# Air Quality Conformity Analysis Report

## NEPA MPO (Carbon County) 2019-2022 TIP and Long Range Transportation Plan

**The Northeastern Pennsylvania Alliance (NEPA) Metropolitan Planning Organization (MPO) Portion of the Allentown-Bethlehem-Easton, Pennsylvania 2008 8-Hour Ozone Nonattainment Area**


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## Table of Contents

Report Date: ..... 1
Overview ..... 1
Background on Transportation Conformity ..... 1
Report Contents ..... 2
National Ambient Air Quality Standard Designations ..... 2
Interagency Consultation ..... 4
Analysis Methodology and Data ..... 4
Key MOVES Input Data ..... 7
Analysis Process Details ..... 13
Conformity Analysis Results ..... 19
Conformity Determination ..... 21
Resources ..... 23
Highway Vehicle Emissions Analysis Glossary ..... 24

## Table of Exhibits

Exhibit 1: Summary of Attachments ..... 2
Exhibit 2: 2008 8-hr Ozone NAAQS Area Designations ..... 3
Exhibit 3: Local Data Inputs Used for Conformity Runs ..... 6
Exhibit 4: Emission Calculation Process ..... 7
Exhibit 5: MOVES Source Types and HPMS Vehicle Groups ..... 10
Exhibit 6: PPSUITE Speed/Emission Estimation Procedure ..... 15
Exhibit 7: Emission Factor vs. Speed Variances (VOC, $NO_X$, and $PM_{2.5}$) ..... 16
Exhibit 8: MOVES Run Specification File Parameter Settings ..... 19
Exhibit 9: 8-Hour Ozone Motor Vehicle Emission budgets ..... 20
Exhibit 10: Transportation Conformity Analysis Years ..... 20
Exhibit 11: Ozone Emission Analysis Results and Conformity Test ..... 21

## Summary of Attachments

**Attachment A**: Project List
**Attachment B**: Detailed Emission Results
**Attachment C**: Sample MOVES Input Files

# Overview

This report provides an analysis of the air quality implications of the Carbon County portion of the Northeastern Pennsylvania Alliance (NEPA) Metropolitan Planning Organization (MPO) 2019-2022 Transportation Improvement Program (TIP) and the region's Long Range Transportation Plan (LRTP). The analysis demonstrates transportation conformity under the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS). The air quality conformity analysis reflects an assessment of the regionally significant, non-exempt transportation projects included in the TIP and LRTP.

This document replaces the previously approved conformity demonstration, and ensures that the findings meet all current criteria established by the U.S. Environmental Protection Agency (EPA) for the applicable NAAQS. A new conformity determination has been completed to provide a regional forecast of emissions based on planned air quality significant projects and the latest available planning assumptions.

## Background on Transportation Conformity

Transportation conformity is a way to ensure that federal funding and approval are awarded to transportation activities that are consistent with air quality goals. Under the Clean Air Act (CAA), transportation and air quality modeling procedures must be coordinated to ensure that the TIP and the LRTP are consistent with the area's applicable State Implementation Plan (SIP). The SIP is a federally approved and enforceable plan by which each area identifies how it will attain and/or maintain the health-related primary and welfare-related secondary NAAQS.

In order to receive transportation funding and approvals from the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA), state and local transportation agencies must demonstrate that the plans, programs, or projects meet the transportation conformity requirements of the CAA as set forth in the transportation conformity rule. Under the transportation conformity rule, transportation plans are expected to conform to the applicable SIP in nonattainment or maintenance areas. The integration of transportation and air quality planning is intended to ensure that transportation plans, programs, and projects will not:

- Cause or contribute to any new violation of any applicable NAAQS.
- Increase the frequency or severity of any existing violation of any applicable NAAQS.
- Delay timely attainment of any applicable NAAQS, any required interim emissions reductions, or other NAAQS milestones.

The transportation conformity determination includes an assessment of future highway emissions for defined analysis years. Emissions are estimated using the latest available planning assumptions and available analytical tools, including EPA's latest approved on-highway mobile sources emissions model, the Motor Vehicle Emission Simulator (MOVES). The conformity determination provides a tabulation of the analysis results for applicable precursor pollutants, showing that the required conformity test was met for each analysis year.

### Report Contents

This document includes a summary of the methodology and data assumptions used for the conformity analysis. As shown in **Exhibit 1**, attachments containing additional detail have been provided with the document. In addition, modeling input and output files have been reviewed by EPA Region III and the Pennsylvania Department of Environmental Protection (DEP).

**EXHIBIT 1: SUMMARY OF ATTACHMENTS**

| Attachment | Title | Description |
|---|---|---|
| **A** | Project List | Provides a list of regionally significant highway projects for the TIP and LRTP. |
| **B** | Detailed Emission Results | Provides a detailed summary of emissions by roadway type. |
| **C** | MOVES Sample Run Specification | Provides example MOVES data importer (XML) and run specification (MRS) files. |

## National Ambient Air Quality Standard Designations

The CAA requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. A nonattainment area is any area that does not meet the primary or secondary NAAQS. Once a nonattainment area meets the standards and additional redesignation requirements in the CAA [Section 107(d)(3)(E)], EPA will designate the area as a maintenance area. Carbon County has been designated as part of the Allentown-Bethlehem-Easton, PA nonattainment area under the 2008 8-hour ozone NAAQS. Transportation conformity requires nonattainment and maintenance areas to demonstrate that all future transportation projects will not prevent an area from reaching its air quality attainment goals.

Ozone is formed by chemical reactions occurring under specific atmospheric conditions. Precursor pollutants that contribute to the formation of ozone include volatile organic compounds (VOC) and oxides of nitrogen ($NO_X$), both of which are components of vehicle exhaust. VOCs may also be produced through the evaporation of vehicle fuel, as well as by displacement of vapors in the gas tank during refueling. By controlling VOC and $NO_X$ emissions, ozone formation can be mitigated. Both precursor pollutants are analyzed in the transportation conformity process.

***1997 8-hour Ozone NAAQS***

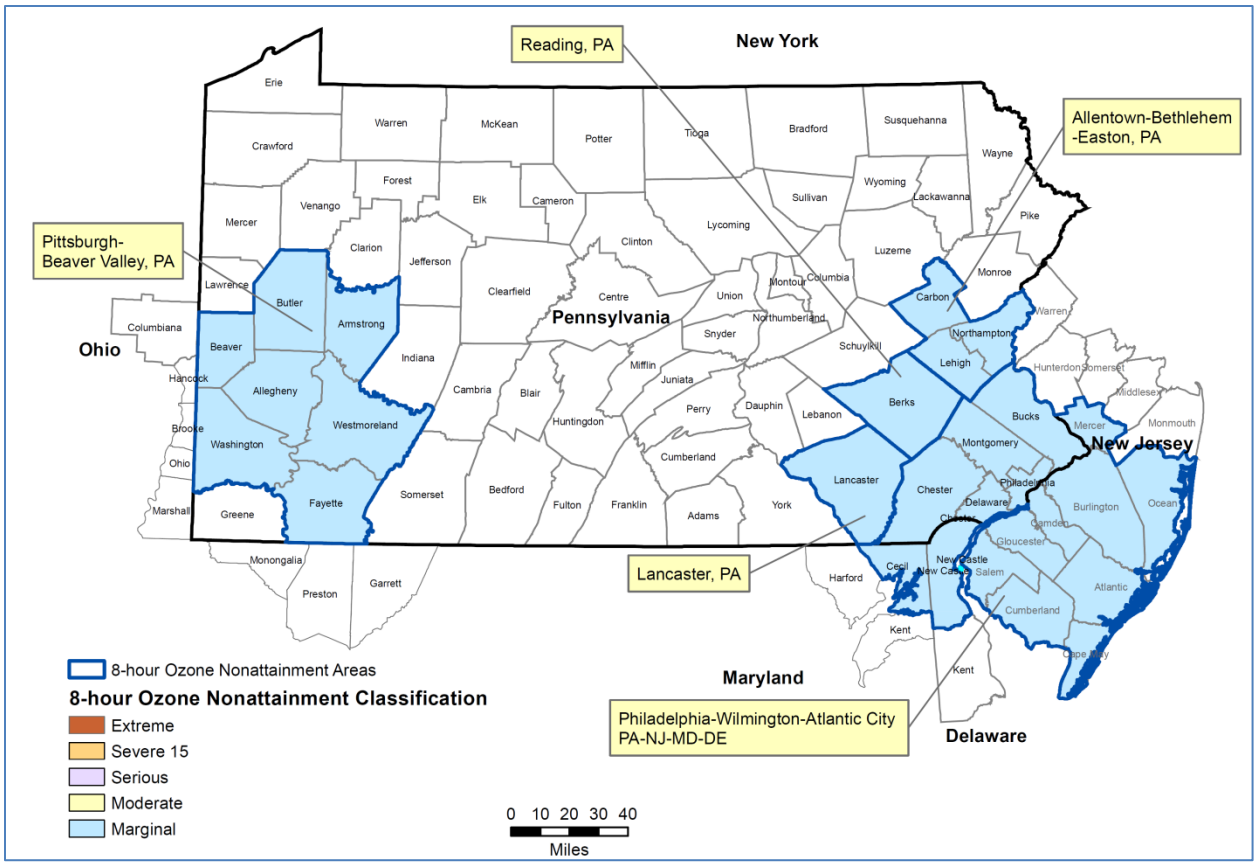
The EPA published the 1997 8-hour ozone NAAQS on July, 18, 1997 (62 FR 38856), with an effective date of September 16, 1997. An area was in nonattainment of the 1997 8-hour ozone NAAQS if the 3-year average of the individual fourth highest air quality monitor readings, averaged over 8 hours throughout the day, exceeded the NAAQS of 0.08 parts per million (ppm). On May 21, 2013, the EPA published a rule revoking the 1997 8-hour ozone NAAQS, for the purposes of transportation conformity, effective

one year after the effective date of the 2008 8-hour ozone NAAQS area designations (77 FR 30160). As of July 20, 2013, Carbon County no longer needs to demonstrate conformity to the 1997 8-hour ozone NAAQS. However, future SIP revisions must address EPA's anti-backsliding requirements.

