-East Lansing Metropolitan Area, and Monroe Metropolitan Area each need a single SO<sub>2</sub> monitoring site.

The NCore trace level SO<sub>2</sub> monitor at Allen Park (261630001) fulfills the requirement for one of the SO<sub>2</sub> monitors required in the Detroit-Warren-Livonia CBSA. The MDEQ operates a second monitor at Detroit – SWHS (261630015). Previously, the MDEQ operated an SO<sub>2</sub> monitor at Port Huron (261470005). Now that the NAAQS is lower, there may be a possibility that these SO<sub>2</sub> concentrations could violate the NAAQS. Therefore, the MDEQ redeployed an SO<sub>2</sub> monitor to Port Huron (261470005) on 1/1/2012.

The MDEQ deployed SO<sub>2</sub> monitors in the Holland-Grand Haven Metropolitan Area at the Jenison site (261390005) in Ottawa County and in the Lansing-East Lansing Metropolitan Area at the Lansing site (260650012) in Ingham County, on 1/1/2012. The MDEQ and Region 5 have come to the conclusion that the Jenison site (261390005) is not sited close enough to pick up the power plant in West Olive, therefore the MDEQ shut down the Jenison SO<sub>2</sub> monitor at the end of 2013. Currently, the MDEQ is pursuing a new monitoring site to be located at the Port Sheldon Township Hall in West Olive, Michigan. **Figure 17** shows an isopleth of the SO<sub>2</sub> emissions from the power plant. The proposed monitoring site is shown by the star in **Figure 17**. **Figure 18** shows the township hall property where the monitor will be placed. The monitoring site is locate

**Figure 17: Modeling Isopleths SO<sub>2</sub> West Olive – 1-Hour Maximum Impacts**



**Figure 18: Port Sheldon Township Hall, West Olive, Michigan**



**Table 27** summarizes the SO<sub>2</sub> monitoring site information for sites that were in existence in 2014, and **Table 28** lists the proposed locations for the new SO<sub>2</sub> monitors in 2015. **Figure 19** shows the geographical distribution of SO<sub>2</sub> sites across Michigan.

### **SO<sub>2</sub> Quality Assurance**

The site operator performs a precision check of the analyzer every two weeks. The precision checks are sent to the QA Coordinator each quarter. Each monitor is audited annually by the AMU's QA Team, which has a separate reporting line of authority from the site operator. The auditor utilizes dedicated gas calibrator and calibration gases that are only for audits. The independent audit challenges the accuracy of the station monitor. The auditor also assesses the monitoring system (inspecting the sample line, filters, and inlet probe), siting, and documentation of precision checks. The results of the audits and precision checks indicate whether the monitor is meeting the measurement quality objectives. The AMU uploads the precision check results and audit results to the EPA's AQS database each quarter. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files.

The EPA conducts thru-the-probe audits on 20% of the SO<sub>2</sub> monitors each year. The audit consists of delivering four levels of calibration gas to the station monitor through the probe. The EPA reports the audit results to AQS.

### **Plans for the 2015 SO<sub>2</sub> Monitoring Network**

During 2015, contingent upon adequate levels of funding, the MDEQ is planning to continue to operate an SO<sub>2</sub> monitor at:

- Detroit-SWHS (261630015)
- Grand Rapids–Monroe St. (260810020)
- Allen Park (261630001)
- Lansing (260650012)
- Port Huron (261470005)
- Sterling State Park (261150006)

On January 1, 2015, the MDEQ is planning to start operating an SO<sub>2</sub> monitor at:

- West Olive (26139xxxx)

TABLE 27: MICHIGAN'S SO<sub>2</sub> MONITORING NETWORK IN 2014

Operating Schedule: Continuous

Method: Ultra Violet Stimulated Fluorescence

**NCore Sites**

Site Name	Monitoring Sites		Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
	AQS Site ID	Address									
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.671389	trace	pop exp	nghbrhd	Kent	1/1/08	GW	778,009
Allen Park	261630001	14700 Goddard	42.2286	-83.208333	trace	pop exp	nghbrhd	Wayne	1/1/08	DWL	4,403,437

**Source-Oriented Sites**

Site Name	Monitoring Sites		Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
	AQS Site ID	Address									
Lansing	260650012	220 N Pennsylvania	42.7386	-84.534722	SO <sub>2</sub>	Max Conc	nghbrhd	Ingham	1/1/12	LEL	464,036
Monroe	261150006	2800 State Park Road	41.92357	-83.345858	SO <sub>2</sub>	Max Conc	Regional	Monroe	1/1/13	Monroe	152,021
Detroit - SW HS	261630015	150 Waterman	42.3028	-83.106667	SO <sub>2</sub>	Max Conc	nghbrhd	Wayne	1/1/71	DWL	4,403,437
Port Huron	261470005	2525 Dove Rd	42.9533	-82.456389	SO <sub>2</sub>	Max Conc	regional	Saint Clair	2/28/81*	DWL	4,296,250

<sup>1</sup> **CBSA Key:**  
 DWL= Detroit-Warren-Livonia Metro. Area  
 GW=Grand Rapids-Wyoming Metro. Area  
 LEL= Lansing-East Lansing Metro. Area  
 HGH= Holland-Grand Haven Metro. Area  
 Monroe= Monroe Urbanized Area

\* Monitor shutdown in 2007 restarted in January 2012

TABLE 28: MICHIGAN'S PROPOSED SO<sub>2</sub> MONITORING NETWORK IN 2015

Operating Schedule: Continuous

Method: Ultra Violet Stimulated Fluorescence

**NCore Sites**

Monitoring Sites												Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Grand Rapids - Monroe St	260810020	1179 Monroe NW	42.9842	-85.671389	trace	pop exp	nghbrhd	Kent	1/1/08	GW	778,009	
Allen Park	261630001	14700 Goddard	42.2286	-83.208333	trace	pop exp	nghbrhd	Wayne	1/1/08	DWL	4,403,437	

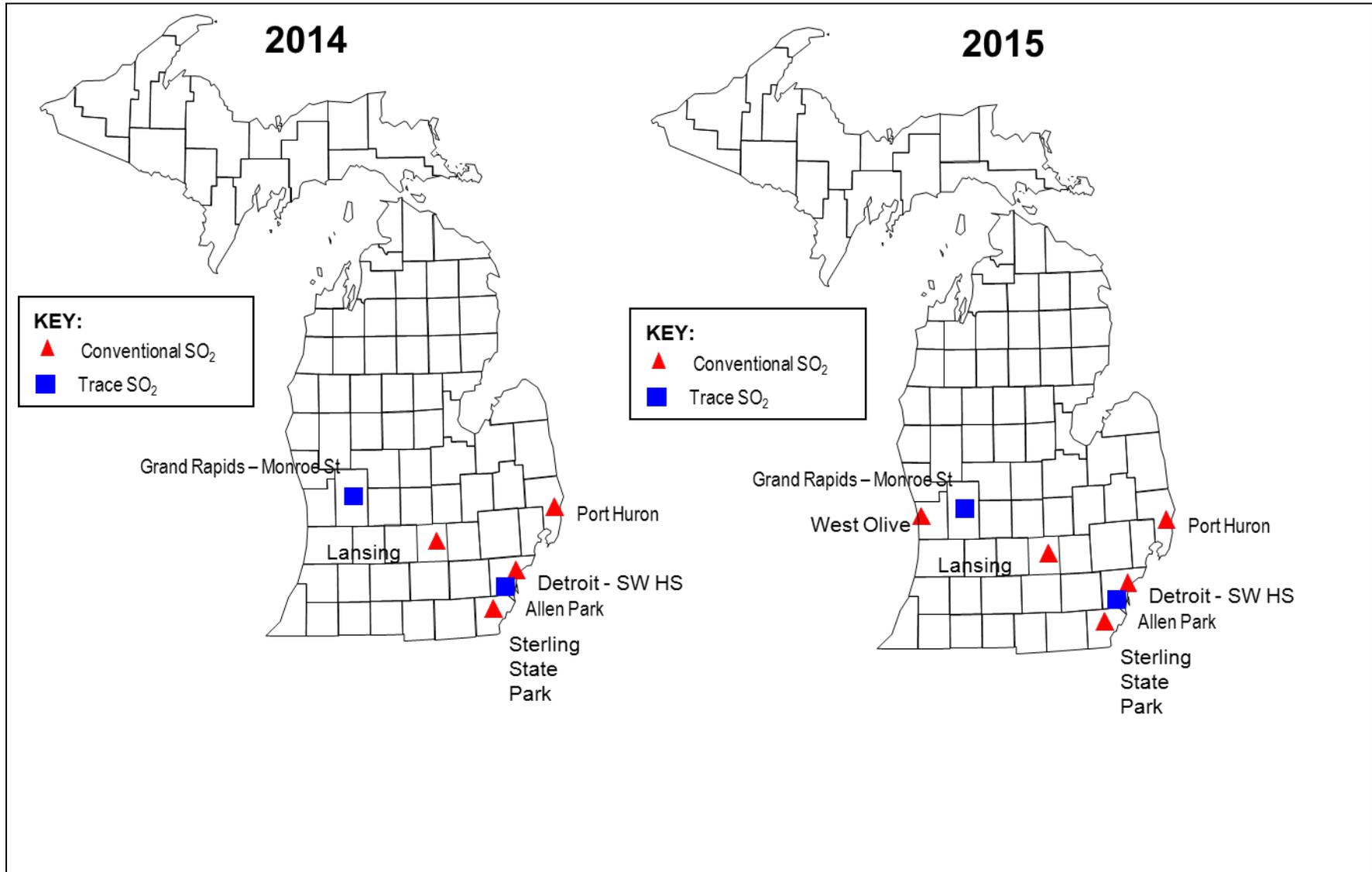
**Source-Oriented Sites**

Monitoring Sites												Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Lansing	260650012	220 N Pennsylvania	42.7386	-84.534722	SO2	Max Conc	nghbrhd	Ingham	1/1/12	LEL	464,036	
Monroe	261150006	2800 State Park Road	41.92357	-83.345858	SO2	Max Conc	Regional	Monroe	1/1/13	Monroe	152,021	
West Olive	26139xxxx				SO2	Max Conc		Ottawa	1/1/15	HGH	263,801	
Detroit - SW HS	261630015	150 Waterman	42.3028	-83.106667	SO2	Max Conc	nghbrhd	Wayne	1/1/71	DWL	4,403,437	
Port Huron	261470005	2525 Dove Rd	42.9533	-82.456389	SO2	Max Conc	regional	Saint Clair	2/28/81*	DWL	4,296,250	

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area  
 GW=Grand Rapids-Wyoming Metro. Area  
 LEL= Lansing-East Lansing Metro. Area  
 HGH= Holland-Grand Haven Metro. Area  
 Monroe= Monroe Urbanized Area

\* Monitor shutdown in 2007 restarted in January 2012

FIGURE 19: MICHIGAN'S SO<sub>2</sub> MONITORING NETWORK



### **Trace Metal Monitoring Network:**

Since 1981, monitoring for trace metals as TSP has been conducted as part of the Michigan Toxics Air Monitoring Program (MITAMP). Over the years, the program gradually expanded to ten sites that collected TSP samples on a once every six or once every 12 day schedule. The samples were analyzed for trace levels of metals. The suite of elements has been modified over the years, with the most recent list including manganese, arsenic, cadmium, and nickel at all sites. Lead is monitored at source-oriented sites and at NCore sites, as discussed in the lead section of this report. The Dearborn NATTS Site (261630033) has a more extensive metals list, which includes: beryllium, vanadium, chromium, manganese, nickel, cobalt, copper, zinc, arsenic, molybdenum, cadmium, barium, lead, and iron.

The trace metals sites include:

- Allen Park (261630001)
- Detroit-SWHS (261630015)
- South Delray (261630027)
- River Rouge (261630005)

Lead sites that have additional trace metals include:

- Vassar (261570001)
- Belding-Merrick St. (260670003)
- Belding-Reed St. (260670002)
- Port Huron (261470031)

Trace metals as PM<sub>10</sub> are determined as part of the NATTS program at Dearborn (261630033). To promote comparability with the TSP-size trace metals collected at other monitoring stations, and to assess both inter-sampler precision and method precision, co-located PM<sub>10</sub> and TSP trace metals are also collected at Dearborn.

The initial data from the Vassar site (261570001) showed high levels of manganese in the TSP fraction, therefore a PM<sub>10</sub> sampler was deployed to the site on 9/1/2012. Due to plant shut down MDEQ would like to discontinue all trace metals monitoring at Vassar (see Lead Monitoring section for more details).

The MDEQ would like to shut down the Belding – Merrick St (260670003) monitor, provided that the Lead non-attainment area is reclassified to attainment (see Lead Monitoring section for more details).

To provide data for an internal manganese work group, PM<sub>10</sub> metals sampling was initiated at River Rouge (261630005) on January 25, 2009. PM<sub>10</sub> filters collected at Allen Park (261630001) and Detroit-SWHS (261630015) were also analyzed for manganese starting January 25, 2009.

Laboratory analysis for manganese as PM<sub>10</sub> was initiated at:

- Allen Park (261630001)
- Detroit-SWHS (261630015)
- River Rouge (261630005)

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Table 29 summarizes the trace metal monitoring site information. Figure 20 compares the locations of trace metal monitoring sites.

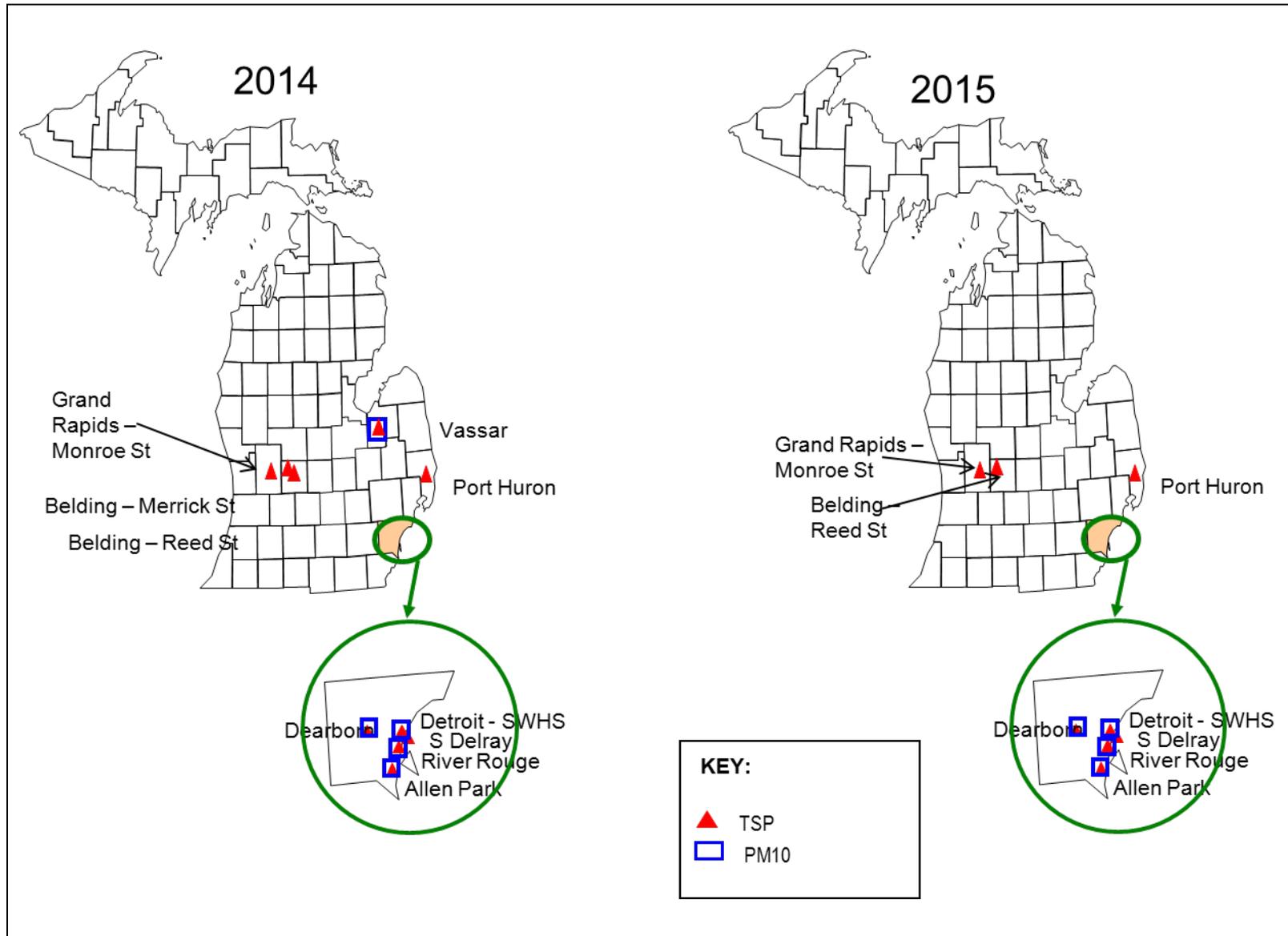
**Table 29: Michigan's Trace Metal Monitoring Network**

<b>Current Monitoring Sites for 2014</b>														
Operating Schedule: 1:6														
Method: TSP: High Volume sampler using glass fiber filter ; Emission Spectra ICAP for lead; ICP MS for remaining metals														
PM10: High Volume sampler using quartz filter; Emission Spectra ICAP for lead; ICP MS for remaining metals														
Monitoring Sites														
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Elements	Size	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)	
Belding - Reed St	260670002	545 Reed St	43.101944	-85.22000	1:6	Pb, Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Ionia	7/2/11	GW	778,009	
Belding - Merrick St	260670003	509 Merrick	43.09984	-85.22163	1:6	Pb, Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Ionia	1/1/10	GW	778,009	
Grand Rapids - Monroe St	260810020	1179 Monroe St NW	42.984167	-85.671389	1:6	Pb, Mn, As, Cd, Ni	TSP	pop exp	ngbrhd	Kent	1/8/10	GW	778,009	
Vassar	261570001	874 E Juron Ave	43.3686	-83.5691	1:6	Pb, Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Tuscola	9/30/11	Not in CBSA	N/A	
Port Horon	261470031	324 Rural St	42.98209	-82.449233	1:6	Pb, Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Saint Clair	1/1/13	DWL	4,296,250	
Allen Park	261630001	14700 Goddard	42.228611	-83.208333	1:6	Mn, As, Cd, Ni	TSP	pop exp	ngbrhd	Wayne	5/1/99	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:6	Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Wayne	1/1/94	DWL	4,296,250	
Detroit - SW HS	261630015	150 Waterman	42.302778	-83.106667	1:6	Mn, As, Cd, Ni	TSP	pop exp	ngbrhd	Wayne	2/26/99	DWL	4,296,250	
S Delray	261630027	7701 W Jefferson	42.292222	-83.106944	1:6	Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Wayne	10/6/04	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	
Allen Park	261630001	14700 Goddard	42.228611	-83.208333	1:6	Mn, As, Cd, Ni	PM 10	pop exp	ngbrhd	Wayne	1/25/09	DWL	4,296,250	
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:6	Mn, As, Cd, Ni	PM 10	max conc	ngbrhd	Wayne	1/25/09	DWL	4,296,250	
Detroit - SW HS	261630015	150 Waterman	42.302778	-83.106667	1:6	Mn, As, Cd, Ni	PM 10	pop exp	ngbrhd	Wayne	1/25/09	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area GW = Grand Rapids- Weyoming Metro Area

<b>Proposed Monitoring Sites for 2015</b>														
Operating Schedule: 1:6														
Method: TSP: High Volume sampler using glass fiber filter ; Emission Spectra ICAP for lead; ICP MS for remaining metals														
PM10: High Volume sampler using quartz filter; Emission Spectra ICAP for lead; ICP MS for remaining metals														
Monitoring Sites														
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Elements	Size	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)	
Belding - Reed St	260670002	545 Reed St	43.101944	-85.22000	1:6	Pb, Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Ionia	7/2/11	GW	778,009	
Grand Rapids - Monroe St	260810020	1179 Monroe St NW	42.984167	-85.671389	1:6	Pb, Mn, As, Cd, Ni	TSP	pop exp	ngbrhd	Kent	1/8/10	GW	778,009	
Port Horon	261470031	324 Rural St	42.98209	-82.449233	1:6	Pb, Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Saint Clair	1/1/13	DWL	4,296,250	
Allen Park	261630001	14700 Goddard	42.228611	-83.208333	1:6	Mn, As, Cd, Ni	TSP	pop exp	ngbrhd	Wayne	5/1/99	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:6	Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Wayne	1/1/94	DWL	4,296,250	
Detroit - SW HS	261630015	150 Waterman	42.302778	-83.106667	1:6	Mn, As, Cd, Ni	TSP	pop exp	ngbrhd	Wayne	2/26/99	DWL	4,296,250	
S Delray	261630027	7701 W Jefferson	42.292222	-83.106944	1:6	Mn, As, Cd, Ni	TSP	max conc	ngbrhd	Wayne	10/6/04	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	
Allen Park	261630001	14700 Goddard	42.228611	-83.208333	1:6	Mn, As, Cd, Ni	PM 10	pop exp	ngbrhd	Wayne	1/25/09	DWL	4,296,250	
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:6	Mn, As, Cd, Ni	PM 10	max conc	ngbrhd	Wayne	1/25/09	DWL	4,296,250	
Detroit - SW HS	261630015	150 Waterman	42.302778	-83.106667	1:6	Mn, As, Cd, Ni	PM 10	pop exp	ngbrhd	Wayne	1/25/09	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	ngbrhd	Wayne	6/1/90	DWL	4,296,250	

FIGURE 20: MICHIGAN'S TRACE METAL MONITORING NETWORK



### **Trace Metal Quality Assurance**

The site operator conducts a precision flow check once a month. The flow check values are sent to the QA Coordinator each quarter. An independent audit is conducted by a member of the AMU's QA Team every six months. The auditor is in a separate line of reporting authority from the site operator and uses independent, dedicated equipment to perform the flow rate audit. The auditor also assesses the condition of the monitor and siting criteria. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files. The audit results are uploaded to the EPA's AQS database each quarter.

The MDEQ Laboratory participates in two types of external performance testing programs. A nationally based audit program sends a sample that has a known concentration of metals spiked onto a filter. The lab analyzes the filter in the same fashion as the routine samples. The results are compared to a "true" value and tabulated for all participants in the program. The MDEQ Laboratory also receives regional round robin audits. The regional audit sample is collected by running an ambient air monitor for 24 hours. The filter is cut into strips and sent to several laboratories. The results for the participating laboratories are compared to each other since a "true" value is not known.

Precision samples for both PM<sub>10</sub> and TSP-sized trace metals are collected at Dearborn (261630033) on a once every twelve day frequency.

### **Plans for the 2015 Trace Metal Network:**

During 2015, contingent upon adequate levels of funding, the MDEQ is planning to continue to collect trace metal measurements, as described for the above elements at:

- Belding-Reed St. (260670002) - TSP – lead, manganese, nickel, arsenic and cadmium
- Grand Rapids-Monroe St. (260810020) - TSP – lead, manganese, nickel, arsenic and cadmium
- Allen Park (261630001) - TSP – lead, manganese, nickel, arsenic and cadmium; for PM<sub>10</sub> manganese, nickel, arsenic and cadmium
- Detroit-SWHS (261630015) - TSP - manganese, nickel, arsenic and cadmium; for PM<sub>10</sub> manganese, nickel, arsenic and cadmium
- South Delray (261630027) - TSP – manganese, nickel, arsenic and cadmium only
- River Rouge (261630005) - TSP - manganese, nickel, arsenic and cadmium; for PM<sub>10</sub> manganese, nickel, arsenic and cadmium
- Dearborn NATTS site (261630033) for both PM<sub>10</sub> and TSP – metals reported include manganese, nickel, arsenic, cadmium, lead, beryllium, vanadium, chromium, cobalt, copper, zinc, molybdenum, barium and iron.
- Port Huron (261470031) - TSP – lead, manganese, nickel, arsenic and cadmium.

On January 1, 2015, the MDEQ would like to shut down the following monitors:

- Belding-Merrick St. (260670003) - TSP – lead, manganese, nickel, arsenic and cadmium (or when the Belding lead non-attainment area has been reclassified to attainment, whichever is later.)
- Vassar (261570001) –TSP- lead, manganese, nickel, arsenic and cadmium; for PM<sub>10</sub> manganese, nickel, arsenic and cadmium

## **Volatile Organic Compound (VOC) Monitoring Network:**

The collection of more than 50 VOCs per sample began at various sites in 1990 as part of MITAMP air toxics network. Either a once every six day or once every 12 day sampling frequency has been used depending on the site and budget status. The Detroit-SWHS (261630005) site in Detroit has been the trend site and has collected VOC samples every year since 1993. The determination of VOC samples on a one every six day sampling frequency using Method TO-15 is required for the NATTS site at Dearborn (261630033). A minimum of six precision samples per year are also collected at Dearborn (261630033) as part of the NATTS program.

**Table 30** summarizes the VOC monitoring site information. **Figure 21** illustrates the geographical distribution of VOC monitors in Michigan.

### **VOC Quality Assurance**

Once a year, the QA Team conducts a thru-the-probe audit using a known concentration of specialized calibration gas. The gas is sent through the station sample probe and collected into a clean, evacuated 6-liter Summa canister over a 24-hour period, and analyzed using EPA Method TO-15. The results are compared to the auditor's target concentration. Once a year, the QA Team also conducts a zero air check on the sampler by running VOC-free air through the probe and into an air canister for 24 hours. The auditor assesses the sampling configuration, including the condition and height of probe and siting criteria.

The MDEQ Laboratory also participates in both national and regional performance test programs. The national program sends a spiked sample of known compounds and concentrations to the laboratory. The results from state laboratories are compared to the "true" value. The regional performance test audit is produced by a multi-sampling unit that collects actual ambient air. The results from the participating laboratories are compared to each other since a "true" value is not known. The QA Coordinator receives, reviews, and retains copies of all performance test audit samples.

Performance evaluation samples containing known levels of various VOCs are analyzed by the MDEQ Laboratory. The MDEQ Laboratory also participates in regional round robin samples.

### **Plans for the 2015 VOC Monitoring Network**

During 2015 contingent upon adequate levels of funding, the MDEQ is planning to continue to collect VOCs at:

- Detroit-SWHS (261630015) once every 12 days.
- Dearborn NATTS site (261630033) once every six days and precision samples.

**TABLE 30: MICHIGAN'S VOC MONITORING NETWORK**

Operating Schedule: 1:6 and 1:12

Method: Stainless Steel Pressurized Canister Sampler; Gas Chromatograph/ Mass Spectrometer (24-hr samples)

Site Name	Monitoring Sites		Latitude	Longitude	Sampling			County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)
	AQS Site ID	Address			Frequency	Purpose	Scale				
Detroit - SWHS	261630015	150 Waterman	42.302778	-83.106667	1:12	pop exp	nghbrhd	Wayne	2/26/99	DWL	4,296,250
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	max conc	nghbrhd	Wayne	6/1/90	DWL	4,296,250

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area

**FIGURE 21: MICHIGAN'S VOC MONITORING NETWORK**



## **Carbonyl Monitoring Network:**

The collection of carbonyl compounds, including formaldehyde and acetaldehyde as part of MITAMP began at various sites in 1995. Either a once every six day or once every 12 day sampling frequency has been used depending on the site and budget status. The Detroit- SWHS (261630005) site in Detroit has been the trend site and has collected carbonyl samples every year since 1995.

Levels of formaldehyde in southeast Michigan are very heterogeneous, unlike other areas of the United States. Historical concentrations at River Rouge (261630005) are elevated, so the continuation of this monitor is important for the characterization of risk and for the determination of trends, this runs on a once every 12 days schedule. Detroit-SWHS (261630015) is the MDEQ's air toxic trend site, so monitoring has continued on a once every 12 day schedule. Monitoring for carbonyl compounds on a one in six day frequency using Method TO-11A is required at the Dearborn NATTS site (261630033). Also, as a part of NATTS, six precision samples for carbonyls are collected every year.

**Table 31** summarizes the carbonyl monitoring site information for sites that were in existence in 2012 and are continuing to operate in 2013. **Figure 22** shows the distribution of carbonyl samplers across Michigan.

### **Carbonyl Quality Assurance**

Once a year, the QA Team conducts a thru-the-probe audit using a known concentration of specialized calibration gas. The gas is sent through the station sample probe and collected on a dinitrophenyl hydrazine (DNPH) cartridge over a 24-hour period, and analyzed using EPA Method TO-11A. The laboratory result is compared to the auditor's target concentration. The QA Team also conducts a zero air check of the sampler once a year by sending carbonyl-free air through the probe and into the sampler for 24 hours. The auditor assesses the sampling configuration, including the condition and height of probe and siting criteria.

The carbonyl samples are sent to two different labs. The NATTS samples go to a National Contract Lab. The National Lab participates in a national performance test program. The lab where the Detroit SWHS and River Rouge samples goes to is also required to participate in the NATTS performance test program. The national contractor sends a spiked sample of known compounds and concentrations to the laboratory. The results are compared to the "true" value. The regional performance test audit is produced by a multi-sampling unit that collects actual ambient air. The results from the participating laboratories are compared to each other since a "true" value is not known. The QA Coordinator receives, reviews, and retains copies of all performance test audit samples.

### **Plans for the 2015 Carbonyl Monitoring Network**

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to collect carbonyls at:

- Detroit-SWHS (261630015) once every 12 days
- River Rouge (261630005) once every 12 days
- Dearborn NATTS site (261630033) once every six days and precision samples.

**TABLE 31: MICHIGAN'S CARBONYL MONITORING NETWORK**

Operating Schedule: 1:6 and 1:12  
 Method: 2,4 dinitrophenyl hydrazine treated silica gel cartridges; HPLC with ultraviolet absorption

Site Name	Monitoring Sites		Latitude	Longitude	Sampling Frequency	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)
	AQS Site ID	Address									
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	max conc	nghbrhd	Wayne	6/1/90	DWL	4,296,250
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:12	max conc	nghbrhd	Wayne	1/1/94	DWL	4,296,250
Detroit - SWHS	261630015	150 Waterman	42.302778	-83.106667	1:12	pop exp	nghbrhd	Wayne	2/26/99	DWL	4,296,250

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area

**FIGURE 22: MICHIGAN'S CARBONYL MONITORING NETWORK**



## **Polynuclear Aromatic Hydrocarbon Monitoring Network:**

As part of the EPA's desire to augment the NATTS, PAHs were added to the Dearborn site on April 6, 2008. Samples are collected on a once every six day sampling schedule using an Anderson PS-1 sampler. The sampler contains a glass thimble filled with prepared polyurethane foam plugs that surround XAD-2 resin. Volatile PAHs are absorbed into the foam and XAD-2 resin. Particle bound PAHs are trapped on a filter that precedes the thimble. A second sampler was deployed to the Dearborn site so that six precision samples can be collected each year, conforming to the EPA's co-location criteria.

The media is sent to the national contract laboratory, Eastern Research Group (ERG), where it is extracted and analyzed according to ASTM test method D 6209, which is equivalent to EPA method TO-13A.

**Table 32** shows the site information for PAH sites that were in operation in 2014 and are currently operating. **Figure 23** shows the locations of sites where PAH monitoring occurs. design.

### **PAH Quality Assurance**

The site operator conducts a precision flow check once a month. The flow check values are sent to the QA Coordinator each quarter. An independent audit is conducted by a member of the AMU's QA Team once a year. The auditor is in a separate line of reporting authority from the site operator and uses independent, dedicated equipment to perform the flow rate audit. The auditor also assesses the condition of the monitor and siting criteria. The QA Coordinator reviews all audit results, and hard copies are retained in the QA files.

### **Plans for the 2015 PAH Monitoring Network**

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to collect PAHs at:

- Dearborn (261630033) – once every six days and precision samples

TABLE 32: PAH NETWORK IN MICHIGAN

Operating Schedule: 1:6  
 Method: Polyurethane foam plugs and XAD-2 resin with gas chromatography mass spectrometry  
 Network as of 2012

Monitoring Sites			Sampling					Date	CBSA <sup>1</sup>		Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Frequency	Purpose	Scale	County	Estab.	CBSA <sup>1</sup>	Pop (2010 Census)
Dearborn	261630033	2842 Wyoming	42.30667	-83.1489	1:6	max conc	nghbrhd	Wayne	6/1/90	DWL	4,296,250

<sup>1</sup> CBSA Key: DWL= Detroit-Warren-Livonia Metro. Area

FIGURE 23: MICHIGAN'S PAH MONITORING NETWORK



## **Meteorological Measurements:**

Various meteorological measurements have been added to supplement the ambient monitoring network and enhance data analysis activities. A description of the types of meteorological measurements that are made at each site is provided in **Table 33**. The only changes the MDEQ plans to make are to move the existing meteorological equipment at the Livonia (261630025) to the new Livonia Near Road (26163xxxx) site and to establish meteorological equipment at the new West Olive (26139xxxx) SO<sub>2</sub> site.

### **Meteorological Equipment Quality Assurance**

On an annual basis, an Equipment Technician conducts a multi-speed and directional certification of the propeller anemometer and vane systems. The QA Team staff or Senior Environmental Technician performs a "sun shot" to check the true north orientation of the anemometer and vane system at the station.

An independent audit is conducted by the QA Team to assess the accuracy of the indoor and outdoor temperature, barometric pressure, and relative humidity measurements at the site. The comparison is done between the station's measurements and the auditor's certified thermometer, barometer, and hygrometer to ensure the quality objectives are being met. The QA Coordinator reviews the results of both the wind speed and wind direction certifications as well as the independent audits. Hard copies of all assessments are retained in the QA file system.

### **Plans for the 2015 Meteorological Monitoring Network**

During 2015, contingent upon adequate levels of funding, Michigan is planning to continue to collect hourly meteorological measurements at:

- Holland (26005003)
- Bay City (260170014)
- Coloma (260210014)
- Cassopolis (260270003)
- Flint (260490021)
- Otisville (260492001)
- Harbor Beach (260630007)
- Belding-Reed St. (260670002)
- Lansing (260650012)
- Kalamazoo (260770008)
- Grand Rapids–Monroe St. (260810020)
- Evans (280810022)
- Tecumseh (260910007)
- New Haven (260990009)
- Sterling Heights/Freedom Hill (260990021)
- Scottville (261050007)
- Houghton Lake (261130001)
- Sterling St Park – Monroe (261150006)
- Muskegon–Green Creek Rd. (261210039)
- Oak Park (261250001)
- Pontiac (261250011)
- Rochester (261250012)
- Jenison (261390005)

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- Port Huron (261470005)
- Seney (261530001)
- Ypsilanti (261610008)
- Allen Park (261630001)
- River Rouge (261630005)
- Detroit–SWHS (261630015)
- Detroit-Joy Rd. (261630026)
- Dearborn (261630033)
- Detroit–FIA/Lafayette (261630039)
- Eliza Howell #1 (261630093)
- Eliza Howell #2 (261630094)

To the best of our knowledge, the following tribal meteorological equipment monitor will continue operation:

- Manistee (261010922)
- Sault Ste. Marie (260330901)

The MDEQ is planning on moving the existing meteorological equipment at the Livonia (261630025) site to the new Livonia Near Road (26163xxxx) site.

The MDEQ is planning on placing meteorological equipment at the new West Olive (26139xxxx) SO<sub>2</sub> site.

**TABLE 33: METEOROLOGICAL MEASUREMENTS IN MICHIGAN**

Site Name	AQS ID	WS	WD	Temperature	Rel. Humidity	Barom. Pressure	Solar Radiation	Sigma Theta
Holland	260050003	X	X	X	X	X	X	X
Bay City	260170014	X	X	X				X
Coloma	260210014	X	X	X				X
Cassopolis	260270003	X	X	X				X
Sault Ste Marie +	260330901	X	X	X		X		X
Flint	260490021	X	X	X		X		X
Otisville	260492001	X	X	X		X		X
Harbor Beach	260630007	X	X	X				X
Belding- Reed St	260670002	X	X	X		X		X
Lansing	260650012	X	X	X		X		X
Kalamazoo	260770008	X	X	X				X
Grand Rapids - Monroe St	260810020	X	X	X	X	X		X
Evans	260810022	X	X	X				X
Tecumseh	260910007	X	X	X		X		X
New Haven	260990009	X	X	X	X		X	X
Sterling Hts/ Freedom Hill	260990021	X	X	X				X
Manistee +	261010922	X	X	X		X	X	X
Scottville	261050007	X	X	X				X
Houghton Lake	261130001	X	X	X		X		X
Sterling St Park - Monroe	261150006	X	X	X				X
Muskegon, Green Ck Rd	261210039	X	X	X				X
Oak Park	261250001	X	X	X		X		X
Pontiac	261250011	X	X	X				X
Rochester	261250012	X	X	X				X
Jenison	261390005	X	X	X				X
West Olive (1/1/2015)	26139xxxx	X	X	X				X
Port Huron	261470005	X	X	X		X		X
Seney	261530001	X	X	X	X	X	X	X
Ypsilanti	261610008	X	X	X		X		X
Allen Park	261630001	X	X	X	X	X		X
River Rouge	261630005	X	X	X				X
Detroit - SW HS	261630015	X	X	X	X	X		X
Detroit - E 7 Mi	261630019	X	X	X	X	X		X
Livonia	261630025	X	X	X	X	X		X
Detroit - Joy Rd	261630026	X	X	X				X
Dearborn	261630033	X	X	X	X	X		X
Detroit -FIA/Lafayette	261630039	X	X	X				X
Eliza How ell #1	261630093	X	X	X				X
Eliza How ell #2	261630094	X	X	X	X	X		X

**Adequacy of Michigan's Monitoring Sites:**

The suitability of the monitoring site locations is frequently assessed by the AMU's QA Team and the EPA. The EPA assesses the adequacy of the stations during PM<sub>2.5</sub> PEP audits, gaseous NPAP audits, and systems audits. The results indicate that the stations are properly sited, which includes distances away from obstructions, large trees, and set-backs from roadways. Suitability of probe heights and separation distances are assessed both by MDEQ and EPA auditors.

The overall design of the regional air monitoring networks will be assessed by the Regional EPA office with assistance from state, local and tribal agencies once every five years. The next regional review is due by July 1, 2015. This review assesses any redundancies of monitors along border areas will be assessed, identifies monitors that are no longer necessary and determines network deficiencies. Preliminary versions of this assessment were reviewed and suggested changes to Michigan's ambient air monitoring network are addressed in various portions of this review.

**Appendix A: Acronyms and Their Definitions:**

>	Greater than
<	Less than
≥	Greater than or equal to
≤	Less than or equal to
%	Percent
µg/m <sup>3</sup>	Micrograms per cubic meter
AERMOD	AMS/EPA Regulatory Model
AMU	Air Monitoring Unit
AQD	Air Quality Division
AQS	Air Quality System (EPA air monitoring data archive)
ARM	Approved regional method
BAM	Beta Attenuation Monitor (hourly PM <sub>2.5</sub> measurement monitor)
CAA	Clean Air Act
CASTNET	Clean Air Status and Trends Network
CBSA	Core-Based Statistical Area
CFR	Code of Federal Regulations
CO	Carbon monoxide
CSA	Consolidated Statistical Area
DNPH	2,4 -di nitrophenyl hydrazine – this is the derivatizing agent on the cartridges used to collect carbonyl samples
DPW	Department of Public Works
EC	Elemental carbon
EPA	U.S. Environmental Protection Agency
FDMS	Filter Dynamic Measurement System
FEM	Federal Equivalent Method
FIA	Family Independence Agency
FRM	Federal Reference Method
GC	Gas chromatograph (instrument providing VOC measurements)
GFIs	Ground fault circuit interrupters
hr	Hour
IN-MI	Indiana-Michigan
LADCO	Lake Michigan Air Directors Consortium
DEQ	Michigan Department of Environmental Quality
MITAMP	Michigan Toxics Air Monitoring Program
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standard
NAMS	National Air Monitoring Station
NATTS	National Air Toxics Trend Sites
NCore	National Core Monitoring Sites
NEI	National Emission Inventory
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of Nitrogen
NO <sub>y</sub>	Oxides of nitrogen + nitric acid + organic and inorganic nitrates
NPAP	National Performance Audit Program
OAQPS	Office of Air Quality and Planning and Standards (EPA)
OC	Organic carbon
OTAQ	Office of Transportation and Air Quality (EPA)
PAH	Polynuclear Aromatic Hydrocarbon
PAMS	Photochemical Assessment Monitoring Station

## **MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

### Appendix A: Acronyms and Their Definitions, Continued

PEP	Performance Evaluation Program
PM	Particulate matter
PM <sub>2.5</sub>	Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns
PM <sub>10</sub>	Particulate matter with a diameter of 10 microns or less
PM <sub>10-2.5</sub>	Coarse PM equal to the concentration difference between PM <sub>10</sub> and PM <sub>2.5</sub>
ppb	parts per billion
ppm	parts per million = mg/kg, mg/L, µg/g (1 ppm = 1,000 ppb)
QA	Quality assurance
QAPP	Quality Assurance Project Plan
RTI	Research Triangle Institute (national contract laboratory for speciated PM <sub>2.5</sub> )
SLAMS	State and Local Air Monitoring Station
SO <sub>2</sub>	Sulfur dioxide
STAG	State Air Grant (federal)
STN	Speciation Trend Network (PM <sub>2.5</sub> )
TEOM	Tapered element oscillating microbalance (hourly PM <sub>2.5</sub> measurement monitor)
tpy	ton per year
TRI	Toxic Release Inventory
TSP	Total Suspended Particulate
U of M	University of Michigan
U.S.	United States
VOC	Volatile organic compounds

## **Appendix B: Summary of Comments Received and Replies**

As part of the network review process, the EPA requires that the MDEQ solicit public comments. The MDEQ made the draft 2015 Network Review available for public review by posting the document on its air quality homepage. To ensure that public was aware that the document was open for comment, the 30-day public comment period was announced in the DEQ Calendar on May 19, 2014.

The MDEQ received 38 comments to the network review. These comments fell into two distinct categories, and they will be addressed separately. There were 36 commenters that commented on EPA's proposal to defund of the PM<sub>2.5</sub> Speciation Monitor at the SWHS (261630015) site. The other 2 commenters spoke to the need for MDEQ to increase SO<sub>2</sub> monitoring throughout the State.

### **Comment:**

The MDEQ received 36 comments requesting that the PM<sub>2.5</sub> Speciation monitor located at SWHS (261630015) be retained and continued to be funded by the EPA. They offered evidence such as the monitor is located in one of Michigan's most polluted areas, it is one of highest PM<sub>2.5</sub> monitoring sites in the state, and the future construction of the International Bridge for reason that the monitor should be retained. It is also stated, that the monitor is also located in an Environmental Justice area and is needed to protect the public health of those living in this area. It was noted that there are also many researchers who are using this data for health studies.

### **Response:**

The MDEQ agrees with these comments and would like the EPA to continue funding so that the SHWS (261630015) and Tecumseh (260910007) speciation monitors can be retained. The data from both of these sites are routinely used in health studies. Mr. Dan Wyant, Director MDEQ, sent a letter to Ms. Janet McCabe, Acting Assistant Administrator, on June 12, 2014 requesting that these monitors be retained. Siting the current health study at Tecumseh as the reason for retaining that monitor. The SWHS monitor is located in an environmental justice area that has been the focus of much EPA and MDEQ attention in recent years, it is located near the proposed New International Trade Crossing, and the City of Dearborn is planning to use the data in a new health study. Mr. G. Vinson Hellwig, Chief, Air Quality Division, also sent a letter to Mr. Lewis Weinstock, EPA, requesting that the SWHS and Tecumseh speciation monitors continue to be funded so that they can be retained. The reasons cited in this letter included SWHS being located in an environmental justice area surrounded by heavy industry and has had violations of the SO<sub>2</sub> NAAQS and Tecumseh having a current health study located using its data.

### **Comment:**

Two commenters argued the need for the MDEQ to increase its focus on sulfur dioxide (SO<sub>2</sub>).

The first commenter asked that the MDEQ rely upon source-oriented dispersion modeling to increase the number of SO<sub>2</sub> samplers in MDEQ's ambient air monitoring network and/or to

relocate existing analyzers to better quantify maximum impacts from the sources already monitored by MDEQ. The commenter provided modeling analyses for DTE's St. Clair, Belle River, Trenton Channel, River Rouge and Monroe plants along with Lansing Board of Water and Light's Eckert plant, Consumer Energy's Campbell plant and Wisconsin Electric's Presque Isle plant. This commenter also stated that SO<sub>2</sub> contributes to the formation of secondary particulate matter.

The second commenter asked that MDEQ install a SO<sub>2</sub> monitor at its New Haven air monitoring station (260990009) so to provide estimates of the SO<sub>2</sub> levels being advected into the Port Huron area

**Response:**

MDEQ's SO<sub>2</sub> air monitoring network is a result of three different requirements or rationale. The first two are required in federal regulations (40 CFR Part 58) that prescribe the minimum required monitoring States must perform under an acceptable State Implementation Plan (SIP).

The first is EPA's requirement to carryout trace level SO<sub>2</sub> monitoring at all National Core (NCore) monitoring sites. MDEQ has met this requirement at its two NCore stations: Allen Park (2616300) and Grand Rapids-Monroe Street (260810020).

The second EPA requirement is the Population Weighted Emission Index (PWEI), added to Part 58 in 2010. For any area with a calculated PWEI value between 5000 and 100,000 million person-tons per year, the MDEQ is required to have one SO<sub>2</sub> monitor. As a result, the MDEQ has SO<sub>2</sub> monitors in Lansing (260650012) and Monroe-Sterling State Park (261150006) to fulfill PWEI requirements for Lansing Board of Water and Light's Eckert station and DTE's Monroe plant, respectively. By January 1, 2015, as described on pages 65 and 66 the annual network review, and further discussed below, MDEQ plans to begin monitoring in West Olive in proximity to Consumer Energy's Campbell plant. The West Olive monitor will bring Michigan into full compliance with the Part 58 minimum monitoring requirements.

The third rationale used by the MDEQ for SO<sub>2</sub> monitoring revolves around continuing those State and Local Air Monitoring Stations (SLAMS) that have observed the highest SO<sub>2</sub> concentrations in the past. For this reason, the MDEQ monitors SO<sub>2</sub> at Port Huron (261470005) and Detroit-Southwestern High School (also known as Detroit-Fort Street, 261630015).

While not part of the MDEQ network, SO<sub>2</sub> monitoring is also being carried out at a school by a southwest Detroit industrial facility near River Rouge. This data is being uploaded to the EPA's national data repository, AQS, and as such, is available for regulatory use.

Currently, the EPA is developing regulations on the need for additional SO<sub>2</sub> data to make SO<sub>2</sub> designations in areas not currently designated as nonattainment. This is the proposed "Data Requirements Rule" that, if finalized, will require States to characterize the air quality these areas through either monitoring or dispersion modeling. The Data Requirement Rule is expected to be finalized in the spring of 2015 with any subsequent monitoring due by January 2017. Until EPA puts final regulations in place, the MDEQ does not believe the time is ripe to propose or implement additional SO<sub>2</sub> monitoring at Marquette, New Haven, St. Clair, Trenton or Belle River. However, once EPA regulations are available, the MDEQ will solicit public comment as part of its annual air monitoring network review process on how and where additional SO<sub>2</sub> monitoring should be conducted, if the State has the resources to conduct such monitoring. Under the proposed regulations, the State will have the choice of characterizing

attainment status of source-specific areas through the use of dispersion modeling in lieu of ambient monitoring.

With respect to the modeling submitted by the commenter on the placement of MDEQ's SO<sub>2</sub> monitors, the MDEQ believes that this modeling supports our monitor placement in Monroe. While the commenter suggests the Lansing and Detroit-Southwestern High School monitors "...could be relocated to capture peak SO<sub>2</sub> concentrations," the MDEQ believes that these monitors are indeed impacted by the nearby emission sources. The MDEQ also believes that given site access, siting criterion for trees and other obstructions, and the need to be in close proximity to electrical power, moving these sites to localized hotspots is not possible without being cost prohibitive.

While the MDEQ continues to pursue SO<sub>2</sub> monitoring in West Olive to characterize impacts from the Consumers Energy Campbell plant, we were not able to secure site access as proposed on pages 65 and 66 of the annual air monitoring network review. The MDEQ is now working to secure access to property located 1 to 2 miles northeast of the Campbell Plant before January 1, 2015. Modeling submitted by the commenter suggests that the plant's SO<sub>2</sub> impacts are significant in this area.

Lastly, the MDEQ recognizes that SO<sub>2</sub> emissions may lead to secondary ambient particulate production. While the EPA has proposed to shut down five particulate matter less than 2.5 micrometers in diameter (PM<sub>2.5</sub>) speciation sites in Michigan, MDEQ has gone on record that the speciation monitor at Detroit-Southwestern High School, located in an area of both high SO<sub>2</sub> emissions and some of the state's highest ambient PM<sub>2.5</sub> levels, should continue to be funded by EPA. The MDEQ has also gone on record that funding for the PM<sub>2.5</sub> speciation monitor at Tecumseh should be retained as local universities are carrying out health studies using this data.



RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF ENVIRONMENTAL QUALITY  
LANSING



DAN WYANT  
DIRECTOR

June 12, 2014

Ms. Janet McCabe, Acting Assistant Administrator  
Office of Air and Radiation  
United States Environmental Protection Agency  
William Jefferson Clinton Building  
Mail Code: 6101A  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Dear Ms. McCabe:

As you are aware, the United States Environmental Protection Agency's (USEPA's) Office of Air Quality Planning and Standards (OAQPS) is proposing to stop funding for 53 particulate (PM<sub>2.5</sub>) speciation ambient monitoring sites across the country. Of these 53 sites, five are located in Michigan: Monroe-Sterling State Park (261150006), Tecumseh (260910007), Detroit-Southwestern High School (261630015), Port Huron (261470005), and Houghton Lake (261130001). The Michigan Department of Environmental Quality (MDEQ) understands the USEPA's desire to maximize limited fiscal resources by cutting nonessential or duplicative programs. For this reason, we support OAQPS's proposal to stop funding the PM<sub>2.5</sub> speciation monitoring at the Monroe-Sterling State Park, Port Huron, and Houghton Lake sites. However, we believe that it would be a mistake to stop funding the PM<sub>2.5</sub> speciation monitoring at the Tecumseh and Detroit-Southwestern High School sites.

The Tecumseh speciation data is being used in an ongoing study to determine the health impact of ambient particulate upon the people living in southeast Michigan. Researchers are taking individuals living in the small town of Tecumseh, exposing them to particulate in the more industrialized Dearborn area for four or more hours, and then quantitating changes in key cardiovascular functions. The researchers have found cardiovascular differences in the individuals correlate with differences in PM<sub>2.5</sub> levels and species found at the two sites (<http://www.nature.com/jes/journal/vaop/ncurrent/full/jes201435a.html>). Obviously, PM<sub>2.5</sub> speciation data from Tecumseh remains crucial for the researchers to continue this investigation.

The Detroit-Southwestern High School speciation monitor is located in an environmental justice area that has been the focus of much USEPA and MDEQ attention in recent years. In addition, the Detroit-Southwestern High School monitor is located at the foot of the proposed New International Trade Crossing, a bridge that will connect Detroit with Windsor, Ontario. It is imperative that PM<sub>2.5</sub> speciation monitoring continue if we are to determine the impact of diesel emissions from use of the proposed bridge upon the southwest Detroit community. Lastly, the city of Dearborn, with support from the Michigan Department of Community Health, is seeking grant funding to compare asthma in their community with other nearby areas. Southwest Detroit is certain to be one of these areas, so we do not want to shut down speciation measurements that may be of use to them.

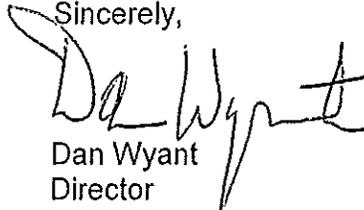
Ms. Janet McCabe

Page 2

June 12, 2014

We hope that this letter helps illustrate the importance of keeping speciated  $PM_{2.5}$  monitoring at our Tecumseh and Detroit-Southwestern High School stations. Should you have any questions regarding this matter, please contact Mr. G. Vinson Hellwig, Chief, Air Quality Division, at 517-284-6773; hellwig@michigan.gov; or MDEQ, P.O. Box 30260, Lansing, Michigan 48909-7760; or you may contact me.

Sincerely,



Dan Wyant  
Director  
517-284-6700

cc: Mr. Steve Page, OAQPS, USEPA  
Mr. Jim Sygo, Deputy Director, MDEQ  
Mr. G. Vinson Hellwig, MDEQ  
Mr. Craig Fitzner, MDEQ

June 6, 2014

Mr. Lewis Weinstock  
109 T.W. Alexander Drive  
Mail Code: C304-06  
Research Triangle Park, NC 27709

Dear Mr. Weinstock:

On behalf of the States of Indiana, Michigan, Minnesota, Ohio and Wisconsin, we are writing in response to EPA's recent evaluation of the Chemical Speciation Network (CSN). We appreciate EPA's approach to evaluating this important network and the potential cost savings that could be gained by closing some monitoring sites. Because there are so many uses for the CSN data, we urge EPA to move slowly and carefully in making changes to the network. We also specifically request that EPA take the following comments into consideration before defunding any site.

