Appendix B

Appendix B

Data Analysis to Determine Possible PM2.5 Contributions from Nonattainment Counties North of Wayne County Michigan Using 2001 – 2005 Data

March 23, 2006

Background

There has been an ongoing disagreement between local, state and federal officials regarding which counties should be included in the official PM2.5 nonattainment area for the Detroit metropolitan area. Michigan submitted to the Environmental Protection Agency (EPA) a list of counties that it recommended to be considered nonattainment for PM2.5 in February 2004. This original submittal recommended two separate nonattainment areas, one for Wayne County and another for Monroe County.

EPA responded in December 2004 that it felt the entire Detroit-Ann Arbor Consolidated Metropolitan Statistical Area (CMSA) should be included in one nonattainment area. This nonattainment area includes the following counties: Monroe, Washtenaw, Wayne, Livingston, Oakland, Macomb and St. Clair. EPA used a number of factors to determine which counties to include in the nonattainment area. Some of the key factors that EPA used to determine which counties should be designated nonattainment included: PM2.5 primary and precursor emissions, commuting patterns, projected population growth and "contribution" from the nearby county under consideration.

The State of Michigan, and Oakland County, both objected to EPA's PM2.5 nonattainment area designations. The State sent a letter to EPA Region 5 requesting EPA to reconsider their decision on February 22. 2005. Oakland County petitioned EPA to reconsider its decision to include it in the nonattainment area on March 7, 2005.

EPA denied both petitions for reconsideration on January 20, 2006. A critical factor that EPA cited in this denial is that EPA considered the entire Detroit-Ann Arbor CMSA as contributing to PM2.5 nonattainment in Wayne County. EPA's analysis "showed that the surrounding counties had sufficient emissions of PM2.5 and precursor pollutants sulfur dioxide (SO2), nitrogen oxides (NOx) and volatile organic compounds (VOC) to cause a contribution to the violating monitors in Wayne County." In fact, the denial of the Oakland County petition was much more detailed than the one for the State because Oakland County raised a number of new issues that EPA had to address.

One of these new analyses dealt with using a representative PM2.5 background level based on data from PM2.5 monitors upwind of Oakland County when it is potentially impacting Wayne County. This occurs when winds are coming from the north to northwest. EPA chose to use rural Pennsylvania and Illinois sites to estimate background PM2.5 levels for all wind directions in its initial Detroit area contribution analysis. EPA's response to the Oakland County reconsideration request chose to use data from Saginaw and Bay City in their revised background determination procedure. EPA's analysis, first, looked at winds with a northerly component (wind directions from the west, clockwise to coming from the east). EPA's analysis showed

PM2.5 levels (2002-2004 data) increasing from 7.32 ug/m^3 in Saginaw, to 8.72 ug/m^3 in Flint. As the air mass traversed Oakland County with northerly winds the PM2.5 concentrations increased to 10.00 ug/m^3 at Oak Park and jumped to 13.66 ug/m^3 in Allen Park.

Later in EPA's response, they refined their analysis to focus on a 45-degree wide northwest wind sector. The results were similar with PM2.5 levels 6.74 ug/m^3 in Saginaw, 7.74 ug/m^3 in Flint, 8.77 ug/m^3 in Oak Park and 12.14 ug/m^3 in Allen Park. EPA cited this data as showing a continuing upward PM2.5 gradient as an air mass moves towards Wayne County from Oakland County, validating the premise that Oakland County contributes to PM2.5 nonattainment in Wayne County.

Weaknesses in EPA's PM2.5 Contribution Analysis

EPA's wind direction analysis was discussed at the January 10, 2006, meeting of the Southeast Michigan Ozone Study (SEMOS) Group that has been meeting over the last ten years to address ozone and particulate matter state implementation plan (SIP) issues for southeast Michigan. A presentation was made, by Michael Lebeis, regarding upwind county PM2.5 contributions with northeast flow in the area using 2001 and 2002 data. During the presentation, and in the discussion that followed, some weaknesses in EPA's analysis for Oakland County were identified. The author is performing additional PM2.5 gradient analyses to overcome these weaknesses in EPA's contribution assessment for northwest flow (Oakland County contribution) and northeast flow (St. Clair and Macomb county contribution) using PM2.5 data from 2001 through 2005.

EPA's Oakland County PM2.5 contribution analysis identifies contributions either at the border between Oakland and Wayne counties (Oak Park), or downwind of the major industrial zone with northerly flow (Allen Park). The contribution analysis should identify how much Oakland County contributes to the part of Wayne County where the PM2.5 National Ambient Air Quality Standard (NAAQS) is exceeded. The Wayne County monitor with the highest PM2.5 concentrations is the Dearborn monitor. Southwestern High School (SWHS), consistently, has the second-highest annual average PM2.5 levels. Recent modeling runs that EPA made to support their CAIR show these two monitors will have the most difficulty meeting the NAAQS after emission reductions from future national controls are considered. Therefore, the contribution analysis should focus on upwind county contributions to these two critical monitors, rather than the sites that EPA chose to assess.

