STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

STEVEN E. CHESTER
DIRECTOR

February 13, 2004

Mr. Thomas V. Skinner, Regional Administrator
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (R-19J)
Chicago, Illinois 60604-3507

Dear Mr. Skinner:

In response to the United States Environmental Protection Agency's (EPA's) request for designation recommendations for the 24-hour and annual particulate matter equal to or less than 2.5 micrometers in diameter (PM 2.5) National Ambient Air Quality Standards (NAAQS), the Michigan Department of Environmental Quality (MDEQ) hereby submits the areas of the state of Michigan with an indication of appropriate designation of attainment or nonattainment and boundaries. These recommendations are supported with an analysis of relevant information in the enclosed document. Consistent with EPA guidance, the MDEQ's recommendations are based on air quality design values for the years 2001-2003.

The MDEQ recommends that Wayne and Monroe Counties be designated as separate nonattainment areas for the annual PM 2.5 NAAQS. The MDEQ believes that deviating from the Consolidated Metropolitan Statistical Area (CMSA) and having two separate nonattainment areas (Monroe and Wayne Counties only) will provide more flexibility in the strategy development phase of air pollution planning without jeopardizing reaching attainment.

For each of the following reasons, we recommend that the only Wayne and Monroe Counties be subject to nonattainment designation.

1. The presumptive point of origin for nonattainment designation (the CMSA) is arbitrary as it applies to PM 2.5, which is clearly evident after reviewing current PM 2.5 monitoring data and historical monitoring data for particulate matter.

2. The monitoring data is conclusive. Most monitors intended to gauge attainment are measuring attainment, making a widespread nonattainment designation inappropriate from a regulatory perspective and misleading from a public health perspective.

3. The EPA just issued a proposed rule with the stated purpose of reducing transport of PM 2.5 from widespread areas that would include all of the CMSA; i.e., addressing regional controls outside of, but influencing, nonattainment counties. This negates the need for widespread nonattainment designations to secure reductions in transport.

4. Even though the prevailing winds are from the south and southwest, the downwind monitors in other urban counties in the CMSA still measure attainment, further evidence that the presumptive CMSA boundary is incorrect.

5. Michigan has authority to adopt controls beyond the nonattainment boundary if needed for reaching attainment. Also, the EPA is required to reject a State Implementation Plan (SIP) if it does not meet the attainment demonstration test. Nothing is gained by lumping in counties where monitors record attainment.

Michigan's track record in achieving all national ambient air quality standards should weigh heavily in EPA's decision making. The state has a proven record of applying controls when necessary beyond nonattainment areas. Ultimately, the degree and expanse of controls will be decided upon after a thorough technical analysis undertaken in the SIP development process.

We look forward to working with the EPA as final designations are developed. If you have questions regarding our recommendations, please contact Mr. G. Vinson Hellwig, Chief, Air Quality Division, (AQD), at 517-373-7069; Mr. Robert Irvine, AQD, at 517-373-7042; or you may contact me.

Sincerely,

Steven E. Chester
Director
517-373-7917

Enclosure
cc/enc: Governor Jennifer M. Granholm
Ms. Cheryl L. Newton, EPA
Mr. Chuck Hersey, SEMCOG
Ms. Dana Debel, Governor's Office
Mr. Jim Sygo, Deputy Director, MDEQ
Mr. G. Vinson Hellwig, MDEQ
Ms. Robert Irvine, MDEQ

Michigan Department of Environmental Quality

Recommended Attainment/Nonattainment Boundaries in Michigan for the PM 2.5 National Ambient Air Quality Standards

Steven E. Chester
Director
February 13, 2004

Recommended Attainment/Nonattainment Boundaries in Michigan for the Annual and 24-hour PM 2.5 National Ambient Air Quality Standards

Summary

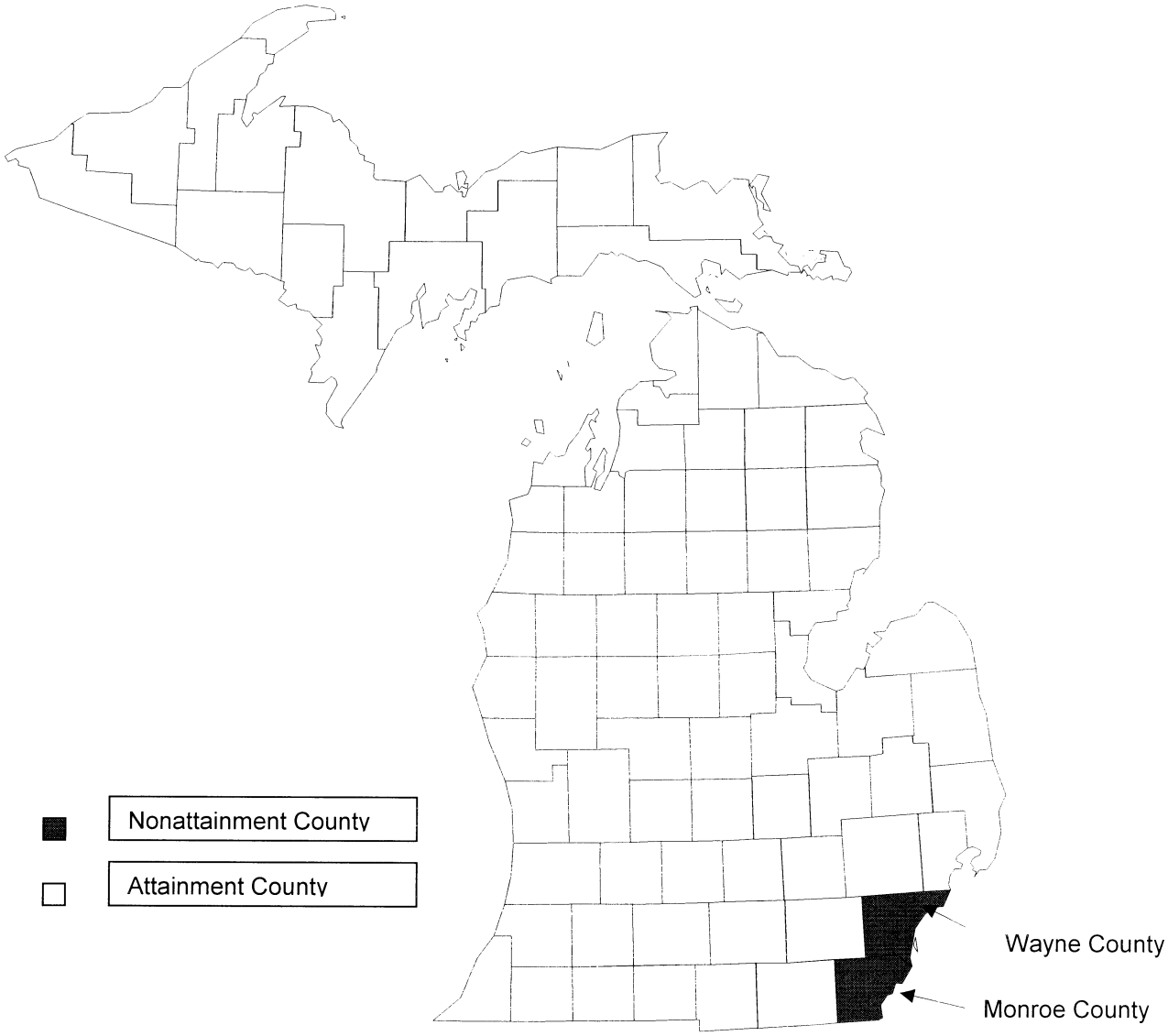
Michigan recommends that Wayne and Monroe Counties be designated as separate nonattainment areas for the annual particulate matter equal to or less than 2.5 micrometers in diameter (PM 2.5), or fine particulate, National Ambient Air Quality Standards (NAAQS), and that all other portions of the state be designated attainment for the annual PM 2.5 NAAQS. See Figure 1 on page 2. Michigan recommends that the entire state be designated attainment for the 24-hour PM 2.5 NAAQS.

This recommendation for the 24-hour NAAQS is based on all Michigan monitors being well below the standards.

