

**Commonwealth of Pennsylvania
Department of Environmental Protection**



**RECOMMENDATIONS TO THE U.S. EPA
FOR 24-HOUR
FINE PARTICULATE (PM_{2.5})
ATTAINMENT/NONATTAINMENT AREAS**

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Fine Particulate (PM_{2.5}) Nonattainment Area Designations**

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What is this document?

The federal Clean Air Act (CAA) provides a mechanism for states to make recommendations to the United States Environmental Protection Agency (EPA) on the designation of areas not meeting the health-based National Ambient Air Quality Standards (NAAQS).

In this document, the Commonwealth of Pennsylvania (Commonwealth) is making recommendations to the U.S. EPA concerning the designation of attainment and nonattainment areas in Pennsylvania for the new 24-hour fine particulate NAAQS established by the U.S. EPA (71 *Fed. Reg.* 61144, Oct. 17, 2006). The designation recommendations are based on air quality monitoring data for 2004-2006 and other available information, including particulate-forming emissions, meteorology and demographics. Since the U.S. EPA anticipates making final designations in December 2009 using air quality monitoring data for 2005-2007, the Department of Environmental Protection (DEP) will continue to work with the U.S. EPA during the process leading to the U.S. EPA's promulgation of the final designations.

What is fine particulate matter?

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. Smaller particles 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. Fine particles are primarily composed of sulfates, nitrates, organic carbon, elemental carbon and crustal material.

PM_{2.5} may either be directly emitted from a source ("primary" particulate, also called "direct" emissions of particulate) or formed in the atmosphere by chemical reaction of gaseous precursors ("secondary" particulate). Precursors of PM_{2.5} can include sulfur dioxide, nitrogen oxides (NO_x), volatile organic compounds (VOC), and ammonia. PM_{2.5} and its precursors result mainly from fuel combustion (motor vehicles, power plants and nonroad engines) and industrial processes.

PM_{2.5} is a significant air pollution problem in parts of 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.

What is the NAAQS for PM_{2.5}? The U.S. EPA sets the NAAQS based on its review of existing scientific knowledge about the adverse health and welfare effects. The CAA requires the U.S. EPA to review and update periodically, if necessary, the NAAQS to

“protect public health with an adequate margin of safety” based on the latest, best-available science. CAA § 109(d), 42 U.S.C. § 7409(d).

Previous particulate standards had been based on total suspended particulates and then particles less than 10 micrometers in diameter (PM₁₀). In 1997, the U.S. EPA revised the NAAQS to reflect the growing body of scientific knowledge that links serious health effects to fine particles.

On July 18, 1997, the U.S. EPA promulgated two new PM_{2.5} standards – an annual average of 15 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), and a 24-hour average of 65 $\mu\text{g}/\text{m}^3$. (The PM₁₀ standards were retained as an indicator for coarse PM; all areas of Pennsylvania meet this standard.) A number of challenges were filed in the federal Court of Appeals for the District of Columbia Circuit regarding these standards. It took until March 2002 for all of the legal challenges to be resolved. Designations of attainment and nonattainment areas for the 1997 standards were made in December 2004 with an effective date of April 5, 2005. (No area in Pennsylvania was designated as nonattainment for the 24-hour standard.) The U.S. EPA then began developing new strategies for implementation of the PM_{2.5} standards. The final PM_{2.5} implementation regulation was published April 25, 2007. State Implementation Plans for the 1997 standard are due in April 2008, three years after the designations were effective.