1. EPA's evaluation presumes that only high concentration sites are valuable. In reality, states must maintain low concentration sites as well as high concentration sites, in order to understand PM<sub>2.5</sub> behavior and transport across state and national boundaries. SIPs are required to evaluate transport, and that can't be done without looking at the differences between rural and urban sites. This must not be relegated to a 'secondary priority' as it says in the assessment; SIPs are a primary priority and they need to include an evaluation of interstate transport. For model validation purposes, low concentration sites are just as valuable as high concentration sites, since air quality models must be able to accurately represent a range of concentrations.
2. Environmental justice was not considered in the ranking. For years EPA has encouraged the states to monitor air quality in environmental justice areas, and the states have responded by siting several speciation monitors in these areas. To evaluate the network and exclude this monitoring objective is counter to the EPA's and the states' long-standing goal of environmental justice and equity.
3. The analysis relies on IMPROVE sites for coverage in rural areas, but IMPROVE sites are only required in Class 1 areas. In the Midwest and Region 5, there are only 4 sites in Class 1 areas, those on the MN-MI/Canadian border. Other Region 5 IMPROVE monitors that are currently sited in non-Class 1 areas are supported by their host states with money from STAG grants. As this source of funding declines, states will have to make hard decisions about which sites to support, and these IMPROVE sites are likely targets because there is no federal mandate to maintain them. This reliance on IMPROVE and the assumption that all IMPROVE sites are permanent is a serious weakness in EPA's assessment and will lead to gaps in regional coverage. Further, even the Class 1 sites are not immune from budget constraints; IMPROVE's budget has been flat in recent years, but costs to operate the sites continue to increase. As a result, the

IMPROVE program is searching for ways to trim costs as well.

4. The timing of the decision to defund should wait until the states complete their annual network reviews and the 5-year network assessments that are due in July 2015. The rush to implement these changes does not allow adequate time for states to make their own evaluation of which sites are most critical. A slower and more thoughtful, collective process is more likely to satisfy the multiple stakeholders and users of CSN data. At the least, states should be allowed to continue any defunded sites they contest until the 5-year assessments are done.
5. The budget process has been less than transparent. EPA's presentations, though helpful, did not explain the rationale for these specific budget cuts.
6. Along those same lines, EPA should provide more specific information on the proposed reinvestment. How will the choices of equipment, analytes, and locations be made and how will the reinvestment dollars be equitably distributed? States should have input into these discussions before decisions are final.
7. Specific sites in Region 5 that should be retained include the following:
  - Tecumseh, MI (26-091-0007) is currently providing data for a health study conducted by University of Michigan.
  - Southwest High School in Detroit (26-163-0015) is located in an environmental justice area surrounded by heavy industry and has had violations of the SO<sub>2</sub> NAAQS.
  - Perkinstown, WI (55-119-8001) is a rural transport site used for SIP analyses.
  - Green Bay, WI (55-009-0005) was installed as a result of the last 5-year network assessment, to help understand the composition of PM<sub>2.5</sub> at one of the highest concentration sites in the state.
  - Mechanicsburg, IN (18-065-0003) is a rural transport site used for SIP analyses.
  - Akron OH (39-153-0023) 5 Points site is the background site used in SIP analyses for Cleveland OH.
  - Toledo OH (39-095-0026) provides coverage for NE Indiana, SE Michigan (outside Detroit) and NW Ohio; the Detroit monitors are not representative of that entire region.
  - Ironton OH (39-087-0012) provides coverage for the tristate Ohio, Kentucky, West Virginia area. The NCore site in West Virginia is not sufficient to represent this wide swath of the Ohio River Valley with its many sources and varied terrain.
  - Youngstown OH (39-099-0014) has a long record and provides information on transport from the Midwest to the Northeast.
  - Rochester MN (27-109-5008) should be retained and the Anoka Airport NCore site 27-003-1002 should be relocated to the Anderson School/Phillips site (27-053-0963) if necessary.

Thank you for your attention to these comments. We look forward to working with EPA to resolve these issues and to minimize the impact of any needed budget cuts on critical data uses from the CSN network.

Sincerely,



Keith Baugues  
Assistant Commissioner, Office of Air Quality  
Indiana Department of Environmental  
Management



G. Vinson Hellwig  
Chief, Air Quality Division  
Michigan Department of Environmental Quality



J. David Thornton  
Assistant Commissioner  
Minnesota Pollution Control Agency



Robert Hodanbosi  
Director, Division of Air Pollution Control  
Ohio Environmental Protection Agency



Bart Sponseller  
Director, Bureau of Air Management  
Wisconsin Department of Natural Resources

Cc: Tim Hanley, EPA-OAQPS  
Beth Landis, EPA-OAQPS  
Loretta Lehrman, EPA Region 5  
Patricia Schraufnagel, EPA Region 5  
Ernest Kierbach, Illinois EPA  
Dick Zeiler, Indiana DEM  
Craig Fitzner, Michigan DEQ  
Gary Engler, Ohio EPA  
Rick Strassman, Minnesota PCA  
Gail Good, Wisconsin DNR

## **Appendix C: Written Comments Received**

Amy Robinson  
MDEQ Air Quality Division  
P. O Box 30260  
Lansing, MI. 48909-7760  
[ROBINSONA1@MICHIGAN.GOV](mailto:ROBINSONA1@MICHIGAN.GOV)

Re: Air Monitor Monitor Review 456645

Dear Ms. Robinson,

Enclosed are my comments regarding the proposed de-funding and removal of the PM 2.5 speciation collector at the Southwestern High School site located in Detroit, MI. 48209 in Region# 5. I am strongly against the monitor being de-funded and removed from the area. The job of the monitor is very vital to the communities that surrounds it.

Ms. Robinson the area's zip codes of Southwest Detroit are deemed by the EPA as the most polluted areas in the State of Michigan. Presently, this and other areas of Wayne County are in non-attainment for S02, Iron Manganese and other harmful chemicals. The area is where residential neighborhoods and industry have long co-existed and people have serious health issues. Residents are plagued by dangerously high pollution as it is the home to one of the largest Waste Water & Sewerage Department in the nation as well as being home to more than 27 heavily polluting companies. The area has one of the largest petroleum refineries in the nation the Marathon Oil Corporation along with Yellow Freight trucking, Marathon Asphalt, Cadillac Asphalt, Great Lake Petroleum Terminal, Inland Waters (a toxic waste disposal company), Sun oil, Sunoco just to name a few. In addition, it is bordered by several steel mills Severstal Steel, U.S. Steel and Zug Island. The monitor is need to record the metals and other compounds coming from these industries.

The American Lung Association report gave this Michigan area an "F" for air quality and reported higher (than the national average) cancer and asthma rates among children and adults. Our residents have been fighting against the "Environmental Injustices" that are being heaped upon them as new industries move in and others expand their industrial footprints further and further into the neighborhoods.

One of the very few tools that we and the Michigan Department of Environmental Quality have to measure the particulate matter is the Southwestern monitor. Presently there are no monitors in the residential parts of the communities. We need an increase in monitors (because they are very badly needed) not a decrease. If this monitor is de-funded/removed it would be such a blow it to us all moreover, it will prevent the MDEQ from doing their job. This monitor gives the MDEQ data to validate whether or not surrounding industries (that are allowed to do self-reporting) are reporting proper/accurate reports of their emissions. It was recently revealed by a reporter using the Freedom of Information Act information that Severstal of Dearborn, MI. has been providing MDEQ with incomplete, inaccurate and limited data since 2006. MDEQ was able to use data from areas monitors to determine the inaccuracy of reports they received from Severstal which led to Severstal being cited that led to the Department of Justice doing an investigation which resulted in the MDEQ requesting the EPA to intervene. The DOJ is currently in neogiations with Severstal to correct the problem. We need the check and balance that these monitors provide.

The concern is so great regarding the need for monitoring that we the community (on our own) and the Sierra Club of Michigan hosted Alan Walts of the Region#5, the MDEQ, the U of M Environmental Health studies and Global Community Monitoring to discuss the poor air quality affecting human lives of our communities after we had Picarro testing of California do an independent monitoring. The testing showed that the harmful pollution was off the charts resulting in the communities asking for more monitors.

The Delay area closest to the Southwestern sampler has been marked as heavy industrial by the city of

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Detroit even though there are more than 200 homes in it. It has heavy truck traffic due the many companies/industries that call Southwest Detroit home. In addition, more problem are coming to the area in being that governor Snyder has cleared the last hurdle in bringing a new public-private bridge to the area thus increased car and truck traffic thus more pollution the residents will be exposed. Also, the Detroit Water and Sewerage is building a sludge processing company in the area near the Southwestern monitor. So to me this is merit for the monitor to be retained.

If it is the mission of the EPA and the MDEQ to protect public health, I appeal to you, the EPA and the MDEQ to re-consider any plans to de-fund/remove the monitor.

Respectfully,

Theresa Landrum  
48217 Community and Environmental Health

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Please please do not cancel the air quality monitoring on SW highschool in Detroit! This is crucial data! We need to know the state of air quality with rhe coming bridge! Our community's health is at stake.  
Michelle Martinez

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Dear Ms Robinson.

I strongly oppose the removal of funding for the Southwestern High School/Waterman Street Air Monitor.

This air monitor serves an important purpose in our community, tracking particulate matter, lead, and other toxins in our air. We are surrounded by industrial pollution that affects our health and quality of life. We need to know what we are breathing.

I live and work in Southwest Detroit--please support this important resource for our neighborhoods!  
Cara Graninger

---

Amy Robinson  
MDEQ – Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760

Dear Ms. Robinson,

I understand that the air monitor that is located on Waterman Street in Southwest Detroit may have its funding cut.

Yet Southwest Detroit has a very high amount of industrial pollution that affects our health and the very quality of our lives.

As a resident of the area for almost 30 years, I can testify to the fact that our neighborhood has many families with children, and children suffer disproportionately from toxic waste. As a retiree, I'm at the opposite end of the scale, but also of an age where industrial pollution can be most harmful.

I urge that the funding for the monitor in our area not be cut. If that's not possible, I'd suggest immediately

**MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

shutting down the bridge.

Sincerely yours,

Dianne Feeley

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Dear MDEQ and EPA,

Our Southwest Detroit Air Monitor located on Waterman, serves a most valuable & crucially important purpose in our community especially, when it has been reported that our Southwest Detroit zip codes are the most polluted and toxic in the entire State of Michigan! Our Southwest Detroit Air Monitor continues to be needed to track particulate matter, lead, and other toxins in our air. We are surrounded by industrial pollution caused by industrial polluters that negatively affects our health and quality of life. The People of Southwest Detroit must know what we are breathing and MDEQ and the EPA are charged with helping to protect and improve our Air Quality and, the ultimate tool in allowing MDEQ and the People of Southwest Detroit monitor our air, is the necessary Air Monitor on Waterman.

Based on our need to improve the air quality in Southwest Detroit, we have actually asked about the need for additional Air Monitors, so you can imagine are shock that the only one that we have in place would be considered to be removed...UNACCEPTABLE!

We, the People of Southwest Detroit, implore MDEQ and the EPA not to remove our only Air Monitoring Device in Southwest Detroit!

Sincerely,

Deb Sumner, Resident Property-Owner & Clark Park Coalition Chairwoman/President Emeritus

---

June 17, 2014

Amy Robinson

MDEQ – Air Quality Division

P.O. Box 30260

Lansing, MI 48909-7760

[robinsona1@michigan.gov](mailto:robinsona1@michigan.gov)

Dear Ms. Robinson,

I am writing to provide public comment in support of preserving funding by the EPA for the air monitor at Southwestern High School. As a resident of southwest Detroit, I am very aware that my community is the most polluted community in the state of Michigan. As host to a number of large, industrial polluters as well as a great deal of truck traffic, the cumulative impact of this pollution has led to public health impacts, including extremely high rates of asthma.

It is important that the air monitor at Southwestern High School continue to monitor the air in our residential community so that the impacts of cumulative air pollution can be measured. I ask that funding be continued for this air monitoring site.

Sincerely,  
Amy Amador

## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

Dear Ms. Robinson,

I am writing to register my strong objection to removing the air monitor installed at Southwestern High School in the 48209 zip code of Detroit. I can imagine of no more important community to have its air monitored than that of Southwest Detroit and the air around the Springwells and Fort Street area.

As the former state representative for the area, as well as a 14-year resident in the adjacent zip code (48216), perhaps no other part of Michigan faces as significant threats to air quality as this area. With the state's only operating oil refinery, the state's largest sewage treatment plant (and one of the largest in America), the nation's most valuable international border crossing, a major freeway, the Rouge steel plant, and other industrial and transportation uses within 2-3 miles of this location, the potential threats that require constant monitoring are obvious.

The area contains some extremely dense residential neighborhoods, especially just north of I-75 and some of the only growing areas of working-class communities in Detroit. Yet, one in four children in the area appears to have asthma and hospitalization rates for adult asthma are three times the norm. This is likely the highest rate of asthma in the state.

The air monitors in question detect particular matter (PM), sulfur dioxide (SO<sub>2</sub>), Volatile Organic Compounds (VOCs) and Carbonyls. Wayne County is not in attainment for federal SO<sub>2</sub> standards.

Simply put, I am completely flabbergasted that decommissioning this important air monitoring spot is even in question. None of this even considers the proposed new border crossing, which is slated to begin construction within a mile from the monitoring site in the coming years.

Please do not stop funding for this monitoring site. It raises issues of important health consideration, environmental justice (in this low-income community of color) and simple common sense.

--

Steve Tobocman

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Air monitors play an important role in monitoring our air quality and therefore our quality of life in Southwest Detroit. Please protect our community by maintaining funding for our air monitors.

Thank you for taking my concerns into consideration,  
Beth Patton

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Ms. Robinson-

I understand you are considering removing from the Southwestern High School site. Even though the school is closed, SW Detroit overall has a far too high level of poor air quality and the monitor should remain. I'm sure you're well aware of all the industry in the surrounding area including steel mills, Marathon factory, and the enormous Rouge Plant complex, along with numerous small manufacturing facilities. Of course this leads to large number of trucks in and out of the area on a daily basis. We already have rates of asthma far above averages. Removing this monitor would be a huge detriment to this growing part of Detroit. Please take into account the entire picture before making this decision.  
Victor Abla

---

Hello,

I am writing to indicate my concern over the removal of the air monitor at Southwest High School in Southwest Detroit. As a teacher at Cesar Chavez Academy Middle School, less than a mile from the monitor, I am concerned by how its removal would affect the air quality in the area.

Southwest is already plagued by the smoke and smog from surrounding refineries at the Marathon Refinery in Rouge and Zug Island, and if that monitor were to be removed, there would be one less

## **MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

oversight for those refineries. I am not only concerned for my health, but the health of my students who experience the diminishing air quality on a daily basis. There are at least 16 schools in the Southwest Detroit area. Isn't air pollution most threatening to the young and the elderly?

Zip code 48217 is the most polluted zip code in Michigan. Is it really a wise decision to turn a blind eye to health concerns in the area and stop the monitoring of air quality there? I don't think we can afford NOT to.

Thank you for your time,

--

Rebecca Wilinski

7th Grade Social Studies Teacher  
Cesar Chavez Middle School

---

Hi Amy,

I am writing to oppose the removal the air monitor that is on top of Southwestern High School. This air monitor serves an important purpose in our community, tracking particulate matter, lead, and other toxins in our air. We are surrounded by industrial pollution that affects our health and quality of life. We need to know what we are breathing.

Thank you,  
Esperanza

**Esperanza Cantú | Development Director**



1211 Trumbull St. | Detroit, MI 48216 | (313) 967-4880 ext. 103 | f (313) 967-4884  
[ecantu@dhdcl.org](mailto:ecantu@dhdcl.org)

---

I strongly object to losing the funding for this vital service to the community. This community is surrounded by industrial Pollution. That pollution has affected our health and quality of life to the residents and visitors to this community. This community has the right to know what is in the air we are breathing. This is wrong to cut the funding. As citizens we want our tax dollars to continue to be used for this monitoring. Do not throw us to the wolves by even thinking of taking this service away. Many are tied to this community through volunteer service, visiting the businesses and restaurants, this is a thriving community. Let us continue to live and not always be in fear because of what is being allowed to be let go into the air.

Controls need to be maintained, so businesses comply. Don't let abuse become out of control, by letting go of this monitoring. You should not be able to sleep at night if you put the many children, elderly and residents at risk, by cutting funding.

Do the right thing, the civil, decent thing continue the funding. Let government work for the people continue the funding. Let's use the tax dollars for the citizens like it is suppose to be used. Thank you for taking time to read these views.

Alanna Ali

## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

Amy Robinson MDEQ  
Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760

Dear Ms. Robinson:

As a resident of Dearborn, Mich., I plea that the Department of Environmental Quality LEAVE ALL CURRENT AIR MONITORS IN DETROIT! Instead of eliminating them, more should be put up and monitored so that pollution in Southeast Michigan can be accurately measured and violating companies can be punished and required to put in necessary equipment so that they do not emit more toxins than their permits allow!

Effective monitoring and enforcement impacts the quality of the air that people breathe in southeast Michigan. I am extremely concerned and dismayed to hear statistics that show an increasing number of children are being diagnosed with asthma and other upper respiratory ailments in our community. We DEPEND on the DEQ to do its job and hold companies accountable for the impact that their actions have on the lives of of the people who live in the communities where they do their business.

Thank you for your consideration.

Leslie Herrick

---

Dear Ms. Robinson:

I am reading that the EPA is cutting funding for air pollution monitors in Michigan and that the **monitor is SW Detroit has been singled out as one of the five that will be cut in the State.**

I would really like to know why the SW Detroit did not make the grade for monitoring.

As a long-time resident, I can assert that the air in my neighborhood very near Fort St. and Waterman St. is dirtier than it was two decades ago. I have no idea whether dangerous pollutants are higher, but particulate matter deposits are greater. Household surfaces are blacker and grittier.

Is it the trucks? Is it industrial? I have no idea, but the situation is experientially worsening.

SW Detroit has to be one of the most industrialized areas in the State. Further, major interstate and international trucking runs through this neighborhood.

**Can you tell me the rationale for removing the SW Detroit air quality monitor, in light of these realities?**

It seems to me that when something is not measured, it effectively ceases to exist.

No measurements of pollution will equal no pollution!



Maureen Powers  
[mpowers@visitdetroit.com](mailto:mpowers@visitdetroit.com)  
Special Assistant to the President for Board and Legislative Affairs  
Detroit Metro Convention & Visitors Bureau  
211 W. Fort St., Ste. 1000, Detroit, MI 48226  
D: 313.202.1802 | F: 313.202.1810



## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

Dear Ms. Robinson:

At a time when the President of the United States has stated that global warming and environmental issues must be a priority, why is MDEQ even thinking of cutting funding to air monitors. Isn't it bad enough that the super polluter Russian-owned steel mill in SW Detroit received special treatment to continue its vile polluting of the environment? MDEQ means Michigan Department of Environmental Quality. It should do its job of protecting the health of Michigan citizens.

Sincerely,

Marilyn Mitchell

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Ms. Robinson, I strongly urge and request that you oppose the removal of funding for the Southwestern High School Air Monitor.

This is truly an attack on our public health.

Thank you, for your consideration.

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This is NOT the way to save money. The increases in asthma and other lung diseases will cost Michigan much more than what can be saved by defunding the monitors. More important, you cannot disregard the health of Michigan's human beings. Save money somewhere else. Suzanne Antisdell

Please don't eliminate the Air Monitor at Waterman St. Near Southwestern High School! Antonio R Cosme

Removing the air quality sensor on Waterman Street in SW Detroit is a ridiculous idea. We need to know what we are breathing in this most polluted zip code in Michigan, please reconsider this tragic choice. We need more monitors not fewer. Judith Briggs

I write to express my grave concern regarding the proposed defunding of the Southwestern air sampler on Waterman. This monitor is vital to my community and is the only monitor in the area that experiences frequent air quality issues as the result of being near the Marathon plant and a trash incinerator. Please do not put my community at risk by defunding this air sampler.

Thank you,

Sofia Nelson

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To whom it may concern:

I urge you to maintain funding for the air sampler (PM 2.5) on Waterman at Southwestern High School in Detroit.

Detroit in general is a site of heavy pollution, and Southwest Detroit is the focal point of this. Diesel emissions related to Ambassador Bridge traffic are one component of this. Southwest is also home to a massive Marathon refinery that recently expanded, a U.S. Steel mill, and a massive sewage plant, to name only a few of its many polluters. Although Southwest is home to many people and some of the city's most resurgent and diverse neighborhoods, it remains a place where it can be difficult and dangerous to breathe.

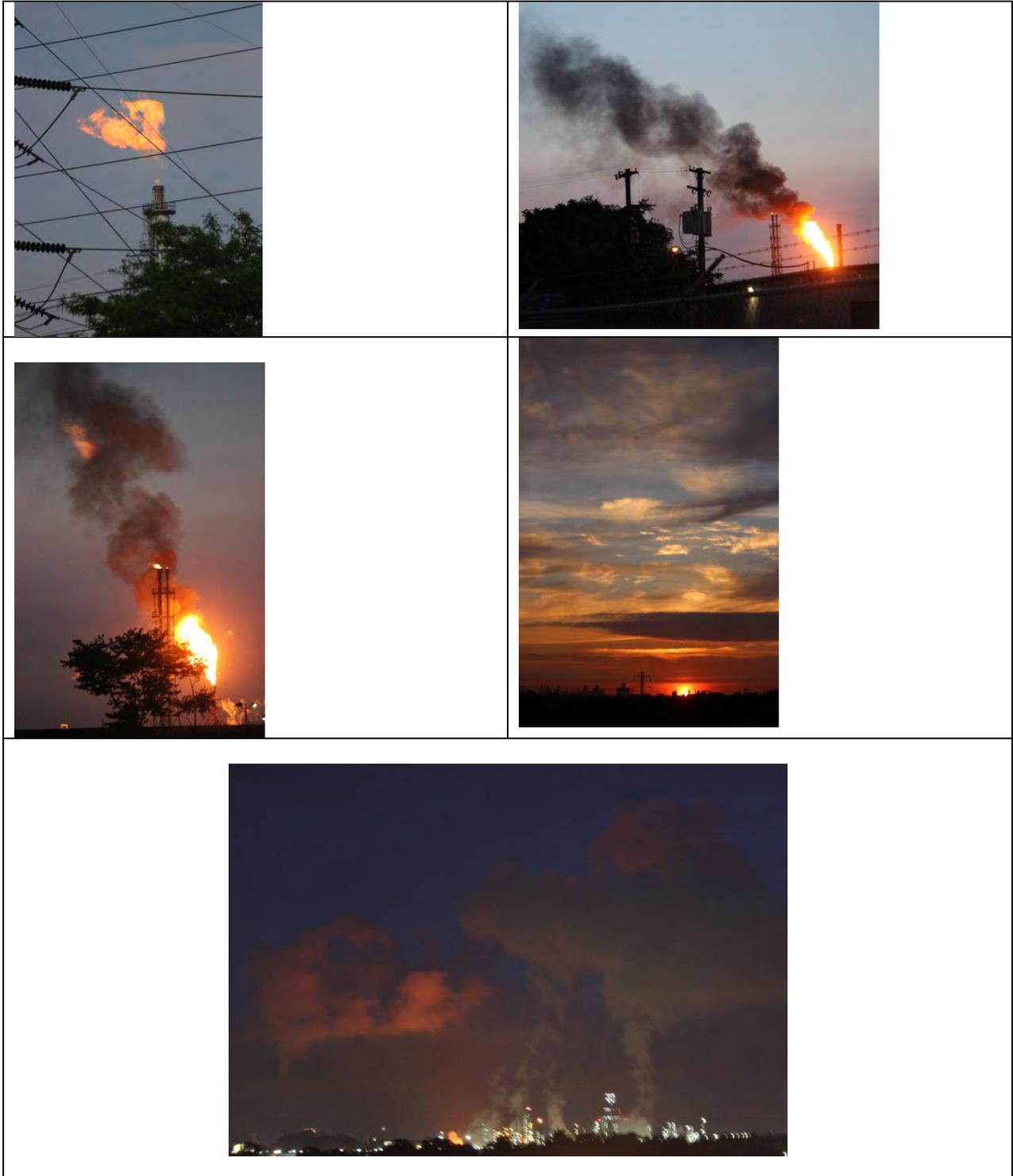
Please retain funding for the air sampler (PM 2.5). The people of Southwest Detroit need it. Everyone in Detroit needs it.

**MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

Sincerely,  
Claire Nowak-Boyd

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Please do not remove any air monitoring equipment in Michigan. In fact, 48217, the most polluted ZIP code in Michigan, desperately needs a monitor. Here are pictures to illustrate the need that were taken on 6-19-14 and 6-20-14. Thank you. Emma Lockridge



## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

June 20, 2014

Ms Robinson,

I write to support the attached letter from Stuart Batterman, regarding the EPA's potential cessation of support for the air monitor at Southwestern High School in Detroit.

I am heartened to learn that MDEQ Director Wyant has communicated to EPA that this air monitor is critical for environmental justice and environmental concerns.

Respectfully,

Margaret Weber, Convener  
Zero Waste Detroit



STUART A. BATTERMAN, MS, PHD  
PROFESSOR OF ENVIRONMENTAL HEALTH SCIENCES  
PROFESSOR OF CIVIL & ENVIRONMENTAL ENGINEERING  
DIRECTOR, CENTER FOR OCCUPATIONAL SAFETY & HEALTH ENGINEERING

Date: June 19, 2014

To: Amy Robinson  
MDEQ – Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760  
robinsona1@michigan.gov

Re: Need for continued operation of the Southwestern High School, Detroit Speciation Monitoring Site

Dear Ms. Robinson:

On behalf of my colleagues in the School of Public Health and the broader research and practice community, we urge MDEQ and US EPA to continue the funding and operation of the Southwestern High School PM<sub>2.5</sub> Speciation Monitoring site. This letter discusses the importance of the data generated by this monitoring site, and it provides multiple and compelling reasons that justify the continued operation of this site. It is our hope that the information in this letter is communicated to EPA staff in Region 5 and Headquarters. We would be happy to interact with EPA personnel directly, if helpful, to clarify or discuss this letter.

This monitoring site is situated around a number of significant point, area and mobile sources, e.g., Severstal Steel, Marathon Oil Refinery, U.S. Steel, and Cadillac Asphalt, as well as the ramps and terminal area for the new international bridge coming on-line in the next few years. Using an every 6-day schedule, the speciation monitor provides concentrations of trace metals (e.g., antimony, arsenic, aluminum, barium, bromine, cadmium, calcium, chromium, cobalt,

## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

copper, chlorine, cerium, cesium, iron, lead, indium, manganese, nickel, magnesium, phosphorus, selenium, tin, titanium, vanadium, silicon, silver, zinc, strontium, sulfur, rubidium, potassium, sodium, zirconium), several important ions (ammonium ion, sodium ion, potassium ion, total nitrate), organic and elemental carbon, and sulfate. We and the research community use these data for multiple purposes, the most important being:

- Understanding the composition and toxicity of PM<sub>2.5</sub>
- Obtaining source apportionments and assessing impacts of various sources, e.g., using receptor models
- Forming exposure metrics for air pollution epidemiology studies
- Trending air quality changes

This important site is not redundant with others in the area (other speciation data is collected at Allen Park and Dearborn sites) for the following reasons:

- Of the monitoring sites in the Detroit area, this monitor site experiences the second highest levels of PM<sub>2.5</sub> (just behind the Dearborn site). While PM<sub>2.5</sub> levels in Detroit have fallen in the past few years, the NAAQS also continues to drop, and the current monitored value of 10 - 11 µg/m<sup>3</sup> at this site is close to the current annual standard (12 µg/m<sup>3</sup>). While PM<sub>2.5</sub> mass concentrations will continue to be monitored at this site, the speciation monitor provides critical data for understanding both sources and potential impacts of pollutants.
- The value of the data provided at this site has been recognized in various reports, e.g., the 2009 MDEQ Ambient Air Quality Network Review noted that emissions in this area may be trending upward, that this site is surrounded by a variety of sources, and that it is impacted regardless of which way the air is blowing. The same report notes that speciated data allows better characterization and source apportionments, i.e., using receptor modeling.
- This monitoring site is well positioned to reflect air quality impacts of traffic over the new International Bridge, which will be constructed in the next few years (commencing 2015). Emissions will increase in the local area due to greater traffic on freeways, local streets, and particularly, the terminal area where idling emissions of numerous heavy-duty diesel trucks will occur. This monitoring site will be impacted by traffic and terminal operations (queuing, inspection, customs, etc.). To our knowledge, permits for the International Bridge require no new air monitoring sites to evaluate such impacts. Thus, the ability to trend impacts of the bridge at this site and to apportion sources are compelling reasons to maintain this site.
- Data from the speciation network is critical in a number of research projects aimed at understanding levels and impacts from traffic-related air pollutants. Both MDEQ and EPA have undertaken special monitoring programs to evaluate traffic impacts in Detroit, and we use this data in research that examines traffic-related and other air pollutants. At present, for example, we have significant funding for studies that are developing hybrid exposure assessment methods (funded by EPA and NIEHS), improving dispersion models (HEI), using epidemiology approaches to understand health impacts of diesel exhaust and other pollutants (NIEHS), and developing public action plans (NIEHS). Loss of the speciation data at this site would negatively impact these studies.

## MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

- As has been well documented, the Detroit area population has considerably poorer respiratory health than elsewhere in the state, and the data provided by the monitoring network is essential in our exposure and health effects studies. It is particularly important to obtain data over a long time period, data from more impacted areas, especially speciation data that can identify those components of PM<sub>2.5</sub> that adversely affect health.
- Finally, we note that low socioeconomic status is associated with increased risk of poor health outcomes from exposure to PM<sub>2.5</sub>. This monitor is located in a community in which a high proportion of residents have incomes below the poverty line. Thus, the ability to monitor PM<sub>2.5</sub> exposures in this community is particularly important given the additional risk for adverse health outcomes for residents in this area, and is an expressed priority of EPA environmental justice activities.

In summary, we think that this monitor serves a critical role for multiple reasons, and we urge MDEQ and EPA to reconsider the defunding decision for this speciation monitor.

Sincerely yours,

A handwritten signature in cursive script that reads "Stuart Batterman".

Stuart Batterman, Ph.D., M.S., B.S.  
Professor of Environmental Health Sciences, School of Public Health, University of Michigan  
Professor of Civil & Environmental Engineering, College of Engineering, University of Michigan  
Director, University of Michigan Center for Occupational Safety & Health Engineering

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## **MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

June 20, 2014

Amy Robinson  
MDEQ-Air Quality Division  
P.O Box 30260  
Lansing, MI 48909-7760  
[Robinsona1@michigan.gov](mailto:Robinsona1@michigan.gov)

### **Re: Continued operation of the Southwestern High School Speciation Monitor**

Dear Ms. Robinson:

As the Detroit City Council Member for District 6, and more importantly a resident of District 6, I am writing to submit a public comment on the Michigan Department of Environmental Quality's (MDEQ) Draft 2015 Ambient Air Monitoring Network Review. I wish to state my **strong objection** to MDEQ's proposed removal of the Speciation Monitor, PM<sub>2.5</sub>, currently installed at Southwestern High School in the 48209 zip code of Detroit. Due to the high presence of industries in Southwest Detroit, the air around the Springwells and Fort Street area should be constantly monitored for the health and safety of the citizens.

Southwest Detroit contains the following industries (all within a 2-3 mile radius of the air monitor location) that emit a significant amount of air pollutants in an extremely dense residential area. These pollutants include Nitrogen Oxides, Carbon Monoxide, Sulfur Dioxide, Particulate Matter, and Volatile Organic Compounds.

1. Great Lakes Works: 19,213 tons
2. Severstal Dearborn: 19, 119 tons
3. Detroit Edison River: 11, 123 tons
4. Ford Motor Co. Research & Development Center: 1, 457 tons
5. Carmeuse Line, Inc: 1,404 tons
6. Marathon Petroleum: 1, 339 tons
7. Dearborn Industrial Generation: 1,258 tons
8. Ford Motor Co. Rouge Complex: 929 tons
9. Detroit Wastewater Treatment Plant: 470 tons
10. Others: 252 tons

One in four children in the area appears to have asthma, and hospitalization rates for adult asthma are three times the norm. The health impact on residents if the air is not monitored is so dire, that I cannot particularly fathom the reasoning for de-funding the Southwestern High School Speciation Monitor. It also seems that in coming to the conclusion to de-fund the Speciation Monitor, MDEQ has not taken into consideration that Southwest Detroit will be the location of the new international crossing.

The Speciation Monitor is extremely critical in Southwest Detroit, an area that contains severely impaired air quality. My community and I sincerely hope that funding for this monitoring site is not removed.

Thank you for your consideration.

Respectfully Submitted,

Raquel Castañeda-López

Council Member Raquel Castañeda-López  
City of Detroit  
District 6  
O: 313-224-2450

## **MICHIGAN'S 2015 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

F: 313-224-1189

[CouncilMemberRaquel@detroitmi.gov](mailto:CouncilMemberRaquel@detroitmi.gov)

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To whom it may concern;

The de-funding of the monitor at Southwestern High school illustrates another effort on how agencies that allowed the worst environmental damage in communities of color are disregarded. This decision is not only unjust but disrespectful. EPA, OCR and DOJ was recently in the community during the Severstal SIP query. The community requested more monitors in affected communities. The monitors are essential due to the industries in the area as well as the NITC bridge that will be hosted by that community. As well as, the truck traffic that's already filtered thru the community. Communities of color such as this are being discarded at an alarming rate in the US. I am here to say enough is enough, stop treating us like collateral damage. We deserve equal protection under the law. This decision is a direct violation of the US CERDA agreement that the US is attempting to recertify in Geneva. This action will violate the spirit of that international accord. EPA you have made plenty of disastrous decisions that affect communities such as this, don't you think it's time to protect the environment or is the name of your agency an OXYMORON. Be responsible for a change. Protect the people. Vincent Martin

---

**From:** jacqueline smith

**To:** [robinsona1@michigan.gov](mailto:robinsona1@michigan.gov)

**Subject:** Southwestern High - Air Monitoring Network for public comment

The EPA is planning to de-funding the Southwestern monitor on Waterman. The the monitor is very viable even though the school is closed. It monitors for some particulate matter (PM 2.5) lead and other metals. It is the only one we have in Detroit that is near us. That new international bridge is coming and we need that monitor to monitor the Diesel fuel emissions as well as the pollutants that will come from them building that bridge and disturbing the soils and underground aquifers. The heavy polluting companies that surround us are all devastating. We need more monitors in the 48217, Matter of fact put monitors in my community at my house xxxx S Ethel street near all of these industries.

[robinsona1@michigan.gov](mailto:robinsona1@michigan.gov)

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6TH DISTRICT  
STATE CAPITOL  
P.O. BOX 30014  
LANSING, MI 48909-7514  
PHONE: (517) 373-0823  
FAX: (517) 373-5993  
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MICHIGAN HOUSE OF REPRESENTATIVES

**RASHIDA TLAIB**  
STATE REPRESENTATIVE

June 18, 2014

Ms. Amy Robinson  
MDEQ – Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760

Subject: Southwestern High School Air Monitor

Dear Ms. Robinson,

I am writing to express my strong opposition to the removal of funding for the air monitor located on Waterman Street, known as the Southwestern High School air monitor, in Detroit.

As you know, the monitor is located in one of Michigan's most heavily polluted areas. The area is surrounded by heavy industry that is responsible for spewing sulfur dioxide (SO<sub>2</sub>), volatile organic compounds, (VOCs), carbonyls, lead, and other particulate matter (PM<sub>2.5</sub>). The Southwestern High School monitor captures data that shows among the highest levels of PM<sub>2.5</sub> in the area. These compounds are harmful to our health and have had profound negative impacts on our quality of life. Our children have some of the highest rates of asthma in the state.

The benefit and value of this monitoring site cannot be understated. Currently, it is one of the only available methods of determining exactly from where air pollution is coming. Without continued monitoring of the local air quality, it will become increasingly difficult to hold sources accountable for the pollution. Additionally, this monitoring site is invaluable to researchers who are committed to showcasing the negative effects of air pollutants. Detroit and especially Southwest Detroit's poor respiratory health is well documented, and the data provided by the Southwest High School air monitor is vital to understanding, proving, and exposing these issues.

It is always necessary to monitor air quality in such a heavily industrial area, but this is an especially critical time to maintain the Southwestern High School air monitor. Presently, the monitor tracks pollutants and emissions from truck and car traffic on the Ambassador Bridge once every six days. Ideally, the monitor would collect data more frequently, but as it stands the Southwestern High School site is one of the only ways to measure traffic pollution, which greatly contributes to PM<sub>2.5</sub> levels and poor air quality. With the construction of the International Bridge looming, this site's importance will only increase. There are no plans to evaluate the new bridge's impacts, making the Southwestern High School air monitor indispensable.

The people of Detroit and especially the people of the industry-laden Southwest Detroit suffer, through no fault of their own, from extremely poor air quality. Businesses, trade traffic and industry emit pollutants with almost no regulation, and there is almost no protection for the residents of these areas. The Southwestern High School air monitor is thus crucial to promoting a clean environment and health for our residents. I must once again express my strong opposition to discontinuing this air monitor.

Sincerely,

A handwritten signature in black ink that reads "Rashida Tlaib". The signature is written in a cursive, flowing style.

Rashida Tlaib  
State Representative  
6<sup>th</sup> District, Detroit, Ecorse, River Rouge

Cc: Alan Walts, EPA, Director, Office of Enforcement and Compliance Assurance  
Steve Page, EPA, Director, Office of Air Quality Planning and Standards



c/o 820 S. West End  
Detroit, MI 48209  
[swdetroitcbc@gmail.com](mailto:swdetroitcbc@gmail.com)  
(313) 717-8223

June 20, 2014

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*Southwest Detroit Business Association*

Debra Williams  
*St. Paul AME Church*

SENT VIA E-MAIL TO ROBINSONA1@MICHIGAN.GOV  
Amy Robinson  
MDEQ Air Quality Division  
P.O. Box 30260 Lansing, MI 48909-7760

Re: Public Comments on the Draft 2015 Ambient Air Monitoring Network Review, to Continue the MDEQ PM2.5 Speciation Monitor at SWHS/Fort St.

The Southwest Detroit Community Benefits Coalition is a grassroots non-profit community organization working to protect residents in Delray and Southwest Detroit from the negative impacts of developments and cumulative pollution, and toward a sustainable, healthy community. Residents of this Environmental Justice Community are largely Latino and African American families of lower socio-economic status. The area has many vulnerable senior citizens and the surrounding district has the highest concentration of children in the City of Detroit. Residents suffer higher incidences of health diseases per capita than anywhere in the state, including lung and heart diseases and cancers. Local Health Department data indicates one in 5 children in the area suffers from asthma and adults are hospitalized for asthma at three times the rate as adults across Michigan.

Low-socioeconomic status is associated with greater negative health impacts from pollution and therefore the immediate population would be further disadvantaged--at even higher risk of health damage--by eliminating this monitor.

The Southwest Detroit Community Benefits Coalition strongly opposes the closure of the SWHS monitor. The Southwestern High School monitor on Fort Street is essential to measure the risks of exposure to air pollutants in order to protect public health, and is necessary to make informed permitting and pollution reduction decisions for many heavy-emissions industries in the area.

The community has engaged in numerous industrial permit public comment processes and has repeatedly requested additional monitoring in order to effectively protect public health. *Without this SWHS monitor near the heaviest polluting sources, the MDEQ and EPA cannot even basically assess air quality conditions for protecting public health on an ongoing basis.*

We note the following additional specific impacts and concern with ceasing operations of the SWHS monitor.

Delray and southwest Detroit are among the most polluted places in the country with a high concentration of heavy industry and transportation inter-mixed with residences. The area already hosts the country's largest wastewater treatment plant with 14 outdated incinerators, coal-fired steel mills (with chronic violations) and a DTE power plant, Ford Auto Plant and Marathon Refinery, intermodal yards, 10,000 daily border trucks, and many other industries that release tons of particulate pollution annually.

The coming New International Trade Crossing (NITC) bridge to Canada will locate a 165-acre customs plaza in the immediate vicinity where trucks will be idling continuously, making more families vulnerable to daily health impacts. The SWHS monitor is in necessary proximity to measure the baseline and future emissions from the new border crossing and intermodal mobile sources to be generated with enhanced border-related activities. The development will bring 125% increase in border trucks, as well as shift 75% of all border traffic to the Delray/NITC bridge, adding to the cumulative area emissions.

The SWHS PM2.5 monitor registers the second-highest particulate readings in the state and the area is currently in non-attainment for the EPA's Sulfur Dioxide National Ambient Air Quality Standard.

The SWHS speciated monitor is critical to understanding *composition, toxicity, source apportionment, and trends* of the damaging fine particulate matter, PM2.5 to inform MDEQ's and EPA's efforts to identify risk management actions.

The SWHS monitor site is not redundant with other monitors in SE Michigan which are not near enough in proximity to effectively detect, measure, nor monitor air concentration conditions which can be associated with health impacts and therefore provide essential function necessary to protect public health.

The SWHS air monitor is also highly important to long-term nationally funded health studies of epidemiology in the area population being undertaken to better understand the impacts of air pollution and the effectiveness of mitigation strategies to improve health.

Given the Environmental Justice conditions of the community immediately affected by air toxins in the vicinity of this monitor, and the unique and critical role this monitor in quantifying air emissions impacts, we urge that the EPA continue full funding and operations of this monitor.

We submit these comments for consideration and we also reviewed and support the comments of the University of Michigan Environmental Health Sciences, the Great Lakes Environmental Law Center, and those submitted on behalf of the South Dearborn Environmental Improvement Association.

Sincerely,

A handwritten signature in black ink, appearing to read "Scott Brines". The signature is written in a cursive style with a prominent initial "S" and a long horizontal flourish extending to the right.

Scott Brines, President

Date: June 19, 2014

To: Amy Robinson  
MDEQ – Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760  
robinsona1@michigan.gov

Re: Need for continued operation of the Southwestern High School, Detroit  
Speciation  
Monitoring Site

Dear Ms. Robinson:

We are writing to urge MDEQ and US EPA to continue the funding and operation of the Southwestern High School PM<sub>2.5</sub> Speciation Monitoring site in Detroit Michigan.

Delray and Southwest Detroit are among the most polluted places in the country with a high concentration of heavy industry and transportation intermixed with residential areas. The area hosts the country's largest wastewater treatment plant, with 14 outdated incinerators, coal-fired steel mills and a DTE power plant, intermodal yards, 10,000 daily border trucks, and many other industries that release tons of particulate pollution annually.

This PM<sub>2.5</sub> monitor already registers the second-highest particulate readings in the state. While PM<sub>2.5</sub> levels in Detroit have fallen in the past few years, the NAAQS also continues to drop, and the current monitored value of 10 - 11 µg/m<sup>3</sup> at this site is close to the current annual standard (12 µg/m<sup>3</sup>). This monitor is located near the proposed site of a new bridge between the U.S. and Canada (NITC), and given the predicted 125% increase in mobile source pollution impacts of the NITC bridge, the importance of this monitor will only increase. Emissions will increase in the local area due to greater traffic on freeways, local streets, and particularly, the terminal area where idling emissions of numerous heavy-duty diesel trucks will occur. This monitoring site will be impacted by traffic and terminal operations (queuing, inspection, customs, etc.).

To our knowledge, permits for the International Bridge require no new air monitoring sites to evaluate such impacts. Thus, the ability to monitor impacts of the bridge at this site and to apportion sources are compelling reasons to maintain this site. While PM<sub>2.5</sub> mass concentrations will continue to be monitored at this site, the speciation monitor provides critical data for understanding both sources and potential impacts of pollutants.

Residents in the community are largely minority, with many senior citizens, children, and economically challenged families. Residents suffer higher incidences of health diseases per capita than anywhere in the state, including lung and heart diseases and cancers. Given the Environmental Justice conditions of the community immediately

affected by air toxins in the vicinity of this monitor, and the unique and critical role this monitor in quantifying air emissions impacts, we urge that the EPA continue full funding and operations of this monitor.

In summary, the data generated by this monitoring site is of critical importance to monitor air quality and impacts on health in Detroit and Delray. There are multiple and compelling reasons that justify the continued operation of this site. Please communicate the information in this letter to in Region 5 and Headquarters. We would be happy to speak with EPA personnel directly, if helpful, to clarify or discuss this letter.

Sincerely,



Angela Reyes, MPH  
Executive Director, Detroit Hispanic Development Corporation  
Detroit, Michigan



Ricardo Guzman, MPH  
Chief Executive Office, Community Health and Social Services  
Detroit, Michigan



Cindy Gamboa  
Project Coordinator, Healthy Environments Partnership  
Detroit, Michigan



Paul Harbin  
Detroit, Michigan



Antonia M. Villarruel, PhD, FAAN  
Associate Dean for Research and Global Affairs  
Professor & Nola J. Pender Collegiate Chair  
University of Michigan

*Kathy Stott*

Kathy Stott, Executive Director  
Southwest Detroit Environmental Vision  
Detroit, Michigan

*Gregoria Diaz*

Gregoria Diaz  
Community Health Promoter  
Healthy Environments Partnership

A handwritten signature in black ink, appearing to be 'Madiha Tarique', with a stylized, overlapping loop structure.

Madiha Tarique  
Public Health Manager,  
ACCESS Community Health and Research Center  
6450 Maple Street, Dearborn MI 48126

:



June 20, 2014

**SENT VIA E-MAIL TO ROBINSONA1@MICHIGAN.GOV**

Amy Robinson  
MDEQ – Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760

**Re: Draft 2015 Ambient Air Monitoring Network Review, PM<sub>2.5</sub> Speciation (SASS) at Fort St (SWHS) - Detroit (261630015)**

Ms. Robinson:

Please accept these comments submitted on behalf of the Great Lakes Environmental Law Center (“GLELC”), a non-profit organization dedicated to protecting the environmental integrity of the Great Lakes region,<sup>1</sup> in response to the Draft 2015 Annual Ambient Air Monitoring Network Review, and in particular, the proposed removal of the PM<sub>2.5</sub> speciation monitor located at Fort Street (Southwestern High School), Detroit, AQS ID No. 261630015 (“the Southwestern High School Monitor”). For the reasons set forth below, GLELC strongly opposes the removal of this monitor.

The air quality in the area of Southwest Detroit is undeniably the worst in the State of Michigan,<sup>2</sup> a fact recognized by the United States Environmental Protection Agency (“USEPA”).<sup>3</sup> This area of the city is inundated with major industrial facilities, including notorious polluters like the United States Steel and Severstal steel plants, and the Marathon Petroleum refinery. Air emissions from these facilities have cumulative and adverse effects. Most striking is the apparent prevalence of cancer and respiratory disorders in city residents.

Since at least 1999, overall cancer rates in Detroit have far outpaced the statewide average. In fact, Detroit's age-adjusted rate for all types of cancers in 2010 was 624.1 cases per 100,000 people, compared with 553.3 per 100,000 people, statewide. Detroit's 2010 cancer rate was also higher than that in cities like New York, San Francisco, and Los Angeles, to name a

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<sup>1</sup> GLELC also hopes that MDEQ and USEPA will give due consideration to the independent comments submitted on behalf of the immediately impacted residents of Southwest Detroit by the Southwest Detroit Community Benefits Coalition.

<sup>2</sup> Tina Lam, *48217: Life in Michigan's Most Polluted ZIP Code*, THE DETROIT FREE PRESS, June 20, 2010, available at <http://www.freep.com/article/20100620/NEWS05/6200555/48217-Life-Michigan-s-most-polluted-ZIP-code>.

<sup>3</sup> See generally, *Environmental Issues in Southwest Detroit*, US ENVTL PROT AGENCY, <http://www.epa.gov/region5/swdetroit/> (last visited June 20, 2014).

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*“Protecting the world's greatest freshwater resource and the communities that depend upon it.”*

4444 2<sup>nd</sup> Avenue  
Detroit, Michigan 48201  
[www.glelc.org](http://www.glelc.org)

few. Additionally, in 2008, following an exhaustive survey, the Michigan Department of Community Health coined Detroit, “the epicenter of asthma burden in Michigan,” stating that the severity of the asthma burden in Detroit warrants immediate attention.<sup>4</sup> Amongst other shocking statistics, MDCH found that rates of asthma hospitalization in Detroit (for both children and adults) were found to be three times higher than that of Michigan as a whole and rates of asthma death over two times higher compared to overall state numbers.<sup>5</sup>

The concern over these disproportionate health risks and other environmental harms in the area of Southwest Detroit is compounded by the fact that this burden is overwhelmingly borne by minority and low-income populations. Indeed, Southwest Detroit is a recognized Environmental Justice community in part because more than 40% of its residents belong to racial/ethnic minority groups and have incomes that fall below the poverty line.<sup>6</sup> However, according to USEPA, no “qualitative factors” such as “environmental justice or ongoing health research efforts” were incorporated into the evaluation process. The Southwestern High School monitor was apparently selected for removal based solely on a study of “geographic” and “chemical overlap,” and “recent data trends.”<sup>7</sup> In a community like Southwest Detroit, environmental justice concerns should not be ignored or discounted.

More even than other monitors, the continuing operation of the Southwestern High School monitor is necessary to continuing efforts to improve air quality in Southwest Detroit. First, this monitor registers the second-highest levels of fine particle air pollution in Michigan – only behind the monitor located in Dearborn (Salina Elementary), Michigan (AQS ID No. 261630033).<sup>8</sup>

Second, it is important to note that the Southwest High School monitor is a speciation monitor. These monitors not only determine levels of particulate emissions, but also the chemical composition of those emissions. This is important, especially in overburdened, Environmental Justice communities, like Southwest Detroit, because this more itemized data can be used to identify individual sources of specific pollutants, and greatly contributes to the interpretation of health studies by evaluating the potential linkage of health effects to PM<sub>2.5</sub> constituents.

Finally, maintenance of the Southwestern High School monitor is critical where it is located in the vicinity of the new Detroit River international crossing and customs plaza, and in light of USEPA’s recent revisions to the NAAQS for PM<sub>2.5</sub>. Construction and use/operation of the new Detroit River international bridge will more than likely cause significant increases in air

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<sup>4</sup> *Epidemiology of Asthma in Michigan*, MICH DEP’T OF CMTY HEALTH, 1 (2008) available at [http://www.michigan.gov/documents/mdch/epi-mich-asthma-Detroit\\_Epicenter\\_of\\_Asthma\\_401493\\_7.pdf](http://www.michigan.gov/documents/mdch/epi-mich-asthma-Detroit_Epicenter_of_Asthma_401493_7.pdf).

<sup>5</sup> *Id.*

<sup>6</sup> EJ VIEW MAPPER, US ENVTL PROT AGENCY, <http://epamap14.epa.gov/ejmap/ejmap.aspx?wherestr=Detroit%2C%20MI> (last visited June 20, 2014). The importance of this monitor from the perspective of environmental justice is immense and has also been recognized (amongst other issues) by MDEQ Director, Dan Wyant, in a letter sent to USEPA’s Office of Air Quality Planning and Standards. E-mail from Jon Grosshans, AICP, LEED-AP, US ENVTL PROT AGENCY, REGION 5 (June 19, 2014) (on file with author).

<sup>7</sup> E-mail from Jon Grosshans, *supra* note 6.

<sup>8</sup> *Michigan’s 2015 Ambient Air Monitoring Network Review*, MICH DEP’T OF ENVTL QUALITY, pp 33-34, available at [http://www.michigan.gov/documents/deq/2015\\_Air\\_Mon\\_Network\\_Review\\_456645\\_7.pdf?20140529125151](http://www.michigan.gov/documents/deq/2015_Air_Mon_Network_Review_456645_7.pdf?20140529125151).

emissions from mobile sources, like construction equipment and commuter vehicles, in Southwest Detroit. A speciation monitor such as that located at Southwestern High School will be critical to studying these increased emissions in the future as recent research has shown that particulate pollution from diesel-burning cars and trucks can have serious health effects if inhaled deeply into the lungs, especially by those with other health problems and living near heavily traveled roadways.<sup>9</sup> Additionally, USEPA's recent revisions to the NAAQS for PM<sub>2.5</sub> could still result in a final designation of nonattainment for Wayne County.<sup>10</sup> Should this occur, Wayne County, and Southwest Detroit, in particular, will need air emissions data like that currently provided by the Southwestern High School speciation monitor to measure levels and chemical constituents of PM<sub>2.5</sub> pollution, with the goal of bringing the area back into attainment.

In short, though GLELC recognizes the funding and budget difficulties currently faced by USEPA in connection with operation of the Ambient Air Monitoring Network, the proposed removal of the Southwestern High School Monitor simply cannot be justified. This area and its residents have long borne a disproportionate share of the health and environmental burdens from air pollution. If changes to the network must be made, they should not include removal of this crucial monitor.

GLELC appreciates your consideration in this matter.

Respectfully submitted,



**Stephanie Karisny**  
Staff Attorney  
skarisny@gmail.com  
586.610.2059

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<sup>9</sup> *Research in Action*, US ENVTL PROT AGENCY, [http://www.epa.gov/head/research/air\\_pollution.html](http://www.epa.gov/head/research/air_pollution.html) (last visited June 20, 2014).

<sup>10</sup> Wayne County is already designated non-attainment for sulfur dioxide, SO<sub>2</sub>.

June 11, 2014

Ms. Amy Robinson  
MDEQ - Air Quality Division  
P.O. Box 30260  
525 West Allegan Street  
Lansing, MI 48909-7760

Dear Ms. Robinson:

SEMCOG, the lead local air quality planning agency in Southeast Michigan submits the following comments in regard to Michigan's 2015 Draft Ambient Air Monitoring Network Review.

The draft Network Review notes the U.S. Environmental Protection Agency's (EPA) intent to shutdown the PM2.5 speciation monitors at three sites in Southeast Michigan - Tecumseh, Southwestern High School/Fort St., and Port Huron. I am writing today to strongly urge the EPA and MDEQ to continue operating these monitors. Given the complexity of PM2.5 and the many different compounds that can contribute to this pollutant, it is very important that we be able to analyze the composition of observed concentrations, not just their total mass. Having a robust history of speciated data at multiple locations in the region, and understanding how that data is changing over time, is key to identifying likely sources of any compliance issue.