This recommendation for the annual NAAQS is based primarily on air quality monitoring data collected from 2001-2003. Monitoring data clearly shows that the PM 2.5 exceedances exist only in the highly industrialized area of Wayne County. The monitors in adjacent counties to the north and west are not violating the NAAQS. Therefore, the most effective controls should be required in the counties with the violating monitors, not in downwind areas where such reductions will be of little benefit to the violating PM 2.5 areas. Further, due to the lack of implementation requirements, local source culpability determinations, and quantification of impact of national and regional measures, Michigan does not believe that the presumptive boundary of the entire Consolidated Metropolitan Statistical Area (CMSA) as the nonattainment area is appropriate or necessary.

Monroe County should be a separate nonattainment area because its lone violating monitor at Luna Pier is likely impacted by the Toledo area emissions and not Wayne County emissions. Luna Pier's proximity to Toledo strongly suggests that emissions from Toledo are responsible for the violations. Comparing monitoring values at Luna Pier and Toledo monitors supports this conclusion. Thus the remedy for lowering emissions in the Luna Pier area will be found in the Toledo emission control programs and not in Wayne County controls. Separate nonattainment area designations will enhance state flexibility in planning and will in no way impair progress toward attaining and maintaining the standard. Since each area has a different make-up of emission sources, separate designations will allow the areas to choose which sources make the most sense to control.

Figure 1
Recommended Areas of Nonattainment for Annual PM 2.5 NAAQS



Michigan Department of Environmental Quality
Air Quality Division

PM 2.5 Designation Recommendations
Technical Support Document
February 13, 2004

Introduction

In July 1997, the U.S. Environmental Protection Agency (EPA) promulgated new NAAQS for PM 2.5, or fine particulate. Annual and 24-hour NAAQS were established for fine particulate. The federal Clean Air Act (CAA) requires the EPA to seek recommendations from state governors for initial designations of the attainment status for all areas of the states when a new or revised standard is established.

The states are also asked to provide recommendations for the appropriate boundaries of all nonattainment areas. An April 1, 2003 EPA guidance memorandum on boundary selection applied a presumption that the boundaries of the Metropolitan Statistical Area (MSA) or CMSA, as defined by the U.S. Office of Management and Budget (OMB), Census Bureau, should also be the boundaries for a nonattainment area. Generally, an MSA is a core area with a substantial population, plus nearby communities maintaining a large economic and social integration with the core community. State recommendations that deviate from an MSA or CMSA boundary must provide an analysis of local factors, and show that violations are not occurring in the excluded portions of the metropolitan area and the excluded portions are not source areas that contribute to the observed violations. The presumptive boundaries reflected in the EPA guidance are not mandated by the CAA.

The EPA will review and either affirm state recommendations or make modifications as determined to be necessary. The EPA intends to promulgate final designations by December 15, 2004.

States will be required to adopt plans to reduce concentrations of fine particulates for areas that are designated as not attaining the standards (nonattainment). Although the EPA planned to propose and finalize its implementation rule for PM 2.5 early enough to be taken into consideration during the designation process, this has not happened.

This document provides the basis for recommendations of attainment/nonattainment designations and boundaries for the PM 2.5 standards for all areas in the state of Michigan. The Michigan Department of Environmental Quality (MDEQ) was assisted in the analysis of the recommendations for the Southeast Michigan area by the Southeast Michigan Council of Governments (SEMCOG).

Analysis

Michigan's recommendations are based on quality-assured monitoring data from 2001-2003, the most recent three consecutive calendar years of data available. Only data collected from federal reference or equivalent method monitors that meet siting requirements of Title 40 of the Code of Federal Regulations, Part 58, Ambient Air Quality Surveillance, are considered appropriate for designations. Locations of the federal reference method (FRM) monitors used in the designation determinations are shown on the map in Figure 2 on page 5. All air quality monitors in Michigan are attaining the 24-hour PM 2.5 NAAQS set at 65 micrograms per cubic meter ($\mu g/m^3$). These values are listed in Table 1 on Page 6.

Several monitors are showing violations of the annual PM 2.5 standard set at 15 $\mu g/m^3$. This analysis will focus on appropriate recommendations regarding the annual PM 2.5 NAAQS. Each monitor's design value for the annual PM 2.5 standard is derived by averaging the annual mean for three consecutive calendar years and rounding to one decimal. A monitor with a design value greater than 15 $\mu g/m^3$ shows a violation of the annual NAAQS.

Table 2 on pages 7 and 8 shows the annual average NAAQS is violated at the Luna Pier site in Monroe County and the Allen Park, Southwest High School (SWHS), Linwood, Dearborn, and Wyandotte sites in Wayne County. Figure 3 on page 9 displays the locations and annual average values at each Southeast Michigan site.

Figure 2
2003 Statewide PM 2.5 FRM Monitoring Network

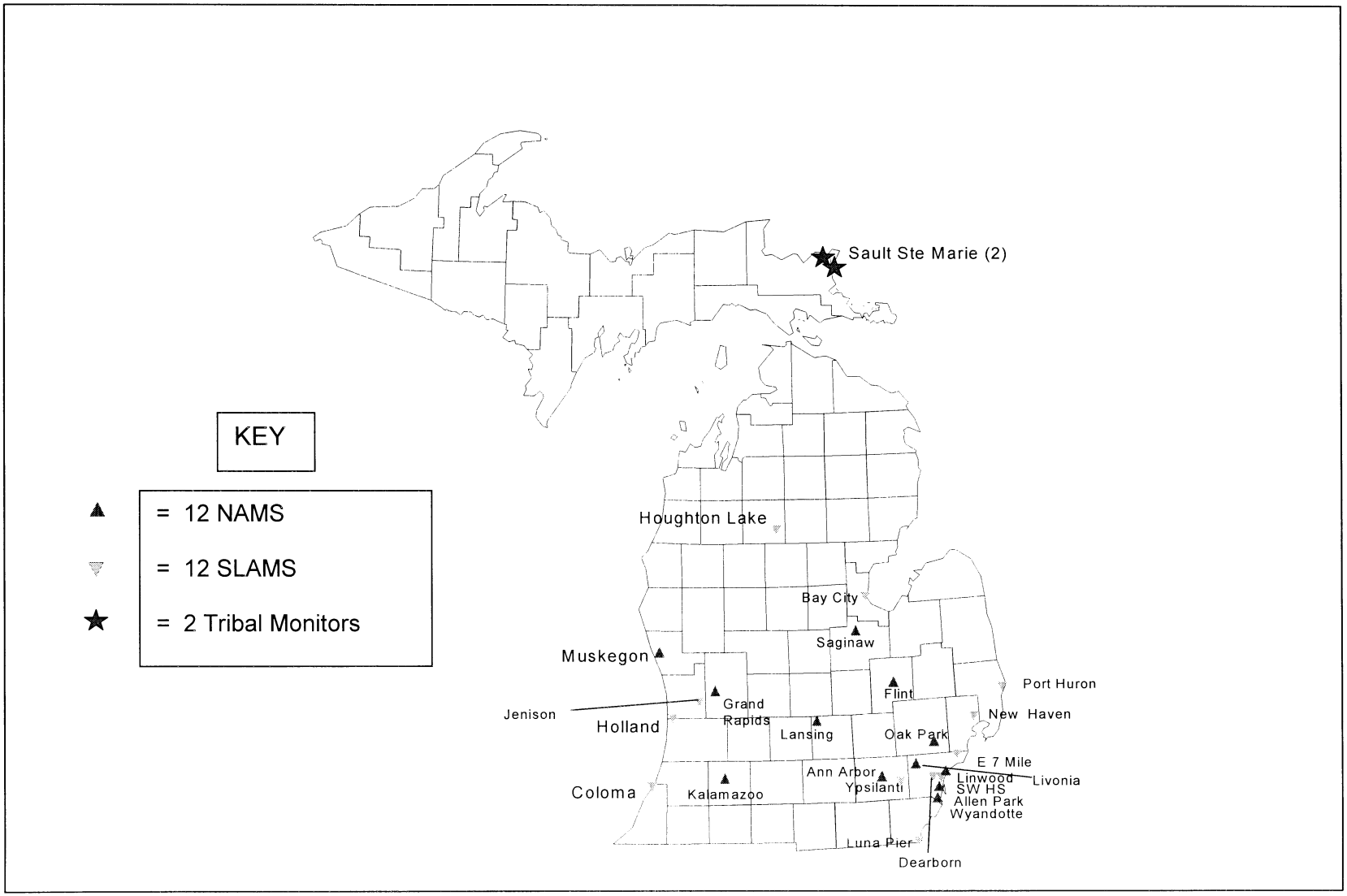


Table 1
98th Percentile of 24-hour values for
PM 2.5 as averaged over three years

