



Air Quality Division
Michigan Department of Environmental Quality

MICHIGAN'S 2009 AMBIENT AIR MONITORING NETWORK REVIEW

JUNE 17, 2008



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TABLE OF CONTENTS

	<u>Page</u>
Executive Summary:	1
Background	1
Recommendations for Michigan's Air Monitoring Network in 2009.....	2
Network Review Goals	2
Public Comment Process	2
Ambient Air Monitoring Network Requirements:.....	4
Other Monitoring Network Requirements	5
PM _{2.5} Monitoring Network Changes	6
Network Review Requirements	6
Quality Assurance	7
Monitor Deployment By Location.....	8
Ozone Monitoring Network:.....	9
Impact of the New Primary Ozone NAAQS	16
Impact of the New Secondary Ozone NAAQS	17
Ozone Season.....	21
Ozone Quality Assurance.....	23
Plans for 2009 Ozone Monitoring Network.....	24
PM_{2.5} FRM Monitoring Network:	25
PM _{2.5} Designation Recommendations	33
Conversion of PM _{2.5} Grant Dollars	33
PM _{2.5} Quality Assurance.....	33
Plans for 2009 PM _{2.5} FRM Monitoring Network	34
PM_{2.5} Continuous Monitoring Network	36
Filter Dynamic Measurement System (FDMS) Inlets.....	36
TEOM Quality Assurance.....	40
Plans for 2009 PM _{2.5} TEOM Network	40
PM_{2.5} Speciation Monitoring Network:.....	41
Chemical Composition of PM _{2.5} and Lab Costs	45
Continuous Speciation Measurements	45
Speciation Quality Assurance.....	45
Plans for 2009 PM _{2.5} Speciation Monitoring Network	46
PM₁₀ Monitoring Network:.....	47
History of PM ₁₀ Collocated and PM ₁₀ Continuous Measurements.....	51
PM ₁₀ Quality Assurance	51
Plans for 2009 PM ₁₀ Monitoring Network	51
Carbon Monoxide (CO) Monitoring Network:.....	52
Trace CO Quality Assurance.....	52
Plans for 2009 CO Monitoring Network	52
Nitrogen Dioxide (NO₂) and NO_y Monitoring Network:.....	55
NO ₂ and NO _y Quality Assurance.....	55
Plans for 2009 NO ₂ and NO _y Monitoring Network.....	55

TABLE OF CONTENTS, CONTINUED

	<u>Page</u>
Sulfur Dioxide (SO₂) Monitoring Network:	58
SO ₂ Quality Assurance	58
Plans for 2009 SO ₂ Monitoring Network	58
Lead Monitoring Network:	61
Lead Quality Assurance	65
Plans for 2009 Lead Monitoring Network	65
Trace Metal Monitoring Network:	66
Trace Metal Quality Assurance	69
Plans for 2009 Trace Metal Network:	69
Volatile Organic Compound (VOC) Monitoring Network:	70
VOC Quality Assurance	70
Plans for 2009 VOC Monitoring Network.....	70
Carbonyl Monitoring Network:	73
Carbonyl Quality Assurance	73
Plans for 2009 Carbonyl Monitoring Network	73
Polynuclear Aromatic Hydrocarbon (PAH) Monitoring Network:	76
PAH Quality Assurance	76
Plans for 2009 PAH Monitoring Network	76
Meteorological Measurements:	77
Meteorological Equipment Quality Assurance	77
Adequacy of Michigan's Monitoring Sites:	78
Appendix A: Acronyms and Their Definitions:	79
Appendix B: Summary of Comments Received and Replies:.....	80
Appendix C: Written Comments Received:	82

List of Tables

	<u>Page</u>
Table 1: Composition of MSAs in Michigan	5
Table 2: Monitor Distribution Throughout the 2008 Network in Michigan	8
Table 3: SLAMS Minimum Ozone Monitoring Requirements.....	9
Table 4: Minimum Number of Ozone Monitors Required Per the October 17, 2006 Revised Monitoring Regulations.....	10
Table 5: Michigan's 2007 Ozone Monitoring Network.....	13
Table 6: 2008 Ozone Monitoring Network in Michigan.....	14
Table 7: Impact of a Reduced Ozone NAAQS on Michigan's Ozone Season.....	21
Table 8: Analysis Using Multiple Sites to Determine Impact of a Reduced Ozone NAAQS on Michigan's Ozone Season.....	22
Table 9: Analysis Using CASTNET Data to Determine Impact of a Reduced Ozone NAAQS on Michigan's Ozone Season.....	23
Table 10: PM2.5 Minimum Monitoring Requirements	25
Table 11: Minimum Number of PM2.5 FRM Monitors Required Per the October 17, 2006 Revised Monitoring Regulations.....	26
Table 12: Michigan's 2007 PM2.5 FRM Monitoring Network	30
Table 13: 2008 PM2.5 FRM Monitoring Network in Michigan	31
Table 14: Michigan's 2007 PM2.5 Continuous Monitoring Network.....	37
Table 15: 2008 PM2.5 Continuous Monitoring Network in Michigan	38
Table 16: Michigan's 2007 PM2.5 Speciation Monitoring Network.....	42
Table 17: 2008 PM2.5 Speciation Monitoring Network in Michigan.....	43
Table 18: PM10 Minimum Monitoring Requirements (Number of Stations per MSA)	47
Table 19: Minimum Number of PM10 Monitors Required Per the October 17, 2006 Revised Monitoring Regulations.....	48
Table 20: Michigan's 2007 PM10 Monitoring Network	49
Table 21: 2008 PM10 Monitoring Network in Michigan	49
Table 22: Michigan's 2007 CO Monitoring Network.....	53
Table 23: 2008 CO Monitoring Network in Michigan	53
Table 24: Michigan's 2007 NO2 and NOY Monitoring Network	56
Table 25: 2008 NO2 and NOY Monitoring Network in Michigan	56
Table 26: Michigan's 2007 SO2 Monitoring Network	59
Table 27: 2008 SO2 Monitoring Network in Michigan.....	59
Table 28: Michigan's 2007 Lead Monitoring Network.....	63
Table 29: 2008 Lead Monitoring Network in Michigan	63
Table 30: Michigan's 2007 Trace Metal Monitoring Network	67
Table 31: 2008 Trace Metal Monitoring Network in Michigan	67
Table 32: Michigan's 2007 VOC Monitoring Network	71
Table 33: 2008 VOC Monitoring Network in Michigan	71
Table 34: Michigan's 2007 Carbonyl Monitoring Network	74
Table 35: 2008 Carbonyl Monitoring Network in Michigan	74
Table 36: 2008 PAH Monitoring Network in Michigan.....	76

List of Figures

	<u>Page</u>
Figure 1: MSAs in Michigan's Lower Peninsula.....	4
Figure 2: Ozone Design Values 2005 – 2007 Across Region 5.....	11
Figure 3: Comparison of Michigan's 2007 and 2008 Ozone Monitoring Networks (No Change)	15
Figure 4: Fourth Highest 8-Hour Ozone Values Averaged Over Three Years (2005-2007).....	17
Figure 5: Maps of Ozone Susceptible Aspen Seedling Species.....	18
Figure 6: Maps of Ozone Susceptible Black Cherry Species	18
Figure 7: Maps of Ozone Susceptible Soybean Yield Loss	19
Figure 8: Maps of Ozone Susceptible Winter Wheat Loss	19
Figure 9: U.S. Maps of Ozone Induced Foliar Injury for 2001 and 2002.....	20
Figure 10: Comparison of Michigan's 2007 and 2008 PM2.5 FRM Monitoring Network.....	32
Figure 11: Nonattainment Areas Recommended By MDEQ Using Data From 2004-2006	33
Figure 12: Comparison of Michigan's 2007 and 2008 PM2.5 Continuous Monitoring Network.....	39
Figure 13: Comparison of Michigan's 2007 and 2008 PM2.5 Speciation Monitoring Network.....	44
Figure 14: Comparison of Michigan's 2007 and 2008 PM10 Monitoring Network.....	50
Figure 15: Comparison of Michigan's 2007 and 2008 CO Monitoring Network.....	54
Figure 16: Comparison of Michigan's 2007 and 2008 NO2 and NOY Monitoring Network.....	57
Figure 17: Comparison of Michigan's 2007 and 2008 SO2 Monitoring Network.....	60
Figure 18: Map of Lead Sources and Lead-TSP Monitoring Sites.....	62
Figure 19: Comparison of Michigan's 2007 and 2008 Lead Monitoring Network.....	64
Figure 20: Comparison of Michigan's 2007 and 2008 Trace Metal Monitoring Network.....	68
Figure 21: Comparison of Michigan's 2007 and 2008 VOC Monitoring Network.....	72
Figure 22: Comparison of Michigan's 2007 and 2008 Carbonyl Monitoring Network.....	75

EXECUTIVE SUMMARY:

The purpose of this document is to examine Michigan's ambient air monitoring network in operation during 2007-2008 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 2009 calendar year, contingent upon adequate levels of funding.

In previous years, the network review was named for the year before any changes occurred. For example, last year's 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, the Michigan Department of Environmental Quality (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 published in 2008 will describe changes to the 2009 monitoring network and is titled "Michigan's 2009 Network review." Due to the change in the naming convention, there are no 2007 or 2008 network reviews. The sequence jumps from "Michigan's 2006 Ambient Air Monitoring Review" to "Michigan's 2009 Ambient Air Monitoring Review."

Background

There are a number of discussions at the federal level that may impact the future design of Michigan's monitoring network, including changes to the National Ambient Air Quality Standard (NAAQS) for ozone and lead and modification of the type of federal funding.

On March 12, 2008, the U.S. Environmental Protection Agency (EPA) changed the national ambient air quality standard (NAAQS) for ozone, reducing the level of the standard from 0.08 parts per million (ppm) to 0.075 ppm. This change will likely have implications for the design of the ozone network as well as the length of the ozone season. The EPA intends to issue a proposed monitoring rule describing any required changes in the monitoring network in June 2008 and a final version of the rule in March 2009. Therefore, the next network review will consider the impact of these modifications on the design of Michigan's ozone network.

On December 17, 2007, the EPA issued an Advance Notice of Proposed Rulemaking for Lead NAAQS (ANPR), in which the level of the lead NAAQS could be reduced from the current maximum quarterly average of 1.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). The ANPR proposed a wide range for the new NAAQS. The averaging time could be changed from quarterly to monthly, necessitating an increase in the sampling frequency to create an average representative of ambient levels. Monitoring methods may change. Different particle size fractions could be required instead of total suspended particulates (TSP). The network design could also be altered. Source oriented, population oriented or a combination of source and population oriented monitoring could be the basis of the new network design. To address these unresolved issues, a proposed rule from EPA was due in March 2008. The final version of the lead rule is due by September 1, 2008. The timing is inconsistent with the time line for the network review, so any changes to Michigan's monitoring network for lead will be addressed in the next network review. The draft version of this network review summarized information about the possible lead NAAQS that was available at that time. The proposed lead NAAQS was published in the Federal Register on May 20, 2008 and the final version of MDEQ's 2009 Network review incorporates these changes.

In 2009, the form of the federal grant funding for the fine particulate matter ($\text{PM}_{2.5}$) program may be changed to require that states provide 40 percent (%) matching funds. If this occurs, Michigan

may not be able to provide such a match and will likely have to discontinue various forms of monitoring, perhaps extending beyond the PM_{2.5} program.

Recommendations for Michigan's Air Monitoring Network in 2009

A special one-year study was conducted at Tecumseh beginning in April 2008 and measured: PM_{2.5} using the federal reference method (FRM), speciated PM_{2.5} continuous elemental carbon/organic carbon (EC/OC) and carbon black. Although the study was scheduled to be shut down on April 1, 2009, comments received by the MDEQ indicate that there is a need to collect this data for a longer term. The MDEQ will try to avoid shutting down any of these monitoring activities at Tecumseh (260910007) by seeking alternative funding mechanisms.

If funding levels are inadequate, possibly resulting from the conversion of 103 Grant funds to 105 funds, changes in the monitoring network will have to occur. Retention of the ozone and PM_{2.5} FRM monitoring sites will be given highest priority.

Using historical data, a change in the ozone season is unwarranted. However, a federal mandate may require an extension of the ozone season in 2009.

Collection of another year of PM_{2.5} FRM data may show that the Grand Rapids (260810020), Jenison (261390005) and Muskegon (261210040) monitors are no longer within +/- 5% of the 24-hour NAAQS. If so, the sampling frequency at these sites may be relaxed to once every three days. Conversely, if another site is within +/- 5% of the NAAQS, daily sampling will be initiated January 1, 2009, contingent upon adequate funding.

The speciation monitor at Kalamazoo (260770008) will be moved to Port Huron (261470005) and will sample once every six days. The Kalamazoo area is currently in attainment for PM_{2.5}. The Port Huron FRM monitor is not meeting the PM_{2.5} NAAQS and experienced elevated levels of fine particulate material on days when other sites remain low. An improved understanding of the composition of the fine particulate material on days with elevated values would help develop better control strategies in that area.

The speciation monitor at Ypsilanti (261610008) will be moved to Southwestern High School (261630015) and will sample once every six days. The Ypsilanti area is currently in attainment for PM_{2.5}. The Southwestern High School FRM monitor is not meeting the PM_{2.5} NAAQS and experiences elevated levels of fine particulate material when the wind is blowing from all directions. Speciated PM_{2.5} data at Southwestern High School will aid in source apportionment and in the development of attainment strategies.

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 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 was placed on the MDEQ's Air

Quality Division (AQD) internet homepage so to solicit comments from the general public and stakeholders. Reviewers were given 30 calendar days from the date that this draft network review report was posted to provide written comments. Written comments were accepted either by e-mail or by parcel post (verbal comments will not be accepted) to:

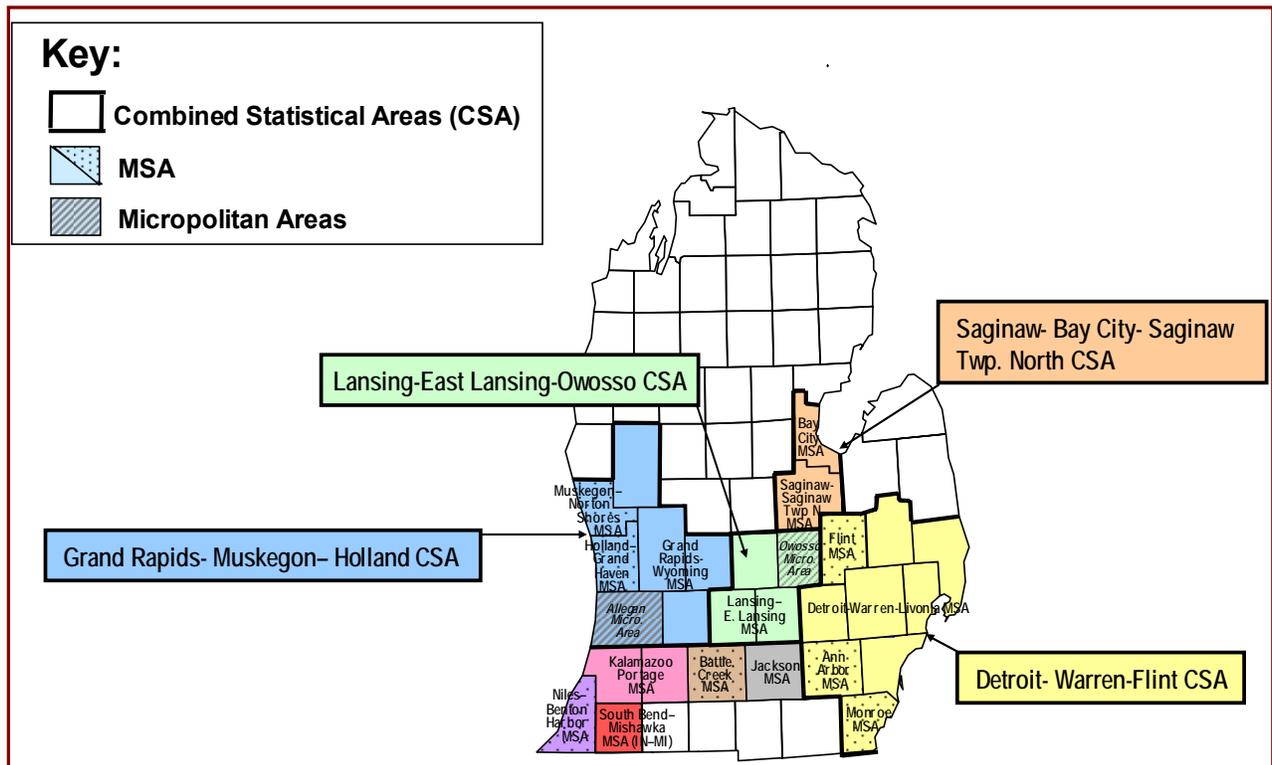
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All written comments received were organized by topic, summarized, and addressed in Appendix B of this final version of the Michigan Ambient Air Monitoring Network Review. The final version will also be placed on the AQD's website and sent to EPA Region 5 for approval. Hardcopies of the final version may be inspected free of charge at the 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.

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} (particulate matter 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 sulfur dioxide (SO₂), nitrogen dioxide (NO₂), and carbon monoxide (CO). Based on the 2000 census, the new MSA outlines for Michigan's Lower Peninsula are shown in **Figure 1**. There are no MSAs in the Upper Peninsula, only micropolitan areas that aren't required to have monitoring stations.

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**. Micropolitan Statistical Areas 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**.¹

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

These geographical areas, coupled with their population totals and historical ambient monitoring data were used to develop the minimum monitoring network design for ozone, PM_{2.5}, and PM₁₀.

TABLE 1: COMPOSITION OF MSAs IN MICHIGAN

MSA	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, National Core (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 are in Michigan. The NCORE sites will leverage the existing infrastructure and be collocated, 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.² In addition, filter-based measurements will be required for PM_{10-2.5} on a once every three day sampling frequency, PM coarse (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.

² NO_y = oxides of nitrogen + nitric acid + organic and inorganic nitrates.

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."³
- 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,

³ "Environmental Protection Agency Ambient Air Quality Surveillance Regulations." 40 CFR part 58 Appendix D, October 17, 2006.

- evidence that the siting and operation of the monitor meets 40 CFR Part 58 Appendices A (quality assurance requirements), C (ambient air quality monitoring), D (network design criteria) and E (probe and monitoring path siting criteria).

For Michigan, the site-specific data is summarized in various tables throughout the review. The modifications to the network should address:

- New census data.
- Changes in air quality levels.
- Changes in emission patterns.

The time frame for implementation of modifications is one year from the time of the previous network review. Changes will be made on a calendar year 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. In turn, the AQD's 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, 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 [tapered element oscillating microbalance], PM_{2.5} Speciation, High Volume TSP, 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 PM_{2.5}, 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.

MICHIGAN'S 2009 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

Monitor Deployment By Location

Table 2 summarizes the distribution of ambient air monitors by pollutant in operation in Michigan during 2008. This review summarizes the purpose behind the continued operation of each monitor, by pollutant and discusses future plans for network operations.

TABLE 2: MONITOR DISTRIBUTION THROUGHOUT THE 2008 NETWORK IN MICHIGAN

Site Name- a box indicates site closure	AQS ID	O ₃	PM _{2.5}	PM _{2.5} TEOM	Speciation	PM ₁₀	CO	trace CO	NO ₂	trace NO _y	SO ₂	trace SO ₂	Metals (TSP), Inc. Lead	VOCs	Carbonyls	Meteor- ological para- meters	Building or Trailer
Holland	260050003	x	x													x	T
Bay City	260170014		x	x													
Benzonia	260190003	x															T
Coloma	260210014	x	x													x	T
Cassopolis	260270003	x														x	B
Rose Lake	260370001	x															B
Flint	260490021	x	x	x									Mn Only			x	T
Otisville	260492001	x														x	T
Harbor Beach	260630007	x														x	T
Lansing	260650012	x	x	x												x	T
Kalamazoo	260770008	x	x	x	x											x	T
Wealthy St. GR	260810007		x			x											
Monroe St. GR	260810020	x	x	x	x	x		x		x		x				x	T
Evans	260810022	x														x	T
Peshawbestown +	260890001	x														x	
Tecumseh	260910007	x	O		O											x	T
New Haven	260990009	x	x													x	T
Warren	260991003	x															T
Manistee +	261010922	x	x														
Scottville	261050007	x														x	T
Houghton Lake	261130001	x	x	x	x											x	T
Luna Pier	261150005		x		x												
Muskegon, Green Ck Rd	261210039	x														x	T
Muskegon, Apple St	261210040		x														
Oak Park	261250001	x	x													x	T
Jenison	261390005	x	x													x	T
Port Huron	261470005	x	x	x												x	T
Seney	261530001	x		x												x	T
Ypsilanti	261610008	x	x	x	x											x	T
Allen Park	261630001	x	x	x	x	x		x		x		x	4			x	T
River Rouge	261630005												4		x		T
Fort St (SW HS)	261630015		x			x					x		4	x	x	x	T
Linwood	261630016		x														B
E. 7 Mile	261630019	x	x						x							x	T
Livonia	261630025		x													x	T
S Delray/ Jefferson	261630027												4				T
Dearborn	261630033		x	x	x	x							x	x	x	x	T
Wyandotte	261630036		x														
Newberry School	261630038		x	x												x	T
FIA/Ambassador Bridge	261630039		x	x												x	T
Total		27	27	13	8	5	0	2	1	2	1	2	6	2	3		

+ = tribal
 retained, but operating in reduced capacity
O = began May 1, 2008
'4 = Suite reduced to Mn, As, Cd, Ni

OZONE MONITORING NETWORK:

As a result of the October 17, 2006 monitoring regulations, the minimum number of required ozone sites in a 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 monitors with a design value using the most recent three years of data that is greater than or equal to 85% of the ozone NAAQS have 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 3**. In other instances, the number of monitors may be reduced if the design value is greater than 115% of the NAAQS.⁴ Note: background and transport ozone monitors are still required, but are not shown in **Table 3**.

TABLE 3: SLAMS MINIMUM OZONE MONITORING REQUIREMENTS

MSA POPULATION ^{1,2}	MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS ≥ 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 3** to Michigan's MSAs, population totals and the most recent three-year design values results in a minimum ozone network design summarized in **Table 4**.

In Southeast Michigan, New Haven (260990009) has been the design value site for many years, measuring maximum ozone concentrations downwind from Detroit. Using the most recent three years of data, the design value is 0.086 ppm, greater than 85% of the NAAQS. Therefore, three ozone monitors are required in the Detroit-Warren-Livonia MSA. The New Haven design value monitor needs to be retained. 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. This leaves one remaining yet-to-be-identified required ozone monitor in the Detroit-Warren-Livonia MSA. EPA Regional staff have indicated that Warren (260991003) may be 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. The E. Seven Mile site in Detroit (261630019) is the former downwind NAMS site and is retained for trends purposes.

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

⁴ Table D-2 of Appendix D to Part 58.

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.

