Air Quality Conformity Analysis Report

Lancaster MPO 2025-2028 TIP and 2050 MTP

National Ambient Air Quality Standards (NAAQS) Addressed:

- The Lancaster, PA 2008 8-Hour Ozone Nonattainment Area
- The Lancaster, PA 2006 24-Hour $PM_{2.5}$ Maintenance Area

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The Lancaster County Planning Commission and
Pennsylvania Department of Transportation

for the
The Lancaster County Transportation Coordinating Committee

May 2024

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Overview

This report provides an analysis of the air quality implications of the Lancaster County Transportation Coordinating Committee (LCTCC) MPO 2025-2028 Transportation Improvement Program (TIP) and 2050 Metropolitan Transportation Plan (MTP). The analysis demonstrates transportation conformity under the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS) and the 2006 24-hour $PM_{2.5}$ NAAQS. The air quality conformity analysis reflects an assessment of the regionally significant, non-exempt transportation projects included in both the TIP and the MTP.

This document replaces the previously approved conformity demonstration of the TIP and MTP, and ensures that the findings meet all current criteria established by the U.S. Environmental Protection Agency (EPA) for the applicable NAAQS.

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 MTP 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, including the end year of the MTP. 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 the Environmental Protection Agency (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 that have been updated or added to the TIP and MTP.
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.

Lancaster County is designated as a nonattainment area under the 2008 8-hour ozone NAAQS and a maintenance area under the 2006 24-hour $PM_{2.5}$ NAAQS. The county is in attainment for all other current ozone and $PM_{2.5}$ 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.

Final Particulate Matter

Fine particulate matter ($PM_{2.5}$) can be emitted directly into the atmosphere (sources include exhaust and dust from brake and tire wear) or formed in the atmosphere by combinations of precursor pollutants (secondary formation). Sulfates and nitrates are two types of pollutants that contribute to secondary formation. Sulfate emissions are a result of power plant and industry emissions, while nitrate emissions result from automobiles, power plants, and other combustion sources. Scientific studies have shown a significant correlation between exposure to fine particulates and severe health issues such as heart disease, lung disease, and premature death.

The pollutants that could be analyzed in the conformity analysis are: [1] direct $PM_{2.5}$ emissions (tail pipe emissions, brake and tire wear), [2] re-entrained road dust, and [3] precursors nitrogen oxides (NO_X), volatile organic compounds (VOC), sulfur oxides (SO_X) and ammonia (NH_3). The EPA has ruled that until

the EPA or DEP find that other precursor pollutants are significant contributors, and a SIP revision is approved stating such findings, direct $PM_{2.5}$ emissions and NOx are the only pollutants that must be analyzed for transportation conformity (40 CFR 93.119(f)(8)–(10)).

1997 Annual $PM_{2.5}$ and 2006 24-hour $PM_{2.5}$ Standards

The EPA published the 1997 annual $PM_{2.5}$ NAAQS on July 18, 1997, (62 FR 38652), with an effective date of September 16, 1997. An area is in nonattainment of this standard if the 3-year average of the annual mean $PM_{2.5}$ concentrations (for designated monitoring sites within an area) exceed 15.0 micrograms per cubic meter ($\mu g/m^3$). Lancaster County was designated as a nonattainment area under the 1997 annual $PM_{2.5}$ NAAQS, effective April 5, 2005 (70 FR 944).

The EPA published the 2006 24-hour $PM_{2.5}$ NAAQS on October 17, 2006, (71 FR 61144), with an effective date of December 18, 2006. The rulemaking strengthened the 1997 24-hour standard of 65 $\mu g/m^3$ (62 FR 38652) to 35 $\mu g/m^3$ and retained the 1997 annual $PM_{2.5}$ NAAQS of 15 $\mu g/m^3$. An area is in nonattainment of the 2006 24-hour $PM_{2.5}$ NAAQS if the 98th percentile of the annual 24-hour concentrations, averaged over three years, is greater than 35 $\mu g/m^3$. Lancaster County was designated as a nonattainment area under the 2006 24-hour $PM_{2.5}$ NAAQS, effective December 14, 2009 (74 FR 58688).

A redesignation request and maintenance plan applicable to both the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS was approved by EPA and effective July 16, 2015 (80 FR 42050). The maintenance plan includes 2017 and 2025 $PM_{2.5}$ and NOx mobile vehicle emission budgets (MVEBs) for transportation conformity purposes. EPA took final action on the "*Fine Particulate Matter National Ambient Air Quality Standards: State Implementation Plan Requirements*" rule on August 24, 2016 (81 FR 58010 effective on October 24, 2016). In that rulemaking, EPA finalized the option that revokes the 1997 primary annual $PM_{2.5}$ NAAQS in areas that are in attainment or maintenance of that NAAQS. After revocation, areas no longer have to expend resources on CAA air quality planning and conformity determination requirements associated with the 1997 annual $PM_{2.5}$ NAAQS.

2012 Annual $PM_{2.5}$ Standard

The EPA published the 2012 annual $PM_{2.5}$ NAAQS on January 15, 2013, (78 FR 3086), with an effective date of March 18, 2013. The EPA revised the annual $PM_{2.5}$ NAAQS by strengthening the standard from 15 $\mu g/m^3$ to 12 $\mu g/m^3$. An area is in nonattainment of this standard if the 3-year average of the annual mean $PM_{2.5}$ concentrations for designated monitoring sites in an area is greater than 12.0 $\mu g/m^3$. On December 18, 2014, EPA issued final designations for the standard that were revised on April 7, 2015 (80 FR 18535). Lancaster County is designated in attainment of the standard.

2024 Annual $PM_{2.5}$ Standard

On February 7, 2024, EPA strengthened the annual $PM_{2.5}$ standard at 9.0 µg/m3 to provide increased public health protection, consistent with the available health science. The nonattainment areas have not been designated yet for this new standard.

Ozone

Ozone is formed by chemical reactions occurring under specific atmospheric conditions. Precursor pollutants that contribute to the formation of ozone include VOC and 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.

1997 and 2008 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, Lancaster 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.

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. Lancaster County was designated as a nonattainment area under the 2008 8-hour ozone NAAQS, effective July 20, 2012 (77 FR 30088). Effective June 3, 2016, EPA determined that Lancaster County has attained the 2008 ozone NAAQS by the applicable attainment date. This determination of attainment does not constitute a redesignation to attainment. Redesignations require states to meet a number of additional statutory criteria, including the EPA approval of a state plan demonstrating maintenance of the air quality standard for 10 years after redesignation.

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). On October 16, 2018 (83 FR 52163), EPA established designations for the 2015 8-hour ozone NAAQS. Lancaster County was designated in attainment of 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 are conducted quarterly and included the review of all input planning assumptions, methodologies and analysis years. A meeting was conducted on February 7, 2024 to review all planning assumptions and to discuss the template and content for transportation conformity analyses.

Analysis Methodology and Data

This transportation conformity analysis was conducted using EPA's MOVES model, which is the official model for estimating emissions from highway vehicles for SIP emission inventories and transportation conformity. MOVES3 has been used for this conformity determination and is (in addition to MOVES4) currently considered one of the latest approved model versions for SIP and transportation conformity purposes (86 FR 1106). After September 12, 2025, MOVES4 must be used for conformity determinations (88 FR 62567).

