

# Michigan's 2015 Ambient Air Monitoring Network Review



Michigan Department of Environmental Quality  
Air Quality Division  
May 19, 2014 - Draft

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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 201 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:

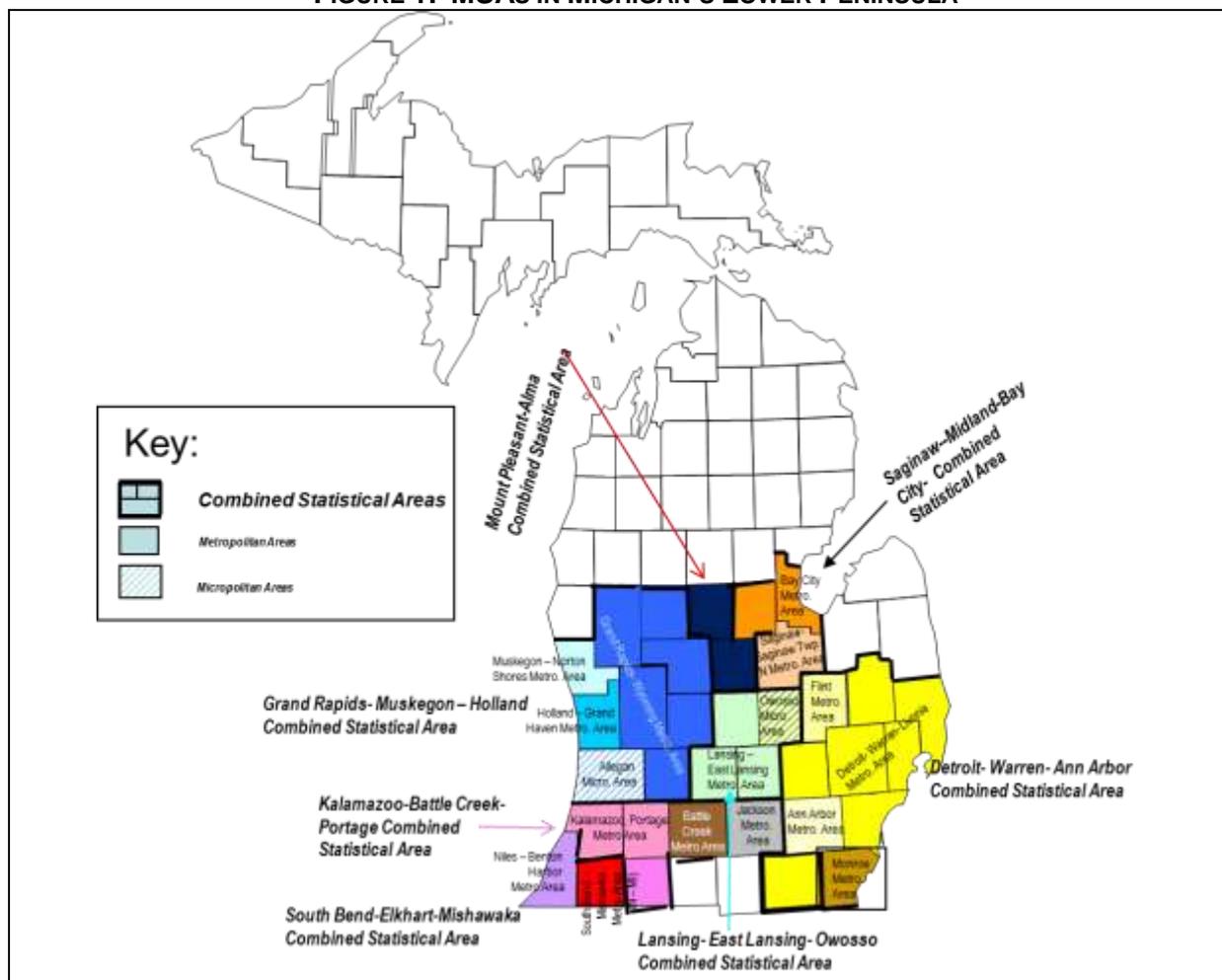
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All written comments that are received will be organized by topic, summarized, and addressed in the final version of the Michigan Ambient Air Monitoring Network Review. The final document will be placed on the AQD section of the MDEQ Internet homepage 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>	NOy	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
Benzonza (Frankfort)	260190003	x																	T
Coloma	260210014	x	x															x	T
Cassopolis	260270003	x																x	B
Sault Ste. Marie +	260330901	x	x	x <sup>+</sup>														x	
Rose Lake	260370001	x																	B
Flint	260490021	x	x	x														x	T
Otisville	260492001	x																x	T
Harbor Beach	260630007	x																x	T
Belding - Reed St	260670002													Pb & 4				x	B
Belding - Merrick St	260670003													Pb & 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													Pb & 4					
Seney	261530001	x		x														x	T
Vassar	261570001													Pb & 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

Total 27 25 14 8 5 2 2 2 5 2 4 2 10 2 3 1 38

+	= 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

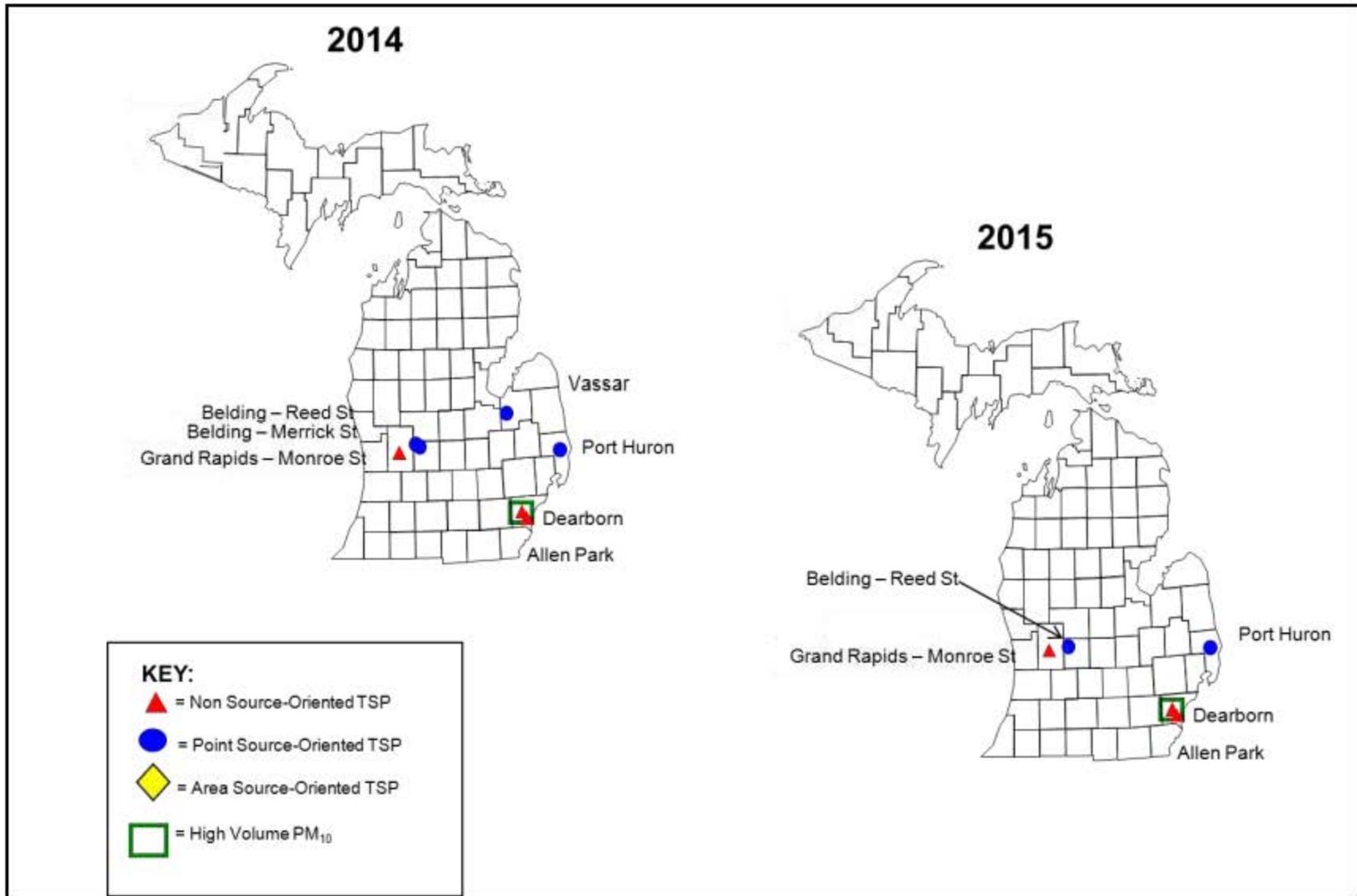
Monitoring Sites			Part. Size	Latitude		Longitude		Sampling Frequency Purpose		Scale	County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID	Address		Latitude	Longitude	Latitude	Longitude	Frequency	Purpose					
Grand Rapids - Monroe St	260810020	1179 Monroe St., NW	TSP	42.984167	-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.

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	chemiluminescence	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			Latitude	Longitude	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID	Address								
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.

