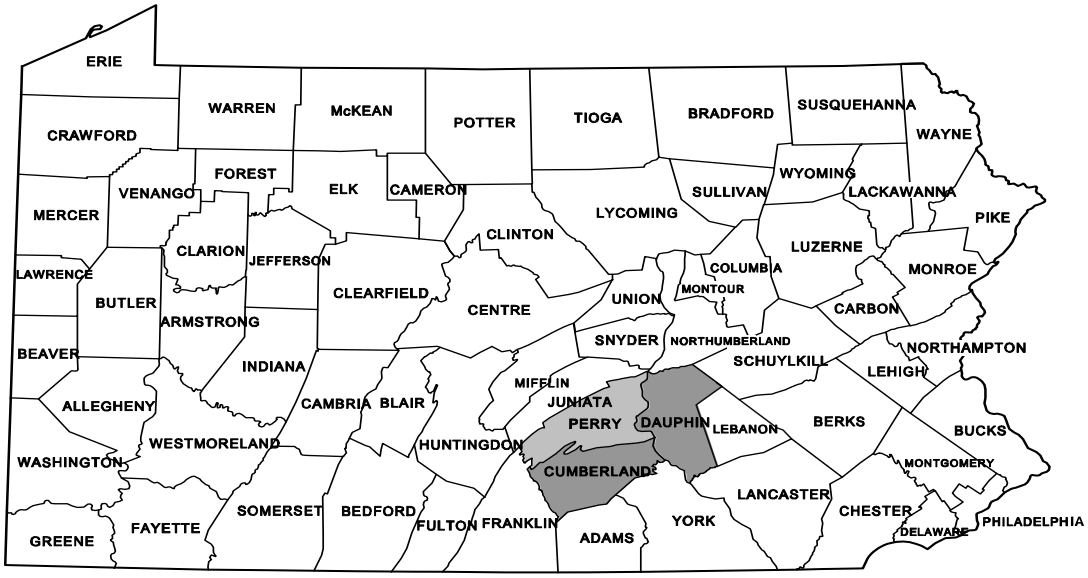
Air Quality Conformity Analysis Report
For Harrisburg Area Transportation Study (HATS)
Ozone Maintenance Area and
PM2.5 Nonattainment Area

FFY 2013-2016 TRANSPORTATION IMPROVEMENT PROGRAM
&
2035 REGIONAL TRANSPORTATION PLAN

VOLUME I - EXECUTIVE SUMMARY



Prepared by:
Tri-County Regional Planning Commission,
HATS Planning Staff

PUBLIC REVIEW: May 4 – June 20, 2012
PUBLIC MEETINGS: June 5, 2012
PLANNING PARTNER APPROVAL: June 22, 2012

1. INTRODUCTION

This document provides an analysis of the air quality implications of the Harrisburg Metropolitan Planning Organization's (MPO) FFY 2013-2016 Transportation Improvement Program (TIP) and 2035 Regional Transportation Plan (RTP). The analysis demonstrates transportation conformity to the 1997 8-hour ozone, the 1997 annual fine particulate ($PM_{2.5}$) and the 2006 24-hour $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS). This document replaces the previous approved conformity determination of the TIP and RTP, and ensures that the findings meet all current ozone and $PM_{2.5}$ criteria established by the United States Environmental Protection Agency (EPA).

Since vehicular emissions contribute to ozone and $PM_{2.5}$ violations, the Clean Air Act Amendments (CAAA) of 1990 require 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.

Separate conformity determinations are required for the two criteria pollutants for which the area is in maintenance or nonattainment: ozone and fine particulates ($PM_{2.5}$). The nonattainment/maintenance areas vary by pollutant as follows:

Ozone:
Harrisburg-Lebanon-Carlisle, PA
(Cumberland, Dauphin, Lebanon, Perry)

$PM_{2.5}$ Annual:
Harrisburg-Lebanon-Carlisle, PA
(Cumberland, Dauphin, Lebanon)

$PM_{2.5}$ Daily:
Harrisburg-Lebanon-Carlisle-York, PA
(Cumberland, Dauphin, Lebanon, York)

For the $PM_{2.5}$ NAAQS, conformity in this document is demonstrated for the Harrisburg (Cumberland, Dauphin) portion of the nonattainment area only. A final $PM_{2.5}$ daily and annual conformity determination approval by U.S. DOT can only occur if all areas within the nonattainment area demonstrate conformity. This requires positive conformity determinations by the York and Lebanon MPOs for each $PM_{2.5}$ standard to achieve an overall conformity determination of the TIP and RTP.

Ozone Status

In an attempt to reduce harmful emissions nationwide, the CAAA 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, the Harrisburg-Lebanon-Carlisle area was designated as a *Marginal ozone nonattainment* area.

On June 15, 2004, EPA finalized ground-level ozone designations under the 1997 8-hour ozone NAAQS. The Harrisburg-Lebanon-Carlisle area was originally designated a *Basic ozone nonattainment* area under the 1997 8-hour ozone standard. On July 25, 2007, EPA approved a State Implementation Plan (SIP) revision requesting that the area be redesignated as *attainment* for the 1997 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 Harrisburg-Lebanon-Carlisle area that provides for continued attainment of the 1997 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 Harrisburg Area maintenance plan for purposes of transportation conformity. Separate emission budgets are provided for the Harrisburg Area Transportation Study (HATS) and the Lebanon County MPO (LEBCO) for the 2009 and 2018 analysis years. The HATS region encompasses Cumberland, Dauphin, and Perry Counties. Based on the approved maintenance plan MVEBs, transportation conformity for the 1997 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).

