

**Commonwealth of Pennsylvania
Department of Environmental Protection**



**Proposed Recommendations to EPA
For
Fine Particulate (PM_{2.5})
Attainment/Nonattainment Areas**

January 2004

Bureau of Air Quality
Pennsylvania Department of Environmental Protection
PO Box 8468
Harrisburg, PA 17105-8468
717-787-9495

www.dep.state.pa.us

Edward G. Rendell
Governor
Commonwealth of Pennsylvania

Kathleen A. McGinty
Secretary
Department of Environmental Protection

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What is this Document?

The federal Clean Air Act (CAA) provides a mechanism for states to make recommendations to the U.S. Environmental Protection Agency (EPA) on the designation of areas not meeting the health-based National Ambient Air Quality Standards (NAAQS). In this document, the Pennsylvania Department of Environmental Protection (Department or DEP) makes preliminary recommendations to EPA concerning attainment/nonattainment designations in the Commonwealth of Pennsylvania for the fine particulate NAAQS adopted by EPA in 1997. The designation recommendations are based on air quality monitoring data for 2000-2002 and other available information including particulate-forming emissions, meteorology and demographics. Because the implications of designations have not been fully established by EPA, DEP intends to continue to work with EPA to revise these recommendations, as appropriate, prior to the promulgation of final designations. EPA will make final designations in December 2004 based on air quality monitoring data for 2001-2003.

What is Fine Particulate?

Particulate matter (PM) includes both solid and liquid particles suspended in the air. PM is chemically and physically diverse and originates from a variety of human and natural activities. PM is composed of particles in a wide range of sizes. Particles less than 10 micrometers in diameter (PM₁₀) pose a health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter (PM_{2.5}) are referred to as fine particles and generally pose the largest health risks. Because of their small size, fine particles can penetrate deeply into the lungs. The characteristics and origin of PM₁₀ and PM_{2.5} are very different. PM₁₀ comes from sources such as unpaved roads, crushing and grinding operations, and windblown dust. PM_{2.5} may either be directly emitted from a source (primary particulate) or formed in the atmosphere by chemical reaction of gaseous precursors (secondary particulate). PM_{2.5} is primarily composed of sulfates, nitrates, organic carbon, elemental carbon and crustal material. PM_{2.5} results mainly from the pollutants emitted when fuel is combusted. Fossil fuel fired power plants and motor vehicles are important sources of primary PM_{2.5} and the gaseous precursors that form additional PM_{2.5} in the atmosphere.

PM_{2.5} is a significant air pollution problem in Pennsylvania. Reducing concentrations of PM_{2.5} is important because levels above the health-based standard are a serious human health threat and also can cause or contribute to other negative environmental impacts.

Health Effects. Fine particles generally pose greater health risks than larger particles. Because of their small size (less than one-seventh the average width of a human hair), fine particles can lodge deeply into the lungs. Health studies have shown a significant association between exposure to PM_{2.5} and premature mortality. Studies have also linked exposure to PM_{2.5} with other significant health problems including

aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, increases in respiratory symptoms like coughing and difficult or painful breathing, chronic bronchitis, and certain cardiovascular problems such as heart attacks and cardiac arrhythmia. Individuals particularly sensitive to PM_{2.5} exposure include older adults, people with heart and lung disease, and children. Millions of Pennsylvanians live in areas where the PM_{2.5} health-based standards are exceeded.

Environmental Effects. Fine particles are the major cause of reduced visibility (haze) in certain parts of the United States, including many national parks. Fine particles cause visibility impairment by scattering and absorbing light before it reaches an observer. In the Eastern United States, haze has reduced the average visual range from approximately 90 miles in the absence of manmade pollution to 15 – 25 miles. In addition, components of PM_{2.5}, such as nitrates and sulfates, contribute to acid rain formation that makes lakes, rivers, and streams unsuitable for many fish, and erodes buildings, historical monuments, and paint on cars. PM_{2.5} and its precursor pollutants can be carried over long distances by wind and then settle on ground or water. This changes the nutrient balance in coastal waters and large river basins, contributing to fish kills and algae blooms in sensitive waterways, such as the Chesapeake Bay. The settling of PM_{2.5} also depletes the nutrients in soil, damages sensitive forests and farm crops, and affects the diversity of ecosystems. Soot, a type of PM_{2.5}, stains and damages stone and other materials.

Where does PM_{2.5} come from? Fine particles are primarily composed of sulfates, nitrates, organic carbon, elemental carbon and crustal material. These particles may either be directly emitted from a source (primary PM) or formed in the atmosphere by chemical reaction of gaseous precursors (secondary PM). Precursors of PM_{2.5} include sulfur dioxide, nitrogen oxides, volatile organic compounds, and ammonia. PM_{2.5} and its precursors result mainly from fuel combustion (motor vehicles, power plants and non-road engines) and industrial processes.

What is the NAAQS for PM_{2.5}? EPA sets NAAQS for PM based on its review of existing scientific knowledge about the adverse health and welfare effects. The CAA requires EPA to review public health standards for major air pollutants every five years and update the NAAQS, if necessary, to “protect public health with an adequate margin of safety” based on the latest, best-available science. Originally, the NAAQS for PM was based on the level of Total Suspended Particulates. As the body of scientific knowledge grew, it became clear that the primary health effects of PM are caused by particles that are smaller than 10 micrometers in diameter because these have greater potential to enter the lower portions of the lungs. In 1987, based on these studies demonstrating the health effects of smaller particles, EPA revised the NAAQS for PM to cover only particles smaller than 10 micrometers, or PM₁₀.

After its next review, in 1997, EPA revised the NAAQS to reflect the growing body of scientific knowledge that links exposure to fine particles to serious health effects. On July 18, 1997, EPA promulgated two new PM_{2.5} standards – an annual average of 15 ug/m³, and a 24-hour average of 65 ug/m³. At that time, EPA proposed to also keep the

PM₁₀ standards as an indicator for coarse PM. However, a standard for coarse particles (those with a diameter between 2.5 and 10 micrometers) is likely to replace the PM₁₀ standard in order to avoid double counting of the fine particles. A number of petitions were filed challenging the new annual and 24-hour PM_{2.5} standards in the U.S. Court of Appeals for the D.C. Circuit. The Court subsequently held, in a split decision, that the CAA provisions for setting the health-based ozone and particulate matter standards were unconstitutional because EPA's authority was an improper delegation of legislative authority. The Court also ruled that EPA could not enforce the standards. Subsequently, EPA sought review of the D.C. Circuit Court's decision by the U.S. Supreme Court. In February 2001, the U.S. Supreme Court upheld EPA's authority under the CAA to set national air quality standards for the protection of public health. In March 2002, the D.C. Circuit Court rejected the remaining claims that EPA's decision was arbitrary and capricious and not supported by the evidence.

With the legal challenges resolved, EPA began developing new strategies for implementation of the PM_{2.5} standards. According to EPA, an implementation regulation for the fine particulate matter standard should be proposed in March 2004. The final PM_{2.5} implementation regulation is expected in December 2004. EPA's new fine particulate standards will provide significantly increased health and environmental protection nationally beyond that provided by the PM₁₀ standard.

An area does not attain the annual standard if the 3-year average of annual averages is more than 15 micrograms per cubic meter. An area does not attain the 24-hour standard if the 98th percentile 24-hour concentration averaged over 3 years is more than 65 micrograms per cubic meter.

What is the Process for Designating Areas that Do Not Attain a NAAQS?

Section 107(d)(1)(B) of the CAA requires EPA to designate areas after promulgating a new NAAQS. Following promulgation of new or revised air standards, Governors are given the opportunity to submit recommendations for attainment/nonattainment areas, supported by most recent quality-assured monitoring data. EPA provides criteria for states' recommendations for designating areas.

EPA has requested that Governor's recommendations for PM_{2.5} attainment and nonattainment designations be submitted by February 15, 2004. EPA may make modifications and promulgate all or part of the Governor's recommendations. If EPA determines that a modification to the recommendation is necessary, EPA will notify the state no later than 120 days prior to promulgating the designation. This provides an opportunity for the state to work with EPA if the state believes EPA's decisions are not appropriate. EPA will make final PM_{2.5} designations in December 2004. The PM_{2.5} State Implementation Plan (SIP) revisions will be due to EPA in February 2008, three years after final designations are effective. The CAA presumptive attainment date is five years after final designations, which would be February 2010. There is the possibility of up to

a five-year extension for the attainment date, if the state demonstrates the need for an extension.