*2008 8-hour Ozone NAAQS*

The EPA published the 2008 8-hour ozone NAAQS on March 27, 2008 (73 FR 16436), with an effective date of May 27, 2008. EPA revised the ozone NAAQS by strengthening the standard to 0.075 ppm. Thus, an area is in nonattainment of the 2008 8-hour ozone NAAQS 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 0.075 ppm. Carbon County was designated as part of a nonattainment area under the 2008 8-hour ozone NAAQS, effective July 20, 2012 (77 FR 30088). **Exhibit 2** illustrates the statewide designations under the 2008 8-Hour ozone NAAQS in Pennsylvania.

**EXHIBIT 2: 2008 8-HR OZONE NAAQS AREA DESIGNATIONS**




Transportation conformity regulations require areas to use the most recent Motor Vehicle Emission Budget (MVEB) approved or ruled adequate for that NAAQS by the EPA. If areas do not have a MVEB for the applicable prior or present ozone NAAQS, conformity is demonstrated using one or both of the interim emissions tests, as required by 40 CFR 93.119. On May 16, 2014 EPA issued a direct final action to update the 1997 8-hour ozone MVEBs for the Allentown-Bethlehem-Easton maintenance area (79 FR

28435). EPA's MOVES model was used to update the MVEB created with the prior MOBILE model, in accordance with EPA regulations. These MVEBs are used to demonstrate conformity under the 2008 8-hour ozone NAAQS.

On February 16, 2018 the D.C. Circuit reached a decision in *South Coast Air Quality Management District v. EPA*, Case No. 15-1115. In that decision, the court vacated major portions of the final rule that established procedures for transitioning from the 1997 ozone NAAQS to the stricter 2008 ozone NAAQS. Both the FHWA and the EPA are working to review the impacts of this rulemaking on transportation conformity for all NAAQS.

***2015 8-hour Ozone NAAQS***

In October 2015, based on its review of the air quality criteria for ozone and related photochemical oxidants, the EPA revised the primary and secondary NAAQS for ozone to provide requisite protection of public health and welfare, respectively (80 FR 65292). The EPA revised the levels of both standards to 0.070 ppm, and retained their indicators, forms (fourth-highest daily maximum, averaged across three consecutive years) and averaging times (eight hours). Under the Clean Air Act, the EPA administrator is required to make all attainment designations within two years after a final rule revising the NAAQS is published. However, the deadline for EPA to issue designations for the 2015 NAAQS for ozone passed on October 1, 2017. Once designations are final, transportation conformity would be required within 12 months for any areas designated nonattainment under the standard.

## Interagency Consultation

As required by the federal transportation conformity rule, the conformity process includes a significant level of cooperative interaction among federal, state, and local agencies. For this air quality conformity analysis, interagency consultation was conducted as required by the Pennsylvania Conformity SIP. This included conference call(s) or meeting(s) of the Pennsylvania Transportation-Air Quality Work Group (including the Pennsylvania Department of Transportation (PennDOT), DEP, EPA, FHWA, FTA and representatives from larger MPOs within the state).

Meeting and conference calls where conducted on October 4, 2017; January 25, 2018 and April 11, 2018 to review all input planning assumptions, methodologies and analysis years.

## Analysis Methodology and Data

This transportation conformity analysis was conducted using EPA's MOVES model. MOVES is an upgrade to EPA's modeling tools and replaces MOBILE6.2 as the official model for estimating emissions from highway vehicles for SIP emission inventories and transportation conformity (75 FR 9411), effective March 2, 2010. MOVES2014 has been used for this conformity determination and is the latest approved model version for SIP and transportation conformity purposes (79 FR 60343).

Planning assumptions are updated following EPA and FHWA joint guidance (EPA420-B-08-901) that clarifies the implementation of the latest planning assumption requirements in 40 CFR 92.110. This

analysis utilizes the latest available traffic, vehicle fleet and environmental data to estimate regional highway emissions. Pennsylvania updates state-level planning assumptions on a 3-year cycle and this information is integrated into the conformity analyses. The analysis methodology and data inputs for this analysis were developed through interagency consultation and used available EPA guidance documents that included:

- *Policy Guidance on the Use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes*, US EPA Office of Air and Radiation, EPA-420-B-14-008, July 2014.
- *MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity.* US EPA Office of Air and Radiation, and Office of Transportation and Air Quality, EPA-420-B-15-093, November 2015.
- *MOVES2014a User Guide*, US EPA Office of Transportation and Air Quality, EPA-420-B-15-095, November 2015.

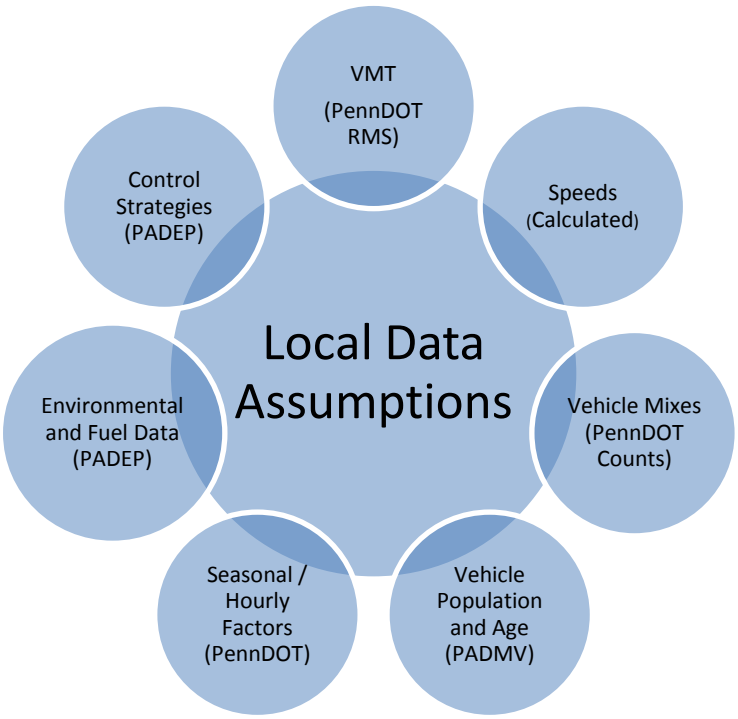
A mix of local and national default (internal to MOVES) data is used in the analysis. As illustrated in **Exhibit 3**, local data has been used for data items that have a significant impact on emissions, including: vehicle miles of travel (VMT), vehicle population, congested speeds, and vehicle type mix, as well as environmental and fuel assumptions. Local data inputs to the analysis process reflect the latest available planning assumptions using information obtained from PennDOT, DEP and other local/national sources.

The methodology used for this analysis is consistent with the methodology used to develop SIP inventories. This includes the use of the traffic data from PennDOT's Roadway Management System (RMS) and custom post-processing software (PPSUITE) to calculate hourly speeds and prepare key traffic input files to the MOVES emission model.

PPSUITE consists of a set of programs that perform the following functions:

- Analyzes highway operating conditions.
- Calculates highway speeds.
- Compiles VMT and vehicle type mix data.
- Prepares MOVES runs and processes MOVES outputs.