TABLE 4: MINIMUM NUMBER OF OZONE MONITORS REQUIRED PER THE OCTOBER 17, 2006 REVISED MONITORING REGULATIONS

		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 violating the NAAQS are in red, sites within 85% of the NAAQS are in blue.						
MSA	2000 Population	Counties	Existing Monitors	2005-2007 most recent 3-year O3 design value	Min No monitors Required	
Detroit-Warren-Livonia Metro Area	4,452,557	Macomb	New Haven	0.086	3	
			Warren	0.086		
		Oakland	Oak Park	0.078		
			Wayne	Allen Park		0.074
			E 7 Mile	0.082		
		Lapeer	---	---		
St Clair	Port Huron	0.085				
Livingston	---	---				
Flint Metro Area	436,141	Genesee	Flint	0.077	2	
			Otisville	0.079		
Monroe Metro Area	145,945	Monroe	---	---		
Ann Arbor Metro Area	322,895	Washtenaw	Ypsilanti	0.078	1	
Grand Rapids-Wyoming Metro Area	740,482	Kent	Grand Rapids	0.083	2	
			Evans	0.083		
		Barry	---	---		
		Newaygo	---	---		
Ionia	---	---				
Holland-Grand Haven Metro Area	238,314	Ottawa	Jenison	0.085	1	
Muskegon-Norton Shores Metro Area	170,200	Muskegon	Muskegon	0.088	1	
Lansing-East Lansing Metro Area	447,728	Clinton	Rose Lake	0.076	2	
			Ingham	Lansing		0.077
		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	0.076	1	
			Van Buren	---		---
Niles-Benton Harbor Metro Area	162,453	Berrien	Coloma	0.084	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	0.080	1	
Other areas:	Comments					
	<i>transport site</i>	Lenawee	Tecumseh	0.079		
		Benzie	Frankfort	0.082		
		Huron	Harbor Beach	0.078		
	<i>violating monitor</i>	Allegan	Holland	0.093		
	<i>background site</i>	Missaukee	Houghton lake	0.074		
		Mason	Scottville	0.081		
		Schoolcraft	Seney	0.082		
	<i>tribal site</i>	Leelanau	Peshawbestown	0.077		
	<i>tribal site</i>	Manistee	Manistee	0.083	(2 yr avg only)	

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).

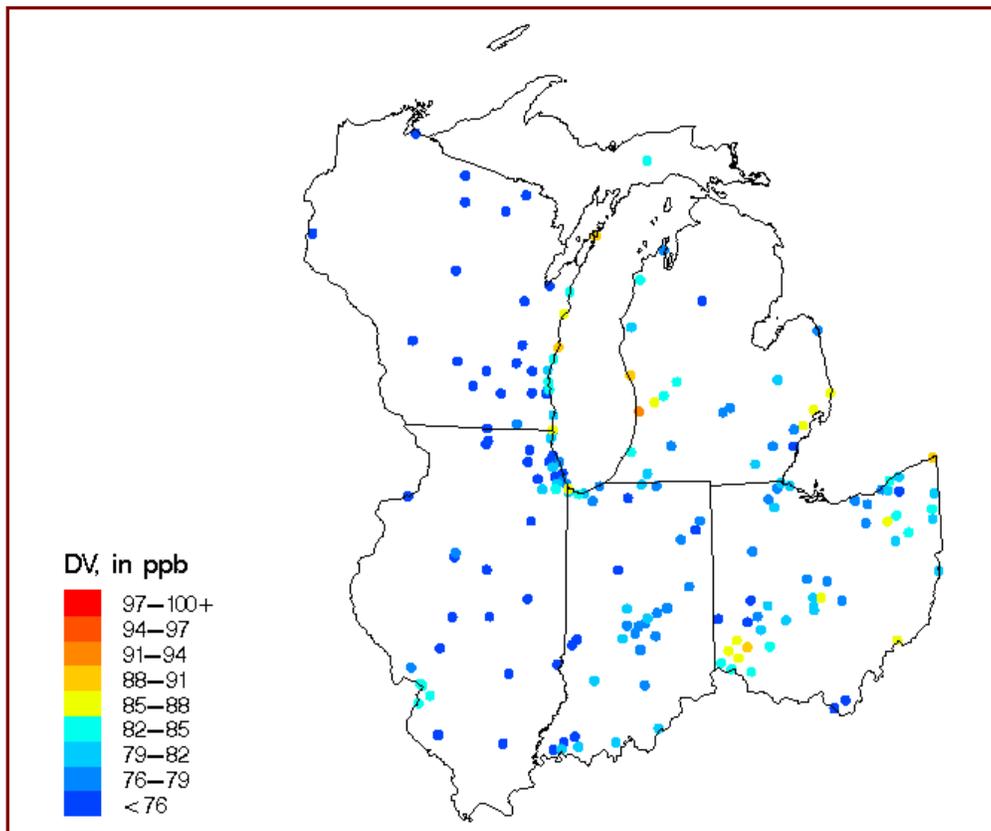
Two ozone monitors are also required in the Grand Rapids-Wyoming MSA and consist of the urban center city site in Grand Rapids on Monroe Street (260810020) and the downwind site at Evans (260810022).

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. Prior to the 2000 census, this area was part of the Grand Rapids MSA and fulfilled part of the ozone network design requirements for that area. Holland (260050003) is also a part of the Lake Michigan PAMS network which measures ozone and its precursors. As requirements have been relaxed, monitoring for PAMS precursors has been gradually discontinued over the years at the Holland site. However, ozone measurements have continued because this site measures the highest ozone values in the state. As of the most recent census, Allegan County is classified as a micropolitan area and as such, is not required to have a monitor. However, the violation status of this monitor requires that it continue operation. The Lake Michigan Air Directors Consortium (LADCO) created a figure comparing ozone concentrations across the region. **Figure 2** shows that Holland also has the highest ozone concentrations in Region 5.

FIGURE 2: OZONE DESIGN VALUES 2005 – 2007 ACROSS REGION 5



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 southwest 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.

Note that design values from **all** ozone monitors within Michigan are greater than 85% of the level of the new NAAQS. Therefore, if monitors were placed within MSAs containing a population of between 50,000 and 350,000, it is likely that the design values from these monitors would also be greater than 85% of the NAAQS. Although the final ozone rule says that unmonitored MSAs are not required to add monitors, those who commented expressed concern to EPA about under-monitored areas and lack of protection from the NAAQS for people living in areas with less than 350,000 people as well as difficulty defining boundaries of new nonattainment areas⁵. The EPA recognized the importance of these issues and stated that they will be addressed in the proposed monitoring rule. It is unknown whether the proposed rule expected in June 2008 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 2010 network review. Currently, the MDEQ doesn't maintain sites in Saginaw, Jackson and Calhoun Counties. If more monitoring sites are required, the 2010 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.

Two tribal ozone sites are in operation in Michigan, Peshawbestown (260890001) in Leelanau County and in Manistee (261010922) in Manistee County. 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 5 summarizes the ozone monitoring site information for sites that were in existence in 2007. **Table 6** shows the ozone sites that are currently in operation and **Figure 3** compares the ozone network in 2007 with the current design. Once EPA finalizes monitoring regulations, expected in June, 2008 changes could be made to the ozone network to meet the new regulations.

⁵ Federal Register Vol 73 No 60 Thursday March 27, 2008 page 15602 first column.

TABLE 5: MICHIGAN'S 2007 OZONE MONITORING NETWORK

Monitoring Sites			SLAMS Stations					Network as of October, 2007			
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	nghbrhd	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 N Pennsylvania	42.7386	-84.53472	pop exp	nghbrhd	Ingham	9/5/80	LEL	LELO	447,728
Grand Rapids	260810020	1179 Monroe NW	42.9842	-85.67139	pop exp	nghbrhd	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	nghbrhd	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 Towner Ave	42.2406	-83.59972	pop exp	nghbrhd	Washtenaw	4/1/00	Ann Arbor	DWF	5,456,428
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	pop exp	nghbrhd	Wayne	1/1/80	DWL	DWF	5,456,428
E 7 Mile	261630019	11600 East Seven Mile Road	42.4308	-83.00028	max conc	nghbrhd	Wayne	4/11/77	DWL	DWF	5,456,428

Monitoring Sites			Special Purpose and Tribal Stations								
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 Statistical Area

TABLE 6: 2008 OZONE MONITORING NETWORK IN MICHIGAN

Operating Schedule: Hourly, April 1 to September 30
Method: Ultra Violet Absorption Continuous Monitor

SLAMS Stations

Network as of March, 2008
Former NAMS sites are shown in Bold.

Monitoring Sites			SLAMS Stations					Network as of March, 2008			MSA Pop. (2000 Census)
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Special Purpose and Tribal Stations

Monitoring Sites			Special Purpose and Tribal Stations					Network as of March, 2008			MSA Pop. (2000 Census)
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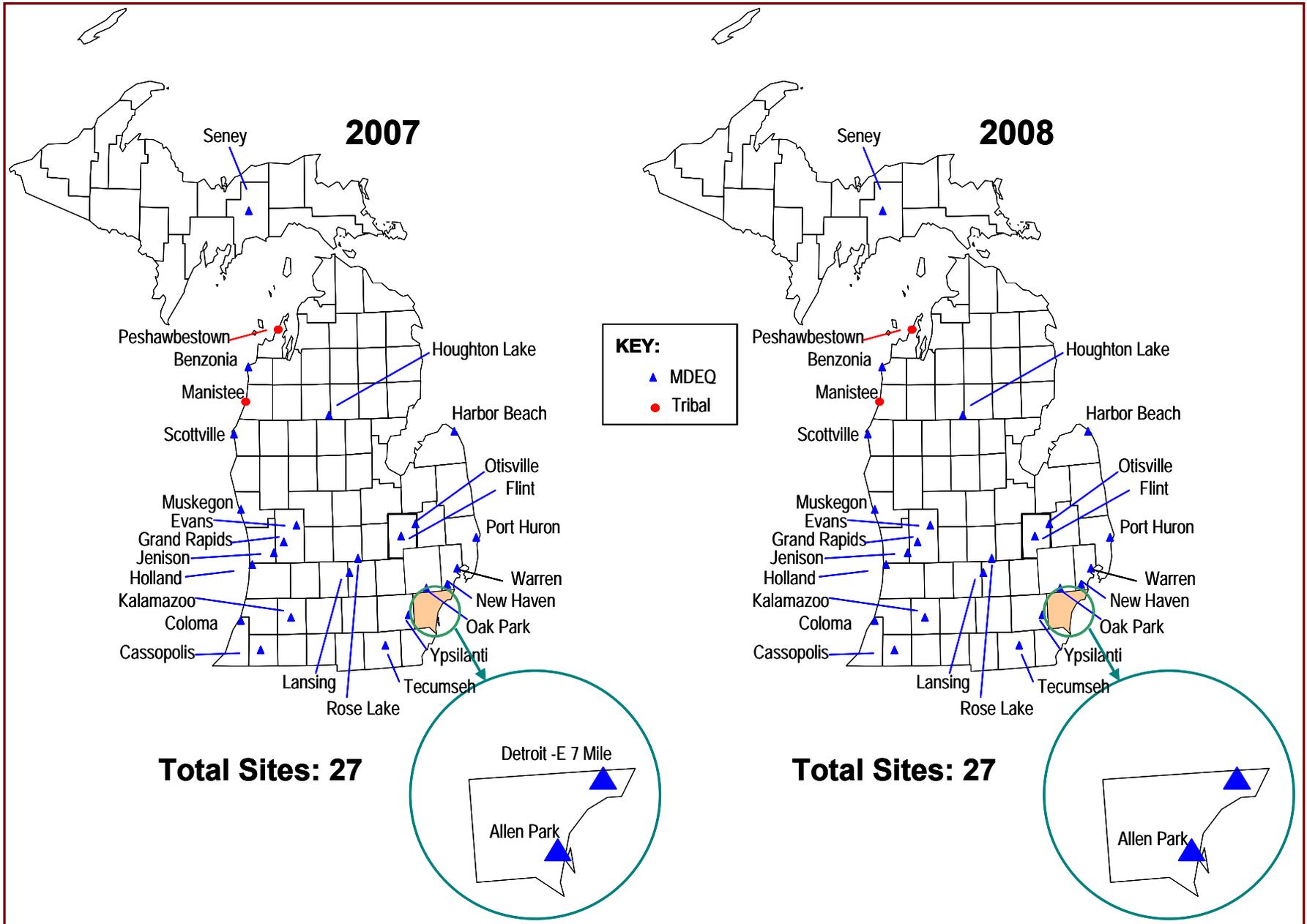
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² CSA Key:

DWF = Detroit-Warren-Flint Combined Statistical Area
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FIGURE 3: COMPARISON OF MICHIGAN'S 2007 AND 2008 OZONE MONITORING 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 this extra decimal place. 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 4 compares the most recent 8-hour design values (using three decimal points) for all ozone sites in Michigan with the new level of the primary NAAQS. As shown, all of the design value sites have a three-year average greater than 0.075 ppm. There are only two sites, Houghton Lake (261130001) and Allen Park (261630001), with averages below 0.075 ppm. Since there is another monitor in Wayne County (E. Seven Mile - 261630019) with a design value equal to 0.082 ppm, Wayne County doesn't meet the new primary ozone NAAQS. Therefore, Missaukee is the only county in Michigan with an ozone monitor that meets the new primary standard.

Impact of the New Secondary Ozone NAAQS

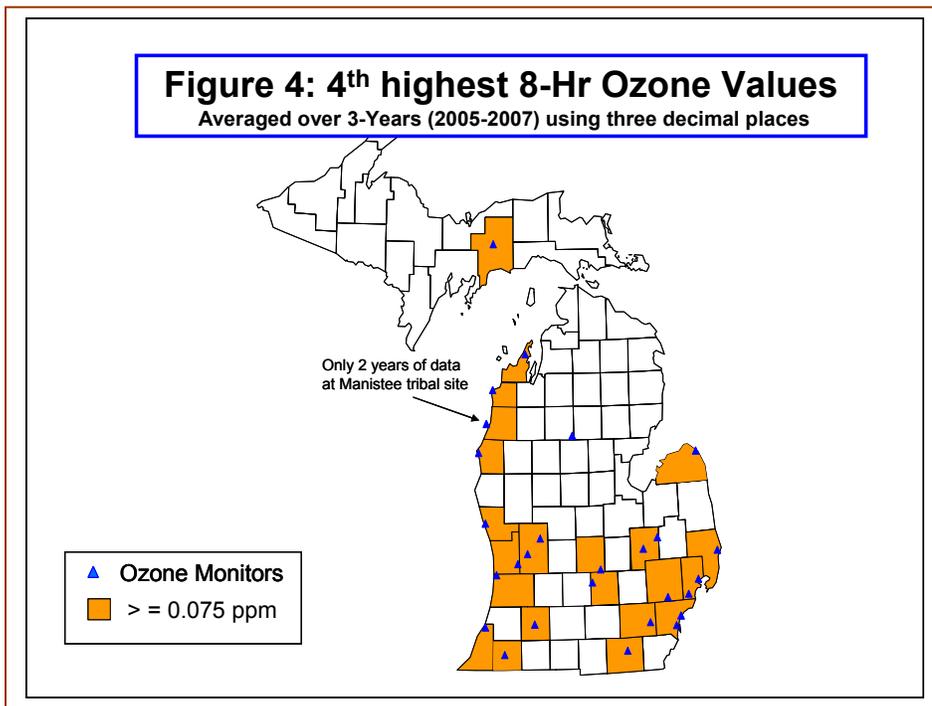
The EPA chose to make the secondary ozone NAAQS identical to the primary NAAQS, and dropped the concept of a weighted sum, called W126. Those who commented expressed concern to EPA that the population based network design may not be adequate to assess crop and ecosystem damage from exposing sensitive plants to elevated ozone levels. 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."⁶ The impact of ozone exposure has been studied on only a small percentage of plant species. Some of the data that is available is shown in the EPA July 2007 Staff Paper and its appendices, which examined the topic of ozone sensitive plant species and crop losses and conducted an extensive analysis of the geographical distribution of these species⁷. **Figures 5 through 9** are taken from the EPA Staff Paper and show the geographical distribution of ozone susceptible species across the nation⁸. In each set of the **Figures 5 through 8**, the maps on the left show the loss using a 10% reduction in hourly ozone concentrations and the maps on the right side show the loss of susceptible species without the 10% reduction. There are some species that are sensitive to ozone, such as cotton, which are not

⁶ Federal Register Vol 73, no 60, March 27, 2008 p 16502 third column.

⁷ Final Staff Paper, Updated July 2007, EPA report No. EPA-452/R-07-007a

⁸ Taken from EPA Final Staff Paper, Updated July 2007, EPA report No. EPA-452/R-07-007a

FIGURE 4: 4TH HIGHEST 8-HOUR OZONE VALUES AVERAGED OVER THREE-YEARS (2005-2007)



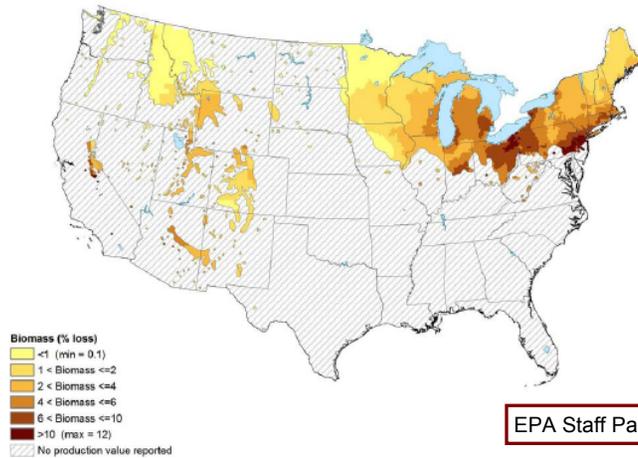
native to Michigan, that are not shown. The impact on corn crops is not shown because there is very little geographical variation in the degree of impact throughout Michigan.

The EPA Staff Paper provides state-by-state lists of ozone-sensitive species that are found in National Parks and Class 1 areas, as well as those species that are important crops. Some of these species are blackberry, black cherry, green ash, milkweed, quaking aspen, sassafras, yellow poplar and white ash. In addition to examining impact on growth and seedling survival rates, foliar injury can be tracked as a good indication of exposure to ozone. The amount of foliar injury varies from plant to plant and is influenced by environmental and genetic factors. Soil conditions and rainfall are cofounders for ozone-induced foliar injury, so ambient measurements could provide a better estimate of damage. **Figure 9** shows county-wide estimates of foliar injury for 2001 and 2002.

Based on the **Figures 5 to 9**, certain spatial patterns of damage due to ozone suggest possible changes to the ozone monitoring network. Background ozone monitoring sites selected to assess attainment of the secondary ozone NAAQS could be located in Michigan's Lower Peninsula in the mid-thumb area, possibly in Sanilac, Tuscola or Lapeer Counties, as shown by the dark orange area shown on the maps of damage to black cherry tree seedlings (**Figure 6**). Much damage also occurs from the south to the north central portion of the Lower Peninsula. The Houghton Lake site in Missaukee County is sited within this area of impact and already measures ozone.

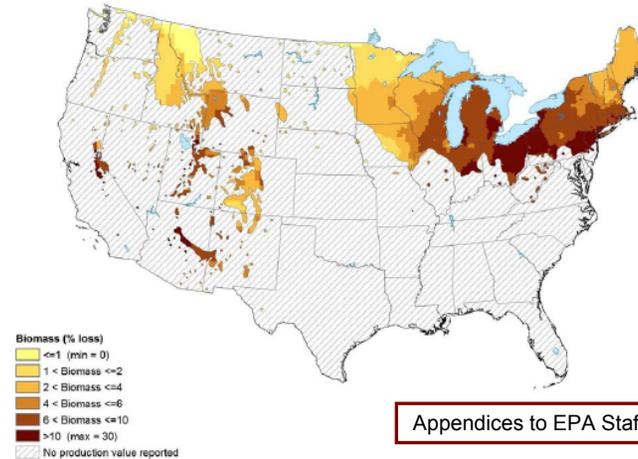
FIGURE 5: MAPS OF OZONE SUSCEPTIBLE ASPEN SEEDLING SPECIES
(TAKEN FROM EPA JULY 2007 STAFF PAPER)

Figure 7-18. Estimated aspen seedling annual biomass loss based on interpolated 2001 maximum 3-month 12-hr W126 with a 10% downward adjustment of hourly O₃ concentrations. This map indicates the geographic range for quaking aspen (*Populus tremuloides*), but it does not necessarily indicate that aspen will be found at every point within its range.



EPA Staff Paper p. 7-59

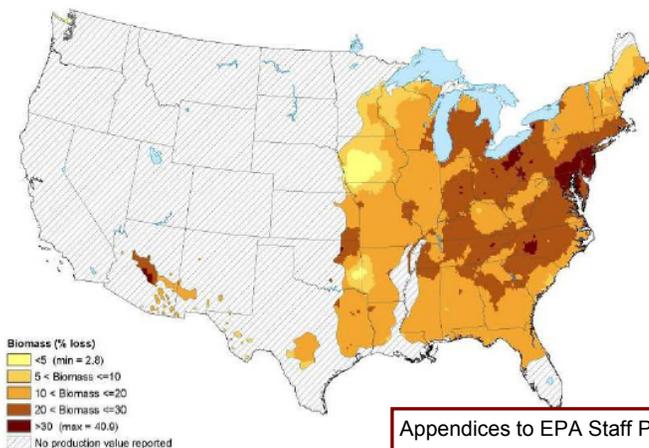
Figure 7H-1. Estimated quaking aspen seedling annual biomass loss based on interpolated 2001 maximum 3-month 12-hr W126 without a 10% downward adjustment of hourly O₃ concentrations. This map indicates the geographic range for quaking aspen (*Populus tremuloides*), but it does not necessarily indicate that quaking aspen will be found at every point within its range.



Appendices to EPA Staff Paper p. 7-H2

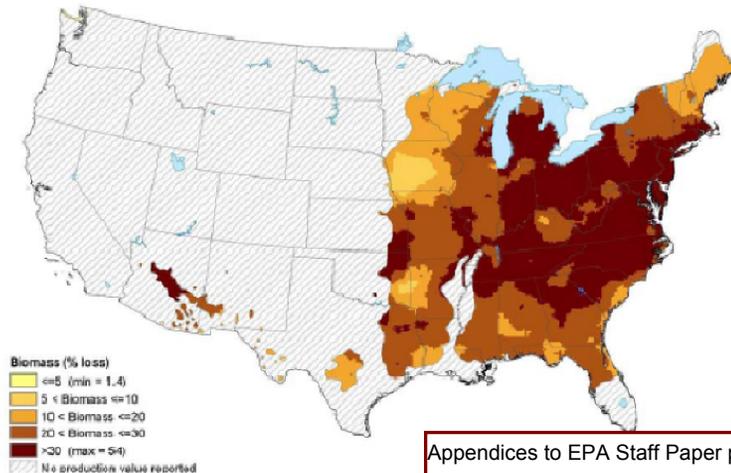
FIGURE 6: MAPS OF OZONE SUSCEPTIBLE BLACK CHERRY SPECIES
(TAKEN FROM EPA JULY 2007 STAFF PAPER)

Figure 7H-2. . Estimated black cherry annual biomass loss based on interpolated 2001 maximum 3-month 12-hr W126 with a 10% downward adjustment of hourly O₃ concentrations. This map indicates the geographic range for black cherry (*Prunus serotina*), but it does not necessarily indicate that black cherry will be found at every point within its range.