EPA Guidance for PM_{2.5} Nonattainment Boundaries. On April 1, 2003, EPA issued a general guidance memorandum, “Designations for the Fine Particulate National Ambient Air Quality Standards.” The guidance memorandum explains that EPA intends to apply a presumption that the boundaries of nonattainment areas should be based on Metropolitan Area boundaries. A metropolitan area may consist of a single Metropolitan Statistical Area (MSA) or a Consolidated Metropolitan Statistical Area (CMSA). The guidance memorandum describes criteria that states can examine when suggesting nonattainment boundaries that are either larger or smaller than the metropolitan area. Some of the critical factors recommended for consideration include population density similarities, emission levels, air quality, and meteorology.

Discussion about Statistical Areas (SAs). The Office of Management and Budget defines Micropolitan, Metropolitan, and Combined Statistical Areas. See the following for the criteria on which statistical areas are based: www.access.gpo.gov/su_docs/fedreg/a001227c.html. The updated list of Statistical Areas is available at: www.census.gov/population/www/estimates/metrodef.html. These areas are all based on a population center known as a core and its associated Core Based Statistical Area (CBSA). A CBSA is a central county or group of counties that has at least one population core and may have a high degree of social and economic integration measured by commuting ties with outlying counties – the so-called employment interchange measure. Counties are considered to be outlying counties if at least 25 percent of the employed residents work in the central county or counties or if 25 percent of the employment in an outlying county is accounted for by workers who reside in the central county.

A CBSA that has an urban area with a population of at least 50,000 can form a Metropolitan Statistical Area with or without outlying counties. A CBSA formed by an urban area with a population of at least 10,000, but less than 50,000 can form a Micropolitan Statistical Area with or without outlying counties. Combined Statistical Areas are formed automatically if two or more adjacent CBSAs have an employment interchange of 25 percent. If the employment interchange is between 15 percent and 25 percent between two or more adjacent CBSAs, a Combined Statistical Area could be formed if local opinion favors the idea. Counties or groups of counties form Metropolitan Divisions if they have a core population of at least 2.5 million and have commuting ties to adjacent counties.

A county may appear in only one CBSA. If a county is a central county in one CBSA and an outlying county in another, it falls within the CBSA where it is a central county. If a county is an outlying county in two or more CBSAs, the county falls in the CBSA where it has the greatest employment interchange measure.

Two Examples of Pennsylvania Statistical Areas. The Harrisburg-Carlisle-Lebanon Combined Statistical Area is comprised of two Metropolitan Statistical Areas.

Dauphin, Cumberland, and Perry counties comprise the one Metropolitan Statistical Area. All three counties have very strong economic and commuting links with each other so that the area comprises both a core and a CBSA. Lebanon County is also a Metropolitan Statistical Area. It is more of a stand-alone adjacent county that has a core and a separate CBSA. Although Lebanon County is not as closely associated with the first three counties, Lebanon County still has commuting patterns that allow the two Metropolitan Statistical Areas to be added into one Combined Statistical Area.

The five-county Philadelphia area has a core population of more than 2.5 million making it a Metropolitan Division and a CBSA. The three county Camden and three-county Wilmington cores are also Metropolitan Divisions, and CBSAs. The three divisions comprise the very large Philadelphia-Camden-Wilmington Metropolitan Statistical Area, due to the strong commuting ties established between all three Metropolitan Divisions. In addition, the one-county Vineland Metropolitan Statistical Area is included in the Metropolitan Statistical Area to form the Combined Metropolitan Statistical Area.

Available Data. Appendix I includes maps and tables that describe the proposed PM_{2.5} planning areas. Appendix II includes documenting material that addresses EPA's designation criteria, pertaining to air pollution emissions and population densities. These include manmade annual emissions of SO₂, NO_x, VOC, PM_{2.5} and NH₃. A map of large SO₂ sources and a chart displaying Pennsylvania speciated monitoring data are also included in Appendix II.

What Would be the Effects of Designation as Nonattainment?

States have the primary responsibility for determining how the NAAQS will be achieved and maintained. Section 110 of the Clean Air Act requires states to submit SIPs within three years after designation of new nonattainment areas. States must demonstrate how the standard will be attained in each nonattainment area. Therefore, Pennsylvania expects to develop and submit PM_{2.5} attainment SIPs by February 2008, three years after EPA is expected to make final designations.

Measures adopted by states to attain the ozone standards will also help states to attain the PM_{2.5} standard because the pollutants that produce ozone (NO_x and VOC) also contribute to PM_{2.5} formation. Therefore, ongoing efforts pertaining to attainment of the one-hour and eight-hour ozone standards will also help to attain the PM_{2.5} standard.

Dates for attainment, rate of progress requirements, mandatory measures, how transport will be considered, technical demonstration requirements, transportation conformity and many other important issues will not be known until EPA finalizes their implementation regulations.

Tentative schedule:

- January 10, 2004 – Open comment period on PM_{2.5} designation recommendations
- February 6, 2004 – Close comment period on PM_{2.5} designation recommendations
- February 16, 2004 – Submit designation recommendations to EPA
- March 2004 – EPA proposes PM_{2.5} implementation rule
- December 2004 – EPA makes final PM_{2.5} designations
- Winter 2004 – EPA finalizes implementation rule
- February 2008 – PM_{2.5} SIP revision due
- February 2010 – PM_{2.5} attainment date with possibility of five-year extension

Transport of PM_{2.5} and multistate/national control measures. A combination of regional controls supplemented by local controls will be necessary for attainment of the annual PM_{2.5} standard. A number of national multi-pollutant strategies for reducing emissions of the PM_{2.5} precursors, NO_x and SO_x, are being considered by Congress. In the event that multi-pollutant legislation is not enacted in time to assist in attainment of the PM_{2.5} standard, EPA has also developed an Air Quality Interstate Transport Rule that would require reductions of NO_x and SO_x as necessary to control transport and provide downwind states the ability to attain the PM_{2.5} standards. This proposed rule is expected to be published by EPA in January 2004. The local or urban component of PM_{2.5} will need to be addressed by local control measures. These measures will be developed by Pennsylvania through a public process as the implementation plan is developed. Pennsylvania will derive additional emission reduction benefits from nationwide mobile measures such as cleaner new cars, cleaner new diesel vehicles and cleaner fuels. Local measures and statewide measures adopted for the purpose of ozone attainment, including implementation of regional NO_x controls and reduced VOC emissions from consumer products, solvent cleaning, and the like, will also assist in attaining the PM_{2.5} standard and reducing downwind contributions. With the successful and timely implementation of a combination of strong national multi-pollutant legislation or transport rule, nationwide mobile measures, and additional local measures, we expect that most areas of the Commonwealth should attain the PM_{2.5} standard.

However, Pennsylvania is highly concerned that EPA's transported air pollution requirements will not be sufficient for all areas of the Commonwealth to achieve the PM_{2.5} standard within the CAA timeframe even with additional local measures.

Pennsylvania's Proposed PM_{2.5} Designation Recommendations

The Commonwealth is proposing to recommend establishment of PM_{2.5} designations based primarily on the June 10, 2003, issued definitions of Core Based Statistical Area (CBSA) boundaries and Combined Statistical Area boundaries. In the past, EPA has recommended a similar strategy with the old versions of Metropolitan Statistical Areas and Consolidated Metropolitan Statistical Areas. CBSAs would be similar to the areas that were designated for the 1-hour ozone standard, and would preserve existing working relationships and political boundaries. The Commonwealth recommends following existing ozone nonattainment area boundaries and utilizing

existing planning areas wherever possible. For reference, the current annual PM_{2.5} design values for monitored counties are shown in Figure 1 of Appendix I.

An entire CBSA with one or more PM_{2.5} monitors measuring a violation of the PM_{2.5} standard would generally be designated as a nonattainment area for all counties. The Commonwealth is also seeking comment on whether this should be extended to all CBSA counties in adjoining states. Counties not in a CBSA with a PM_{2.5} monitor measuring a violation of the PM_{2.5} standard would also be designated nonattainment.

A county-by-county list of proposed designation recommendations is included in Appendix I as Table I. All areas currently monitor attainment with the 24-hour standard of 65 ug/m³. The 2003 Metropolitan Areas for Pennsylvania and adjacent non-Pennsylvania counties are shown in Figure 2. A map of Pennsylvania's recommended boundaries for PM_{2.5} nonattainment areas is shown in Figure 3. Discussion of the basis for DEP's recommendation for specific areas is included below.

Philadelphia Area: The existing 1-hour interstate ozone nonattainment area includes Bucks, Chester, Delaware, Montgomery and Philadelphia Counties in Pennsylvania. In New Jersey, it includes Burlington, Gloucester, Salem, Cumberland and Mercer counties. In Maryland, it includes Cecil County. And in Delaware, it includes New Castle and Kent Counties. Kent County was not in the MSA but was recommended by the State of Delaware as an addition. EPA has recommended that Cape May and Atlantic Counties in New Jersey and Sussex County in Delaware be added to the Philadelphia Area for the 8-hour ozone nonattainment area.