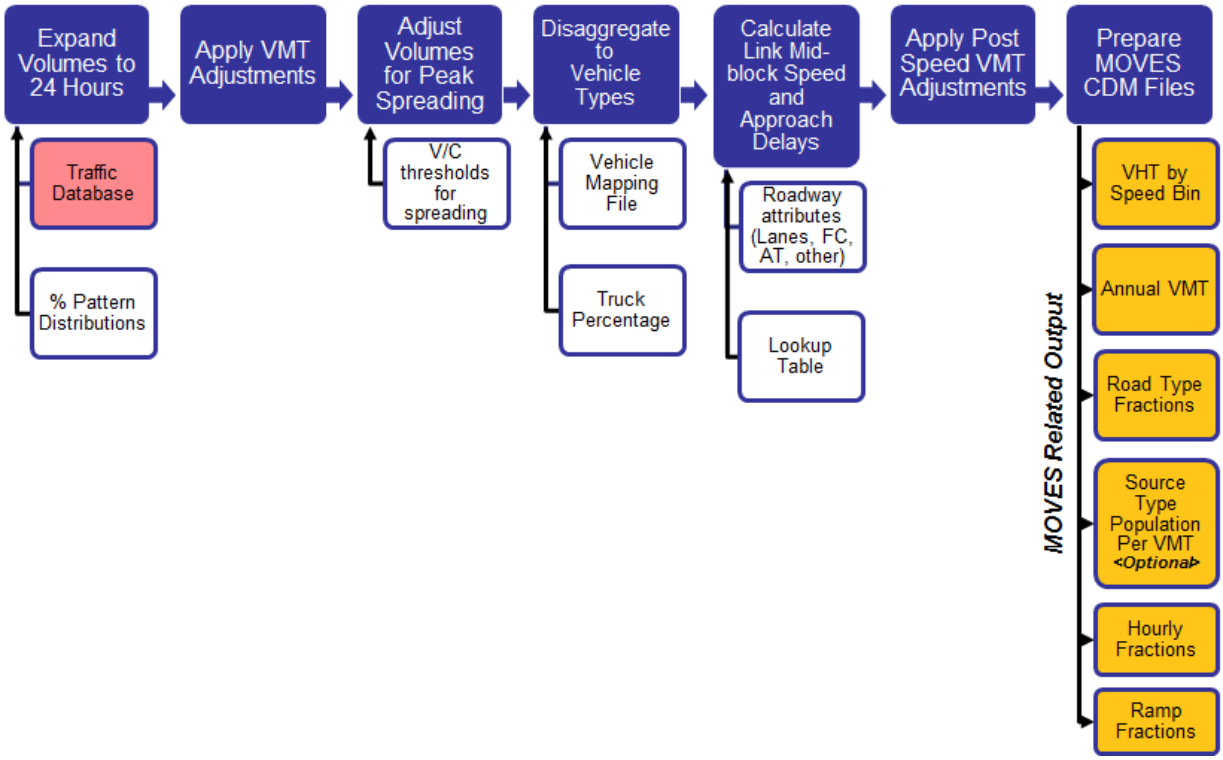
**EXHIBIT 3: LOCAL DATA INPUTS USED FOR CONFORMITY RUNS**




PPSUITE is a widely used and accepted tool for estimating speeds and processing emissions rates. The PPSUITE tool has been used for developing on-highway mobile source inventories in SIP revisions, control strategy analyses, and conformity analyses in other states. The software was developed to utilize accepted transportation engineering methodologies. The PPSUITE process is integral to producing traffic-related input files to the MOVES emission model. **Exhibit 4** summarizes the key functions of PPSUITE within the emission calculation process. Other MOVES input files are prepared externally to the PPSUITE software, including vehicle population, vehicle age, environmental and fuel input files.

The CENTRAL software is also used in this analysis. CENTRAL is a menu-driven software platform that executes the PPSUITE and MOVES processes in batch mode. The CENTRAL software allows users to execute runs for a variety of input options and integrates custom MySQL steps into the process. CENTRAL provides important quality control and assurance steps, including file naming and storage automation.

**EXHIBIT 4: EMISSION CALCULATION PROCESS**




## Key MOVES Input Data

A large number of inputs to MOVES are needed to fully account for the numerous vehicle and environmental parameters that affect emissions. These inputs include traffic flow characteristics, vehicle descriptions, fuel parameters, I/M program parameters and environmental variables. MOVES includes a default national database of meteorology, vehicle fleet, vehicle activity, fuel and emission control program data for every county; EPA, however, cannot certify that the default data is the most current or best available information for any specific area. As a result, local data, where available, is recommended for use when conducting a regional conformity analysis. A mix of local and default data is used for this analysis. These data items are discussed in the following sections.

**Roadway Data**

The roadway data inputs to emissions calculations for this conformity analysis are based on information from the RMS database maintained by PennDOT's Bureau of Planning and Research (BPR). PennDOT obtains this information from periodic visual and electronic traffic counts. RMS data is dynamic, since it is continually reviewed and updated from new traffic counts and field visits conducted by PennDOT. Information on roadways included in the USDOT National Highway System is reviewed, at minimum, on an annual basis, while information on other roadways is reviewed at least biennially. On a triennial basis, a current "snapshot" of the RMS database is taken and downloaded to provide an updated record of the Commonwealth's highway system for estimating emissions. The RMS database contains all state

highways, including the Pennsylvania Turnpike, divided into segments approximately 0.5 miles in length. These segments are usually divided at important intersections or locations where there is a change in the physical characteristics of the roadway (e.g. the number of lanes changes). There are approximately 82,000 state highway segments across all 67 Pennsylvania counties. The following information is extracted from RMS for emission calculations:

- Lanes.
- Distances.
- Volumes representing Average Annual Daily Traffic (AADT).
- Truck percentages.
- PennDOT urban/rural classifications.
- PennDOT functional class codes.
- Number of signals (based on linkage to PennDOT's Geographic Information System (GIS) signal location data).

RMS volumes and distances are used in calculating highway VMT totals for each county. As discussed in the next section, adjustments are needed to convert the volumes to an average summer weekday, winter weekday, and monthly day (including weekends and weekdays), as applicable to the pollutant/precursor being analyzed. In addition, the traffic volumes must be forecast to support future years. Lane values and traffic signals are important inputs for determining the congestion and speeds for individual highway segments. Truck percentages are used in the speed determination process in order to split volumes to individual vehicle types used by MOVES software. Road segments are classified not only by function, but also by whether it is located in an urban, small urban or rural area. The PennDOT urban/rural (UR) and functional classes (FC) designations are important indicators of the type and function of each roadway segment. These variables provide valuable insights into other characteristics not contained in the RMS data, which are used for speed and emission calculations.

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 PennDOT 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 Highway Performance Monitoring System (HPMS) VMT trends and future county socioeconomic projections based on the 2014 Woods and Poole Economics, Inc. State Profile (http://www.woodsandpoole.com/). The statistical models incorporate historical VMT trends, socioeconomic data (households, mean household income), and a relative measure of transportation capacity (lane miles per capita). PennDOT's BPR maintains and updates these growth rates on a periodic basis based on new demographic projections and updated information on HPMS VMT. The results of the updated VMT forecasts have been shared with the participants in the Pennsylvania Transportation-Air Quality Working Group.

**Other Supporting Traffic Data**

Other traffic data is used to adjust and disaggregate traffic volumes. Key sources used in these processes include the following:

- *Highway Performance Monitoring System (HPMS VMT)*: According to EPA guidance, baseline inventory VMT computed from the RMS must be adjusted to be consistent with HPMS VMT totals. The VMT contained in the HPMS reports are considered to represent average annual daily traffic (AADT), an average of all days in the year, including weekends and holidays. Adjustment factors are calculated for the 2014 analysis year. These factors are used to adjust roadway data VMT to be consistent with the reported HPMS totals, and are applied to all county and facility group combinations within the region. These adjustments are important to account for local roadway VMT not represented within the RMS.
- *Seasonal Factors*: The traffic volumes estimated from the RMS are adjusted to summer or average monthly conditions (as needed for annual processing), using seasonal adjustment factors prepared by PennDOT's BPR in their annual traffic data report published on the BPR website (http://www.dot.state.pa.us/ Search: Research and Planning). The seasonal factors are also used to develop MOVES daily and monthly VMT fraction files, allowing MOVES to determine the portion of annual VMT that occurs in each month of the year.
- *Hourly Patterns*: Speeds and emissions vary considerably depending on the time of day. In order to produce accurate emission estimates, it is important to estimate the pattern by which roadway volume varies by breaking the data down into hourly increments. Pattern data is in the form of a percentage of the daily volumes for each hour. Distributions are provided for all the counties within the region and by each facility type grouping. The hourly pattern data has been developed from 24-hour vehicle count data compiled by PennDOT's BPR, using the process identified in PennDOT's annual traffic data report. The same factors are also used to develop the MOVES hourly fraction file.

**Vehicle Class**

Emission rates within MOVES also vary significantly by vehicle type. MOVES produces emission rates for thirteen MOVES vehicle source input types. VMT, however, is input to MOVES by six HPMS vehicle groups (note that passenger cars and light trucks are grouped for input to MOVES2014). **Exhibit 5** summarizes the distinction between each classification scheme.

**EXHIBIT 5: MOVES SOURCE TYPES AND HPMS VEHICLE GROUPS**

| SOURCE TYPES | | HPMS Class Groups | |
|---|---|---|---|
| 11 | Motorcycle | 10 | Motorcycle |
| 21 | Passenger Car | 25 | Passenger Car |
| 31 | Passenger Truck | 25 | Passenger/Light Truck |
| 32 | Light Commercial Truck | 40 | Buses |
| 41 | Intercity Bus | 50 | Single Unit Trucks |
| 42 | Transit Bus | 60 | Combination Trucks |
| 43 | School bus | | |
| 51 | Refuse Truck | | |
| 52 | Single Unit Short-haul Truck | | |
| 53 | Single Unit Long-haul Truck | | |
| 54 | Motor Home | | |
| 61 | Combination Short-haul Truck | | |
| 62 | Combination Long-haul Truck | | |

The emissions estimation process includes a method to disaggregate the traffic volumes to the thirteen source types and then to recombine the estimates to the six HPMS vehicle classes. Vehicle type pattern data is used by PPSUITE to distribute the hourly roadway segment volumes among the thirteen MOVES source types. Similar to the 24-hour pattern data, this data contains percentage splits to each source type for every hour of the day. The vehicle type pattern data is developed from several sources of information:

- PennDOT truck percentages from the RMS database.
- Hourly distributions for trucks and total traffic compiled by PennDOT's BPR.
- Transit data from PennDOT and the National Transit Database Transit Profiles (https://www.ntdprogram.gov).
- School bus registration data from PennDOT's Bureau of Motor Vehicles Registration Database.

Vehicle type percentages are also input into the capacity analysis section of PPSUITE to adjust the speeds in response to truck volume. Larger trucks take up more roadway space compared to an equal number of cars and light trucks, which is accounted for in the speed estimation process by adjusting capacity using information from the Transportation Research Board's fifth edition of the *Highway Capacity Manual*. (http://hcm.trb.org/).

**Vehicle Ages**

Vehicle age distributions are input to MOVES for each of the thirteen source types. These distributions reflect the percentage of the vehicle fleet falling under each vehicle model year (MY), to a maximum age of 31 years. The vehicle age distributions were prepared from the most recently available registration download from PennDOT's Bureau of Motor Vehicles Registration Database. Due to data limitations,

information for light duty vehicles (including source types 11, 21, 31 and 32) was used as local data for MOVES inputs, while heavy-duty vehicles (including source types 41, 42, 43, 51, 52, 53, 54, 61, and 62) used the internal MOVES national default data. The registration data download is based on MOBILE6.2 vehicle categories. The data was converted to source types using the EPA convertor spreadsheets provided with the MOVES emission model.