Site	2001 98th Percentile	2002 98th Percentile	2003 98th Percentile	2001-2003 Average
Holland	42.1	36.7	35.6	38.1
Bay City	34.2	32.0	26.7	31.0
Coloma	32.3	30.6	34.1	32.3
Sault Ste Marie #1	27.9	22.1	26.3	25.4
Sault Ste Marie #2	28.0	27.0	25.2	26.7
Flint	38.0	30.8	31.2	33.3
Lansing	37.2	32.8	29	33.0
Kalamazoo	40.0	32.3	36.9	36.4
Grand Rapids	43.5	35.1	35	37.9
New Haven	42.0	35.6	31.8	36.5
Houghton Lake	---	---	23.6	23.6
Luna Pier	39.2	42.7	34.7	38.9
Muskegon	34.9	29.8	36.3	33.7
Oak Park	39.4	38.4	36.6	38.1
Jenison	35.0	36.8	31	34.3
Saginaw	34.6	26.0	26.8	29.1
Port Huron	40.5	35.3	37.2	37.7
Ann Arbor	38.5	31.3	33.3	34.4
Ypsilanti	39.7	30.9	38.8	36.5
Allen Park	48.3	39.6	40.5	42.8
SW High School	42.9	38.2	33.6	38.2
Linwood	46.0	42.7	46.2	45.0
E 7 Mile	42.0	34.4	37.1	37.8
Livonia	44.7	32.7	38.1	38.5
Dearborn	43.2	45.7	42.8	43.9
Wyandotte	46.6	34.1	34.8	38.5

Note: The 24-hour NAAQS is 65 μ/m^3.

Table 2
Statewide Fine Particulate Monitors 2001-2003 (μ/m^3)

Site	Year	Annual Avg	3-Yr Annual Avg[1]
Holland	2001	12.82	12.2
Allegan Co.	2002	12.43	12.3
	2003	12.40	12.5
Bay City	2001	11.53	10.9
Bay Co.	2002	11.25	11.0
	2003	10.9	11.2
Coloma	2001	13.16	12.5
Berrien Co.	2002	12.53	12.6
	2003	12.5	12.7
Sault Ste. Marie #1	2001	8.2	
Chippewa Co.	2002	7.58	7.9
	2003	8.6	8.1
Sault Ste. Marie #2	2001	7.94	
Chippewa Co.	2002	7.79	7.9
	2003	8.1	7.9
Flint	2001	13.10	12.7
Genesee Co.	2002	12.54	12.9
	2003	12.0	12.5
Lansing	2001	14.04	13.2
Ingham Co.	2002	13.52	13.5
	2003	13.0	13.5
Kalamazoo	2001	15.63	15.2
Kalamazoo Co.	2002	14.79	15.2
	2003	13.9	14.8
Grand Rapids	2001	14.42	14.0
Kent Co.	2002	13.34	13.9
	2003	13.5	13.7
New Haven	2001	13.60	13.2
Macomb Co.	2002	13.35	13.5
	2003	12.8	13.1
Luna Pier	2001	15.30	15.2
Monroe Co.	2002	16.26	15.8
	2003	13.7	15.4
Muskegon	2001	12.57	12.2
Muskegon Co.	2002	12.36	12.3
	2003	11.9	12.3
Oak Park	2001	14.70	14.7
Oakland Co.	2002	15.00	15.0
	2003	14.6	14.8

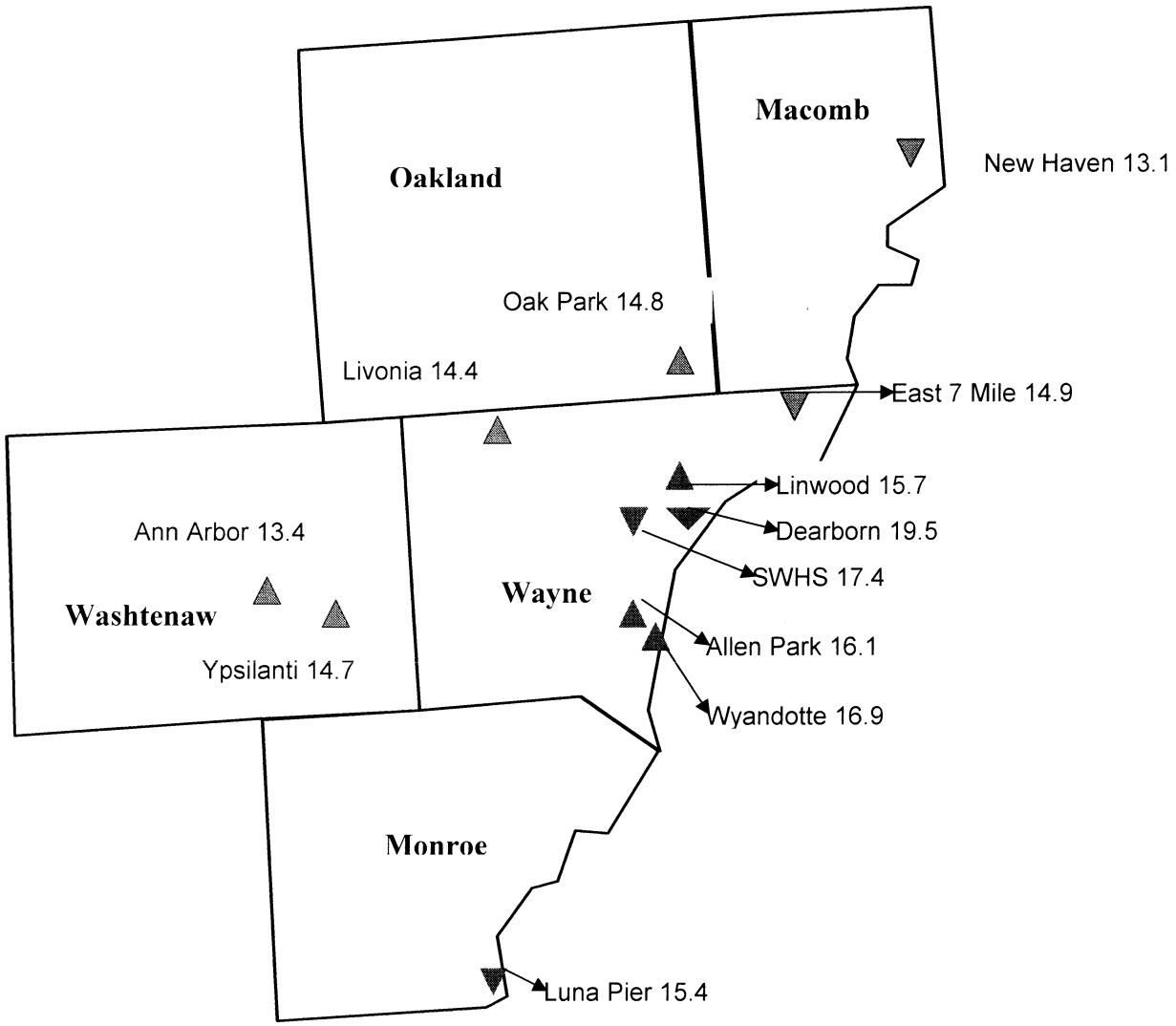
1. The 3-year Annual Average is based on the averages of the year listed and the two preceding years. The shaded value represents years 2001-2003.
Note: The annual NAAQS is 15 μ/m^3