The Commonwealth recommends utilizing existing planning areas where possible. This will allow for integrated air quality planning among a group of counties and states that have experience working together to improve air quality. The Commonwealth is recommending that counties that are in the EPA proposed 8-hour ozone nonattainment area be designated nonattainment for PM_{2.5}. The Commonwealth is seeking comment on whether to follow the old 1-hour ozone boundaries or the new, proposed 8-hour ozone boundaries.

Allentown-Bethlehem-Easton Area: Lehigh County and Northampton County are both monitoring attainment of the PM_{2.5} standard. Since this area is currently attainment, no nonattainment designation is necessary.

Reading Area: Berks County should be the planning area.

Lancaster Area: Lancaster County should be the planning area.

York Area: The one-hour ozone nonattainment boundary includes both York and Adams Counties. They are recommended as the nonattainment planning area.

Harrisburg Area: The MSA, which includes Cumberland, Dauphin, Perry and Lebanon Counties, is recommended as nonattainment.

Scranton/Wilkes-Barre Area: Since this area is currently attainment, no nonattainment designation is necessary.

State College Area: Since this area is currently attainment, no nonattainment designation is necessary.

Williamsport-Lock Haven Area: This area does not have a PM_{2.5} monitor but based on nearby PM_{2.5} levels, this area is recommended as attainment.

Altoona Area: This area does not have a PM_{2.5} monitor but based on nearby PM_{2.5} levels, this area is recommended as attainment.

Johnstown Area: The 2003 Census includes only Cambria County as the MSA. Cambria County is recommended as the planning area.

Erie Area: Since this area is currently attainment, no nonattainment designation is necessary.

Youngstown-Warren-Mercer Area: The 2003 Census MSA includes Trumbull, Columbiana and Mahoning counties in Ohio and Mercer County in PA. The Commonwealth recommends these counties as the nonattainment planning area.

Pittsburgh Area: The one-hour and recommended 8-hour ozone nonattainment planning areas include Beaver, Butler, Armstrong, Allegheny, Westmoreland, Washington and Fayette counties. The 2003 Census added Lawrence County to the Combined Metropolitan Area. Because this county has traditionally been a stand-alone planning area, the Commonwealth is recommending not including Lawrence County as part of the Pittsburgh nonattainment area.

Pike County: The 2003 Census added Pike County to the NYC CMSA. In reviewing the population density and emission density data, it is unlikely that this county will have any significant impact on the NYC area now or in the near future. Pike County is not part of the one-hour and not recommended as part of the 8-hour ozone planning area. The Commonwealth is seeking comment on not including Pike County as part of the NYC nonattainment area.

Appendix I: Planning Areas

TABLE I. List of Proposed Designations

Pennsylvania Areas	Annual Design Values*	24-Hour Design Values**	Proposed Designation	Comments
DEPs Southeast Region	(ug/m ³)	(ug/m ³)		
Philadelphia-Camden-Vineland PA-NJ-DE-MD Combined SA				
Bucks County	14.2	39	Nonattainment	
Chester County	16.0	38	Nonattainment	Data 7/2002 – 6/2003
Delaware County	15.5	39	Nonattainment	
Montgomery County	14.2	41	Nonattainment	
Philadelphia County	16.8	45	Nonattainment	
DEPs Southcentral Region				
Altoona Metropolitan SA				
Blair County	No monitor		Attainment	
Harrisburg-Carlisle-Lebanon Combined SA				
Harrisburg-Carlisle Metropolitan SA				
Cumberland County	14.7	43	Nonattainment	Monitor moved 3/2001
Dauphin County	15.5	46	Nonattainment	
Perry County	12.7	34	Nonattainment	
Lebanon Metropolitan SA				
Lebanon County	No monitor		Nonattainment	
Lancaster Metropolitan SA				
Lancaster County	17.1	43	Nonattainment	
Reading Metropolitan SA				
Berks County	16.7	43	Nonattainment	
York-Hanover-Gettysburg Combined SA				
York-Hanover Metropolitan SA				
York County	16.9	43	Nonattainment	
Gettysburg Micropolitan SA				
Adams County	13.3	38	Nonattainment	

Pennsylvania Areas	Annual Design Values* (ug/m ³)	24-Hour Design Values** (ug/m ³)	Proposed Designation	Comments
Chambersburg Micropolitan SA Area				
Franklin County	No monitor		Attainment	
Huntingdon Micropolitan SA				
Huntingdon County	No monitor		Attainment	
Remaining Counties in DEPs Southcentral Region				
Bedford County	No monitor		Attainment	
Fulton County	No monitor		Attainment	
Juniata County	No monitor		Attainment	
Mifflin County	No monitor		Attainment	
DEPs Southwest Region				
Pittsburgh-New Castle Combined Statistical Area				
Pittsburgh Metropolitan Statistical Area				
Allegheny County	21.7	63	Nonattainment	
Armstrong County	No monitor		Nonattainment	
Beaver County	15.9	41	Nonattainment	
Butler County (Part of DEPs Northwest Region)	No monitor		Nonattainment	
Fayette County	No monitor		Nonattainment	
Washington County	15.5	41	Nonattainment	
Westmoreland County	15.6	40	Nonattainment	
New Castle Micropolitan SA				
Lawrence County (Part of DEPs Northwest Region)	No monitor		Attainment	
Johnstown Metropolitan SA				
Cambria County	15.9	41	Nonattainment	
Somerset Micropolitan SA				
Somerset County	No Monitor		Attainment	
Indiana Micropolitan SA				
Indiana County	No monitor		Attainment	

Pennsylvania Areas	Annual Design Values* (ug/m ³)	24-Hour Design Values** (ug/m ³)	Proposed Designation	Comments
Remaining Counties in DEPs Southwest Region				
Greene County	No monitor		Attainment	
DEPs Northwest Region				
Erie Metropolitan SA				
Erie County	13.6	36	Attainment	
Youngstown-Warren-Boardman Metropolitan SA				
Mercer County	14.5	38	Nonattainment	Downwind of the monitors in the MSA measuring NA
Meadville Micropolitan SA				
Crawford County	No monitor		Attainment	
St. Marys Micropolitan SA				
Elk County	No monitor		Attainment	
Bradford Micropolitan SA				
McKean County	No monitor		Attainment	
Oil City Micropolitan SA				
Venango County	No monitor		Attainment	
Warren Micropolitan SA				
Warren County	No monitor		Attainment	
Remaining Counties in DEPs Northwest Region				
Clarion County	No monitor		Attainment	
Jefferson County	No monitor		Attainment	
Forest County	No monitor		Attainment	
DEPs Northcentral Region				
State College Metropolitan SA				
Centre County	12.5	39	Attainment	