**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.

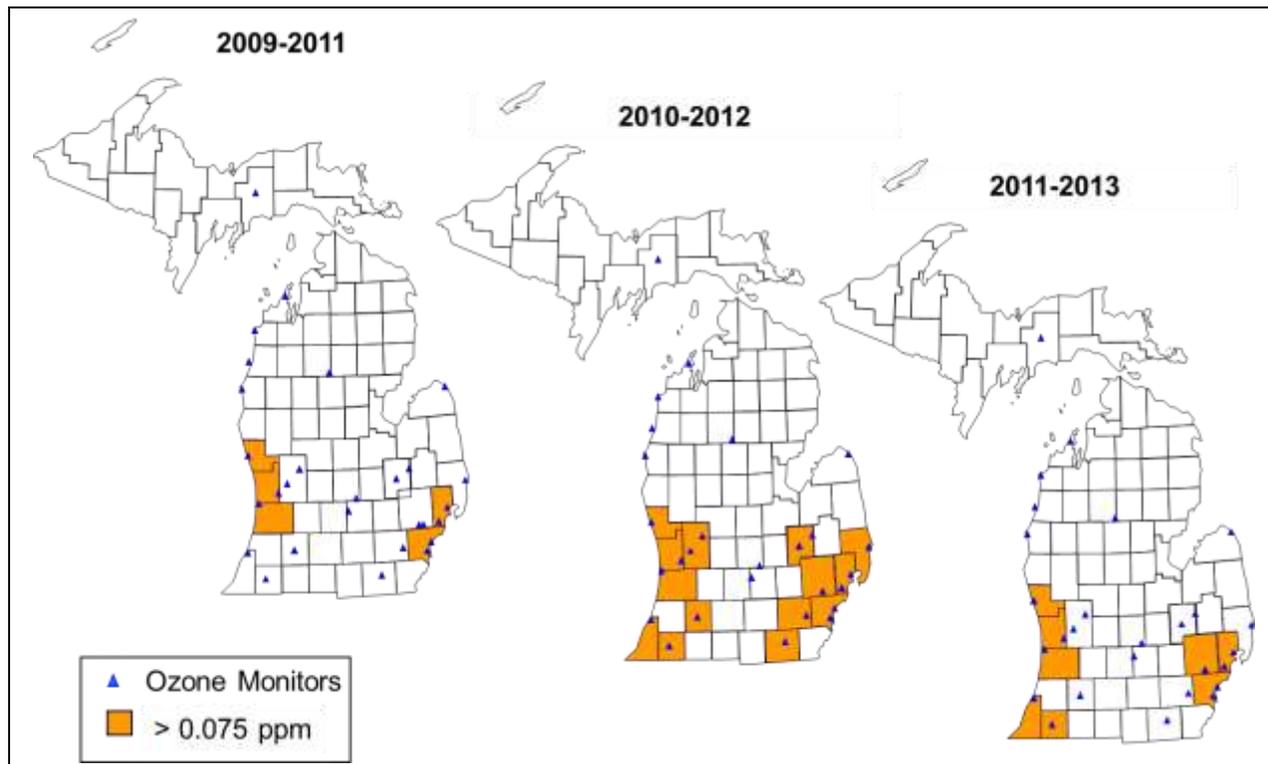
CBSA	2010 Population	Counties	Existing Monitors	2011-2013 most recent 3-year O3 design value	Min No monitors Required	
Detroit-Warren-Livonia Metro Area	4,296,250	Macomb	New Haven	0.077	3	
			Warren	0.077		
		Oakland	Oak Park	0.076		
			Wayne	Allen Park		0.072
		Lapeer	---	Detroit - E 7 Mile		0.077
			St Clair	---		---
			Livingston	---		---
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 -	---		
Grand Rapids-Wyoming Metro Area	774,160	Kent	Monroe St	0.074	2	
			Evans	0.074		
		Barry	---			
		Newaygo	---			
Holland-Grand Haven Metro Area	263,801	Ottawa	Ionia	---	1	
			Jenison	0.077		
Muskegon-Norton Shores Metro Area	172,188	Muskegon	Muskegon -	---	---	
Lansing-East Lansing Metro Area	464,036	Clinton	Green Creek Rd	0.081	1	
			Rose Lake	0.071		
		Ingham	Lansing	0.072		
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	

**Other areas:**

Comments

<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.

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.

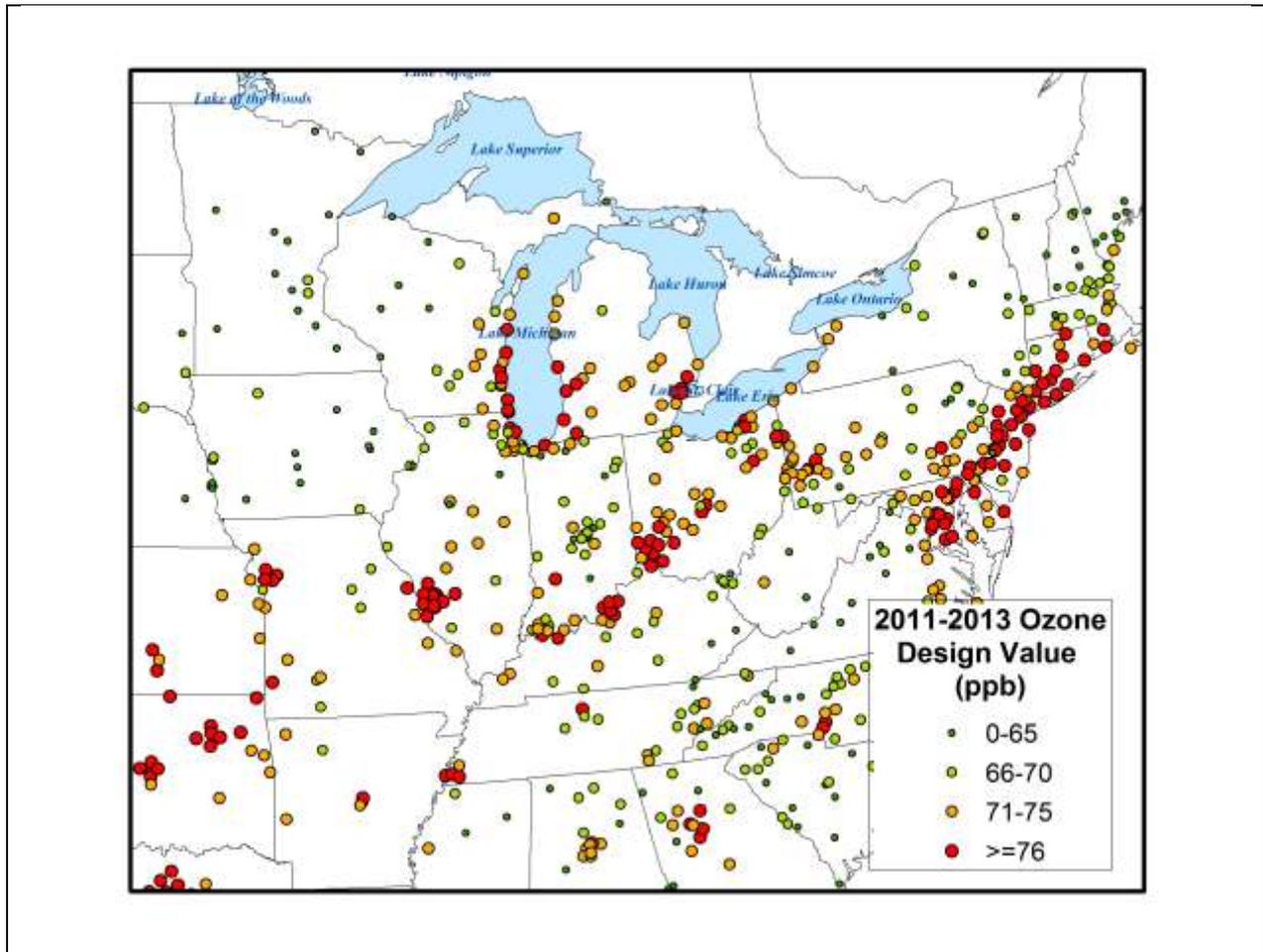
The ozone monitor in Holland (260050003) is in Allegan County and now violating the 0.075 ppm 8-hour ozone NAAQS. This site continually measures the highest ozone values in the state and had historically been the highest in the region.