**Vehicle Population**

The vehicle population information, including the number and age of vehicles, impacts forecasted start and evaporative emissions within MOVES. Similar to vehicle ages, MOVES requires vehicle populations for each of the thirteen source type categories. County vehicle registration data was used to estimate vehicle population for light-duty vehicles, transit buses, and school buses. Other heavy-duty vehicle population values were based on VMT for each source type using the vehicle mix and pattern data discussed previously. PPSUITE automatically applies MOVES default ratios of VMT and source type population (e.g. the number of miles per vehicle by source type) to the local VMT estimates to produce vehicle population.

For the preparation of source type population for other required conformity analysis years, base values were adjusted using forecast population and household data for the area. Growth rates were limited so as to not exceed the VMT growth assumptions.

**Meteorology Data**

Average monthly minimum temperatures, maximum temperatures, and humidity values are consistent with the regional State Implementation Plan (SIP) modeling conducted by DEP. The data was obtained from WeatherBank, Inc. EPA's MOBILE6.2-MOVES meteorological data convertor spreadsheet (http://www.epa.gov/oms/models/moves/tools.htm) was used to prepare the hourly temperature inputs needed for the MOVES model, based on the available data.

**Fuel Parameters**

The MOVES default fuel formulation and fuel supply data were reviewed and updated based on available local volumetric fuel property information. The gasohol market penetration and Reid Vapor Pressure (RVP) values were updated, but MOVES default data was used for the remaining parameters. Key assumptions include:

- 10.0 RVP used for summer months [Local data].
- 10% ethanol used throughout the year [MOVES defaults].

**I/M Program Parameters**

The inspection maintenance (I/M) program inputs to the MOVES model are based on previous and current programs within each county (all PA I/M programs are based on county boundaries). All analysis years include Pennsylvania's statewide I/M program. The default I/M program parameters included in

MOVES were examined for each county and necessary changes were made to the default parameters to match the actual local program.

The I/M program requirements vary by region (five regions) and include on-board diagnostics (OBD) technology that uses the vehicle's computer for model years 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
  [Includes tailpipe exhaust testing using ASM2015 or equipment for pre-1996 vehicles up to 25 years old]
- *Pittsburgh Region* - Allegheny, Beaver, Washington and Westmoreland Counties.
  [Includes tailpipe exhaust testing using PA 97 equipment for pre-1996 vehicles up to 25 years old]
- *South Central and Lehigh Valley Region* - Berks, Cumberland, Dauphin, Lancaster, Lebanon, Lehigh, Northampton and York Counties.
  [Gas cap and visual inspection only]
- *North Region* - Blair, Cambria, Centre, Erie, Lackawanna, Luzerne, Lycoming, and Mercer Counties.
  [Gas cap and visual inspection only]
- *Other 42 Counties* – Includes the remaining 42 counties not included above.
  [Visual inspection only]

**Other Vehicle Technology and Control Strategy Data**

Current federal vehicle emissions control and fuel programs are incorporated into the MOVES software. These include the National Program standards covering vehicles MY2012-MY2016. Modifications of default emission rates are required to reflect the early implementation of the National Low Emission Vehicle (NLEV) Program in Pennsylvania. To reflect these impacts, EPA has released instructions and input files that can be used to model these impacts.

The Pennsylvania Clean Vehicles (PCV) Program, adopted in 1998, incorporated the California Low Emission Vehicle Regulations (CA LEV II) by reference. The PCV Program allowed automakers to comply with the NLEV program as an alternative to this Pennsylvania program until MY2006. Beginning with MY2008, all "new" passenger cars and light-duty trucks with a gross vehicle weight rating (GVWR) of 8,500 pounds or less sold/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 both work with the public, including manufacturers, vehicle dealers and consumers, to ensure that vehicles sold and purchased in Pennsylvania or vehicles purchased from other states by Pennsylvania residents comply with the requirements of the PCV Program, in order to be titled in Pennsylvania. Additionally, PennDOT ensures that paperwork for title and registration includes proof of CARB- or 50-state emission certification or that the vehicle owner qualifies for an exemption to the requirements, as listed on PennDOT's MV-9 form and in the PCV Program regulation. When necessary, information from

PennDOT's title and registration process may be used to audit vehicle title transactions to determine program compliance.

The impacts of this program are modeled for all analysis years beyond 2008 using the same instructions and tools downloaded for the early NLEV analysis. EPA provided input files to reflect state programs similar to the CAL LEV II program. Modifications to those files were made to reflect a 2008 program start date for Pennsylvania.

## Analysis Process Details

The previous sections have summarized the input data used for computing speeds and emission rates for this conformity analysis. This section explains how PPSUITE and MOVES use that input data to produce emission estimates. **Exhibit 6** provides a more detailed overview of the PPSUITE analysis procedure using the available traffic data information described in the previous sections.

**VMT Preparation**

Producing an emissions inventory with PPSUITE requires a process of disaggregation and aggregation. Data is available and used on a very detailed scale – individual roadway segments for each of the 24 hours of the day. This data needs to be processed individually to determine the distribution of vehicle hours of travel (VHT) by speed and then aggregated by vehicle class to determine the input VMT to the MOVES emission model. Key steps in the preparation of VMT include:

- *Assemble VMT* - The RMS database contains the roadway segments, distances and travel volumes needed to estimate VMT. PPSUITE processes each segment by simply multiplying the assigned travel volume by the distance to obtain VMT.
- *Apply Seasonal Adjustments* – PPSUITE adjusts the traffic volumes to the appropriate analysis season. These traffic volumes are assembled by PPSUITE and extrapolated over the course of a year to produce the annual VMT file input to MOVES.
- *Disaggregate to Hours* - After seasonal adjustments are applied, the traffic volumes are distributed to each hour of the day. This allows for more accurate speed calculations (effects of congested hours) and allows PPSUITE to prepare the hourly VMT and speeds for input to MOVES.
- *Peak Spreading* - After distributing the daily volumes to each hour of the day, PPSUITE identifies hours that are unreasonably congested. For those hours, PPSUITE then spreads a portion of the volume to other hours within the same peak period, thereby approximating the "peak spreading" that normally occurs in such over-capacity conditions. This process also helps prevent hours with unreasonably congested speeds from disproportionately impacting emission calculations.
- *Disaggregation to Vehicle Types* - EPA requires VMT estimates to be prepared by the six HPMS vehicle groups, reflecting specific local characteristics. As described in the previous section, the hourly volumes are disaggregated into thirteen MOVES source types based on data from PennDOT and NTD, in combination with MOVES defaults. The thirteen MOVES source types are then recombined into six HPMS vehicle classes.

- *Apply HPMS VMT Adjustments* - Volumes must also be adjusted to account for differences with the HPMS VMT totals, as described in previous sections. VMT adjustment factors are provided as inputs to PPSUITE and are applied to each of the roadway segment volumes. VMT adjustment factors are also applied to runs for future years.
- *Apply VMT Growth Adjustments* - Volumes must also be adjusted to estimate future year VMT. VMT growth factors are provided as inputs to PPSUITE, and are applied to each of the roadway segment volumes. The VMT growth factors were developed from the PennDOT BPR Growth Rate forecasting system.

**Speed Estimation**

Emissions for many pollutants (including VOC and $NO_X$) vary significantly with travel speed. VOC emissions generally decrease as speed increases, while $NO_X$ emissions decrease at low speeds and increases at higher speeds, as illustrated in **Exhibit 7**. Because emissions are so sensitive to speed changes, EPA recommends special attention be given to developing reasonable and consistent speed estimates. EPA also recommends that VMT be disaggregated into subsets that have roughly equal speeds, with separate emission factors for each subset. At a minimum, speeds should be estimated separately by road type.

The computational framework used for this analysis meets and exceeds the recommendation above relating to speed estimates. Speeds are individually calculated for each roadway segment and hour. Rather than accumulating the roadway segments into a particular road type and calculating an average speed, each individual link hourly speed is represented in the MOVES vehicle hours of travel (VHT) by a speed bin file. This MOVES input file allows the specification of a distribution of hourly speeds. For example, if 5% of a county's arterial VHT operates at 5 mph during the AM peak hour and the remaining 95% operates at 65 mph, this can be represented in the MOVES speed input file. For the roadway vehicle emissions calculations, speed distributions are input to MOVES by road type and source type for each hour of the day.

To calculate speeds, PPSUITE first obtains initial capacities (i.e., how much volume the roadway can serve before heavy congestion) and free-flow speeds (speeds assuming no congestion) from a speed/capacity lookup table. As described previously, this data contains default roadway information indexed by the area and facility type codes. For areas with known characteristics, values can be directly coded to the database and the speed/capacity default values can be overridden. For most areas where known information is unavailable, the speed/capacity lookup tables provide valuable default information regarding speeds, capacities, signal characteristics, and other capacity adjustment information used for calculating congested delays and speeds. The result of this process is an estimated average travel time for each hour of the day for each highway segment. The average travel time multiplied by traffic volume produces vehicle hours of travel (VHT).

