



Air Quality Division
Michigan Department of Environmental Quality

MICHIGAN'S 2010 AMBIENT AIR MONITORING NETWORK REVIEW

MAY 21, 2009

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EXECUTIVE SUMMARY:

The purpose of this document is to examine Michigan's ambient air monitoring network in operation during 2008-2009 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 2010 calendar year, contingent upon adequate levels of funding.

The draft 2010 grant guidance recommends¹ that states defer from making major changes to their sulfur dioxide (SO₂), carbon monoxide (CO), and nitrogen dioxide (NO₂) networks until the U.S. Environmental Protection Agency (EPA) can complete the National Ambient Air Quality Standard (NAAQS) reviews for these pollutants, perhaps as early as May 13, 2011. As a result of these reviews, changes to the monitoring networks may have to be implemented. Also, a comprehensive 5-year network review is due by July 1, 2010. Therefore, substantial changes to Michigan's air monitoring network will be delayed until after the completion of the 5-year network review and EPA's review of the CO, NO₂ and SO₂ NAAQS.

Unfortunately, at the time that this network review was being conducted, the Michigan Department of Environmental Quality (MDEQ) was notified that the form of federal grant funding for the fine particulate matter (PM_{2.5}) program may be changed for fiscal year (FY) 2010. This change, from a 103 grant to a 105 grant, could require that states provide a 40% match, with EPA providing only 60% of what was provided for PM_{2.5} monitoring in the past. In addition, the grant dollars would no longer be earmarked solely for the operation of the PM_{2.5} network. If this funding change comes to fruition, the MDEQ will NOT be able to absorb the costs to operate the ambient network in its current form, necessitating that a number of monitoring activities be discontinued.

Since it is still speculative at this time if and how EPA will switch the PM_{2.5} funding mechanism in 2010, MDEQ will assume that FY 2009 funding will remain constant. MDEQ feels this approach is more prudent than describing various network scenarios that could result from yet unquantified cuts because many of these scenarios would entail networks not meeting all applicable federal requirements. If EPA does indeed cut MDEQ's funding for FY 2010, MDEQ will work with EPA Region 5 staff to determine the appropriate monitoring approach.

In previous years, the network review was named for the year before any changes occurred. For example, a previous review was called the 2006 network review, was published in 2007 and described changes to the 2008 monitoring network. To be consistent with other states in the region, MDEQ is changing the naming convention and will name the review according to the year that the changes will take place. In other words, the network review that was published in 2008 described changes to the 2009 monitoring network and was titled "Michigan's 2009 Network Review." Due to the change in the naming convention, there are no 2007 nor 2008 network reviews. The sequence jumps from "Michigan's 2006 Ambient Air Monitoring Review" to "Michigan's 2009 Ambient Air Monitoring Review." The 2010 Ambient Air Monitoring Review continues with this convention.

¹ *Draft Fiscal Year 2010 National Program and Grant Guidance*, U. S. EPA Office of Air and Radiation, February 18, 2009.

BACKGROUND

There are a number of discussions at the federal level that may impact the future design of Michigan's monitoring network that include changes to the NAAQS for ozone and lead, the deployment of the National Core (NCORE) network and modification of the type of federal funding.

On March 12, 2008, the EPA changed the NAAQS for ozone, reducing the level of the standard from 0.08 ppm to 0.075 ppm. This change will likely have implications in the design of the ozone network and may impact the length of the ozone season in some areas. The EPA issued a proposed monitoring rule describing any required changes in the monitoring network in June 2008. The final rule is anticipated in late 2009. The final rule may provide detailed guidance about the design of the ozone network and length of the ozone season. Smaller metropolitan areas with population levels between 50,000 and 350,000, currently without ozone monitors, *may* be required to monitor under the new rule. Since details are forthcoming, the modifications to the design of Michigan's ozone network will be considered in the next network review. Although changes to the ozone season are due to be implemented during 2010 such changes are not anticipated in Michigan. The ozone season should continue to run from April 1 through September 30.

On November 12, 2008, the 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. The monitoring network design has been modified to consist of both source-oriented monitors as well as population oriented monitors. An emissions threshold of 1.0 ton per year has been established that triggers a source-oriented monitoring requirement. The source-oriented lead monitoring sites have to be operational by January 1, 2010 so are included in this network review. Although the population-oriented monitoring sites are not required to be operational until January 2011, this component will also be included in this network review for completeness. The population oriented sites are already in existence. Therefore, the MDEQ will have both its source-oriented and population-oriented networks in operation by January 1, 2010.

The October 17, 2006 changes to the ambient monitoring requirements set a deadline for the deployment of the NCORE network by 2011, with the network design plans due by July 1, 2009. Michigan's NCORE network is discussed in the current network review meeting this deadline.

RECOMMENDATIONS FOR MICHIGAN'S AIR MONITORING NETWORK IN 2010

There are only a few monitors that are recommended for closure in 2010. A special one-year study was conducted at Tecumseh beginning in April 2008. Although it was planned to shut down the following monitors on April 1, 2009: PM_{2.5} federal reference monitor (FRM), PM_{2.5} speciation, continuous elemental carbon/organic carbon (EC/OC) and carbon black measured with an aethalometer, the collection of a full year of EC/OC and carbon black data was not collected due to a special study that was conducted near the Rouge Mere Railyard in 2009. The EC/OC instrument and aethalometer were relocated to support this special monitoring project. Monitoring was resumed at Tecumseh in 2009 after completion of the special study. The MDEQ will continue to operate the particulate equipment (PM_{2.5} FRM, PM_{2.5} speciation, continuous EC/OC and carbon black) site for an additional year. The MDEQ is also planning to deploy an R & P tapered element oscillating microbalance (TEOM) to Tecumseh from June 2009 through August 2010 to help in an exposure study being conducted by University of Michigan (U of M) and Michigan State University (MSU).

The POC 2 co-located PM_{2.5} FRM sampler will be relocated from Allen Park (261630001) to Dearborn (261630033) to create additional deck space at Allen Park for population-oriented lead monitoring.

Humidity will be added to the Grand Rapids (260810020) NCore station by January 1, 2010.

If funding levels are inadequate to support speciation at both Houghton Lake (2611130001) and Tecumseh (260910007) from April 1, 2009 through March 2010, the Houghton Lake speciation sampler will be shut down.

Historical data² shows that ozone levels remain low outside of the current ozone season and there is little likelihood of a violation of the more stringent NAAQS in March or October in Michigan. Although the EPA's final recommendations for the length of the ozone season are not available at this time, it seems likely that the ozone season will remain April 1 to September 30 in Michigan.

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

One of the EPA's requirements for the network review is that it must document the process for obtaining public comments and will need to include any comments received through the public notification process. For Michigan, this network review document is being placed on the Air Quality Division (AQD) section of the MDEQ Internet homepage to solicit comments from the general public and stakeholders. Reviewers will be given 30 calendar days from the date that this draft network review report is posted to provide written comments. Written comments will be accepted either by e-mail or by parcel post (verbal comments will not be accepted) and should be sent to:

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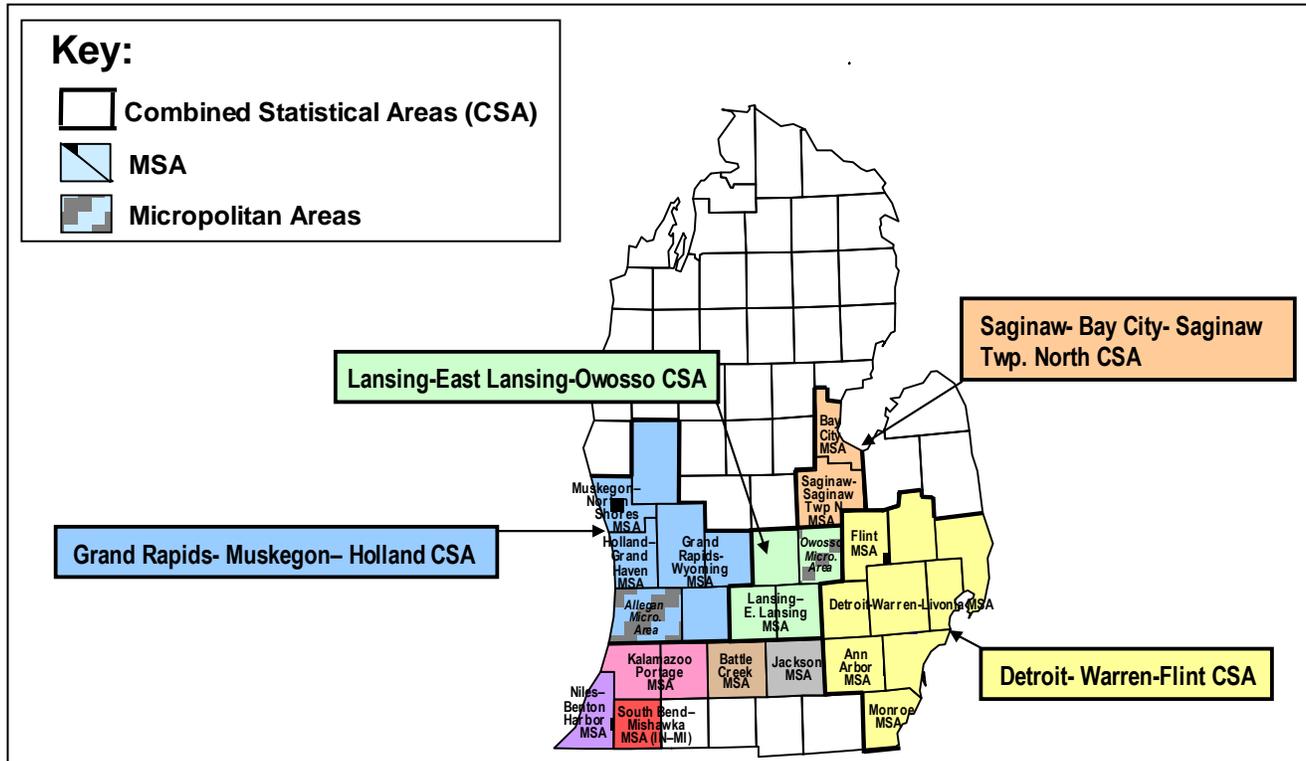
All written comments received will be organized by topic, summarized, and addressed in the final version of the Michigan Ambient Air Monitoring Network Review. That document will be placed on the AQD section of the MDEQ Internet homepage and sent to EPA Region 5 for approval. Hardcopies of the final version may be inspected 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.

² A detailed analysis of historical ozone data was included in the 2009 Network Review.

AMBIENT AIR MONITORING NETWORK REQUIREMENTS:

On October 17, 2006, the ambient monitoring requirements were changed under the CAA, 40 CFR Part 58. The minimum network design criteria for ozone, PM_{2.5} (PM with an aerodynamic diameter less than or equal to [≤] 2.5 micrometers) and PM₁₀ (≤10 micrometers) are now based on the 2000 Metropolitan Statistical Area (MSA) geographical borders, population totals, and historical concentrations. Minimum network requirements no longer exist for SO₂, NO₂, and CO. Based on the 2000 census, the new MSA outlines for Michigan's Lower Peninsula are shown in **Figure 1**.

FIGURE 1: MSAs IN MICHIGAN'S LOWER PENINSULA



The population of each MSA or Combined Statistical Area (CSA) is a critical factor in network design for eligibility in receiving an air monitor under the new regulations. Each MSA must have an urban core population totaling at least 50,000 people in the most recent decennial census. MSAs achieving that population density requirement 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 CSAs, also shown in **Figure 1**. Note: Only those micropolitan areas that are part of larger CSA 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 population, plus adjacent counties having a high degree of social and economic integration. MSAs and micropolitan areas are the two categories of a CBSA. The specific counties that make up each MSA or micropolitan area are listed in **Table 1**.³ These geographical areas, coupled with their population totals and historical

³ **Table 1** was obtained from the Library of Michigan, LDDS, Department of History, Arts, and Libraries, June 10, 2003.

ambient monitoring data were used to develop the minimum monitoring network design for ozone, PM_{2.5}, and PM₁₀.

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

| CORE BASED STATISTICAL AREA | URBAN CORE | CENTRAL METROPOLITAN COUNTIES | OUTLYING METROPOLITAN COUNTIES |
|---|---|-------------------------------|--------------------------------|
| Ann Arbor | Ann Arbor Urbanized Area | Washtenaw | |
| Battle Creek | Battle Creek Urban Area | Calhoun | |
| Bay City | Bay City Urbanized Area | Bay | |
| Detroit-Warren-Livonia* | Detroit Urbanized Area | Macomb, Oakland, Wayne | |
| | Port Huron Urbanized Area | St. Clair | |
| | Lapeer Urban Cluster | | Lapeer |
| | South Lyon- Howell- Brighton Urbanized Area | Livingston | |
| Flint | Flint Urbanized Area | Genesee | |
| Grand Rapids-Wyoming | Grand Rapids Urbanized Area | Kent | Barry, Newaygo |
| | Ionia Urban Cluster | | Ionia |
| Holland-Grand Haven | Holland Urbanized Area | Ottawa | |
| Jackson | Jackson Urbanized Area | Jackson | |
| Kalamazoo-Portage | Kalamazoo Urbanized Area | Kalamazoo | |
| | Paw Paw Urban Cluster | | Van Buren |
| Lansing-East Lansing | Lansing Urbanized Area | Clinton, Eaton, Ingham | |
| Monroe | Monroe Urbanized Area | Monroe | |
| Muskegon-Norton Shores | Muskegon Urbanized Area | Muskegon | |
| Niles-Benton Harbor | Benton Harbor – St Joseph Urbanized Area | Berrien | |
| Saginaw-Saginaw Twp. North | Saginaw Urbanized Area | Saginaw | |
| South Bend-Mishawaka Indiana-Michigan (IN-MI) | 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).

OTHER MONITORING NETWORK REQUIREMENTS

The October 17, 2006 changes to the ambient monitoring regulations eliminated the National Air Monitoring Stations (NAMS) category of monitors that were primarily used for trend purposes. Instead, NCore network sites would replace the NAMS sites providing a full suite of measurements at one location. The NCore network, when complete, will consist of about 75 sites nationwide, two of which will be in Michigan. The NCore sites will leverage the existing infrastructure and be co-located, if possible, with existing Photochemical Assessment Monitoring Stations (PAMS), National Air Toxics Trends Sites (NATTS), Clean Air Status and Trends Network (CASTNET), or speciation monitoring network sites. The NCore stations will collect the following measurements: ozone, SO₂ (trace), CO (trace), NO_y (trace), continuous PM_{2.5}, wind speed, wind direction, relative humidity, and ambient temperature. In addition, filter-based measurements will be required for PM coarse (PM_{10-2.5}) on a once every three day sampling frequency, PM_{10-2.5} speciation, and PM_{2.5}. Ten NCore sites nationwide will be selected to measure lead. The NCore monitoring plan is due by July 1, 2009, and all stations must be operational by 2011.

Although the NAMS monitors will be replaced with the NCore sites, the State and Local Air Monitoring Stations (SLAMS) monitors will remain to 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.

PM_{2.5} MONITORING NETWORK CHANGES

Michigan does not spatially average PM_{2.5} values from multiple sites to determine attainment with the annual PM_{2.5} NAAQS. Therefore, if a PM_{2.5} 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. Thus, the loss of the subject site will affect the spatial coverage of the data set, but will have no impact on attainment status.

If access to a design value site is lost, the MDEQ will attempt to locate a new site physically as close to the design value site as possible. The new monitor will have the same scale of representativeness and monitoring objectives as the closed site. If subsequent data indicate that the new site is not the design value site, one of the pre-existing sites will become the design value site and the new site will be shut down.

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."⁴
- 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 the five-year assessment due July 1, 2010.

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_{2.5} 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).

⁴ "Environmental Protection Agency Ambient Air Quality Surveillance Regulations." 40 CFR part 58 Appendix D, October 17, 2006.

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 whenever possible.

Prior to 2007, the particulate network was reviewed in a separate review that was submitted to the EPA each July. Recent changes to the monitoring regulations have incorporated the particulate review into the overall monitoring network review.

QUALITY ASSURANCE

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 monitoring network. The AMU also has QAPPs for the PM_{2.5} monitoring program, the NATTS, and has adopted the EPA's PM_{2.5} Speciation Trends Network (STN) QAPP. 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_{2.5} FRM, continuous PM_{2.5} TEOM, PM_{2.5} Speciation, High Volume TSP [total suspended particulate], and PM₁₀) and the gaseous monitors (CO, SO₂, ozone, and NO₂) at least once a year. The toxics monitors (volatile organics compounds [VOCs] and carbonyl compounds) are also audited once a year 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_{2.5} 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 to five 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.

MONITOR DEPLOYMENT BY LOCATION

Table 2 summarizes the distribution of ambient air monitors by pollutant in operation in

LEAD MONITORING NETWORK:

To address new evidence that exposure to low levels of lead early in life can cause deleterious effects such as IQ and memory loss, the EPA modified the lead NAAQS on November 12, 2008⁵. The level of the primary (health-based) standard was reduced from a maximum quarterly average of 1.5 $\mu\text{g}/\text{m}^3$ to 0.15 $\mu\text{g}/\text{m}^3$ 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 $\mu\text{g}/\text{m}^3$. The secondary standard, which addresses welfare impacts from lead, is identical to the new primary standard. The once every six day sampling frequency has been retained.

Since the CAA was passed, lead levels have dropped dramatically, primarily due to the phase-out of leaded gasoline used to prevent engine knocking. Currently some point sources such as smelters, foundries, boilers, waste incinerators, glass manufacturers and cement producers emit lead, as do piston driven aircraft engines still using leaded fuel. Therefore, the EPA has implemented a source-oriented network design that requires monitoring agencies to conduct ambient air monitoring near facilities emitting more than 1 ton of lead per year. Additional monitoring sites can be required by the Regional Administrator if there is a likelihood that lead levels in an area will be greater than half of the level of the NAAQS, or 0.075 $\mu\text{g}/\text{m}^3$ as a rolling three-month average. Factors such as complex and varied density of emissions, topography, or population may be used to impact this additional monitoring requirement. The source-oriented lead monitoring sites have to be operational by January 1, 2010. The design for the source-oriented monitoring network must be provided for review in the July 1, 2009 Network Review. It is possible to apply for a waiver from the source-oriented monitoring requirements if a monitoring agency can demonstrate that there is little likelihood of violating the NAAQS. The source-oriented monitoring sites should be sited to measure lead on a microscale to middle scale that corresponds to a range from several meters up to 4.0 kilometers.

Monitors are also required in CBSA with more than 500,000 people. These non source-oriented monitors need to be operational by January 1, 2011 and discussed in the network review that is due July 1, 2010. Although the non source-oriented monitoring sites are not required to be operational until January 2011, this component will also be included in this network review for completeness. The proposed locations for the population-oriented sites are already in existence. Therefore, the MDEQ will deploy both source-oriented and population-oriented networks by January 1, 2010. Waivers from the non-source-oriented monitoring requirement are not permitted.

The modified NAAQS still retains the TSP size fraction of lead, but acknowledges that agencies may, under certain conditions, measure lead as PM_{10} , if low volume sampling devices are used. Currently, the MDEQ is using high volume TSP samplers to measure lead levels at one monitoring station. As recent as 2007, the MDEQ determined TSP lead as part of its air toxics monitoring network at ten sites. However, in the 1990's, the MDEQ operated a much more robust TSP trace metals network, reaching as many as 18 sites scattered through 11 counties in Michigan.

To meet the monitoring requirements of the NAAQS, maintain comparability with historical data and make judicious use of existing instrumentation, the MDEQ will deploy high volume TSP samplers at source-oriented and population-oriented monitoring sites in the lead network.

⁵ "EPA NAAQS for Lead; Final Rule." 40 CFR parts 50, 51, 53 and 58, November 12, 2008.

SOURCE-ORIENTED MONITORING NETWORK DESIGN

Beginning shortly after the promulgation of the final lead NAAQS on October 15, 2008, the EPA and MDEQ began to define and clarify the extent of the ambient monitoring network for lead. Lists of point and area sources were provided by Regional EPA staff. State emission inventory staff reviewed inventory data and provided updated estimates. In this iterative process, the list of point sources in Michigan was consolidated to four facilities, which are listed in **Table 3**.

The MDEQ emissions inventory staff then compared the Toxic Release Inventory (TRI) and National Emissions Inventory (NEI) data for the remaining sources emitting more than 1 ton per year (tpy) of lead. They found that the differences in emissions derived from TRI guidance versus NEI guidance are mainly because the TRI guidance requires use of a generic controlled emission factor for sources which have a control device. NEI guidance requires use of an uncontrolled emission factor and applying a process-specific control factor. The conflicting guidance has ramifications when calculating lead emissions. Therefore, the most accurate emissions data is that which is reported to the MDEQ and staff recommend that these numbers be used to design the lead network.

In the case of the Consumers Energy JH Campbell facility, the company uses a controlled emission factor of 4.2E-4 lb lead/ton coal for reporting lead emissions, in accordance with TRI guidance. This factor represents about 96.8% control. For PM₁₀, however, the company follows the NEI guidance of using an uncontrolled emission factor and applying a 99% control factor for PM₁₀, based on a recent stack test. This discrepancy results in a 3.2 fold difference in lead emissions. If the company were to report lead emissions based on the NEI guidance, the lead emissions would be less than 1,000 pounds and monitoring would not be required.

TABLE 3: INITIAL LIST OF LEAD POINT SOURCES IN MICHIGAN THAT COULD TRIGGER A MONITORING REQUIREMENT (ACCORDING TO MDEQ EMISSION'S INVENTORY INFORMATION)

| COUNTY | FACILITY | CITY | NEI | | TRI | | | STATE EI | | |
|------------|------------------------------|------------|-----|------------|-----|------------|------------|------------|------------|------------|
| | | | 02 | 05 | 04 | 05 | 06 | 05 | 06 | 07 |
| Charlevoix | St. Marys Cement Inc | Charlevoix | 0.5 | | 0.0 | 0.0 | 0.0 | 0.9 | 1.0 | 1.0 |
| Ionia | Extruded Metals | Belding | 1.0 | 0.9 | 1.0 | 0.9 | 1.3 | 0.9 | 1.0 | 0.9 |
| Ottawa | JH Campbell Generating Plant | West Olive | | 0.1 | 0.1 | 1.0 | 0.9 | 1.0 | 0.8 | 0.9 |
| Wayne | US Steel Corp. Great Lakes | Ecorse | 1.1 | 3.5 | 3.6 | 3.5 | | 0.1 | 0.3 | 0.3 |

From 2005 through 2007, three of the stationary sources reported lead emissions hovering close to the one tpy threshold. Year to year fluctuations have the potential to be problematic in the creation and operation of a stable lead monitoring network.

A list of airports with significant propeller-driven aircraft emissions was developed by EPA⁶ Office of Transportation and Air Quality/Office of Air Quality Planning and Standards (OTAQ/OAQPS) based on revised 2002 NEI data. The airport with the highest possible total of lead emissions was Oakland County Airport, totaling 0.76 tpy (see **Table 4**). Due to the more diffuse nature of emissions from area sources, there is little likelihood of violating the lead NAAQS by Oakland County Airport *so monitoring was waived by EPA Region 5*.

⁶ Area sources were supplied in an e-mail from Motria Caudill, Region 5 EPA to Mary Ann Heindorf et al. MDEQ, December 3, 2008

TABLE 4: INITIAL LIST OF LEAD AREA SOURCES IN MICHIGAN THAT COULD TRIGGER A MONITORING REQUIREMENT (ACCORDING TO EPA)

| AIRPORT NAME | ABBREVIATION | COUNTY | LEAD EMISSIONS TONS/YR |
|----------------------|--------------|---------|------------------------|
| Oakland County Int'l | PTK | Oakland | 0.76 |
| Detroit Metropolitan | DTW | Wayne | 0.39 |

In the next phase of network design, the MDEQ air monitoring staff met with emissions inventory and modeling staff. The emissions inventory data were thoroughly reviewed by the inventory staff, checking with field inspectors and industry representatives to insure that the calculations and assumptions used in the calculations were correct. Simultaneously, modeling staff performed dispersion modeling on the top three facilities to determine if there was a possibility of violating the NAAQS. In addition, since both St. Mary's Cement and East Jordan Iron Works are located relatively close to each other in Charlevoix County, modeling was performed to estimate the impact of the sum of their emissions on air quality.

MDEQ employed EPA's AERMOD (AMS/EPA Regulatory Model) to estimate both the magnitude and location of potential impacts from the facilities. An ambient background derived from historical lead monitoring was added to the modeled impact to determine the likelihood that these facilities would cause a total impact at greater than one-half of the new lead NAAQS (0.075 µg/m³). The modeling results are shown in **Table 5**. The historical lead background levels are shown in **Appendix B, Table B3**.

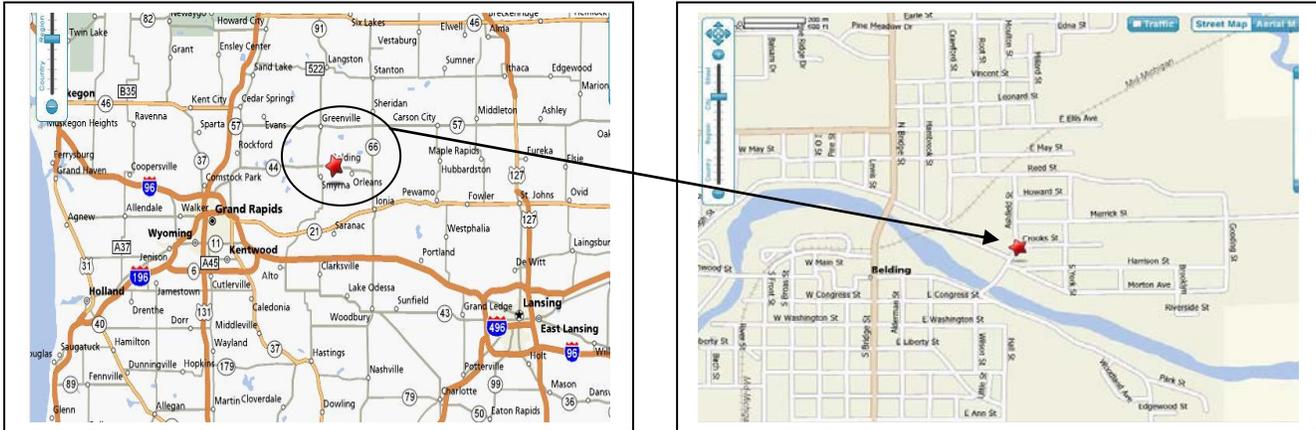
TABLE 5: LEAD (PB) NAAQS MODELING RESULTS

| | Generic Impact ¹ (ug/m3) | Annual Emissions (lbs/yr) | Operating Schedule (hrs/yr) | Hourly Emissions (lbs/hr) | Scaled Impact (ug/m3) | Monitored background (ug/m3) | NAAQS Impact (ug/m3) |
|--|--|------------------------------|--------------------------------|------------------------------|--------------------------|---------------------------------|-------------------------|
| Campbell Units 1&2 ² | 0.00117 | 883.6 | 8760 | 0.10087 | 0.000118 | 0.0121 | 0.0123 |
| Campbell Unit 3 ² | 0.00073 | 1144.3 | | 0.13063 | 0.000095 | | |
| St. Mary's Cement | 0.00507 | 1925.7 | 7200 | 0.26746 | 0.001356 | 0.0056 | 0.0070 |
| St. Mary's Cement | 0.00507 | 1925.7 | 7200 | 0.26746 | 0.001356 | 0.0056 | 0.0094 |
| East Jordan Metal Works | 0.00776 | 1337.41 | 4180 | 0.31995 | 0.002483 | | |
| Extruded Metals | 10.98756 | 2053.1 | 8936 | 0.29801 | 3.252419 | 0.0121 | 3.2645 |
| ¹ Based on 1.0 lb/hr unit emissions - Impact based on a monthly average | | | | | | | |
| ² Campbell impacts for Unit 1/2 and Unit 3 were summed together for facility total | | | | | | | |
| ³ Listed impact is the East Jordan maximum impact within the St. Mary's receptor grid | | | | | | | |

St. Mary's Cement was modeled both by itself and with East Jordan Iron Works which lower levels of lead, but is relatively close to the St. Mary's Cement Plant. As shown by the table, the combined impact of these stationary is not within 50% of the NAAQS. Only one point source, Extruded Metals in Belding in Ionia County has the potential to violate the NAAQS.

The location of Extruded Metals (Mueller Industries) at 302 Ashfield, Belding MI 48809 is shown in **Figure 2**.

FIGURE 2: BELDING MI AND THE LOCATION OF EXTRUDED METALS



The area surrounding the facility is mainly residential with a few parking lots and commercial buildings in the area. A prefabricated building manufacturing company, now closed, is located nearby as is seen in the photographs that follow. The area is hilly with Extruded Metals at a lower elevation and the residential area at an elevation closer to the stack height. Due to the short the short stack heights, the maximum point of impact is near the facility's fence line, as shown by the modeling output in **Figure 3**. Winds are primarily from the west as shown by the wind rose in **Figure 4**. The aerial view, shown in **Figure 5**, illustrates the many parking lots directly to the east of the facility and in line with the model output. One lot is owned by Extruded Metals and is considered to be company property, not ambient air. Therefore, the southern most parking lot is unsuitable for a monitoring location. The parking lot to the north is a union parking lot frequented by the employees of Extruded Metals. Access is not likely.

FIGURE 3: MODELED LEAD ISOPLETHS COMPARED TO POSSIBLE MONITORING SITE LOCATIONS

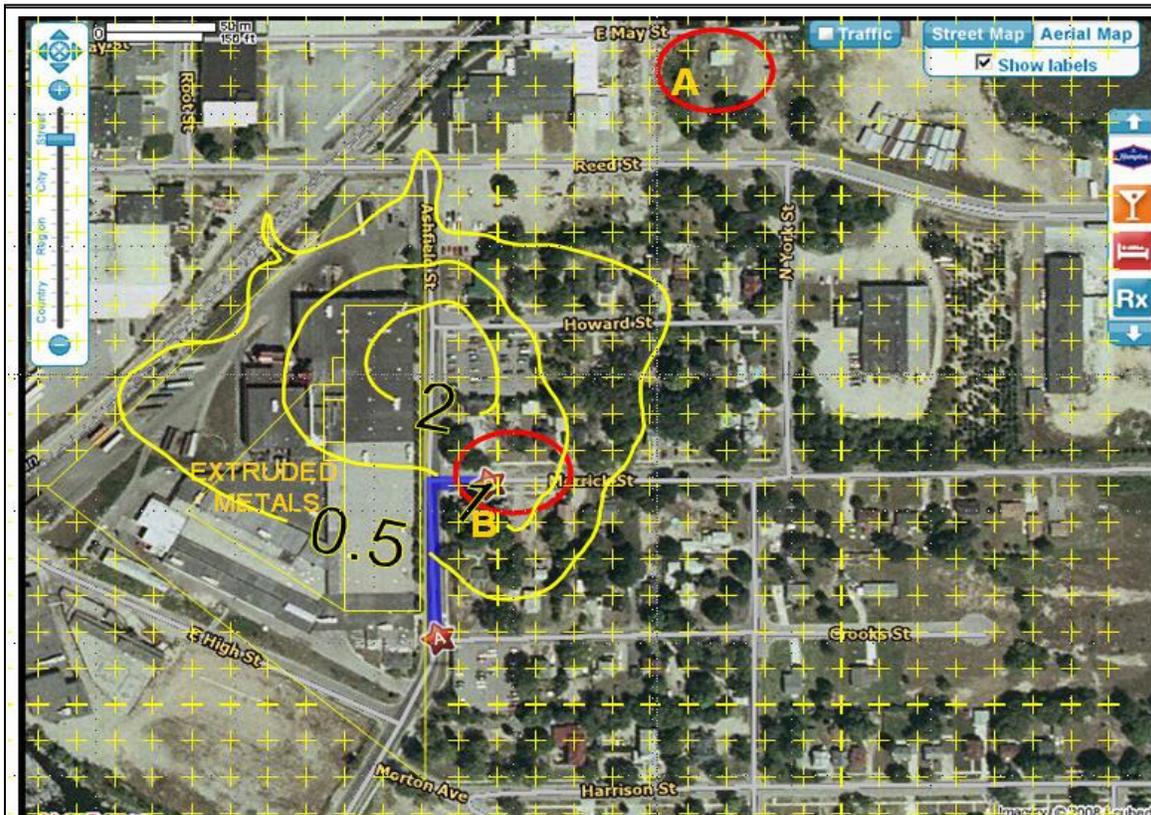


FIGURE 4: WIND ROSE USING DATA FROM THE GRAND RAPIDS MONROE ST SITE (260810020) FOR BELDING IN IONIA COUNTY

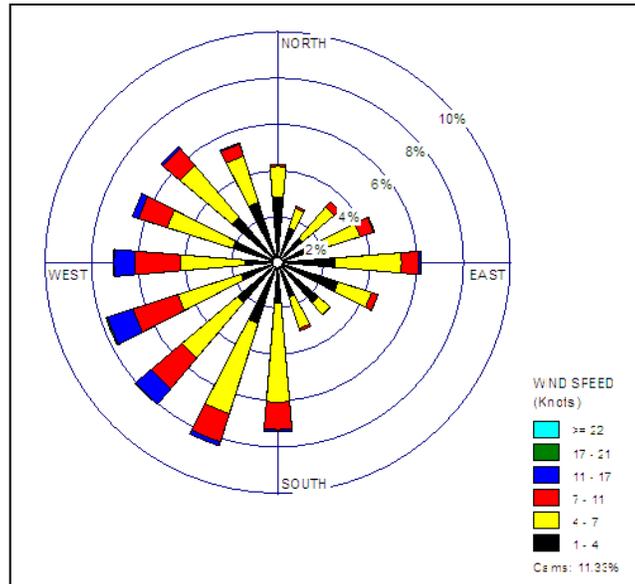
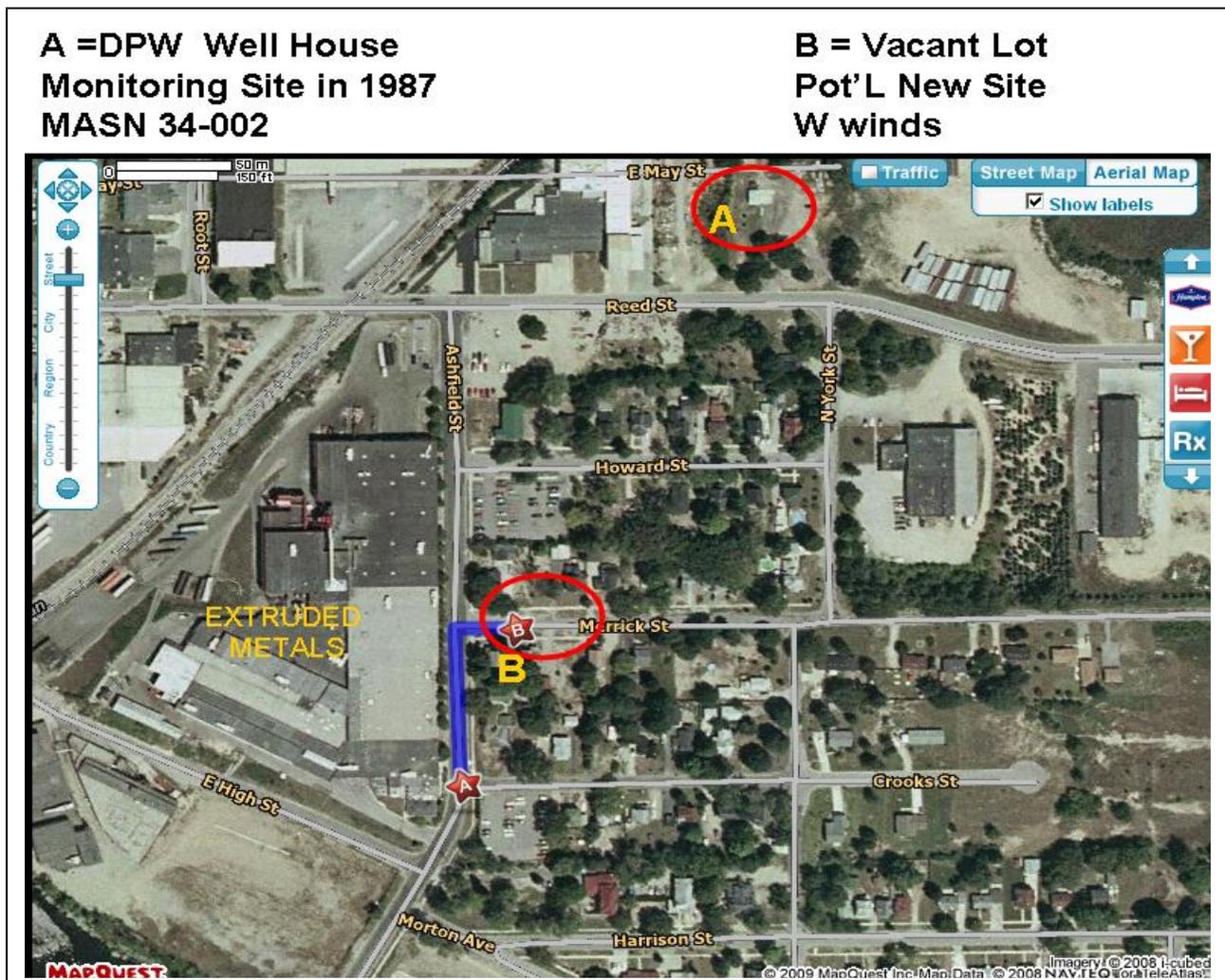
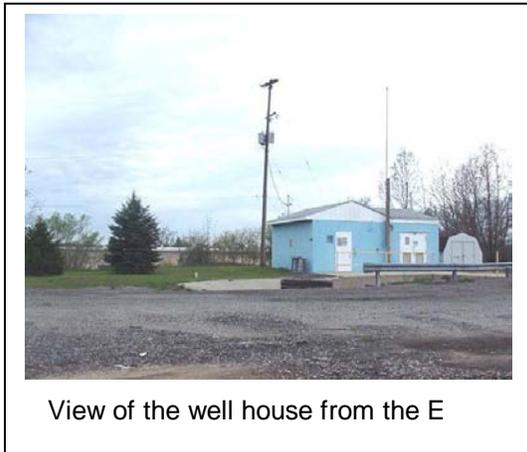


FIGURE 5: MAP OF EXTRUDED METALS, AND POSSIBLE MONITORING LOCATIONS



Reconnaissance in the area has located two other possible monitoring locations. Site A located at 545 Reed St, as shown in **Figure 5** is at well house #5 operated by the Belding Department of Public Works (DPW). Previously, MDEQ had monitored TSP at this location (260670002). Monitoring was discontinued December 1987. MDEQ has contacted the DPW and it is likely that access can be regained. MDEQ proposes to place a tower and meteorological equipment adjacent to the pump house, as shown in the photographs in **Figure 6**. The high volume lead sampler would be placed either at the side of the driveway, closer to Extruded Metals, or at the east side of the property in a small clearing. The exact location is subject to negotiations with the property owner.