The benefits of having a spatially dense, consistent and long-term monitoring network were clearly demonstrated in the PM2.5 conceptual model developed to inform the 2008 PM2.5 SIP. The in-depth analysis performed for this model development was only possible because of the long monitoring history available from multiple sites in Southeast Michigan. While our region is currently in compliance with the 2013 PM2.5 NAAQS, these standards are continuously being strengthened. It is therefore important that we retain a robust monitoring network in the region. Should Southeast Michigan face compliance issues in the future, having a history of speciated data for all three of these sites would be critical to understanding the local vs. regional contribution of different PM2.5 components and identifying the major source contributors.

Sincerely,



Joan Weidner  
Air Quality Specialist

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OLSON, BZDOK & HOWARD

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June 19, 2014

Amy Robinson  
MDEQ Air Quality Division  
P. O Box 30260  
Lansing, MI. 48909-7760

Via Email to: [robinson1@michigan.gov](mailto:robinson1@michigan.gov)

RE: SDEIA Comments on MDEQ Draft 2015 Ambient Air Monitoring  
Network Review  
Our File N<sup>o</sup>: 5355.05

PUBLIC  
INTEREST  
LAWYERS

Dear Ms. Robinson:

PRINCIPALS:

James M. Olson  
Christopher M. Bzdok  
Scott W. Howard  
Jeffrey L. Jocks

ATTORNEYS:

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We write to submit public comments on behalf of the South Dearborn Environmental Improvement Association (SDEIA) on the Michigan Department of Environmental Quality's (MDEQ) Draft 2015 Ambient Air Monitoring Network Review. SDEIA is deeply concerned about the proposed removal, due to defunding by the EPA, of a speciation monitor for PM<sub>2.5</sub> currently located and operated at the Southwest High School in Detroit.

SDEIA is a Michigan not-for-profit corporation whose members primarily consist of individuals who reside and work in the South End neighborhood of Dearborn, in Wayne County. The South End neighborhood of Dearborn is surrounded by numerous sources of pollutants, including Severstal North America's steel manufacturing facility, Dearborn Industrial Generation, the Ford Rouge Complex, a large rail yard, and the Marathon refinery. SDEIA's members are directly and adversely impacted by pollution in the ambient air that is emitted by these sources and others, and SDEIA's mission includes undertaking activities to further the improvement of environmental conditions in the South End. The South End neighborhood of Dearborn is a predominantly low-income, Arab-American neighborhood that is, like Southwest Detroit, considered an Environmental Justice Community.

Southwest Detroit, like the South End of Dearborn, has endured many years of heavy air pollution. Air quality in these areas is unquestionably the worst in the State of Michigan, and in some instances it is among the worst in all of the U.S. Environmental Protection Agency's (EPA) Region V or in all of the country. It makes little sense to defund and remove a PM<sub>2.5</sub> monitor that now registers the second-highest levels of fine particular pollution in the state – levels that are only marginally below the current EPA annual National Ambient Air Quality Standards (NAAQS) of 12.0 ug/m<sup>3</sup>. Although SDEIA recognizes that funding for these activities may be

Amy Robinson  
MDEQ Air Quality Division  
June 19, 2014  
Page 2

finite, it respectfully submits that funding cuts would be better implemented anywhere other than in Southwest Detroit or the South End of Dearborn, which have long borne more than their fair share of air pollution. Sparing Southwest Detroit and the South End from the loss of a critical air quality monitor is supported, in particular, by Environmental Justice considerations – something to which EPA both cannot and should not give mere lip service in the case of these neighborhoods.

The PM<sub>2.5</sub> speciation monitor slated for removal is critical to efforts by MDEQ and EPA, as well as various environmental and community health advocacy groups, to work toward cleaner air in the South End and Southwest Detroit neighborhoods. For example, there is a high likelihood that Wayne County will soon be classified as non-attainment for the EPA's NAAQS for PM<sub>2.5</sub> (as is already the case for the EPA's Sulfur Dioxide NAAQS). Speciation monitors will be especially important in MDEQ's and EPA's efforts to identify sources of PM<sub>2.5</sub> pollution and work toward bringing this area into attainment. The monitor slated for removal is located near the proposed site of a new bridge between the U.S. and Canada, moreover, and given the likely mobile source pollution impacts of that project, the importance of this monitor will only increase. This monitor is also located near the U.S. Steel facility on Zug Island, one of southeast Michigan's largest sources of air pollution.

Also important is the fact that a speciation monitor does more than simply measure the levels of pollution in ambient air. Speciation monitors are critical in areas with severely impaired air quality, such as the South End and Southwest Detroit, because they provide much-needed evidence of the source of air pollution by identifying the particular metals and other compounds present in fine particulate matter. Funding and staffing for investigative and enforcement actions regarding air pollution being far too limited, speciation data is an important tool for MDEQ and EPA in their efforts to identify and work with sources of air pollution to improve air quality in southeast Michigan.

SDEIA believes air quality monitoring and protection efforts in the South End and Southwest Detroit is already woefully sparse and underfunded. Simply stated, there is a compelling need for more monitoring, and more funding for monitors, rather than less.

Thank you for your consideration.

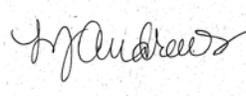
Respectfully Submitted,



Christopher M. Bzdok



Emerson Hilton



T. J. Andrews  
Law Office of Tracy Jane Andrews  
Co-Counsel



Detroiters  
Working for  
Environmental  
Justice

June 20, 2014

MDEQ Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760  
Att: Amy Robinson

Via email to: [robinsona1@michigan.gov](mailto:robinsona1@michigan.gov)

RE: SDEIA Comments on MDEQ Draft 2015 Ambient Air Monitoring  
Network Review  
Our File No. 5355.05

Dear Ms. Robinson:

Detroiters Working for Environmental Justice (DWEJ) is strongly opposed to the impending decision to remove the PM<sub>2.5</sub> monitor from SW Detroit. In an era where most recent conversations with enforcement agencies have been about the need for additional monitoring capacity, this scenario is outrageous.

DWEJ has been working to improve the environment in Detroit for more than 20 years. The health problems that are attributable to environmental exposures such as to PM<sub>2.5</sub> are well documented. This area of Detroit leads the state in asthma-related hospitalizations and mortality due to asthma. SW Detroit is also home to the fastest-growing population of young children.

This monitoring site is situated around a number of significant point, area, and mobile sources, e.g., Severstal Steel, Marathon Oil Refinery, U.S. Steel, and Cadillac Asphalt, as well as the ramps and terminal area for the new international bridge coming online in the next few years. Using an every six-day schedule, the speciation monitor provides concentrations of trace metals (e.g., antimony, arsenic, aluminum, barium, bromine, cadmium, calcium, chromium, cobalt, copper, chlorine, cerium, cesium, iron, lead, indium, manganese, nickel, magnesium, phosphorus, selenium, tin, titanium, vanadium, silicon, silver, zinc, strontium, sulfur, rubidium, potassium, sodium, zirconium), several important ions (ammonium ion, sodium ion, potassium ion, total nitrate), organic and elemental carbon, and sulfate.

This important site is not redundant with others in the area (other speciation data is collected at Allen Park and Dearborn sites) for the following reasons:

- Of the monitoring sites in the Detroit area, this monitor site experiences the second-highest levels of PM<sub>2.5</sub> (just behind the Dearborn site). While overall PM<sub>2.5</sub> levels in Detroit have fallen in the past few years, the NAAQS also continues to drop, and the current monitored value of 10 - 11 µg/m<sup>3</sup> at this site is close to the current annual standard (12 µg/m<sup>3</sup>). While PM<sub>2.5</sub> mass concentrations will continue to be monitored at



this site, the speciation monitor provides critical data for understanding both sources and potential impacts of pollutants.

- The value of the data provided at [this site](#) has been recognized in various reports; e.g., the 2009 MDEQ Ambient Air Quality Network Review noted that emissions in this area may be trending upward, that this site is surrounded by a variety of sources, and that it is impacted regardless of which way the air is blowing.
- Data from the speciation network is critical in a number of research projects aimed at understanding levels and impacts from traffic-related air pollutants. Both MDEQ and EPA have undertaken special monitoring programs to evaluate traffic impacts in Detroit.
- As has been well documented, the Detroit area population has considerably poorer respiratory health than elsewhere in the state, and the data provided by the monitoring network is essential in our exposure and health effects studies. It is particularly important to obtain data over a long time period, data from more impacted areas, especially speciation data that can identify those components of  $PM_{2.5}$  that adversely affect health.
- Finally, please note that low socioeconomic status is associated with increased risk of poor health outcomes from exposure to  $PM_{2.5}$ . This monitor is located in a community in which a high proportion of residents have incomes below the poverty line. Thus, the ability to monitor  $PM_{2.5}$  exposures in this community is particularly important given the additional risk for adverse health outcomes for residents in this area, and is an expressed priority of EPA environmental justice activities.
- While MDEQ and EPA have undertaken some special monitoring to evaluate traffic impacts, this monitoring site provides information related to the International Bridge; in particular, it will help establish baseline and trend data on a neighborhood scale appropriate to assessing changes in air quality due to changes (increases) in truck and car traffic near the site. When the new bridge is opened, this site will likely reflect local impacts from traffic and terminal operations (queuing, inspection, etc.). It is also well known that this part of Detroit is slated to host expanded logistics facilities such as a new and expanded intermodal freight facility.

In addition, DWEJ supports the comments of other organizations such as the University of Michigan Environmental Health Sciences and South Dearborn Environmental Improvement Association.

Respectfully submitted,

Guy O. Williams  
President & CEO

June 20, 2014



Ms. Amy Robinson  
MDEQ – Air Quality Division  
P.O. Box 30260  
Lansing, MI 48909-7760  
robinsona1@michigan.gov

Subject: **DTE Energy Comments on the Draft 2015 Michigan Ambient Air  
Monitoring Network Review**

Dear Ms. Robinson:

DTE Energy is pleased to submit the following comments regarding the Draft 2015 Michigan Ambient Air Quality Monitoring Network Review. We are supportive of your efforts to meet the air quality monitoring requirements mandated in EPA's regulations, especially with the limited funding that is available to develop such an important environmental data base.

DTE Energy supports the changes that were proposed in the draft network plan for 2015. However, DTE Energy has one important additional comment, related to the 1-hour sulfur dioxide (SO<sub>2</sub>) National Ambient Air Quality Standard (NAAQS). The main focus of SO<sub>2</sub> monitoring has been on the official nonattainment area in southeastern Wayne County. Also, the Michigan Department of Environmental Quality's Air Quality Division (MDEQ-AQD) restarted the SO<sub>2</sub> monitor at its Port Huron site in St. Clair County a few years ago. This monitor has measured the second-highest SO<sub>2</sub> 1-hour concentrations in the State. DTE Energy owns and operates two power plants in St. Clair County, Belle River Power Plant and St. Clair Power Plant that will soon have to undergo detailed modeling to determine the attainment status of the ambient air around these plants. It is imperative that monitoring data is available to develop a representative background concentration for these upcoming designation analyses.

The current closest SO<sub>2</sub> monitoring site in southeast Michigan that has been used to calculate background levels is the Allen Park site. This site is adequate for sources in Wayne County, but does not provide a legitimate background figure for St. Clair County sources. DTE Energy recommends the deployment of an additional SO<sub>2</sub> monitor at MDEQ-AQD's existing New Haven site, which currently monitors ozone (O<sub>3</sub>) and fine particulate matter (PM<sub>2.5</sub>). This data would provide a much more reasonable

background value for this extremely important modeling exercise. Because the New Haven site already is operational for two other criteria pollutants, and also measures relevant meteorological data, it would be a cost effective addition to the 2015 network.

Thank you for the opportunity to review this important document. The MDEQ-AQD staff should be commended for the quality of this draft monitoring plan.

A handwritten signature in cursive script that reads "Michael Lebeis".

Michael Lebeis  
Senior Air Quality Engineer  
Environmental Management & Resources  
DTE Energy  
313-235-8615 (office)  
248-568-1784 (cell)



June 20, 2014

Amy Robinson  
Michigan Department of Environmental Quality  
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**Via Electronic Mail**

**Re: Sierra Club and Earthjustice Comments on Michigan's Proposed 2015 Ambient Air Monitoring Network Review**

Ms. Robinson:

On behalf of Sierra Club and Earthjustice, we submit the following comments on the Michigan Department of Environmental Quality's proposed 2015 Ambient Air Monitoring Network Review ("MDEQ 2015 Proposed Monitoring Plan").<sup>1</sup> These comments focus on the sulfur dioxide monitoring aspects of the Plan and briefly touch on the importance of monitoring PM<sub>2.5</sub>. In addition, these comments address why Michigan should use modeling to implement the 2010 SO<sub>2</sub> National Ambient Air Quality Standards (NAAQS).<sup>2</sup>

**I. There is a Compelling Need for Additional Source-Oriented SO<sub>2</sub> Modeling and Monitoring in Michigan.**

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<sup>1</sup> Michigan Department of Environmental Quality Air Quality Division, *Michigan's 2015 Ambient Air Monitoring Network Review* (proposed May 19, 2014), available at [https://www.michigan.gov/documents/deq/2015\\_Air\\_Mon\\_Network\\_Review\\_456645\\_7.pdf](https://www.michigan.gov/documents/deq/2015_Air_Mon_Network_Review_456645_7.pdf) (last visited June 16, 2014).

<sup>2</sup> MDEQ's 2015 Proposed Monitoring Plan also demonstrates that at least eight counties in Michigan are exceeding the 2008 Ozone NAAQS. 2015 Proposed Monitoring Plan at p. 25. As explained in Sierra Club's June 4, 2014 comments on Michigan's Proposed Infrastructure State Implementation Plan, it is critical that MDEQ require coal-fired EGUs that are causing such exceedances to install pollution controls and comply with stringent emission limits in order to protect public health and avoid future non-attainment designations. See Sierra Club, *Comments Concerning Michigan State Implementation Plan Infrastructure Applicable to the 2010 Nitrogen Dioxide, 2010 Sulfur Dioxide, 2008 Ozone, and 2012 Particulate Matter 2.5 National Ambient Air Quality Standards* (June 4, 2014), at pp. 22-25, attached hereto as Ex. 1. Those comments are incorporated herein by reference.

A. Without the Use of SO<sub>2</sub> Modeling, the Proposed Monitoring Network Is Insufficient to Identify Even the Most Significant Violations of the NAAQS.

The overriding purpose of an air quality monitoring network is to determine which areas of Michigan do not meet the NAAQS and therefore require pollution reductions to ensure that the residents of those areas are not breathing unhealthy air. When the U.S. Environmental Protection Agency (“EPA”) revised the SO<sub>2</sub> NAAQS in 2010, it highlighted the significance of stationary sources in terms of monitoring network design and noted that peak 1-hour concentrations would likely be greatest near stationary sources.<sup>3</sup>

However, EPA decided to rely heavily on modeling to identify areas exceeding the SO<sub>2</sub> NAAQS in light of the expense and burden of establishing a monitoring network that addresses all significant sources, the “special challenges SO<sub>2</sub> emissions present in terms of monitoring short-term SO<sub>2</sub> levels for comparison with the NAAQS in many situations,” and “the superior utility that modeling offers for assessing SO<sub>2</sub> concentrations.”<sup>4</sup> In particular, EPA noted that:

[W]e intend to use a hybrid analytic approach that would combine the use of monitoring and modeling to assess compliance with the new 1-hour SO<sub>2</sub> NAAQS.... [W]e believe that for a short-term 1-hour standard it is more technically appropriate, efficient, and effective to use modeling as the principle means of assessing compliance for medium to larger sources, and to rely more on monitoring for groups of smaller sources and sources not as conducive to modeling.<sup>5</sup>

EPA’s final 2010 SO<sub>2</sub> NAAQS rule simply built upon EPA’s historical practice of using modeling to determine attainment and nonattainment status for SO<sub>2</sub> NAAQS. In doing so, EPA properly recognized the “strong source-oriented nature of SO<sub>2</sub> ambient impacts,” Final SO<sub>2</sub> NAAQS Rule at 35,370, and concluded that the appropriate methodology for purposes of determining compliance, attainment, and nonattainment with the new NAAQS is modeling. *See id.* at 35,551. Accordingly, in promulgating the 2010 SO<sub>2</sub> NAAQS, EPA explained that, for the one-hour standard, “it is more appropriate and efficient to principally use modeling to assess compliance for medium to larger sources . . . .” *Id.* at 35,570. Similarly, EPA then explained in a white paper that using modeling to determine attainment for the SO<sub>2</sub> standard “could better address several potentially problematic issues than would the narrower monitoring-focused approach discussed in the proposal for the SO<sub>2</sub> NAAQS, including the unique source-specific impacts of SO<sub>2</sub> emissions and the special challenges SO<sub>2</sub> emissions have historically presented in terms of monitoring short-term SO<sub>2</sub> levels for comparison with the NAAQS in many situations (75 FR 35550).”<sup>6</sup>

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<sup>3</sup> U.S. Environmental Protection Agency (EPA), Primary National Ambient Air Quality Standard for Sulfur Dioxide; Final Rule, 75 Fed. Reg. 35520, 35557 (June 22, 2010).

<sup>4</sup> *Id.* at 35550.

<sup>5</sup> *Id.* at 35551.

<sup>6</sup> U.S. EPA, *Implementation of the 1-Hour SO<sub>2</sub> NAAQS Draft White Paper for Discussion* at 3-4 [“EPA White Paper”], available at <http://www.epa.gov/airquality/sulfurdioxide/pdfs/20120522whitepaper.pdf>

More recently, in its proposed Data Requirements Rule for the 1-Hour Sulfur Dioxide NAAQS,<sup>7</sup> EPA has indicated that it will allow states the “flexibility to choose whether to use monitoring or modeling to characterize air quality around or in proximity to identified sources.”<sup>8</sup> However, EPA emphasizes that in order to use monitoring to characterize air quality, states “will need to take specific actions to identify, relocate and/or install new ambient SO<sub>2</sub> monitors that would characterize peak 1-hour SO<sub>2</sub> concentrations in areas around or impacted by identified SO<sub>2</sub> sources.”<sup>9</sup>

The proposed rule’s companion Technical Assistance Document further indicates that states should take into account all existing data in determining where to site monitors, including “existing modeling results.”<sup>10</sup> Air agencies that choose to use monitoring as a means of satisfying the anticipated data requirements rule are thus required to develop a network proposal in which it demonstrates that the area characterized around an identified SO<sub>2</sub> source (or sources) includes the locations where peak 1-hour SO<sub>2</sub> concentrations are expected to occur.<sup>11</sup>

The Sierra Club recognizes that MDEQ lacks sufficient resources to add all large and medium SO<sub>2</sub> sources to the monitoring network at this time. However, in the interest of both efficiency and the health of Michigan residents, MDEQ should ensure its existing monitors are placed in priority areas based on the extent of emissions and/or proximity to large, potentially-affected populations. Priority areas include capturing the peak emissions concentrations from the following major sources:

- DTE’s St. Clair and Belle River plants;
- DTE’s Trenton Channel and River Rouge plants;
- Wisconsin Electric’s Presque Isle plant;
- Lansing Board of Water & Light’s Eckert plant;
- DTE’s Monroe plant; and
- Consumers Energy’s J.H. Campbell plant.

Where the air monitoring network is insufficient to adequately characterize peak SO<sub>2</sub> air quality, MDEQ must use dispersion modeling to determine compliance with the 1-hour SO<sub>2</sub> standard.

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<sup>7</sup> Data Requirements Rule for the 1-Hour Sulfur Dioxide (SO<sub>2</sub>) Primary National Ambient Air Quality Standard (NAAQS); Proposed Rule, 79 *Federal Register* 27446 (May 13, 2014), available at <http://www.gpo.gov/fdsys/pkg/FR-2014-05-13/pdf/2014-09458.pdf> [“proposed Data Requirements Rule”]

<sup>8</sup> *Id.* at 27453.

<sup>9</sup> *Id.* at 27458. In the proposed rule’s companion Technical Assistance Document (TAD), EPA offers the following guidance on how air agencies might satisfy the SO<sub>2</sub> data requirements in order to determine compliance with the NAAQS: “The EPA expects monitoring conducted in response to [an anticipated] future data requirements rule to be targeted, source-oriented monitoring, for which the primary objective would be to identify peak SO<sub>2</sub> concentrations in the ambient air that are attributable to an identified emission source or group of sources.” *See* SO<sub>2</sub> NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, U.S. EPA Office of Air and Radiation, Office of Air Quality Planning and Standards, Air Quality Assessment Division (December 2013 Draft) <http://www.epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf>

<sup>10</sup> TAD at 2.

<sup>11</sup> TAD at 16 (“The primary objective is to place monitoring sites at the location or locations of expected peak concentrations.”).

B. The Public Health Impacts of SO<sub>2</sub> Emissions on Michigan Residents are Significant.

In order to “protect public health with an adequate margin of safety,” EPA revised the SO<sub>2</sub> primary NAAQS in 2010 to replace the 24-hour and annual standards with a short-term, 1-hour standard.<sup>12</sup> In revising the standard, EPA noted that its rationale focused primarily on the causal relationship between respiratory morbidity following short-term exposure to SO<sub>2</sub>.<sup>13</sup> Indeed, SO<sub>2</sub> exposure for as little as 5-10 minutes can lead to adverse health effects to asthmatics.<sup>14</sup> EPA also noted that the existing standards were not adequate to “protect public health with an adequate margin of safety.”<sup>15</sup> EPA then selected a short-term standard that was designed to limit adverse respiratory effects on at-risk populations.<sup>16</sup>

Short-term SO<sub>2</sub> exposure is associated with a variety of negative health effects, particularly among at-risk populations:

Current scientific evidence links health effects with short-term exposure to SO<sub>2</sub> ranging from 5-minutes to 24-hours. Adverse respiratory effects include narrowing of the airways which can cause difficulty breathing (bronchoconstriction) and increased asthma symptoms. These effects are particularly important for asthmatics during periods of faster or deeper breathing (e.g., while exercising or playing).

Studies also show an association between short-term SO<sub>2</sub> exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses - particularly in at-risk populations including children, the elderly and asthmatics.<sup>17</sup>

Unfortunately, a considerable portion of Michigan’s residents can be categorized as at-risk, and many of these at-risk populations live in the Detroit-Warren-Livonia area, a major population center located near some of the state’s largest stationary sources of SO<sub>2</sub> emissions. For example, the prevalence of asthma among Detroit adults is 50 percent higher than that of Michigan as a whole, and rates of asthma hospitalization in Detroit are three times higher than that of Michigan as a whole.<sup>18</sup>

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<sup>12</sup> EPA, Primary National Ambient Air Quality Standard for Sulfur Dioxide; Final Rule, 75 Fed. Reg. 35520, 35521 (June 22, 2010).

<sup>13</sup> *Id.* at 35526.

<sup>14</sup> *Id.* at 35536.

<sup>15</sup> *Id.* at 35550.

<sup>16</sup> *Id.*

<sup>17</sup> EPA, Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide, available at <http://www.epa.gov/airquality/sulfurdioxide/pdfs/20100602fs.pdf> (last visited June 18, 2012).

<sup>18</sup> See “Epidemiology of Asthma in Michigan,” available at [https://www.michigan.gov/documents/mdch/epi-mich-asthma-Detroit\\_Epicenter\\_of\\_Asthma\\_401493\\_7.pdf](https://www.michigan.gov/documents/mdch/epi-mich-asthma-Detroit_Epicenter_of_Asthma_401493_7.pdf).

C. SO<sub>2</sub> Emissions Contribute to the Creation of Fine Particulate Matter, Which Is Linked to Premature Death.

In addition to the adverse health effects attributable directly to SO<sub>2</sub>, the health of Michigan residents is further threatened because SO<sub>2</sub> pollution contributes to the formation of secondary particles of fine particulate matter (PM<sub>2.5</sub>). Secondary particles of PM<sub>2.5</sub> are formed from atmospheric reactions of chemicals including SO<sub>2</sub>, and most of the fine particle pollution in the United States is formed in this way.<sup>19</sup>

PM<sub>2.5</sub> pollution contributes to a number of adverse health effects, including heart attacks, aggravated asthma, decreased lung function, coughing, and difficulty breathing.<sup>20</sup> Most disturbingly, PM<sub>2.5</sub> is also associated with premature death in people with existing heart or lung disease.<sup>21</sup> According to the EPA, “the evidence is sufficient to conclude that the relationship between long-term PM<sub>2.5</sub> exposures and mortality is causal.”<sup>22</sup>

The estimated numbers of deaths caused by fine particulate matter from some of the state’s largest SO<sub>2</sub> sources emphasize the urgency of adequate SO<sub>2</sub> monitoring. DTE’s Trenton Channel plant alone is estimated to have caused between 56 and 110 premature deaths in 2011, ranking it among the 18 plants in the nation whose premature deaths cost society more than the value of the electricity they generate.<sup>23</sup> Similarly, DTE’s St. Clair plant is estimated to have caused between 76 and 160 premature deaths in 2011, while the J.H. Campbell plant is estimated to have caused between 70 and 140 premature deaths in that year.<sup>24</sup>

**II. The State Cannot Rely on Monitoring to Comply with the SO<sub>2</sub> NAAQS.**

Before discussing specific inadequacies in Michigan’s proposed monitoring network, it is important to note that the state should not use a monitoring network as the primary means of evaluating SO<sub>2</sub> NAAQS compliance but, instead, should rely on lower-cost and more accurate air dispersion modeling.

A. Monitors Alone Cannot Accurately Evaluate Compliance With The SO<sub>2</sub> NAAQS For Medium And Large Sources.

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<sup>19</sup>EPA, Basic Information on Particulate Matter, available at <http://www.epa.gov/pm/basic.html> (last visited June 18, 2012).

<sup>20</sup> EPA, Health information on Particulate Matter, available at <http://www.epa.gov/pm/health.html> (last visited June 18, 2012).

<sup>21</sup> *Id.*

<sup>22</sup> EPA, Integrated Science Assessment for Particulate Matter, EPA/600/R-08/139F (Dec. 2009), at 7-96, available at [http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM\\_ISA\\_full.pdf](http://www.epa.gov/ncea/pdfs/partmatt/Dec2009/PM_ISA_full.pdf) (last visited June 16, 2014)

<sup>23</sup>Environmental Integrity Project, Net Loss: Comparing the Cost of Pollution vs. the Value of Electricity from 51 Coal-Fired Plants (June 2012), at ii, v, and available at [http://www.environmentalintegrity.org/news\\_reports/documents/PowerPlantReport\\_2012.6.6.Final.pdf](http://www.environmentalintegrity.org/news_reports/documents/PowerPlantReport_2012.6.6.Final.pdf) (last visited June 16, 2014).

<sup>24</sup> *Id.*

When EPA promulgated the 2010 SO<sub>2</sub> NAAQS, it conceded that the current monitor network—consisting of 441 monitors, less than a third of the number in place three decades ago—is insufficient to support a monitoring approach to implementation. As EPA explained in the final 2010 SO<sub>2</sub> NAAQS Rule, “even if monitoring does not show a violation,” that absence of data is not determinative of attainment status absent modeling, and that monitoring in general is “less appropriate, more expensive, and slower to establish.” *Id.*

Deploying a more extensive monitoring network as part of the NAAQS implementation process would suffer from a number of drawbacks that render this approach too slow, too impractical, and too ineffective for monitoring to replace modeling as the primary means of implementing the 1-hr SO<sub>2</sub> NAAQS.

First, the minimum monitoring requirements established by EPA for the most part will not be sufficient to characterize SO<sub>2</sub> air quality or to determine compliance with the 1-hr SO<sub>2</sub> standard.<sup>25</sup> For any area with fewer than three SO<sub>2</sub> monitors positioned to capture peak concentrations from a large SO<sub>2</sub> source, monitoring will be inadequate to establish 1-hr SO<sub>2</sub> compliance.<sup>26</sup> And if only one monitor is located near a large source, that source has a clear invitation to game the system by, for example, slightly adjusting its stack or operating parameters to ensure that high impacts will not occur at the one monitor.

Second, even if the state were to have the resources to deploy a sufficient number of monitors, the state may not be able locate a monitor where the modeling indicates the highest impact are likely to occur for technical reasons, such as inability to gain physical or legal access to the site, or lack of access to power supply.<sup>27</sup>

Third, even if a sufficiently extensive monitoring network were established, implementation of the NAAQS through monitoring would likely take up to a decade, which is an untenable amount of time. Not only would this delay be a disservice to the public, it would also be a disservice to the regulated entities, especially owners of coal-fired power plants. Coal-fired power plants are making critical decisions now about the need for additional pollution controls or retirements because of a number of factors such as other major environmental regulations, declining demand for energy, declining prices and increasing availability of zero or low SO<sub>2</sub> generating sources, and the age of the existing coal fired power plant fleet. Evaluating and achieving compliance through more expeditious and cost-effective air dispersion modeling can thus provide the regulatory clarity needed to make prudent decisions about those plants now that reliance on increased monitoring alone cannot.

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<sup>25</sup> See Andrew Gray, Gray Sky Solutions, “Review of Michigan’s 2015 SO<sub>2</sub> Ambient Air Monitoring Network,” June 20, 2014, at 3, attached as Ex. 2.

<sup>26</sup> *Id.*

<sup>27</sup> An inability to place monitors at appropriate locations is another argument in favor of a modeling approach, as EPA has long recognized: “Although siting criteria may preclude the placement of ambient monitors at certain locations, this does not preclude the placement of model receptors at these sites.” U.S. EPA 1994 SO<sub>2</sub> Guideline Document at 2-6.

EPA itself has acknowledged that for medium to large sources, monitoring is “less appropriate, more expensive, and slower to establish.” Final Rule, 75 Fed. Reg. 35,570. This has been EPA’s position for decades. For example, in 1994, EPA explained:

A small number of ambient SO<sub>2</sub> monitors usually is not representative of the air quality for an area. Typically, modeling estimates of maximum ambient concentration are based on a fairly infrequent combination of meteorological and source operating conditions. To capture such results on a monitor would normally require a prohibitively large and expensive network. Therefore, dispersion modeling will generally be necessary to evaluate comprehensively a source’s impacts and to determine the areas expected high concentrations.[] Air quality modeling results would be especially important if sources were not emitting at their maximum level during the monitoring period or if the monitoring period did not coincide with potentially worst-case meteorological conditions.

U.S. EPA 1994 SO<sub>2</sub> Guideline Document at 2-5 to 2-6 (emphasis added). EPA has also explained:

Monitoring is not more accurate than computer modeling, except for determining ambient concentrations under real-time conditions at a discrete location. Monitoring is limited in time as well as space. Monitoring can only measure pollutant concentrations as they occur; it cannot predict future concentrations when emission levels and meteorological conditions may differ from present conditions. Computer modeling, on the other hand, can analyze all possible conditions to predict concentrations that may not have occurred yet but could occur in the future.

67 Fed. Reg. 22,168, 22,185 (May 2, 2002) (emphasis added).

As far back as 1983, EPA stated that in “most SO<sub>2</sub> cases, monitoring data alone will not be sufficient for areas dominated by point sources. A small number of ambient monitors usually is not representative of the air quality for the entire area.” Sheldon Meyers Memorandum re Section 107 Designation Policy Summary (April 21, 1983), attached hereto as Exhibit 3; *see also Montana Sulphur & Chemical Co. v. EPA*, 666 F.3d 1174, 1184 (9th Cir. 2012) (“EPA explained that it was ‘not practical, given the number and complexity of sulfur dioxide sources, to install a sufficient number of monitors to provide the spatial coverage provided by air quality dispersion models.’”) (emphasis added).

Indeed, it is unlikely that *any* number of monitors would be sufficient to implement the NAAQS. The State and Territorial Air Pollution Program Administrators/Association of Local Air Pollution Control Officers (now National Association of Clean Air Agencies, or “NACAA”) told EPA over a decade ago that monitoring could not be used to effectively determine compliance with short-term SO<sub>2</sub> ambient standards. *See* STAPPA-ALAPCO Letter to Eric Ginsburg (Feb. 15, 2001). NACAA explained that since short-term SO<sub>2</sub> “concentrations are strongly influenced by meteorology (wind direction, wind speed, stability, etc.), there is no assurance that any

prescribed number of monitors around a facility would detect the highest levels in adjacent population neighborhoods.” *Id.* at 1. NACAA also explained that “[r]edeploying monitors in the existing network to cover specific facilities in an attempt to keep costs down does not recognize the true potential of need.” *Id.* at 1-2. NACAA also explained that redeployment of existing monitors is problematic because many existing monitors are needed for long-term trends analysis. NACAA further acknowledged the difficulty of gaining physical and legal access to essential monitoring locations. *Id.* at 4.

#### B. The Cost of Modeling is Modest Compared to the Cost of Monitoring.

The cost of modeling compliance with the SO<sub>2</sub> NAAQS is modest, particularly in comparison to the costs of installing and operating a monitoring network. One of the main reasons it is significantly cheaper to model rather than monitor for attainment designations is the profile of SO<sub>2</sub> emitters. SO<sub>2</sub> emissions are not spread evenly across all of the 84,000 SO<sub>2</sub> emitters in the United States. Instead, just 479 sources, 236 of which are coal-fired EGUs, are responsible for 90% of all SO<sub>2</sub> emissions in the United States. In Michigan, over 80 percent of the state’s SO<sub>2</sub> emissions are emitted by approximately 70 coal-fired electric generating units.<sup>28</sup> As a result, by focusing on this small subset of SO<sub>2</sub> sources, Michigan could expeditiously make significant progress in ensuring that the health protections promised by the NAAQS are met.

The profile of SO<sub>2</sub> emitters—where a handful of medium and large sources generate nearly all of SO<sub>2</sub> emissions in the country and the source specific locational nature of the SO<sub>2</sub> air pollution—means that SO<sub>2</sub> air pollution from medium and large sources can be readily and accurately modeled by simple particle dispersion modeling.

The Michigan DEQ modeling staff could likely model the medium and large SO<sub>2</sub> emitters under its current budget. If the Michigan DEQ did not have in-house modeling resources, the agency would incur some costs charged by third party modelers, but even these costs are comparatively nominal. Independent third party modelers could conduct AERMOD time series modeling for SO<sub>2</sub> for less than \$5,000 per source, and in most instances less than \$3,000. Thus to model the large and medium sources in Michigan that cause 90% of the SO<sub>2</sub> emissions would cost less than \$150,000. This number drops rapidly, however, when one accounts for the sources in areas monitored as nonattainment or that have committed to retiring by a date certain.

In stark contrast, simply purchasing and installing a single monitor can cost upwards of \$100,000 per site. In fact, many states submitted comments to EPA stating that implementing the SO<sub>2</sub> NAAQS via monitors would be cost-prohibitive, and MDEQ’s 2015 Proposed Monitoring Network report cautions that “MDEQ cannot implement all of the new monitoring requirements described above without new funding and a concomitant reduction in other monitoring requirements due to financial and staffing limitations.”<sup>29</sup>

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<sup>28</sup> 2011 National Emissions Inventory <http://www.epa.gov/ttnchie1/net/2011inventory.html>

<sup>29</sup> MDEQ 2015 Proposed Monitoring Network at p. 1.

### **III. The Current Monitoring Network Is Inadequate To Monitor The Threats To Michigan Citizens' Health Posed by Large Sources' SO<sub>2</sub> Emissions.**

#### **A. Source-Oriented SO<sub>2</sub> Monitors Are Needed to Meet Monitoring Objectives.**

When adopting the 1-hour NAAQS for SO<sub>2</sub>, EPA observed that the highest concentrations of SO<sub>2</sub> would most likely be found near large stationary sources:

A significant fact for ambient SO<sub>2</sub> concentrations is that stationary sources are the predominant emission sources of SO<sub>2</sub> and the peak, maximum SO<sub>2</sub> concentrations that may occur are most likely to occur nearer the parent stationary source.<sup>30</sup>

Pursuant to EPA regulations, monitoring network plans must achieve three objectives: 1) provide the public with data on air pollution; 2) provide supporting data for air pollution research; and 3) “support compliance with ambient air quality standards and emissions strategy development.”<sup>31</sup> Additionally, a network must also incorporate “a variety of types of monitoring sites.”<sup>32</sup>

Monitoring sites must be capable of informing managers about many things including the peak air pollution levels, typical levels in populated areas, air pollution transported into and outside of a city or region, and air pollution levels near specific sources.<sup>33</sup>

Because stationary sources are by far the largest contributors to ambient SO<sub>2</sub> pollution, MDEQ must place monitors in areas of predicted peak emissions concentrations for at least the largest sources of SO<sub>2</sub> emissions.<sup>34</sup> Due to the source-oriented nature of SO<sub>2</sub> pollution, monitors sited to measure background concentration levels or typical concentrations in high-density population areas need to be supplemented with monitors sited to “determine the impact of significant sources or source categories on air quality.”<sup>35</sup> An SO<sub>2</sub> monitoring network can only support compliance with ambient air quality standards if individual monitors are located such that they will measure the areas of greatest anticipated concentration, *i.e.*, areas affected by the largest sources of SO<sub>2</sub> pollution.<sup>36</sup> A network that omits monitors near the largest sources of SO<sub>2</sub> pollution therefore also fails to provide at-risk members of the public with adequate and accurate information about the quality of the air they are breathing.

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<sup>30</sup> *Id.* at 35557.

<sup>31</sup> 40 C.F.R. § 58 App. D, § 1.1 (2011).

<sup>32</sup> *Id.* § 1.1.1. The regulations specify “six general site types: (a) Sites located to determine the highest concentrations expected to occur in the area covered by the network. (b) Sites located to measure typical concentrations in areas of high population density. (c) Sites located to determine the impact of significant sources or source categories on air quality. (d) Sites located to determine general background concentration levels. (e) Sites located to determine the extent of regional pollutant transport among populated areas; and in support of secondary standards. (f) Sites located to measure air pollution impacts on visibility, vegetation damage, or other welfare-based impacts.”

<sup>33</sup> *Id.*

<sup>34</sup> Proposed Data Requirements Rule TAD at 16.

<sup>35</sup> 40 C.F.R. § 58 App. D, § 1.1.

<sup>36</sup> Proposed Data Requirements Rule TAD at 16.

B. Michigan's Limited Monitoring Network is Inadequate to Determine Whether Some of the Largest Pollution Sources Are Causing Unhealthy Levels of SO<sub>2</sub>.

MDEQ currently operates four SO<sub>2</sub> ambient air monitors in the state: one in Lansing, one in the Sterling State Park in Monroe County, one in Port Huron, and one at the Southwest High School in Detroit.<sup>37</sup> In addition, MDEQ is redeploying a monitor from Jenison in Ottawa County to a new monitoring site in West Olive.<sup>38</sup> MDEQ also operates an NCore monitor at Allen Park.<sup>39</sup>

At Sierra Club's request, an air dispersion modeling expert conducted a review of MDEQ's 2015 Proposed Monitoring Plan (hereinafter, "Gray Report").<sup>40</sup> As discussed above, a single monitor for each major SO<sub>2</sub> source is insufficient to characterize SO<sub>2</sub> air quality or to demonstrate compliance with the 2010 SO<sub>2</sub> NAAQS. Instead, compliance must be demonstrated using both a complex network of monitors and air quality modeling.<sup>41</sup> For the purpose of these comments, Sierra Club asked an air dispersion modeling expert to 1) examine whether MDEQ's monitors are deployed in a manner that captures peak predicted impacts from major sources, and 2) recommend the best location for a single monitor to identify the highest SO<sub>2</sub> concentrations caused by emissions from each of the major sources. These recommended monitor sites represent the beginning of what Sierra Club hopes will eventually be a robust monitoring network, informed and supplemented by air quality modeling, that will ensure that Michigan is able to identify, address, and prevent SO<sub>2</sub> NAAQS exceedances.

As discussed in greater detail below, the Gray Report finds that the proposed Plan fails to include SO<sub>2</sub> monitors capable of capturing peak predicted emissions concentrations from several of the largest SO<sub>2</sub> sources, including the Trenton Channel, St. Clair, Belle River, and Presque Isle power plants.<sup>42</sup> Without monitors near these large sources of SO<sub>2</sub>, the monitoring network cannot effectively determine the "peak air pollution levels" caused by such sources.<sup>43</sup> Additionally, by omitting source-oriented monitors near many of the largest sources of SO<sub>2</sub>, the monitoring network fails to provide adequate information on "air pollution levels near specific sources."<sup>44</sup> Finally, while monitors are better placed with regards to SO<sub>2</sub> emissions from the River Rouge and Eckert plants, MDEQ should consider installing additional monitors to ensure that peak air pollution levels are being caught.<sup>45</sup>

Because Michigan's monitoring network does not capture predicted peak SO<sub>2</sub> concentrations from a number of major sources, MDEQ must either redeploy or expand its monitoring network.

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<sup>37</sup> MDEQ 2015 Proposed Monitoring Plan at 65.

<sup>38</sup> *Id.* MDEQ had previously deployed an SO<sub>2</sub> monitor at the Jenison site in Ottawa County, but shut down the monitor in 2013 pending moving the monitor to its new proposed location.

<sup>39</sup> *Id.*

<sup>40</sup> Andrew Gray, Gray Sky Solutions, "Review of Michigan's 2015 SO<sub>2</sub> Ambient Air Monitoring Network," June 20, 2014, at 3, attached as Ex. 2.

<sup>41</sup> *Id.* at p. 3.

<sup>42</sup> *Id.* at 4.

<sup>43</sup> 40 C.F.R. § 58 App. D, § 1.1 (2011).

<sup>44</sup> *Id.*

<sup>45</sup> Gray Report at 4, 6, and 11.

In addition, because the monitoring network is not expansive enough to characterize SO<sub>2</sub> air quality, MDEQ must rely on dispersion modeling to comply with the 1-hour SO<sub>2</sub> standard.

#### IV. Modeling and Emissions Data Support the Installation or Redeployment of Source-Oriented SO<sub>2</sub> Monitors Near DTE’s River Rouge, Trenton Channel, St. Clair, Belle River and Presque Isle Power Plants.

Air dispersion modeling performed at the Sierra Club’s request indicates that both allowable and, in some instances, maximum or actual emissions from the St. Clair, Belle River, Monroe, J.H. Campbell, Eckert, and Presque Isle power plants result in modeled violations of the 1-hour SO<sub>2</sub> NAAQS.<sup>46</sup> In addition, MDEQ’s own modeling data for the St. Clair, Belle River, Trenton Channel and River Rouge plants shows predicted violations of the NAAQS.<sup>47</sup> As shown in Table 1, below, all of these plants have modeled maximum emissions above the SO<sub>2</sub> NAAQS.

Based on a review of the air modeling analyses, the Gray Report concludes that several of these plants do not have SO<sub>2</sub> monitors located in the peak emissions concentration areas identified by the modeling. Table 1, below, summarizes the Gray Report’s findings and recommendations for where MDEQ should place SO<sub>2</sub> monitors to better capture predicted peak emissions concentrations from these major sources.

Table 1 Summary of Recommended Monitor Locations

Source	Allowable Emissions (tpy)	Modeled Maximum SO <sub>2</sub> Concentration (ppb)	Monitor Located Near Modeled Peak?	Recommended Monitor Location
River Rouge	34,200	91	YES*	Oakwood Hts / Melvindale
Trenton Channel	55,254	107	NO	Allen Rd. & West Rd.
Belle River	71,631	85	NO	} St. Clair Hwy & King Rd.
St. Clair	98,322	186	NO	
JH Campbell	87,563	111	YES	West Olive
Monroe	14,300	91	YES	Sterling Park
Eckert Station	29,068	117	YES*	2-3 km SE or SW of plant
Presque Isle	30,482	295	NO	Southwest Marquette

\* The monitors near River Rouge and Eckert Station could be relocated to capture peak SO<sub>2</sub> concentrations. See text for details.

<sup>46</sup> See Steven Klafka, *Belle River and St. Clair Power Plants, St. Clair, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (May 28, 2014)*, [hereinafter “Klafka Belle River and St. Clair Report”], attached hereto as Ex. 4; Steven Klafka, *Eckert Station, Lansing, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (May 30, 2014)*, [hereinafter “Eckert Report”], attached hereto as Ex. 5; Steven Klafka, *J.H. Campbell Plant, West Olive, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (May 28, 2014)*, [hereinafter “J.H. Campbell Report”], attached hereto as Ex. 6; Steven Klafka, *Monroe Power Plant, Monroe, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (April 16, 2014)*, [hereinafter “Monroe Report”], attached hereto as Ex. 7; Steven Klafka, *Presque Isle Power Plant, Marquette, Michigan, Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub> (May 30, 2014)* [hereinafter “Presque Isle Report”], attached hereto as Ex. 8.

<sup>47</sup> H. Andrews Gray, *SO<sub>2</sub> Impacts from the St. Clair and Belle River Power Plants (June 3, 2014)* (attached hereto as Ex. 9) [Gray St Clair/Belle River Report]. Gray conducted his analysis of the impacts from the St. Clair and Belle River plants using modeling files obtained from MDEQ. Gray also used MDEQ’s modeling files to analyze the appropriate locations for monitors for the Trenton Channel and River Rouge plants.

MDEQ must therefore redeploy or expand its monitoring network to cover peak concentrations from major sources. Moreover, because the monitoring network is not sufficient to characterize SO<sub>2</sub> air quality, MDEQ must continue to use dispersion modeling to comply with the 1-hour SO<sub>2</sub> standard for all sources.

A. The Monitoring Network Does Not Adequately Capture SO<sub>2</sub> Impacts from DTE's River Rouge and Trenton Channel Power Plant.

The Southwest High School (SWHS) SO<sub>2</sub> monitor is located within five kilometers of a number of large SO<sub>2</sub> sources in the Detroit area, including the River Rouge power plant. The Gray Report notes that while the SWHS monitor is “located in an area where high concentrations from the River Rouge plant might be expected to occur, . . . the modeled peak impacts from all nearby sources combined (and also peak impacts from individual sources, including River Rouge) were typically located to the south or southwest of the SWHS monitor.”<sup>48</sup> To capture the peak predicted concentrations from the River Rouge plant, MDEQ should place a monitor near the intersection of Oakwood Blvd. and S. Dix St, between the Oakwood Heights and Melvindale neighborhoods.<sup>49</sup> As discussed above, however, regardless of placement, a single monitor cannot suffice to characterize the SO<sub>2</sub> air quality in the surrounding area, and so the state must continue to use modeling to evaluate and demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.<sup>50</sup>

Moreover, the Gray Report concludes that “there currently exists no monitor in southern Wayne County that can be used to characterize peak SO<sub>2</sub> air quality around the Trenton Channel power plant.”<sup>51</sup> The Gray Report notes that the Allen Park monitor is located about 8 to 10 km southwest of major SO<sub>2</sub> sources, but in a generally upwind direction, and therefore likely does not capture peak emissions concentrations.<sup>52</sup> The Gray Report thus finds that the Allen Park monitor “does not satisfy the need for source-oriented monitors that can be used to characterize peak concentrations around major sources, as required by the proposed data requirements rule.”<sup>53</sup> To assess peak SO<sub>2</sub> concentrations associated with emissions from the Trenton Channel power plant, the Gray Report recommends that MDEQ place a monitor approximately 4.5 km northwest of the plant, near the intersection of Allen Road and West Road in the Woodhaven neighborhood.<sup>54</sup> Again, however, even with a properly placed monitor, the state must continue to use modeling to evaluate and demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.

B. The Monitoring Network Does Not Adequately Capture Peak SO<sub>2</sub> Impacts from DTE's St. Clair and Belle River Power Plants.

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<sup>48</sup> Gray Report at 6.

<sup>49</sup> *Id.*

<sup>50</sup> *Id.*

<sup>51</sup> *Id.*

<sup>52</sup> *Id.*

<sup>53</sup> *Id.*

<sup>54</sup> *Id.* at 7.

The St. Clair and Belle River power plants can emit up to 98,322 tons SO<sub>2</sub>/year and 71,631 tons SO<sub>2</sub>/year, respectively. Modeling performed by MDEQ and on behalf of the Sierra Club indicates that the two plants' emissions will cause violations of the SO<sub>2</sub> NAAQS over a wide area.<sup>55</sup> Yet, no SO<sub>2</sub> monitor is sited close enough to the plants to capture their peak emissions concentrations.

Modeling analysis using MDEQ's inputs and outputs found that peak SO<sub>2</sub> concentrations from the Belle River and St. Clair plants are expected to occur between approximately 3.5 and 6 kilometers north and northwest of the two power plants.<sup>56</sup> The nearest SO<sub>2</sub> monitor is the Port Huron monitor, which is located over 20 km north of the plants. The Gray Report finds that "[w]hile there will likely be *some* occasional impact at the Port Huron monitor due to emissions from the St. Clair and Belle River power plants, there is almost no chance that the maximum SO<sub>2</sub> concentration generated by St. Clair and Belle River will be observed in Port Huron."<sup>57</sup> In fact, MDEQ acknowledges in its proposed Monitoring Plan that a monitor placed at such a distance is unlikely to capture peak emissions concentrations from a large SO<sub>2</sub> source; MDEQ notes that it plans to move a monitor at Jenison in Ottawa County to West Olive because that monitor is too far away to capture emissions from the J.H. Campbell plant, located 30 km west of the monitor.<sup>58</sup>

Because the Port Huron monitor cannot capture the peak SO<sub>2</sub> emissions concentrations from the Belle River and St. Clair power plants, the Gray Report recommends that MDEQ redeploy the monitor to an area slightly northwest of the two sources, such as the Pine River Elementary School or the St. Clair Lion's Club.<sup>59</sup> Even if MDEQ installed a properly placed monitor, however, the state must continue to use modeling to evaluate and demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.<sup>60</sup>

C. The Monitoring Network Does Not Adequately Capture Peak SO<sub>2</sub> Impacts from the Presque Isle Power Plant.

Modeling performed on behalf of the Sierra Club predicts that the Presque Isle plant's emissions will cause exceedances of the SO<sub>2</sub> NAAQS.<sup>61</sup> Again, however, no SO<sub>2</sub> monitor is sited close enough to the plants to capture the plant's peak emissions concentrations. Based on the results of the air dispersion modeling, the Gray Report recommends that MDEQ place a monitor in southwestern Marquette, north of Highway 41.<sup>62</sup> Once again, even if MDEQ installed a properly placed monitor, the state must continue to use modeling to evaluate and demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.

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<sup>55</sup> See *supra* at Table 1.

<sup>56</sup> Gray Report at 7.

<sup>57</sup> *Id.* at 8.

<sup>58</sup> *Id.* at 7. The Gray Report notes that the West Olive location appears situated to capture secondary modeled peak concentrations, though not ideally placed to capture primary peak concentrations from the Campbell plant. *Id.* Even with this monitor, however, because a single monitor cannot suffice to characterize SO<sub>2</sub> air quality, MDEQ must continue to use modeling to evaluate and demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.

<sup>59</sup> *Id.* at 9.

<sup>60</sup> *Id.*

<sup>61</sup> See *supra* at Table 1.

<sup>62</sup> See Gray Report at 14, Figure 13.

**D. The Lansing Monitor May Not Capture Peak SO<sub>2</sub> Concentrations from the Eckert Power Plant.**

Modeling performed on behalf of the Sierra Club predicts that the Eckert plant's emissions may cause exceedances of the SO<sub>2</sub> NAAQS.<sup>63</sup> The Gray Report finds that the Lansing monitor is not co-located with the Eckert plant's predicted peak emissions concentrations.<sup>64</sup> Specifically, the Gray Report notes that while "[t]he Lansing SO<sub>2</sub> monitoring site is located about 3 km to the northeast of the Eckert Station power plant," "[t]he modeled peak SO<sub>2</sub> concentration is located 1.8 km to the south-southeast of the power plant."<sup>65</sup> The Report further finds that the monitor appears to be located in an area of somewhat lower concentrations, likely due to lower wind frequency in that direction.<sup>66</sup> As a result, the Gray Report recommends that MDEQ consider relocating the SO<sub>2</sub> monitor to a location about 2-3 km to the southeast or west-southwest of the plant in order to capture the peak concentration impacts from Eckert Station.<sup>67</sup> As stated above, however, because a single monitor cannot suffice to characterize the SO<sub>2</sub> air quality in the surrounding area, MDEQ must continue to use modeling to evaluate and demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.

**V. Maintaining the Current Network of Speciated PM<sub>2.5</sub> Monitors is Critical to Protecting Public Health.**

Alarming, MDEQ's proposed monitoring plan notes that EPA has recommended de-funding of five speciated PM<sub>2.5</sub> monitors in Michigan.<sup>68</sup> Sierra Club strongly opposes closure of these speciated PM<sub>2.5</sub> monitors, particularly the monitor located at the Southwest High School in Detroit.

Preserving the current network of speciated PM<sub>2.5</sub> monitors is essential to protecting the health of Michigan residents, especially those in urban Detroit. Chemical speciation of particulate matter is "needed to characterize PM<sub>2.5</sub> composition and to better understand the sources and processes leading to elevated PM<sub>2.5</sub> concentrations."<sup>69</sup> Chemical speciation provides information on the levels of metals and other hazardous air pollutants that make up particulate matter. In EPA's own words, speciation of PM<sub>2.5</sub> is "critically important for the implementation efforts associated with air quality programs," including source attribution analysis (*i.e.*, determining the likely mix of sources impacting a site), emission inventory, air quality model evaluation, and tracking the success of emissions reductions programs.<sup>70</sup> Emission inventory and

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<sup>63</sup> See *supra* Table 1.

<sup>64</sup> Gray Report at 11.