The delay in implementing the 1997 standard did not affect the U.S. EPA’s periodic review of the standard itself. Therefore, on October 17, 2006, the U.S. EPA published its latest revisions to the PM standards. The daily (24-hour) standard for PM_{2.5} was made more protective and changed from 65 $\mu\text{g}/\text{m}^3$ to 35 $\mu\text{g}/\text{m}^3$. An area does not attain the 24-hour standard if the 98th percentile 24-hour concentration averaged over 3 years is more than 35 $\mu\text{g}/\text{m}^3$. The annual standard for PM_{2.5} of 15 $\mu\text{g}/\text{m}^3$ was retained. The daily standard for PM₁₀ of 150 $\mu\text{g}/\text{m}^3$ was retained while the annual standard of 50 $\mu\text{g}/\text{m}^3$ was revoked completely. (No area in Pennsylvania violates the PM₁₀ standard.) The U.S. EPA's new fine particulate 24-hour standards will provide significantly increased health and environmental protection.

Health Effects. Millions of Pennsylvanians live in areas where the PM_{2.5} health-based standards are exceeded. 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.

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 to 25 miles. In addition, components of PM_{2.5}, such as nitrates and sulfates, contribute to acid rain formation. Acid rain 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. The U.S. EPA has not set a separate standard for PM_{2.5} to protect welfare and the environment.

What is the process for designating areas?

Section 107(d)(1)(B) of the CAA requires the U.S. 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 and nonattainment areas, supported by the most recent quality-assured monitoring data. The U.S. EPA provides criteria for states' recommendations for designating areas.

The U.S. EPA has requested that governors' recommendations for PM_{2.5} attainment and nonattainment designations be submitted by December 18, 2007, one year after the promulgation of the revised NAAQS. The U.S. EPA may make modifications and promulgate all or part of a Governor's recommendations. If EPA determines that a modification to the recommendation is necessary, the U.S. 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 the U.S. EPA if the state believes its decisions are not appropriate.

The recommendations in this document are based on 2004-2006 air quality monitoring data, the most recent full-year quality-assured data available. The U.S. EPA will make final PM_{2.5} designations in December 2009, most likely based on 2006-2008 air quality monitoring data.

The PM_{2.5} State Implementation Plan (SIP) revisions will be due to the U.S. EPA in April 2013, three years after final designations are expected to be effective. The CAA presumptive attainment date is five years after final designations are effective, which would be April 2015. There is a possibility of up to a five-year extension for the attainment date, if the state demonstrates the need for an extension.

The anticipated schedule for the recommendations of designation and development of SIPs is as follows:

November 17, 2007	Open comment period on PM _{2.5} designation recommendations
December 7, 2007	Close comment period on PM _{2.5} designation recommendations
December 18, 2007	State recommendations due to the U.S. EPA
December 2009	EPA's final designations published
April 2010	Effective date of the U.S. EPA's final designations
April 2013	PM _{2.5} SIP revision due to the U.S. EPA
Up to April 2015	Attainment date
Up to April 2020	Attainment date with a 5-year extension

DEP held three public meetings on its proposed recommendations on November 26, November 27 and November 28, 2007, in Harrisburg, Pittsburgh and Norristown, respectively.

What would be the effects of designation as nonattainment?

An area designated as nonattainment may be affected because the regulatory regimen for new or modified stationary sources will be different. In addition, the "conformity" provisions of the CAA apply only in nonattainment areas; transportation plans and federally-funded actions and projects must conform to the SIP in order not to interfere with NAAQS attainment and maintenance.

Any major new or modified stationary source inside a PM_{2.5} nonattainment area could be affected. Under current regulations, new major stationary sources need to demonstrate that they do not cause or significantly contribute to a violation of the NAAQS. The U.S. EPA has recently promulgated proposed rules offering several potential methods for sources to demonstrate during the applicable New Source Review/Prevention of Significant Deterioration permitting process whether or not their proposed emission increases would significantly contribute to an area that is already violating the PM_{2.5} standard(s) and trigger additional control requirements and emissions offsets. Until these rules are finalized it is difficult to speculate what impact they may have on sources; however, since the rules are required by the CAA to ensure that as new modifications and sources are added, these activities result in progress towards attainment, air quality in the area should improve with the addition of new and modified sources.