Appendices to EPA Staff Paper p. 7-9

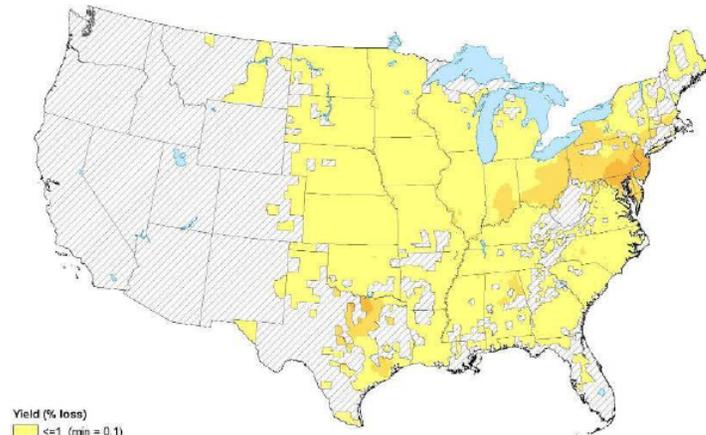
Figure 7H-3. Estimated black cherry annual biomass loss based on interpolated 2001 maximum 3-month 12-hr W126 without a 10% downward adjustment of hourly O₃ concentrations. This map indicates the geographic range for black cherry (*Prunus serotina*), but it does not necessarily indicate that black cherry will be found at every point within its range.



Appendices to EPA Staff Paper p. 7-H4

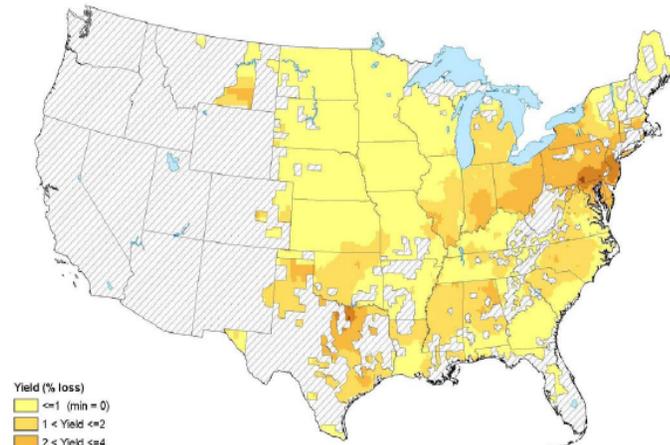
FIGURE 7: MAPS OF OZONE SUSCEPTIBLE SOYBEAN YIELD LOSS
(TAKEN FROM EPA JULY 2007 STAFF PAPER)

Figure 7-15. Estimated soybean yield loss based on interpolated 2001 3-month 12-hr W126 with a 10% downward adjustment of hourly O₃ concentrations.



EPA Staff Paper p. 7-49

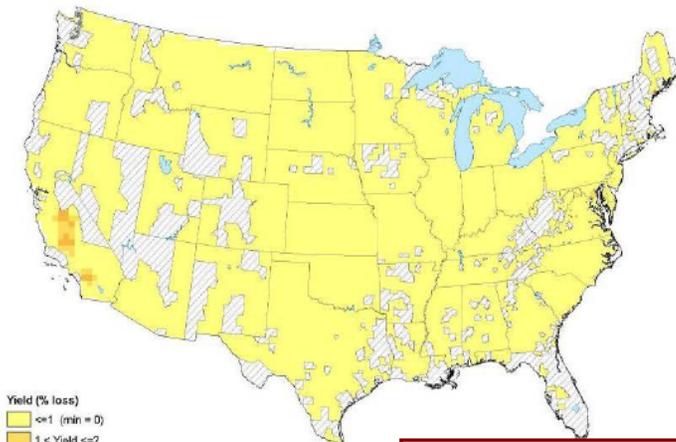
Figure 7G-1. Estimated soybean yield loss based on interpolated 2001 3-month 12-hr W126. (Without a 10% reduction in exposure.)



Appendices to EPA Staff Paper p. 7-G2

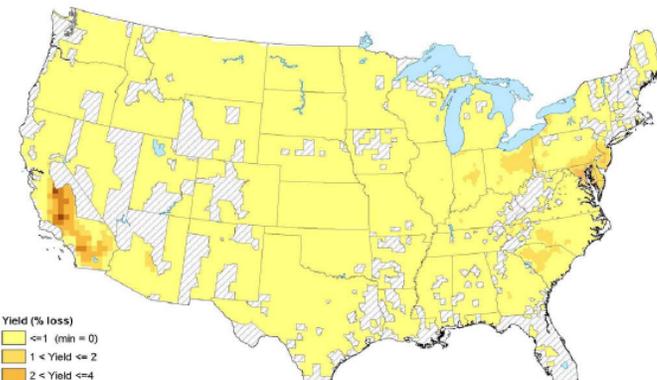
FIGURE 8: MAPS OF OZONE SUSCEPTIBLE WINTER WHEAT LOSS
(TAKEN FROM EPA JULY 2007 STAFF PAPER)

Figure 7G-5. Estimated winter wheat yield loss based on interpolated 2001 3-month 12-hr W126. (With a 10% reduction in exposure.)



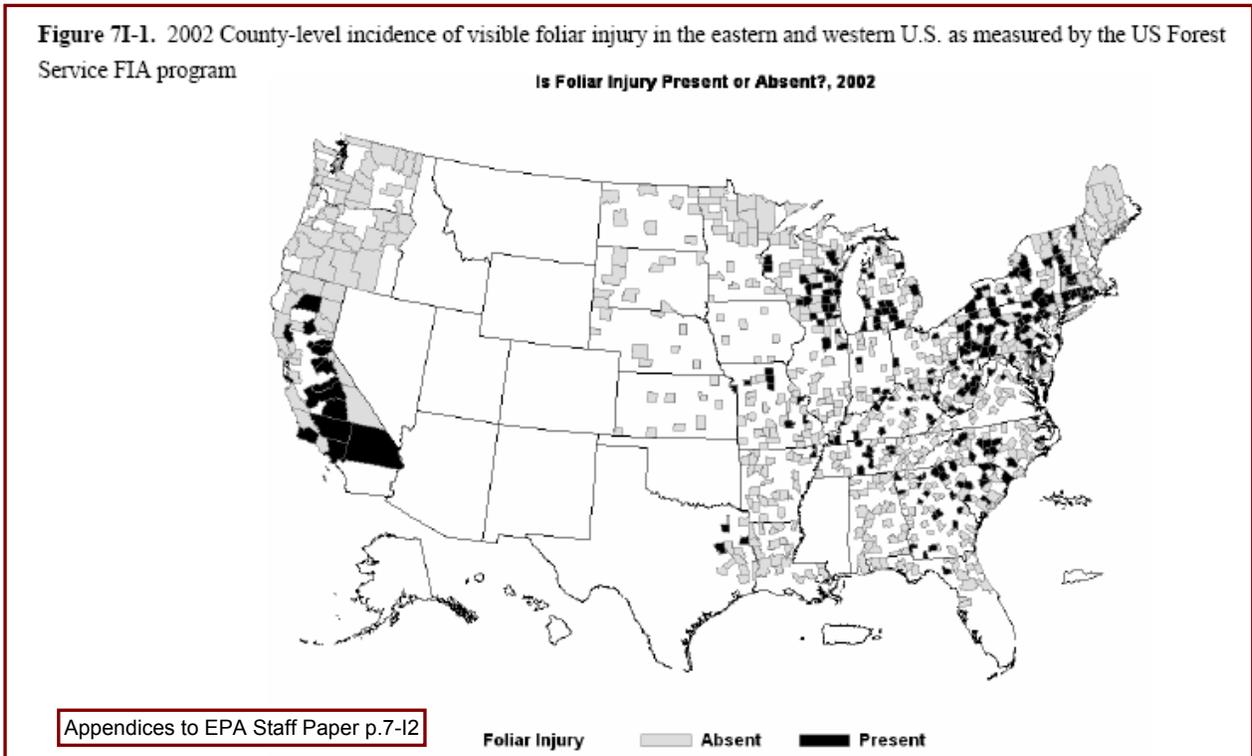
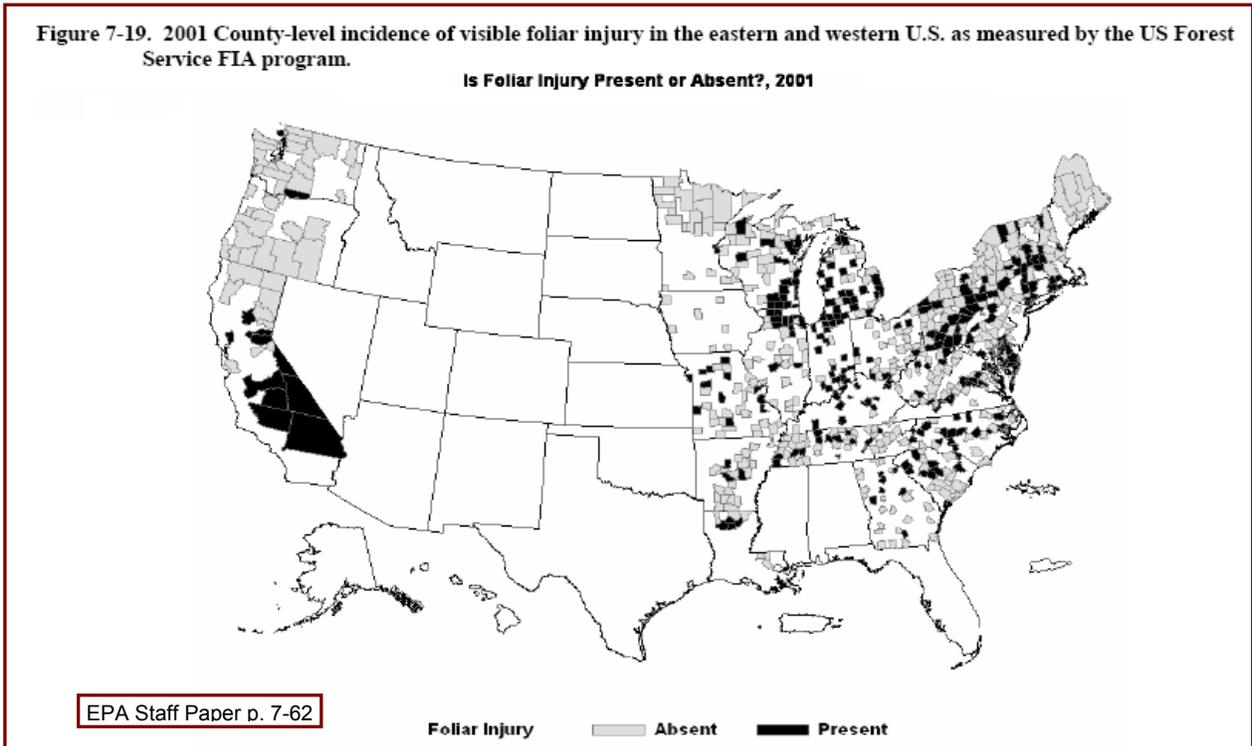
Appendices to EPA Staff Paper p. 7-G6

Figure 7G-6. Estimated winter wheat yield loss based on interpolated 2001 3-month 12-hr W126. (Without a 10% reduction in exposure.)



Appendices to EPA Staff Paper p. 7-G 7

FIGURE 9: U.S. MAPS OF OZONE INDUCED FOLIAR INJURY FOR 2001 AND 2002
(TAKEN FROM THE EPA JULY 2007 STAFF PAPER)



Ozone Season

With the enactment of the more stringent primary NAAQS, the length of the ozone season in Michigan may need to be extended from the current April 1 to September 30. To identify possible changes, historical ozone data was analyzed to determine how 8-hour ozone averages in March and October compare to the new level of 0.075 ppm. Usually, most of the monitors in Michigan only run during the established ozone season, but as part of two special research projects conducted in conjunction with LADCO and the University of Michigan, the ozone monitors at Seney (261530001) and Southwestern High School (261630015) operated for up to 12 months per year. In addition, in 1998, the MDEQ operated its ozone network during October to determine the necessity of changing the ozone season after the last revision to the ozone NAAQS.

Table 7 summarizes the 4th highest 8-hour ozone values that were measured during the months of October through March at Seney (261530001) and Southwestern High School (261630015). When the data are compared to 85% of the new level of the NAAQS, only two readings at Seney were greater than 60 parts per billion (ppb). Values of 66 and 62 ppm were recorded on March 29, 2005 and March 28, 2005, respectively. During 2005, ozone values were atypically high all over Michigan. Therefore, the likelihood of repeating this event is low providing some evidence that the ozone season need not be adjusted in Michigan.

TABLE 7: IMPACT OF A REDUCED OZONE NAAQS ON MICHIGAN'S OZONE SEASON

Site	Year	Jan				Feb				Mar				Oct				Nov				Dec			
		1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Seney 261530001	2003	---	---	---	---	---	---	---	---	48	48	46	46	60	59	49	41	39	38	38	37	43	40	39	38
	2004	42	41	40	40	---	---	---	---	---	---	---	---	56	45	39	38	37	36	36	36	40	40	39	39
	2005	42	40	39	39	46	45	44	44	66	62	60	53	---	---	---	---	---	---	---	---	---	---	---	---
	2006	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	2007	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
SW HS 261630015	2003	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	2004	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	2005	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
	2006	---	---	---	---	---	---	---	---	---	---	---	---	32	31	28	26	25	23	21	19	22	22	21	20
	2007	23	22	21	19	30	30	29	29	48	41	40	39	---	---	---	---	---	---	---	---	---	---	---	---
		80 % of NAAQS																							
		0.075 NAAQS																							
		Seney Values within 80% of NAAQS																							
		Value, ppb		Date																					
		66		3/29/05																					
		62		3/28/05																					

Table 8 shows historical data collected during October 1998 from all sites across Michigan, which gives a better indication of spatial variability of elevated ozone concentrations. Unfortunately, Seney (261530001) and Southwestern High School (261630015) were not in operation during 1998, so changes in ozone concentration in March and October over time cannot be estimated. However, it can be inferred that ozone concentrations have dropped since 1998 because the number of ozone nonattainment areas in Michigan have been reduced from 25 counties to only one. The data in **Table 8** show that 8-hour ozone values were greater than 85% of the new ozone NAAQS on only two occasions. This data set also supports the conclusion that the ozone season need not be adjusted in Michigan.

TABLE 8: ANALYSIS USING MULTIPLE SITES TO DETERMINE IMPACT OF A REDUCED OZONE NAAQS ON MICHIGAN'S OZONE SEASON

Area	Site	Year	Oct				Dates			
			1st	2nd	3rd	4th	1st	2nd	3rd	4th
West Michigan	Holland	1998	58	49	46	45	10/16/98	10/17/98	10/12/98	10/18/98
	Frankfort	1998	62	52	47	46	10/16/98	10/17/98	10/11/98	10/10/98
	Coloma	1998	60	55	53	51	10/16/98	10/17/98	10/11/98	10/10/98
	Parnell	1998	54	53	52	49	10/16/98	10/12/98	10/17/98	10/18/98
	Scottville	1998	60	53	42	42	10/16/98	10/18/98	10/18/98	10/10/98
	Muskegon	1998	56	50	44	42	10/16/98	10/17/98	10/18/98	10/11/98
	Traverse City	1998	53	52	46	39	10/16/98	10/17/98	10/18/98	10/10/98
	Grand Rapids	1998	43	42	40	40	10/17/98	10/18/98	10/16/98	10/11/98
	Grand Rapids	1997	53	49	49	46	10/5/97	10/3/97	10/8/97	10/12/97
SE Michigan	Tecumseh	1998	63	50	46	40	10/17/98	10/12/98	10/18/98	10/11/98
	New Haven	1998	46	44	41	39	10/17/98	10/12/98	10/5/98	10/18/98
	Warren	1998	39	39	39	35	10/17/98	10/18/98	10/5/98	10/4/98
	Oak Park	1998	49	47	38	36	10/17/98	10/18/98	10/5/98	10/10/98
	Port Huron	1998	48	47	36	34	10/17/98	10/18/98	10/10/98	10/5/98
	Ann Arbor	1998	55	45	42	36	10/17/98	10/12/98	10/18/98	10/11/98
	Allen Park	1998	40	37	35	34	10/17/98	10/6/98	10/18/98	10/5/98
	E 7 Mile	1998	45	42	39	36	10/17/98	10/5/98	10/18/98	10/6/98
Central Michigan	Rose Lake	1998	54	53	52	43	10/12/98	10/17/98	10/18/98	10/11/98
	Flint	1998	44	44	37	35	10/17/98	10/18/98	10/5/98	10/4/98
	Otisville	1998	56	55	54	40	10/17/98	10/18/98	10/12/98	10/11/98
	Lansing	1998	58	56	55	43	10/17/98	10/18/98	10/12/98	10/11/98
	Houghton Lake	1998	59	50	49	46	10/12/98	10/17/98	10/18/98	10/10/98
80 % of NAAQS										
0.075 NAAQS			0.060							

In **Table 9**, CASTNET data was also used to assess 8-hour ozone levels in March and October. A single 8-hour value greater than 85% of the NAAQS was recorded at the Hoxeyville site in Wexford County during March 2003, 2005 and 2006. None of the other CASTNET sites showed 8-hour values close to the NAAQS during March. However, ozone was elevated at all CASTNET sites during October 2005. Unionville in Tuscola County and Hoxeyville showed elevated concentrations in October during 2003 and 2005. No elevated levels have been recorded at any CASTNET site during 2007. Historically, CASTNET data hasn't undergone the same level of quality assurance as the ambient data; however, EPA has plans to do so before 2009.

Plans for 2009 Ozone Monitoring Network

It is unknown what impact the monitoring regulations that are expected to be proposed in June 2008 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, but budget reductions may necessitate a reduction in the ozone network. The following monitors are planned to be retained as part of the 2009 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} measurements in a number of ways. The minimum number of PM_{2.5} sites using a FRM in a MSA has been changed and is shown in **Table 10**.⁹ In addition to these minimum requirements, background and transport monitors are required. A new element of the regulations is 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 the minimum required number of FRM sites must co-locate continuous PM_{2.5} measurements.

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

The regulations also allow states to discontinue FRM monitors if they can operate continuous samplers in a way that qualifies them to be Approved Regional Methods or Federal Equivalent Method samplers. Due to the high levels of nitrate and humidity in the Midwest, it is unlikely that the continuous monitors used by MDEQ (Tapered Element Oscillating Microbalances or TEOMs), as well of many of the other monitors operated by the states in the Midwest can achieve this status.

TABLE 10: PM_{2.5} MINIMUM MONITORING REQUIREMENTS

MSA POPULATION ^{1,2}	MOST RECENT THREE-YEAR DESIGN VALUE CONCENTRATIONS ≥ 85% OF ANY PM _{2.5} NAAQS ³	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.

Applying **Table 10** to Michigan's MSAs, population totals and most recent three-year design values results are shown in **Table 11**. 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 MSA, daily sampling must be initiated, according to the Federal Register.

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 24-

⁹ Table D-5 of Appendix D to Part 58.

MICHIGAN'S 2009 ANNUAL AMBIENT AIR MONITORING NETWORK REVIEW

hour concentrations have been measured during 2007 in Port Huron (261470005) making the three year average equal to 40.6 µg/m³. This site should be retained. The required sites are Dearborn (261630033), Allen Park (261630001), Port Huron (261470005) and possibly, Linwood (261630016), due to its former status as the 24-hour design value site, if funding permits.

TABLE 11: MINIMUM NUMBER OF PM_{2.5} FRM MONITORS REQUIRED PER THE OCTOBER 17, 2006 REVISED MONITORING REGULATIONS

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/m ³	85% of 35 ug /m ³	2005-2007	2005-2007		
				12.8	30				
Values for sites violating the NAAQS are in red. The 3-year PM _{2.5} average at MSA Design Value site is shown in bold. Values for sites within 85% of the NAAQS are in blue.									
MSA	2000 Population	Counties	Existing Monitors	most recent 3-year PM _{2.5} design value (annual)	most recent 3-year PM _{2.5} design value (24-Hr)	most recent 3-year PM _{2.5} design value (24-Hr)	most recent 3-year PM _{2.5} design value (24-Hr)	Min No monitors Required	Comments
Detroit-Warren-Livonia Metro Area	4,452,557	Macomb	New Haven	12.5	36	36		3	
		Oakland	Oak Park	13.6	40	40			
		Wayne	Allen Park	14.0	38	38			daily
			SW HS	15.5	40	40			
			Linwood	14.3	41	41			
			E 7 Mile	14.1	41	41			
			Livonia	13.2	34	34			
			Dearborn	17.2	43	43			
			Wyandotte	14.3	36	36			
			Newberry	13.2	40	40			
		<i>only 2 years of data</i>	FIA	13.5	37	37			
		Lapeer	---						
		St Clair	Port Huron	13.2	41	41			
		Livingston	---						
Flint Metro Area	436,141	Genesee	Flint	11.6	29	29		0	
Monroe Metro Area	145,945	Monroe	Luna Pier	13.8	38	38		1	
Ann Arbor Metro Area	322,895	Washtenaw	Ypsilanti	13.7	39	39		1	
			Ann Arbor (closed)						
Grand Rapids-Wyoming Metro Area	740,482	Kent	Grand Rapids	12.9	36	36		2	daily
			<i>only 1 year of data</i>	Wyoming	12.8	30	30		
			Barry	---					
			Newaygo	---					
			Ionia	---					
Holland-Grand Haven Metro Area	238,314	Ottawa	Jerison	12.6	35	35		1	daily
Muskegon-Norton Shores Metro Area	170,200	Muskegon	Muskegon	11.6	34	34		1	daily
Lansing-East Lansing Metro Area	447,728	Ingham	Clinton	---					
			Lansing	12.2	32	32		1	
		Eaton	---						
Bay City Metro Area	110,157	Bay	Bay City	10.9	31	31		1	
Saginaw-Saginaw Twp N Metro Area	210,039	Saginaw	Saginaw (closed)					1	
Kalamazoo-Portage Metro Area	314,866	Kalamazoo	Kalamazoo	13.0	31	31		1	
		Van Buren	---						
Niles-Benton Harbor Metro Area	162,453	Berrien	Coloma	11.8	32	32		1	
Jackson Metro Area	158,422	Jackson	---						
Battle Creek Metro Area	137,985	Calhoun	---						
South Bend-Mishawaka Metro Area IN/MI	51,104	Cass	---						
Other areas									
		Allegan	Holland	11.9	34	34			<i>metropolitan area</i>
		Missaukee	Houghton Lake	8.3	25	25			
	<i>only 2 years of data</i>	Manistee	Manistee	8.5	26	26			

A conceptual model¹⁰ of PM_{2.5} in the Detroit CSA was created by Dr. Jay Turner, describing the nature of PM_{2.5} across the area. In his model, Dr. Turner examined high PM_{2.5} days and identified

¹⁰ 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.

a subset of dates that were influenced by emissions from local sources. According to Dr. Turner's findings, the emissions from nearby sources that contribute to this "local excess" of PM_{2.5} have decreased dramatically at Wyandotte (261630036). A modest decrease was detected at Dearborn (261630033) and at Linwood (261630016). There was no change observed at Southwestern High School (261630015). However, a new international border crossing, called Detroit River International Crossing, may be constructed near Southwestern High School and motor vehicle emissions could impact the monitor. Therefore, the Southwestern High School monitor needs to be retained. 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 by the Federal Register.