Table 2 (cont'd)
Statewide Fine Particulate Monitors 2001-2003 (μ/m^3)

Site	Year	Annual Avg	3-Yr Annual Avg[1]
Jenison	2001	13.84	13.3
Ottawa Co.	2002	13.58	13.5
	2003	12.7	13.4
Saginaw	2001	11.50	10.6
Saginaw Co.	2002	10.79	10.9
	2003	10.6	11.0
Port Huron	2001	13.96	13.8
St. Clair Co.	2002	13.84	14.0
	2003	14.2	14.0
Ann Arbor	2001	13.50	13.2
Washtenaw Co.	2002	13.57	13.4
	2003	13.1	13.4
Ypsilanti	2001	14.49	14.3
Washtenaw Co.	2002	14.86	14.5
	2003	14.6	14.7
Allen Park	2001	17.34	16.5
Wayne Co.	2002	15.94	16.3
	2003	15.2	16.1
SW HS	2001	18.28	18.0
Wayne Co.	2002	17.43	17.9
	2003	16.6	17.4
Linwood	2001	15.79	16.1
Wayne Co.	2002	15.59	15.6
	2003	15.8	15.7
East 7 Mile	2001	15.64	14.9
Wayne Co.	2002	14.17	14.8
	2003	14.6	14.9
Livonia	2001	14.60	14.1
Wayne Co.	2002	14.5	14.5
	2003	14.1	14.4
Dearborn	2001	19.61	19.9
Wayne Co.	2002	19.84	19.3
	2003	19.1	19.5
Wyandotte	2001	18.20	17.4
Wayne Co.	2002	16.28	17.4
	2003	16.3	16.9

1. The 3-year Annual Average is based on the averages of the year listed and the two preceding years. The shaded value represents years 2001-2003.
Note: The annual NAAQS is 15 μ/m^3

Figure 3
Southeast Michigan FRM Annual Mean Concentration (µg/m^3), 2001- 2003 Data from Air Quality System (AQS), January 2004



▲ National Air Monitoring Stations (NAMS)
▼ State and Local Air Monitoring Stations (SLAMS)

Discussion of EPA's 11 criteria for deviating from designation of a CMSA

The 11 criteria used for deviating from the EPA-preferred full MSA and CMSA designations were closely followed in Michigan's recent ozone recommendations. The MDEQ believes that the criteria are relevant for consideration in designating ozone nonattainment areas because they are based on many years of study, modeling, and observation of the factors that influence ozone formation and transport.

Unlike ozone, PM 2.5 is a relatively new criteria pollutant. Aside from the last several years of FRM monitoring data, which has been collected in Michigan and other states, our understanding of the pollutant is still very limited. Some speciation monitoring has been done in the Detroit area that tells us the general composition of the particulate, but the most important information is not known; i.e., which sources are contributing to the violations of the Detroit area monitors. Without knowing this answer, many of the 11 EPA criteria may not be relevant in determining the size of the PM 2.5 nonattainment area.

For this reason, the MDEQ is relying heavily on the actual monitoring data in the CMSA and not on all 11 of the criteria. Listed below are the 11 criteria and a brief discussion of how the factors were used, or not used, in our recommendation.

Basis for designating only Wayne and Monroe Counties as nonattainment

Emissions and air quality in adjacent areas (including adjacent CMSAs)

The design values calculated at the Wayne County monitors sited at Dearborn, SWHS, Linwood, Wyandotte, and Allen Park are above the annual PM 2.5 NAAQS. The monitor in Monroe County at Luna Pier is also in violation of the NAAQS for the 2001-2003 period. All other monitors throughout the state are in attainment with the annual PM 2.5 NAAQS. Wayne County monitors that meet the standard are sited in Livonia and at East Seven Mile Road outside the industrial core area.

Monitors in adjacent counties are in fact demonstrating attainment with the PM 2.5 standards. The prevailing wind direction demonstrates that sources in adjacent counties do not contribute to PM 2.5 nonattainment; rather, it is a localized problem. The other adjacent counties, while in attainment, are receiving pollution from Wayne County rather than contributing to nonattainment in Wayne County.

The currently available PM 2.5 emissions inventory is for calendar year 1999, which is based on a limited number of EPA PM 2.5 emission factors. Also, many factors were of poor quality. For these reasons, emissions data in the CMSA counties should not at this time be relied upon to evaluate the size of the nonattainment area. Michigan is still evaluating the PM 2.5 problem to determine the extent of local impacts causing the violations at the Wayne County monitors. Until that is known, an assumption that emissions from other CMSA counties are contributing to the violations is unsupported and premature.

Population density and degree of urbanization including commercial development (significant difference from surrounding areas)

The violating Wayne County monitors are located in a heavy industry corridor that was formerly nonattainment for particulate matter 10. PM 2.5 mass annual average design values increase on a gradient from southwest to northeast through downtown Detroit, then decrease moving away from the city. An 'outer ring' of suburban sites (Ann Arbor, Ypsilanti, and Oak Park) have lower, attaining concentrations. The monitor in Dearborn has the highest annual average design value of PM 2.5 and is located in the most highly industrialized area of the industry corridor.

Population density and degree of urbanization are highest in Wayne County compared to the rest of the CMSA. In fact, population density is more than twice as high in Wayne County as it is in the next most dense counties of Oakland and Macomb. It should be noted that these two counties are directly north of Wayne County, and PM 2.5 violations are not occurring in these two counties. The only other county in the CMSA with a violating monitor is Monroe County, where the monitor is only a few miles from the Ohio border and immediately downwind from Toledo, Ohio.

Because the nature of the sources contributing most to the violations are not yet clearly identified, it is inappropriate to include other counties in the CMSA as part of the nonattainment area simply because of their proximity to Wayne County.

Monitoring data representing concentrations in local areas and larger areas (urban or regional)

The EPA guidance for PM 2.5 nonattainment area boundaries indicates that the presumptive boundaries for nonattainment areas should be the entire MSA or CMSA. Under this presumption, ten counties in Southeast Michigan would constitute a single nonattainment area.

However, monitoring data supports our recommendation of only designating Wayne and Monroe Counties as nonattainment. No other counties in the CMSA, or in the whole state, have violating monitors. Table 1 on page 6 contains the annual averages for all monitors in the state. (We are recommending that Wayne and Monroe Counties be separate nonattainment areas for reasons described later in this document.)

Monitoring data should be the primary factor considered in delineating PM 2.5 nonattainment areas. The monitors and protocols have been developed specifically for this purpose. Until we have better knowledge of PM 2.5 source/receptor relationships in the southeast Michigan area, monitoring data must be relied upon in setting the nonattainment boundaries. The area has multiple monitors that give a good picture of the extent of the PM 2.5 problem.

Location of emission sources (emission sources and nearby receptors should generally be included in the same nonattainment area)

The purpose of defining the location of emission sources is to provide an indication of what point, area, and mobile sources may be contributing to violations of the standard. As described previously, current source/receptor information for the southeast Michigan area is currently inadequate for this purpose.

One step in the process of identifying sources contributing to the violations of the standard is to identify the species of PM 2.5 pollutants in the area. Such speciated PM 2.5 data is being collected at three of the Wayne County monitors and at the Luna Pier monitor. Figure 4 on page 16 contains a pie chart showing the composition of PM 2.5 that has been collected since 2001 from the Allen Park monitor. Organic carbon makes up the largest fraction, followed closely by sulfate and nitrate. From the speciated data obtained at the sites, organic carbon shows the largest changes from site to site. Each species shows the same southwest to northeast gradient changes in concentration as does total PM 2.5; i.e., increasing as you approach the city center, peaking at the Dearborn monitor, and decreasing as you move away from the city center. The Dearborn monitor has significantly more organic carbon than other sites. More study is required to explain these observations.