<sup>65</sup> *Id.*

<sup>66</sup> *Id.*

<sup>67</sup> *Id.*

<sup>68</sup> MDEQ 2015 Proposed Monitoring Plan at 46.

<sup>69</sup> EPA, "Revised Requirements for Designation of Reference and Equivalent Methods for PM<sub>2.5</sub> and Ambient Air Quality Surveillance for Particulate Matter," Final Rule, 62 Fed. Reg. 38764, 38777 (July 18, 1997).

<sup>70</sup> *Id.* at 38778. See also EPA, "Particulate Matter (PM<sub>2.5</sub>) Speciation Guidance Document," pp 6-7 (draft dated July 22, 1998), available at <http://www.epa.gov/ttnamti1/files/ambient/pm25/spec/specpln2.pdf>; <http://www.epa.gov/region4/sesd/pm25/p2.html>

modeling tools are essential to developing sound source emission reduction strategies.<sup>71</sup> Understanding the chemical composition of PM<sub>2.5</sub> in an area is also vital to assessing the health risks associated with PM<sub>2.5</sub>.<sup>72</sup>

Maintaining speciated PM<sub>2.5</sub> monitoring capabilities is particularly important at the Southwest High School in Detroit, which is located near a mix of large industrial sources and power plants that emit many toxic air pollutants, including mercury, lead, arsenic, cadmium, and chromium. Without adequate monitoring, MDEQ and EPA cannot assess whether concentrations of toxic air pollutants have reached unsafe levels, nor can they design and implement effective emission reduction strategies for these toxic air pollutants. If anything, EPA should expand the number of speciated PM<sub>2.5</sub> monitors in the Detroit area. Dismantling the speciated PM<sub>2.5</sub> monitors would erode protections upon which Detroit residents rely, and which it is EPA and MDEQ's duty to safeguard.

## VI. CONCLUSION

For the reasons set forth above, because the monitoring network will not characterize peak concentrations from the Trenton Channel, St. Clair, Belle River, and Presque Isle power plants, MDEQ must amend its proposed 2015 Monitoring Plan to add or re-deploy source-oriented monitors associated with those plants, and should consider adding source-oriented monitors associated with the River Rouge and Eckert plants to ensure that peak concentrations are caught. MDEQ must also continue to rely on dispersion modeling to comply with the 1-hour SO<sub>2</sub> standard. Finally, in order to protect the health of Michigan citizens, EPA should maintain its current network of speciated PM<sub>2.5</sub> monitors.

Respectfully submitted,

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<sup>71</sup> *Id.*

<sup>72</sup> *Id.*

Michigan DEQ  
June 20, 2014  
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*On behalf of Sierra Club and Earthjustice*

cc: EPA, Region 5

# **EXHIBIT 1**



**VIA ELECTRONIC MAIL**

June 4, 2014

Erica Wolf  
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Michigan Department of Environmental Quality  
P.O. Box 30260  
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**Re: Comments Concerning Michigan State Implementation Plan Infrastructure  
Applicable to the 2010 Nitrogen Dioxide, 2010 Sulfur Dioxide, 2008 Ozone, and 2012  
Particulate Matter 2.5 National Ambient Air Quality Standards**

Dear Ms. Wolf:

On behalf of Sierra Club, its over 13,800 members in Michigan, and others who are adversely impacted by Michigan's sources of sulfur dioxide ("SO<sub>2</sub>") and ozone pollution, we submit the following comments on Michigan's Proposed Infrastructure State Implementation Plan for the 2010 Nitrogen Dioxide National Ambient Air Quality Standards ("NAAQS"), 2010 Sulfur Dioxide NAAQS, 2008 Ozone NAAQS, and 2012 Particulate Matter NAAQS ("Draft ISIP").<sup>1</sup> According to the state of Michigan's Environmental Calendar from May 5, 2014 on the proposed amendment to the Michigan ISIP, interested parties must submit written comments by 5:00 p.m. via electronic mail on June 4, 2014, so these comments are timely submitted.

As acknowledged by the Michigan Department of Environmental Quality's ("MDEQ") public notice, Michigan must submit an Infrastructure State Implementation Plan ("Infrastructure SIP" or "ISIP") that addresses all of the requirements in sections 110(a)(1) and (2) of the Clean Air Act ("CAA" or "Act") for five distinct NAAQS recently promulgated by the U.S. Environmental Protection Agency, including: (1) the June 2, 2010 one-hour primary SO<sub>2</sub> standard; and (2) the March 27, 2008 eight-hour primary ozone standard. 42 U.S.C. § 7410(a)(1) & (2). As proposed, Michigan's Draft ISIP does not satisfy several essential requirements of Section 110(a)(1) and (2), including requirements to establish enforceable emission limits and to

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<sup>1</sup> Please note that the actual title is Michigan's Proposed Infrastructure State Implementation Plan for the 2010 Nitrogen Dioxide NAAQS, 2010 Sulfur Dioxide NAAQS, and the 2012 Particulate Matter NAAQS. It does not include 2008 Ozone NAAQS. This appears to be a typographical error.

address significant contributions to downwind states. The following comments explain these deficiencies in greater detail.<sup>2</sup>

By addressing the deficiencies in its draft ISIP, the state of Michigan will benefit in four ways. First, and most importantly, Michigan will take action required to improve public health impacts in the state. There are currently at least fourteen counties that are exceeding the SO<sub>2</sub> or ozone NAAQS. Since the NAAQS set ambient pollution levels that states should not exceed in order to protect the health of its citizen, the potential public health benefits of addressing these deficiencies are significant. For example, there are over 230,000 children and over 700,000 adults who currently have asthma in Michigan. The disease costs approximately \$224 million in direct medical costs alone, and an additional \$170 million in indirect costs.<sup>3</sup> Second, Michigan will meet its obligations under the Clean Air Act and insulate itself from EPA having to take corrective action. Third, Michigan can prevent the inevitable future designation of fourteen counties as being in nonattainment for the 2010 SO<sub>2</sub> or 2008 ozone NAAQS, thus sparing the state from having to comply with rigorous Clean Air Act requirements. Finally, the state could bring regulatory certainty to coal-fired power plants in Michigan, which could ultimately save these regulated entities money, as they are deciding how to comply with a number of environmental regulations.

## **I. Background**

### **A. National Ambient Air Quality Standards**

The Clean Air Act (“CAA”) is, at its core, a directive to protect the public from harmful air pollution. Indeed, “pollution prevention” is a “primary goal” of the CAA. 42 U.S.C. §7401(c). Pursuant to this mandate, EPA is required to promulgate “primary ambient air quality standards [“NAAQS”] . . . the attainment and maintenance of which . . . are requisite to protect the public health.” 42 U.S.C. § 7409(b)(1). So far, EPA has identified six criteria pollutants—sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen oxide, and lead—that have scientifically demonstrated effects on health and the environment, at certain levels.

The NAAQS represent a ceiling of air pollution concentrations that apply throughout the country. As such, the primary NAAQS form the basis for regulating air emissions for the entire country and provide the foundation for setting specific emission limitations for most large stationary sources. The primary national ambient air quality standards set ambient pollution levels that should not be exceeded in order to protect public health with an adequate margin of safety. *See* 42 U.S.C. § 7409(b)(1). These standards serve as the basis for development and approval of infrastructure state implementation plans (“ISIPs”).

#### **1. Sulfur Dioxide: Public Health Impacts and the Current NAAQS**

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<sup>2</sup> A copy of these comments, all exhibits, and supporting modeling files can be found at <https://app.box.com/s/q8ikvwkff0yr749pk92x>.

<sup>3</sup> Asthma Initiative of Michigan, “Asthma in Michigan 2010: A Blue Print for Action,” available at [http://www.michigan.gov/documents/mdch/AsthmaInitiativeofMichigan\\_Strategic\\_Plan6-06\\_269864\\_7.pdf](http://www.michigan.gov/documents/mdch/AsthmaInitiativeofMichigan_Strategic_Plan6-06_269864_7.pdf)

Exposure to SO<sub>2</sub> in even very short time periods—such as five minutes—has significant health impacts and causes decrements in lung function, aggravation of asthma, and respiratory and cardiovascular morbidity. *See* Primary National Ambient Air Quality Standard for Sulfur Dioxide Final Rule, 75 Fed. Reg. 35,520, 35,525 (June 22, 2010) (hereinafter “Final Rule”). EPA has also determined that SO<sub>2</sub> exposure can also aggravate existing heart disease, leading to increased hospitalizations and premature deaths. *See* Final Rule, 75 Fed. Reg. at 35,525.

On June 2, 2010, EPA revised the primary SO<sub>2</sub> NAAQS by establishing a new one-hour standard at a level of 75 ppb which is met when the 3-year average of the annual 99th percentile of the daily maximum one-hour average concentrations is less than or equal to 75 ppb. *See* Primary National Ambient Air Quality Standard for Sulfur Dioxide Final Rule, 75 Fed. Reg. 35,520 (June 20, 2010), [hereinafter “Final SO<sub>2</sub> NAAQS Rule”]. The primary SO<sub>2</sub> NAAQS was set at such a level in order to protect public health from the serious threats posed by short-term exposure to SO<sub>2</sub>.

Due to both the shorter averaging time and the numerical difference, the new 1-hour SO<sub>2</sub> NAAQS is far more protective of human health than the prior SO<sub>2</sub> NAAQS and promises huge health benefits. EPA has estimated that 2,300 to 5,900 premature deaths and 54,000 asthma attacks a year will be prevented by the new standard. Env'tl. Prot. Agency, Final Regulatory Impact Analysis (RIA) for the SO<sub>2</sub> National Ambient Air Quality Standards (NAAQS) tbl. 5.14 (2010). Timely implementation of the new NAAQS is thus critical. Each year of delay in implementing the SO<sub>2</sub> NAAQS means 5,900 people will die prematurely and 54,000 asthma attacks will occur unnecessarily. Each year of delay will likewise drive up the medical costs that individuals will have to pay, and will be another year in which people must abstain from everyday activities such as exercise, school, and work. EPA estimated that the net benefit of implementing the 75 ppb SO<sub>2</sub> NAAQS was up to \$36 billion dollars. 75 Fed. Reg. 35,520, 35,588 (June 22, 2010).

## **2. Ozone: Public Health Impacts and the Current NAAQS**

Exposure to ozone in the air we breathe can cause serious problems to our health, including chest pain, coughing, throat irritation, and congestion. It can worsen bronchitis, emphysema, and asthma. 73 Fed. Reg. 16,436 (Mar. 27, 2008). Ground level ozone also can reduce lung function and inflame the linings of the lungs. *Id.* Repeated exposure may permanently scar lung tissue. *Id.* These effects may lead to increased school absences, medication use, visits to doctors and emergency rooms, and hospital admissions. Research also indicates that ozone exposure may increase the risk of premature death from heart or lung disease. *Id.* Ozone also damages vegetation and trees, including forests, parks, and crops.

In 2008, EPA revised the primary ozone standard to 75 ppb of the annual fourth-highest daily maximum eight-hour concentration averaged over 3 years. *See* National Ambient Air Quality Standard for Ozone, 73 Fed. Reg. 16,436 (Mar. 27, 2008). This revised standard, if properly implemented, will result in improvements in public health (including preventing premature deaths) and the environment. When EPA revised the ozone standard, EPA recognized it was providing increased protection for public health, especially for children, the elderly, and asthmatics.

EPA estimates that the 2008 eight-hour ozone NAAQS has the potential to avoid 260 to 2,000 premature deaths annually as of 2020. The total benefits in ozone reduction from this standard are estimated to save \$2 to \$17 billion per year. EPA, Fact Sheet: Final Revisions to the National Ambient Air Quality Standards for Ozone, at 1-3 (2008), [http://www.epa.gov/glo/pdfs/2008\\_03\\_factsheet.pdf](http://www.epa.gov/glo/pdfs/2008_03_factsheet.pdf). In fact, 2011 and 2012 ozone ambient monitoring data indicate that EPA's estimates of the health benefits from reducing ozone exposure may have been low.<sup>4</sup>

## **B. Implementation of the NAAQS**

The Clean Air Act creates a framework for the “development of cooperative Federal, State, regional, and local programs to prevent and control air pollution.” 42 U.S.C. § 7401(a)(4). Pursuant to section 109(b)(1) of the Act, EPA has established primary NAAQS for six criteria air pollutants, “the attainment and maintenance of which . . . are requisite to protect the public health.” *Id.* § 7409(b)(1). States have “primary responsibility” for assuring air quality within the state. *Id.* § 7407(a). Following promulgation of a NAAQS, the Act requires that a state shall “adopt and submit to the Administrator . . . a plan which provides for implementation, maintenance, and enforcement of such primary [NAAQS].” *Id.* § 7410(a)(1). For attainment and unclassifiable areas, section 110(a)(2)(A) requires that these Infrastructure SIPs or ISIPs “include enforceable emission limitations . . . as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements” of the Clean Air Act, including the requirement to maintain the NAAQS. 42 U.S.C. §§ 7410(a)(2)(A), 7410(a)(1); *Conn. Fund for Env't, Inc. v. EPA*, 696 F.2d 169, 172 (2d Cir. 1982) (CAA requires that SIPs contain “measures necessary to ensure the attainment and maintenance of NAAQS”); *Mont. Sulphur & Chem. Co. v. EPA*, 666 F.3d 1174, 1180 (9th Cir. 2012) (“The Clean Air Act directs states to develop implementation plans—SIPs—that ‘assure’ attainment and maintenance of national ambient air quality standards (“NAAQS”) through enforceable emission limitations.”) (citing 42 U.S.C. §§ 7407(a), 7410(a)(2)(A)); *Hall v. EPA*, 273 F.3d 1146, 1153 (9th Cir. 2001) (“Each State must submit a [SIP] that specif[ies] the manner in which [NAAQS] will be achieved and maintained within each air quality control region in the State”) (internal citations omitted); *see also* EPA, “Sulfur Dioxide Implementation—Programs and Requirements for Reducing Sulfur Dioxide,” *available at* <http://www.epa.gov/airquality/sulfurdioxide/implement.html>.

EPA may approve an Infrastructure SIP only if it meets the requirements of section 110(a)(2) of the Act. *See* 42 U.S.C. § 7410(a)(2)(A)-(M). The state bears the burden of demonstrating that its SIP submission satisfies the standards of section 110(a)(2). *Mich. Dep't of Env'tl. Quality v. Browner*, 230 F.3d 181, 183, 185 (6th Cir. 2000) (affirming EPA's rejection of

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<sup>4</sup> In 2012, much of the country experienced record high temperatures and very high ozone levels. However, the 2008 ozone NAAQS benefits analysis was based on 2008 ozone levels and thus did not account for the higher ozone levels that were experienced in 2012. Current science indicates that temperatures experienced during 2012 will soon become typical due to climate change. If we do not reduce greenhouse emissions rapidly and substantially, the hottest summer of the last 20 years is expected to occur every other year, or even more frequently. *See, e.g.*, “Changes in Ecologically Critical Terrestrial Climate Conditions,” *Science*, 2 Aug. 2013, Vol. 341, no. 6145, 486-492. Therefore, the benefits analysis likely underestimated the ozone reductions that the 2008 ozone NAAQS will require and, consequently, the benefits the standard will provide.

a SIP proposal where the state “failed to offer evidence that [the] proposed rules will not interfere with the attainment and maintenance of the NAAQS.”). An adequate Infrastructure SIP “must demonstrate that the measures, rules, and regulations contained in it are adequate to provide for the timely attainment and maintenance of the national standard that it implements.” 40 C.F.R. § 51.112(a).

**1. The Plain Language and Legislative History of the Clean Air Act Require that Infrastructure SIPs Must Impose Emission Limits Adequate to Prevent NAAQS Exceedances in Areas Not Designated Nonattainment.**

The Clean Air Act, on its face, requires ISIPs to prevent exceedances of the NAAQS. Following promulgation of a NAAQS, a state must “adopt and submit to the Administrator . . . a plan which provides for implementation, maintenance, and enforcement of such [NAAQS].” 42 U.S.C. § 7410(a)(1). Pursuant to section 110(a)(2)(A), this ISIP must “include *enforceable emission limitations* . . . as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements” of the Clean Air Act (which include the requirement to maintain compliance with the NAAQS). *Id.* § 7410(a)(2)(A) (emphasis added). As defined by the Act, the term “emission limitation” means “a requirement established by the State or the Administrator which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction, and any design, equipment, work practice or operational standard promulgated under this chapter.” *Id.* § 7602(k). Thus, the plain language of section 110(a)(2)(A) requires that ISIPs include enforceable emission limits on sources that are sufficient to ensure attainment and maintenance of the NAAQS.

The legislative history of the Clean Air Act also supports this interpretation. As the Senate Committee Report accompanying the 1970 Clean Air Act explained, the Act “would establish certain tools as potential parts of an implementation plan and *would require that emission requirements be established by each State for sources of air pollution agents or combinations of such agents in such region* and that these emission requirements be monitored and enforceable.” Sen. Cmte. on Pub. Works Rpt. at 12 (Sept. 17, 1970) (emphasis added), attached hereto as Ex. 1. This was reaffirmed in the subsequent Senate Conference Report, which stated that: “In order to implement the national ambient air quality standards, these [state implementation] plans *must provide for emission limitations on all services in the region covered by the plan*, together with schedules and timetables of compliance, systems for monitoring both ambient air and emissions from individual sources, and adequate enforcement authority.” Sen. Conf. Rpt., 116 Cong. Rec. 42,381, 42,384 (Dec. 18, 1970) (emphasis added), attached hereto as Ex. 2.<sup>5</sup>

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<sup>5</sup> Although the language of current section 110(a)(2)(A) was originally found in section 110(a)(2)(B), the substance has remained true to the statements found in the Senate Committee Reports. There were only two substantive changes between 1970 and the present. First, the addition of former section 172(c)’s requirement that SIPs’ emission limitations, schedules, and timetables be “enforceable.” *See* Rpt. of the Senate Cmte. on Env’t. and Pub. Works accompanying the Clean Air Act Amendments of 1989 at 20 (Dec. 20, 1989) (explaining that “Paragraph (1) of rewritten section 110(c) combines and streamlines existing section 110(a)(2)(b) and the enforceability requirements of section 172(c) of current law”), attached as Ex. 3; *see also* 42 U.S.C. § 7502(c) (section 172(c)) (requiring that a SIP revision submitted before July 1, 1982 pursuant to a demonstration under subsection (a)(2)

**2. EPA Regulations Implementing the Clean Air Act Require That Infrastructure SIPs Impose Emission Limits Adequate to Prohibit NAAQS Exceedances in Areas Not Designated Nonattainment.**

EPA regulations implementing section 110(a)(2) also require that infrastructure SIPs contain emission limits that ensure NAAQS attainment. Pursuant to these regulations, in order for EPA to approve a SIP, it “must demonstrate that the measures, rules, and regulations contained in it are adequate to provide for the timely attainment and maintenance of the national standard that it implements.” 40 C.F.R. § 51.112(a). As the regulation clearly states, all SIPs must contain emission limits that adequately ensure the NAAQS is achieved. *Id.* Although these regulations were developed before the Clean Air Act was amended to separate Infrastructure SIPs from nonattainment SIPs—a process that began with the 1977 amendments and was completed by the 1990 amendments—the regulations nonetheless apply to ISIPs. EPA has not changed the regulation since 1990, and in the preamble to the final rule promulgating 40 C.F.R. § 51.112, EPA expressly identifies that its new regulations were *not* implementing Subpart D, the new nonattainment provisions of the Act. *See* Air Quality Implementation Plans; Restructuring SIP Preparation Regulations, 51 Fed. Reg. 40,656, 40,656 (Nov. 7, 1986) (“It is beyond the scope of th[is] rulemaking to address the provisions of Part D of the Act . . .”). Consequently, EPA intended 40 C.F.R. § 51.112 to apply to ISIPs. Thus, it is clear that ISIPs must contain “measures, rules, and regulations” sufficient to ensure maintenance of the NAAQS.

**3. Prior EPA Interpretations of the Act Require that Infrastructure SIPs Impose Emission Limits Adequate to Prohibit NAAQS Exceedances in Areas Not Designated Nonattainment.**

EPA has relied on section 110(a)(2)(A) and 40 C.F.R. § 51.112 on multiple occasions to reject Infrastructure SIPs that did not contain specific emissions limits sufficient to demonstrate attainment and maintenance of the NAAQS. For example, in March 2006, EPA disapproved Missouri’s attempt to revise the SO<sub>2</sub> emission limits in its ISIP for two power plants because the new emission limits would not ensure maintenance of the three-hour sulfur dioxide NAAQS then in effect. *See* Approval and Promulgation of Implementation Plans; State of Missouri, 71 Fed. Reg. 12,623, 12,624 (Mar. 13, 2006). In so doing, EPA explained that “Section 110(a)(2)(A) of the [Act] requires, in part, that the [state implementation] plan include emission limitations to meet the requirements of the Act, including the requirement in section 110(a)(1) that the plan must be adequate to attain and maintain ambient air quality standards.” *Id.* EPA further explained that “40 C.F.R. 51.112 requires that the plan demonstrate that rules contained in the SIP are adequate to attain the ambient air quality standards.” *Id.* In the case of Missouri’s proposed ISIP, EPA expressed concern that the SO<sub>2</sub> emission rates for the two power plants in question were “not protective of the short-term sulfur dioxide NAAQS” because, while Missouri had lowered the emission rates for the facilities, it had dramatically increased the averaging times (from a 3-hour average to an annual average) without providing “a demonstration, as

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“shall contain enforceable measures to assure attainment of the applicable standard not later than December 1, 1987”). Second, the clarification in the 1990 Clean Air Act Amendments that the “means[] or techniques” for meeting the requirements of the Act included “economic incentives such as fees, marketable permits, and auctions of emissions rights.” 42 U.S.C § 7410(a)(2)(A).

required by the [Clean Air Act] and EPA regulations, that the [sulfur dioxide national ambient air quality] standards, and particularly the three-hour and the twenty-four hour standards, can be protected by an annual emission limit.” *Id.*

More recently, in December 2013, EPA rejected a revision to Indiana’s sulfur dioxide ISIP pursuant to 40 C.F.R. § 51.112, because Indiana failed to demonstrate that the ISIP, as revised, was sufficient to ensure maintenance of the sulfur dioxide NAAQS. *See Approval of Air Quality Implementation Plans; Indiana; Disapproval of State Implementation Plan Revision for ArcelorMittal Burns Harbor; Final Rule, 78 Fed. Reg. 78,720, 78,721 (Dec. 27, 2013).* Indiana had submitted a request to EPA to revise its sulfur dioxide ISIP for the ArcelorMittal Burns Harbor facility to remove the SO<sub>2</sub> emission limit for the blast furnace flare at the facility. *Id.* In the proposed disapproval, EPA explained that “[u]nder 40 C.F.R. 51.112(a), each SIP must demonstrate that the measures, rules, and regulations it contains are adequate to provide for the timely attainment and maintenance of the NAAQS.” *See Approval of Air Quality Implementation Plans; Indiana; Disapproval of State Implementation Plan Revision for ArcelorMittal Burns Harbor; Proposed Rule, 78 Fed. Reg. 17,157, 17,158 (Mar. 20, 2013).* EPA rejected the proposed amendment because Indiana did not demonstrate that existing emission limit for the ArcelorMittal blast furnace gas flare was “redundant, unnecessary, or that its removal would not result in or allow an increase in actual SO<sub>2</sub> emissions,” and, consequently, that removal of the limit would not “affect the validity of the emission rates used in the existing attainment demonstration, thus undermining the SIP’s ability to ensure protection of the SO<sub>2</sub> NAAQS.” *Id.* at 17,159; *see also* 78 Fed. Reg. at 78,721.

#### **4. Supreme and Appellate Court Opinions Hold that Infrastructure SIPs Must Impose Emission Limits Adequate to Prohibit NAAQS Exceedances in Areas not Designated Nonattainment.**

Since the inception of the modern Clean Air Act in 1970, courts have interpreted the language presently found in section 110(a)(2)(A) to require that SIPs contain enforceable emission limits sufficient to prevent exceedances of the NAAQS. In *Train v. NRDC*, a seminal case on SIP approval requirements, the Supreme Court explained that:

In complying with this requirement [that a SIP provide for attainment and maintenance of the NAAQS] a State’s plan must include ‘emission limitations,’ which are regulations of the composition of substances emitted into the ambient air from such sources as power plants, service stations, and the like. They are the specific rules to which operators of pollution sources are subject, and which if enforced should result in ambient air which meets the national standards.

421 U.S. 60, 78 (1975); *see also id.* at 67 (citing language from then-current section 110(a)(2)(B) now found in section 110(a)(2)(A)).

Courts of Appeals have followed this holding without exception. For example, in *Pennsylvania Department of Environmental Resources v. EPA*, the Third Circuit stated that the Clean Air Act “directs the EPA to withhold approval from a state implementation plan if the

‘maintenance of [the] standard’ cannot be assured.” 932 F.2d 269, 272 (3rd Cir. 1991).<sup>6</sup> The court observed that the “need to maintain the Clean Air Act standards once they are reached is well-recognized by the Courts.” *Id.* Other courts have provided similar analyses. In *Mision Industrial, Inc. v. EPA*, for example, the First Circuit explained that, “[b]efore approving an air quality implementation plan or revision, the Administrator must determine that it ‘includes emission limitations . . . and such other measures as may be necessary to insure attainment and maintenance of (the) primary or secondary standard . . . .’” 547 F.2d 123, 129 (1st Cir. 1976) (quoting former section 110(a)(2)(B)).

The 1990 Clean Air Act amendments do not alter this picture. Court decisions since the 1990 amendments have continued to hold that ISIPs must have emission limits that maintain the NAAQS. In *Alaska Department of Environmental Conservation v. EPA*, the Supreme Court explained that an Infrastructure SIP under CAA section 110(a)(1) must be a “plan which provides for implementation, maintenance, and enforcement of [NAAQS].” 540 U.S. 461, 470 (2004) (quoting section 110(a)(1)). “While States have wide discretion in formulating their plans . . . SIPs must include certain measures Congress specified to assure that national ambient air quality standards are achieved.” *Id.* (internal citations and quotations omitted). Thus, in order for EPA to approve a SIP, it “must ‘include enforceable emission limitations and other control measures, means, or techniques . . . as may be necessary or appropriate to meet the applicable [CAA] requirements.’” *Id.* (quoting 42 U.S.C. § 7410(a)(2)(A)).

The circuit courts have also been clear that section 110(a)(2)(A) from the post-1990 Clean Air Act requires enforceable emission limits in ISIPs. For example, the Ninth Circuit affirmed that “[t]he Clean Air Act directs states to develop implementation plans—SIPs—that ‘assure’ attainment and maintenance of national ambient air quality standards (‘NAAQS’) through enforceable emission limitations.” *Mont. Sulphur & Chem. Co.*, 666 F.3d at 1180 (citing 42 U.S.C. §§ 7407(a), 7410(a)(2)(A)) (emphasis added). And the Sixth Circuit has explained that “EPA’s deference to a state is conditioned on the state’s submission of a plan ‘which satisfies the standards of § 110(a)(2)’ and which includes emission limitations that result in compliance with the NAAQS.” *Mich. Dep’t of Env’tl. Quality*, 230 F.3d at 185 (quoting *Train*, 421 U.S. at 79).

Additionally, in *Hall v. EPA*, the Ninth Circuit held that EPA had not fulfilled its responsibility under another provision—section 110(l)<sup>7</sup>—to evaluate whether a revised air quality plan will achieve the pollution reductions required under the Act. 273 F.3d at 1152. In *Hall*, the court held that EPA had incorrectly approved a revision to an air quality plan solely on the basis that the revisions did not relax the existing SIP, rather than “measur[ing] the existing level of pollution, compar[ing] it with the national standards, and determin[ing] the effect on this comparison of specified emission modifications.” *Id.* at 1157-58 (quoting *Train*, 421 U.S. at 93). EPA claimed a statutory equivalence between non-relaxation of rules approved in 1981 and non-

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<sup>6</sup> The court was interpreting the 1977 version of the statute in which Subpart 1 of Part D had been added, *id.* at 271 n.1, but relied on the language of then-current section 110(a)(2)(B) (now found in section 110(a)(2)(A)). *Pennsylvania Dep’t of Env’tl. Res.*, 32 F.2d at 272.

<sup>7</sup> Section 110(l) provides, in relevant part, that “[t]he Administrator shall not approve a revision of a [state implementation] plan if the revision would interfere with any applicable requirement concerning attainment and reasonable further progress . . . or any other applicable requirement of this chapter.” 42 U.S.C. § 7410(l).

interference with current attainment requirements. *Id.* at 1155. The court rejected EPA’s application of the “no relaxation” rule, finding it inconsistent with the Act because it set an improper baseline that failed to take into consideration the 1990 amendments, which set new deadlines for attainment and established other new requirements for incremental progress towards attainment. *Id.* at 1160-61. Those current attainment requirements were the baseline from which EPA should have measured “non-interference.” *Id.* EPA’s analysis was required to reflect consideration of the prospects of meeting current attainment requirements under a revised air quality plan. *Id.* Just as a plan revision must not interfere with attainment of the NAAQS under section 110(1), an ISIP must likewise include enforceable limits sufficient to ensure the initial plan provides for maintenance of the NAAQS under 110(a)(2)(A).

## **II. Michigan’s Draft Infrastructure SIP Fails to Meet the Requirements of Section 110(a)(2) of the Clean Air Act.**

### **A. Michigan’s Draft ISIP does not incorporate the 2010 SO<sub>2</sub> and 2008 Ozone NAAQS.**

As discussed in detail above, an Infrastructure SIP must provide for the implementation maintenance, and enforcement of the primary NAAQS, the levels of air quality necessary to protect public health. 42 U.S.C. § 7410(a)(1) & § 7409(b)(1). Michigan’s proposed ISIP must address the following NAAQS:

- The 2010 SO<sub>2</sub> NAAQS, which imposes a new one-hour standard at a level of 196 micrograms per cubic meter (“µg/m<sup>3</sup>”) or 75 ppb, which is met when the 3-year average of the 99th percentile of the annual distribution of daily maximum one-hour average concentrations is less than or equal to 75 ppb. 40 C.F.R. § 50.17(a)-(b).
- The 2008 primary ozone standard, which imposes the standard of 75 ppb of the annual fourth-highest daily maximum eight-hour concentration averaged over 3 year. 40 C.F.R. § 50.15(a)-(b).

A preliminary requirement to implementing these primary NAAQS is to incorporate the standards directly into the ISIP meant to attain and maintain them. 42 U.S.C. § 7410(a)(2)(A). Despite this requirement, Michigan fails to include the revised NAAQS in its regulations. Accordingly, in order to comply with the Clean Air Act, Michigan must revise the Draft ISIP so that it contains accurate, up-to-date ambient air quality standards reflective of the 2010 one-hour SO<sub>2</sub> and 2008 eight-hour ozone NAAQS.

### **B. The Draft ISIP Fails to Include Enforceable One-hour SO<sub>2</sub> Emission Limitations to Ensure Attainment and Maintenance of the Primary SO<sub>2</sub> NAAQS.**

Michigan's Draft ISIP fails to include restrictions on major SO<sub>2</sub> sources to ensure that areas not currently designated nonattainment will attain and maintain the new one-hour SO<sub>2</sub> NAAQS.

**1. Michigan must revise the Draft ISIP to include enforceable one-hour SO<sub>2</sub> emission limits for sources that have emissions or emission limits that cause an exceedance of the NAAQS.**

The Draft ISIP fails to include adequate enforceable emission limitations or other required measures for sources of SO<sub>2</sub> sufficient to ensure attainment and maintenance of the 2010 SO<sub>2</sub> NAAQS. As discussed above, under section 110(a)(2)(A), the ISIP must “include enforceable emission limitations . . . as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements” of the Clean Air Act (which include the requirement to maintain compliance with the NAAQS).

Emission limits are especially important for meeting the one-hour SO<sub>2</sub> NAAQS given the “strong source-oriented nature of SO<sub>2</sub> ambient impacts.” Final SO<sub>2</sub> NAAQS Rule, 75 Fed. Reg. at 35,570. Nationally, large point sources account for 95 percent of SO<sub>2</sub> emissions, 66 percent of which come from fossil fuel combustion at electric facilities. *Id.* at 35,524. In Michigan, eighty percent (or 229,015 out of 285,658 tons) of SO<sub>2</sub> emissions come from coal electric generating units (“EGUs”). See SO<sub>2</sub> NEI All Sectors(2011)\_28 Apr 2014.xlsx, Excel Worksheet “Percentage Summary (All States)”, attached hereto as Ex. 4.; see also EPA, The National Emissions Inventory, Sector Summaries, <http://www.epa.gov/ttn/chief/net/2011inventory.html>.

Despite the large contribution from coal EGUs, MDEQ has not even attempted to demonstrate that emissions allowed by the Draft ISIP will ensure compliance with the one-hour SO<sub>2</sub> standard. In fact, the Draft ISIP would simply allow the major air pollution sources in the state to continue operating under their present emission limits. Michigan must correct these deficiencies before it finalizes its ISIP since its own modeling shows that the Belle River and St. Clair power plants are causing an exceedance of the SO<sub>2</sub> NAAQS. In addition, Sierra Club did additional modeling which shows that Belle River, St. Clair, Eckert, J.H. Campbell, and Presque Isle's emissions are causing exceedances of the SO<sub>2</sub> NAAQS. In order to comply with Section 110(a)(2) of the Clean Air Act, MDEQ must establish emission limits on these facilities to ensure maintenance of the SO<sub>2</sub> NAAQS.

**a. MDEQ's Own Modeling Shows that the Belle River and St. Clair Power Plants' Emissions are Causing Exceedances of the NAAQS.**

Michigan modeled the SO<sub>2</sub> emissions from the Belle River and St. Clair power plants as part of its process in developing its Wayne County SO<sub>2</sub> nonattainment SIP. MDEQ shared its modeling files with Sierra Club. According to MDEQ's modeling, Belle River and St. Clair power plants' emissions are authorized to cause exceedances of the NAAQS. See H. Andrews Gray, *SO<sub>2</sub> Impacts from the St. Clair and Belle River Power Plants* (June 3, 2014) (attached hereto as Ex. 5) [Gray Report]. The following table summarizes the results of MDEQ's modeling:

**Table 1. Modeled SO2 Emission Rates<sup>8</sup>**

source group	CONC ug/m3	CONC ppb	receptor location	
			XR	YR
St. Clair	994.526	379.6	373000	4731250
Belle River	403.449	154.0	374500	4736500
ALL	1,004.144	383.3	371000	4730000

Sierra Club hired a modeler to run AERMOD using the MDEQ's input files but making some conservative adjustments, such as using the fourth highest value rather than the maximum value. The results of this modeling demonstrate that the emissions from Belle River and St. Clair power plants will cause a violation of the NAAQS. *Id.*

**Table 2. Modeled Maximum 5-year Average of the 4<sup>th</sup>-Highest Daily Peak 1-hr Average SO<sub>2</sub> Concentration (NAAQS Design Value)**

source group	CONC ug/m3	CONC ppb	receptor location	
			XR	YR
St. Clair	488.009	186.3	376750	4733750
Belle River	223.085	85.1	374500	4734500
ALL	589.978	225.2	375250	4739500

The SO<sub>2</sub> concentration impact from both sources exceeds 100 ppb across the entire 23 km x 15 km receptor grid, covering an area of almost 350 km<sup>2</sup>. *Id.* The maximum 5-yr average of the 4th highest daily peak 1-hr SO<sub>2</sub> concentration (the "design value") for both sources combined was 225 ppb, at a receptor located about 4 km NW of Belle River and about 6 km NW of the St. Clair power plant (about 3-4 km SW of the city of St. Clair). *Id.* The SO<sub>2</sub> impact (design value concentration) due to St. Clair emissions was 186 ppb, located about 3 km to the SW of the St. Clair source. Belle River showed somewhat lower SO<sub>2</sub> impacts than St. Clair, with a design value of 85 ppb, at a receptor located 4 km to the SW of the Belle River power plant. *Id.*

Using the results of the AERMOD model, one can determine the SO<sub>2</sub> emission reductions that would be required to meet the 1-hr SO<sub>2</sub> NAAQS. *Id.* Facility-wide SO<sub>2</sub> emissions at St. Clair would need to be reduced by 60 percent to reduce the design value (186 ppb) to a level in which the NAAQS would no longer be violated (75 ppb). *Id.* Facility-wide emissions would therefore need to be reduced from 98,322 tpy to 35,590 tpy (9,039 lb/hr) so that St. Clair's emissions are not, on their own, causing a violation of the 1-hr SO<sub>2</sub> NAAQS. *Id.*

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<sup>8</sup> *Id.*

Similarly, emissions from the two large Belle River boiler units would need to be reduced by 12 percent in order to reduce its design value (85 ppb) down to the NAAQS level (75 ppb). *Id.* Total SO<sub>2</sub> emissions from the Belle River facility would have to be reduced from 71,631 tpy to 63,094 (14,405 lb/hr) so that no violations of the 1-hr SO<sub>2</sub> NAAQS occur (due just to Belle River emissions). *Id.*

The combined impact from both St. Clair and Belle River was 225 ppb (design value), which implies that SO<sub>2</sub> emissions from both sources combined would need to be reduced by 67 percent in order to meet the 1-hr SO<sub>2</sub> NAAQS (assuming no other sources contribute to the peak concentrations, and that background SO<sub>2</sub> is negligible). *Id.* If this level of emission reduction were applied to both power plants, St. Clair's facility-wide SO<sub>2</sub> emissions would be reduced to 32,748 tpy (7,477 lb/hr) and Belle River's two large units would emit only 23,857 tpy (5,447 lb/hr) of SO<sub>2</sub>. *Id.*

Since the state is aware of Belle River and St. Clair's impact on the attainment of the NAAQS in St. Clair County, it simply cannot finalize the ISIP without addressing this problem.

- b. Sierra Club's modeling shows that Belle River, St. Clair, Eckert, J.H. Campbell, and Presque Isle's emissions are causing exceedances of the NAAQS.

As determined by expert air dispersion modeling conducted at Sierra Club's request, emission limits allowed at the Belle River, St. Clair, Eckert, J.H. Campbell, and Presque Isle coal-fired power plants are insufficient to attain and maintain the NAAQS. *See* Steven Klafka, *Belle River and St. Clair Power Plants, St. Clair, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (May 28, 2014)*, [hereinafter "Belle River and St. Clair Report"], attached hereto as Ex. 6; Steven Klafka, *Eckert Station, Lansing, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (May 30, 2014)*, [hereinafter "Eckert Report"], attached hereto as Ex. 7; Steven Klafka, *J.H. Campbell Plant, West Olive, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (May 28, 2014)*, [hereinafter "J.H. Campbell Report"], attached hereto as Ex. 8; Steven Klafka, *Monroe Power Plant, Monroe, Michigan, Evaluation of Compliance with 1-hour NAAQS for SO<sub>2</sub> (April 16, 2014)*, [hereinafter "Monroe Report"], attached hereto as Ex. 9; Steven Klafka, *Presque Isle Power Plant, Marquette, Michigan, Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub> (May 30, 2014)* [hereinafter "Presque Isle Report"], attached hereto as Ex. 10.

The Belle River and St. Clair Report, Eckert Report, J.H. Campbell Report, Monroe Report, and Presque Isle Report present the results of an air dispersion modeling analysis for each plant that compares the modeled ambient air concentrations of each plant's SO<sub>2</sub> emissions with the 2010 one-hour primary SO<sub>2</sub> NAAQS. The modeling analyses employed EPA's AERMOD program to model the plants' "allowable" (based on the current Title V permit) and in certain instances "actual" emissions (based on maximum plant-wide hourly emissions obtained from annual emission inventory reports) or "maximum" emissions (based on the highest combined emission rate from all units during a single hour from USEPA *Air Markets Program Data*) to determine whether each plant's emissions could cause exceedances of the one-hour SO<sub>2</sub> NAAQS. *See* Belle River and St. Clair Report at 3; Eckert Report at 3; J.H. Campbell Report at 3; Monroe Report at 3; Presque Isle Report at 3. In particular, the modeling based on the

allowable emissions is crucial to a determination of whether the Michigan Draft ISIP is adequate to attain and maintain the SO<sub>2</sub> NAAQS, because this is what is allowed in each plant's permit.

The modeling protocol employed in these analyses is consistent with all available technical guidance, including Appendix W and EPA's March 2011 guidance for implementing the one-hour SO<sub>2</sub> NAAQS. Additionally, the modeler used the most recent version of AERMOD, AERMET, and AERMINUTE available at the time of the studies. *See* Belle River and St. Clair Report at 1; Eckert Report at 1; J.H. Campbell Report at 1; Monroe Report at 1; Presque Isle Report at 1. Where any assumptions were made in the running of the models, the modeler employed conservative inputs, which favor the prediction of lower impacts from the plants, so that the results may understate the plants' SO<sub>2</sub> emission impacts. *See* Belle River and St. Clair Report at 5; Eckert Report at 4; J.H. Campbell Report at 4; Monroe Report at 4; Presque Isle Report at 4.

The modeling reports demonstrate that the Draft ISIP improperly authorizes these plants to continue to cause exceedances of the one-hour SO<sub>2</sub> NAAQS based on their allowable emission rates and in some instances actual or maximum emission rates. *See* Belle River and St. Clair Report at 3, Table 1; Eckert Report at 3, Table 1; J.H. Campbell Report at 3, Table 1; Monroe Report at 3, Table 1; Presque Isle Report at 3, Table 1. The modeling results are above the NAAQS and show exceedances in St. Clair, Macomb, Eaton, Clinton, Ingham, Ottawa, Monroe, and Marquette counties, Michigan. *See* Belle River and St. Clair Report at 6-7, Figure 1 and Figure 2; Eckert Report at 5, Figure 1; J.H. Campbell Report at 5, Figure 1; Monroe Report at 5, Figure 1; Presque Isle Report at 5, Figure 1. Currently, only a portion of Wayne County has been designated nonattainment under the one-hour SO<sub>2</sub> NAAQS. *See generally* Air Quality Designations for the 2010 Sulfur Dioxide (SO<sub>2</sub>) Primary National Ambient Air Quality Standard, 78 Fed. Reg. 47,191, 47,201 (Aug. 5, 2013), [hereinafter "Final 2010 SO<sub>2</sub> Designations"].<sup>9</sup> Because these power plants are in areas that are not currently designated nonattainment, MDEQ must submit an ISIP that "provides for implementation, maintenance, and enforcement of" the NAAQS within those areas. 42 U.S.C. § 7410(a)(1).

The findings from each modeling report are summarized in Table 3 below.

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<sup>9</sup> EPA has yet to issue designations for areas aside from those containing monitors that recorded exceedances of the NAAQS. *See* Final 2010 SO<sub>2</sub> Designations at 47,191 (designating areas with monitor violations from 2009-2011 as nonattainment).

**Table 3: Summary of Modeled Allowable, Actual, and Maximum Emissions**

<b>Power Plant</b>	<b>Emission Rates</b>	<b>Facility Impact (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>Background (<math>\mu\text{g}/\text{m}^3</math>)<sup>10</sup></b>	<b>Total Impact Facility Impact plus Background (<math>\mu\text{g}/\text{m}^3</math>)</b>	<b>SO<sub>2</sub> NAAQS (<math>\mu\text{g}/\text{m}^3</math>)<sup>11</sup></b>	<b>Counties Impacted (Not Designated Nonattainment)</b>
Belle River Plant	Allowable	244.2	31.4	275.6	196.2	St. Clair <sup>12</sup>
	Maximum	287.7	31.4	319.1	196.2	St. Clair
St. Clair Power Plant	Allowable	518.3	31.4	549.7	196.2	St. Clair and Macomb <sup>13</sup>
	Actual	290.1	31.4	321.5	196.2	
Eckert Station	Allowable	306.1	31.4	337.5	196.2	Eaton, Clinton, and Ingham
J.H. Campbell Plant	Allowable	290.7	31.4	322.1	196.2	Ottawa
	Maximum	184.0	31.4	215.4	196.2	
Monroe Power Plant	Allowable	237.8	31.4	269.2	196.2	Monroe
	Actual	370.5	31.4	401.9	196.2	
Presque Isle Power Plant	Allowable	772.5	31.4	803.9	196.2	Presque Isle
	Maximum	419.5	31.4	450.9	196.2	

See Belle River and St. Clair Report at 3, Table 1 and 6-7, Figure 1 and Figure 2; Eckert Report at 3, Table 1 and 5, Figure 1; J.H. Campbell Report at 3, Table 1 and 5, Figure 1; Monroe Report at 3, Table 1 and 5, Figure 1; Presque Isle Report at 3, Table 1 and 5, Figure 1.

Based on the modeling results summarized above, MDEQ must promulgate enforceable emission limits with one-hour averaging times into its Draft ISIP that are no less stringent than the limits listed in Table 4, below, to achieve and maintain the one-hour SO<sub>2</sub> NAAQS. These limits represent the maximum rate that each facility can emit without causing NAAQS exceedances, thus reducing each plant's allowable emissions by the corresponding percentage.

<sup>10</sup> Mr. Klafka used the 2010-2012 design value for Kent County, Michigan to estimate the background level. Kent County design value was the lowest measured background in the state. Thus, using this background level likely underestimates the SO<sub>2</sub> levels in the counties mentioned in Table 1.

<sup>11</sup> The 75 ppb standard can be converted to  $\mu\text{g}/\text{m}^3$  as follows:  $75/0.3823 = 196.2 \mu\text{g}/\text{m}^3$ .

<sup>12</sup> This plant also causes impacts in Canada, resulting in SO<sub>2</sub> NAAQS exceedances in another country. Addressing these exceedances now would prevent a potential action by EPA under section 115, which requires EPA to prevent or eliminate a reasonably anticipated danger to public health impacting another country.

<sup>13</sup> This plant also causes impacts in Canada, resulting in SO<sub>2</sub> NAAQS exceedances in another country. Addressing these exceedances now would prevent a potential action by EPA under section 115, which requires EPA to prevent or eliminate a reasonably anticipated danger to public health impacting another country.

These emission limits must apply at all times, including during periods of start-up, shutdown, and malfunction, to ensure that all areas of Michigan attain and maintain the SO<sub>2</sub> NAAQS.<sup>14</sup>

**Table 4: Limits Necessary to Achieve and Maintain the One-Hour SO<sub>2</sub> NAAQS**

Plant	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/MMBtu)
Belle River Plant	33%	11,037.0	0.81
St. Clair Power Plant	68%	7,138.2	0.53
Belle River and St. Clair, Combined <sup>15</sup>	72%	10,702.7	0.40
Eckert Station	46%	3,573.3	0.90
J.H. Campbell Plant	43%	11,333.3	0.79
Monroe Power Plant	31%	6,826.4	0.22
Presque Isle Power Plant	79%	1,484.7	0.30

See Belle River and St. Clair Report at 4, Table 3; Eckert Report at 4, Table 3; J.H. Campbell Report at 4, Table 3; Monroe Report at 4, Table 3; Presque Isle Report at 4, Table 3.

As demonstrated by the modeling reports, Belle River Power Plant, St. Clair Power Plant, Eckert Station J.H. Campbell Plant, Monroe Power Plant, and Presque Isle Power Plant are currently authorized to cause exceedances of the one-hour SO<sub>2</sub> NAAQS based on their allowable, actual, and/or maximum emission rates. Therefore, MDEQ must impose additional emission limits on the plants that ensure attainment and maintenance of the NAAQS at all times. As the ISIP submission does not incorporate emission limitations that are necessary to meet the applicable requirements of the Clean Air Act (or indeed, any new emission limits for these or other SO<sub>2</sub>-emitting facilities), including the requirement to maintain compliance with the 2010 SO<sub>2</sub> NAAQS, the Draft ISIP must be appropriately revised.

**2. Modeling is the appropriate tool for evaluating the adequacy of Infrastructure SIPs and ensuring attainment and maintenance of the SO<sub>2</sub> NAAQS.**

As outlined by EPA in the Final SO<sub>2</sub> NAAQS Rule, 75 Fed. Reg. at 35,551, air dispersion modeling is the best method for evaluating the short-term impacts of large SO<sub>2</sub> sources. This is consistent with EPA’s historic use of air dispersion modeling for attainment designations and SIP revisions. Furthermore, an agency may not ignore information put in front of it, such as Sierra Club’s modeling submitted with these comments. *See generally Motor Vehicle Mfrs. Ass’n v. State Farm Mut. Auto Ins. Co.*, 463 U.S. 29, 43 (1983) (holding that it was

<sup>14</sup> Modeling-based emissions limits are well-documented. For example, Minnesota has used SO<sub>2</sub> modeling to establish emission limits on several plants in order to avoid nonattainment designations. *See* Black Dog Plant Permit No. 03700003-11, Technical Support Document, at 5 & 10 (permit emission limits based on modeling analyses), attached hereto as Ex. 11; *see also* Allen S. King Title V Technical Support Document, at 6, 14, 16 & 39 (permit emission limits based on modeling analyses), attached hereto as Ex. 12.

<sup>15</sup> The combined results for Belle River and St. Clair look at the cumulative impacts of both facilities together on air quality. A 72% reduction in emissions rate is needed at *each* plant in order to prevent exceedances of the NAAQS.

arbitrary and capricious for the agency to ignore an important aspect of an issue placed before it); *see also NRDC v. EPA*, 571 F.3d 1245, 1254 (D.C. Cir.2009) (restating EPA’s own statement that additional information presented in a notice-and-comment rulemaking must be considered during the rulemaking by the corresponding state and EPA) (*citing* 70 Fed. Reg. 71,612, 71,655).

MDEQ has long been on notice that modeling data is an important resource in the SO<sub>2</sub> NAAQS attainment and maintenance process. Appropriately, MDEQ is currently using modeling to determine the level of emissions reductions required to bring Wayne County into attainment. *See* Ex. 5. EPA has historically used modeling in determining attainment for the SO<sub>2</sub> standard. *See e.g.*, U.S. EPA, *Implementation of the 1-Hour SO<sub>2</sub> NAAQS Draft White Paper for Discussion* at 3, fn. 1, [hereinafter “EPA White Paper”], *available at* <http://www.epa.gov/airquality/sulfurdioxide/pdfs/20120522whitepaper.pdf>; *see also* Respondent’s Opposition to Motion of the State of North Dakota for a Stay of EPA’s 1-Hour Sulfur Dioxide Ambient Standard Rule at 3, *National Environmental Development Association’s Clean Air Project v. EPA* (D.C. Cir. 2010) (No. 10-1252), attached hereto as Ex. 13 (“the Agency has historically relied on modeling to make designations for sulfur dioxide”). In fact, in EPA’s 1994 SO<sub>2</sub> Guideline Document, EPA noted that “for SO<sub>2</sub> attainment demonstrations, monitoring data alone will generally not be adequate,” U.S. EPA, 1994 SO<sub>2</sub> Guideline Document, [hereinafter “1994 SO<sub>2</sub> Guideline Document”], *available at* [http://www.epa.gov/ttn/oarpg/t1/memoranda/so2\\_guide\\_092109.pdf](http://www.epa.gov/ttn/oarpg/t1/memoranda/so2_guide_092109.pdf), at 2-5, and that “[a]ttainment determinations for SO<sub>2</sub> will generally not rely on ambient monitoring data alone, but instead will be supported by an acceptable modeling analysis which quantifies that the SIP strategy is sound and that enforceable emission limits are responsible for attainment.” *Id.* at 2-1. The 1994 SO<sub>2</sub> Guideline Document goes on to note that monitoring alone is likely to be inadequate: “[f]or SO<sub>2</sub>, dispersion modeling will generally be necessary to evaluate comprehensively a source’s impacts and to determine the areas of expected high concentrations based upon current conditions.” *Id.* at 2-3.

EPA’s approval and acceptance of modeling for making attainment designations stretches back decades and demonstrates that modeling is equally applicable to determining the adequacy of an Infrastructure SIP. In 1983, the Office of Air Quality Planning and Standards (“OAQPS”) issued a Section 107 Designation Policy Summary. *See* Sheldon Meyers Memorandum re Section 107 Designation Policy Summary (April 21, 1983), attached hereto as Ex. 14. OAQPS explained that “air quality modeling emissions data, etc., should be used to determine if the monitoring data accurately characterize the worst case air quality in the area.” *Id.* at 1. Without modeling data, the worst-case air quality may not be accurately characterized. In certain instances, EPA relied solely on modeling data to determine nonattainment designations; demonstrating modeling is accepted and trustworthy. *Id.* at 2. In fact, reliance on modeling for nonattainment designations stretches back to the Carter Administration. In 1978, EPA designated Laurel, Montana as nonattainment “due to measured and modeled violations of the primary SO<sub>2</sub> standard.” *Mont. Sulphur & Chem. Co.*, 666 F.3d at 1181 (*citing* 43 Fed. Reg. 8,962 (Mar. 3, 1978)).

EPA’s final 2010 SO<sub>2</sub> NAAQS rule simply built upon EPA’s historical practice of using modeling to determine attainment and nonattainment status for SO<sub>2</sub> NAAQS. In doing so, EPA properly recognized the “strong source-oriented nature of SO<sub>2</sub> ambient impacts,” Final SO<sub>2</sub> NAAQS Rule at 35,370, and concluded that the appropriate methodology for purposes of

determining compliance, attainment, and nonattainment with the new NAAQS is modeling. *See id.* at 35,551 (describing dispersion modeling as “the most technically appropriate, efficient and readily available method for assessing short-term ambient SO<sub>2</sub> concentrations in areas with large point sources.”). Accordingly, in promulgating the 2010 SO<sub>2</sub> NAAQS, EPA explained that, for the one-hour standard, “it is more appropriate and efficient to principally use modeling to assess compliance for medium to larger sources . . . .” *Id.* at 35,570. Similarly, EPA then explained in the EPA White Paper that using modeling to determine attainment for the SO<sub>2</sub> standard “could better address several potentially problematic issues than would the narrower monitoring-focused approach discussed in the proposal for the SO<sub>2</sub> NAAQS, including the unique source-specific impacts of SO<sub>2</sub> emissions and the special challenges SO<sub>2</sub> emissions have historically presented in terms of monitoring short-term SO<sub>2</sub> levels for comparison with the NAAQS in many situations (75 FR 35550).” EPA White Paper at 3-4.