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

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

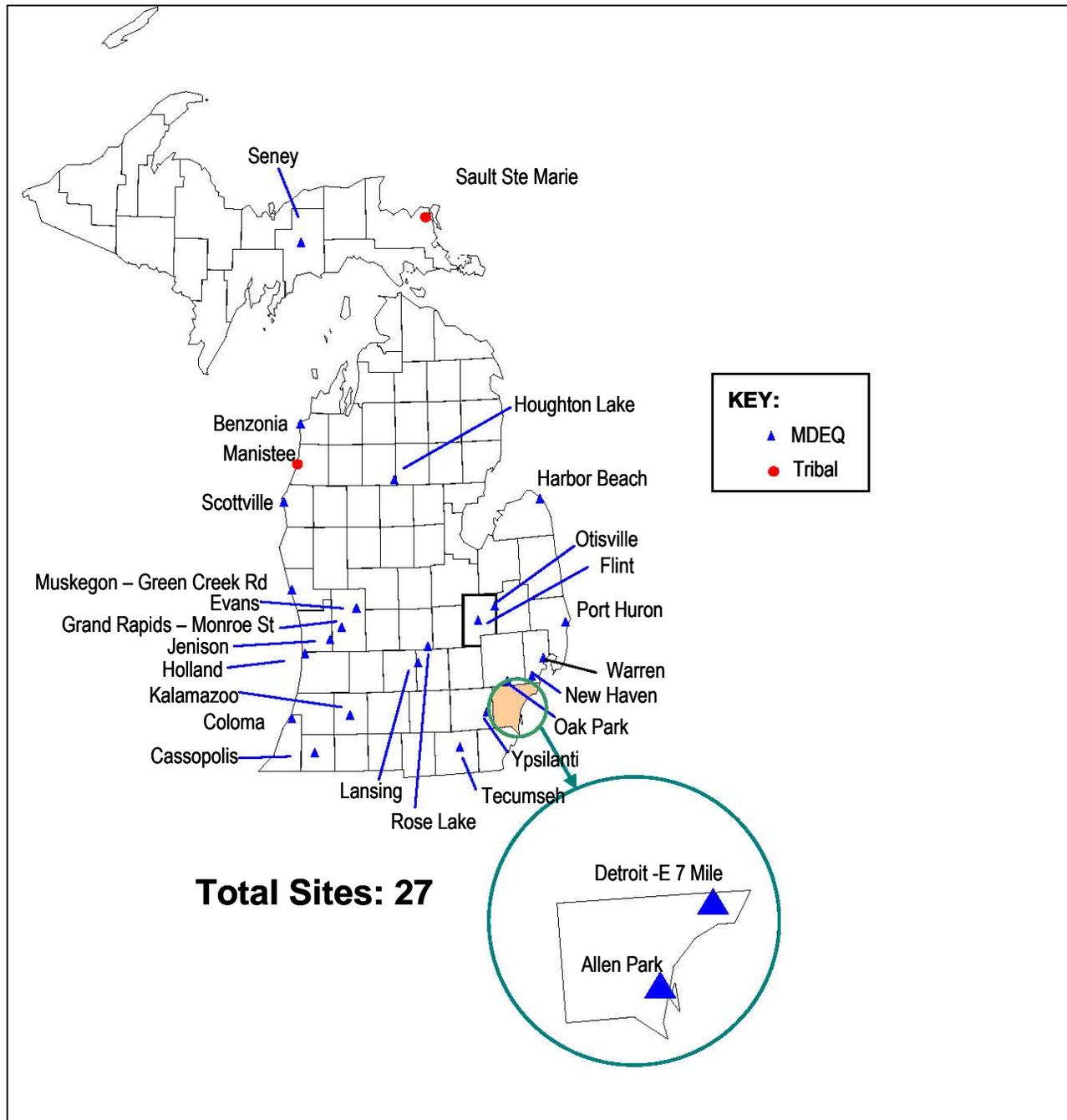
Monitoring Sites			<i>NCore sites are shown in italics</i>								Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>		
Rose Lake	260370001	8562 E Stoll Rd	42.7983	-84.39389	max conc	urban	Clinton	6/7/79	LEL	464,036	
Flint	260490021	Whaley 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	Lenaw ee	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 Domres 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.

**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	22				
			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>9.4</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	---					
		Ionia	---						
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	---			<b>0</b>			
			Ingham	Lansing	<b>8.3</b>				21
			Eaton	---					
Bay City Metro Area	107,771	Bay	Bay City	<b>7.8</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-Mishawaka Metro Area (NMI)	52,293	Cass	---						
<b>Other areas</b>									
		Allegan	Holland	8.3	22			<i>micropolitan 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)

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.

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.

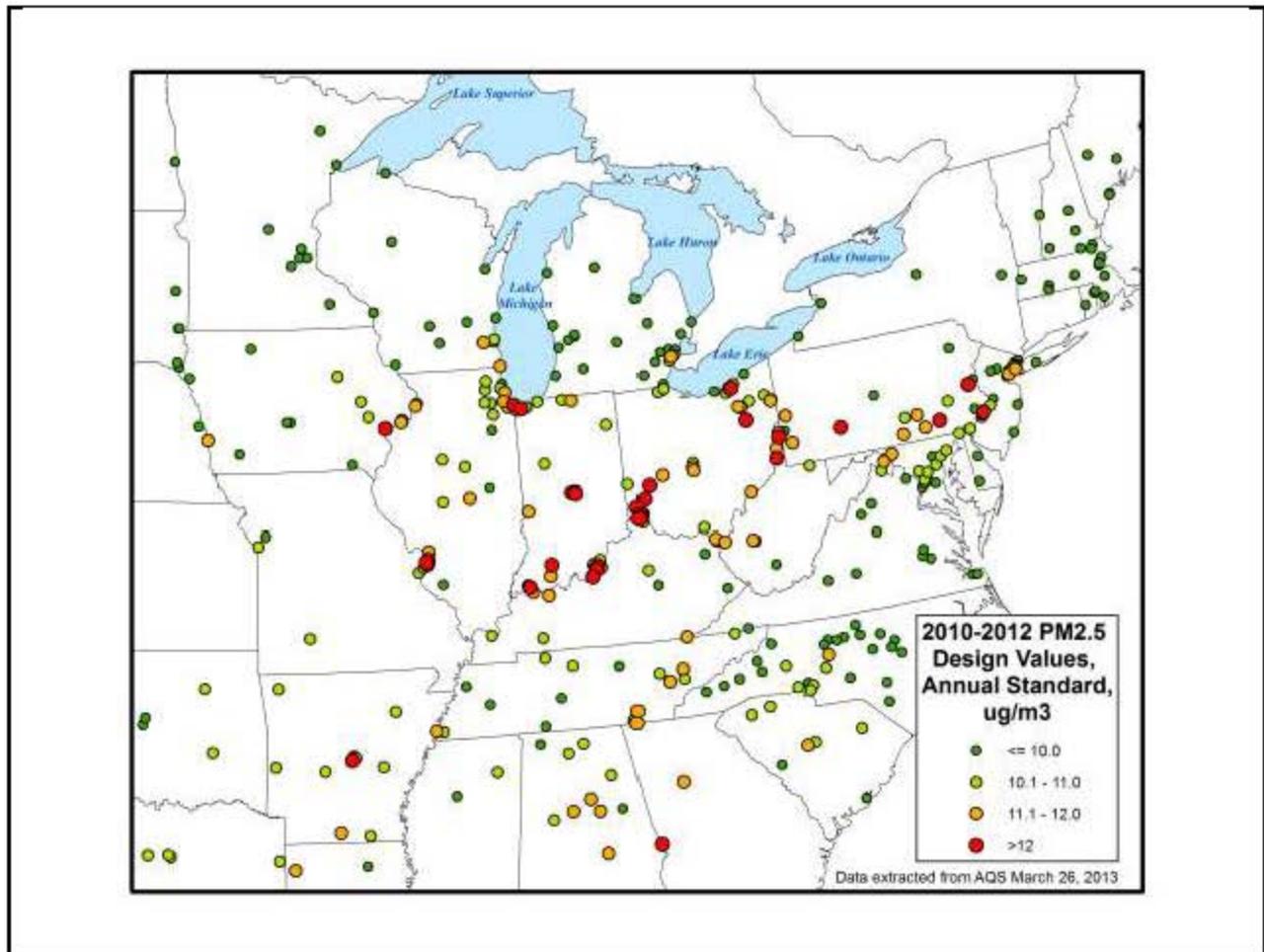
The PM<sub>2.5</sub> monitor in Holland (260050003) in Allegan County is a micropolitan area. The monitor's design value is no longer within 5% of the NAAQS. Now that concentrations have fallen, it may be possible to discontinue monitoring at Holland, but the MDEQ will continue to operate the monitor.