Information is also available on PM 2.5 component levels entering the airshed as background versus the components that are urban-generated (called "urban excess"). Annually, the Detroit urban area contributes no sulfate, 1.6 ug/m^3 nitrate, and 4.9 ug/m^3 of organic carbon to PM 2.5 levels, above regional background concentrations. We continue to work with the Southeast Michigan Ozone Study and the Lake Michigan Air Director's Consortium are continuing to study this information for the purpose of better understanding the contributing sources. Analysis of speciation data will help to determine the source contribution of the particles and will be essential in developing a strategy for attainment. Also, a variety of projects are underway which will shed additional light on the source/receptor relationships, including traffic studies, PM 2.5 speciation data analysis, an urban organics study, and an ammonia monitoring study.

Traffic and commuting patterns

Traffic and commuting patterns have been shown in previous ozone demonstrations to extensively cross county lines in Wayne County and its neighboring counties to the north and west. However, the relative significance of these patterns in terms of impacts on violating PM 2.5 monitors in Wayne County has not been determined. Until such information is available for the Southeast Michigan area, traffic and commuting patterns cannot be relied upon as criteria for making designations. As stated previously, the major contributors to the violations in Wayne County are the local industrial sources.

Expected growth (including extent, pattern and rate of growth)

These data are available and have been used in previous ozone demonstrations for the CMSA. However, the relative significance of these patterns in terms of impacts on violating PM 2.5 monitors in Wayne County has not been determined. Studies described previously will provide more information in the future.

Meteorology (weather/transport patterns)

Meteorological observations provide a fundamental understanding of pollutant transport and dispersion. Parameters of particular interest include surface temperature, dew point, wind speed, and wind direction. In addition, the inclusion of upper-air sounding data allows for the computation of stability and mixing heights. A good way of depicting the relationship between observed meteorological observations and pollutant transport patterns is a back trajectory path using the HYSPLIT model. The MDEQ created trajectory paths for the 2002 Dearborn PM 2.5 sample days (three-day sampling cycle).

To facilitate visual understanding, these trajectory paths were split into differing Air Quality Index (AQI) categories, and are displayed on the following pages as Figures 5 through 7 on pages 16 and 17.

The HYSPLIT trajectory interactive model is provided by the National Oceanic and Atmospheric Administration. HYSPLIT can predict forward and backward trajectories using either forecast data or archived data. The backward trajectory option will predict the path and origin of a parcel of air based on its final destination. For the PM 2.5 back trajectories, archived data was used for each day for which monitored data was available. For each day, the model was asked to provide the back trajectory for the previous 48 hours based on the Detroit Metro Airport being the final destination. The HYSPLIT provided all the trajectory path latitude/longitude coordinates for each requested day. These trajectory paths were sorted by daily monitored concentrations into the different AQI categories, and then superimposed on a map using the Surfer program.

These data clearly show that the highest PM 2.5 days in the Detroit area are when winds are from the south and southwest. This reinforces our conclusions that the counties to the north of Wayne County are not contributing to Wayne County's PM 2.5 violations.

Geography-topography (mountain ranges or other air basin boundaries)

No geography/topography distinctions are present in the southeast Michigan area, so this is not a factor of boundary analysis.

Jurisdictional boundaries (e.g., counties, air districts, existing 1-hour nonattainment areas, reservations, etc.)

This recommendation does not suggest sub-county areas, nor should the full CMSA serve as the minimum boundary. The only monitors in the CMSA violating the standard are in Wayne and Monroe Counties. For reasons explained elsewhere in this paper, Wayne and Monroe Counties should be separate nonattainment areas.

Level of control of emission sources

As described elsewhere in this document, the emission sources that are causing the violations of the standard in Wayne and Monroe Counties have not yet been identified. However, the oxides of nitrogen (NOx) State Implementation Plan (SIP) call regional controls of NOx from utilities will significantly reduce regional levels of NOx, reducing background levels in Michigan. Tier II reductions of mobile emissions will also have a positive impact on reducing PM 2.5 levels, as will future diesel rules and multipollutant transport rules. These reductions, in conjunction with local controls in the vicinity of the areas violating the standard, are likely to bring these areas into attainment. As source/receptor relationships are further identified specific control strategies will be developed.

Regional emission reductions (e.g., NOx SIP call or other enforceable regional strategies)

Regional PM 2.5 levels (also referred to as rural background) are quite high throughout the upper Midwest. The value in Figure 8 on page 18 for rural background reflects a level of 12.4 ug/m^3. The rural background level represented in Figure 7 is based on data from IMPROVE monitors in rural Illinois and Indiana, which was averaged for 2001 and 2002. Thus, reducing regional PM 2.5 emissions will be important in reducing the levels at Michigan's violating areas and throughout the state. The EPA has demonstrated this in the modeling done for the NOx SIP call and more recently in EPA modeling of the Clear Skies and the Interstate Air Quality Rule proposals. The conclusion that reducing regional upwind emissions will lower PM 2.5 levels statewide supports our recommendation of limiting the nonattainment area to Wayne and Monroe Counties and not including the full CMSA. Reductions necessary to bring areas with violating monitors into attainment, in conjunction with region controls, are likely to be limited to sources in Wayne County and Toledo, Ohio sources for Monroe County.

Additional support for Michigan's nonattainment recommendation

Michigan's monitoring data suggests that the PM 2.5 problem areas are concentrated in the most industrialized areas of Wayne County. Figure 2 on page 5 shows the monitoring sites in Southeast Michigan and the annual average PM 2.5 levels. The most industrialized area, along the eastern side of the county, contains the violating monitors, whereas the monitors in the ring counties are meeting the standard. The bar graph in Figure 8 on page 18 depicts the trend of PM 2.5 levels increasing from south to north, with the highest monitor being the Dearborn monitor, after which the levels generally decrease. This pattern suggests that the sources that are pushing the monitors in Wayne County over the standard are located in Wayne County. Therefore, the nonattainment designation can appropriately be restricted to Wayne County.

Wayne County should be a separate nonattainment area from Monroe County

Monroe County should be designated nonattainment. However, because of its proximity to the Toledo area, it should not be included with Wayne County. Toledo PM 2.5 monitors are violating the standard, strongly suggesting that high pollutant levels from Toledo are impacting the Luna Pier monitor. A key solution to reducing the PM 2.5 levels in southern Monroe County will likely be found in reductions in Ohio. The back trajectories in Figure 7 on page 17 for the highest PM 2.5 days clearly show impacts coming from the south and impacting southern Monroe County. Combining Monroe and Wayne Counties as one nonattainment area will do nothing to solve Monroe's nonattainment problem.

The spatial representativeness of the Luna Pier monitor can be addressed by comparing it with an upwind monitor in Toledo, Ohio and the assumed regional (background) monitor. As can be seen in the time series plots in Figures 9 through 12 on pages 19 through 22, the Luna Pier monitor closely tracks the Toledo monitor, more than it tracks the regional monitor. This suggests that violations at Luna Pier represent the air mass arriving from Toledo.

It also is unlikely that Monroe County impacts Wayne County significantly enough to warrant combining them. Monitoring further north of Luna Pier would likely show attainment because of the rural, nonindustrial nature of Monroe County. The population density is one of the lowest compared to the rest of the CMSA. Also, other monitors in similar southern counties in Michigan are not violating the standard, suggesting that the Luna Pier monitor may not reflect PM 2.5 levels that exist in other parts of Monroe County. Again, the pattern for monitors violating the standard is their location near heavily industrialized areas, and Luna Pier's proximity to the industrialized portions of Toledo follows that pattern.

Conclusions

For each of the following reasons, we recommend that the counties subject to nonattainment designation are Wayne and Monroe.

- The presumptive point of origin for nonattainment designation (the CMSA) is arbitrary as it applies to PM 2.5, which is clearly evident after reviewing current PM 2.5 monitoring data and historical monitoring data for particulate matter.

- The monitoring data is conclusive. Most monitors intended to gauge attainment are measuring attainment, making a widespread nonattainment designation inappropriate from a regulatory perspective and misleading from a public health perspective.

- The EPA just issued a proposed rule with the stated purpose of reducing transport of PM from widespread areas that would include all of the CMSA; i.e., addressing regional controls outside of, but influencing, nonattainment counties. This negates the need for widespread nonattainment designations to secure reductions in transport.