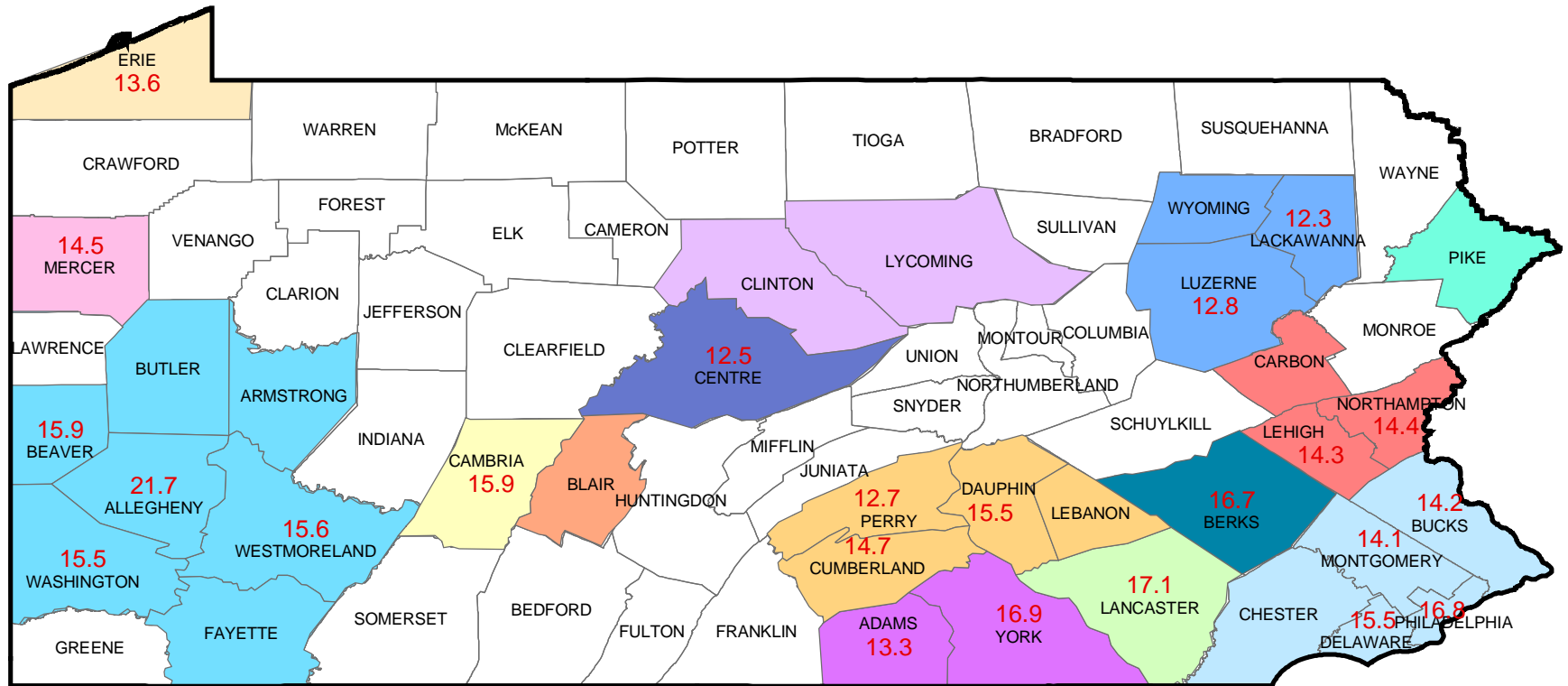
Pennsylvania Areas	Annual Design Values* (ug/m ³)	24-Hour Design Values** (ug/m ³)	Proposed Designation	Comments
Williamsport-Lock Haven Combined Statistical Area				
Williamsport Metropolitan SA				
Lycoming County	No monitor		Attainment	
Lock Haven Micropolitan SA				
Clinton County	No monitor		Attainment	
Bloomsburg-Berwick Micropolitan SA				
Columbia County	No monitor		Attainment	
Montour County	No monitor		Attainment	
DuBois Micropolitan SA				
Clearfield County	No monitor		Attainment	
Sunbury-Lewisburg-Selinsgrove Combined SA				
Lewisburg Micropolitan SA				
Union County	No monitor		Attainment	
Selinsgrove Micropolitan SA				
Snyder County	No monitor		Attainment	
Sunbury Micropolitan SA				
Northumberland County	No monitor		Attainment	
Remaining Counties in Northcentral Region				
Bradford County	No monitor		Attainment	
Cameron County	No monitor		Attainment	
Potter County	No monitor		Attainment	
Sullivan County	No monitor		Attainment	
Tioga County	No monitor		Attainment	
DEPs Northeast Region				
Allentown-Bethlehem-Easton Metropolitan Statistical Area				
Carbon County	No monitor		Attainment	
Lehigh County	14.3	41	Attainment	
Northampton County	14.4	42	Attainment	

Pennsylvania Areas	Annual Design Values*	24-Hour Design Values**	Proposed Designation	Comments
Scranton-Wilkes-Barre-Hazleton Metropolitan SA	(ug/m ³)	(ug/m ³)		
Lackawanna County	12.3	38	Attainment	
Luzerne County	12.8	36	Attainment	
Wyoming County	No monitor		Attainment	
New York-Newark-Edison Metropolitan SA				
Pike County	No monitor		Attainment	Part of New York MSA, designate as attainment
East Stroudsburg Micropolitan SA				
Monroe County	No monitor		Attainment	
Remaining Counties in Northeast Region				
Schuylkill County	No monitor		Attainment	
Susquehanna County	No monitor		Attainment	
Wayne County	No monitor		Attainment	

*Three-Year Average (2000-2002) of the Annual Averages of the PM_{2.5} Concentrations
**Three-Year Average (2000-2002) of the 98th percentile 24-hour PM_{2.5} Concentrations

Figure 1 - Pennsylvania 2000 - 2002 PM 2.5 Annual Design Values Per County

Based on Statistical Areas from 2000 Census Data (Report Dated June 10, 2003)



Metropolitan Statistical Areas

- | | | |
|------------------------------------|--|--|
| ■ Allentown-Bethlehem-Easton_PA-NJ | ■ Lancaster_PA | ■ Scranton-Wilkes-Barre_PA |
| ■ Altoona_PA | ■ New_York-Northern_New_Jersey-Long_Island_NY-NJ-CT-PA | ■ State_College_PA |
| ■ Erie_PA | ■ Philadelphia-Wilmington-Atlantic_City_PA-NJ-DE-MD | ■ Williamsport-Lock_Haven_PA |
| ■ Harrisburg-Carlisle-Lebanon_PA | ■ Pittsburgh_PA | ■ York-Hanover-Gettysburg_PA |
| ■ Johnstown_PA | ■ Reading_PA | ■ Youngstown-Warren-East_Liverpool_OH-PA |

Figure 2 - Metropolitan Statistical Areas

Based on 2000 Census Data (Report Dated June 10, 2003)

