APPENDIX D

Technical Support Document
Mobile Source Highway Emissions Inventory

Executive Summary

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July 2014

Mobile Source Emissions Inventory
Executive Summary
July 2014

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SUMMARY

This technical appendix supports the ozone State Implementation Plan (SIP) for the following nonattainment areas:

- *Allentown-Bethlehem-Easton* area, consisting of:
  - Lehigh County,
  - Northampton County, and
  - Carbon County.
- *Lancaster* area, consisting of Lancaster County
- Philadelphia, Pennsylvania portion of the *Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE* Area, consisting of:
  - Bucks County,
  - Chester County,
  - Delaware County,
  - Montgomery County, and
  - Philadelphia County.
- *Pittsburgh-Beaver Valley* area, consisting of:
  - Allegheny County,
  - Armstrong County,
  - Beaver County,
  - Butler County,
  - Fayette County,
  - Washington County, and
  - Westmoreland County.
- *Reading area*, consisting of Berks County.

To meet emission inventory requirements of section 172(c)(3) of the Clean Air Act, a regional mobile source highway inventory has been prepared for the ozone emissions. Emissions are estimated for the 2011 analysis year. The pollutants included in the inventory are for ozone precursors, volatile organic compounds (VOC) and the nitrogen oxides (NOx), and carbon monoxide (CO).

Appendix D has been provided to summarize the methodology and analysis results for the motor vehicle emissions inventory using MOVES2010b. To complement this executive summary, attachments have been provided with additional detail regarding the analysis methodology, the MOVES input parameters, and the output vehicle miles of travel (VMT) and emission results for the region. These include:

Exhibit 1: Summary of Appendices

Appendix	Title	Description
D-1	Explanation of Methodology	Provides a detailed summary of the methodology used to calculate the VMT and emissions.
D-2	VOC, NOx, and CO Emission Results	Provides annual emission exhibits by county, road type, source type and process categories in 2011.
D-3	MOVES Sample Input File	Provides examples of the MOVES input files.

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Emissions Inventory

A summary of the motor vehicle emissions for the nonattainment areas is provided in **Exhibit 2**. The emission estimates for all pollutants have been developed using the MOVES2010b emission model and latest planning assumptions. Emissions have been estimated for the 2011 analysis year.

Exhibit 2: Motor Vehicle Emissions Using MOVES2010b

Pollutants	Area	County	VOC	NOx	CO
July Weekday (*Short Tons/Day*)	Allentown	Lehigh	8.24	17.13	85.53
		Northampton	7.00	14.04	65.30
		Carbon	1.94	4.39	21.76
		Area Total	*17.18*	*35.56*	*172.59*
	Lancaster	Lancaster	11.99	24.42	121.03
		Area Total	*11.99*	*24.42*	*121.03*
	Philadelphia	Bucks	11.47	22.55	119.86
		Chester	9.29	20.29	102.86
		Delaware	8.68	17.25	88.68
		Montgomery	14.50	28.89	159.89
		Philadelphia	16.63	34.40	160.42
		Area Total	*60.58*	*123.39*	*631.69*
	Pittsburgh	Allegheny	20.40	41.15	208.35
		Armstrong	1.61	3.33	15.76
		Beaver	3.22	6.45	32.45
		Butler	4.44	9.64	46.20
		Fayette	2.91	5.31	27.66
		Washington	4.02	8.71	42.75
		Westmoreland	6.95	14.26	73.47
		Area Total	*43.54*	*88.85*	*446.64*
	Reading	Berks	9.86	22.11	98.88
		Area Total	*9.86*	*22.11*	*98.88*
Annual (*Short Tons/Year*)	Allentown	Lehigh	2,938.97	6,154.43	37,317.95
		Northampton	2,524.35	5,086.83	30,028.04
		Carbon	706.66	1,592.35	9,454.14
		Area Total	6,169.98	12,833.61	76,800.12
	Lancaster	Lancaster	4,233.63	8,879.12	52,716.37
		Area Total	*4,233.63*	*8,879.12*	*52,716.37*
	Philadelphia	Bucks	4,120.01	8,292.77	49,954.81
		Chester	3,309.73	7,413.67	41,456.81
		Delaware	3,097.85	6,222.26	37,084.67
		Montgomery	5,156.21	10,458.00	64,680.67
		Philadelphia	5,814.04	11,482.34	66,678.77
		Area Total	21,497.83	43,869.04	259,855.73
	Pittsburgh	Allegheny	7,755.25	14,865.96	98,535.36
		Armstrong	611.63	1,223.02	7,454.79
		Beaver	1,232.52	2,365.83	15,550.01
		Butler	1,672.83	3,527.63	21,200.51
		Fayette	1,114.77	1,950.20	13,397.21
		Washington	1,540.23	3,197.99	20,163.87
		Westmoreland	2,657.30	5,229.77	34,579.73
		Area Total	16,584.53	32,360.40	210,881.48
	Reading	Berks	3,479.35	8,073.19	43,022.47
		Area Total	*3,479.35*	*8,073.19*	*43,022.47*

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Analysis Methodology

Guidance documents from EPA were used to develop the base and future year emissions inventories for the region. They include:

- *Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes*, US EPA Office of Transportation and Air Quality, EPA-420-B-12-010, April 2012.
- *Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b*. US EPA Office of Transportation and Air Quality, EPA-420-B-12-028, April 2012.
- *Motor Vehicle Emission Simulator (MOVES) – User Guide for MOVES2010b,* US EPA Office of Transportation and Air Quality, EPA-420-B-12-001b, June 2012.

The highway mobile source emission inventory was developed using available travel data and EPA's MOVES2010b emission model. The methodologies used to produce the emission data conform to the recommendations provided in EPA's *Technical Guidance*. A mix of local data and national default (internal to MOVES2010b) data has been used for this submission. Local data has been used for the primary data items that have a significant impact on emissions. These include:

- Vehicle miles of travel (VMT) by vehicle type.
- Average speed distribution.
- Vehicle type mixes.
- Source type population (for light-duty vehicles).
- Vehicle age distribution.
- Hourly distributions.
- Meteorology data.
- Inspection/Maintenance program.
- Fuel supply.

Most local data inputs to the analysis process reflect the latest planning assumptions based on 2011 data obtained from the Pennsylvania Department of Transportation (PennDOT), the Bureau of Motor Vehicles, and other local/national sources. Newer data was available and was used for control strategies (e.g. Inspection-Maintenance programs), vehicle age distributions and fuel characteristics.

The analysis methodology is consistent with past statewide inventory efforts including the 2011 National Emissions Inventory (NEI) submission. This includes the use of custom post processing software to calculate hourly speeds and prepare key traffic input files to the MOVES2010b emission model. A detailed methodology is provided in **Appendix D-1**. The following sections address the key input data sources and analysis tools used for the emissions inventory for the Allentown-Bethlehem-Easton Area.

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DATA SOURCES AND ANALYSIS TOOLS

This section provides a summary of the key input data and analysis tools used for producing the emissions inventory. The key elements to the modeling protocol are described in the sections below. A more detailed description of the analysis process and tools is provided in the methodology reports in **Appendix D-1** through **D-3**.

Analysis Tools

The mobile vehicle emissions inventory analysis utilizes several key software/programs for producing the county emissions totals. These tools are outlined in **Exhibit 3**.

Exhibit 3: Summary of Analysis Tools

Tool	Purpose
MOVES2010b	Produces emission rates for the emissions of VOC, NOx, and CO
PPSUITE	Processes the highway data; Calculates hourly congested speeds for each state roadway segment; Prepares MOVES2010b input files; Processes MOVES2010b output files into a summary report.
CENTRAL	Provides a batch menu driven process to execute PPSUITE, MOVES2010b and other MYSQL steps.

The inventory reflects the highway mobile source emission estimations using EPA's MOVES2010b emission model released on June 2012. The MOVES2010b model provides a more robust estimate of emissions as compared to its predecessor MOBILE6.2. MOVES2010b has been integrated with local traffic, vehicle fleet, environmental, fuel, and control strategy data to estimate emissions.

PPSUITE represents an enhanced version of the Post Processor for Air Quality (PPAQ) software system that has been used for previous inventory and conformity submissions in Pennsylvania. The software has undergone significant revisions to ensure consistency with the MOVES2010b. PPSUITE was used to calculate hourly congested speeds for each roadway link, apply vehicle type fractions, aggregate VMT, prepare MOVES2010b traffic-related input files and process MOVES2010b outputs.

The PPSUITE software and process methodologies are consistent with that used for state inventories and transportation conformity analyses throughout Pennsylvania. **Exhibit 4** summarizes the key functions of PPSUITE.

CENTRAL is a menu-driven software platform that executes the PPSUITE and MOVES2010b processes in batch mode. The 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.

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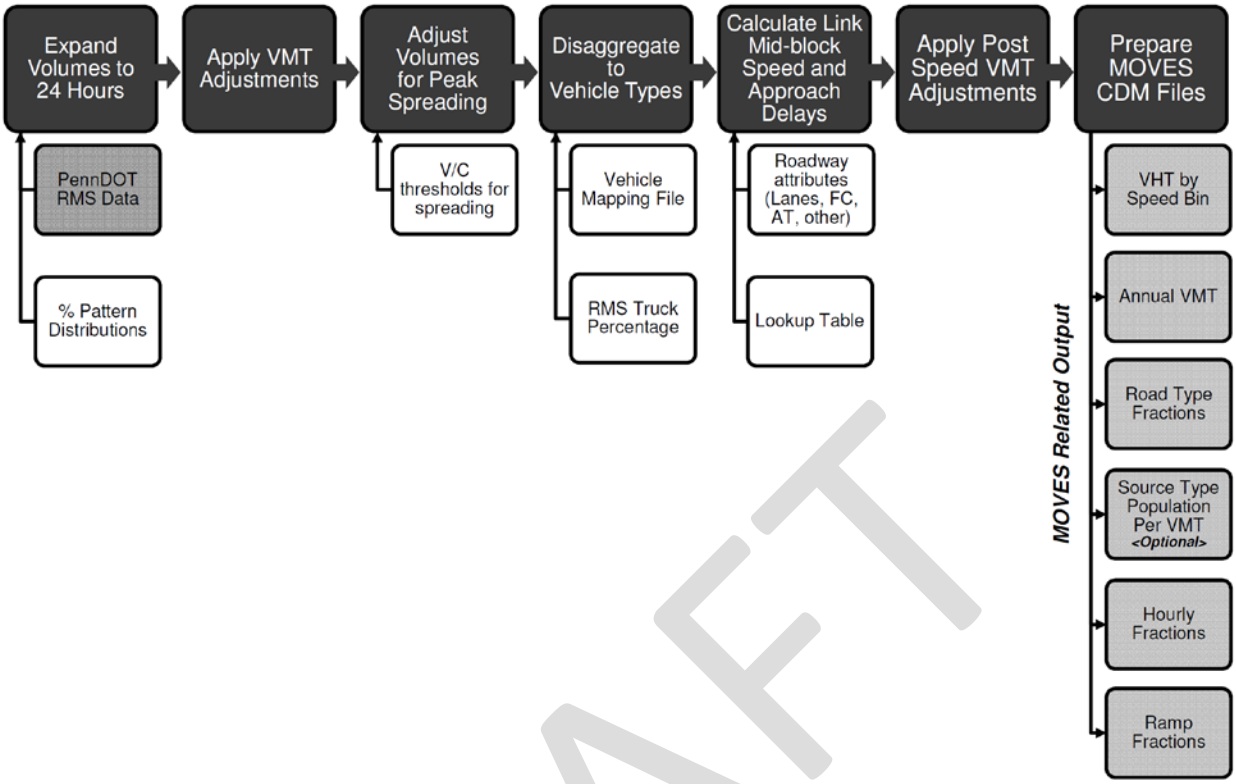
Exhibit 4: PPSUITE Process



Traffic Data Source/Fleet Data Inputs

Traffic Volume Data: The PennDOT Roadway Management System (RMS) data serves as the primary highway data source for the county and functional class VMT estimates. The data source is used to provide a "snapshot" of the regional roadway system and traffic volumes in 2011 (consistent with past triennial updates of traffic data). The 2011 data is also integrated with traffic signal locations. The data includes the average annual daily traffic (AADT) volumes for all state roadways in Pennsylvania. To account for additional local roadway VMT and to ensure consistency with reported Highway Performance Monitoring System (HPMS) VMT totals, the VMT totals estimated from PennDOT's RMS are adjusted to match the annual 2011 HPMS VMT totals, as reported to FHWA.

Seasonal Adjustments: Within MOVES, annual VMT is split to monthly sub-totals and then to weekdays and weekends using seasonal factors. The monthly seasonal factors are developed from data contained in the document, *2011 Pennsylvania Traffic Data*, prepared by PennDOT's Bureau of Planning and Research (BPR). The seasonal and daily factors provided in this document are based on statistical analyses of 2011 traffic counts taken at permanent and in-pavement ATR (automatic traffic recorder) locations throughout the state.