On March 12, 2008, EPA revised its NAAQS for ozone by strengthening the standard to 0.075 parts per million (ppm). Subsequently, EPA has taken steps regarding the designation and classification of areas and has developed an initial set of implementation rules under this NAAQS. Designations are anticipated to be published in late Spring 2012. Once effective, the designations and implementation rules govern the actions localities, states and EPA must take to improve or preserve air

quality in each area. EPA has proposed (77 FR 8197) to revoke the 1997 ozone standards one year after designations for the 2008 ozone standards are effective for the purposes of regional transportation conformity only. Based on available monitoring data, the Harrisburg-Lebanon-Carlisle area is anticipated to be designated as an attainment area under this new standard. If the area is designated nonattainment under the 2008 ozone NAAQS, a regional transportation conformity determination would be required within one year of the effective date of designation.

This conformity determination report demonstrates that the TIP and RTP conform to the requirements under the 1997 ozone NAAQS and the 2008 ozone NAAQS, if applicable.

$PM_{2.5}$ 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 was set at 15 micrograms per cubic meter ($\mu g/m^3$) and is based on a 3-year average of annual mean $PM_{2.5}$ concentrations. The daily standard was set at 65 $\mu g/m^3$. An area meets the 24-hour $PM_{2.5}$ 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.

Effective December 14, 2009, EPA issued the 2006 $PM_{2.5}$ standard that tightened the 24-hour $PM_{2.5}$ standard from 65 $\mu g/m^3$ to 35 $\mu g/m^3$, and retained the 1997 annual $PM_{2.5}$ standard at 15 $\mu g/m^3$. Areas that have failed to meet the standards outlined above have been designated as nonattainment areas and are now subject to transportation conformity requirements.

The Harrisburg-Lebanon-Carlisle area (Dauphin, Cumberland and Lebanon counties) has been designated as a nonattainment area for the 1997 annual $PM_{2.5}$ standard. For the 2006 24-hour $PM_{2.5}$ standard, the Harrisburg-Lebanon-Carlisle-York nonattainment area consists of Cumberland, Dauphin, Lebanon and York counties.

There are currently no approved SIP $PM_{2.5}$ emission budgets for the nonattainment areas under either $PM_{2.5}$ standard. Before $PM_{2.5}$ motor vehicle emissions budgets in the SIP are ruled "adequate" or approved by EPA, the nonattainment area must meet the "Interim Rule" conformity test requirements, with the Lebanon Metropolitan Planning Organization (LEBCO), York County Metropolitan Planning Organization (YCMPO) and Harrisburg Area Transportation Study (HATS) approving conformity for their respective portions of the nonattainment area. Consultation among the three MPOs, state and federal agencies is required in accordance with the EPA's regulations. LEBCO, YCMPO and HATS, through the interagency consultation process, have agreed to perform the conformity analysis on their respective areas separately, and the combined results will demonstrate conformity for the entire nonattainment area. 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 baseline emission levels.
- $PM_{2.5}$ 24-Hour Standard: Demonstration that future year daily emissions are no greater than the 2008 baseline 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, 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 U.S. Environmental Protection Agency (EPA) to implement regulations that will provide 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 includes a demonstration that annual emissions in future years are not greater than

the 2002 baseline and that daily emissions in future years are not greater than the 2008 baseline. Ozone and $PM_{2.5}$ daily analyses are for emissions during a *summer weekday*. Annual $PM_{2.5}$ analyses are for *annualized* emissions, as estimated from 12 monthly runs.

This report evaluates the Highway and Transit Transportation Improvement Program (TIP) and the Regional Transportation Plan (RTP) for the Harrisburg MPO portion of the $PM_{2.5}$ nonattainment and ozone maintenance areas. It presents the most recent estimates of mobile source emissions for the region, including consideration of significant projects on the TIP and RTP. 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 urban and rural areas of Dauphin and Cumberland counties for $PM_{2.5}$. Although the MPO includes Perry County, it is excluded from the emission analysis since it is in attainment of the $PM_{2.5}$ standard. For ozone, Cumberland, Dauphin and Perry Counties are included in the analysis. The Lebanon and York County portions of the $PM_{2.5}$ nonattainment area are addressed in separate reports.

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 pollutants 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 are 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 determine 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 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 released a new emissions model (MOVES2010a). States are currently reviewing the model for future application to SIP and transportation conformity analyses. A grace period extension allows for the continued use of EPA's MOBILE6.2 model through March 2, 2013 (77 FR 11394) for regional conformity purposes. 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 Regionally Significant" (NRS), and include those projects which are not exempt by definition, but for which the air quality impacts are too small to quantify through current modeling practices. All decisions on project significance were

made using the guidelines in the report, "PennDOT Project Review & Classification Guidelines for Regional Air Quality Conformity", dated January 2012.

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 2009 and 2018 emission budgets in the Harrisburg-Lebanon-Carlisle maintenance plan. For particulate matter, future year annual emissions are demonstrated to be less than or equal to the 2002 baseline and future year daily emissions are demonstrated to be less than or equal to the 2008 baseline 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 $PM_{2.5}$ annual and daily analyses, respectively. The 2015 year satisfies the requirements for an analysis year within 5 years of when the conformity analysis determination is made. The 2018 year is the emission budget year established in the ozone maintenance plan. 2025 is an interim year to ensure there is not more than 10 years between any two analysis years. The 2035 year is the last year of the Harrisburg, York and Lebanon MPO long range transportation plans.

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 currently being implemented.

In order to proceed with its planned projects, each MPO must adopt a conformity resolution. To that end, this study has proceeded with reasonable assumptions and the best available data. The intent of this analysis is to provide an even-handed comparison within these limitations, applying the same assumptions to each of the milestone scenarios within any given year. A reasonable effort has also been extended to provide an evaluation of future year emissions as compared to the levels in 2002.