FIGURE 6: DPW PUMP HOUSE IN BELDING, MI (SITE A)



Site B is located closer to the modeled point of maximum impact as shown in **Figure 3**. The location is at a vacant lot on Merrick St. The monitor would be placed in the right of way between the sidewalk and the street. The DPW has already consented to access. There would not be a suitable location for a tower and meteorological equipment. **Figure 7** shows photographs of the site.

The final site will be selected to meet the requirements set forth in the Federal Register and is dependent upon obtaining a site access agreement from property owners in the area and obtaining approval from EPA. Unfortunately, at this time, site access agreements have not been finalized, so the exact locations are not available for publication in the Network Review. Once access is negotiated arrangements will need to be made for site development and power. The MDEQ will continue to keep Region 5 EPA informed of progress in establishing the site.

FIGURE 7: VIEWS FROM THE VACANT LOT ON MERRICK ST, BELDING MI



NON SOURCE-ORIENTED MONITORING NETWORK DESIGN (POPULATION-ORIENTED)

An historical summary of lead monitoring in Michigan has been discussed in previous versions of the network review. Likewise, summaries of previous versions of lead monitoring requirements were also discussed. Previous versions have proposed population-oriented monitoring stations as part of the lead network. However, the version finalized on November 12, 2008 has renamed the population-oriented monitors to non-source-oriented monitors.

According to the lead NAAQS, each 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. This location should be impacted by re-entrained roadway dust, hazardous waste sites, closed industrial sources that were previously sources of lead, construction and demolition sites and other sources of lead. **Table 6** compares the population distribution by CBSA totals for Michigan with monitoring locations that are currently in use.

The NATTS at Dearborn (261630033) is located close to a plethora of 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_{10} 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_{10} sampler under certain instances. However, the MDEQ opted to collect co-located lead measurements as both TSP and PM_{10} at the Dearborn site to continue generating trend data (TSP – Pb), promote comparability with other NATTS sites in the nation (PM_{10} – Pb) and to determine precision for both size fractions. In addition, a single Met One SASS monitor supports the measurement of lead as $PM_{2.5}$, rounding out the suite of various particle sizes. This location fulfills the non source-oriented monitoring requirement for the Detroit-Warren-Livonia CBSA, leverages the NATTS network PM_{10} lead measurements and supports continued comparison of the distribution of lead between three particle size fractions. As long as the total number of lead sites in Michigan is less than ten, the co-located TSP samplers at Dearborn also fulfills the 15% co-location requirement for the lead network. The sampling frequency for all of the high volume lead measurements at Dearborn is once every six days. If the MDEQ encounters budgetary problems, the sampling frequency of the PM_{10} and TSP co-located samplers will be reduced from once every six days to once every 12 days as is allowed by EPA. The MDEQ opts to operate co-located samplers on a once every six day schedule to collect more complete data.

Prior to April 1, 2007, when budget cuts prompted closure, a trace metals monitor was operational at the Monroe St site in Grand Rapids (260810020). This location is near major

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roadways and is in the central Grand Rapids business district. It is a candidate for a NCore site. Reinstating lead monitoring at this location would complement the NCore site and meet the requirements for a non-source-oriented lead site for the Grand Rapids-Wyoming CBSA.

The MDEQ is proposing to add a third lead site at the population-oriented NCore site at Allen Park (261630001), re-establishing lead measurements. Although trace metals are currently collected at Allen Park as part of Michigan's air toxics monitoring network, the suite of measurements was reduced to include only Mn, As, Cd and Ni on April 1, 2007 due to budgetary reasons. Re-establishing lead at Allen Park will incur a minimal laboratory cost, have no impact on field operations, will supplement air toxics measurements, enhance the NCore suite of measurements at Allen Park and improve the spatial coverage of the lead network.

TABLE 6: APPLICATION OF NON SOURCE-ORIENTED LEAD MONITORING REQUIREMENTS (10/15/08 FINAL REVISION TO THE LEAD NAAQS IN MICHIGAN'S NETWORK)

| MSA | 2000 Population | Counties | Existing Monitoring Locations | Proposed Pb Monitoring Sites |
|--|------------------------|-------------|-------------------------------|------------------------------|
| Detroit-Warren-Livonia Metro Area | 4,452,557 | Macomb | New Haven | X |
| | | | Warren | |
| | | Oakland | Oak Park | |
| | | | Allen Park | |
| | | Wayne | E 7 Mile | |
| | | | SW High School | |
| | | | River Rouge | |
| | | | Wyandotte | |
| | | | Livonia | |
| | | | Linwood | |
| Dearborn | Dearborn | X | | |
| | Newberry School | | | |
| | Lafayette St | | | |
| Lapeer | --- | | | |
| | St Clair | Port Huron | | |
| | Livingston | --- | | |
| Flint Metro Area | 436,141 | Genesee | Flint Otisville | |
| Monroe Metro Area | 145,945 | Monroe | Luna Pier | |
| Ann Arbor Metro Area | 322,895 | Washtenaw | Ypsilanti | |
| Grand Rapids-Wyoming Metro Area | 740,482 | Kent | Monroe St | X |
| | | | Wealthy St | |
| | | Barry | Evans | |
| | | | --- | |
| Newaygo | --- | | | |
| | Ionia | --- | | |
| | --- | | | |
| Holland-Grand Haven Metro Area | 238,314 | Ottawa | Jenison | |
| Muskegon-Norton Shores Metro Area | 170,200 | Muskegon | Muskegon | |
| Lansing-East Lansing Metro Area | 447,728 | Clinton | Rose Lake | |
| | | Ingham | Lansing | |
| | | Eaton | --- | |
| Bay City Metro Area | 110,157 | Bay | Bay City | |
| Saginaw-Saginaw Twp N Metro Area | 210,039 | Saginaw | --- | |
| Kalamazoo-Portage Metro Area | 314,866 | Kalamazoo | Kalamazoo | |
| | | Van Buren | --- | |
| Niles-Benton Harbor Metro Area | 162,453 | Berrien | Coloma | |
| Jackson Metro Area | 158,422 | Jackson | --- | |
| Battle Creek Metro Area | 137,985 | Calhoun | --- | |
| South Bend Mishawaka Metro Area IN/MI | 51,104 | Cass | Cassopolis | |
| Monitoring Stations in Other Areas: | <u>Comments</u> | | | |
| | <i>transport site</i> | Lenawee | Tecumseh | |
| | | Benzie | Frankfort | |
| | | Huron | Harbor Beach | |
| | | Allegan | Holland | |
| | <i>background site</i> | Missaukee | Houghton lake | |
| | | Mason | Scottville | |
| | | Schoolcraft | Seney | |
| | <i>tribal site</i> | Leelanau | Peshawbestown | |
| | <i>tribal site</i> | Manistee | Manistee | |

Table 7 summarizes the lead monitoring site information for sites that were in existence in 2008. **Table 8** shows the proposed new lead network broken down by source-oriented and non-source-oriented sites. **Figure 8** compares the lead network in 2009 and 2008 with the proposed design that will be implemented by January 1, 2010.

TABLE 7: MICHIGAN'S 2008 LEAD MONITORING NETWORK

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

Network as of December, 2008

| Site Name | Monitoring Sites | | Part. Size | Sampling | | | Scale | County | Date Estab. | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
|-----------|------------------|--------------|------------|-----------|------------|-------------------|----------|---------|-------------|-------------------|------------------|------------------------|-----------|
| | AQS Site ID | Address | | Latitude | Longitude | Frequency Purpose | | | | | | | |
| Dearborn | 261630033 | 2842 Wyoming | TSP | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | TSP | 42.306666 | -83.148889 | 1:6, co-loc | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | PM 10 | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | PM 10 | 42.306666 | -83.148889 | 1:6, co-loc | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

TABLE 8: PROPOSED LEAD MONITORING NETWORK

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

Proposed Source Oriented Sites

| Site Name | Monitoring Sites | | Latitude | Longitude | Sampling | | Scale | County | Date Estab. | Facility Name | Est Emissions Tons/yr |
|-----------|------------------|---------|----------|-----------|-----------|----------|-------|--------|-------------|---------------|-----------------------|
| | AQS Site ID | Address | | | Frequency | Purpose | | | | | |
| | | | | | 1:6 | max conc | | | 1/1/2010 * | | |
| | | | | | 1:6 | max conc | | | 1/1/2010 * | | |
| | | | | | | | | | 1/1/2010 * | | |
| | | | | | | | | | 1/1/2010 * | | |

Proposed Non-Source Oriented Sites

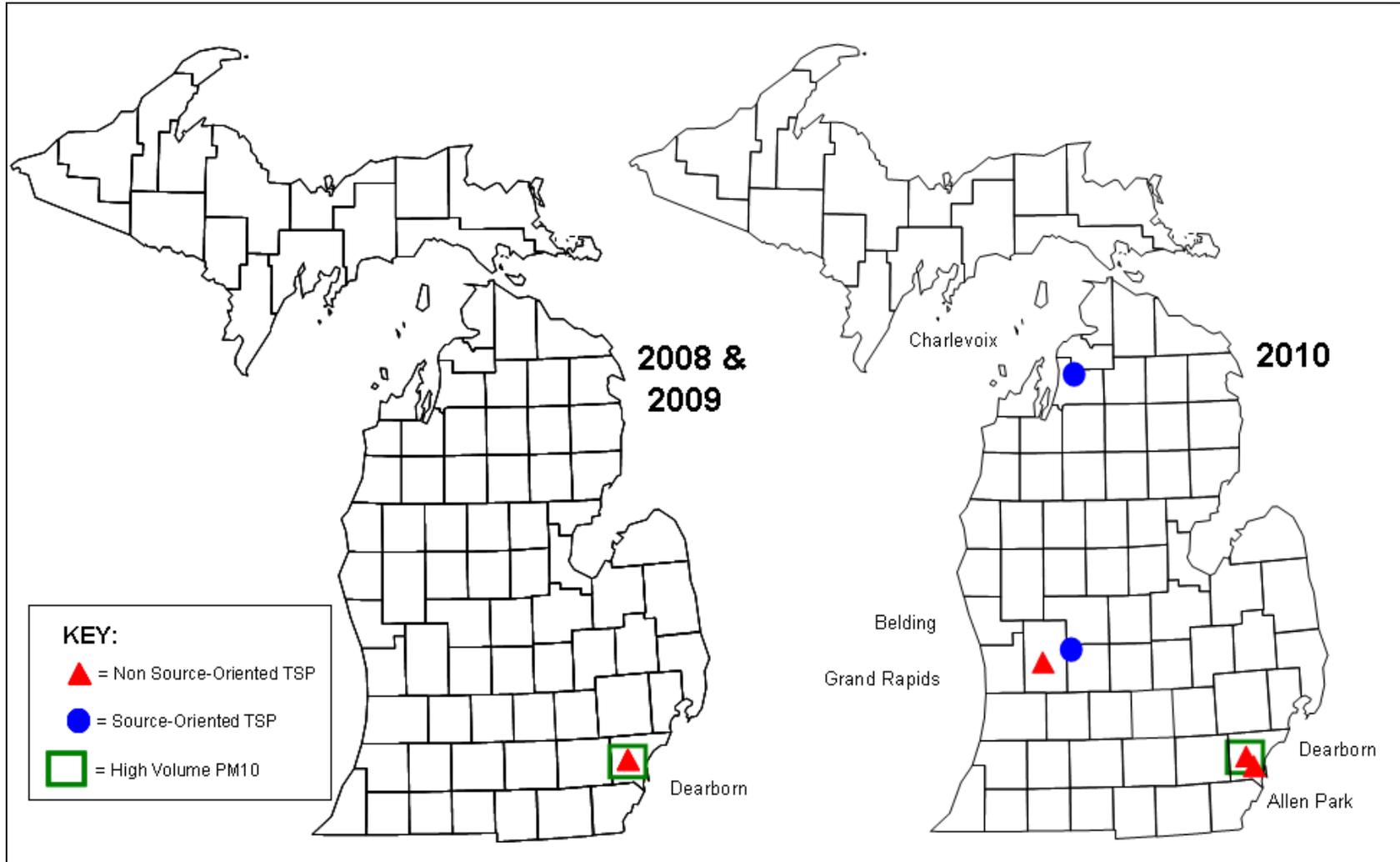
| Site Name | Monitoring Sites | | Latitude | Longitude | Sampling | | | Scale | County | Date Estab. | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
|--------------|------------------|----------------------|-----------|------------|-------------|-----------|--------------|-------|------------|-------------|-------------------|------------------|------------------------|
| | AQS Site ID | Address | | | Frequency | Purpose | Scale | | | | | | |
| Grand Rapids | 260810020 | 1179 Monroe St., NW, | 42.984167 | -85.671389 | 1:6 | Pop. Exp. | Neighborhood | Kent | 1/1/2010 * | GRW | GRMH | 1,088,514 | |
| Allen Park | 261630001 | 14700 Goddard | 42.228611 | -83.208333 | 1:6 | Pop. Exp. | Neighborhood | Wayne | 1/1/2010 * | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming | 42.306666 | -83.148889 | 1:6, co-loc | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 | |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

* Planned start up date.

FIGURE 8: COMPARISON OF MICHIGAN'S 2008 LEAD MONITORING NETWORK WITH THE PROPOSED SOURCE AND NON-SOURCE-ORIENTED NETWORK



LEAD QUALITY ASSURANCE

The site operator conducts a precision flow check each quarter. The flow check values are sent to the senior auditor 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. The audit program is part of the NPAP and is required by the CFR. Annually, 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.

PLANS FOR 2010 LEAD MONITORING NETWORK

In 2010, the MDEQ is planning to continue to collect lead measurements using high volume TSP samplers to partially fulfill the new non-source-oriented monitoring requirements for Detroit-Warren-Livonia CBSA at:

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

The MDEQ is also planning to continue the collection of co-located PM₁₀ lead at the Dearborn (261630033) NATTS site during 2010.

Beginning on January 1, 2010, the remaining non-source-oriented monitoring requirements for Grand Rapids- Wyoming CBSA will be fulfilled by high volume TSP lead monitoring at:

- Monroe St. site (260810020) in Grand Rapids

On January 1, 2010, the MDEQ plans to supplement the non-source-oriented monitoring network by re-establishing high volume monitoring for lead at an existing air toxics monitoring station that will become an NCore site for the Detroit-Warren-Livonia CBSA at:

- Allen Park site (261630001)

The source-oriented network for lead will begin operation on or before January 1, 2010 and will collect high volume TSP samples at the following locations:

- Belding in Ionia County (2606700XX)

NCORE MONITORING NETWORK:

Various iterations of the Monitoring Strategy⁷ proposed the elimination of NAMS sites and the creation of NCore sites. The purpose behind 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 the suite of measurements at one site can create knowledge of how concentrations of various pollutants are inter related and the effectiveness of control programs. Data from NCore sites will be 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, multiple air sheds 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).

Lastly, a limited number of rural NCore stations will be created. The NCore sites should be located away from the influences of major sources, be sited in areas of relatively homogeneous geography and should sample on a regional scale or larger. Regional scale corresponds to distances of tens to hundreds of kilometers. There are no rural NCore sites proposed for Michigan.

Whether urban or rural, the Federal Register⁸ specifies the minimum parameters that each NCore site must measure:

- Continuous PM_{2.5}
- 24-hr PM_{2.5}
- Speciated PM_{2.5}
- PM_{10-2.5}
- Speciated PM_{10-2.5}
- Ozone
- SO₂
- CO
- NO/NO_y
- Wind speed
- Wind direction
- Relative humidity
- Outdoor temperature
- Lead (at 10 NCore nationwide)

Although a waiver from the Regional Administrator may allow the substitution of oxides of nitrogen (NO_x) monitoring for NO_y, the MDEQ has NO_y monitors and is planning to operate them at the NCore sites. Although meteorological measurements from other near by sites may be substituted for NCore measurements, the MDEQ plans to collect meteorological

⁷ "Ambient Air Monitoring Strategy for State, Local, and Tribal Air Agencies," Office of Air Quality Planning and Standards, Research Triangle Park, NC, December 2008

⁸ "Environmental Protection Agency National Ambient Air Quality Standards for Lead; Final Rule." 40 CFR parts 50, 51, 53 and 58, November 12, 2008.

measurements at its NCore stations. The wind speed (WS) and wind direction (WD) will be collected as vector measurements. Sigma theta will also continue to be collected. The Federal Register also specifies that ten NCore sites nationwide will be required to collect lead at the NCore site or within the same MSA/CSA. The non-source-oriented lead sites previously described in the MDEQ's network review happen to coincide with the NCore site locations.

Grant guidance states that agencies are "encouraged to migrate to low-volume PM₁₀ sampling," especially at locations that are co-located with PM_{2.5} FRMs to support measurement of PM_{10-2.5}. The fiscal year 2010 grant guidance does not specifically allocate funds for speciated PM_{10-2.5} or coarse mass measurements. Coarse is encouraged at NCore and at other key sites in 2010. Until technology develops sufficiently, continuous and speciated coarse particulate measurements, ammonia and nitric acid measurements are not required at NCore sites.

PROPOSED N CORE SITES

In previous reviews of Michigan's ambient monitoring network, the MDEQ has proposed using the Monroe St site (260810020) as the NCore station in the Grand Rapids-Wyoming CBSA and the Allen Park (261630001) site as the NCore station in the Detroit-Warren-Livonia CBSA. More information is provided here to support the selection of these stations as NCore candidates.

GRAND RAPIDS MONROE ST. SITE (260810020)

The Monroe St. site (260810020) located at 1179 Monroe St., NW is situated in an industrialized area in the urban center city of the Grand Rapids-Wyoming MSA and was formerly operated as a NAMS ozone site. The site has been in operation since April 24, 1980 and is a population-oriented site. The latitude and longitude coordinates for the site are 42.984167 and -85.671389 expressed as decimal degrees. The site is in Kent County.

Approximately 12% of the population in Kent County resides within 4 km of the site. However, if the radius is expanded to 12.62 km, 52.8% of the county's population is captured. If a radius out to the maximum range for urban scale is used (50 km), the radius exceeds the boundaries of the metropolitan area. Within the 4 km radius there are no airports, parks or large retail centers, due to the urban nature of the area. However there are 32 schools and two hospitals within 4 km of the Monroe Ave. monitor.

Figure 9 shows an aerial view of the Monroe Ave. site. A fire station is located north of the monitoring station. City parking lots sit to the east and west of the trailer. The administration building for the City of Grand Rapids, as well as the Grand River, are located to the west of the site. The site is bordered by four major roadways. Leonard St. is 53.3 meters north of the station and is a paved 4-lane road. Monroe Ave. lies 38 meters to the east and is also a paved four-lane road. US route 131 is 403 meters to the west of the station and is a paved six-lane highway. Interstate route 96, not shown on the aerial photograph, is 1,410 meters to the south of the site and is also a paved six-lane highway.

In 2007, the average daily traffic count on Route 131 was 92,400 vehicles per day. The traffic counts on Leonard between Monroe and Plainfield was listed at 22,100 vehicles per day.

Within the previous three years, the EPA has reviewed the suitability of the site in a PM_{2.5} PEP audit on January 30, 2007 and in an ozone NPAP audit on May 5, 2007. There are 14 sources within 4 km of the site. Five sources are motor vehicle parts manufacturers, two sources make various types of furniture, and the remaining industries include an iron foundry, lithographic printing, surgical supply manufacturer, fabric coating mill, plastics manufacturing, to wholesale

and supply companies. The stationary sources provide a good mix of industries typical in a Midwestern urban area. There are two facilities within 500 meters from the site. The closest facility is Thierica at 900 Clancy Ave., which is a motor vehicle parts manufacturer. Thierica lies about 350 meters to the Southeast. American Seating, an institutional furniture manufacturer, lies approximately 445 meters to the southwest. The dominant wind flow is from the southwest.

FIGURE 9: AERIAL VIEW OF THE GRAND RAPIDS (260810020) MONITORING STATION.

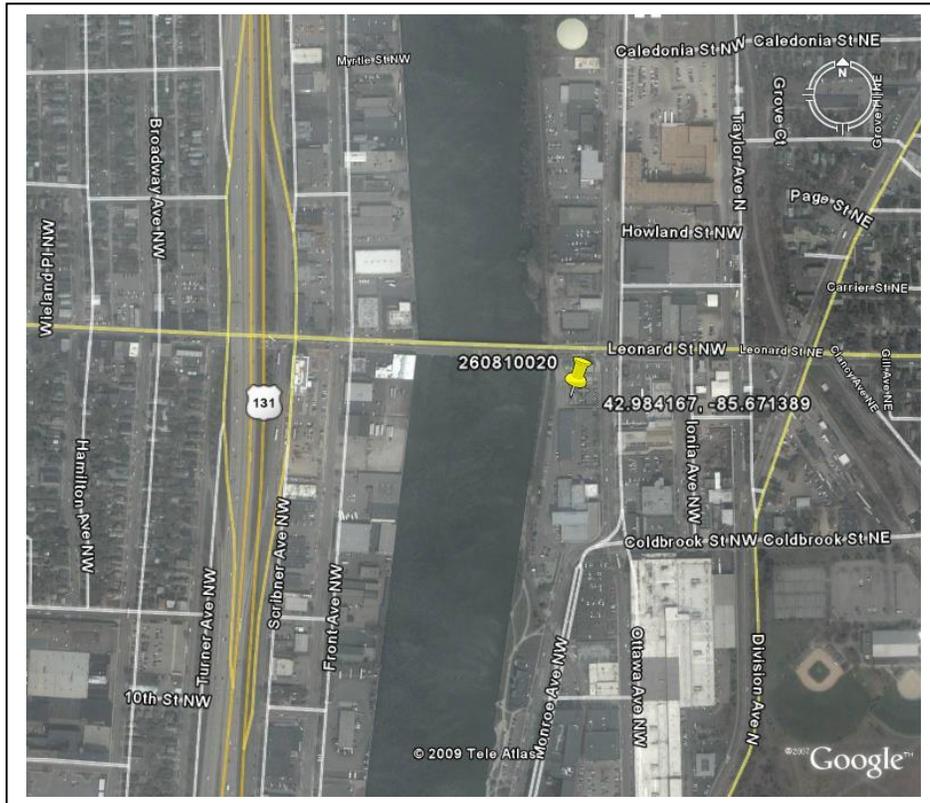


Table 9 shows the measurements currently made at the Grand Rapids (260810020) site as well as their spatial scales. The PM_{2.5} TEOM is an older model that does not conform to Forum on Environmental Measurements (FEM) or approved regional methods (ARM) requirements. The high nitrate and humidity levels impact the performance of continuous PM_{2.5} monitors operated in Michigan. The potential positive bias in these measurements could create an erroneous nonattainment designation in Michigan, if an FEM or ARM were deployed. Therefore, the MDEQ prefers to continue to operate FRM PM_{2.5} samplers and avoid the possibility of an erroneous designation, even though the manual sampling method is labor intensive and results are delayed. MDEQ operates its TEOMs using an inlet temperature of 30 C from October through March and at 50 C from April through September to improve data comparability with the FRMs.

During 2008 and for the first quarter of 2009, a PM_{2.5} FRM sampler was operated on a daily sampling schedule because the 98th percentile value averaged over the previous three years was within +/- 5% of the 24-hour NAAQS of 35 µg/m³. As a result of the lower values collected in 2008, the three-year average is less than 95% of the NAAQS and daily sampling can be reduced to a once every three day schedule. The sampling frequency was reduced on April 1, 2009.

Currently a Met One SASS unit is sampling on a once every six day schedule to collect speciated PM_{2.5} measurements in Grand Rapids. The sampling frequency won't be increased to once every three days, because a speciation sampler is already operating on a once every three day schedule at Allen Park (261630001). Michigan is one of nine states required to have more than one NCore site, so the once every three day sampling frequency requirement has already been fulfilled by the other station.

In preparation for the deployment of NCore and to allow time to break in the instruments, the MDEQ deployed trace level CO and SO₂ monitors to both the Grand Rapids (260810020) and Allen Park (261630001) NCore sites on April 10, 2007 and January 1, 2008 respectively, using instruments from API, as described in **Table 9**. TECO NOy instruments were also installed. Since that time, instrument malfunctions have necessitated the purchase of spare trace units from a different vendor. These newer units will be used as spares and consist of a TECO 43C trace SO₂ and a TECO 48c CO sampler.

The Monroe St. site currently has a hi-vol PM₁₀ sampler that operates on a once every six day schedule. When a low volume PM₁₀ sampler is deployed to the site to assess PM coarse by difference, the hi-vol will be removed to create extra space on the deck. At this point, the MDEQ is waiting for more guidance from the EPA about sampling techniques and adequate levels of funding.

Currently, relative humidity is measured at the Holland (260050003) station. The humidity sensor will be removed and redeployed to Grand Rapids (260810020) by January 1, 2010 or a new unit will be purchased. The MDEQ is opting to calculate sigma theta as an indication of wind stability, as is done at all of our stations.

As previously discussed, urban or neighborhood scale measurements are appropriate for urban NCore sites. **Table 9** shows that the Monroe St. site meets the spatial scale criterion.

The table also shows that most of the measurements required for an NCore site are already being collected at the Monroe St. site (260810020). Only PM_{10-2.5} speciation, continuous PM_{10-2.5} and lead remain to be added to the station. At this time, detailed guidance about PM_{10-2.5} speciation is not available. Not all NCore sites may be required to measure speciated coarse particulate. The MDEQ will wait for additional guidance before committing to the deployment of a speciated PM_{10-2.5} sampler to the Monroe St. site (260810020). PM_{10-2.5} mass is to be determined using either a dichotomous sampler or a continuous sampler.

**PUBLIC COMMENT DRAFT:
MICHIGAN'S 2010 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

TABLE 9: CURRENT AND FUTURE MEASUREMENTS COLLECTED AT THE PROPOSED 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 _{2.5} 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 _{2.5} FRM mass | NCore | Neighborhood | 1:1 to 1:3 days* | R & P Partisol plus 2025 | manual collection, gravimetric analysis | 10/23/98 | --- | --- |
| PM _{2.5} Speciation | NCore | Neighborhood | 1:6 days | Met One SASS + URG 3000N | manual collection, laboratory analysis** | 6/1/02 | --- | --- |
| Trace CO | NCore/AQI | Neighborhood | Continuous | API 300 eu | non-dispersive infra red | 4/25/07 | --- | probe height 5 m |
| Trace SO ₂ | NCore/AQI | Neighborhood | Continuous | API 100 as | UV fluorescence | 4/1/08 | --- | probe height 5 m |
| NO _y | NCore/AQI | Neighborhood | Continuous | TECO 42C | chemiluminescece | 4/1/08 | --- | external converter to be installed at 10 m probe height 5 m |
| Ozone | NCore/AQI was NAMS | Neighborhood | Continuous | API 400 A | 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 | --- | 1/1/10 | --- |
| PM _{10-2.5} mass | NCore | Neighborhood | 1:3 days | R & P Partisol plus 2025 | manual collection, gravimetric analysis | --- | 1/1/10 | --- |
| PM _{10-2.5} Continuous | --- | --- | --- | --- | --- | --- | --- | Not planned |
| PM _{10-2.5} Speciation | --- | --- | --- | --- | --- | --- | --- | EPA to provide details later |
| 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 | --- | 1/1/10 | > 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 | aneroid barometer | 7/15/93 | --- | optional |
| PM ₁₀ | SLAMS | Neighborhood | 1:6 days | Hi-vol | manual collection, gravimetric analysis | 1/1/85 | --- | --- |

* Currently the FRM is sampling daily, but, due to the reduction in the 98th percentile value to less than 95% of the NAAQS, the sampling frequency will be reduces to once every three days

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

According to the Federal Register, ten NCore stations nationwide are required to measure lead. As previously discussed in this network review, the MDEQ is planning to collect lead measurements at the Monroe St. site to meet the non source-oriented monitoring requirements in the new lead NAAQS. Lead sampling will commence on January 1, 2010. Previously, lead measurements were collected at the site from September 6, 1995 through April 1, 2007. The site was a special purpose site for lead. Measurements were discontinued on April 1, 2007 due to budgetary concerns.

The MDEQ had reviewed the EPA's "NCore Readiness Self-Assessment" document and is close to being ready to operate the Monroe St. site as an NCore station. The site sits in a parking lot adjacent to the City of Grand Rapids office. The station consists of two trailers with rooftop decking that are surrounded by a chain link fence. One trailer is used as a temperature-controlled air monitoring station, while the second trailer is a workshop for the City of Grand Rapids. The monitoring trailer contains two 9,000 BTU air conditioners used to maintain shelter temperature at a goal of 75 F. Rooftop decking connects both trailers and hosts a variety of samplers, see **Figure 10**. Views from eight compass points surrounding the monitoring station are shown in **Figure 11**.

There is a 200-amp service next to the trailer that feeds a 100-amp sub panel inside the trailer, supplying an adequate amount of power. All instruments placed outside of the shelter are connected to ground fault circuit interrupters (GFIs). The MDEQ does not use uninterrupted power supplies (UPS) due to cost and reliability issues because the batteries wear out. The main trailer contains three 6' x 19" racks. The separation distance of 1 meter will be maintained when a low volume PM₁₀ sampler is added to the deck. However, some rearrangement of samplers may be necessary. Trace metals as TSP were previously collected at the site using a high volume sampler, so reactivation of the sampler for lead won't be problematic as far as inlet separation distances are concerned. The meteorological equipment, which sits atop a ten-meter tower is audited and serviced annually. The towers are lowered for these tasks.

The Grand Rapids (260810020) site has a API 700 calibrator that is programmed to perform a nightly zero and precision check for all gases. The MDEQ also performs a multipoint calibration at midnight for ozone. The MDEQ currently doesn't have a calibrator suitable for the generation of MDL level concentrations, but is working on modifying an existing instrument for this purpose. The station also has a API 701 zero air system capable of generating 20 liters/minute of zero air. Trace gas monitors that use the zero air also perform an internal zero. The MDEQ audits the API 701 zero air system using a separate zero air generator. Use of the trace gas internal zero data, performance results and zero air audits together work to ensure that the station's zero air generator is functioning properly.

Wind speed, wind direction, temperature and pressure instruments are certified each year against reference standards, but they are not NIST traceable. The relative humidity device is certified on an annual basis by the manufacturer, but this may not be NIST traceable. The MDEQ uses independent calibrators, zero air sources and gas standards to audit our instruments. The gas standards are compatible with trace level specifications.