Congested Speeds: Based on the average annual daily traffic, a single set of hourly speed distributions are estimated by the PPSUITE post processing system and input to MOVES. To disaggregate the daily RMS volumes to hourly volumes, auto and truck hourly pattern data from PennDOT's *2011 Pennsylvania Traffic Data* report is used to determine the temporal variations in traffic volumes.

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Vehicle Population: Vehicle population is a key input that has an important impact on start and evaporative emissions. MOVES2010b requires the number of vehicles by 13 source types to determine evaporative emissions. State 2011 vehicle registration data (consistent with past triennial updates of traffic data) was used to estimate vehicle population for light-duty vehicles, school buses and transit buses. The data was split to source types using MOVES default population data. For all other heavy-duty vehicles, PPSUITE calculates vehicle population based on the analysis year VMT for each source type and default MOVES ratios of VMT and source type population (e.g. the number of miles per vehicle by source type).

VMT by Source Type: The total VMT is disaggregated to the 13 MOVES source types. For this inventory, the vehicle mix was calculated for each county and functional class grouping utilizing a combination of:

- 2011 RMS truck percentages
- 2011 school bus registration data
- 2011 PennDOT transit data

EPA's MOVES default distribution of VMT by source type was used to determine the remaining source type VMT percentages. The development of vehicle type pattern data input to the MOVES2010b software is described in more detail in **Appendix D-1**.

Vehicle Age Distribution: Vehicle age distributions are required to be input by 13 source types. The distributions reflect the percentage of vehicles in the fleet up to 31 years old. A recent 2011 registration download from PennDOT's Bureau of Motor Vehicles Registration Database has indicated a substantially older fleet than recorded in the 2002-2008 period. As a result, the 2011 vehicle age distributions have been used for this inventory. Due to insufficient data, only data for light-duty vehicles are used as local inputs; and, heavy-duty vehicles use the MOVES2010 national default age distribution. 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.

I/M and Fuel Parameters

I/M Program: The inspection maintenance (I/M) program inputs to the MOVES model are based on past and current programs within each county (all Pennsylvania I/M programs are based on county boundaries). All analysis years include Pennsylvania's statewide program. The default I/M program parameters included in MOVES model were examined for each county and necessary changes made to the defaults to match the actual local program.

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 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
- *Pittsburgh Region* - Allegheny, Beaver, Washington and Westmoreland Counties

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- *South Central and Lehigh Valley Region* - Berks, Cumberland, Dauphin, Lancaster, Lebanon, Lehigh, Northampton and York Counties
- *North Region* - Blair, Cambria, Centre, Erie, Lackawanna, Luzerne, Lycoming, and Mercer Counties

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.

Fuel Assumptions: The MOVES2010b default fuel formulation and fuel supply data were reviewed and updated based on available local volumetric fuel property information. The gasohol market penetration values and RVP values were updated but MOVES2010b default data was used for the remaining parameters. Key assumptions included:

- *Philadelphia Region*:
  - Using MOVES default RVP (6.96 for summer months).
  - 10% ethanol used throughout the year for analysis year 2011.
- *Pittsburgh Region:*
  - A low RVP (7.8) fuel program for summer months.
  - 10% ethanol used throughout the year for analysis year 2011.
- *Other PA Regions:*
  - 8.7 RVP used for summer months.
  - 10% ethanol used throughout the year for analysis year 2011.

Meteorology Data

Updated weather information has been obtained from WeatherBank, Inc. (www.weatherbank.com). The 10-year (1998-2008) average minimum and maximum monthly temperature and relative humidity values were obtained for each of the 9 airport locations in Pennsylvania.

The MOVES2010b model requires temperature and relative humidity data for each hour of the day and for all the 12 months for the annual analysis. EPA's data converters were used to convert minimum and maximum daily temperatures to an hourly temperature profile that could be input to MOVES2010b. These assumptions are consistent with the 2011 NEI inventory submission.

Vehicle Technology Programs

Federal Programs

Current federal vehicle emissions control and fuel programs are incorporated into the MOVES2010b software. These include the National Program standards covering model year vehicles through 2016. Modifications of default emission rates are required to reflect the early implementation of the National Low Emission Vehicle Program (NLEV) program in Pennsylvania. To reflect these impacts, EPA has

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released instructions and input files that can be used to model these impacts. This inventory utilized the August 2010 version of the files (http://www.epa.gov/oms/models/moves/tools.htm).

State Programs

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

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

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RESOURCES

2011 Pennsylvania Traffic Data, PennDOT Bureau of Planning and Research, 2011.

Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes, US EPA Office of Transportation and Air Quality, EPA-420-B-12-010, April 2012.

Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b. US EPA Office of Transportation and Air Quality, EPA-420-B-12-028, April 2012.

Motor Vehicle Emission Simulator (MOVES) – User Guide for MOVES2010b, US EPA Office of Transportation and Air Quality, EPA-420-B-12-001b, June 2012.

Metrological Data from Weather Bank, Inc., www.weatherbank.com

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APPENDIX D-1

Explanation of Methodology

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Explanation of Methodology
July 2014

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INTRODUCTION

The purpose of this document is to explain how the Pennsylvania Department of Environmental Protection (Department) estimates emissions from highway vehicles for inclusion in its emission inventories and State Implementation Plans.

Overview of Emissions Inventories

The Department's inventories generally categorize emissions into four categories:

- Highway vehicles.
- Point sources (major industrial, commercial and utility sources).
- Non-point sources (smaller industrial/commercial sources, consumer products).
- Nonroad mobile sources (including construction and agricultural equipment, lawn and garden equipment).

An evaluation of emissions from point, area, and mobile sources is needed to develop a complete inventory needed for a maintenance demonstration plan. This documentation addresses the mobile source activity and emissions for base and future years used to support such a demonstration.

Of all of the sources of air pollution, only the emissions of some stationary sources are measured directly and continuously through instrumentation. Emissions from all other sources must be modeled based on available local data, including those from highway vehicles. In their very simplest form, estimates of emissions follow the following pattern:

Emission rate x activity level = emissions per time period (usually day or year)

Most emission rates have been developed by the U.S. Environmental Protection Agency (EPA), in cooperation with industry and states, and are compiled and documented into key references or emission models. These include Compilation of Air Pollution Emission Factors (AP-42), the Motor Vehicle Emission Simulator (MOVES) model, and the NONROAD model. Adding up the products of the emission rates and activity levels for all sources of a given pollutant constitutes the emission inventory for that pollutant.

Highway Vehicle Emission Inventories

Highway vehicles contribute significantly to air pollution, particularly to ground-level ozone, which is the most persistent air pollutant in Pennsylvania. Ground-level ozone is not emitted directly to the atmosphere, but is formed by photochemical reactions between volatile organic compounds (VOCs) and oxides of nitrogen (NO_x) in the presence of sunlight. The long, hot, humid days of summer are particularly conducive to ozone formation, so ozone levels are of concern primarily during the months of May through September. Both VOCs and NOx are emitted from highway vehicles. Pennsylvania's ozone-related emission inventory efforts focus on these two types of pollutants.

Obviously, direct measurement of emission levels from all vehicles in use is impossible. In comparison to highway vehicles, estimating residential heating emissions is a fairly simple calculation because there is a constant emission rate and a fairly simple measure of activity. However, for highway vehicles

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estimating the emission rate and activity levels of all vehicles on the road during a typical summer day is a complicated endeavor.

If every vehicle emitted the same amount of pollution all the time, one could simply multiply those emission standards (emission rate in grams of pollution per mile) times the vehicle miles traveled (VMT) to estimate total emissions. But emission rates from all vehicles vary over the entire range of conditions under which they operate. These variables include air temperature, speed, traffic conditions, operating mode and fuel characteristics. The inventory must also account for non-exhaust or evaporative emissions. In addition, the fleet is composed of several generations and types of vehicles with different emission control technologies. This requires the estimation algorithm include the composition of the fleet (vehicle ages and types).

In order to estimate both the rate at which emissions are being generated and to calculate vehicle miles traveled (activity level), Pennsylvania examines its road network and fleet to estimate vehicle activity. For ozone-related inventories, this is done for a typical summer weekday. For carbon monoxide (CO) and particulate matter (PM) emission inventories, this may be done for a typical winter weekday, summer weekday and/or annual conditions. Not only must this be done for a baseline year, but it must also be projected into the future. This process involves a large quantity of data and is extremely complex.

Computer models have been developed to perform these calculations by simulating the travel of vehicles on the Commonwealth's roadway system. The models also generate emissions rates (also called emission factors) for different vehicle types for area-specific conditions, and then combine them in summary form. The area-specific conditions include vehicle and highway data, plus control measure characteristics and future year projections of all variables. The key models used to generate this mobile source emissions inventory are:

MOVES: EPA's MOVES2010b model, release in June 2012, was used for this mobile source inventory as approved by EPA. The MOVES model provides a more robust estimate of emissions as compared to its predecessor MOBILE6.2. MOVES calculates average in-use fleet emissions for each of thirteen categories of vehicles under various conditions affecting in-use emission levels (e.g., ambient temperatures, average traffic speeds, gasoline volatility) as specified by the model user.

MOVES can be used to estimate national, state, and county level inventories of criteria air pollutants, precursors, greenhouse gas emissions, and some mobile source air toxics from highway vehicles. Additionally, MOVES can make projections for energy consumption (total, petroleum-based, and fossil-based).

PPSUITE: For the Department's highway emissions inventory, a post processor named PPSUITE (formerly named PPAQ - Post Processor for Air Quality) is used, which consists of a set of programs that perform the following functions:

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

PPSUITE is a widely used and accepted tool for estimating speeds and processing emissions rates. The software is based upon accepted transportation engineering methodologies. For example, PPSUITE uses speed and delay estimation procedures based on planning methods provided in the *Highway Capacity Manual*, a report prepared by the Transportation Research Board (TRB) summarizing current knowledge and analysis techniques for capacity and level-of-service analyses of the transportation system.

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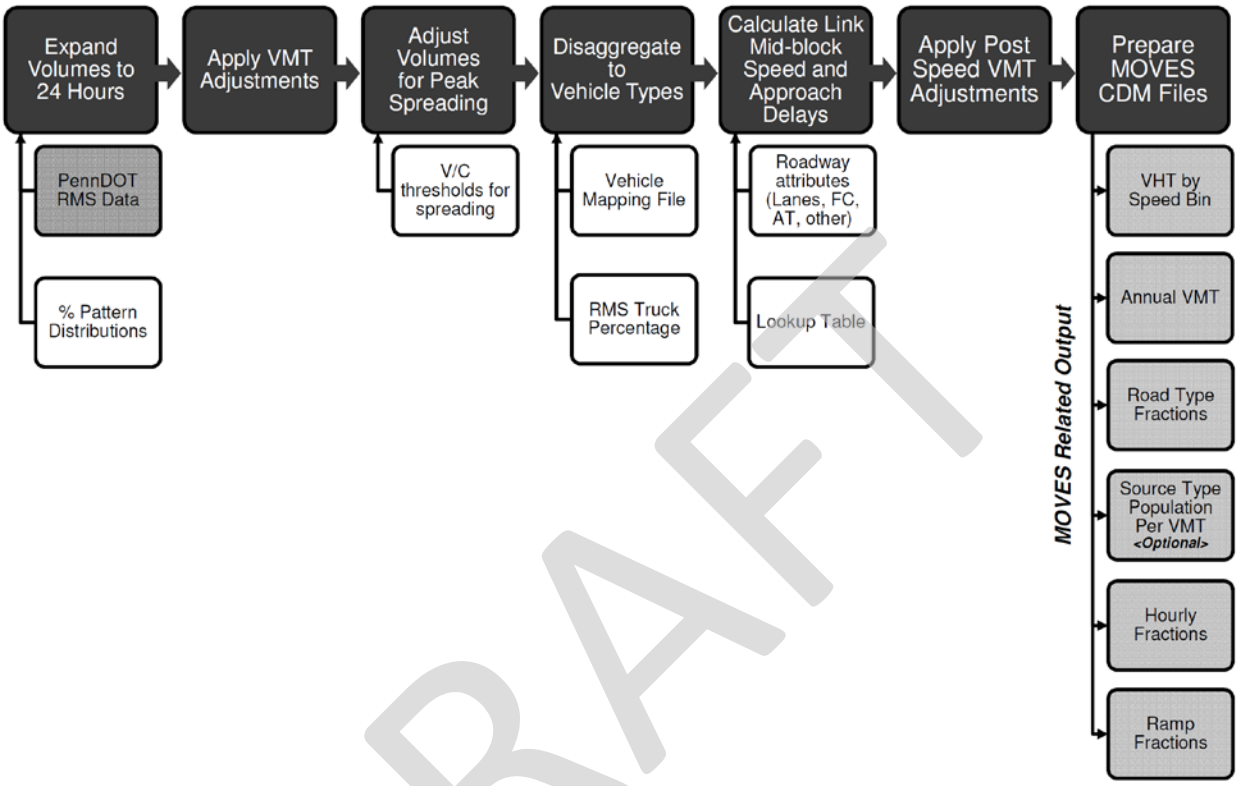
The PPSUITE process is integral to producing key input files to the MOVES emission model. Exhibit 1 summarizes the key functions of PPSUITE and the traffic-related input files prepared for the MOVES County Data Manager (CDM).