A second weakness is that EPA's PM2.5 contribution evaluation looked at Oakland County being upwind of Wayne County with winds from the north (coarse analysis), or with winds from the northwest (refined analysis). The assessment must evaluate how much Oakland County contributes when it is upwind of the Dearborn and SWHS sites. The appropriate wind direction sector for Oakland County ranges from, approximately, west-northwest (300°) to north (360°). In fact, the greatest population density in Oakland County is in the eastern five miles of the County that is due north of the Dearborn monitor. Table 4, from EPA's supporting document analysis for Oakland County's petition for reconsideration, identifies a decrease in PM2.5 levels from Flint (6.54 ug/m^3) to Oak Park (6.33 ug/m^3) with winds from the north. The north sector

includes winds from 338° through 22°. It is important to include the part of this sector in the analysis when the eastern part of Oakland County is upwind of the Dearborn site.

A final difference between the current analysis and EPA's is the meteorological data set used to identify which sampling days had wind flow towards Wayne County from Oakland, or St. Clair / Macomb counties. EPA chose to use weather data from the Oakland County monitor. EPA compared weather data from this site to data from the Saginaw monitoring site, and saw a good correlation between them. The author chose to use meteorological data from two National Weather Service (NWS) sites, Flint (FNT) and Detroit Metro Airport (DTW), due to availability and higher data retrieval. Also, both FNT and DTW are far enough inland from Lake Huron and Lake Erie that lake breeze influences do not dominate the flow pattern during the late spring and early summer months. The FNT site is representative for the counties north of Wayne County. DTW data is appropriate for the weather conditions in Wayne County. The daily resultant wind direction is reported in the local climatological data (LCD) summaries for both FNT and DTW, and was used to identify sampling days where upwind counties may have contributed to Wayne County PM2.5 levels.

Northwest Flow / Northeast Flow PM2.5 Contribution Analysis Methodology

The first step of the procedure is to identify sampling days from 2001 through 2005 with northwest flow (300°–360°) and northeast flow (0°–60°), using FNT and DTW LCD summaries. The daily resultant wind direction data were used in this part of the method. The average of the FNT and DTW wind direction was compared to see if a PM2.5 sampling day fell into either applicable wind direction sector. If the average wind direction was 360°, the day was considered a northwest flow day since eastern Oakland County is upwind of the Dearborn site with that particular flow vector.

PM2.5 data were tabulated for northwest flow days from the following sites to identify PM2.5 gradients when Oakland County is upwind of the high PM2.5 sites in Wayne County:

1. Saginaw
2. Flint
3. Oak Park
4. Linwood
5. Southwestern High School
6. Dearborn
7. Allen Park

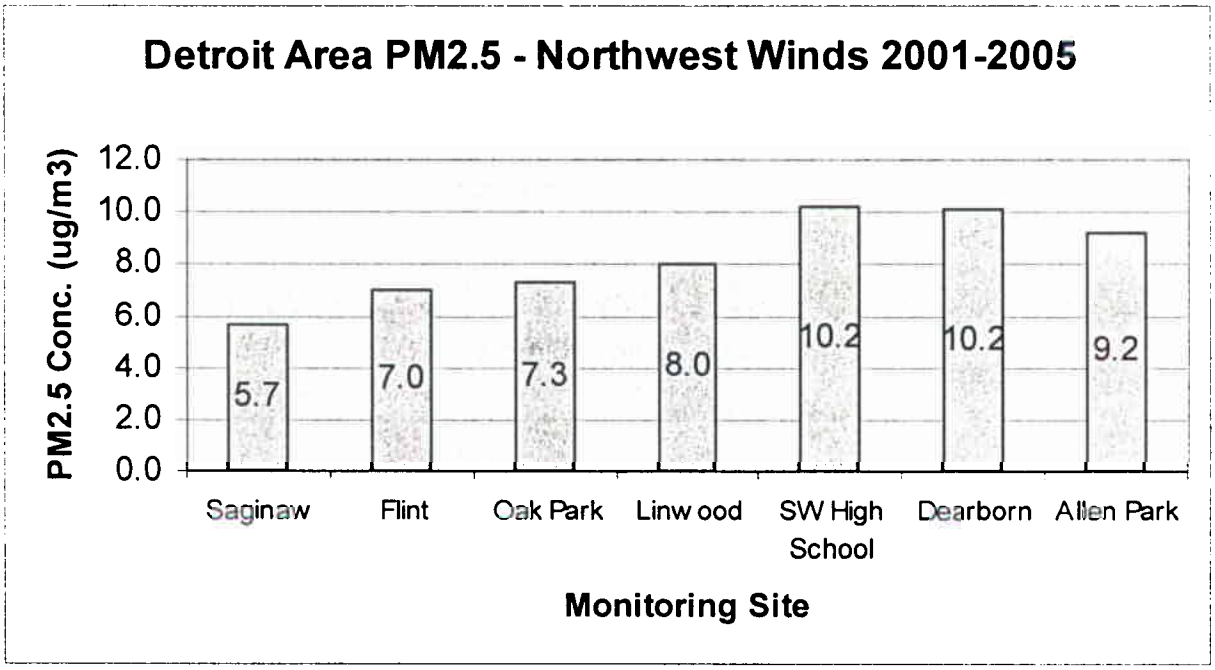
The northeast flow PM2.5 gradient was determined using the following sites when St. Clair and Macomb County are upwind of Wayne County:

1. Port Huron
2. New Haven
3. East Seven Mile
4. Linwood
5. Southwestern High School
6. Dearborn
7. Allen Park

Data were incorporated into separate spreadsheets for each respective flow analysis. Averages were calculated to identify how PM2.5 concentrations increase, or decrease, as an air mass approaches Wayne County from the northwest and northeast.

Northwest Flow PM2.5 Contribution Results

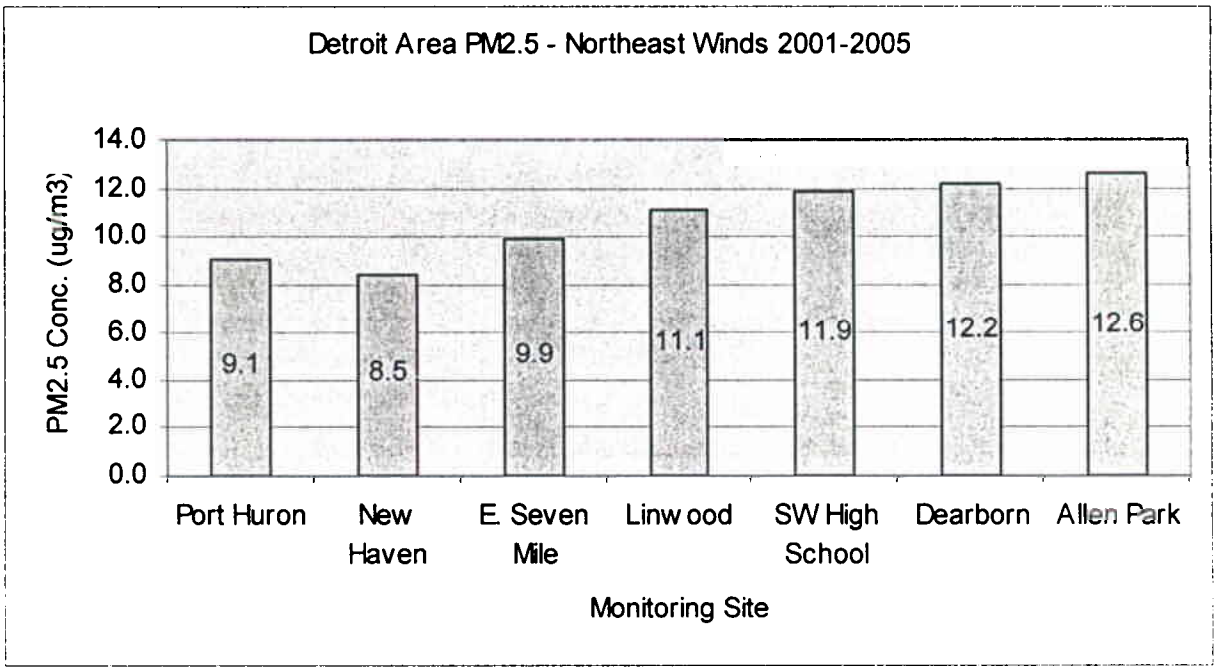
The following figure illustrates the average PM2.5 concentrations during 2001 through 2005 with northwest flow (300°-360°) in metropolitan Detroit. With northwesterly winds in southeast Michigan, the PM2.5 concentration increases from a background level of 5.7 ug/m^3 at the Saginaw monitor, to 7.0 ug/m^3 at the Flint site. The PM2.5 gradient lessens between Flint and Oak Park which is only 0.3 ug/m^3 above levels at Flint. PM2.5 levels increase between the Oakland County border and the industrial core sites (SWHS and Dearborn) by 2.9 ug/m^3. PM2.5 concentrations fall off south of the industrial zone by 1 ug/m^3 from levels observed at SWHS and Dearborn. These averages compare quite well with EPA's Table 4 averages when both northwest and north sectors are considered. The entire spreadsheet for evaluating PM2.5 gradients with northwest flow is provided in Appendix A-1.