- Even though the prevailing winds are from the south and southwest, the downwind monitors in other urban counties in the CMSA still measure attainment, further evidence that the presumptive CMSA boundary is incorrect.

- Michigan has authority to adopt controls beyond the nonattainment boundary if needed for reaching attainment. Also, the EPA is required to reject a SIP if it does not meet the attainment demonstration test. Nothing is gained by lumping in counties where monitors record attainment.

- Michigan has succeeded in achieving previous particulate standards with similar patterns of measured nonattainment.

- Luna Pier data closely track Toledo data, confirming that we need two distinct attainment strategies.

Figure 4
PM 2.5 Speciation
(Allen Park Monitor)

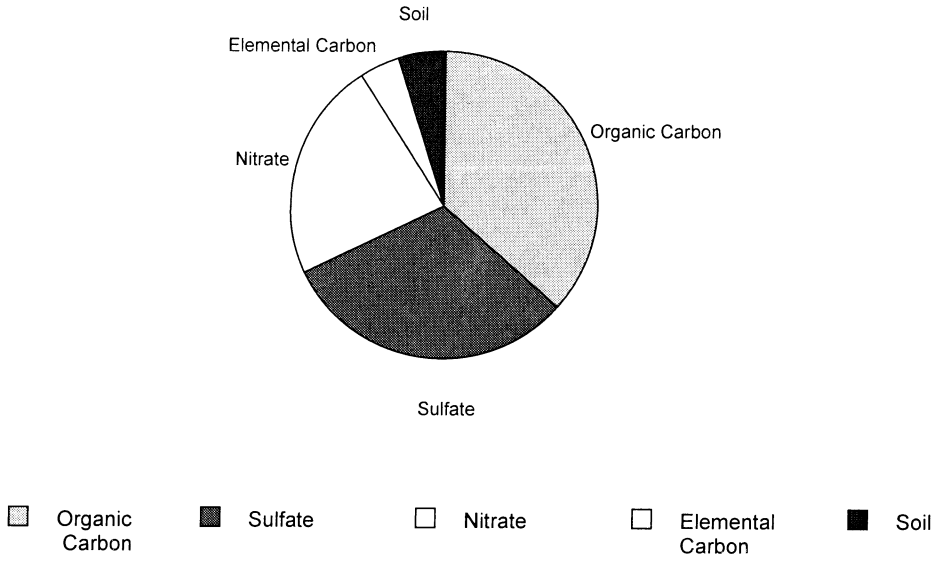


Figure 5
AQI Good
Trajectories are exclusively from a northern component vector.

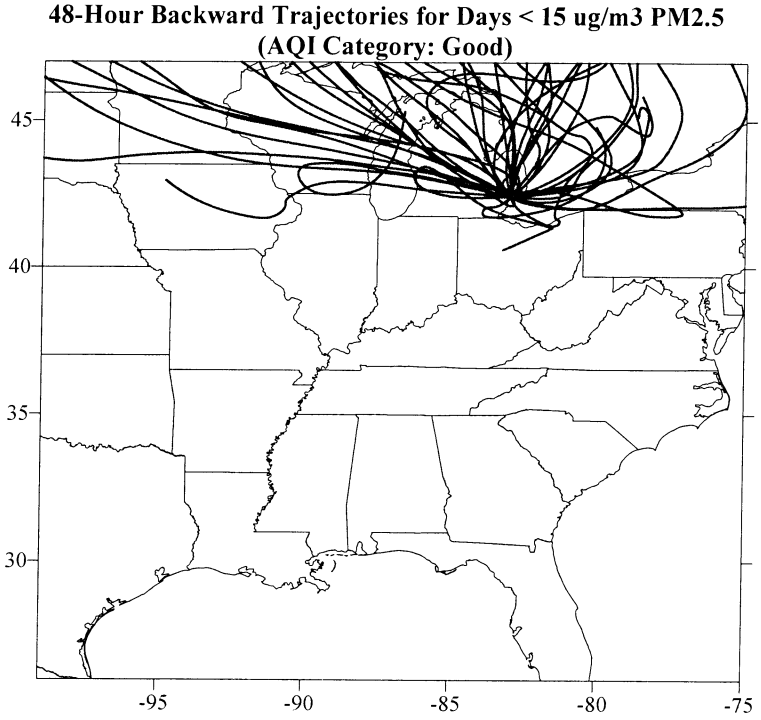


Figure 6
AQI High Moderate
Trajectories exhibit a bias to the southwest quadrant.

48-Hour Backward Trajectories for Days >= 28 ug/m3 & < 40 ug/m3 PM2.5
(AQI Category: High Moderate)

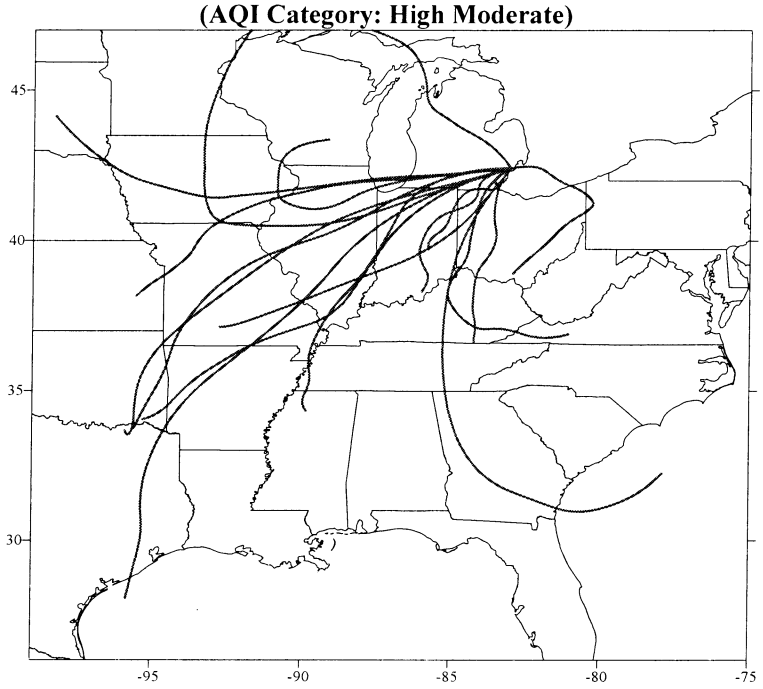


Figure 7
AQI Unhealthy for Sensitive Groups
Trajectories are exclusively biased to the southwest quadrant.

48-Hour Backward Trajectories for Days >= 40 ug/m3 PM2.5
(AQI Category: Unheathy for Sensitive Groups)