Exhibit 1: Summary of PPSUITE Process



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The following sections summarize the key data and methodologies used to produce the mobile source emissions inventory. This includes a summary of local data sources and a step-by-step review of the speed calculation process. The emission data and process has been developed according to recommendations provided by EPA in key policy and technical guidance as provided below:

- *Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes*, US EPA Office of Transportation and Air Quality, EPA-420-B-12-010, April 2012.
- *Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b*. US EPA Office of Transportation and Air Quality, EPA-420-B-12-028, April 2012.

The process has focused on developing an emissions inventory using the available tools and data to its fullest extent. This includes the use of available local data for items that have a significant impact on emissions and applying a robust calculation process to estimate hourly traffic speeds.

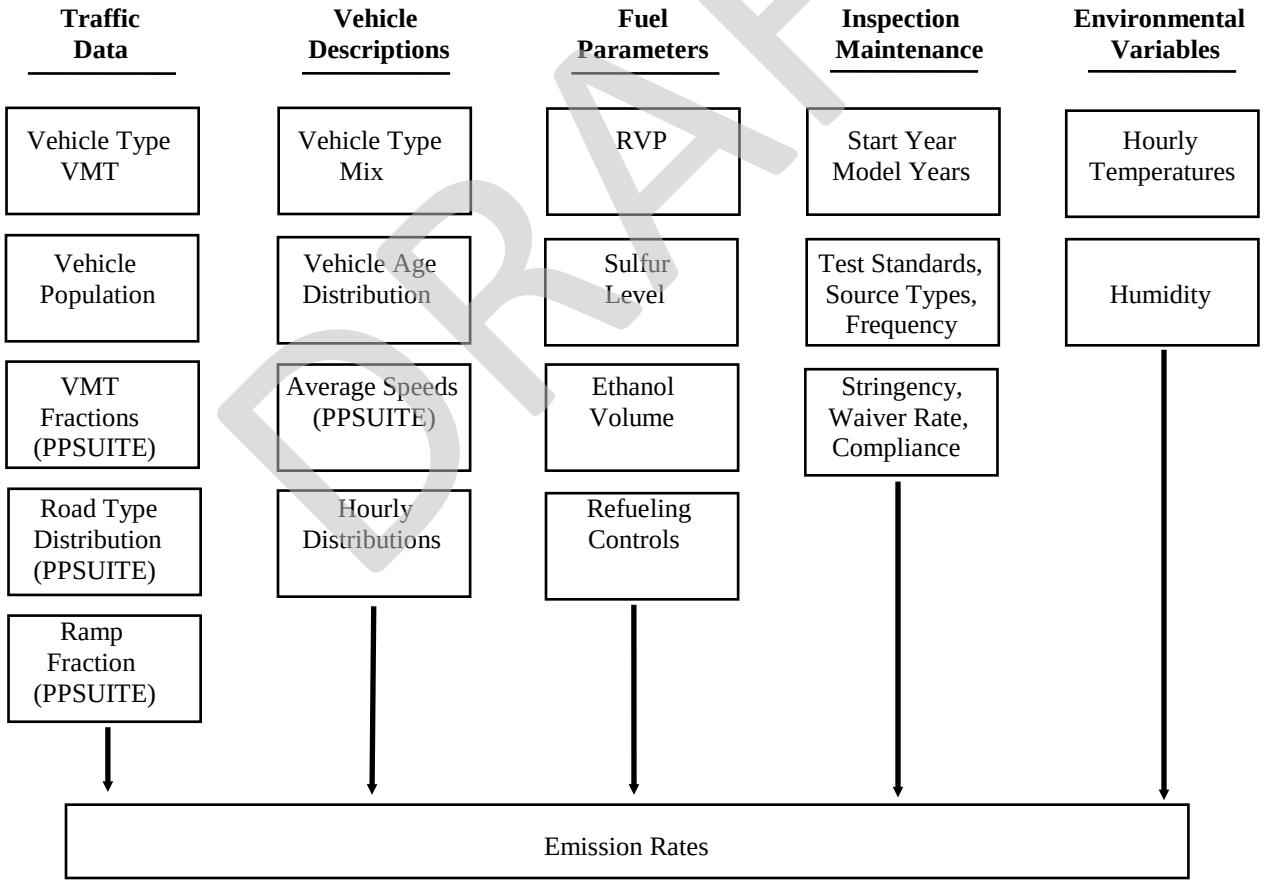
WHERE DOES PENNSYLVANIA OBTAIN ITS DATA?

Summary of MOVES Inputs

A large number of inputs to MOVES are needed to fully account for the numerous vehicle and environmental parameters that affect emissions. These include traffic flow characteristics (as determined from the PPSUITE software), vehicle descriptions, fuel parameters, inspection/maintenance 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; but EPA cannot certify that the default data is the most current or best available information for any specific area. As a result, local data is recommended for use for analyses supporting state implementation plans (SIPs).

A mix of local and default data is used for this inventory. Local data sources are used for all inputs that have a significant impact on calculated emission rates. Exhibit 2 summarizes Pennsylvania-specific inputs assembled and used for this inventory. These data items are discussed in the following sections.

Exhibit 2: MOVES Local Data Input Summary



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Vehicle Miles of Travel (VMT)

The VMT input to emissions calculations for Pennsylvania is based on information from the Roadway Management System (RMS) maintained by the Pennsylvania Department of Transportation's (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 National Highway System is reviewed at least annually, 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 up-to-date record of the Commonwealth's highway system for estimating emissions. This emissions inventory is based on the most current snapshot of the RMS data.

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 120,000 state highway segments for the 67 Pennsylvania counties contained in the RMS. Each of these segments contains an abundance of descriptive data, but only the following information is extracted 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 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. In addition, the traffic volumes must be forecast to support future year emission inventories. Lane values and traffic signals are an important input for determining the congestion and speeds for individual highway segments. Truck percentages are used in the speed determination process and are used to split volumes to individual vehicle types used by the MOVES software.

Road segments are classified by function, as well as whether it is located in an urban, small urban or rural area, as indicated below in Exhibit 3. The PennDOT urban/rural (UR) and functional classes (FC) are important indicators of the type and function of each roadway segment. The variables provide insights into other characteristics not contained in the RMS data that are used for speed and emission calculations.

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Exhibit 3: PennDOT Urban/Rural and Functional Class Codes

Urban/Rural Code	1=Rural 2=Small Urban 3=Urban	
Functional Class	Rural Functional Classes Used For Rural Areas	Urban Functional Classes Used For Small Urban and Urban Areas
	1=Rural Freeway	11=Urban Freeway
	2=Rural Other Principal Arterial	12=Urban Expressway
	6=Rural Minor Arterial	14=Urban Principal Arterial
	7=Rural Major Collector	16=Urban Minor Arterial
	8=Rural Minor Collector	17=Urban Collector
	9=Rural Local	19=Urban Local

Additional Network Information: The PPSUITE software system allows for many additional variables other than those available in the RMS database. Using these variables improves the ability of the Department to incorporate real roadway conditions into its estimates. The variables include information regarding free-flow speeds and capacities, signal characteristics and other physical roadway features that can affect a roadway's calculated congested speed. This data can be determined from lookup tables based on a roadway segment's urban/rural code and functional class. Much of the lookup table data was developed from information contained in the *Highway Capacity Manual*, PennDOT information on speeds and signal densities, and other engineering judgment.

MOVES Traffic Inputs: The PPSUITE software uses RMS traffic data to prepare key inputs to the MOVES emission model including:

- VMT.
- Travel speeds.
- Road type distributions.
- Ramp fractions.

VMT is the primary traffic input that affects 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 CDM.

Emissions for many pollutants (including both VOC and NOx) vary significantly with travel speed. While VOCs generally decrease as speed increases, NOx decreases at the low speed range and increases at higher speeds, as illustrated in Exhibit 4. To obtain the best estimate of vehicle speeds, the Department uses the PPSUITE set of programs, whose primary function is to calculate speeds and to organize and simplify the handling of large amounts of data needed for calculating speeds and for preparing MOVES input files. The PPSUITE software prepares the MOVES vehicle hours of travel (VHT) by speed bin file which summarizes the distribution of speeds across all links into each of 16 MOVES speed bins for each hour of the day. This robust process ensures that MOVES emission rates are used to the fullest extent and is consistent with the methods and recommendations provided in EPA's *Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b*.

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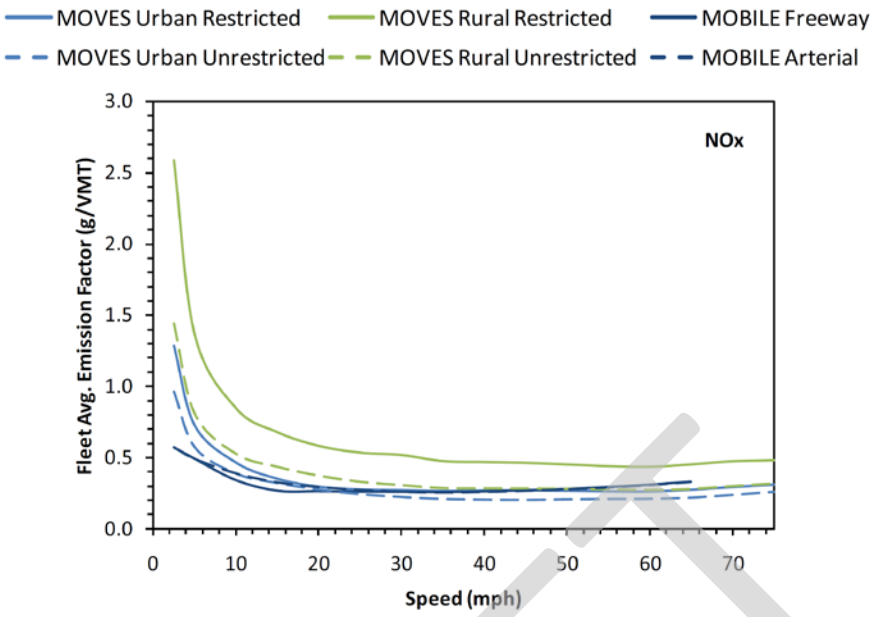
Exhibit 4: Emission Factor vs. Speed Variances (NOx)



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

In MOVES, typical drive cycles and associated operating conditions vary by the type of roadway. MOVES defines five different road types as follows:

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

The off-network road type includes emissions from vehicle starts, extended idle activity, and evaporative emissions. Off-network activity in MOVES is primarily determined by the Source Type Population input, as discussed in a following section. The remaining distribution among road types is determined by equating the PennDOT functional class with each MOVES road type as follows:

- MOVES Road Type (2) = PennDOT Functional Class (1).
- MOVES Road Type (3) = PennDOT Functional Class (2,6,7,8,9).
- MOVES Road Type (4) = PennDOT Functional Class (11,12).
- MOVES Road Type (5) = PennDOT Functional Class (14,16,17,19).

For this inventory, the MOVES road type distribution file is automatically generated by PPSUITE using the defined equivalencies.

Since ramps are not directly represented within the RMS database information, it is assumed that 8% of the Freeway VHT is Ramp VHT. This is consistent with the recommendations provided in EPA's technical guidance.

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Adjustments to Roadway Data

Before the RMS data can be used by PPSUITE for speed and emission calculations, several adjustments and additions must be made to the roadway data. These adjustments are summarized below.

HPMS Adjustments: According to EPA guidance, baseline inventory VMT computed from the RMS highway segment volumes must be adjusted to be consistent with Highway Performance Monitoring System (HPMS) VMT totals. The HPMS VMT reported for Pennsylvania is a subsystem of the RMS established to meet the data reporting requirements of the Federal Highway Administration (FHWA) and to serve as PennDOT's official source of highway information. Although it has some limitations, the HPMS system is currently in use in all 50 states and is being improved under FHWA direction.

Although the HPMS VMT and the roadway data used for an inventory emissions analysis are both based on data from the RMS system, differences do exist between them and include the following. First, the HPMS and inventory roadway data are "snapshots" of the RMS data taken at different times. Since the RMS is dynamic, changing constantly due to new data, differences will result between the data used for calculating HPMS VMT totals and the inventory data used for an emissions analysis. Second, since the RMS does not contain many of the local roadways, local road estimates of HPMS VMT are obtained through alternative procedures developed by PennDOT. To account for such differences, adjustment factors are calculated and used to adjust the inventory roadway data to the reported HPMS VMT totals submitted to FHWA. The VMT contained in the HPMS reports are considered to represent average annual daily traffic (AADT).

Adjustment factors are calculated which adjust the base year RMS download VMT to the reported HPMS totals for that year. These factors are developed for each county and functional class combination and are also applied to all future year runs. Adjustments for the "higher" functional classes (e.g. Freeway, Arterials - major routes) are close to 1.000 since HPMS VMT is derived from RMS information, and the only difference in the data is that the "snapshot" for the emission calculations is taken at a different time than for the HPMS. "Lower" classes (e.g. local roads) require greater adjustment since a large part of the local system is not under state jurisdiction and is not in the RMS database. There is, of course, a significant amount of local road mileage in the state. It is assumed that those local streets that are in RMS are representative of all local streets in their area with respect to volume and speed, so that roadway mileage adjustment is appropriate.