**FIGURE 10: MONITORING STATION AT 1179 MONROE ST NW, GRAND RAPIDS, MI
(260810020)**

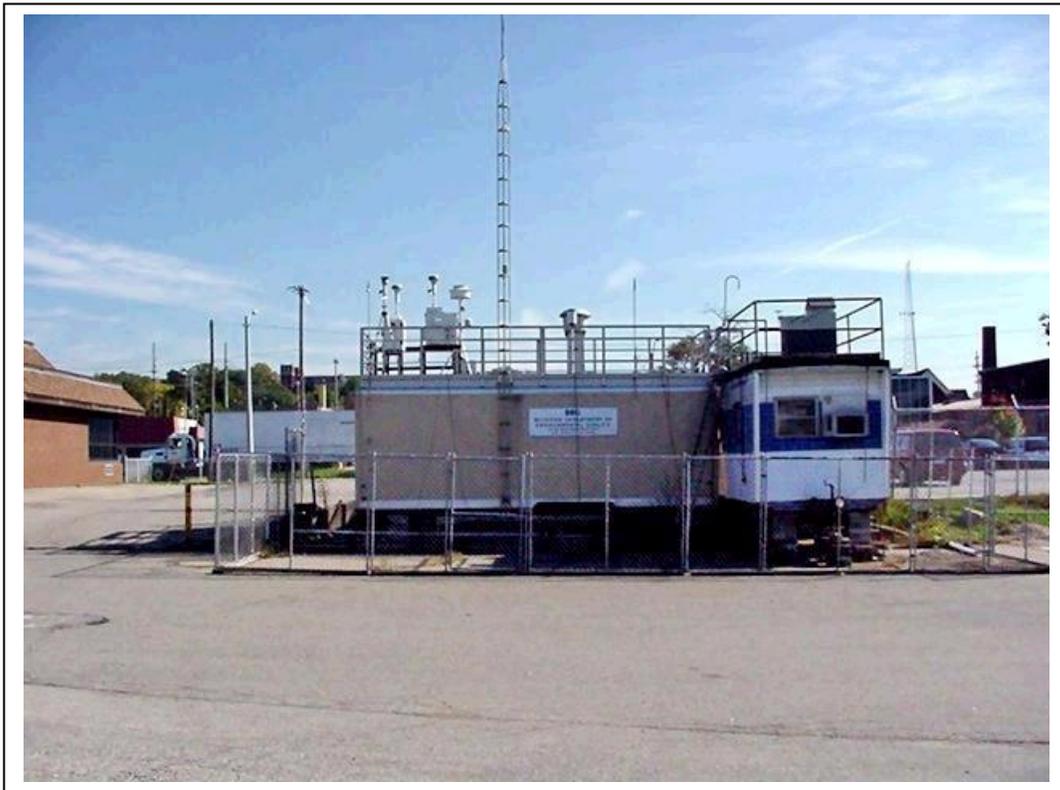
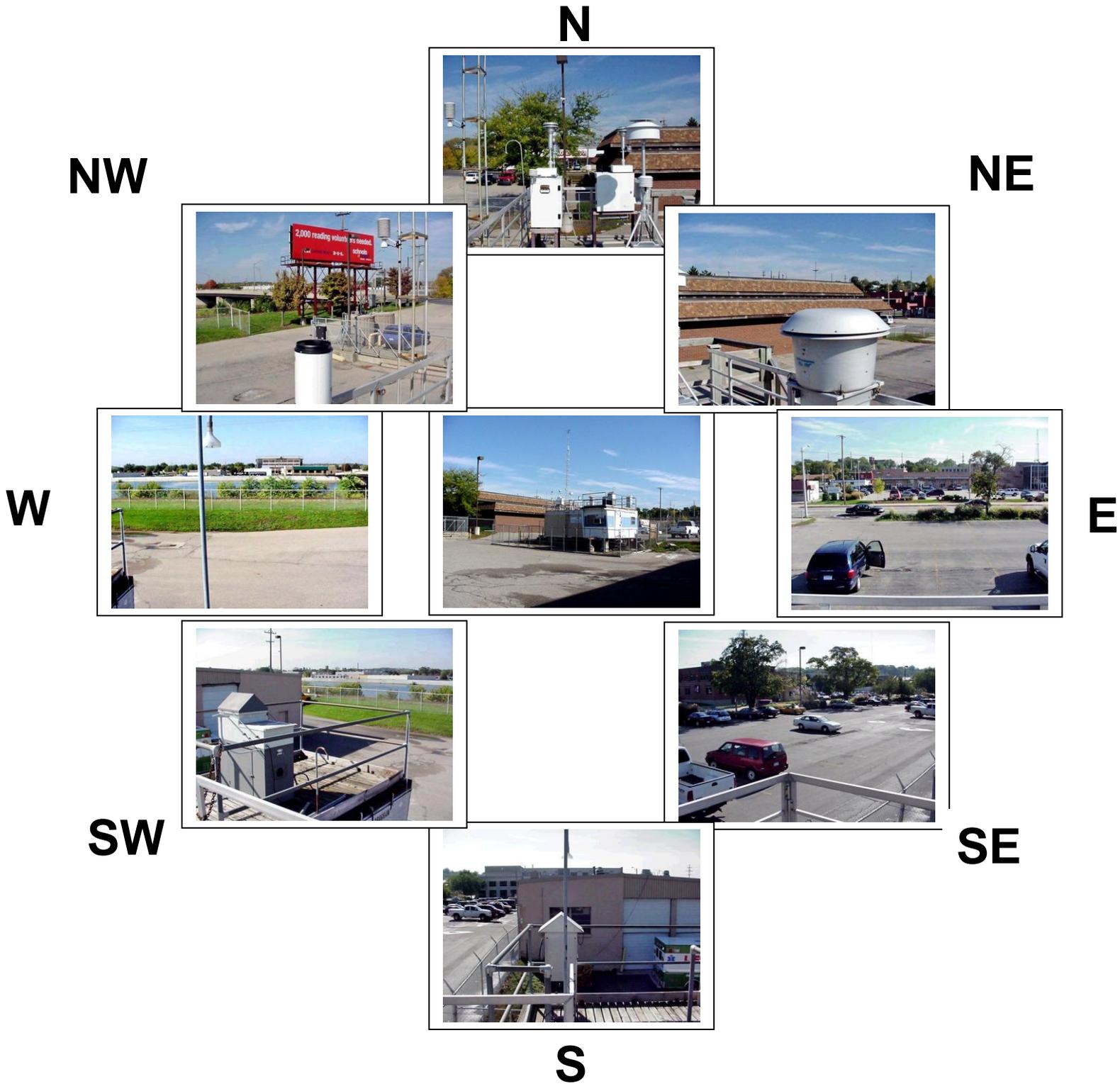


FIGURE11: VIEW FROM EIGHT COMPASS POINTS AROUND THE MONROE ST., MONITORING STATION (260810020) IN GRAND RAPIDS, MI



ALLEN PARK SITE (261630001)

The Allen Park site (261630001) located at 14700 Goddard is situated in an urban area of the Detroit-Warren-Livonia CMSA and was formerly designated as a NAMS ozone site. Currently, it is the population-oriented STN site. The site has been in operation since January 1, 1971. The latitude and longitude coordinates for the site are 42.228611 and -83.208333 expressed as decimal degrees. Approximately 3.3% of Wayne County's total population lives within 4 km of the site. However, if the radius is expanded to 32.9 km, 75.5% of Wayne County's population is captured. Within the 4 km radius there are no airports, hospitals or large retail centers. There are 27 schools and 12 parks within 4 km of the Allen Park monitor.

Figure 12 shows an aerial view of the Allen Park site. Interstate highway I-75 is 196 meters to the west and is a paved 6-lane highway. The average daily traffic count is estimated at 95,600 vehicles per day. Goddard (which becomes Moran) is a paved four-lane road that lies 34 meters to the south.

Within the past three years, the EPA has reviewed the suitability of the site location in an ozone NPAP audit on September 19, 2006 and two speciation audit and technical systems audits on June 8, 2006 and July 28, 2008, respectively.

While a water treatment plant lies directly to the north of the site, there are no other facilities within 4 km of the Allen Park site, according to the 2002 emissions inventory data on EPA's AirData website. The closest facility is Wyandotte Municipal Power at 2555 Van Alstyne in Wyandotte, which lies about 7.7 km to the northeast, directly downwind from the Allen Park monitoring site.

FIGURE 12 : AERIAL VIEW OF THE ALLEN PARK (261630001) SITE

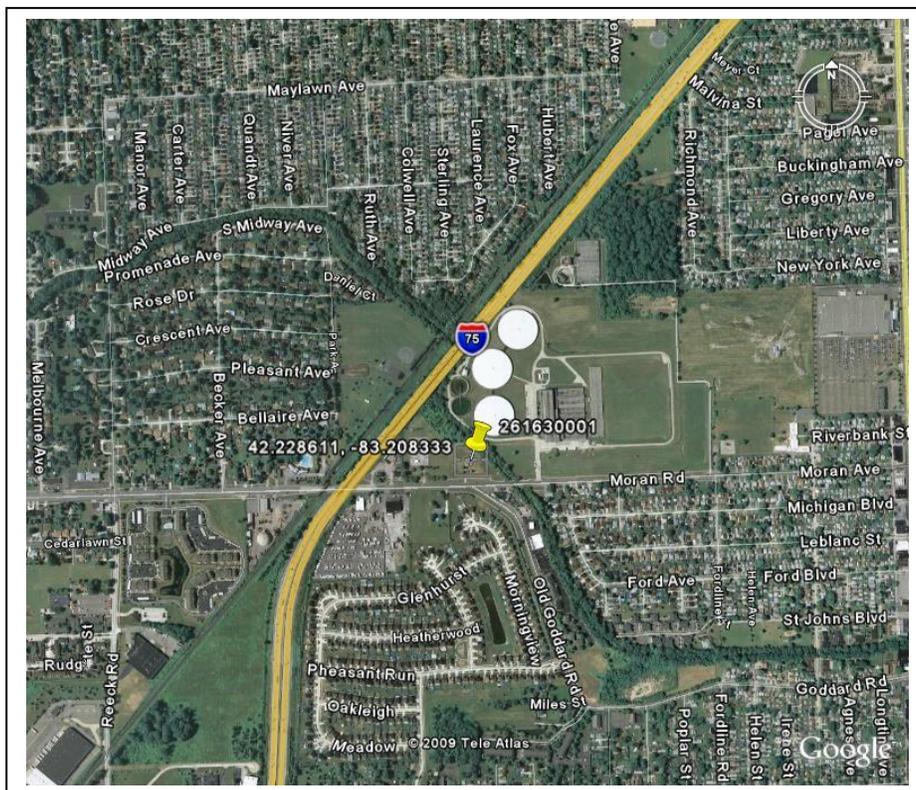


Table 10 shows the measurements currently made at the Allen Park (261630001) site as well as their spatial scales. The PM_{2.5} TEOM is an older model that does not conform to FEM or ARM requirements. The high nitrate and humidity levels impact the performance of continuous fine particulate monitors operated in Michigan. The potential positive bias in these measurements could create an erroneous nonattainment designation in Michigan, if an FEM or ARM were deployed. Therefore, the MDEQ prefers to continue to operate FRM PM_{2.5} samplers and avoid the possibility of an erroneous designation, even though the manual sampling method is labor intensive and results are delayed. The MDEQ operates its TEOMs using an inlet temperature of 30 C from October through March and at 50 C from April through September to improve data comparability with the FRMs.

Currently a Met One Super SASS is sampling on a once every three day schedule and is one of three speciation sites within Wayne County. The two other speciation sites, located at Dearborn (261630033) and Southwestern High School (261630015) (SW High School) provide information about chemical composition at locations impacted by local sources and sample on a once every six day frequency. An URG 3000 N carbon sampler was added to the site in March 2009 and will also sample on a once every three day schedule. To understand comparability between the various carbon methods, an IMPROVE carbon sampler is continuing to operate on a once every three day schedule. All three samplers will continue to operate through March 31, 2010, as is being done at a handful of sites nationwide.

In preparation for the deployment of NCore and to allow time to break in the instruments, the MDEQ deployed trace level CO and SO₂ to both the Grand Rapids (260810020) and Allen Park (261630001) NCore sites on April 10, 2007 and on January 1, 2008 respectively, using instruments from API, as described in **Table 10**. TECO NOy instruments were also installed at the two proposed NCore sites. Since that time, instrument malfunctions have necessitated the purchase of spare trace units from a different vendor. These newer units will be used as spares and consist of a TECO 43C trace SO₂, and a TECO 48c CO sampler.

As previously discussed, urban or neighborhood scale measurements are appropriate for urban NCore sites. **Table 10** shows that the Allen Park site meets the spatial scale criterion.

The table also shows that most of the measurements required for an NCore site are already being collected at the Allen Park site (261630001). Only PM_{10-2.5} speciation, continuous PM_{10-2.5} and lead remain to be added to the station. At this time, detailed guidance about PM_{10-2.5} speciation is not available. Not all NCore sites may be required to measure speciated coarse particulate. The MDEQ will wait for additional guidance before committing to the deployment of a speciated PM_{10-2.5} or mass samplers to the Allen Park site (261630001).

TABLE 10: CURRENT AND FUTURE MEASUREMENTS COLLECTED AT THE PROPOSED 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 _{2.5} 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 _{2.5} FRM mass | NCore | Neighborhood | 1:1 day | R & P Partisol plus 2025 | manual collection, gravimetric analysis | 5/12/99 | --- | --- |
| PM _{2.5} 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 | non-dispersive infra red | 6/1/07 | --- | 4 m probe ht |
| Trace SO ₂ | NCore/AQI | Neighborhood | Continuous | API 100 as | UV fluorescence | 4/1/08 | --- | 4 m probe ht |
| NO _y | NCore/AQI | Neighborhood | Continuous | TECO 42C | chemiluminescece | 4/1/08 | --- | external converter to be installed at 10 m 4 m probe ht |
| Ozone | NCore/AQI was NAMS | Neighborhood | Continuous | API 400 A | UV absorption | 1/1/80 | --- | <i>Year round</i> 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 | 1/1/10 | --- |
| PM _{10-2.5} mass | NCore | Neighborhood | 1:3 days | R & P Partisol plus 2025 | manual collection, gravimetric analysis | --- | 1/1/10 | --- |
| PM _{10-2.5} Continuous | --- | --- | --- | --- | --- | --- | --- | Not planned |
| PM _{10-2.5} Speciation | --- | --- | --- | --- | --- | --- | --- | EPA to provide details later |
| 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 | aneroid barometer | 1/5/71 | --- | optional |
| Black Carbon | SLAMS | --- | Continuous | Magee large spot AE2100 | optical absorption | 12/19/03 | --- | Not Req by NCore |
| PM ₁₀ 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.

According to the Federal Register, ten NCore stations nationwide are required to measure lead. As previously discussed in this network review, the MDEQ is planning to collect lead measurements at the Allen Park site to meet the non-source-oriented monitoring requirements in the new lead NAAQS. Lead sampling will commence on January 1, 2010. Previously, lead measurements were collected at the site from January 5, 1971 through April 1, 2007. The site was a maximum concentration population oriented SLAMs site for lead. Measurements were discontinued on April 1, 2007 due to budgetary concerns.

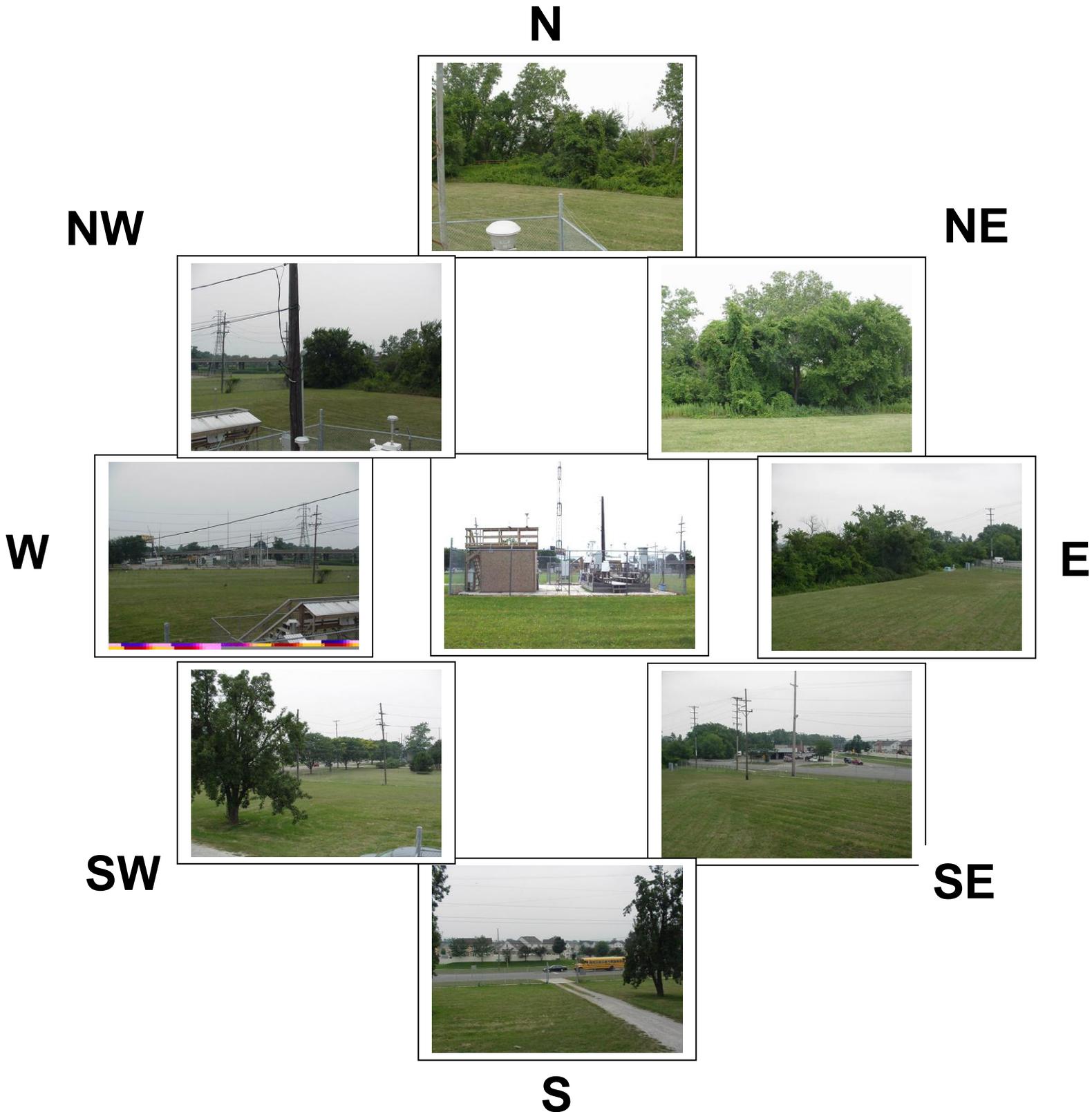
The Allen Park (261630001) site served as the ambient station in the DEARS study against which residential and personal measurements were compared. Also, after the power was upgraded to a 200 amp service, fine particulate material was collected for chemical characterization and toxicity testing by ORD. Further, Environment Canada's mobile monitoring van, CRUISER, used the site as a stationary location. Met One performed FEM testing for the BAM units at the Allen Park site during February 2007.

The MDEQ reviewed the EPA's "NCore Readiness Self-Assessment" document and is close to being ready to operate the Allen Park site as an NCore station. The site sits in a large field owned by the City of Detroit's sewerage overflow holding plant. The entire plot is surrounded by a chain link fence, with the monitoring area encircled with a second fence. The monitoring area is subdivided into the main section containing an 8' x 8' concrete bunker, deck and rooftop deck to facilitate access to sampling heads for cleaning. The concrete bunker has a opening with fixed dimensions to accommodate an air conditioner. The maximum cooling power for an air conditioner that will fit into this size opening is about 12,500 BTU. To upgrade the air conditioner, a larger opening would have to be cut into the concrete shelter, or a residential style air conditioner, with compressor and forced air unit would need to be installed, requiring a sizeable investment. A photo of the site is shown in **Figure 13**. Views from eight compass points surrounding the site are shown in **Figure 14**.

FIGURE 13: MONITORING STATION AT 14700 GODDARD, ALLEN PARK, MI (261630001)



FIGURE 14: VIEWS FROM EIGHT COMPASS POINTS AROUND THE ALLEN PARK (261630001)
MONITORING STATION



The other area contains a shelter that used to house three IMPROVE channels, now only the IMPROVE carbon channel remains. Various researchers have been given access to this area for co-located measurements.

There is a 200-amp service at the pole outside of the air monitoring fence, with the site itself running on a 100 amp sub-panel. Sufficient space is available near the pole to accommodate specialized monitoring projects, such as the CRUISER or collection of particulate material, as discussed previously. All MDEQ instruments placed outside of the shelter are connected to GFIs. The MDEQ does not use UPS due to cost and reliability issues because the batteries wear out. The concrete shelter contains two 6' x 19" racks that are about full. The separation distance of 1 meter will be maintained when a low volume PM₁₀ sampler is added to the deck; however, some rearrangement of samplers may be necessary. The MDEQ is proposing to move the co-located PM_{2.5} FRM sampler to Dearborn (261630033) to create more space on the deck at Allen Park (261630001). Trace metals as TSP were previously collected at the site using a high volume sampler, so reactivation of the sampler for lead won't be problematic as far as inlet separation distances are concerned. The meteorological equipment, which sits atop a 10-meter tower, is audited and serviced annually. The towers are lowered for these tasks.

The Allen Park (261630001) site has a API 700 calibrator that is programmed to perform a nightly zero and precision check for all gases. The MDEQ also performs a multipoint calibration at midnight for ozone. The MDEQ currently doesn't have a calibrator suitable for the generation of MDL level concentrations, but is working on modifying an existing instrument for this purpose. The station also has a API 701 zero air system capable of generating 20 liters/minute of zero air. Trace gas monitors that use the zero air also perform an internal zero. The MDEQ audits the API 701 zero air system using a separate zero air generator. Use of the trace gas internal zero data, performance results and zero air audits together work to ensure that the station's zero air generator is functioning properly.

Wind speed, wind direction, temperature and pressure instruments are certified each year against reference standards, but they are not NIST traceable. The relative humidity device is certified on an annual basis by the manufacturer, but this may not be NIST traceable. The MDEQ uses independent calibrators, zero air sources and gas standards to audit our instruments. The gas standards are compatible with trace level specifications.

The locations proposed for NCore stations in Michigan are shown in **Table 11**. The following preparations need to be made by the MDEQ prior to January 1, 2010 to meet the NCore deployment date:

- Move the co-located PM_{2.5} FRM sampler (POC = 2) from Allen Park (261630001) to Dearborn (261630033) to clear deck space for NCore samplers.
- The MDEQ will either add a new humidity sensor to the Grand Rapids (260810020) site or relocate the humidity sensor currently in operation at Holland (260050003) to Grand Rapids (260810020) by January 1, 2010.

Although the EPA encourages the deployment of PM coarse samplers at NCore and other key sites in 2010, the MDEQ will defer designing/implementing PM coarse speciation samplers until more information and funding are available. Identification of key sites also needs to be confirmed. In addition to the proposed NCore stations at Grand Rapids (260810020) and Allen Park (261630001), the MDEQ proposes that these key sites include: Dearborn (261630033) and SW High School (261630015). If PM coarse is to be determined by difference using low volume PM₁₀ samplers, the MDEQ will need to purchase more units because the existing

OZONE MONITORING NETWORK:

As a result of the October 17, 2006 monitoring regulations, the minimum number of required ozone sites in an MSA has changed. In addition, due to the 2000 census, MSA boundaries have been modified and population totals tied to measurements of ambient air quality have increased. Any 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, more monitors are required in these MSAs. By lowering the NAAQS, the number of monitors that are required in each MSA may shift to the next higher category, as shown in **Table 12**. In other instances, the number of monitors may be reduced if the design value is greater than 115% of the NAAQS.⁹ Note: background and transport ozone monitors are still required, but are not shown in **Table 12**.

TABLE 12: SLAMS MINIMUM OZONE MONITORING REQUIREMENTS

| MSA POPULATION ^{1,2} | MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS $\geq 85\%$ OF ANY OZONE NAAQS ³ | MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS $< 85\%$ OF ANY OZONE NAAQS ^{3,4} |
|---------------------------------|--|---|
| > 10 million | 4 | 2 |
| 4 - 10 million | 3 | 1 |
| 350,000 - < 4 million | 2 | 1 |
| 50,000 - < 350,000 ⁵ | 1 | 0 |

¹ Minimum monitoring requirements apply to the MSA.

² Population based on the latest available census figures.

³ The ozone NAAQS levels and forms are defined in 40 CFR Part 50.

⁴ These minimum monitoring requirements apply in the absence of a design value.

⁵ MSA must contain an urbanized area of 50,000 or more population.

Applying the requirements described in **Table 12** to Michigan's MSAs, population totals and the most recent three-year design values results in a minimum ozone network design summarized in **Table 13**. All monitors in Michigan are within 85% of the more stringent ozone NAAQS of 0.075 ppm. Therefore, it is a reasonable assumption that, if, monitors were operational in MSAs with population levels between 50,000 to 350,000, they would also be within 85% of the NAAQS. Detailed guidance describing the implementation of monitoring at these MSAs with a high likelihood to violate the NAAQS but with lower population levels is forthcoming from the EPA. It is unknown whether the rule would require monitoring in these areas: Monroe, Bay City, Saginaw-Saginaw Township North, Jackson and Battle Creek Metropolitan Areas. Any design changes will be discussed in next year's 2011 network review. Currently, the MDEQ doesn't maintain sites in Saginaw, Jackson and Calhoun Counties. If more monitoring sites are required, the 2011 budget will need to supply the necessary funds to create as many as three new sites and add five new ozone monitors to Michigan's network.

⁹ Table D-2 of Appendix D to Part 58.

TABLE 13: APPLICATION MINIMUM OZONE 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. | | | | | | | | | |
| MSA | 2000 Population | Counties | Existing Monitors | 2006-2008 most recent 3-year O3 design value | Min No monitors Required | | | | |
| Detroit-Warren-Livonia Metro Area | 4,452,557 | Macomb | New Haven | 0.081 | 3 | | | | |
| | | | Warren | 0.080 | | | | | |
| | | | Oakland | 0.077 | | | | | |
| | | | Wayne | 0.071 | | | | | |
| | | | E 7 Mile | 0.082 | | | | | |
| | | | Lapeer | --- | | | | | |
| Flint Metro Area | 436,141 | Genesee | Flint | 0.074 | 2 | | | | |
| | | | Otisville | 0.076 | | | | | |
| | | | --- | --- | | | | | |
| Monroe Metro Area | 145,945 | Monroe | --- | --- | --- | | | | |
| Ann Arbor Metro Area | 322,895 | Washtenaw | Ypsilanti | 0.074 | 1 | | | | |
| Grand Rapids-Wyoming Metro Area | 740,482 | Kent | Grand Rapids | 0.077 | 2 | | | | |
| | | | Evans | 0.078 | | | | | |
| | | | Barry | --- | | | | | |
| | | | Newaygo | --- | | | | | |
| Holland-Grand Haven Metro Area | 238,314 | Ottawa | Jenison | 0.079 | 1 | | | | |
| | | | Muskegon-Norton Shores Metro Area | 170,200 | | Muskegon | Muskegon | 0.082 | 1 |
| | | | Lansing-East Lansing Metro Area | 447,728 | | Clinton | Rose Lake | 0.073 | 2 |
| Ingham | Lansing | 0.073 | | | | | | | |
| Eaton | --- | | | | | | | | |
| Bay City Metro Area | 110,157 | Bay | --- | --- | --- | | | | |
| Saginaw-Saginaw Twp N Metro Area | 210,039 | Saginaw | --- | --- | --- | | | | |
| Kalamazoo-Portage Metro Area | 314,866 | Kalamazoo | Kalamazoo | 0.073 | 1 | | | | |
| | | Van Buren | --- | --- | | | | | |
| Niles-Benton Harbor Metro Area | 162,453 | Berrien | Coloma | 0.078 | 1 | | | | |
| Jackson Metro Area | 158,422 | Jackson | --- | --- | --- | | | | |
| Battle Creek Metro Area | 137,985 | Calhoun | --- | --- | --- | | | | |
| South Bend Mishawaka Metro Area IN/MI | 51,104 | Cass | Cassopolis | 0.075 | 1 | | | | |
| Other areas: | <u>Comments</u> | | | | | | | | |
| | <i>transport site</i> | Lenawee | Tecumseh | 0.075 | | | | | |
| | | Benzie | Frankfort | 0.076 | | | | | |
| | | Huron | Harbor Beach | 0.074 | | | | | |
| | <i>violating monitor</i> | Allegan | Holland | 0.086 | | | | | |
| | <i>background site</i> | Missaukee | Houghton lake | 0.071 | | | | | |
| | | Mason | Scottville | 0.075 | | | | | |
| | | Schoolcraft | Seney | 0.075 | | | | | |
| | <i>tribal site</i> | Leelanau | Peshawbestown | 0.071 | | | | | |
| | <i>tribal site</i> | Manistee | Manistee | 0.077 | | | | | |

In Southeast Michigan, New Haven (260990009) has been the design value site for many years, measuring maximum ozone concentrations downwind from Detroit. However, updated design values using 2008 data, indicate that the E Seven Mile (261630019) site in Detroit is the new design value site for the Detroit-Warren-Livonia MSA. 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 E Seven Mile (261630019) sites need to be retained until the location of the design value site stabilizes. Allen Park (261630001) is upwind of the central business district and since it is a likely NCore site for the Detroit-Warren-Livonia MSA, it is required to measure ozone over the entire year, 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, so the Warren ozone monitor needs to be retained. The Oak Park (261250001) and Port Huron (261470005) monitors are the only ozone sites in Oakland and St. Clair Counties, respectively.

Two monitors are required in the Ann Arbor MSA and consist of the Ypsilanti monitor (261610008) and the downwind monitor in Oak Park (261250001). 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 at Oak Park (261250001), although Oakland County 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 Street (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.

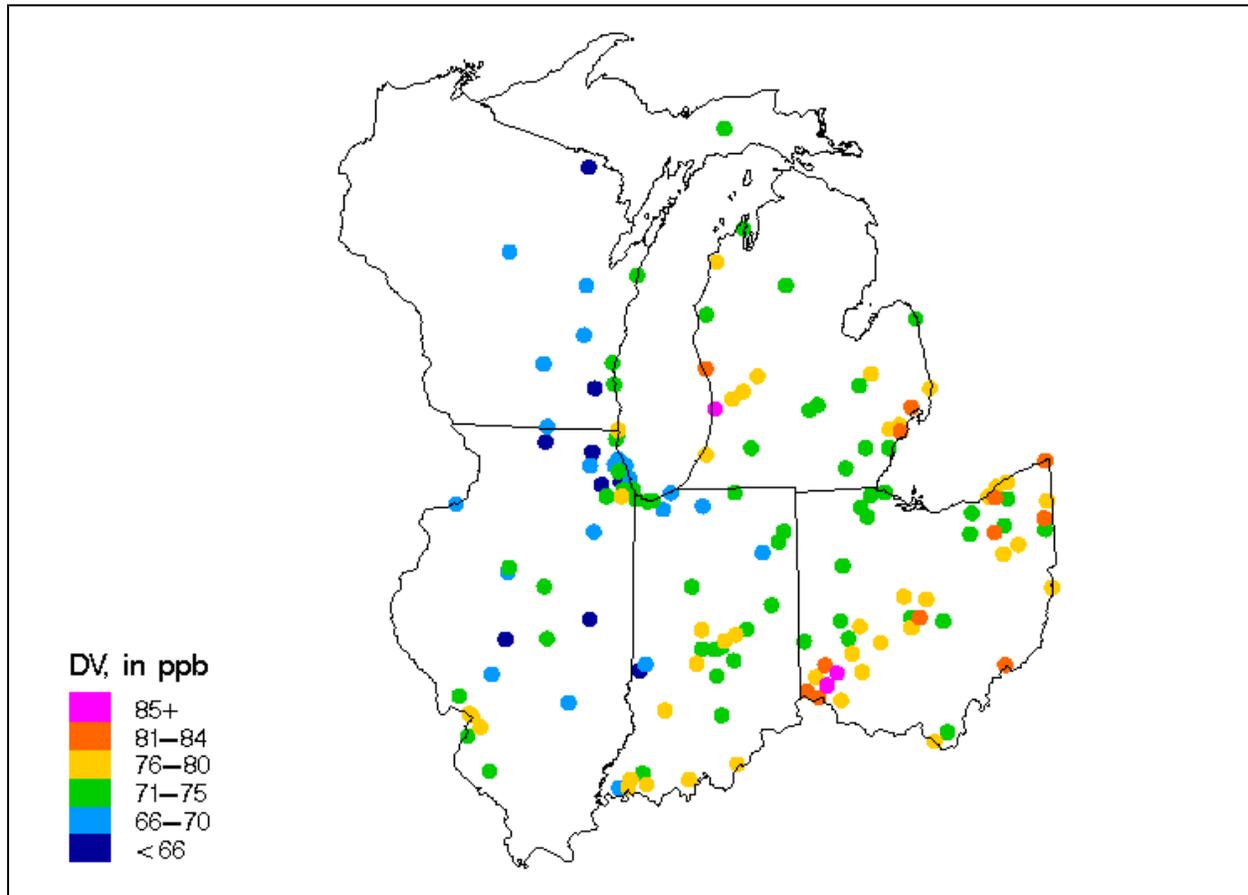
A single ozone monitor is required in the MSAs of Holland-Grand Haven, Muskegon-Norton Shores, Kalamazoo-Portage, Niles-Benton Harbor, and South Bend-Mishawaka. The Jenison (261390005), Muskegon (261210039), Kalamazoo (260770008), Coloma (260210014) and Cassopolis (260270003) monitors fulfill these requirements, respectively.

The ozone monitor in Holland (260050003 is in Allegan County) is in violation of the ozone NAAQS. Although Allegan County is classified as a micropolitan area and as such, is not required to have a monitor, the violation status of this monitor requires that it continue operation. This site continually measures the highest ozone values in the state and usually across the region. The Lake Michigan Air Directors Consortium (LADCO) created a map shown in **Figure 15** comparing ozone concentrations across the region. Holland still has the largest design value in the region, reaching 86 parts per billion (ppb). Two sites near Cincinnati now equal 85 ppb.

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 southwesternly winds. Scottville (261050007) and Benzonia (260190003) are sited to measure transport of ozone along Lake Michigan and have been in

operation for 8 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.

FIGURE 15: OZONE DESIGN VALUES 2006 – 2008 ACROSS REGION 5¹⁰



Two tribal ozone sites are in operation in Michigan in Peshawbestown (260890001) in Leelanau County and in Manistee (261010922) in Manistee County. Ozone levels measured at the Manistee site are greater than the ozone NAAQS. Review of tribal monitors is outside the scope of this review, but these sites are listed for completeness and to provide a description of spatial coverage of ozone sites across the area.

Table 14 summarizes the ozone monitoring site information for sites that were in existence in 2008. **Table 15** shows the ozone sites that are currently in operation. **Figure 16** compares the ozone network in 2008 with the current design. Once the EPA finalizes monitoring regulations, changes could be made to the ozone network to meet the new regulations. Recent work by LADCO that included Cox, CART and reaction studies underscored the importance and utility of long data sets in data analysis activities to uncover trends. Every attempt will be made to retain the design of the current ozone network and only add new sites.