Northeast Flow PM2.5 Contribution Results

The following figure documents the average PM2.5 concentrations during 2001 through 2005 with northeast flow (0°-60°) in metropolitan Detroit. With northeasterly flow in southeast Michigan, the PM2.5 concentration start from a much higher background level of 9.1 ug/m^3 at the Port Huron monitor. PM2.5 levels actually decrease to 8.5 ug/m^3 at the New Haven site. Then PM2.5 concentrations increase to 9.9 ug/m^3 at the East Seven Mile site, which is one mile south of the Macomb County / Wayne County border. PM2.5 levels increase to, approximately, 12 ug/m^3 at the SWHS and Dearborn monitoring sites. PM2.5 concentrations increase south of

the industrial zone at the Allen Park site which had an average PM2.5 concentration of 12.6 ug/m^3 with northeast winds. The entire spreadsheet for evaluating PM2.5 gradients with northeast flow is provided in Appendix A-2.



Northwest & Northeast Flow – Important PM2.5 Monitoring Site Details

Part of the complexity of using a particular site as a background site is that PM2.5 levels are influenced by primary PM2.5 emissions and precursor emissions (SO2, NOx, VOC and NH3). These emissions come from sources far away (regional background) and nearby (local contribution).

The Saginaw monitoring site is, approximately, two miles north of the northern edge of Saginaw (Tittabawassee Road). Also, the Saginaw monitoring site is 1.5 miles west of I-75. This is in a rural section of Saginaw County dominated by farmland. When the winds are coming from the northwest (wind directions from 300° - 360°) the regional background and the local contribution is very low.

The Flint monitoring site is located about one-half mile east of I-475, and two miles north of I-69. Due north of the monitor is the Flint River flood plain. Residential and commercial parcels are northwest of the site. Also, I-475 traffic and a railroad switchyard likely influence PM2.5 levels when winds are coming from the northwest.

The Oak Park site is located close to Oak Park High School. However, the primary local PM2.5 influence on this site is I-696, which is one-half mile north of the site. The parcels northwest of the site are residential with some commercial establishments along Greenfield and Ten Mile Road.

The Linwood site is located in a residential section of Detroit about one-quarter mile north of the I-96 / I-94 interchange. Northwestern High School is just northwest of the site. The Henry Ford Hospital complex is northeast of the site as well as the Lodge Freeway.

SWHS is a site in southwest Detroit on a busy street with a lot of truck traffic (Fort Street), and within one-quarter mile of I-75. These two roads are the dominant sources to the northwest of the SWHS site. Northeast winds are almost parallel to I-75 and Fort Street in this area. Therefore, the primary local contributor to PM2.5 at this site is due to mobile sources. Some large industries that were northeast of this site have shut down in the last ten years, including the General Motors Fisher Body Plant.

The Dearborn site is located in an industrial section of Wayne County. The primary industrial sources in the area are south and west of the monitor. However, north-northwest of the monitor is a railroad switchyard, and I-94 is about one mile away. Northeast of the site is Dix Avenue, which gets quite a bit of truck traffic, but not as much as SWHS. There are not any major local PM2.5 point sources northeast of the Dearborn site.

The Allen Park monitor is very close to I-75, just east, one-quarter mile, of where Goddard Road goes underneath the freeway. A Detroit Waterworks plant is one-quarter mile north and east of the monitor. Northwest of the monitor is a residential section of Allen Park, and the commercial establishments near downtown Allen Park. A number of the large PM2.5 sources are northeast of this monitoring site including Marathon's refinery, Severstal Steel and the Ford Dearborn complex as well as the sources around Zug Island (steel & coke production, a waste treatment plant and a power plant).

The Port Huron monitoring site is on Dove Road near the south side of Port Huron. Northeast of the site is an industrial park with commercial and light industrial businesses. Also, a railroad yard is north of the site. Finally, northeast of the site is the Blue Water Bridge with its significant truck traffic, especially when there are traffic problems. On the south side of Sarnia, on the Canadian side of the border, is a large chemical complex. However, these sources would likely impact the Port Huron monitor with winds from the east-northeast through the east. Overall, the Port Huron site is not a very good background site with all these sources northeast of the monitor. This is illustrated with the relatively "high background" PM2.5 levels during northeast flow at the Port Huron site.