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 93.110. This analysis utilizes the best available available traffic, vehicle fleet and environmental data to estimate regional highway emissions. PennDOT updates many of the key planning assumptions on a triennial basis to support EPA's National Emissions Inventory (NEI) and FHWA's latest planning assumption requirements for transportation conformity. The PennDOT triennial data update is typically used to inform the planning assumptions for the future analysis years used for transportation conformity.

Due to the impacts that COVID has had on the vehicle fleet turnover, PennDOT, in coordination with the Pennsylvania Air Quality Workgroup, has determined that the estimates of the vehicle fleet age for the most recent available data (2020-2022) may not be reflective of future conditions or longer term trends. Thus, the vehicle age assumption relied on previous planning assumptions used for past conformity analyses.

All other data assumptions for the conformity analysis relied on the latest available planning assumptions or national/local defaults consistent with methods used for past conformity analyses and EPA's technical guidance. This includes information and characteristics related to fuels, inspection maintenance (I/M) program parameters, heavy-truck long duration idling, and environmental data (e.g. temperatures and humidity). 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 MOVES3 for State Implementation Plan Development, Transportation Conformity, General Conformity, and Other Purposes,* US EPA Office of Transportation and Air Quality, EPA-420-B-20-044, November 2020.
- *MOVES3 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity,* US EPA Office of Transportation and Air Quality, EPA-420-B-20-052, November 2020.

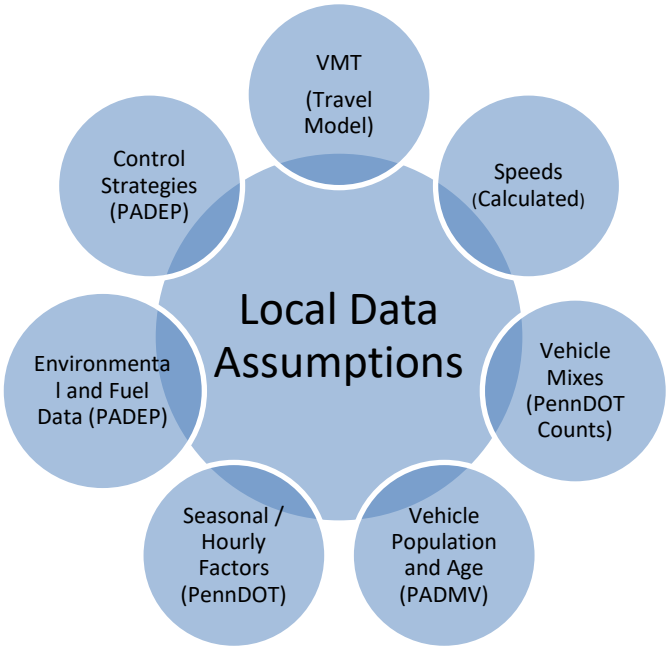
A mix of local and national default (internal to MOVES) data are used in the analysis. As illustrated in **Exhibit 2**, local data has been used for data items that have a significant impact on emissions, including: vehicle miles of travel (VMT), vehicle population, congested speeds, and vehicle type 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 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:

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.

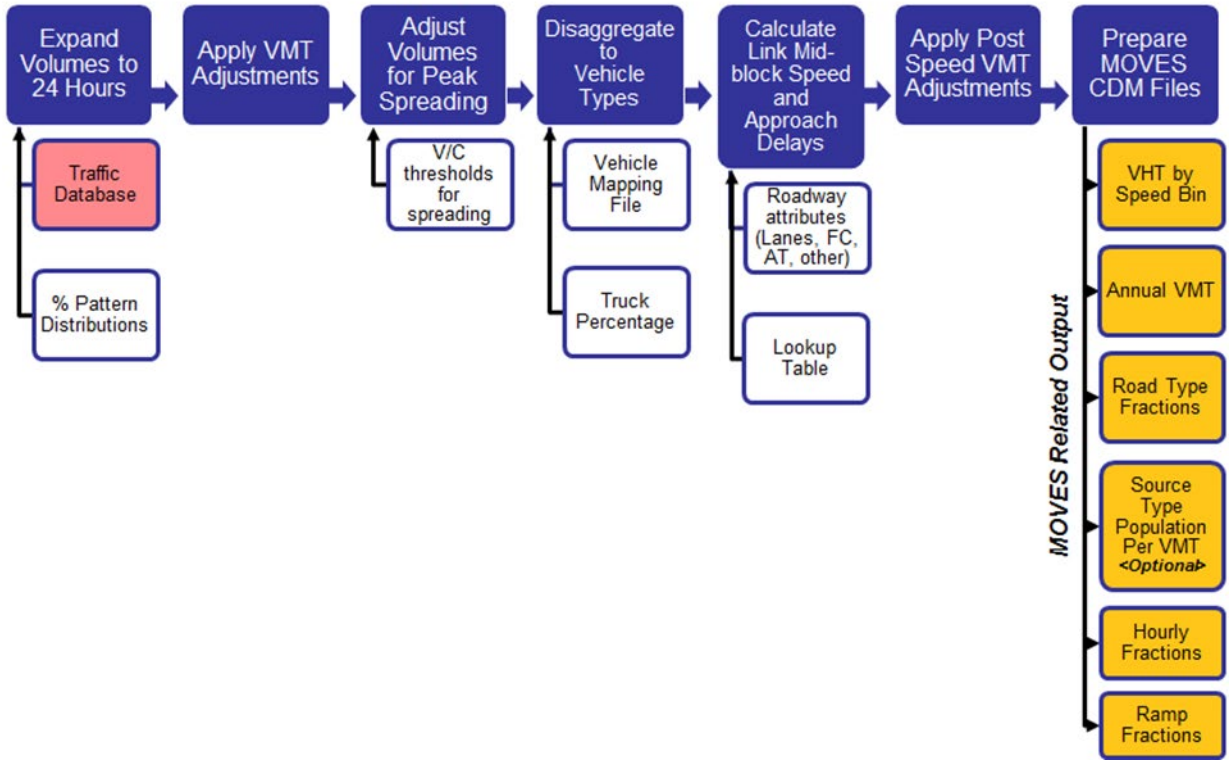
EXHIBIT 2: LOCAL DATA INPUTS USED FOR CONFORMITY RUNS



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 3** 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 SQL steps into the process. CENTRAL provides important quality control and assurance steps, including file naming and storage automation.

EXHIBIT 3: 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.

Travel Demand Model

The roadway data input to emissions calculations for this conformity analysis is based on information from the region's travel demand forecasting model. The travel demand model estimates roadway volumes based on input demographic forecasts and expected changes to the transportation roadway network.

The travel demand model follows the basic "four-step" travel demand forecasting process and utilizes the Cube Voyager (TP+) software platform. The model was recently updated in 2020 to include the Lancaster, Harrisburg, York, Franklin, Adams and Lebanon MPO areas in the south-central region. The network contains attributes such as distance, number of lanes, area type, facility type, free flow speed, capacity of the lane, and location of traffic signals. The model updates included a revalidation of the travel model to 2018-2019 traffic conditions. Using the projected traffic volume data from the model, conditions were evaluated for all applicable future analysis years. All significant air quality projects from the TIP and MTP 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, and 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 socioeconomic and land use data projections developed by Lancaster County Planning Commission. This data includes total population, households, and employment. **Exhibit 4** summarizes the socioeconomic data for the base year and horizon years of the MTP. Socioeconomic data for other analysis years were forecasted using interpolation.