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

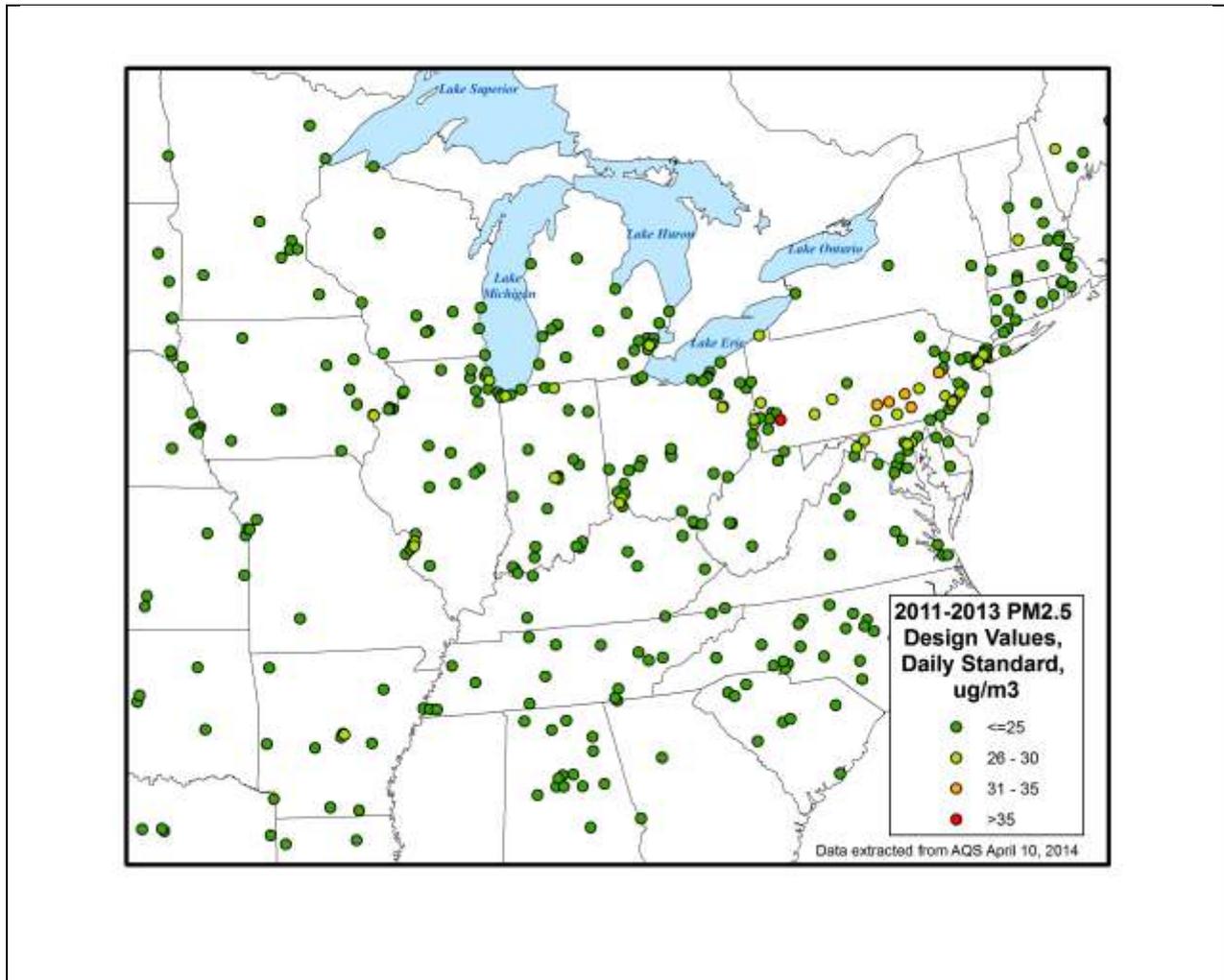
There are two tribal PM<sub>2.5</sub> monitoring sites located in Michigan, one in Manistee (261010922) and a co-located pair in Sault Ste Marie (260330901).

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.

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**

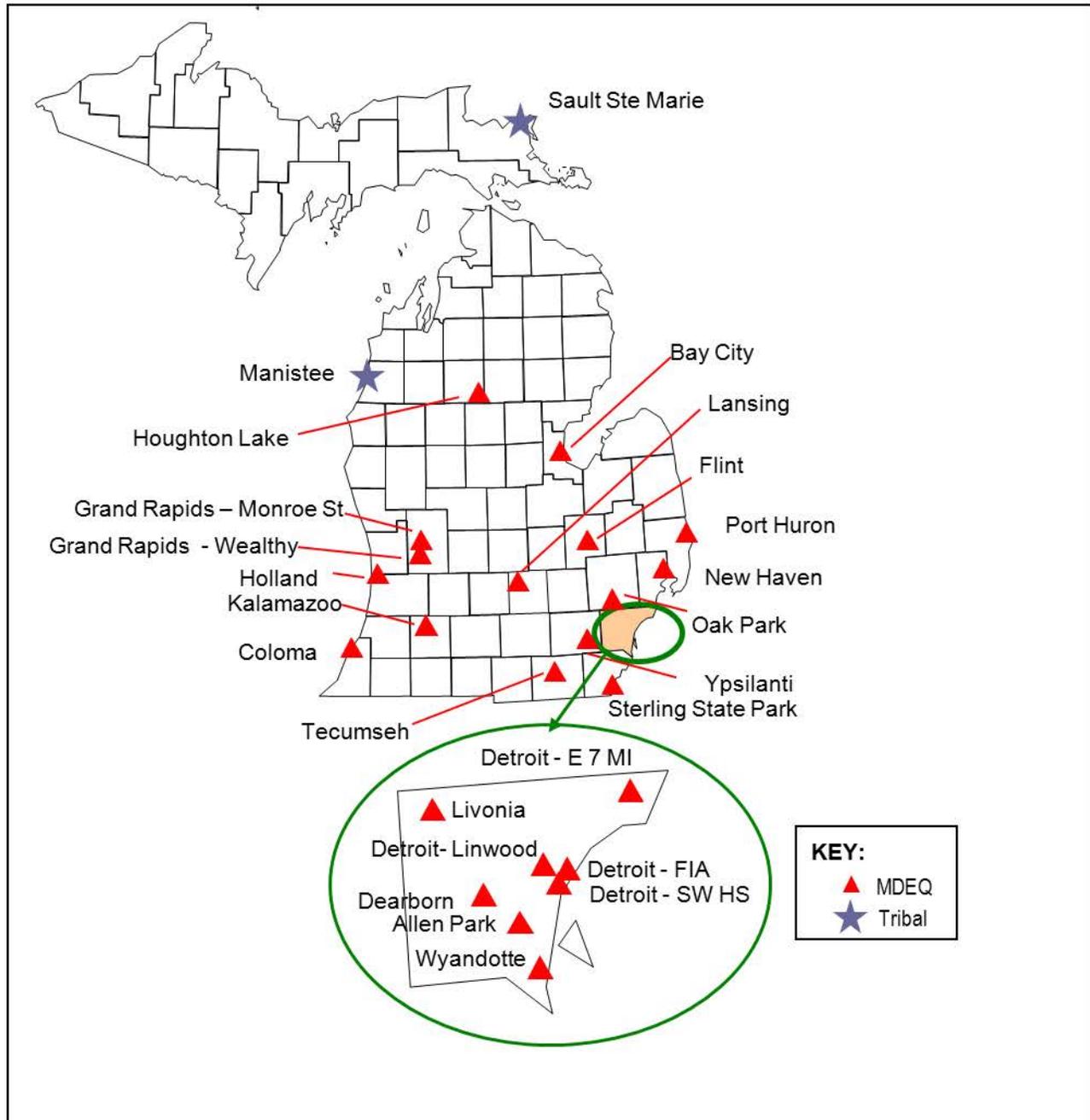
Monitoring Sites			Latitude	Longitude	Sampling Frequency	Monitor Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID	Address									
Holland	260050003	966 W. 32 <sup>nd</sup> , Holland	42.768	-86.14861	1:3	Pop. Exp.	Neighborhood	Allegan	10/31/98	A	111,408
Bay City	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	Lenawee	7/6/93	Not in CBSA	NA
New Haven	260990009	57700 Gratiott	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 Tower 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			Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID	Address										
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)

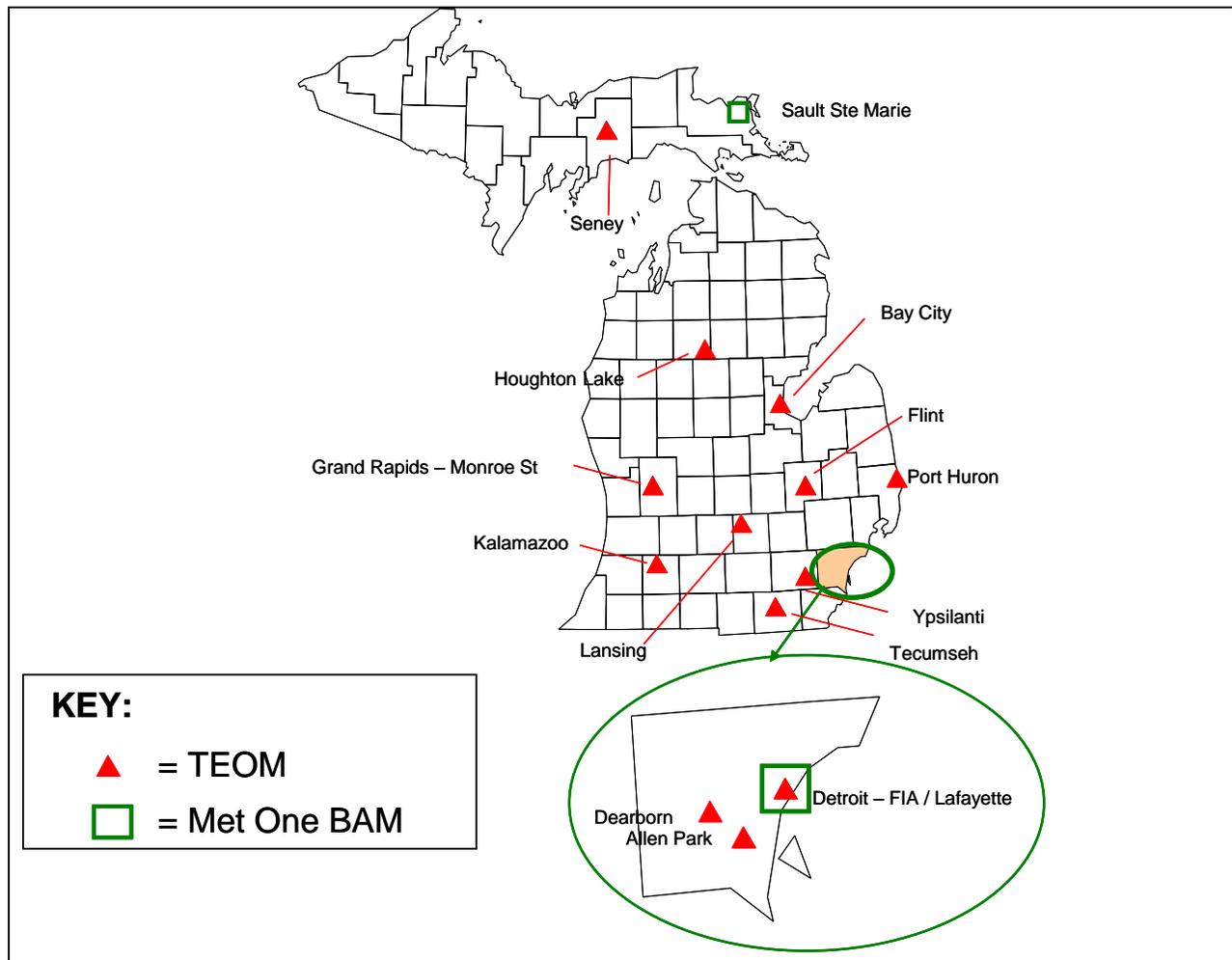
Sault Ste. Marie	260330901	650 W Easterday Ave	46.49366	-84.36416	Tribal	Regional	Chippewa	1/1/2012	Not in CBSA	N/A
Detroit - FIA/Lafayette St	261630039	2000 W Lafayette	42.323	-83.06861	Source Oriented	Neighborhood	Wayne	10/1/09	DWL	4,296,250