¹⁰ Map provided by D. Kenski, Lake Michigan Air Directors Consortium

**PUBLIC COMMENT DRAFT:
MICHIGAN'S 2010 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

TABLE 14: MICHIGAN'S 2008 OZONE MONITORING NETWORK

| Monitoring Sites | | | SLAMS Stations | | | | | Network as of October, 2008 | | | | |
|---|-------------|--|----------------|-----------|-----------------|----------|-------------|--------------------------------------|-------------------|------------------|------------------------|--|
| Operating Schedule: Hourly, April 1 to September 30 Method: Ultra Violet Absorption Continuous Monitor | | | | | | | | Former NAMS sites are shown in Bold. | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| Rose Lake | 260370001 | 8562 E Stoll Rd | 42.7983 | -84.39389 | max conc | urban | Clinton | 6/7/79 | LEL | LELO | 447,728 | |
| Flint | 260490021 | Whaley Park, 3610 Iowa | 43.0472 | -83.67028 | pop exp | ngbrhrhd | Genesee | 6/16/92 | Flint | DWF | 5,456,428 | |
| Otisville | 260492001 | Washburn Rd | 43.1683 | -83.46167 | max conc | urban | Genesee | 5/13/80 | Flint | DWF | 5,456,428 | |
| Lansing | 260650012 | 220 H Pennsylvania | 42.7386 | -84.53472 | pop exp | ngbrhrhd | Ingham | 9/5/80 | LEL | LELO | 447,728 | |
| Grand Rapids | 260810020 | 1179 Monroe HWY | 42.9842 | -85.67139 | pop exp | ngbrhrhd | Kent | 4/24/80 | GRW | GRMH | 1,088,514 | |
| Warren | 260991003 | Warren Fire Station Common & Hoover | 42.5133 | -83.00611 | max conc | urban | Macomb | 1/1/77 | DWL | DWF | 5,456,428 | |
| Holland | 260050003 | Ottogan St. Between 61 st & 62 nd Sts. | 42.7678 | -86.14861 | max conc | regional | Allegan | 8/25/92 | Allegan Micro | GRMH | 1,088,514 | |
| Frankfort / Benzonia | 260190003 | West St., Benzonia Twp. | 44.61694 | -86.10944 | max conc | regional | Benzie | 7/28/92 | Not in MSA | Not in CSA | N/A | |
| Coloma | 260210014 | Paw Paw WWTP, 4689 Defield Rd., Coloma | 42.1978 | -86.30972 | max conc | regional | Berrien | 8/3/92 | NBH | Not in CSA | 162,453 | |
| Cassopolis | 260270003 | Ross Beatty High School | 41.8956 | -86.00167 | pop exp | urban | Cass | 5/16/91 | SBM | Not in CSA | N/A | |
| Harbor Beach | 260630007 | 1172 S. M 25, Sand Beach Twp. | 43.8364 | -82.64306 | backgrd | regional | Huron | 4/1/94 | Not in MSA | Not in CSA | N/A | |
| Kalamazoo | 260770008 | Fairgrounds, 2500 Lake St | 42.2781 | -85.54194 | pop exp | ngbrhrhd | Kalamazoo | 6/1/92 | KP | Not in CSA | 452,851 | |
| Evans | 260810022 | 10300 14 Mile Road, NE | 43.1767 | -85.41667 | max conc | urban | Kent | 4/1/99 | GRW | GRMH | 1,088,514 | |
| Tecumseh | 260910007 | 6792 Raisin Center Highway | 41.9956 | -83.94667 | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A | |
| New Haven | 260990009 | 57700 Gratiot | 42.7314 | -82.79361 | max conc | urban | Macomb | 7/14/80 | DWL | DWF | 5,456,428 | |
| Scottville | 261050007 | 525 W US 10 | 43.9533 | -86.29444 | max conc | regional | Mason | 4/1/98 | Not in MSA | Not in CSA | N/A | |
| Muskegon | 261210039 | 1340 Green Creek Road | 43.2781 | -86.31111 | pop exp | regional | Muskegon | 5/1/91 | MNS | GRMH | 1,088,514 | |
| Oak Park | 261250001 | 13701 Oak Park Blvd. | 42.4631 | -83.18333 | pop exp | urban | Oakland | 1/9/81 | Ann Arbor | DWF | 5,456,428 | |
| Jenison | 261390005 | 6981 28Th Ave. Georgetown Twp. | 42.8944 | -85.85278 | pop exp | regional | Ottawa | 4/1/89 | HGH | DWF | 1,088,514 | |
| Port Huron | 261470005 | 2525 Dove Rd | 42.9533 | -82.45639 | pop exp | regional | Saint Clair | 2/28/81 | DWL | DWF | 5,456,428 | |
| Seney | 261530001 | Seney Wildlife Refuge | 46.2889 | -85.95027 | bkgrd | regional | Schoolcraft | 1/15/02 | Not in MSA | Not in CSA | N/A | |
| Ypsilanti | 261610008 | 555 Towner Ave | 42.2406 | -83.59972 | pop exp | ngbrhrhd | Washtenaw | 4/1/00 | Ann Arbor | DWF | 5,456,428 | |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.20833 | pop exp | ngbrhrhd | Wayne | 1/1/80 | DWL | DWF | 5,456,428 | |
| E 7 Mile | 261630019 | 11600 East Seven Mile Road | 42.4308 | -83.00028 | max conc | ngbrhrhd | Wayne | 4/11/77 | DWL | DWF | 5,456,428 | |

| Monitoring Sites | | | Special Purpose and Tribal Stations | | | | | MSA Pop. (2000 Census) | | | | |
|------------------|--------------|----------------------------|-------------------------------------|-----------|------------|----------|-----------|------------------------|-------------------|------------------|------------------------|--|
| Site Name | AIRS Site ID | Address | Latitude | Longitude | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| Houghton Lake | 261130001 | 1769 S Jeffs Road | 44.3106 | -84.89194 | background | regional | Missaukee | 4/1/98 | Not in MSA | Not in CSA | N/A | |
| Peshawbestown | 260890001 | 3155 W. Peshawbestown Road | 45.0289 | -85.6292 | transport | regional | Leelanau | 4/21/03 | Not in MSA | Not in CSA | N/A | |
| Manistee | 261010922 | 3031 Domres Rd | 44.307 | -86.24268 | transport | regional | Manistee | 4/1/06 | Not in MSA | Not in CSA | N/A | |

| | |
|---|--|
| ¹ PMSA Key: | ² CSA Key: |
| DWL= Detroit-Warren-Livonia Metro. Area | DWF = Detroit-Warren-Flint Combined Statistical Area |
| GRW=Grand Rapids-Wyoming Metro. Area | GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area |
| HGH = Holland-Grand Haven Metro. Area | LELO = Lansing-East Lansing-Owosso Combined Statistiacl 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) | |

**PUBLIC COMMENT DRAFT:
MICHIGAN'S 2010 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

TABLE 15: 2009 OZONE MONITORING NETWORK IN MICHIGAN

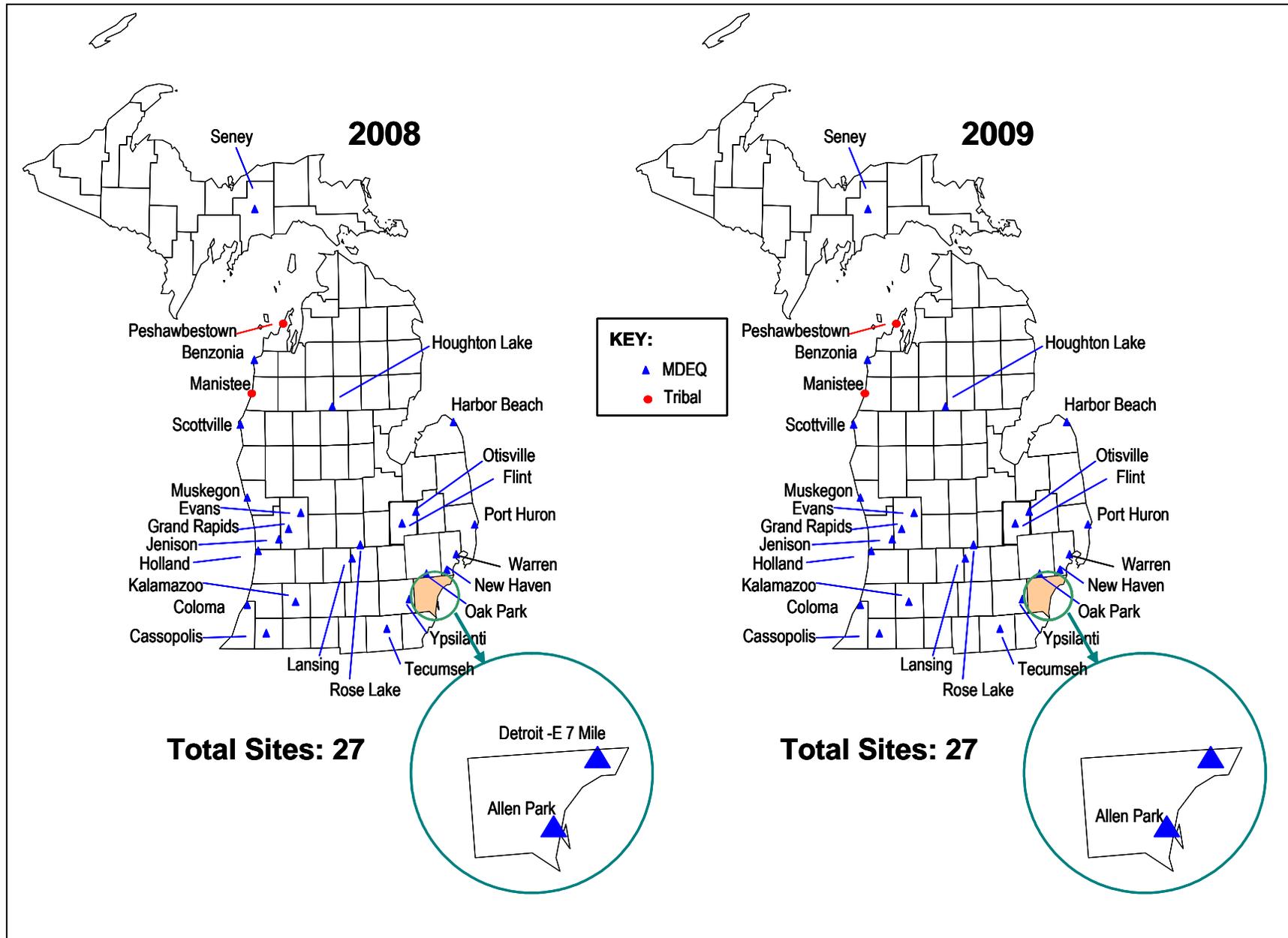
| Monitoring Sites | | | | SLAMS Stations | | | | Network as of March 10, 2009 | | | |
|---|-------------|--|----------|----------------|-----------------|----------|-------------|--------------------------------------|-------------------|------------------|------------------------|
| Operating Schedule: Hourly, April 1 to September 30 Method: Ultra Violet Absorption Continuous Monitor | | | | | | | | Former NAMS sites are shown in Bold. | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
| Rose Lake | 260370001 | 8562 E Stoll Rd | 42.7983 | -84.39389 | max conc | urban | Clinton | 6/7/79 | LEL | LELO | 447,728 |
| Flint | 260490021 | Whaley Park, 3610 Iowa | 43.0472 | -83.67028 | pop exp | ngnbrhd | Genesee | 6/16/92 | Flint | DWF | 5,456,428 |
| Otisville | 260492001 | Washburn Rd | 43.1683 | -83.46167 | max conc | urban | Genesee | 5/13/80 | Flint | DWF | 5,456,428 |
| Lansing | 260650012 | 220 H Pennsylvania | 42.7386 | -84.53472 | pop exp | ngnbrhd | Ingham | 9/5/80 | LEL | LELO | 447,728 |
| Grand Rapids | 260810020 | 1179 Monroe IHW | 42.9842 | -85.67139 | pop exp | ngnbrhd | Kent | 4/24/80 | GRW | GRMH | 1,088,514 |
| Warren | 260991003 | Warren Fire Station Common & Hoover | 42.5133 | -83.00611 | max conc | urban | Macomb | 1/1/77 | DWL | DWF | 5,456,428 |
| Holland | 260050003 | Ottogan St. Between 61 st & 62 nd Sts. | 42.7678 | -86.14861 | max conc | regional | Allegan | 8/25/92 | Allegan Micro | GRMH | 1,088,514 |
| Frankfort / Benzonia | 260190003 | West St., Benzonia Twp. | 44.61694 | -86.10944 | max conc | regional | Benzie | 7/28/92 | Not in MSA | Not in CSA | N/A |
| Coloma | 260210014 | Paw Paw WWTP, 4689 Defield Rd., Coloma | 42.1978 | -86.30972 | max conc | regional | Berrien | 8/3/92 | NBH | Not in CSA | 162,453 |
| Cassopolis | 260270003 | Ross Beatty High School | 41.8956 | -86.00167 | pop exp | urban | Cass | 5/16/91 | SBM | Not in CSA | N/A |
| Harbor Beach | 260630007 | 1172 S. M25, Sand Beach Twp. | 43.8364 | -82.64306 | backgrd | regional | Huron | 4/1/94 | Not in MSA | Not in CSA | N/A |
| Kalamazoo | 260770008 | Fairgrounds, 2500 Lake St | 42.2781 | -85.54194 | pop exp | ngnbrhd | Kalamazoo | 6/1/92 | KP | Not in CSA | 452,851 |
| Evans | 260810022 | 10300 14 Mile Road, NE | 43.1767 | -85.41667 | max conc | urban | Kent | 4/1/99 | GRW | GRMH | 1,088,514 |
| Tecumseh | 260910007 | 6792 Raisin Center Highway | 41.9956 | -83.94667 | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A |
| New Haven | 260990009 | 57700 Gratiot | 42.7314 | -82.79361 | max conc | urban | Macomb | 7/14/80 | DWL | DWF | 5,456,428 |
| Scottville | 261050007 | 525 W US 10 | 43.9533 | -86.29444 | max conc | regional | Mason | 4/1/98 | Not in MSA | Not in CSA | N/A |
| Muskegon | 261210039 | 1340 Green Creek Road | 43.2781 | -86.31111 | pop exp | regional | Muskegon | 5/1/91 | MNS | GRMH | 1,088,514 |
| Oak Park | 261250001 | 13701 Oak Park Blvd. | 42.4631 | -83.18333 | pop exp | urban | Oakland | 1/9/81 | Ann Arbor | DWF | 5,456,428 |
| Jenison | 261390005 | 6981 28 th Ave. Georgetown Twp. | 42.8944 | -85.85278 | pop exp | regional | Ottawa | 4/1/89 | HGH | DWF | 1,088,514 |
| Port Huron | 261470005 | 2525 Dove Rd | 42.9533 | -82.45639 | pop exp | regional | Saint Clair | 2/28/81 | DWL | DWF | 5,456,428 |
| Seney | 261530001 | Seney Wildlife Refuge | 46.2889 | -85.95027 | bkgrd | regional | Schoolcraft | 1/15/02 | Not in MSA | Not in CSA | N/A |
| Ypsilanti | 261610008 | 555 Townner Ave | 42.2406 | -83.59972 | pop exp | ngnbrhd | Washtenaw | 4/1/00 | Ann Arbor | DWF | 5,456,428 |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.20833 | pop exp | ngnbrhd | Wayne | 1/1/80 | DWL | DWF | 5,456,428 |
| E 7 Mile | 261630019 | 11600 East Seven Mile Road | 42.4308 | -83.00028 | max conc | ngnbrhd | Wayne | 4/11/77 | DWL | DWF | 5,456,428 |

| Monitoring Sites | | | | Special Purpose and Tribal Stations | | | | MSA Pop. (2000 Census) | | | |
|------------------|--------------|----------------------------|----------|-------------------------------------|------------|----------|-----------|------------------------|-------------------|------------------|------------------------|
| Site Name | AIRS Site ID | Address | Latitude | Longitude | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
| Houghton Lake | 261130001 | 1769 S Jeffs Road | 44.3106 | -84.89194 | background | regional | Missaukee | 4/1/98 | Not in MSA | Not in CSA | N/A |
| Peshawbestown | 260890001 | 3155 W. Peshawbestown Road | 45.0289 | -85.6292 | transport | regional | Leelanau | 4/21/03 | Not in MSA | Not in CSA | N/A |
| Manistee | 261010922 | 3031 Domres Rd | 44.307 | -86.24268 | transport | regional | Manistee | 4/1/06 | Not in MSA | Not in CSA | N/A |

¹ PMSA Key:
 DWL= Detroit-Warren-Livonia Metro. Area
 GRW=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)

² CSA Key:
 DWF = Detroit-Warren-Flint Combined Statistical Area
 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area
 LELO = Lansing-East Lansing-Owosso Combined Statistiacl Area

FIGURE 16: COMPARISON OF MICHIGAN'S 2008 AND 2009 OZONE NETWORKS (NO CHANGE)



IMPACT OF THE NEW PRIMARY OZONE NAAQS

Previously, the primary ozone NAAQS was calculated by selecting the 4th highest 8-hour ozone value in a given year. This value was averaged with the corresponding values from the two previous years and was expressed in ppm. The three-year average was rounded up to the nearest one hundredth, so an average of 0.085 ppm would round up to 0.09 ppm. This value was compared to the level of the NAAQS, which was set at 0.08 ppm. Any values greater than 0.08 ppm violated the NAAQS.

On March 27, 2008, the EPA changed the level of the primary NAAQS from 0.08 ppm to 0.075 ppm. Note the extra decimal place used in expressing the level of the new standard. The EPA found that the sensitivity of the ozone monitors is suitable to support reporting to an additional significant figure. With this change, the data handling conventions also changed. Now when the 8-hour average ozone concentration is calculated in ppm, any digits beyond the third decimal place are truncated. When the three-year average of the fourth highest maximum ozone concentration is calculated, any digits to the right of the third decimal place are also truncated.

To determine compliance with the primary ozone NAAQS, each site must capture an average of 90% complete data over the three previous years, with no single year falling below 75% completeness. If a site has less than this amount of data, it can still be found to violate the NAAQS. However, it is possible, on a case by case basis, to evaluate meteorological conditions on the days with missing data to determine whether the concentration can be assumed to be less than the level of the NAAQS.

Figure 17 compares the most recent 8-hour design values (using three decimal points) for all ozone sites in Michigan with the average for the three previous years. As a result of the reduction in the 4th highest 8-hour ozone values measured in 2008, ten more counties meet the NAAQS.

IMPACT OF THE NEW SECONDARY OZONE NAAQS

The EPA chose to make the secondary ozone NAAQS identical to the primary NAAQS. According to the March 27, 2008 final ozone rule, "EPA intends to consider specific requirements for a minimum number of rural ozone monitors per state."¹¹ More definitive guidance is forthcoming, but is not currently available. The MDEQ operates a number of ozone monitors in rural areas that correspond to areas previously identified as containing ozone susceptible species¹². Potential locations for background monitoring stations include:

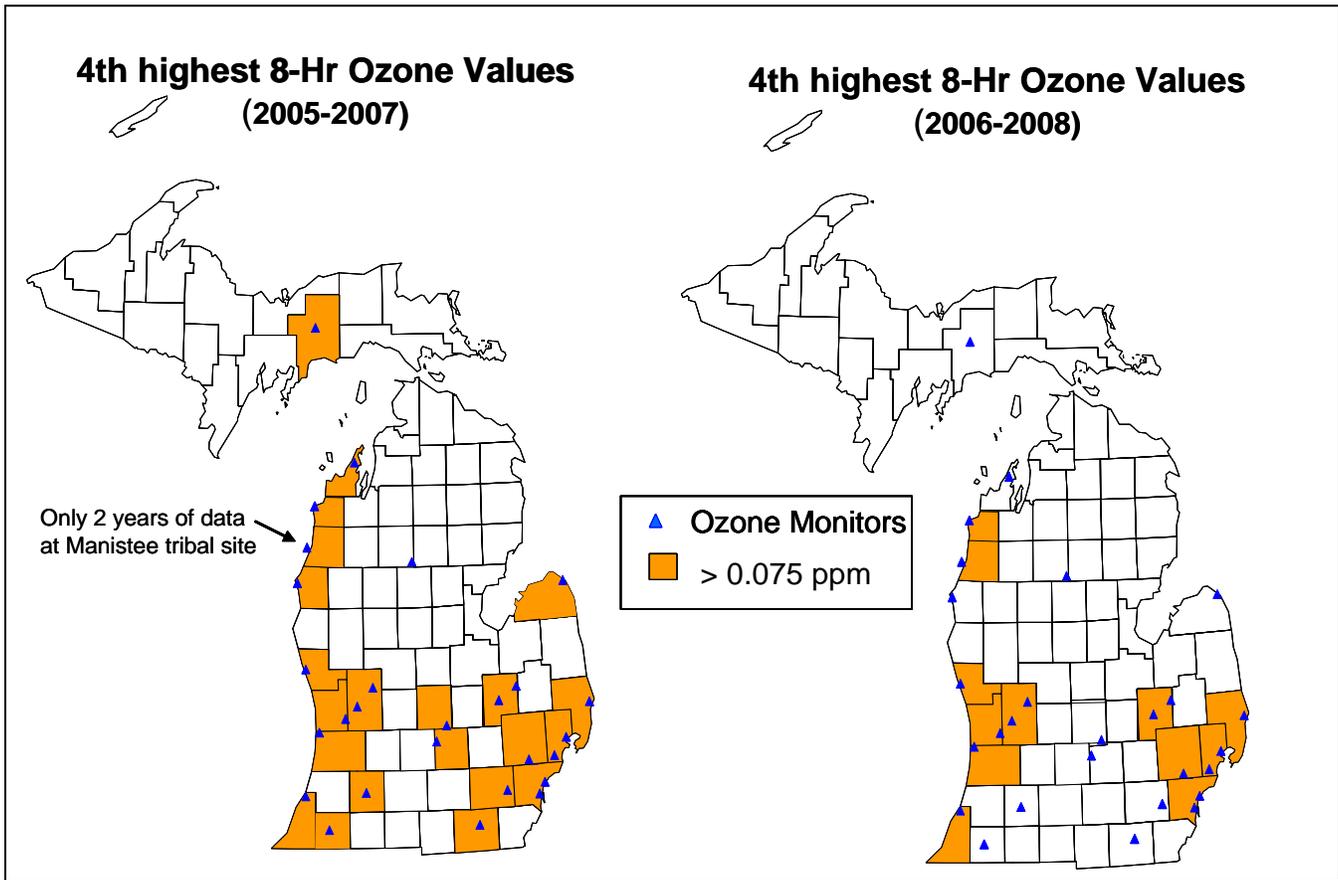
- Houghton Lake (261130001) in Missaukee County
- Seney (261530001) in Schoolcraft County
- Benzonia (260190003) in Benzie County
- Harbor Beach (260630007) in Huron County
- Tecumseh (260910007) in Lenawee County
- Scottville (261050007) in Mason County

Once more guidance is issued from the EPA, appropriate background ozone monitoring sites will be selected, with Houghton Lake (261630001) and Seney (261530001) being the most preferred candidates, due to their geographical location.

¹¹ Federal register Vol 73, no 6, March 27, 2008 p. 16502 third column.

¹² *Michigan's 2009 Ambient Air Monitoring Network Review*, MDEQ June 17, 2008

FIGURE 17: COMPARISON OF 4TH HIGHEST 8-HOUR OZONE VALUES AVERAGED OVER THREE-YEARS 2005-2007 AND 2006-2008



OZONE SEASON

With the enactment of the more stringent primary NAAQS, the length of the ozone season may need to be modified in some areas. Analysis in the previous network review indicates that the current ozone season, which extends from April 1 through September 30, is adequate for Michigan and no changes are necessary. Conversations with the EPA indicate that it is likely the EPA won't propose any modifications to Michigan's ozone season.

OZONE QUALITY ASSURANCE

The site operator conducts a precision check on the monitor every two weeks. The results of the precision checks are sent to the senior auditor for review each quarter. Each ozone monitor is also audited annually by the AMU's QA Team. The audit utilizes a dedicated ozone generator 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 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 2010 OZONE MONITORING NETWORK

It is unknown what impact upcoming guidance will have on the design of the ozone network. However, 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 2010 ozone network:

- Cassopolis (260270003)
- Rose Lake (260370001)
- Flint (260490021)
- Otisville (260492001)
- Lansing (260650012)
- Grand Rapids (260810020)
- Evans (260810022)
- Oak Park (261250001)
- Ypsilanti (261610008)
- Holland (260050003)
- Frankfort/Benzonia (260190003)
- Coloma (260210014)
- Harbor Beach (260630007) (downwind monitor)
- Kalamazoo Fairgrounds (260770008)
- Tecumseh (260910007) (background monitor)
- New Haven (260990009)
- Warren (260991003)
- Scottville (261050007)
- Muskegon (261210039)
- Jenison (261390005)
- Port Huron (261470005)
- Seney (261530001)
- Allen Park (261630001)
- E Seven Mile (261630019)
- Houghton Lake (261130001) (special purpose monitor)

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

- Peshawbestown (260890001) (tribal monitor)
- Manistee (261050922) (tribal monitor)

PM_{2.5} FRM MONITORING NETWORK:

The October 17, 2006 changes to the monitoring regulations impacted PM_{2.5} (fine particulate) measurements in a number of ways. The minimum number of PM_{2.5} sites using a FRM in an MSA has been changed and is shown in **Table 16**.¹³ 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 ARMs or 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 positive bias. Therefore, to avoid an erroneous non-attainment designation caused by monitor bias, the MDEQ will avoid deploying any continuous monitors that have ARM or FEM status, because any data will be used by the EPA to determine attainment.

On February 24, 2009, the United States Court of Appeals ordered the EPA to reconsider the annual NAAQS for PM_{2.5}.¹⁴ At this time, it is unknown what impact this may have on the design of the ambient monitoring network for PM_{2.5}, but if the level of the standard is lowered appreciably, monitoring requirements for MSAs may be altered from the value in the right column to the higher value in the center column of **Table 16**.

TABLE 16: PM_{2.5} MINIMUM MONITORING REQUIREMENTS

| MSA POPULATION^{1,2} | MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS ≥ 85% OF ANY PM_{2.5} NAAQS³ | MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS < 85% OF ANY PM_{2.5} NAAQS^{3,4} |
|-------------------------------------|---|--|
| > 1,000,000 | 3 | 2 |
| 500,000 – < 1,000,000 | 2 | 1 |
| 50,000 - ≤ 500,000 ⁵ | 1 | 0 |

¹ Minimum monitoring requirements apply to the MSA.

² Population based on the latest available census figures.

³ The PM_{2.5} NAAQS levels and forms are defined in 40 CFR Part 50.

⁴ These minimum monitoring requirements apply in the absence of a design value.

⁵ 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 FRM sites must co-locate continuous PM_{2.5} measurements.

Applying **Table 16** to Michigan's MSAs, population totals and most recent three-year design values results in **Table 17**. Any design values that are within 85% of a PM_{2.5} NAAQS are shown in blue font. Red font is used for those values that are greater than the NAAQS. Design values that are shown in bold represent the controlling site in each MSA, which is also called the design value site. The monitors with design values that are within 5% of the 24-hour NAAQS are shaded yellow. If these yellow shaded monitors are the design value site in a

¹³ Table D-5 of Appendix D to Part 58.

¹⁴ American Farm Bureau Federation and National Pork Producers Council Vs. EPA, United States Court of Appeals for the District of Columbia Circuit Court 2/24/09

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MSA, daily sampling must be initiated, according to the Federal Register. Changes in the minimum number of required monitoring stations within each MSA are shown in **green bold**.

TABLE 17: APPLICATION MINIMUM PM_{2.5} MONITORING REQUIREMENTS IN THE OCTOBER 17, 2006 FINAL REVISION TO THE MONITORING REGULATION TO MICHIGAN'S PM_{2.5} FRM NETWORK

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

| MSA | 2000 Population | Counties | Existing Monitors | annual | 24-hr | Values with in 5% of the 24-Hr NAAQS are shaded yellow. 33-37 = 5% NAAQS | Min No monitors Required | Comments | |
|--------------------------------------|----------------------------|------------|-----------------------------|---|---|---|--------------------------|-------------------|-------|
| | | | | 85% of 15 ug/m3 12.8 | 85% of 35 ug /m3 30 | | | | |
| | | | | The 3-year PM _{2.5} average at MSA Design Value site is shown in bold. | | | | | |
| | | | | 2006-2008 | 2006-2008 | | | | |
| | | | | most recent 3-year PM _{2.5} design value (annual) | most recent 3-year PM _{2.5} design value (24-Hr) | | | | |
| Detroit-Warren-Livonia Metro Area | 4,452,557 | Macomb | New Haven | 11.3 | 31 | | 3 | | |
| | | | Oakland | Oak Park | 12.1 | 33 | | | |
| | | | Wayne | Allen Park | 12.6 | 31 | | | daily |
| | | | | SW HS | 14.0 | 35 | | | |
| | | | | Linwood | 12.9 | 34 | | | |
| | | | | E 7 Mile | 12.4 | 33 | | | |
| | | | | Livonia | 11.9 | 31 | | | |
| | | | | Dearborn | 15.5 | 37 | | | |
| | | | | Wyandotte | 12.4 | 29 | | | |
| | | | | Newberry | 12.8 | 31 | | | |
| | | FIA | 13.1 | 33 | | | | | |
| | | Lapeer | --- | | | | | | |
| | | St Clair | Port Huron | 11.9 | 35 | | | | |
| | | Livingston | --- | | | | | | |
| Flint Metro Area | 436,141 | Genesee | Flint | 10.6 | 26 | | 0 | | |
| Monroe Metro Area | 145,945 | Monroe | Luna Pier | 12.4 | 31 | | 1 | | |
| Ann Arbor Metro Area | 322,895 | Washtenaw | Ypsilanti | 12.1 | 31 | | 1 | | |
| | | | Ann Arbor (closed) | | | | | | |
| Grand Rapids-Wyoming Metro Area | 740,482 | Kent | Grand Rapids | 11.8 | 29 | | 1 | daily in 2008 | |
| | | | <i>only 2 years of data</i> | Wyoming | 12.0 | 28 | | | |
| | | | | Barry | --- | | | | |
| | | | | Newaygo | --- | | | | |
| | | Ionia | --- | | | | | | |
| Holland-Grand Haven Metro Area | 238,314 | Ottawa | Janison | 11.5 | 29 | | 0 | daily in 2008 | |
| Muskegon-Norton Shores Metro Area | 170,200 | Muskegon | Muskegon | 10.5 | 28 | | 0 | daily in 2008 | |
| Lansing-East Lansing Metro Area | 447,728 | Clinton | --- | | | | | | |
| | | | Ingham | Lansing | 10.9 | 27 | | 0 | |
| | | | | Eaton | --- | | | | |
| Bay City Metro Area | 110,157 | Bay | Bay City | 9.7 | 26 | | 0 | | |
| Saginaw-Saginaw Twp N Metro Area | 210,039 | Saginaw | Saginaw (closed) | | | | 0 | | |
| Kalamazoo-Portage Metro Area | 314,866 | Kalamazoo | Kalamazoo | 12.1 | 28 | | 0 | | |
| | | | | Van Buren | --- | | | | |
| Niles-Benton Harbor Metro Area | 162,453 | Berrien | Coloma | 10.8 | 28 | | 0 | | |
| Jackson Metro Area | 158,422 | Jackson | --- | | | | | | |
| Battle Creek Metro Area | 137,985 | Calhoun | --- | | | | | | |
| South Bend-Mishawaka Metro Area INMI | 51,104 | Cass | --- | | | | | | |
| Other areas | | | | | | | | | |
| | | Allegan | Holland | 11.0 | 30 | | | metropolitan area | |
| | | Missaukee | Houghton Lake | 7.4 | 22 | | | | |
| | | Manistee | Manistee | 8.4 | 25 | | | | |
| | <i>only 1 year of data</i> | Teumseh | Lenawee | 9.7 | 23 | | | | |

The reduced concentrations of PM_{2.5} measured during 2008 have caused the 2006-2008 design values to drop markedly in many MSAs. The minimum number of monitoring sites in Holland-Grand Haven, Muskegon-Norton Shores, Lansing-East Lansing, Bay City, Kalamazoo-Portage 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. The requirement for a site in the Flint MSA dropped to zero last year. Although the MDEQ may be able to remove nine PM_{2.5} FRM stations from operation, we are reluctant to do so at this time. It is unknown if the fine particulate levels measured in 2008 are indicative of a downward trend or if 2008 was an anomalous year. Also, if the annual PM_{2.5} NAAQS is strengthened in the

near future, monitoring may be required again in these MSAs. Finally, a detailed five-year network review is due to be completed by July 1, 2010. The EPA has recommended that any extensive changes to the monitoring networks be delayed until then to take advantage of the more detailed analysis.

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Only three PM_{2.5} FRM monitors are required in the Detroit-Warren-Livonia MSA. Dearborn (261630033) is the highest annual design value site with annual averages typically above 17 µg/m³. Allen Park (261630001) is the population-oriented trend site, and as such, is also required to collect speciated PM_{2.5} samples on a once every three day schedule. In years prior to the 2004-2006 time period, Linwood (261630016) was the 24-hour design value site, but in the most recent two three-year intervals, Dearborn has been the 24-hour design value site. Both the annual and 24-hour design values from Dearborn for the Detroit-Warren-Livonia MSA are greater than or equal to 85% of the NAAQS, requiring three PM_{2.5} FRM sites in this MSA. Elevated annual concentrations have been measured during 2008 at SW High School (9261630015), supporting the conceptual model¹⁵ of PM_{2.5} created by Dr. Jay Turner, describing the nature of PM_{2.5} across the area. In his model, Dr. Turner discusses an urban excess of fine particulate from local sources that impact Dearborn (261630033), SW High School (261630015) and Wyandotte (261630036). Both SW High School and Wyandotte need to be retained to continue to evaluate the impacts from these local sources. Also, a new international border crossing called Detroit River International Crossing (DRIC) could be created near SW High School and contribute to more emissions from motor vehicles, further reiterating the need to retain the SW High School monitor. Emissions near the E Seven Mile site (261630019) could be increasing. So, although only three monitors are required in the Detroit-Warren-Livonia Metropolitan Area, the conceptual model as well as other data analysis results reinforce the importance of retaining a larger network size that exceeds the minimum number of sites specified in the Federal Register.

Currently a co-located sampler is in operation at the Allen Park site (261630001). This monitor is used to determine precision and was sampling on a once every 12 day schedule during 2008. It is difficult to capture 75% complete data because only 7 or 8 samples are collected per quarter when a once every 12 day schedule is used. Therefore, on January 1, 2009 the sampling frequency was increased from once every 12 days to once every six days. Allen Park (261630001) may become the NCore site for the Detroit-Warren-Livonia MSA. As such, deck space will be at a premium. To make room on the deck, the MDEQ proposes to move the co-located sampler from Allen Park (261630001) to Dearborn (261630033), where the

¹⁵ Turner, Jay R. "A Conceptual Model for Ambient Fine particulate Matter Over Southeast Michigan: High Concentration days. Washington University in St. Louis. Revision 0.1 (First Draft) March 4, 2008

deck was recently enlarged. The co-located monitor at Dearborn (261630033) will begin operation on January 1, 2010.

The sites at Newberry School (261630038) and Lafayette (261630039) are 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, respectively.

Through a cooperative grant project with Region 5 EPA and EPA ORD, the MDEQ deployed a special purpose PM_{2.5} FRM sampler to Tecumseh (260910007) in Lenawee County on April 1, 2008. Other special measurements that were added to the Tecumseh site include: PM_{2.5} speciation, continuous EC/OC and an aethalometer to measure carbon black. The collection of the EC/OC and black carbon at Tecumseh was temporarily discontinued in 2008 to support a Regional monitoring study to investigate the impact of rail yard emissions on PM_{2.5} levels. Therefore, the MDEQ will collect FRM measurements for one more year at Tecumseh so a complete year of FRM, BC and EC/OC data can be captured at the upwind site.

Prior to a reduction in the design value, 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 MDEQ will refrain from making any changes to the monitoring network until we are certain that levels of fine particulate are continuing to decline and that 2008 was not an anomalous year. We will complete the 5-year network review due by July 1, 2010 before making any changes. The MDEQ is also waiting for the outcome of the court case about the level of the annual PM_{2.5} NAAQS.

The evaluation of monitoring data indicated that the Grand Rapids Monroe Street (260810020) monitor was within $\pm 5\%$ of the 24-hour NAAQS, triggering the daily monitoring requirement. The sampling frequency was increased to daily on January 1, 2008. According to data collected during 2008, levels have fallen and daily sampling is no longer required at the Monroe St. site. The sampling frequency was reduced to once every three days on April 1, 2009 at the beginning of the quarter following completion of validation of the fourth quarter 2008 data.

