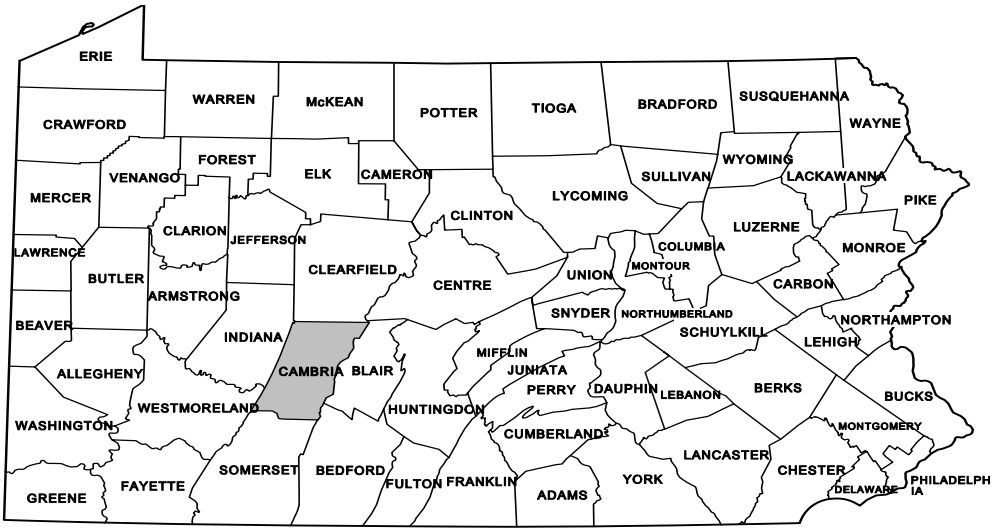
AIR QUALITY
CONFORMITY ANALYSIS REPORT
FOR THE JOHNSTOWN OZONE MAINTENANCE AREA
(8-HOUR OZONE NAAQS)
And
The JOHNSTOWN MPO Portion of the
JOHNSTOWN PM2.5 NONATTAINMENT AREA
(1997 Annual and 2006 Daily NAAQS)

VOLUME I - EXECUTIVE SUMMARY

FFY 2011-2014 TIP and 2035 LRTP



Prepared by:
Pennsylvania Department of Transportation

DRAFT

PUBLIC REVIEW:

PLANNING PARTNER APPROVAL:

TABLE OF CONTENTS

1. INTRODUCTION

This document provides an analysis of the air quality implications of the Johnstown Metropolitan Planning Organization's FFY 2011-2014 Transportation Improvement Program (TIP) and 2035 Long-Range Transportation Plan (LRTP).

This document and supporting analysis demonstrates transportation conformity to the 8-hour ozone and the 1997 annual and 2006 daily fine particulate ($PM_{2.5}$) National Ambient Air Quality Standards (NAAQS). This document replaces the previous approved conformity demonstration of the TIP and LRTP and ensures that the findings meet all current ozone and $PM_{2.5}$ criteria established by the U.S. Environmental Protection Agency (EPA).

Since vehicular emissions contribute to ozone and $PM_{2.5}$ violations, the Clean Air Act requires transportation planners in nonattainment and maintenance areas to consider the air quality impacts of their proposed plans, programs, and projects. These activities, if subject to federal involvement, must be shown to conform based on the requirements for each pollutant.

The Johnstown MPO must make separate conformity determinations for the two criteria pollutants for which it is in maintenance and nonattainment: ozone and $PM_{2.5}$. For the 1997 annual and 2006 daily $PM_{2.5}$ daily standards, this document provides an affirmative conformity determination for only the Johnstown MPO (Cambria County) portion of the nonattainment area. A final conformity determination approval by the U.S. Department of Transportation (US DOT) requires a positive conformity determination by the Southwestern Pennsylvania Commission for the Indiana County portion of the nonattainment area.

Ozone Status

In an attempt to reduce harmful emissions nationwide, the Clean Air Act Amendments (CAAA) of 1990 classified certain metropolitan areas as nonattainment if they did not comply with federal air quality standards under the 1-hour ozone standard. Under the 1-hour standard, Cambria County was designated as a "Marginal" ozone nonattainment area.

Effective June 15, 2004, the EPA finalized ground-level ozone designations under the new 8-hour ozone NAAQS. The standard replaced the pre-existing 1-hour ozone NAAQS. Cambria County was originally designated a "Basic" ozone nonattainment area under the 8-hour standard.

On August 1, 2007, EPA approved a State Implementation Plan (SIP) revision requesting that the Johnstown ozone nonattainment area be redesignated as attainment for the 8-hour ozone standard. In conjunction with its redesignation request, the Pennsylvania Department of Environmental Protection (DEP) submitted a SIP revision consisting of a maintenance plan for the Johnstown area that provides for continued attainment of the 8-hour ozone NAAQS for at least 10 years after the redesignation.

EPA approved the adequacy determination for motor vehicle emission budgets (MVEBs) that are identified in the maintenance plan for purposes of transportation conformity (note: budgets were corrected and approved in March 4, 2008 federal register). Emission budgets are provided for the 2009 and 2018 analysis years. Based on the approved maintenance plan MVEBs for Cambria County, transportation conformity for the 8-hour ozone standard must demonstrate that future year emissions are no greater than the established 2009 and 2018 emission budgets.

Pollutants subject to conformity determination in ozone nonattainment and maintenance areas include volatile organic compounds (VOC) and nitrogen oxides (NO_x).

$PM_{2.5}$ Status

In July, 1997, EPA completed its review of evidence on exposure to ambient fine-particulate matter and revised the PM_{10} NAAQS for particulate matter by creating an annual and 24-hour standard for particles with a nominal diameter of 2.5 microns or less ($PM_{2.5}$). The annual standard is set at 15 micrograms per cubic meter (µg/m3) and is based on a 3-year average of annual mean $PM_{2.5}$ concentrations.

Effective December 14, 2009, EPA issued the 2006 $PM_{2.5}$ standard that tightened the 24-hour fine particle standard from 65 micrograms per cubic meter (µg/m3) to 35 µg/m3, and retained the 1997 annual fine particle standard at 15 µg/m3. An area meets the 24-hour standard if the 98^{th} percentile of the 24-hour $PM_{2.5}$ concentrations in a year, averaged over three years, is less than or equal to the level of the standard (35 µg/m3). Areas that have failed to meet the standards outlined above have been designated as

nonattainment areas and are now subject to transportation conformity.

The Johnstown area (Cambria County and portions of Indiana County) has been designated as a nonattainment area for the 1997 annual and 2006 daily $PM_{2.5}$ standard.

There are currently no approved SIP $PM_{2.5}$ emission budgets for Cambria County under either $PM_{2.5}$ standard. Before $PM_{2.5}$ MVEBs in the SIP are ruled "adequate" or approved by EPA, the nonattainment area must meet the "Interim Rule" conformity test requirements. Interagency consultation has determined that the following interim tests are applicable to this conformity determination:

- $PM_{2.5}$ Annual Standard: Demonstration that future year annual emissions are no greater than the 2002 emission levels.
- $PM_{2.5}$ 24 Hour Standard: Demonstration that future year emissions are no greater than the 2008 emission levels.

The interagency consultation process has determined that the 24-hour $PM_{2.5}$ emissions represent a summer (e.g. July) weekday consistent with the ozone analysis.

Pollutants subject to conformity determination in a $PM_{2.5}$ nonattainment area include direct emissions of fine particulates (tailpipe, brake wear and tire wear), re-entrained dust from public roadways and dust created during transportation–related construction activities; and up to 4 precursors (NO_x, VOC, ammonia [NH_3], and sulfur oxides [SO_x]).