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. Future efforts will utilize 2008/2011 related data which have been compiled for use with the MOVES emission model (but not the MOBILE6.2 model) in conjunction with its implementation for conformity. The inter-agency consultation group affirmed this approach. Examples of key tools and input data are presented below:

- MOBILE6.2 is used to determine emission factors for the region.
- Travel Demand Model – Uses latest regional travel model validated to 2000 conditions and updated to reflect 2005 truck data from the South Central Goods Movement Study.
- Socioeconomic Forecasts – Latest MPO household and employment forecasts are used within the travel model to develop future year VMT estimates for roadways within the county.
- HPMS Adjustments – A model run has been produced for 2008. Missing local roadway VMT is reconciled to the 2008 HPMS to ensure consistency. These adjustments are carried forward to future years.
- Monthly VMT data is derived from Pennsylvania Department of Transportation (PennDOT) adjustment factors to apportion annual VMT to each month. $PM_{2.5}$ analyses use monthly VMT totals aggregated to an annual figure.
- Vehicle Mix Patterns – Vehicle mix patterns have been developed based on 2005 PennDOT RMS truck percentages.
- Vehicle Fleet Ages – 2005 vehicle fleet age data was prepared from the state motor vehicle registration database.

1.5 Document Contents

The conformity analysis for the Harrisburg metropolitan 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. It defines the purpose of the report. Further, it describes the scope of the study: its geographical coverage, the time frame considered and the emissions that have been 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 shown in Tables 1 – 9 at the end of this report.

A more detailed discussion of the analysis is presented in section three, which provides an overview of the study process and background information on the relationship between vehicular emissions and ozone/$PM_{2.5}$. The TIP and RTP are discussed, focusing on any projects that might significantly affect emissions. Traffic parameters used in the modeling process are presented. Other parameters are also discussed. The section concludes by discussing emission tables developed during the analysis and presenting the implications of these results.

The fourth section of the report discusses the "financial constraints" of the Transportation Improvement Program and the 2035 Regional Transportation Plan.

Section five discusses the public participation process of the conformity analysis. This process includes the advertisements of availability of the TIP/RTP and accompanying conformity documents, as well as any comments or responses related to the documents.

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

Volume II of this report contains the technical data used to conduct the ozone and $PM_{2.5}$ conformity determinations. Key variables, such as vehicle miles traveled (VMT), vehicle hours traveled (VHT), average speed, and emissions (annual direct $PM_{2.5}$ and NO_X for $PM_{2.5}$) are shown. In addition, the TIP/RTP for the region, MOBILE6.2 set-up files and other variables are shown. Copies of Volume II are available from the Tri-County Regional Planning Commission (TCRPC) upon request (call 717-234-2639).

2. SUMMARY

As required by the Clean Air Act Amendments of 1990 (CAAA), a study of vehicle emissions was performed for the Harrisburg MPO's portion of the ozone maintenance and $PM_{2.5}$ 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 2009 and 2018 mobile emission budgets established in the Harrisburg-Lebanon-Carlisle area maintenance plan. The future emission projections include the implementation of the TIP and RTP. 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 ozone analysis year of 2015, the VOC and NOx emissions are less than the 2009 budget (for each respective pollutant). For the 2018, 2025, and 2030 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 (RTP 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.

$PM_{2.5}$

The analysis for $PM_{2.5}$ direct and precursor emissions includes the estimation of future year emissions including the influence of planned projects. 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 NOx precursors include ozone precursor strategies that reduce NOx, VMT growth mitigation, alternative fuels, fleet turnover, etc. Federal control measures that significantly reduce these emissions include low sulfur gasoline and diesel fuels, new heavy duty engine rules 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 and the results of the modeling. In addition, it provides background information to support the conclusions.

3.1 Overview

The 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 calculate the impact of regional population and employment growth, TIP/RTP transportation projects, and travel diversions on total emission estimates. The programs rely on a variety of input factors, which are discussed in more detail below (see "Traffic Parameters" and "Other Parameters").

Key traffic parameters include daily and annual vehicle miles of travel (VMT), average speeds, and vehicle mix. These input factors are calculated by the PPSUITE post processor using the travel demand model network volumes for base and future years. The model produces traffic volumes for all state roadways in the region. The model network contains roadways broken into 6 functional classifications (Interstate, Other Principal Arterials, Minor Arterials, Major Collectors, Minor Collectors and Local Roads) in two area settings: rural and urban.

The VMT 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.

Existing VMT was projected to the future years using forecasted population and employment estimates input to the travel demand model. Travel demand model outputs for each year provided the total travel for each roadway segment throughout the nonattainment and maintenance areas.

Speed data was calculated for each highway segment and hour of the day, based on roadway capacity and traffic volume using the post processing software. 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 changes in physical conditions due to TIP and RTP improvement projects.

Other input parameters include information about the types of vehicles using the road and environmental factors. Since local data provides a useful distinction for this comparative analysis, county-specific data was used to describe the vehicle fleet on the highway.

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 RTP projects, satisfy the applicable transportation conformity tests for both ozone and $PM_{2.5}$ precursor 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 Harrisburg MPO

region is nonattainment for criteria pollutants and precursors related to $PM_{2.5}$ and in maintenance for ozone.