Seasonal Adjustments to Volumes: The RMS contains AADT volumes that are an average of all days in the year, including weekends and holidays. An ozone emission analysis, however, is based on a typical July or summer weekday. PM and CO analyses require volumes representing a typical summer or winter weekday and monthly average conditions (needed for producing annual totals). Therefore, the RMS volumes must be seasonally adjusted. Seasonal factors were developed for each functional class and urban/rural code based on yearly count information prepared by PennDOT's BPR. These factors are applied to the existing RMS AADT volumes to produce the July volumes. The same factors are also used to develop the MOVES daily and monthly VMT fraction files.

Hourly Adjustments: Speeds and emissions vary considerably depending on the time of day. Therefore, it is important to estimate the pattern by which roadway volume varies by hour of the day. The 24-hour pattern data provides PPSUITE with information used to split the daily roadway segment volumes to each of the 24 hours in a day. Pattern data is in the form of a percentage of the daily volumes for each hour. Distributions are provided for each county and functional class grouping. This data is developed from 24-hour count data compiled by PennDOT's BPR, according to the process in the agencies annual traffic data reports. The same factors are also used to develop the MOVES hourly fraction file.

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Vehicle Type Processing

Emission rates within MOVES vary significantly by the type of vehicle. The MOVES model produces emissions and rates by thirteen MOVES vehicle source types. However, VMT is input to MOVES by six HPMS vehicle groups. 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	20	Passenger Car
31	Passenger Truck	30	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 process used for this inventory includes a method to disaggregate the RMS 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 divide the hourly roadway segment volumes to 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 for this inventory 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.
- School bus registration data from PennDOT's Bureau of Motor Vehicles Registration Database.

The vehicle type pattern data is developed for each county and functional class combination. First, RMS truck percentages are averaged for all roadways within a county and functional class grouping. Using this percentage data, the total roadway volume for any segment is divided to auto and truck vehicle type categories. The transit data and school bus data is used to further disaggregate trucks, resulting in four vehicle groups (light-duty, school, transit, and other heavy-duty).

From these groups, MOVES default Pennsylvania county VMT distributions by source type are used to divide the four groups into each of the MOVES source types. PennDOT hourly distributions for trucks and total traffic are used to create source type percentage breakdowns for each hour of the day.

Vehicle Type Capacity Analysis Factors: Vehicle type percentages are provided to the capacity analysis section of PPSUITE to adjust the speeds in response to trucks. That is, a given number of larger trucks take up more roadway space than a given number of cars, and this is accounted for in the speed estimation process by adjusting capacity using information from the *Highway Capacity Manual*.

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Vehicle Fleet and Population Data

The information on the vehicle fleet including the number and age of vehicles has a significant impact on forecasted start and evaporative emissions within MOVES. The MOVES Model requires the population of vehicles by the thirteen source type categories. Pennsylvania county vehicle registration data is used to estimate vehicle population for light-duty vehicles, school buses and transit buses. The data is split to source types using MOVES default Pennsylvania county population data. Other heavy-duty vehicle population values are based on VMT for each source type using the vehicle mix and pattern data discussed previously. The PPSUITE software automatically applies default MOVES 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.

Vehicle Age: Vehicle age distributions are input to MOVES for each county by the thirteen source types. The distributions reflect the percentage of vehicles in the fleet up to 31 years old. The most recent available registration download from PennDOT's Bureau of Motor Vehicles Registration Database has been used for the inventory. Due to insufficient data, only information for light-duty vehicles are used as local inputs; and, heavy-duty vehicles use the MOVES2010 national default age distribution. The registration data download is based on MOBILE6.2 vehicle categories. As a result, the data was converted to source types using the EPA convertor spreadsheets provided with the MOVES emission model.

Environmental, Fuel and Technology Assumptions

Information on environmental, fuel, vehicle technology and other control strategy assumptions were determined based on a review of MOVES2010b default information by the PaDEP.

Fuel Parameters: The same vehicle will produce different emissions using a different type of gasoline. Fuel control strategies can be powerful emission reduction mechanisms. The MOVES2010b default fuel formulation and fuel supply data were reviewed and updated based on available local volumetric fuel property information. The gasohol market penetration and RVP values were updated but MOVES2010b default data was used for the remaining parameters.

Refueling Emissions: MOVES also allows users to calculate refueling emissions, the emissions created when vehicles are refueled at service stations. Pennsylvania includes refueling emissions in its area source inventory and not in its highway vehicle inventory. Refueling emissions are not included in the highway emissions inventory.

Vehicle Emission Inspection/Maintenance (I/M) Parameters: MOVES allows users to vary inputs depending on the I/M program in place for the area. The inputs include:

- Program start year.
- Stringency level.
- First and last model years subject to the program.
- Waiver rates.
- Compliance rates.
- Program type (test-only, test-and-repair, etc.) and effectiveness.
- Frequency of inspection (annual, biennial).
- Vehicle type coverage.
- Test type (idle, loaded, etc.)

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The MOVES default Pennsylvania assumptions were reviewed and modifications were made per actual program parameters.

Environmental Variables: Ambient temperature and humidity are known to have a significant impact on most pollutant processes for on-road vehicles. In MOVES2010, temperature and humidity affect emissions through three mechanisms: 1) direct effect via a temperature adjustment on emission rates; 2) direct effect via a humidity correction factor for NOx; 3) indirect effect via an air conditioning adjustment for which temperature and relative humidity are used to populate a heat index which in turn is used to calculate the fraction of vehicle fleet with air conditioning turned on. Hourly temperatures have been compiled for each county based on information from WeatherBank, Inc. to specify temperatures from nine airports within the state. Ozone analysis temperature and humidity values were determined using the procedures documented in EPA's technical guidance. Minimum and maximum temperatures for each month were converted to hourly temperatures using EPA convertors supplied with the MOVES model.

A summary of the MOVES related inputs used for the inventory and future year estimates are attached with the submission.

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SPEED/EMISSION ESTIMATION PROCEDURE

The previous sections have summarized the input data used for computing speeds and emissions for Pennsylvania. This section explains how PPSUITE and MOVES uses that input data to produce emission estimates. Exhibit 6 summarizes PPSUITE's analysis procedure used for each of the RMS highway segments in the state.

Producing an emissions inventory with PPSUITE requires a process of disaggregation and aggregation. Data is available and used on a very small scale -- individual ½ mile roadway segments 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 input VMT to the MOVES emission model.

Volume/VMT Development

Before speeds can be calculated and MOVES run, volumes acquired from RMS must be adjusted and disaggregated. Such adjustments include factoring to future years, seasonal adjustments, and disaggregating daily volumes to each hour of the day and to each of the thirteen MOVES source types.

Determine Future Year Volumes: The RMS database contains up-to-date current year volumes. However, to conduct a future year analysis, these volumes must be factored to the year being analyzed. Growth factors have been prepared for each county and functional class grouping. These growth factors are applied to the base year RMS volumes to obtain future year estimates that can be utilized by PPSUITE. For this base year inventory, forecasting was not required.

Example:

A typical freeway link in the RMS database is I-80 segment 2500 in Luzerne County, Pennsylvania. This link has an urban/rural code=1 which indicates the link is in a rural area, and a functional class=1 indicating a rural freeway.

The average annual daily traffic (AADT) from the RMS database for this link in 2008 is 12,077 vehicles/day.

Growth factors have been developed to factor the 2008 volume to future years. For example, to factor the 2008 volume to the year 2014, a growth factor of 1.282 would yield:

2014 volume = 12,077 vehicles/day x 1.282 = 15,483 vehicles/day

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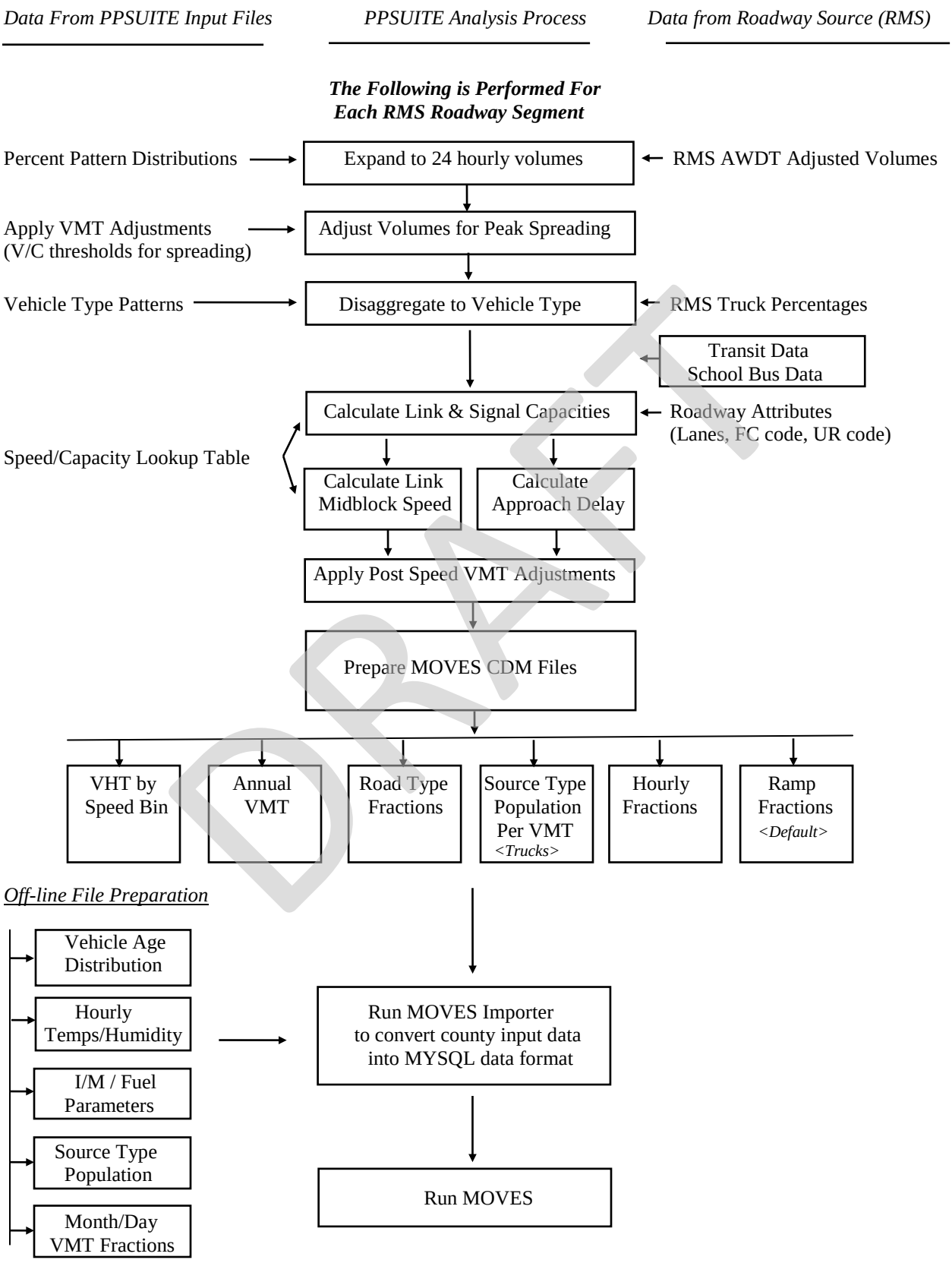
Exhibit 6: PPSUITE Speed / Emission Estimation Procedure



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Seasonal Adjustments: PPSUITE takes the input daily volumes from RMS (which represents annual average daily traffic (AADT)) and seasonally adjusts the volumes to an average weekday in July. This adjustment utilizes factors developed for each functional class and urban/rural code. VMT can then be calculated for each link using the adjusted weekday volumes.

Example:

Again, assume the rural freeway link: I-80 segment 2500 in Luzerne County, Pennsylvania. The AADT for this link in 2008 is 12,077 vehicles/day.

Seasonal factors have been developed for urban/rural code and functional class combinations. For an urban/rural code=1 and a functional class=1, the factor to convert from AADT to an average weekday in July is = 1.15.

Average Weekday July Volume = 12,077 x 1.15 = 13,889 vehicles/day.

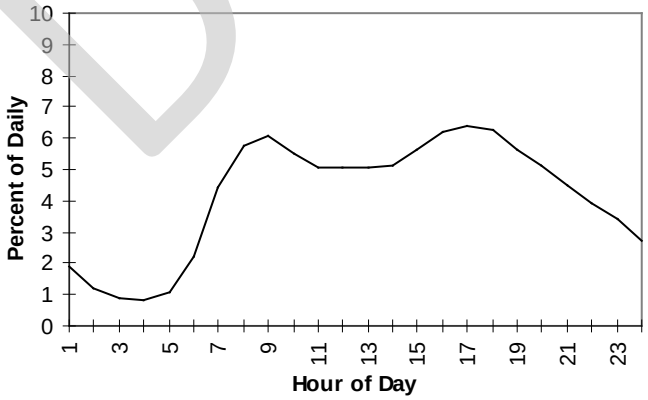
Total VMT (daily) for this link is calculated as volume x distance. The distance of this link as obtained from RMS is 0.296 miles.