1.1 Purpose

The CAAA directs the EPA to implement regulations providing for reductions in pollutant emissions. This conformity demonstration is based on the current final conformity guidance, 40 CFR Parts 51 and 93 as revised, and adheres to all requirements in the 8-hour ozone and the $PM_{2.5}$ NAAQS.

Transportation conformity for ozone includes a demonstration that emission forecasts do not exceed the emission budgets established in the maintenance plan. Transportation conformity for the fine particulate standards include a demonstration that annual emissions in future years are not greater than those in 2002 and that daily emissions in future years are not greater than those in 2008. Ozone and $PM_{2.5}$ daily analyses are for emissions during a summer weekday. Annual $PM_{2.5}$ analyses are annualized based on 12 monthly runs.

This report evaluates the Highway and Transit TIP and the LRTP for Cambria County. It presents the most recent estimates of highway mobile source emissions for the region, including consideration of significant projects on the TIP and LRTP. It provides the basis for determining if the conformity criteria have been satisfied for both ozone and fine particulates.

1.2 Coverage

This report considers the impact of emissions within the Johnstown MPO area. The MPO boundary matches the limits of Cambria County. The SPC MPO portion (Indiana County) of the $PM_{2.5}$ nonattainment area is addressed in a separate report.

Ozone and Precursors

Ozone is a secondary pollutant; it is not directly discharged into the atmosphere. Instead, it is produced by the reaction of several precursor chemical compounds in the presence of sunlight. VOCs and NO_x are primary reactants. VOCs are alternately classified as non-methane hydrocarbons (NMHC), since methane is less reactive and therefore not considered. Under the EPA conformity regulations, both VOC and NOx must be analyzed for regional transportation conformity.

$PM_{2.5}$ and Precursors

Fine particulates are emitted directly by motor vehicles as a result of the combustion process (tailpipe emissions), re-entrained and transportation construction dust; and formed through reactions in the atmosphere among the precursors VOC, NO_x, NH_3 and SO_x. Under EPA conformity regulations:

- Direct emissions from tailpipe, brake wear and tire wear must be analyzed.
- Re-entrained dust is included only if EPA or DEP determines that it is a significant contributor to $PM_{2.5}$ in the nonattainment area, or is named in a $PM_{2.5}$ SIP and a motor vehicle emissions budget is established for this item.
- Transportation construction dust is encompassed in regional transportation conformity if it is named in a $PM_{2.5}$ SIP and a motor vehicle emissions budget is established for this item.

- NO_x must be analyzed during the interim period (prior to SIP submission and budget adequacy determination or approval), unless EPA and DEP determine it is not a significant contributor.
- VOC, NH_3 and SO_x analysis is not required during the interim period unless EPA or DEP determines one or more of these precursors to be a significant contributor.

The $PM_{2.5}$ conformity analysis encompasses the following pollutants, per the inter-agency consultation process required by EPA regulations, the absence of a SIP and attendant MVEBs, and the absence of EPA and DEP significance determinations:

- Direct emissions (tailpipe, brake/tire wear)
- NO_x precursor emissions

1.3 Analysis Overview

Emissions from highway vehicles within the area have been analyzed using EPA's MOBILE6.2, the agency's currently approved computer model. EPA has recently released a new emissions model (MOVES2010). States are currently reviewing the model for future application to SIP and transportation conformity analyses. A two-year grace period allows for the continued use of EPA's MOBILE6.2 model until March of 2012. The modeling procedures are described in more detail later in this report.

Certain projects were excluded if it was determined that they would not impact regional emissions (e.g., reconstructing bridges, resurfacing projects, etc.) in accordance with 40 CFR Parts 51 and 93. These projects are noted as "Exempt" (X) in Volume II, Appendices A and B. Other projects are noted as "Not Significant" (NS), and include those projects which are not exempt by definition, but whose air quality impacts are too small to quantify through current modeling practice. All decisions on project significance were made using the guidelines in the report, "PennDOT Project Review & Classification Guidelines for Regional Air Quality Conformity", dated April 2009.

This conformity test was conducted under the requirements of 40 CFR Parts 51 and 93. For ozone, forecast emissions are demonstrated to be no greater than the Cambria County 2009 and 2018 emission budgets in the Johnstown Area maintenance plan. For particulate matter, future year annual emissions are demonstrated to be less than or equal to emissions in 2002, and future year daily emissions are demonstrated to be less than or equal to emissions in 2008 for each of the pollutants and precursors required to be analyzed. There are currently no SIP motor vehicle budgets for $PM_{2.5}$ or its precursors.

Ozone emissions are analyzed for a summer weekday. $PM_{2.5}$ analyses are calculated separately for the annual and 24-hour standards. For the annual standard, annualized emissions are calculated per EPA guidance dated August, 2005 under the option of monthly calculations, weighted by monthly vehicle miles of travel (VMT) and aggregated to provide an annual total. For the 24-hour standard, emissions are analyzed for a summer weekday as consistent with the ozone analysis.

Analysis years are for 2002, 2008, 2015, 2018, 2025 and 2035. The 2002 and 2008 analysis years are the interim test base years for the PM annual and daily analyses respectively. The 2015 year satisfies the PM requirements for an analysis year within 5 years of when the conformity determination is made. The 2018 year is an emission budget year established in the ozone maintenance plan. The remaining years are interim years to ensure there is not more than 10 years between any two analysis years.

The Johnstown and SPC MPOs conducted the same emissions tests for the same analysis/horizon years for their respective portions of the Johnstown $PM_{2.5}$ nonattainment area.

1.4 Analysis Limitations

The Final Conformity Rule asserts that the conformity process must include an evaluation of proposed capital facility investments. This is required to assure that such expenditures, which are typically irreversible, are not made without consideration of air quality consequences and that CAAA requirements are being implemented.

In order to proceed with its planned projects, each MPO must adopt a conformity resolution. This study has proceeded with reasonable assumptions and the best available data to provide a valid comparison within these limitations, applying the same assumptions to each of the milestone scenarios within any given year. A reasonable effort has been extended to provide an evaluation of future year emissions.

The planning assumptions used for this conformity submission have been updated as compared to past submissions. Many of the traffic

related assumptions are updated on a "triennial" basis to satisfy EPA's latest planning assumption requirements. The last update was based on 2005 data and future efforts will utilize 2008 related data. Examples of key tools and input data are presented below:

- MOBILE6.2 is used to determine emission factors for the region.
- Roadway Traffic Data – Uses PENNDOT's 2005 Roadway Management System (RMS) data.
- VMT growth rates based on PENNDOT's VMT forecasting system. Growth rates based on historic HPMS VMT through 2005 and socioeconomic forecasts by county.
- HPMS Adjustments – Missing local roadway VMT is reconciled to the 2008 HPMS to ensure consistency. These adjustments are carried forward to future years.
- Vehicle Mix Patterns – Vehicle mix patterns have been developed for the county based on 2005 PennDOT RMS truck percentages.
- Vehicle Fleet Ages – Updated 2005 vehicle fleet age data was prepared from the state motor vehicle registration database.

1.5 Document Contents

The conformity analysis for the Johnstown MPO area is divided into two volumes. Volume I is the executive summary of the analysis. It consists of six sub-sections:

Section one provides introductory material and defines the purpose of the report. Further, it describes the scope of the study: its geographical coverage, the time frame considered, and the pollutant emissions analyzed. The limitations of the study, primarily related to constraints affecting the analysis, are also presented here.