The New Haven monitor is located on Gratiot Avenue, just north of Main Street. Gratiot gets quite a bit of traffic, but most car and truck traffic is on I-94 which is a little more than two miles east of the site. The large sources in Port Huron, Sarnia and on both sides of the St Clair River north of Marine City are outside of the northeast sector ($0^{o} - 60^{o}$) used in this analysis. There is only a small residential neighborhood, and then farmland or large residential lots further northeast from the site.

The East Seven Mile site is close to the northern edge of Detroit, next to Osborne High School. This PM2.5 monitor is just east of Hoover, and south of Seven Mile. East Seven Mile is dominated by commercial businesses. The area between the mile roads is residential. However, there are a number of light industrial businesses along Eight Mile, and especially along

Groesbeck Highway and Gratiot just north of Eight Mile in Macomb County. The busiest road in the area is Eight Mile which handles a great deal of east-west traffic in this area.

Northwest Flow – PM2.5 Contribution Analysis

Starting at the Saginaw monitor, average background PM2.5 concentrations are very low (5.7 ug/m^3) with northwest flow. This monitor reflects minimal long-range transport from the northern portion of Michigan, and a nearby extremely rural area.

Average PM2.5 concentrations ramp up by 1.3 ug/m^3 from the Saginaw monitor to the Flint monitoring site. This increase comes from a combination of highway emissions and commercial and residential activity in the Flint area.

PM2.5 levels remain, approximately the same between southern Genesee County and southern Oakland County. PM2.5 impacts from Genesee County sources diminish while fresh primary PM2.5 emissions from mobile and area source activities help keep PM2.5 levels only 0.3 ug/m^3 higher at Oak Park than at Flint.

The PM2.5 gradient increases as the air mass moves into northern Wayne County, from Oakland County, with Linwood's average PM2.5 almost 1 ug/m^3 higher than Oak Park's average. The gradient gets steeper between Linwood and Dearborn (& SWHS), which is over 2 ug/m^3 higher than Linwood. Further southeast, the PM2.5 concentrations drop by about 1 ug/m^3 between Dearborn and Allen Park. The major industrial source area in southwest Detroit and Dearborn is not upwind of the Allen Park monitor with northwesterly winds. Instead the Allen Park monitor is influenced by a commercial / residential upwind local area, leading to this decrease. Approximately two-thirds of the PM2.5 difference between average Saginaw and Dearborn PM2.5 levels occurs between Oak Park and Dearborn monitors, which is likely from sources in Wayne County.

Northeast Flow – PM2.5 Contribution Analysis

The background PM2.5 levels are difficult to assess because the farthest northeast site in southeast Michigan, Port Huron, has some large PM2.5 sources upwind of it with northeasterly flow. Port Huron's average "background" PM2.5 concentration with northeast flow, 9.1 ug/m^3, is much higher than the Saginaw northwest flow background.

With northeast flow at the New Haven site, the local source contribution is minimal, and the impact from the sources that affected the Port Huron site has diminished. Also, any impact from Sarnia's large chemical complex, or from the three large power plants north of Marine City would occur with wind directions from, approximately, 60° to 90°. This is outside of the range of winds considered northeasterly in this analysis (0°-60°). The resulting average PM2.5 concentration drops from Port Huron to New Haven by 0.6 ug/m^3 (8.5 ug/m^3).

Between the New Haven and East Seven Mile sites is the fast-growing Macomb County corridor along I-94. There has been extensive business development, residential building and heavy traffic. These three factors, plus the light industry along the Groesbeck Highway / Gratiot area in

southern Macomb County, likely account for most of the 1.4 ug/m^3 increase from northern Macomb County to northern Wayne County.

Linwood is the next site to the southwest of the East Seven Mile site. PM2.5 levels increase by just over 1 ug/m^3 from the northern edge of Wayne County to this central Wayne County site with northeast flow. PM2.5 levels continue to increase by another 1 ug/m^3 as you move further southwest to the Dearborn / SWHS area under northeast flow, and peak at the Allen Park site at 12.6 ug/m^3. The
Allen Park site has the major industrial area upwind of it when winds are coming from the northeast. As was the case for northwest flow, almost two-thirds of the increase between the background site (Port Huron) and the key nonattainment sites (Dearborn & SWHS) occurs from the northern border of Wayne County. This supports a focus on Wayne County PM2.5 sources to reduce PM2.5 impacts under northeast flow conditions.