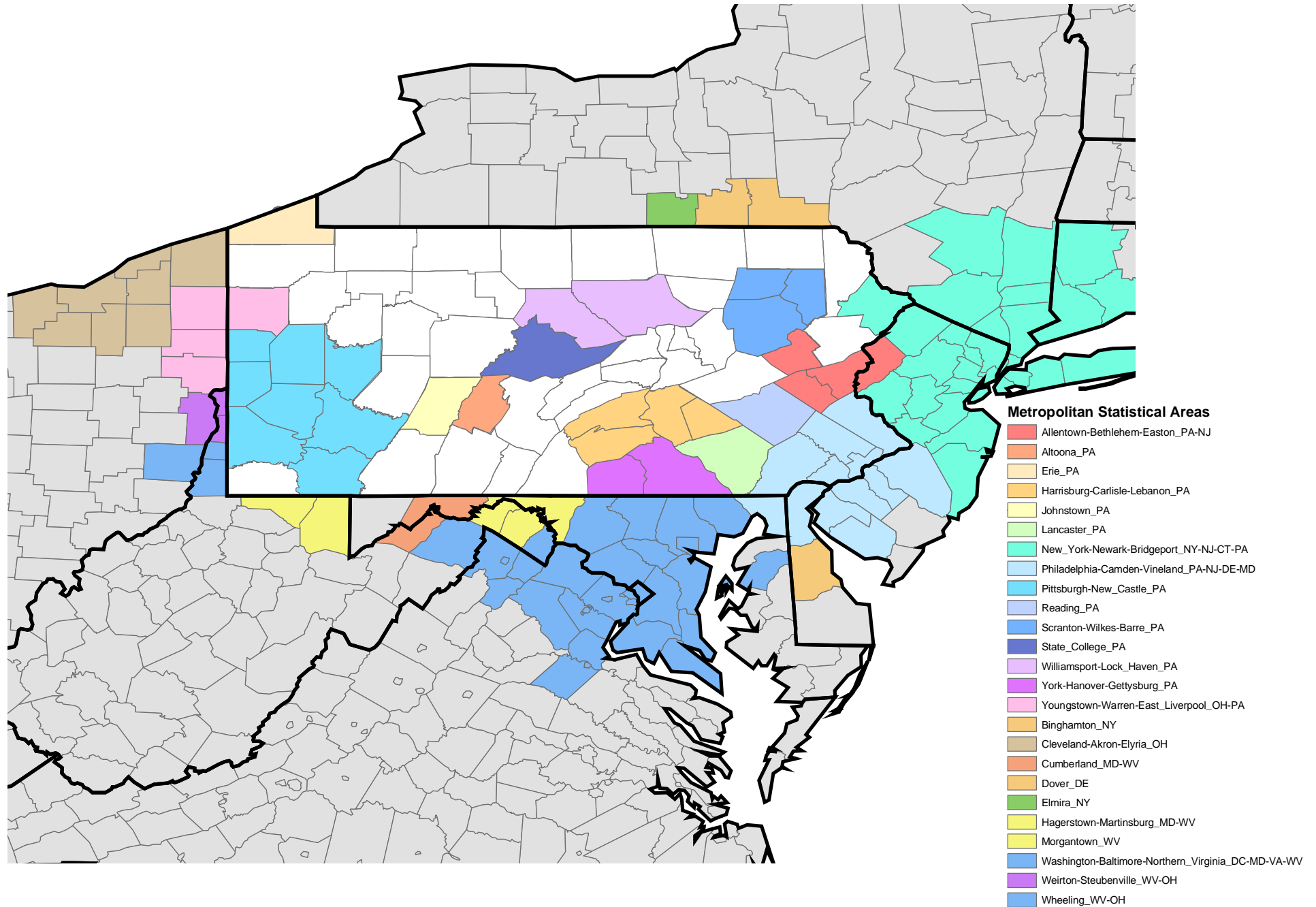
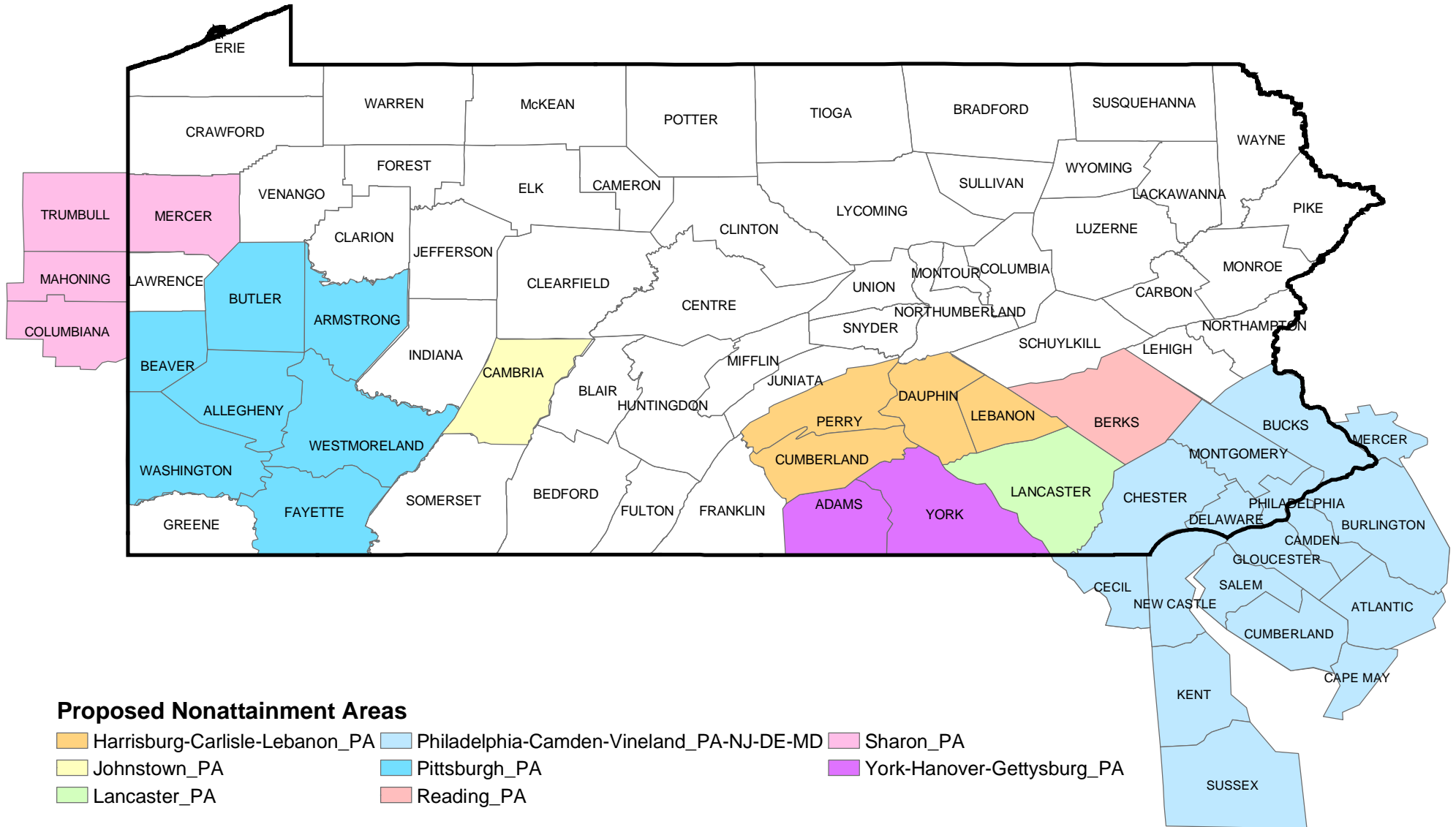


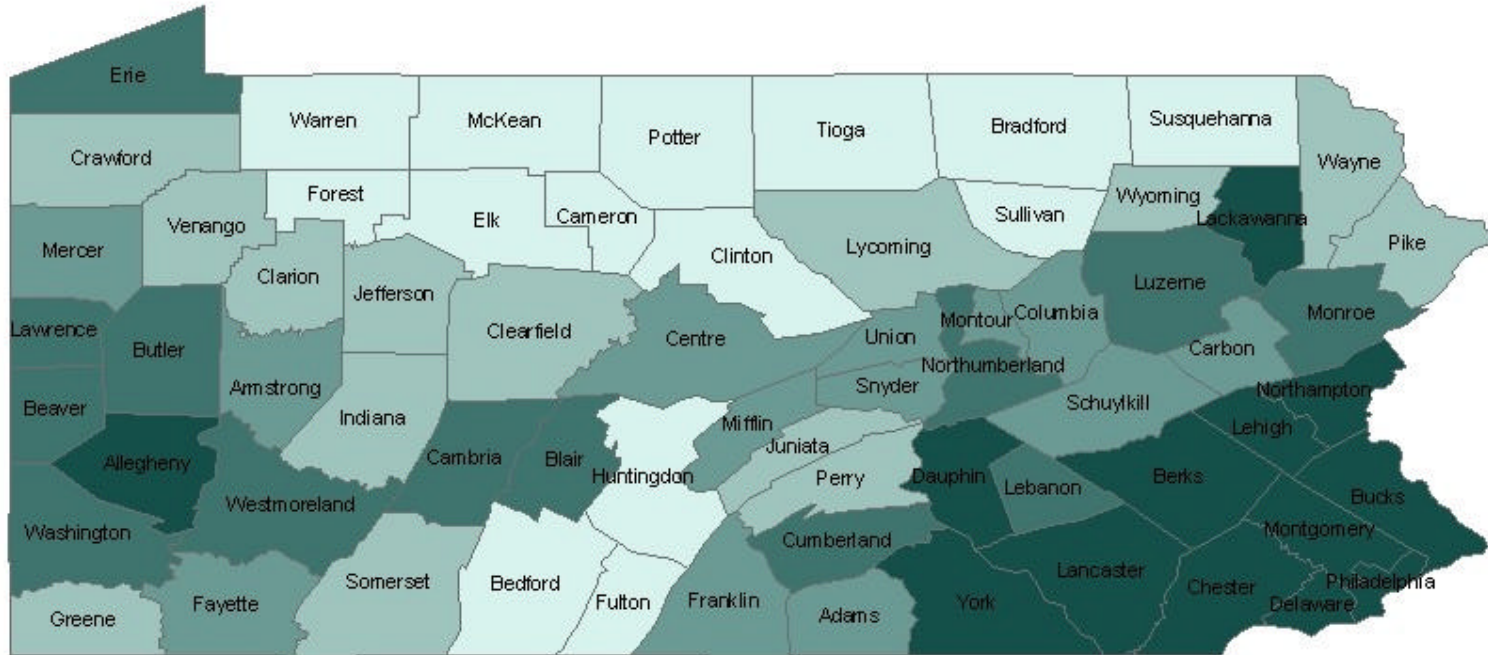
Figure 3 - Proposed PM 2.5 Nonattainment Areas

Based on Statistical Areas from 2000 Census Data (Report Dated June 10, 2003)