Section two provides a summary of the analysis. This information is also presented in graphic form in Tables 1 through 6 at the end of this report.

A more detailed discussion of the analysis is presented in section three. It provides an overview of the study process and background information on the relation between vehicular emissions and ozone. The TIP and LRTP are discussed, with a focus on projects that might significantly affect emissions. Traffic and other parameters used in the modeling process are presented and discussed. This section also includes a discussion of the emission tables (Tables 2, 3, 5, 6, 8, and 9) developed during the analysis, and presenting the implications of these results.

The fourth section of this report discusses the "financial constraints" of the TIP and LRTP.

Section five discusses the public participation process of the conformity analysis. This process includes the advertisements of availability of the TIP/LRTP and accompanying conformity documents, as well as any comments received and associated responses.

The sixth section concludes this report by summarizing the results of the analysis and stating a conclusion regarding the conformity TIP and LRTP to the applicable State Implementation Plan, and the Clean Air Act, as amended.

Volume II of this report contains the technical data used to conduct the conformity determination. Key variables, such as vehicle miles traveled (VMT), vehicle hours traveled (VHT), average speed, and daily VOC and NO_X emissions (ozone) and annual direct $PM_{2.5}$ and NOx emissions ($PM_{2.5}$) are shown. In addition, the TIP/LRTP for the region, MOBILE6.2 set-up files, and other variables are shown. Copies of Volume II are available from PennDOT's Air Quality Section upon request.

2. SUMMARY

As required by the Clean Air Act Amendments of 1990 (CAAA), a study of vehicle emissions was performed for the Johnstown ozone maintenance and $PM_{2.5}$ (Cambria County portion) nonattainment areas. State and federal emissions control measures are included in the analysis for the relevant analysis year.

Ozone Precursors:

The study compared the ozone emission forecasts for VOC and NO_x to the Cambria County 2009 and 2018 MVEBs established in the Johnstown maintenance plan. The future emission projections include the implementation of the TIP and LRTP. These projects are listed in section 3.3. The regional evaluation of the projects indicates an overall increase in mobility and a decrease in VOC and NO_X emissions.

For the 2015 analysis year, the VOC and NOx emissions are less than the 2009 budget (for each respective pollutant). For the 2018, 2025, and 2035

analysis years, the VOC and NOx emissions are less than the 2018 budgets.

To further address VOC and NO_x reductions in the later years after the TIP (LRTP years), strategies such as reduction in VMT, speed changes, smoothness of traffic flows, use of alternative fuels, and other factors will be key to further reducing air pollution levels. Some of these have been mandated by the CAAA, and the state has committed to executing others.

$PM_{2.5}$

Similar to the analysis for ozone precursors, the analysis for $PM_{2.5}$ direct and precursor emissions includes the estimation of future year emissions inclusive of the influence of planned projects. The same projects listed as analyzed in the ozone conformity analysis are analyzed for $PM_{2.5}$ conformity.[1] Analysis years, satisfying EPA requirements, include 2002, 2008, 2015, 2025, and 2035. In all cases, annual emissions are less than or equal to 2002 base year emissions levels, thus satisfying the annual $PM_{2.5}$ conformity test. In addition, summer weekday emissions for all years are less than the 2008 base year, thus satisfying the daily $PM_{2.5}$ conformity test.

Projects and occurrences having particular impact on $PM_{2.5}$ and its NO_x precursors include ozone precursor strategies that reduce NOx, VMT growth mitigation, alternative fuels, fleet turnover, etc. Federal control measures significantly reducing these emissions include low sulfur gasoline and diesel fuels, new heavy duty engine rule, and continued influx of Tier II light duty vehicles coupled with ongoing retirement of older vehicles.

3. ANALYSIS

This section of the report presents the premises for the analysis, background information supporting the modeling, and the results of the analyses.

3.1 Overview

This study used a set of computer programs and databases to estimate vehicle miles of travel and operating speeds, and to subsequently calculate emission factors and total emissions. The programs rely on a variety of input factors, which are discussed in more detail below. A travel demand model does not exist in this region.

Key traffic parameters include daily vehicle miles of travel (DVMT), average speeds, and vehicle type mix. These input factors are calculated by the PPSUITE post processor for Air Quality computer program from highway databases containing traffic volumes and descriptions of physical characteristics.

The existing DVMT was determined for each roadway class/setting by multiplying the length of road by the number of vehicles using the road per day. Additional adjustments to VMT included:

Ozone and $PM_{2.5}$ Daily:

- Seasonal adjustments to reflect summer weekday conditions.
- Adjustments of daily VMT to align with 2008 HPMS.

$PM_{2.5}$ Annual:

- Seasonal adjustments to reflect an average day in each month.
- Factoring/aggregation of daily/monthly estimates, respectively, to an annual VMT estimate.
- Adjustments to ensure that annual VMT estimates align with 2008 HPMS.

The existing DVMT was then projected to the future years by applying local growth factors derived from both historic traffic volume growth trends and trip-end growth, as related to past and future projected population and employment growth. Using the latest planning assumptions, population growth, employment growth, and land use trends have been considered in the analyses to as great an extent possible.

Speed data was calculated, using the post processing software, for each highway segment and hour of the day, based on the roadway's capacity and traffic volume. Thus, average speeds reflect physical highway conditions, the effects of traffic signals, and congestion caused by traffic volume. For future conditions, congestion (and thereby speed) is affected by traffic growth and other changes in physical conditions due to TIP and/or LRTP improvement projects.

Other input parameters include information regarding vehicle types using the roads and environmental factors. Since local data provides a

1 40 CFR Parts 51 and 93 define projects (regionally significant or not, exempt or not) for the conformity analysis identically for ozone and fine particulates.

useful distinction for this comparative analysis, county-specific data was used to describe the vehicle fleet on the highway. The environmental factors used in this analysis (e.g., ambient temperatures) were established based on historic records for peak ozone events within the county (ozone), and for monthly temperatures under EPA's inventory guidance ($PM_{2.5}$).

This conformity analysis, performed according to the Final Conformity Rules for ozone and $PM_{2.5}$, indicates that future year emission estimates, including the impacts of planned TIP and LRTP projects, satisfy the applicable transportation conformity tests for both ozone and $PM_{2.5}$ pollutants.

3.2 Background

National Ambient Air Quality Standards (NAAQS) have been established by EPA for a number of pollutants considered harmful to public health and the environment. The Johnstown area is in maintenance for ozone and nonattainment for $PM_{2.5}$.

Ozone:

Ozone is a strong irritant to the eyes and upper respiratory system. It hampers breathing and damages crops and rubberized materials. It is the main component of smog. A region is in nonattainment of the 8-hour ozone standard if the 3-year average of the individual fourth highest air quality monitor readings, averaged over 8 hours throughout the day, exceeds the NAAQS of 0.08 parts per million (ppm).

Ozone is formed by chemical reactions occurring under specific atmospheric conditions. Two of the important classes of compounds in these reactions are hydrocarbons (including VOC) and oxides of nitrogen. Both of these are components of vehicular exhaust. Additionally, the hydrocarbons may be produced by evaporation from vehicle fuel system components, and by displacement of vapors in the gas tank during refueling. By controlling these emissions, ozone formation can be controlled.

The actual reactions occurring in the atmosphere are complex and the subject of ongoing research. However, it is known that the formation of ground level ozone is a photochemical oxidation process activated by sunlight. Higher ozone concentrations are associated with warm temperatures, high pressure systems involving temperature inversions and low wind speeds. Under these stagnant conditions, emissions and ozone tend to accumulate rather than disperse.