<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	42.229	-83.20833	1:3	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	4,296,250	
Detroit - SW HS	261630015	SW Highschool, 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

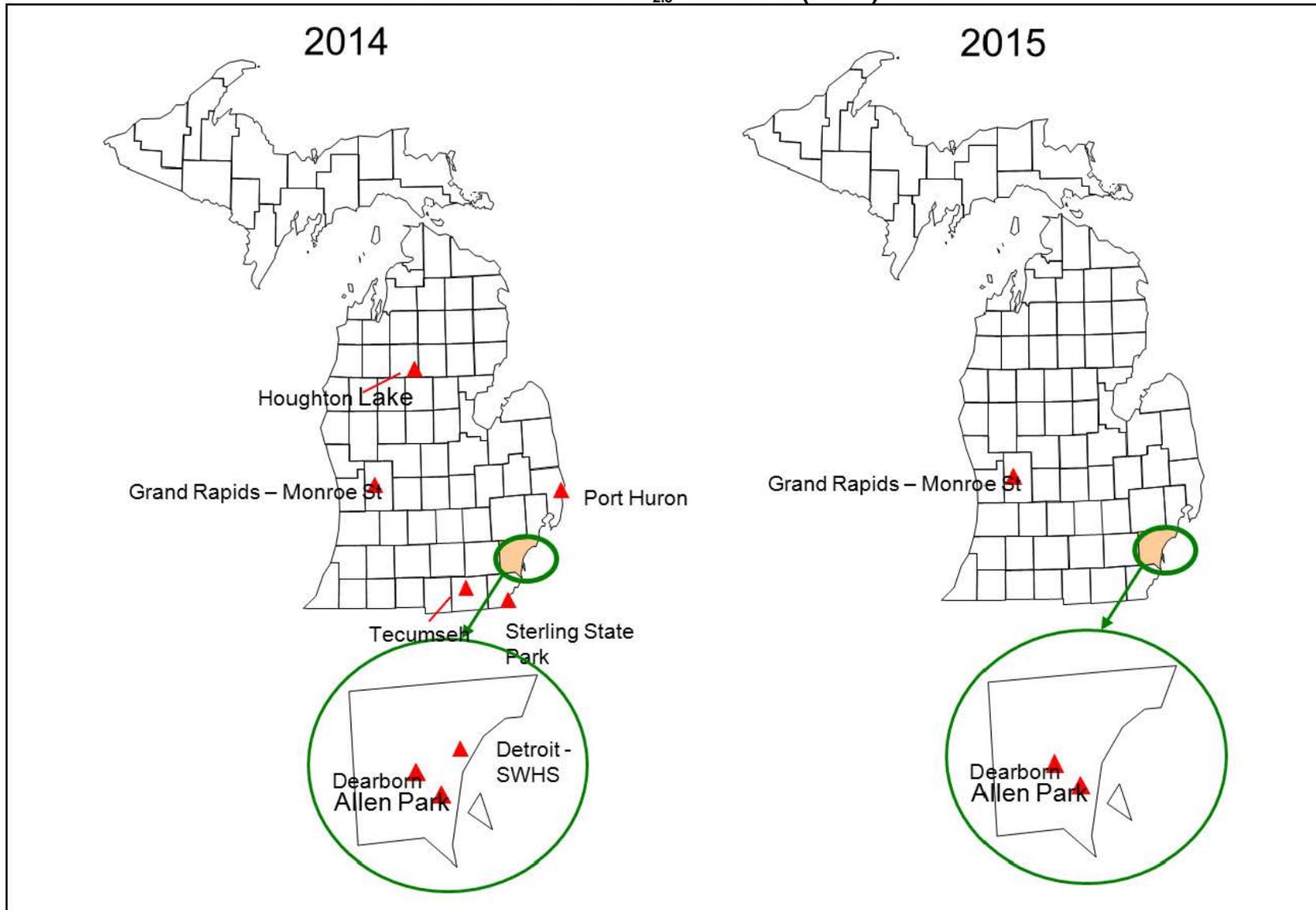
Monitoring Sites		Address	Latitude	Longitude	Sampling Method	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)	Comments
Site Name	AQS Site ID											
Allen Park	261630001	14700 Goddard	42.229	-83.20833	McGee large spot Aethalometer (carbon black)	Pop. Exp.	Neighborhood	Wayne	1/1/04	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	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>**

<b>POPULATION CATEGORY</b>	<b>HIGH CONCENTRATION<sup>2</sup></b>	<b>MEDIUM CONCENTRATION<sup>3</sup></b>	<b>LOW CONCENTRATION<sup>4,5</sup></b>
> 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 2014 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW - DRAFT**

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

**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>		Pop (2010 Census)
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		N/A
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>		Pop (2010 Census)
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>		Pop (2010 Census)
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

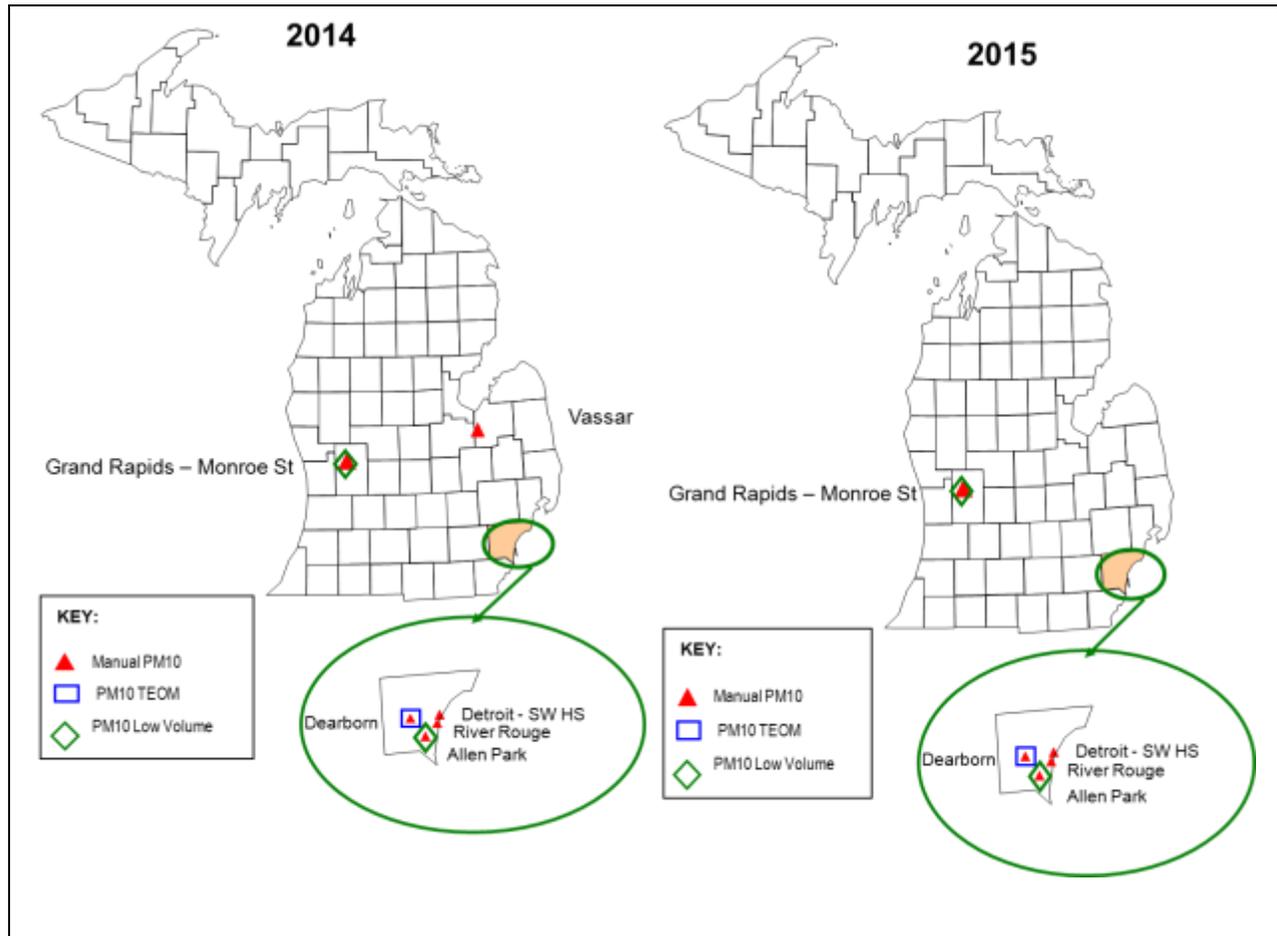
**NCore Low Volume PM Coarse Sites**

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>		Pop (2010 Census)
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**