Eight areas encompassing 20 counties have already been designated as nonattainment for the 1997 annual PM_{2.5} standard. To the extent that these areas are also designated as nonattainment for the 24-hour PM_{2.5} standard, there would be no net change in requirements in these areas as a result of designation for the 24-hour standard.

The Commonwealth is in the process of developing SIPs that demonstrate how these areas will attain the annual standard by April 2010. Pennsylvania will derive additional emission reduction benefits from regional measures as well as mobile measures, such as cleaner new cars, cleaner new diesel vehicles and cleaner fuels, as these are implemented over the next few years. Measures adopted by states to meet this annual standard will also assist in reducing peak levels of PM_{2.5} and meeting the 24-hour standard.

Measures adopted by the states to attain the ground level 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 eight-hour ozone standards will also help to attain the PM_{2.5} standard.

In addition, regional and national control measures will assist Pennsylvania in attaining the 24-hour PM_{2.5} standard. In March 2005, the U.S. EPA issued the Clean Air Interstate Rule to address the ongoing problem of regional transport of pollutants. The Clean Air Interstate Rule (CAIR) will permanently cap emissions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x), which contribute to PM_{2.5} and ozone, in the eastern United States. CAIR achieves large reductions of SO₂ and/or NO_x emissions across 28 eastern states and the District of Columbia. When fully implemented, CAIR will reduce SO₂ emissions in these states by over 70 percent and NO_x emissions by over 60 percent from 2003 levels. The electric generating units in the Commonwealth are subject to CAIR under a U.S. EPA Federal Implementation Plan (FIP) promulgated on April 28, 2006. The Commonwealth may submit a SIP that achieves the CAIR reductions in place of the FIP.

To the extent additional measures are required to attain the PM_{2.5} NAAQS, they would be developed by Pennsylvania through a public process as the implementation plan is developed. The Commonwealth will also work with states in areas that affect and are affected by Pennsylvania's air quality to develop measures that will not disadvantage Pennsylvania economically.

Pennsylvania's PM_{2.5} Designation Recommendations

EPA guidance for PM_{2.5} designation boundaries. On April 1, 2003, the U.S. EPA issued a general guidance memorandum, "Designations for the Fine Particulate National Ambient Air Quality Standards." The guidance memorandum described criteria that states were to examine when suggesting nonattainment boundaries for the 1997 standards that are either larger or smaller than the metropolitan area. Some of the critical factors recommended for consideration included population density similarities, emission levels, air quality, and meteorology. EPA's 2003 guidance applied a presumption that the boundaries for urban nonattainment areas should be based on statistical metropolitan/micropolitan areas, as defined by the United States Office of Management and Budget (OMB).¹ Pennsylvania used this guidance when developing designation recommendations for the annual PM_{2.5} standard.

¹ The Office of Management and Budget defines Micropolitan, Metropolitan, and Combined Statistical Areas. The areas consist of a central county or group of counties with a population core and a high degree of social and economic integration measured by commuting ties with outlying counties. OMB also defines

EPA promulgated guidance specifically for the revised 24-hour PM_{2.5} NAAQS designations on June 8, 2007. The U.S. EPA is applying no such presumption about statistical areas for the revised 24-hour standard in its 2007 guidance. The U.S. EPA also anticipates that the same boundaries for the annual PM_{2.5} standard may also be appropriate for implementing the 24-hour standard where both standards are violated, in order to facilitate overall air quality planning.

The Department has strongly considered providing for continuity of existing air quality planning efforts in its recommendations for the revised 24-hour PM_{2.5} NAAQS, as per EPA's 2007 guidance. In central and eastern Pennsylvania, the U.S. EPA's 2005 designations generally followed county boundaries and, in part, the OMB's boundaries for Metropolitan Statistical Areas and Combined Statistical Areas. The OMB-defined areas are defined primarily by having a high degree of social and economic integration measured by commuting ties with outlying counties. Where the U.S. EPA's designations did not follow these boundaries, they tended to make the nonattainment area smaller than the MSA or CSA. For example, Perry County was not included in the Harrisburg nonattainment area, even though it is part of the CSA. In western Pennsylvania, EPA's designations carved out small portions of some counties surrounding high-emitting power plants to add to full counties. For example, several townships in Indiana County were added to the Johnstown (Cambria County) nonattainment area. The process is well underway in developing SIPs for those areas. Therefore, recommendations for the revised 24-hour standard do not change most of these boundaries.