EXHIBIT 4: SOCIOECONOMIC GROWTH ASSUMPTIONS TO THE TRAVEL MODEL

County	Year	Population	Household	Total Employment
Lancaster	2018	539,687	201,312	245,114
	2025	588,888	221,620	252,876
	2035	636,674	240,644	263,957
	2045	681,986	260,492	275,006
	2050	708,347	271,435	280,519

The travel model network and assigned traffic volumes are processed by PPSUITE to prepare the traffic inputs needed to run the MOVES emission model. The following information is extracted from the model for emission calculations:

- Lanes
- Roadway capacity
- Distance
- Daily traffic volume
- Type of area abutting the roadway (e.g. urban, suburban, rural, etc.)
- Type of roadway facility (e.g. interstate, arterial, collector, local, etc.)

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 regional travel model 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 were calculated as part of the model's validation process. These factors are used to adjust locally modeled 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 regional travel demand model.
- *Seasonal Factors*: The traffic volumes estimated from the regional travel demand model are adjusted to summer or average monthly conditions (as needed for annual processing), using seasonal adjustment factors prepared by PennDOT's Bureau of Planning and Research (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 five HPMS vehicle groups (note that passenger cars and light trucks are grouped for input to MOVES). **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	Other Buses	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 five 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 Roadway Mangement System (RMS) database.
- Hourly distributions for trucks and total traffic compiled by PennDOT's BPR.
- 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, intercit bus and motor home (including source types 11, 21, 31, 32, 41 and 54) was used as local data for MOVES inputs, while the rest of heavy-duty vehicles (including source types 42, 43, 51, 52, 53, 61, and 62) used the MOVES national default age distribution 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 MOVES3 default data assumptions have been reviewed and determined adequate to be used as inputs to the MOVES emissions modeling. Key assumptions include:

- 10.0 RVP used for summer months.
- 100% market share of 10% ethanol throughout the year for analysis years 2025, 2035, 2045 and 2050 (based on MOVES3 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 2021 I/M program performance.

In order to assure that emission controls are working properly, vehicle inspection and maintenance (I/M) programs have been adopted in some nonattainment areas. These programs have the added benefit of improving the fuel efficiency of vehicles. 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 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.
  [Includes gas cap and visual inspection only for 1975 through 1995 model years]
- *North Region* - Blair, Cambria, Centre, Erie, Lackawanna, Luzerne, Lycoming, and Mercer Counties.
  [Gas cap and visual inspection only – No OBD]
- *Other 42 Counties* – Includes the remaining 42 counties not included above.
  [Visual inspection only – No OBD]

The OBDII program is implemented in Philadelphia and Pittsburgh along with tailpipe (idle in Pittsburgh and idle and ASM in Philadelphia) and gas cap tests. Tests in other regions include:

- *Subject vehicles registered in the South Central and Lehigh Valley counties receive the visual, OBD and gas cap tests.*
- *Subject vehicles registered in the North region receive a gas cap test and visual inspection.*
- *Subject vehicles registered in the other 42 counties (67 total counties) receive a visual inspection as part of the annual safety inspection.*

Vehicle Technology Programs

Federal Programs

Current federal vehicle emissions control and fuel programs are incorporated into the MOVES3 software. The MOVES3 model includes the National Program standards covering light duty vehicles through model year 2026, heavy duty greenhouse gas standards for model year 2014-2018 vehicles, and the Tier 3 vehicle

standards. 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 NLEV input database was created for Pennsylvania per EPA's instructions and was used for this inventory.

MOVES3 also incorporates the following new federal emission standard rules:

- *Greenhouse Gas Emissions and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles – Phase 2 (HD GHG2) Rule*: MOVES3 accounts for the HD GHG2 rule published in 2016. The rule set stricter fuel economy standards for HD vehicles which reduce CO2 emissions, but also impact other pollutants through changes in glider sales, hoteling activity, vehicle mass and road load coefficients.

- *Safe Affordable Fuel Efficient (SAFE) Vehicles Rule*: MOVES3 also accounts for the March 2020 SAFE standards for light-duty vehicles. These standards were less stringent than the preceding fuel economy standards, and thus increased fuel consumption and CO2 emissions.

State Programs

The Pennsylvania Clean Vehicles (PCV) Program, adopted in 1998, incorporated the California Low Emission Vehicle Regulations (CA LEV) 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 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 regional travel demand model 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 five 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, in combination with MOVES defaults. The thirteen MOVES source types are then recombined into five 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 adjustments are provided as inputs to PPSUITE and are applied to each of the roadway segment volumes. VMT adjustments are also applied to runs for future years.