2008 VMT = 13,889 vehicles/day x 0.296 miles = 4,111 vehicle-miles / day.

Disaggregation to 24 Hours: After seasonally adjusting the link volume, the volume is split 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 the MOVES model.

Example:

To support speed calculations and emission estimates by time of day, the July weekday volume is disaggregated to 24 hourly volumes. Temporal patterns were previously developed from PennDOT count data and input to PPSUITE. For the I-80 rural freeway link with morning peak volumes similar to evening peak hours (neutral), the following temporal pattern is applied:



Using the I-80 segment, typical hourly volumes which result include:

8-9 a.m.	6.0% x (4,111 vehicle miles/ 0.296mi.) = 833 vehicles/hour (vph)
12-1 p.m.	5.0% x (4,111 vehicle .miles/ 0.296mi.) = 694 vph
5-6 p.m.	6.3% x (4,111 vehicle miles/ 0.296mi.) = 875 vph

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After dividing 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.

Disaggregation to Vehicle Type: EPA requires VMT estimates to be prepared by source type, reflecting specific local characteristics. As a result, for Pennsylvania's emission inventory runs, the hourly volumes are disaggregated to the thirteen MOVES source types based on count data assembled by PennDOT in combination with MOVES defaults.

Example:

Disaggregation of the total I-80 VMT to the various source types would include the following:

Total Volume 8-9 am = 833 vph

Source Type Volume 8-9 am:

Motorcycle	11	0.5%	4 vph
Passenger Car	21	54.7%	456 vph
Passenger Truck	31	27.9%	232 vph
Light Commercial Truck	32	9.3%	78 vph
Intercity Bus	41	0.1%	1 vph
Transit Bus	42	0.1%	1 vph
School bus	43	0.1%	1 vph
Refuse Truck	51	0.0%	0 vph
Single Unit Short-haul Truck	52	2.2%	19 vph
Single Unit Long-haul Truck	53	0.3%	2 vph
Motor Home	54	0.1%	1 vph
Combination Short-haul Truck	61	1.9%	16 vph
Combination Long-haul Truck	62	2.6%	22 vph

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Speed/Delay Determination

EPA recognizes that the estimation of vehicle speeds is a difficult and complex process. Because emissions are so sensitive to speeds, it recommends special attention be given to developing reasonable and consistent speed estimates; it also recommends that VMT be disaggregated into subsets that have roughly equal speed, 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 that recommendation. Speeds are individually calculated for each roadway segment and hour and include the delays encountered at signals. 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 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 model runs, distributions of speeds are input to MOVES by road type and source type by each hour of the day; VMT and VHT is accumulated by the same groupings for the application of the emission factors to produce resulting emission totals.

To calculate speeds, PPSUITE first obtains initial capacities (how much volume the roadway can serve before heavy congestion) and free-flow speeds (speeds assuming no congestion) from the speed/capacity lookup data. As described in previous sections, this data contains default roadway information indexed by the urban/rural code and functional class. For areas with known characteristics, values can be directly coded to the RMS database and the speed/capacity data can be overridden. However, for most areas where known information is not available, the speed/capacity lookups provide valuable default information regarding speeds, capacities, signal characteristics, and other capacity adjustment information used for calculating congested delays and speeds. An effort has been made to enhance the RMS data with traffic signal locations using other GIS signal data available from PennDOT's Bureau of Highway Safety and Traffic Engineering.

Example:

The speed/capacity lookup table is used to obtain important data used for link speed calculations. For the I-80 link with an urban/rural code = 1 (rural) and a functional class = 1 (freeway), the lookup table provides information including the following:

freeflow speed = 65 mph
capacity = 1800 vph per lane
number of signals = 0 (per RMS linkage to GIS traffic signal locations)

This information is used along with the physical characteristics of the roadway to calculate the delay (including congestion) to travel this link during each hour of the day:

For example: The I-80 link is calculated to have a travel time, including delay of 17.76 seconds for the 8-9am hour.

Total travel time, in vehicle hours, for the 8-9am hour is calculated as:

VHT (8-9am) = 17.76 seconds x 833vph / 3600 sec/hr = 4.12 vehicle hours.

The result of this process is an estimated average travel time for each hour of the day for each highway segment. The average time can be multiplied by the volume to produce vehicle hours of travel (VHT).

HPMS and VMT Adjustments

Volumes must also be adjusted to account for differences with the HPMS VMT totals, as described previously. VMT adjustment factors are provided as input to PPSUITE, and are applied to each of the roadway segment volumes. These factors were developed from the latest HPMS download (conducted triennially); however, they are also applied to any future year runs. The VMT added or subtracted to the RMS database assumes the speeds calculated using the original volumes for each roadway segment for each hour of the day.

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Example:

Using the Luzerne County I-80 rural freeway link example, the daily assigned volume is adjusted to account for reconciliation with the HPMS VMT. RMS VMT (in AADT) for Luzerne County rural freeways totals 962,559 vehicle miles in 2008. HPMS VMT (in AADT) as supplied by PennDOT and reported to FHWA totals to 990,088 vehicle miles for the rural freeways. A factor is developed by dividing the HPMS VMT by the RMS VMT:

HPMS adjustment factor for Luzerne County rural freeways = 990,088 / 962,559 = 1.029.

This factor is held constant in all future years. As an example, this adjustment is made to the I-80 freeway link VMT for the 8-9am hour after speed calculations are made, and produces the final July weekday VMT for this hour used for Ozone runs.

I-80 Link VMT (8-9am) = 833vph x 0.296 miles x 1.029 = 254 vehicle miles/hour.

MOVES Emissions Run

After computing speeds and aggregating VMT and VHT, PPSUITE prepares traffic-related inputs needed to run EPA's MOVES software, which is used to estimate emission factors in grams of pollutant per vehicle mile and to produce total emissions based on input VMT to the model. The process uses MOVES2010b, the officially released emissions model that was obtained directly from EPA.

The MOVES inputs prepared by PPSUITE include the following:

- Vehicle Type VMT.
- Vehicle Population.
- VMT fractions.
- Average speed distributions.
- Road Type Distribution.
- Ramp Fractions.

These files are text formatted files with a *.csv extension. The files are provided as inputs within the MOVES county data importer. In addition the remaining MOVES input data including temperatures, I/M programs, fuel and vehicle ages are prepared manually outside of the PPSUITE process.

The MOVES county importer is run in batch mode. This program converts all data files into the MYSQL formats 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. MOVES is then executed in batch mode.

MOVES can be executed using either the *inventory* or *rate-based* approaches. For this highway emissions inventory, MOVES is applied using the *inventory-based* approach. Under this method, actual VMT and population are provided as inputs to the model; MOVES is responsible for producing the total emissions for the region. Under the rate-based approach, MOVES would produce emission factors, after which PPSUITE would apply the emission factors to the link data and calculate total regional emissions.

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RESOURCES

MOVES model

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

Policy Guidance on the Use of MOVES2010 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes, US EPA Office of Transportation and Air Quality, EPA-420-B-12-010, April 2012.

Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2010, 2010a and 2010b. US EPA Office of Transportation and Air Quality, EPA-420-B-12-028, April 2012.

Motor Vehicle Emission Simulator (MOVES) – User Guide for MOVES2010b, US EPA Office of Transportation and Air Quality, EPA-420-B-12-001b, June 2012.

Traffic Engineering

Highway Capacity Manual, Transportation Research Board, presents current knowledge and techniques for analyzing the transportation system.

Traffic Data Collection and Factor Development Report, 2011 Data, Pennsylvania Department of Transportation, Bureau of Planning and Research.

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Highway Vehicle Inventory Glossary

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

AWDT: Average Weekday Daily Traffic.

Basic emission rates: MOBILE emission rates based on the applicable Federal emission standards and the emission control technologies characterizing the fleet in various model years.

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

FC: Functional code, applied in data management to road segments to identify their type (freeway, local, etc.).

Fuel volatility: The ability of fuel components to evaporate, thus entering the atmosphere as pollution. Fuel volatility is usually measured as Reid Vapor Pressure (RVP) in pounds per square inch. The lower the RVP, the less volatile the fuel.

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

HPMS: Highway Performance Monitoring System, PENNDOT's official source of highway information and a subset of RMS.

I/M: Vehicle emissions inspection/maintenance 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.

MOBILE: The model EPA has developed and which Pennsylvania uses to estimate emissions from highway vehicles.

MOVES: The latest model EPA has developed with which Pennsylvania uses to estimate emissions from highway vehicles.

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 processes MOBILE emission rates.

RMS: Roadway Management System, a database maintained by PENNDOT from traffic counts and field visits.

Segment (also referred to as link): Division of roadway in the PENNDOT Roadway Management System. Usually represents 0.5 mile segments of roadway.

UR: Urban/rural code, applied in data management to identify whether a road segment is urban, small urban or rural.

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VHT: Vehicle hours traveled.

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

Vehicle Type: One of eight types, distinguished primarily by fuel type and/or weight, used in MOBILE modeling.

Source Type: One of thirteen types, distinguished primarily by weight, used in MOVES modeling.

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

County Data Manager: 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.

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APPENDIX D-2

Emission Results

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APPENDIX D-2-1
Allentown-Bethlehem-Easton Area Emission Summary Tables

Appendix D-2-1-1
2011 July Weekday Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

Appendix D-2-1-2
2011 Annual Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

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Appendix D-2-1-1

2011 Allentown-Bethlehem-Easton Area Area Emission Summary

Summer Weekday (Tons/Day)

County	VMT	Speed (mph)	VOC	NOX	CO
Lehigh	9,251,839	40.9	8.24	17.13	85.53
Northampton	6,306,177	39.7	7.00	14.04	65.30
Lehigh Valley MPO	15,558,016	-	15.24	31.17	150.83
Carbon	2,387,690	46.3	1.94	4.39	21.76

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Appendix D-2-1-1
2011 Allentown-Bethlehem-Easton Area Emission Summary by Road Type
Summer Weekday (Tons/Day)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Lehigh	Off-Network	-	-	5.39	3.62	30.65
	Rural Restricted Access	298,962	64.82348912	0.08	0.68	1.87
	Rural Unrestricted Access	648,919	42.59254052	0.19	0.92	3.41
	Urban Restricted Access	3,316,660	56.08611836	0.87	4.96	21.46
	Urban Unrestricted Access	4,987,297	33.81275214	1.71	6.95	28.15
	Total	***9,251,839***		***8.24***	***17.13***	***85.53***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Northampton	Off-Network	-	-	4.97	3.36	28.33
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	763,892	46.56189936	0.21	1.09	3.91
	Urban Restricted Access	2,227,709	56.8719825	0.62	4.85	13.93
	Urban Unrestricted Access	3,314,576	32.15179852	1.19	4.74	19.12
	Total	***6,306,177***		***7.00***	***14.04***	***65.30***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Carbon	Off-Network	-	-	1.25	0.85	7.16
	Rural Restricted Access	1,113,829	64.89380015	0.28	1.68	7.40
	Rural Unrestricted Access	799,013	37.1415114	0.26	1.19	4.47
	Urban Restricted Access	31,845	59.79114797	0.01	0.04	0.21
	Urban Unrestricted Access	443,003	35.70416377	0.15	0.63	2.51
	Total	***2,387,690***		***1.94***	***4.39***	***21.76***