### EXHIBIT 6: PPSUITE SPEED/EMISSION ESTIMATION PROCEDURE

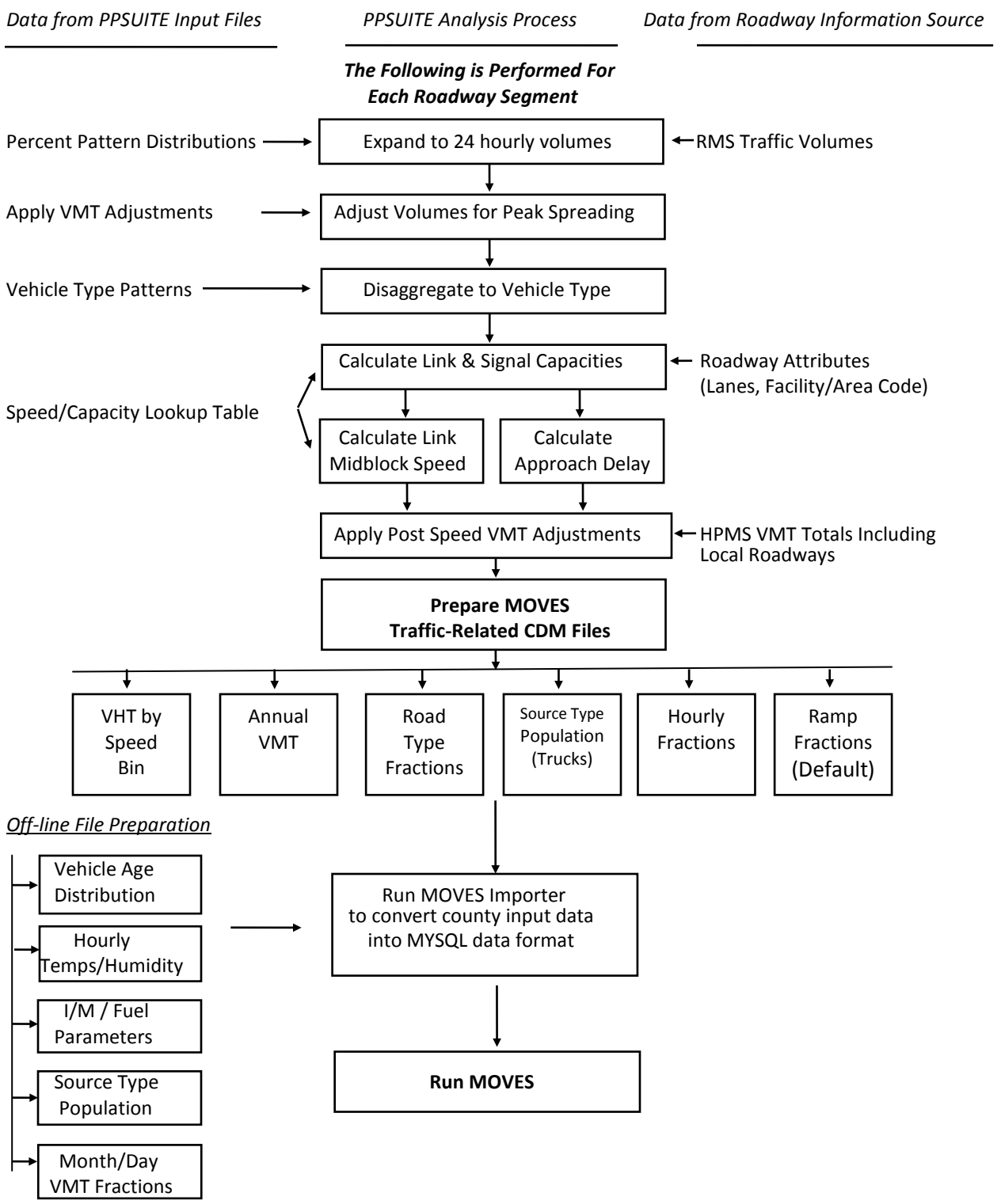
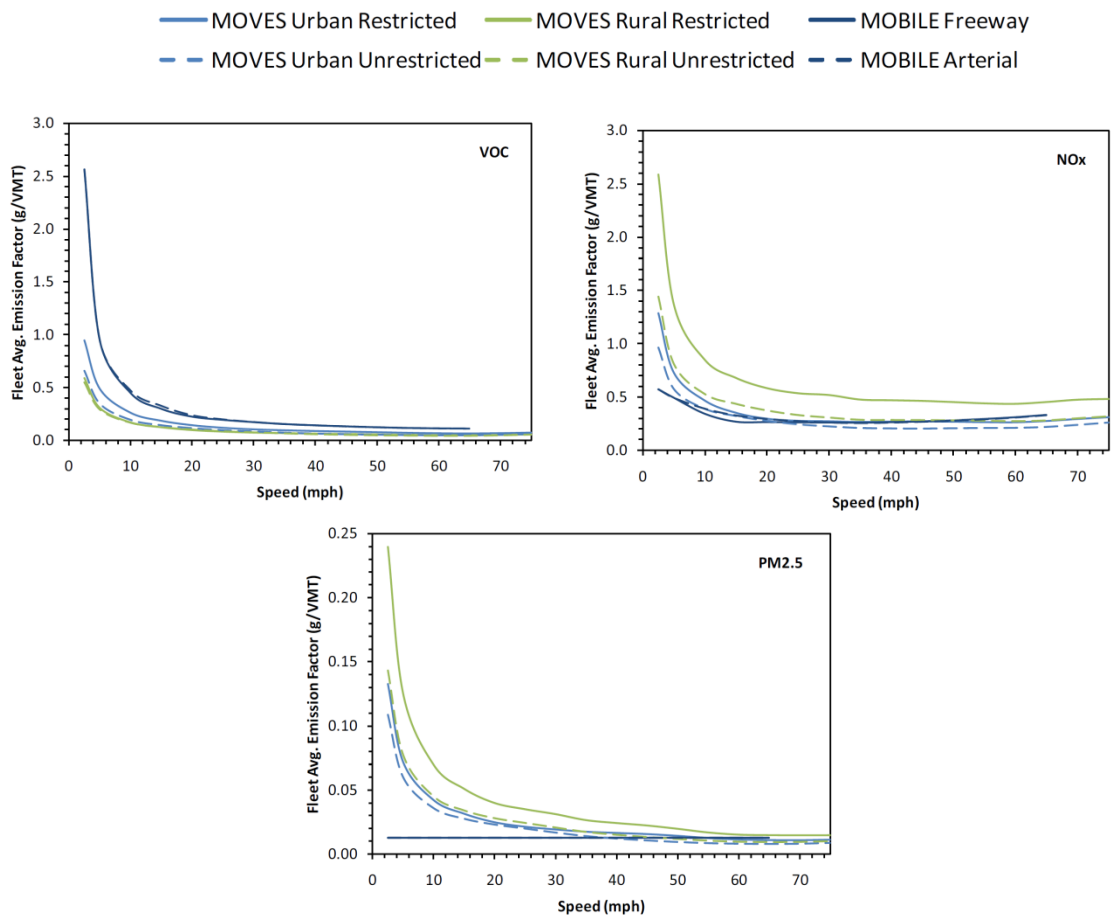


**EXHIBIT 7: EMISSION FACTOR VS. SPEED VARIANCES (VOC, NOX, AND $PM_{2.5}$)**




*Source: Figure 3 from Implications of the MOVES2010 Model on Mobile Source Emission Estimates, Air & Waste Management Association, July 2010.*

**Developing the MOVES Traffic Input Files**

The PPSUITE software is responsible for producing the following MOVES input files during any analysis run:

- VMT by HPMS vehicle class.
- VHT by speed bin.
- Road type distributions.
- Hourly VMT fractions.
- Ramp fractions.

These files are text formatted files with a *.csv extension. The files are provided as inputs within the MOVES County Data Manager (CDM) and are described below:

- *VMT Input File*: VMT is the primary traffic input affecting emission results. The roadway segment distances and traffic volumes are used to prepare estimates of VMT. PPSUITE performs these calculations and outputs the MOVES annual VMT input file to the County Data Manager (CDM). The annual VMT is computed by multiplying the RMS adjusted VMT by 365 days (366 days in a leap year).
- *VHT by Speed Bin File*: As described in the previous section, the PPSUITE software prepares the MOVES VHT by speed bin file, which summarizes the distribution of speeds across all links into each of the 16 MOVES speed bins for each hour of the day by road type. This robust process is consistent with the methods and recommendations provided in EPA's technical guidance for the MOVES2014 model (http://www.epa.gov/otaq/models/moves/) and ensures that MOVES emission rates are used to the fullest extent.
- *Road Type Distributions*: Within MOVES, typical drive cycles and associated operating conditions vary by roadway type. MOVES defines five different roadway types as follows:

  1 Off-Network.
  2 Rural Restricted Access.
  3 Rural Unrestricted Access.
  4 Urban Restricted Access.
  5 Urban Unrestricted Access.

  For this analysis, the MOVES road type distribution file is automatically generated by PPSUITE using defined equivalencies. The off-network road type includes emissions from vehicle starts, extended idling, and evaporative emissions. Off-network activity in MOVES is primarily determined by the Source Type Population input.
- *Ramp Fractions*: Since ramps are not directly represented within the RMS database, the assumption is that 8% of total Freeway VHT is Ramp VHT, consistent with EPA's technical guidance.

**MOVES Runs**

After computing speeds and aggregating VMT and VHT, PPSUITE prepares traffic-related inputs needed to run EPA's MOVES software. Additional required MOVES inputs are prepared externally from the processing software and include temperatures, I/M program parameters, fuel characteristics, vehicle fleet age distributions, and source type population. The MOVES county importer is run in batch mode. This program converts all data files into the MySQL format used by the MOVES model. At that point, a MOVES run specification file (*.mrs) is created which specifies options and key data locations for the run. The MOVES run is then executed in batch mode. A summary of key MOVES run specification settings is shown in **Exhibit 8**. MOVES can be executed using either an inventory or rate-based approach. For this analysis, MOVES is applied using the *inventory-based* approach. Using this approach, actual VMT and population are provided as inputs to the model; MOVES is responsible for producing the total emissions for the region.