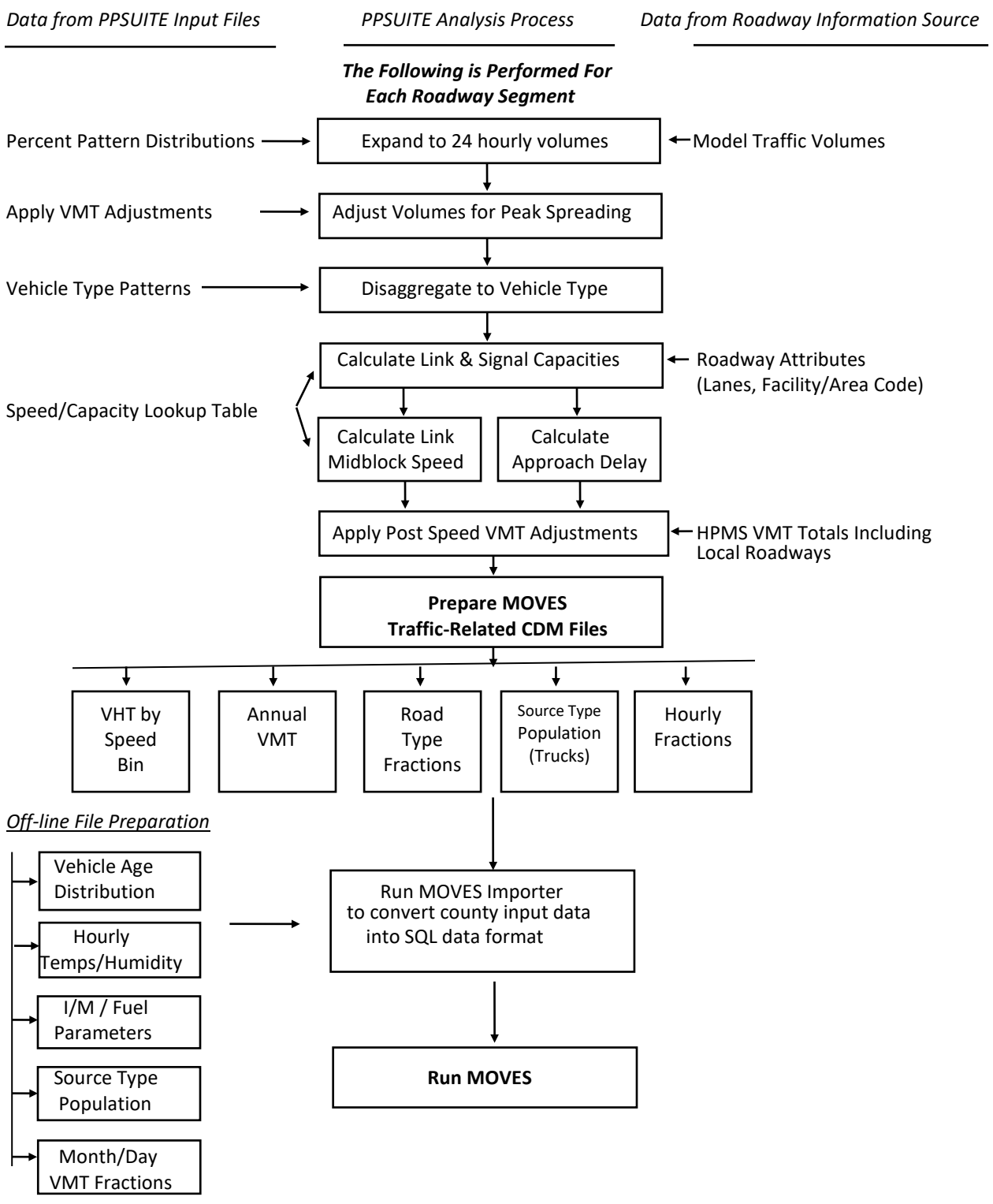
Speed Estimation

Emissions for many pollutants (including VOC and NOx) vary significantly with travel speed. VOC emissions generally decrease as speed increases, while NO_X emissions decrease at low speeds and increase at higher speeds. 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



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.

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 or travel model roadway 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.

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 SQL 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 7**. 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 7: MOVES RUN SPECIFICATION FILE PARAMETER SETTINGS

Parameter	Setting
MOVES Version	MOVES3
MOVES Default Database Version	MOVESDB20221007
Scale	COUNTY
Analysis Mode	Inventory
Time Span	**Annual Runs:** Single MOVES run with 12-month inputs including all days and hours **July Weekday Runs:** July month, Weekday, 24 hours
Time Aggregation	Hour
Geographic Selection	County [FIPS]
Vehicle Selection	All source types Gasoline, Diesel, CNG, E85, Electricity
Road Type	All road types including off-network
Pollutants and Processes	All $PM_{2.5}$ categories, VOC, NO_X
Database selection	Early NLEV database PA-Specific CA LEV database
General Output	Units: Emission = grams; Distance = miles; Time = hours; Energy = Million BTU
Output Emissions	Time = Month, Emissions by Process ID, Source Type and Road Type

Conformity Analysis Results

Transportation conformity analyses of the current TIP and MTP have been completed for Lancaster 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 the Lancaster MPO Area under 2008 8-hour Ozone NAAQS. However, the Lancaster MPO Area has an approved SIP revision establishing MVEBs under the 1997 8-hour ozone NAAQS using MOVES (78 FR 78263). 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 8**.

EXHIBIT 8: 8-HOUR OZONE MOTOR VEHICLE EMISSION BUDGETS

County / Pollutant	2009 Budget (tons/day)	2018 Budget (tons/day)
VOC	14.29	10.14
NOx	35.18	20.57

On July 16, 2015, EPA approved the Commonwealth of Pennsylvania's request to redesignate Lancaster County to attainment for the 1997 annual and 2006 24-hour $PM_{2.5}$ NAAQS (80 FR 42050). The MVEBs provided in the maintenance plans for the county are summarized in **Exhibit 9**.

EXHIBIT 9: ANNUAL $PM_{2.5}$ MOTOR VEHICLE EMISSION BUDGETS

County / Pollutant	2017 Budget (tons/year)	2025 Budget (tons/year)
$PM_{2.5}$	249	185
NOx	6,916	4,447

Analysis Years

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

- A near-term year, one to five years in the future.
- The last year of the MTP's forecast period.
- Attainment year of the standard if within timeframe of TIP and MTP.

- 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
2025	Budget Year
2035	Interim Year
2045	Interim Year
2050	Horizon Year of MTP

Components of the $PM_{2.5}$ Regional Emissions Analysis

$PM_{2.5}$ can be the result of either direct or indirect emissions. Direct transportation emissions can be the result of brake or tire-wear, particulates in exhaust emissions, or dust raised by on-road vehicles or construction equipment. Possible indirect transportation related emissions of $PM_{2.5}$ include: NH_3, NO_X, SO_X, and VOC.

The EPA has ruled that regional analysis of direct $PM_{2.5}$ emissions must include both exhaust and brake/tire-wear emissions. EPA's current regulations specify that road dust should be included in the regional analysis of direct $PM_{2.5}$ emissions only if the EPA or the state air agency have found it to be a significant contributor to the region's nonattainment. Neither the EPA nor the state air agency have determined road dust to be a significant contributor in the nonattainment area for this conformity determination.

Until a SIP revision is approved proving that NO_X is insignificant, EPA's current regulations state that indirect $PM_{2.5}$ emissions must be analyzed for NO_X. Conversely, VOC, SO_X and NH_3 must be analyzed only if the state(s) or the EPA determines one or more of these pollutants significant. Therefore, NO_X is the only indirect $PM_{2.5}$ component analyzed for the nonattainment area in this conformity determination.

Regionally Significant Highway Projects

For the purposes of conformity analysis, model highway networks are created for each analysis year. For the horizon years, regionally significant projects from the MTP 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 MTP 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 and the 2006 24-hour $PM_{2.5}$ 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**.

2008 Ozone NAAQS

Exhibit 11 summarizes the Lancaster County ozone emission results for a summer weekday in each analysis year. The analysis year emission results are compared to the 2018 emission budgets in **Exhibit 8**. All years satisfy the conformity budget test for ozone since the analysis results are below the budgets established in the regional maintenance plan.

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

Pollutant	*2018 BUDGET (tons/day)*	*2025 (tons/day)*	*2035 (tons/day)*	*2045 (tons/day)*	*2050 (tons/day)*
VOC	***10.14***	*3.64*	*2.60*	*2.17*	*2.18*
NO_X	***20.57***	*8.27*	*5.19*	*5.30*	*5.57*
Conformity Result		**Pass**	**Pass**	**Pass**	**Pass**

2006 24-hour $PM_{2.5}$ NAAQS

Exhibit 12 summarizes the Lancaster County annual $PM_{2.5}$ and NO_X emissions. Emissions are compared against the available 2025 SIP MVEBs listed in **Exhibit 9**. The results illustrate that projected emissions are below the applicable MVEBs.

Exhibit 12: ANNUAL $PM_{2.5}$ EMISSION ANALYSIS RESULTS AND CONFORMITY TEST
(Annual)

Pollutant	*2025 (tons/year)*	*2035 (tons/year)*	*2045 (tons/year)*	*2050 (tons/year)*
$PM_{2.5}$	*104*	*71*	*67*	*68*
NO_X	*2,805*	*1,795*	*1,835*	*1,930*
MVEB - $PM_{2.5}$	***185***	***185***	***185***	***185***
MVEB - NO_X	***4,447***	***4,447***	***4,447***	***4,447***
Conformity Result	**Pass**	**Pass**	**Pass**	**Pass**

Conformity Determination

Financial Constraint

The planning regulations, Sections 450.324(f)(11) and 450.326(j), requires the transportation plan and TIP 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 LCTCC 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 the Lancaster MPO Area and have compared the cost with the estimated revenues and maintenance needs of the new roads over the same period. The TIP and MTP have been determined to be financially constrained.