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Appendix D-2-1-1
2011 Allentown-Bethlehem-Easton Area Emission Summary by Source Type
Summer Weekday (Tons/Day)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lehigh	Motorcycle	49,795	0.5%	0.29	3.5%	0.04	0.2%	0.81	1.0%
	Passenger Car	5,016,615	54.2%	2.12	25.8%	3.11	18.1%	22.08	25.8%
	Passenger Truck	2,640,306	28.5%	3.98	48.3%	6.01	35.1%	43.14	50.4%
	Light Commercial Truck	893,392	9.7%	1.28	15.6%	2.25	13.2%	13.95	16.3%
	Intercity Bus	6,210	0.1%	0.00	0.0%	0.09	0.5%	0.03	0.0%
	Transit Bus	13,641	0.1%	0.01	0.1%	0.15	0.9%	0.13	0.2%
	School Bus	5,605	0.1%	0.01	0.1%	0.04	0.2%	0.12	0.1%
	Refuse Truck	4,595	0.0%	0.00	0.0%	0.04	0.2%	0.02	0.0%
	Single Unit Short-haul Truck	202,859	2.2%	0.19	2.3%	0.89	5.2%	3.18	3.7%
	Single Unit Long-haul Truck	28,540	0.3%	0.02	0.3%	0.11	0.7%	0.32	0.4%
	Motor Home	12,229	0.1%	0.02	0.3%	0.06	0.4%	0.38	0.4%
	Combination Short-haul Truck	157,402	1.7%	0.07	0.9%	1.52	8.9%	0.44	0.5%
	Combination Long-haul Truck	220,650	2.4%	0.23	2.8%	2.82	16.5%	0.93	1.1%
	Total	***9,251,839***	***100.0%***	***8.24***	***100.0%***	***17.13***	***100.0%***	***85.53***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Northampton	Motorcycle	32,628	0.5%	0.25	3.6%	0.02	0.2%	0.54	0.8%
	Passenger Car	3,287,114	52.1%	1.79	25.6%	2.26	16.1%	16.04	24.6%
	Passenger Truck	1,730,056	27.4%	3.33	47.6%	4.37	31.1%	32.44	49.7%
	Light Commercial Truck	585,384	9.3%	1.07	15.2%	1.63	11.6%	10.65	16.3%
	Intercity Bus	7,950	0.1%	0.00	0.1%	0.11	0.8%	0.03	0.1%
	Transit Bus	11,370	0.2%	0.01	0.1%	0.13	0.9%	0.11	0.2%
	School Bus	6,257	0.1%	0.01	0.1%	0.05	0.3%	0.11	0.2%
	Refuse Truck	4,775	0.1%	0.00	0.0%	0.04	0.3%	0.02	0.0%
	Single Unit Short-haul Truck	208,999	3.3%	0.19	2.8%	0.90	6.4%	3.27	5.0%
	Single Unit Long-haul Truck	29,437	0.5%	0.02	0.3%	0.12	0.8%	0.33	0.5%
	Motor Home	12,599	0.2%	0.02	0.3%	0.06	0.5%	0.39	0.6%
	Combination Short-haul Truck	162,231	2.6%	0.07	1.0%	1.53	10.9%	0.45	0.7%
	Combination Long-haul Truck	227,376	3.6%	0.23	3.2%	2.83	20.1%	0.92	1.4%
	Total	***6,306,177***	***100.0%***	***7.00***	***100.0%***	***14.04***	***100.0%***	***65.30***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Carbon	Motorcycle	12,933	0.5%	0.06	3.2%	0.01	0.2%	0.22	1.0%
	Passenger Car	1,302,961	54.6%	0.54	27.6%	0.88	20.1%	6.16	28.3%
	Passenger Truck	685,917	28.7%	0.92	47.5%	1.56	35.6%	10.70	49.2%
	Light Commercial Truck	231,887	9.7%	0.29	15.2%	0.57	13.0%	3.39	15.6%
	Intercity Bus	1,012	0.0%	0.00	0.0%	0.01	0.3%	0.00	0.0%
	Transit Bus	1,899	0.1%	0.00	0.1%	0.02	0.5%	0.02	0.1%
	School Bus	792	0.0%	0.00	0.1%	0.01	0.1%	0.02	0.1%
	Refuse Truck	1,088	0.0%	0.00	0.0%	0.01	0.2%	0.00	0.0%
	Single Unit Short-haul Truck	48,676	2.0%	0.04	2.3%	0.21	4.8%	0.75	3.5%
	Single Unit Long-haul Truck	6,871	0.3%	0.00	0.2%	0.03	0.6%	0.08	0.3%
	Motor Home	2,931	0.1%	0.01	0.3%	0.02	0.3%	0.09	0.4%
	Combination Short-haul Truck	37,769	1.6%	0.02	0.8%	0.37	8.5%	0.10	0.5%
	Combination Long-haul Truck	52,953	2.2%	0.05	2.7%	0.69	15.6%	0.21	1.0%
	Total	***2,387,690***	***100.0%***	***1.94***	***100.0%***	***4.39***	***100.0%***	***21.76***	***100.0%***

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Appendix D-2-1-1
2011 Allentown-Bethlehem-Easton Area Emission Summary by Process
Summer Weekday (Tons/Day)

County	Emission Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lehigh	Running Exhaust	2.13	25.8%	13.51	78.8%	54.87	64.2%
	Start Exhaust	3.09	37.5%	3.03	17.7%	30.36	35.5%
	Evap Permeation	0.75	9.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	1.59	19.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.48	5.9%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.03	0.4%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.04	0.5%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.13	1.5%	0.60	3.5%	0.29	0.3%
	Total	***8.24***	***100.0%***	***17.13***	***100.0%***	***85.53***	***100.0%***

County	Emission Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Northampton	Running Exhaust	1.53	21.8%	10.68	76.0%	36.96	56.6%
	Start Exhaust	2.84	40.5%	2.78	19.8%	28.05	43.0%
	Evap Permeation	0.68	9.8%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	1.35	19.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.41	5.9%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.02	0.3%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.04	0.5%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.12	1.8%	0.58	4.1%	0.28	0.4%
	Total	***7.00***	***100.0%***	***14.04***	***100.0%***	***65.30***	***100.0%***

County	Emission Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Carbon	Running Exhaust	0.54	27.6%	3.54	80.6%	14.60	67.1%
	Start Exhaust	0.76	39.2%	0.71	16.2%	7.10	32.6%
	Evap Permeation	0.15	7.6%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	0.35	17.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.10	5.4%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.01	0.4%	0.00	0.0%	0.00	0.0%
	Crankcase Start Exhaust	0.01	0.5%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.03	1.5%	0.14	3.2%	0.06	0.3%
	Total	***1.94***	***100.0%***	***4.39***	***100.0%***	***21.76***	***100.0%***

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Appendix D-2-1-2
2011 Allentown-Bethlehem-Easton Area Area Emission Summary
Annual (Tons/Year)

County	VMT	Speed (mph)	VOC	NOX	CO
Lehigh	2,988,096,138	42.1	2938.97	6154.43	37317.95
Northampton	2,046,098,683	40.5	2524.35	5086.83	30028.04
Lehigh Valley MPO	5,034,194,821	-	5463.32	11241.26	67345.98
Carbon	772,100,241	46.3	706.66	1592.35	9454.14

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Appendix D-2-1-2
2011 Allentown-Bethlehem-Easton Area Emission Summary by Road Type
Annual (Tons/Year)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Lehigh	Off-Network	-	-	2,048.92	1,402.04	19,416.77
	Rural Restricted Access	96,314,786	64.91911342	24.94	246.79	611.17
	Rural Unrestricted Access	210,428,358	42.85132497	60.98	328.90	1,126.01
	Urban Restricted Access	1,055,992,705	57.69505107	268.36	1,778.58	6,901.82
	Urban Unrestricted Access	1,625,360,287	35.08715246	535.77	2,398.12	9,262.17
	Total	***2,988,096,138***		***2,938.97***	***6,154.43***	***37,317.95***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Northampton	Off-Network	-	-	1,885.77	1,304.33	17,870.29
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	248,441,874	46.79265469	67.55	388.09	1,292.72
	Urban Restricted Access	709,330,489	57.67880162	194.82	1,743.32	4,505.19
	Urban Unrestricted Access	1,088,326,320	33.09706451	376.21	1,651.09	6,359.84
	Total	***2,046,098,683***		***2,524.35***	***5,086.83***	***30,028.04***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Carbon	Off-Network	-	-	484.27	329.15	4,541.11
	Rural Restricted Access	358,846,806	64.89525101	88.22	606.53	2,467.58
	Rural Unrestricted Access	258,650,742	37.21297761	84.06	419.14	1,520.83
	Urban Restricted Access	10,138,855	59.79114174	2.46	12.62	70.11
	Urban Unrestricted Access	144,463,838	36.00571544	47.65	224.92	854.51
	Total	***772,100,241***		***706.66***	***1,592.35***	***9,454.14***

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Appendix D-2-1-2

2011 Allentown-Bethlehem-Easton Area Emission Summary by Source Type

Annual (Tons/Year)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lehigh	Motorcycle	16,085,844	0.5%	80.48	2.7%	15.09	0.2%	398.27	1.1%
	Passenger Car	1,620,586,580	54.2%	844.85	28.7%	1,112.77	18.1%	11,251.83	30.2%
	Passenger Truck	852,934,440	28.5%	1,388.42	47.2%	2,136.88	34.7%	17,927.42	48.0%
	Light Commercial Truck	288,604,969	9.7%	449.98	15.3%	793.16	12.9%	5,833.32	15.6%
	Intercity Bus	1,816,899	0.1%	1.14	0.0%	29.25	0.5%	7.85	0.0%
	Transit Bus	4,527,742	0.2%	3.37	0.1%	56.95	0.9%	43.69	0.1%
	School Bus	1,860,327	0.1%	2.71	0.1%	16.20	0.3%	42.00	0.1%
	Refuse Truck	1,478,506	0.0%	0.72	0.0%	13.94	0.2%	6.84	0.0%
	Single Unit Short-haul Truck	65,322,029	2.2%	58.02	2.0%	323.96	5.3%	1,108.15	3.0%
	Single Unit Long-haul Truck	9,199,039	0.3%	6.56	0.2%	41.41	0.7%	117.56	0.3%
	Motor Home	3,935,589	0.1%	7.05	0.2%	23.55	0.4%	147.80	0.4%
	Combination Short-haul Truck	50,692,787	1.7%	23.09	0.8%	548.50	8.9%	141.14	0.4%
	Combination Long-haul Truck	71,051,388	2.4%	72.58	2.5%	1,042.78	16.9%	292.06	0.8%
	Total	***2,988,096,138***	***100.0%***	***2,938.97***	***100.0%***	***6,154.43***	***100.0%***	***37,317.95***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Northampton	Motorcycle	10,597,056	0.5%	67.65	2.7%	9.99	0.2%	278.41	0.9%
	Passenger Car	1,067,612,490	52.2%	726.69	28.8%	817.64	16.1%	8,967.40	29.9%
	Passenger Truck	561,899,430	27.5%	1,175.06	46.5%	1,561.63	30.7%	14,168.03	47.2%
	Light Commercial Truck	190,124,980	9.3%	378.87	15.0%	579.23	11.4%	4,669.84	15.6%
	Intercity Bus	2,348,746	0.1%	1.44	0.1%	37.34	0.7%	9.76	0.0%
	Transit Bus	3,796,036	0.2%	2.79	0.1%	48.19	0.9%	35.86	0.1%
	School Bus	2,088,938	0.1%	2.71	0.1%	17.77	0.3%	40.46	0.1%
	Refuse Truck	1,522,472	0.1%	0.73	0.0%	14.14	0.3%	6.91	0.0%
	Single Unit Short-haul Truck	67,247,719	3.3%	58.82	2.3%	331.32	6.5%	1,141.99	3.8%
	Single Unit Long-haul Truck	9,470,230	0.5%	6.64	0.3%	42.52	0.8%	121.58	0.4%
	Motor Home	4,053,974	0.2%	7.16	0.3%	24.30	0.5%	152.87	0.5%
	Combination Short-haul Truck	52,187,207	2.6%	23.27	0.9%	554.26	10.9%	142.19	0.5%
	Combination Long-haul Truck	73,149,406	3.6%	72.52	2.9%	1,048.50	20.6%	292.74	1.0%
	Total	***2,046,098,683***	***100.0%***	***2,524.35***	***100.0%***	***5,086.83***	***100.0%***	***30,028.04***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Carbon	Motorcycle	4,181,966	0.5%	17.11	2.4%	4.12	0.3%	104.57	1.1%
	Passenger Car	421,317,211	54.6%	214.91	30.4%	319.88	20.1%	3,022.59	32.0%
	Passenger Truck	221,793,563	28.7%	328.41	46.5%	562.51	35.3%	4,453.85	47.1%
	Light Commercial Truck	74,981,666	9.7%	105.57	14.9%	204.41	12.8%	1,424.78	15.1%
	Intercity Bus	305,127	0.0%	0.19	0.0%	5.05	0.3%	1.38	0.0%
	Transit Bus	632,083	0.1%	0.49	0.1%	8.15	0.5%	6.53	0.1%
	School Bus	263,736	0.0%	0.47	0.1%	2.51	0.2%	7.97	0.1%
	Refuse Truck	353,046	0.0%	0.17	0.0%	3.43	0.2%	1.63	0.0%
	Single Unit Short-haul Truck	15,747,875	2.0%	13.70	1.9%	77.91	4.9%	264.24	2.8%
	Single Unit Long-haul Truck	2,220,764	0.3%	1.54	0.2%	9.90	0.6%	27.86	0.3%
	Motor Home	950,613	0.1%	1.65	0.2%	5.77	0.4%	36.27	0.4%
	Combination Short-haul Truck	12,211,006	1.6%	5.43	0.8%	134.83	8.5%	33.49	0.4%
	Combination Long-haul Truck	17,141,586	2.2%	17.00	2.4%	253.88	15.9%	68.98	0.7%
	Total	***772,100,241***	***100.0%***	***706.66***	***100.0%***	***1,592.35***	***100.0%***	***9,454.14***	***100.0%***

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Appendix D-2-1-2
2011 Allentown-Bethlehem-Easton Area Emission Summary by Process
Annual (Tons/Year)

County	Emission Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lehigh	Running Exhaust	668.01	22.7%	4,751.48	77.2%	17,897.48	48.0%
	Start Exhaust	1,499.46	51.0%	1,163.71	18.9%	19,324.03	51.8%
	Evap Permeation	136.35	4.6%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	399.67	13.6%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	165.89	5.6%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	9.29	0.3%	0.91	0.0%	3.70	0.0%
	Crankcase Start Exhaust	19.81	0.7%	0.04	0.0%	2.52	0.0%
	Crankcase Extended Idle Exhaust	0.61	0.0%	0.07	0.0%	0.16	0.0%
	Extended Idle Exhaust	39.88	1.4%	238.22	3.9%	90.06	0.2%
	Total	***2,938.97***	***100.0%***	***6,154.43***	***100.0%***	***37,317.95***	***100.0%***