Appendix II: Supporting Documentation

Pennsylvania Population Density



Source: U.S. Census Bureau, 2000

Population / Sq.Mi

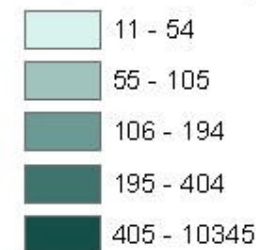
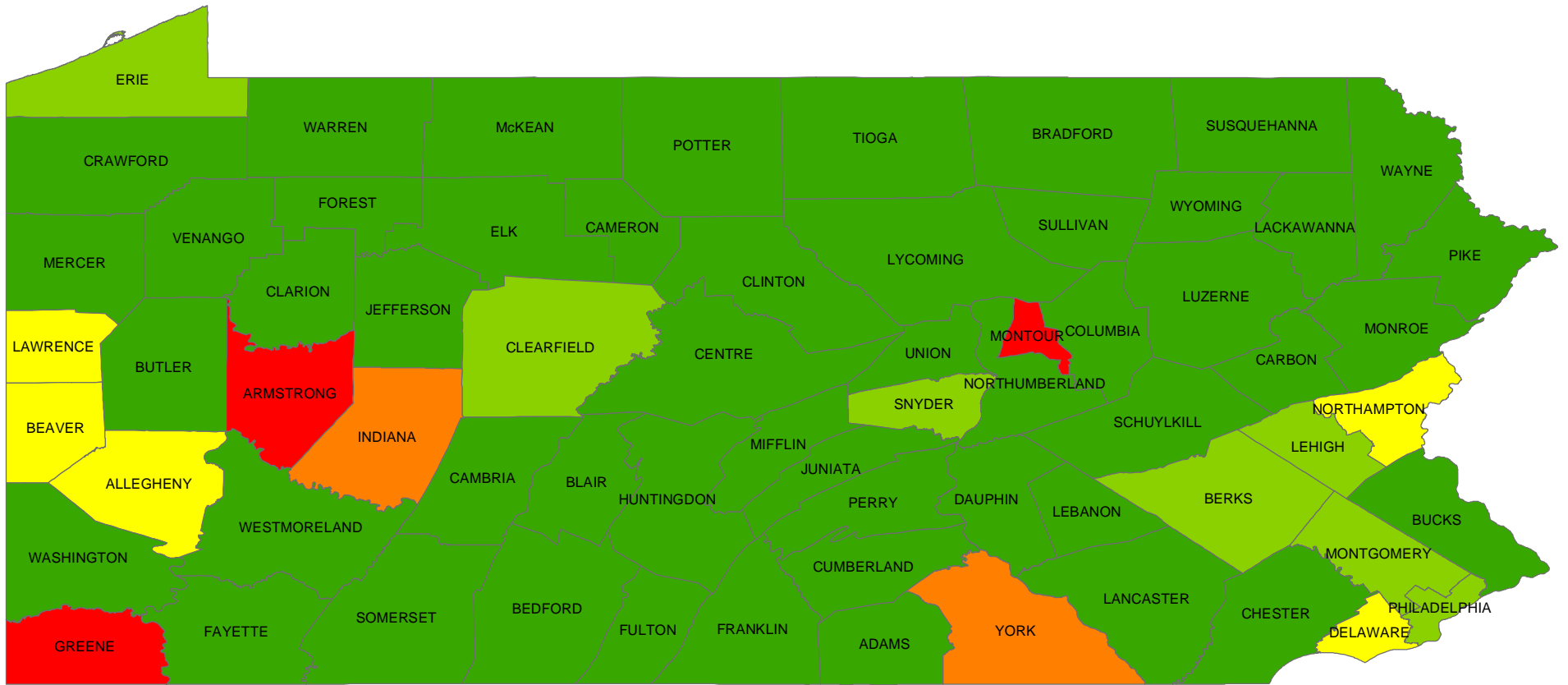


Figure 4

Figure 5a - 1999 SO2 Emissions Density

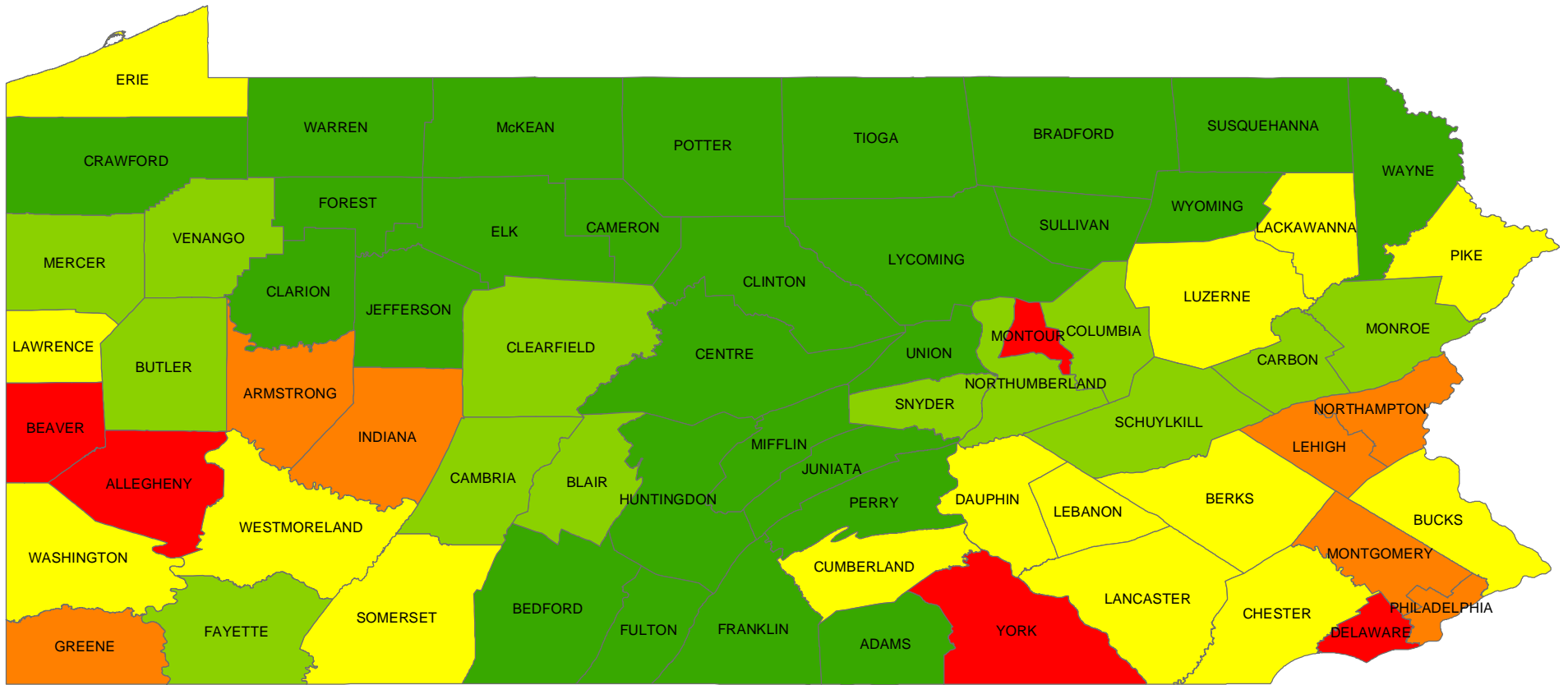
Tons Per Year Per Square Mile



SO2 (tpy) / Sq. Mi. 0.073 - 12.436 12.436 - 45.963 45.963 - 152.847 152.847 - 240.043 240.043 - 862.207