What factors have been considered? The U.S. EPA recommends that states look at a number of factors in making its recommendations for 24-hour PM_{2.5} designations (Attachment 2 to the 2007 Guidance). The Department, on behalf of the Commonwealth, has considered these factors as follows:

Air Quality. The Commonwealth's recommendations are based on the 2006 PM_{2.5} 24-hour design values (using the 2004, 2005 and 2006 monitored data). Figure B-1 is a map of the 2006 PM_{2.5} 24-hour design values for all of the PM_{2.5} monitors. The monitors exceeding the 35 µg/m³ standard are displayed in red. (With rounding, design values of 35.5 are considered exceeding the standard.) All of the areas that were designated nonattainment for the annual standard in 2004 have monitors that exceed the revised 24-hour standard. In addition, two monitors in counties that were not designated nonattainment for the annual standard in 2004 are in violation of the revised 24-hour standard: the State College monitor (in Centre County) and the Freemansburg monitor (in Northampton County). The Commonwealth is recommending that all of these areas be designated nonattainment for the 24-hour PM_{2.5} standard.

Metropolitan Statistical Areas (an urban area with a population of at least 50,000 with or without outlying counties), Micropolitan Statistical Areas (a population of at least 10,000 but less than 50,000 with or without outlying counties) and Combined Statistical Areas (combinations of either of the above). In particular, a Combined Statistical Area is formed if two core areas are significantly integrated by employment. In this document, DEP considered the most current list of Statistical Areas available at: www.census.gov/population/www.estimates/metrodef.html.

Emissions and Current Emission Controls.

Stationary Point Sources. Figures B2-B5 in Appendix B show the PM_{2.5} precursor emissions per square mile for stationary point sources, which are the sources for which the Department collects individual emissions-related information. Stationary point sources include major manufacturing operations and power plants. Figures B11-B14 show similar information for specific point sources.

Area Sources. Figures B6-B10 (Emission Density for Area Sources) in Appendix B show PM_{2.5} precursor emissions per square mile, including emissions resulting from:

- Stationary area sources, which are the industrial, commercial, and residential sources too small or too numerous to be handled individually, such as commercial and residential open burning, architectural and industrial maintenance coatings application and clean-up, consumer product use, and vehicle refueling at service stations.
- Highway vehicles, which include passenger cars and light-duty trucks, other trucks, buses and motorcycles; and
- Nonroad sources, which consist of a diverse collection of engines, including engines in outdoor power equipment, recreational vehicles, farm and construction machinery, lawn and garden equipment, industrial equipment, recreational marine vessels, commercial marine vessels, locomotives, ships, aircraft and many other such sources.

Stationary area source emissions of ammonia (NH₃) are concentrated in the areas with high concentrations of agriculture, including areas of animal and crop operations. Stationary area source emissions of the other PM_{2.5} precursors tend to be more concentrated in populated areas as a result of vehicle traffic or combustion sources.

Highway and nonroad emissions of NO_x, direct PM_{2.5} and VOC have been declining and will continue to do so, as national and state controls on new highway vehicles, nonroad equipment and motor vehicle fuels come into effect, and older vehicles are replaced. In areas where transportation is a significant generator of emissions, Pennsylvania's designations predominantly follow transportation planning boundaries (for example, Lehigh/Northampton counties).