**EXHIBIT 8: MOVES RUN SPECIFICATION FILE PARAMETER SETTINGS**

| Parameter | Setting |
|---|---|
| **MOVES Version** | MOVES2014a |
| **MOVES Default Database Version** | MOVESDB20161117 |
| **Scale** | COUNTY |
| **Analysis Mode** | Inventory |
| **Time Span** | **July Weekday Runs:**<br>July month, Weekday, 24 hours |
| **Time Aggregation** | Hour |
| **Geographic Selection** | County [FIPS] |
| **Vehicle Selection** | All source types<br>Gasoline, Diesel, CNG, E85 |
| **Road Type** | All road types including off-network |
| **Pollutants and Processes** | All $PM_{2.5}$ categories, $NO_X$, VOC |
| **Database selection** | Early NLEV database<br>PA-Specific CAL LEV program database |
| **General Output** | Units:<br>Emission = grams; Distance = miles;<br>Time = hours; Energy = Million BTU |
| **Output Emissions** | Time = Hour, Emissions by Process ID, Source Type and Road Type |

## Conformity Analysis Results

A transportation conformity analysis of the current TIP and LRTP has been completed for Carbon County. The analyses were performed according to the requirements of the Federal transportation conformity rule at 40 CFR Part 93, Subpart A. The analyses utilized the methodologies, assumptions and data as presented in previous sections. Interagency consultation has been used to determine applicable emission models, analysis years and emission tests.

### Emission Tests

There are currently no approved SIP MVEBs for Carbon County under 2008 8-hour ozone NAAQS. However, an approved SIP revision has established MVEBs under the 1997 8-hour ozone NAAQS using MOVES. As required, the approved budgets are used for the ozone conformity test. The ozone conformity analysis has been conducted to evaluate emissions in comparison to the applicable ozone MVEBs summarized in **Exhibit 9**.

**EXHIBIT 9: 8-HOUR OZONE MOTOR VEHICLE EMISSION BUDGETS**

| County / Pollutant | 2009 Budget (tons/day) | 2018 Budget (tons/day) |
|---|---|---|
| VOC | 3.4372 | 2.263 |
| NOx | 6.8977 | 3.541 |

**Analysis Years**

Section 93.119(g) of the Federal Transportation Conformity Regulations requires that emissions analyses be conducted for specific analysis years as follows:

- The last year of the LRTP's forecast period.
- The attainment year of the standard if within timeframe of TIP and LRTP.
- An intermediate year or years such that if there are two years in which analysis is performed, the two analysis years are no more than ten years apart.

All analysis years were determined through the interagency consultation process. **Exhibit 10** provides the analysis years used for this conformity analysis.

**EXHIBIT 10: TRANSPORTATION CONFORMITY ANALYSIS YEARS**

| Analysis Year | Description |
|---|---|
| 2022 | Interim Year – *Last Year of TIP* |
| 2025 | Budget Year |
| 2035 | Interim Year |
| 2040 | Last Year of LRTP |

**Regionally Significant Highway Projects**

For the purposes of conformity analysis, highway networks are created for each analysis year. For the horizon years, regionally significant projects from the LRTP were coded onto the networks. Detailed assessments were only performed for those new projects which may have a significant effect on emissions in accordance with 40 CFR Parts 51 and 93. 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 and LRTP list, have been excluded from consideration since they are considered exempt under 40 CFR 93.126-127. A list of highway projects is shown in **Attachment A**.

**Analysis Results**

An emissions analysis has been completed for the 2008 8-hour ozone NAAQS. The results of the analysis are summarized in the tables below. Forecast years have been estimated using the procedures and assumptions provide in this conformity report. A detailed emission summary is also provided in **Attachment B**. Example MOVES importer (XML) and run specification (MRS) files are provided in **Attachment C**.

**Exhibit 11** summarizes the ozone emission results for a summer weekday in each analysis year. The analysis year emission results are compared to the emission budgets in **Exhibit 9** as follows:

- The 2017 analysis year result is compared to the 2009 budget.
- The 2018 analysis year result is compared to the 2018 budget.
- The 2020, 2025, 2035 and 2040 analysis year results are compared to the 2018 budget.

All years satisfy the conformity budget test for ozone since the analysis results are below the budgets established in the regional maintenance plan for the 1997 ozone NAAQS.

**EXHIBIT 11: OZONE EMISSION ANALYSIS RESULTS AND CONFORMITY TEST**
(Summer Weekday)

| Pollutant | *2018 BUDGET (tons/day)* | *2022 (tons/day)* | *2025 (tons/day)* | *2035 (tons/day)* | *2040 (tons/day)* |
|---|---|---|---|---|---|
| *VOC* | ***2.26*** | *1.01* | *0.81* | *0.52* | *0.49* |
| *$NO_X$* | ***3.54*** | *2.30* | *1.81* | *1.26* | *1.33* |
| Conformity Result | | **Pass** | **Pass** | **Pass** | **Pass** |

## Conformity Determination

**Financial Constraint**

The planning regulations, Sections 450.322(b)(11) and 450.324(e), require the transportation plan 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 NEPA MPO, in conjunction with PennDOT, FHWA and FTA, has developed an estimate of the cost to maintain and operate existing roads, bridges and transit systems in Carbon County and have compared the cost with the estimated revenues and maintenance needs of the new roads over the same period. The TIP and LRTP have been determined to be financially constrained.

**Public Participation**

The TIP and LRTP have undergone the public participation requirements as well as the comment and response requirements according to the procedures established in compliance with 23 CFR part 450, NEPA's Public Participation Plan, and Pennsylvania's Conformity SIP. The draft document was made available for a 30-day public review and comment period beginning on June 15, 2018, which included a public meeting on July 17, 2018.

**Conformity Statement**

The conformity rule requires that the TIP and LRTP conform to the applicable SIP(s) and be adopted by the MPO/RPO before any federal agency may approve, accept, or fund projects. Conformity is determined by applying criteria outlined in the transportation conformity regulations to the analysis.

The TIP and LRTP for the NEPA MPO area is found to conform to the applicable air quality SIP(s) or EPA conformity requirements. This finding of conformity positively reflects on the efforts of the NEPA MPO and its partners in meeting the regional air quality goals, while maintaining and building an effective transportation system.

# Resources

**MOVES Model**

Modeling Page within EPA's Office of Mobile Sources Website contains a downloadable model, MOVES users guide and other information. See (http://www.epa.gov/omswww/models.htm)

*Policy Guidance on the Use of MOVES2014 for State Implementation Plan Development, Transportation Conformity, and Other Purposes*, US EPA Office of Air and Radiation, EPA-420-B-14-008, July 2014.

*MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity.* US EPA Office of Air and Radiation, and Office of Transportation and Air Quality, EPA-420-B-15-093, November 2015.

*MOVES2014a User Guide, US EPA Office of Transportation and Air Quality, EPA-420-B-15-095, November 2015.*

**Traffic Engineering**

*Highway Capacity Manual, fifth edition (HCM2010),* Transportation Research Board, presents current knowledge and techniques for analyzing the transportation system.

*Traffic Data Collection and Factor Development Report, 2008 Data,* Pennsylvania Department of Transportation, Bureau of Planning and Research.

## Highway Vehicle Emissions Analysis Glossary

**AADT:** Average Annual Daily Traffic, average of ALL days.

**CAA:** Clean Air Act as amended.

**CARB:** California Air Resources Board.

**CFR**: Code of Federal Regulations.

**County Data Manager (CDM):** User interface developed to simplify importing specific local data for a single county or a user-defined custom domain without requiring direct interaction with the underlying MySQL database in the MOVES emission model.

**DEP:** Department of Environmental Protection.

**Emission rate or factor:** Expresses the amount of pollution emitted per unit of activity. For highway vehicles, this is usually expressed in grams of pollutant emitted per mile driven.

**EPA:** Environmental Protection Agency.

**FC:** Functional code. Applied to road segments to identify their type (freeway, local, etc.).

**FHWA:** Federal Highway Administration.

**FR:** Federal Register.

**FTA:** Federal Transit Administration.

**Growth factor:** Factor used to convert volumes to future years.

**HPMS:** Highway Performance Monitoring System.

**I/M:** Vehicle emissions inspection/maintenance programs are required in certain areas of the country. The programs ensure that vehicle emission controls are in good working order throughout the life of the vehicle. The programs require vehicles to be tested for emissions. Most vehicles that do not pass must be repaired.

**LRTP:** Long Range Transportation Plan

**MOVES:** Motor Vehicle Emission Simulator. The latest model EPA has developed to estimate emissions from highway vehicles.

**MVEB:** motor vehicle emissions budget.

**NAAQS:** National Ambient Air Quality Standard.

**Pattern data:** Extrapolations of traffic patterns (such as how traffic volume on road segment types varies by time of day, or what kinds of vehicles tend to use a road segment type) from segments with observed data to similar segments.

**PPSUITE:** Post-Processor for Air Quality. A set of programs that estimate speeds and prepares MOVES inputs and processes MOVES outputs.

**Road Type:** Functional code, applied in data management to road segments to identify their type (rural/urban highways, rural/urban arterials, etc.).