Figure 5b - 1999 NOx Emissions Density

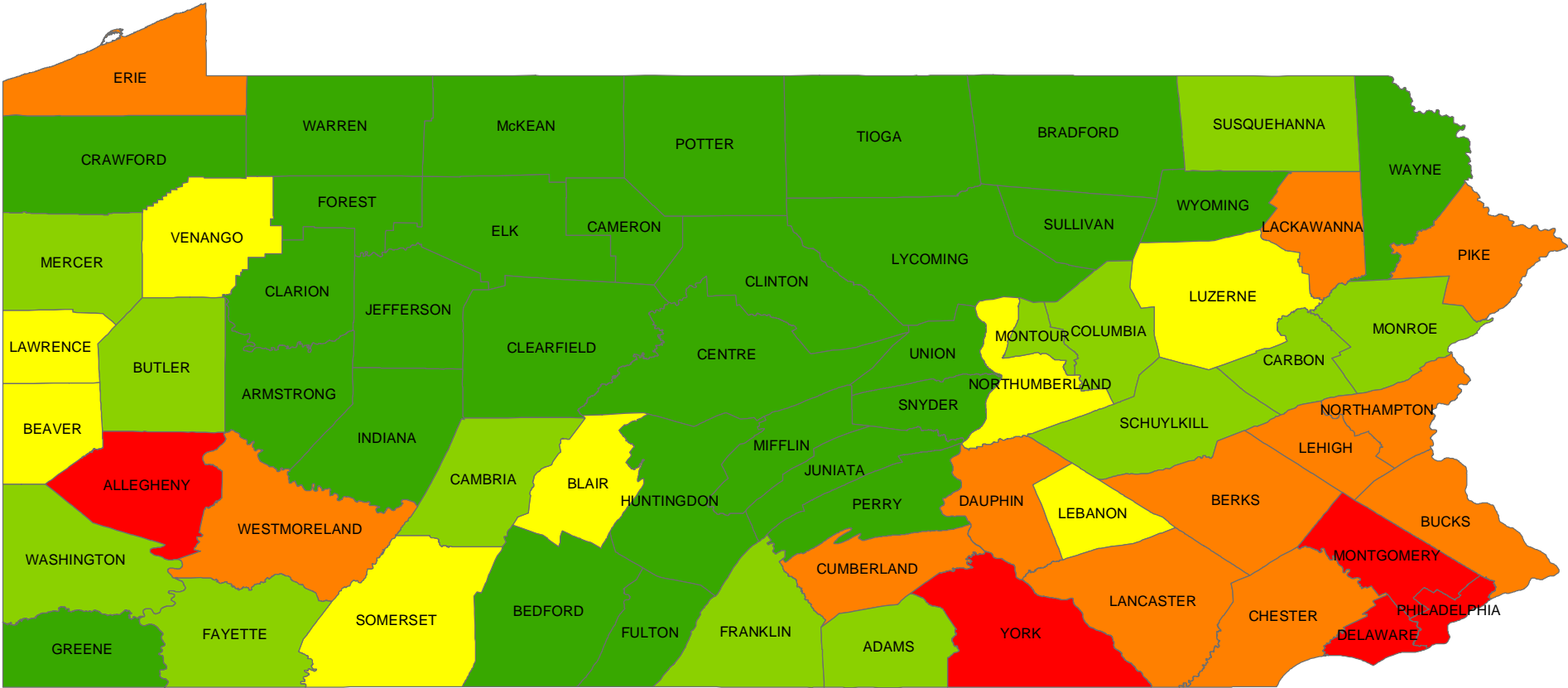
Tons Per Year Per Square Mile



NOx (tpy) / Sq. Mi. ■ 0.275 - 9.255 ■ 9.255 - 19.076 ■ 19.076 - 35.586 ■ 35.586 - 66.211 ■ 66.211 - 157.502

Figure 5c - 1999 VOC Emissions Density

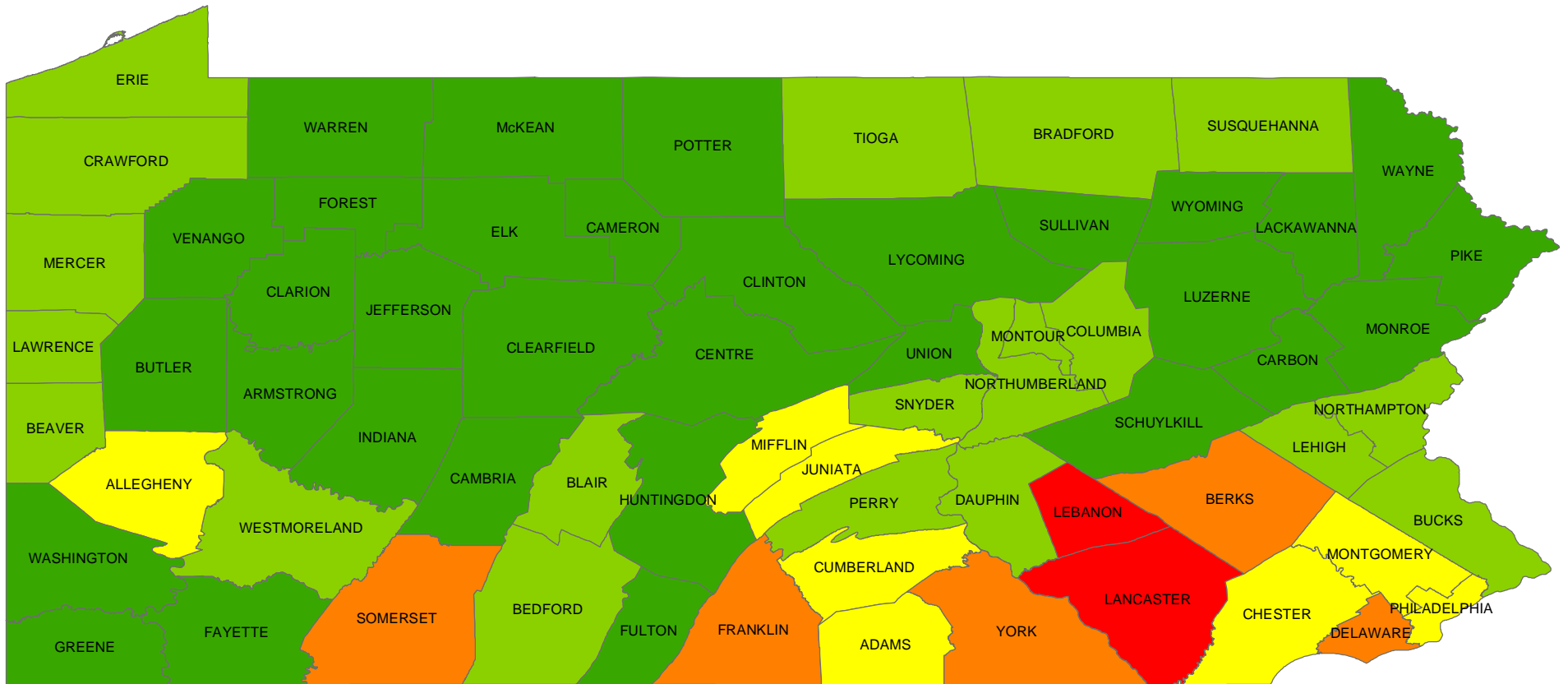
Tons Per Year Per Square Mile



VOC (tpy) / Sq. Mi. ■ 1.547 - 6.838 ■ 6.839 - 12.451 ■ 12.452 - 20.828 ■ 20.829 - 44.718 ■ 44.719 - 111.698

Figure 5e - 1999 NH3 Emissions Density

Tons Per Year Per Square Mile

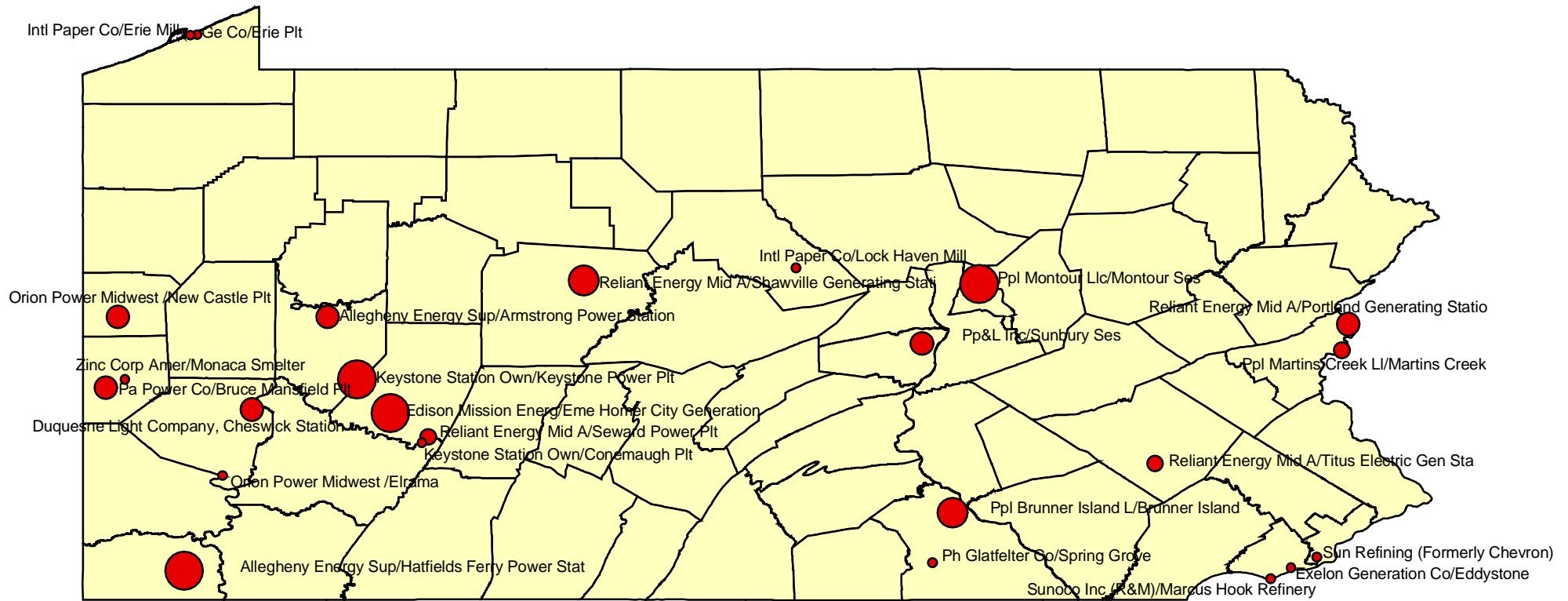


NH3 (tpy) / Sq. Mi. 0.190 - 1.346 1.346 - 2.615 2.615 - 4.212 4.212 - 7.682 7.682 - 15.325