Moreover, the courts have upheld EPA’s use of modeling. For example, in *Montana Sulphur*, the company challenged a SIP call, a SIP disapproval, and a Federal Implementation Plan (“FIP”) promulgation, because they were premised on a modeling analysis that showed the Billings/Laurel, Montana area was in nonattainment for SO<sub>2</sub>. 666 F.3d at 1184. The court rejected Montana Sulphur’s argument that EPA’s reliance on modeling was arbitrary and capricious or otherwise unlawful. *Id.* at 1185; *see also Sierra Club v. Costle*, 657 F.2d 298, 332 (D.C. Cir. 1981) (“Realistically, computer modeling is a useful and often essential tool for performing the Herculean labors Congress imposed on EPA in the Clean Air Act”); *Republic Steel Corp. v. Costle*, 621 F.2d 797, 805 (6th Cir. 1980) (approving use of modeling to predict future violations and incorporating “worst-case” assumptions regarding weather and full-capacity operations of pollutant sources). Further demonstrating the superiority of modeling, the D.C. Circuit has acknowledged the inherent problem of using monitored data for criteria pollutants, namely that “a monitor only measures air quality in its immediate vicinity.” *Catawba County v. EPA*, 571 F.3d 20, 30 (D.C. Cir. 2009).

Indeed, EPA employs and relies on modeling to inform its designations because the agency is well aware that modeling produces reliable results. For example, as John C. Vimont, EPA Region 9’s Regional Meteorologist, has stated under oath:

EPA does recognize the usefulness of ambient measurements for information on background concentrations, provided reliable monitoring techniques are available. EPA does not recommend, however, that ambient measurements be used as the sole basis of setting emission limitations or determining the ambient concentrations resulting from emissions from an industrial source. These should be based on an appropriate modeling analysis.

Declaration of John C. Vimont at 1, 11 (emphasis added), attached hereto as Ex. 15. Testimony as to the accuracy and appropriateness of modeling has also been presented by Roger Brode, a physical scientist in EPA’s Air Quality Modeling Group who co-chairs the AMS/EPA Regulatory Model Improvement Committee (AERMIC) and the AERMOD Implementation Workgroup. *See* Declaration of Roger W. Brode at 1, 2, attached hereto as Ex. 16. Mr. Brode has stated under oath that AERMOD is “readily capable of accurately predicting whether the revised primary SO<sub>2</sub> NAAQS is attained and whether individual sources cause or contribute to a violation of the SO<sub>2</sub> NAAQS.” *Id.* at 2. Mr. Brode has explained:

As part of the basis for EPA adopting the AERMOD model as the preferred model for nearfield applications in the *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51, the performance of the AERMOD model was extensively evaluated based on a total of 17 field study data bases (AERMOD: Latest Features and Evaluation Results. EPA-454/R-03-003. U.S. Environmental Protection Agency, Research Triangle Park (2003), portions of which are attached to this affidavit) (“EPA 2003”). The scope of the model evaluations conducted for AERMOD far exceeds the scope of evaluations conducted on any other model that has been adopted in Appendix W to Part 51. These evaluations demonstrate the overall good performance of the AERMOD model based on technically sound model evaluation procedures, and also illustrate the significant advancement in the science of dispersion modeling represented by the AERMOD model as compared to other models that have been used in the past. In particular, adoption of the AERMOD model has significantly reduced the potential for overestimation of ambient impacts from elevated sources in complex terrain compared to other models.

*Id.* at 3-4 (emphasis added). The Belle River Power Plant, St. Clair Power Plant, Eckert Station, J.H. Campbell Plant, Monroe Power Plant, and Presque Isle Power Plant are clear examples of elevated sources.

EPA’s practice in a number of other contexts also demonstrates that modeling is a technically superior approach for ascertaining impacts on NAAQS, as well as the extensive history of EPA’s preference for modeling over monitoring to evaluate compliance. For example, all NO<sub>2</sub>, PM<sub>2.5</sub>, SO<sub>2</sub> NAAQS, and Prevention of Significant Deterioration (“PSD”) increment compliance verification analyses are performed with air dispersion modeling, such as running AERMOD in a manner consistent with the *Guideline on Air Quality Models*. 40 C.F.R. § 52.21(l)(1). Indeed, in order to ensure consistency in how air impacts are determined, both existing sources and newly permitted sources should be assessed using the same methods. AERMOD modeling performs particularly well in evaluating emission sources with one or a handful of large emission points. The stacks are well characterized in terms of location, dimensions, and exhaust parameters, and have high release heights. AERMOD accurately models medium-to-large SO<sub>2</sub> sources—even with conditions of low wind speed, the use of off-site meteorological data, and variable weather conditions. Indeed, AERMOD has been tested and performs very well during conditions of low wind speeds:

AERMOD’s evaluation analyses included a number of site-specific meteorological data sets that incorporate low wind speed conditions. For example, the Tracy evaluation included meteorological data with wind speeds as low as 0.39 meter/second (m/s); the Westvaco evaluation included wind speeds as low as 0.31 m/s; the Kincaid SO<sub>2</sub> evaluation included wind speeds as low as 0.37 m/s; and the Lovett evaluation included wind speeds as low as 0.30 m/s. Concerns . . . regarding AERMOD’s ability to model low wind speed conditions seem to neglect the data used in actual AERMOD evaluations.

Comments of Camille Sears 1, at 10, attached hereto as Ex. 17 (citing AERMOD evaluations and modeled meteorological data, *available at* [http://www.epa.gov/ttn/scram/dispersion\\_prefrec.htm](http://www.epa.gov/ttn/scram/dispersion_prefrec.htm)).

Finally, EPA’s use of air dispersion modeling and AERMOD in particular was upheld in the context of a recent Clean Air Act § 126 petition for resolution of cross-state impacts. *See Genon Rema, LLC v. U.S. EPA*, 722 F.3d 513, 526 (3rd Cir. 2013). In this case, the EPA granted the New Jersey Department of Environmental Protection’s 126 petition, finding that trans-boundary sulfur dioxide emissions from the Portland coal-fired power plant in Pennsylvania were significantly contributing to nonattainment and interference with the maintenance of the one-hour SO<sub>2</sub> NAAQS in New Jersey. *Id.* at 518. EPA based its finding on a review of the AERMOD dispersion modeling submitted by New Jersey, its independent assessment of AERMOD, and other highly technical analyses. *Id.* The court upheld the EPA’s decision after examining the record, which showed that EPA had thoroughly examined the relevant scientific data and clearly articulated a satisfactory explanation of the action that established a rational connection between the facts found and the choice made. *Id.* at 525-28.

EPA has acknowledged that, for the one-hour SO<sub>2</sub> NAAQS, modeling is the most accurate means of determining attainment with the NAAQS, Final SO<sub>2</sub> NAAQS Rule at 35,551, 35,570, yet the Michigan Draft ISIP lacks SO<sub>2</sub> emissions limitations informed by air dispersion modeling. As a result, the proposed amendment fails to ensure that Michigan will achieve and maintain the 2010 one-hour SO<sub>2</sub> NAAQS. To comply with the Act’s obligations, Michigan must include adequate emissions limits in the ISIP—that is, source-specific one-hour SO<sub>2</sub> emission limits that show no exceedances of the NAAQS when modeled.

**3. The Draft ISIP must include enforceable SO<sub>2</sub> emission limits with a one-hour averaging period that apply at all times.**

As discussed, an emission limitation necessary to comply with section 110(a)(2)(A) means “a requirement established by the State or the Administrator which limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction, and any design, equipment, work practice or operational standard promulgated under this chapter.” 42 U.S.C. § 7602(k). Therefore, emission limitations must also contain proper averaging times. Otherwise the emission limits would allow for peaks that cause exceedances of the NAAQS, but are averaged with lower emissions over time, and therefore do not register as exceedances. In this instance, the one-hour SO<sub>2</sub> NAAQS requires a one-hour averaging period.

In various contexts, EPA has stated that one-hour averaging times are necessary to comply with the one-hour SO<sub>2</sub> NAAQS. For instance, in 2011, EPA disagreed with the Kansas Department of Health and Environment’s issuance of a PSD permit that contained a 30-day averaging time rather than a one-hour averaging period. *See* Letter from Karl Brooks, Regional Administrator, EPA Region 7 to Dr. Robert Moser, Secretary, Kansas Department of Health and Environment (Feb. 3, 2011), attached hereto as Ex. 18. EPA explained:

[i]t is well known that there can be considerable variability in actual 1-hour emission rates. Therefore, to ensure protection of the 1-hour . . . SO<sub>2</sub> NAAQS . . . the permit needs to contain . . . SO<sub>2</sub> 1-hour average emission limits for both new and existing steam generating units. To ensure the source does not cause or contribute to air pollution in violation of the NAAQS, the emission limits should be consistent with the modeling rates and have the same averaging period, i.e. in this case maximum hourly emission limits consistent with the 1-hour NAAQS.

*Id.* at 2. Similarly, in its disapproval of Missouri’s SIP in 2006, EPA determined that the emission rates in the SIP were “not protective of the short-term sulfur dioxide NAAQS” because they were based on an annual average. *See* Approval and Promulgation of Implementation Plans; State of Missouri, 71 Fed. Reg. 12,623, 12,624 (Mar. 13, 2006). In 2011, the Environmental Appeals Board confirmed that emission limits for SO<sub>2</sub> should be based on hourly averaging times, and rejected an agency’s attempt to use a 3-hour averaging time instead. *In re: Mississippi Lime Co.*, PSDAPLPEAL11-01, 2011 WL 3557194, at \*26-27 (E.P.A. Aug. 9, 2011) (“Emission limits should be based on concentration estimates for the averaging time that results in the most stringent control requirements. 40 C.F.R. pt. 51, app. W, § 10.2.3.1.a.”).

In addition to including emissions limits based on a one-hour averaging period, Michigan’s Draft ISIP must require monitoring of SO<sub>2</sub> emission limits on a continuous basis using a continuous emission monitor system or systems. Clean Air Act section 110(a)(2)(F) requires Michigan’s Draft ISIP to establish a system to monitor emissions from stationary sources and to submit periodic emissions reports. In order to ensure emission limits which are protective of the one-hour SO<sub>2</sub> NAAQS, the ISIP must require that SO<sub>2</sub> emissions are monitored from these sources during every hour of operation, regardless of whether SO<sub>2</sub> pollutant control equipment has been installed or not.

Michigan’s ISIP is required to implement, maintain, and enforce the NAAQS and therefore must include “enforceable emission limitations” to ensure its effectiveness. 42 U.S.C. § 7410(a)(2)(A). Only one-hour averaging periods can ensure compliance with the one-hour SO<sub>2</sub> NAAQS.<sup>16</sup> Therefore, to ensure that all areas in Michigan attain and maintain the one-hour SO<sub>2</sub> NAAQS, MDEQ must revise its ISIP to include enforceable emission limits with one-hour averaging times, monitored continuously, for coal-fired power plants and other large sources of SO<sub>2</sub>. These emission limits must apply at all times, including periods of start-up, shutdown, and malfunction.

#### **4. Enforceable emission limits are necessary to avoid nonattainment designations.**

In addition to being a required component of the ISIP, enforceable emission limits—either in permits or source-specific SIP provisions—are necessary to avoid future nonattainment designations in areas where modeling or monitoring shows that SO<sub>2</sub> levels exceed the one-hour NAAQS. *See* EPA, Next Steps for Area Designations and Implementation of the Sulfur Dioxide National Ambient Air Quality Standard at 4 (Feb. 6, 2013) (explaining that agencies should work “to avoid a nonattainment designation by establishing and submitting to EPA enforceable emission limitations ensuring that attainment with the SO<sub>2</sub> NAAQS (in the form of permit limits, source-specific SIP revisions, or other permanent and enforceable legal documents) occurs prior to the date that final designations based on modeling information are issued” (emphasis added)); Primary National Ambient Air Quality Standard for Sulfur Dioxide, 75 Fed. Reg. at 35,553 (June 22, 2010) (areas will “be designated ‘nonattainment’ if *either available monitoring data or modeling* shows that a violation exists, or ‘attainment’ if both available monitoring data and modeling indicate the area is attaining” (emphasis added)). Currently, Michigan only has one

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<sup>16</sup> Though any averaging time longer than one hour will impermissibly allow exceedances of the short-term standard, if a state nonetheless uses a longer averaging time, the emission limits at minimum would need to be ratcheted down accordingly to ensure that no short-term exceedances of the standard occur.

county designated as nonattainment, but that number will jump to nine counties as the designation process continues. Nonattainment designations create rigorous Clean Air Act requirements that states must comply with, including offsets, LAER, and nonattainment NSR. Michigan could avoid having eight counties formally designated as nonattainment by using this opportunity to add enforceable emissions limits to attain the SO<sub>2</sub> NAAQS on and protect public health.

Addressing the issue now will also bring regulatory certainty to owners of coal-fired power plants in Michigan, which could ultimately save these regulated entities money. This is because many of the coal-fired power plants that do not already have flue gas desulfurization equipment are currently evaluating which sulfur controls to install as a result of other rules, including MATS, CSAPR, and Regional Haze. As a result, establishing emission limits and pollution control requirements through the ISIP will allow the sources to plan with certainty how they will comply with all potentially applicable rules and avoid the potential that a source will make a significant investment in one suite of pollution controls for MATS, Regional Haze or CSAPR only to conclude that the suite of controls is inadequate to comply with the SO<sub>2</sub> NAAQS and that a second suite of controls is necessary. Thus, complying with the SO<sub>2</sub> NAAQS may add little or no additional capital cost to the costs of complying with other rules—provided that the sources factor the SO<sub>2</sub> NAAQS into their initial decision on which controls to install so that the sources can comply with life-saving pollution reduction rules most economically by using only one suite of technologies.

Indeed, industry itself has made this same exact point to EPA, though in slightly different terms:

Multiple recently-issued rules all focus on large combustion source-related emissions (e.g. boilers) and may require significant capital expenditures to achieve compliance. The compliance options and deadlines for these rules, however, vary widely. If the rules compliance deadlines and requirements are not coordinated, the sources subject to them will be forced to make investment decisions without a full understanding of what may be required to comply with the rules having later compliance deadline. This may result in a series of sub-optimized decisions . . . [with a] suboptimal overall solution—both from a cost and environmental perspective. For example . . . a source could invest in Boiler MACT controls without a full understanding of the SO<sub>2</sub> NAAQS issued because SO<sub>2</sub> air dispersion modeling has not yet been completed . . . .

*See* NAAQS Implementation Coalition Comments on the 10th Modeling Conference, March 6, 2012 Joseph C. Stanko, Hunton and Williams, at 10 (emphasis added). By regulating these facilities now, the state of Michigan can prevent a source from incurring additional expenses through piecemealed legislation.

To avoid inevitable nonattainment designations in eight counties and to bring regulatory certainty to sources in those counties, MDEQ should amend the Draft ISIP to establish enforceable emission limits to ensure that large sources of SO<sub>2</sub> do not cause exceedances of the one-hour SO<sub>2</sub> NAAQS.

**C. The Draft ISIP fails to include enforceable emission limitations needed to address significant monitored violations of the primary ozone NAAQS.**

Michigan's Draft ISIP also fails to include emission limits and other restrictions on sources of ozone precursors, including anthropogenic sources like nitrogen oxides ("NO<sub>x</sub>") and volatile organic compounds ("VOCs"), to ensure that areas not designated nonattainment will attain and maintain the 2008 eight-hour Ozone NAAQS. Monitoring data demonstrates that the 2008 Ozone NAAQS is being exceeded in at least eight counties in Michigan.

Emission limits are especially important for meeting the eight-hour ozone NAAQS, because fuel combustion from sources such as electric generating units "is one of the largest anthropogenic sources of emissions of NO<sub>x</sub> in the United States." 73 Fed. Reg. at 16504.<sup>17</sup> Specifically, in Michigan, coal-fired electric generating units are responsible for thirteen percent of all NO<sub>x</sub> emissions released in the State (or 70,328 tons) in 2011. *See* NO<sub>x</sub> NEI All Sectors(2011)\_28 Apr 2014.xlsx, Excel Worksheet "Percentage Summary (All States)", attached hereto as Ex. 19; *see also* EPA, The National Emissions Inventory, Sector Summaries, <http://www.epa.gov/ttn/chief/net/2011inventory.html>. Yet Michigan fails to demonstrate how it plans to address these significant NO<sub>x</sub> emissions and other ozone precursors.

**1. Monitoring data demonstrates that at least eight counties in Michigan are exceeding the 2008 Ozone NAAQS.**

Michigan's Draft ISIP fails to impose necessary restrictions on ozone precursor sources sufficient to ensure the attainment and maintenance of the 2008 Ozone NAAQS in areas designated attainment as shown by the EPA's own ozone monitoring data. Ozone monitor data reveals that twelve counties from 2010-2012 had exceedances that are above attainment/unclassifiable levels. Looking at data from 2011-2013, eight counties again show exceedances of 0.076 ppm or higher. The monitors reveal that ozone concentrations in these areas exceed the 2008 Ozone NAAQS, and thus are above the level deemed safe for public health. *See* MI Ozone Monitors 2010-2013, Excel Worksheet "MI Ozone Monitors 2010-2013," attached hereto as Ex. 20; *see also* EPA AirData: Monitor Values Report, [http://www.epa.gov/airdata/ad\\_rep\\_mon.html](http://www.epa.gov/airdata/ad_rep_mon.html). Despite these exceedances, no areas with monitoring exceedances, and in fact no area in Michigan, is designated nonattainment. 77 Fed. Reg. 30,088, 30,128 (May 21, 2012) (labeling all of Michigan unclassifiable /attainment). Michigan must revise the Draft ISIP to address these exceedances and ensure attainment and maintenance of the 2008 Ozone NAAQS.

The 2008 eight-hour ozone monitor values are listed below for the violating counties

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<sup>17</sup> Oil and gas production can also be a major source of ozone precursors. Michigan currently has twenty-seven pending active high volume hydraulic fracturing permits throughout the state. High Volume Hydraulic Fracturing: Active Applications and Active Permits, [http://www.michigan.gov/documents/deq/High\\_Volume\\_Hydraulic\\_Fracturing\\_Activity\\_MAP\\_423435\\_7.pdf](http://www.michigan.gov/documents/deq/High_Volume_Hydraulic_Fracturing_Activity_MAP_423435_7.pdf). MDEQ should analyze whether and how oil and gas production is affecting air quality and specifically ozone formation in the state. If the oil and gas production is found to be causing ozone exceedances, a minor source permitting program should be established that requires offsets for new and old oil and gas sources to combat emissions of ozone precursors. This will enable the state to meet its duty under the ISIP to attain and maintain the 2008 Ozone NAAQS.

from 2010 to 2013.

**Table 5: Fourth Highest Monitor Values of Counties with Three-Year Averages from 2010 to 2013 equal to 0.076 ppm or Above.<sup>18</sup>**

County (Monitor Number)	Average 2010-2012	Average 2011-2013
Allegan (#260050003)	0.084	0.086
Berrien (#260210014)	0.082	0.082
Cass (#260270003)	0.078	0.078
Genesee (#260490021)	0.076	0.074
Lenawee (#260910007)	0.076	0.075
Macomb (#260990009)	0.078	0.077
Macomb (#260991003)	0.079	0.077
Muskegon (#261210039)	0.082	0.081
Oakland (#261250001)	0.078	0.076
Ottawa (#261390005)	0.078	0.077
St. Clair (#261470005)	0.077	0.075
Washtenaw (#261610008)	0.076	0.075
Wayne (#261630019)	0.081	0.077

See Ex. 20.

<sup>18</sup> Sierra Club has petitioned EPA to redesignate Allegan, Macomb, Muskegon, and Wayne counties as nonattainment for the 2008 Ozone NAAQS on the basis that the 2009-2011 monitoring data revealed that these counties were exceeding the NAAQS. See In the Matter of the Final Rule Published at 77 Fed. Reg. 30,088 (May 20, 2012), entitled “Air Quality Designations for 2008 Ozone National Ambient Air Quality Standards,” Docket No. EPA-HQ-OAR 2008-0476 (July 20, 2012). Sierra Club also petitioned EPA to redesignate Allegan, Berrien, Cass, Genesee, Macomb, Muskegon, Oakland, Ottawa, St. Clair, Washtenaw, and Wayne counties as nonattainment for 2008 Ozone NAAQS on the basis that the 2010-2013 monitoring data revealed that these counties were exceeding the NAAQS. See Petition to the Administrator of the U.S. EPA to Redesignation as Nonattainment 57 Areas with 2012 Design Values Violating the 2008 8-Hour NAAQS for Ozone (Nov. 11, 2013).

Despite persistent ozone NAAQS exceedances in the state, the Draft ISIP does not even attempt to demonstrate that emissions allowed under it will ensure compliance with the eight-hour ozone standard, let alone includes any NO<sub>x</sub> limits to address such exceedances. In order for Michigan to comply with the Clean Air Act and the requirements of section 110(a)(2)(A), Michigan must revise its ISIP to include enforceable emission limits and other measures that will ensure the attainment and maintenance of the 2008 Ozone NAAQS.

**2. Adding control devices and emissions limits on electric generating units are a cost effective option to reduce NO<sub>x</sub> and attain and maintain the 2008 Ozone NAAQS.**

Control devices and limits on coal-fired EGUs are generally the most cost effective option to ensure the 2008 Ozone NAAQS are attained and maintained. A power plant can cost-effectively reduce nitrogen oxides by installing selective catalytic reduction (“SCR”) technology, and by imposing short-term stringent emission limits on all coal-fired EGUs. Notably, only three major coal-burning power plants in Michigan have installed or are planning to install SCR technology: Monroe, J.H. Campbell (Units 2 and 3), and Dan E. Karn. The other sixty-seven coal-fired EGUs in Michigan lack SCR, accounting for 89 percent of all Michigan EGUs. Moreover, only two plants—Sims and T.B. Simon—have even installed SNCR, a less effective control technology. The uncontrolled EGUs cause or contribute to exceedances of the NAAQS. In fact, several of these EGUs are located in counties where ozone design values exceed the NAAQS, including the Trenton Channel, River Rouge, and Wyandotte power plants in Wayne County, and the J.H. Campbell power plant in Ottawa County. In addition, St. Clair and Belle River power plants likely contribute to the Wayne County exceedances, as well as to recent exceedances in St. Clair County. The most cost effective way to address ozone exceedances is to place emissions limits on all EGUs that will ensure that power plants contributing to the exceedances install SCR, and that those with SCR installed run their controls continuously.

In Michigan, where at least eight counties show exceedances of the 2008 Ozone NAAQS, all EGUs should have emission limits based on available and demonstrated control technology. SCR catalysts have been applied over the last 20 years as retrofits to existing power plants across the country and have a proven track record of meeting low emission rates. In particular, a limit of 0.07 pound per MMBtu (“lb/MMBtu”) based on an eight-hour averaging time that applies at all times, including during startup and shut down is readily achievable. EPA has long acknowledged that 90% removal efficiency for SCR on coal-burning units is achievable. *See* EPA, “Ambient Air Quality Impact Report for Desert Rock Energy Facility PSD Permit,” at 8, Table 3, attached hereto as Ex. 21. Thus, taking even the highest emission rate that EPA has set with no post-combustion control—that is, 0.5 lb/MMBtu—and applying the 90% control from SCR, an emission limit of 0.05 lb/MMBtu is clearly achievable. However, MDEQ could add a 40% “safety factor” and establish limitations in the ISIP at 0.07 lb/MMBtu. A review of the RACT/BACT/LAER clearinghouse demonstrates that numerous PSD permits for coal-burning boilers were issued in the early 2000s with emission limits of 0.07 lb/MMBtu. Later that decade, permits for proposed new coal plants were issued with NO<sub>x</sub> limits of 0.05 lb/MMBtu. For example, MDEQ’s permit to install for the Consumers Energy Karn-Weadock plant included a NO<sub>x</sub> emissions limit of 0.05 lb/MMBtu. EPA acknowledged, in setting limits for the proposed Desert Rock facility, that even 0.05 lb/MMBtu involves a significant “safety factor.” In 2001, Babcock & Wilcox Company, in its paper, “How Low Can We Go”, attached hereto as Ex. 22,

said that 0.016 lb/MMBtu was achievable for units burning bituminous coal and 0.008 lb/MMBtu for those burning Powder River Basin coal. *See* Ex. 22 at 5, Table 2.

Actual data confirms that 0.07 lb/MMBtu is easily achievable. For example, during the 2006 ozone season, approximately 88 coal-fired units achieved emission limits of less than 0.07. *See* CAMD NO<sub>x</sub> Ranked Low to High Ozone 2006, attached hereto as Ex. 23. While these emission rates should be based on 0.07 lb/MMBtu, the limit should be set as a lb/hour limit, calculated by multiplying 0.07 MMBtu/hr times the maximum allowable heat input or maximum heat input in prior permit applications for the EGU. Setting the limit in lb/hour ensures consistent protection of the ambient air quality regardless of whether the claimed maximum heat input capacity for the unit is accurate or changes in the future. In addition, a limit in lb/hour addresses the issue of startup and shutdown. Even if the NO<sub>x</sub> emission rate in lb/MMBtu is higher during startup and shutdown when the SCR cannot be engaged, the source should be able to remain under the limit because the heat input is lower during startup and shutdown.

Ideally, Michigan should set the limit with an 8-hour averaging time to protect the 8-hour averaging time of the 2008 Ozone NAAQS. This is especially important for coal-burning EGUs, because electricity demand tends to be highest on hot, summer days, which coincides with those times when ozone levels are the worst. Without short-term averaging times, EGUs could emit NO<sub>x</sub> at higher rates at precisely the time when the ozone levels are the worst and still meet the emission limit using a longer-term average period by reducing their NO<sub>x</sub> emissions during periods when the ozone levels are not as severe.

### **3. Enforceable emission limits are necessary to avoid future nonattainment designations.**

In addition to being a required component of the ISIP, enforceable emission limits—either in permits or source-specific SIP provisions—are necessary to avoid nonattainment designations in areas where modeling or monitoring shows that ozone levels exceed the eight-hour NAAQS. Michigan should use this ISIP process to address current ozone exceedances in at least eight counties and prevent these counties from being redesignated as nonattainment for the 2008 Ozone NAAQS, or designated nonattainment for the forthcoming Ozone NAAQS, by adding appropriate enforceable emission limits on NO<sub>x</sub> sources.<sup>19</sup> In order to comply with section 110(a)(2)(A) and avoid nonattainment designations for areas impacted by high ozone levels, MDEQ must amend the Draft ISIP to ensure that large sources of NO<sub>x</sub> cannot continue to contribute to exceedances of the eight-hour Ozone NAAQS.

#### **D. The Draft ISIP fails to Include Measures that Ensure Compliance with Section 110(a)(2)(A) of the Act Regarding the 2010 SO<sub>2</sub> and 2008 Ozone NAAQS.**

The statutory and regulatory sections that MDEQ incorporated into its Draft ISIP are insufficient to ensure compliance with the 2010 SO<sub>2</sub> and 2008 Ozone NAAQS. Most striking is that none of the rules and regulations cited in Michigan's Draft ISIP include appropriate

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<sup>19</sup> In January, EPA solicited comments on the Ozone NAAQS. *See generally* Review of National Ambient Air Quality Standards for Ozone; Draft Document (Doc ID: EPA-HQ-OAR-2008-0699-0116) (Jan. 29, 2014).

emission limits for the 2010 SO<sub>2</sub> and 2008 ozone NAAQS, as shown by modeling and monitoring data. *See generally* Draft ISIP. Michigan is taking little to no action to address any NAAQS exceedances.

For example, Michigan's sulfur emission limits on coal-burning facilities require a 2.5 lb/MMBtu for plant with steam capacity less than or equal to 500,000 lbs per hour and 1.67 lb/MMBtu for plant steam capacity greater than 500,000 lbs per hour. *See* R.336.1401, Table 41. As discussed above, the limits necessary to meet the 2010 SO<sub>2</sub> NAAQS range from 0.95 to 0.22 lb/MMBtu. Nitrogen oxides limits are equally as weak. Sources that emit more than 25 tons during the ozone control period and serve a generator that has a nameplate capacity of 25 megawatts must meet an emission rate of 0.25 lbs/MMBtu input or a 65% reduction of 1990 NO<sub>x</sub> levels by May 31, 2014. *See* R.336.1801(2)(a)-(b). The regulation also allows for plants to avoid this limit for two years after the compliance date. *See* R.336.1801(2) (b). As discussed above, a 0.07 lb/MMBtu limit is feasible and should be required in order to attain and maintain the 2008 Ozone NAAQS.

Further, the final ISIP must not allow for ambient air incremental increases, variances, exceptions, or exclusions with regard to limits placed on sources of pollutants; otherwise, Michigan cannot assure compliance with the 2010 SO<sub>2</sub> and 2008 ozone NAAQS. Michigan's rules allow exemptions from enforcement that undermine the programs meant to ensure attainment and maintenance with the NAAQS. *See generally* Draft ISIP.

Particularly concerning is Michigan's Clean Corporate Citizen (C3) program (MCL 324.1421 through 324.1429). *See* Draft ISIP at 2. A business can become a so-called Clean Corporate Citizen by meeting minimal requirements, *see generally* MCL §§ 324.1401-1429, yet with the designation companies can avoid enforcement measures. In fact, Michigan states that the program allows a facility to avoid civil fines or violations "unless it had been established by clear and convincing evidence that either C3 facility's actions posed a significant endangerment to public health, safety or welfare...was intentional or occurred as a result of the operator's gross negligence..." *See* Draft ISIP at 2. In addition, C3 designated companies will experience fewer inspections and be given 72-hours' notice before an inspection occurs. *Id.* at 2-3. This weakens Michigan's enforcement abilities and, in light of Michigan's significant air quality problems, is extremely troubling.

More generally, the regulations allow for various exceptions. For example, MDEQ has wide discretion to promulgate rules that exempt certain sources from obtaining permits. *See* MCL § 324.5505(4). Michigan also undercuts its enforcement program by allowing various excuses as affirmative defenses and allowing MDEQ to suspend enforcement, as well as grant variances from requirements for undue hardship. *See* MCL §324.5527; MCL §324.5535; MCL §324.5537. MDEQ also has enforcement discretion for excess emissions resulting from malfunction, start-up, or shutdown. *See* R.336.1915. These regulations impair the ability of Michigan to attain and maintain the NAAQS.

As a result of all of these inadequacies, exemptions, variances, and other shortfalls not listed in these comments, the Draft ISIP cannot ensure that Michigan will attain and maintain the 2010 SO<sub>2</sub> and 2008 Ozone NAAQS. Michigan must revise its ISIP to include enforceable

emission limits that address the exceedances shown by the modeling and monitor data and that otherwise address 2010 SO<sub>2</sub> and 2008 Ozone NAAQS, and it must update its emission regulations to ensure that proper mass limitations and short term averaging periods are imposed on large sources of pollutants, including coal-fired power plants.

**E. The Draft Infrastructure SIP Fails to Address Sources Significantly Contributing to Nonattainment or Interference with Maintenance of the NAAQS in Downwind States.**

Michigan must address interstate transport of its emissions that will contribute to exceedances or interfere with the maintenance of the NAAQS. Under section 110(a)(2)(D), a SIP must contain “adequate provisions (i) prohibiting . . . any source . . . from emitting any air pollutant in amounts which will—(I) contribute significantly to nonattainment in, or interfere with maintenance by, any other State with respect to any such national primary or secondary ambient air quality standard . . .” 42 U.S.C. § 7410(a)(2)(D)(i)(I); *see also EPA v. EME Homer City Generation*, No. 12-1182, slip op. at 14 (U.S. Apr. 29, 2014) (reiterating that this is a mandatory duty) [hereinafter “*Homer City*”]. Michigan’s ISIP, as proposed, fails to address any cross-state impacts that are due to sources within the state. *See* Draft ISIP at 3. This is inadequate and should result in EPA disapproving the submittal.

The Clean Air Act sets a mandatory duty for states to submit ISIPs within three years of promulgation of a NAAQS. 42 U.S.C. § 7410(a)(1). Under CAA section 110, there is no prerequisite action required, such as EPA issuing guidance, before states must fulfill their mandatory duty. *See Homer City* at 14 (“the CAA sets a series of precise deadlines to which the States and EPA must adhere.”). MDEQ cannot rely on the fact that EPA’s 2013 ISIP Guidance does not address interstate transport provisions. *See* Draft ISIP at 3.<sup>20</sup> This guidance directly contradicts the language of the Clean Air Act. Therefore, Michigan must create an ISIP to address Prongs 1 and 2 of the interstate provisions and provide the public with an opportunity to comment on it.<sup>21</sup>

Further, it has already been demonstrated through CSAPR that Michigan is contributing to other states’ pollution problems, and so Michigan’s contention that it is not subject to any finding of significant contribution to any other state’s attainment or maintenance at this time, *see* Draft ISIP at 3, is incorrect. Under CSAPR, which is a less stringent standard than the 2010 SO<sub>2</sub>

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<sup>20</sup> The Supreme Court has resoundingly disapproved the belief that states cannot address the section 110(a)(2)(D)(i), the Good Neighbor provision, until EPA first calculates the budget of emissions and gives upwind states the opportunity to propose SIPs allocating those budgets among in-state sources before issuing a FIP. *See Homer City*, 696 F.3d 7, 37 (D.C. Cir. 2012), rev’d, No. 12-1182, slip op. at 27-28 (U.S. Apr. 29, 2014) (stating “nothing in the statute places EPA under an obligation to provide specific metrics to States before they undertake to fulfill their good neighbor obligations” and finding the D.C. Circuit impermissibly altered the clear deadlines in the Act).

<sup>21</sup> Just as EPA has historically used air dispersion modeling in attainment designations and SIP revisions, so has the agency relied on modeling to assess cross-state impacts under the Act’s Good Neighbor provision—section 110(a)(2)(D)(i)(I). Under the Clean Air Interstate Rule (“CAIR”) and the Cross-State Air Pollution Rule (“CSAPR”), as well as the 2003 NO<sub>x</sub> SIP Call, EPA has used modeling to determine pollutants’ cross-state impacts. Note that the D.C. Circuit court never questioned the agency’s use of modeling to assess cross-state impacts. *See generally North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008).

and 2008 Ozone NAAQS, Michigan was required to reduce its NO<sub>x</sub> and SO<sub>2</sub> emissions to address 1997 8-hour ozone, 1997 Annual PM<sub>2.5</sub>, and 2006 24-hour PM<sub>2.5</sub>. See EPA, CSAPR: Resources for Implementation, <http://www.epa.gov/airtransport/CSAPR/stateinfo.html#states> (showing Michigan on a list of states that are included in CSAPR).<sup>22</sup>

Michigan must demonstrate that it is addressing its contributions to other states' pollution. Michigan cannot rely on its Prevention of Significant Deterioration ("PSD") and nonattainment New Source Review ("NNSR") permitting program to determine that Michigan is not contributing to nonattainment or interference with maintenance of the NAAQS in downwind states. See Draft ISIP at 4. PSD and NNSR programs only address new sources, thus old sources are never evaluated to determine if they are contributing to downwind states' pollution. Additionally, the NNSR program only applies to nonattainment areas, which Michigan does not have for ozone, nitrogen dioxide, and PM<sub>2.5</sub>. Thus, Michigan must still address whether it is contributing to nonattainment areas or interfering with the NAAQS in other states to satisfy its requirements under the Interstate Transport Provision.<sup>23</sup>

In light of the *Homer City* Supreme Court decision, MDEQ should act quickly to address pollution that may be contributing to another state's nonattainment or interfering with another state's maintenance of the NAAQS. The Court's decision means Michigan must address its exceedances under its own volition, or EPA will be required to act. Even if CSAPR is fully implemented, Michigan will still have to address the pollutants that are contributing to nonattainment or interference with the NAAQS that are not covered by CSAPR. Michigan should take the opportunity now to place enforceable emission limits on large sources contributing to problems with the attainment and maintenance of the NAAQS in other states. MDEQ must provide provisions in its proposed ISIP to ensure that pollution from Michigan is not preventing other states from attaining or maintaining the NAAQS.

### III. CONCLUSION

The Draft ISIP fails to ensure that 2010 SO<sub>2</sub> and 2008 Ozone NAAQS are attained and maintained, as described above. Michigan must adopt new provisions in the ISIP to protect public health and comply with the Act's requirements. The Sierra Club is happy to provide any other information that might assist Michigan in evaluating the impacts of these sources and developing an ISIP in full compliance with the Clean Air Act.

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<sup>22</sup> Even if CSAPR were simply reinstated, however, a state cannot rely on CSAPR to address its transport requirements for the newer standards that CSAPR was never meant to address, such as 2008-hour ozone and 2012 Annual PM<sub>2.5</sub> NAAQS. <http://www.epa.gov/airtransport/CSAPR/stateinfo.html#states>.

<sup>23</sup> Just as EPA has historically used air dispersion modeling in attainment designations and SIP revisions, so has the agency relied on modeling to assess cross-state impacts under the Act's Good Neighbor provision—section 110(a)(2)(D)(i)(I). Under CAIR and CSAPR, as well as the 2003 NO<sub>x</sub> SIP Call, EPA has used modeling to determine pollutants' cross-state impacts. Note that the D.C. Circuit court never questioned the agency's use of modeling to assess cross-state impacts. See generally *North Carolina v. EPA*, 531 F.3d 896 (D.C. Cir. 2008).

Respectfully submitted,

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*On behalf of Sierra Club*

# **EXHIBIT 2**

**Review of Michigan's 2015 SO<sub>2</sub> Ambient  
Air Monitoring Network**

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## I. Monitoring Requirements and Objectives

In 2010, the US EPA revised the primary sulfur dioxide (SO<sub>2</sub>) national ambient air quality standards (NAAQS).<sup>1</sup> The revised SO<sub>2</sub> standards include a new 1-hr standard, set at a level of 75 ppb. The standard requires that the 1-hr SO<sub>2</sub> “design value” be below 75 ppb at all locations, where the design value is computed as the three-year average of the 99<sup>th</sup> percentile daily peak 1-hr average concentrations.

As part of the new standard, EPA also established minimum requirements for SO<sub>2</sub> air monitoring.<sup>2</sup> The standard requires states to place one to three monitors within each Core-Based Statistical Area (CBSA) based on the population weighted emissions index (PWEI).<sup>3</sup> EPA estimated that approximately 163 monitors are needed nationwide to satisfy this minimum monitoring requirement. For most areas, the minimum level of monitoring will not be sufficient to characterize SO<sub>2</sub> air quality or to determine compliance with the 1-hr standard. For this and other reasons, EPA has stated that it will rely on dispersion modeling to determine whether areas with significant sources of SO<sub>2</sub> emissions are in compliance with the 1-hr standard.<sup>4</sup>

The PWEI-based minimum monitoring requirements established by the EPA require placement of up to three ambient SO<sub>2</sub> monitors in larger (typically urban) areas that have both a high population and a high cumulative SO<sub>2</sub> emission rate. Conversely, areas with a high cumulative SO<sub>2</sub> emission rate but a low population would not be required to deploy ambient SO<sub>2</sub> monitors under the EPA rule. Thus the minimal monitoring requirements laid out by EPA are insufficient to protect rural areas, in which emissions from large sources may still cause violations of the SO<sub>2</sub> NAAQS, albeit with impacts on a smaller population. Because the SO<sub>2</sub> NAAQS is an air pollutant concentration standard, and is not population based, areas surrounding large SO<sub>2</sub> sources that do not have SO<sub>2</sub> monitor(s) in place to characterize peak concentration impacts will be required to rely solely on dispersion modeling to determine compliance with the NAAQS.

Moreover, even within those CBSAs that have three ambient monitors, in many instances the minimum required SO<sub>2</sub> monitoring will still not be adequate to characterize peak concentrations from major SO<sub>2</sub> sources. For example, if a large CBSA contains multiple areas with high SO<sub>2</sub> emissions density but each is located in a geographically distinct region, then the monitors may fail to capture the peak locations for each of the large source regions. In such instances, states must supplement the monitoring data with dispersion modeling to determine compliance with the standard.

As part of the revisions to the SO<sub>2</sub> NAAQS, EPA has also proposed a set of data requirements for SO<sub>2</sub> that include air monitoring and dispersion modeling requirements (“data requirements rule”).<sup>5</sup> EPA’s approach focuses “on characterizing air quality in areas with large sources of SO<sub>2</sub>

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<sup>1</sup> Primary National Ambient Air Quality Standards for Sulfur Dioxide; Final Rule, 75 *Federal Register* 35520 (June 22, 2010). <http://www.epa.gov/ttn/naaqs/standards/so2/fr/20100622.pdf>

<sup>2</sup> *Id.*

<sup>3</sup> Fact Sheet: Revisions to the Primary National Ambient Air Quality Standard, Monitoring Network, and Data Reporting Requirements for Sulfur Dioxide. <http://www.epa.gov/air/sulfurdioxide/pdfs/20100602fs.pdf>

<sup>4</sup> *Id.*

<sup>5</sup> Data Requirements Rule for the 1-Hour Sulfur Dioxide (SO<sub>2</sub>) Primary National Ambient Air Quality Standard (NAAQS); Proposed Rule, 79 *Federal Register* 27446 (May 13, 2014). <http://www.gpo.gov/fdsys/pkg/FR-2014-05-13/pdf/2014-09458.pdf>

emissions, and includes smaller sources in areas with higher population.... Air agencies would have the flexibility to characterize air quality using either modeling of actual source emissions or using appropriately sited ambient air quality monitors.”<sup>6</sup>

The proposed data requirements rule identifies the sources around which air agencies would need to characterize SO<sub>2</sub> air quality; depending on the population of the area. The proposed rule requires states to characterize air quality for areas surrounding large sources with annual SO<sub>2</sub> emissions greater than 10,000 tons/year, as well as areas surrounding sources with emissions greater than 3,000 tons/year if the population of a metro area exceeds 1 million. For all areas to which the rule applies, states may characterize air quality through either ambient monitoring or dispersion modeling, or a combination of the two.

Where a state uses ambient monitoring to characterize the SO<sub>2</sub> air quality surrounding a large source (or sources), then the monitoring must capture peak concentration impacts. According to the EPA, “[s]tates electing to monitor to satisfy this rule will need to take specific actions to identify, relocate and/or install new ambient SO<sub>2</sub> monitors that would characterize peak 1-hour SO<sub>2</sub> concentrations in areas around or impacted by identified SO<sub>2</sub> sources.”<sup>7</sup> In its companion Technical Assistance Document (TAD), EPA offers the following guidance on how air agencies might satisfy the SO<sub>2</sub> data requirements in order to determine compliance with the NAAQS: “The EPA expects monitoring conducted in response to [an anticipated] future data requirements rule to be targeted, source-oriented monitoring, for which the primary objective would be to identify peak SO<sub>2</sub> concentrations in the ambient air that are attributable to an identified emission source or group of sources.”<sup>8</sup>

In addition, the TAD recommends that states assess the ability of each set of ambient monitors within each area to adequately characterize SO<sub>2</sub> air quality around large sources using all available information: “The approach taken by a state, local, or tribal air agency to determine where a sufficient number of SO<sub>2</sub> monitors may be sited to characterize ambient peak SO<sub>2</sub> concentrations should take into account as much available data as possible. Such data might include: all the available data with respect to relevant source emission profiles, existing air quality data, existing modeling results, meteorological data and analyses (e.g., wind roses), terrain, general knowledge of a source or sources and the surroundings, and general knowledge about an area with respect to monitoring site feasibility.”<sup>9</sup>

Air agencies that choose to use monitoring as a means of satisfying the anticipated data requirements rule are thus required to develop a network proposal in which it is demonstrated that the area characterized around an identified SO<sub>2</sub> source (or sources) includes the locations where peak 1-hour SO<sub>2</sub> concentrations are expected to occur. The TAD guidelines state that the

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<sup>6</sup> Fact Sheet: Proposed Data Requirements Rule for the 1-Hour Sulfur Dioxide Primary National Ambient Air Quality Standard (NAAQS). <http://www.epa.gov/airquality/sulfurdioxide/pdfs/20140418fs.pdf>

<sup>7</sup> Id.

<sup>8</sup> SO<sub>2</sub> NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, U.S. EPA Office of Air and Radiation, Office of Air Quality Planning and Standards, Air Quality Assessment Division (December 2013 Draft) <http://www.epa.gov/airquality/sulfurdioxide/pdfs/SO2MonitoringTAD.pdf>

<sup>9</sup> Id.

primary objective for source-oriented site selection “is to place monitoring sites at the location or locations of expected peak concentrations.”<sup>10</sup>

In cases where the air monitoring network is insufficient to adequately characterize peak SO<sub>2</sub> air quality, dispersion modeling will be required to determine compliance with the standard. In its SIP guidance document for SO<sub>2</sub>,<sup>11</sup> EPA states that “[a]ir quality modeling, using actual emissions, may also be necessary to determine the representativeness of the monitoring data, and/or to provide needed information where there is nonexistent or inadequate monitoring data for the affected area. For SO<sub>2</sub>, air quality dispersion modeling would generally be necessary to comprehensively evaluate a source’s impacts on the affected area and to determine the areas of expected high concentrations based upon current conditions.”<sup>12</sup>

In areas with less than three SO<sub>2</sub> monitors, it is quite likely that the monitoring network will not be able to sufficiently characterize the SO<sub>2</sub> air quality surrounding a large source (or sources) and therefore modeling must be performed to assist in the demonstration of attainment (using actual emission rates). A nonattainment area subject to a SIP must also use air quality modeling to characterize the sources’ impacts to the region, to demonstrate attainment through specific control efforts (using allowable emission rates), and to determine the representativeness of the monitoring data.

While EPA’s proposed rule does not mandate that states install more than the minimum number of monitors, installing sufficient monitors in areas surrounding major source(s) would assist in verifying dispersion modeling results. For example, where no monitors exist near the peak concentration areas for a particular source, then the design values will be entirely dependent on dispersion model results. Placing even one monitor in a peak concentration area would provide feedback on the model, and could improve or verify modeling results.

## **II. Assessment of Michigan’s SO<sub>2</sub> Monitoring Network**

I reviewed Michigan’s current SO<sub>2</sub> air monitoring network plan to determine whether the monitoring network satisfies the requirements of the revised SO<sub>2</sub> standard in addition to the proposed data requirements rule. The current (and planned) SO<sub>2</sub> monitoring network does not include sufficient monitors in peak concentration impact areas that surround many of the state’s largest SO<sub>2</sub> sources.

There are a number of large SO<sub>2</sub> sources in Michigan for which a characterization of the surrounding area will be required. These sources are summarized in Table 1, along with their allowable SO<sub>2</sub> emission rates, modeled peak SO<sub>2</sub> concentrations,<sup>13</sup> and recommendations for monitoring locations. The SO<sub>2</sub> monitors in each of the areas surrounding these sources are examined further below.

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<sup>10</sup> Id.

<sup>11</sup> Guidance for 1-Hour S02 Nonattainment Area SIP Submissions (April 2014).  
<http://www.epa.gov/airquality/sulfurdioxide/pdfs/20140423guidance.pdf>

<sup>12</sup> Id.

<sup>13</sup> Modeled maximum SO<sub>2</sub> concentrations in Table 1 are based on allowable emissions, and assume no background concentration.

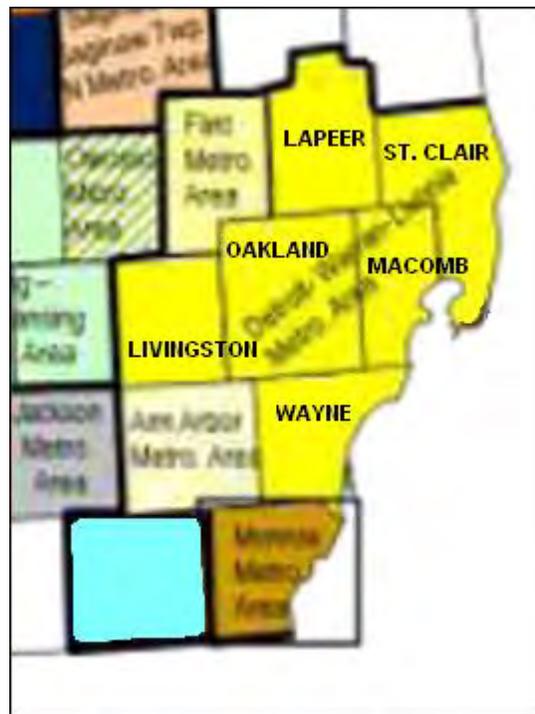
**Table 1. Large SO<sub>2</sub> Sources in Michigan and Monitor Locations**

Source	Allowable Emissions (tpy)	Modeled Maximum SO <sub>2</sub> Concentration (ppb)	Monitor Located Near Modeled Peak?	Recommended Monitor Location
River Rouge	34,200	91	YES*	Oakwood Hts / Melvindale
Trenton Channel	55,254	107	NO	Allen Rd. & West Rd.
Belle River	71,631	85	NO	} St. Clair Hwy & King Rd.
St. Clair	98,322	186	NO	
JH Campbell	87,563	111	YES	West Olive
Monroe	14,300	91	YES	Sterling Park
Eckert Station	29,068	117	YES*	2-3 km SE or SW of plant
Presque Island	30,482	295	NO	Southwest Marquette

\* The monitors near River Rouge and Eckert Station could be relocated to capture peak SO<sub>2</sub> concentrations. See text for details.

**Detroit-Warren-Livonia CBSA Monitors**

The Detroit-Warren-Livonia CBSA consists of six counties, shown in solid yellow in Figure 1. Ninety percent of the population of the six-county CBSA resides in the three central counties surrounding Detroit—Wayne, Oakland, and Macomb—whereas 96 percent of the SO<sub>2</sub> emissions within the CBSA are from sources in only two of the counties, Wayne and St. Clair, as shown in Table 2.



**Figure 1. Detroit-Warren-Livonia CBSA**

**Table 2. SO<sub>2</sub> Emissions and Population in the Six County Detroit-Warren-Livonia CBSA**

<b>County</b>	<b>2010 Population</b>	<b>2008 NEI SO<sub>2</sub> emissions (tpy)</b>	<b>PWEI</b>
Macomb	840,978	1,367.46	1,150
Oakland	1,202,362	2,780.69	3,343
Wayne	1,820,584	55,790.51	101,571
Lapeer	88,319	152.87	14
St. Clair	163,040	64,388.92	10,498
Livingston	180,967	257.45	47
<b>Detroit-Warren-Livonia CBSA</b>	<b>4,296,250</b>	<b>124,737.90</b>	<b>535,905</b>

The PWEI calculation for the entire six-county CBSA indicates that at least two SO<sub>2</sub> monitors are required within the CBSA (100,000 < PWEI < 1,000,000).

The borders of individual CBSAs are somewhat arbitrary, especially for large counties.<sup>14</sup> A large CBSA, such as the Detroit-Warren-Livonia CBSA, could be divided into two separate geographic regions, each with a large core population and significant SO<sub>2</sub> emissions. For example, in MDEQ's 2014 Annual Ambient Monitoring Review<sup>15</sup>, MDEQ indicated that the Detroit-Warren-Livonia statistical area could be subdivided into the Detroit-Livonia-Dearborn Metropolitan Division (Wayne County) and the Warren-Farmington Hills-Troy Metropolitan Division (Lapeer, Livingston, Macomb, Oakland and St. Clair Counties). The northern subdivision of the CBSA contains an urbanized cluster of at least 10,000 in population (Warren/Troy/Pontiac), as does the southern subdivision of Wayne County (which includes Detroit). If this division of the CBSA were considered, then the resulting population weighted emissions index (PWEI) would indicate that two SO<sub>2</sub> monitors are required in each subdivision (see Table 3).

<sup>14</sup> A Core-Based Statistical Area (CBSA) is defined as an entity consisting of the county or counties associated with at least one urbanized area/urban cluster of at least 10,000 in population, plus adjacent counties having a high degree of social and economic integration.

<sup>15</sup> Michigan's 2014 Annual Ambient Air Monitoring Network Review (May 19, 2014- Draft).

**Table 3. Population Weighted Emissions Index (PWEI) for the Subdivided CBSA**

<b>CBSA Division</b>	<b>2010 Population</b>	<b>2008 NEI SO2 emissions</b>	<b>PWEI</b>
<b>Detroit-Livonia- Dearborn Metropolitan</b>	1,820,584	55,791	101,571
<b>Warren- Farmington Hills- Troy Metropolitan</b>	2,475,666	68,947	170,691

The Michigan Department of Environmental Quality (MDEQ) currently operates three SO<sub>2</sub> monitors within the Detroit-Warren-Livonia CBSA. One of the monitors is located in Allen Park (Wayne County). This monitor is a neighborhood-scale NCore SO<sub>2</sub> monitor, and MDEQ uses it to establish background concentrations in the nonattainment area. The Allen Park monitor is located about 8 to 10 km southwest of major SO<sub>2</sub> sources, but is usually upwind of those sources, and is therefore not located near expected peak SO<sub>2</sub> concentrations. Although this monitor may be counted to satisfy the minimum requirements for SO<sub>2</sub> monitoring within the CBSA, it does not satisfy the need for source-oriented monitors that can be used to characterize peak concentrations around major SO<sub>2</sub> sources, as required by the proposed data requirements rule.