The role that each component plays in formation of ozone is also complex. Increases in NO_x could lead to an increase in ozone, depending on the time of suspension in the atmosphere and its transport to other polluted areas. Reductions in NO_x emissions may achieve regional ozone reductions. On the other hand, reductions in VOC are often most important for local ozone reduction.

Transportation accounts for significant portions of man-made emissions. On average, mobile sources contribute approximately 36% of the hydrocarbons, 45% of the oxides of nitrogen, and 78% of the carbon monoxide (CO) emissions from man-made sources. For VOCs, the rate of emissions (expressed in grams per mile for motor vehicles) generally decreases with an increase of vehicle speed. This trend is most dramatic for VOC and CO at low speeds. However, both VOC and CO exhibit a slight increase in emission rates as vehicles travel above 40 miles per hour (mph).

For NO_x, however, the emissions rate is a more gradual decline with increasing speed up to approximately 25 mph. Above that speed, vehicle NO_x emissions increase gradually. At 40 mph, the NO_x emissions begin to increase rapidly, due, in part, to the higher engine temperatures associated with higher speeds. Thus, while increasing speeds generally reduces VOC emissions, increasing speeds may cause NO_x emissions increases (see Chart 1). There is no simple way to solve both issues without producing an overall TIP and LRTP with a mix of strategies that reduce the NOx increases.

$PM_{2.5}$:

Particulate matter is the term for solid or liquid particles found in the air. Some particle aggregations are large or dark enough to be seen as soot or smoke, but fine particulate matter is tiny and is generally not visible to the naked eye. Highway vehicle particulate emissions consist mainly of these very tiny particles, also known as $PM_{2.5}$, because they are less than or equal to 2.5 microns in diameter. There are two current standards related to the $PM_{2.5}$ pollutant: annual standard and 24-hour standard. The annual standard is a maximum exposure of 15 mg/m^3. If a region experiences a 3-year average of annual mean greater than this value, it is considered nonattainment for the $PM_{2.5}$ pollutant. An area meets the 24-hour standard if the 98^{th} percentile of the 24-hour $PM_{2.5}$ concentrations in a year, averaged over three years, is

less than or equal to the level of the standard (35 µg/m3).

Both on-road and nonroad mobile sources emit fine particulate matter. Diesel-powered vehicles and engines contribute approximately half of the mobile source particulate emissions.

Fine particulate matter is a health concern because very fine particles can reach the deepest regions of the lungs. Health effects include asthma, difficult or painful breathing, and chronic bronchitis, especially in children and the elderly. Fine particulate matter associated with diesel exhaust is also thought to cause lung cancer and is listed as a mobile source air toxic. Fine particulate matter can travel long distances on air currents and is also a major cause of haze, which reduces visibility, affecting cities and scenic areas throughout the country.

Unlike ozone precursors, $PM_{2.5}$ is not significantly sensitive to many key input parameters including temperature, humidity, and vehicle speed. Instead, the primary factors that affect $PM_{2.5}$ emission factors include: registration (age) data, diesel sales fractions, annual mileage accumulation rates, vehicle class mix, and fuel sulfur contents. (Also see NO_x discussion in the previous ozone subsection).

Emission Control Strategies:

Recognizing the contribution of transportation sources to air pollution, the federal government initiated an emission control program in 1968. These requirements are periodically revised, based on the effectiveness of existing controls in meeting pollutions challenges. In addition, cleaner burning fuels have decreased emissions rates of gasoline powered cars, and to some extent, diesel vehicles. Additional new federal vehicle and fuel control programs have been implemented between 2004 and 2010, and additional vehicle programs will be phased-in through 2016. Increasing VMT, however, tends to counteract a portion of reductions from cleaner vehicles and fuels.

In order to assure that emission controls are working properly, vehicle inspection and maintenance (I/M) programs have been adopted in some nonattainment and maintenance areas. These programs have the added benefit of improving the fuel efficiency of vehicles on the road. The Pennsylvania I/M program was upgraded and expanded throughout the state with a phase-in period starting in September 2003 and fully implemented by June 2004.

The program requirements vary by region and include on-board diagnostics (OBD) technology that uses the vehicle's computer for model years (MY) 1996 and newer to identify potential engine and exhaust system problems that could affect emissions. The program, named PAOBDII, is implemented by region, as follows:

- Philadelphia Region - Bucks, Chester, Delaware, Montgomery and Philadelphia Counties,
- Pittsburgh Region - Allegheny, Beaver, Washington and Westmoreland Counties,
- South Central and Lehigh Valley Region - Berks, Cumberland, Dauphin, Lancaster, Lebanon, Lehigh, Northampton and York Counties.

Other elements of the Pennsylvania I/M program include a gas cap test and visual inspections of subject vehicles in the north region (Blair, Cambria, Centre, Erie, Lackawanna, Luzerne, Lycoming, and Mercer Counties), and a visual inspection as part of the annual safety inspection in the other 42 counties.

The Pennsylvania Clean Vehicles (PCV) Program, adopted in 1998, incorporated the California Low Emission Vehicle Program (CA LEV II) by reference although it allowed automakers to comply with the NLEV program as an alternative to this Pennsylvania program until MY 2006. Beginning with MY 2008, "new" passenger cars and light-duty trucks with a gross vehicle weight rating (GVWR) of 8,500 pounds or less that are sold or leased and titled in Pennsylvania must be certified by the California Air Resources Board (CARB) or be certified for sale in all 50 states. For this program, a "new" vehicle is a qualified vehicle with an odometer reading less than 7,500 miles. DEP and PennDOT worked with the automobile manufacturers, dealers and other interested business partners and finalized procedures for complying with these new requirements. DEP is focusing on its outreach with the manufacturers and dealers on what they can offer for sale and how to certify that the vehicles are compliant. PennDOT's role is to ensure paperwork procedures for title and registrations include these certifications of compliance or that the vehicle owner qualifies for an exemption to the requirements. In all cases, DEP will use information obtained during PennDOT's title and registration process to oversee and audit, as needed, certain vehicle title transactions to determine compliance to the program. The impacts

of this program are modeled for all analysis years beyond 2008.

3.3 Transportation Improvement Program / Long Range Transportation Plan

The complete TIP and LRTP for the Johnstown MPO area are included in Volume II, Appendix A, for highways and transit service projects.

Detailed assessments were only performed for those projects on the TIP and LRTP which may have a significant effect on emissions in accordance with 40 CFR Parts 51 and 93. Essentially, only those projects which would increase capacity or significantly impact vehicular speeds were considered. Projects such as bridge replacements and roadway restoration projects, which constitute the majority of the TIP/ LRTP list, have been excluded from consideration since they are not expected to significantly alter the volume or speed of traffic.

The following TIP/ LRTP AQ significant highway projects are included in this analysis.

Cambria County:

1. New Germany Interchange 2 (US 219) – Construct southbound ramps on US 219 at New Germany interchange and connect to SR 2009. This project will divert traffic from SR 160 and SR 2009 to US 219 and ease local street congestions. Project location: Croyle Township, PA. Completion year: 2035.

2. CIP Improvements – US 219 West Ebensburg Interchange - Project includes traffic signal and signing upgrades, lighting, turning lane improvement and construction of parallel service road. Improvements are based on the recommendations from a 2009 Congested corridor Improvement Program (CCIP) study. Cambria Township. Completion year 2035.

3. Industrial Park Rd / Elton Rd - Widen roadway including turning lanes, sight distance and alignment improvements at intersections, and add signalization. Richland Township. Completion year: 2035.