Population, Urbanization, Traffic, Commuting, and Growth. These related factors are the primary determinates of the OMB's designation of metropolitan and micropolitan statistical areas and were used extensively by Pennsylvania in its recommendations for the annual PM_{2.5} standard, and to a lesser extent, by the U.S. EPA in its final designations. For the 24-hour standard, the U.S. EPA explicitly stated that these area boundaries would no longer be presumed to define nonattainment areas. The Commonwealth, however, has emphasized continuity of planning for attainment of the

24-hour standard with the annual standard. Consequently, the Commonwealth's recommended boundaries take these factors into account. It should be noted, however, that a high rate of growth does not necessarily mean high absolute increases. For example, while Pike County has a high rate of growth, population is relatively low and, therefore, emissions are expected to remain an insignificant contribution to the New York City area. Figure B15 shows population density by county and Figure B16 shows population growth between 1990 and 2000.

Political and other boundaries. Following county boundaries has a natural advantage in that these are the same boundaries used by the Commonwealth's regional transportation planning organizations (which are also often economic planning organizations as well). Inventory data for non-point sources is also more accurate and available on the county level.

However, the U.S. EPA included small portions (individual townships and boroughs) of some counties in the annual PM designations. For purposes of continuity of planning, the Commonwealth is not recommending changes to any of these small-area boundaries for the 24-hour designations.

Meteorology and Topography. Many regions across the Commonwealth have weather that is influenced by topography. There are many areas of river valleys and higher terrain across western Pennsylvania that influence the way wind flows across the region. Many of the monitors that exceed the 24-hour PM_{2.5} standard are located in regions that contain significant topographic features, such as the Allegheny Plateau and the Ridge and Valley regions in western Pennsylvania. Topography also has a role in the way morning inversions form. Morning inversions are a key meteorological feature that contributes to higher daily levels of PM_{2.5} across a region. Various areas contend with the influences of the Appalachian Mountains, as well. The changes in local elevation become less drastic in southcentral and southeastern portions of the Commonwealth. The Philadelphia area, by contrast, has relatively few topographic features that restrict airflow. Less restricted airflow over the region could explain why 24-hour design values in southeastern Pennsylvania are much more uniform than their counterparts in western Pennsylvania. Topography also plays a role in the Susquehanna Valley (which for discussion purposes will include the Lancaster, York, Reading, and Harrisburg areas). Monitors in this area are immediately downwind of the Appalachian Mountain chain. In meteorological scenarios of recirculation when the wind comes out the east (or is calm across the region), there are higher daily PM_{2.5} levels in the Susquehanna Valley region due to pollutants becoming bottled up on the eastern slope of the Appalachian Mountains.

Discussion by Area

Recommended Nonattainment Areas

Air quality monitoring data for 2004-2006 indicate that monitors in the following areas are in violation of the 24-hour PM_{2.5} NAAQS. The Commonwealth is making the following PM_{2.5} nonattainment area designation recommendations based upon air quality

monitoring data for 2004-2006, the other information described immediately above regarding the factors in the U.S. EPA's 2007 guidelines, and any additional information described below.

Southwest Pennsylvania:

Liberty-Clairton Nonattainment Area: This nonattainment area includes the City of Clairton, Borough of Glassport, Borough of Liberty, Borough of Lincoln and Borough of Port View. The Commonwealth recommends the same area be designated nonattainment for the 24-hour PM_{2.5} standard.

Supporting Factors: Annual and 24-hour PM_{2.5} design values are much higher, particularly at the Liberty monitor, than the surrounding areas. There are significant differences between the two monitors within the PM_{2.5} nonattainment area with the Liberty monitor being significantly over the annual standard and the Clairton monitor recently just meeting the annual standard (Summary of Pennsylvania's PM_{2.5} Nonattainment Analysis, 2007). Twenty-four hour PM_{2.5} concentrations are also significantly different (~30 µg/m³). This steep gradient between these two nearby monitors suggests a local source with enhancements from local topography is contributing to the nonattainment area's relatively high 24-hour and annual PM_{2.5} design values. A smaller nonattainment area is therefore justified.