A second monitor in Wayne County is located at the Southwest High School (SWHS), which is within five kilometers of a number of large SO<sub>2</sub> sources in the area, including the River Rouge power plant. The modeled peak SO<sub>2</sub> concentration impact due to River Rouge's emissions was 91 ppb, located 4 km to the west/northwest of the power plant. The modeled SO<sub>2</sub> concentration impact due to River Rouge at the SWHS monitor was 75 ppb, which is over 80 percent of the peak concentration. This monitor is therefore located in an area where high concentrations from the River Rouge plant might be expected to occur, although the modeled peak impacts from all nearby sources combined (and also peak impacts from individual sources, including River Rouge) were typically located to the south or southwest of the SWHS monitor. To capture the peak predicted concentrations from the River Rouge plant, a monitor could be placed at the location of the modeled peak SO<sub>2</sub> concentration impact from the power plant, which is near the intersection of Oakwood Blvd. and S. Dix St, between the Oakwood Heights and Melvindale neighborhoods. As discussed above, however, regardless of placement, a single monitor cannot suffice to characterize the SO<sub>2</sub> air quality in the surrounding area, and so the state must continue to use modeling to demonstrate compliance with the 1-hour SO<sub>2</sub> NAAQS.

There currently exists no monitor in southern Wayne County that can be used to characterize peak SO<sub>2</sub> air quality around the Trenton Channel power plant. Without a representative monitor located in an area of expected peak impact, the determination of compliance with the 1-hour SO<sub>2</sub> standard for the area surrounding this source will have to be made entirely based upon dispersion modeling. Dispersion model results indicate that peak SO<sub>2</sub> concentration impacts from the Trenton Channel power plant occur approximately 4.5 km to the northwest of the power plant,

near the intersection of Allen Rd. and West Rd in the Woodhaven neighborhood. MDEQ should place a monitor in this area to capture peak concentration impacts from the Trenton Channel power plant.

MDEQ operates a third SO<sub>2</sub> monitor within the Detroit-Warren-Livonia CBSA at Port Huron (2010 population: 30,115) in St. Clair County. This monitor is located about 4 km southwest of central Port Huron, over 20 km north of the two major sources in St. Clair County, the Belle River and St. Clair power plants. MDEQ redeployed this monitor in 2012 in response to the tightening of the SO<sub>2</sub> NAAQS level.

The (actual) 2012 SO<sub>2</sub> emissions from the Belle River and St. Clair power plants totaled over 60,000 tpy. Due to the size of these two sources, the proposed SO<sub>2</sub> data requirements rule will require the State to characterize the SO<sub>2</sub> air quality in the area surrounding these two facilities. The SO<sub>2</sub> air quality characterization (and determination of compliance with the 1-hour standard) can be accomplished using monitoring, modeling or a combination of the two.

Recent modeling performed to evaluate the impacts of SO<sub>2</sub> emissions from the Belle River and St. Clair power plants showed that peak SO<sub>2</sub> concentrations were located between about 3.5 to 6 km north and northwest of the two power plants.<sup>16</sup> The Port Huron monitor is located more than 20 km north of the two power plants, far from the area where modeling shows the peak impact from Belle River and St. Clair is occurring. While emissions from Belle River and St. Clair likely impact the Port Huron monitoring location, that monitor is not placed in a location where peak concentrations are expected to occur and, therefore, an additional monitor is needed and continued use of modeling to demonstrate compliance with the 1-hr SO<sub>2</sub> standard is required.

The AERMOD dispersion model results<sup>17</sup> predict that the Belle River and St. Clair power plants are causing violations of the 1-hour SO<sub>2</sub> standard in surrounding areas. Multi-year design value concentrations (modeled using actual emission rates from the two power plants, with no additional background concentrations added) were approximately 110 ppb (35 ppb above the standard level). The comparable modeled concentrations (multi-year average of 99<sup>th</sup> percentile peak daily 1-hour concentration) at Port Huron were approximately 35 ppb (40 ppb below the standard level).

MDEQ has acknowledged that SO<sub>2</sub> monitors placed over 20 km from large SO<sub>2</sub> sources are not likely to capture peak concentration impacts. For example, MDEQ placed a monitor at Jenison located at the eastern edge of Ottawa County, about 30 km east of the JH Campbell power plant. According to MDEQ, “The MDEQ and Region 5 have come to the conclusion that the Jenison site (261390005) is not sited close enough to pick up the [Campbell] power plant in West Olive, therefore the MDEQ shut down the Jenison SO<sub>2</sub> monitor at the end of 2013. Currently, the MDEQ is pursuing a new monitoring site to be located at the Port Sheldon Township Hall in West Olive, Michigan.”<sup>18</sup>

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<sup>16</sup> AERMOD modeling conducted by H. Andrew Gray. (June 2014).

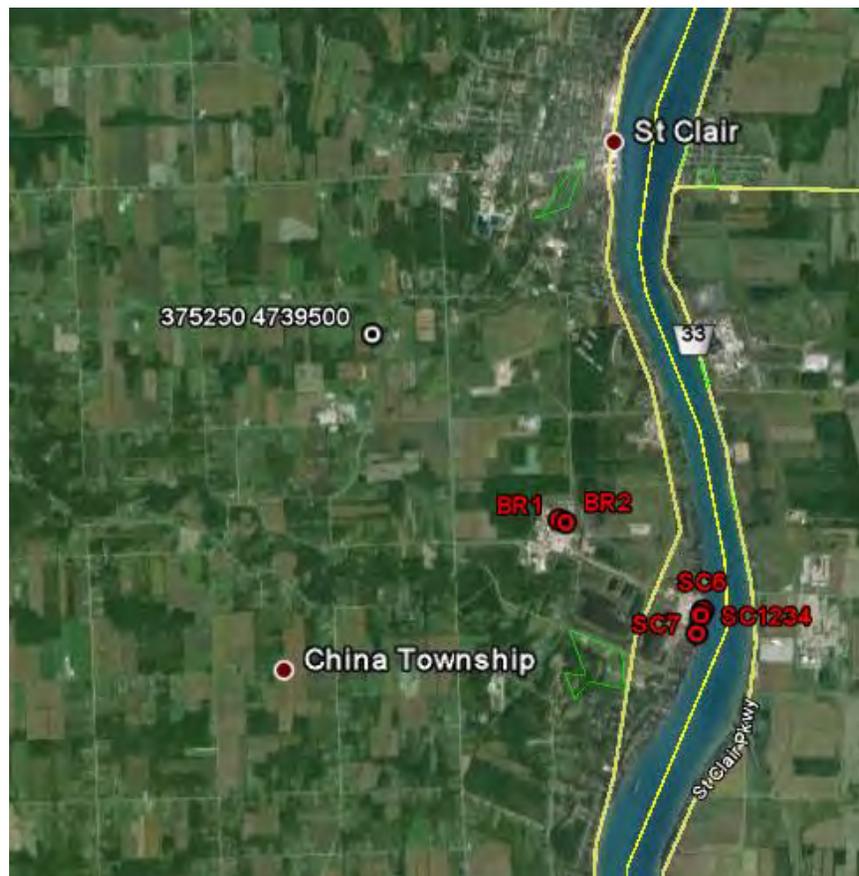
[https://app.box.com/files/0/f/2045514148/Andrew\\_Gray\\_Files/aermod3.out](https://app.box.com/files/0/f/2045514148/Andrew_Gray_Files/aermod3.out)

<sup>17</sup> Belle River and St. Clair Power Plants, St. Clair, Michigan: Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>. Steven Klafka, Wingra Engineering, Madison Wisconsin. (June 3, 2014).

<sup>18</sup> Michigan's 2014 Annual Ambient Air Monitoring Network Review (May 19, 2014 - Draft).

Similarly, the Port Huron monitor is not close enough to adequately “pick up” the peak concentrations from the St. Clair and Belle River power plants. While there will likely be *some* occasional impact at the Port Huron monitor due to emissions from the St. Clair and Belle River power plants, there is almost no chance that the maximum SO<sub>2</sub> concentration generated by St. Clair and Belle River will be observed in Port Huron.

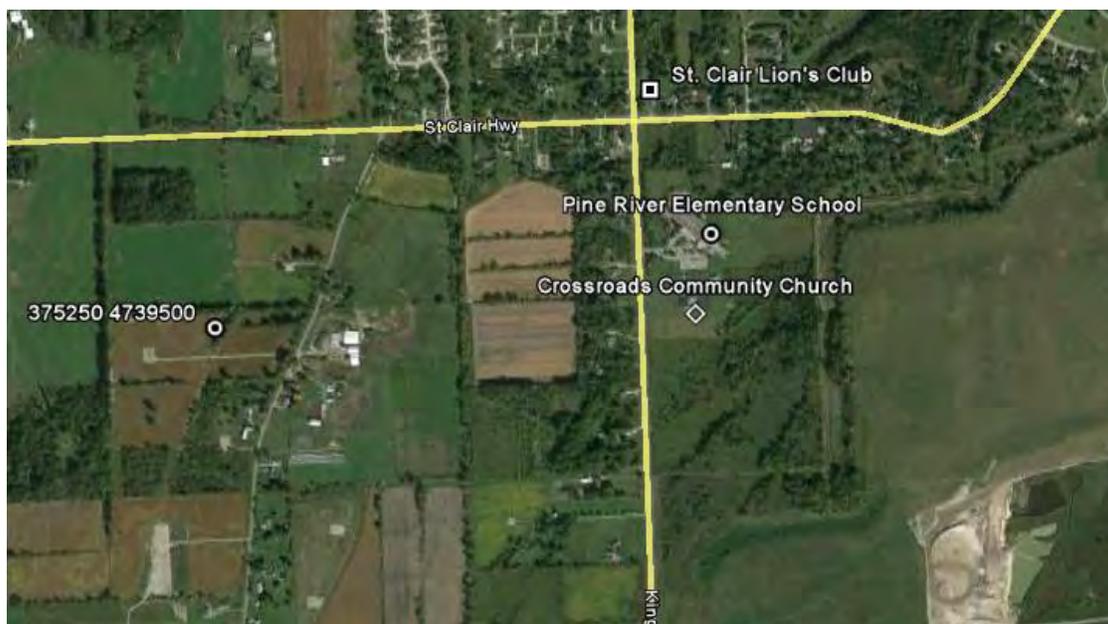
Instead, MDEQ should place the St. Clair County monitor closer to where the expected SO<sub>2</sub> concentration maximums actually occur. The city of St. Clair (2010 population: 5,471) is located 5 to 7 km north of the two major SO<sub>2</sub> sources. The dispersion model results indicate that peak concentration impacts from the two power plants (combined) occurred about 4 km to the southwest of the city of St. Clair (shown as point 37520 4739500 in Figure 2).<sup>19</sup> The population of St. Clair County would be better served by having an SO<sub>2</sub> monitor in the proximity of the city of St. Clair rather than in Port Huron, which may have a larger population but is not near any major SO<sub>2</sub> sources.



**Figure 2. Location of the modeled peak SO<sub>2</sub> design value concentration due to emissions from the Belle River (BR1, BR2) and St. Clair (SC1234, SC6, SC7) power plants (peak location is at 375250 4739500)**

<sup>19</sup> AERMOD modeling conducted by H. Andrew Gray (June 2014).  
[https://app.box.com/files/0/f/2045514148/Andrew\\_Gray\\_Files/aermod3.out](https://app.box.com/files/0/f/2045514148/Andrew_Gray_Files/aermod3.out)

The modeled peak SO<sub>2</sub> (design value) concentration from the two sources combined is located northwest of the two major sources, about one kilometer west-southwest of the intersection of St. Clair Highway and King Road (see Figure 3). An example of a preferable choice for a St. Clair County SO<sub>2</sub> monitoring site would be at (or near) this intersection (N 42.8022 W 82.5137). The Pine River Elementary School is located just southeast of this intersection, and the St. Clair Lion's Club is located just northeast of the intersection, both potential sites for an SO<sub>2</sub> monitoring location.



**Figure 3. Intersection of St. Clair Highway and King Road**

In sum, while the Detroit-Warren-Livonia CBSA has the minimum number of SO<sub>2</sub> monitors required by the PWEI calculation, the network is not sufficient to characterize SO<sub>2</sub> air quality in the area, particularly around the River Rouge, Trenton Channel, St. Clair, and Belle River power plants. As a result, the proposed data requirements rule for SO<sub>2</sub> will require either monitoring or modeling (or both) to be conducted to characterize the areas around these large SO<sub>2</sub> sources. The state will need to determine compliance with the 1-hour SO<sub>2</sub> standard for each of these three areas independently.

## **Campbell Monitor**

Dispersion modeling results for the JH Campbell power plant<sup>20</sup> indicate that peak SO<sub>2</sub> concentration impacts generally occur to the north of the power plant. The new West Olive monitoring location is situated about 3.3 km to the south-southeast of the Campbell power plant, and so is not located in a place likely to capture peak predicted concentrations; however, it is close to secondary modeled peak concentration locations. The modeled design value SO<sub>2</sub> concentration at the location of the new West Olive monitoring site due to JH Campbell's emissions was predicted to be about 80 percent of the peak modeled SO<sub>2</sub> concentration, which was located about 3.8 km north of JH Campbell (near the intersection of Fillmore St. and 168<sup>th</sup> Ave.). Although monitor located to the north would likely be subject to somewhat higher concentration impacts from the power plant, based on currently available information, the West Olive site appears to be an adequate location for a single source-oriented monitoring site that will capture elevated, but not peak, concentrations from the Campbell power plant. However, because a single monitor cannot suffice to characterize the SO<sub>2</sub> air quality in the surrounding area, the state must continue to use modeling to demonstrate compliance with the 1-hour SO<sub>2</sub> NAAQS.

## **Monroe Monitor**

The Monroe Metro Area (consisting of Monroe County) has a number of significant sources of SO<sub>2</sub>, including the Monroe power plant. The 2008 SO<sub>2</sub> emissions from all Monroe County sources was 135,800 tpy, more than twice the emissions from any other single county in Michigan.<sup>21</sup> With a 2010 population of 152,021, the PWEI for the Monroe County MSA is 20,644, which indicates that a minimum of one SO<sub>2</sub> monitor is required in the county.

The proposed data requirements for SO<sub>2</sub> will require a characterization of the SO<sub>2</sub> air quality around the Monroe power plant to determine compliance with the 1-hour SO<sub>2</sub> standard. MDEQ operates a monitor in Monroe at Sterling State Park, located about 3.7 km north of the Monroe power plant. Examination of dispersion model results for the Monroe power plant<sup>22</sup> indicates that the peak SO<sub>2</sub> concentration impacts occur between 2 and 3 km to the north-northeast of the plant, within about 1.5 km of the Sterling Park monitor. The Sterling Park monitor appears to be an adequate choice for a monitoring site where one would expect a peak SO<sub>2</sub> concentration impact to occur. Once again, however, a single monitor cannot suffice to characterize the SO<sub>2</sub> air quality in the surrounding area, and so the state must continue to use modeling to demonstrate compliance with the 1-hour SO<sub>2</sub> NAAQS.

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<sup>20</sup> J.H. Campbell Plant, West Olive, Michigan: Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>. Steven Klafka, Wingra Engineering, Madison Wisconsin. (June 1, 2014).

<sup>21</sup> Michigan's 2014 Annual Ambient Air Monitoring Network Review (May 19, 2014- Draft).

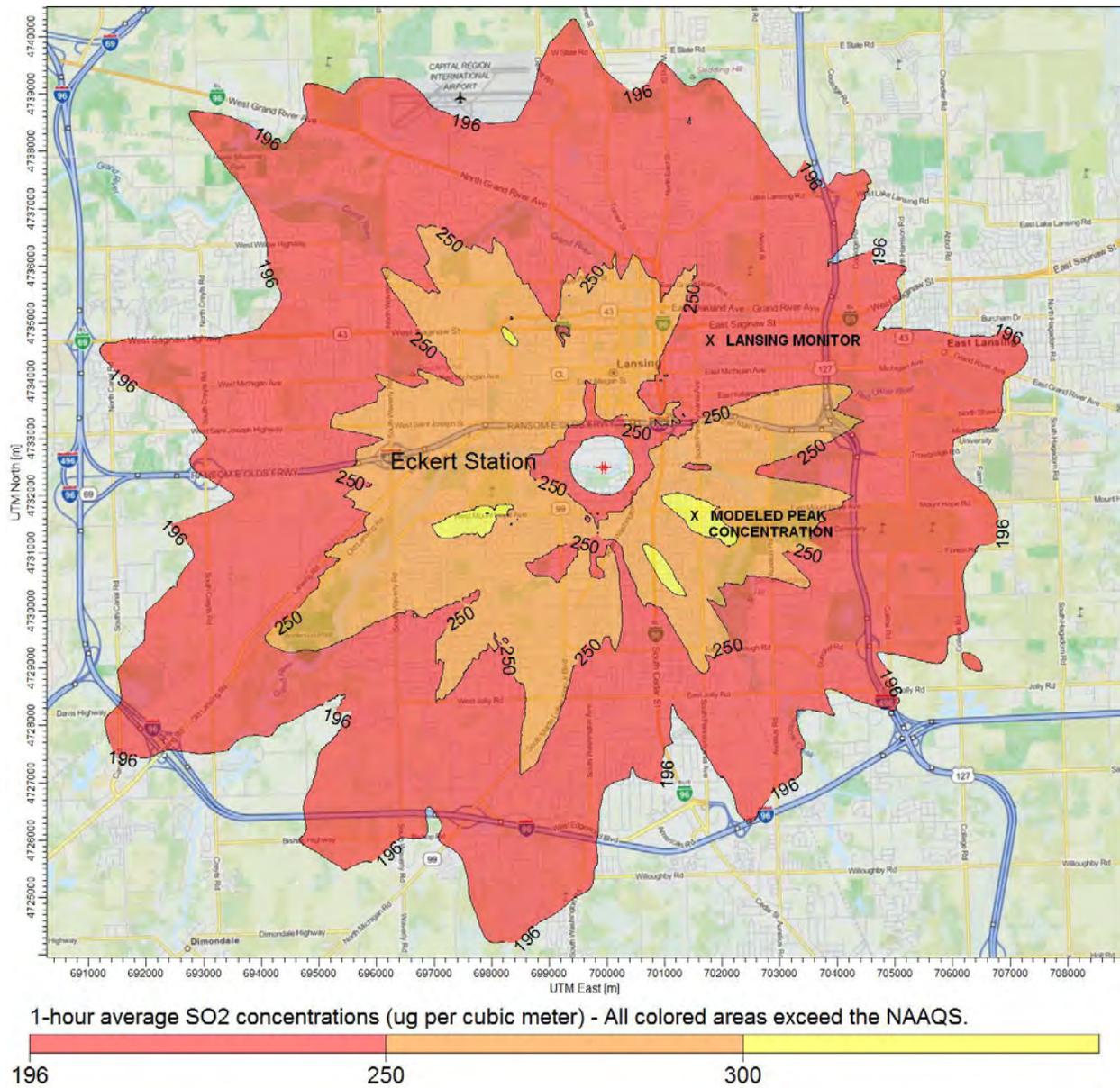
<sup>22</sup> Monroe Power Plant, Monroe, Michigan: Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>. Steven Klafka, Wingra Engineering, Madison Wisconsin. (June 1, 2014).

## Lansing Monitor

The Lansing SO<sub>2</sub> monitoring site is located about 3 km to the northeast of the Eckert Station power plant, as shown in Figure 4. The modeled peak SO<sub>2</sub> concentration is located 1.8 km to the south-southeast of the power plant.<sup>23</sup> The modeled SO<sub>2</sub> concentration at the monitoring site was about 70 percent of the peak modeled concentration, so the monitor appears to be located in an area of elevated SO<sub>2</sub> concentration impacts. Examination of Figure 4, however, shows that the monitor appears to be in a direction associated with somewhat lower concentration impacts, most likely due to lower wind direction frequency. MDEQ should consider relocating the SO<sub>2</sub> monitor to a location about 2-3 km to the southeast or west-southwest of the plant in order to capture the peak concentration impacts from Eckert Station. As stated above, however, because a single monitor cannot suffice to characterize the SO<sub>2</sub> air quality in the surrounding area, MDEQ must continue to use modeling to demonstrate compliance with the 1-hr SO<sub>2</sub> NAAQS.

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<sup>23</sup> Eckert Station, Lansing, Michigan: Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>. Steven Klafka, Wingra Engineering, Madison Wisconsin. (May 30, 2014)



**Figure 4. Eckert Station SO<sub>2</sub> Concentrations Based on Allowable Emissions**

### Marquette Monitor

Although the PWEI calculation does not require a monitor to be placed in Marquette County (21010 population; 67,077), the SO<sub>2</sub> emissions from the Presque Isle power plant may cause a violation of the 1-hour SO<sub>2</sub> NAAQS. Dispersion model results<sup>24</sup> (using maximum emission

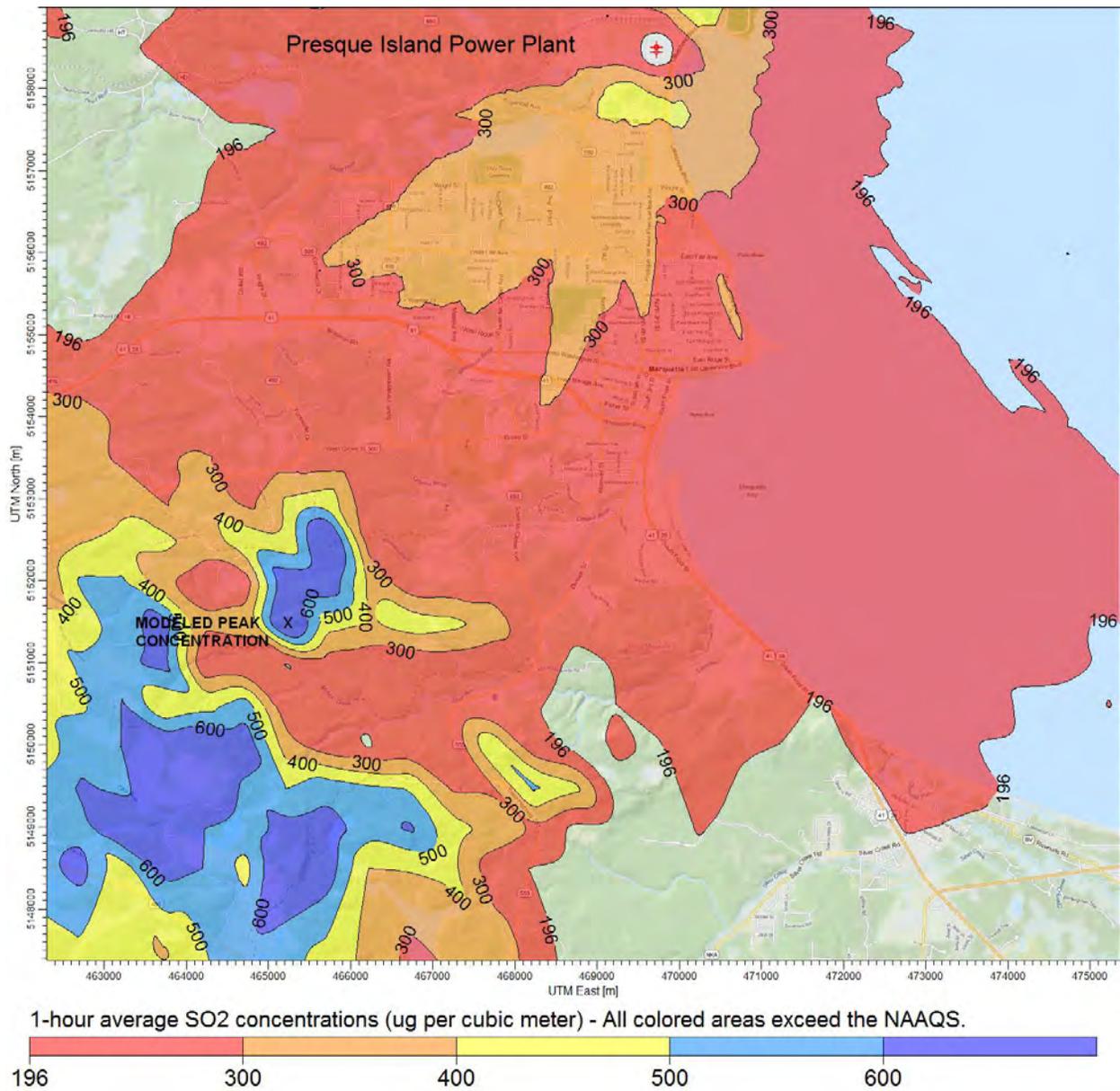
<sup>24</sup> Presque Isle Power Plant, Marquette, Michigan: Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>. Steven Klafka, Wingra Engineering, Madison Wisconsin. (May 30, 2014).

rates) indicate that peak SO<sub>2</sub> concentrations in the area (172 ppb) likely exceed the NAAQS level.

According to the dispersion model,<sup>25</sup> the peak SO<sub>2</sub> concentration impacts from the Presque Isle power plant occur in the hills south of Marquette, about 8 km south-southwest of the power plant, as shown in Figure 5. The predicted peak occurred at an elevation of 364 m (msl), whereas the source is located at an elevation of 186 m (AERMOD tends to predict somewhat higher concentrations at elevated receptors). Areas of high SO<sub>2</sub> concentration were also predicted by the model to occur 3 to 4 km south and southwest of the plant, in southwestern Marquette (north of Highway 41). It is recommended that a monitor be placed in this area of southwestern Marquette (which has typical elevations that are about 50 to 60 m above that of the power plant).

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<sup>25</sup> Id.



**Figure 5. Presque Isle Power Plant SO<sub>2</sub> Concentrations Based on Allowable Emissions**

# **EXHIBIT 3**

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

APR 21 1983

OFFICE OF  
AIR, NOISE, AND RADIATIONMEMORANDUM

SUBJECT: Section 107 Designation Policy Summary

FROM: *Sheldon Meyers*  
Sheldon Meyers, Director  
Office of Air Quality Planning and Standards (ANR-443)TO: Director, Air and Waste Management Division  
Regions II-IV, VI-VIII, XDirector, Air Management Division  
Regions I, V, IX

On February 3, 1983, the Agency published a Federal Register notice regarding the status of all areas designated nonattainment under Part D of the Clean Air Act. This notice indicated that for a significant number of nonattainment areas States are anticipated to be able to demonstrate attainment of the primary national ambient air quality standards. Accordingly, for those areas, States have been encouraged to update their Section 107 designations. In addition, a number of nonattainment areas were identified in the February 3, 1983, notice as "unlikely to attain standards." The Federal Register also stated that the basic existing policy will generally be continued for redesignation. This memorandum summarizes and clarifies existing policy for reviewing designations and provides new guidance on processing these actions.

Policy For Reviewing 107 Designations

1. Data: In general, all available information relative to the attainment status of the area should be reviewed. These data should include the most recent eight (8) consecutive quarters of quality assured, representative ambient air quality data plus evidence of an implemented control strategy that EPA had fully approved. Supplemental information, including air quality modeling emissions data, etc., should be used to determine if the monitoring data accurately characterize the worst case air quality in the area. Also, the following items can be considered in special situations.

An attainment designation can be made using only the most recent four (4) quarters of ambient data if an acceptable state of the art modeling analysis (such as city-specific EKMA for ozone) is provided showing that the basic SIP strategy is sound and that actual, enforceable emission reductions are responsible for the recent air quality improvement.

For nonattainment designations which were originally based solely on modeling, redesignation to attainment is possible even if less than four (4) quarters of ambient data are available provided that a reference modeling analysis considering the sources' legal emission limits shows attainment of the standards. Information must also be presented showing that the sources causing the problem are in compliance with the enforceable SIP measures.

Although the current ozone standard implies the need for three years of data for attainment designations, two years of data with no exceedances is an acceptable surrogate. As discussed previously, this should be accompanied by evidence of an implemented control strategy that EPA had fully approved.

2. Projected Future Violations: Projections of future violations can provide the basis for continuing nonattainment designations. This concept is particularly important because of the current economic downturn. Information submitted to support attainment redesignations must adequately and accurately reflect anticipated operating rates. Areas should remain nonattainment where such projections reveal air quality violations.

3. Modeling: In most SO<sub>2</sub> cases, monitoring data alone will not be sufficient for areas dominated by point sources. A small number of ambient monitors usually is not representative of the air quality for the entire area. Dispersion modeling employing the legally enforceable SO<sub>2</sub> SIP limits will generally be necessary to evaluate comprehensively the sources' impacts as well as to identify the areas of highest concentrations. If either the modeling or monitoring indicates that SO<sub>2</sub> air quality standards are being violated, the area should remain nonattainment.

4. Boundaries: Current policies on appropriate boundaries for designation of nonattainment areas by EPA remain in effect, i.e., generally political boundaries such as city or county for TSP and SO<sub>2</sub>, county as a minimum for rural ozone, entire urbanized area and fringe areas of development for urban ozone, and urban core area for CO. When States redesignate, EPA will continue to accept reasonable boundaries which are supported by appropriate data, such as specific new monitoring and/or modeling data or evidence of improvement due to control strategy implementation. Nonattainment areas for ozone should include the significant VOC sources.

5. Dispersion Techniques: Areas which are projected to attain the TSP or SO<sub>2</sub> standards because of the use of unauthorized dispersion techniques should continue to be designated as nonattainment.

### Policy for Processing 107 Redesignations

1. SIP Review Actions: Section 107 designations have generally been classified as minor actions, with only a few of the more significant ones being processed as moderate. In the future, redesignations of Tier II nonattainment areas should be classified as major actions so that they can receive a comprehensive review to help ensure regional consistency. Redesignation of Tier I nonattainment areas should continue to be handled as minor or moderate actions, as appropriate.

2. "Unclassifiable" Areas: Since EPA and the States have had nearly five years to resolve discrepancies for nonattainment designations, it is now inappropriate to redesignate any area from nonattainment to unclassifiable. There has been ample time since the first designations were made in 1978 to thoroughly study each nonattainment area. Sufficient data should now exist to either make a redesignation to attainment or to keep the nonattainment designation.

If you have any questions, please contact Tom Helms at (FTS) 629-5525.

cc: Regional Administrator, Regions I-X  
Chief, Air Programs Branch, Regions I-X

# **EXHIBIT 4**

**Belle River and St. Clair Power Plants**

**St. Clair, Michigan**

**Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>**

**June 3, 2014**

*Conducted by:*

*Steven Klafka, P.E., BCEE*

*Wingra Engineering, S.C.*

*Madison, Wisconsin*

## 1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO<sub>2</sub>) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Belle River and St. Clair Power Plants located in St. Clair, Michigan.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO<sub>2</sub> NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO<sub>2</sub> NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>1</sup>

## 2. Compliance with the 1-hour SO<sub>2</sub> NAAQS

### 2.1 1-hour SO<sub>2</sub> NAAQS

The 1-hour SO<sub>2</sub> NAAQS takes the form of a three-year average of the 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.<sup>2</sup> Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of µg/m<sup>3</sup>. The 1-hour SO<sub>2</sub> NAAQS of 75 ppb equals 196.2 µg/m<sup>3</sup>, and this is the value used for determining whether modeled impacts exceed the NAAQS.<sup>3</sup> The 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

### 2.2 Modeling Results

Modeling results for Belle River and St. Clair Power Plants are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Belle River and St. Clair Power Plants are estimated to create downwind SO<sub>2</sub> concentrations which

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<sup>1</sup> [http://www.epa.gov/scram001/so2\\_modeling\\_guidance.htm](http://www.epa.gov/scram001/so2_modeling_guidance.htm)

<sup>2</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010.

<sup>3</sup> The ppb to µg/m<sup>3</sup> conversion is found in the source code to AERMOD v. 13350, subroutine Modules. The conversion calculation is  $75/0.3823 = 196.2 \mu\text{g}/\text{m}^3$ .

exceed the 1-hour NAAQS.

For the modeling results presented in Table 1, the evaluated emission rates include the allowable, maximum and actual. “Allowable” is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. “Maximum” is the highest combined emission rate from all units during any single hour as measured during the 2011 to 2013 period as taken from USEPA *Air Markets Program Data*.<sup>4</sup> “Actual” are the measured emissions for each hour during this same period.

Air quality impacts in Michigan are based on a background concentration of 31.4 µg/m<sup>3</sup>. This is the 2010-12 design value for Kent County, Michigan - the lowest measured background concentration in the state. This is the most recently available design value.

**Table 1 - SO<sub>2</sub> Modeling Results for Belle River and St. Clair Power Plants Modeling Analysis**

Emission Rates	Averaging Period	99 <sup>th</sup> Percentile 1-hour Daily Maximum (µg/m <sup>3</sup> )				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable (Belle River)	1-hour	244.2	31.4	275.6	196.2	No
Allowable (St. Clair)	1-hour	518.3	31.4	549.7	196.2	No
Actual (St. Clair)	1-hour	290.1	31.4	321.5	196.2	No
Maximum (Belle River)	1-hour	287.7	31.4	319.1	196.2	No
Allowable (Both Plants)	1-hour	597.5	31.4	628.9	196.2	No
Actual (Both Plants)	1-hour	291.7	31.4	323.1	196.2	No

The currently permitted emissions used for the modeling analysis are summarized in Table 2.

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<sup>4</sup> <http://ampd.epa.gov/ampd/>

**Table 2 - Modeled SO<sub>2</sub> Emissions from Belle River and St. Clair Power Plants** <sup>5</sup>

Stack ID	Unit ID	Allowable Emissions (lbs/hr)
B01	Unit 1 (Belle River)	8,176.8
B02	Unit 2 (Belle River)	8,176.8
S01	Unit 1 (St. Clair)	2,355.0
S02	Unit 2 (St. Clair)	2,355.0
S03	Unit 3 (St. Clair)	2,354.7
S04	Unit 4 (St. Clair)	2,354.7
S06	Unit 6 (St. Clair)	5,187.0
S07	Unit 7 (St. Clair)	7,840.7
Facility Total	All Units	38,800.7

Based on the modeling results, emission reductions from current allowable rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3. Reductions from current allowable emissions are calculated first using the emissions and impacts of each plant alone, and secondly considering the combined emissions and impacts of both plants. The combined impact requires that each plant reduce its current allowable emissions by 72%.

**Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO<sub>2</sub>**

Facility	Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (µg/m <sup>3</sup> )	Required Facility Reduction Based on Allowable Emissions (%)	Required Total Emission Rate 1-hour Average (lbs/hr)	Required Total Emission Rate 1-hour Average (lbs/mmbtu)
Belle River Alone	164.8	33%	11,037.0	0.81
St. Clair Alone	164.8	68%	7,138.2	0.53
Combined	164.8	72%	10,702.7	0.40

Figure 1 shows the extent of NAAQS violations based on allowable emissions from the Belle River Power Plant.

Figure 2 shows the extent of NAAQS violations based on allowable emissions from the St. Clair Power Plant.

<sup>5</sup> Michigan Department of Environmental Quality, Renewal Operating Permit MI-ROP-B2796-2009, June 1, 2009. The emission limit for each boiler at the Belle River Power Plant is 1.2 lbs/mmbtu heat input (3-hour average) and for each boiler at the St. Clair Power Plant is 1.67 lbs/mmbtu (monthly average).

Figure 3 shows the extent of NAAQS violations based on allowable emissions from both plants.

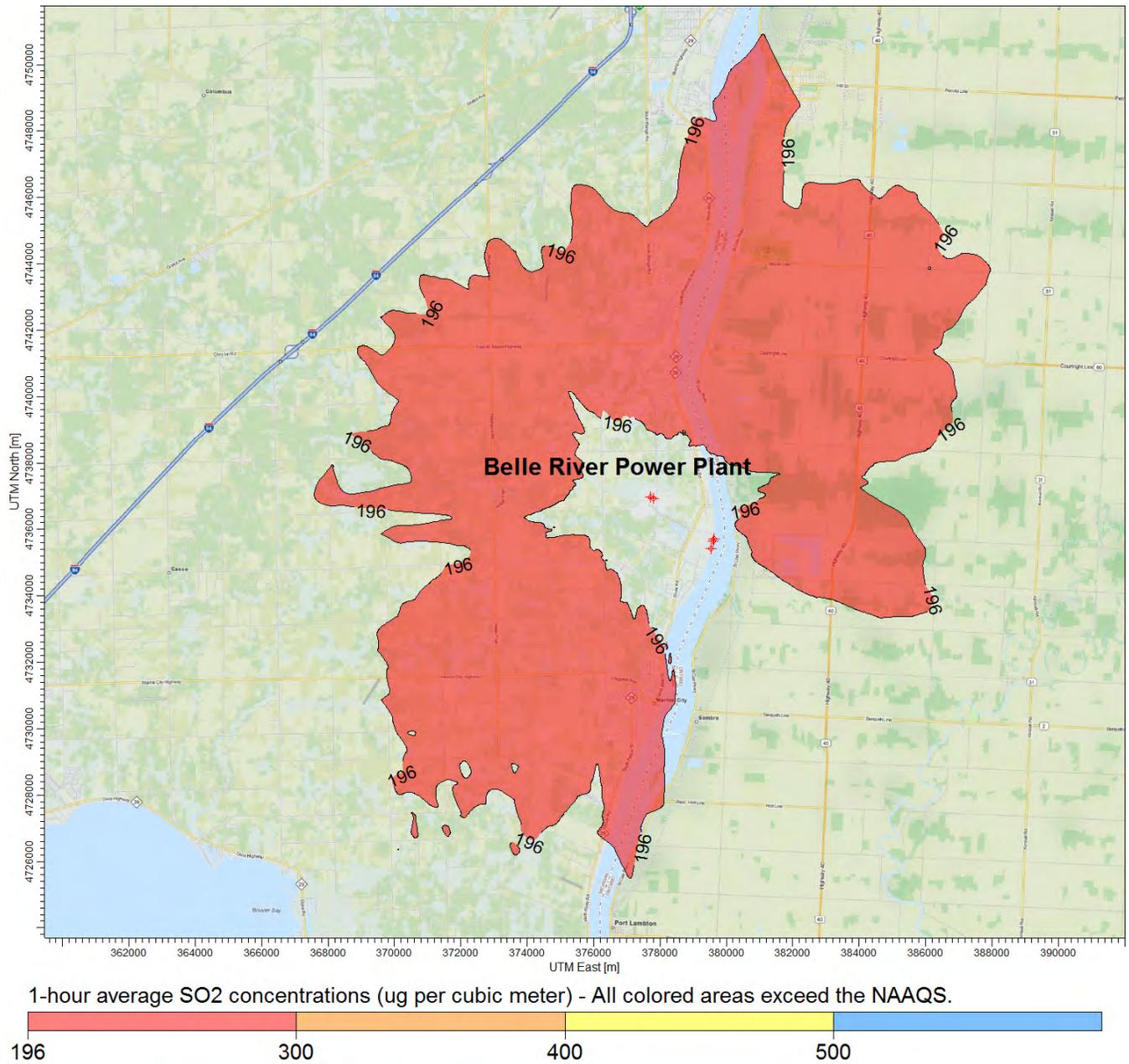
Figure 4 shows the extent of NAAQS violations based on actual hourly emissions from both plants.

### **2.3 Conservative Modeling Assumptions**

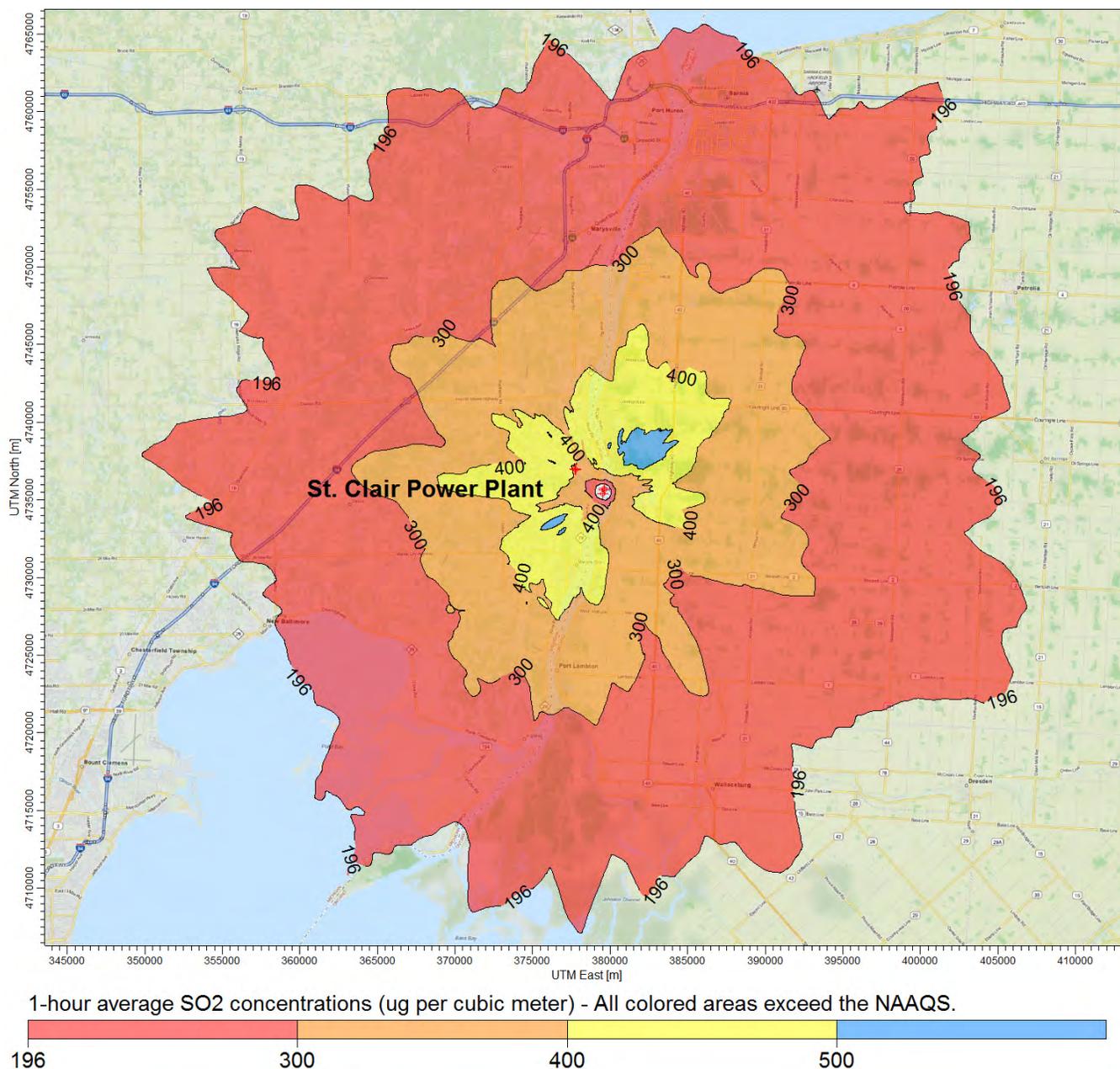
A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

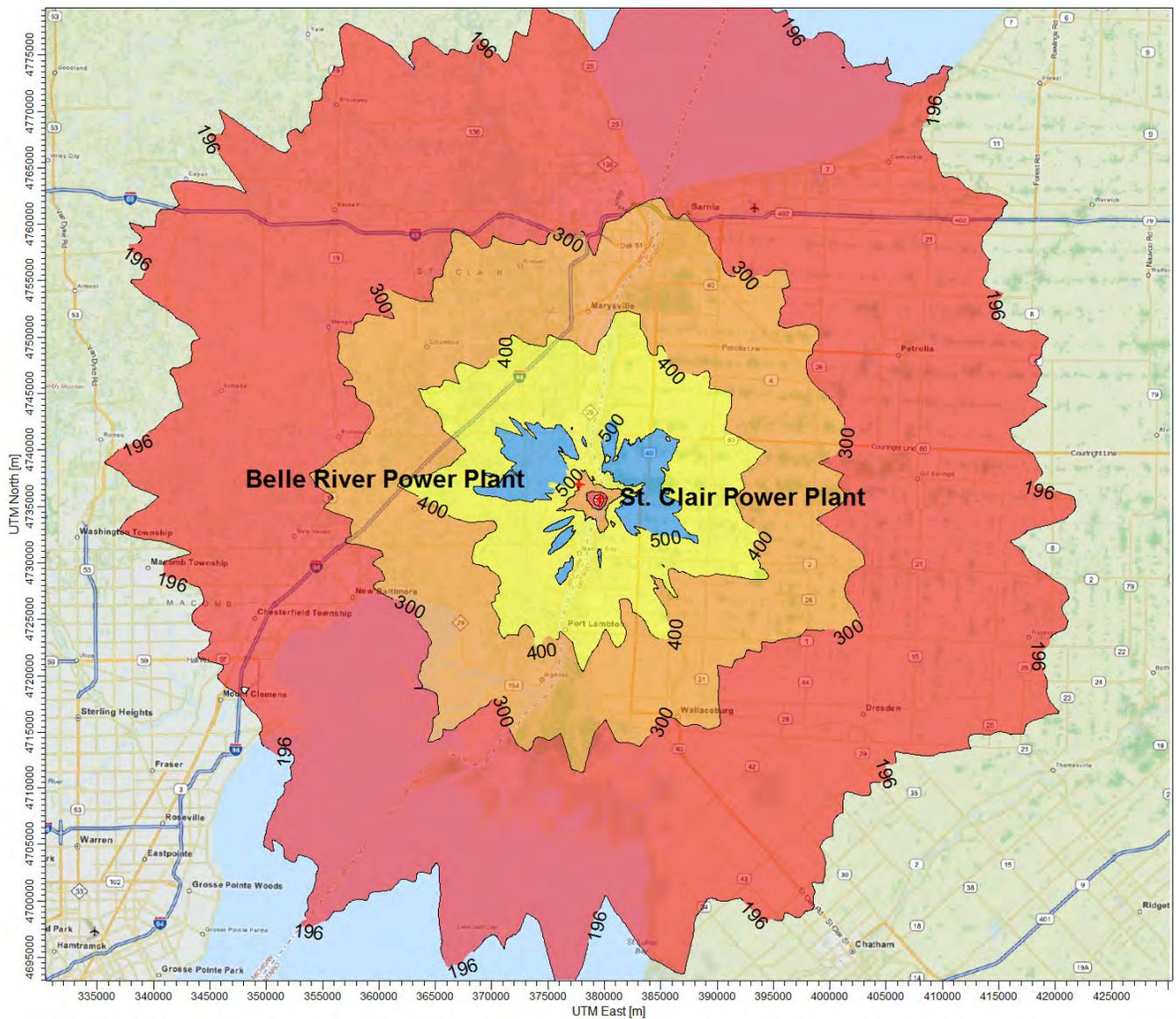
- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO<sub>2</sub> air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No evaluation has been conducted to determine if the stack height exceeds Good Engineering Practice or GEP height. If the stack height exceeds GEP, the predicted concentrations will increase.
- No consideration of off-site sources. These other sources of SO<sub>2</sub> will increase the predicted impacts.



**Figure 1 - Belle River Power Plant SO<sub>2</sub> Concentrations Based on Allowable Emissions**



**Figure 2 - St. Clair Power Plant SO<sub>2</sub> Concentrations Based on Allowable Emissions**



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

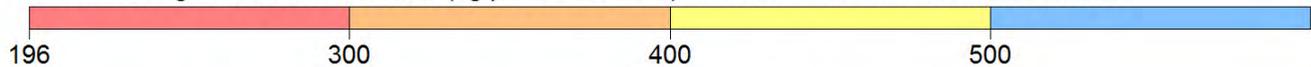
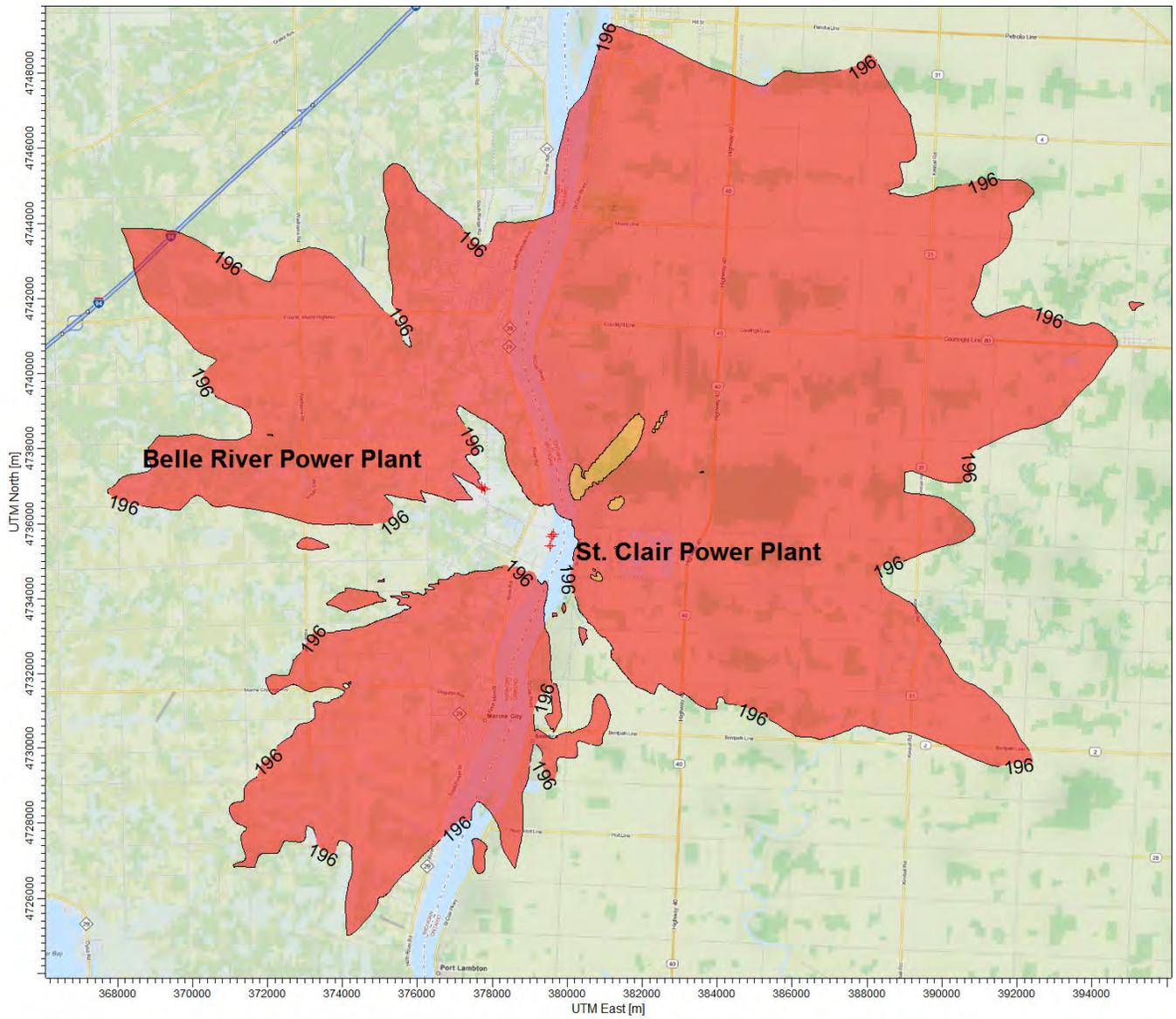


Figure 3 – Belle River and St. Clair Power Plants Combined SO<sub>2</sub> Concentrations Based on Allowable Emissions



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

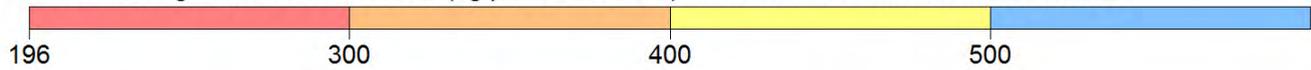


Figure 4 - Belle River and St. Clair Power Plants Combined SO<sub>2</sub> Concentrations Based on Actual Emissions

### **3. Modeling Methodology**

#### **3.1 Air Dispersion Model**

The modeling analysis used USEPA's AERMOD program, v. 13350. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

#### **3.2 Control Options**

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.<sup>6</sup> For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

#### **3.3 Output Options**

The AERMOD analysis was based on three years of recent meteorological data. The modeling analyses used one run with three years of sequential meteorological data from 2011-2013. Consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO<sub>2</sub> impacts concentrations consistent with the form of the 1-hour SO<sub>2</sub> NAAQS.<sup>7</sup>

Please refer to Table 1 for the modeling results.

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<sup>6</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.

<sup>7</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

## **4. Model Inputs**

### **4.1 Geographical Inputs**

The “ground floor” of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.<sup>8</sup>

USEPA’s AERSURFACE v. 13016 was used to develop the meteorological data for the modeling analysis. This model can also be used to evaluate surrounding land use within 3 kilometers. The evaluated power plants are located on the Canadian border with the U.S. The 1992 National Land Cover Data or NLCD data required by AERSURFACE does not extend into Canada. For this reason, AERSURFACE was not used to evaluate surrounding land use. Instead, based on a review of aerial photographs, it was clear the land use surrounding both power plants is rural. It was concluded that the rural option would be used for the modeling summarized in this report.