4. East Revloc, US 219 Interchange - Project includes re-construction of the existing Rt 422/ US 219 interchange to add two new ramps and complete cloverleaf. Improvement will eliminate two existing traffic signals and reduce congestion. Cambria Township, Completion year: 2035.

5. PA 56 West TSM Alternatives - Traffic signal and signing upgrades, lighting, turning lane improvements at various intersections on PA 56 in Johnstown from Washington St to the Lower Yoder Township line. Coty of Johnstown. Completion year: 2010.

6. SR 3031 Airport Rd / Frankstown Rd. - Intersection upgrade, safety widening and possible realignment / relocation of the Airport Rd / Frankston Rd intersection. Conemaugh Township. Completion year: 2035.

7. PA 756 Elton Road 2 - Project includes additional turning lanes and signalization on PA 756 between Donald Lane and Industrial Park Rd (SR 756, set 130 to 150). Richland Township. Completion year: 2035.

The following list of LRP/TIP AQ significant transit projects is included in this analysis.

Cambria County:

There are no air quality significant transit projects in Cambria County.

3.4 Traffic Parameters

Traffic parameters within the emissions modeling provide the basis for the conformity emission test comparisons. For ozone and $PM_{2.5}$ daily analyses, data is compiled for an average summer day. For $PM_{2.5}$ annual conditions, data is compiled for each month of the year, then aggregated to an annual total. Overall processing is similar for ozone and particulates. The following summarizes the data sources, compilation and processing to produce VMT, speeds and emissions by pollutant / precursor. There is no travel demand model for this area; instead, state traffic databases are used to calculate regional VMT and speeds.

Emission factors vary with average speed and vehicle type mix. Daily emissions are calculated by multiplying the emission factor (expressed in grams per vehicle mile) and traffic volumes (expressed in daily vehicle miles of travel for ozone, and compiled for each month for $PM_{2.5}$).

Annual Average Daily Traffic (AADT) volumes on individual roadway segments were generated from 2008 PennDOT HPMS and Roadway Management System (RMS) databases. Actual traffic counts are completed at thousands of sites around the state at least once every three years. Separate from the HPMS, there are 60 permanent counting stations, which provide data on growth trends and periodic fluctuations in traffic volumes (e.g., seasonal variations). Adjustment factors developed from these permanent station records are applied to the HPMS data.

Individual roadway segments are designated within RMS to one of the six (6) functional classifications and to one of the three settings. RMS also records the length of roadway for each segment, the number of lanes, and the traffic volume. A computerized tabulation of DVMT for each roadway class and setting is generated by multiplying the ADT and the length for each segment, and summing the products. In addition, PennDOT has developed temporal variation data, which describe both the hourly variation of traffic volumes within a day, the daily variation within a week, and the monthly variation over the year. The AADT volumes were adjusted to reflect average summer weekday conditions in the peak ozone season, and were also disaggregated to hourly volumes within the day to support detailed speed estimation.

Similarly for $PM_{2.5}$ emissions, VMT and speeds are calculated for an average day in each month to produce emissions estimates on a typical day for each month. This is then extrapolated to a monthly total and then summed to yield an annual total.

VMT forecast growth rates are based on PennDOT's VMT forecasting system as documented in the report "Statistical Evaluation of Projected Traffic Growth, Traffic Growth Forecasting System: Final Report, March 14, 2005". The resulting forecasting system includes the development of VMT forecasts and growth rates for four functional classifications in each Pennsylvania county: urban interstate, urban non-interstate, rural interstate, and rural non-interstate. The forecasts use statistical relationships based on historic HPMS VMT trends and future county socioeconomic projections from Woods and Poole Economics, Inc. The statistical models incorporate historical VMT trends, socio and economic data (households, mean household income), and a relative measure of transportation capacity (lane miles per capita). The results of the study have been shared between PennDOT, DEP, and other Interagency Consultation Group members, including the PA Conformity Work Group (which includes EPA, Federal Highway Administration (FHWA), Federal Transit Administration (FTA) and representatives from larger MPOs within the state).

Speeds were calculated for base and future years by the PPSUITE post processor computer system, and were validated against data from PennDOT's ongoing speed monitoring program. The PPSUITE software contains procedures to calculate the capacity of each highway segment, giving consideration to the physical attributes of the highway (functional class, number of lanes, geographic setting), the effects of traffic congestion are then accounted for by comparing traffic volumes to this capacity for each hour of the day, and calculating the speeds which will result.

Speeds are forecast by adjusting the link attributes to reflect future physical improvements, changing the traffic volumes to reflect growth or other actions, and recalculating capacities and speeds. This approach has proven to be appropriately sensitive to the variety of factors, which affect congestion and speed.

The traffic data was developed using the projection process described above. Conditions were evaluated for future analysis years for ozone and $PM_{2.5}$ direct and precursor emissions. The roadways affected by the TIP/ LRTP projects listed were further analyzed to determine operational changes, which may result from implementation of the TIP/ LRTPs. In this way, emission characteristics were developed for the region.

The traffic data serves as the regional population, employment, travel, and congestion estimates required by the CAAA, and uses the area's latest planning assumptions. Travel, represented by DVMT, reflects population and employment trends. The speed estimation procedure serves as a measure of congestion, and is consistent with on-going, established monitoring programs. The estimates were coordinated with other data resources, such as the local planning departments. The RMS and HPMS data are available in published formats.

With supplemental analysis performed by PPSUITE, both speed and vehicle type mix data were used in application of the MOBILE6.2 computer model. The emission factors (expressed in grams per vehicle mile) derived by the model were then multiplied by the appropriate VMT for each functional class / setting / time period to calculate the

total emissions (in kilograms per day). Off-system adjustments were made using the Congestion Mitigation and Air Quality (CMAQ) methodologies and the PAQONE emissions model developed by the consulting firm of Michael Baker Jr., Inc. for PennDOT.

3.5 Other Parameters

MOBILE6.2 includes a variety of input parameters which characterize the environmental setting, the vehicle fleet, the condition of emission controls, and the volatility of gasoline. A set of sample input files has been provided in Volume II, Appendix B, of this document. Separate runs of the program were performed for each year and improvement scenario, as described in section 3.7, to produce the following outputs: summer weekday VOC, NOx, and direct $PM_{2.5}$, and annual direct $PM_{2.5}$ and NO_x.

The sample input file shows a number of the parameters use MOBILE6.2 default or uncorrected values. A combination of default assumptions and site-specific data were determined through the interagency consultation process. For all data, assumptions were applied uniformly to the baseline, TIP and LRTP cases, providing an unbiased comparison.

MOBILE6.2 allows a calculation for refueling losses. This analysis is used for estimating the effectiveness of vapor recovery systems at fueling stations, where such equipment exists. DEP includes refueling emissions as area sources, not as part of the mobile source category. Therefore the emissions from refueling have not been calculated for this conformity analysis.

Emissions from fuel evaporation from vehicles depend on the age of the vehicle, fuel used, length of time the vehicle was operating, and whether the engine was cold or hot when it was started. The effect of the start condition also varies with the emissions control system on the particular vehicle. This study used national average percentages for fuel evaporation from highway motor vehicles.

All runs include an Enhanced Inspection & Maintenance program that was implemented in January, 2004. Other environmental and fuel settings specific to ozone and $PM_{2.5}$ conformity analysis runs are described below.

Ozone and Daily $PM_{2.5}$:

Minimum and maximum temperature and humidity data in the local area parameter and scenario records have been developed from historic temperature records in 14 regions across the state (see Volume II, Appendix C3). These temperatures represent conditions consistent with the development of the region's maintenance plan.