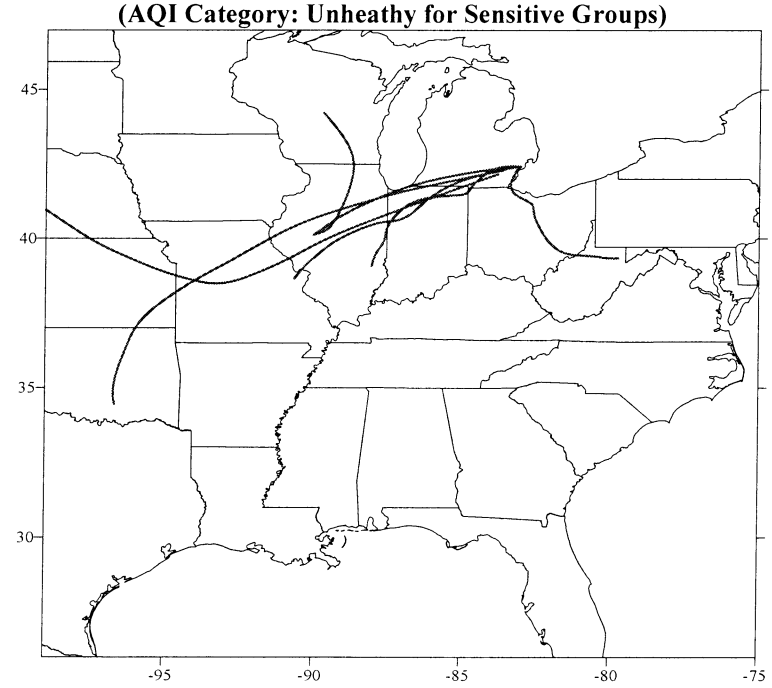


Figure 8
Three Year Annual Average
PM 2.5 2001-2003

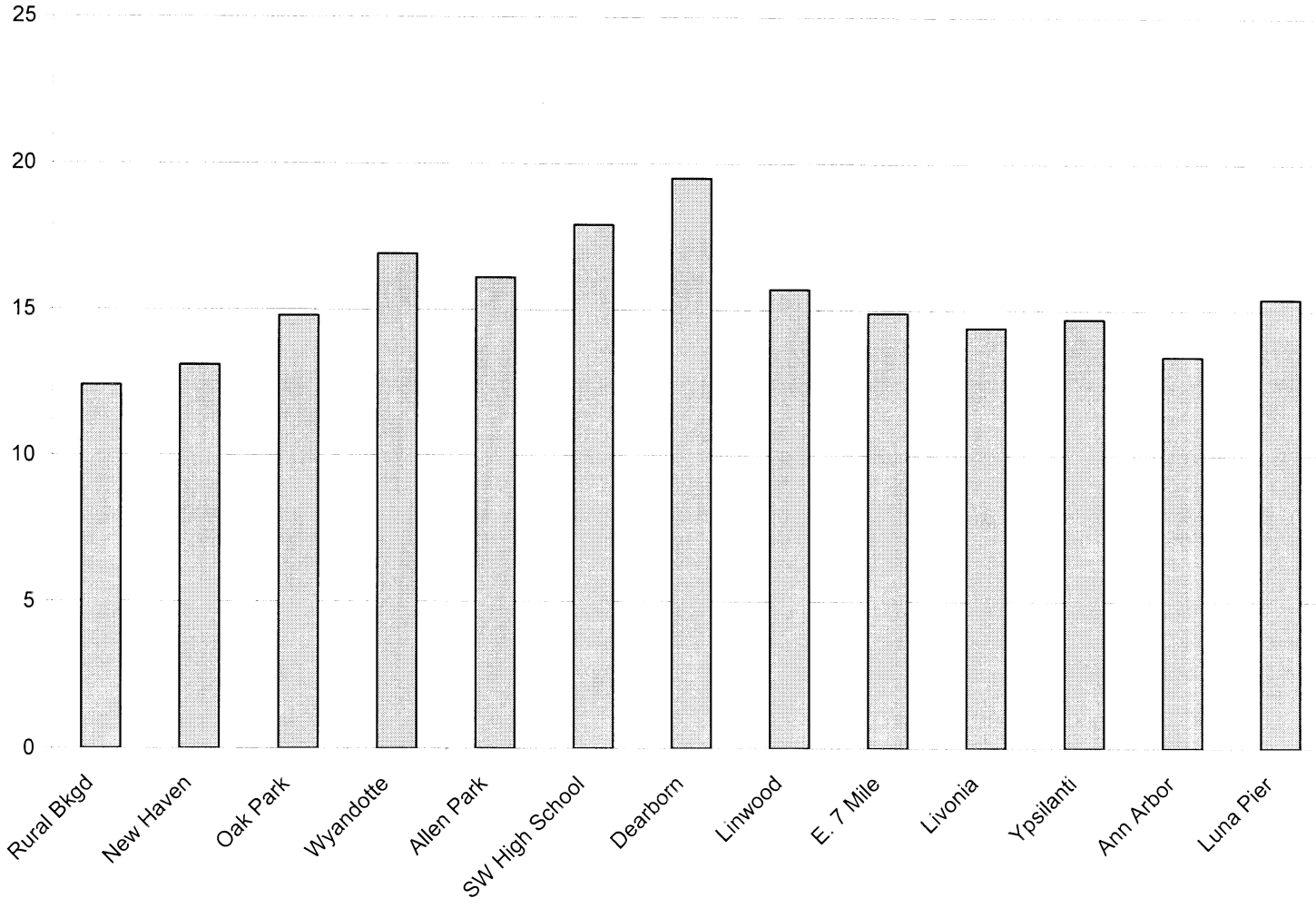


Figure 9
Seasonal Comparison of Daily PM2.5 Concentrations of Regional Background, Luna Pier, and Toledo Sites