During 2008, a co-located PM_{2.5} FRM sampler operated at the Monroe site (260810020) on a once every 12 day sampling frequency. The sampling frequency was increased to once every six days beginning on January 1, 2009 to improve data capture. The Grand Rapids Monroe St. site (260810020) has been proposed as an NCore site for the Grand Rapids-Wyoming MSA. Because rooftop deck space is limited at Monroe Street and PM_{2.5} levels have been falling, the MDEQ proposes to move the co-located sampler to Luna Pier (261150005) where concentrations are higher, beginning January 1, 2010.

One monitor is required in Monroe MSA. The Luna Pier site is the only PM_{2.5} site in Monroe County, located east of I-75, close to the Ohio border. It was selected to help determine transport into the Detroit MSA, and it meets the requirement for a monitor in Monroe County.

As shown in **Table 17**, using the most recent three years of data, the Flint (260490021) monitor has an annual and a 24-hour average equaling 11.6 and 29 $\mu\text{g}/\text{m}^3$ respectively. Both of these averages are less than 85% of their respective NAAQS. Therefore, the Flint MSA *no longer requires* a PM_{2.5} monitoring site. No changes are suggested at this time. If a violation of the NAAQS by the Flint site continues to be unlikely and a network reduction is necessary due to future budget issues, the monitor could be eliminated at a future time, possibly after the five-year network review.

One monitor is required in the Ann Arbor MSA. The Ypsilanti site (261610008) fulfills this requirement and 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. The sampling frequency of the co-located sampler was increased from once every 12 days to once every six days beginning January 1, 2009 to make it easier to capture 75% complete data per quarter.

Previously, a single PM_{2.5} FRM monitor was required in the Holland-Grand Haven MSA and Muskegon-Norton Shores MSA. This requirement was fulfilled by the monitor in Jenison (261390005) and by the monitor in Muskegon (261210040), respectively. Recent design values indicate that monitoring is no longer required in these MSAs, but monitoring at these sites will continue for the reasons described previously. Because PM_{2.5} levels measured by both monitors was within 5% of the level of the 24-hour NAAQS, the sampling frequency was changed from once every six days to daily for both Jenison (261390005) and Muskegon (261210040) on January 1, 2007. Analysis of the most recent three years of data indicates that both the Jenison (261390005) and Muskegon (261210040) may reduce the sampling frequency. On April 1, 2009 both sites resumed sampling on a once every six day schedule.

The Lansing monitor (260650012) fulfills the requirement for one site in the Lansing-East Lansing MSA. The annual and 24-hour PM_{2.5} averages from this site are no longer greater than 85% of the NAAQS, indicating that monitoring is no longer required. MDEQ will continue to operate the monitor for one more year for the reasons discussed previously.

The Saginaw-Saginaw Township North MSA is required to have a PM_{2.5} FRM site. The MDEQ used to operate a PM_{2.5} monitoring site at Saginaw Valley University (261450018) but access was lost due to rapid increases in enrollment at the university. The monitoring trailer was located close to student dormitories and had to be removed for expansion of student housing. The site was shut down January 1, 2006. Annual average PM_{2.5} levels at the Saginaw site were less than those measured at the Bay City site. The 98th percentiles of the 24-hour values that were measured at Saginaw were either within 0.2 µg/m³ of those measured at Bay City or were 2 to 6 µg/m³ less than Bay City, depending upon the year. The EPA Regional Administrator granted a waiver for the PM_{2.5} Saginaw monitor.

In April 2006, the sampling frequency of the Bay City monitor (260170014) was reduced to once every six days due to a budget cut. As a result of changes in the monitoring regulations, the once every three day sampling frequency was restored January 2007. The 24-hour PM_{2.5} average from the monitor in Bay City is less than 85% of the NAAQS, indicating that monitoring is no longer required. MDEQ will continue to operate the monitor for one more year for the reasons discussed previously.

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

During 2008, a co-located PM_{2.5} FRM sampler was operated at Kalamazoo (260770008) on a once every 12 day sampling schedule to determine precision. The sampling frequency was increased to once every six days on January 1, 2009 to improve data capture.

Coloma (260210014) fulfilled the requirement for the Niles-Benton Harbor MSA. The 24-hour PM_{2.5} average from this site is greater than 85% of the NAAQS, indicating that monitoring is

still required. The MDEQ will continue to operate the monitor for one more year for the reasons discussed previously.

The PM_{2.5} monitor in Holland (260050003) in Allegan County is a micropolitan area. The monitor's design value is no longer within 5% of the NAAQS. Because the site is in a micropolitan area, daily sampling was not required. Now that concentrations have fallen, it may be possible to discontinue monitoring at Holland, but MDEQ will continue to operate the monitor for one more year for the reasons discussed previously.

Houghton Lake (261130001) is the background PM_{2.5} FRM site in Michigan.

A tribal PM_{2.5} monitor is located in Manistee (261010922). Tribal monitors are also operational in the Sault Ste Marie area. However, the MDEQ no longer contracts with the Inter-Tribal Council in Sault Ste. Marie to weigh these filters so has no knowledge of the nuances of the PM_{2.5} network design in that area of the state.

Table 18 summarizes the PM_{2.5} FRM monitoring site information for sites that existed in 2008. **Table 19** shows the PM_{2.5} FRM sites that are currently in operation and provides a summary of technical information required in this review. **Figure 18** compares the PM_{2.5} FRM monitoring network in 2008 with the current design.

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TABLE 18: 2008 PM_{2.5} 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 | | | Network as of October 2008 | | |
|--|--------------------|--|-----------------|------------------|--------------------------------|----------------------|--------------|---------------|--------------|-------------------------|------------------------|------------------------|----------------------|--|--|----------------------------|--|--|
| Monitoring Sites | | | | | | | | | Start | | | MSA Pop. (2000) | | | | | | |
| Site Name | AOS Site ID | Address | Latitude | Longitude | 2008 Sampling Frequency | Purpose | Scale | County | Date | PMSA¹ | CSA² | Census | | | | | | |
| Holland | 260050003 | 970 W. 32 nd , Holland | 42.768 | -86.14861 | 1:3 | Pop. Exp. | Neighborhood | Allegan | 10/31/98 | Allegan Micro. | GRMH | 1,088,514 | | | | | | |
| Bay City | 260170014 | 1001 Jennison St | 43.571 | -83.89083 | 1:3 | Pop. Exp. | Neighborhood | Bay | 8/24/00 | Bay City | SBCSTN | 403,070 | | | | | | |
| Coloma | 260210014 | 4689 Defield Rd., Paw Paw WWTP | 42.198 | -86.30972 | 1:3 | Transport | Regional | Berrien | 11/7/98 | NBH | Not in CSA | 162,453 | | | | | | |
| Flint | 260490021 | Whaley Park, 3610 Iowa St., Flint | 43.047 | -83.67028 | 1:3 | Pop. Exp. | Neighborhood | Genesee | 12/16/98 | Flint | DWF | 5,456,428 | | | | | | |
| Lansing | 260650012 | 220 N. Pennsylvania | 42.739 | -84.53472 | 1:3 | Pop. Exp. | Neighborhood | Ingham | 11/7/98 | LEL | LELO | 447,728 | | | | | | |
| Kalamazoo | 260770008 | Fairgrounds, 1400 Olmstead Rd | 42.278 | -85.54194 | 1:3 | Pop. Exp. | Neighborhood | Kalamazoo | 11/19/98 | KP | Not in CSA | 452,851 | | | | | | |
| Wyoming | 260810007 | 507 Wealthy St | 42.956 | -85.67917 | 1:3 | Pop. Exp. | Neighborhood | Kent | 1/1/07 | GRWV | GRMH | 1,088,514 | | | | | | |
| Grand Rapids | 260810020 | 1179 Monroe St., NW, | 42.984 | -85.67139 | 1:1 | Pop. Exp. | Neighborhood | Kent | 10/23/98 | GRWV | GRMH | 1,088,514 | | | | | | |
| New Haven | 260990009 | 57700 Gratiot | 42.731 | -82.79361 | 1:3 | Pop. Exp. Max. Conc. | Neighborhood | Macomb | 12/22/98 | DWL | DWF | 5,456,428 | | | | | | |
| Houghton lake | 261130001 | 1789 S Jeffs Rd | 44.311 | -84.89194 | 1:3 | Background | Regional | Missaukee | 2/8/03 | Not in MSA | Not in CSA | N/A | | | | | | |
| Luna Pier | 261150005 | Erie Shooting Club | 41.764 | -83.47194 | 1:3 | Transport | Regional | Monroe | 12/17/99 | Monroe | DWF | 5,456,428 | | | | | | |
| Muskegon | 261210040 | 199 E. Apple | 43.233 | -86.23861 | 1:1 | Pop. Exp. | Neighborhood | Muskegon | 12/18/98 | MNS | GRMH | 1,088,514 | | | | | | |
| Oak Park | 261250001 | 13701 Oak Park Blvd. 6981 28 th Ave, Georgetown | 42.463 | -83.18333 | 1:3 | Pop. Exp. | Urban | Oakland | 12/25/98 | DWL | DWF | 5,456,428 | | | | | | |
| Jenison | 261390005 | Twp | 42.894 | -85.85278 | 1:1 | Pop. Exp. | Neighborhood | Ottawa | 11/7/98 | HGH | GRMH | 1,088,514 | | | | | | |
| Port Huron | 261470005 | 2525 Dove Rd. | 42.953 | -82.45639 | 1:3 | Pop. Exp. | Regional | Saint Clair | 2/11/99 | DWL | DWF | 5,456,428 | | | | | | |
| Ypsilanti | 261610008 | 555 Townner Ave | 42.241 | -83.59972 | 1:3 | Pop. Exp. | Neighborhood | Washtena | 8/4/99 | Ann Arbor | DWF | 5,456,428 | | | | | | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | 1:1 | Pop. Exp. | Neighborhood | Wayne | 5/12/99 | DWL | DWF | 5,456,428 | | | | | | |
| SW Highsch., Detroit | 261630015 | SW Highschool, 6921 W. Fort St | 42.303 | -83.10667 | 1:3 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 2/26/99 | DWL | DWF | 5,456,428 | | | | | | |
| Linwood | 261630016 | 6050 Linwood, McMichael School | 42.358 | -83.09617 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 5/12/99 | DWL | DWF | 5,456,428 | | | | | | |
| E. 7 Mile | 261630019 | 11600 E. 7 Mile, Osborne School | 42.431 | -83.00028 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 4/30/00 | DWL | DWF | 5,456,428 | | | | | | |
| Livonia | 261630025 | 38707 Seven Mile Rd | 42.423 | -83.42639 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 8/21/99 | DWL | DWF | 5,456,428 | | | | | | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | 1:3 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 2/5/99 | DWL | DWF | 5,456,428 | | | | | | |
| Wyandotte | 261630036 | 3625 Biddle, Wyandotte | 42.187 | -83.15404 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 2/20/99 | DWL | DWF | 5,456,428 | | | | | | |

| 2008 Special Purpose and Tribal PM_{2.5} Monitors in Michigan | | | | | | | | | | | | | | |
|--|--------------------|----------------------------|-----------------|------------------|--------------------------------|---------------------|-----------------|--------------|---------------|-------------|-------------------------|------------------------|---------------|--|
| Monitoring Sites | | | | | | | | | Start | | | (2000) | | |
| Site Name | AOS Site ID | Address | Latitude | Longitude | 2008 Sampling Frequency | Monitor Type | Purpose | Scale | County | Date | PMSA¹ | CSA² | Census | |
| Tecumseh | 260910007 | 6792 Raisin Center Highway | 41.996 | -83.94667 | 1:3 | SPM | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A | |
| Manistee | 261010922 | 3031 Domres Rd | 44.307 | -86.24268 | 1:3 | Tribal | Tribal | Regional | Manistee | 4/2/06 | Not in MSA | Not in MSA | N/A | |
| Newberry School | 261630038 | 4045 29 th St | 42.335 | -83.1097 | 1:3 | SPM | Source Oriented | Neighborhood | Wayne | 12/26/05 | DWL | DWF | 5,456,428 | |
| FIA/Lafayette St | 261630039 | 2000 W/Lafayette | 42.323 | -83.06861 | 1:3 | SPM | Source Oriented | Neighborhood | Wayne | 8/26/05 | DWL | DWF | 5,456,428 | |

¹ PMSA Key:
 DWL= Detroit-Warren-Livonia Metro. Area
 GRWV=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)

² CSA Key:
 DWF = Detroit-Warren-Flint Combined Statistical Area
 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area
 LELO = Lansing-East Lansing-Owosso Combined Statistiacl Area

**PUBLIC COMMENT DRAFT:
MICHIGAN'S 2010 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW**

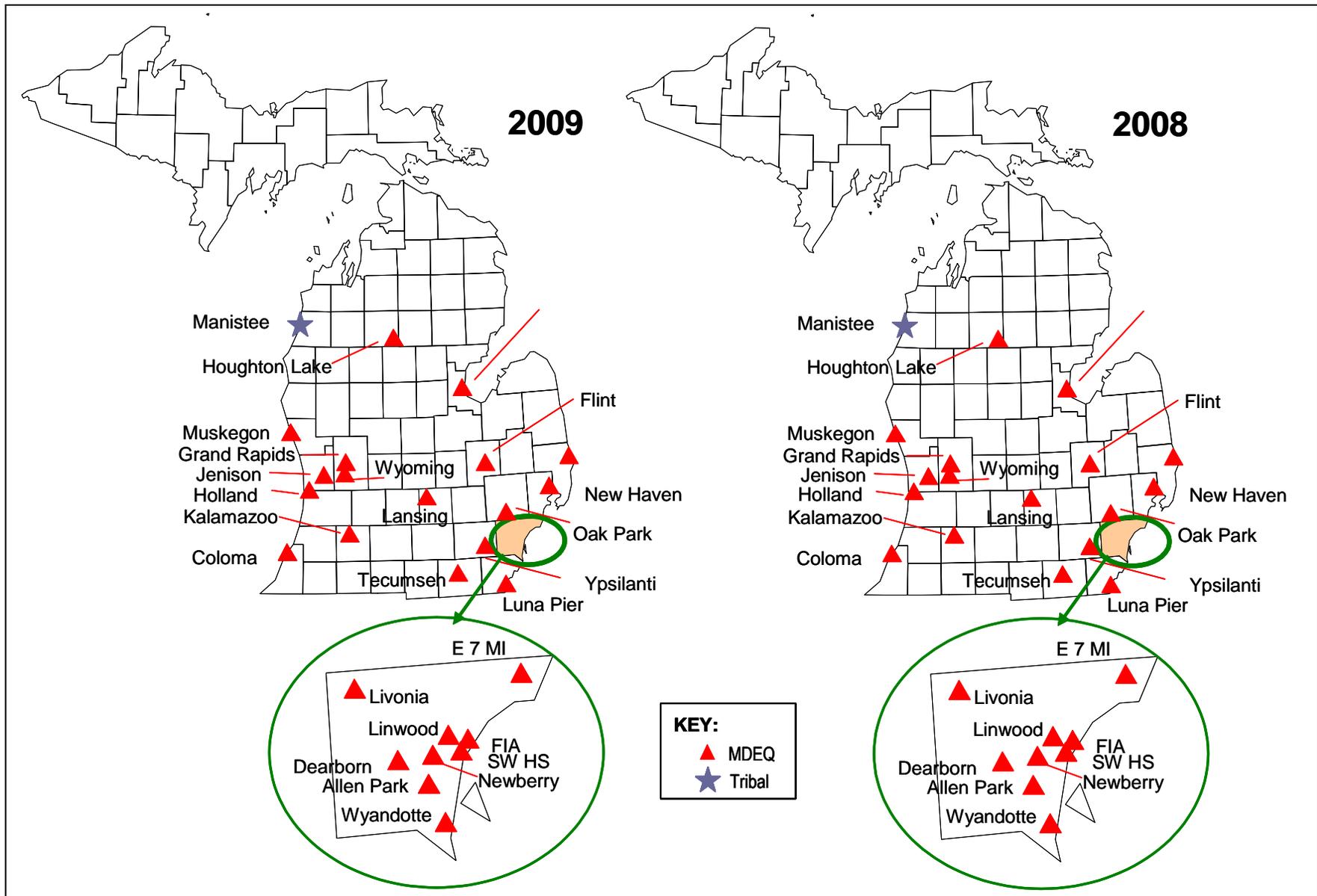
TABLE 19: 2009 PM_{2.5} FRM NETWORK IN MICHIGAN

| Operating Schedule: Once every 6 days, once every 3 days or daily see below Method: Partisol 2025 Rupprecht & Patashnick Samplers | | | | | | | | | | | | | |
|--|-------------|--|----------|-----------|-------------------------|----------------------|--------------|-------------|------------|-------------------|------------------|-----------------|--------|
| SLAMS Network | | | | | | | | | | | | | |
| Network as of March 2009 | | | | | | | | | | | | | |
| Monitoring Sites | | | | | | | | | | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | 2009 Sampling Frequency | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000) | Census |
| Holland | 260050003 | 970 W. 32 nd , Holland | 42.768 | -86.14861 | 1:3 | Pop. Exp. | Neighborhood | Allegan | 10/31/98 | Allegan Micro. | GRMH | 1,088,514 | |
| Bay City | 260170014 | 1001 Jennison St. | 43.571 | -83.89083 | 1:3 | Pop. Exp. | Neighborhood | Bay | 8/24/00 | Bay City | SBCSTN | 403,070 | |
| Coloma | 260210014 | 4689 Defield Rd., Paw Paw WWTP | 42.196 | -86.30972 | 1:3 | Transport | Regional | Berrien | 11/7/98 | NBH | Not in CSA | 162,453 | |
| Flint | 260490021 | Whaley Park, 3610 Iowa St., Flint | 43.047 | -83.67028 | 1:3 | Pop. Exp. | Neighborhood | Genesee | 12/16/98 | Flint | DWF | 5,456,428 | |
| Lansing | 260650012 | 220 N. Pennsylvania Fairgrounds, 1400 Olmstead Rd | 42.739 | -84.53472 | 1:3 | Pop. Exp. | Neighborhood | Ingham | 11/7/98 | LEL | LELO | 447,728 | |
| Kalamazoo | 260770008 | 507 Wealthy St | 42.278 | -85.54194 | 1:3 | Pop. Exp. | Neighborhood | Kalamazoo | 11/19/98 | KP | Not in CSA | 452,851 | |
| Wyoming | 260810007 | 1179 Monroe St., NW, | 42.984 | -85.67139 | 1:1 to 1:3 4/1/09 | Pop. Exp. | Neighborhood | Kent | 10/23/98 | GRW | GRMH | 1,088,514 | |
| Grand Rapids | 260810020 | 57700 Gratiot | 42.731 | -82.79361 | 1:3 | Pop. Exp. Max. Conc. | Neighborhood | Macomb | 12/22/98 | DWL | DWF | 5,456,428 | |
| New Haven | 260990009 | 1769 S Jeffs Rd | 44.311 | -84.89194 | 1:3 | Background | Regional | Missaukee | 2/8/03 | Not in MSA | Not in CSA | N/A | |
| Houghton lake | 261130001 | Erie Shooting Club | 41.764 | -83.47194 | 1:3 | Transport | Regional | Monroe | 12/17/99 | Monroe | DWF | 5,456,428 | |
| Luna Pier | 261150005 | 199 E. Apple | 43.233 | -86.23861 | 1:1 | Pop. Exp. | Neighborhood | Muskegon | 12/18/98 | MNS | GRMH | 1,088,514 | |
| Muskegon | 261210040 | 13701 Oak Park Blvd. 6981 28 th Ave, Georgetown Twp | 42.463 | -83.18333 | 1:3 | Pop. Exp. | Urban | Oakland | 12/25/98 | DWL | DWF | 5,456,428 | |
| Oak Park | 261250001 | 2525 Dove Rd. | 42.953 | -82.45639 | 1:3 | Pop. Exp. | Regional | Saint Clair | 2/11/99 | DWL | DWF | 5,456,428 | |
| Jenison | 261390005 | 555 Towner Ave | 42.241 | -83.59972 | 1:3 | Pop. Exp. | Neighborhood | Washtena | 8/4/99 | Ann Arbor | DWF | 5,456,428 | |
| Port Huron | 261470005 | 14700 Goddard | 42.229 | -83.20833 | 1:1 to 1:3 4/1/09 | Pop. Exp. | Neighborhood | Wayne | 5/12/99 | DWL | DWF | 5,456,428 | |
| Ypsilanti | 261610008 | SW Highschool, 6921 W. Fort St | 42.303 | -83.10667 | 1:3 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 2/26/99 | DWL | DWF | 5,456,428 | |
| Allen Park | 261630001 | 6050 Linwood, McMichael School | 42.358 | -83.09617 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 5/12/99 | DWL | DWF | 5,456,428 | |
| SW Highsch., Detroit | 261630015 | 11600 E. 7 Mile, Osborne School | 42.431 | -83.00028 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 4/30/00 | DWL | DWF | 5,456,428 | |
| Linwood | 261630016 | 38707 Seven Mile Rd | 42.423 | -83.42639 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 8/21/99 | DWL | DWF | 5,456,428 | |
| E. 7 Mile | 261630019 | 2642 Wyoming, Salina School | 42.307 | -83.14889 | 1:3 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 2/5/99 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 3625 Biddle, Wyandotte | 42.187 | -83.15404 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 2/20/99 | DWL | DWF | 5,456,428 | |
| Wyandotte | 261630036 | | | | | | | | | | | | |

| 2009 Special Purpose and Tribal PM_{2.5} Monitors in Michigan | | | | | | | | | | | | | |
|--|-------------|----------------------------|----------|-----------|-------------------------|--------------|-----------------|--------------|----------|------------|-------------------|------------------|---------------|
| Monitoring Sites | | | | | | | | | | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | 2007 Sampling Frequency | Monitor Type | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | (2000 Census) |
| Tecumseh | 260910007 | 6792 Raisin Center Highway | 41.996 | -83.94667 | 1:3 | SPM | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A |
| Manistee | 261010922 | 3031 Domres Rd | 44.307 | -86.24268 | 1:3 | Tribal | Tribal | Regional | Manistee | 4/2/06 | Not in MSA | Not in MSA | N/A |
| Newberry School | 261630038 | 4045 29 th St | 42.335 | -83.1097 | 1:3 | SPM | Source Oriented | Neighborhood | Wayne | 12/26/05 | DWL | DWF | 5,456,428 |
| FIA/Lafayette St | 261630039 | 2000 W Lafayette | 42.323 | -83.06861 | 1:3 | SPM | Source Oriented | Neighborhood | Wayne | 8/26/05 | DWL | DWF | 5,456,428 |

| | | | |
|-------------------------------|--|------------------------------|--|
| ¹ PMSA Key: | DWL= Detroit-Warren-Livonia Metro. Area GRW=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) | ² CSA Key: | DWF = Detroit-Warren-Flint Combined Statistical Area GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area LELO = Lansing-East Lansing-Owosso Combined Stat. Area |
|-------------------------------|--|------------------------------|--|

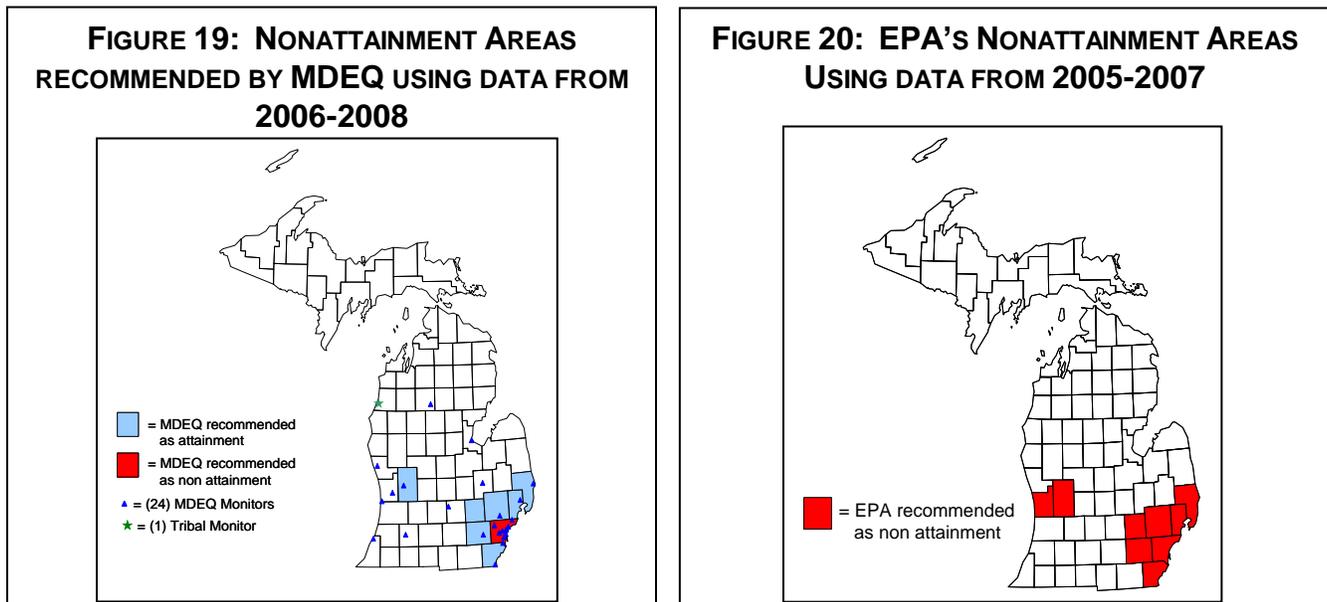
FIGURE 18: COMPARISON OF MICHIGAN'S 2008 AND 2009 PM_{2.5} FRM MONITORING NETWORK
(WHILE THERE WERE NO CHANGES IN SITE LOCATIONS, SAMPLING FREQUENCIES HAVE CHANGED.)



PM_{2.5} DESIGNATION RECOMMENDATIONS

On March 4, 2009, the MDEQ petitioned to use 2006-2008 ambient air monitoring data as the basis for the final attainment designations for the revised 24-hour NAAQS for PM_{2.5}. Using this more recent data set means that Kent and Ottawa counties meet the 24-hour NAAQS. Also, Wayne County is the only county in Southeast Michigan that does not meet the 24-hour NAAQS. The MDEQ requested that Oakland, Macomb, Washtenaw, St. Clair, Livingston and Monroe be designated as attainment as shown in **Figure 19**.

Prior to validation of the 2008 data, the EPA recommended that the areas shown in **Figure 20** be designated as non attainment. All monitors in these potential nonattainment areas should be retained.



CONVERSION OF PM_{2.5} GRANT DOLLARS

Currently the PM_{2.5} monitoring networks are funded through a Section 103 Grant. Previously, the EPA was considering changing the Section 103 Grant to a conventional Section 105 Grant, which required the receiving agency to supply a 40% match to the federal funds. However, no updates have been forthcoming on this issue recently. If the funds are converted and a match is required, this would be equivalent to cutting more than \$400,000 from the MDEQ's PM_{2.5} monitoring program. If this occurs, a number of monitors, including PM_{2.5} and ozone monitors will need to be shut down due to lack of funding.

PM_{2.5} QUALITY ASSURANCE

The PM_{2.5} program has separate, fully approved QAPP. The MDEQ operates four co-located PM_{2.5} FRM samplers, meeting the precision monitoring requirement of 15%. The sampling frequency of the precision samplers at Grand Rapids (260810020), Kalamazoo (260770008), Ypsilanti (261610008), and Allen Park (261630001) was reduced from once every six days to once every 12 days, as specified in 40 CFR Part 58 modifications to the regulations. However, the limited number of samples that are collected per quarter has made collection of 75% complete data arduous. On January 1, 2009, the MDEQ opted to increase sampling from once every 12 days to once every six days at these co-located sites. The roll out of NCore monitoring on January 1, 2010 has made deck space a premium commodity at Grand Rapids

(260810020) and at Allen Park (261630001). Therefore, the MDEQ is proposing to relocate these two co-located samplers to Luna Pier (261150005) and Dearborn (261630033) to clear more deck space.

In addition to operating precision monitors, MDEQ's station operators conduct flow checks to ensure the flow rate is meeting the measurement quality objectives. The results from these flow checks are submitted to the PM_{2.5} auditor each month for review. Every six months, each PM_{2.5} 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 EPA conducts PEP audits at eight sites each year. The EPA auditor sets up a PM_{2.5} monitor to run side-by-side with the station PM_{2.5} 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, distances from trees, exhaust vents, and large building. Probe heights and separation distances are also assessed.

PLANS FOR THE 2010 PM_{2.5} FRM MONITORING NETWORK

If at the end of 2009, the three-year, 24-hour design values are within 5% of the NAAQS at any design value sites, their sampling frequency will increase to daily.

The following PM_{2.5} monitors will be retained as part of the 2010 network:

- The one in three day PM_{2.5} FRM monitor in Holland (260050003)
- The one in three day PM_{2.5} FRM monitor in Grand Rapids (260810020)
- The daily PM_{2.5} FRM monitor in Allen Park (261630001)
- The one in three day PM_{2.5} FRM monitor at Linwood in Detroit (261630016)
- The one in three day PM_{2.5} FRM monitor in Flint (260490021)
- The one in three day PM_{2.5} FRM monitor in Lansing (260650012)
- The one in three day PM_{2.5} FRM monitor in Kalamazoo (260770008)
- The one in three day PM_{2.5} FRM Wyoming (260810007)
- The one in three day PM_{2.5} FRM Oak Park monitor (261250001)
- The one in three day PM_{2.5} FRM Livonia monitor (261630025)
- The one in three day PM_{2.5} FRM Wyandotte monitor (261630036)
- The one in three day PM_{2.5} FRM monitor at Bay City (260170014)
- The one in three day transport PM_{2.5} FRM monitor at Coloma (260210014)
- The one in three day PM_{2.5} FRM monitor in New Haven (260990009)
- The one in three day background PM_{2.5} FRM monitor in Houghton Lake (261130001)
- The one in three day PM_{2.5} FRM transport monitor in Luna Pier (261150005)
- The one in three day PM_{2.5} FRM monitor in Muskegon (261210040)
- The one in three day PM_{2.5} FRM monitor in Jenison (261390005)
- The one in three day PM_{2.5} FRM monitor in Port Huron (261470005)

- The one in three day PM_{2.5} FRM monitor in Ypsilanti (261610008)
- The one in three day PM_{2.5} FRM monitor in SW High School in Detroit (261630015)
- The one in three day PM_{2.5} FRM monitor at E Seven Mile in Detroit (261630019)
- The one in three day PM_{2.5} FRM monitor in Dearborn (261630033)
- The one in three day PM_{2.5} FRM monitor at Newberry School in Detroit (261630038)
- The one in three day PM_{2.5} FRM monitor at Lafayette in Detroit (261630039)
- The one in three day PM_{2.5} FRM monitor at Tecumseh (260910007)

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

- The one in six day PM_{2.5} FRM monitor in Kalamazoo (260770008).
- The one in six day PM_{2.5} FRM monitor in Grand Rapids (260810020) will be moved to Luna Pier (261150005) to make room for the deployment of NCore monitors on the deck at Grand Rapids.
- The one in six day PM_{2.5} FRM monitor in Ypsilanti (261610008).
- The one in six day PM_{2.5} FRM monitor in Allen Park (261630001) will be moved to Dearborn (261630033) to make room for the deployment of NCore monitors on the deck at Allen Park.

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

- A one in three day PM_{2.5} FRM tribal monitoring site at Manistee (261010922), contingent upon the Little River Band of Ottawa Indians' plans for 2010

CONTINUOUS PM_{2.5} MONITORING NETWORK

According to the October 17, 2006 changes to the monitoring regulations, 50% of all of the FRM sites are now required to have a continuous PM_{2.5} monitor. As described above, the MDEQ operates 26 FRM sites throughout the state. Therefore, 13 continuous monitors are required.

In 2008 and 2009, the MDEQ operated Rupprecht & Patashnick TEOM samplers to supply continuous fine particulate data at 13 monitoring sites, as shown in **Tables 20** and **21**. The MDEQ currently is meeting the minimum 50% collocation requirement. **Figure 21** compares maps of the continuous networks for both years. The two TEOMs previously located at Newberry School (261630038) and FIA/Lafayette (261630039) were on loan and were returned to the EPA in March 2008. The newer TEOM unit that was co-located at FIA/Lafayette (261630039) remains as a single monitor. The spare TEOM was deployed to Newberry School (261630038), retaining the 13 sites. In the event that another TEOM needs repair, the unit at FIA/Lafayette site will be deployed to the site lacking a functional TEOM. Therefore, incomplete data may be generated at the FIA/Lafayette (261630039) site due to repair issues.

Researchers from the U of M and MSU are investigating the impact of exposure to fine particulate on physiology. The researchers have requested that the MDEQ relocate a PM_{2.5} TEOM to Tecumseh (260910007) beginning in June 2009 to help generate data necessary for their research. The TEOM should operate from June 2009 through August 2010. To meet this request and support research occurring in Southeast Michigan, the MDEQ proposes to temporarily discontinue operation of the PM_{2.5} TEOM at Newberry School (261630038) for deployment to Tecumseh (260910007).

According to the revisions to the monitoring regulations, it is likely that Michigan will have two NCore stations, one in Detroit and one in Grand Rapids. These stations will be required to operate a continuous PM_{2.5} sampler. Therefore, a PM_{2.5} TEOM is required in Grand Rapids (260810020) and at Allen Park (261630001), which will likely be the NCore site for Detroit. Both sites currently have PM_{2.5} TEOMs.

FILTER DYNAMIC MEASUREMENT SYSTEM (FDMS) INLETS

Initially, the MDEQ operated all TEOM units with an inlet temperature of 50°C. Because this high inlet temperature was volatilizing nitrate during the winter months, and due to the EPA's desire to make the continuous data as "FRM-like" as possible, FDMS inlets were installed on the TEOMs during October 2003 and operated until through April 2005, allowing the inlet temperature to be reduced. The data from units with the FDMS inlets showed good correlation with the FRM data during the winter months, but during the summer, the correlation was poor. The FDMS units captured much more nitrate than the FRMs during the summer and thus yielded much higher TEOM readings than recorded by the FRMs. During summer days with high humidity, condensation occurred in the FDMS lines, interfering with data capture and creating maintenance problems. As a possible solution to both the condensation problem and data comparability issue, the MDEQ proposed to operate the TEOMs with the FDMS inlets during the winter months and without the FDMS inlets during the summer. The MDEQ selected the week of April 1, 2006 to remove the inlets and the week of October 1, 2006 to replace them, corresponding to Michigan's ozone monitoring season. Performance was worse than during the previous year, and was most likely due to a degradation of the nafion driers in the FDMS inlets. In March 2007, the chillers broke on two units and could not be replaced because the instrument manufacturer discontinued the necessary parts in the version of the FDMS units operated by the MDEQ. Rather than buying the version C upgrades to the FDMS units, all FDMS units were removed from the TEOMs in February 2007.