Pittsburgh-Beaver Valley Nonattainment Area: The Pittsburgh-Beaver Valley annual PM_{2.5} nonattainment area consists of most of Allegheny County (except the Liberty-Clairton area), Beaver, Butler, Washington and Westmoreland counties, and small portions of Lawrence, Armstrong and Greene counties. Liberty-Clairton is a separate nonattainment area. The Commonwealth recommends that the Pittsburgh nonattainment area remain the same for the 24-hour standard, except that Greene County should not be included.

The portion of Greene County (Monongahela Twp) included in the Pittsburgh-Beaver Valley annual PM_{2.5} nonattainment area is situated in the southernmost portion of the annual nonattainment area. Two monitors in Washington County, Charleroi and Washington, have 24-hour design values below the PM_{2.5} 24-hour standard. Emissions from this portion of Greene County are not believed to be significantly affecting monitors to the north; if they were, the Charleroi and Washington monitors, like other monitors farther to the north, would also be exceeding the 24-hour PM_{2.5} standard.

Supporting Factors: This region of Pennsylvania is dominated by relatively high terrain cut by numerous river valleys. While these features tend to trap local emissions overall the monitors within this proposed nonattainment area tend to correlate well with one another.² This suggests that while the proposed nonattainment area is quite extensive that it can be grouped together as one nonattainment area.

² *Summary of Pennsylvania's PM_{2.5} Nonattainment Analysis*, Appendix C, Department of Environmental Protection, 2007

The nonattainment area includes three air basins as defined in 25 *Pa Code* § 121.1; the Lower Beaver Valley Air Basin, the Allegheny County Air Basin and the Monongahela Valley air basin. These air basins provide a set of common controls for sulfur compound emissions, a PM_{2.5} precursor (25 *Pa Code* § 123.22).

This multi-county area is included in one single transportation-planning agency as designated by the U.S. Department of Transportation (U.S. DOT) based on economic and commuting patterns.

Johnstown Nonattainment Area: Cambria County and several townships in Indiana County surrounding a coal-fired power plant were designated as a nonattainment area for the annual PM_{2.5} standard. The Commonwealth recommends the same for the 24-hour standard.

Supporting Factors: Some of the highest terrain in the Commonwealth brackets the Johnstown nonattainment area on the east and west. The nonattainment area also includes portions of Indiana County that contain large coal-fired power plants. Prevailing winds carry precursor and direct PM_{2.5} emissions from these sources eastward into Cambria County. The nonattainment area also contains the Johnstown air basin, which defines a common set of sulfur compound controls (25 *Pa Code* § 121.1 and 123.22). Sulfur compounds are an important PM_{2.5} precursor.

Northcentral Pennsylvania:

State College Nonattainment Area: The area is designated as attainment for the annual PM_{2.5} standard. The State College monitor violates the 24-hour standard. The Commonwealth recommends that Centre County be designated as nonattainment for the 24-hour standard.

Supporting Factors: The proposed nonattainment area is located in the Ridge and Valley province of Pennsylvania and is isolated from all of the other nonattainment areas in the Commonwealth. Centre County has significantly more people than the counties surrounding it and has experienced significant growth over the last several decades. The area is designated as a single-county transportation agency by US DOT based on economic, political and commuting patterns. These factors support a single county in the nonattainment area.

Southcentral Pennsylvania:

Harrisburg-Lebanon-Carlisle Nonattainment Area: Cumberland, Dauphin and Lebanon counties were designated as nonattainment for the annual PM_{2.5} standard. There are two MSAs included in this area. The Harrisburg MSA includes Perry County; however, emission contributions from Perry County to the area are insignificant. While Lebanon County is its own MSA, there is significant commuting between these MSAs. The Commonwealth recommends that the three-county area be designated as nonattainment for the 24-hour standard.