Both New Haven (260990009) and Wyandotte (261630036) have design values within 5% of the 24-hour NAAQS. According to the October 17, 2006 regulations, they are exempted from the daily sampling requirement because there is another monitor in the MSA that is the design value site. The Oak Park (261250001) site is the only monitor in Oakland County and it is important to retain this sampler to show that Oakland County meets the PM_{2.5} NAAQS. The Southwestern High School (261630015) PM_{2.5} monitor is very important to the development of attainment strategies. By comparing the PM_{2.5} data at the non-attaining sites (Dearborn [261630033], Southwestern High School [261630015], Allen Park [261630001] and Wyandotte [261630036]), differences in source impacts can be elucidated. 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 EPA's Region 5 and their Office of Research and Development, MDEQ deployed a special purpose PM_{2.5} FRM sampler to Tecumseh (260910007) in Lenawee County before April 1, 2008. Other special measurements that were added to the Tecumseh site include: PM_{2.5} speciation and continuous EC/OC. Possibly an aethalometer to measure carbon black could be added in the near future. The special study will continue for only one year. By comparing measurements from this upwind site with the Detroit metropolitan area, the sources of primary and secondary OC impacting the urban area can be better understood. This is discussed further in the speciated PM_{2.5} monitoring section.

Two monitors are required in the Grand Rapids-Wyoming MSA. Prior to January 2007, only the Grand Rapids Monroe Street monitor (260810020) existed in this MSA. To meet the requirement for a second site within the Grand Rapids-Wyoming MSA, MDEQ added a PM_{2.5} FRM monitor to the Wyoming site (260810007) in January 2007. The MDEQ has conducted PM₁₀ monitoring in Wyoming for a number of years, so use of this site presented an opportunity to correct the deficiency in the network design. Another change to the monitoring network in Grand Rapids involved an increase in the sampling frequency of the Monroe Street site (260810020). The evaluation of more recent monitoring data in the previous network review indicated that the Grand Rapids Monroe Street monitor (260810020) was within +/- 5% of the 24-hour NAAQS, triggering the daily monitoring requirement. The sampling frequency was increased to daily on January 1, 2008.

One monitor is required in the 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 11**, 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 µg/m³ 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.

One monitor is required in the Ann Arbor MSA. Previously, the MDEQ operated a PM_{2.5} site in Ann Arbor (261610005) on a rooftop at the University of Michigan. Access became problematic and siting deteriorated due to excessive tree growth, so the site was closed on January 1, 2006. While the Ann Arbor site was operational, the MDEQ also ran a PM_{2.5} monitor in Ypsilanti (261610008). The ambient concentrations at Ypsilanti were approximately 1 µg/m³ greater than the levels at Ann Arbor, so the design value site was not lost when Ann Arbor was closed. The Ypsilanti site is located in a zip code with some of the highest incidences of asthma in Michigan, and will be retained to meet the monitoring requirement for the Ann Arbor MSA.

A single PM_{2.5} FRM monitor is required in the Holland-Grand Haven MSA. This requirement is fulfilled by the monitor in Jenison (261390005). The FRM requirement for Muskegon-Norton Shores MSA is met by the monitor in Muskegon (261210040). Budget cuts in April 2006 prompted a reduction in the sampling frequency of both of these monitors from once every three days to once every six days.¹¹ When the monitoring regulations were changed in October 2006, the EPA specified that all monitors with a 24-hour design value for 2004-2006 within +/- 5% of the NAAQS must sample daily. On January 1, 2007, the sampling frequency was changed from once every six days to daily for both Jenison (261390005) and Muskegon (261210040). Analysis of the most recent three years of data indicates that both the Jenison (261390005) and Muskegon (261210040) sites will need to continue to sample on a daily schedule.

The Lansing monitor (260650012) fulfills the requirement for one site in the Lansing-East Lansing 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 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 greater than 85% of the NAAQS, indicating that monitoring is still required.

The Kalamazoo monitor (260770008) fulfills the requirement that the Kalamazoo-Portage MSA have one FRM sampler. Both the most recent 24-hour and annual averages from the Kalamazoo monitor exceed 85% of the respective NAAQS, indicating that one site must be retained in this MSA.

¹¹ To cut approximately \$173,000 from the budget, the sampling schedules of the Bay City, Coloma, New Haven, Muskegon, Oak Park, Jenison, Port Huron, E. Seven Mile, and Livonia monitors were changed from once every three day to once every six day sampling. In addition, Holland, Grand Rapids, and Linwood were reduced from daily sampling to once every six day sampling. The continuous monitor and speciation sampler were removed from Holland.

Coloma (260210014) fulfills the requirement for the Niles-Benton Harbor MSA. In April 2006, the sampling frequency of the Coloma monitor (260210014) 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 this site is greater than 85% of the NAAQS, indicating that monitoring is still required.

The $PM_{2.5}$ monitor in Holland (260050003) in Allegan County is in a micropolitan area. Although the monitor's design value is within 5% of the NAAQS, daily sampling is not required in micropolitan areas.

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

The MDEQ is proposing to change the special purpose $PM_{2.5}$ FRM monitors at Newberry School (261630038) in Detroit and FIA/Lafayette (261630039), also in Detroit to SLAMS monitors. Originally part of a special study, these monitors have provided valuable information about the distribution of $PM_{2.5}$ in the Detroit area. These monitors will be changed to SLAMS before the 2010 network review.

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 12 summarizes the $PM_{2.5}$ FRM monitoring site information for sites that existed in 2007. **Table 13** shows the $PM_{2.5}$ FRM sites that are currently in operation and provides a summary of technical information required in this review. **Figure 10** compares the $PM_{2.5}$ FRM monitoring network in 2007 with the current design.

TABLE 12: MICHIGAN'S 2007 PM_{2.5} FRM MONITORING NETWORK

Operating Schedule: Once every 6 days, once every 3 days or daily see below														SLAMS Network		Network as of December, 2007	
Method: Partisol 2025 Rupprecht & Patashnick Samplers																	
Monitoring Sites						2007 Sampling				Start		MSA Pop.					
Site Name	AQS Site ID	Address	Latitude	Longitude	Frequency	Purpose	Scale	County	Date	PMSA ¹	CSA ²	(2000 Census)					
Holland	260050003	970 W. 32 nd , Holland	42.7678	-86.14861	1:3	Pop. Exp.	Neighborhood	Allegan	10/31/98	Allegan Micro.	GRMH	1,088,514					
Bay City	260170014	1001 Jennison St	43.5714	-83.89083	1:3	Pop. Exp.	Neighborhood	Bay	8/24/00	Bay City	SBCSTN	403,070					
Coloma	260210014	4689 Defield Rd., Paw Paw WWTP	42.1978	-86.30972	1:3	Transport	Regional	Berrien	11/7/98	NBH	Not in CSA	162,453					
Flint	260490021	Whaley Park, 3610 Iowa St., Flint	43.0472	-83.67028	1:3	Pop. Exp.	Neighborhood	Genesee	12/16/98	Flint	DWF	5,456,428					
Lansing	260650012	220 N. Pennsylvania	42.7386	-84.53472	1:3	Pop. Exp.	Neighborhood	Ingham	11/7/98	LEL	LELO	447,728					
Kalamazoo	260770008	Fairgrounds, 1400 Olmstead Rd	42.2781	-85.54194	1:3	Pop. Exp.	Neighborhood	Kalamazoo	11/19/98	KP	Not in CSA	452,851					
Wyoming	260810007	507 Wealthy St	42.9561	-85.67917	1:3	Pop. Exp.	Neighborhood	Kent	1/1/07	GRW	GRMH	1,088,514					
Grand Rapids	260810020	1179 Monroe St., NW,	42.9842	-85.67139	1:3	Pop. Exp.	Neighborhood	Kent	10/23/98	GRW	GRMH	1,088,514					
New Haven	260990009	57700 Gratiot	42.7314	-82.79361	1:3	Pop. Exp. Max. Conc.	Neighborhood	Macomb	12/22/98	DWL	DWF	5,456,428					
Houghton lake	261130001	1769 S Jeffs Rd	44.3106	-84.89194	1:3	Background	Regional	Missaukee	2/8/03	Not in MSA	Not in CSA	N/A					
Luna Pier	261150005	Erie Shooting Club	41.7639	-83.47194	1:3	Transport	Regional	Monroe	12/17/99	Monroe	DWF	5,456,428					
Muskegon	261210040	199 E. Apple	43.2331	-86.23861	1:1	Pop. Exp.	Neighborhood	Muskegon	12/18/98	MNS	GRMH	1,088,514					
Oak Park	261250001	13701 Oak Park Blvd.	42.4631	-83.18333	1:3	Pop. Exp.	Urban	Oakland	12/25/98	DWL	DWF	5,456,428					
Jenison	261390005	6981 28 th Ave, Georgetown Twp	42.8944	-85.85278	1:1	Pop. Exp.	Neighborhood	Ottawa	11/7/98	HGH	GRMH	1,088,514					
Port Huron	261470005	2525 Dove Rd.	42.9533	-82.45639	1:3	Pop. Exp.	Regional	Saint Clair	2/11/99	DWL	DWF	5,456,428					
Ypsilanti	261610008	555 Towner Ave	42.2406	-83.59972	1:3	Pop. Exp.	Neighborhood	Washtena	8/4/99	Ann Arbor	DWF	5,456,428					
Allen Park SW Highsch., Detroit	261630001	14700 Goddard	42.2286	-83.20833	1:1	Pop. Exp.	Neighborhood	Wayne	5/12/99	DWL	DWF	5,456,428					
	261630015	SW Highschool, 6921 W. Fort St	42.3028	-83.10667	1:3	Pop. Exp. Max. Conc.	Neighborhood	Wayne	2/28/99	DWL	DWF	5,456,428					
Linwood	261630016	6050 Linwood, McMichael School	42.3578	-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	42.4308	-83.00028	1:3	Pop. Exp.	Neighborhood	Wayne	4/30/00	DWL	DWF	5,456,428					
Livonia	261630025	38707 Seven Mile Rd	42.4231	-83.42639	1:3	Pop. Exp.	Neighborhood	Wayne	8/21/99	DWL	DWF	5,456,428					
Dearborn	261630033	2842 Wyoming, Salina School	42.3067	-83.14889	1:3	Pop. Exp. Max. Conc.	Neighborhood	Wayne	2/5/99	DWL	DWF	5,456,428					
Wyandotte	261630036	3625 Biddle, Wyandotte	42.1873	-83.15404	1:3	Pop. Exp.	Neighborhood	Wayne	2/20/99	DWL	DWF	5,456,428					

2007 Special Purpose and Tribal PM _{2.5} Monitors in Michigan														
Monitoring Sites						2007 Sampling				Start				(2000 Census)
Site Name	AQS Site ID	Address	Latitude	Longitude	Frequency	Monitor Type	Purpose	Scale	County	Date	PMSA ¹	CSA ²	Census	
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	42.3233	-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 (INMI)	² CSA Key:	DWF = Detroit-Warren-Flint Combined Statistical Area GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area LELO = Lansing-East Lansing-Owosso Combined Statistiad Area
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TABLE 13: 2008 PM_{2.5} FRM MONITORING 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 2008

Monitoring Sites			2007					Start			MSA Pop.	
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Purpose	Scale	County	Date	PMSA ¹	CSA ²	(2000 Census)
Holland	260050003	970 W. 32 nd , Holland	42.7678	-86.14861	1:3	Pop. Exp.	Neighborhood	Allegan	10/31/98	Allegan Micro.	GRMH	1,088,514
Bay City	260170014	1001 Jennison St	43.5714	-83.89083	1:3	Pop. Exp.	Neighborhood	Bay	8/24/00	Bay City	SBCSTN	403,070
Coloma	260210014	4689 Defield Rd., Paw Paw WWTP	42.1978	-86.30972	1:3	Transport	Regional	Berrien	11/7/98	NBH	Not in CSA	162,453
Flint	260490021	Whaley Park, Iowa St., Flint	43.0472	-83.67028	1:3	Pop. Exp.	Neighborhood	Genesee	12/16/98	Flint	DWF	5,456,428
Lansing	260650012	220 N. Pennsylvania	42.7386	-84.53472	1:3	Pop. Exp.	Neighborhood	Ingham	11/7/98	LEL	LELO	447,728
Kalamazoo	260770008	Fairgrounds, Olmstead Rd	42.2781	-85.54194	1:3	Pop. Exp.	Neighborhood	Kalamazoo	11/19/98	KP	Not in CSA	452,851
Wyoming	260810007	507 Wealthy St	42.9561	-85.67917	1:3	Pop. Exp.	Neighborhood	Kent	1/1/07	GRW	GRMH	1,088,514
Grand Rapids	260810020	1179 Monroe St., NW,	42.9842	-85.67139	1:1	Pop. Exp.	Neighborhood	Kent	10/23/98	GRW	GRMH	1,088,514
New Haven	260990009	57700 Gratiot	42.7314	-82.79361	1:3	Pop. Exp. Max. Conc.	Neighborhood	Macomb	12/22/98	DWL	DWF	5,456,428
Houghton lake	261130001	1769 S Jeffs Rd	44.3106	-84.89194	1:3	Background	Regional	Missaukee	2/8/03	Not in MSA	Not in CSA	N/A
Luna Pier	261150005	Erie Shooting Club	41.7639	-83.47194	1:3	Transport	Regional	Monroe	12/17/99	Monroe	DWF	5,456,428
Muskegon	261210040	199 E. Apple	43.2331	-86.23861	1:1	Pop. Exp.	Neighborhood	Muskegon	12/18/98	MNS	GRMH	1,088,514
Oak Park	261250001	13701 Oak Park Blvd.	42.4631	-83.18333	1:3	Pop. Exp.	Urban	Oakland	12/25/98	DWL	DWF	5,456,428
Jenison	261390005	6981 28 th Ave, Georgetown Twp	42.8944	-85.85278	1:1	Pop. Exp.	Neighborhood	Ottawa	11/7/98	HGH	GRMH	1,088,514
Port Huron	261470005	2525 Dove Rd.	42.9533	-82.45639	1:3	Pop. Exp.	Regional	Saint Clair	2/11/99	DWL	DWF	5,456,428
Ypsilanti	261610008	555 Towner Ave	42.2406	-83.59972	1:3	Pop. Exp.	Neighborhood	Washtena	8/4/99	Ann Arbor	DWF	5,456,428
Allen Park SW Highsch., Detroit	261630001	14700 Goddard	42.2286	-83.20833	1:1	Pop. Exp.	Neighborhood	Wayne	5/12/99	DWL	DWF	5,456,428
	261630015	SW Highschool, 6921 W. Fort St	42.3028	-83.10667	1:3	Pop. Exp. Max. Conc.	Neighborhood	Wayne	2/26/99	DWL	DWF	5,456,428
Linwood	261630016	6050 Linwood, McMichael School	42.3578	-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	42.4308	-83.00028	1:3	Pop. Exp.	Neighborhood	Wayne	4/30/00	DWL	DWF	5,456,428
Livonia	261630025	38707 Seven Mile Rd	42.4231	-83.42639	1:3	Pop. Exp.	Neighborhood	Wayne	8/21/99	DWL	DWF	5,456,428
Dearborn	261630033	2842 Wyoming, Salina School	42.3067	-83.14889	1:3	Pop. Exp. Max. Conc.	Neighborhood	Wayne	2/5/99	DWL	DWF	5,456,428
Wyandotte	261630036	3625 Biddle, Wyandotte	42.1873	-83.15404	1:3	Pop. Exp.	Neighborhood	Wayne	2/20/99	DWL	DWF	5,456,428

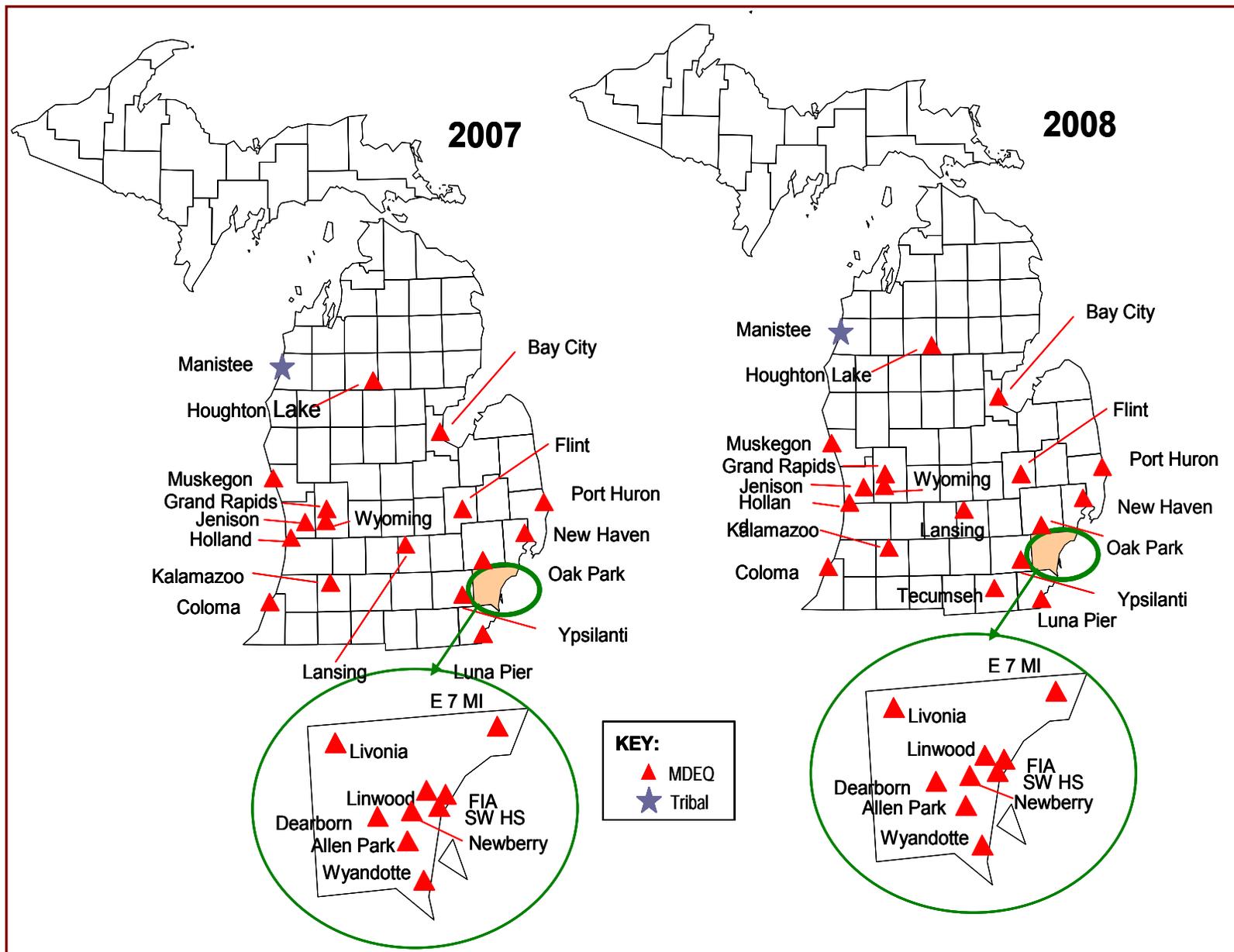
2008 Special Purpose and Tribal PM_{2.5} Monitors in Michigan

Monitoring Sites			2007					Start			(2000 Census)		
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Date	PMSA ¹	CSA ²	(2000 Census)
Tecumseh	260910007	6792 Raisin Center Highway	41.9956	-83.94667	1:3	SPM	up wind backgrd	regional	Lenawee	7/6/93	Not in MSA	Not in CSA	N/A
Maristee	261010922	3031 Dornres 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	42.3233	-83.06861	1:3	SPM	Source Oriented	Neighborhood	Wayne	8/26/05	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
 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 (INMI)

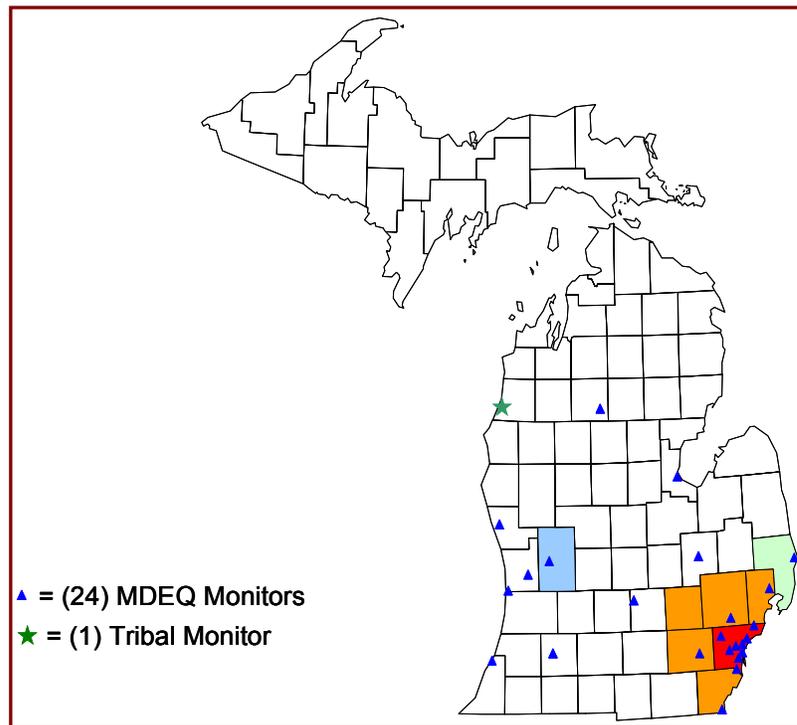
FIGURE 10: COMPARISON OF MICHIGAN'S 2007 AND 2008 PM_{2.5} FRM MONITORING NETWORK
 (WHILE THERE WERE NO CHANGES IN SITE LOCATIONS, SAMPLING FREQUENCIES HAVE CHANGED.)



PM_{2.5} Designation Recommendations

On December 18, 2007, the MDEQ submitted designation recommendations to EPA on the revised 24-hour NAAQS for PM_{2.5}. Wayne County was recommended as a distinct nonattainment area due to the unique nature of PM_{2.5} at the Dearborn (261630033) and Southwestern High School (261630033) sites. The MDEQ recommended another distinct nonattainment area for St. Clair County due to impacts from Sarnia, Ontario. The MDEQ has proposed that Monroe, Washtenaw, Livingston, Oakland and Macomb counties should make up a third nonattainment area in Southeast Michigan. The only county the MDEQ recommended as nonattainment on the west side of the state was Kent County. These areas are illustrated in **Figure 11**. All monitors in these potential nonattainment areas should be retained.

FIGURE 11: NONATTAINMENT AREAS RECOMMENDED BY MDEQ USING DATA FROM 2004-2006



Conversion of PM_{2.5} Grant Dollars

Currently the PM_{2.5} monitoring networks are funded through a Section 103 Grant. However, the EPA is considering changing the Section 103 Grant to a conventional Section 105 Grant, which requires the receiving agency to supply a 40% match to the federal funds. If the funds are converted and a match is required, this will be the equivalent of 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 a separate, fully approved QAPP. The MDEQ operates four collocated 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) has been reduced from once every six days to once every 12 days, as specified in 40 CFR Part 58 modifications to the regulations.