County	Emission Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Northampton	Running Exhaust	484.06	19.2%	3,781.64	74.3%	12,154.84	40.5%
	Start Exhaust	1,375.80	54.5%	1,068.67	21.0%	17,778.56	59.2%
	Evap Permeation	124.95	4.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	331.71	13.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	142.64	5.7%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	6.88	0.3%	0.87	0.0%	2.91	0.0%
	Crankcase Start Exhaust	18.18	0.7%	0.04	0.0%	2.33	0.0%
	Crankcase Extended Idle Exhaust	0.61	0.0%	0.07	0.0%	0.16	0.0%
	Extended Idle Exhaust	39.52	1.6%	235.55	4.6%	89.24	0.3%
	Total	***2,524.35***	***100.0%***	***5,086.83***	***100.0%***	***30,028.04***	***100.0%***

County	Emission Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Carbon	Running Exhaust	171.50	24.3%	1,262.98	79.3%	4,912.08	52.0%
	Start Exhaust	368.77	52.2%	273.29	17.2%	4,519.54	47.8%
	Evap Permeation	27.28	3.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	86.51	12.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	35.93	5.1%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	2.37	0.3%	0.22	0.0%	0.95	0.0%
	Crankcase Start Exhaust	4.87	0.7%	0.01	0.0%	0.59	0.0%
	Crankcase Extended Idle Exhaust	0.14	0.0%	0.02	0.0%	0.04	0.0%
	Extended Idle Exhaust	9.28	1.3%	55.83	3.5%	20.95	0.2%
	Total	***706.66***	***100.0%***	***1,592.35***	***100.0%***	***9,454.14***	***100.0%***

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APPENDIX D-2-2
Lancaster County Emission Summary Tables

Appendix D-2-2-1
2011 July Weekday Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

Appendix D-2-2-2
2011 Annual Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

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Appendix D-2-2-1
2011 Lancaster County Emission Summary
Summer Weekday (Tons/Day)

County	VMT	Speed (mph)	VOC	NOX	CO
Lancaster	12,789,519	43.2	11.99	24.42	121.03

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Appendix D-2-2-1

2011 Lancaster County Emission Summary by Road Type
Summer Weekday (Tons/Day)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Lancaster	Off-Network	-	-	8.15	5.43	45.08
	Rural Restricted Access	1,504,295	65.0	0.35	1.48	10.45
	Rural Unrestricted Access	3,154,301	46.5	0.89	4.95	16.50
	Urban Restricted Access	2,629,352	53.9	0.72	4.40	17.54
	Urban Unrestricted Access	5,501,572	35.3	1.87	8.18	31.47
	Total	***12,789,519***		***11.99***	***24.42***	***121.03***

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Appendix D-2-2-1

2011 Lancaster County Emission Summary by Source Type

Summer Weekday (Tons/Day)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lancaster	Motorcycle	68,232	0.5%	0.43	3.5%	0.05	0.2%	1.12	0.9%
	Passenger Car	6,874,134	53.7%	3.08	25.7%	4.30	17.6%	30.64	25.3%
	Passenger Truck	3,617,944	28.3%	5.76	48.1%	8.36	34.2%	61.02	50.4%
	Light Commercial Truck	1,224,187	9.6%	1.85	15.4%	3.11	12.7%	19.82	16.4%
	Intercity Bus	8,475	0.1%	0.01	0.0%	0.12	0.5%	0.04	0.0%
	Transit Bus	15,047	0.1%	0.01	0.1%	0.15	0.6%	0.14	0.1%
	School Bus	4,434	0.0%	0.01	0.1%	0.03	0.1%	0.10	0.1%
	Refuse Truck	7,194	0.1%	0.00	0.0%	0.06	0.2%	0.03	0.0%
	Single Unit Short-haul Truck	316,435	2.5%	0.30	2.5%	1.34	5.5%	4.89	4.0%
	Single Unit Long-haul Truck	44,555	0.3%	0.03	0.3%	0.17	0.7%	0.49	0.4%
	Motor Home	19,074	0.1%	0.04	0.3%	0.09	0.4%	0.56	0.5%
	Combination Short-haul Truck	245,620	1.9%	0.11	0.9%	2.32	9.5%	0.70	0.6%
	Combination Long-haul Truck	344,188	2.7%	0.36	3.0%	4.33	17.7%	1.47	1.2%
	Total	***12,789,519***	***100.0%***	***11.99***	***100.0%***	***24.42***	***100.0%***	***121.03***	***100.0%***

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Appendix D-2-2-1
2011 Lancaster County Emission Summary by Process
Summer Weekday (Tons/Day)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lancaster	Running Exhaust	2.90	24.2%	18.99	77.8%	75.94	62.7%
	Start Exhaust	4.58	38.2%	4.51	18.4%	44.61	36.9%
	Evap Permeation	1.20	10.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	2.30	19.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.70	5.8%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.04	0.3%	0.00	0.0%	0.02	0.0%
	Crankcase Start Exhaust	0.06	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.20	1.7%	0.92	3.8%	0.46	0.4%
	Total	***11.99***	***100.0%***	***24.42***	***100.0%***	***121.03***	***100.0%***

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Appendix D-2-2-2
2011 Lancaster County Emission Summary
Annual (Tons/Year)

County	VMT	Speed (mph)	VOC	NOX	CO
Lancaster	4,150,294,966	44.2	4233.63	8879.12	52716.37

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Appendix D-2-2-2

2011 Lancaster County Emission Summary by Road Type

Annual (Tons/Year)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Lancaster	Off-Network	-	-	3,028.27	2,109.23	28,380.46
	Rural Restricted Access	484,659,822	65.0	109.99	537.79	3,284.87
	Rural Unrestricted Access	1,021,743,499	47.0	282.86	1,771.59	5,328.99
	Urban Restricted Access	837,239,063	56.4	220.36	1,556.24	5,508.16
	Urban Unrestricted Access	1,806,652,583	36.2	592.16	2,904.26	10,213.90
	Total	***4,150,294,966***		***4,233.63***	***8,879.12***	***52,716.37***

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Appendix D-2-2-2

2011 Lancaster County Emission Summary by Source Type

Annual (Tons/Year)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lancaster	Motorcycle	22,145,858	0.5%	116.19	2.7%	21.14	0.2%	554.97	1.1%
	Passenger Car	2,231,110,112	53.8%	1205.57	28.5%	1,551.72	17.5%	15,666.19	29.7%
	Passenger Truck	1,174,261,600	28.3%	1992.59	47.1%	2,993.74	33.7%	25,309.56	48.0%
	Light Commercial Truck	397,329,550	9.6%	643.87	15.2%	1,104.88	12.4%	8,273.06	15.7%
	Intercity Bus	2,519,853	0.1%	1.62	0.0%	39.32	0.4%	11.15	0.0%
	Transit Bus	5,048,422	0.1%	3.63	0.1%	59.36	0.7%	47.81	0.1%
	School Bus	1,487,526	0.0%	2.26	0.1%	12.38	0.1%	36.13	0.1%
	Refuse Truck	2,338,866	0.1%	1.17	0.0%	21.36	0.2%	10.87	0.0%
	Single Unit Short-haul Truck	102,459,700	2.5%	91.64	2.2%	496.33	5.6%	1,711.08	3.2%
	Single Unit Long-haul Truck	14,427,396	0.3%	10.37	0.2%	63.16	0.7%	180.90	0.3%
	Motor Home	6,175,313	0.1%	11.06	0.3%	35.55	0.4%	221.54	0.4%
	Combination Short-haul Truck	79,522,500	1.9%	36.93	0.9%	852.17	9.6%	225.20	0.4%
	Combination Long-haul Truck	111,468,270	2.7%	116.74	2.8%	1,628.03	18.3%	467.91	0.9%
	Total	***4,150,294,966***	***100.0%***	***4,233.63***	***100.0%***	***8,879.12***	***100.0%***	***52,716.37***	***100.0%***

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Appendix D-2-2-2

2011 Lancaster County Emission Summary by Process

Annual (Tons/Year)

County		VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Lancaster	Running Exhaust	914.44	21.6%	6,768.53	76.2%	24,330.65	46.2%
	Start Exhaust	2,183.46	51.6%	1,729.97	19.5%	28,230.70	53.6%
	Evap Permeation	217.31	5.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	571.10	13.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	240.08	5.7%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	12.82	0.3%	1.35	0.0%	5.27	0.0%
	Crankcase Start Exhaust	28.85	0.7%	0.06	0.0%	3.68	0.0%
	Crankcase Extended Idle Exhaust	0.99	0.0%	0.12	0.0%	0.26	0.0%
	Extended Idle Exhaust	64.57	1.5%	379.08	4.3%	145.82	0.3%
	Total	***4,233.63***	***100.0%***	***8,879.12***	***100.0%***	***52,716.37***	***100.0%***

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APPENDIX D-2-3
Philadelphia Area Emission Summary Tables

Appendix D-2-3-1
2011 July Weekday Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

Appendix D-2-3-2
2011 Annual Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

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Appendix D-2-3-1
2011 Philadelphia Area Emission Summary
Summer Weekday (Tons/Day)

County	VMT	Speed (mph)	VOC	NOX	CO
Bucks	14,614,068	45.9	11.47	22.55	119.86
Chester	13,198,835	44.8	9.29	20.29	102.86
Delaware	10,324,285	39.7	8.68	17.25	88.68
Montgomery	20,134,609	42.6	14.50	28.89	159.89
Philadelphia	16,521,773	23.8	16.63	34.40	160.42
Philadelphia MPO	*74,793,570*	-	*60.58*	*123.39*	*631.69*

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Appendix D-2-3-1
2011 Philadelphia Area Emission Summary by Road Type
Summer Weekday (Tons/Day)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Bucks	Off-Network	-	-	8.23	5.84	48.93
	Rural Restricted Access	386,283	65	0.07	0.30	2.24
	Rural Unrestricted Access	1,208,420	48	0.26	1.58	5.31
	Urban Restricted Access	3,782,921	57	0.77	4.42	21.50
	Urban Unrestricted Access	9,236,445	42	2.15	10.42	41.89
	Total	***14,614,068***		***11.47***	***22.55***	***119.86***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Chester	Off-Network	-	-	6.29	4.62	37.78
	Rural Restricted Access	615,179	65	0.11	0.48	3.56
	Rural Unrestricted Access	1,558,477	45	0.37	2.27	6.91
	Urban Restricted Access	3,614,348	56	0.74	4.21	20.65
	Urban Unrestricted Access	7,410,831	40	1.78	8.72	33.95
	Total	***13,198,835***		***9.29***	***20.29***	***102.86***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Delaware	Off-Network	-	-	6.12	4.39	36.38
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	0	N/A	0.00	0.00	0.00
	Urban Restricted Access	3,346,976	52	0.74	4.65	18.96
	Urban Unrestricted Access	6,977,309	36	1.82	8.21	33.34
	Total	***10,324,285***		***8.68***	***17.25***	***88.68***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Montgomery	Off-Network	-	-	9.86	6.98	58.46
	Rural Restricted Access	181,449	65	0.03	0.14	1.05
	Rural Unrestricted Access	260,156	50	0.06	0.33	1.14
	Urban Restricted Access	7,153,004	52	1.49	7.55	40.95
	Urban Unrestricted Access	12,539,999	39	3.07	13.88	58.28
	Total	***20,134,609***		***14.50***	***28.89***	***159.89***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Philadelphia	Off-Network	-	-	10.66	7.88	62.87
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	0	N/A	0.00	0.00	0.00
	Urban Restricted Access	4,936,996	29	1.60	9.52	30.52
	Urban Unrestricted Access	11,584,776	22	4.37	17.00	67.02
	Total	***16,521,773***		***16.63***	***34.40***	***160.42***