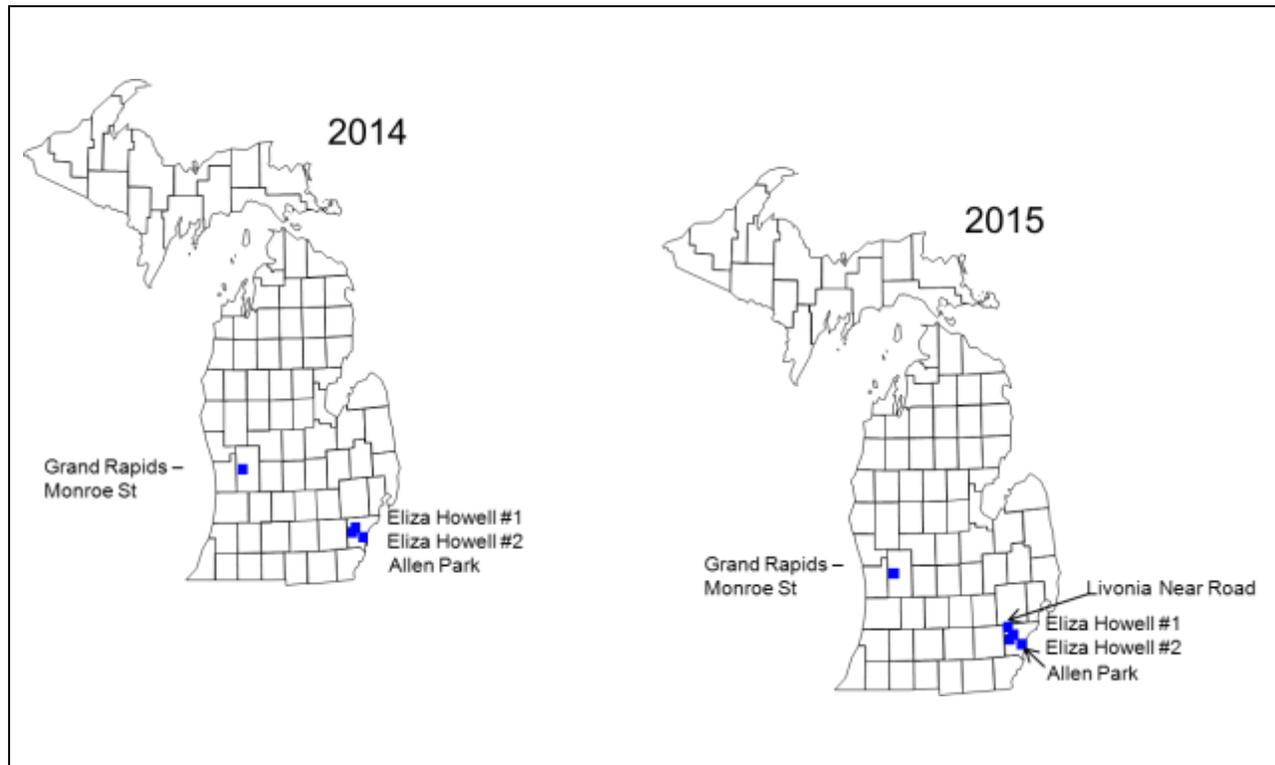
Monitoring Sites												Pop (2010)
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Date	CBSA <sup>1</sup>	Census	
Eliza Howell #1	261630093	Service Road I-96 & Telegraph	42.38599	-83.26632	CO	Near Road	nghbrhd	Wayne	9/1/11	DWL	4,296,250	
Eliza Howell #2	261630094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

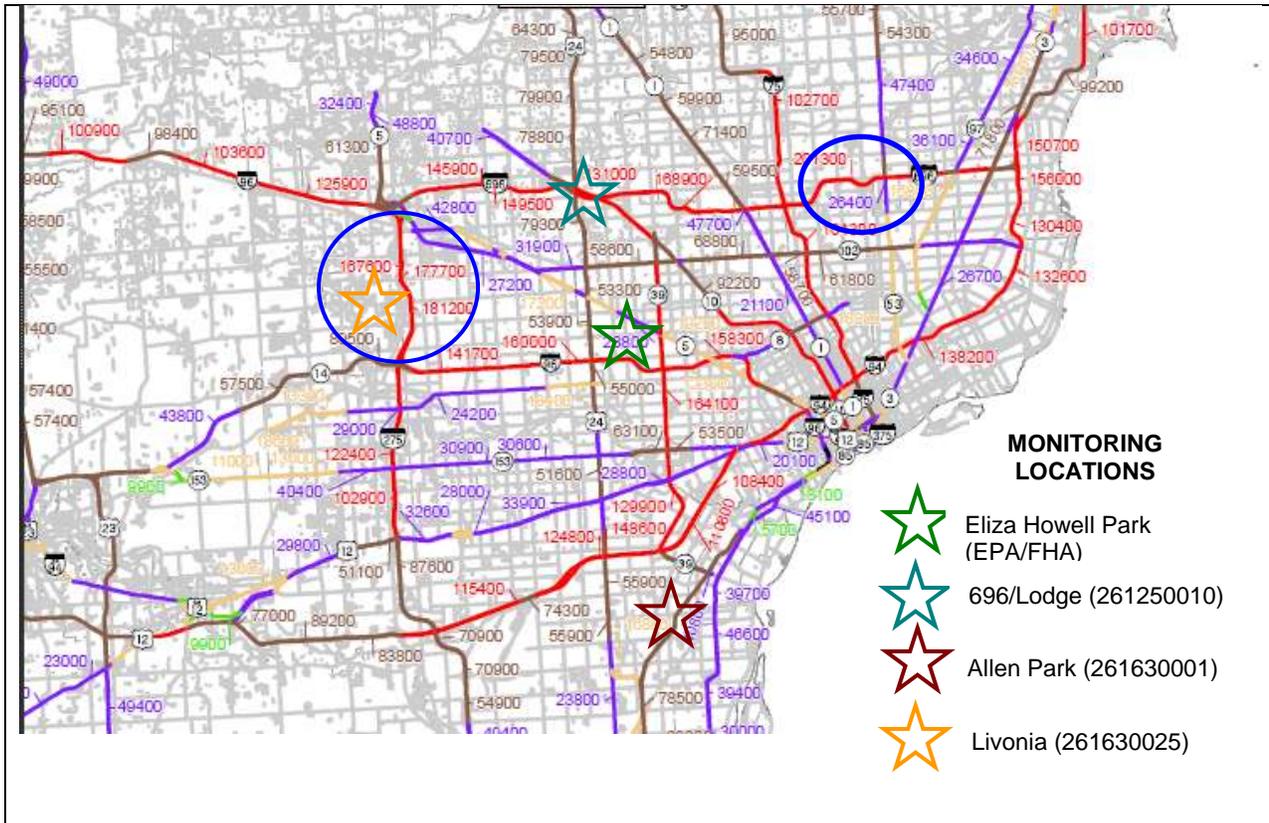
**Table 23: NO<sub>2</sub> Network Design**