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 filter weight is entered into the EPA's AQS database, 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 2009 PM_{2.5} FRM Monitoring Network

The design of the network is contingent upon receiving adequate levels of funding to continue operation of the PM_{2.5} FRM network. Because the operation of the FRM at Tecumseh (260910007) is only a 12-month study, this FRM is slated to be discontinued on March 31, 2009.

If at the end of 2008, 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. If the design values for Jenison (261390005), Grand Rapids (260810020) and Muskegon (261210040) are no longer within 5% of the NAAQS, their sampling frequency will be reduced to once every three days beginning January 1, 2009.

The following PM_{2.5} monitors will be retained as part of the 2009 network:

- The one in three day PM_{2.5} FRM monitor in Holland (260050003)
- The daily PM_{2.5} FRM monitor in Grand Rapids (260810020) may be reduced to a one in three day sampling schedule depending upon the impact of the 2008 data on the design value
- 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 daily day PM_{2.5} FRM monitor in Muskegon (261210040) may be reduced to a one in three day sampling schedule depending upon the impact of the 2008 data on the design value
- The daily day PM_{2.5} FRM monitor in Jenison (261390005) may be reduced to a one in three day sampling schedule depending upon the impact of the 2008 data on the design value
- 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 Southwestern 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) will be changed from a special purpose monitor to a SLAMS monitor
- The one in three day PM_{2.5} FRM monitors at Lafayette in Detroit (261630039) will be changed from a special purpose monitor to a SLAMS monitor

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

- The one in twelve day PM_{2.5} FRM monitor in Kalamazoo (260770008)
- The one in twelve day PM_{2.5} FRM monitor in Grand Rapids (260810020)
- The one in twelve day PM_{2.5} FRM monitor in Ypsilanti (261610008)
- The one in twelve day PM_{2.5} FRM monitor in Allen Park (261630001)

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 2008.

PM_{2.5} CONTINUOUS MONITORING NETWORK

According to the October 17, 2006 changes to the monitoring regulations, 50% of the minimum required number of FRM monitoring sites are now required to have a continuous PM_{2.5} monitor. As described previously, the MDEQ operates 25 FRM sites throughout the state. Therefore, seven continuous monitors are required. In 2007 and 2008, MDEQ operated Rupprecht & Patashnick TEOM samplers to supply continuous PM_{2.5} data at 13 monitoring sites, as shown in **Tables 14** and **15**. The MDEQ is currently meeting the minimum 50% collocation requirement. **Figure 12** 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 EPA in March 2008. The newer TEOM unit that was collocated 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.

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 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 malfunctioned 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.

During 2007, the MDEQ operated the TEOMs during the summer months of 2007 at an inlet temperature of 50°C, and reduced the inlet temperature to 30°C in the winter months to minimize loss of nitrates. The collocated set of TEOMs at FIA/Lafayette (261630039) were operated at 30°C and 50°C to assess comparability. When the unit on loan was returned to EPA in March 2008, all inlets across the state resumed operation at the same inlet temperature.

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.

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 14: MICHIGAN'S 2007 PM_{2.5} CONTINUOUS MONITORING NETWORK

Operating Schedule: continuous
 Method: Rupprecht & Patashnick Tapered Element Oscilating Microbalance (TEOMS) Samplers
 Network as of December, 2007

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	43.5714	-83.89083	Pop. Exp.	Neighborhood	Bay	11/19/05	Bay City	SBCSTN	403,070
Flint	260490021	Whaley Park, 3610 Iowa St., Flint	43.0472	-83.67028	Pop. Exp.	Neighborhood	Genesee	5/23/02	Flint	DWF	5,456,428
Lansing	260650012	220 N. Pennsylvania	42.7386	-84.53472	Pop. Exp.	Neighborhood	Ingham	12/1/99	LEL	LELO	447,728
Kalamazoo	260770008	Fairgrounds, 1400 Olmstead Rd	42.2781	-85.54194	Pop. Exp.	Neighborhood	Kalamazoo	8/17/00	KP	Not in CSA	452,851
Grand Rapids	260810020	1179 Monroe St., NW,	42.9842	-85.67139	Pop. Exp.	Neighborhood	Kent	11/4/99	GRW	GRMH	1,088,514
Houghton lake	261130001	1769 S Jeffs Rd	44.3106	-84.89194	Background	Regional	Missaukee	10/9/03	Not in MSA	Not in CSA	N/A
Port Huron	261470005	2525 Dove Rd.	42.9533	-82.45639	Pop. Exp.	Regional	Saint Clair	9/18/03	DWL	DWF	5,456,428
Seney	261530001	Seney Wildlife Refuge	46.2889	-85.95027	bkgrd	regional	Schoolcraft	1/1/02	Not in MSA	Not in CSA	N/A
Ypsilanti	261610008	555 Towner Ave	42.2406	-83.59972	Pop. Exp.	Neighborhood	Washtenaw	2/24/00	Ann Arbor	DWF	5,456,428
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	DWF	5,456,428
Dearborn	261630033	2842 Wyoming, Salina School	42.3067	-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	42.3233	-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. Area

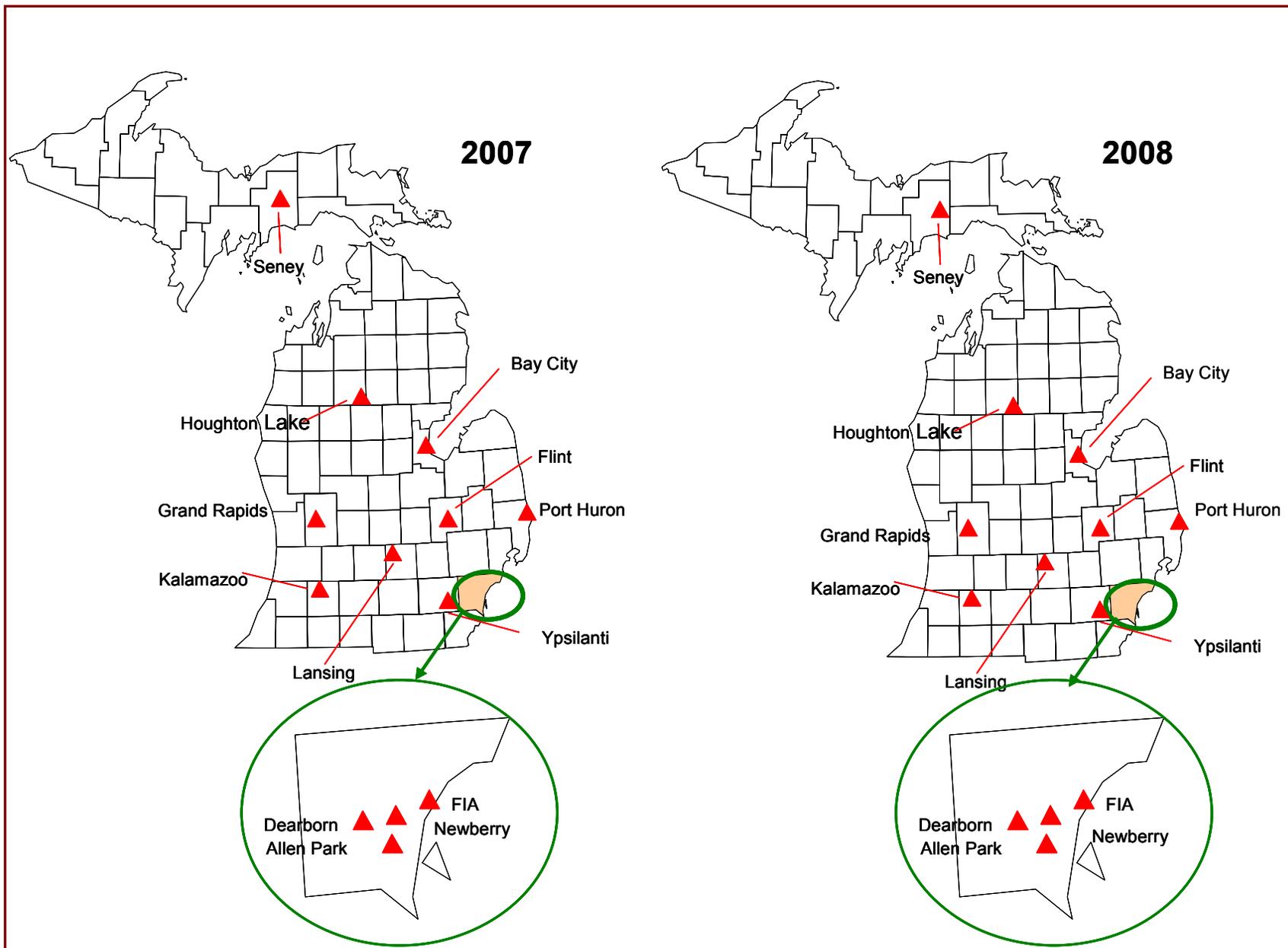
TABLE 15: 2008 PM_{2.5} CONTINUOUS MONITORING NETWORK IN MICHIGAN

Operating Schedule: continuous												Network as of March 2008
Method: Rupprecht & Patashnick Tapered Element Oscilating 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	43.5714	-83.89083	Pop. Exp.	Neighborhood	Bay	11/19/05	Bay City	SBCSTN	403,070	
Flint	260490021	Whaley Park, 3610 Iowa St., Flint	43.0472	-83.67028	Pop. Exp.	Neighborhood	Genesee	5/23/02	Flint	DWF	5,456,428	
Lansing	260650012	220 N. Pennsylvania	42.7386	-84.53472	Pop. Exp.	Neighborhood	Ingham	12/1/99	LEL	LELO	447,728	
Kalamazoo	260770008	Fairgrounds, 1400 Olmstead Rd	42.2781	-85.54194	Pop. Exp.	Neighborhood	Kalamazoo	8/17/00	KP	Not in CSA	452,851	
Grand Rapids	260810020	1179 Monroe St., NW,	42.9842	-85.67139	Pop. Exp.	Neighborhood	Kent	11/4/99	GRW	GRMH	1,088,514	
Houghton lake	261130001	1769 S Jeffs Rd	44.3106	-84.89194	Background	Regional	Missaukee	10/9/03	Not in MSA	Not in CSA	N/A	
Port Huron	261470005	2525 Dove Rd.	42.9533	-82.45639	Pop. Exp.	Regional	Saint Clair	9/18/03	DWL	DWF	5,456,428	
Seney	261530001	Seney Wildlife Refuge	46.2889	-85.95027	bkgd	regional	Schoolcraft	1/1/02	Not in MSA	Not in CSA	N/A	
Ypsilanti	261610008	555 Towner Ave	42.2406	-83.59972	Pop. Exp.	Neighborhood	Washtenaw	2/24/00	Ann Arbor	DWF	5,456,428	
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	DWF	5,456,428	
Dearborn	261630033	2842 Wyoming, Salina School	42.3067	-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	42.3233	-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. Area

FIGURE 12: COMPARISON OF MICHIGAN'S 2007 AND 2008 PM_{2.5} CONTINUOUS MONITORING NETWORK
(DURING 2007, TWO TEOMs WERE IN OPERATION AT FIA/LAFAYETTE. IN 2008, ONLY ONE TEOM WILL OPERATE AT THIS SITE.)



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. The audit data is uploaded to EPA's AQS database.

Plans for 2009 PM_{2.5} TEOM Network

No 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 2009. 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 and will most likely become a NCORE site. 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. If Grand Rapids is selected as a NCORE site, continuous PM_{2.5} measurements will be retained at Monroe Street (260810020).

During 2009, 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)
- Newberry (261630038)
- FIA/Lafayette (261630039)
- Bay City (260170014)
- Houghton lake (261130001)

PM_{2.5} SPECIATION 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 speciation 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 OC 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 16** and the current network is shown in **Table 17**. **Figure 13** 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) will be shut down on or before September 30, 2008, which is the end of this contract year with Kalamazoo County.

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 Sonoma Technology, Incorporated and Jay Turner¹². There are several days when elevated PM_{2.5} FRM measurements were made at Port Huron (261470005) and nowhere else in the MSA. As such, the MDEQ is proposing to move the Kalamazoo speciation monitor to Port Huron (261470005) to better understand the composition of elevated PM_{2.5} events downwind from Detroit.

Analysis of PM_{2.5} data by Jay Turner as well as discussions with stakeholders in the development of attainment strategies for southeast Michigan indicated that the emissions near the Southwestern High School site (261630015) MAY be trending upward, while at other monitoring stations, the trend is in the opposite direction. While not the design value site, levels of PM_{2.5} at the Southwestern High School (261630015) site are higher than at most other stations. The station is surrounded by a variety of sources. No matter what direction the wind is blowing, the station has elevated levels of fine particulate. Collection of speciated PM_{2.5} data at Southwestern High School would allow the MDEQ and stakeholders to better characterize fine particulate at this site. To fund this project, monitoring at another speciation site will have to be discontinued. Ypsilanti (261610008) was selected so that speciation monitoring can be retained in other areas of Michigan.

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. 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, 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 spiral aerosol speciation sampler 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.

¹² 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.

TABLE 16: MICHIGAN'S 2007 PM_{2.5} SPECIATION MONITORING NETWORK

Operating Schedule: Once Every 3 days (Allen Park), once every 6 days all others
 Method: Met One SASS and two URG 3000 N units to collect organic & elemental carbon at Dearborn & Ypsilanti
 Network as of December, 2007

Monitoring Sites												MSA Pop.
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Frequency	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	(2000 Census)
Kalamazoo	260770008	Fairgrounds, 1400 Olmstead Rd	42.2781	-85.54194	1:6	Pop. Exp.	Neighborhood	Kalamazoo	8/17/00	KP	Not in CSA	452,851
Grand Rapids	260810020	1179 Monroe St., NW,	42.9842	-85.67139	1:6	Pop. Exp.	Neighborhood	Kent	11/4/99	GRW	GRMH	1,088,514
Houghton lake	261130001	1769 S Jeffs Rd	44.3106	-84.89194	1:6	Background	Regional	Missaukee	10/9/03	Not in MSA	Not in CSA	N/A
Luna Pier	261150005	Erie Shooting Club	41.7639	-83.47194	1:6	Transport	Regional	Monroe	12/17/99	Monroe	DWF	5,456,428
Ypsilanti	261610008	555 Towner Ave	42.2406	-83.59972	1:6	Pop. Exp.	Neighborhood	Washtena	2/24/00	Ann Arbor	DWF	5,456,428
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	1:3	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	DWF	5,456,428
Dearborn	261630033	2842 Wyoming, Salina School	42.3067	-83.14889	1:6	Pop. Exp. Max. Conc.	Neighborhood	Wayne	9/26/03	DWL	DWF	5,456,428

Continuous Speciation Measurements

Monitoring Sites												MSA Pop.
Site Name	AQS Site ID	Address	Latitude	Longitude	Sampling Method	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	(2000 Census)
Allen Park	261630001	14700 Goddard	42.2286	-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	42.3067	-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
FIA/Lafayette St	261630039	2000 W Lafayette	42.3233	-83.06861	McGee small spot Aethalometer (carbon black)	Source Oriented	Neighborhood	Wayne	8/20/05	DWL	DWF	5,456,428
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	42.3067	-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

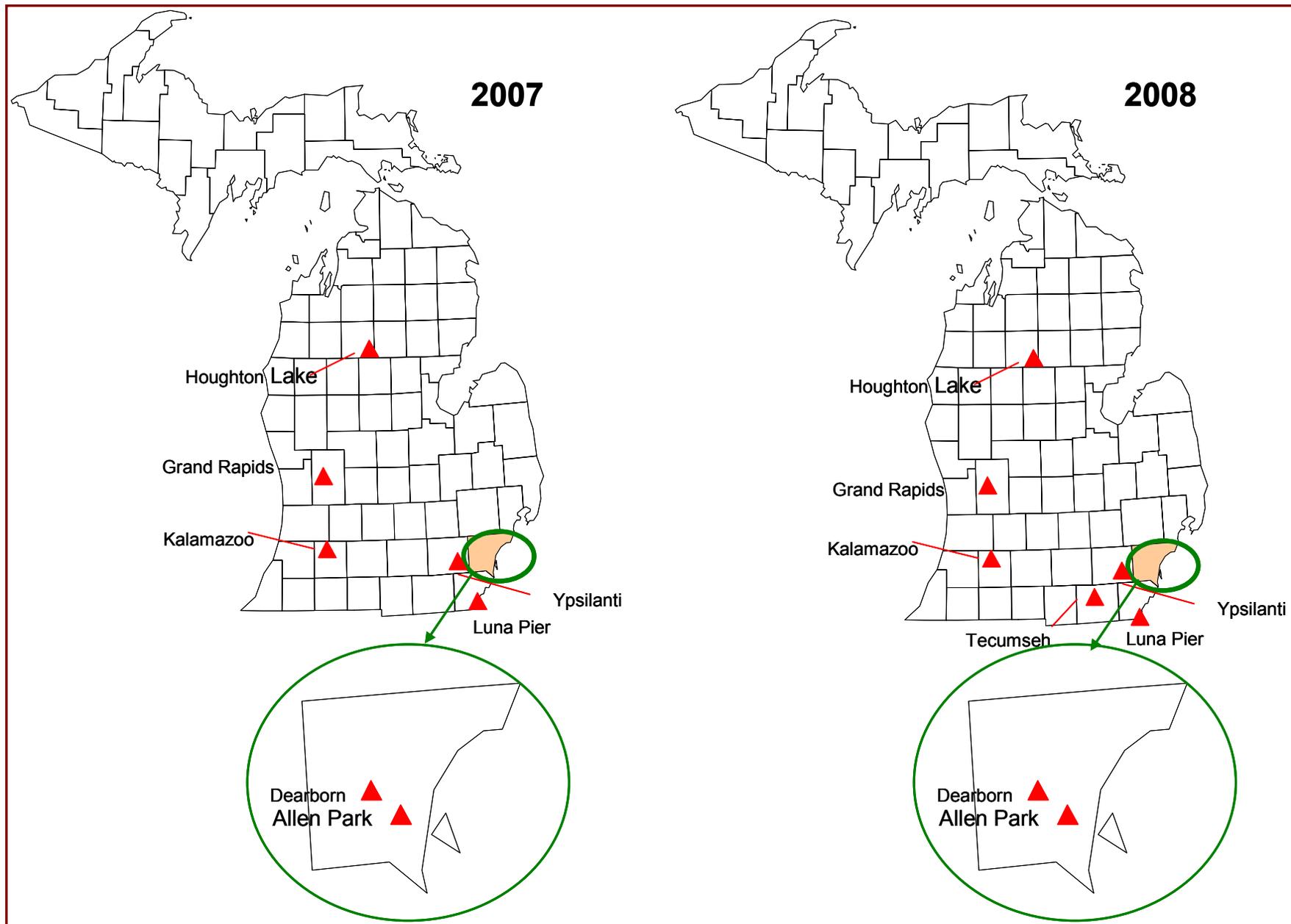
TABLE 17: 2008 PM_{2.5} SPECIATION MONITORING NETWORK IN MICHIGAN

Operating Schedule: Once Every 3 days (Allen Park), once every 6 days all others													Network as of March, 2008	
Method: Met One SASS and two URG 3000 N units to collect organic & elemental carbon at Dearborn & Ypsilanti														
Monitoring Sites					Sampling				Start		MSA Pop.			
Site Name	AQS Site ID	Address	Latitude	Longitude	Frequency	Purpose	Scale	County	Date	PMSA ¹	CSA ²	(2000 Census)	Comments	
Kalamazoo	260770008	Fairgrounds, 1400 Olmstead Rd	42.2781	-85.54194	1:6	Pop. Exp.	Neighborhood	Kalamazoo	8/17/00	KP	Not in CSA	452,851		
Grand Rapids	260810020	1179 Monroe St., NW,	42.9842	-85.67139	1:6	Pop. Exp.	Neighborhood	Kent	11/4/99	GRW	GRMH	1,088,514		
Tecumseh	260910007	6792 Raisin Center Highway	41.9956	-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	44.3106	-84.89194	1:6	Background	Regional	Missaukee	10/9/03	Not in MSA	Not in CSA	N/A		
Luna Pier	261150005	Erie Shooting Club	41.7639	-83.47194	1:6	Transport	Regional	Monroe	12/17/99	Monroe	DWF	5,456,428		
Ypsilanti	261610008	555 Towner Ave	42.2406	-83.59972	1:6	Pop. Exp.	Neighborhood	Washtena	2/24/00	Ann Arbor	DWF	5,456,428		
Allen Park	261630001	14700 Goddard	42.2286	-83.20833	1:3	Pop. Exp.	Neighborhood	Wayne	12/1/00	DWL	DWF	5,456,428		
Dearborn	261630033	2842 Wyoming, Salina School	42.3067	-83.14889	1:6	Pop. Exp. Max. Conc.	Neighborhood	Wayne	9/26/03	DWL	DWF	5,456,428		
Continuous Speciation Measurements														
Monitoring Sites					Sampling				Start		MSA Pop.			
Site Name	AQS Site ID	Address	Latitude	Longitude	Method	Purpose	Scale	County	Date	PMSA ¹	CSA ²	(2000 Census)	Comments	
Tecumseh	260910007	6792 Raisin Center Highway	41.9956	-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	42.2286	-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	42.3067	-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	42.3233	-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	41.9956	-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	42.3067	-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

FIGURE 13: COMPARISON OF MICHIGAN'S 2007 AND 2008 PM_{2.5} SPECIATION MONITORING NETWORK



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

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 PM_{2.5} 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 EC. 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 February 21, 2008 and returned to 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 EC/OC. 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.

EPA Region 5 submitted and was awarded funds to study the impacts from locomotives on air quality. EC/OC data from both Dearborn (261630033) and Newberry School in Detroit (261630038) will be used to supplement inventory and modeling work planned by EPA Region 5. Another issue involved in the project is the need to better understand the nature of primary and secondary OC. By comparing hourly measurements of OC collected at Dearborn and Newberry School with measurements obtained at an upwind site, the proportion of newly formed OC to aged OC transported into the area may be obtained. Using some of these special grant funds, MDEQ deployed an EC/OC sampler at the upwind site in Tecumseh (260910007). Due to interest in supplementing the project and a desire to enrich the data set, MDEQ is investigating deploying an aethalometer at the Tecumseh site (260910007) for one year.

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 the Research Triangle Institute National Laboratory who supplies speciation analysis services for the entire nation.

Plans for 2009 PM_{2.5} Speciation Monitoring Network

PM_{2.5} FRM, speciation, continuous EC/OC and carbon black measurements at Tecumseh (260910007) will be discontinued March 31, 2009 because this is a special project with finite funding.