Ozone:

Ozone is a strong irritant to the eyes and upper respiratory system. It hampers breathing and also damages crops and rubberized materials, and it is the main component of smog. If a region experiences more than three violations of the ozone standard over a three-year period, it is considered to be nonattainment for ozone. The 1997 8-hour standard for ozone is a maximum 8-hour average exposure of 0.08 parts per million (ppm). The revised 2008 8-hour ozone NAAQS is 0.075 ppm, calculated in the same manner as the 1997 8-hour ozone NAAQS.

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 (NO_x). Both of these are compounds present in vehicular exhaust. In addition, hydrocarbons may be produced by evaporation 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. In addition, higher concentrations are associated with warm temperatures, and high-pressure systems involving temperature inversions and low wind speeds. Under these stagnant conditions, emissions tend to accumulate, rather than disperse.

The role that each component plays in the 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 it's transport to other polluted areas. Reductions in NOx emissions would achieve regional ozone reductions. On the other hand, reductions in VOC are most often 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) 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 from vehicles traveling above 40 miles per hour.

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

$PM_{2.5}$:

Particulate matter is the term for solid or liquid particles found in the air. Some particles 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. Mobile source 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 Harrisburg MPO region is nonattainment for both the annual and 24-hour standard. The annual standard is a maximum exposure of 15 $\mu g/m^3$. If a region experiences a three-year average of annual means greater than this value, it is considered nonattainment for the $PM_{2.5}$ annual standard. 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 $\mu g/m^3$).

Both on-road and non-road mobile sources emit fine particulate matter. Diesel-powered vehicles and engines contribute more than half 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 therefore 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 United States.

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.

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 addition, cleaner burning fuel and controls at refueling stations have worked to decrease the emission rates of gasoline powered cars, and, to some extent, diesel vehicles. Additional federal new 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 absorb portions of the reductions attributable to cleaner cars 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 areas. The Pennsylvania inspection and maintenance (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 test requirements vary by region and include on-board diagnostics (OBD) technology that uses the vehicle's computer for model years 1996 and newer to download potential engine problems that could effect emissions. The program, named PAOBDII, is implemented in the Philadelphia, Pittsburgh, Harrisburg (Dauphin and Cumberland counties only) and Lehigh Valley Regions. The Northern Region receives gas cap and visual inspections and the other 42 counties in the Commonwealth receive a visual inspection. For all of projected analysis years beyond 2004, the upgraded I/M program was modeled.

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 focused 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 ensures that 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 uses 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 FFY 2013 Transportation Improvement Program (TIP) and 2035 Regional Transportation Plan (RTP)

The complete Transportation Improvement Program and 2035 Regional Transportation project lists for the Harrisburg MPO area are included in Volume II, Appendix A, for highways, and Volume II, Appendix B, for transit service projects.

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

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

Cumberland County:

1. PA 114 Park and Ride Lot - This project includes the construction of a park and ride lot on the east

side of PA 114 north of I-81 in Silver spring Township

2. I-81 Exit 29 Interchange – This project includes expansion of the interchange and signalization of the ramps.

3. Carlisle Pike and US 22 signal coordination – signal coordination on Carlisle Pike and US 22 in Cumberland and Dauphin counties.

4. US 15/Slate Hill Road – Relocating off ramp and adding signals

5. Rossmoyne Rd/Wesley Dr/Sheely Lane – Various improvements determined through Corridor Study

6. Carlisle Pike improvements – add lane from Central Blvd. to Sporting Hill Road

7. Trindle and St. Johns Church Road – intersection improvements and signal coordination

8. Mount Rock Road connector – New connector road from PA233 to Big Spring School District

9. Lower Allen Drive extension – Extend Lower Allen Drive to Lisburn Road

10. Gettsyburg Road Realignment - Realign 800 feet of Gettysburg Road and create a new intersection at Wesley Drive, remove portion of Gettysburg Road to reduce flooding.

11. Sheely Lane widening – Widen from Trindle Road to Simpson Ferry Road.

12. Sporting Hill Road widening – Widen from Trindle Road to Carlisle Pike.

13. Gettysburg Road widening – Widen from Carlisle Road to 18th Street.

14. Trindle Road widening – Widen from Camp Hill to Sporting Hill Road.

15. Wertzville Road widening – Widen from Valley Road to East Penn Drive.

16. Wertzville Road widening – Center turn lane.

17. Simpson Ferry Road – Priority signal corridor project - PA114 to US15

18. PA 641 – Priority signal corridor project - US15 / PA581 to PA114

19. I-83 Improvements – I-83 York split, lane additions near I-83 and PA 581 interchange area.

Dauphin County:

1. Rutherford Intermodal Center - The project expands the Rutherford Intermodal Facility to accommodate an additional 125,000 lifts per year and enables the facility to keep pace with growing freight traffic demand in the Harrisburg MPO area.

2. US 322 Corridor Improvements – Construction of a collector road parallel to US 322 and making US 322 limited access. Construction of a bridge Grayson Road to Derry Street.

3. Second Street Corridor – This project involves changing Second Street to 2-way street from Forster Street to Division Street.

4. US 422, US 322 & PA 39 Interchange – The project involves redesigning of the interchange with widening of ramps.

5. Governor Road widening – Widen from Bull Frog Valley Road to Homestead Road.

6. PA 39/PA 743 Improvements – Various capacity increasing projects along PA 39 and PA 743

7. Oberlin Road – Improvements to two intersections on Oberlin Road (Fulling Mill Road and Spring Garden Drive) and realignment of 1,800 feet of Oberlin Road

8. Allentown Blvd & Mountain Rd Intersection – Add through lanes, and separate dual left turn lanes.

9. Jonestown Rd - Franklin St & Locust St Intersections – Geometric improvements and signalization.

10. Milroy Road Widening – Widen between Grayson Road and Route 322.

11. Division Street Bridge – Construct new bridge.

12. Paxton Street priority signal corridor project – I-83/Front St to Eisenhower Blvd.

13. PA 230 priority signal corridor project – US22 to Paxton Street.

14. Union Deposit Road priority signal corridor project – 25th Street to Rutherford Road.

Perry County:

1. PA 34 Corridor Improvements- This project involves the reconstruction of an intersection at Sunnyside Dr., installation of turning lanes at Richwine Rd., Fox Hollow Rd., and Rambo Rd., and installation of traffic signals at PA Route 850 and Souder Road, and the relocation of Windy Hill Road to tie into Souder Road.