An in-use Reid vapor pressure (RVP) of 8.7 pounds per square inch (see Volume II, Appendix C4) has been used for all analysis summer weekday analysis scenarios.

Annual $PM_{2.5}$

For annual emission analyses, the mean daily maximum and minimum temperatures and barometric pressure values have been obtained for each of the 12 months based on 2005 weather data. Absolute humidity values are calculated from collected relative humidity and barometric pressures using EPA's M6HUMID program. The absolute humidity and the Min/Max temperatures are the inputs for each monthly scenario. This data is also summarized in Volume II, Appendix C3.

Since this inventory submission prepared emission runs for monthly scenarios, additional RVP data (for each month of the year) was needed to reflect the monthly variations. Data on monthly RVP values was obtained from EPA's NEI fuel data assumptions and is summarized in Volume II, AppendixB4.

3.6 Transportation Control Measures

No Transportation Control Measures (TCMs) have been adopted for the Johnstown MPO area because existing and planned emissions controls are sufficient for attainment and maintenance purposes.

3.7 Emissions

The results of the computer modeling are used to demonstrate conformity for ozone and $PM_{2.5}$ pollutants. For ozone, emission forecasts are compared against Cambria County 2009 and 2018 emission budgets established in the area's maintenance plan. For the annual $PM_{2.5}$ standard, a "Less-Than-2002" emission test is performed to demonstrate conformity. For the daily $PM_{2.5}$ standard, a "Less-Than-2008" emission test is performed to demonstrate conformity. Emissions are produced for the following analysis scenarios:

Ozone:

1- Interim Year – A 2015 analysis year has been included as an interim year even though it is not required for the ozone conformity determination. Represents summer traffic volumes on the base highway network, plus those AQ significant projects that are scheduled for completion by 2015. This year is compared against the 2009 emission budget year for Cambria County.

2- Budget Year - 2018 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by 2018. This year is an emission budget year established in the maintenance plan.

3- Interim Year - 2025 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by 2025. This year is included to ensure that no analysis year is more than 10 years apart.

4- End Year of LRTP –2035 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by end of Plan. This year represents the end year of the plan and satisfies the conformity requirement for at least a 20-year horizon.

Annual $PM_{2.5}$

1- Base Network - 2002 traffic volumes adjusted to 12 monthly totals and aggregated to annual totals. This year serves as the required base year used for the annual $PM_{2.5}$ conformity test.

2- Near Term Year – 2015 serves as the initial conformity test year. This year is within 5 years of the conformity determination, as required by EPA during the "interim" period as related to the fine particulate standards.

3- Interim Year –2025 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by 2025. These years are included to ensure that no analysis year is more than 10 years apart.

4- Long-Range Plan End Year –2035 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by end of Plan. The end of the LRTP is a required analysis year.

Daily $PM_{2.5}$

1- Base Network - 2008 traffic volumes and the base highway network. This year serves as the required base year used for the daily $PM_{2.5}$ conformity test.

2- Near Term Year – 2015 serves as the initial conformity test year. This year is within 5 years of the conformity determination, as required by EPA during the "interim" period as related to the fine particulate standards.

3- Interim Year – 2025 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by 2025. These years are included to ensure that no analysis year is more than 10 years apart.

4- Long-Range Plan End Year –2035 summer traffic volumes and the base highway network, plus those AQ significant projects that are scheduled for completion by end of Plan. The analysis must include the end year of the LRTP.

Based on this analysis and the summary emission tables provided at the end of this report, the conformity results for the 8-hour ozone, annual direct $PM_{2.5}$ and daily direct $PM_{2.5}$ are described below:

Ozone Conformity Test Results:

Results for Cambria County indicate that forecasted 2015 VOC and NOx emission estimates (including TIP & LRTP) are lower than the 2009 Cambria County MVEBs established in the Johnstown maintenance plan. Forecasted 2018, 2025, and 2035 emissions are lower than the Cambria County 2018 VOC and NOx MVEBs. The decreases reflected in the historic trend may change in future years beyond the study horizon. These issues must be addressed in the state's air quality implementation planning, considering all sources, stationary and mobile.

$PM_{2.5}$ Annual Conformity Test Results:

Results for the Cambria County portion of the Johnstown $PM_{2.5}$ nonattainment area are that future year estimates of annual direct $PM_{2.5}$ and NO_X will be lower than the 2002 base year under the implementation of the TIP and LRTP.

$PM_{2.5}$ Daily Conformity Test Results:

Results for the Cambria County portion of the Johnstown $PM_{2.5}$ nonattainment area are that future year estimates of daily direct $PM_{2.5}$ and NO_X will be lower than the 2008 base year under the implementation of the TIP and LRTP.

3.8 Discussion

This analysis demonstrates that the forecast summer day VOC and NO_X emissions and annual and daily direct $PM_{2.5}$ and NO_X emissions satisfy the applicable conformity tests for the ozone and fine particulate standards. Therefore, implementation of the TIP and LRTP as defined in the study will not adversely affect air quality goals.

Further measures directed at reducing vehicle trips may become increasingly important in future transportation plans and programs. Transit and intermodal alternatives may serve as a means for achieving these reductions. The current plan and program present several appropriate means of achieving this. Additionally, transit and intermodal alternatives can be incorporated into preliminary engineering for highway projects.

4. FINANCIAL CONSTRAINT

The Planning Regulations, Sections 450.322 (b) (11) and 450.324 (e) require the TIP and LRTP to be financially constrained while the existing transportation system is being adequately operated and maintained. Only projects for which construction and operating funds are reasonably expected to be available are included. The Johnstown MPO, in conjunction with PennDOT, has developed an estimate of the cost to maintain and operate the existing roads and bridges in the Johnstown MPO area and have compared that with the estimated revenues and maintenance needs of the new roads.

5. PUBLIC PARTICIPATION

This TIP and LRTP have undergone the public participation requirements and the comment and response requirements set forth in the Final Conformity Rule, the Final Statewide/Metropolitan Planning Rule, and Pennsylvania's Conformity SIP. A public meeting was held, pursuant to public notice, on ___(date)_____. The documentation of the public notice for the hearings, comments, and the responses to comments can be found in Volume II, Appendix C.

6. CONFORMITY STATEMENT

The Clean Air Act Amendments of 1990 (CAAA) require that a Metropolitan Planning Organization (MPO) determine that a Transportation Improvement Program (TIP) and Long Range Transportation Plan (LRTP) conform with the applicable State Implementation Plan (SIP), or other tests as defined in the EPA's Conformity Rule, before the TIP and LRTP are adopted. No Federal agency may approve, accept, or fund a TIP/ LRTP or its component projects unless the TIP/ LRTP have been found to conform to the SIP. Under the Act, conformity is determined by applying three criteria; that "the transportation plans and programs--

(i) Are consistent with the most recent estimates of mobile source emissions;

(ii) Provide for the expeditious implementation of transportation control measures in the applicable implementation plan; and

(iii) With respect to ozone and carbon monoxide non-attainment areas, contribute to annual emissions reductions consistent with sections 182(b)(1) and 187(a)(7)"

Each new transportation plan and TIP/ LRTP must be found to conform before they are approved by the MPO/RPO or accepted by U.S. DOT.

As specified under the first item, the most recent estimates of highway emissions for the Cambria County have been developed as a part of this study. The analyses indicate:

- The forecast ozone precursors, VOC and NO_X, are lower than the Cambria County 2009 and 2018 emission budgets established in the Johnstown maintenance plan for the 8-hour ozone standard.
- The forecast annual direct $PM_{2.5}$ and NO_X, are less than the 2002 baseline emissions when implementing the TIP and LRTP.
- The forecast Cambria County daily direct $PM_{2.5}$ and NO_X, are less than the 2008 baseline emissions when implementing the TIP and LRTP.