The MDEQ is planning to shut down the speciation monitor at:

- Kalamazoo (260770008) that sampled once every six days
- Ypsilanti (261610008) that sampled once every six days

The MDEQ is planning to add a speciation sampler to:

- Port Huron (261470005) which will sample once every six days
- Southwestern High School (261630015) which will sample once every six days

During 2009, 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
- Grand Rapids (260810020) operating once every six days
- Houghton Lake (261130001) 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 18**.¹³

TABLE 18: 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 18** to Michigan's urban areas, population totals and historical PM₁₀ data results in the design requirements that are shown in **Table 19**. 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 Southwestern 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 monitor(s) 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 20 summarizes the PM₁₀ monitoring site information for sites that were in existence in 2007. **Table 21** shows the PM₁₀ sites that are currently in operation. **Figure 14** compares the PM₁₀ network in 2007 with the current design.

¹³ Table D-4 of Appendix D to Part 58.

TABLE 19: MINIMUM NUMBER OF PM₁₀ MONITORS REQUIRED PER THE OCTOBER 17, 2006 REVISED MONITORING REGULATIONS

Design value sites are in bold				2005-2007 most recent 3- year PM10 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	60	low	
			SW HS	73	low	
			Dearborn	79	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	45		1-2
			Wyoming	51	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 20: MICHIGAN'S 2007 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 December, 2007

Site Name	Monitoring Sites AQS		Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
	Site ID	Address											
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
 KP= Kalamazoo-Portage Metro. Area

² CSA Key:

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

TABLE 21: 2008 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 March 2008

Site Name	Monitoring Sites AQS		Latitude	Longitude	Sampling Frequency	Monitor Type	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
	Site ID	Address											
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

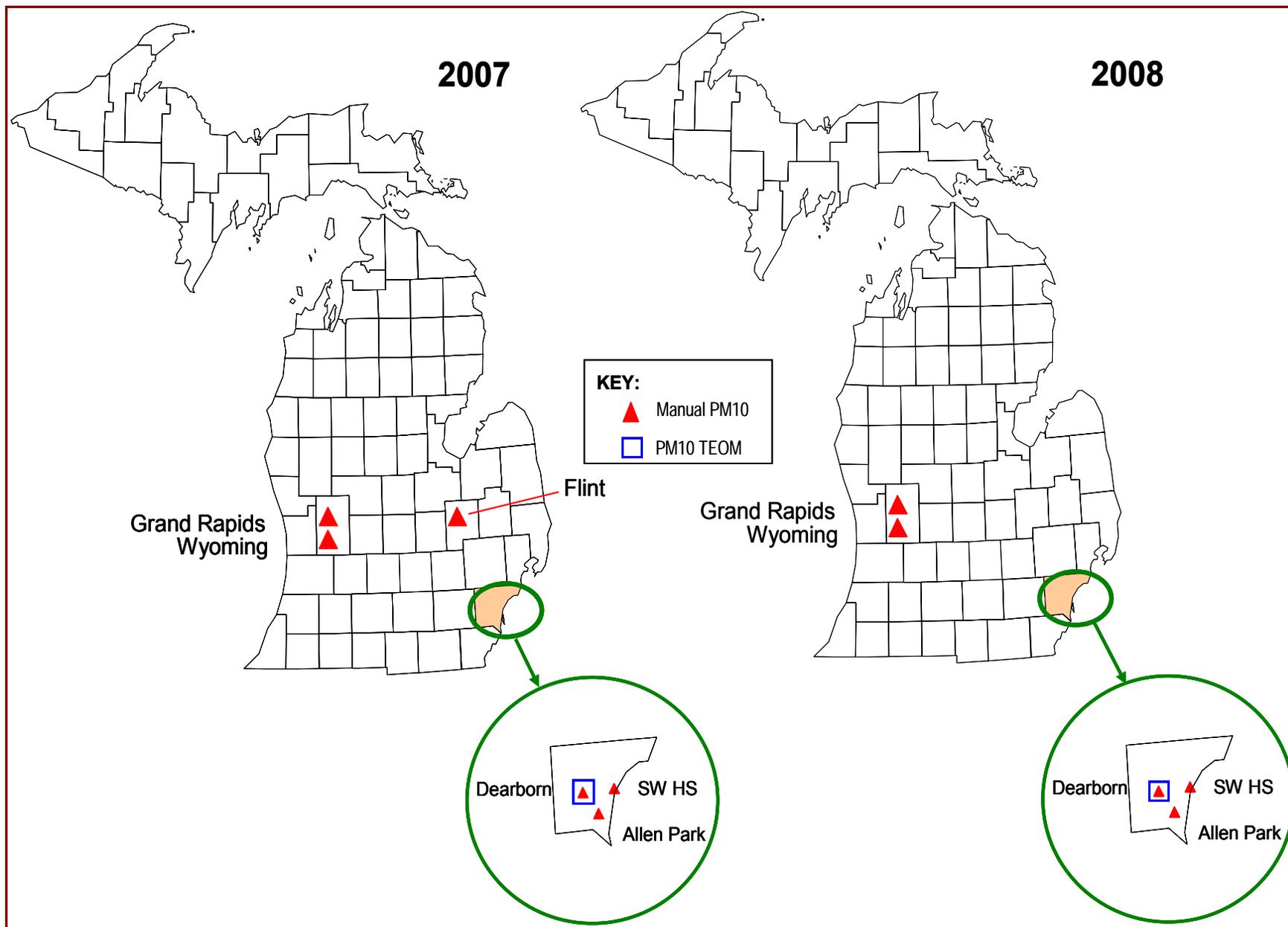
¹ PMSA Key:

DWL= Detroit-Warren-Livonia Metro. Area
 GRW=Grand Rapids-Wyoming Metro. Area
 KP= Kalamazoo-Portage Metro. Area

² CSA Key:

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

FIGURE 14: COMPARISON OF MICHIGAN'S 2007 AND 2008 PM₁₀ MONITORING NETWORK



History of PM₁₀ Collocated and PM₁₀ Continuous 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 collocated 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 collocated 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.

PM₁₀ Quality Assurance

The site operator conducts a 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.

Plans for 2009 PM₁₀ Monitoring Network

During 2009, 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/Southwestern High School (261630015) on a once every six day schedule
- The PM₁₀ monitor in Dearborn (261630033) and the collocated 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 FIA/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. 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 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.

Table 22 summarizes the CO monitoring site information for sites that were in existence in 2007. **Table 23** shows the CO sites that are currently in operation. **Figure 15** compares the CO network in 2007 with the current design.

Trace CO Quality Assurance

The site operator performs a precision check of the analyzer every two weeks. The 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 2009 CO Monitoring Network

During 2009, 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 22: MICHIGAN'S 2007 CO MONITORING NETWORK

Operating Schedule: Continuous Network as of December, 2007
 Method: Gas Filter Correlation Analyzer- Trace CO

Monitoring Sites			Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
Site Name	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: 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 23: 2008 CO MONITORING NETWORK IN MICHIGAN

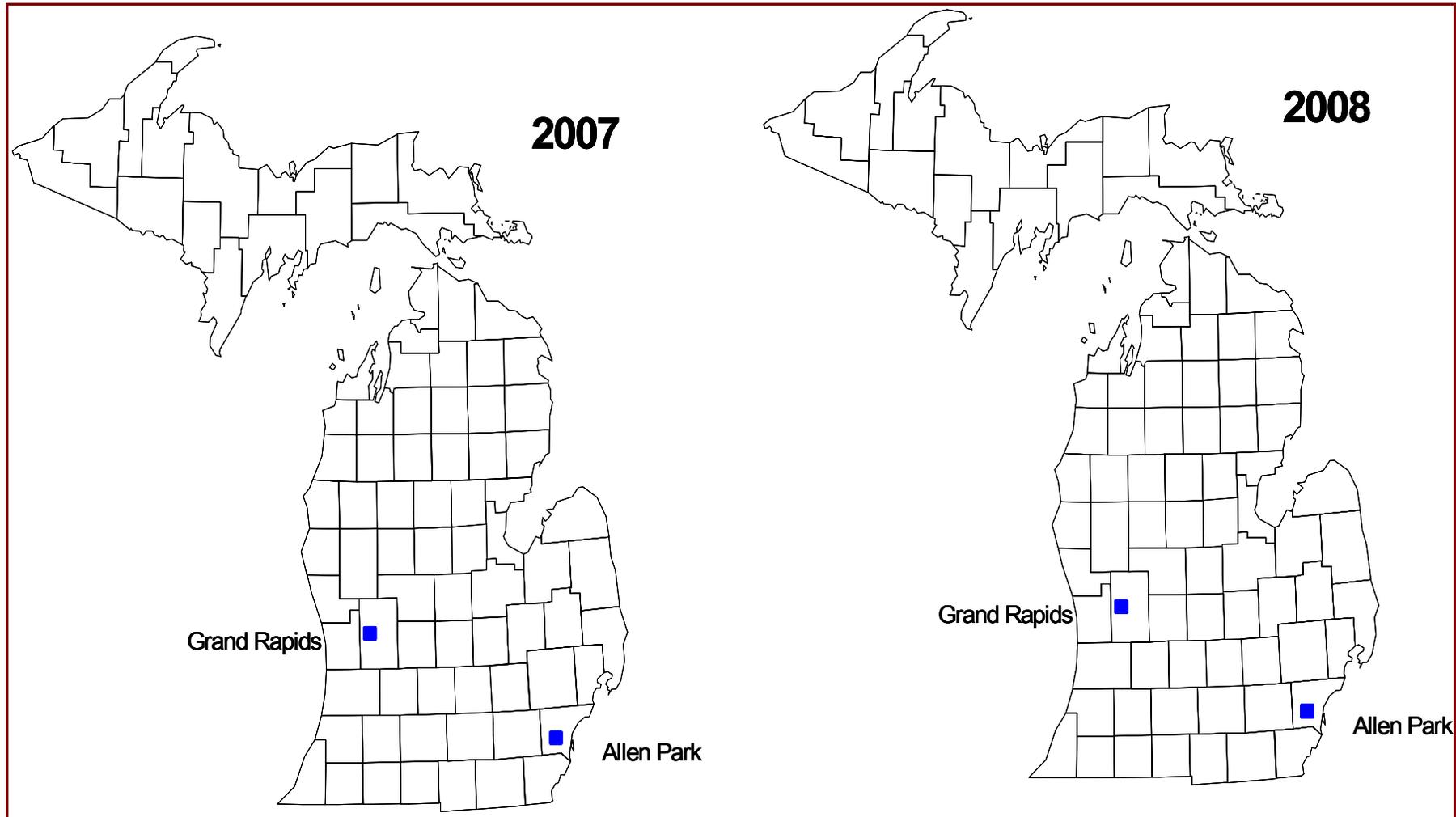
Operating Schedule: Continuous Network as of March, 2008
 Method: Gas Filter Correlation Analyzer- Trace CO

Monitoring Sites			Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
Site Name	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: 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 15: COMPARISON OF MICHIGAN'S 2007 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 24 summarizes the NO₂ and NO_y monitoring site information for sites that were in existence in 2007. **Table 25** shows the NO₂ and NO_y sites that are currently in operation. **Figure 16** compares the NO₂ and NO_y monitoring network in 2007 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 2009 NO₂ and NO_y Monitoring Network

During 2009, 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, MDEQ will continue to operate trace level NO_y monitors at:

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

TABLE 24: MICHIGAN'S 2007 NO₂ AND NO_y MONITORING NETWORK

Operating Schedule: Continuous
 Method: Chemiluminescence

Network as of December, 2007
 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: 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 25: 2008 NO₂ AND NO_y MONITORING NETWORK IN MICHIGAN

Operating Schedule: Continuous
 Method: Chemiluminescence

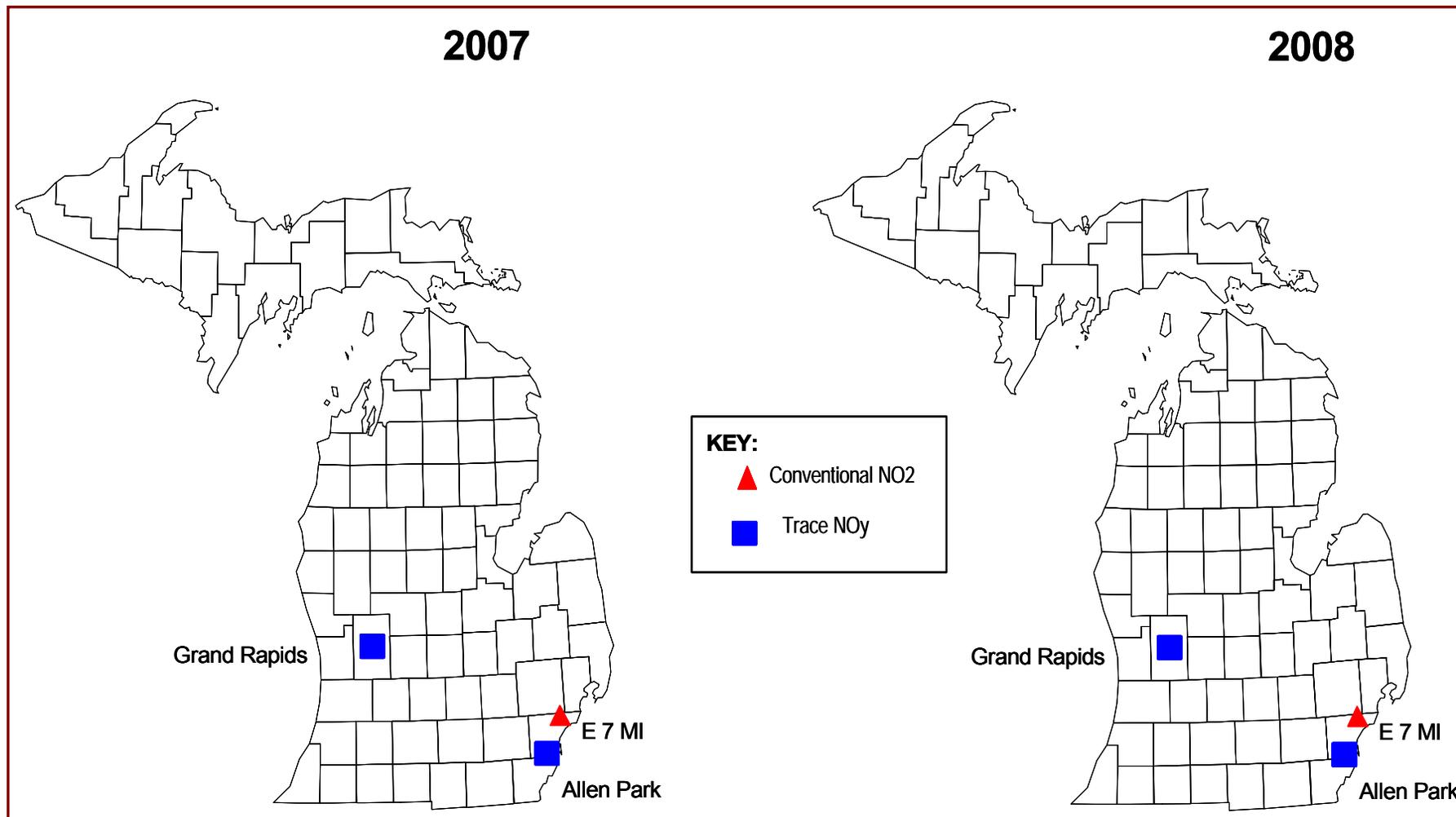
Network as of March, 2008
 Former NAMS sites are shown in bold.

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: 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 16: COMPARISON OF MICHIGAN'S 2007 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 Southwestern 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 is on hold until the unit is returned.

Table 26 summarizes the SO₂ monitoring site information for sites that were in existence in 2006. **Table 27** shows the SO₂ sites that are currently in operation. **Figure 17** compares the SO₂ network in 2007 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 2009 SO₂ Monitoring Network

During 2009, contingent upon adequate levels of funding, the MDEQ is planning to operate SO₂ at:

- Southwestern 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 26: MICHIGAN'S 2007 SO₂ MONITORING NETWORK

Operating Schedule: Continuous
 Method: Ultra Violet Stimulated Fluorescence

Network as of December, 2007
 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										
Fort St. (SWHS)	261630015	6921 W. Fort	42.302778	-83.106667	SO2	max conc	nghbrhd	Wayne	1/1/71	DWL	DWF	5,456,428
Grand Rapids	260810020	1179 Monroe NW	42.984167	-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: DWL= Detroit-Warren-Livonia Metro. Area
 GRW=Grand Rapids-Wyoming Metro. Area

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 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

TABLE 27: 2008 SO₂ MONITORING NETWORK IN MICHIGAN

Operating Schedule: Continuous
 Method: Ultra Violet Stimulated Fluorescence

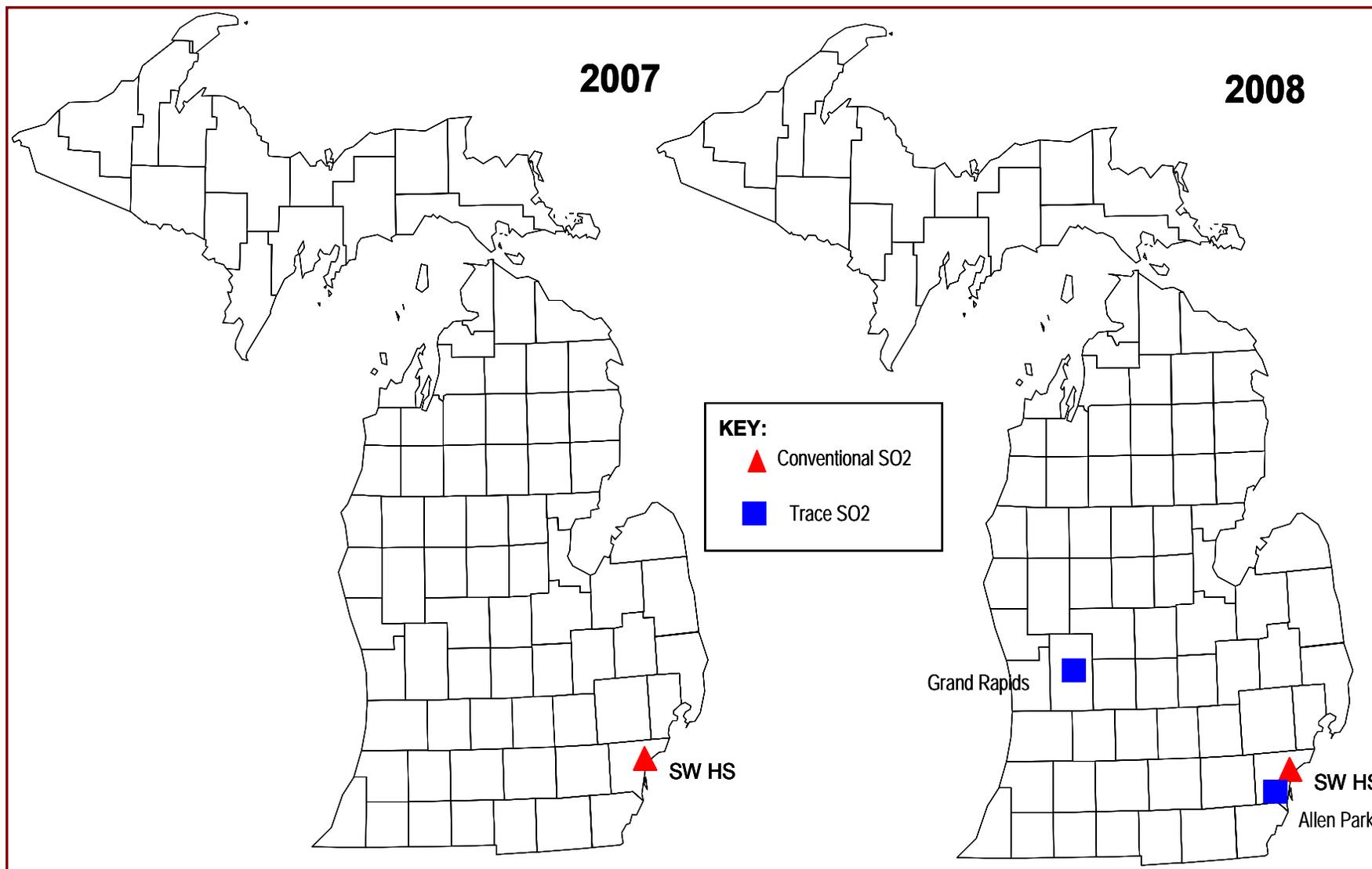
Network as of March 2008
 Former NAMS sites are shown in bold.

Site Name	Monitoring Sites		Latitude	Longitude	Measurement	Purpose	Scale	County	Start Date	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
	AQS Site ID	Address										
Fort St. (SWHS)	261630015	6921 W. Fort	42.302778	-83.106667	SO2	max conc	nghbrhd	Wayne	1/1/71	DWL	DWF	5,456,428
Grand Rapids	260810020	1179 Monroe NW	42.984167	-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: 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 17: COMPARISON OF MICHIGAN'S 2007 AND 2008 SO₂ MONITORING NETWORK



LEAD MONITORING NETWORK:

The January 20, 1999 monitoring requirements for lead state that a single NAMS site must be located in one of the two cities with the greatest population in each region. In Region 5, the Chicago-Gary-Kenosha CSA and the Detroit-Ann Arbor-Flint CSA have the largest populations, with Chicago exceeding the population level in Detroit. Although the formal NAMS lead monitor for the region should remain in Chicago due to its larger population, the NAMS monitor at Detroit's E. Seven Mile (261630019) continued its operation as a trace metals site.

The October 17, 2006 monitoring requirements also de-emphasized monitoring for lead. Historically, lead levels in Michigan have been far below the NAAQS. Therefore, as a result of the budget cuts in April 2007, most of the lead sites that were collecting lead levels as part of the Michigan Toxics Air Monitoring Program (MITAMP) were either shut down, or the number of elements that are measured by the laboratory was curtailed as a cost-savings practice. Lead was discontinued at Ypsilanti (261610008), Southwestern High School (261630015), River Rouge (261630005), Allen Park (261630001), Grand Rapids (260810020), Flint (260490021), at the background site at Houghton Lake (261130001) and at the former E. Seven Mile (261630019) NAMS site.