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<sup>8</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

## 4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO<sub>2</sub> emissions from the facility. Off-site sources were not considered. Table 1 presented the concentrations which were predicted based on the following emission scenarios:

- 1) approved or allowable emissions based on permits issued by the regulatory agency,
- 2) Maximum emissions which are the highest combined emission rate from all units during any single hour as measured during the 2011 to 2013 period as taken from USEPA *Air Markets Program Data*, and<sup>9</sup>
- 3) Actual emissions which are the measured emissions for each hour during this same period.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

**Table 4 – Facility Stack Parameters and Emissions**<sup>10</sup>

Stack	B01	B02	S01	S02	S03	S04	S06	S07
Description	Belle River Unit 1	Belle River Unit 2	St. Clair Unit 1	St. Clair Unit 2	St. Clair Unit 3	St. Clair Unit 4	St. Clair Unit 6	St. Clair Unit 7
X Coord. [m]	377804	377713	379538	379538	379538	379538	379597	379629
Y Coord. [m]	4736933	4736972	4735415	4735415	4735415	4735415	4735659	4735718
Base Elevation [m]	179.91	179.81	177.63	177.63	177.63	177.63	177.4	177.35
Release Height [m]	200.04	200.04	182.58	182.58	182.58	182.58	129.54	182.88
Gas Exit Temperature [°K]	416.48	416.48	422.04	424.82	422.04	424.82	422.04	408.15
Gas Exit Velocity [m/s]	27.432	27.432	27.889	32.034	30.267	27.706	49.225	40.234
Inside Diameter [m]	7.772	7.772	4.06	4.06	4.06	4.06	4.054	4.877
Allowable Emission Rate [g/s]	1,030	1,030	296.7	296.7	296.7	296.7	653.6	987.9
Maximum Emission Rate [g/s]	1,945.2	477.5	-	-	-	-	-	-
Actual Emission Rate [g/s]	-	-	-	-	-	-	-	-

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and temperatures. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and

<sup>9</sup> <http://ampd.epa.gov/ampd/>

<sup>10</sup> Stack parameters were obtained from an AERMOD input file from a previous modeling analysis provided by the Michigan Department of Environmental Quality, SCPP BRPP 1Hr SO<sub>2</sub> SIA Run 50km 05\_09 Aux DG 15PPM\_5yrs\_SO2.DTA, April 24, 2012.

increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

### **4.3 Building Dimensions and GEP**

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash and this may under-predict impacts.

### **4.4 Receptors**

For Belle River and St. Clair Power Plants, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Belle River and St. Clair Power Plants and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Belle River and St. Clair Power Plants and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Belle River and St. Clair Power Plants and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.<sup>11</sup>

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

### **4.5 Meteorological Data**

To improve the accuracy of the modeling analysis, recent meteorological data for the 2011-2013 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were not available so USEPA methods were not used to reduce calm and missing hours.<sup>12</sup> The

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<sup>11</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

<sup>12</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

USEPA software program AERMINUTE v. 11325 is typically used for these tasks.

For this modeling project, pre-processed meteorological data were provided by the Michigan Department of Environmental Quality.<sup>13, 14</sup> Data for the 2011 to 2012 period were downloaded from the DEQ web site and data for the 2013 period were provided directly by DEQ. The agency prepared its meteorological data using the procedures described in this report.

This section discusses how the meteorological data was prepared for use in the 1-hour SO<sub>2</sub> NAAQS modeling analyses. The USEPA software program AERMET v. 12245 is used for these tasks.

#### **4.5.1 Surface Meteorology**

Surface meteorology was obtained for St. Clair International Airport located near the Belle River and St. Clair Power Plants. Integrated Surface Hourly (ISH) data for the 2011-2013 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

#### **4.5.2 Upper Air Data**

Upper-air data are collected by a “weather balloon” that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawinsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Belle River and St. Clair Power Plants, the concurrent 2011-2013 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the White Lake, Michigan measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA’s FSL website.<sup>15</sup> All reporting levels were downloaded and processed with AERMET.

#### **4.5.3 AERSURFACE**

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for

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<sup>13</sup> Michigan Department of Environmental Quality, Map of Available Meteorological Stations, [http://www.michigan.gov/documents/deq/deq-aqd-mm-met\\_support\\_256121\\_7.pdf](http://www.michigan.gov/documents/deq/deq-aqd-mm-met_support_256121_7.pdf)

<sup>14</sup> Email from J. Haywood – MDEQ to S. Klafka – Wingra Engineering, S.C., Modeling Procedures for Trenton Channel Power Plant, February 24, 2014. This email includes a recommendation to use AERMET v. 12345 rather than v. 13350.

<sup>15</sup> Available at: <http://esrl.noaa.gov/raobs/>

an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey's 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors.

#### **4.5.4 Data Review**

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.<sup>16</sup> The AERMOD output file shows there were 0.95% missing data.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the St. Clair International Airport is located close to Belle River and St. Clair Power Plants, this meteorological data set was considered appropriate for this modeling analysis.<sup>17</sup> This weather station provided high quality surface measurements for the most recent 5-year time, and had similar land use, surface characteristics, terrain features and climate. Finally, DEQ provided pre-processed meteorological data for this project so had concluded the weather stations were representative of the project location.

## **5. Background SO<sub>2</sub> Concentrations**

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>18</sup> To preserve the form of the 1-hour SO<sub>2</sub> standard, based on the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration was added to the modeled fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration.<sup>19</sup>

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<sup>16</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.

<sup>17</sup> USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.

<sup>18</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.

<sup>19</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010, p. 3.

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in Michigan.<sup>20</sup>

## **6. Reporting**

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

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<sup>20</sup> <http://www.epa.gov/airtrends/values.html>

# **EXHIBIT 5**

**Eckert Station**  
**Lansing, Michigan**  
**Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>**  
**May 30, 2014**

*Conducted by:*  
*Steven Klafka, P.E., BCEE*  
*Wingra Engineering, S.C.*  
*Madison, Wisconsin*

## 1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO<sub>2</sub>) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Eckert Station located in Lansing, Michigan.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO<sub>2</sub> NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO<sub>2</sub> NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>1</sup>

## 2. Compliance with the 1-hour SO<sub>2</sub> NAAQS

### 2.1 1-hour SO<sub>2</sub> NAAQS

The 1-hour SO<sub>2</sub> NAAQS takes the form of a three-year average of the 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.<sup>2</sup> Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of µg/m<sup>3</sup>. The 1-hour SO<sub>2</sub> NAAQS of 75 ppb equals 196.2 µg/m<sup>3</sup>, and this is the value used for determining whether modeled impacts exceed the NAAQS.<sup>3</sup> The 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

### 2.2 Modeling Results

Modeling results for Eckert Station are summarized in Table 1. It was determined that based on currently permitted emissions, the Eckert Station is estimated to create downwind SO<sub>2</sub> concentrations which exceed the 1-hour NAAQS.

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<sup>1</sup> [http://www.epa.gov/scram001/so2\\_modeling\\_guidance.htm](http://www.epa.gov/scram001/so2_modeling_guidance.htm)

<sup>2</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010.

<sup>3</sup> The ppb to µg/m<sup>3</sup> conversion is found in the source code to AERMOD v. 13350, subroutine Modules. The conversion calculation is  $75/0.3823 = 196.2 \mu\text{g}/\text{m}^3$ .

For the modeling results presented in Table 1, the allowable emission rates were evaluated. “Allowable” is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. There are six boilers at Eckert Station. Two scenarios were evaluated. The first assumed all Units 1 to 6 in operation and the second with only Units 4 to 6 in operation.

Air quality impacts in Michigan are based on a background concentration of 31.4 µg/m<sup>3</sup>. This is the 2010-12 design value for Kent County, Michigan - the lowest measured background concentration in the state. This is the most recently available design value.

**Table 1 - SO<sub>2</sub> Modeling Results for Eckert Station Modeling Analysis**

Emission Rates	Averaging Period	99 <sup>th</sup> Percentile 1-hour Daily Maximum (µg/m <sup>3</sup> )				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable (Units 1 - 6)	1-hour	306.1	31.4	337.5	196.2	No
Allowable (Units 4 - 6)	1-hour	174.0	31.4	205.4	196.2	No

The currently permitted emissions used for the modeling analysis are summarized in Table 2.

**Table 2 - Modeled SO<sub>2</sub> Emissions from Eckert Station <sup>4</sup>**

Stack ID	Unit ID	Heat Input (mmbtu/hr)	Allowable Emissions 24-hour Average (lbs/mmbtu)	Allowable Emissions 24-hour Average (lbs/hr)
S01	Unit 1	509.0	1.67	850.0
S02	Unit 2	522.0	1.67	871.7
S03	Unit 3	522.0	1.67	871.7
S04	Unit 4	807.0	1.67	1,347.7
S05	Unit 5	807.0	1.67	1,347.7
S06	Unit 6	807.0	1.67	1,347.7
Total	All	3,974.0	-	6,636.6

Based on the modeling results, emission reductions from currently permitted rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

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<sup>4</sup> Michigan Department of Environmental Quality, Renewal Operating Permit MI-ROP-B2647-2012, May 17, 2012. The emission limit for each boiler is 1.67 lbs/mmbtu heat input.

**Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO<sub>2</sub>**

Operating Units	Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (µg/m <sup>3</sup> )	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
Units 1 – 6	164.8	46%	3,573.3	0.90

Predicted exceedences of the 1-hour NAAQS for SO<sub>2</sub> based on allowable emissions extend throughout the region to a maximum distance of 10 kilometers.

Figure 1 shows the full extent of NAAQS violations based on allowable emissions from Units 1 to 6.

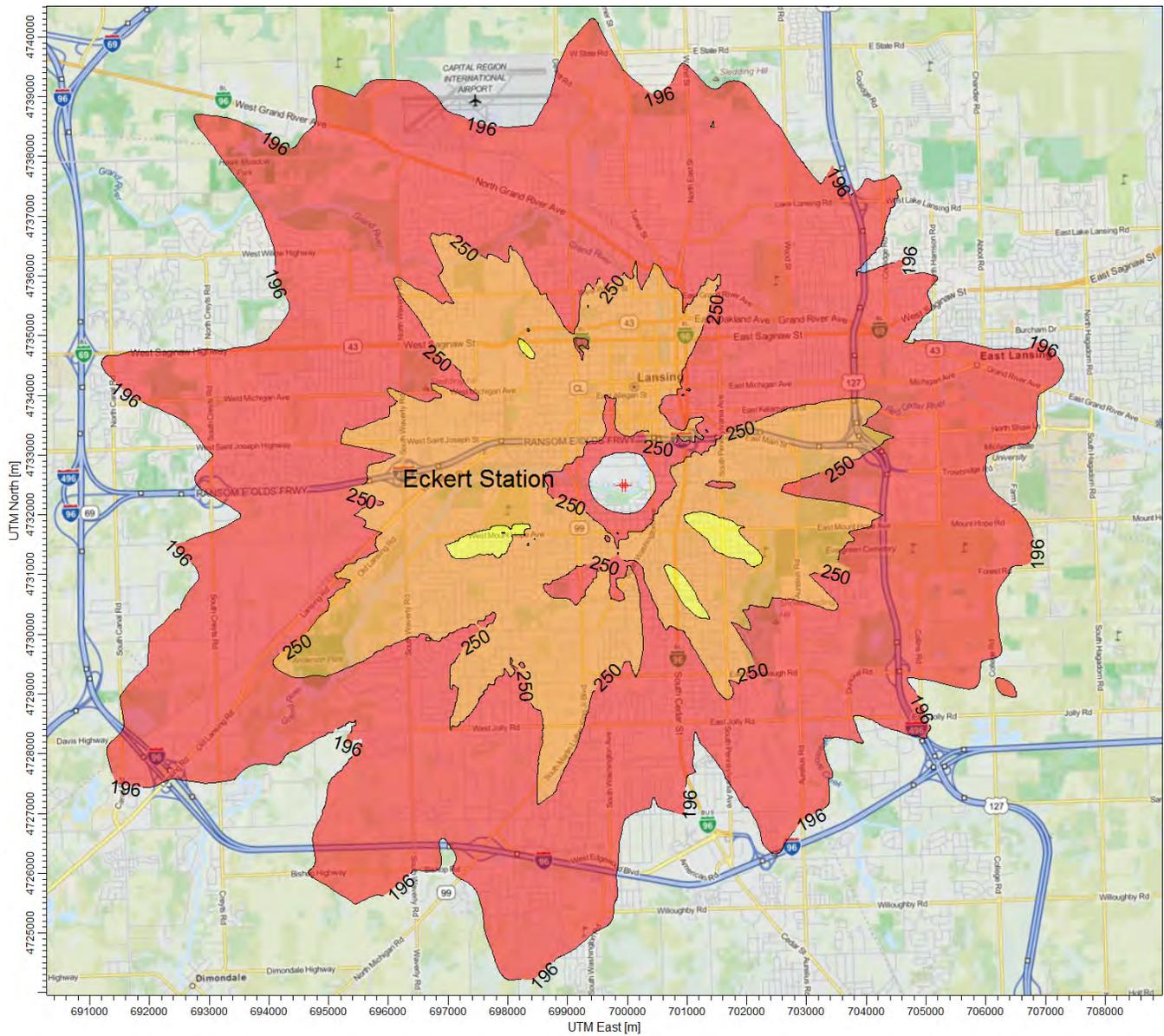
Figure 2 provides a close up local view of NAAQS violations based on allowable emissions from Units 1 to 6.

### 2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

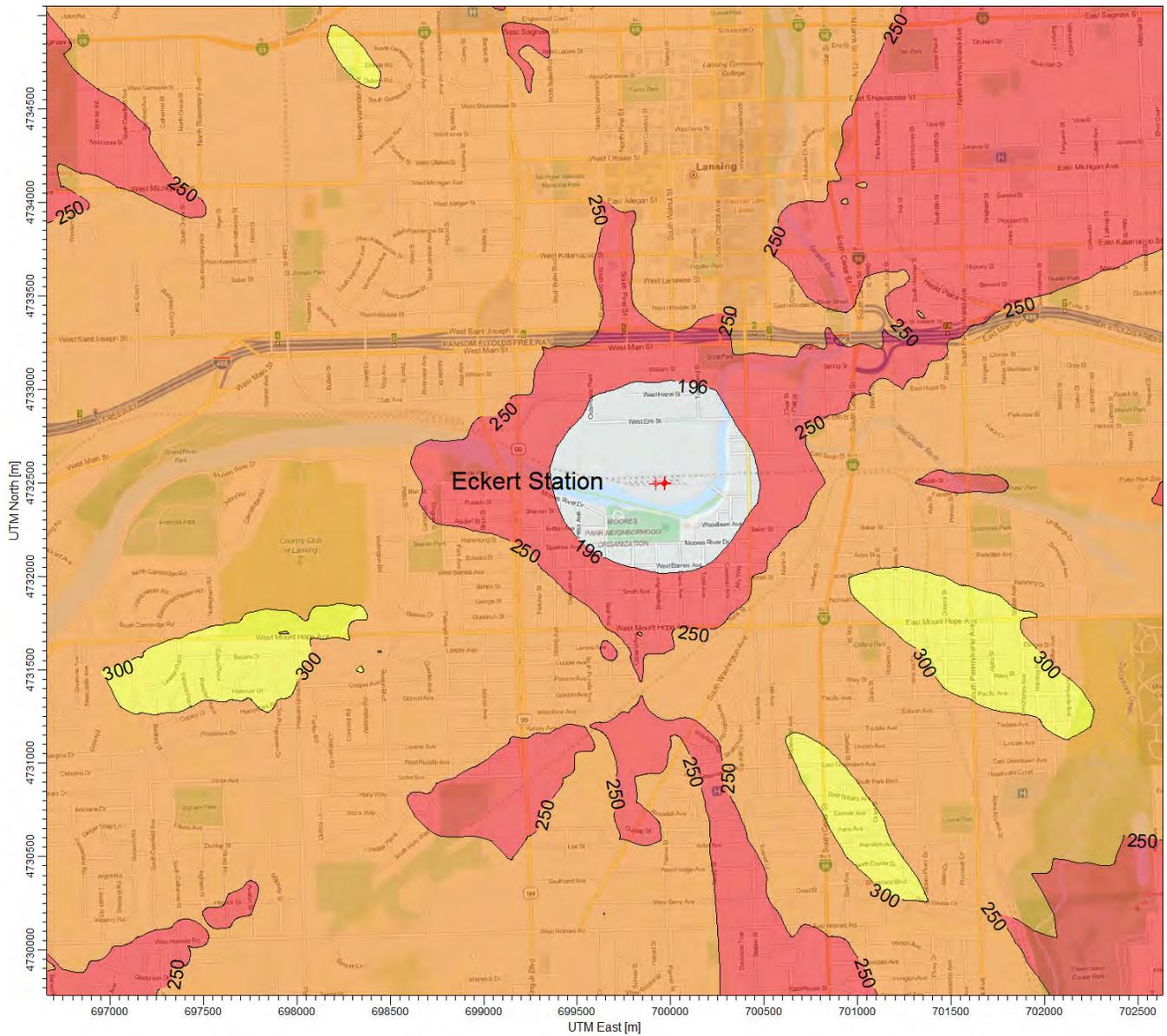
- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO<sub>2</sub> air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No evaluation has been conducted to determine if the stack height exceeds Good Engineering Practice or GEP height. If the stack height exceeds GEP, the predicted concentrations will increase.
- No consideration of off-site sources. These other sources of SO<sub>2</sub> will increase the predicted impacts.



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.



Figure 1 - Eckert Station SO<sub>2</sub> Concentrations Based on Allowable Emissions from Units 1 to 6 (Regional View)



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.



Figure 2 - Eckert Station SO<sub>2</sub> Concentrations Based on Allowable Emissions from Units 1 to 6 (Local View)

### **3. Modeling Methodology**

#### **3.1 Air Dispersion Model**

The modeling analysis used USEPA's AERMOD program, v. 13350. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

#### **3.2 Control Options**

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.<sup>5</sup> For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

#### **3.3 Output Options**

The AERMOD analysis was based on three years of recent meteorological data. The modeling analyses used one run with three years of sequential meteorological data from 2010-2012. Consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations, AERMOD provided a table of fourth-highest 1-hour SO<sub>2</sub> impacts concentrations consistent with the form of the 1-hour SO<sub>2</sub> NAAQS.<sup>6</sup>

Please refer to Table 1 for the modeling results.

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<sup>5</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.

<sup>6</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

## **4. Model Inputs**

### **4.1 Geographical Inputs**

The “ground floor” of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.<sup>7</sup>

USEPA’s AERSURFACE v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 80.6% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation.

This is greater than the 50% value considered appropriate for the use of urban dispersion coefficients. However, based on discussions with Michigan DEQ modeling staff, it was concluded the use of rural dispersion coefficients was preferred for Eckert Station.<sup>8</sup> Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

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<sup>7</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

<sup>8</sup> Email, J. Haywood – Michigan Department of Environmental Quality to S. Klafka – Wingra Engineering, Request for Modeling Guidance and Meteorology for Michigan Plants, May 10, 2014.

## 4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO<sub>2</sub> emissions from the facility. Off-site sources were not considered. Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

**Table 4 – Facility Stack Parameters and Emissions**<sup>9</sup>

Stack	S01	S02	S03	S04	S05	S06
Description	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
X Coord. [m]	699918.17	699920.96	699918.43	699966.12	699969.91	699967.23
Y Coord. [m]	4732496.2	4732494.82	4732493.19	4732499.12	4732498.23	4732495.78
Base Elevation [m]	254.02	254	253.97	254	253.97	253.94
Release Height [m]	188.67	188.67	188.67	188.67	188.67	188.67
Gas Exit Temperature [°K]	416.483	416.483	416.483	416.483	416.483	416.483
Gas Exit Velocity [m/s]	35.934	35.934	35.934	32.34	32.34	32.34
Inside Diameter [m]	1.829	1.829	1.829	2.438	2.438	2.438
Allowable Emission Rate [g/s]	107.1	109.8	109.8	169.8	169.8	169.8

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and temperatures. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

<sup>9</sup> Stack parameters taken from USEIA, 2012 Form EIA-860 Data - Schedule 6, 'Stack & Flue Data', <http://www.eia.gov/electricity/data/eia860/>

### **4.3 Building Dimensions and GEP**

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash and this may under-predict impacts.

### **4.4 Receptors**

For Eckert Station, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Eckert Station and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Eckert Station and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Eckert Station and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.<sup>10</sup>

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

### **4.5 Meteorological Data**

To improve the accuracy of the modeling analysis, recent meteorological data for the 2011-2013 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.<sup>11</sup> The USEPA software program AERMINUTE v. 11325 is used for these tasks.

This section discusses how the meteorological data was prepared for use in the 1-hour SO<sub>2</sub> NAAQS

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<sup>10</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

<sup>11</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

modeling analyses. The USEPA software program AERMET v. 12345 is used for these tasks.

#### **4.5.1 Surface Meteorology**

Surface meteorology was obtained for Lansing - Capitol City Airport located near the Eckert Station. Integrated Surface Hourly (ISH) data for the 2011-2013 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

#### **4.5.2 Upper Air Data**

Upper-air data are collected by a “weather balloon” that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawinsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Eckert Station, the concurrent 2011-2013 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the White Lake, Michigan measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA’s FSL website.<sup>12</sup> All reporting levels were downloaded and processed with AERMET.

#### **4.5.3 AERSURFACE**

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey’s 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with no

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<sup>12</sup> Available at: <http://esrl.noaa.gov/raobs/>

months with continuous snow cover.

#### **4.5.4 Data Review**

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.<sup>13</sup> The AERMOD output file shows there were 2.1% missing data.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the Lansing - Capitol City Airport is located close to Eckert Station, this meteorological data set was considered appropriate for this modeling analysis.<sup>14</sup> This weather station provided high quality surface measurements for the most recent 5-year time, and had similar land use, surface characteristics, terrain features and climate.

Finally, Michigan DEQ staff were contacted to discuss modeling procedures for this project and determine the meteorological data collection station. They recommended the use of data from the surface and upper air weather stations used for this modeling analysis, and provided pre-processed weather data suitable for AERMOD for the 2011 to 2013 period.<sup>15</sup> Due to concerns about the most recent version of AERMET, v. 13350, all years of weather data were processed using the previous version, v. 12345.

## **5. Background SO<sub>2</sub> Concentrations**

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>16</sup> To preserve the form of the 1-hour SO<sub>2</sub> standard, based on the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration was added to the modeled fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration.<sup>17</sup>

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in Michigan.<sup>18</sup>

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<sup>13</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.

<sup>14</sup> USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.

<sup>15</sup> Email, J. Haywood – Michigan Department of Environmental Quality to S. Klafka – Wingra Engineering, Request for Modeling Guidance and Meteorology for Michigan Plants, May 10, 2014.

<sup>16</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.

<sup>17</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010, p. 3.

<sup>18</sup> <http://www.epa.gov/airtrends/values.html>

## **6. Reporting**

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

# **EXHIBIT 6**

**J.H. Campbell Plant**  
**West Olive, Michigan**  
**Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>**  
**June 1, 2014**

*Conducted by:*

*Steven Klafka, P.E., BCEE*

*Wingra Engineering, S.C.*

*Madison, Wisconsin*

## 1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO<sub>2</sub>) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the J.H. Campbell Plant located in West Olive, Michigan.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO<sub>2</sub> NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO<sub>2</sub> NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>1</sup>

## 2. Compliance with the 1-hour SO<sub>2</sub> NAAQS

### 2.1 1-hour SO<sub>2</sub> NAAQS

The 1-hour SO<sub>2</sub> NAAQS takes the form of a three-year average of the 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.<sup>2</sup> Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of µg/m<sup>3</sup>. The 1-hour SO<sub>2</sub> NAAQS of 75 ppb equals 196.2 µg/m<sup>3</sup>, and this is the value used for determining whether modeled impacts exceed the NAAQS.<sup>3</sup> The 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

### 2.2 Modeling Results

Modeling results for J.H. Campbell Plant are summarized in Table 1. It was determined that based on either currently permitted or maximum hourly emissions, the J.H. Campbell Plant is estimated to create downwind SO<sub>2</sub> concentrations which exceed the 1-hour NAAQS. Table 1 presents the

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<sup>1</sup> [http://www.epa.gov/scram001/so2\\_modeling\\_guidance.htm](http://www.epa.gov/scram001/so2_modeling_guidance.htm)

<sup>2</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010.

<sup>3</sup> The ppb to µg/m<sup>3</sup> conversion is found in the source code to AERMOD v. 13350, subroutine Modules. The conversion calculation is  $75/0.3823 = 196.2$  µg/m<sup>3</sup>.

modeling results based on the allowable and maximum emission rates. “Allowable” is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. “Maximum” is the highest combined emission rate from all units during any single hour as measured during the 2011 to 2013 period as taken from USEPA *Air Markets Program Data*.<sup>4</sup>

Air quality impacts in Michigan are based on a background concentration of 31.4 µg/m<sup>3</sup>. This is the 2010-12 design value for Kent County, Michigan - the lowest measured background concentration in the state. This is the most recently available design value.

**Table 1 - SO<sub>2</sub> Modeling Results for J.H. Campbell Plant Modeling Analysis**

Emission Rates	Averaging Period	99 <sup>th</sup> Percentile 1-hour Daily Maximum (µg/m <sup>3</sup> )				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	290.7	31.4	322.1	196.2	No
Maximum	1-hour	184.0	31.4	215.4	196.2	No

The currently permitted emissions and measured maximum emissions used for the modeling analysis are summarized in Table 2.

**Table 2 - Modeled SO<sub>2</sub> Emissions from J.H. Campbell Plant**<sup>5,6</sup>

Stack ID	Unit ID	Heat Input (mmbtu/hr)	Allowable Emissions (lbs/mmbtu)	Allowable Emissions (lbs/hr)	Maximum Emissions (lbs/hr)
S01	Boiler 1	2,490	1.67	4,158.3	-
	Boiler 2	3,560	1.67	5,945.2	-
S01	Total	-	-	10,103.5	5,634.6
S03	Boiler 3	8,240	1.2	9,888.0	7,546.0
Total	All	14,290	-	19,991.5	13,180.6

Based on the modeling results, emission reductions from current rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

<sup>4</sup> <http://ampd.epa.gov/ampd/>

<sup>5</sup> Michigan Department of Environmental Quality, Renewal Operating Permit MI-ROP-B2835-2013, September 18, 2013. The 3-hour average emission limit for Units 1 and 2 is 1.67 lbs/mmbtu and for Unit 3 is 1.2 lbs/mmbtu heat input.

<sup>6</sup> Maximum emissions are based on the measured hourly rates reported for the 2011 to 2013 period in USEPA *Air Markets Program Data*. The maximum emissions occurred during Hour 13 on August 9, 2011.

**Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO<sub>2</sub>**

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max ( $\mu\text{g}/\text{m}^3$ )	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
164.8	43%	11,333.3	0.79

Predicted exceedences of the 1-hour NAAQS for SO<sub>2</sub> based on allowable emissions extend throughout the region to a maximum distance of 20 kilometers.

Figure 1 shows the full extent of NAAQS violations based on allowable emissions.

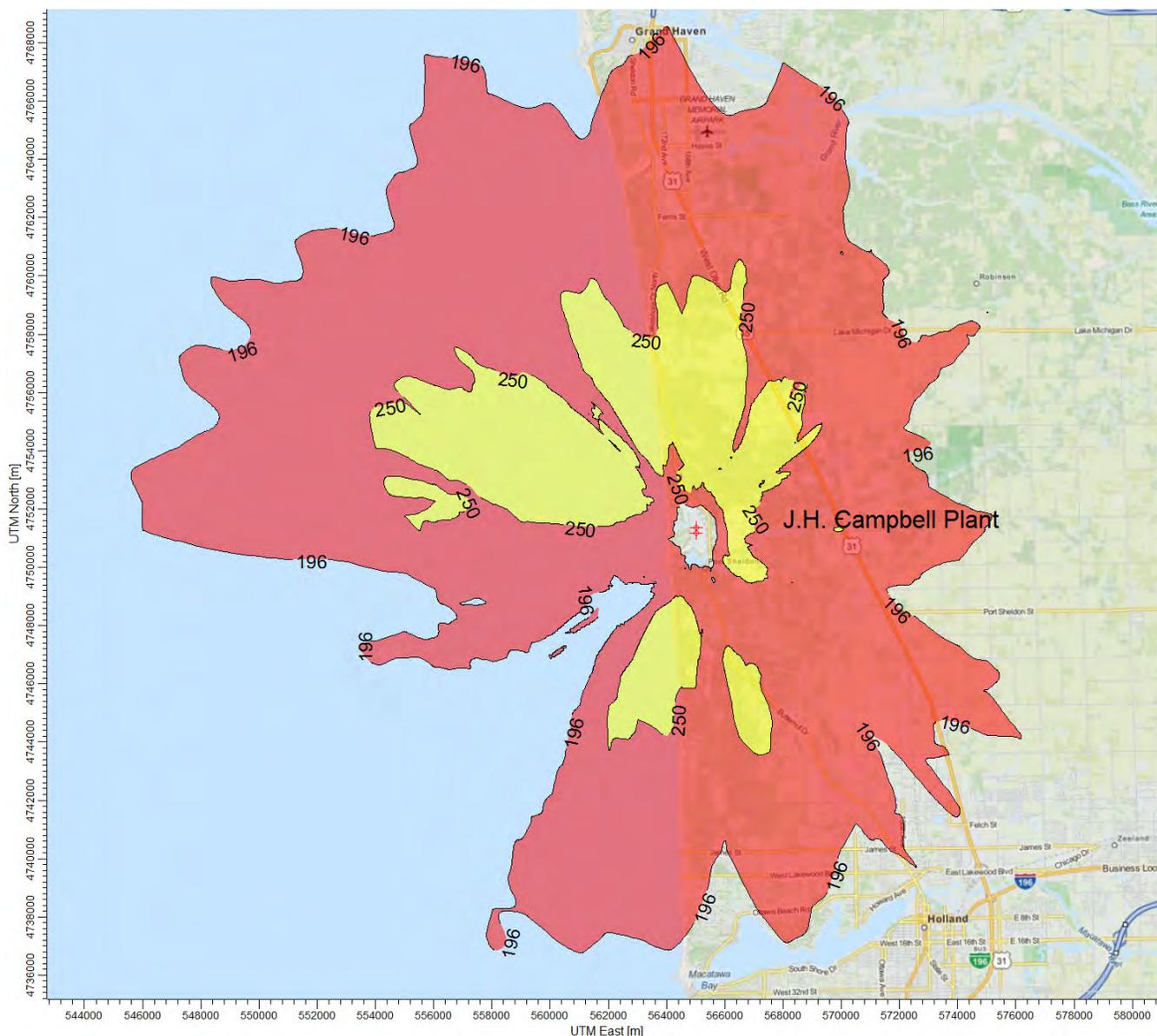
Figure 2 provides a close up local view of NAAQS violations based on allowable emissions.

### **2.3 Conservative Modeling Assumptions**

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO<sub>2</sub> air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No evaluation has been conducted to determine if the stack height exceeds Good Engineering Practice or GEP height. If the stack height exceeds GEP, the predicted concentrations will increase.
- No consideration of off-site sources. These other sources of SO<sub>2</sub> will increase the predicted impacts.



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.



Figure 1 – Regional View of SO<sub>2</sub> Concentrations Based on Allowable Emissions from J. H. Campbell Plant

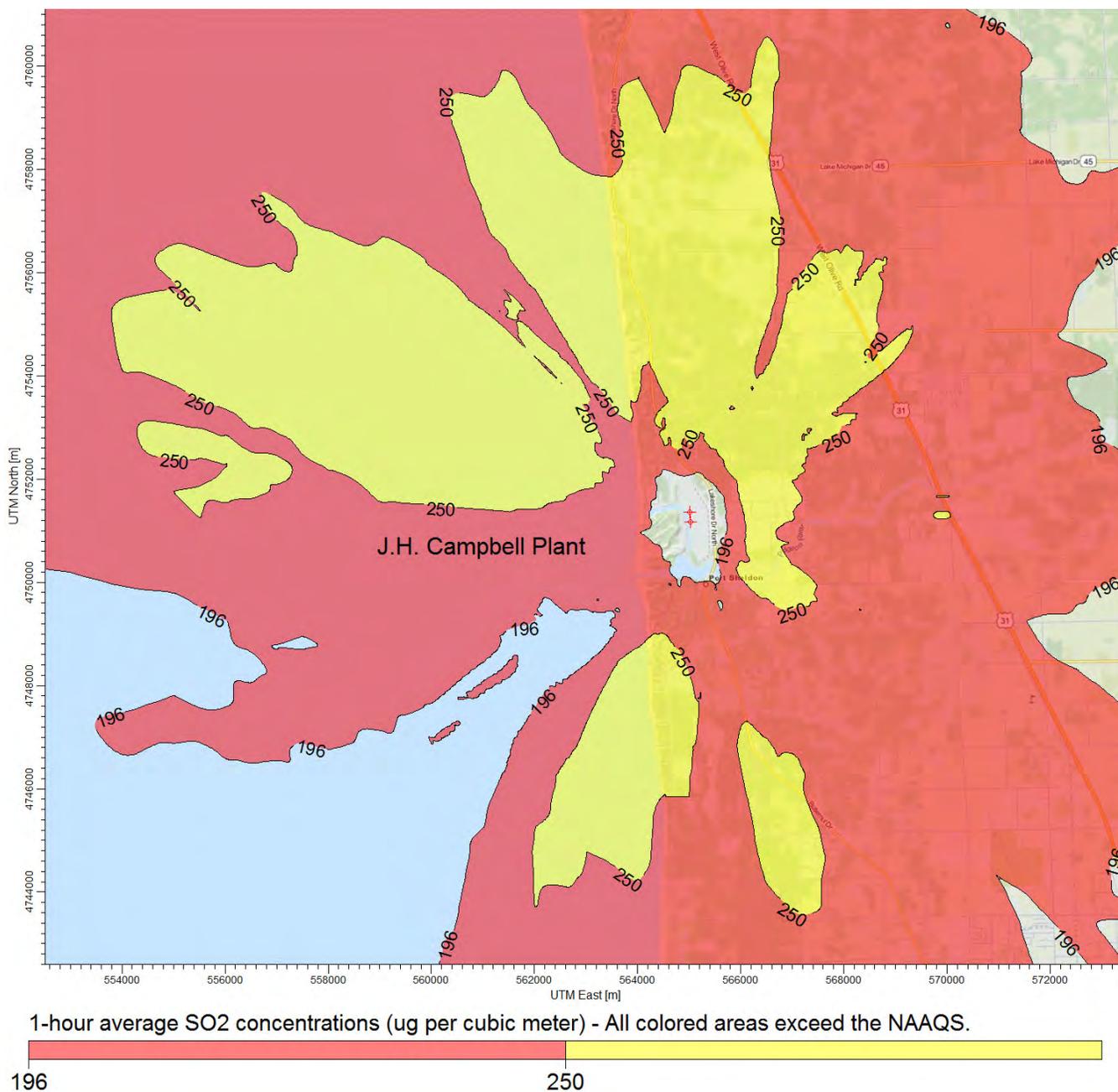


Figure 2 - Local View of SO<sub>2</sub> Concentrations Based on Allowable Emissions from J. H. Campbell Plant

### **3. Modeling Methodology**

#### **3.1 Air Dispersion Model**

The modeling analysis used USEPA's AERMOD program, v. 13350. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

#### **3.2 Control Options**

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.<sup>7</sup> For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

#### **3.3 Output Options**

The AERMOD analysis was based on three years of recent meteorological data. The modeling analyses used one run with three years of sequential meteorological data from 2010-2012. Consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations, AERMOD provided a table of fourth-highest 1-hour SO<sub>2</sub> impacts concentrations consistent with the form of the 1-hour SO<sub>2</sub> NAAQS.<sup>8</sup>

Please refer to Table 1 for the modeling results.

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<sup>7</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.

<sup>8</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

## **4. Model Inputs**

### **4.1 Geographical Inputs**

The “ground floor” of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.<sup>9</sup>

USEPA’s AERSURFACE v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 1.0% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

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<sup>9</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

## 4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO<sub>2</sub> emissions from the facility. Off-site sources were not considered. Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

**Table 4 – Facility Stack Parameters and Emissions**<sup>10</sup>

Stack	S01	S03
Description	Units 1 and 2	Unit 3
X Coord. [m]	565030.7	565009.72
Y Coord. [m]	4751165.28	4751360.76
Base Elevation [m]	182.49	182.1
Release Height [m]	121.9	195.7
Gas Exit Temperature [°K]	420.7	443.9
Gas Exit Velocity [m/s]	39.33	30.63
Inside Diameter [m]	5.79	8.31
Allowable Emission Rate [g/s]	1273	1246

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and temperatures. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

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<sup>10</sup> Stack parameters were taken from an April 4, 2013 AERMOD input file, Campbell.adi, provided by Michigan DEQ.

### **4.3 Building Dimensions and GEP**

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash and this may under-predict impacts.

### **4.4 Receptors**

For J.H. Campbell Plant, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on J.H. Campbell Plant and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on J.H. Campbell Plant and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on J.H. Campbell Plant and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.<sup>11</sup>

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

### **4.5 Meteorological Data**

To improve the accuracy of the modeling analysis, recent meteorological data for the 2011-2013 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.<sup>12</sup> The USEPA software program AERMINUTE v. 11325 is used for these tasks.

This section discusses how the meteorological data was prepared for use in the 1-hour SO<sub>2</sub> NAAQS

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<sup>11</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

<sup>12</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

modeling analyses. The USEPA software program AERMET v. 12345 is used for these tasks.

#### **4.5.1 Surface Meteorology**

Surface meteorology was obtained for Tulip City Airport located near the J.H. Campbell Plant. Integrated Surface Hourly (ISH) data for the 2011-2013 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

#### **4.5.2 Upper Air Data**

Upper-air data are collected by a “weather balloon” that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawinsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For J.H. Campbell Plant, the concurrent 2011-2013 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the White Lake, Michigan measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA’s FSL website.<sup>13</sup> All reporting levels were downloaded and processed with AERMET.

#### **4.5.3 AERSURFACE**

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey’s 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors.

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<sup>13</sup> Available at: <http://esrl.noaa.gov/raobs/>

#### 4.5.4 Data Review

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.<sup>14</sup> The AERMOD output file shows there were 2.7% missing data.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the Tulip City Airport is located close to J.H. Campbell Plant, this meteorological data set was considered appropriate for this modeling analysis.<sup>15</sup> This weather station provided high quality surface measurements for the most recent 5-year time, and had similar land use, surface characteristics, terrain features and climate.

Finally, Michigan DEQ staff were contacted to discuss modeling procedures for this project and determine the meteorological data collection station. They recommended the use of data from the surface and upper air weather stations used for this modeling analysis, and provided pre-processed weather data suitable for AERMOD for the 2011 to 2013 period.<sup>16</sup> Due to concerns about the most recent version of AERMET, v. 13350, all years of weather data were processed using the previous version, v. 12345.

### 5. Background SO<sub>2</sub> Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>17</sup> To preserve the form of the 1-hour SO<sub>2</sub> standard, based on the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration was added to the modeled fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration.<sup>18</sup>

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in Michigan.<sup>19</sup>

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<sup>14</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.

<sup>15</sup> USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.

<sup>16</sup> Email, J. Haywood – Michigan Department of Environmental Quality to S. Klafka – Wingra Engineering, Request for Modeling Guidance and Meteorology for Michigan Plants, May 14, 2014.

<sup>17</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.

<sup>18</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010, p. 3.

<sup>19</sup> <http://www.epa.gov/airtrends/values.html>

## **6. Reporting**

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

# **EXHIBIT 7**

**Monroe Power Plant**  
**Monroe, Michigan**  
**Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>**  
**June 1, 2014**

*Conducted by:*

*Steven Klafka, P.E., BCEE*

*Wingra Engineering, S.C.*

*Madison, Wisconsin*

## 1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO<sub>2</sub>) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Monroe Power Plant located in Monroe, Michigan.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO<sub>2</sub> NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO<sub>2</sub> NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>1</sup>

## 2. Compliance with the 1-hour SO<sub>2</sub> NAAQS

### 2.1 1-hour SO<sub>2</sub> NAAQS

The 1-hour SO<sub>2</sub> NAAQS takes the form of a three-year average of the 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.<sup>2</sup> Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of µg/m<sup>3</sup>. The 1-hour SO<sub>2</sub> NAAQS of 75 ppb equals 196.2 µg/m<sup>3</sup>, and this is the value used for determining whether modeled impacts exceed the NAAQS.<sup>3</sup> The 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

### 2.2 Modeling Results

Modeling results for Monroe Power Plant are summarized in Table 1. It was determined that based on either currently permitted emissions or measured actual emissions, the Monroe Power Plant is estimated to create downwind SO<sub>2</sub> concentrations which exceed the 1-hour NAAQS.

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<sup>1</sup> [http://www.epa.gov/scram001/so2\\_modeling\\_guidance.htm](http://www.epa.gov/scram001/so2_modeling_guidance.htm)

<sup>2</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010.

<sup>3</sup> The ppb to µg/m<sup>3</sup> conversion is found in the source code to AERMOD v. 13350, subroutine Modules. The conversion calculation is  $75/0.3823 = 196.2 \mu\text{g}/\text{m}^3$ .

For the modeling results presented in Table 1, the evaluated emission rates include the allowable and actual. “Allowable” is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. “Actual” are the measured emissions for each hour between January 1, 2011 and December 31, 2013 as taken from USEPA *Air Markets Program Data*.<sup>4</sup>

Air quality impacts in Michigan are based on a background concentration of 31.4 µg/m<sup>3</sup>. This is the 2010-12 design value for Kent County, Michigan - the lowest measured background concentration in the state. This is the most recently available design value.

**Table 1 - SO<sub>2</sub> Modeling Results for Monroe Power Plant Modeling Analysis**

Emission Rates	Averaging Period	99 <sup>th</sup> Percentile 1-hour Daily Maximum (µg/m <sup>3</sup> )				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	237.8	31.4	269.2	196.2	No
Actual	1-hour	370.5	31.4	401.9	196.2	No

The currently permitted emissions used for the modeling analysis are summarized in Table 2.

**Table 2 - Modeled SO<sub>2</sub> Emissions from Monroe Power Plant**<sup>5</sup>

Stack ID	Unit ID	Allowable Emissions 24-hour Average (lbs/hr)
S01	Unit 1	2,462.6
S02	Unit 2	2,462.6
S03	Unit 3	2,462.6
S04	Unit 4	2,462.6
Facility Total	All Units	9,850.2

Based on the modeling results, emission reductions from current allowable rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

<sup>4</sup> <http://ampd.epa.gov/ampd/>

<sup>5</sup> Michigan Department of Environmental Quality, Renewal Operating Permit MI-ROP-82816-2009a, July 25, 2011. The emission limit for each boiler is 0.323 lbs/mbtu heat input.

**Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO<sub>2</sub>**

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (µg/m <sup>3</sup> )	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
164.8	31%	6,826.4	0.22

Predicted exceedences of the 1-hour NAAQS for SO<sub>2</sub> based on actual hourly emissions extend throughout the region to a maximum distance of 15 kilometers.

Figure 1 shows the extent of NAAQS violations based on allowable emissions.

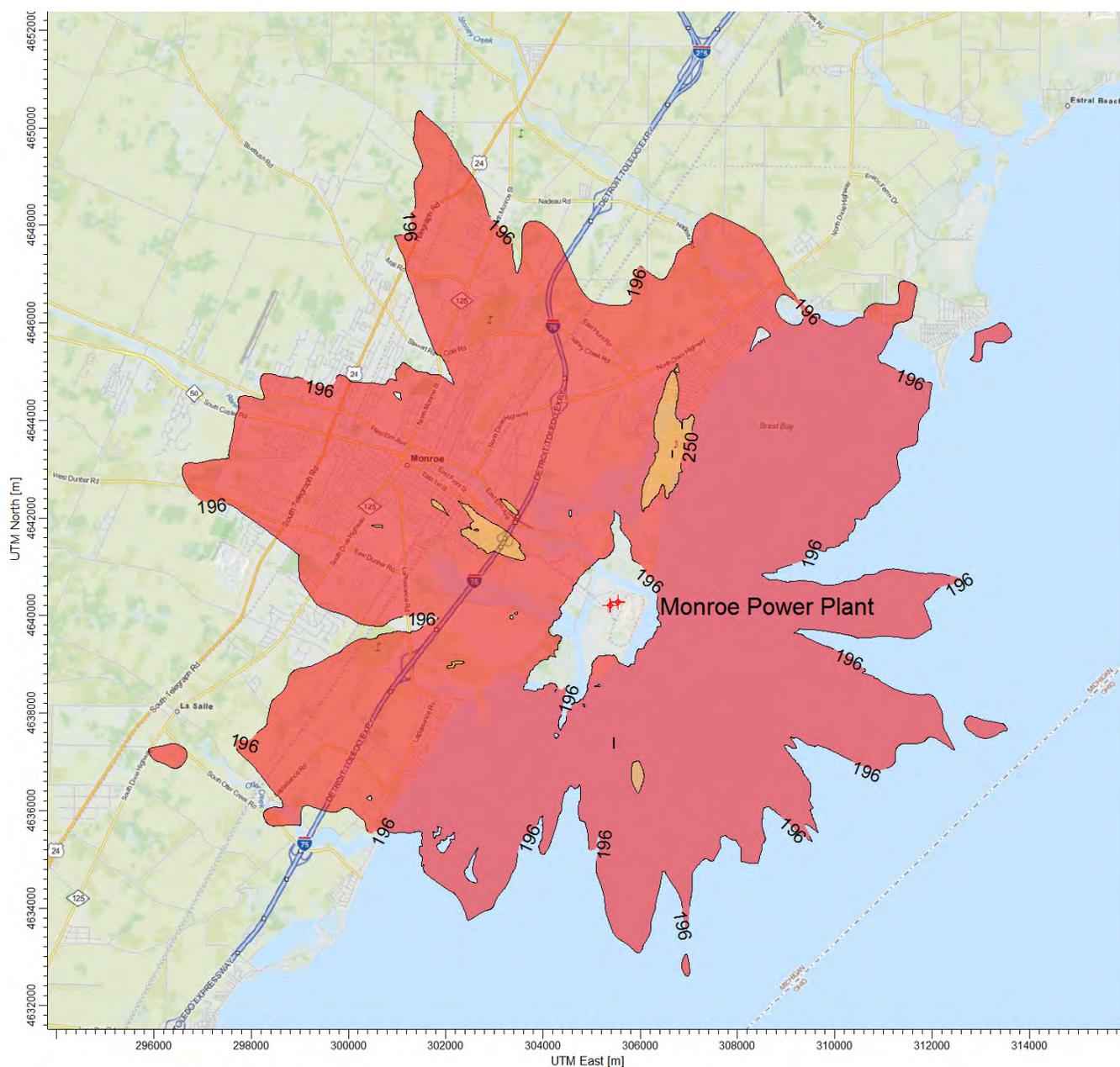
Figure 2 shows the extent of NAAQS violations based on actual hourly emissions.

### 2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

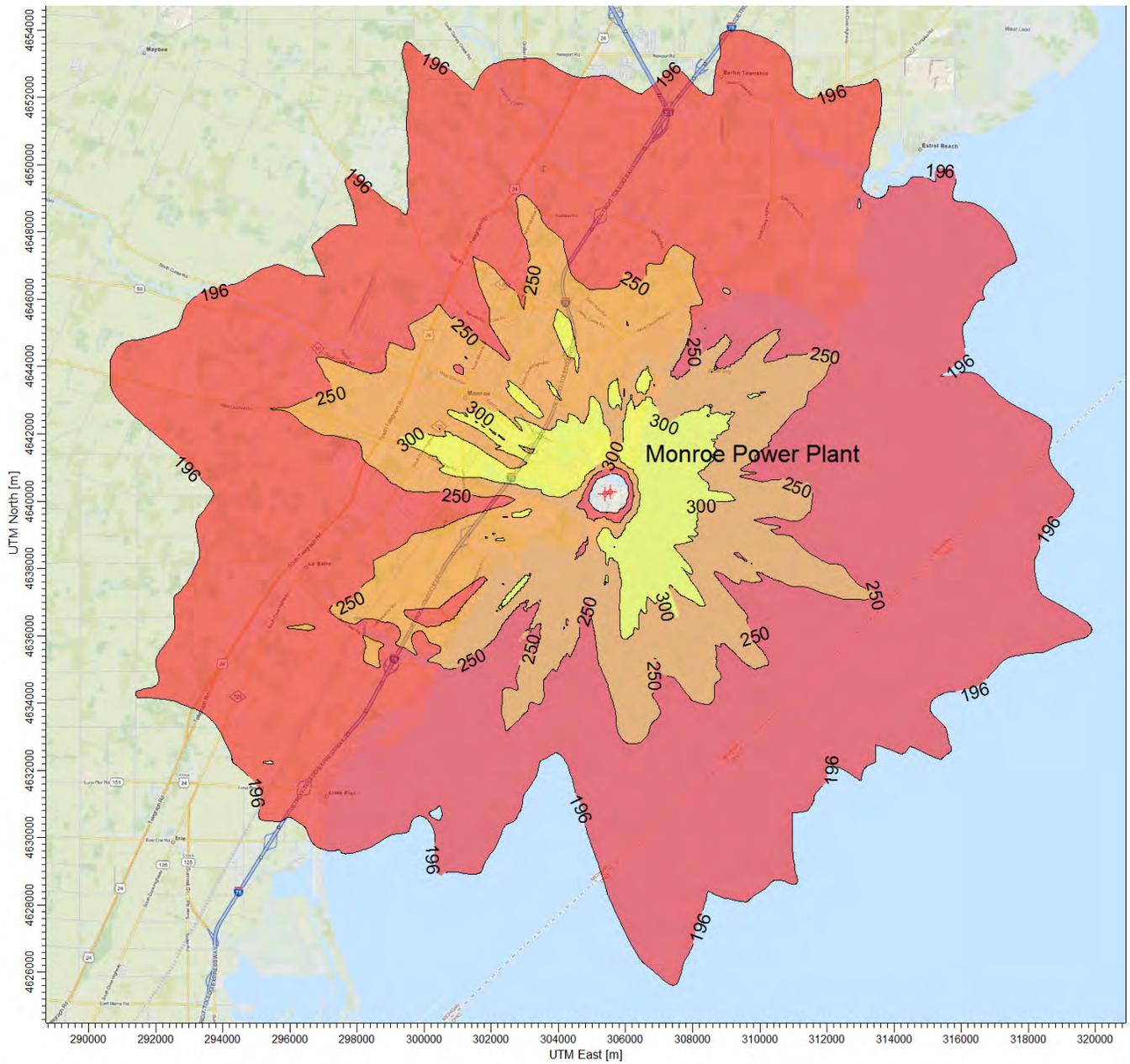
- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO<sub>2</sub> air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No evaluation has been conducted to determine if the stack height exceeds Good Engineering Practice or GEP height. If the stack height exceeds GEP, the predicted concentrations will increase.
- No consideration of off-site sources. These other sources of SO<sub>2</sub> will increase the predicted impacts.



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.



**Figure 1 - Monroe Power Plant SO<sub>2</sub> Concentrations Based on Allowable Emissions**



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.



**Figure 2 - Monroe Power Plant SO<sub>2</sub> Concentrations Based on Actual Hourly Emissions**

### **3. Modeling Methodology**

#### **3.1 Air Dispersion Model**

The modeling analysis used USEPA's AERMOD program, v. 13350. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

#### **3.2 Control Options**

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.<sup>6</sup> For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

#### **3.3 Output Options**

The AERMOD analysis was based on three years of recent meteorological data. The modeling analyses used one run with three years of sequential meteorological data from 2011-2013. Consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO<sub>2</sub> impacts concentrations consistent with the form of the 1-hour SO<sub>2</sub> NAAQS.<sup>7</sup>

Please refer to Table 1 for the modeling results.

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<sup>6</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.

<sup>7</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

## **4. Model Inputs**

### **4.1 Geographical Inputs**

The “ground floor” of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.<sup>8</sup>

USEPA’s AERSURFACE v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 9.9% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

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<sup>8</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

## 4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO<sub>2</sub> emissions from the facility. Off-site sources were not considered. Table 1 presented the predicted concentrations based on the following scenarios:

- 1) approved or allowable emissions based on permits issued by the regulatory agency, and
- 2) actual hourly emissions measured each hour between January 1, 2011 and December 31, 2013 as taken from USEPA *Air Markets Program Data*.<sup>9</sup>

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

**Table 4 – Facility Stack Parameters and Emissions**<sup>10</sup>

Stack	S01	S02	S03	S04
Description	Unit 1	Unit 2	Unit 3	Unit 4
X Coord. [m]	305534	305538	305379	305385
Y Coord. [m]	4640274	4640278	4640207	4640211
Base Elevation [m]	175.71	175.92	177.27	177.25
Release Height [m]	176.48	176.48	176.48	176.48
Gas Exit Temperature [°K]	325.928	325.928	325.928	325.928
Gas Exit Velocity [m/s]	39.624	39.624	39.624	39.624
Inside Diameter [m]	6.309	6.309	6.309	6.309
Allowable Emission Rate [g/s]	310.3	310.3	310.3	310.3
Actual Emission Rate [g/s]	-	-	-	-

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and temperatures. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

<sup>9</sup> <http://ampd.epa.gov/ampd/>

<sup>10</sup> Stack height and diameter taken from DTE Electric Company, Renewable Operating Permit Application, March 7, 2014. Stack flow rate and temperature taken from USEIA, 2012 Form EIA-860 Data - Schedule 6, 'Stack & Flue Data', <http://www.eia.gov/electricity/data/eia860/>

### **4.3 Building Dimensions and GEP**

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash and this may under-predict impacts.

### **4.4 Receptors**

For Monroe Power Plant, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Monroe Power Plant and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Monroe Power Plant and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Monroe Power Plant and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.<sup>11</sup>

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for these tasks.

### **4.5 Meteorological Data**

To improve the accuracy of the modeling analysis, recent meteorological data for the 2011-2013 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were not available so USEPA methods were not used to reduce calm and missing hours.<sup>12</sup> The USEPA software program AERMINUTE v. 11325 is typically used for these tasks.

This section discusses how the meteorological data was prepared for use in the 1-hour SO<sub>2</sub> NAAQS

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<sup>11</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

<sup>12</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

modeling analyses. The USEPA software program AERMET v. 12245 is used for these tasks.