Figure 6

Top 25 SO2 Emitting Facilities in Pennsylvania based on Calendar Year 1999 Emissions Data

Accounts for 91% of Major Industrial Sources, 82% of all Emission Sources

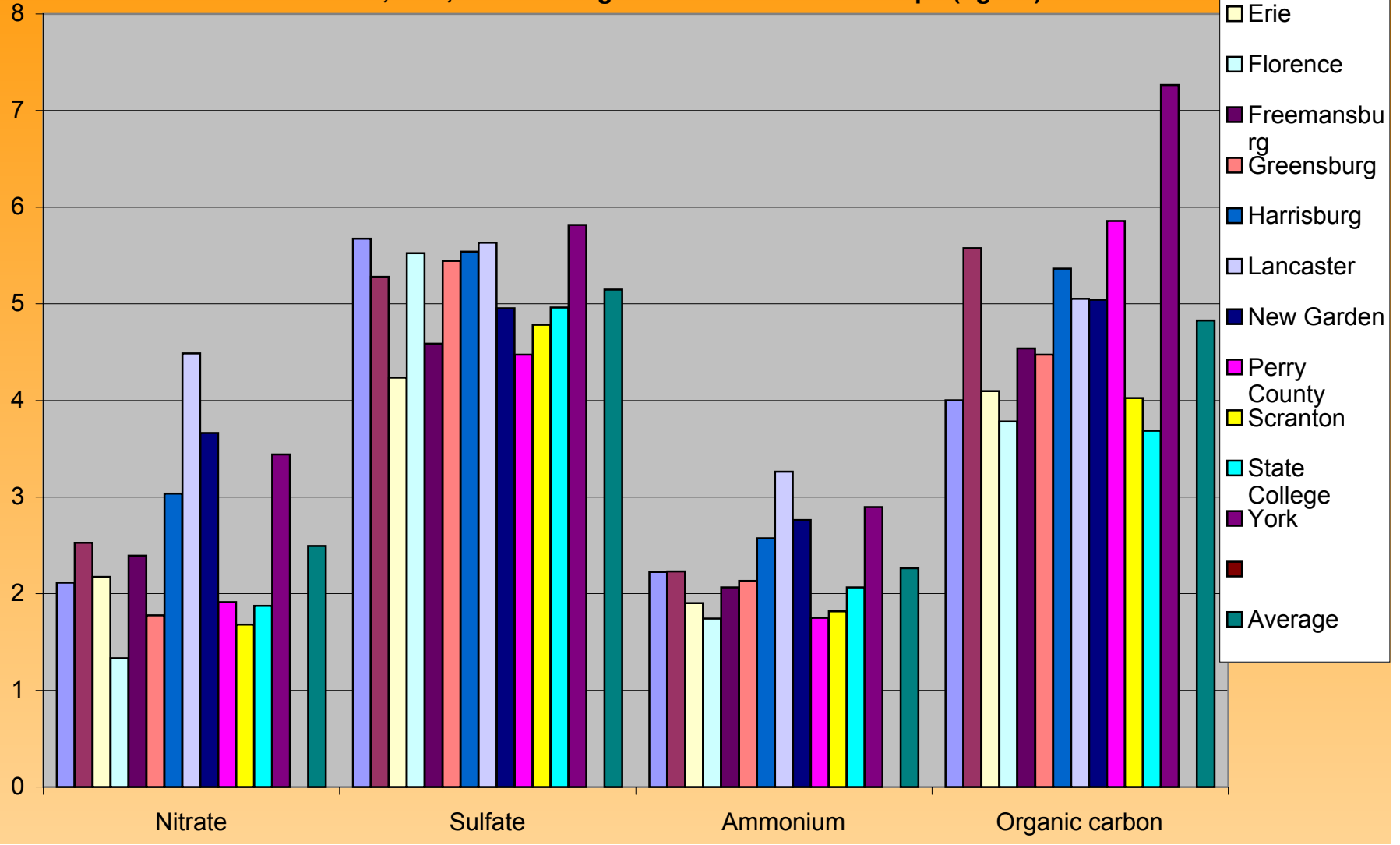


SO2 Facilities (in Tons Per Year) ● 4848 - 9249 ● 9250 - 19537 ● 19538 - 41603 ● 41604 - 71188 ● 71189 - 163462

Figure 7 - Speciated Monitoring Data

7/1/2002 - 6/26/2003

NO₃, SO₄, NH₄ and Organic Carbon - Cluster Graph (ug/m³)



Appendix III: Key Terms

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KEY TERMS

Air Quality Monitoring – a program through which air quality samples are collected to judge attainment of ambient air quality standards, to prevent or alleviate air pollution emergencies, to observe pollution trends throughout regions, and to evaluate the effects of urban, land-use, and transportation planning relating to air pollution. The Ambient Air Monitoring Program in Pennsylvania is run by DEP and two local independent health departments (Allegheny and Philadelphia counties). Measurements are taken in areas of high population density, high expected levels of pollution, or both.

Ambient air quality – concentration of pollutants in the air around us, generally expressed in parts of pollutant per volume of air (contrasted with emissions)

Area sources of air pollution – usually refers to smaller commercial sources that are not required to be permitted, residential and other miscellaneous sources (ex. fires).

Biogenic sources – natural sources of air pollution, for example, trees.

Emissions – for purposes of PM_{2.5}, the sulfur dioxide, nitrogen oxide, organic compounds, soot and ammonia pollution coming directly from area, mobile, nonroad and stationary facilities, estimated before dilution in the ambient air. Generally expressed in mass over a time period, ex. tons per day or tons per year.

Core Based Statistical Area – a central county or group of counties with at least one population core and a high degree of social and economic integration. Criteria are set by the U.S. Office of Management and Budget.

Designation - the process by which the U.S. Environmental Protection Agency identifies the areas which do not meet the NAAQS.

Design Value - the value for a monitor or a nonattainment area that, for legal purposes, determines whether the monitor or area violates the standard. The annual PM_{2.5} design value for a monitor is the three year average of the annual averages. The 24-hour design value for a monitor is the 98th percentile 24-hour concentration averaged over 3 years. The design value for an area with more than one monitor is the highest monitor design value.

Metropolitan Statistical Area - a CBSA with a minimum population of at least 50,000.

Micropolitan Statistical Area – a CBSA with a population of at least 10,000 but less than 50,000.

Mobile sources of air pollution – highway vehicles, including cars, motorcycles, trucks and buses.

National Ambient Air Quality Standards (NAAQS)– established by EPA. Primary standards protect public health with a margin of safety, secondary standards protect the environment.

New Source Review – the process by which new or modified major sources are reviewed in nonattainment areas to determine whether or not they must obtain compensating emission reductions to ensure overall pollution decreases.

Nonattainment – if an area (boundaries determined by EPA) is violating a NAAQS or has not completed all requirements to be removed from this status, it is designated nonattainment.

Nonroad (off-road) sources of air pollution – construction, farming, lawn and garden, industrial plant vehicles, airport service equipment, locomotives, airplanes, etc.

Nitrogen oxides (NO_x) - Chemical compounds containing nitrogen and oxygen. NO_x contributes to PM_{2.5}, ozone, haze, acid rain, and the nitrification of waterways and soils.

Ozone – a gas composed of three oxygen atoms. It is not usually emitted directly into the air, but at ground level is created by a chemical reaction between oxides of nitrogen (NO_x) and volatile organic compounds (VOC) in the presence of heat and sunlight. Ozone has the same chemical structure whether it occurs miles above the earth (stratospheric) or at ground level (tropospheric) and can be good or bad, depending on its location in the atmosphere.

Particulate Matter - includes both solid and liquid particles suspended in the air originating from a variety of human and natural activities

PM_{2.5} - Particles less than 2.5 micrometers in diameter are referred to as fine particles and generally pose the largest health risks. Because of their small size, fine particles can penetrate deeply into the lungs.

PM₁₀ - Particles less than 10 micrometers in diameter. Particles of this size pose a health concern because they can be inhaled into and accumulate in the respiratory system

State Implementation Plan (SIP) - Document prepared by states, and submitted to EPA for approval, which identifies actions and programs to be undertaken by the State and its subdivisions to implement their responsibilities under the Clean Air Act. Once approved by EPA, a SIP is federally enforceable.

Stationary (point) sources of air pollution – major industrial facilities with permits that are individually assessed by DEP

Sulfur Oxides (SO_x) - Chemical compounds containing sulfur and oxygen. Sulfur oxides contribute to PM_{2.5}, haze and acid rain.

Volatile Organic Compounds (VOCs) - A group of chemicals that react in the atmosphere to produce PM_{2.5} and ozone; does not include methane and other compounds determined by EPA to have negligible photochemical reactivity.