2. US 11/15 Improvements- This project involves construction of a parking access road, bicycle and pedestrian facilities, and conversion of side streets to one way.

3. PA 274 Improvements- This project involves widening of shoulders, installation of guide rails, restriping intersections, and improving overhead clearance beneath the US Routes 11/15 overpass.

3.4 Traffic Parameters

Traffic parameters within the emissions modeling provide the basis for computing regional mobile emission estimates for ozone and $PM_{2.5}$ pollutants. 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 an average summer day. Annual emission estimates are calculated by expanding average day emissions in each month to monthly and annual totals.

Travel Demand Model:

Travel data was generated by TCRPC's Travel Demand Forecasting Model. The regional model was developed to estimate future travel throughout the Tri-County region. The model utilizes the TP+ software platform; a transportation demand forecasting software package that uses widely practiced traditional four-step forecasting methods. There are 489 internal Traffic Analysis Zones (TAZs) in the model, plus a highway network consisting of all major state highways. The highway network is updated for each analysis year to reflect actual changes in the system that are open to the public. The network contains attributes such as distance, number of lanes, area type, facility type, free flow speed, capacity of the lane, location of signals, etc.

The TCRPC Travel Demand Forecasting Model was constructed in 1995 for the calibration year 1990. In 2004-2005, the model was upgraded to the TP+ software platform and revalidated to a 2000 base year. In 2008, the model was updated to better reflect regional external travel. This included revising the external origin to external destination truck trip tables using data from the South Central PA Regional Goods Movement Study that was completed in November 2006. The model was also enhanced to separately distribute auto and truck trips, improving overall regional traffic assignments. Using the projected traffic volume data from the model, conditions were evaluated for all applicable future analysis years. All air quality significant projects from the TIP and RTP were coded into the travel demand model.

Transit data was also generated as part of the travel demand model. Existing fixed transit routes and their associated attributes (i.e., stops, headways, fares, speeds) are included within a transit subroutine. Ridership estimates generated by this subroutine are fed back into the model stream as part of the overall network processing.

Traffic forecasts were projected based on the latest socio-economic and land use data projections developed by the TCRPC. This data includes household population, retail and non-retail employment, group-quarters population, school and college enrollments, etc.

The roadway network is made up of nodes that are attached by lines called links. Each of these links in the road network is assigned attributes, one of which is a facility type designation. There are various facility type designations in the TCRPC model, including interstate, expressway, arterial, collector and local. Tables provided in Volume II-Technical Analysis of this report show the tabulation of daily (for ozone) and annual (for $PM_{2.5}$) vehicle miles of travel (VMT). The VMT is generated by multiplying the projected traffic volume for a link and the length of that link, then by summing the products for all links in that facility group.

The TCRPC travel model produces traffic volumes for the morning, midday, evening, and night time periods. For ozone analyses, these projected traffic volumes were adjusted to reflect average

weekday conditions in the summer, the peak ozone season. For annual $PM_{2.5}$ analyses, the volumes were adjusted to reflect an average day (including weekends) in each month. All volumes were also disaggregated to each hour of the day to support detailed speed estimation within the MOBILE6.2 model.

Speed Post Processing:

Speeds were calculated for each year using the PPSUITE post processing software that is based on the PPAQ system used for past conformity and inventory submissions. PPSUITE contains procedures to calculate the capacity of each highway segment, giving consideration to the physical attributes of the highway (facility type, number of lanes, geographic setting). The effects of traffic congestion are accounted for by comparing traffic volumes to this capacity for each hour of the day, then by calculating the speeds that will result.

Speeds are estimated based on traffic volumes and capacities. The model forecasts traffic volumes by adjusting the link attributes to reflect future physical improvements, adjusting the input to the transit network to reflect the changes in transit service, 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 that affect congestion and speed.

Future Year Traffic Data:

The future roadway networks input to the regional traffic model were created by using the base year model road and transit networks and adding the planned improvements to those networks based on the completion year of each project. The socio-economic and land use data were also projected for each future analysis year. This procedure was used to develop emissions characteristics for each analysis year using the model. The results of the model were used as inputs into the PPSUITE software.

The traffic data for this conformity analysis, including the regional population, employment, travel, and congestion estimates, use the region's latest planning assumptions as required by the CAAA. Travel, represented by VMT, reflects population and employment trends. The speed estimation procedure serves as a measure of congestion, and is consistent with ongoing, established monitoring programs. The estimates were coordinated with other data resources, such as local planning departments and information from the HPMS. The PennDOT-coordinated 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 MOBILE6.2 computer model were then multiplied by the appropriate VMT for each facility group / area type / time period to calculate the total emissions in kilograms per day. These results were expanded for analyses requiring annual VMT estimates.

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 C, of this document. Separate runs of the program were performed for each year and improvement scenario, as described in section 3.7, to produce summer weekday VOC and NOx.

The sample input file shows a number of the parameters indicate use of 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 each analysis scenario, 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 an area emissions source, 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 Dauphin and Cumberland Counties 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 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 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, Appendix C4.