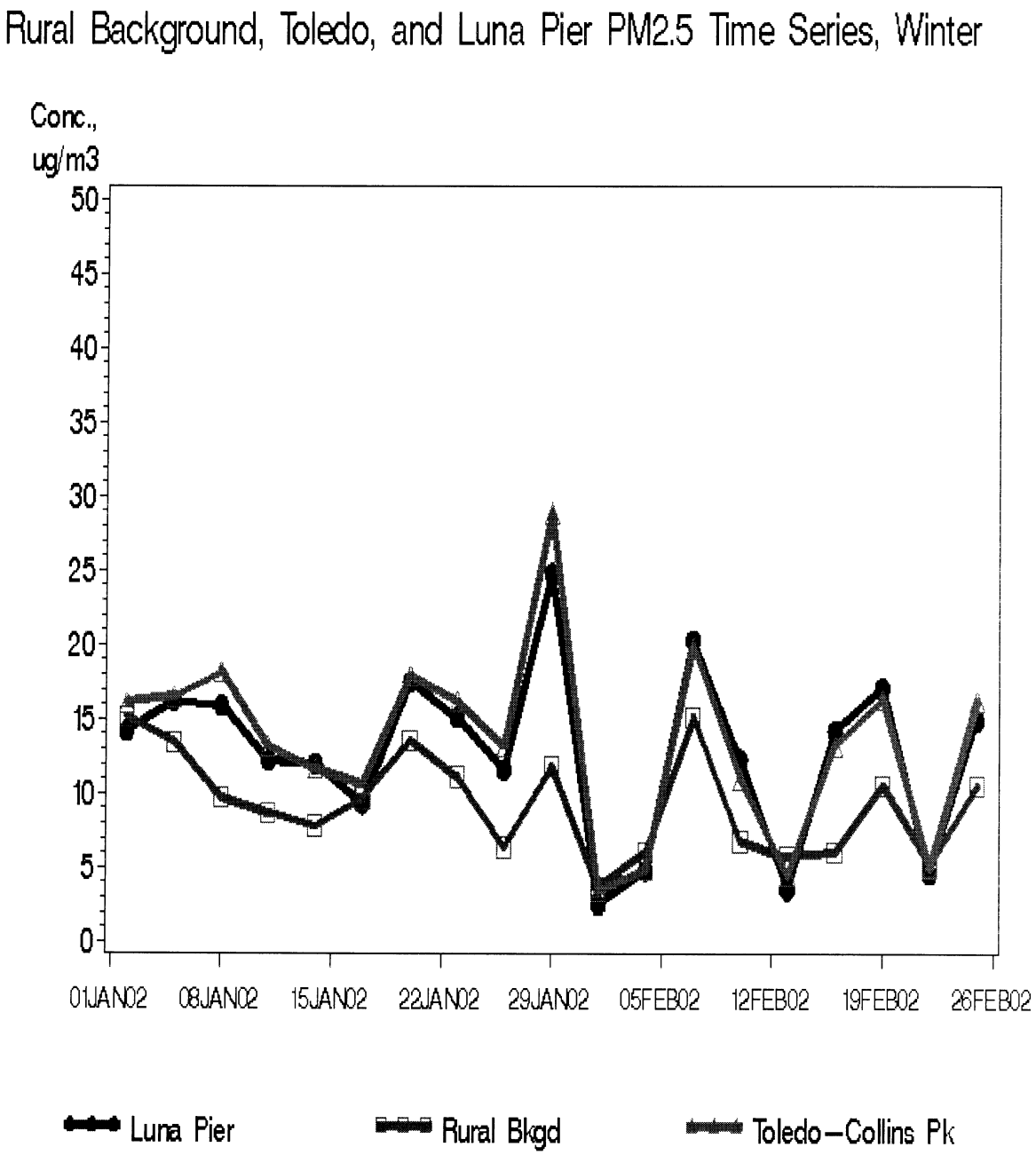


Figure 10

Rural Background, Toledo, and Luna Pier PM2.5 Time Series, Fall

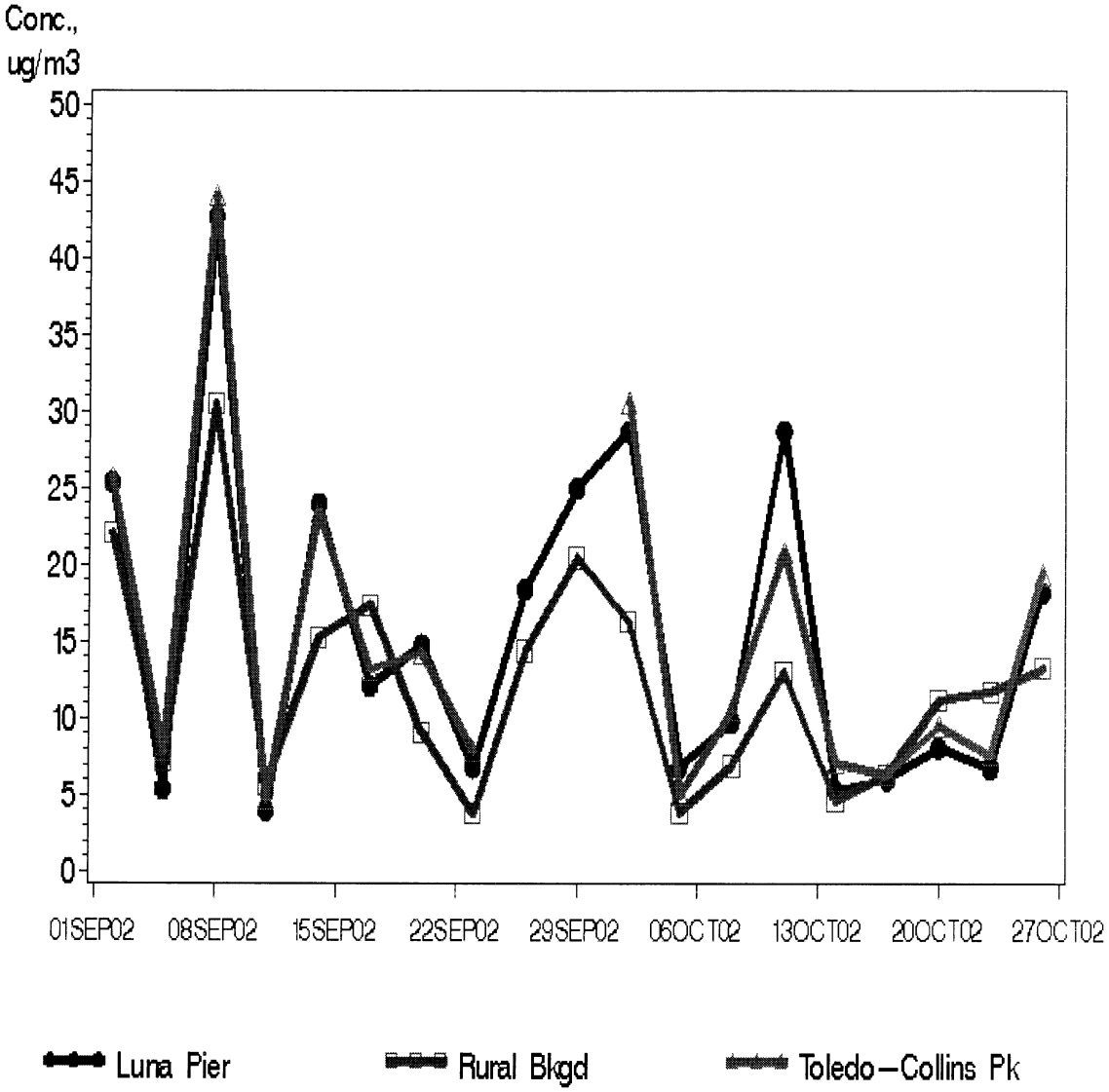


Figure 11

Rural Background, Toledo, and Luna Pier PM2.5 Time Series, Summer

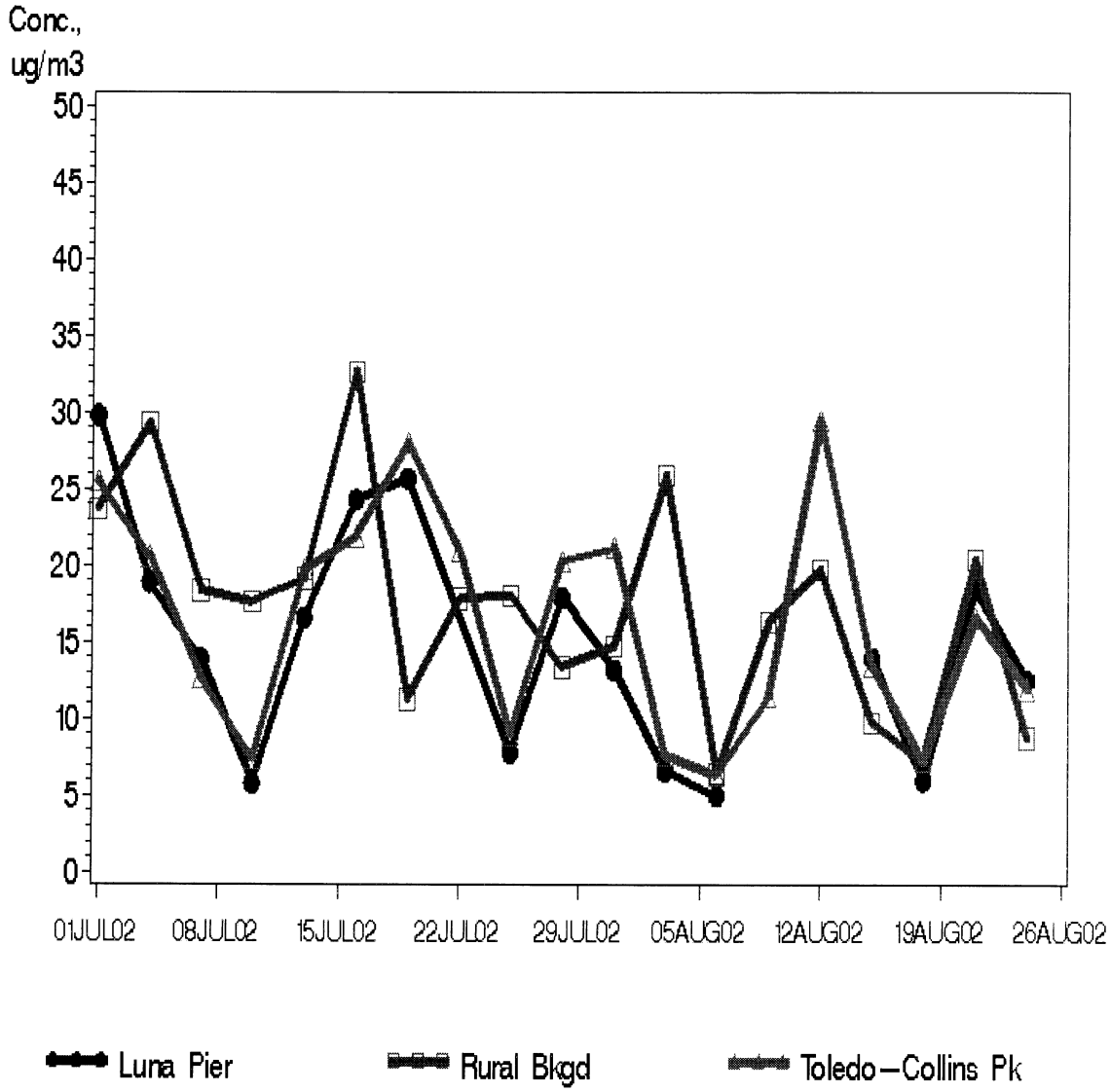


Figure 12

Rural Background, Toledo, and Luna Pier PM2.5 Time Series, Spring