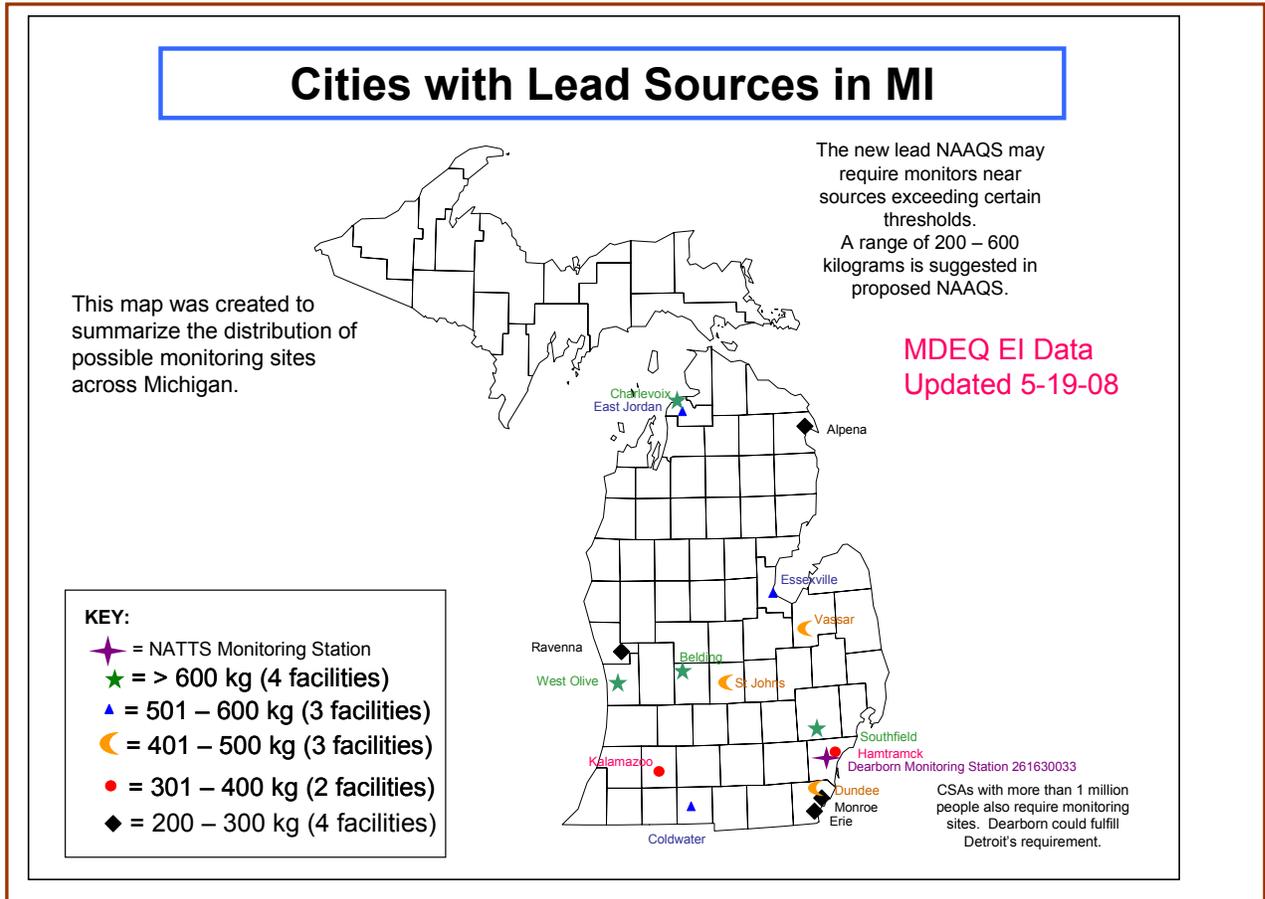
Dearborn (261630033) has been designated as a NATTS and as such, must determine trace metal concentrations from PM₁₀ filters. The MDEQ is continuing to measure trace metals from TSP to maintain continuity with our historical database and provide a full suite of trace metal measurements by various size fractions (PM_{2.5}, PM₁₀, TSP) at the NATTS site. Since operation of this site is funded through another grant source, monitoring of lead and the other trace metals, both as TSP and as PM₁₀ continued without interruption. TSP metals will continue to be measured at Dearborn, retaining continuity with the MDEQ's historical database. Lead measurements as PM_{2.5} are made throughout the speciation network.

On May 20, 2008, the EPA published the proposed lead NAAQS with the final rule due on September 15, 2008. The document proposed a level for the lead NAAQS ranging from 0.10 to 0.30 ug/m³ and solicited comments on a wider range from 0.50 ug/m³ to less than 0.10 ug/m³ and perhaps down to zero. A two-fold approach was proposed in the design of an ambient air monitoring network for lead. Combined metropolitan statistical areas with population totals greater than one million people will be required to have a lead monitor. Monitors would also be required near sources emitting more than a threshold level of lead that could range from 200 to 600 kg/year.

The Detroit-Warren-Flint CSA is the only urbanized area that would require a lead monitor in Michigan. The NATTS site at Dearborn meets this criterion. Using the most recent emission inventory data (2006) from Michigan DEQ, from four to 16 new monitoring stations could be required. **Figure 18** illustrates the distribution of possible sites across Michigan.

Changes to the lead NAAQS could impact the ambient monitoring network in ways other than increasing the number of monitoring stations. The particle size fraction may be changed from TSP to PM₁₀. This would entail use of a sampler other than the high volume particulate sampler currently operated at the Dearborn site. The averaging time may be altered from a quarterly average to a monthly average. If the averaging time changes, and depending on the details surrounding the form of the new NAAQS, a once every six day sampling frequency may generate an inadequate number of samples to be representative of lead concentrations. Depending on the sampling frequency that is selected by EPA, monitoring methodology may be inadequate and require the use of sequential low volume samplers.

FIGURE 18: CITIES WITH LEAD SOURCES IN MI



Once the lead NAAQS and monitoring details are finalized, the MDEQ will be able to evaluate the impact from the new regulations and propose changes to the network in next year's review.

Table 29 summarizes the lead monitoring site information for sites that were in existence in 2007.

Table 30 shows the lead site that is currently in operation. **Figure 19** compares the lead network in 2007 with the current design.

TABLE 28: MICHIGAN'S 2007 LEAD MONITORING NETWORK

Operating Schedule: 1:6 and 1:12 Network as of December, 2007
 Method: High Volume Sampler & ICAP Spectra

Site Name	Monitoring Sites		Latitude	Longitude	Sampling			County	Date Estab.	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
	AQS Site ID	Address			Frequency	Purpose	Scale					
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

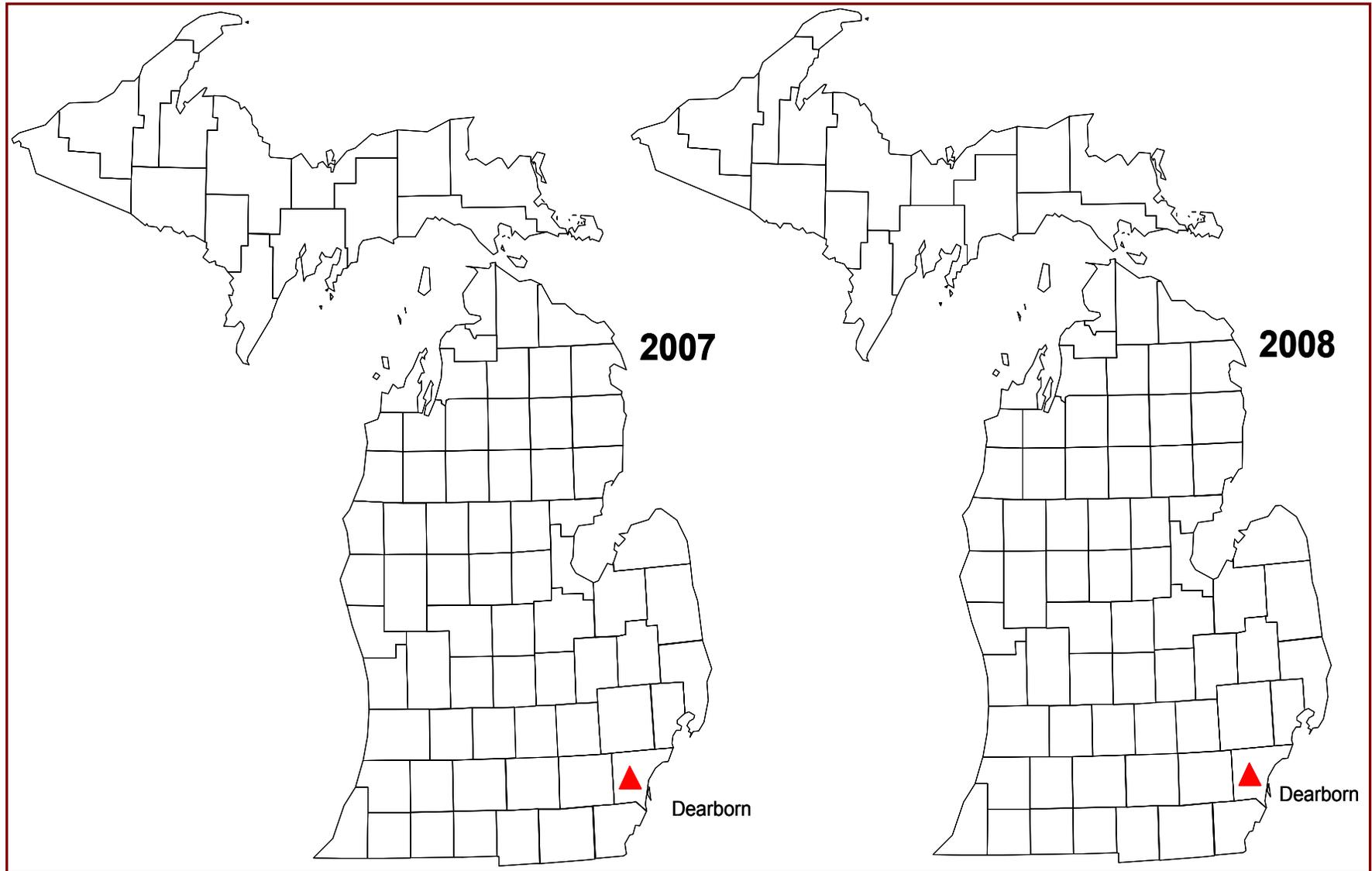
TABLE 29: 2008 LEAD MONITORING NETWORK IN MICHIGAN

Operating Schedule: 1:6 and 1:12 Network as of March, 2008
 Method: High Volume Sampler & ICAP Spectra

Site Name	Monitoring Sites		Latitude	Longitude	Sampling			County	Date Estab.	PMSA ¹	CSA ²	MSA Pop. (2000 Census)
	AQS Site ID	Address			Frequency	Purpose	Scale					
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

FIGURE 19: COMPARISON OF MICHIGAN'S 2007 AND 2008 LEAD MONITORING 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 2009 Lead Monitoring Network

During 2009, contingent upon adequate levels of funding, the MDEQ is planning to continue to collect lead measurements at:

- Dearborn NATTS site (261630033)

Any other changes to the lead network are contingent upon details in the final lead rule as well as adequate funding levels.

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, collocated PM₁₀ and TSP trace metals are also collected at Dearborn.

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)
- Southwestern High School (261630015)
- South Delray (261630027)
- River Rouge (261630005).

Table 31 summarizes the trace metal monitoring site information for sites that were in existence in 2007. **Table 32** shows the trace metal sites that are currently in operation as well as the elements that are measured at each. **Figure 20** compares the trace metal monitoring network in 2007 with the current design.

TABLE 30: MICHIGAN'S 2007 TRACE METAL MONITORING NETWORK

Operating Schedule: 1:6 and 1:12
 Method: TSP: High Volume sampler using glass fiber filter ; Emission Spectra ICAP for lead; ICP MS for remaining metals
 PM10: High Volume sampler using quartz filter; Emission Spectra ICAP for lead; ICP MS for remaining metals

Former NAMS sites are shown in bold.
 Network as of December, 2007

Monitoring Sites		Address	Latitude	Longitude	Sampling Frequency	Elements	Size	Purpose	Scale	County	Date Estab.	PMSA ¹	CSA ²
Site Name	AQS Site ID												
Flint	260490021	Whaley Park, 3610 Iowa	43.04722	-83.670278	1:6	Mn	TSP	max conc	nghbrhd	Genesee	6/17/92	Flint	DWF
Allen Park	261630001	14700 Goddard	42.228611	-83.208333	1:6	Mn, As, Cd, Ni	TSP	pop exp	nghbrhd	Wayne	5/1/99	DWL	DWF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:6	Mn, As, Cd, Ni	TSP	max conc	nghbrhd	Wayne	1/1/94	DWL	DWF
SW Highsch., Detroit	261630015	SW Highschool, 6921 W. Fort St., Detroit	42.302778	-83.106667	1:6	Mn, As, Cd, Ni	TSP	pop exp	nghbrhd	Wayne	2/26/99	DWL	DWF
Delray (Yellow Freight)	261630027	7701 W Jefferson	42.292222	-83.106944	1:6	Mn, As, Cd, Ni	TSP	max conc	nghbrhd	Wayne	10/6/04	DWL	DAAF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF

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 31: 2008 TRACE METAL MONITORING NETWORK IN MICHIGAN

Operating Schedule: 1:6 and 1:12
 Method: TSP: High Volume sampler using glass fiber filter ; Emission Spectra ICAP for lead; ICP MS for remaining metals
 PM10: High Volume sampler using quartz filter; Emission Spectra ICAP for lead; ICP MS for remaining metals

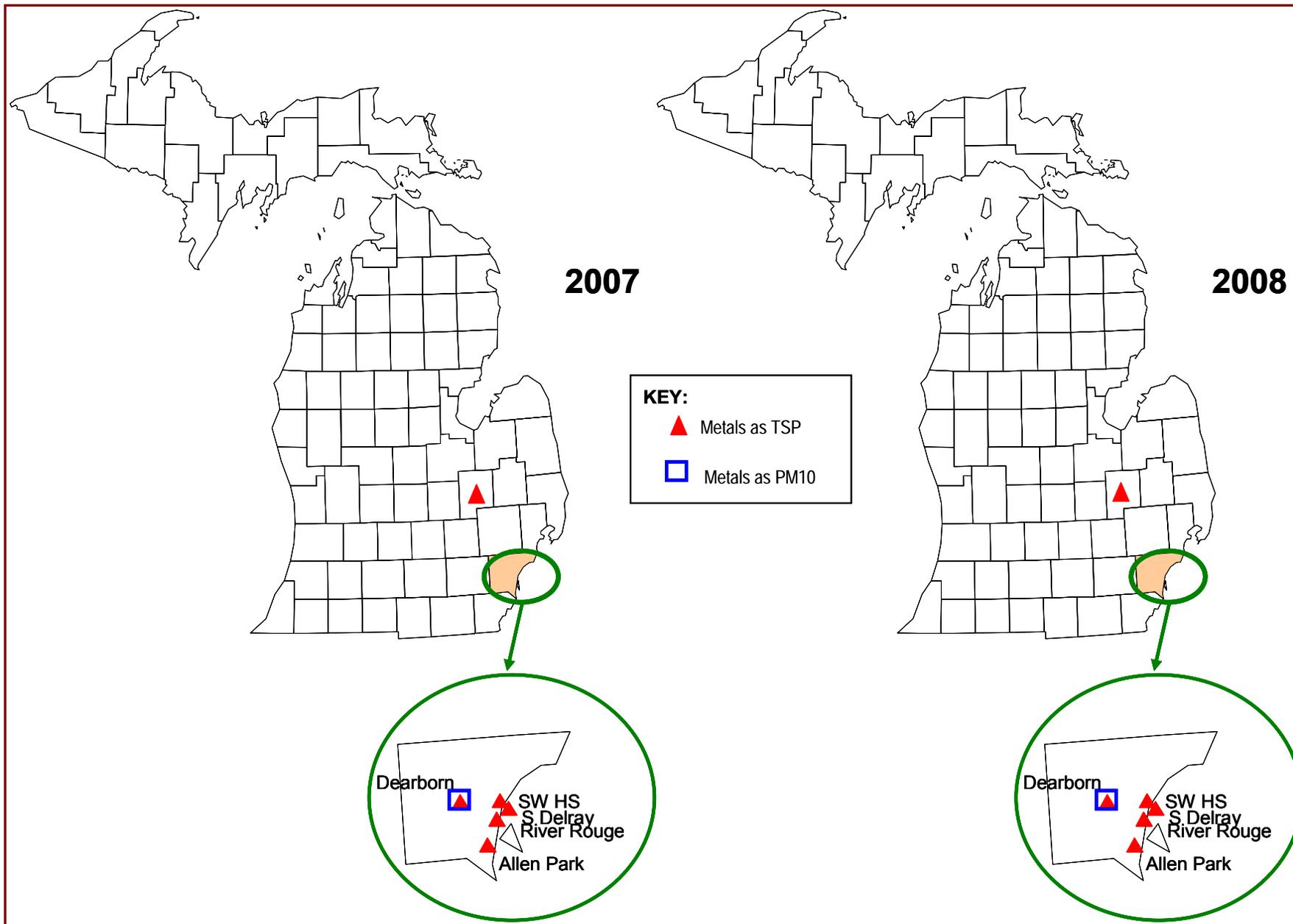
Former NAMS sites are shown in bold.
 Network as of March 2008

Monitoring Sites		Address	Latitude	Longitude	Sampling Frequency	Elements	Size	Purpose	Scale	County	Date Estab.	PMSA ¹	CSA ²
Site Name	AQS Site ID												
Flint	260490021	Whaley Park, 3610 Iowa	43.04722	-83.670278	1:6	Mn	TSP	max conc	nghbrhd	Genesee	6/17/92	Flint	DWF
Allen Park	261630001	14700 Goddard	42.228611	-83.208333	1:6	Mn, As, Cd, Ni	TSP	pop exp	nghbrhd	Wayne	5/1/99	DWL	DWF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF
River Rouge	261630005	315 Genesee	42.267222	-83.132222	1:6	Mn, As, Cd, Ni	TSP	max conc	nghbrhd	Wayne	1/1/94	DWL	DWF
SW Highsch., Detroit	261630015	SW Highschool, 6921 W. Fort St., Detroit	42.302778	-83.106667	1:6	Mn, As, Cd, Ni	TSP	pop exp	nghbrhd	Wayne	2/26/99	DWL	DWF
Delray (Yellow Freight)	261630027	7701 W Jefferson	42.292222	-83.106944	1:6	Mn, As, Cd, Ni	TSP	max conc	nghbrhd	Wayne	10/6/04	DWL	DAAF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	TSP	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF
Dearborn	261630033	2842 Wyoming	42.306666	-83.148889	1:6	Be, V, Cr, Mn, Co, Ni, Cu, Zn, As, Mo, Cd, Ba, Pb, Fe	PM 10	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF

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 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

FIGURE 20: COMPARISON OF MICHIGAN'S 2007 AND 2008 TRACE METAL MONITORING NETWORK



Trace Metal 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 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 2009 Trace Metal Network:

During 2009, 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) – manganese, nickel, arsenic and cadmium only
- Southwestern High School (261630015) – manganese, nickel, arsenic and cadmium only
- South Delray (261630027) – manganese, nickel, arsenic and cadmium only
- River Rouge (261630005) – manganese, nickel, arsenic and cadmium 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

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 Southwestern 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 33 summarizes the VOC monitoring site information for sites that were in existence in 2007. **Table 34** shows the VOC sites that are currently in operation. **Figure 21** compares the VOC monitoring network in 2007 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 2009 VOC Monitoring Network

During 2009, contingent upon adequate levels of funding, the MDEQ is planning to continue to collect VOCs at:

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

TABLE 32: MICHIGAN'S 2007 VOC MONITORING NETWORK

Operating Schedule: 1:6 and 1:12; PAMS site has hourly measurements via GC
 Method: Stainless Steel Pressurized Canister Sampler; Gas Chromatograph/ Mass Spectrometer (24-hr samples) Network as of December, 2007

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	1:6	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 33: 2008 VOC MONITORING NETWORK IN MICHIGAN

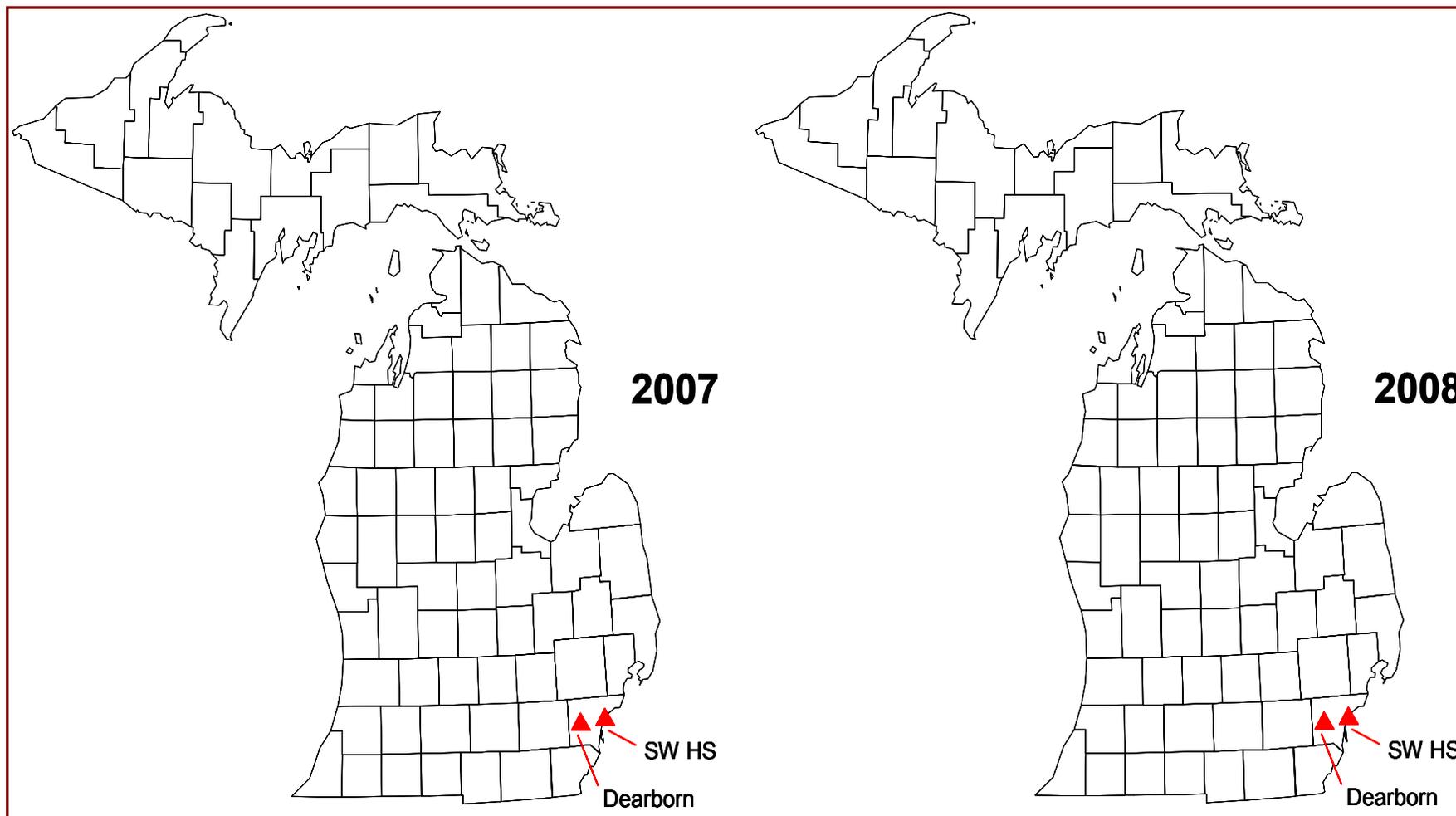
Operating Schedule: 1:6 and 1:12; PAMS site has hourly measurements via GC
 Method: Stainless Steel Pressurized Canister Sampler; Gas Chromatograph/ Mass Spectrometer (24-hr samples) Network as of March 2008

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	1:6	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
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FIGURE 21: COMPARISON OF MICHIGAN'S 2007 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 Southwestern 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 vary, unlike other areas of the U.S. where concentrations are more uniform. 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. Southwestern High School (261630015) is 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. This resulted in the following carbonyl monitoring sites being shut down:

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

Table 35 summarizes the carbonyl monitoring site information for sites that were in existence in 2007. **Table 36** shows the carbonyl sites that are currently in operation. **Figure 22** compares the carbonyl monitoring network in 2007 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 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 2009 Carbonyl Monitoring Network

During 2009, contingent upon adequate levels of funding, Michigan is planning to continue to collect carbonyls at:

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

TABLE 34: MICHIGAN'S 2007 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 December 2007

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

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 GRMH = Grand Rapids-Muskegon-Holland Combined Stat. Area

TABLE 35: 2008 CARBONYL MONITORING NETWORK IN MICHIGAN

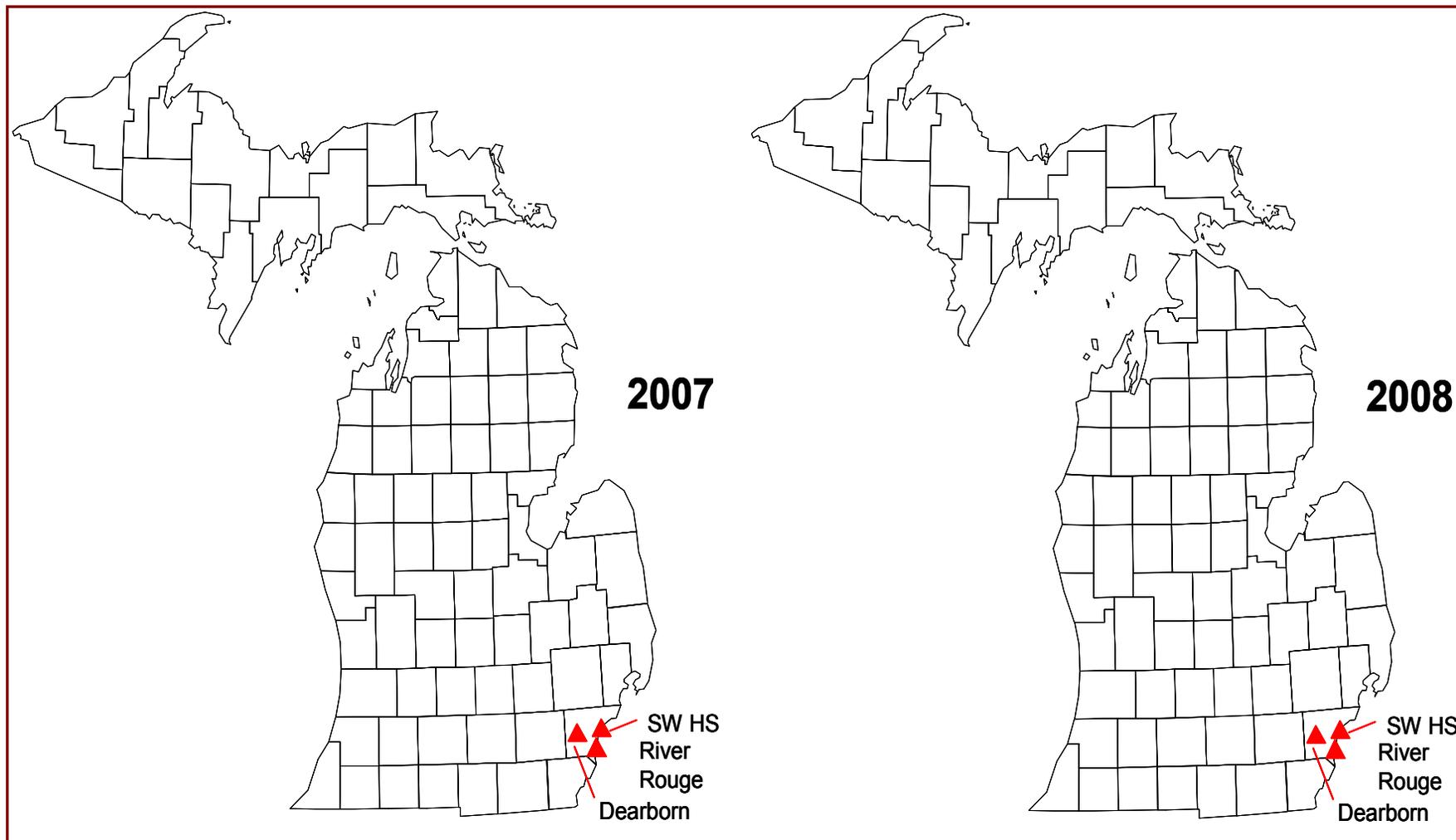
Operating Schedule: 1:6 and 1:12
 Method: 2,4 dinitrophenyl hydrazine treated silica gel cartridges; HPLC with ultraviolet absorption
 Network as of March 2008

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

FIGURE 22: COMPARISON OF MICHIGAN'S 2007 AND 2008 CARBONYL MONITORING NETWORK



POLYNUCLEAR AROMATIC HYDROCARBON (PAH) MONITORING NETWORK:

As part of EPA's desire to augment 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 where it is extracted and analyzed according to American Society for Testing and Materials test method D 6209, which is equivalent to EPA method TO-13A.

There were no PAH sites in existence in 2007. **Table 37** shows the PAH sites that are currently in operation.

TABLE 36: 2008 PAH MONITORING NETWORK IN MICHIGAN

Operating Schedule: 1:6										Network as of April 2008			
Method: Polyurethane foam plugs and XAD-2 resin with gas chromatography mass spectrometry													
Monitoring Sites					Sampling							MSA Pop.	
Site Name	AQS Site ID	Address	Latitude	Longitude	Frequency	Purpose	Scale	County	Date Estab.	PMSA ¹	CSA ²	(2000 Census)	
Dearborn	261630033	2842 Wyoming	42.30667	-83.14889	1:6	max conc	nghbrhd	Wayne	6/1/90	DWL	DWF	5,456,428	
¹ PMSA Key:						² CSA Key:							
DWL= Detroit-Warren-Livonia Metro. Area						DWF = Detroit-Warren-Flint Combined Statistical Area							

PAH 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 uses a similar packed sampling thimble that is dedicated to audit use only. 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 2009 PAH Monitoring Network

During 2009, 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)

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 by both MDEQ and EPA auditors.

The overall design of the regional air monitoring networks will be assessed by the EPA Regional 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
AMU	Air Monitoring Unit
ANPR	Advanced Notice of Proposed Rulemaking (EPA)
AQD	Air Quality Division
AQS	Air Quality System (EPA air monitoring data archive)
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
EC	Elemental carbon
EC/OC	Elemental carbon/organic carbon
EPA	U.S. Environmental Protection Agency
FDMS	Filter Dynamic Measurement System
FRM	Federal Reference Method
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
NO ₂	Nitrogen dioxide
NO _y	Oxides of nitrogen + nitric acid + organic and inorganic nitrates
NPAP	National Performance Audit Program
OC	Organic carbon
PAH	Polynuclear Aromatic Hydrocarbon
PAMS	Photochemical Assessment Monitoring Station
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 (1 ppm = 1,000 ppb)
QA	Quality assurance
QAPP	Quality Assurance Project Plan
SLAMS	State and Local Air Monitoring Station
SO ₂	Sulfur dioxide
STN	Speciation Trend Network (PM _{2.5})
TEOM	Tapered element oscillating microbalance (hourly PM _{2.5} measurement monitor)
TSP	Total Suspended Particulate
U.S.	United States
VOC	Volatile organic compounds
W126	Weighted sum of hourly ozone values measured during daylight hours

APPENDIX B: SUMMARY OF COMMENTS RECEIVED AND REPLIES

As part of the network review process, the 2009 Monitoring Network Review was placed on the MDEQ's web page for public comment. Stake holders were notified by e-mail. A 30-day time frame was provided for written comments. This section of the network review responds to those comments.

Four letters were received: one from an industrial stakeholder and three governmental advisory agencies. A regional governmental agency submitted verbal comments.

General themes discussed by the respondents included:

- Support of redesign of the PM_{2.5} speciation monitoring network;
- Support of the new PM_{2.5} background site at Tecumseh; and
- Recognition of the value of maintaining a spatially dense, long term network to better understand PM_{2.5}.

Specific concerns entailed:

- Support by all of the commentators to relocate the Kalamazoo (260770008) PM_{2.5} speciation monitor to Port Huron (261470005).
- All commentators supported refining the PM_{2.5} speciation network one step further by moving the Ypsilanti (261610008) PM_{2.5} speciation monitor to Southwestern High School (261630015) in Detroit.
- Three of the commentators recognized the need to continue collecting measurements at the background site in Tecumseh (260910008) and urged the MDEQ to continue the operation of this site, if at all possible.
- One commenter discussed the need to relocate ozone monitors along the eastern and western shorelines of the Lower Peninsula, retaining fewer ozone monitors in the interior.
- One commentator suggested the collection of continuous EC/OC measurements at site(s) closer to the Dearborn (261630033) monitor.

This section discusses the general themes first, then the specific concerns. MDEQ's responses to the comments are *italicized*.

General Themes

Support of redesign of the PM_{2.5} speciation monitoring network: *MDEQ agrees that the proposed changes to the speciation network will capture data that will be useful to better understand the chemical composition of elevated 24-hour spikes in PM_{2.5}. This will be important as MDEQ works with stakeholders to develop attainment strategies for the 24-hour spikes in PM_{2.5} standard.*

Support of the new PM_{2.5} background site at Tecumseh: *MDEQ agrees that data at the Tecumseh (260910007) site is important to understand regional transport and to characterize primary and secondary organic carbon. Funding to support the continued operation of the site is uncertain at this time. MDEQ will strive to retain fine particulate related measurements at Tecumseh (260910007) if at all possible.*

Recognition of the value of maintaining a spatially dense, long term network to better understand PM_{2.5}: *MDEQ agrees that a spatially dense network is critical to unravel the nature of fine particulate material and in the development of attainment strategies. However, with the possible transition from 103 to 105 grant funding looming in the near future, it is uncertain how much of the*

current network will be able to be retained. The network design criteria that is described in the Federal Register specifies the minimum number of $PM_{2.5}$ sites for metropolitan areas. Any monitor surpassing the minimum number and locations required in the Federal Register are candidates for elimination if the conversion from 103 to 105 grant funding occurs.

Specific Issues

Relocation of the Kalamazoo (260770008) $PM_{2.5}$ speciation monitor to Port Huron (261470005): MDEQ agrees. The $PM_{2.5}$ speciation monitor will be operational at Port Huron (261470005) before July 1, 2008 if arrangements can be finalized with the national contract laboratory for the sampling media.

Move the Ypsilanti (261610008) $PM_{2.5}$ speciation monitor to Southwestern High School (261630015) in Detroit: MDEQ agrees. The $PM_{2.5}$ speciation monitor will be operational at Southwestern High School (261630015) before July 1, 2008 if arrangements can be finalized with the national contract laboratory for the sampling media.

Continue collecting measurements at the background site in Tecumseh (260910008): MDEQ agrees that the $PM_{2.5}$ FRM and $PM_{2.5}$ speciation measurements as well as the continuous EC/OC measurements at Tecumseh (260910007) are important and support:

- better characterization of long range transport of fine particulate material;
- investigation of secondary and primary organic carbon; and
- development of attainment strategies.

MDEQ will investigate alternative funding sources that will support continued operation of the speciation and FRM monitors. MDEQ is already seeking additional funding to purchase the EC/OC monitor that is currently being rented by MDEQ.

Relocate ozone monitors along the eastern and western shorelines of the Lower Peninsula and retain fewer ozone monitors in the interior: The ozone monitors that are located in the interior of the Lower Peninsula are required according to ozone network design criteria outlined in Table D-2 of the Federal Register. However, the ozone network design requirements specified in the Federal Register could be modified as a result of the changes to the ozone NAAQS. More monitoring could be required in rural areas, which could apply to the shorelines mentioned by the commenter. Monitors could also be required in other, less populated metropolitan areas. EPA is expected to provide guidance discussing these possible network design changes shortly. Because it is likely the guidance will be issued after the due date of July 1, 2008 for the current network review, any changes to the ozone network will be discussed in the 2010 network review.

Collect continuous EC/OC measurements at site(s) closer to the Dearborn (261630033) monitor. There are few suitable monitoring locations in the area specified. Negotiating access to site(s) and obtaining power upgrades can be arduous and time consuming. If a funding mechanism can be located and help obtained to negotiate access to the site(s) and power, MDEQ will investigate this possibility.

APPENDIX C: WRITTEN COMMENTS RECEIVED

SEMCOG . . . *Equipping local government leaders for the future*

Southeast Michigan Council of Governments • 535 Griswold Street • Suite 300 • Detroit, Michigan 48226 • (313) 961-4266 • Fax (313) 961-4869
 www.semco.org

May 21, 2008

Dr. Mary Ann Heindorf
 MDEQ - Air Quality Division
 P.O. Box 30260
 525 West Allegan Street
 Lansing, MI 48909-7760

RECEIVED

MAY 23 2008

AIR QUALITY DIV.

Dear Dr. Heindorf,

Mary Ann

SEMCOG, the lead local air quality planning agency in Southeast Michigan submits the following comments in regard to Michigan's 2009 Ambient Air Monitoring Network Review. Our comments are based on maximizing the value of monitoring data to support critical decisions we must make to achieve national air quality standards and to assure we have data representative of the region's air quality.

- SEMCOG strongly supports the relocation of the Kalamazoo PM2.5 speciation monitor to Port Huron. It is essential that MDEQ and SEMCOG gain a better understanding of the high 24-hour PM2.5 concentrations that are occurring at this site on days when the rest of the Southeast Michigan monitoring network remains low. Determining which PM2.5 components are elevated on these high days, and the wind direction associated with them, will allow for better pinpointing of likely source contributors.
- SEMCOG also recommends the relocation of the PM2.5 speciation monitor at Ypsilanti to the Southwestern High School (Fort Street) site, in southwest Detroit. Annual average fine particulate concentrations at Southwestern High School, while declining, are the second highest in the region. Daily concentrations are also elevated and the site is located in a highly industrialized area with many potential source contributors. More information is needed regarding the composition of PM2.5 at this site in order to determine the most effective strategy for bringing the area into attainment of the NAAQS.
- SEMCOG is very pleased that MDEQ has begun collecting PM2.5 data at the Tecumseh site. This site will provide critical information on background concentrations in Southeast Michigan. However, we are very concerned that funding may not be available to continue this monitoring beyond April 1, 2009. While having one year of data from this site will provide some idea of background concentrations, a longer data history is needed to secure a statistically robust dataset.

The benefits of having a spatially dense, consistent and long-term monitoring network was most recently affirmed in the PM2.5 conceptual model development just completed for SEMCOG by Jay Turner of Washington University in St. Louis. The in-depth analysis performed for this model development was only possible because of the long monitoring history available from multiple sites in Southeast Michigan. SEMCOG urges MDEQ and EPA to provide the necessary funding to keep this entire monitoring network operating in future years.

William T. Roberts
 Chairperson
 Mayor,
 City of Walled Lake

Mary Blackmon
 First Vice Chair
 Trustee, Wayne County
 Regional Education
 Service Agency

Robert J. Cannon
 Vice Chairperson
 Supervisor,
 Clinton Township

Philip M. Cavanagh
 Vice Chairperson
 Commissioner,
 Wayne County Board
 of Commissioners

Robert Hison
 Vice Chairperson
 Mayor,
 City of St. Clair Shores

Michael Sedlak
 Vice Chairperson
 Clerk,
 Green Oak Township

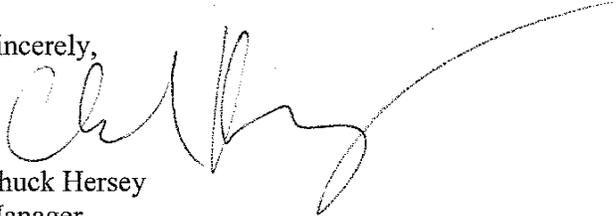
John F. Jones
 Immediate Past Chair
 Supervisor,
 Ira Township

Paul E. Tait
 Executive Director

May 21, 2008
Page 2

With the ever increasing stringency of national PM2.5 standards, the need for more and better air monitoring has never been greater. Funding must be provided to allow for the collection and analysis of this data in order to effectively address the true source contributors in Southeast Michigan and other regions across the country.

Sincerely,



Chuck Hersey
Manager
Environmental Program

cc: Steven Chester, MDEQ
Jim Sygo, MDEQ
Vinson Hellwig, MDEQ

From: Mike Koerber <koerber@ladco.org>
To: HeindorfM@michigan.gov
Date: 5/9/2008 9:54:26 AM
Subject: Public Comment: Michigan's 2009 Ambient Air Monitoring Network Review

Mary Ann:

I would like to offer two comments on the State of Michigan's 2009 ambient air monitoring network review:

(1) Need to continue ambient monitoring program: The Michigan Department of Environmental Quality (MDEQ) has done an outstanding job of establishing and operating a high quality ambient monitoring network. The monitoring data provide the foundation for effective and appropriate air quality management. For example, the rich set of PM_{2.5}-related measurements in southeastern Michigan have supported the development of the State Implementation Plan to address the current annual PM_{2.5} standard, and provide the basis for the recent conceptual model prepared by Dr. Jay Turner for the new daily PM_{2.5} standard. Neither of these efforts would have been possible without MDEQ's monitoring data. I, therefore, strongly encourage MDEQ to continue their ambient monitoring program.

(2) Revision to PM_{2.5}-speciation network: As discussed at the May 6, 2008, SEMOS meeting, additional PM_{2.5}-speciation measurements are needed in southeastern Michigan to increase understanding of the PM_{2.5} problem in that part of the state. In particular, the Ypsilanti and Kalamazoo speciation monitors should be moved to Southwestern High School (261630015) and Port Huron (261470005). The Southwestern High School site is one of two remaining sites in Wayne County still measuring nonattainment of the annual PM_{2.5} standard. Speciation data at this location would aid in further source apportionment analyses. The Port Huron site is at the northern fringe of the southeastern Michigan area and is impacted on a number of days from other source regions (e.g., southwestern Ontario). Speciation data at this location would also aid in further source apportionment analyses.

In addition, another high priority is establishing an appropriate background monitoring site with PM_{2.5}-mass and speciation data for the southeastern Michigan area (see, for example, recommendations in "Data Analysis and Source Apportionment of PM_{2.5} in Selected Midwestern Cities", Final Report, April 2008, Sonoma Technology, Inc. and "A Conceptual Model for Ambient Fine Particulate Matter Over Southeast Michigan: High Concentration Days", Revision 0.2 (Draft Final Report), April 23, 2008, Washington University). MDEQ's establishment of a site at Tecumseh meets this need. Although the Ypsilanti site was established to provide upwind measurements, it was found to be influenced by emissions from the urbanized area and, thus, does not represent an appropriate background site. (As noted above, the Ypsilanti speciation monitor should be moved to address more important needs.) Tecumseh is sufficiently removed from the urbanized area and is located in a predominant upwind direction. MDEQ's network review document mentions that the PM_{2.5}-mass and speciation measurements will continue for only one year at Tecumseh as part of a special study. While analyses of the Tecumseh should be conducted to verify the appropriateness of this site for background measurements, I strongly encourage MDEQ to continue operation of the PM_{2.5}-mass and speciation monitoring at Tecumseh beyond the 1-year study period.

Finally, the network review document references the EPA Region V study of impacts from locomotive on air quality and mentions the establishment of a continuous EC/OC sampler at Tecumseh to collect upwind data. Please note that we are continuing to discuss the proper location of upwind monitors for this study and encourage MDEQ to look for a site(s) closer to the railyard near the Dearborn monitor. Tecumseh is too far upwind to provide appropriate EC/OC data to help assess the impact from primary EC and OC emissions from the railyard.

Thank you for the opportunity to comment.

Mike

Michael Koerber
Executive Director
Lake Michigan Air Directors Consortium
9501 W. Devon Avenue, Suite 701
Rosemont, IL 60018
847-720-7880
koerber@ladco.org

From: "Kissling, Kurt" <kisslink@pepperlaw.com>
To: HeindorfM@michigan.gov
Date: 5/30/2008 11:36:17 AM
Subject: Michigan's 2009 Ambient Air Monitoring Network Review

Ms. Heindorf:

On behalf of my client, Oakland County, Michigan, I hereby submit the following comment on MDEQ's 2009 Ambient Air Monitoring Network Review:

To improve the data quality and availability in the Detroit nonattainment area, Commenter recommends the transfer of the PM-2.5 speciation monitors currently situated in Kalamazoo and Ypsilanti to the existing monitoring sites in Port Huron and Southwestern High School (Detroit). There is a far greater need for speciation data at the Port Huron and Southwestern High School locations because those monitoring sites are within the PM-2.5 nonattainment area and located at key locations where additional speciation data will assist the State of Michigan with understanding and addressing PM-2.5 emissions. Speciation data at these new locations should help assist with future attainment efforts and demonstrations.

Please contact me with any questions.

Thanks,
Kurt A. Kissling
Pepper Hamilton LLP
100 Renaissance Center, 36th Floor
Detroit, MI 48243-1157
313.393.7313 - Direct
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CC: Lerminiauxk@oakgov.com

From: Michael P Lebeis <lebeism@dteenergy.com>
To: HeindorfM@michigan.gov
Date: 6/2/2008 12:49:04 PM
Subject: Comments on 2009 Michigan Air Monitoring Review
CC: woolleyl@dteenergy.com; 124Hleonardd@dteenergy.com

Dear Mary Ann:

DTE Energy provides the following comments in response to your ambient air quality network review, posted on the MDEQ web site, one month ago. DTE Energy supports your plan to optimize the State of Michigan's air monitoring network. We believe that your proposed plan meets this goal. We especially appreciate that you are willing to discuss it with the business community in groups, including SEMOS. Also, the fact that you incorporate many of the business participant suggestions into your monitoring plan is very encouraging to us that you listen to how these decisions affect industries in the State.

Your task is extremely challenging as regulated pollutants change, as ambient standards are revised and as monitoring requirements get updated. Your agency has focused monitoring efforts on the areas in Michigan likely to have difficulty meeting the respective ambient air quality standards.

Over the last five years, the spotlight has been on ground-level ozone (O₃) and fine particulate matter (PM_{2.5}). Most of the emphasis has been on these two criteria pollutants, with corresponding greater resources aimed to address them rather than the other criteria pollutants, and hazardous air pollutants. DTE Energy supports this monitoring focus.

We offer a few suggestions for monitoring site relocations, and retaining monitors in certain areas, rather than in locations with lower ambient levels.

1. Ozone monitors need to be located along the eastern and western edges of the Lower Peninsula (LP), with fewer in the interior of the LP and only one in the Upper Peninsula (UP).
2. If funds allow, keep the special monitoring program going at the Tecumseh site, to provide concentration data for the impact from upwind states' into southeast Michigan. The Luna Pier site is likely affected by Toledo, and does not identify unbiased background levels.
3. Move the speciated PM_{2.5} monitor from Kalamazoo to Port Huron to help determine the source(s) of high 24-hour average levels, when other sites in southeast Michigan are experiencing lower PM_{2.5} concentrations.
4. If funds allow, move the Ypsilanti PM_{2.5} speciation monitor to the Southwestern High School site in Detroit.

Thank you for this opportunity to comment on the MDEQ's monitoring plan for 2009.

Mike Lebeis
Senior Air Quality Engineer
Environmental Management & Resources
DTE Energy
313-235-8615