Public Participation

The TIP and MTP 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, LCTCC Public Participation Plan, and Pennsylvania's Conformity SIP. The draft document was made available for a 30-day public review and comment period starting May 13th, which included a public meeting.

Conformity Statement

The conformity rule requires that the TIP and MTP 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 MTP for the Lancaster MPO are 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 LCTCC 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 MOVES3 for State Implementation Plan Development, Transportation Conformity, General Conformity, and Other Purposes, US EPA Office of Transportation and Air Quality, EPA-420-B-20-044, November 2020.

MOVES3 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity, US EPA Office of Transportation and Air Quality, EPA-420-B-20-052, November 2020.

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, 2020 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 SQL 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.

MTP: Metropolitan 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

NTD: National Transit Database

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

TAZ: Traffic Analysis Zone System

TIP: Transportation Improvement Program

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 and MTP air quality significant highway projects are included in this analysis:

MPMS	Name	Description
2025-2028 Transportation Improvement Program		
97013	US 222/US 30 Interchange Improvements	This project consists of interchange improvements which involve US30 interchange ramp widening and reconstruction to accommodate two lane ramps from US 222 South to US30 West and from US30 East to US 222 North. US 30 Westbound will be widened between PA23 and PA 272 for improved weaving and US 30 Eastbound will include minor reconstruction to the outside thru-lane for the conversion to an optional exit lane to the US 222 Northbound ramp. The US 222 ramp bridge over US 30 will be replaced and Eden Road overhead bridge will be rehabilitated and US 222 lowered to provide additional vertical clearance. This project is in Manheim Township, Lancaster County.
109618	US 222 Reconstruction	This project may consist of a Roadway Reconstruction and Conversion to 6-lanes on US 222 from one-mile north of US 30 to north of Jake Landis Interchange (SR 8030) in Manheim Township, Lancaster County. 2.9 miles on US 222.
110502	US30/PA 462 Improvements	The project consists of interchange improvements at US 30 and PA 462 (E. Lincoln Hwy) in East Lampeter Township, Lancaster County, PA. There are a large number of crashes that occur at the intersection of SR 462 EB / SR 30 EB off-ramp and Oakview Road. This is due to the separate lanes of SR 462 and the SR 30 off-ramp converging into one intersection approach. Left turns are not allowed from the SR 30 off-ramp to Oakview Road, because this movement crosses the adjacent eastbound through lanes from SR 462. Drivers attempting to make this turn illegally have caused many crashes. The proposed project will combine both SR 462 EB and the SR 30 EB off-ramp into a single approach and will eliminate the potential for illegal turns across adjacent through lanes and the resulting crashes.
114217	Riverfront to Downtown Connections Streetscape	This project may consist of comprehensive streetscaping. Columbia Borough is proposing to utilize Smart Growth Transportation funding to support the implementation of a comprehensive streetscape program with the goal of providing safe, accessible connections for residents as well as visitors as they travel by foot, bicycle, and car between the Riverfront (featuring Columbia River Park / Northwest Lancaster County River Trail), our emerging downtown commercial core and rich Historic District, and the surrounding neighborhoods. Potential Improvements will include the following: multi-modal accommodations; travel and turning lanes; curbs and sidewalks; intersections, crosswalks, and traffic calming improvements; parking improvements; traffic and wayfinding signage; green infrastructure and landscaping to improve stormwater management; street trees and furnishings (benches / trash receptacles); public art.

121048	Pitney Rd and PA 340 Intersection with PA 462	This project may consist of intersection improvements on PA 462 (King Street) intersections with PA 340 (Old Philadelphia Pike) and SR 3028 (Pitney Road) in East Lampeter, West Lampeter, Lancaster Townships and Lancaster City, Lancaster County. Possible work includes: Redevelop the Bridgeport Crossroads area with dual southbound through lanes along Pitney Road, eliminate the eastbound and westbound left turn lanes along Lincoln Highway at Pitney Road/ Lampeter Road, and remove the signal at Old Philadelphia Pike. New dual eastbound left lanes onto the relocated Old Philadelphia Pike and shift the alignment slightly to provide a potential roundabout to the north of Lincoln Highway.
121061	Lititz Pk and Oregon Pk - Lancaster TSMO 2025-2026	This project may consist of upgrading seven signalized intersections to connect to PennDOT's UCC system at seven intersections on Lititz Pike (PA 501) and Oregon Pike (PA 272) in Lancaster County.
121062	PA 741 Signals - Lancaster TSMO 2025-2026	This project may consist of upgrading nine signalized intersections to connect to PennDOT's UCC system on PA 741 in East Hempfield Township, Lancaster County.
121060	ITS - Lancaster TSMO 2025-2026	This project may consist of upgrading three signal systems to connect to PennDOT's UCC system. Also, adding six ITS signal CCTV and one DMS with a CCTV to help manage traffic within the US 30 system in East Lampeter Township, Lancaster County.
20119	Brunnerville Rd and Newport Rd Int	This project may consist of intersection improvements which include, widening for turn lanes and signal upgrade or roundabout at the intersection of Brunnerville and Newport Road in Warwick Township, Lancaster County.
110557	Intercourse Village Safety Imp	This project may consist of safety improvements and mobility improvements in Intercourse Village in Leacock Township, Lancaster County and will improve facility deficiencies through realigning the Y intersection of SR 0772 and SR 0340. The realignment of this intersection may require a traffic signal at the intersection of SR 0340 and Queen Street. Traffic will change from two-way to one-way on SR 0772 from the intersection of SR 0340 to Queen Street. Queen Street will be widened to include two-way traffic.

2050 Metropolitan Transportation Plan (MTP) Incorporates Projects from PennDOT's 12-Year Program (TYP)		
80931	Harrisburg Pike Corridor Improvements	This project may consist of widening to add capacity, resurfacing and additional signals with signal coordination on Harrisburg Pike (SR 4020) Corridor in the City of Lancaster and Manheim Township, Lancaster County.
94912	PA 23 / PA 741 Intersection Improvements	This project may consist of intersection improvements, including adding turn lanes and improving signalization, on PA-23 (Marietta Avenue) from Good Drive to PA-741 in East Hempfield Township, Lancaster County.
110507	PA324/US222/Fairview Ave	This project consists of an intersection improvement / realignment at the intersection of US 222 (S. Prince St.) and PA 324 (New Danville Pk / S. Queen St) and Fairview Ave. in Lancaster Township, West Lampeter Township and City of Lancaster, Lancaster County.
97251	Colonel Howard Blvd Improvement	This project may consist of intersection improvements on State Route 1040 (Colonel Howard Boulevard) from PA 272 (Reading Road) to Lesher Road in East Cocalico Township, Lancaster County. Potential option included is a diverging diamond interchange.
119474	Enola Low Grade Trail East 2	This project may consist of constructing a 3-mile segment of the Enola Low-Grade Trail on an abandoned rail corridor between Bart Township and the Chester County line, Lancaster County. Includes grading and surfacing for a 10-foot wide stone/paved trail with 2-foot shoulders. Existing drainage facilities will be cleaned and replaced as needed, and there will be three at-grade road crossings of low-volume local roads and one trailhead.
121049	Transit Development Plan Implementation	Proposal Implementation of the Transit Development Plan, including possible Micro-Transit Service Areas. SCTA, through RRTA, is considering implementing micro-transit option tions to increase user flexibility. They are currently working on a Transit Development Plan. Project Location Micro-Transit Service Areas: Elizabethtown, Columbia, Manheim, Lititz, Lancaster City, Ephrata/Akron, New Holland.