Beginning in 2007, the MDEQ operates the TEOMs from April through September at 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_{2.5} 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 20: MICHIGAN'S 2008 CONTINUOUS PM_{2.5} MONITORING NETWORK

| Operating Schedule: continuous | | Network as of October 2008 | | | | | | | | | | |
|--------------------------------|------------------|--|----------|-----------|----------------------|--------------|-------------|------------|-------------------|------------------|------------------------|--|
| Method: | | Rupprecht & Patashnick Tapered Element Oscillating Microbalance (TEOMS) Samplers | | | | | | | | | | |
| Site Name | Monitoring Sites | | Latitude | Longitude | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| | AQS Site ID | Address | | | | | | | | | | |
| Bay City | 260170014 | 1001 Jennison St | 43.571 | -83.89083 | Pop. Exp. | Neighborhood | Bay | 11/19/05 | Bay City | SBCSTN | 403,070 | |
| Flint | 260490021 | Whaley Park, 3610 Iowa St., Flint | 43.047 | -83.67028 | Pop. Exp. | Neighborhood | Genesee | 5/23/02 | Flint | DWF | 5,456,428 | |
| Lansing | 260650012 | 220 N. Pennsylvania | 42.739 | -84.53472 | Pop. Exp. | Neighborhood | Ingham | 12/1/99 | LEL | LELO | 447,728 | |
| Kalamazoo | 260770008 | Fairgrounds, 1400 Olmstead Rd | 42.278 | -85.54194 | Pop. Exp. | Neighborhood | Kalamazoo | 8/17/00 | KP | Not in CSA | 452,851 | |
| Grand Rapids | 260810020 | 1179 Monroe St., NW, | 42.984 | -85.67139 | Pop. Exp. | Neighborhood | Kent | 11/4/99 | GRW | GRMH | 1,088,514 | |
| Houghton lake | 261130001 | 1769 S Jeffs Rd | 44.311 | -84.89194 | Background | Regional | Missaukee | 10/9/03 | Not in MSA | Not in CSA | N/A | |
| Port Huron | 261470005 | 2525 Dove Rd. | 42.953 | -82.45639 | Pop. Exp. | Regional | Saint Clair | 9/18/03 | DWL | DWF | 5,456,428 | |
| Seney | 261530001 | Seney Wildlife Refuge | 46.289 | -85.95027 | bkgrd | Regional | Schoolcraft | 1/1/02 | Not in MSA | Not in CSA | N/A | |
| Ypsilanti | 261610008 | 555 Towner Ave | 42.241 | -83.59972 | Pop. Exp. | Neighborhood | Washtenaw | 2/24/00 | Ann Arbor | DWF | 5,456,428 | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | Pop. Exp. | Neighborhood | Wayne | 12/1/00 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 9/26/03 | DWL | DWF | 5,456,428 | |
| Newberry School | 261630038 | 4045 29 th St | 42.335 | -83.1097 | Source Oriented | Neighborhood | Wayne | 1/1/05 | DWL | DWF | 5,456,428 | |
| FIA/Lafayette St | 261630039 | 2000 W Lafayette | 42.323 | -83.06861 | Source Oriented | Neighborhood | Wayne | 8/20/05 | DWL | DWF | 5,456,428 | |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
GRW=Grand Rapids-Wyoming Metro. Area
KP= Kalamazoo-Portage Metro. Area
LEL= Lansing-E. Lansing Metro. Area

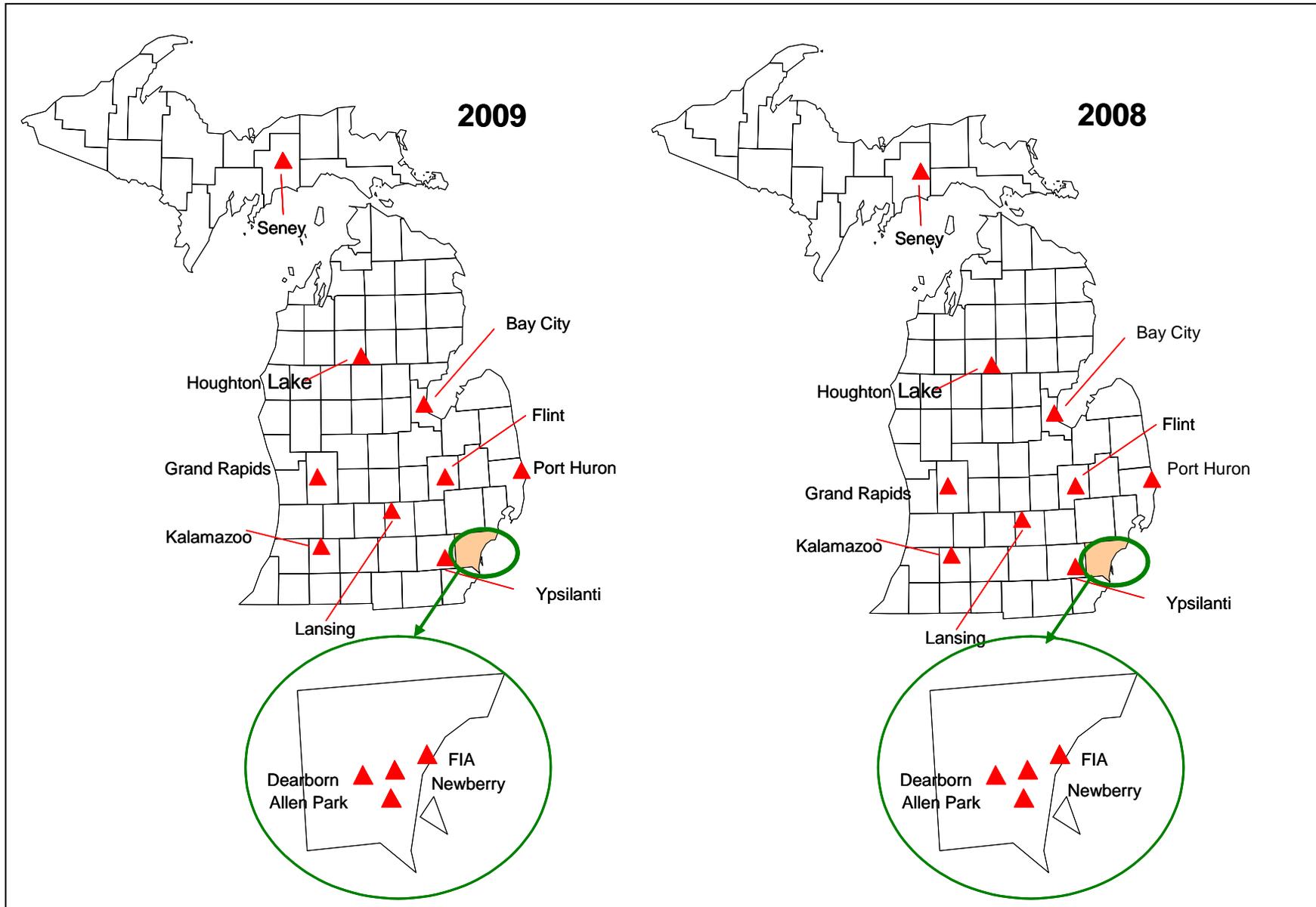
² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area
LELO = Lansing-East Lansing-Owosso Combined Statistiacl Area
SBCSTN=Saginaw-Bay City-Saginaw Twp. North Combined Stat. Are

TABLE 21: 2009 CONTINUOUS PM_{2.5} MONITORING NETWORK IN MICHIGAN

| Operating Schedule: continuous | | | | | | | | | | | | |
|--|------------------|-----------------------------------|----------|-----------|----------------------|--------------|-------------|------------|-------------------|------------------|------------------------|--|
| Method: Rupprecht & Patashnick Tapered Element Oscillating Microbalance (TEOMS) Samplers | | | | | | | | | | | | |
| Network as of March 10 , 2009 | | | | | | | | | | | | |
| Site Name | Monitoring Sites | | Latitude | Longitude | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| | AQS Site ID | Address | | | | | | | | | | |
| Bay City | 260170014 | 1001 Jennison St | 43.571 | -83.89083 | Pop. Exp. | Neighborhood | Bay | 11/19/05 | Bay City | SBCSTN | 403,070 | |
| Flint | 260490021 | Whaley Park, 3610 Iowa St., Flint | 43.047 | -83.67028 | Pop. Exp. | Neighborhood | Genesee | 5/23/02 | Flint | DWF | 5,456,428 | |
| Lansing | 260650012 | 220 N. Pennsylvania | 42.739 | -84.53472 | Pop. Exp. | Neighborhood | Ingham | 12/1/99 | LEL | LELO | 447,728 | |
| Kalamazoo | 260770008 | Fairgrounds, 1400 Olmstead Rd | 42.278 | -85.54194 | Pop. Exp. | Neighborhood | Kalamazoo | 8/17/00 | KP | Not in CSA | 452,851 | |
| Grand Rapids | 260810020 | 1179 Monroe St., NW, | 42.984 | -85.67139 | Pop. Exp. | Neighborhood | Kent | 11/4/99 | GRW | GRMH | 1,088,514 | |
| Houghton lake | 261130001 | 1769 S Jeffs Rd | 44.311 | -84.89194 | Background | Regional | Missaukee | 10/9/03 | Not in MSA | Not in CSA | N/A | |
| Port Huron | 261470005 | 2525 Dove Rd. | 42.953 | -82.45639 | Pop. Exp. | Regional | Saint Clair | 9/18/03 | DWL | DWF | 5,456,428 | |
| Seney | 261530001 | Seney Wildlife Refuge | 46.289 | -85.95027 | bkgrd | Regional | Schoolcraft | 1/1/02 | Not in MSA | Not in CSA | N/A | |
| Ypsilanti | 261610008 | 555 Towner Ave | 42.241 | -83.59972 | Pop. Exp. | Neighborhood | Washtenaw | 2/24/00 | Ann Arbor | DWF | 5,456,428 | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | Pop. Exp. | Neighborhood | Wayne | 12/1/00 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 9/26/03 | DWL | DWF | 5,456,428 | |
| Newberry School | 261630038 | 4045 29 th St | 42.335 | -83.1097 | Source Oriented | Neighborhood | Wayne | 1/1/05 | DWL | DWF | 5,456,428 | |
| FIA/Lafayette St | 261630039 | 2000 W Lafayette | 42.323 | -83.06861 | Source Oriented | Neighborhood | Wayne | 8/20/05 | DWL | DWF | 5,456,428 | |

| | |
|--|---|
| <p>¹ PMSA Key:</p> <p>DWL= Detroit-Warren-Livonia Metro. Area GRW=Grand Rapids-Wyoming Metro. Area KP= Kalamazoo-Portage Metro. Area LEL= Lansing-E. Lansing Metro. Area</p> | <p>² CSA Key:</p> <p>DWF = Detroit-Warren-Flint Combined Statistical Area GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area LELO = Lansing-East Lansing-Owosso Combined Statistiacl Area SBCSTN=Saginaw-Bay City-Saginaw Twp. North Combined Stat. Are</p> |
|--|---|

FIGURE 21: COMPARISON OF MICHIGAN'S 2008 AND 2009 CONTINUOUS PM_{2.5} NETWORK



PM_{2.5} 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 2010 PM_{2.5} TEOM NETWORK

Minimal changes to the continuous PM_{2.5} network are anticipated, but due to the uncertain nature of the funding, operation of some TEOMs may need to be discontinued in 2010. Continued operation of the PM_{2.5} TEOMs at Dearborn (261630033), Allen Park (261630001), and Grand Rapids (260610020) will be given the highest priority. The Dearborn (261630033) monitor measures the highest concentrations of PM_{2.5} in Michigan and is needed for the development of attainment strategies, AIRNOW reporting, 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. The MDEQ also plans to support exposure research by moving the TEOM at Newberry (261630038) to Tecumseh (260910007).

During 2010, contingent upon adequate levels of funding, Michigan is planning to continue to operate PM_{2.5} TEOM monitors at:

- Flint (260490021)
- Lansing (260650012)
- Kalamazoo (260770008)
- Grand Rapids (260810020)
- Seney (261530001)
- Ypsilanti (261610008)
- Allen Park (261630001)
- Port Huron (261470005)
- Dearborn (261630033)
- FIA/Lafayette (261630039)
- Bay City (260170014)
- Houghton Lake (261130001)
- Tecumseh (26091000) – to be discontinued September 2010.
- Newberry School (261630038) – to become operational September 2010.

In September 2010, the TEOM that was operational at Tecumseh (260910007) will be shut down and returned to Newberry School (261630038).

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 NCore and Dearborn PM_{2.5} TEOMs .

SPECIATED PM_{2.5} MONITORING NETWORK:

The October 17, 2006 changes to the monitoring regulations specify that speciation monitoring is required but offer little detail. Continued operation of the speciation trend site network is required on a national level and these sites sample on an increased sampling frequency of once every three days. There is a single speciated trend site in Michigan, located at Allen Park (261630001). All remaining supplemental speciation sites operate on a once every six day schedule. A new special purpose speciation site was established at Tecumseh (260910007) in April 2008 to assess organic carbon levels upwind from Detroit. Operation of the Tecumseh (260910007) monitor will continue for one year. The speciation network that was operational in 2007 is described in **Table 22** and the current network is shown in **Table 23**. **Figure 22** illustrates the coverage across Michigan.

Currently, the Kalamazoo (260770008) speciation sampler is operated by Kalamazoo County Health Department. As a result of the continuing attainment status of the Kalamazoo FRM monitor and MDEQ's reduced budget, the speciation monitor at Kalamazoo (260770008) was shut down on June 17, 2008.

The need for an additional speciation site in Southeast Michigan became apparent as a result of the PM_{2.5} conceptual model developed by Jay Turner as well as data analysis and source apportionment work performed by STI and Jay Turner¹⁶. There are several days when elevated PM_{2.5} FRM measurements were made at Port Huron (261470005) and nowhere else in the CMA. As such, the MDEQ moved the Kalamazoo speciation monitor to Port Huron (261470005) on July 5, 2008 to better understand the composition of elevated PM_{2.5} events downwind from Detroit.

The conceptual model also identified SW High School (261630015) as a site that is influenced by point sources. Speciation data would help better define sources that contribute to elevated PM_{2.5} levels at SW High School. Therefore, as a result of the network review process last year, the speciation sampler at Ypsilanti (261610008), which has been in operation since February 24, 2000, was shut down on July 17, 2008 and moved to SW High School. The speciation sampler became operational on November 2, 2008.

Beginning in 2003 and continuing through 2004, an IMPROVE speciation sampler was operated at Allen Park (261630001) to allow comparisons between the rural IMPROVE network and the urban STN network. Allen Park was one of several urban sites participating in this inter-comparison study. National data analysis indicated that there were differences in the results generated by the various carbon samplers.

To improve the OC/EC data that is collected by the speciation network, the EPA decided to upgrade the carbon channel to URG model 3000 N units, becoming more similar to the IMPROVE network. The upgrades are occurring in a phased in approach. The IMPROVE carbon channel was retained at Allen Park (261630001). Two sites, Ypsilanti (261610008) and Dearborn (261630033) were upgraded with the URG 3000 N units on April 23, 2007. To assess inter sampler variability, operation of the SASS carbon channels at Dearborn (261630033) and Ypsilanti (261610008) continued through July 5, 2007. After that date, the URG 3000N units were the sole source of carbon data from those two sites. With the beginning of cold weather in November 2007, the URG units began to malfunction. The units that Michigan received were lacking the internal heaters necessary for cold weather operation. The units were pulled out of service in January 2008 until heaters were received and the

¹⁶ Wade, K., J Turner, S. Brown, J Garlock, and H. Hafner, "Data Analysis and Source Apportionment of PM_{2.5} in Selected Midwestern Cities," Prepared for LADCO, February 2008.

samplers upgraded. Ypsilanti (261610008) and Dearborn (261630033) became operational on March 12, 2008 and March 6, 2008, respectively.

Then, on June 17, 2008, the URG sampler at Ypsilanti was shut down and moved to Dearborn while the unit previously at Dearborn was returned to the manufacturer for repair. Eventually, the repaired URG 3000N sampler was deployed to SW High School on September 3, 2008.

Phase two deployment of six more URG 3000 N samplers was completed on March 19, 2009 when the samplers were deployed to: Luna Pier (261150005), Houghton Lake (261130001), Grand Rapids (260810020), Port Huron (261470005), Tecumseh (260910007) and Allen Park (261630001). 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 for at least one year to support EPA OAQPS inter-sampler comparability studies.

CHEMICAL COMPOSITION OF PM_{2.5} AND LAB COSTS

If the Section 103 funds are converted into Section 105 funds and cuts need to be made to the fine particulate network, one option may be to archive some of the speciation filters for later analysis. Changes to the national speciation laboratory contract may support greater options in the selection of tests. Operational costs could be minimized by adopting an alternative approach to sample analysis so that more coverage can be retained in the monitoring network.

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 began operation at Dearborn (261630033) and Allen Park (261630001) on December 19, 2003 and January 1, 2004, respectively. These units measure carbon black, which is very similar and correlates well with elemental carbon. Then, two small spot Magee aethalometers, on loan from the EPA, were deployed at Newberry School (261630038) in Detroit on December 26, 2004 and at Lafayette (261630039), also in Detroit, on August 9, 2005. The units were removed from the field on February 21, 2008 and returned to the EPA. The high density of aethalometer data in the Detroit area has been very useful in spatial analysis. LADCO completed a nonparametric linear regression using the data to identify the locations of possible sources of carbon black.

A continuous EC/OC monitor from Sunset Laboratories was deployed to the Newberry School (261630038) site on February 1, 2005 to determine diurnal variation in elemental carbon and organic carbon. To help in the development of attainment strategies, the Southeast Michigan Council of Governments purchased a second Sunset EC/OC unit that was deployed at Dearborn (261630033) on June 11, 2007.

There are significant rail yard activities in many Midwest cities, including rail yards proximate to compliance monitoring sites, which violates the daily and/or annual average PM_{2.5} NAAQS (examples include Cleveland, Detroit, and St. Louis). The impacts of rail yard activities on observed ambient particulate matter burdens at these monitoring sites are not known. Therefore, the Midwest Rail Study is being conducted by Region 5 EPA to develop a better understanding of rail yard PM emissions and their air quality impacts. The first phase of this study focuses on emission inventory development, special purpose monitoring, and dispersion modeling for a rail yard in Dearborn.

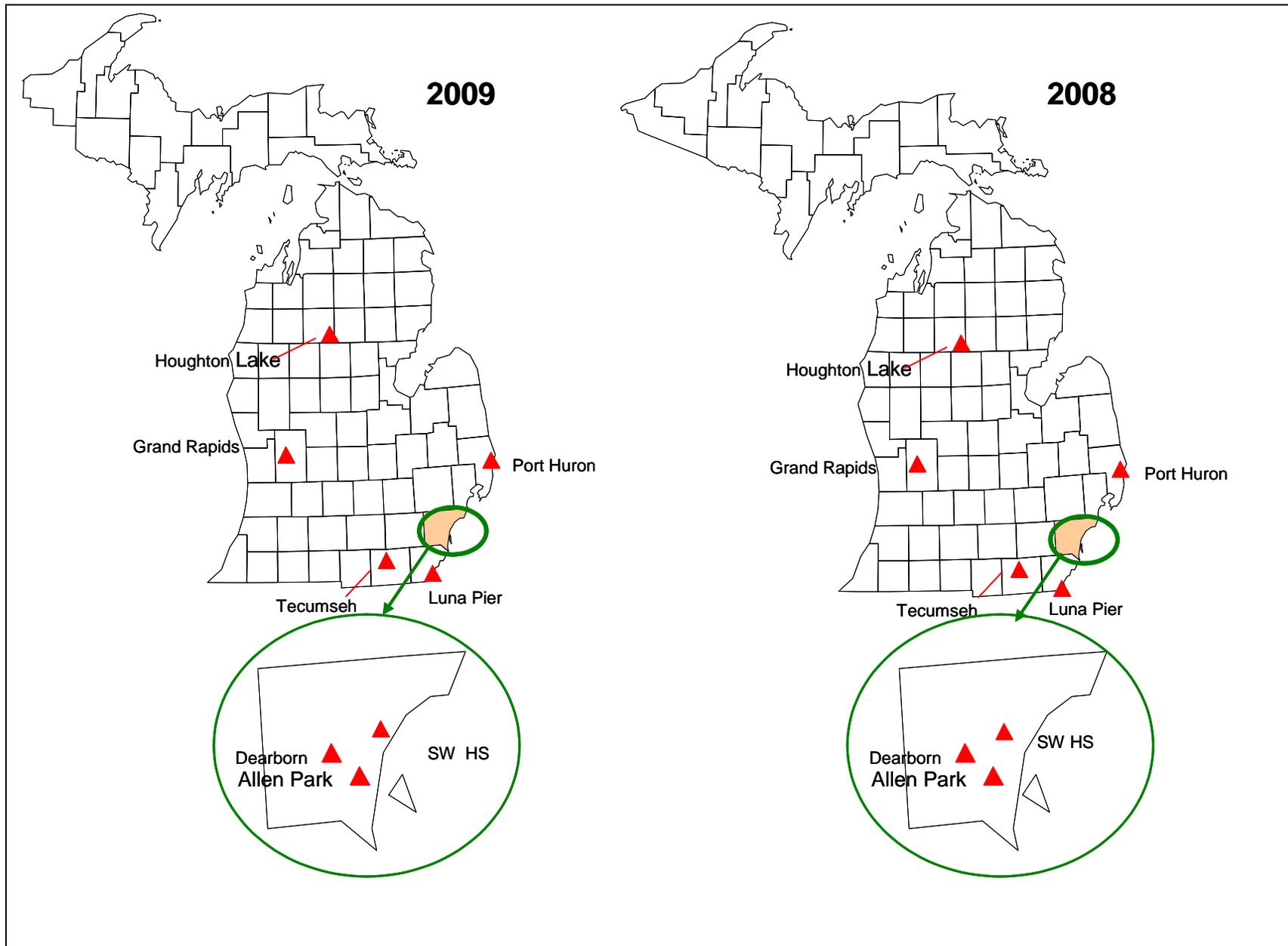
TABLE 22: MICHIGAN'S PM_{2.5} SPECIATION NETWORK IN 2008

| Operating Schedule: Once Every 3 days (Allen Park), once every 6 days all others | | | | | | | | | | | | | Network as of October, 2008 | |
|---|-------------|-------------------------------|----------|-----------|---|----------------------|--------------|-----------|------------|-------------------|------------------|------------------------|-----------------------------|--|
| Method: Met One SASS and two URG 3000 N units to collect organic & elemental carbon at Dearborn & Ypsilanti | | | | | | | | | | | | | | |
| Monitoring Sites | | | | | | | | | | | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | Sampling Frequency | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | Comments | |
| Kalamazoo | 260770008 | Fairgrounds, 1400 Olmstead Rd | 42.278 | -85.54194 | 1:6 | Pop. Exp. | Neighborhood | Kalamazoo | 8/17/00 | KP | Not in CSA | 452,851 | | |
| Grand Rapids | 260810020 | 1179 Monroe St., NW | 42.984 | -85.67139 | 1:6 | Pop. Exp. | Neighborhood | Kent | 11/4/99 | GRW | GRMH | 1,088,514 | | |
| Tecumseh | 260910007 | 6792 Raisin Center Highway | 41.996 | -83.94667 | 1:6 | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A | SPM | |
| Houghton lake | 261130001 | 1769 S Jeffs Rd | 44.311 | -84.89194 | 1:6 | Background | Regional | Missaukee | 10/9/03 | Not in MSA | Not in CSA | N/A | | |
| Luna Pier | 261150005 | Erie Shooting Club | 41.764 | -83.47194 | 1:6 | Transport | Regional | Monroe | 12/17/99 | Monroe | DWF | 5,456,428 | | |
| Ypsilanti | 261610008 | 555 Towner Ave | 42.241 | -83.59972 | 1:6 | Pop. Exp. | Neighborhood | Washtena | 2/24/00 | Ann Arbor | DWF | 5,456,428 | | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 12/1/00 | DWL | DWF | 5,456,428 | | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | 1:6 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 9/26/03 | DWL | DWF | 5,456,428 | | |
| Continuous Speciation Measurements | | | | | | | | | | | | | | |
| (*Monitoring was interrupted to help EPA Region 5 conduct a short term study near the Rouge Mere Rail Yard in Dearborn). | | | | | | | | | | | | | | |
| Monitoring Sites | | | | | | | | | | | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | Sampling Method | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | Comments | |
| Tecumseh | 260910007 | 6792 Raisin Center Highway | 41.996 | -83.94667 | McGee Aethalometer - borrowed from Wash. Univ. (carbon black) | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A | SPM | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | McGee large spot Aethalometer (carbon black) | Pop. Exp. | Neighborhood | Wayne | 12/1/00 | DWL | DWF | 5,456,428 | | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | McGee large spot Aethalometer (carbon black) | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 9/26/03 | DWL | DWF | 5,456,428 | | |
| Newberry School | 261630038 | 4045 29 th St | 42.335 | -83.1097 | McGee small spot Aethalometer (carbon black) | Source Oriented | Neighborhood | Wayne | 1/1/05 | DWL | DWF | 5,456,428 | ended 4/1/08 | |
| FIA/Lafayette St | 261630039 | 2000 W Lafayette | 42.323 | -83.06861 | McGee small spot Aethalometer (carbon black) | Source Oriented | Neighborhood | Wayne | 8/20/05 | DWL | DWF | 5,456,428 | ended 4/1/08 | |
| Tecumseh * | 260910007 | 6792 Raisin Center Highway | 41.996 | -83.94667 | Sunset EC/OC | up wind backgrd | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A | SPM | |
| Newberry School * | 261630038 | 4045 29 th St | 42.335 | -83.1097 | Sunset EC/OC | Source Oriented | Neighborhood | Wayne | 1/1/05 | DWL | DWF | 5,456,428 | | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | Sunset EC/OC | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 6/11/07 | DWL | DWF | 5,456,428 | | |
| ¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area GRW=Grand Rapids-Wyoming Metro. Area KP= Kalamazoo-Portage Metro. Area | | | | | | | | | | | | | | |
| ² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area | | | | | | | | | | | | | | |

TABLE 23: MICHIGAN'S 2009 PM_{2.5} SPECIATION NETWORK

| Operating Schedule: Once Every 3 days (Allen Park), once every 6 days all others | | | | | | | | | | | | Network as of March, 2009 | |
|--|-------------|--------------------------------|----------|-----------|--|--|--------------|-------------|------------|-------------------|------------------|---------------------------|--|
| Method: Met One SASS and two URG 3000 N units to collect organic & elemental carbon at Dearborn & Ypsilanti | | | | | | | | | | | | | |
| Monitoring Sites | | | | | | | | | | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | Sampling Frequency | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| Grand Rapids | 260810020 | 1179 Monroe St., NW, | 42.984 | -85.67139 | 1:6 | Pop. Exp. | Neighborhood | Kent | 11/4/99 | GRW | GRMH | 1,088,514 | |
| Houghton lake | 261130001 | 1769 S Jeffs Rd | 44.311 | -84.89194 | 1:6 | Background | Regional | Missaukee | 10/9/03 | Not in MSA | Not in CSA | N/A | |
| Luna Pier | 261150005 | Erie Shooting Club | 41.764 | -83.47194 | 1:6 | Transport | Regional | Monroe | 12/17/99 | Monroe | DWF | 5,456,428 | |
| Port Huron | 261470005 | 2525 Dove Rd. | 42.953 | -82.45639 | 1:6 | Pop. Exp. | Regional | Saint Clair | 7/5/08 | DWL | DWF | 5,456,428 | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | 1:3 | Pop. Exp. | Neighborhood | Wayne | 12/1/00 | DWL | DWF | 5,456,428 | |
| SW Highsch., Detroit | 261630015 | SW Highschool, 6921 W. Fort St | 42.303 | -83.10667 | 1:6 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 11/2/08 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | 1:6 | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 9/26/03 | DWL | DWF | 5,456,428 | |
| Continuous Speciation Measurements | | | | | | | | | | | | | |
| (*Monitoring was interrupted to help EPA Region 5 conduct a short term study near the Rouge Mere Rail Yard in Dearborn). | | | | | | | | | | | | | |
| Monitoring Sites | | | | | | | | | | | | | |
| Site Name | AQS Site ID | Address | Latitude | Longitude | Sampling Method | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | McGee large spot Aethalometer (carbon black) | Pop. Exp. | Neighborhood | Wayne | 12/1/00 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | McGee large spot Aethalometer (carbon black) | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 9/26/03 | DWL | DWF | 5,456,428 | |
| Tecumseh * | 260910007 | 6792 Raisin Center Highway | 41.996 | -83.94667 | Sunset EC/OC | up wind backgrd Source | regional | Lenawee | 7/6/93 | Not in MSA | Not in CSA | N/A | |
| Newberry School * | 261630038 | 4045 29 th St | 42.335 | -83.1097 | Sunset EC/OC | Oriented | Neighborhood | Wayne | 1/1/05 | DWL | DWF | 5,456,428 | |
| Dearborn | 261630033 | 2842 Wyoming, Salina School | 42.307 | -83.14889 | Sunset EC/OC | Pop. Exp. Max. Conc. | Neighborhood | Wayne | 6/11/07 | DWL | DWF | 5,456,428 | |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area | | | | | | | |
| GRW=Grand Rapids-Wyoming Metro. Area | | | | | | GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area | | | | | | | |
| KP= Kalamazoo-Portage Metro. Area | | | | | | | | | | | | | |

FIGURE 22: COMPARISON OF MICHIGAN'S 2009 AND 2008 PM_{2.5} SPECIATION NETWORK



To support the monitoring activities planned in this project, the MDEQ temporarily shut down the continuous EC/OC samplers at Tecumseh (260910007) and Newberry School (261630038) on September 8, 2008 and August 20, 2008, respectively. Aethalometers borrowed from LADCO and EPA/OAQPS and the two continuous EC/OC samplers were deployed to the new stations established at Miller Road (261630044) and Ten Tyck (261630043). **Figure 23** is a map of these locations. The Miller Road (261630044) EC/OC and aethalometer became operational on September 12, 2008 and September 11, 2009, respectively. The Ten Tyck (261630043) EC/OC and aethalometer became operational on August 20, 2008 and September 1, 2008, respectively.

FIGURE 23: DEARBORN AREA MONITORING SITES FOR THE MIDWEST RAIL STUDY



Monitoring at Miller road and Ten Eyck was discontinued on December 16, 2008. All monitors were moved to the Dearborn site (261630033) so that inter-sampler precision could be

assessed through January 2009. The EC/OC monitors resumed operation at Tecumseh (260910007) and Newberry School (261630039) by February 1, 2009.

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_{2.5} 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, and hard copies are retained in the QA files. The audit data is also uploaded to the EPA's AQS database.

The EPA conducted flow rate and system audits on four of the network's PM_{2.5} speciation monitors in 2006. All four stations that were audited were found to be acceptable and meeting the measurement quality objectives. The EPA also conducts audits of RTI National Laboratory, which supplies speciation analysis services for the entire nation.

Plans for the 2010 PM_{2.5} Speciation Monitoring Network

During 2010, contingent upon adequate levels of funding, Michigan is planning to continue to operate 24-hour PM_{2.5} speciation monitors at:

- Luna Pier (261150005) operating once every six days
- Tecumseh (260910007) operating once every six days
- Grand Rapids (260810020) operating once every six days
- Houghton Lake (261130001) operating once every six days
- Port Huron (261470005) operating once every six days
- Allen Park (261630001) operating once every three days
- Dearborn (261630033) operating once every six days

PM₁₀ MONITORING NETWORK:

The October 17, 2006 monitoring regulations modified the minimum number of PM₁₀ samplers required in MSAs. Since then, further revisions have occurred relaxing the numbers of sites required in high population areas with low concentrations of PM₁₀, as shown in **Table 24**.¹⁷

TABLE 24: PM₁₀ MINIMUM MONITORING REQUIREMENTS (NUMBER OF STATIONS PER MSA)¹

| POPULATION CATEGORY | HIGH CONCENTRATION ² | MEDIUM CONCENTRATION ³ | LOW CONCENTRATION ^{4,5} |
|---------------------|---------------------------------|-----------------------------------|----------------------------------|
| > 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 |

- ¹ 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.
- ² High concentration areas are those for which ambient PM₁₀ data show ambient concentrations exceeding the PM₁₀ NAAQS by 20% or more.
- ³ Medium concentration areas are those for which ambient PM₁₀ data show ambient concentrations exceeding 80% of the PM₁₀ NAAQS.
- ⁴ Low concentration areas are those for which ambient PM₁₀ data show ambient concentrations < 80% of the PM₁₀ NAAQS.
- ⁵ These minimum monitoring requirements apply in the absence of a design value.

Applying **Table 24** to Michigan's urban areas, population totals and historical PM₁₀ data results in the design requirements that are shown in **Table 25**.

According to the tables, two to four PM₁₀ sites are required in the Detroit-Warren-Livonia Metropolitan Area. Currently, there are three sites in operation, one at Allen park (261630001), one at SW High School (261630015) and the design value site at Dearborn (261630033).

The PM₁₀ monitoring requirements specify that one to two PM₁₀ sites are required in the Grand Rapids-Wyoming MSA. There are two sites currently in operation, one in Wyoming (260810007) and one in Grand Rapids (260810020). Both of these sites are operational at the request of EPA Region 5.

According to the requirements, either no or one PM₁₀ monitors are required in the Flint MSA. In 2006, the MDEQ operated a PM₁₀ sampler in Flint (260490021) but as a result of budget cuts, PM₁₀ sampling was discontinued on April 1, 2007.

Table 26 summarizes the PM₁₀ monitoring site information for sites that were in existence in 2008. **Table 27** shows the PM₁₀ sites that are currently in operation. **Figure 24** compares the PM₁₀ network in 2008 with the current design.

¹⁷ Table D-4 of Appendix D to Part 58.