Lancaster Nonattainment Area: Lancaster County was designated nonattainment for the annual PM_{2.5} standard and the 8-hour ozone standard. This area is served by a single-county transportation-planning agency based on economic, political and commuting patterns. The Commonwealth recommends the same for the PM_{2.5} 24-hour standard.

Reading Nonattainment Area: Berks County was designated nonattainment for the annual PM_{2.5} standard and is the planning area for the 8-hour ozone standard. Commonwealth recommends that Berks County be designated as a nonattainment area for the 24-hour PM_{2.5} standard. Although the OMB added Berks County to the Philadelphia Combined Statistical Area (CSA) in 2006 because of increasing commuting ties to the larger area, it traditionally has its own planning functions and should not be included in the Philadelphia nonattainment area.

York Nonattainment Area: York County was designated nonattainment for the annual PM_{2.5} standard. York County was designated as an 8-hour ozone nonattainment area with Adams County. However, the Adams County monitor is attaining the PM_{2.5} 24-hour standard. The Commonwealth recommends that York County be designated individually as a nonattainment area for the PM_{2.5} 24-hour standard.

Supporting Factors: The region is comprised of four (4) nonattainment areas that lie south of Blue Mountain, which marks the southern border of the Allegheny Mountains. This physical boundary influences regional wind patterns and often poses a barrier to maritime air masses originating from the Atlantic Ocean. Several broad valleys stretch across the region mainly aligned from east to west though these terrain features are generally smaller than the mountains to the north. Region population, population density and population growth are relatively consistent across the region.

Statistical analyses indicate monitors within the area generally correlate well with one another.³ These monitors, however, correlate less well with monitors in eastern Pennsylvania, Adams County (to the west) and Perry County (to the north). While correlation statistics argue for a combined nonattainment area, historically these areas have been kept separate. The Department has defined four (4) air basins that roughly correspond to the current and proposed PM_{2.5} nonattainment areas in southcentral Pennsylvania. These include the Reading Air Basin in Berks County, the Lancaster Air Basin in Lancaster County, the Harrisburg Air Basin in Cumberland and Dauphin counties and the York Air Basin in York County. These basins are defined in 25 *Pa Code* § 121.1 and designate sulfur compound controls outlined in 25 *Pa Code* § 123.22. Sulfur compounds are an important PM_{2.5} precursor.

Eastern Pennsylvania:

Allentown-Bethlehem-Easton Nonattainment Area: No area in this metropolitan area violates the annual PM_{2.5} standard. However, for the 24-hour standard, the Freemansburg

³ *Summary of Pennsylvania's PM_{2.5} Nonattainment Analysis*, Appendix C, Department of Environmental Protection, 2007

monitor in Northampton County is violating the standard. The Allentown monitor in Lehigh County was discontinued at the end of 2005. Twenty-four hour design values for 2005 at the Allentown monitor exceeded the 24-hour standard and were very similar to design values at the near-by Freemansburg monitor. Twenty-four hour PM_{2.5} design values in 2005, the last year both monitors were operating, for Allentown and Freemansburg were 36.4 µg/m³ and 36.1 µg/m³ respectively. Because of this and the integrated economic base of the two counties, the Commonwealth recommends that Lehigh and Northampton counties be designated as a nonattainment area for the 24-hour standard. Other Pennsylvania counties in this region make insignificant contributions to the nonattainment problem at the Freemansburg monitor.

Supporting Factors: The region is bounded on the north by Blue Mountain providing a significant physical barrier. A broad valley runs from east to west connecting both Lehigh and Northampton counties. Statistical analyses indicate monitors within the area generally do not correlate all that well with monitors to the south (Summary of Pennsylvania's PM_{2.5} Nonattainment Analysis, Appendix C, 2007) justifying a separate nonattainment area. The Department's Allentown-Bethlehem-Easton Air Basin defined in 25 Pa Code § 121.1 covers portions on Lehigh and Northampton counties. Designated sulfur compound controls for this air basin are outlined in 25 Pa Code § 123.22.