#### **4.5.1 Surface Meteorology**

Surface meteorology was obtained for Custer Airport located near the Monroe Power Plant. Integrated Surface Hourly (ISH) data for the 2011-2013 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

#### **4.5.2 Upper Air Data**

Upper-air data are collected by a “weather balloon” that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawinsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Monroe Power Plant, the concurrent 2011-2013 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the White Lake, Michigan measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA’s FSL website.<sup>13</sup> All reporting levels were downloaded and processed with AERMET.

#### **4.5.3 AERSURFACE**

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey’s 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors. Seasonal moisture conditions were considered average with the

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<sup>13</sup> Available at: <http://esrl.noaa.gov/raobs/>

winter months having continuous snow cover.

#### **4.5.4 Data Review**

Missing meteorological data were not filled as the data file met USEPA's 90% data completeness requirement.<sup>14</sup> The AERMOD output file shows there were 0.56% missing data.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the Custer Airport is located close to Monroe Power Plant, this meteorological data set was considered appropriate for this modeling analysis.<sup>15</sup> This weather station provided high quality surface measurements for the most recent 3-year time, and had similar land use, surface characteristics, terrain features and climate. Finally, recommendations from the Michigan Department of Environmental Quality were also considered.<sup>16, 17</sup>

### **5. Background SO<sub>2</sub> Concentrations**

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>18</sup> To preserve the form of the 1-hour SO<sub>2</sub> standard, based on the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration was added to the modeled fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration.<sup>19</sup>

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in Michigan.<sup>20</sup>

### **6. Reporting**

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

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<sup>14</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.

<sup>15</sup> USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.

<sup>16</sup> Michigan Department of Environmental Quality, Map of Available Meteorological Stations, [http://www.michigan.gov/documents/deq/deq-aqd-mm-met\\_support\\_256121\\_7.pdf](http://www.michigan.gov/documents/deq/deq-aqd-mm-met_support_256121_7.pdf)

<sup>17</sup> Email from J. Haywood – MDEQ to S. Klafka – Wingra Engineering, S.C., Modeling Procedures for Trenton Channel Power Plant, February 20, 2014. This email includes a recommendation to use AERMET v. 12345 rather than v. 13350.

<sup>18</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.

<sup>19</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010, p. 3.

<sup>20</sup> <http://www.epa.gov/airtrends/values.html>

# **EXHIBIT 8**

**Presque Isle Power Plant**  
**Marquette, Michigan**  
**Evaluation of Compliance with the 1-hour NAAQS for SO<sub>2</sub>**  
**May 30, 2014**

*Conducted by:*

*Steven Klafka, P.E., BCEE*

*Wingra Engineering, S.C.*

*Madison, Wisconsin*

## 1. Introduction

Wingra Engineering, S.C. was hired by the Sierra Club to conduct an air modeling impact analysis to help USEPA, state and local air agencies identify facilities that are likely causing violations of the 1-hour sulfur dioxide (SO<sub>2</sub>) national ambient air quality standard (NAAQS). This document describes the results and procedures for an evaluation conducted for the Presque Isle Power Plant located in Marquette, Michigan.

The dispersion modeling analysis predicted ambient air concentrations for comparison with the one hour SO<sub>2</sub> NAAQS. The modeling was performed using the most recent version of AERMOD, AERMET, and AERMINUTE, with data provided to the Sierra Club by regulatory air agencies and through other publicly-available sources as documented below. The analysis was conducted in adherence to all available USEPA guidance for evaluating source impacts on attainment of the 1-hour SO<sub>2</sub> NAAQS via aerial dispersion modeling, including the AERMOD Implementation Guide; USEPA's Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010; modeling guidance promulgated by USEPA in Appendix W to 40 CFR Part 51; and, USEPA's March 2011 Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>1</sup>

## 2. Compliance with the 1-hour SO<sub>2</sub> NAAQS

### 2.1 1-hour SO<sub>2</sub> NAAQS

The 1-hour SO<sub>2</sub> NAAQS takes the form of a three-year average of the 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations, which cannot exceed 75 ppb.<sup>2</sup> Compliance with this standard was verified using USEPA's AERMOD air dispersion model, which produces air concentrations in units of µg/m<sup>3</sup>. The 1-hour SO<sub>2</sub> NAAQS of 75 ppb equals 196.2 µg/m<sup>3</sup>, and this is the value used for determining whether modeled impacts exceed the NAAQS.<sup>3</sup> The 99<sup>th</sup>-percentile of the annual distribution of daily maximum 1-hour concentrations corresponds to the fourth-highest value at each receptor for a given year.

### 2.2 Modeling Results

Modeling results for Presque Isle Power Plant are summarized in Table 1. It was determined that based on either currently permitted or measured actual emissions, the Presque Isle Power Plant is estimated to create downwind SO<sub>2</sub> concentrations which exceed the 1-hour NAAQS.

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<sup>1</sup> [http://www.epa.gov/scram001/so2\\_modeling\\_guidance.htm](http://www.epa.gov/scram001/so2_modeling_guidance.htm)

<sup>2</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010.

<sup>3</sup> The ppb to µg/m<sup>3</sup> conversion is found in the source code to AERMOD v. 13350, subroutine Modules. The conversion calculation is  $75/0.3823 = 196.2 \mu\text{g}/\text{m}^3$ .

Table 1 presents the modeling results based on allowable and maximum emissions. “Allowable” is the peak emission rate from each unit as approved by the current air quality operation permit for the facility. “Maximum” is the highest combined emission rate from all units during any single hour as measured during the 2011 to 2013 period as taken from USEPA *Air Markets Program Data*.<sup>4</sup>

Air quality impacts in Michigan are based on a background concentration of 31.4 µg/m<sup>3</sup>. This is the 2010-12 design value for Kent County, Michigan - the lowest measured background concentration in the state. This is the most recently available design value.

**Table 1 - SO<sub>2</sub> Modeling Results for Presque Isle Power Plant Modeling Analysis**

Emission Rates	Averaging Period	99 <sup>th</sup> Percentile 1-hour Daily Maximum (µg/m <sup>3</sup> )				Complies with NAAQS?
		Impact	Background	Total	NAAQS	
Allowable	1-hour	772.5	31.4	803.9	196.2	No
Maximum	1-hour	419.5	31.4	450.9	196.2	No

The currently permitted emissions and measured maximum emissions used for the modeling analysis are summarized in Table 2.

**Table 2 - Modeled SO<sub>2</sub> Emissions from Presque Isle Power Plant**<sup>5</sup>

Stack ID	Unit ID	Heat Input (mmbtu/hr)	Allowable Emissions Averaging Period	Allowable Emissions (lbs/mmbtu)	Allowable Emissions (lbs/hr)	Maximum Emissions (lbs/hr)
S05	Unit 5	995	24-hours	1.67	1,661.7	1,057.5
S06	Unit 6	995	24-hour	1.67	1,661.7	1,112.5
S07	Unit 7	1,010	3-hours	1.2	1,212.0	473.9
S08	Unit 8	1,010	3-hours	1.2	1,212.0	522.2
S09	Unit 9	1,010	3-hours	1.2	1,212.0	512.6
Stack Total	All Units	-	-	-	6,959.3	3,678.7

Based on the modeling results, emission reductions from current allowable rates considered necessary to achieve compliance with the 1-hour NAAQS were calculated and presented in Table 3.

<sup>4</sup> <http://ampd.epa.gov/ampd/>

<sup>5</sup> Michigan Department of Environmental Quality, Renewal Operating Permit MI-ROP-B4261-2013a, May 10, 2013. The emission limit for Units 5 and 6 is 1.67 lbs/mmbtu and for Units 7 to 9 is 1.2 lbs/mmbtu heat input.

**Table 3 - Required Emission Reductions for Compliance with the 1-hour NAAQS for SO<sub>2</sub>**

Acceptable Impact (NAAQS - Background) 99th Percentile 1-hour Daily Max (µg/m <sup>3</sup> )	Required Total Facility Reduction Based on Allowable Emissions (%)	Required Total Facility Emission Rate (lbs/hr)	Required Total Facility 1-hour Average Emission Rate (lbs/mmbtu)
164.8	79%	1,484.7	0.30

Predicted exceedences of the 1-hour NAAQS for SO<sub>2</sub> based on allowable emissions extend throughout the region to a maximum distance of 39 kilometers.

Figure 1 shows the full extent of NAAQS violations based on allowable emissions.

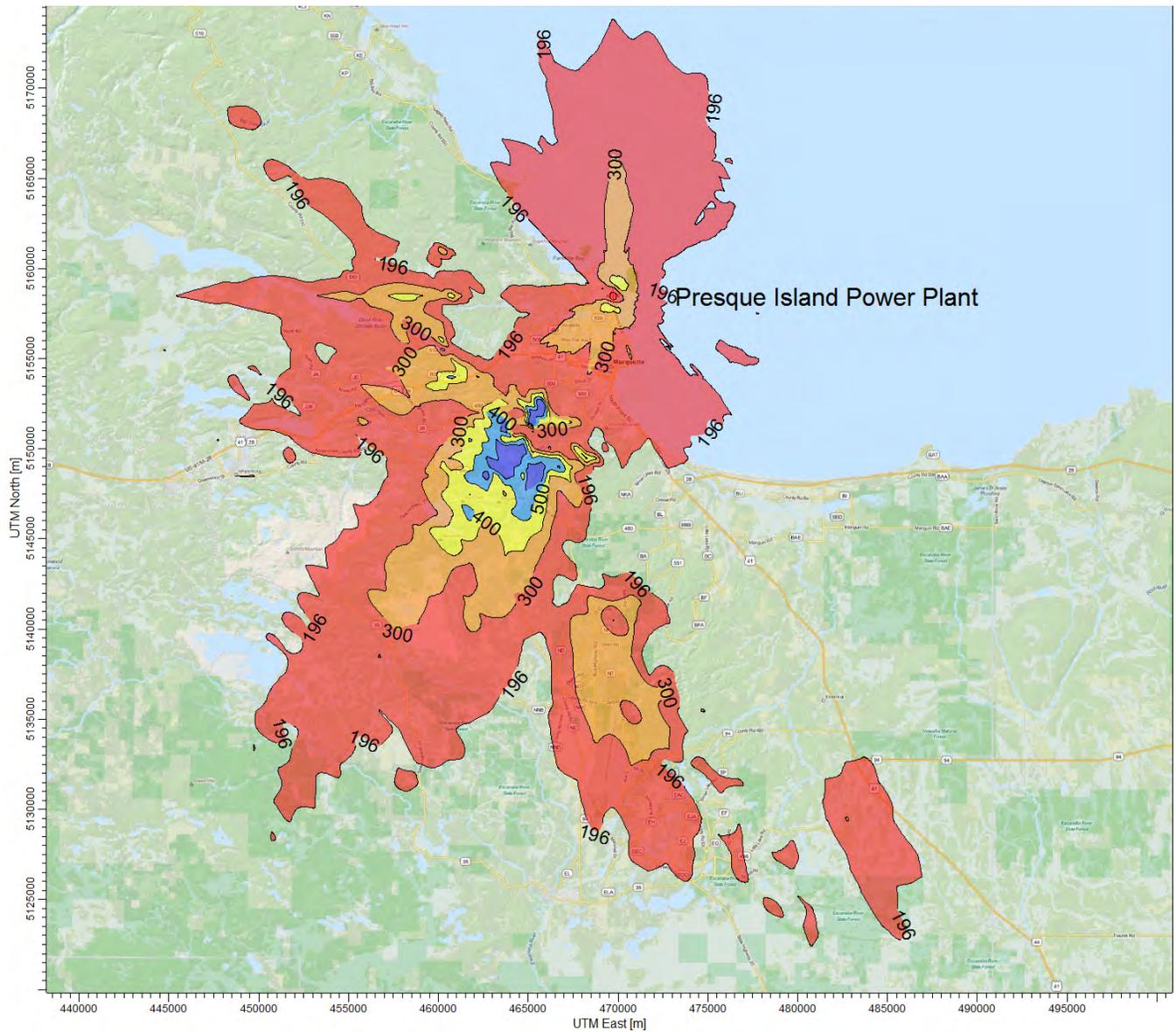
Figure 2 provides a close up local view of NAAQS violations based on allowable emissions.

### 2.3 Conservative Modeling Assumptions

A dispersion modeling analysis requires the selection of numerous parameters which affect the predicted concentrations. For the enclosed analysis, several parameters were selected which under-predict facility impacts.

Assumptions used in this modeling analysis which likely under-estimate concentrations include the following:

- Allowable emissions are based on a limitation with an averaging period which is greater than the 1-hour average used for the SO<sub>2</sub> air quality standard. Emissions and impacts during any 1-hour period may be higher than assumed for the modeling analysis.
- No consideration of facility operation at less than 100% load. Stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts.
- No consideration of building or structure downwash. These downwash effects typically increase predicted concentrations near the facility.
- No evaluation has been conducted to determine if the stack height exceeds Good Engineering Practice or GEP height. If the stack height exceeds GEP, the predicted concentrations will increase.
- No consideration of off-site sources. These other sources of SO<sub>2</sub> will increase the predicted impacts.



1-hour average SO<sub>2</sub> concentrations (ug per cubic meter) - All colored areas exceed the NAAQS.

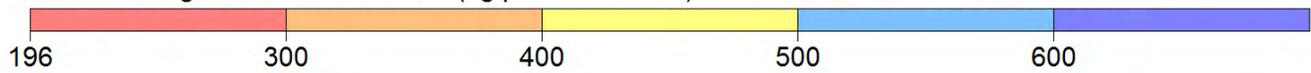


Figure 1 – Presque Island Power Plant SO<sub>2</sub> Concentrations Based on Allowable Emissions (Regional View)

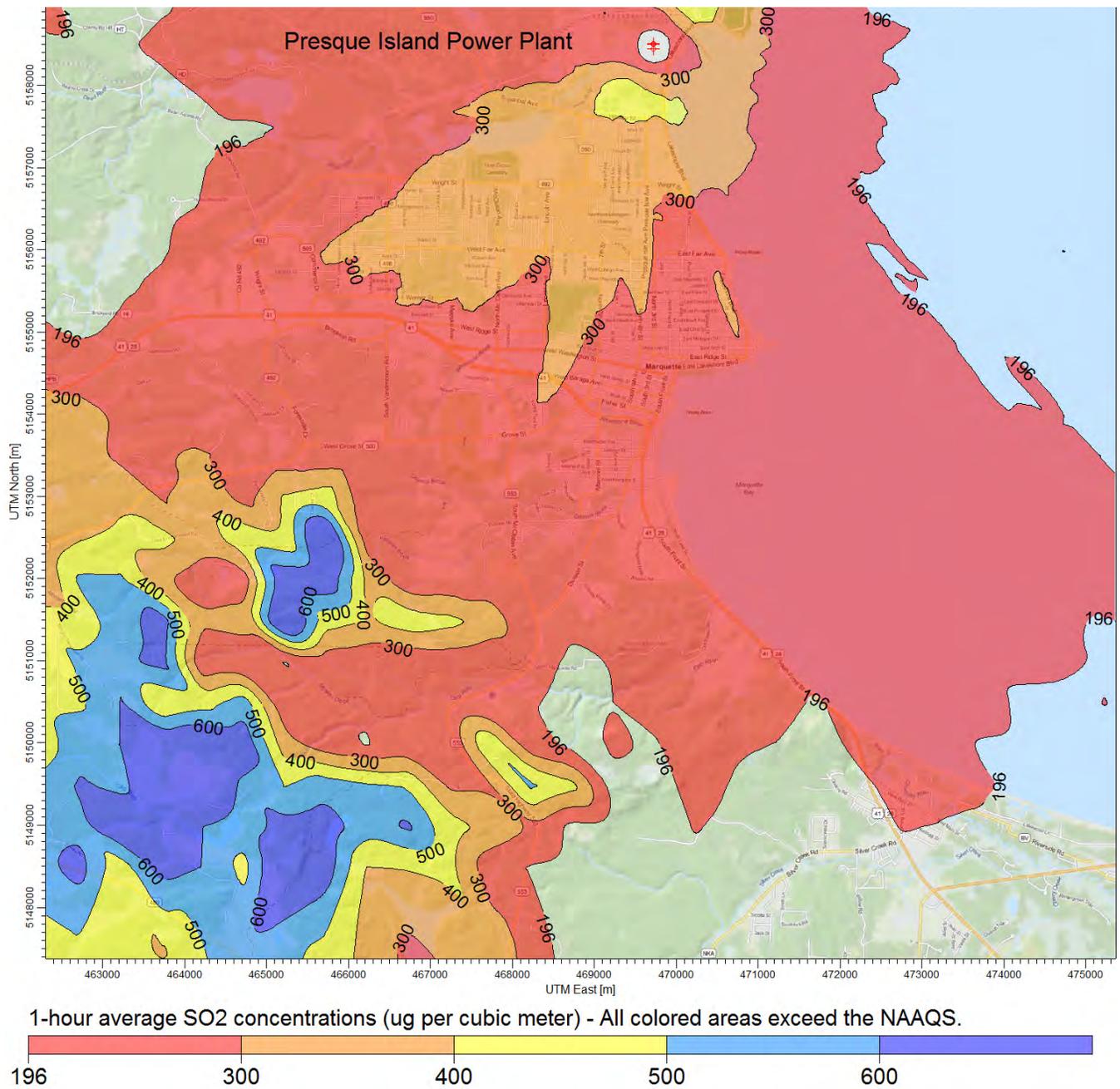


Figure 2- Presque Island Power Plant SO<sub>2</sub> Concentrations Based on Allowable Emissions (Local View)

### **3. Modeling Methodology**

#### **3.1 Air Dispersion Model**

The modeling analysis used USEPA's AERMOD program, v. 13350. AERMOD, as available from the Support Center for Regulatory Atmospheric Modeling (SCRAM) website, was used in conjunction with a third-party modeling software program, *AERMOD View*, sold by Lakes Environmental Software.

#### **3.2 Control Options**

The AERMOD model was run with the following control options:

- 1-hour average air concentrations
- Regulatory defaults
- Flagpole receptors

To reflect a representative inhalation level, a flagpole height of 1.5 meters was used for all modeled receptors. This parameter was added to the receptor file when running AERMAP, as described in Section 4.4.

An evaluation was conducted to determine if the modeled facility was located in a rural or urban setting using USEPA's methodology outlined in Section 7.2.3 of the Guideline on Air Quality Models.<sup>6</sup> For urban sources, the URBANOPT option is used in conjunction with the urban population from an appropriate nearby city and a default surface roughness of 1.0 meter. Methods described in Section 4.1 were used to determine whether rural or urban dispersion coefficients were appropriate for the modeling analysis.

#### **3.3 Output Options**

The AERMOD analysis was based on three years of recent meteorological data. The modeling analyses used one run with three years of sequential meteorological data from 2011-2013. Consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations, AERMOD provided a table of fourth-high 1-hour SO<sub>2</sub> impacts concentrations consistent with the form of the 1-hour SO<sub>2</sub> NAAQS.<sup>7</sup>

Please refer to Table 1 for the modeling results.

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<sup>6</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005.

<sup>7</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 24-26.

## **4. Model Inputs**

### **4.1 Geographical Inputs**

The “ground floor” of all air dispersion modeling analyses is establishing a coordinate system for identifying the geographical location of emission sources and receptors. These geographical locations are used to determine local characteristics (such as land use and elevation), and also to ascertain source to receptor distances and relationships.

The Universal Transverse Mercator (UTM) NAD83 coordinate system was used for identifying the easting (x) and northing (y) coordinates of the modeled sources and receptors. Stack locations were obtained from facility permits and prior modeling files provided by the state regulatory agency. The stack locations were then verified using aerial photographs.

The facility was evaluated to determine if it should be modeled using the rural or urban dispersion coefficient option in AERMOD. A GIS was used to determine whether rural or urban dispersion coefficients apply to a site. Land use within a three-kilometer radius circle surrounding the facility was considered. USEPA guidance states that urban dispersion coefficients are used if more than 50% of the area within 3 kilometers has urban land uses. Otherwise, rural dispersion coefficients are appropriate.<sup>8</sup>

USEPA’s AERSURFACE v. 13016 was used to develop the meteorological data for the modeling analysis. This model was also used to evaluate surrounding land use within 3 kilometers. Based on the output from the AERSURFACE, approximately 12.6% of surrounding land use around the modeled facility was of urban land use types including Type 21 – Low Intensity Residential, Type 22 – High Intensity Residential and Type 23 – Commercial / Industrial / Transportation.

This is less than the 50% value considered appropriate for the use of urban dispersion coefficients. Based on the AERSURFACE analysis, it was concluded that the rural option would be used for the modeling summarized in this report. Please refer to Section 4.5.3 for a discussion of the AERSURFACE analysis.

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<sup>8</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, November 9, 2005, Section 7.2.3.

## 4.2 Emission Rates and Source Parameters

The modeling analyses only considered SO<sub>2</sub> emissions from the facility. Off-site sources were not considered. Table 1 presents concentrations which were predicted for the following scenarios:

- 1) approved or allowable emissions based on permits issued by the regulatory agency, and
- 2) maximum emissions based on measured actual hourly SO<sub>2</sub> emissions as taken from USEPA Air Markets Program Data.<sup>9</sup> To assure realistic emission rates were used, emissions from all units at the facility were combined and the hour with the maximum total facility emissions was used to determine the maximum emissions.

Stack parameters and emissions used for the modeling analysis are summarized in Table 4.

**Table 4 – Facility Stack Parameters and Emissions**<sup>10</sup>

Stack	S05	S06	S07	S08	S09
Description	Unit 5	Unit 6	Unit 7	Unit 8	Unit 9
X Coord. [m]	469725.08	469725.08	469721.79	469726.32	469725.72
Y Coord. [m]	5158442.79	5158448.49	5158506.51	5158502.88	5158507.72
Base Elevation [m]	185.56	185.6	186.04	185.99	186.04
Release Height [m]	121.92	121.92	124.97	124.97	124.97
Gas Exit Temperature [°K]	416.483	416.483	416.483	416.483	416.483
Gas Exit Velocity [m/s]	22.878	22.878	22.454	22.454	22.454
Inside Diameter [m]	2.743	2.743	2.896	2.896	2.896
Allowable Emission Rate [g/s]	209.4	209.4	152.7	152.7	152.7

The above stack parameters and emissions were obtained from regulatory agency documents and databases identified in Section 2.3. The analysis was conducted based on 100% operating load using maximum exhaust flow rates and temperatures. Operation at less than full capacity loads was not considered. This assumption tends to under-predict impacts since stack parameters such as exit flow rate and temperature are typically lower at less than full load, reducing pollutant dispersion and increasing predicted air quality impacts. Stack location, height and diameter were verified using aerial photographs, and flue gas flow rate and temperature were verified using combustion calculations.

<sup>9</sup> <http://ampd.epa.gov/ampd/>

<sup>10</sup> Stack height and diameter taken from DTE Electric Company, Renewable Operating Permit Application, March 7, 2014. Stack flow rate and temperature taken from USEIA, 2012 Form EIA-860 Data - Schedule 6, 'Stack & Flue Data', <http://www.eia.gov/electricity/data/eia860/>.

### **4.3 Building Dimensions and GEP**

No building dimensions or prior downwash evaluations were available. Therefore this modeling analysis did not address the effects of downwash and this may under-predict impacts.

### **4.4 Receptors**

For Presque Isle Power Plant, three receptor grids were employed:

1. A 100-meter Cartesian receptor grid centered on Presque Isle Power Plant and extending out 5 kilometers.
2. A 500-meter Cartesian receptor grid centered on Presque Isle Power Plant and extending out 10 kilometers.
3. A 1,000-meter Cartesian receptor grid centered on Presque Isle Power Plant and extending out 50 kilometers. 50 kilometers is the maximum distance accepted by USEPA for the use of the AERMOD dispersion model.<sup>11</sup>

A flagpole height of 1.5 meters was used for all these receptors.

Elevations from stacks and receptors were obtained from National Elevation Dataset (NED) GeoTiff data. GeoTiff is a binary file that includes data descriptors and geo-referencing information necessary for extracting terrain elevations. These elevations were extracted from 1 arc-second (30 meter) resolution NED files. The USEPA software program AERMAP v. 11103 is used for this task.

### **4.5 Meteorological Data**

To improve the accuracy of the modeling analysis, recent meteorological data for the 2011-2012 period were prepared using the USEPA's program AERMET which creates the model-ready surface and profile data files required by AERMOD. Required data inputs to AERMET included surface meteorological measurements, twice-daily soundings of upper air measurements, and the micrometeorological parameters surface roughness, albedo, and Bowen ratio. One-minute ASOS data were available so USEPA methods were used to reduce calm and missing hours.<sup>12</sup> The USEPA software program AERMINUTE v. 11325 is used for these tasks.

This section discusses how the meteorological data was prepared for use in the 1-hour SO<sub>2</sub> NAAQS modeling analyses. The USEPA software program AERMET v. 13350 is used for these tasks.

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<sup>11</sup> USEPA, Revision to the Guideline on Air Quality Models: Adoption of a Preferred General Purpose (Flat and Complex Terrain) Dispersion Model and Other Revisions, Appendix W to 40 CFR Part 51, Section A.1.(1), November 9, 2005.

<sup>12</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, p. 19.

#### **4.5.1 Surface Meteorology**

Surface meteorology was obtained for Munising Lakeshore Station located near the Presque Isle Power Plant. Integrated Surface Hourly (ISH) data for the 2011-2013 period were obtained from the National Climatic Data Center (NCDC). The ISH surface data was processed through AERMET Stage 1, which performs data extraction and quality control checks.

#### **4.5.2 Upper Air Data**

Upper-air data are collected by a “weather balloon” that is released twice per day at selected locations. As the balloon is released, it rises through the atmosphere, and radios the data back to the surface. The measuring and transmitting device is known as either a radiosonde, or rawinsonde. Data collected and radioed back include: air pressure, height, temperature, dew point, wind speed, and wind direction. The upper air data were processed through AERMET Stage 1, which performs data extraction and quality control checks.

For Presque Isle Power Plant, the concurrent 2011-2013 upper air data from twice-daily radiosonde measurements obtained at the most representative location were used. This location was the Green Bay, Wisconsin measurement station. These data are in Forecast Systems Laboratory (FSL) format and were downloaded in ASCII text format from NOAA’s FSL website.<sup>13</sup> All reporting levels were downloaded and processed with AERMET.

#### **4.5.3 AERSURFACE**

AERSURFACE is a program that extracts surface roughness, albedo, and daytime Bowen ratio for an area surrounding a given location. AERSURFACE uses land use and land cover (LULC) data in the U.S. Geological Survey’s 1992 National Land Cover Dataset to extract the necessary micrometeorological data. LULC data was used for processing meteorological data sets used as input to AERMOD.

AERSURFACE v. 13016 was used to develop surface roughness, albedo, and daytime Bowen ratio values in a region surrounding the meteorological data collection site. AERSURFACE was used to develop surface roughness in a one kilometer radius surrounding the data collection site. Bowen ratio and albedo was developed for a 10 kilometer by 10 kilometer area centered on the meteorological data collection site. These micrometeorological data were processed for seasonal periods using 30-degree sectors.

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<sup>13</sup> Available at: <http://esrl.noaa.gov/raobs/>

#### 4.5.4 Data Review

The AERMOD output file shows there were 20.5% missing data. Missing meteorological data were not and did not meet USEPA's 90% data completeness requirement.<sup>14</sup> Michigan DEQ staff were contacted to discuss modeling procedures for this project and determine the meteorological data collection station. They recommended the use of data from the surface and upper air weather stations used for this modeling analysis, and provided pre-processed weather data suitable for AERMOD for the 2011 to 2013 period.<sup>15</sup> Due to concerns about the most recent version of AERMET, v. 13350, all years of weather data were processed using the previous version, v. 12345.

To confirm the representativeness of the airport meteorological data, the surface characteristics of the airport data collection site and the modeled source location were compared. Since the Munising Lakeshore Station is located close to Presque Isle Power Plant, this meteorological data set was considered appropriate for this modeling analysis.<sup>16</sup> Additionally, this weather station provided high quality surface measurements for the most recent 5-year time, and had similar land use, surface characteristics, terrain features and climate.

### 5. Background SO<sub>2</sub> Concentrations

Background concentrations were determined consistent with USEPA's Modeling Guidance for SO<sub>2</sub> NAAQS Designations.<sup>17</sup> To preserve the form of the 1-hour SO<sub>2</sub> standard, based on the 99<sup>th</sup> percentile of the annual distribution of daily maximum 1-hour concentrations averaged across the number of years modeled, the background fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration was added to the modeled fourth-highest daily maximum 1-hour SO<sub>2</sub> concentration.<sup>18</sup>

Background concentrations were based on the 2010-12 design value measured by the ambient monitors located in Michigan.<sup>19</sup>

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<sup>14</sup> USEPA, Meteorological Monitoring Guidance for Regulatory Modeling Applications, EPA-454/R-99-05, February 2000, Section 5.3.2, pp. 5-4 to 5-5.

<sup>15</sup> Email, J. Haywood – Michigan Department of Environmental Quality to S. Klafka – Wingra Engineering, Request for Modeling Guidance and Meteorology for Michigan Plants, May 10, 2014.

<sup>16</sup> USEPA, AERMOD Implementation Guide, March 19, 2009, pp. 3-4.

<sup>17</sup> USEPA, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, Attachment 3, March 24, 2011, pp. 20-23.

<sup>18</sup> USEPA, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard, August 23, 2010, p. 3.

<sup>19</sup> <http://www.epa.gov/airtrends/values.html>

## **6. Reporting**

All files from the programs used for this modeling analysis are available to regulatory agencies. These include analyses prepared with AERSURFACE, AERMET, AERMAP, and AERMOD.

# **EXHIBIT 9**

**SO<sub>2</sub> Impacts from the St. Clair  
and Belle River Power Plants**

**H. Andrew Gray**  
Gray Sky Solutions  
San Rafael, CA

3 June 2014

AERMOD files for the modeling of Belle River and St. Clair sources were provided by the Michigan Department of Environmental Quality (DEQ). An input file was provided that contained the sources (each stack/unit is modeled separately), their locations, stack parameters, SO<sub>2</sub> emission rates (allowable/permitted levels), and building downwash parameters.

An AERMOD output file was also received from DEQ. A few observations concerning the DEQ modeling:

- (1) A nested grid of 4,725 receptors was used, with 250 m spacing near the sources and 100 m spacing further out. The coarse grid receptors extend approximately 70 km to the SW and NW, including a couple receptors in the NW corner of the Detroit nonattainment area (nearby, but not at the SWHS site. The closest modeled receptor is about 2 km NE of the SWHS site).
- (2) The DEQ model run only simulated one year (2009) despite the fact that a five-year meteorological data set with local airport data had been prepared (PHN: St. Clair County Airport). (I was provided with the five-year met data.)
- (3) The output from the DEQ AERMOD model run only included the highest 1-hr average concentration (for 2009), and not the 4<sup>th</sup>-highest daily peak 1-hr concentration (which corresponds to the NAAQS design value).

The following table is a summary of the source locations and emission rates that were modeled by DEQ (there were eight additional modeled Belle River and St. Clair sources: STCDG121, STCDG122, BELLERVA, BRDG111, BRDG112, BDG113, BRDG114, and BRDG115), however their emissions were negligible, totaling less than 0.04 tpy):

**Table 1. Modeled SO<sub>2</sub> Emission Rates**

	source	Modeled SO <sub>2</sub> Emissions			Location	
		g/s	lb/hr	tpy	X	Y
SC1	B2796A	296.725	2,355.0	10,314.9	379538	4735415
SC6	B2796B	653.551	5,187.0	22,719.1	379597	4735659
SC7	B2796C	987.949	7,841.0	34,343.6	379629	4735718
SC2	B2796F	296.725	2,355.0	10,314.9	379538	4735415
SC3	B2796G	296.725	2,355.0	10,314.9	379538	4735415
SC4	B2796H	296.725	2,355.0	10,314.9	379538	4735415
<b>St. Clair</b>		<b>2,828.400</b>	<b>22,448.0</b>	<b>98,322.3</b>		
BRU1	B2796I	1,030.285	8,177.0	35,815.3	377804	4736933
BRU2	B2796J	1,030.285	8,177.0	35,815.3	377713	4736972
<b>Belle River</b>		<b>2,060.569</b>	<b>16,354.0</b>	<b>71,630.5</b>		

The following table shows the results of the DEQ AERMOD model run. The values in the table are the modeled maximum 1-hr average SO<sub>2</sub> concentration impact during 2009 for each source group, and for “ALL” sources (i.e., the combined impact from all Belle River and St. Clair sources). Also included in the table is the location of the modeled peak value.

**Table 2. Modeled Maximum 1-hr SO<sub>2</sub> Concentrations during 2009 (DEQ run)**

source group	CONC ug/m3	CONC ppb	receptor location	
			XR	YR
St. Clair	994.526	379.6	373000	4731250
Belle River	403.449	154.0	374500	4736500
ALL	1,004.144	383.3	371000	4730000

According to the model, the peak location for Belle River during 2009 was about 3 km to the W of the source. The 1-hr peaks for St. Clair and for both sources combined (“ALL”) were located between 8 and 10 km to the SW of the source.

### 2008-2012 Modeling

Using the meteorological data for St. Clair County Airport, I ran the AERMOD model (using identical emission rates, stack parameters, etc.) with a somewhat smaller receptor set for the full five-year period, 2008-2012 (a nested grid was developed with receptors spaced at 250 m within a 100 km<sup>2</sup> area surrounding the sources, and 1000 m spacing within a larger 23 km x 15 km region; over 2000 total receptors were used). Also included was a receptor located at SWHS within the Detroit nonattainment area.

The results are summarized below:

**Table 3. Modeled Maximum 5-year Average of the 4<sup>th</sup>-Highest Daily Peak 1-hr Average SO<sub>2</sub> Concentration (NAAQS Design Value)**

source group	CONC ug/m3	CONC ppb	receptor location	
			XR	YR
St. Clair	488.009	186.3	376750	4733750
Belle River	223.085	85.1	374500	4734500
ALL	589.978	225.2	375250	4739500

The SO<sub>2</sub> concentration impact from both sources exceeds **100 ppb** across the entire 23 km x 15 km receptor grid, covering an area of almost 350 km<sup>2</sup>. The maximum 5-yr average of the 4<sup>th</sup> highest daily peak 1-hr SO<sub>2</sub> concentration (the “design value”) for both sources combined was **225 ppb**, at a receptor located about 4 km NW of Belle River and about 6 km NW of the St. Clair power plant (about 3-4 km SW of the city of St. Clair). The SO<sub>2</sub> impact (design value concentration) due to St. Clair emissions was **186 ppb**, located about 3 km to the SW of the St. Clair source. Belle River showed somewhat lower SO<sub>2</sub> impacts than St. Clair, with a design value of **85 ppb**, at a receptor located 4 km to the SW of the Belle River power plant.

Using the results of the AERMOD model, one can determine the SO<sub>2</sub> emission reductions that would be required to meet the 1-hr SO<sub>2</sub> NAAQS. Facility-wide SO<sub>2</sub> emissions at St. Clair would need to be reduced by 60 percent to reduce the design value (186 ppb) to a level in which the NAAQS would no longer be violated (75 ppb). Facility-wide emissions would therefore need to be reduced from 22,448 lb/hr to 9,039 lb/hr so that St. Clair’s emissions are not, on their own, causing a violation of the 1-hr SO<sub>2</sub> NAAQS.

Similarly, emissions from the two large Belle River boiler units would need to be reduced by 12 percent to in order to reduce its design value (85 ppb) down to the NAAQS level (75 ppb). Total SO<sub>2</sub> emissions from the Belle River facility would have to be reduced from 16,354 lb/hr to 14,405 lb/hr so that no violations of the 1-hr SO<sub>2</sub> NAAQS occur (due just to Belle River emissions).

**Table 4. Emission Reductions Required to Meet the 1-hr SO<sub>2</sub> NAAQS (75 ppb)**

Source	Design Value Concentration (ppb)	Required Percentage Reduction	Base Case Emission Rate (lb/hr)	Required Facility Emission Rate (lb/hr)
St. Clair	186.3	59.7%	22,448	9,039
Belle River	85.1	11.9%	16,354	14,405
<b>ALL</b>	<b>225.2</b>	<b>66.7%</b>		
St. Clair		66.7%	22,448	7,477
Belle River		66.7%	16,354	5,447

The combined impact from both St. Clair and Belle River was 225 ppb (design value) which implies that SO<sub>2</sub> emissions from both sources combined would need to be reduced by **67 percent** in order to meet the 1-hr SO<sub>2</sub> NAAQS (assuming no other sources contribute to the peak concentrations, and that background SO<sub>2</sub> is negligible). If

this level of emission reduction were applied to both power plants, St. Clair's facility-wide SO<sub>2</sub> emissions would be reduced to 7,477 lb/hr and Belle River's two large units would emit only 5,447 lb/hr of SO<sub>2</sub>. At that reduced rate of SO<sub>2</sub> emissions, the model predicts that the two sources combined would not cause a violation of the 1-hr SO<sub>2</sub> NAAQS.

SO<sub>2</sub> Concentration Impacts at SWHS due to Belle River and St. Clair Emissions

The AERMOD model was also used to predict the concentrations at the SWHS receptor location for the five-year period 2008-2012. The SWHS receptor is located approximately 72 km from the two sources. The results are shown in the following table:

**Table 4. 1<sup>st</sup> Highest and 4<sup>th</sup> Highest Peak Daily 1-hr Average SO<sub>2</sub> Concentrations Averaged Over 5 Years at the SWHS Receptor (326355, 4685525)**

source group	1st Highest Max Avg		4th Highest Max Avg	
	CONC ug/m3	CONC ppb	CONC ug/m3	CONC ppb
St. Clair	75.084	28.7	59.046	22.5
Belle River	43.775	16.7	34.194	13.1
ALL	117.423	44.8	91.144	34.8

Conclusions

(1) The model predicts that the peak SO<sub>2</sub> concentrations due to emissions from Belle River and St. Clair would exceed the 1-hr SO<sub>2</sub> NAAQS level (75 ppb) across a widespread area surrounding the two sources -- an area much larger than 350 km<sup>2</sup>. Peak 1-hr SO<sub>2</sub> concentrations due to the two sources are predicted to be as high as 500 ppb. The modeled design value (maximum 5-yr average of the 4<sup>th</sup> highest daily peak 1-hr concentration) for the two sources combined is **225 ppb**, which is three times the NAAQS standard level. Although apparently no monitoring data exist to confirm the modeling result, the model presents very strong evidence that there were likely violations of the 1-hr SO<sub>2</sub> NAAQS in the area surrounding these sources.

(2) During most of the peak SO<sub>2</sub> concentration events, St. Clair was causing the majority of the impact. The model predicts that the emissions from St. Clair alone would cause a violation of the 1-hr SO<sub>2</sub> NAAQS across the entire 350 km<sup>2</sup> receptor area (i.e., the 5-yr average of the 4<sup>th</sup> highest daily peak SO<sub>2</sub> concentrations would exceed 75 ppb). The modeled NAAQS design value due to only St. Clair's emissions is **186 ppb**.

(3) The model predicts that emissions from Belle River alone would also cause violations of the 1-hr SO<sub>2</sub> NAAQS at a number of the modeled receptor locations, comprising approximately a 26 km<sup>2</sup> area. The design value SO<sub>2</sub> concentration for Belle River was **85** ppb.

(4) According to the model results, SO<sub>2</sub> emissions from St. Clair and Belle River would need to be reduced by 67 percent in order to prevent a violation of the 1-hr SO<sub>2</sub> NAAQS. St. Clair's emissions would need to be reduced by 60 percent to eliminate NAAQS violations caused solely by its SO<sub>2</sub> emissions. Belle River's SO<sub>2</sub> emissions would need to be reduced by 12 percent so that its emissions, on their own, don't cause a violation of the NAAQS.

(5) Although the design value 1-hr SO<sub>2</sub> concentration impact predicted by the model due to these two sources at SWHS (45 ppb) is less than the NAAQS standard level of 75 ppb (or 60 ppb, considering that a background of 15 ppb was assumed in the nonattainment area), it is still a significant enough contribution, especially when one considers the long distance from the sources (over 70 km), to warrant attention when determining the sources responsible for the SO<sub>2</sub> concentration impacts at SWHS. The distance to SWHS is beyond the recommended distance for AERMOD (typically 50 km), therefore it is recommended that a model such as CALPUFF is implemented to better estimate the long-range transport patterns that might transport SO<sub>2</sub> from Belle River and St. Clair to the Detroit nonattainment area and the SWHS receptor. (CALUFF has the capability of addressing non-steady-state meteorological patterns, such as the "turning" of the winds over longer distances and travel times.)

The meteorological conditions and transport patterns that would transport SO<sub>2</sub> from Belle River and St. Clair towards the nonattainment area (and SWHS) may, in fact, be quite different than those that cause violations at SWHS due to nearby sources located to the south of SWHS in the nonattainment area (e.g., River Rouge). Nonetheless, given the size of St. Clair's (and to a lesser extent, Belle River's) SO<sub>2</sub> emission rates, the regional-scale impacts of these two sources should be further evaluated.

## **H. ANDREW GRAY**

### **EDUCATION**

Ph.D. environmental engineering science, California Institute of Technology, Pasadena, California, 1986

M.S. environmental engineering science, California Institute of Technology, Pasadena, California, 1980

B.S. civil engineering/engineering and public policy, Carnegie-Mellon University, Pittsburgh, Pennsylvania, 1979

### **EXPERIENCE**

**Dr. H. Andrew Gray** has been performing research in air pollution for over 30 years, within academic, governmental, and consulting environments. He has made significant contributions in the areas of airborne particles and visibility, including the development and application of computer-based air quality models. His areas of expertise are air pollution control strategy design and evaluation, computer modeling of the atmosphere, characterization of ambient air quality and air pollutant source emissions, aerosol monitoring and modeling, visibility analysis, receptor modeling, statistical data analysis, mathematical programming, numerical methods, and analysis of environmental public policy. Dr. Gray is currently an independent contractor focusing on particulate matter and visibility related research issues. Previous Gray Sky Solutions projects include assessment of Clean Air Act and other regulations on visibility in Class I (park and wilderness) areas, development of air pollution control plans and emission inventories for tribal lands, review and development of guidelines for modeling long-range transport impacts using the CALPUFF model, evaluation of particulate air quality impacts associated with diesel exhaust emissions, air quality management plan modeling protocol review, a critical review of Clean Air Mercury Rule (CAMR) documents, and assessment of the regional air quality impacts of power plant emissions. Most recently, Dr. Gray has been carrying out dispersion modeling studies to determine the impacts associated with mercury emissions in the Chesapeake Bay region.

Before starting Gray Sky Solutions, Dr. Gray was the manager of the PM<sub>10</sub> and Visibility Program at Systems Applications International (SAI / ICF Inc.). At SAI, Dr. Gray conducted and managed a number of varied air pollution research projects. In the early 1990s, Dr. Gray directed a large (over \$1 million) air-quality modeling program to determine the impact of SO<sub>2</sub> emissions from a large coal-fired power plant on Grand Canyon sulfate and visibility levels. He managed projects to develop carbon particle emission data for the Denver area, designed a PM<sub>10</sub> monitoring and modeling program for the El Paso area, determined the appropriate tradeoffs between direct PM<sub>10</sub> emissions and emissions of PM<sub>10</sub> precursors, estimated the visibility effects in federal Class I areas due to the 1990 Clean Air Act Amendments (results of which were incorporated into EPA's 1993 Report to Congress on the expected visibility consequences of the 1990 Clean Air Act Amendments), and provided assistance to EPA Region VIII's tribal air programs. Other projects include emission inventory development for Sacramento and carbon monoxide modeling of Phoenix, Arizona to support federal and regional implementation plans in those regions, systematic evaluation of the Interagency Workgroup on Air Quality Modeling (IWAQM) recommendations for the use of MESOPUFF II, a critical assessment of exposures to particulate diesel exhaust in

California, and an evaluation of PM<sub>2.5</sub> and PM<sub>10</sub> air quality data in support of EPA's review of the federal particulate matter air quality standards. Later projects included a study of micrometeorology and modeling of low wind speed stable conditions in the San Joaquin Valley (CA), an assessment of the reductions in nationwide ambient particulate nitrate exposures due to mobile source NO<sub>x</sub> emission reductions, an evaluation of visibility conditions in the Southern Appalachian Mountains region, a review of cotton ginning emission factors, and a critical review and assessment of the PM<sub>10</sub> Attainment Demonstration Plan for the San Joaquin Valley. Dr. Gray was a member of the modeling subcommittee of the technical committee of the Grand Canyon Visibility Transport Commission.

Previous to his tenure at SAI, Dr. Gray was responsible for the PM<sub>10</sub> and visibility programs at the South Coast Air Quality Management District which involved directing monitoring, analysis, and modeling efforts to support the design of air pollution control strategies for the South Coast Air Basin of California. He developed and applied the methodologies for assessing PM<sub>10</sub> concentrations that have continued to be used by the District through numerous subsequent air quality management plan revisions. Dr. Gray authored portions of the 1989 Air Quality Management Plan issued by the District that describe the results of modeling and data analyses used to evaluate particulate matter control strategies. Dr. Gray was instrumental in promoting the development and application of state-of-science models for predicting particulate matter concentrations. His responsibilities included direction and oversight of numerous aerosol-related contracts, including development of the SEQUILIB and SAFER models, construction of an ammonia emission database, and development of sulfate, nitrate and organic chemical mechanisms. In addition, Dr. Gray was responsible for initiating the District's visibility control program.

In research performed at the California Institute of Technology, Dr. Gray studied control of atmospheric fine primary carbon particle concentrations and performed computer programming tasks for acquisition and analysis of real-time experimental data. He designed, constructed, and operated the first long-term fine particle monitoring network in Southern California in the early 1980s. He also developed and applied deterministic models to predict source contributions to fine primary carbon particle concentrations and constructed objective optimization procedures for control strategy design. In research carried out for the Department of Mechanical Engineering at Carnegie-Mellon University, Dr. Gray developed fuel use data for input to an emission simulation model for the northeastern United States.

### **Specialized Professional Competence**

- Air pollution control strategy design
- Atmospheric air quality characterization
- Aerosols and visibility
- Computer modeling and data analysis
- Dispersion modeling for particulate matter and visibility
- Receptor modeling including Chemical Mass Balance (CMB) and factor analysis
- Analysis of environmental public policy

## **Professional Experience**

- Systems Applications International (SAI)—PM<sub>10</sub> and visibility program manager—participated in and managed numerous air quality modeling and analysis projects for public and private sector clients, with emphasis on particulate matter and visibility research
- South Coast Air Quality Management District, El Monte, California—air quality specialist—developed and applied air quality modeling analyses to support air pollution control strategy design for the South Coast Air Basin of California
- California Institute of Technology, Pasadena, California—research assistant—Ph.D. candidate in environmental engineering science. Thesis: Control of atmospheric fine primary carbon particle concentrations (thesis advisors: Dr. Glen Cass, Dr. John Seinfeld, and Dr. Richard Flagan)
- California Institute of Technology, Pasadena, California—laboratory assistant—performed computer programming tasks for acquisition and analysis of real-time experimental data
- Department of Mechanical Engineering, Carnegie-Mellon University, Pittsburgh, Pennsylvania—research assistant—developed fuel use data for an emissions simulation model for the northeastern United States. Grant from the U.S. Department of Energy for evaluation of national energy policy
- Department of Civil Engineering, Carnegie-Mellon University, Pittsburgh, Pennsylvania—consultant—analyzed structural retrofit design for Ferrari Dino import automobile for United States five mph crash test

## **HONORS AND AWARDS**

Harold Allen Thomas Scholarship Award, Carnegie-Mellon University  
University Honors, Carnegie-Mellon University

## **PROFESSIONAL AFFILIATIONS**

Air and Waste Management Association  
American Association for Aerosol Research

## **SELECTED PUBLICATIONS AND PRESENTATIONS**

The Deposition of Airborne Mercury within the Chesapeake Bay Region from Coal-fired Power Plant Emission in Pennsylvania, in press (2010)

Source Contributions to Atmospheric Fine Carbon Particle Concentrations (with G.R. Cass), *Atmospheric Environment*, 32:3805-3825 (1998)

“Monitoring and Analysis of the Surface Layer at Low Wind Speeds in Stable PBL’s in the Southern San Joaquin Valley of California” (with others), presented at the American Meteorological Society’s 12th Symposium on Boundary Layers and Turbulence, Vancouver, British Columbia (July 1997)

“Estimation of Current and Future Year NO<sub>x</sub> to Nitrate Conversion for Various Regions of the United States” (with A. Kuklin), presented at the 90th Meeting of the Air and Waste Management Association, Toronto, Ontario (June 1997)

Integrated Monitoring Study (IMS) 1995: Characterization of Micrometeorological Phenomena: Mixing and Diffusion in Low Wind Speed Stable Conditions: Study Design and Preliminary Results (with others), in *Measurement of Toxic and Related Air Pollutants*, Air and Waste Management Association, Pittsburgh, Pennsylvania, pp. 484-500 (1996)

Regional Emissions and Atmospheric Concentrations of Diesel Engine Particulate Matter: Los Angeles as a Case Study (with G.R. Cass), in *Diesel Exhaust: A Critical Analysis of Emissions, Exposure, and Health Effects*, Health Effects Institute, Cambridge, Massachusetts, pp. 125-137 (1995)

“Assessment of the Effects of the 1990 Clean Air Act Amendments on Visibility in Class I Areas”, presented at the 86th Annual Meeting & Exhibition of the Air and Waste Management Association, Denver, Colorado (June 1993)

“Source Contributions to Atmospheric Carbon Particle Concentrations” (with others), presented at the Southern California Air Quality Study Data Analysis Conference, Los Angeles, California (July 1992)

“Modeling Wintertime Sulfate Production in the Southwestern United States” (with M. Ligocki), presented at the AWMA/EPA International Specialty Conference on PM<sub>10</sub> Standards and Nontraditional Particulate Source Controls, Scottsdale, Arizona (January 1992)

“Deterministic Modeling for the Navajo Generating Station Visibility Impairment Study: An Overview,” presented at the 84th Meeting of the Air and Waste Management Association, Vancouver, British Columbia (June 1991)

“Receptor and Dispersion Modeling of Aluminum Smelter Contributions to Elevated PM<sub>10</sub> Concentrations” (with R. G. Ireson and A. B. Hudischewskyj), presented at the 84th Meeting of the Air and Waste Management Association, Vancouver, British Columbia (June 1991)

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“Virginia City Power Plant Modeling,” prepared on behalf of the Chesapeake Bay Foundation, Annapolis, MD (2008)

“Chesterfield Power Plant Modeling,” prepared on behalf of the Chesapeake Bay Foundation, Annapolis, MD (2008)

“The Deposition of Airborne Mercury in Pennsylvania,” prepared on behalf of the Chesapeake Bay Foundation, Annapolis, MD (2007)

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“Air Quality Modeling and Visibility Impacts Associated with Sammis Power Plant Emissions,” prepared on behalf of the United States of America, Washington, D.C. (2003)

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“Assessment of the Impacts of Clean Air Act and Other Provisions on Visibility in Class I Areas” (with others), prepared for American Petroleum Institute, Washington, D.C. (1998)

“California Regional PM<sub>10</sub> Air Quality Study: 1995 Integrated Monitoring Study Data Analysis: Time and Length Scales for Mixing Secondary Aerosols During Stagnation Periods” (with others), prepared for California Air Resources Board, Sacramento (1997)

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“Base Case Carbon Monoxide Emission Inventory Development for Maricopa County, Arizona” (with others), SYSAPP-93/077, prepared for Maricopa Association of Governments, Phoenix, Arizona (1993)

“Sacramento FIP Modeling 3: Future Emissions Inventory” (with others), SYSAPP-93/036, prepared for Pacific Environmental Services, Inc., North Carolina and U.S. Environmental Protection Agency, San Francisco (1993)

“Emissions Inventory Development for the Tribal Air Program” (with M. Causley and S. Reid), SYSAPP-92/146, prepared for U.S. Environmental Protection Agency, Region VIII, Denver, Colorado (1992)

“Carbon Particle Emissions Inventory for Denver Brown Cloud II: Development and Assessment” (with S. B. Reid and L. R. Chinkin), prepared for Colorado Department of Health, Denver, Colorado (1992)

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“Modeling Program for PM-10 State Implementation Plan Development for the El Paso/Ciudad Juarez Airshed” (with C. Emery and M. Ligocki), SYSAPP-91/134, prepared for U.S. Environmental Protection Agency, Dallas Texas (1991)

“Deterministic Modeling for Navajo Generating Station Visibility Study. Volume I. Technical Report” (with others), SYSAPP-91/045a, prepared for Salt River Project, Phoenix, Arizona (1991)

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“Policy on Recombinant DNA Activities: Relaxing Guidelines While Increasing Safety,” project report, Department of Engineering and Public Policy, Carnegie-Mellon University, Pittsburgh, Pennsylvania (1978)

“Air Pollution Control Analyses for State Implementation Plan Revisions in Allegheny County,” project report, Department of Engineering and Public Policy, Carnegie-Mellon University, Pittsburgh, Pennsylvania (1978)

**EMPLOYMENT HISTORY**

Systems Applications International	Manager, PM <sub>10</sub> and Visibility Program	1989–1997
South Coast Air Quality Management District	Air Quality Specialist	1985–1989
California Institute of Technology, Pasadena, California	Research Assistant Laboratory Assistant	1979–1985 1979
Carnegie-Mellon University, Dept. of Mechanical Engineering Pittsburgh, Pennsylvania	Research Assistant	1978–1979