Appendix A-1
Oakland County Contribution to Wayne County PM2.5 Levels
PM2.5 Data with North or Northwest Winds (2001 - 2005)

Month	Day	Year	Saginaw (ug/m3)	Flint (ug/m3)	Oak Park (ug/m3)	Linwood (ug/m3)	Southwestern High School (ug/m3)	Dearborn (ug/m3)	Allen Park (ug/m3)
1	1	2001	6.0	6.3	4.7	4.4		5.4	6.9
2	21	2001	4.5	4.5	4.8	5.2	6.9	8.0	7.5
2	27	2001	4.0	6.9	8.5	9.7	11.8	13.8	11.0
3	5	2001	3.5	4.8	5.9	6.2	7.8	8.2	7.5
3	11	2001	5.5	8.2	10.2	9.6	10.1	13.1	11.3
3	17	2001		3.5	5.1	6.3	6.8	7.0	7.3
5	4	2001	7.2	9.9		19.9	25.9	23.6	20.6
7	12	2001	4.6	3.9		6.2	8.4	7.3	6.8
7	15	2001	10.2	12.1	11.6	11.3	12.0	11.3	11.8
8	14	2001	2.9	4.5	4.2	6.7	9.8	7.5	7.9
8	20	2001	4.8	6.5	7.4	8.4	10.2	9.2	8.6
9	1	2001	3.2		6.6		6.4	8.4	8.8
9	25	2001	0.7	2.1	1.4	2.0	3.5	2.4	2.6
9	28	2001	3.6	4.4	3.9	3.7	6.0	4.9	5.5
10	16	2001	4.0	3.9	3.8	3.9		4.7	
2	4	2002		4.6	4.1	4.5	7.9	8.8	
2	10	2002	18.3	14.0		15.0	25.2	23.3	13.5
2	22	2002	1.9	4.4	13.1	4.9	7.3	7.2	6.7
3	21	2002	6.2		14.5	10.3	10.4	16.8	9.6
4	5	2002	4.9		9.4	9.4	11.9	11.5	
5	14	2002	5.7	6.8	6.7	7.3	8.3	9.0	7.5
6	28	2002		11.3	12.0	12.4	13.9	13.3	15.0
7	4	2002	12.2	17.2	18.0	20.0	18.2	21.5	18.7
8	24	2002	8.9	10.6	12.1	14.3	14.3	14.6	13.6
9	11	2002	3.3	4.1	4.0	4.4	5.2	5.9	5.5
11	22	2002		2.9	3.5	4.0	5.5	3.8	4.2
12	25	2002	1.8	2.3	4.3	5.1	5.3	5.4	5.7
1	3	2003	4.5	7.8	9.0	11.1	13.4	13.5	11.3
1	6	2003	5.4	7.6	8.2	9.2	10.6	10.7	10.3
2	23	2003		5.0	7.6	7.2	9.6	10.9	10.2
5	27	2003	9.1	10.9	11.1	14.2	18.5	17.0	15.8
6	5	2003	10.2	10.4	10.3	14.0	13.5	14.7	11.0
8	7	2003	7.8	9.0	10.8	14.2	16.0	16.0	14.3
8	10	2003	9.3	8.3	7.3	8.3	7.7	7.7	8.4
8	16	2003	26.8	29.0					
8	22	2003	8.0	8.5	10.2	10.9	14.3	13.2	12.6
10	6	2003	3.6	8.3	7.2		14.9	13.3	
10	21	2003		7.0	7.5		11.1	11.3	9.2
11	8	2003	5.0	5.5	5.6	4.9	7.5	7.3	6.4
12	2	2003	3.0	3.8	3.9	5.4	6.9	6.1	5.8
12	14	2003	9.4	12.5	15.7		16.1	17.0	17.5
1	13	2004	3.3		9.2	9.3	11.6	13.5	9.0