Philadelphia Nonattainment Area: The Pennsylvania portion of the existing 8-hour ozone and annual PM_{2.5} interstate nonattainment areas consists of Bucks, Chester, Delaware, Montgomery and Philadelphia counties. The Commonwealth is recommending that these counties be designated as a 24-hour PM_{2.5} nonattainment area, primarily to maintain continuity for planning.

Supporting Factors: No major topographic features to restrict airflow are present in this region of the state. Some minor hills separate this region from the Lehigh Valley area to the north. Emissions, population density and population growth are relatively uniform across the region. Statistical analysis has show most of the monitors in southeast Pennsylvania correlate well with one another except for a couple of monitors which may be unduly influenced by local emission sources⁴. Twenty-four hour PM_{2.5} concentrations are relatively uniform with concentrations in areas away from the I-95 corridor falling below the 24-hour PM_{2.5} NAAQS. This drop off in design values supports separating the region from other nonattainment areas to the north and west. The nonattainment area would combine the Department's inner and outer Southeast Air Basins (25 Pa Code § 121.1). Designated sulfur compound controls for these air basins are outlined in 25 Pa Code § 123.22. Sulfur compounds are an important PM_{2.5} precursor.

Recommended Attainment Areas

Erie Area: The area is monitoring attainment with the annual and 24-hour standards and, therefore, the Commonwealth is recommending designation as attainment.

⁴ Summary of Pennsylvania's PM_{2.5} Nonattainment Analysis, Appendix C, Department of Environmental Protection, 2007

Mercer County Area: Mercer County is part of the Youngstown-Warren Metropolitan Statistical Area (MSA) in Ohio. Upwind monitors in Ohio's Trumbull and Mahoning counties are monitoring violations of the revised 24-hour standard. However, one downwind monitor in Ohio and the Mercer County monitor itself are monitoring attainment, indicating that Mercer County is not contributing to PM_{2.5} problems in the metropolitan area. The Commonwealth recommends that Mercer County not be included as part of any nonattainment area for the 24-hour standard.

Pike County: The area does not have a monitor, but is part of the New York City Consolidated Metropolitan Statistical Area (CMSA). It was not included as part of the New York City annual PM_{2.5} nonattainment area. While population in Pike County is growing, population is still very low. Pike County is now and likely to remain an insignificant contributor to New York City nonattainment. The Commonwealth, therefore, recommends that it not be included in any designation for the New York City area as nonattainment for the 24-hour standard.

Scranton/Wilkes-Barre Area: The area is monitoring attainment with the annual and 24-hour standards and, therefore, the Commonwealth is recommending designation as attainment.

Available Data. Appendix A includes a map and a table that describe the recommendations for 24-hour PM_{2.5} areas, as well as a map of the existing annual PM_{2.5} standard nonattainment areas. Appendix B includes documenting material that addresses the U.S. EPA's designation criteria pertaining to air quality, emissions and population factors.

ACRONYMS AND TERMS

CAA	Clean Air Act
CSA	Combined Statistical Area
DEP	Department of Environmental Protection (Pennsylvania)
EPA	Environmental Protection Agency (United States)
$\mu\text{g}/\text{m}^3$	micrograms per cubic meter (of air)
MANE-VU	Mid-Atlantic/Northeast Visibility Union
MSA	Metropolitan Statistical Area
NAAQS	National Ambient Air Quality Standards
NH_3	chemical formula for ammonia
NO_x	oxides of nitrogen
OMB	Office of Management and Budget (United States)
PM	particulate matter
$\text{PM}_{2.5}$	particulate matter under 2.5 microns in size
PM_{10}	particulate matter under 10 microns in size
SIP	State Implementation Plan
SO_2	sulfur dioxide
USDOT	United States Department of Transportation
VOC	volatile organic compounds