ATTACHMENT B

Detailed Emission Results

Detailed Emission Results for Ozone Analysis

2025 Ozone by Road Type

County	Road Type	Summer Day VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lancaster	Off-Network	N/A	N/A	2.419	1.416
	Rural Restricted	1,237,562	62.8	0.068	0.726
	Rural UnRestricted	2,907,077	40.5	0.199	1.194
	Urban Restricted	3,915,146	58.2	0.214	1.856
	Urban UnRestricted	7,977,700	26.6	0.737	3.073
	Subtotal	*16,037,486*		*3.638*	*8.265*
Off-Model Project Emission Benefits				0.000	0.000
Region Total		**16,037,486**		**3.638**	**8.265**
			(Kg/Day)	**3,300**	**7,498**

2025 Ozone by Source Type

County	Source Type	Summer Day VMT	Emissions (Tons/Day)	
			VOC	NOx
Lancaster	Motorcycle	98,798	0.255	0.062
	Passenger Car	6,468,306	0.956	0.356
	Passenger Truck	6,825,192	1.826	1.739
	Light Commercial Truck	808,961	0.248	0.359
	Intercity Bus	31,658	0.010	0.128
	Transit Bus	40,326	0.015	0.154
	School Bus	11,860	0.003	0.032
	Refuse Truck	5,820	0.002	0.018
	Single Unit Short-haul Truck	593,412	0.111	0.742
	Single Unit Long-haul Truck	39,912	0.005	0.040
	Motor Home	18,624	0.014	0.043
	Combination Short-haul Truck	216,223	0.033	0.768
	Combination Long-haul Truck	878,393	0.159	3.826
	Subtotal	*16,037,486*	*3.638*	*8.265*
Off-Model Project Emission Benefits			0.000	0.000
Region Total		**16,037,486**	**3.638**	**8.265**
		(Kg/Day)	**3,300**	**7,498**

2025 Ozone by Emission Process

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lancaster	Running Exhaust	0.676	7.262
	Start Exhaust	0.577	0.807
	Brakewear	0.000	0.000
	Tirewear	0.000	0.000
	Evap Permeation	0.310	0.000
	Evap Fuel Vapor Venting	0.793	0.000
	Evap Fuel Leaks	1.220	0.000
	Crankcase Running Exhaust	0.039	0.056
	Crankcase Start Exhaust	0.008	0.000
	Crankcase Extended Idle Exhaust	0.002	0.001
	Extended Idle Exhaust	0.012	0.130
	Auxiliary Power Exhaust	0.001	0.009
	Subtotal	*3.638*	*8.265*
Off-Model Project Emission Benefits		0.000	0.000
Region Total		**3.638**	**8.265**
	(Kg/Year)	**3,300**	**7,498**

2035 Ozone by Road Type

County	Road Type	Summer Day VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lancaster	Off-Network	N/A	N/A	1.740	1.002
	Rural Restricted	1,492,775	63.8	0.047	0.432
	Rural UnRestricted	3,121,344	39.7	0.134	0.735
	Urban Restricted	4,333,981	57.9	0.141	1.023
	Urban UnRestricted	8,571,581	25.1	0.533	2.003
	Subtotal	*17,519,680*		*2.596*	*5.195*
Off-Model Project Emission Benefits				0.000	0.000
Region Total		**17,519,680**		**2.596**	**5.195**
			(Kg/Day)	**2,355**	**4,712**

2035 Ozone by Source Type

County	Source Type	Summer Day VMT	Emissions (Tons/Day)	
			VOC	NOx
Lancaster	Motorcycle	107,690	0.254	0.067
	Passenger Car	7,050,453	0.639	0.144
	Passenger Truck	7,439,447	1.335	0.468
	Light Commercial Truck	881,743	0.162	0.077
	Intercity Bus	34,778	0.007	0.086
	Transit Bus	45,057	0.008	0.093
	School Bus	13,267	0.001	0.020
	Refuse Truck	6,006	0.001	0.014
	Single Unit Short-haul Truck	662,072	0.075	0.629
	Single Unit Long-haul Truck	44,108	0.003	0.033
	Motor Home	18,725	0.008	0.023
	Combination Short-haul Truck	233,988	0.025	0.664
	Combination Long-haul Truck	982,346	0.081	2.875
	Subtotal	*17,519,680*	*2.596*	*5.195*
Off-Model Project Emission Benefits			0.000	0.000
Region Total		**17,519,680**	**2.596**	**5.195**
		(Kg/Day)	**2,355**	**4,712**

2035 Ozone by Emission Process

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lancaster	Running Exhaust	0.328	4.522
	Start Exhaust	0.331	0.514
	Brakewear	0.000	0.000
	Tirewear	0.000	0.000
	Evap Permeation	0.153	0.000
	Evap Fuel Vapor Venting	0.513	0.000
	Evap Fuel Leaks	1.231	0.000
	Crankcase Running Exhaust	0.031	0.062
	Crankcase Start Exhaust	0.004	0.000
	Crankcase Extended Idle Exhaust	0.001	0.001
	Extended Idle Exhaust	0.004	0.077
	Auxiliary Power Exhaust	0.001	0.018
	Subtotal	*2.596*	*5.195*
Off-Model Project Emission Benefits		0.000	0.000
Region Total		**2.596**	**5.195**
	(Kg/Year)	**2,355**	**4,712**

2045 Ozone by Road Type

County	Road Type	Summer Day VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lancaster	Off-Network	N/A	N/A	1.358	0.994
	Rural Restricted	1,796,791	63.6	0.049	0.458
	Rural UnRestricted	3,299,135	38.9	0.122	0.728
	Urban Restricted	4,830,314	57.7	0.134	1.021
	Urban UnRestricted	9,309,955	23.7	0.512	2.095
	Subtotal	*19,236,194*		*2.174*	*5.295*
Off-Model Project Emission Benefits				0.000	0.000
Region Total		**19,236,194**		**2.174**	**5.295**
			(Kg/Day)	**1,972**	**4,804**

2045 Ozone by Source Type

County	Source Type	Summer Day VMT	Emissions (Tons/Day)	
			VOC	NOx
Lancaster	Motorcycle	117,967	0.269	0.073
	Passenger Car	7,723,292	0.550	0.105
	Passenger Truck	8,149,418	1.018	0.330
	Light Commercial Truck	965,922	0.128	0.050
	Intercity Bus	40,400	0.007	0.092
	Transit Bus	49,042	0.008	0.097
	School Bus	14,456	0.001	0.020
	Refuse Truck	6,817	0.002	0.016
	Single Unit Short-haul Truck	739,796	0.079	0.693
	Single Unit Long-haul Truck	49,081	0.003	0.037
	Motor Home	20,967	0.008	0.019
	Combination Short-haul Truck	259,739	0.026	0.716
	Combination Long-haul Truck	1,099,296	0.079	3.046
	Subtotal	*19,236,194*	*2.174*	*5.295*
Off-Model Project Emission Benefits			0.000	0.000
Region Total		**19,236,194**	**2.174**	**5.295**
		(Kg/Day)	**1,972**	**4,804**