Month	Day	Year	Saginaw (ug/m3)	Flint (ug/m3)	Oak Park (ug/m3)	Linwood (ug/m3)	Southwestern High School (ug/m3)	Dearborn (ug/m3)	Allen Park (ug/m3)
4	27	2004	2.0	3.0	3.8	4.5	13.0		4.7
5	3	2004	2.2	3.4	3.3	3.8	5.5		4.3
5	15	2004	2.9	6.4	4.5			3.3	4.8
6	2	2004	6.5	6.9	7.4		10.9	14.3	8.7
7	5	2004	5.5	6.7	8.7		10.7		10.2
7	14	2004	5.0	6.0	5.7			6.2	6.2
8	13	2004	3.6	5.7	5.8	6.1	8.5	8.5	8.7
9	9	2004	2.8	4.3	4.2	4.5	6.2	6.4	5.1
11	8	2004	1.8	2.8	4.5	3.6	4.6	4.4	4.6
12	11	2004	3.5	4.0	3.3	3.3	4.0	4.3	6.5
12	14	2004	2.1	3.1	2.4	2.8	4.5	4.9	
12	23	2004	3.0	3.7	4.7	5.4	6.4	6.8	6.2
12	26	2004	11.8	18.4	22.2	22.2	24.6	25.4	28.4
1	16	2005	5.3	5.7	7.2	7.4	10.4		10.5
3	2	2005	2.2	4.5	3.4	3.1		5.6	4.4
3	8	2005	2.2	3.4	3.1	2.9	4.1	6.5	3.9
5	7	2005	24.3	26.2	25.9	28.8	28.4	27.5	24.2
5	16	2005	2.4	3.0	2.5	2.4	5.6	5.1	4.9
7	9	2005	8.2	12.0	10.3		13.6	17.0	16.0
7	27	2005	5.7	6.5	6.9	7.1	9.1	7.8	8.1
8	5	2005	5.0	7.1	7.8	6.3	9.5	9.1	9.7
10	16	2005	2.0	2.4	3.2	3.6	4.7	3.7	4.4
10	19	2005	3.1	3.9	5.9	6.4	7.5	10.0	6.3
10	22	2005	5.5	6.0	6.4		8.5	8.0	8.7
10	25	2005	2.7	3.2	2.3	2.6	2.9	3.8	2.6
10	28	2005	4.4	7.2	7.0	7.5	13.5	11.5	11.9
12	12	2005	4.3	6.0	6.3	7.9	7.8	8.9	8.7

	Saginaw	Flint	Oak Park	Linwood	SW High School	Dearborn	Allen Park
Average	5.7	7.0	7.3	8.0	10.2	10.2	9.2
2001	4.6	5.8	6.0	7.4	9.7	9.0	8.9
2002	7.0	7.8	9.2	9.3	11.1	11.8	10.0
2003	8.5	9.5	8.8	9.9	12.3	12.2	11.1
2004	3.9	5.4	6.2	6.8	8.8	8.7	8.0
2005	5.5	6.9	7.0	7.2	9.7	9.6	8.9

Appendix A-2
St. Clair County / Macomb County Contribution to Wayne County PM2.5 Levels
PM2.5 Data with North or Northeast Winds (2001 - 2005)

Month	Day	Year	Port Huron (ug/m3)	New Haven (ug/m3)	East Seven Mile (ug/m3)	Linwood (ug/m3)	Southwestern High School (ug/m3)	Dearborn (ug/m3)	Allen Park (ug/m3)
1	19	2001	14.3	17.4	20.4		24.3	22.2	25.9
2	15	2001	9.5	10.7	16.0	14.2	17.7	16.3	15.3
5	19	2001	11.5	8.6	12.5	11.5	15.8	14.4	15.0
6	6	2001	8.5	9.2	11.7	11.4	13.3	12.6	14.8
6	21	2001	14.3		13.2	14.0	18.6	15.0	15.6
8	23	2001	21.2	20.0	24.1	23.3	31.3	31.0	27.7
9	4	2001	4.1	4.5	5.4		7.9	6.1	9.4
9	13	2001	3.4	4.6	5.1	5.0	7.3	5.5	5.7
1	29	2002	13.6	11.9	18.3	19.2	25.1	22.7	32.5
3	6	2002	19.2	22.8	26.9		28.7	31.1	27.8
3	24	2002	8.9	8.2	11.8	11.1	12.7	15.2	
4	2	2002	22.0	17.8	24.9	22.9	25.7	24.2	24.8
4	20	2002	4.3	4.0	5.0	4.6	6.0	5.6	6.2
5	17	2002	2.8	2.5	2.2	2.3	3.3	2.9	3.2
5	20	2002	2.9	3.1	3.1		4.7	4.9	5.5
6	13	2002	10.4	13.8	9.7		10.1	10.3	12.0
7	10	2002	3.8	5.3	4.5	5.1	6.5	5.7	
7	19	2002	9.7	12.8	18.2	22.8		26.2	22.8
8	6	2002		2.7			4.2	3.0	
8	27	2002	7.6	8.5	11.1	11.7	14.1	11.8	15.4
9	5	2002	4.2	4.7	6.8		7.9	8.9	9.6
10	23	2002		4.0	5.0	4.9	6.0	6.5	6.0
10	29	2002	6.9	6.7	6.4	7.5	8.5	7.4	7.5
11	16	2002	5.0	6.8	6.1	7.5	9.0	8.3	9.2
12	13	2002	30.7	27.0	31.4	33.9	34.8	35.5	31.9
12	16	2002	3.1	3.2	4.1	2.1	5.4	5.2	5.0
2	17	2003	14.5	14.1	15.7	15.9	15.2	14.6	
3	13	2003	6.8	7.3	9.3	11.0	12.0	11.9	12.7
4	6	2003	6.1	8.7	8.1	8.3	7.7		7.5
4	9	2003	8.6	6.9	9.9	11.8	14.3	13.8	15.0
4	12	2003	4.2		6.0	5.9	7.4	6.8	7.0
5	3	2003	6.4	7.3	8.4	9.5	9.7	10.0	10.9
5	15	2003	20.2		15.0	14.4	13.1	14.5	
5	21	2003	3.2	2.5	2.7	3.1	4.2	4.4	3.8
6	20	2003	4.9	5.1	4.7		7.5	6.6	6.1
7	23	2003	3.8	3.7	4.8	4.6	6.1	5.5	5.5
8	13	2003	12.1	13.4	19.0	18.4	19.1	18.5	24.5
11	2	2003	8.8	9.7	18.0	22.0	30.3	26.0	28.5
12	5	2003	21.2	19.8	17.9	19.3	18.7	18.2	19.0
1	4	2004	5.1	6.2	8.2	8.5	8.9	21.8	9.0
1	16	2004	4.3	6.8	7.7	13.6	15.5	16.7	16.0
2	15	2004	19.5	4.0	4.8	5.5	6.7	6.2	6.8