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					

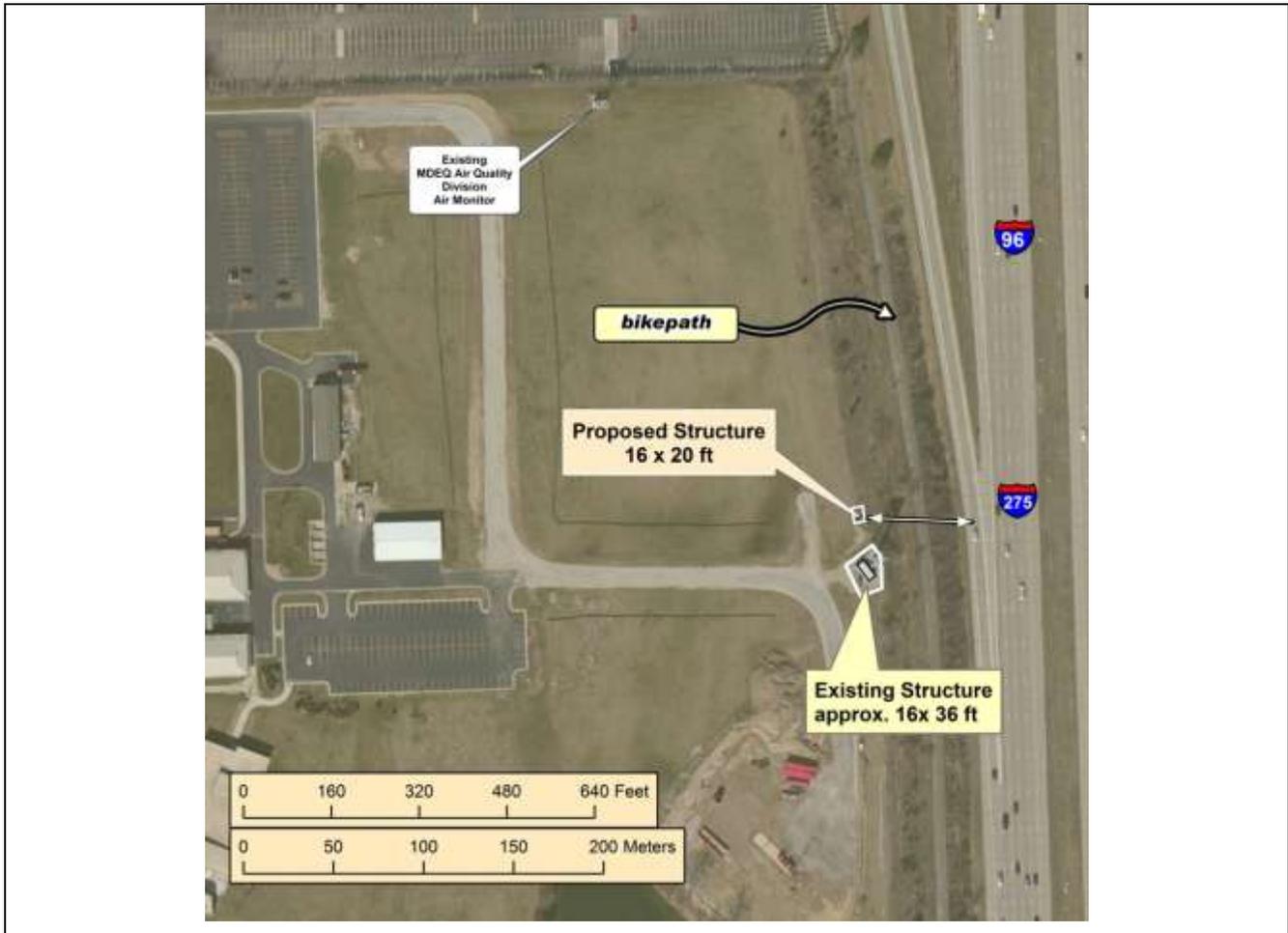
**Tier 1: Near Roadway NO<sub>2</sub> Monitors – Phase 2**

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, 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**

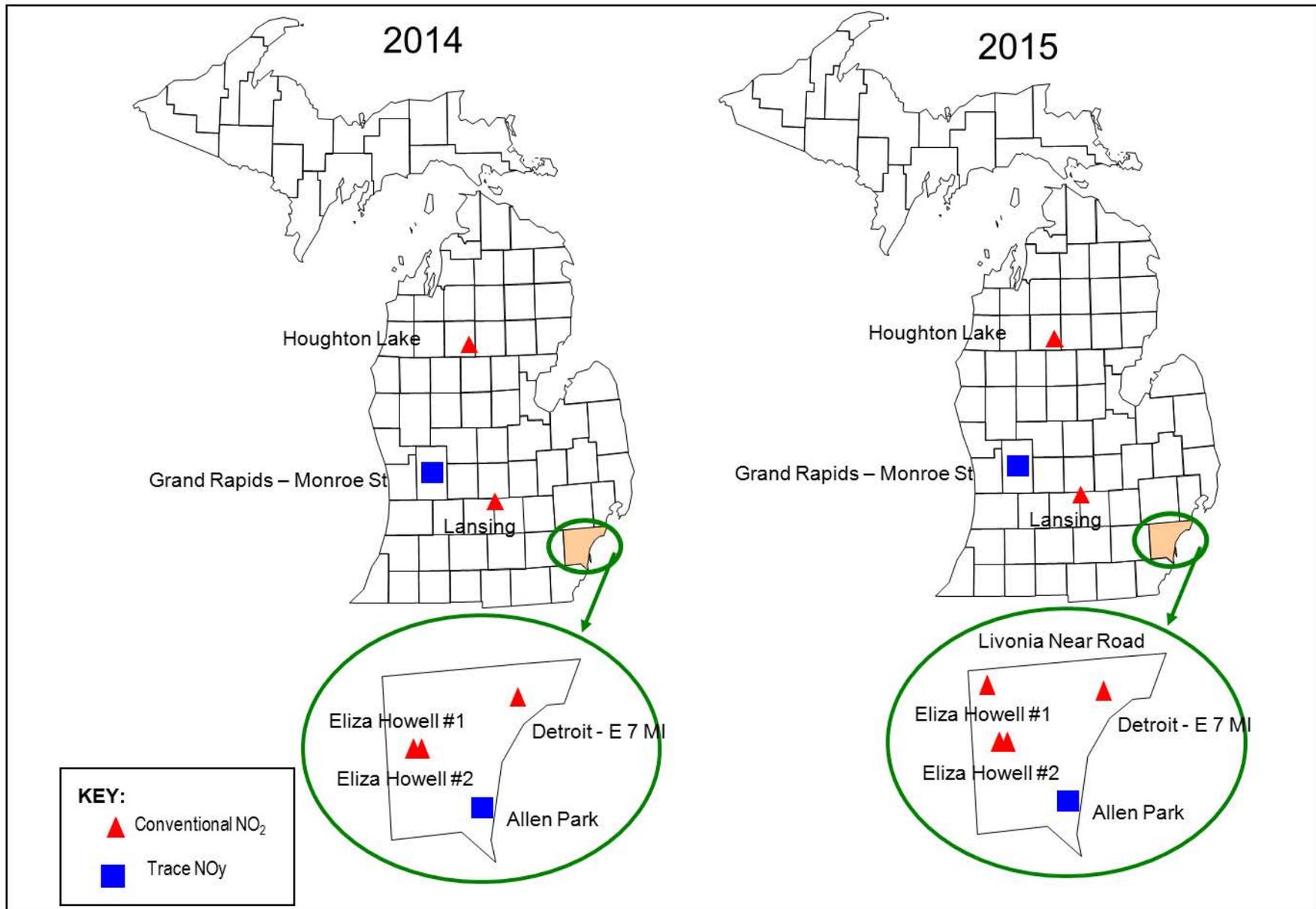
Monitoring Sites		Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
Site Name	AQS Site ID										
Detroit - E 7 Mile	261630019	11600 East Seven Mile Road	42.4308	-83.000278	NO <sub>2</sub>	pop exp	urban	Wayne	12/1/90	DWL	4,296,250
Lansing	260650012	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:

$$(\text{CBSA population}^{16}) * (\text{total SO}_2 \text{ emissions in that CBSA in tpy}) / 1,000,000 = \text{PWEI}$$

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**

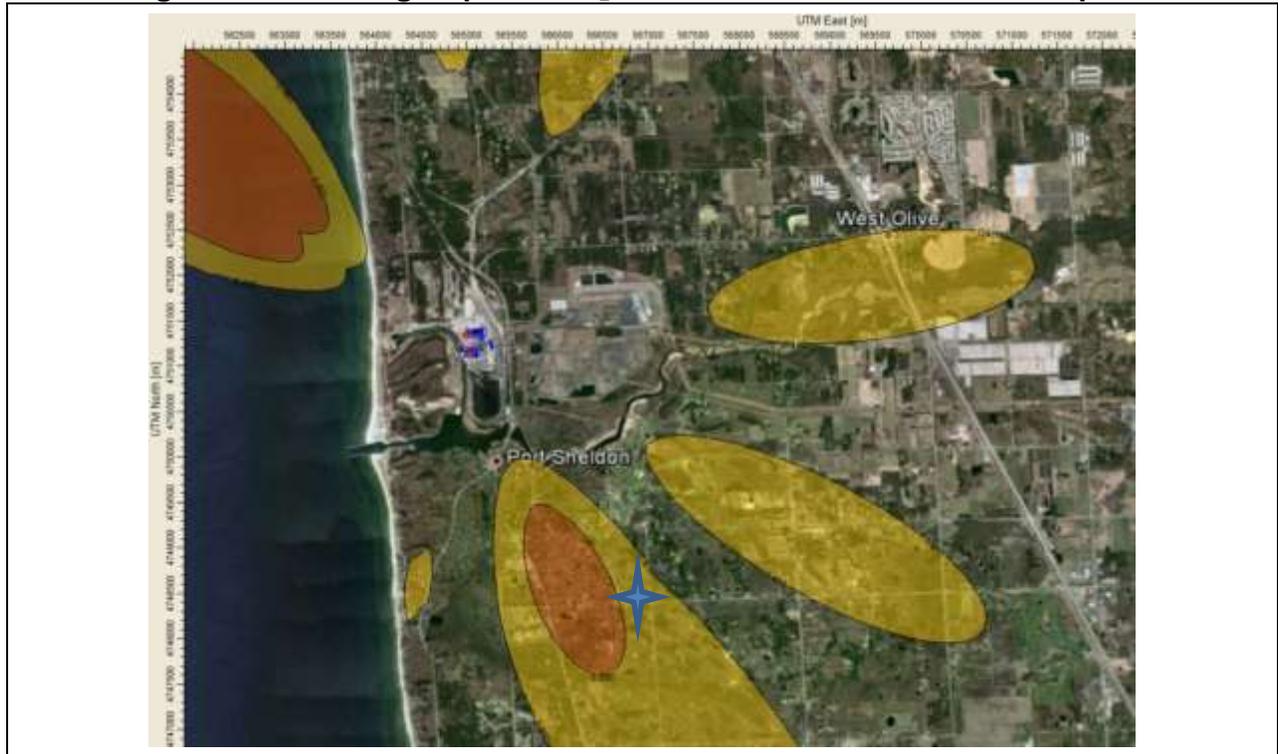
MSA	Counties	2008 NEI Download: Total County SO <sub>2</sub> Emissions, tpy	2008 NEI SO <sub>2</sub> Total Emissions, tpy	2010 Population	2008/2010 NEI PWEI	Monitors Required 2008 EI & 2010 Census
Detroit-Warren-Livonia Metro Area	Macomb	1,367.46	124,738	4,296,250	535,905	2
	Oakland	2,780.69				
	Wayne	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											
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
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