2045 Ozone by Emission Process

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lancaster	Running Exhaust	0.313	4.647
	Start Exhaust	0.265	0.481
	Brakewear	0.000	0.000
	Tirewear	0.000	0.000
	Evap Permeation	0.098	0.000
	Evap Fuel Vapor Venting	0.365	0.000
	Evap Fuel Leaks	1.094	0.000
	Crankcase Running Exhaust	0.031	0.068
	Crankcase Start Exhaust	0.003	0.000
	Crankcase Extended Idle Exhaust	0.001	0.001
	Extended Idle Exhaust	0.003	0.076
	Auxiliary Power Exhaust	0.001	0.023
	Subtotal	*2.174*	*5.295*
Off-Model Project Emission Benefits		0.000	0.000
Region Total		**2.174**	**5.295**
	(Kg/Year)	**1,972**	**4,804**

2050 Ozone by Road Type

County	Road Type	Summer Day VMT	Speed (mph)	Emissions (Tons/Day)	
				VOC	NOx
Lancaster	Off-Network	N/A	N/A	1.323	1.024
	Rural Restricted	1,956,254	63.4	0.052	0.487
	Rural UnRestricted	3,455,280	38.4	0.126	0.762
	Urban Restricted	5,150,019	57.6	0.139	1.077
	Urban UnRestricted	9,697,906	22.8	0.537	2.219
	Subtotal	*20,259,458*		*2.177*	*5.570*
Off-Model Project Emission Benefits				0.000	0.000
Region Total		**20,259,458**		**2.177**	**5.570**
			(Kg/Day)	**1,975**	**5,053**

2050 Ozone by Source Type

County	Source Type	Summer Day VMT	Emissions (Tons/Day)	
			VOC	NOx
Lancaster	Motorcycle	124,077	0.279	0.077
	Passenger Car	8,123,357	0.554	0.106
	Passenger Truck	8,571,520	0.998	0.315
	Light Commercial Truck	1,015,916	0.126	0.048
	Intercity Bus	44,075	0.007	0.101
	Transit Bus	51,251	0.008	0.102
	School Bus	15,103	0.001	0.021
	Refuse Truck	7,249	0.002	0.017
	Single Unit Short-haul Truck	786,845	0.083	0.739
	Single Unit Long-haul Truck	52,241	0.003	0.039
	Motor Home	22,299	0.008	0.020
	Combination Short-haul Truck	277,784	0.027	0.764
	Combination Long-haul Truck	1,167,740	0.081	3.221
	Subtotal	*20,259,458*	*2.177*	*5.570*
Off-Model Project Emission Benefits			0.000	0.000
Region Total		**20,259,458**	**2.177**	**5.570**
		(Kg/Day)	**1,975**	**5,053**

2050 Ozone by Emission Process

County	Emission Process	Emissions (Tons/Day)	
		VOC	NOx
Lancaster	Running Exhaust	0.324	4.903
	Start Exhaust	0.261	0.489
	Brakewear	0.000	0.000
	Tirewear	0.000	0.000
	Evap Permeation	0.093	0.000
	Evap Fuel Vapor Venting	0.354	0.000
	Evap Fuel Leaks	1.103	0.000
	Crankcase Running Exhaust	0.032	0.072
	Crankcase Start Exhaust	0.003	0.000
	Crankcase Extended Idle Exhaust	0.001	0.001
	Extended Idle Exhaust	0.003	0.080
	Auxiliary Power Exhaust	0.001	0.025
	Subtotal	*2.177*	*5.570*
Off-Model Project Emission Benefits		0.000	0.000
Region Total		**2.177**	**5.570**
	(Kg/Year)	**1,975**	**5,053**

Detailed Emission Results for Annual $PM_{2.5}$ Analysis

2025 Annual $PM_{2.5}$ by Road Type

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lancaster	Off-Network	N/A	N/A	482.11	18.10
	Rural Restricted	379,331,311	62.8	251.44	6.41
	Rural UnRestricted	865,416,162	40.5	400.44	15.03
	Urban Restricted	1,251,201,408	58.2	668.47	18.56
	Urban UnRestricted	2,351,963,484	26.6	1,002.92	45.80
	Subtotal	*4,847,912,365*		*2,805.39*	*103.89*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**4,847,912,365**		**2,805.39**	**103.89**
			(Kg/Year)	**2,545,003**	**94,249**

2025 Annual $PM_{2.5}$ by Source Type

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lancaster	Motorcycle	29,806,139	22.58	0.73
	Passenger Car	1,951,408,080	134.18	16.99
	Passenger Truck	2,059,076,456	563.93	31.31
	Light Commercial Truck	244,053,820	112.22	5.13
	Intercity Bus	8,679,508	38.97	0.97
	Transit Bus	13,153,008	55.69	1.04
	School Bus	3,868,258	11.27	0.44
	Refuse Truck	1,779,830	6.17	0.12
	Single Unit Short-haul Truck	182,144,340	244.25	6.29
	Single Unit Long-haul Truck	12,249,689	14.11	0.38
	Motor Home	5,718,000	16.41	0.60
	Combination Short-haul Truck	66,392,008	263.27	5.55
	Combination Long-haul Truck	269,583,230	1,322.34	34.34
	Subtotal	*4,847,912,365*	*2,805.39*	*103.89*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**4,847,912,365**	**2,805.39**	**103.89**
		(Kg/Year)	**2,545,003**	**94,249**

2025 Annual $PM_{2.5}$ by Emission Process

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lancaster	Running Exhaust	2,451.92	51.33
	Start Exhaust	283.98	13.80
	Brakewear	0.00	21.81
	Tirewear	0.00	8.77
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	19.35	7.15
	Crankcase Start Exhaust	0.01	0.12
	Crankcase Extended Idle Exhaust	0.36	0.28
	Extended Idle Exhaust	46.62	0.58
	Auxiliary Power Exhaust	3.13	0.06
	Subtotal	*2,805.39*	*103.89*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**2,805.39**	**103.89**
	(Kg/Year)	**2,545,003**	**94,249**

2035 Annual $PM_{2.5}$ by Road Type

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lancaster	Off-Network	N/A	N/A	361.60	15.98
	Rural Restricted	457,557,731	63.8	150.41	3.21
	Rural UnRestricted	928,424,079	39.7	248.78	9.25
	Urban Restricted	1,385,053,550	57.9	370.39	9.46
	Urban UnRestricted	2,527,207,885	25.1	664.14	32.76
	Subtotal	*5,298,243,246*		*1,795.31*	*70.66*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**5,298,243,246**		**1,795.31**	**70.66**
			(Kg/Year)	**1,628,679**	**64,104**