3.6 Transportation Control Measures

No Transportation Control Measures (TCMs) have been adopted for the Harrisburg MPO region 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 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. The analysis represents summer traffic volumes on base highway network, plus those AQ significant projects that are scheduled for completion by 2015. The 2015 analysis is compared against the 2009 emission budget for the area.

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- Regional Transportation 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 year of the RTP is a required ozone analysis year.

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 $PM_{2.5}$ standards.

3- Interim Year – 2025 This year is included to ensure that no analysis year is more than 10 years apart and also covers all projects that are scheduled to be completed by 2025.

4- Regional Transportation Plan End Year – 2035 analyzes all AQ significant projects that are scheduled for completion by end of Plan. The 2035 analysis year is the end year of the long range plans for all MPOs in the nonattainment area.

24-Hour $PM_{2.5}$

1- Base Network - 2008 traffic volumes and the base highway network. This year serves as the required base year used for the 24-Hour $PM_{2.5}$ 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- Regional Transportation 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 2035 analysis year is the end year of the long range plans for all MPOs in the nonattainment area.

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 the Harrisburg MPO region indicate that estimated 2015 VOC and NOx emission estimates (including TIP & RTP) are lower than the 2009 emission budgets established in the Harrisburg-Lebanon-Carlisle area maintenance plan. Estimated 2018, 2025, and 2035 emissions are lower than the 2018 VOC and NOx emission budgets.

$PM_{2.5}$ Annual Conformity Test Results:

Results for the Harrisburg MPO region indicate 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 RTP.

$PM_{2.5}$ 24-Hour Conformity Test Results:

Results for the Harrisburg MPO region indicate 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 RTP.

3.8 Discussion

This analysis demonstrates that the forecast summer day VOC and NO_X emissions and the annual and daily direct $PM_{2.5}$ and NO_X emissions satisfy the applicable conformity tests for the ozone and $PM_{2.5}$ standards. Therefore, implementation of the TIP and RTP, 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. The local transit provider, Capital Area Transit (CAT), has also committed to purchasing newer, cleaner buses in future years.

4. FINANCIAL CONSTRAINT

The Planning Regulations, Sections 450.322 (b) (11) and 450.324 (e) require the TIP and RTP 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 Harrisburg MPO (Harrisburg Area Transportation Study [HATS]) in conjunction with PennDOT, Federal Highway Administration (FHWA), and Federal Transit Administraion (FTA), has developed estimates of the cost to maintain and operate the existing highway and transit systems in the Harrisburg MPO region and have compared that with the estimated revenues and maintenance needs of the new roads over the same period. The TIP and RTP have been determined to be financially constrained.

5. PUBLIC PARTICIPATION

The TIP and RTP have undergone the Public Participation requirements as 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 June 5, 2012. The documentation of the public notice for the hearings, comments and the responses to comments are in Volume II, Appendix F.

6. CONFORMITY STATEMENT

The CAAA require that a MPO determines that the TIP and RTP conform with the applicable State Implementation Plan (SIP) before the TIP/RTP are adopted. No Federal agency may approve, accept, or fund a TIP/RTP or its component projects unless the TIP/RTP has been found to conform to the SIP. Under the CAAA, 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 nonattainment areas, contribute to annual emissions reductions consistent with sections 182(b)(1) and 187(a)(7)"

Each new transportation plan must be found to conform before the transportation plan is approved by the MPO or accepted by DOT.

As specified under the first item, the most recent estimates of highway emissions for the Harrisburg MPO region have been developed as a part of this study. The analyses results indicate VOC and NO_X, emissions are lower than the 2009 and 2018 emission budgets established in the Harrisburg-Lebanon-Carlisle area maintenance plan for the 1997 8-hour ozone standard. The estimated Harrisburg MPO region's daily direct $PM_{2.5}$ and NO_X, are less than the 2008 baseline emissions, when implementing the TIP and RTP. The estimated annual direct $PM_{2.5}$ and NO_X emissions are less than the 2002 baseline emissions, when implementing the TIP and RTP. Consequently, the overall precursor emissions will be reduced, satisfying the third criterion.

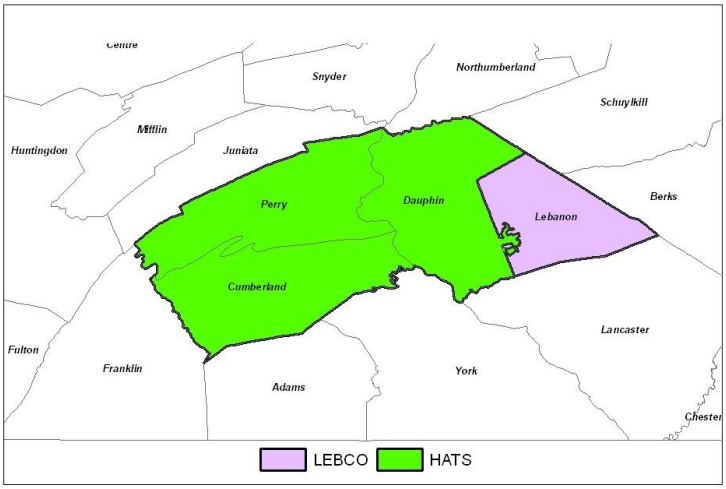
No Transportation Control Measures were included in previous State Implementation Plans. Consequently, the second criterion is not applicable.

Therefore, the Transportation Improvement Program for the Harrisburg Area Transportation Study conforms to the current implementation plan, and satisfies the conformity requirements of the Clean Air Act Amendments of 1990.