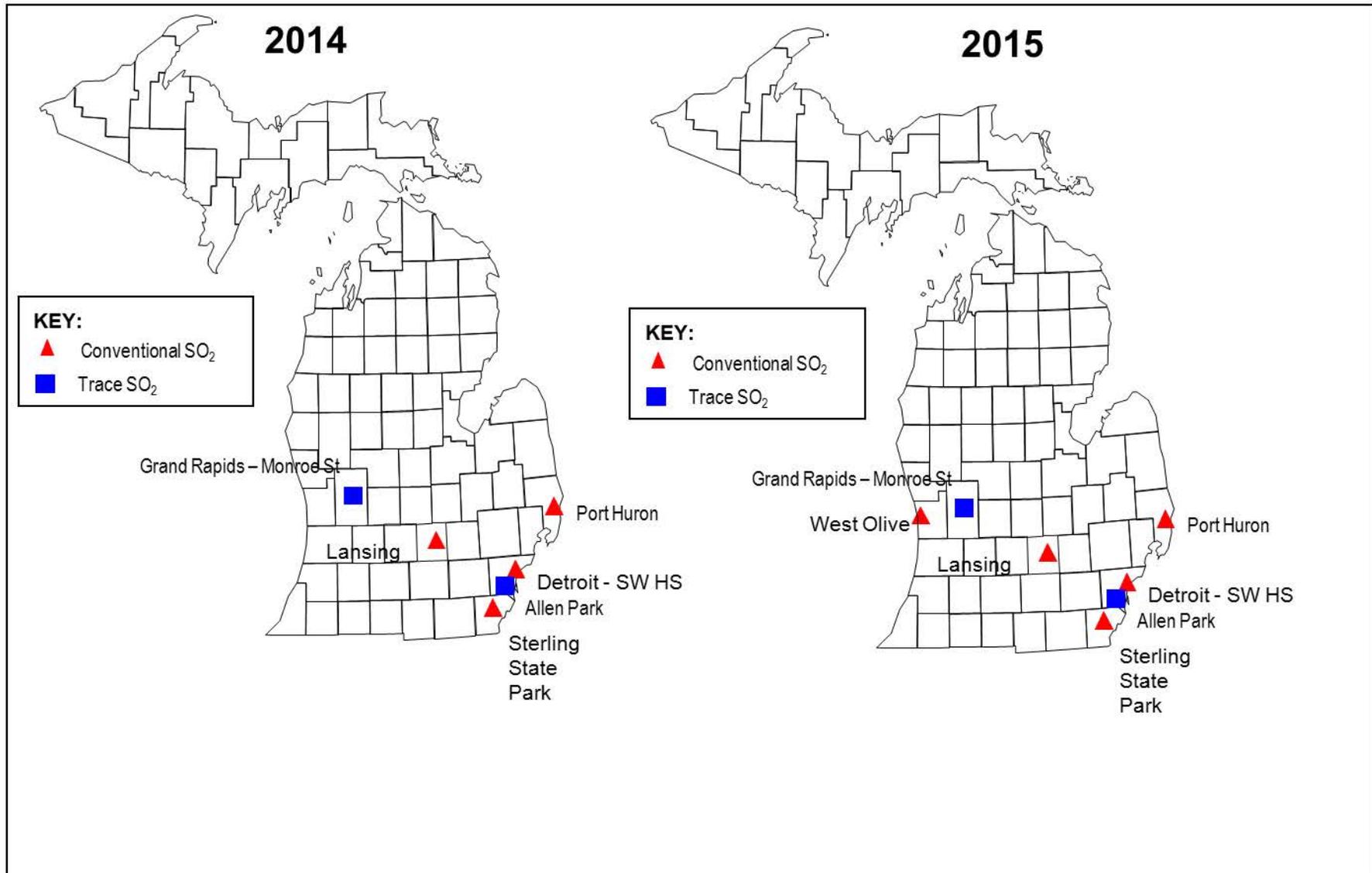
**Source-Oriented Sites**

Monitoring Sites											
Site Name	AQS Site ID	Address	Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	CBSA <sup>1</sup>	Pop (2010 Census)
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
West Olive	26139xxxx				SO <sub>2</sub>	Max Conc		Ottawa	1/1/15	HGH	263,801
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

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)

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

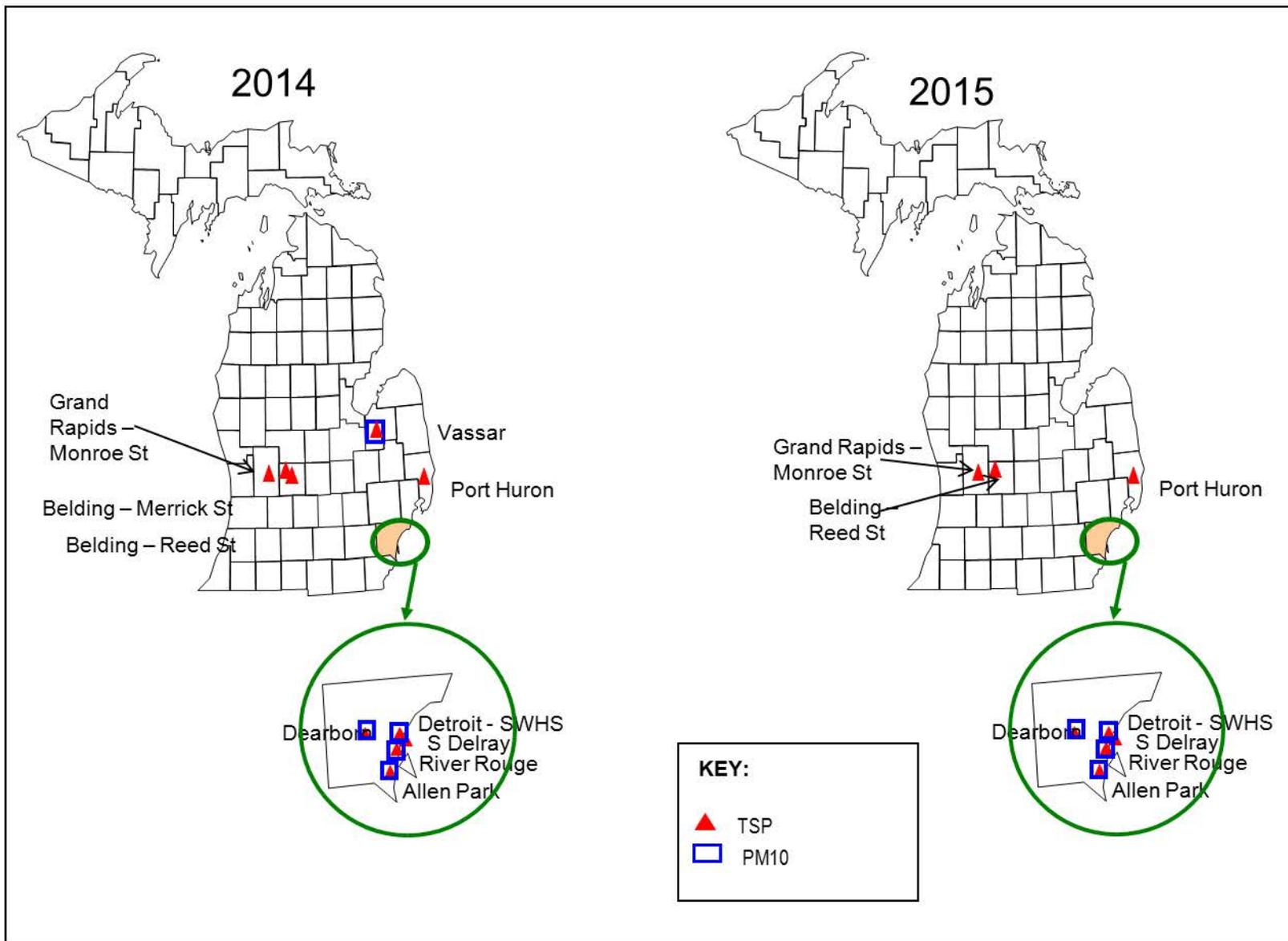
Current Monitoring Sites for 2014															
Monitoring Sites															Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Elements	Size	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>			
Belding - Reed St	260670002	545 Reed St	43.101944	-85.22000	1:6	Pb, 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		

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

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

Proposed Monitoring Sites for 2015															
Monitoring Sites															Pop (2010 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Elements	Size	Purpose	Scale	County	Date Estab.	CBSA <sup>1</sup>			
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 w 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)

- 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

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. 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.