TABLE 25: APPLICATION OF THE MINIMUM PM₁₀ MONITORING REGULATIONS IN THE APRIL 30, 2007 CORRECTION TO THE OCTOBER 17, 2006 FINAL REVISION TO THE MONITORING REGULATION TO MICHIGAN'S PM₁₀ NETWORK

| Table 19: Application of Minimum PM ₁₀ Monitoring Requirements in the October 17, 2006 Final Revision to the Monitoring Regulation to Michigan's PM ₁₀ Network | | | | | | |
|--|--------------------|-----------|----------------------|---|-----------------|--------------------------------|
| Design value sites are in bold | | | | 2006-2008 most recent 3- year PM ₁₀ design value (24-Hr) | Conc. Class. | Min No monitors Required |
| MSA | 2000 Population | Counties | Existing Monitors | | | |
| Detroit-Warren-Livonia Metro Area | 4,452,557 | Macomb | --- | --- | | 2-4 |
| | | Oakland | --- | --- | | |
| | | Wayne | Allen Park | 42 | low | |
| | | | SW HS | 58 | low | |
| | | | Dearborn | 72 | low | |
| | | Lapeer | --- | --- | | |
| | | St Clair | --- | --- | | |
| Livingston | --- | --- | | | | |
| Flint Metro Area | 436,141 | Genesee | Flint | discontinued | low | 0 -1 |
| Monroe Metro Area | 145,945 | Monroe | --- | --- | | |
| Ann Arbor Metro Area | 322,895 | Washtenaw | --- | --- | | |
| Grand Rapids-Wyoming Metro Area | 740,482 | Kent | Monroe St GR | 35 | | 1-2 |
| | | | Wyoming | 43 | low | |
| | | Barry | --- | --- | | |
| | | Newaygo | --- | --- | | |
| | | Ionia | --- | --- | | |
| Holland-Grand Haven Metro Area | 238,314 | Ottawa | --- | --- | | |
| Muskegon-Norton Shores Metro Area | 170,200 | Muskegon | --- | --- | | |
| Lansing-East Lansing Metro Area | 447,728 | Clinton | --- | --- | | |
| | | Ingham | --- | --- | | |
| | | Eaton | --- | --- | | |
| Bay City Metro Area | 110,157 | Bay | --- | --- | | |
| Saginaw-Saginaw Twp N Metro Area | 210,039 | Saginaw | --- | --- | | |
| Kalamazoo-Portage Metro Area | 314,866 | Kalamazoo | --- | --- | | |
| | | Van Buren | --- | --- | | |
| Niles-Benton Harbor Metro Area | 162,453 | Berrien | --- | --- | | |
| Jackson Metro Area | 158,422 | Jackson | --- | --- | | |
| Battle Creek Metro Area | 137,985 | Calhoun | --- | --- | | |
| South Bend-Mishawaka Metro Area IN/IM | 51,104 | Cass | --- | --- | | |
| MSAs with populations greater than 500,000 require at least 1 PM 10 monitor. | | | | | | |

TABLE 26: MICHIGAN'S 2008 PM₁₀ MONITORING NETWORK

Operating Schedule: Once Every 6 days (Continuous measurements are also available at Dearborn)
 Method: Manual High Volume Sampler (Dearborn also uses a R&P TEOM to make continuous measurements) Network as of October 2008

| Monitoring Sites | | | Sampling | | Monitor | Start | | | MSA Pop. (2000 Census) | | | | |
|------------------|----------------------|----------------|----------|-----------|------------|------------------------|----------|---------|------------------------|---------|-------------------|------------------|-----------|
| Site Name | AQS Site ID | Address | Latitude | Longitude | Frequency | Type | Purpose | Scale | County | Date | PMSA ¹ | CSA ² | Census |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.20833 | 1:6 | High Vol | pop exp | nghbrhd | Wayne | 9/12/87 | DWL | DWF | 5,456,428 |
| W Fort (SW HS) | 261630015 | 6921 West Fort | 42.3028 | -83.10667 | 1:6 | High Vol | max conc | nghbrhd | Wayne | 3/27/87 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | 42.3067 | -83.14889 | 1:6 | High Vol | max conc | nghbrhd | Wayne | 6/12/90 | DWL | DWF | 5,456,428 |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.9842 | -85.67139 | 1:6 | High Vol | pop exp | nghbrhd | Kent | 3/20/87 | GRW | GRMH | 1,088,514 |
| Grand Rapids | 260810007 | 509 Wealthy | 42.9561 | -85.67917 | 1:6 | High Vol | pop exp | nghbrhd | Kent | 2/3/89 | GRW | GRMH | 1,088,514 |
| Dearborn | 261630033 | 2842 Wyoming | 42.3067 | -83.14889 | 1:6 | High Vol for precision | max conc | nghbrhd | Wayne | 6/12/90 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 continuous | 2842 Wyoming | 42.3067 | -83.14889 | continuous | R&P PM10 TEOM | max conc | nghbrhd | Wayne | 4/1/00 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

TABLE 27: 2009 PM₁₀ MONITORING NETWORK IN MICHIGAN

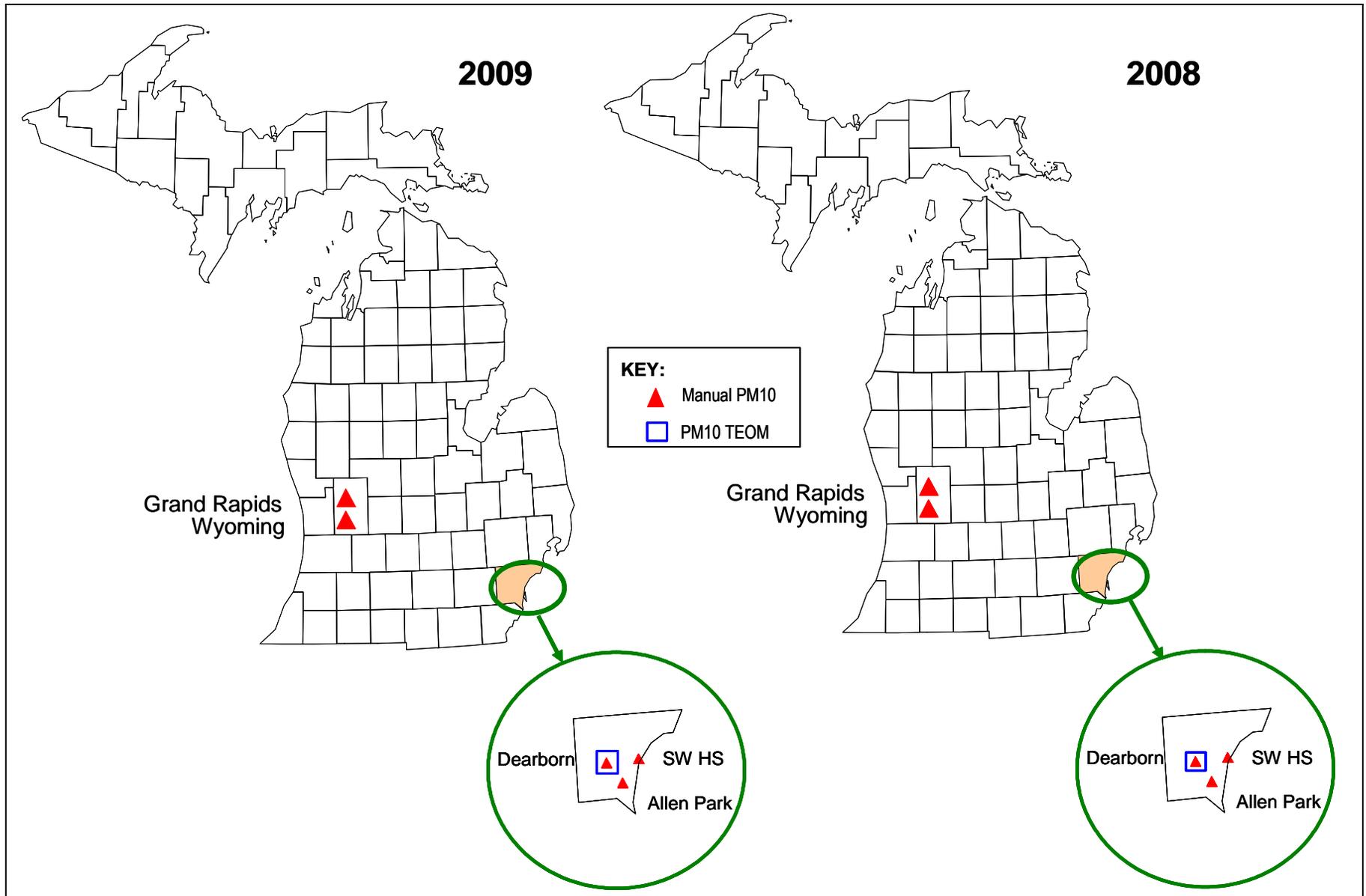
Operating Schedule: Once Every 6 days (Continuous measurements are also available at Dearborn)
 Method: Manual High Volume Sampler (Dearborn also uses a R&P TEOM to make continuous measurements) Network as of April, 2009

| Monitoring Sites | | | Sampling | | Monitor | Start | | | MSA Pop. (2000 Census) | | | | |
|------------------|----------------------|----------------|----------|-----------|------------|------------------------|----------|---------|------------------------|---------|-------------------|------------------|-----------|
| Site Name | AQS Site ID | Address | Latitude | Longitude | Frequency | Type | Purpose | Scale | County | Date | PMSA ¹ | CSA ² | Census |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.20833 | 1:6 | High Vol | pop exp | nghbrhd | Wayne | 9/12/87 | DWL | DWF | 5,456,428 |
| W Fort (SW HS) | 261630015 | 6921 West Fort | 42.3028 | -83.10667 | 1:6 | High Vol | max conc | nghbrhd | Wayne | 3/27/87 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | 42.3067 | -83.14889 | 1:6 | High Vol | max conc | nghbrhd | Wayne | 6/12/90 | DWL | DWF | 5,456,428 |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.9842 | -85.67139 | 1:6 | High Vol | pop exp | nghbrhd | Kent | 3/20/87 | GRW | GRMH | 1,088,514 |
| Grand Rapids | 260810007 | 509 Wealthy | 42.9561 | -85.67917 | 1:6 | High Vol | pop exp | nghbrhd | Kent | 2/3/89 | GRW | GRMH | 1,088,514 |
| Dearborn | 261630033 | 2842 Wyoming | 42.3067 | -83.14889 | 1:6 | High Vol for precision | max conc | nghbrhd | Wayne | 6/12/90 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 continuous | 2842 Wyoming | 42.3067 | -83.14889 | continuous | R&P PM10 TEOM | max conc | nghbrhd | Wayne | 4/1/00 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area

FIGURE 24: COMPARISON OF MICHIGAN'S 2009 AND 2008 PM₁₀ MONITORING NETWORK



HISTORY OF PM₁₀ CO-LOCATED AND CONTINUOUS PM₁₀ MEASUREMENTS

Prior to 2001, both the MDEQ and the Wayne County Department of the Environment, Air Quality Management Division were responsible for operating PM₁₀ networks outside of and within Wayne County, respectively. The monitoring site that measured the highest concentration of PM₁₀ in each of these monitoring networks was subject to special monitoring requirements, as specified in the air monitoring regulations in effect during that time. In Wayne County, the highest PM₁₀ levels were measured at the Dearborn site (261630033) and were sufficiently high to trigger a daily sampling requirement. As time progressed, PM₁₀ levels dropped and the EPA allowed the sampling frequency of the manual sampler at Dearborn to be reduced to a once every six day frequency, if a continuous PM₁₀ sampler was added to the site. A Rupprecht & Patashnick PM₁₀ TEOM became operational on April 1, 2000, and the sampling frequency of the manual monitor was reduced to once every six days.

In the network outside of Wayne County, the Wyoming (260810007) monitor had the highest PM₁₀ values. Historically, PM₁₀ was sampled on a once every other day schedule, but as PM₁₀ levels dropped, the sampling frequency was reduced to once every six days.

To determine precision for each of the two PM₁₀ networks, a co-located monitor was operated on a once every six day sampling schedule at the two highest sites, Wyoming (260810007) and Dearborn (261630033). When a PM_{2.5} FRM sampler had to be added to Wyoming to meet the modifications in network design, the co-located PM₁₀ sampler was removed on December 31, 2006 due to limited power. In addition, two precision samplers were no longer required because the MDEQ had assumed responsibility for the entire air monitoring network in October 2002.

PM QUALITY ASSURANCE

The site operator conducts a flow check once a month. The flow check values are sent to the Senior auditor 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 2010 PM₁₀ MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, the MDEQ is planning to operate 24-hour PM₁₀ monitors at:

- The PM₁₀ monitor in Allen Park (261630001) on a once every six day schedule
- The PM₁₀ monitor in Fort Street/SW High School (261630015) on a once every six day schedule
- The PM₁₀ monitor in Dearborn (261630033) and the co-located PM₁₀ monitor on a once every six day schedule.
- The PM₁₀ monitor at Monroe Street in Grand Rapids (260810020) on a once every six day schedule
- The PM₁₀ monitor at Wealthy Street in Grand Rapids (260810007) on a once every six day schedule

The MDEQ is also planning to operate:

- The special purpose monitor PM₁₀ TEOM at Dearborn (261630033) on a daily schedule.

CARBON MONOXIDE (CO) MONITORING NETWORK:

The new monitoring regulations no longer require CO monitoring. Therefore, when the budget was cut April 2007, the following CO monitors were shut down: Warren (260991003), Oak Park (261250001), Livonia (261630025), and Linwood (261630016). In the previous year, the trace level CO monitors at Newberry School (261630038) and at Lafayette (261630039) were shut down on March 31st. Since Grand Rapids and Detroit may be future NCore sites and trace CO is a required component of the NCore program, the CO monitors at Grand Rapids (260810020) and Allen Park (261630001) were shut down and replaced with trace gas CO monitors.

The trace CO monitors were deployed at Allen Park (261630001) and Grand Rapids (260810020) in December 2007. Both monitors developed problems and were returned to the vendor for repair. The Allen Park monitor needed a new Nafion drier, an electronics upgrade and had to have a diode replaced. The Grand Rapids monitor had problems with the Nafion drier and issues with some of the plumbing. No trace CO measurements were collected at either station while the vendor was repairing the instruments because the MDEQ lacks spare trace CO units. The repaired units were returned to Allen Park and Grand Rapids in March 2008. Collection of data resumed April 1, 2008. Another trace CO monitor has been purchased to act as a back-up unit in case of breakdowns.

Table 28 summarizes the CO monitoring site information for sites that were in existence in 2008. **Table 29** shows the CO sites that are currently in operation. **Figure 25** compares the CO network in 2008 with the current design.

TRACE CO QUALITY ASSURANCE

The site operator performs a precision check of the analyzer every two weeks. Results of precision checks are sent to the senior auditor 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.

At this time, the EPA is not conducting thru-the-probe audits for the trace level CO monitors, but intends to implement this program in the future.

PLANS FOR THE 2010 CO MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, Michigan is planning to continue to operate trace level CO monitors to ramp up for full scale NCore operations, due January 1, 2011:

- Grand Rapids (26810020)
- Allen Park (261630001)

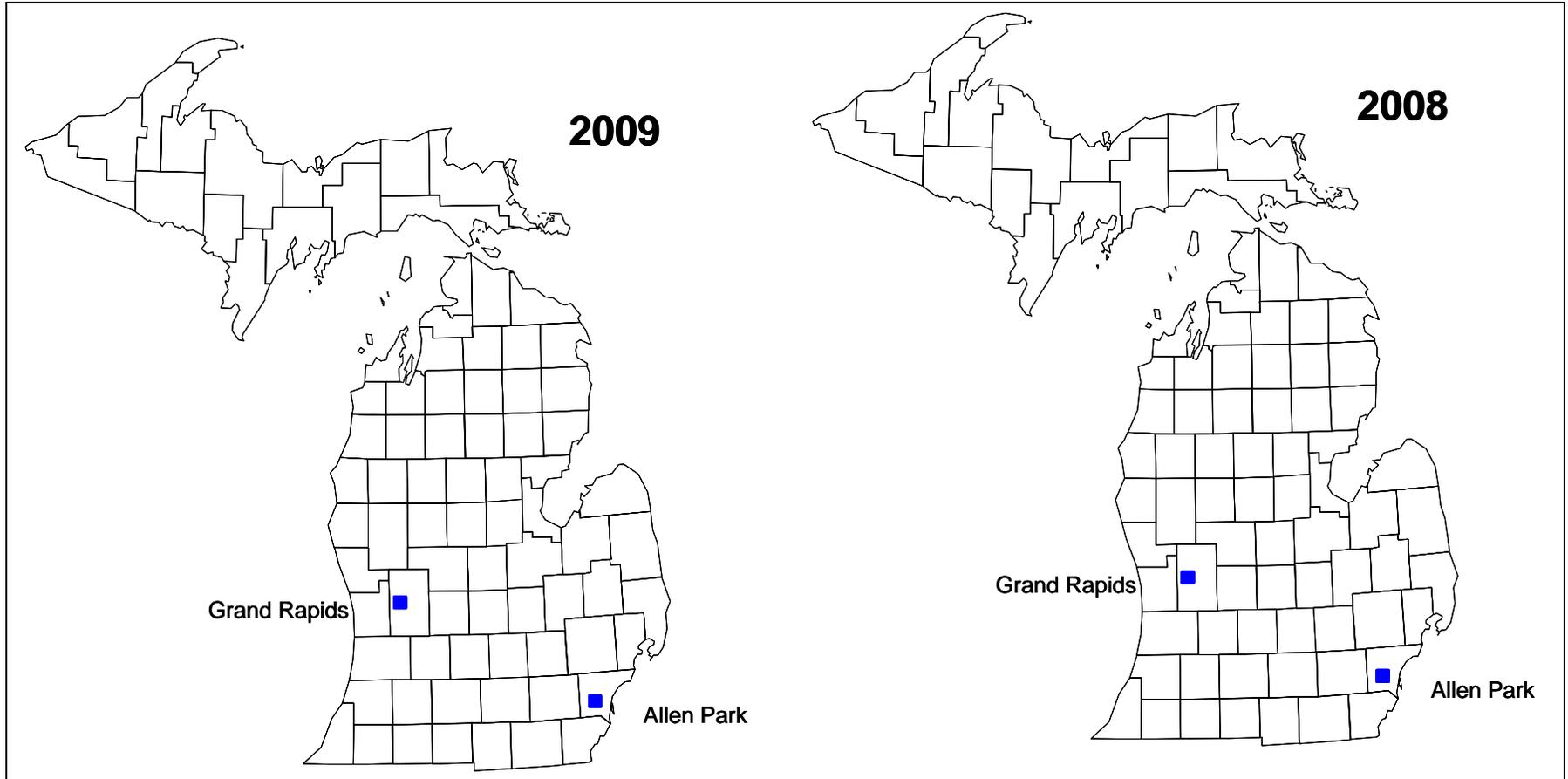
TABLE 28: MICHIGAN'S 2008 CO MONITORING NETWORK

| Operating Schedule: Continuous | | | | | | | | | | Network as of October, 2008 | | | |
|---|------------------|----------------|----------|------------|-------------|--|---------|--------|------------|-----------------------------|------------------|------------------------|--|
| Method: Gas Filter Correlation Analyzer- Trace CO | | | | | | | | | | | | | |
| Site Name | Monitoring Sites | | Latitude | Longitude | Measurement | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| | AQS Site ID | Address | | | | | | | | | | | |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.9842 | -85.671389 | trace | pop exp | nghbrhd | Kent | 4/10/07 | GRW | GRMH | 1,088,514 | |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.208333 | trace | pop exp | nghbrhd | Wayne | 5/24/07 | DWL | DWF | 5,456,428 | |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area | | | | | | | |
| GRW=Grand Rapids-Wyoming Metro. Area | | | | | | GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area | | | | | | | |

TABLE 29: 2009 CO MONITORING NETWORK IN MICHIGAN

| Operating Schedule: Continuous | | | | | | | | | | Network as of March, 2009 | | | |
|---|------------------|----------------|----------|------------|-------------|--|---------|--------|------------|---------------------------|------------------|------------------------|--|
| Method: Gas Filter Correlation Analyzer- Trace CO | | | | | | | | | | | | | |
| Site Name | Monitoring Sites | | Latitude | Longitude | Measurement | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) | |
| | AQS Site ID | Address | | | | | | | | | | | |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.9842 | -85.671389 | trace | pop exp | nghbrhd | Kent | 4/10/07 | GRW | GRMH | 1,088,514 | |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.208333 | trace | pop exp | nghbrhd | Wayne | 5/24/07 | DWL | DWF | 5,456,428 | |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area | | | | | | | |
| GRW=Grand Rapids-Wyoming Metro. Area | | | | | | GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area | | | | | | | |

FIGURE 25: COMPARISON OF MICHIGAN'S 2009 AND 2008 CO MONITORING NETWORK



NITROGEN DIOXIDE (NO₂) AND NO_y MONITORING NETWORK:

The October 17, 2006 regulations no longer require NO₂ monitoring. Therefore, when the budget was cut in April 2007, the following NO₂ monitors were shut down: Grand Rapids (260810020) and Linwood (261630016). The Holland NO_y (260050003) monitor was also shut down. Detroit's E Seven Mile (261630019) monitor was retained because it is the downwind NO₂ site in the Detroit area. The Linwood monitor (261630016) was shut down because it was thought less useful in modeling exercises.

Trace NO_y monitors for the NCore sites at Grand Rapids (260810020) and Allen Park (261630001) were deployed in December 2007. The monitors have been operating intermittently since then. Various problems included issues with the power supply to the lamp, leaks in various lines and a clog in the flow restrictor. The instruments have been repaired and have started to collect data on April 1, 2008.

Table 31 summarizes the NO₂ and NO_y monitoring site information for sites that were in existence in 2008. **Table 31** shows the NO₂ and NO_y sites that are currently in operation. **Figure 26** compares the NO₂ and NO_y monitoring network in 2008 with the current design.

NO₂ AND NO_y QUALITY ASSURANCE

The site operator performs a precision check of the analyzer every two weeks. The precision checks are sent to the senior auditor 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) NO₂ and NO_y monitors, the EPA conducts thru-the-probe audits to 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 trace level monitors, but intends to implement this program in the future.

PLANS FOR THE 2010 NO₂ AND NO_y MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, the MDEQ is planning to operate NO₂ at:

- E Seven Mile Road in Detroit (261630019)

Also contingent upon adequate funding, as part of the ramp up for full scale NCore operations, due January 1, 2011, the MDEQ will continue to operate trace level NO_y monitors at:

- Grand Rapids site (26810020)
- Allen Park site (261630001)

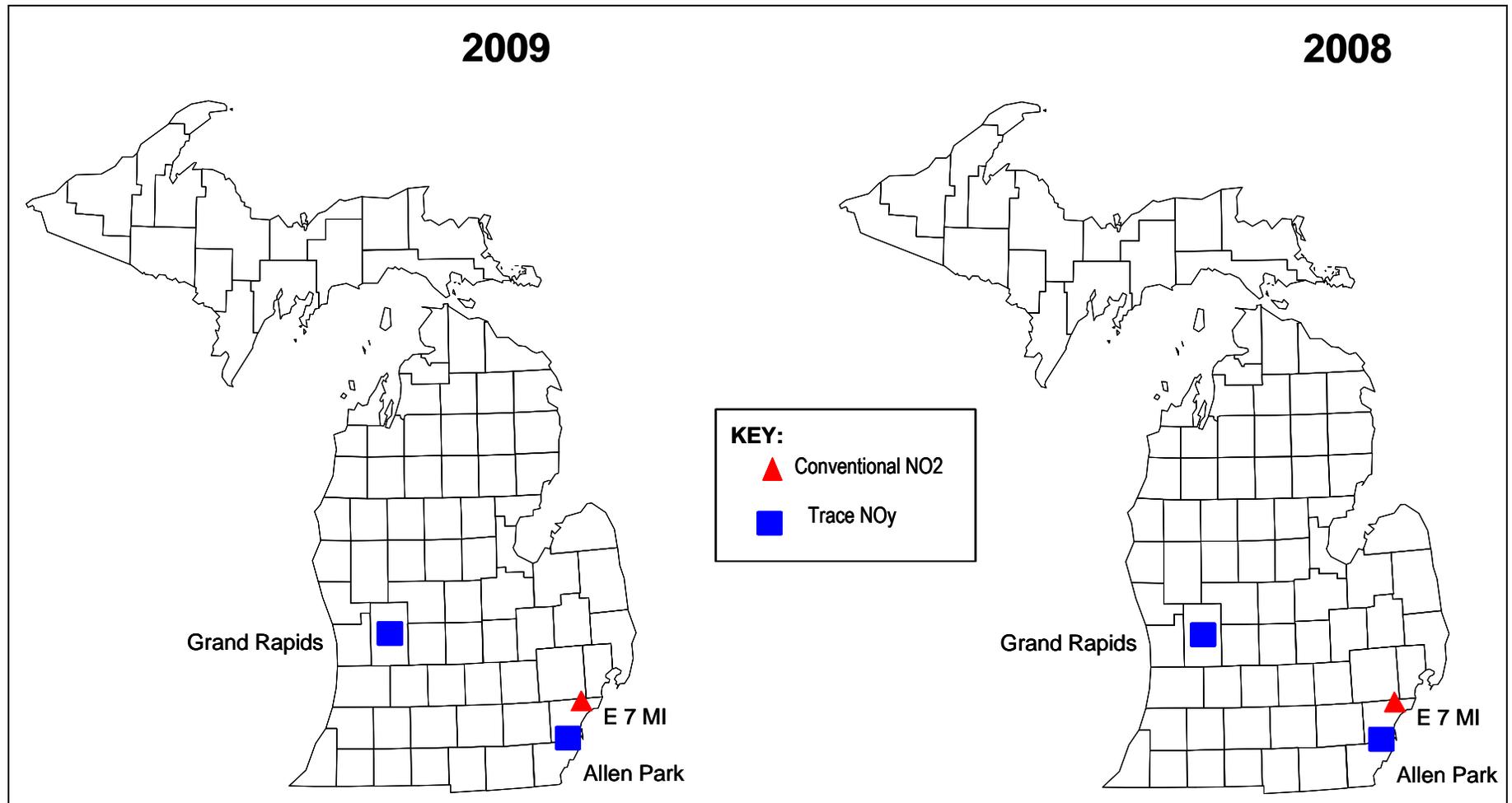
TABLE 30: MICHIGAN'S 2008 NO₂ AND NO_y MONITORING NETWORK

| Operating Schedule: Continuous Method: Chemiluminescence | | | | | | | | | Network as of October, 2008 Former NAMS sites are shown in bold. | | | |
|---|------------------|-----------------------------------|----------|-----------|-----------------------|--|--------------|--------------|---|-------------------|------------------|------------------------|
| Site Name | Monitoring Sites | | Latitude | Longitude | Measurement | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
| | AQS Site ID | Address | | | | | | | | | | |
| E 7 Mile | 261630019 | 11600 East Seven Mile Road | 42.431 | -83.00028 | NO₂ | pop exp | urban | Wayne | 12/1/90 | DWL | DWF | 5,456,428 |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.984 | -85.67139 | trace | pop exp | nghbrhd | Kent | 1/1/08 | GRW | GRMH | 1,088,514 |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | trace | pop exp | nghbrhd | Wayne | 1/1/08 | DWL | DWF | 5,456,428 |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area GRW=Grand Rapids-Wyoming Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area | | | | | | |

TABLE 31: 2009 NO₂ AND NO_y MONITORING NETWORK IN MICHIGAN

| Operating Schedule: Continuous Method: Chemiluminescence | | | | | | | | | Network as of March, 2009 Former NAMS sites are shown in bold. | | | |
|---|------------------|-----------------------------------|----------|-----------|-----------------------|--|--------------|--------------|---|-------------------|------------------|------------------------|
| Site Name | Monitoring Sites | | Latitude | Longitude | Measurement | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
| | AQS Site ID | Address | | | | | | | | | | |
| E 7 Mile | 261630019 | 11600 East Seven Mile Road | 42.431 | -83.00028 | NO₂ | pop exp | urban | Wayne | 12/1/90 | DWL | DWF | 5,456,428 |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.984 | -85.67139 | trace | pop exp | nghbrhd | Kent | 1/1/08 | GRW | GRMH | 1,088,514 |
| Allen Park | 261630001 | 14700 Goddard | 42.229 | -83.20833 | trace | pop exp | nghbrhd | Wayne | 1/1/08 | DWL | DWF | 5,456,428 |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area GRW=Grand Rapids-Wyoming Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area | | | | | | |

FIGURE 26: COMPARISON OF MICHIGAN'S 2009 AND 2008 NO₂ AND NO_y MONITORING NETWORK



SULFUR DIOXIDE (SO₂) MONITORING NETWORK:

The October 17, 2006 monitoring regulations no longer require SO₂ monitoring. Therefore, when the budget was cut in April 2007, the following SO₂ monitors were shut down: Warren (260991003), Grand Rapids (260810020), Flint (260490021), Port Huron (261470005), Linwood (261630016) and E Seven Mile in Detroit (261630019).

The SO₂ monitor was retained at SW High School (261630015) because it has the highest annual average SO₂ levels in Southeast Michigan, is located in the old nonattainment area for SO₂, was a NAMS site, and is important for trend levels. This monitor has been in operation for 32 years.

Trace SO₂ monitors for the NCore sites at Grand Rapids (260810020) and Allen Park (261630001) were deployed December 2007. Initially, there were significant problems with calibrating the units coupled with base line drift. The unit at Grand Rapids is now functioning properly and data collection is underway. However, the instrument at Allen Park still has severe problems was returned to the manufacturer for repair. Data collection at Allen Park resumed and a back-up monitor has been purchased to cover break-downs.

Table 32 summarizes the SO₂ monitoring site information for sites that were in existence in 2008. **Table 33** shows the SO₂ sites that are currently in operation. **Figure 27** compares the SO₂ network in 2008 with the current design.

SO₂ QUALITY ASSURANCE

The site operator performs a precision check of the analyzer every two weeks. The precision checks are sent to the senior auditor 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.

For conventional (non-trace level) SO₂ monitors, the EPA conducts thru-the-probe audits to 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 trace level SO₂ monitors, but intends to implement this program in the future.

PLANS FOR THE 2010 SO₂ MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, the MDEQ is planning to operate SO₂ at:

- SW High School site (261630015).

Also contingent upon adequate funding, as part of the ramp up for full scale NCore operations, due January 1, 2011, we will continue to operate trace level SO₂ monitors at:

- Grand Rapids site (26810020)
- Allen Park site (261630001)

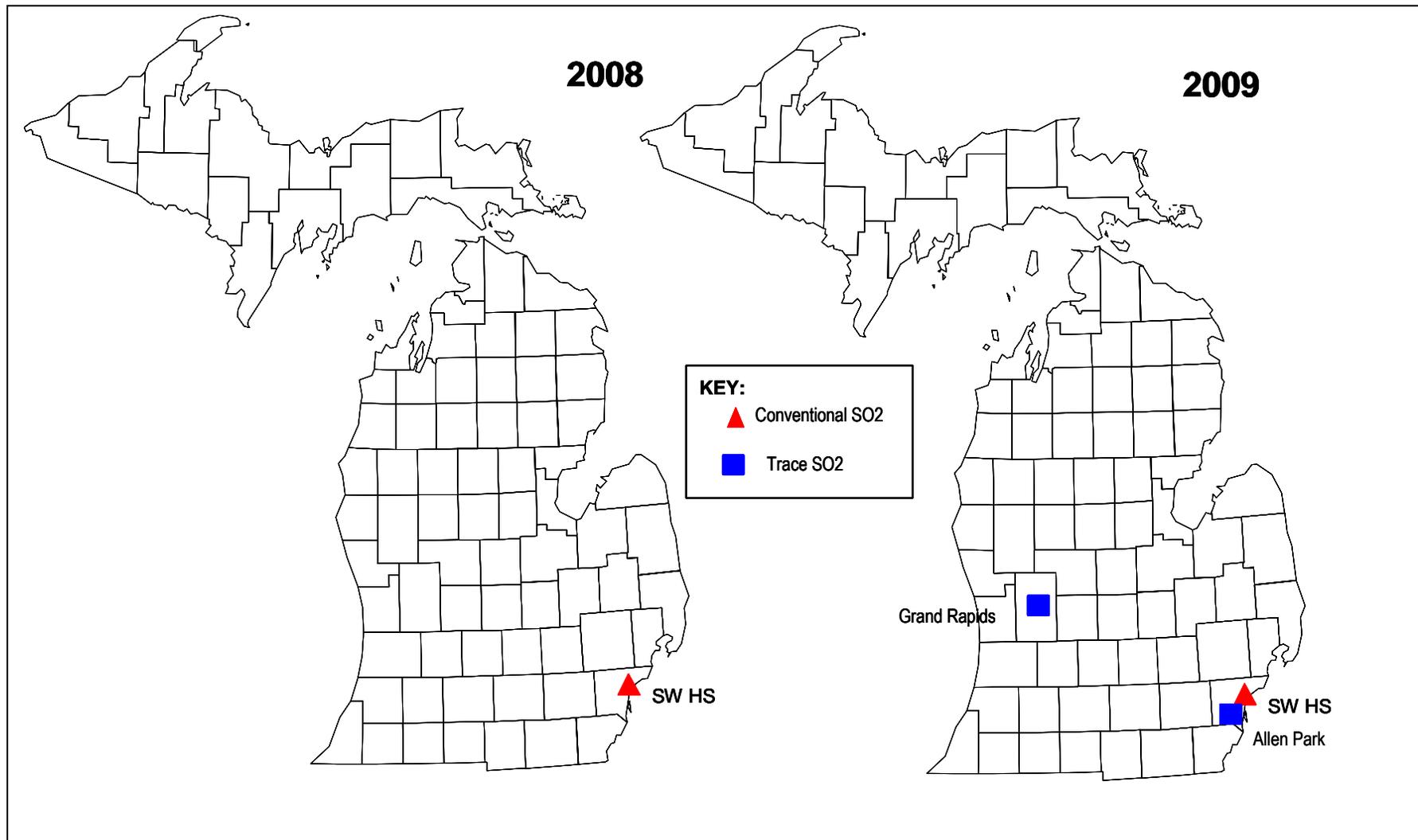
TABLE 32: MICHIGAN'S 2008 SO₂ MONITORING NETWORK

| Operating Schedule: Continuous | | | | | | | | | Network as of October, 2008 | | | |
|--|------------------|---------------------|----------|------------|-------------|-----------------------|---------|--------------|--------------------------------------|-------------------|------------------|------------------------|
| Method: Ultra Violet Stimulated Fluorescence | | | | | | | | | Former NAMS sites are shown in bold. | | | |
| Monitoring Sites | | | Latitude | Longitude | Measurement | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
| Site Name | AQS Site ID | Address | | | | | | | | | | |
| Fort St. (SWHS) | 261630015 | 6921 W. Fort | 42.30278 | -83.106667 | SO2 | max conc | nghbrhd | Wayne | 1/1/71 | DWL | DWF | 5,456,428 |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.98417 | -85.671389 | trace | pop exp | nghbrhd | Kent | 1/1/08 | GRW | GRMH | 1,088,514 |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.208333 | trace | pop exp | nghbrhd | Wayne | 1/1/08 | DWL | DWF | 5,456,428 |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | |

TABLE 33: 2009 SO₂ MONITORING NETWORK IN MICHIGAN

| Operating Schedule: Continuous | | | | | | | | | Network as of March 2009 | | | |
|--|------------------|---------------------|----------|------------|-------------|-----------------------|---------|--------------|--------------------------------------|-------------------|------------------|------------------------|
| Method: Ultra Violet Stimulated Fluorescence | | | | | | | | | Former NAMS sites are shown in bold. | | | |
| Monitoring Sites | | | Latitude | Longitude | Measurement | Purpose | Scale | County | Start Date | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
| Site Name | AQS Site ID | Address | | | | | | | | | | |
| Fort St. (SWHS) | 261630015 | 6921 W. Fort | 42.30278 | -83.106667 | SO2 | max conc | nghbrhd | Wayne | 1/1/71 | DWL | DWF | 5,456,428 |
| Grand Rapids | 260810020 | 1179 Monroe NW | 42.98417 | -85.671389 | trace | pop exp | nghbrhd | Kent | 1/1/08 | GRW | GRMH | 1,088,514 |
| Allen Park | 261630001 | 14700 Goddard | 42.2286 | -83.208333 | trace | pop exp | nghbrhd | Wayne | 1/1/08 | DWL | DWF | 5,456,428 |
| ¹ PMSA Key: | | | | | | ² CSA Key: | | | | | | |

FIGURE 27: COMPARISON OF MICHIGAN'S 2009 AND 2008 SO₂ MONITORING NETWORK



TRACE METAL MONITORING NETWORK:

Since 1981, monitoring for trace metals as TSP has been conducted as part of the MITAMP. Over the years, the program gradually expanded to nine 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 beryllium, vanadium, chromium, manganese, nickel, cobalt, copper, zinc, arsenic, molybdenum, cadmium, barium, lead, and iron.

Monitoring for trace metals is not required by the monitoring regulations. Due to budget cuts, reductions had to be made in the monitoring program for trace metals so that other required monitors could be retained. As a result, some trace metal sites were completely shut down, while the number of elements measured at others was reduced.

Trace metals as PM₁₀ 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 PM₁₀ and TSP trace metals are also collected at Dearborn.

To provide data for an internal manganese work group, PM₁₀ sampling was initiated at River Rouge (261630005) on January 25, 2009. PM₁₀ filters collected at Allen Park (261630001) and SW High School (261630015) were also analyzed for manganese starting January 25, 2009.