MAPS

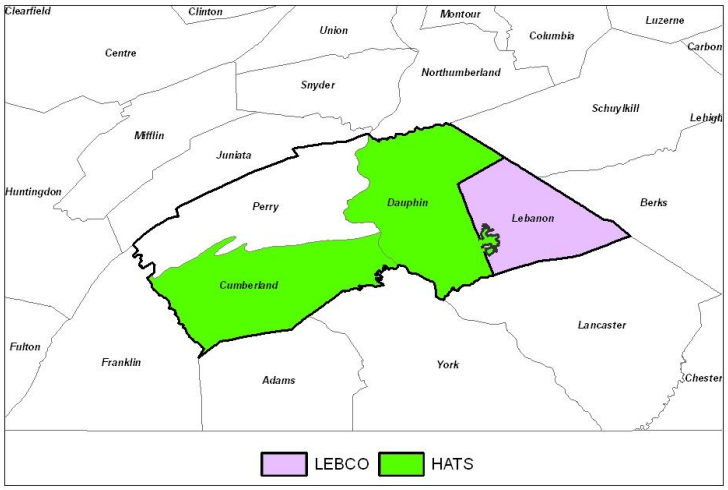
Harrisburg-Lebanon-Carlisle Ozone Maintenance Area

MPOs



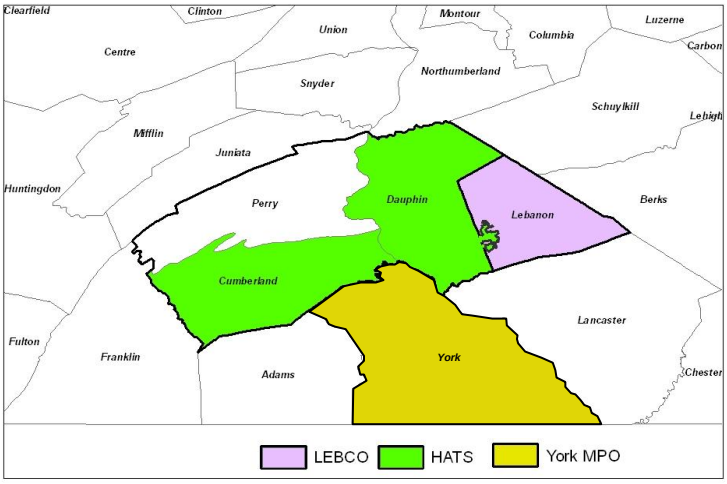
Harrisburg-Lebanon-Carlisle PM2.5 Nonattainment Area

MPOs



Harrisburg-Lebanon-Carlisle PM2.5 Nonattainment Area

PM2.5 24-Hour Standard



TABLES

TABLE 1
OZONE Conformity
Summary of Total Highway Vehicle Miles Traveled (VMT)
Average Summer Weekday
Harrisburg MPO Portion of Harrisburg-Lebanon-Carlisle Ozone Maintenance Area

	2015	2018	2025	2035
HATS Region	22,001,408	22,789,625	25,384,984	31,489,756

TABLE 2
OZONE Conformity
Summary of Total Highway VOC Emissions (kilograms/day)
Average Summer Weekday
Harrisburg MPO Portion of Harrisburg-Lebanon-Carlisle Ozone Maintenance Area

	2015	2018	2025	2035
HATS Region	**9,022** (9.95 tons/day)	**7,314** (8.06 tons/day)	**6,005** (6.62 tons/day)	**8,107** (8.94 tons/day)
Emission Budget	**23,014** **(2009 Budget)**	**16,136** **(2018 Budget)**	**16,136** ***Same as 2018***	**16,136** ***Same as 2018***

TABLE 3
OZONE Conformity
Summary of Total Highway NO_X Emissions (kilograms/day)
Average Summer Weekday
Harrisburg MPO Portion of Harrisburg-Lebanon-Carlisle Ozone Maintenance Area

	2015	2018	2025	2035
HATS Region	**17,955** (19.79 tons/day)	**12,795** (14.10 tons/day)	**7,689** (8.48 tons/day)	**6,779** (7.47 tons/day)
Emission Budget	**41,917** **(2009 Budget)**	**18,409** **(2018 Budget)**	**18,409** ***Same as 2018***	**18,409** ***Same as 2018***

* Lebanon County emission numbers are based on analyses contained in a separate conformity report for the Lebanon MPO. Separate emissions budgets are provided for the HATS region within the maintenance plan.

** All analysis years are lower than applicable budget years.

*** The maintenance plan emission budgets as posted in the federal register are in kg/day; as a result emission results are provided for ozone in kg/day.

TABLE 4
Annual $PM_{2.5}$ Conformity
Summary of Total Highway Million Vehicle Miles Traveled (MVMT)
Annual Totals
Harrisburg MPO portion of the Harrisburg-Lebanon-Carlisle $PM_{2.5}$ Nonattainment Area

	2002*	2015	2025	2035
Base Year	5,738.559	---NA---	---NA---	---NA---
TIP/RTP	---NA---	6,659.798	7,724.050	8,770.426

TABLE 5
Annual $PM_{2.5}$ Conformity
Summary of Total Highway $PM_{2.5}$ Emissions (tons/year)
Annual Conditions
Harrisburg MPO portion of the Harrisburg-Lebanon-Carlisle $PM_{2.5}$ Nonattainment Area

	2002*	2015	2025	2035
Base Year	**331**	---NA---	---NA---	---NA---
TIP/RTP	---NA---	138	124	136

TABLE 6
Annual $PM_{2.5}$ Conformity
Summary of Total Highway NO_X Emissions (tons/year)
Annual Conditions
Harrisburg MPO portion of the Harrisburg-Lebanon-Carlisle $PM_{2.5}$ Nonattainment Area