Consequently, the overall precursor emissions will be reduced, satisfying the third criterion.

The Johnstown MPO area was not considered to be nonattainment for ozone prior to the CAAA of 1990 and has not submitted a SIP including TCMs under the 1990 CAA Amendments. No transportation control measures for this area exist in a state implementation plan. Consequently, the second criterion (above) is not applicable.

Therefore, the Long Range Transportation Plan and Transportation Improvement Programs for the Johnstown MPO area are found to satisfy the regional transportation conformity requirements:

- For the 8-hour ozone standard for the Johnstown ozone maintenance area under the U.S. Clean Air Act.

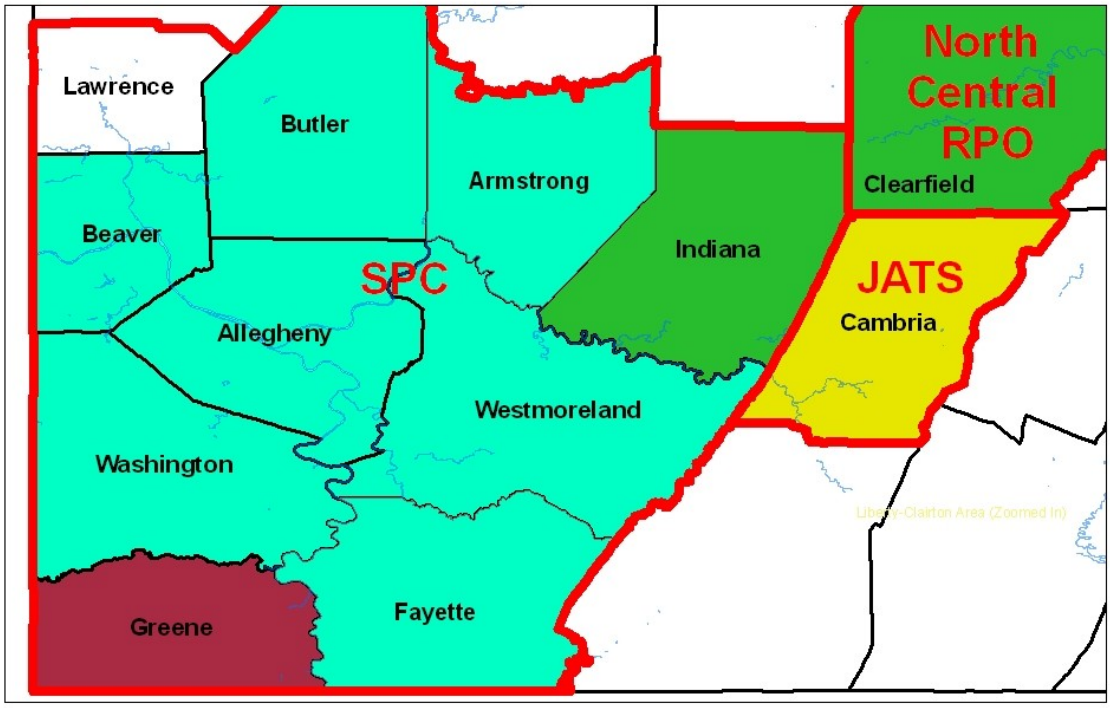
- For the annual fine particulate standard for the Cambria County portion of the Johnstown annual $PM_{2.5}$ nonattainment area under the U.S. Clean Air Act.

- For the daily fine particulate standard for the Cambria County portion of the Johnstown daily $PM_{2.5}$ nonattainment area under the U.S. Clean Air Act.

MAPS

Southwest Pennsylvania's 8Hr Ozone Nonattainment Areas

MPOs / RPOs



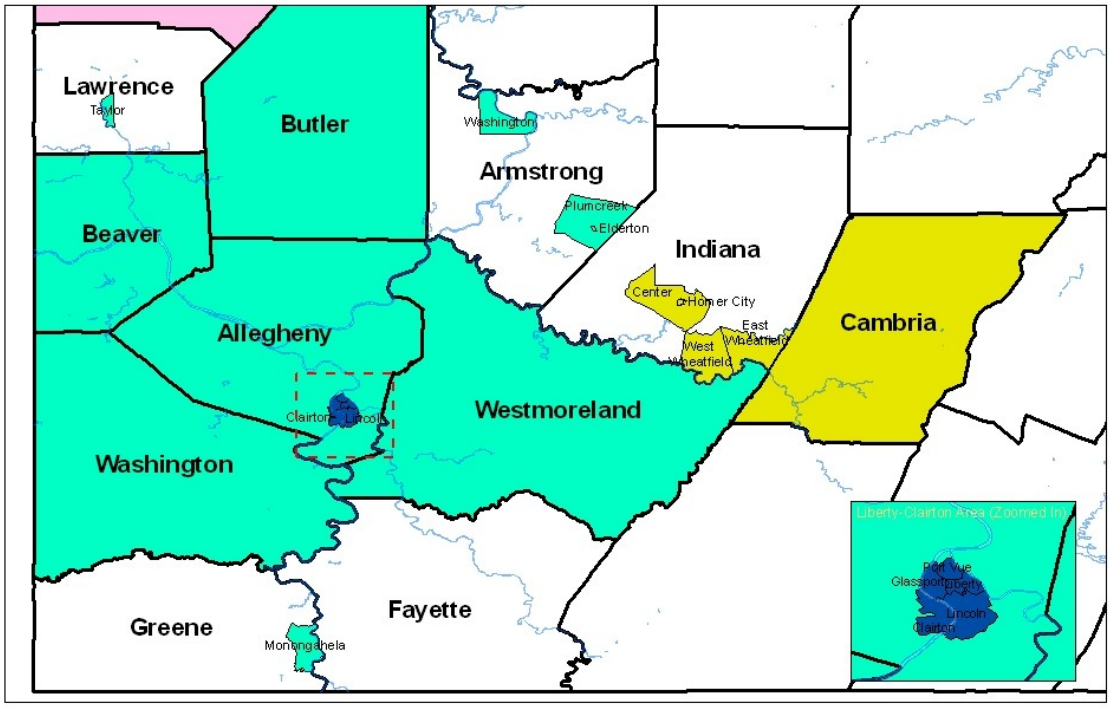
Ozone Nonattainment Areas

Attainment Counties | Indiana & Clearfield | Greene Co | Johnstown, PA | Pittsburg, PA

Johnstown, PA now in Maintenance of 8-hour Ozone Standard

Southwest Pennsylvania's PM 2.5 Nonattainment Areas

Areas are Shaded Based on EPA's December 17, 2004 Designations



PM 2.5 Nonattainment Areas

Attainment Counties | Johnstown, PA | Pittsburg, PA | Youngstown-Warren-Sharon | Liberty-Clairton

TABLES

TABLE 1
OZONE Conformity
Summary of Total Highway Vehicle Miles Traveled (VMT)
Average Summer Weekday
Johnstown Ozone Maintenance Area

	2015	2018	2025	2035
Cambria	3,259,090	3,203,862	3,007,252	2,705,364

TABLE 2
OZONE Conformity
Summary of Total Highway VOC Emissions (tons/day)
Average Summer Weekday
Johnstown Ozone Maintenance Area

	2015	2018	2025	2035
Cambria	1.87 (1,697 kg/day)	1.55 (1,409 kg/day)	1.14 (1,031 kg/day)	0.99 (900 kg/day)
Emission Budget*	**3.80 (2009 Budget)**	**2.30 (2018 Budget)**	***Same as 2018***	***Same as 2018***