**RMS:** Roadway Management System.

**SIP:** State Implementation Plan.

**Source Type:** One of thirteen vehicle types used in MOVES modeling.

**VHT:** Vehicle hours traveled.

**VMT:** Vehicle miles traveled. In modeling terms, it is the simulated traffic volumes multiplied by link length.

**VOC:** volatile organic compound emissions.

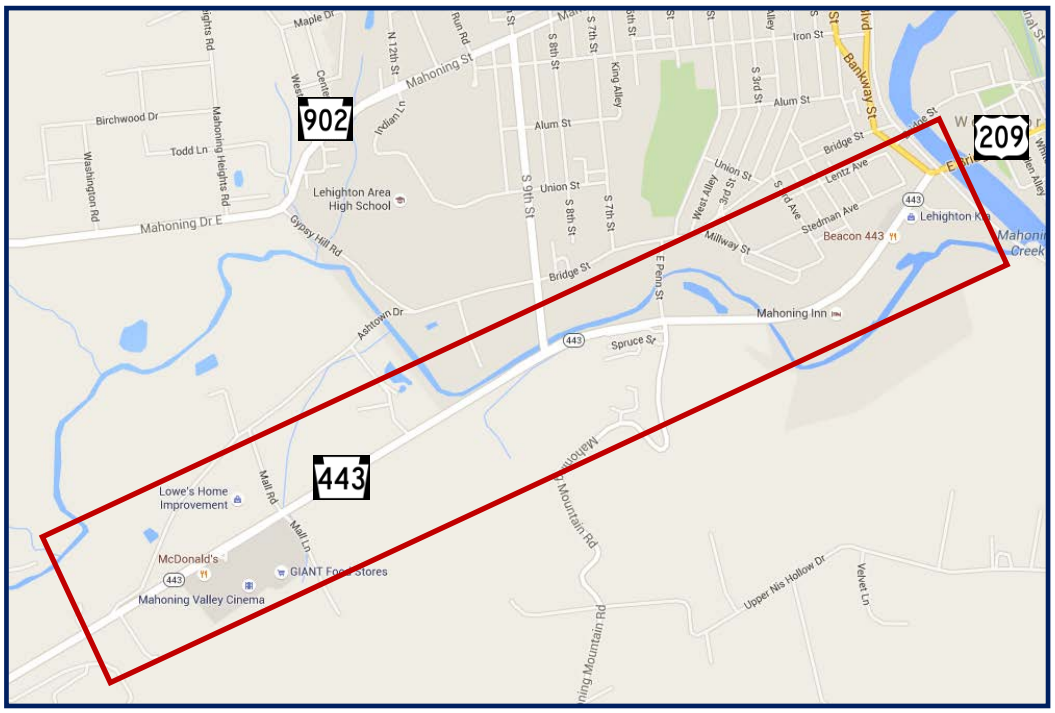
# ATTACHMENT A

## Project List

**The following TIP/LRTP air quality significant highway project is included in this analysis.**

**PA Route 443 Improvements**: The State Route 443 (Blakeslee Boulevard Drive) corridor will be improved from Carbon Plaza Mall to Thomas J. McCall Memorial Bridge, Borough of Lehighton and Mahoning Townships. PA 443 functions as a minor arterial through the center of the region. It is the region's most prominent and heavily traveled east-west roadway, connecting Lehighton Borough with much of the area's commercial activity.

The proposed project involves widening the roadway and installing a center turn lane along State Route 443, from Ashtown Drive to East Bridge Street (State Route 209) at the McCall Memorial Bridge. The proposed center turn lane along SR 443 is approximately 9,000 linear feet, which is 80% of the length of the project. In addition, left-turn lanes will be added at the Mall Road/Mall Lane intersection and at the East Penn St./Mahoning Mountain Road intersection, to improve traffic flow and reduce crashes. A right-turn lane will be added at the realigned intersection with State Route 902. The completion year is 2022. The following map depicts the project limits.




**Penn Turnpike Exit 87 / SR 903 Interchange**: This project was completed and opened for traffic on June 30, 2015. It is included into analysis as committed to imitate changes in traffic operations in Carbon County.

# ATTACHMENT B

## Detailed Emission Results

## Detailed Emission Results for Ozone Analysis

### Carbon County Ozone Daily Emission Summary

***2022 FFY19 Conformity (By Road Type)***

| County | Road Type | Summer Daily VMT | Speed (mph) | Emissions (Tons/Day) | |
|---|---|---|---|---|---|
| | | | | VOC | NOx |
| Carbon | Off-Network | N/A | N/A | 0.7 | 0.73 |
| | Rural Restricted | 1,258,267 | 61.2 | 0.1 | 0.98 |
| | Rural UnRestricted | 805,924 | 37.8 | 0.1 | 0.31 |
| | Urban Restricted | 213,716 | 59.8 | 0.0 | 0.11 |
| | Urban UnRestricted | 415,526 | 30.0 | 0.0 | 0.16 |
| | *Subtotal* | *2,693,433* | | *1.01* | *2.30* |
| Off-Model Project Emission Benefits | | | | 0.00 | 0.00 |
| **Region Total** | | **2,693,433** | | **1.01** | **2.30** |
| | | | **(Kg/Day)** | **913** | **2,084** |

## Carbon County Ozone Daily Emission Summary

***2022 FFY19 Conformity (By Source Type)***

| County | Source Type | Summer Daily VMT | Emissions (Tons/Day) | |
|---|---|---|---|---|
| | | | VOC | NOx |
| Carbon | Motorcycle | 15,954 | 0.0 | 0.01 |
| | Passenger Car | 1,255,729 | 0.2 | 0.18 |
| | Passenger Truck | 818,941 | 0.4 | 0.52 |
| | Light Commercial Truck | 207,549 | 0.1 | 0.14 |
| | Intercity Bus | 599 | 0.0 | 0.00 |
| | Transit Bus | 4,166 | 0.0 | 0.02 |
| | School Bus | 1,302 | 0.0 | 0.00 |
| | Refuse Truck | 6,584 | 0.0 | 0.02 |
| | Single Unit Short-haul Truck | 136,753 | 0.0 | 0.17 |
| | Single Unit Long-haul Truck | 7,497 | 0.0 | 0.01 |
| | Motor Home | 5,213 | 0.0 | 0.01 |
| | Combination Short-haul Truck | 52,787 | 0.0 | 0.13 |
| | Combination Long-haul Truck | 180,359 | 0.1 | 1.09 |
| | *Subtotal* | *2,693,433* | *1.01* | *2.30* |
| Off-Model Project Emission Benefits | | | 0.00 | 0.00 |
| **Region Total** | | **2,693,433 (Kg/Day)** | **1.01 913** | **2.30 2,084** |

## Carbon County Ozone Daily Emission Summary

***2022 FFY19 Conformity (By Emission Process)***

| County | Emission Process | Emissions (Tons/Day) | |
|---|---|---|---|
| | | VOC | NOx |
| Carbon | Running Exhaust | 0.18 | 1.56 |
| | Start Exhaust | 0.37 | 0.30 |
| | Brakewear | 0.00 | 0.00 |
| | Tirewear | 0.00 | 0.00 |
| | Evap Permeation | 0.06 | 0.00 |
| | Evap Fuel Vapor Venting | 0.16 | 0.00 |
| | Evap Fuel Leaks | 0.13 | 0.00 |
| | Crankcase Running Exhaust | 0.00 | 0.00 |
| | Crankcase Start Exhaust | 0.00 | 0.00 |
| | Crankcase Extended Idle Exhaust | 0.00 | 0.00 |
| | Extended Idle Exhaust | 0.09 | 0.42 |
| | Auxiliary Power Exhaust | 0.00 | 0.01 |
| | *Subtotal* | *1.01* | *2.30* |
| Off-Model Project Emission Benefits | | 0.00 | 0.00 |
| **Region Total** | | **1.01** | **2.30** |
| | **(Kg/Day)** | **913** | **2,084** |

## Carbon County Ozone Daily Emission Summary

***2025 FFY19 Conformity (By Road Type)***

| County | Road Type | Summer Daily VMT | Speed (mph) | Emissions (Tons/Day) | |
|---|---|---|---|---|---|
| | | | | VOC | NOx |
| Carbon | Off-Network | N/A | N/A | 0.6 | 0.67 |
| | Rural Restricted | 1,314,528 | 61.2 | 0.1 | 0.73 |
| | Rural UnRestricted | 834,226 | 38.0 | 0.1 | 0.22 |
| | Urban Restricted | 214,600 | 59.8 | 0.0 | 0.08 |
| | Urban UnRestricted | 413,747 | 30.4 | 0.0 | 0.11 |
| | *Subtotal* | *2,777,101* | | *0.81* | *1.81* |
| Off-Model Project Emission Benefits | | | | 0.00 | 0.00 |
| **Region Total** | | **2,777,101** | | **0.81** | **1.81** |
| | | | **(Kg/Day)** | **736** | **1,639** |

## Carbon County Ozone Daily Emission Summary

***2025 FFY19 Conformity (By Source Type)***

| County | Source Type | Summer Daily VMT | Emissions (Tons/Day) | |
|---|---|---|---|---|
| | | | VOC | NOx |
| Carbon | Motorcycle | 16,432 | 0.0 | 0.01 |
| | Passenger Car | 1,293,367 | 0.2 | 0.14 |
| | Passenger Truck | 843,477 | 0.3 | 0.34 |
| | Light Commercial Truck | 213,784 | 0.1 | 0.09 |
| | Intercity Bus | 610 | 0.0 | 0.00 |
| | Transit Bus | 4,337 | 0.0 | 0.01 |
| | School Bus | 1,346 | 0.0 | 0.00 |
| | Refuse Truck | 6,874 | 0.0 | 0.01 |
| | Single Unit Short-haul Truck | 141,803 | 0.0 | 0.13 |
| | Single Unit Long-haul Truck | 7,801 | 0.0 | 0.01 |
| | Motor Home | 5,405 | 0.0 | 0.01 |
| | Combination Short-haul Truck | 54,823 | 0.0 | 0.10 |
| | Combination Long-haul Truck | 187,041 | 0.1 | 0.94 |
| | *Subtotal* | *2,777,101* | *0.81* | *1.81* |
| Off-Model Project Emission Benefits | | | 0.00 | 0.00 |
| **Region Total** | | **2,777,101** | **0.81** | **1.81** |
| | | **(Kg/Day)** | **736** | **1,639** |