	2002*	2015	2025	2035
Base Year	**22,067**	---NA---	---NA---	---NA---
TIP/RTP	---NA---	5,980	2,473	1,985

* Perry County is not in the Harrisburg $PM_{2.5}$ nonattainment area
** 2002 VMT and Emissions from 2002 EPA National Emissions Inventory (NEI) for Cumberland and Dauphin Counties.
*** 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
Harrisburg MPO Portion of Harrisburg-Lebanon-Carlisle-York 24-Hour $PM_{2.5}$ Nonattainment Area

	2008	2015	2025	2035
Base Year	17,845,229	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	20,197,563	23,438,629	28,885,666

TABLE 8
24-Hour $PM_{2.5}$ Conformity
Summary of Total Highway $PM_{2.5}$ Emissions (tons/day)
Daily Conditions
Harrisburg MPO Portion of Harrisburg-Lebanon-Carlisle-York 24-Hour $PM_{2.5}$ Nonattainment Area

	2008	2015	2025	2035
Base Year	**0.65**	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	0.42	0.38	0.44

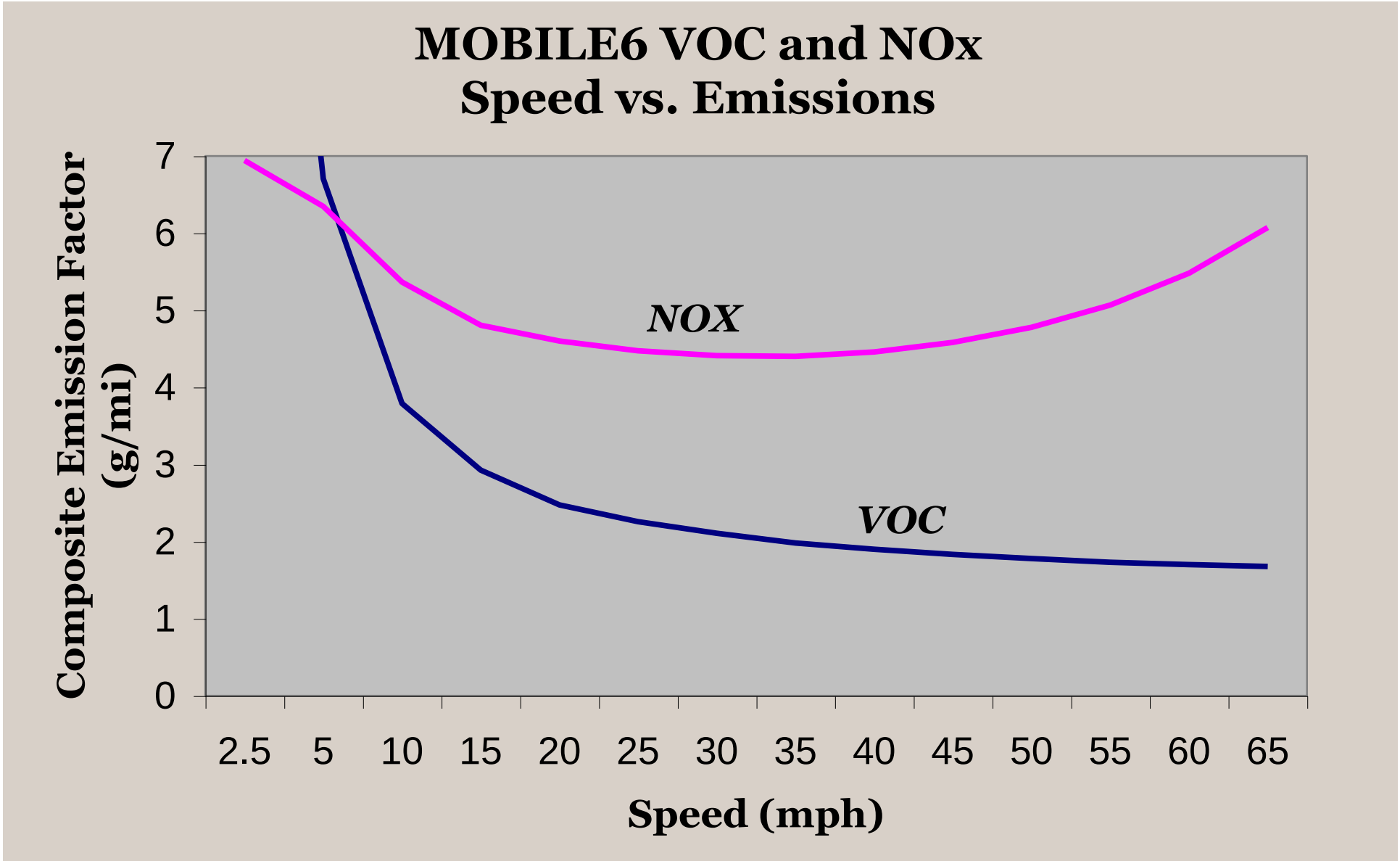
TABLE 9
24-Hour $PM_{2.5}$ Conformity
Summary of Total Highway NO_X Emissions (tons/day)
Daily Conditions
Harrisburg MPO Portion of Harrisburg-Lebanon-Carlisle-York 24-Hour $PM_{2.5}$ Nonattainment Area

	2008	2015	2025	2035
Base Year	**37.14**	---NA---	---NA---	---NA---
TIP/LRTP	---NA---	17.91	7.51	6.43

* York and Lebanon Counties are provided in separate conformity documents for each MPO. A positive conformity determination is required from all three MPOs.

** Future year emission estimates (2015, 2025 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)

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