2035 Annual $PM_{2.5}$ by Source Type

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lancaster	Motorcycle	32,501,328	24.22	0.80
	Passenger Car	2,127,865,988	66.70	17.26
	Passenger Truck	2,245,268,000	165.62	25.22
	Light Commercial Truck	266,114,970	26.13	3.20
	Intercity Bus	9,547,290	26.15	0.40
	Transit Bus	14,681,652	33.36	0.34
	School Bus	4,322,919	6.76	0.12
	Refuse Truck	1,843,777	4.86	0.04
	Single Unit Short-haul Truck	203,310,670	205.33	3.77
	Single Unit Long-haul Truck	13,538,320	11.75	0.23
	Motor Home	5,748,079	8.96	0.35
	Combination Short-haul Truck	71,867,493	226.72	3.51
	Combination Long-haul Truck	301,632,760	988.75	15.43
	Subtotal	*5,298,243,246*	*1,795.31*	*70.66*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**5,298,243,246**	**1,795.31**	**70.66**
		(Kg/Year)	**1,628,679**	**64,104**

2035 Annual $PM_{2.5}$ by Emission Process

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lancaster	Running Exhaust	1,545.31	18.75
	Start Exhaust	194.10	14.77
	Brakewear	0.00	24.88
	Tirewear	0.00	9.62
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	21.27	2.24
	Crankcase Start Exhaust	0.01	0.12
	Crankcase Extended Idle Exhaust	0.30	0.13
	Extended Idle Exhaust	27.76	0.13
	Auxiliary Power Exhaust	6.56	0.02
	Subtotal	*1,795.31*	*70.66*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**1,795.31**	**70.66**
	(Kg/Year)	**1,628,679**	**64,104**

2045 Annual $PM_{2.5}$ by Road Type

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lancaster	Off-Network	N/A	N/A	362.36	11.79
	Rural Restricted	550,743,363	63.6	159.18	3.18
	Rural UnRestricted	982,293,693	38.9	246.95	8.93
	Urban Restricted	1,543,671,523	57.7	370.11	8.99
	Urban UnRestricted	2,744,187,589	23.7	696.31	33.99
	Subtotal	*5,820,896,169*		*1,834.90*	*66.89*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**5,820,896,169**		**1,834.90**	**66.89**
			(Kg/Year)	**1,664,591**	**60,680**

2045 Annual $PM_{2.5}$ by Source Type

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lancaster	Motorcycle	35,622,640	26.50	0.89
	Passenger Car	2,332,212,608	54.89	16.65
	Passenger Truck	2,460,889,208	123.01	22.49
	Light Commercial Truck	291,680,560	17.79	2.85
	Intercity Bus	11,118,007	27.89	0.29
	Transit Bus	16,041,197	34.86	0.32
	School Bus	4,728,578	6.88	0.11
	Refuse Truck	2,084,414	5.43	0.05
	Single Unit Short-haul Truck	227,354,930	226.76	4.17
	Single Unit Long-haul Truck	15,079,090	12.97	0.25
	Motor Home	6,446,018	6.50	0.18
	Combination Short-haul Truck	79,837,199	244.60	3.57
	Combination Long-haul Truck	337,801,720	1,046.82	15.08
	Subtotal	*5,820,896,169*	*1,834.90*	*66.89*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**5,820,896,169**	**1,834.90**	**66.89**
		(Kg/Year)	**1,664,591**	**60,680**

2045 Annual $PM_{2.5}$ by Emission Process

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lancaster	Running Exhaust	1,591.37	14.71
	Start Exhaust	184.47	10.92
	Brakewear	0.00	28.37
	Tirewear	0.00	10.62
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	23.36	1.95
	Crankcase Start Exhaust	0.01	0.09
	Crankcase Extended Idle Exhaust	0.30	0.11
	Extended Idle Exhaust	27.18	0.09
	Auxiliary Power Exhaust	8.21	0.01
	Subtotal	*1,834.90*	*66.89*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**1,834.90**	**66.89**
	(Kg/Year)	**1,664,591**	**60,680**

2050 Annual $PM_{2.5}$ by Road Type

County	Road Type	Annual VMT	Speed (mph)	Emissions (Tons/Year)	
				NOx	$PM_{2.5}$
Lancaster	Off-Network	N/A	N/A	373.72	10.63
	Rural Restricted	599,621,067	63.4	169.55	3.35
	Rural UnRestricted	1,028,356,291	38.4	258.59	9.29
	Urban Restricted	1,645,840,843	57.6	390.55	9.34
	Urban UnRestricted	2,858,652,340	22.8	737.51	35.88
	Subtotal	*6,132,470,541*		*1,929.92*	*68.49*
Off-Model Project Emission Benefits				0.00	0.00
Region Total		**6,132,470,541**		**1,929.92**	**68.49**
			(Kg/Year)	**1,750,793**	**62,132**

2050 Annual $PM_{2.5}$ by Source Type

County	Source Type	Annual VMT	Emissions (Tons/Year)	
			NOx	$PM_{2.5}$
Lancaster	Motorcycle	37,478,290	27.88	0.94
	Passenger Car	2,453,715,800	55.55	17.34
	Passenger Truck	2,589,084,600	118.45	22.26
	Light Commercial Truck	306,864,340	17.38	2.85
	Intercity Bus	12,167,599	30.54	0.32
	Transit Bus	16,789,896	36.69	0.33
	School Bus	4,947,766	7.23	0.11
	Refuse Truck	2,237,028	5.84	0.05
	Single Unit Short-haul Truck	241,881,950	242.15	4.46
	Single Unit Long-haul Truck	16,062,693	13.89	0.27
	Motor Home	6,855,132	6.87	0.20
	Combination Short-haul Truck	85,379,857	260.60	3.72
	Combination Long-haul Truck	359,005,590	1,106.86	15.64
	Subtotal	*6,132,470,541*	*1,929.92*	*68.49*
Off-Model Project Emission Benefits			0.00	0.00
Region Total		**6,132,470,541**	**1,929.92**	**68.49**
		(Kg/Year)	**1,750,793**	**62,132**

2050 Annual $PM_{2.5}$ by Emission Process

County	Emission Process	Emissions (Tons/Year)	
		NOx	$PM_{2.5}$
Lancaster	Running Exhaust	1,679.71	14.59
	Start Exhaust	187.39	9.78
	Brakewear	0.00	30.62
	Tirewear	0.00	11.22
	Evap Permeation	0.00	0.00
	Evap Fuel Vapor Venting	0.00	0.00
	Evap Fuel Leaks	0.00	0.00
	Crankcase Running Exhaust	24.77	1.98
	Crankcase Start Exhaust	0.01	0.08
	Crankcase Extended Idle Exhaust	0.32	0.12
	Extended Idle Exhaust	28.83	0.09
	Auxiliary Power Exhaust	8.91	0.01
	Subtotal	*1,929.92*	*68.49*
Off-Model Project Emission Benefits		0.00	0.00
Region Total		**1,929.92**	**68.49**
	(Kg/Year)	**1,750,793**	**62,132**

ATTACHMENT C

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

(Sample for 2025 July Weekday and Annual Runs)

MOVES County Data Manager Importer File – July Weekday Run (MOVESIMPORTER.XML)

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MOVES Run Specification File – July Weekday Run (MOVESRUN.MRS)

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MOVES County Data Manager Importer File – Annual Run (MOVESIMPORTER.XML)

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MOVES Run Specification File – Annual Run (MOVESRUN.MRS)

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