## Carbon County Ozone Daily Emission Summary

***2025 FFY19 Conformity (By Emission Process)***

| County | Emission Process | Emissions (Tons/Day) | |
|---|---|---|---|
| | | VOC | NOx |
| Carbon | Running Exhaust | 0.13 | 1.14 |
| | Start Exhaust | 0.28 | 0.23 |
| | Brakewear | 0.00 | 0.00 |
| | Tirewear | 0.00 | 0.00 |
| | Evap Permeation | 0.05 | 0.00 |
| | Evap Fuel Vapor Venting | 0.13 | 0.00 |
| | Evap Fuel Leaks | 0.13 | 0.00 |
| | Crankcase Running Exhaust | 0.00 | 0.00 |
| | Crankcase Start Exhaust | 0.00 | 0.00 |
| | Crankcase Extended Idle Exhaust | 0.00 | 0.00 |
| | Extended Idle Exhaust | 0.08 | 0.43 |
| | Auxiliary Power Exhaust | 0.00 | 0.01 |
| | *Subtotal* | *0.81* | *1.81* |
| Off-Model Project Emission Benefits | | 0.00 | 0.00 |
| **Region Total** | | **0.81** | **1.81** |
| | **(Kg/Day)** | **736** | **1,639** |

## Carbon County Ozone Daily Emission Summary

***2035 FFY19 Conformity (By Road Type)***

| County | Road Type | Summer Daily VMT | Speed (mph) | Emissions (Tons/Day) | |
|---|---|---|---|---|---|
| | | | | VOC | NOx |
| Carbon | Off-Network | N/A | N/A | 0.4 | 0.58 |
| | Rural Restricted | 1,752,906 | 60.9 | 0.1 | 0.48 |
| | Rural UnRestricted | 925,825 | 37.7 | 0.0 | 0.10 |
| | Urban Restricted | 258,059 | 59.8 | 0.0 | 0.05 |
| | Urban UnRestricted | 458,430 | 29.9 | 0.0 | 0.05 |
| | *Subtotal* | *3,395,219* | | *0.52* | *1.26* |
| Off-Model Project Emission Benefits | | | | 0.00 | 0.00 |
| **Region Total** | | **3,395,219** | | **0.52** | **1.26** |
| | | | **(Kg/Day)** | **470** | **1,141** |

## Carbon County Ozone Daily Emission Summary

***2035 FFY19 Conformity (By Source Type)***

| County | Source Type | Summer Daily VMT | Emissions (Tons/Day) | |
|---|---|---|---|---|
| | | | VOC | NOx |
| Carbon | Motorcycle | 19,910 | 0.0 | 0.01 |
| | Passenger Car | 1,567,055 | 0.1 | 0.08 |
| | Passenger Truck | 1,022,009 | 0.2 | 0.13 |
| | Light Commercial Truck | 259,025 | 0.0 | 0.03 |
| | Intercity Bus | 978 | 0.0 | 0.00 |
| | Transit Bus | 5,446 | 0.0 | 0.01 |
| | School Bus | 1,635 | 0.0 | 0.00 |
| | Refuse Truck | 8,800 | 0.0 | 0.01 |
| | Single Unit Short-haul Truck | 182,401 | 0.0 | 0.11 |
| | Single Unit Long-haul Truck | 10,003 | 0.0 | 0.01 |
| | Motor Home | 6,953 | 0.0 | 0.00 |
| | Combination Short-haul Truck | 70,451 | 0.0 | 0.08 |
| | Combination Long-haul Truck | 240,551 | 0.1 | 0.78 |
| | *Subtotal* | *3,395,219* | *0.52* | *1.26* |
| Off-Model Project Emission Benefits | | | 0.00 | 0.00 |
| **Region Total** | | **3,395,219** | **0.52** | **1.26** |
| | | **(Kg/Day)** | **470** | **1,141** |

## Carbon County Ozone Daily Emission Summary

***2035 FFY19 Conformity (By Emission Process)***

| County | Emission Process | Emissions (Tons/Day) | |
|---|---|---|---|
| | | VOC | NOx |
| Carbon | Running Exhaust | 0.07 | 0.67 |
| | Start Exhaust | 0.12 | 0.10 |
| | Brakewear | 0.00 | 0.00 |
| | Tirewear | 0.00 | 0.00 |
| | Evap Permeation | 0.02 | 0.00 |
| | Evap Fuel Vapor Venting | 0.10 | 0.00 |
| | Evap Fuel Leaks | 0.14 | 0.00 |
| | Crankcase Running Exhaust | 0.00 | 0.00 |
| | Crankcase Start Exhaust | 0.00 | 0.00 |
| | Crankcase Extended Idle Exhaust | 0.00 | 0.00 |
| | Extended Idle Exhaust | 0.07 | 0.46 |
| | Auxiliary Power Exhaust | 0.01 | 0.02 |
| | *Subtotal* | *0.52* | *1.26* |
| Off-Model Project Emission Benefits | | 0.00 | 0.00 |
| **Region Total** | | **0.52** | **1.26** |
| | **(Kg/Day)** | **470** | **1,141** |

## Carbon County Ozone Daily Emission Summary

***2040 FFY19 Conformity (By Road Type)***

| County | Road Type | Summer Daily VMT | Speed (mph) | Emissions (Tons/Day) | |
|---|---|---|---|---|---|
| | | | | VOC | NOx |
| Carbon | Off-Network | N/A | N/A | 0.4 | 0.61 |
| | Rural Restricted | 2,109,958 | 60.2 | 0.1 | 0.53 |
| | Rural UnRestricted | 1,030,063 | 37.3 | 0.0 | 0.10 |
| | Urban Restricted | 293,554 | 59.7 | 0.0 | 0.05 |
| | Urban UnRestricted | 507,828 | 29.2 | 0.0 | 0.05 |
| | *Subtotal* | *3,941,403* | | *0.49* | *1.33* |
| Off-Model Project Emission Benefits | | | | 0.00 | 0.00 |
| **Region Total** | | **3,941,403** | | **0.49** | **1.33** |
| | | | **(Kg/Day)** | **443** | **1,205** |

## Carbon County Ozone Daily Emission Summary

***2040 FFY19 Conformity (By Source Type)***

| County | Source Type | Summer Daily VMT | Emissions (Tons/Day) | |
|---|---|---|---|---|
| | | | VOC | NOx |
| Carbon | Motorcycle | 22,967 | 0.0 | 0.02 |
| | Passenger Car | 1,807,735 | 0.1 | 0.07 |
| | Passenger Truck | 1,178,972 | 0.2 | 0.10 |
| | Light Commercial Truck | 298,808 | 0.0 | 0.03 |
| | Intercity Bus | 1,286 | 0.0 | 0.00 |
| | Transit Bus | 6,450 | 0.0 | 0.01 |
| | School Bus | 1,935 | 0.0 | 0.00 |
| | Refuse Truck | 10,595 | 0.0 | 0.01 |
| | Single Unit Short-haul Truck | 218,924 | 0.0 | 0.13 |
| | Single Unit Long-haul Truck | 12,030 | 0.0 | 0.01 |
| | Motor Home | 8,343 | 0.0 | 0.01 |
| | Combination Short-haul Truck | 84,641 | 0.0 | 0.10 |
| | Combination Long-haul Truck | 288,716 | 0.1 | 0.85 |
| | *Subtotal* | *3,941,403* | *0.49* | *1.33* |
| Off-Model Project Emission Benefits | | | 0.00 | 0.00 |
| **Region Total** | | **3,941,403** | **0.49** | **1.33** |
| | | **(Kg/Day)** | **443** | **1,205** |

## Carbon County Ozone Daily Emission Summary

***2040 FFY19 Conformity (By Emission Process)***

| County | Emission Process | Emissions (Tons/Day) | |
|---|---|---|---|
| | | VOC | NOx |
| Carbon | Running Exhaust | 0.07 | 0.72 |
| | Start Exhaust | 0.09 | 0.09 |
| | Brakewear | 0.00 | 0.00 |
| | Tirewear | 0.00 | 0.00 |
| | Evap Permeation | 0.01 | 0.00 |
| | Evap Fuel Vapor Venting | 0.10 | 0.00 |
| | Evap Fuel Leaks | 0.14 | 0.00 |
| | Crankcase Running Exhaust | 0.00 | 0.00 |
| | Crankcase Start Exhaust | 0.00 | 0.00 |
| | Crankcase Extended Idle Exhaust | 0.00 | 0.00 |
| | Extended Idle Exhaust | 0.07 | 0.49 |
| | Auxiliary Power Exhaust | 0.01 | 0.03 |
| | *Subtotal* | *0.49* | *1.33* |
| Off-Model Project Emission Benefits | | 0.00 | 0.00 |
| **Region Total** | | **0.49** | **1.33** |
| | **(Kg/Day)** | **443** | **1,205** |

# ATTACHMENT C

## Sample MOVES Data Importer (XML) Input File
## and
## Run Specification (MRS) Input File

**(Sample for 2025 July Weekday)**

**MOVES County Data Manager Importer File – 2025 July Weekday Run (MOVESIMPORTER.XML)**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## MOVES Run Specification File – 2025 July Weekday Run (MOVESRUN.MRS)

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