As a result of the April 2007 budget cuts, trace metal monitors at the following sites were shut down:

- Grand Rapids (260810020).
- Houghton Lake (261130001)
- Ypsilanti (261610008)
- E Seven Mile (261630019)

Laboratory analysis for trace metals was limited to only manganese at:

- Flint (260490021)

Laboratory analysis for trace metals was reduced to manganese, arsenic, cadmium, and nickel at:

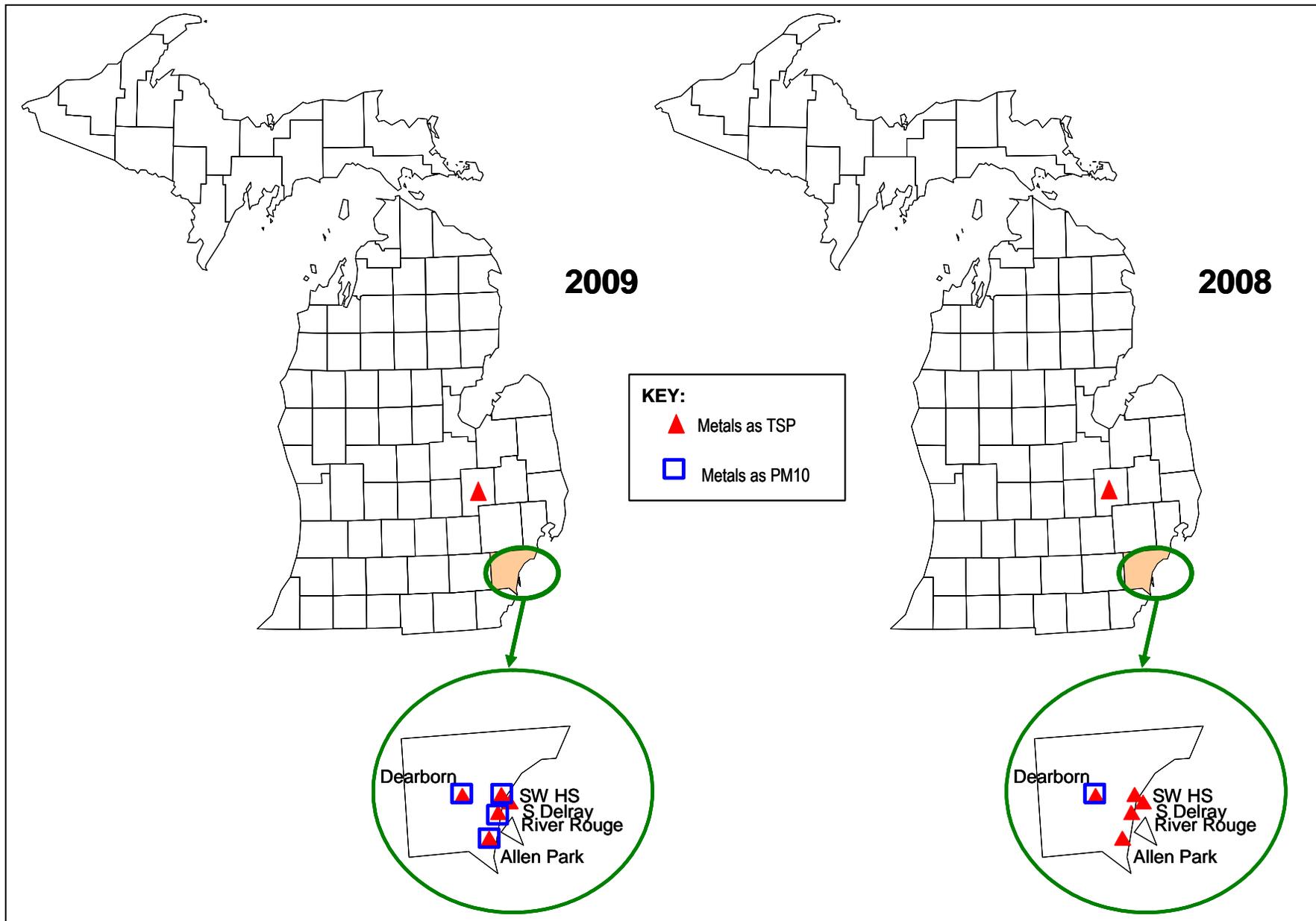
- Allen Park (261630001)
- SW High School (261630015)
- South Delray (261630027)
- River Rouge (261630005)

Laboratory analysis for manganese as PM₁₀ was initiated at:

- Allen Park (261630001)
- SW High School (261630015)
- River Rouge (261630005)

Table 34 summarizes the trace metal monitoring site information for sites that were in existence in 2009. **Table 35** shows the trace metal sites that are currently in operation as well as the elements that are measured at each. **Figure 28** compares the trace metal monitoring network in 2009 with the current design.

FIGURE 28: COMPARISON OF MICHIGAN'S 2009 AND 2008 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 senior auditor 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. Each quarter, a nationally based audit sample is sent that has a known concentration of metals spiked onto a filter. The results are compared to a "true" value. Each quarter, the MDEQ Laboratory also receives a regional round robin audit. 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 PM₁₀ and TSP-sized trace metals are collected at Dearborn (261630033) on a once every six day frequency.

PLANS FOR THE 2010 TRACE METAL NETWORK:

During 2010, contingent upon adequate levels of funding, the MDEQ is planning to continue to collect trace metal measurements, as described for the above elements at:

- Flint (260490021) – manganese only
- Allen Park (261630001)- TSP - manganese, nickel, arsenic and cadmium; for PM₁₀ manganese only
- SW High School (261630015) TSP - manganese, nickel, arsenic and cadmium; for PM₁₀ manganese only
- South Delray (261630027) – manganese, nickel, arsenic and cadmium only
- River Rouge (261630005) TSP - manganese, nickel, arsenic and cadmium; for PM₁₀ manganese only
- Dearborn NATTS site (261630033) for both PM₁₀ and TSP – metals reported include manganese, nickel, arsenic, cadmium, lead, beryllium, vanadium, chromium, cobalt, copper, zinc, molybdenum, barium and iron

Once a full year of manganese as PM₁₀ at Allen Park (261630001), River Rouge (261630005) and SW High School (261630015) is collected, the analysis of PM₁₀ filters at these sites will be discontinued.

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 SW High School (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.

At most sites, monitoring for VOCs is not required by the monitoring regulations. Due to recent budget cuts, reductions had to be made in the monitoring program so that other required monitors could be retained. To save some of the VOC monitoring sites, other sites were completely shut down.

As a result of the April 2007 budget cuts, the VOC samplers at the following sites were shut down:

- Grand Rapids (260810020)
- Houghton Lake (261130001)
- Ypsilanti (261610008)

Table 36 summarizes the VOC monitoring site information for sites that were in existence in 2008. **Table 37** shows the VOC sites that are currently in operation. **Figure 29** compares the VOC monitoring network in 2008 with the current design.

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. The auditor assesses the sampling configuration, including the condition and height of probe and siting criteria.

The MDEQ Laboratory also participates in both a national and regional performance test program. The national program 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.

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

PLANS FOR THE 2010 VOC MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, the MDEQ is planning to continue to collect VOCs at:

- SW High School (261630015) once every 12 days,
- Dearborn NATTS site (261630033) once every six days and precision samples.

TABLE 36: MICHIGAN'S 2008 VOC MONITORING NETWORK

Operating Schedule: 1:6
Method: Stainless Steel Pressurized Canister Sampler; Gas Chromatograph/ Mass Spectrometer (24-hr samples) Network as of October, 2008

| Site Name | Monitoring Sites | | Latitude | Longitude | Sampling Frequency | Purpose | Scale | County | Date Estab. | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
|----------------------|------------------|--|-----------|------------|--------------------|----------|---------|--------|-------------|-------------------|------------------|------------------------|
| | AQS Site ID | Address | | | | | | | | | | |
| SW Highsch., Detroit | 261630015 | SW Hughschool, 6921 W. Fort St., Detroit | 42.302778 | -83.106667 | 1:12 | pop exp | nghbrhd | Wayne | 2/26/99 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

TABLE 37: 2009 VOC MONITORING NETWORK IN MICHIGAN

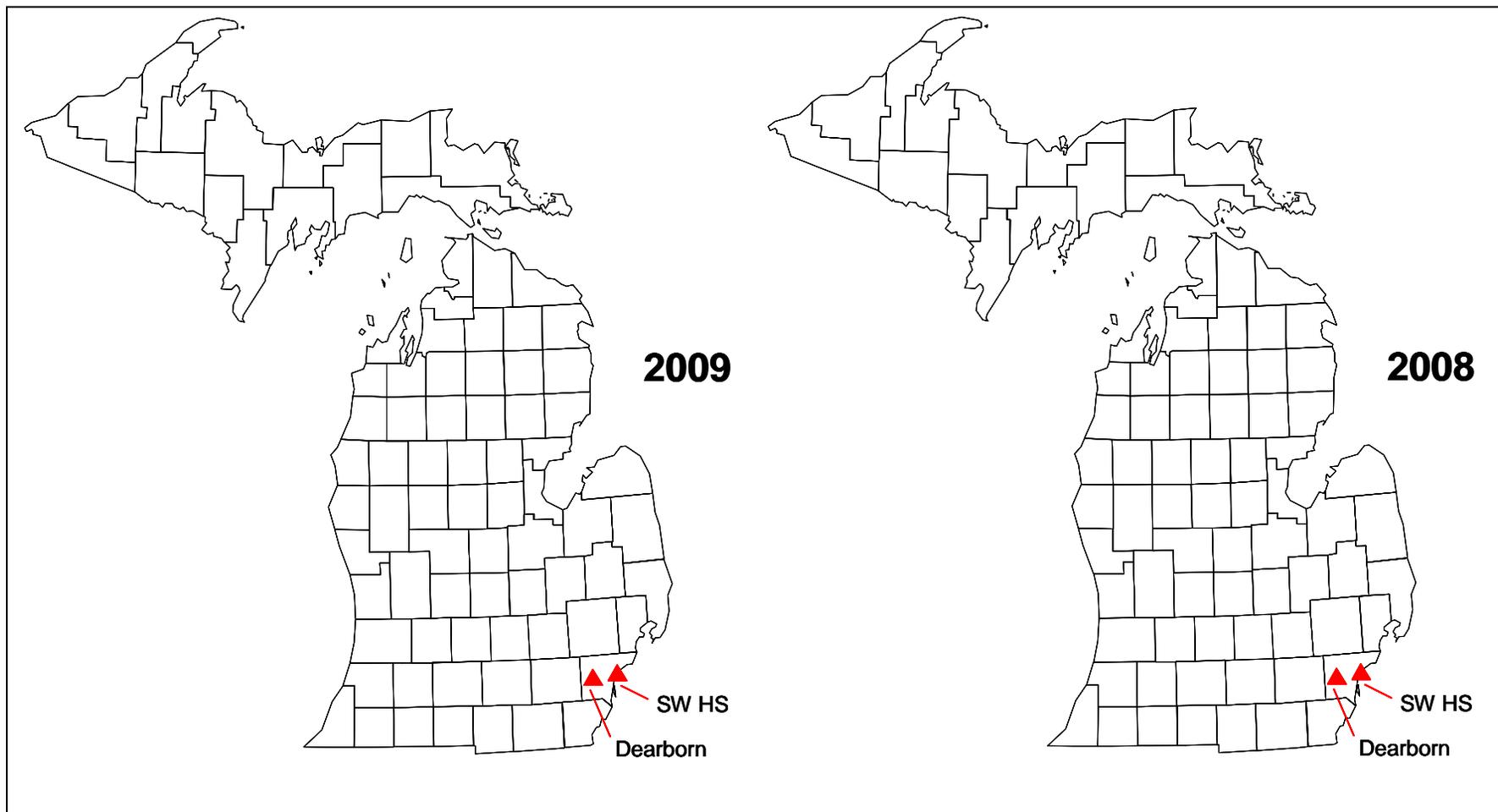
Operating Schedule: 1:6
Method: Stainless Steel Pressurized Canister Sampler; Gas Chromatograph/ Mass Spectrometer (24-hr samples) Network as of March 2009

| Site Name | Monitoring Sites | | Latitude | Longitude | Sampling Frequency | Purpose | Scale | County | Date Estab. | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
|----------------------|------------------|--|-----------|------------|--------------------|----------|---------|--------|-------------|-------------------|------------------|------------------------|
| | AQS Site ID | Address | | | | | | | | | | |
| SW Highsch., Detroit | 261630015 | SW Hughschool, 6921 W. Fort St., Detroit | 42.302778 | -83.106667 | 1:12 | pop exp | nghbrhd | Wayne | 2/26/99 | DWL | DWF | 5,456,428 |
| Dearborn | 261630033 | 2842 Wyoming | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

FIGURE 29: COMPARISON OF MICHIGAN'S 2009 AND 2008 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 SW High School (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. Sampling for carbonyls is performed at River Rouge (261630005) on a once every six day schedule. SW High School (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.

At most sites, monitoring for carbonyls is not required by the monitoring regulations. Due to recent budget cuts, reductions had to be made in the monitoring program so that other required monitors could be retained. As a result some of the carbonyl monitoring sites were completely shut down, including:

- Grand Rapids (260810020)
- Houghton Lake (261130001)
- Ypsilanti (261610008)

Table 38 summarizes the carbonyl monitoring site information for sites that were in existence in 2008. **Table 39** shows the carbonyl sites that are currently in operation. **Figure 30** compares the carbonyl monitoring network in 2008 with the current design.

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 auditor assesses the sampling configuration, including the condition and height of probe and siting criteria.

The MDEQ Laboratory also participates in both a national and regional performance test program. The national program 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.

The MDEQ Laboratory received bi-annual performance evaluation samples from a contract through EPA that are analyzed for carbonyl compounds. The MDEQ Laboratory also analyzes regional round robin samples.

PLANS FOR THE 2010 CARBONYL MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, Michigan is planning to continue to collect carbonyls at:

- SW High School (261630015) once every 12 days
- River Rouge (261630005) once every six days
- Dearborn NATTS site (261630033) once every six days and precision samples

TABLE 38: MICHIGAN'S 2008 CARBONYL MONITORING NETWORK

Operating Schedule: 1:6 and 1:12
 Method: 2,4 dinitrophenyl hydrazine treated silica gel cartridges; HPLC with ultraviolet absorption
 Network as of October 2008

| Monitoring Sites | | | Latitude | Longitude | Sampling Frequency | Purpose | Scale | County | Date Estab. | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
|----------------------|-------------|--|-----------|------------|--------------------|----------|---------|--------|-------------|-------------------|------------------|------------------------|
| Site Name | AQS Site ID | Address | | | | | | | | | | |
| Dearborn | 261630033 | 2842 Wyoming | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |
| River Rouge | 261630005 | 315 Genesee | 42.267222 | -83.132222 | 1:6 | max conc | nghbrhd | Wayne | 1/1/94 | DWL | DWF | 5,456,428 |
| SW Highsch., Detroit | 261630015 | SW Hughschool, 6921 W. Fort St., Detroit | 42.302778 | -83.106667 | 1:12 | pop exp | nghbrhd | Wayne | 2/26/99 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
 GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

TABLE 39: 2009 CARBONYL MONITORING NETWORK IN MICHIGAN

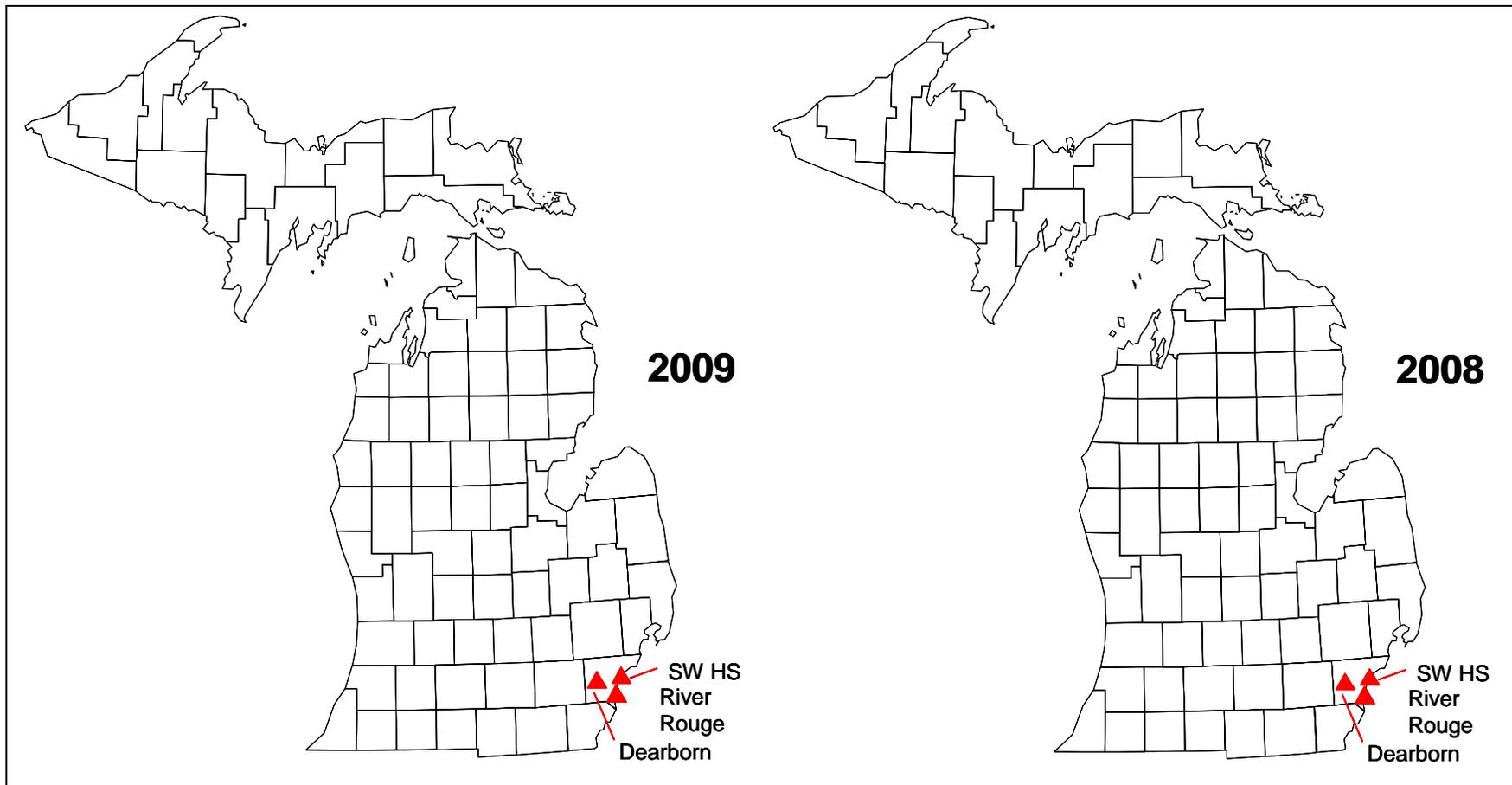
Operating Schedule: 1:6 and 1:12
 Method: 2,4 dinitrophenyl hydrazine treated silica gel cartridges; HPLC with ultraviolet absorption
 Network as of March 2009

| Monitoring Sites | | | Latitude | Longitude | Sampling Frequency | Purpose | Scale | County | Date Estab. | PMSA ¹ | CSA ² | MSA Pop. (2000 Census) |
|----------------------|-------------|--|-----------|------------|--------------------|----------|---------|--------|-------------|-------------------|------------------|------------------------|
| Site Name | AQS Site ID | Address | | | | | | | | | | |
| Dearborn | 261630033 | 2842 Wyoming | 42.306666 | -83.148889 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 |
| River Rouge | 261630005 | 315 Genesee | 42.267222 | -83.132222 | 1:6 | max conc | nghbrhd | Wayne | 1/1/94 | DWL | DWF | 5,456,428 |
| SW Highsch., Detroit | 261630015 | SW Hughschool, 6921 W. Fort St., Detroit | 42.302778 | -83.106667 | 1:12 | pop exp | nghbrhd | Wayne | 2/26/99 | DWL | DWF | 5,456,428 |

¹ PMSA Key: DWL= Detroit-Warren-Livonia Metro. Area
 GRW=Grand Rapids-Wyoming Metro. Area

² CSA Key: DWF = Detroit-Warren-Flint Combined Statistical Area
 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

FIGURE 30: COMPARISON OF MICHIGAN'S 2009 AND 2008 CARBONYL MONITORING NETWORK



POLYNUCLEAR AROMATIC HYDROCARBON (PAH) MONITORING NETWORK:

As part of 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 EPA's collocation 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 40 shows the site information for PAH sites that were in operation in 2008. **Table 41** shows the PAH sites that are currently in operation. **Figure 31** compares the PAH monitoring network in 2008 with the current design.

PAH QUALITY ASSURANCE

The site operator conducts a precision flow check once a month. The flow check values are sent to the senior auditor 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. The audit results are uploaded to the EPA's AQS database each quarter.

PLANS FOR THE 2010 PAH MONITORING NETWORK

During 2010, contingent upon adequate levels of funding, Michigan is planning to continue to collect PAHs on a once every six day sampling frequency at:

- Dearborn (261630033)

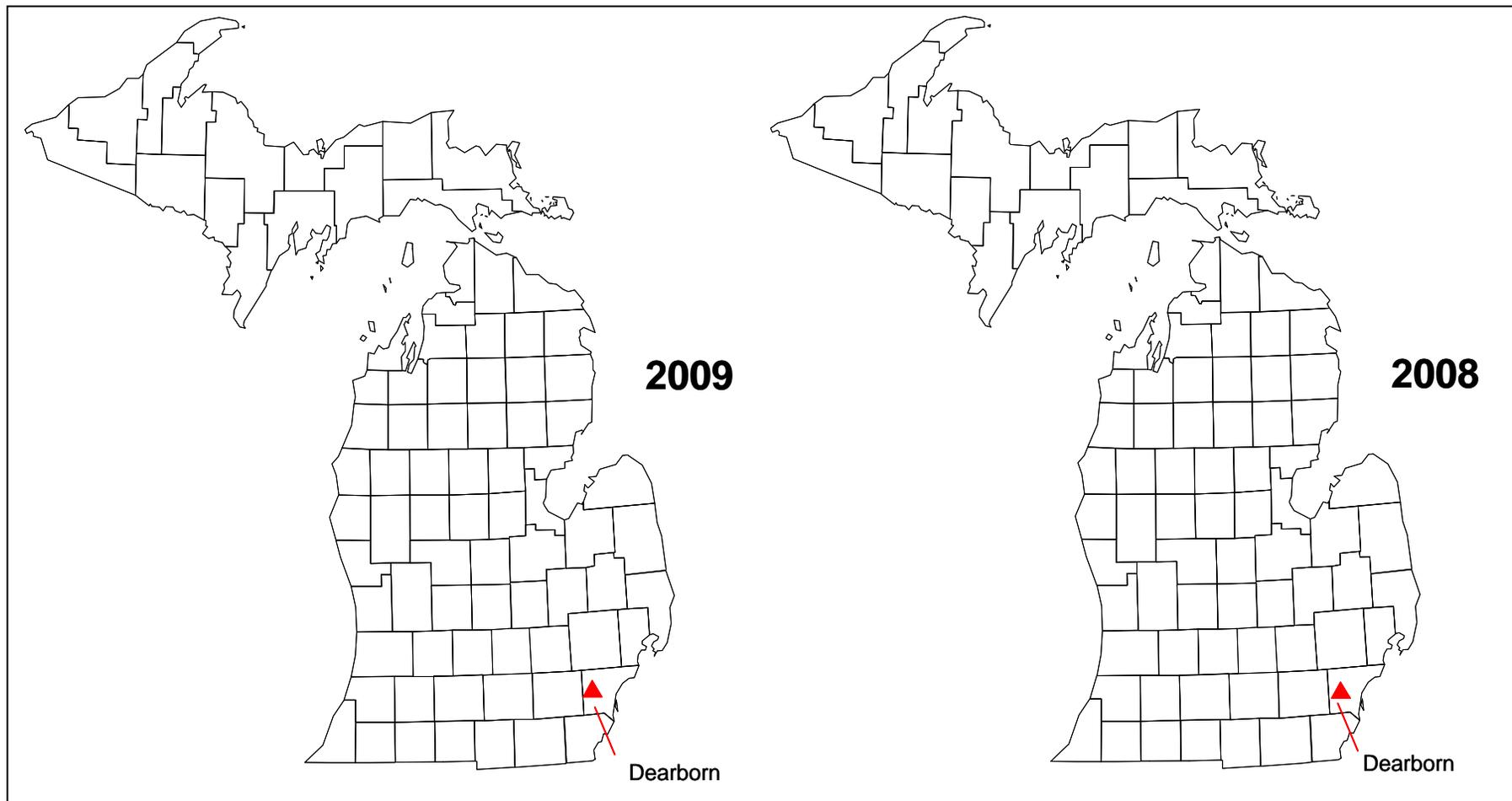
TABLE 40: 2008 PAH NETWORK IN MICHIGAN

| | | | | | | | | | | | | | |
|---|----------------|----------------|-----------------|------------------|------------------|--|--------------|---------------|-------------|------------------------------------|------------------------|-----------------|--|
| Operating Schedule: 1:6 | | | | | | | | | | | | | |
| Method: Polyurethane foam plugs and XAD-2 resin with gas chromatography mass spectrometry | | | | | | | | | | Network as of October 2008 | | | |
| Monitoring Sites | | | | | | | | | | | | MSA Pop. | |
| Site | AQS | | | | | | | | | | | (2000 | |
| Name | Site ID | Address | Latitude | Longitude | Frequency | Purpose | Scale | County | Date | PM₁₀¹ | CSA² | Census) | |
| Dearborn | 261630033 | 2842 Wyoming | 42.30667 | -83.1489 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 | |
| ¹ PM ₁₀ Key: | | | | | | ² CSA Key: | | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area | | | | | | | |

TABLE 41: 2009 PAH NETWORK IN MICHIGAN

| | | | | | | | | | | | | | |
|---|----------------|----------------|-----------------|------------------|------------------|--|--------------|---------------|-------------|------------------------------------|------------------------|-----------------|--|
| Method: Polyurethane foam plugs and XAD-2 resin with gas chromatography mass spectrometry | | | | | | | | | | Network as of April 2009 | | | |
| Monitoring Sites | | | | | | | | | | | | MSA Pop. | |
| Site | AQS | | | | | | | | | | | (2000 | |
| Name | Site ID | Address | Latitude | Longitude | Frequency | Purpose | Scale | County | Date | PM₁₀¹ | CSA² | Census) | |
| Dearborn | 261630033 | 2842 Wyoming | 42.30667 | -83.1489 | 1:6 | max conc | nghbrhd | Wayne | 6/1/90 | DWL | DWF | 5,456,428 | |
| ¹ PM ₁₀ Key: | | | | | | ² CSA Key: | | | | | | | |
| DWL= Detroit-Warren-Livonia Metro. Area | | | | | | DWF = Detroit-Warren-Flint Combined Statistical Area | | | | | | | |

FIGURE 31: COMPARISON OF MICHIGAN'S 2009 AND 2008 PAH MONITORING NETWORK



METEOROLOGICAL MEASUREMENTS:

Various meteorological measurements have been added to sites across the network to supplement the ambient monitoring network and enhance data analysis activities. No changes are planned to the meteorological network.

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.

ADEQUACY OF MICHIGAN'S MONITORING SITES:

The suitability of the monitoring sites locations is frequently assessed by the AMU's QA Team and by the EPA. The EPA assesses the adequacy of the stations during PM_{2.5} 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, 2010. In this review any redundancies of monitors along border areas will be assessed. Any monitors that are no longer necessary and any deficiencies in the network will be identified.

APPENDIX A: ACRONYMS AND THEIR DEFINITIONS:

| | |
|-------------------|--|
| > | Greater than |
| < | Less than |
| ≥ | Greater than or equal to |
| ≤ | Less than or equal to |
| % | Percent |
| µg/m ³ | 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 methods |
| ARM | Automotive Recyclers of Michigan |
| 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 |
| DPW | Department of Public Works |
| EC | Elemental carbon |
| EPA | U.S. Environmental Protection Agency |
| FDMS | Filter Dynamic Measurement System |
| FEM | Forum on Environmental Measurements |
| FIA | Family Independence Agency |
| FRM | Federal Reference Method |
| GC | Gas chromatograph (instrument providing hourly VOC measurements) |
| GFI | Ground fault circuit interrupters |
| hr | Hour |
| IN-MI | Indiana-Michigan |
| LADCO | Lake Michigan Air Directors Consortium |
| MDEQ | 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 ₂ | Nitrogen dioxide |
| NO _x | Oxides of Nitrogen |
| NO _y | 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:

| | |
|----------------------|--|
| > | Greater than |
| PEP | Performance Evaluation Program |
| PM | Particulate matter |
| PM _{2.5} | Particulate matter with an aerodynamic diameter less than or equal to 2.5 microns |
| PM ₁₀ | Particulate matter with a diameter of 10 microns or less |
| PM _{10-2.5} | Coarse PM equal to the concentration difference between PM ₁₀ and PM _{2.5} |
| 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 _{2.5}) |
| SLAMS | State and Local Air Monitoring Station |
| SO ₂ | Sulfur dioxide |
| STAG | State Air Grant (federal) |
| STN | Speciation Trend Network (PM _{2.5}) |
| SW HS | Southwestern High School (261630015) |
| TEOM | Tapered element oscillating microbalance (hourly PM _{2.5} measurement monitor) |
| tpy | Ton per year |
| TRI | Toxic Release Inventory |
| TSP | Total Suspended Particulate |
| U of M | University of Michigan |
| UPS | Uninterrupted power supplies |
| U.S. | United States |
| VOC | Volatile organic compounds |

APPENDIX B: LEAD DISPERSION MODELING INPUTS

TABLE B1: MICHIGAN NAAQS LEAD (Pb) ANALYSIS

| Lead Source Input and Generic Ambient Impact Data | | | | | | | | | | | | |
|--|---------------|--------------------------|-------|-----------------|----------|---------------------|-------|-----------------------|-------|-------------------|----------|--|
| (Impacts based on AERMOD version 07026) | | | | | | | | | | | | |
| (05/20/09) | | | | | | | | | | | | |
| INPUT PARAMETERS | | | | | | | | | | | | Monthly Generic Impacts ($\mu\text{g}/\text{m}^3$) |
| SOURCES | Stack Type | Generic Emission Rate | | Stack Height | | Exit Temperature | | Exit Flow/Velocity | | Stack Diameter | | |
| | | (lb/hr) | (g/s) | (feet) | (meters) | (Deg F) | (K) | (ACFM) | (m/s) | (feet) | (meters) | |
| Monroe Units 1 & 2 | Point | 0.50 | 0.063 | 578.7 | 176.40 | 119.9 | 322.0 | 2,147,923 | 15.45 | 29.99 | 9.14 | 0.00187 |
| Monroe Units 3 & 4 | Point | 0.50 | 0.063 | 578.7 | 176.40 | 119.9 | 322.0 | 2,147,923 | 15.45 | 29.99 | 9.14 | |
| Campbell Units 1 & 2 | Point | 1.00 | 0.126 | 399.9 | 121.90 | 299.9 | 422.0 | 2,598,690 | 46.58 | 19.00 | 5.79 | 0.00117 |
| Campbell Unit 3 | Point | 1.00 | 0.126 | 649.9 | 198.10 | 293.1 | 418.2 | 2,699,086 | 23.43 | 27.30 | 8.32 | 0.00073 |
| St. Mary's Cement | Point | 1.00 | 0.126 | 323.0 | 98.45 | 220.0 | 377.6 | 499,214 | 26.73 | 10.99 | 3.35 | 0.00507 |
| East Jordan Iron Work | Point | 1.00 | 0.126 | 43.6 | 13.30 | 150.0 | 338.7 | 69,737 | 14.50 | 5.58 | 1.70 | 0.00776 |
| Extruded Metals | Point | 1.00 | 0.126 | 38.0 | 11.58 | 445.0 | 502.6 | 2,477 | 4.00 | 2.00 | 0.61 | 10.98756 |

TABLE B2: AERMOD MODELING INPUT/OUTPUT SUMMARY

| Pb POINT SOURCE DATA | | | | | | | | | | | |
|-----------------------------|----------|----------|----------|---------|-----------|----------|--------|--------|------|-----------|--|
| SOURCE | NUMBER | EMISSION | STACK | STACK | STACK | STACK | BLDG | URBAN | CAP/ | EMIS RATE | |
| ID | PART. | RATE | HEIGHT | TEMP. | EXIT VEL. | DIAMETER | EXISTS | SOURCE | HOR | SCALAR | |
| ID | CATS. | (G/SEC) | (METERS) | (DEG.K) | (M/SEC) | (METERS) | | | | VARY BY | |
| Monroe Units 1 & 2 | 0 | 0.063 | 176.40 | 322.00 | 15.45 | 9.14 | NO | NO | NO | | |
| Monroe Units 3 & 4 | 0 | 0.063 | 176.40 | 322.00 | 15.45 | 9.14 | NO | NO | NO | | |
| Campbell Unit 3 | 0 | 0.126 | 198.10 | 418.20 | 23.43 | 8.32 | YES | NO | NO | | |
| Campbell Units 1 & 2 | 0 | 0.126 | 121.90 | 422.00 | 46.58 | 5.79 | YES | NO | NO | | |
| St. Mary's Cement | 0 | 0.126 | 98.45 | 377.60 | 26.73 | 3.35 | YES | NO | NO | | |
| East Jordan Iron Work | 0 | 0.126 | 13.30 | 338.70 | 14.50 | 1.70 | NO | NO | NO | | |
| Extruded Metals | 0 | 0.126 | 11.58 | 502.60 | 4.00 | 0.61 | YES | NO | NO | | |
| Impact Summary | | | | | | | | | | | |
| 2007 | | | | | | | | | | | |
| Monroe Units 1 & 2 | 0.00187 | | | | | | | | | | |
| Monroe Units 3 & 4 | | | | | | | | | | | |
| Campbell Unit 3 | 0.00073 | | | | | | | | | | |
| Campbell Units 1 & 2 | 0.00117 | | | | | | | | | | |
| St. Mary's Cement | 0.00507 | | | | | | | | | | |
| East Jordan Iron Work | 0.00776 | | | | | | | | | | |
| Extruded Metals | 10.98756 | | | | | | | | | | |

TABLE B3: PROPOSED LEAD BACKGROUNDS

| LOCATION | MONITORING STATION | YEAR | MAX QUARTERLY AVG ($\mu\text{g}/\text{m}^3$) | MAX |
|------------|------------------------------|------------------|--|---------------|
| Charlevoix | Houghton Lake (261130001) | 2004 | 0.0032 | 0.0056 |
| | | 2005 | 0.0056 | |
| | | 2006 | 0.0038 | |
| | | 04 to '06 | | |
| West Olive | Grand Rapids (260810020) | 2004 | 0.0121 | 0.0121 |
| | | 2005 | 0.0102 | |
| | | 2006 | 0.0081 | |
| | | 04 to '06 | | |
| Belding | Grand Rapids (260810020) | 2004 | 0.0121 | 0.0121 |
| | | 2005 | 0.0102 | |
| | | 2006 | 0.0081 | |
| | | 04 to '06 | | |
| Ecorse | River Rouge (261630005) | 2004 | 0.0259 | 0.0259 |
| | | 2005 | 0.0191 | |
| | | 2006 | 0.0144 | |
| | | 04 to '06 | | |