Month	Day	Year	Port Huron (ug/m3)	New Haven (ug/m3)	East Seven Mile (ug/m3)	Linwood (ug/m3)	Southwestern High School (ug/m3)	Dearborn (ug/m3)	Allen Park (ug/m3)
4	12	2004	5.9	6.5	7.8	8.1	10.7	10.2	
5	21	2004		7.0	8.1	8.5	9.0	9.5	7.7
7	17	2004	13.8	15.0	16.5	15.2	10.6	15.0	16.4
7	23	2004	3.5	2.9	4.4	4.2	4.6	4.5	5.0
7	26	2004	7.0	7.8	8.2	8.1	9.5	9.3	11.0
8	4	2004			8.0	8.5		10.2	
9	18	2004	3.2	4.2	4.5	4.0	4.6	4.2	5.4
10	12	2004	9.3	7.9	14.3	13.3	15.3	16.0	16.7
10	21	2004	5.2	5.3	7.0	7.0	9.4	7.7	7.3
10	27	2004	30.4	23.8	27.0	31.4	32.7	27.0	28.2
11	2	2004	9.3	8.3	8.0	10.3	11.5	10.9	11.1
11	11	2004	6.2	5.6	6.2	5.9	8.6	11.6	7.0
1	1	2005	6.3	6.4	6.8	7.1	7.4	7.1	8.8
1	4	2005	7.1	8.1	11.0	11.1	13.6	13.1	12.7
1	22	2005	9.3	8.4	7.2	15.5	7.5		8.1
1	31	2005	26.7	27.0		38.2	30.9	32.3	37.6
2	9	2005	4.5	3.6	6.5	7.2	10.5	9.0	12.1
3	23	2005	5.5	6.7	7.5	8.2	8.8	10.8	11.2
3	26	2005	8.5	9.8	12.2	13.2	15.9	15.5	16.1
4	1	2005	3.6	4.0	5.3	4.3	6.2	7.8	5.8
4	7	2005	16.7	11.2	10.3	27.2	13.1	12.6	12.2
4	13	2005	4.0	4.1	4.1	3.8	4.7	6.6	6.2
4	22	2005	12.0	10.6	12.1	12.8	12.6	13.5	15.1
5	25	2005	5.8	4.6	5.1	5.4	6.6	3.7	6.4
6	18	2005	3.1	3.4	4.4	3.8	1.7	4.2	5.1
7	6	2005	5.2	7.2	8.8	8.8	9.6	9.1	9.7
7	30	2005		4.2	7.3	4.4	7.5	7.4	10.6
8	14	2005	5.4	6.7	8.8	10.5	10.3	10.7	12.2
8	23	2005	5.1	4.3	4.0		5.0	4.6	4.8
9	16	2005	5.5	5.0	5.1	5.5	6.2	5.5	6.2
10	7	2005	3.2	3.5	4.0	3.2	3.5		4.3
10	10	2005	8.0	7.9	11.8	11.8	12.1	11.6	12.4

Average	Port Huron	New Haven	E. Seven Mile	Linwood	SW High School	Dearborn	Allen Park
	9.1	8.5	9.9	11.1	11.9	12.2	12.6
2001	10.9	10.7	13.6	13.2	17.0	15.4	16.2
2002	9.7	9.2	11.5	12.0	12.5	13.1	14.6
2003	9.3	9.0	10.7	12.0	12.7	12.6	12.8
2004	9.2	7.8	8.9	9.7	10.8	11.4	11.0
2005	7.7	7.3	7.5	10.6	9.7	10.3	10.9