TABLE 3
OZONE Conformity
Summary of Total Highway NO_X Emissions (tons/day)
Average Summer Weekday
Johnstown Ozone Maintenance Area

	2015	2018	2025	2035
Cambria	2.52 (2,285 kg/day)	1.90 (1,722 kg/day)	1.26 (1,139 kg/day)	0.99 (895 kg/day)
Emission Budget*	**5.60 (2009 Budget)**	**2.70 (2018 Budget)**	***Same as 2018***	***Same as 2018***

* Emission budgets from August 1, 2007 Johnstown area maintenance plan (MVEBs revised/corrected on March 4, 2008)

** All years lower than applicable emission budget

TABLE 4
Annual $PM_{2.5}$ Conformity
Summary of Total Highway Million Vehicle Miles Traveled (MVMT)
Annual Totals
Cambria County portion of the Johnstown $PM_{2.5}$ Nonattainment Area

	2002*	2015	2025	2035
Base Year	1,134.59	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	1,081.08	997.17	896.41

TABLE 5
Annual $PM_{2.5}$ Conformity
Summary of Total Highway $PM_{2.5}$ Emissions (tons/year)
Annual Conditions
Cambria County portion of the Johnstown $PM_{2.5}$ Nonattainment Area

	2002*	2015	2025	2035
Base Year	49.34	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	17.53	13.61	11.90

TABLE 6
Annual $PM_{2.5}$ Conformity
Summary of Total Highway NO_X Emissions (tons/year)
Annual Conditions
Cambria County portion of the Johnstown $PM_{2.5}$ Nonattainment Area

	2002*	2015	2025	2035
Base Year	3,187.80	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	840.78	415.34	325.97

*2002 VMT and Emissions from 2002 EPA National Emissions Inventory (NEI) for Cambria County
Future year emission estimates (2015, 2025, and 2035) fall below the 2002 baseline year

TABLE 7
24-Hour $PM_{2.5}$ Conformity
Summary of Total Highway Vehicle Miles Traveled (VMT)
Daily Totals
Cambria County portion of the Johnstown $PM_{2.5}$ Nonattainment Area

	2008	2015	2025	2030	2035
Base Year	3,377,566	---NA---	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	3,259,090	3,007,252	2,856,158	2,705,364

TABLE 8
24-Hour $PM_{2.5}$ Conformity
Summary of Total Highway $PM_{2.5}$ Emissions (tons/day)
Daily Conditions
Cambria County portion of the Johnstown $PM_{2.5}$ Nonattainment Area

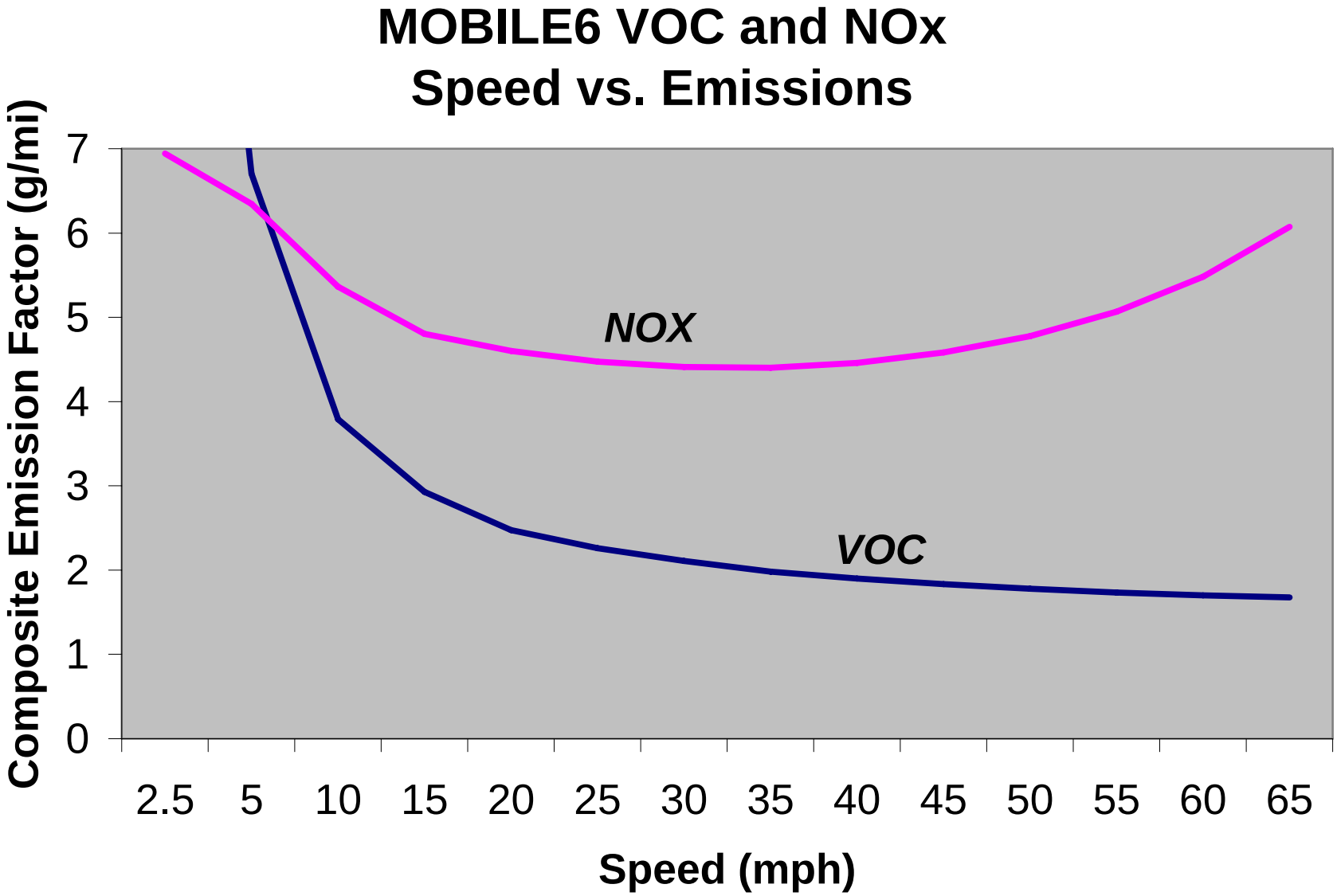
	2008	2015	2025	2030	2035
Base Year	**0.08** **(75 kg/day)**	---NA---	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	0.05 (47 kg/day)	0.04 (37 kg/day)	0.04 (33.90 kg/day)	0.04 (32 kg/day)

TABLE 9
24-Hour $PM_{2.5}$ Conformity
Summary of Total Highway NO_X Emissions (tons/day)
Daily Conditions
Cambria County portion of the Johnstown $PM_{2.5}$ Nonattainment Area

	2008	2015	2025	2030	2035
Base Year	**5.21** **(4,727 kg/day)**	---NA---	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	2.52 (2,285 kg/day)	1.26 (1,139 kg/day)	1.07 (974.8 kg/day)	0.99 (895 kg/day)

* Future year emission estimates (2015, 2025, 2030, and 2035) fall below the 2008 baseline year

CHARTS


MOBILE6 VOC and NOx
Speed vs. Emissions
Composite Emission Factor (g/mi)
0
1
2
3
4
5
6
7
NOX
VOC
2.5
5
10
15
20
25
30
35
40
45
50
55
60
65
Speed (mph)