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Appendix D-2-3-1
2011 Philadelphia Area Emission Summary by Source Type
Summer Weekday (Tons/Day)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Bucks	Motorcycle	79,407	0.5%	0.43	3.8%	0.06	0.3%	1.28	1.1%
	Passenger Car	7,999,936	54.7%	3.09	26.9%	4.05	18.0%	31.73	26.5%
	Passenger Truck	4,214,568	28.8%	5.40	47.1%	7.86	34.8%	59.19	49.4%
	Light Commercial Truck	1,420,579	9.7%	1.80	15.7%	3.08	13.6%	20.17	16.8%
	Intercity Bus	11,333	0.1%	0.01	0.1%	0.15	0.7%	0.05	0.0%
	Transit Bus	17,592	0.1%	0.01	0.1%	0.18	0.8%	0.15	0.1%
	School Bus	17,963	0.1%	0.02	0.2%	0.12	0.5%	0.31	0.3%
	Refuse Truck	6,287	0.0%	0.00	0.0%	0.05	0.2%	0.03	0.0%
	Single Unit Short-haul Truck	276,140	1.9%	0.25	2.2%	1.12	5.0%	4.22	3.5%
	Single Unit Long-haul Truck	38,897	0.3%	0.03	0.2%	0.14	0.6%	0.42	0.4%
	Motor Home	16,640	0.1%	0.03	0.3%	0.08	0.3%	0.48	0.4%
	Combination Short-haul Truck	214,375	1.5%	0.09	0.8%	1.99	8.8%	0.60	0.5%
	Combination Long-haul Truck	300,351	2.1%	0.30	2.6%	3.68	16.3%	1.23	1.0%
	Total	***14,614,068***	***100.0%***	***11.47***	***100.0%***	***22.55***	***100.0%***	***119.86***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Chester	Motorcycle	71,431	0.5%	0.35	3.7%	0.05	0.3%	1.15	1.1%
	Passenger Car	7,196,442	54.5%	2.46	26.4%	3.50	17.3%	27.49	26.7%
	Passenger Truck	3,791,275	28.7%	4.31	46.4%	6.77	33.4%	50.04	48.6%
	Light Commercial Truck	1,277,889	9.7%	1.45	15.6%	2.68	13.2%	16.92	16.5%
	Intercity Bus	8,883	0.1%	0.01	0.1%	0.12	0.6%	0.04	0.0%
	Transit Bus	17,906	0.1%	0.01	0.1%	0.18	0.9%	0.16	0.2%
	School Bus	11,979	0.1%	0.01	0.2%	0.08	0.4%	0.24	0.2%
	Refuse Truck	6,046	0.0%	0.00	0.0%	0.05	0.2%	0.03	0.0%
	Single Unit Short-haul Truck	266,562	2.0%	0.25	2.7%	1.10	5.4%	4.10	4.0%
	Single Unit Long-haul Truck	37,530	0.3%	0.03	0.3%	0.14	0.7%	0.41	0.4%
	Motor Home	16,069	0.1%	0.03	0.3%	0.08	0.4%	0.47	0.5%
	Combination Short-haul Truck	206,936	1.6%	0.09	1.0%	1.94	9.6%	0.59	0.6%
	Combination Long-haul Truck	289,888	2.2%	0.30	3.2%	3.60	17.7%	1.22	1.2%
	Total	***13,198,835***	***100.0%***	***9.29***	***100.0%***	***20.29***	***100.0%***	***102.86***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Delaware	Motorcycle	55,760	0.5%	0.32	3.7%	0.04	0.2%	0.88	1.0%
	Passenger Car	5,617,611	54.4%	2.32	26.8%	3.02	17.5%	23.46	26.5%
	Passenger Truck	2,959,494	28.7%	4.06	46.8%	5.80	33.6%	43.50	49.1%
	Light Commercial Truck	997,542	9.7%	1.36	15.7%	2.31	13.4%	14.87	16.8%
	Intercity Bus	12,978	0.1%	0.01	0.1%	0.18	1.1%	0.05	0.1%
	Transit Bus	25,628	0.2%	0.02	0.2%	0.28	1.6%	0.22	0.3%
	School Bus	17,906	0.2%	0.02	0.2%	0.12	0.7%	0.24	0.3%
	Refuse Truck	4,715	0.0%	0.00	0.0%	0.04	0.2%	0.02	0.0%
	Single Unit Short-haul Truck	206,420	2.0%	0.20	2.3%	0.89	5.2%	3.27	3.7%
	Single Unit Long-haul Truck	29,046	0.3%	0.02	0.3%	0.11	0.7%	0.33	0.4%
	Motor Home	12,437	0.1%	0.02	0.3%	0.06	0.4%	0.39	0.4%
	Combination Short-haul Truck	160,247	1.6%	0.07	0.9%	1.53	8.9%	0.46	0.5%
	Combination Long-haul Truck	224,499	2.2%	0.24	2.8%	2.86	16.6%	0.97	1.1%
	Total	***10,324,285***	***100.0%***	***8.68***	***100.0%***	***17.25***	***100.0%***	***88.68***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Montgomery	Motorcycle	110,966	0.6%	0.55	3.8%	0.08	0.3%	1.77	1.1%
	Passenger Car	11,179,424	55.5%	3.92	27.0%	5.54	19.2%	43.78	27.4%
	Passenger Truck	5,889,612	29.3%	6.88	47.4%	10.65	36.9%	79.21	49.5%
	Light Commercial Truck	1,985,158	9.9%	2.31	15.9%	4.23	14.7%	26.80	16.8%
	Intercity Bus	9,717	0.0%	0.01	0.0%	0.13	0.5%	0.04	0.0%
	Transit Bus	31,087	0.2%	0.02	0.1%	0.32	1.1%	0.28	0.2%
	School Bus	14,460	0.1%	0.02	0.1%	0.10	0.3%	0.29	0.2%
	Refuse Truck	6,711	0.0%	0.00	0.0%	0.05	0.2%	0.03	0.0%
	Single Unit Short-haul Truck	296,083	1.5%	0.28	2.0%	1.26	4.3%	4.62	2.9%
	Single Unit Long-haul Truck	41,692	0.2%	0.03	0.2%	0.16	0.6%	0.46	0.3%
	Motor Home	17,850	0.1%	0.03	0.2%	0.09	0.3%	0.54	0.3%
	Combination Short-haul Truck	229,809	1.1%	0.11	0.7%	2.19	7.6%	0.66	0.4%
	Combination Long-haul Truck	322,040	1.6%	0.34	2.4%	4.09	14.2%	1.39	0.9%
	Total	***20,134,609***	***100.0%***	***14.50***	***100.0%***	***28.89***	***100.0%***	***159.89***	***100.0%***

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County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Philadelphia	Motorcycle	89,170	0.5%	0.61	3.7%	0.05	0.2%	1.44	0.9%
	Passenger Car	8,983,566	54.4%	4.39	26.4%	5.96	17.3%	42.61	26.6%
	Passenger Truck	4,732,768	28.6%	7.71	46.3%	11.12	32.3%	78.21	48.8%
	Light Commercial Truck	1,595,244	9.7%	2.62	15.7%	4.77	13.9%	27.04	16.9%
	Intercity Bus	22,154	0.1%	0.02	0.1%	0.36	1.0%	0.12	0.1%
	Transit Bus	224,167	1.4%	0.21	1.3%	2.89	8.4%	2.18	1.4%
	School Bus	38,308	0.2%	0.05	0.3%	0.33	0.9%	0.47	0.3%
	Refuse Truck	6,166	0.0%	0.00	0.0%	0.06	0.2%	0.03	0.0%
	Single Unit Short-haul Truck	270,860	1.6%	0.34	2.0%	1.48	4.3%	4.74	3.0%
	Single Unit Long-haul Truck	38,153	0.2%	0.04	0.2%	0.19	0.6%	0.48	0.3%
	Motor Home	16,325	0.1%	0.04	0.2%	0.10	0.3%	0.58	0.4%
	Combination Short-haul Truck	210,284	1.3%	0.14	0.8%	2.35	6.8%	0.77	0.5%
	Combination Long-haul Truck	294,608	1.8%	0.48	2.9%	4.75	13.8%	1.76	1.1%
	Total	***16,521,773***	***100.0%***	***16.63***	***100.0%***	***34.40***	***100.0%***	***160.42***	***100.0%***

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Appendix D-2-3-1
2011 Philadelphia Area Emission Summary by Process
Summer Weekday (Tons/Day)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Bucks	Running Exhaust	2.39	20.8%	16.71	74.1%	70.91	59.2%
	Start Exhaust	4.65	40.5%	5.08	22.5%	48.55	40.5%
	Evap Permeation	1.40	12.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	2.05	17.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.72	6.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.03	0.3%	0.00	0.0%	0.02	0.0%
	Crankcase Start Exhaust	0.06	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.17	1.4%	0.76	3.3%	0.38	0.3%
	Total	***11.47***	***100.0%***	***22.55***	***100.0%***	***119.86***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Chester	Running Exhaust	2.21	23.8%	15.67	77.2%	65.06	63.3%
	Start Exhaust	3.54	38.1%	3.86	19.0%	37.39	36.4%
	Evap Permeation	1.07	11.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	1.65	17.8%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.57	6.2%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.03	0.3%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.05	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.17	1.8%	0.76	3.7%	0.38	0.4%
	Total	***9.29***	***100.0%***	***20.29***	***100.0%***	***102.86***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Delaware	Running Exhaust	1.86	21.5%	12.85	74.5%	52.29	59.0%
	Start Exhaust	3.45	39.8%	3.77	21.9%	36.06	40.7%
	Evap Permeation	1.04	12.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	1.57	18.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.55	6.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.03	0.3%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.05	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.14	1.6%	0.62	3.6%	0.31	0.3%
	Total	***8.68***	***100.0%***	***17.25***	***100.0%***	***88.68***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Montgomery	Running Exhaust	3.37	23.2%	21.91	75.8%	101.40	63.4%
	Start Exhaust	5.58	38.5%	6.10	21.1%	58.02	36.3%
	Evap Permeation	1.69	11.6%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	2.64	18.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.91	6.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.05	0.3%	0.00	0.0%	0.02	0.0%
	Crankcase Start Exhaust	0.07	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.19	1.3%	0.88	3.0%	0.44	0.3%
	Total	***14.50***	***100.0%***	***28.89***	***100.0%***	***159.89***	***100.0%***

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County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Philadelphia	Running Exhaust	4.13	24.8%	26.52	77.1%	97.52	60.8%
	Start Exhaust	6.02	36.2%	6.58	19.1%	62.22	38.8%
	Evap Permeation	1.82	11.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	3.16	19.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	1.07	6.5%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.06	0.4%	0.01	0.0%	0.03	0.0%
	Crankcase Start Exhaust	0.08	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.29	1.7%	1.30	3.8%	0.64	0.4%
	Total	***16.63***	***100.0%***	***34.40***	***100.0%***	***160.42***	***100.0%***

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Appendix D-2-3-2
2011 Philadelphia Area Emission Summary
Annual (Tons/Year)

County	VMT	Speed (mph)	VOC	NOX	CO
Bucks	4,727,714,740	46.3	4,120.01	8,292.77	49,954.81
Chester	4,277,234,661	45.3	3,309.73	7,413.67	41,456.81
Delaware	3,336,447,774	40.9	3,097.85	6,222.26	37,084.67
Montgomery	6,505,446,210	43.9	5,156.21	10,458.00	64,680.67
Philadelphia	5,344,510,485	25.7	5,814.04	11,482.34	66,678.77
Philadelphia MPO	*24,191,353,871*	-	*21,497.83*	*43,869.04*	*259,855.73*

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Appendix D-2-3-2
2011 Philadelphia Area Emission Summary by Road Type
Annual (Tons/Year)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Bucks	Off-Network	-	-	3,103.30	2,284.90	29,066.23
	Rural Restricted Access	124,437,780	65	21.34	108.67	646.71
	Rural Unrestricted Access	391,585,306	48	83.56	562.74	1,588.12
	Urban Restricted Access	1,204,522,245	58	236.20	1,585.11	6,213.62
	Urban Unrestricted Access	3,007,169,409	42	675.61	3,751.37	12,440.14
	Total	***4,727,714,740***		***4,120.01***	***8,292.77***	***49,954.81***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Chester	Off-Network	-	-	2,369.42	1,813.02	22,234.46
	Rural Restricted Access	198,173,354	65	33.98	173.14	1,029.97
	Rural Unrestricted Access	507,158,668	45	115.99	809.92	2,089.71
	Urban Restricted Access	1,150,850,483	56	228.65	1,507.76	5,975.00
	Urban Unrestricted Access	2,421,052,155	41	561.70	3,109.83	10,127.67
	Total	***4,277,234,661***		***3,309.73***	***7,413.67***	***41,456.81***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Delaware	Off-Network	-	-	2,307.41	1,713.92	21,597.24
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	0	N/A	0.00	0.00	0.00
	Urban Restricted Access	1,065,709,327	56	221.05	1,645.70	5,523.18
	Urban Unrestricted Access	2,270,738,447	36	569.39	2,862.64	9,964.25
	Total	***3,336,447,774***		***3,097.85***	***6,222.26***	***37,084.67***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Montgomery	Off-Network	-	-	3,722.39	2,726.89	34,850.29
	Rural Restricted Access	58,452,519	65	10.03	51.07	303.82
	Rural Unrestricted Access	84,085,637	50	17.40	118.72	339.45
	Urban Restricted Access	2,277,629,193	55	443.42	2,632.85	11,826.25
	Urban Unrestricted Access	4,085,278,861	39	962.98	4,928.47	17,360.87
	Total	***6,505,446,210***		***5,156.21***	***10,458.00***	***64,680.67***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Philadelphia	Off-Network	-	-	4,026.99	3,051.04	37,549.13
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	0	N/A	0.00	0.00	0.00
	Urban Restricted Access	1,571,998,035	35	441.67	2,958.63	8,887.03
	Urban Unrestricted Access	3,772,512,450	23	1,345.39	5,472.66	20,242.62
	Total	***5,344,510,485***		***5,814.04***	***11,482.34***	***66,678.77***

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Appendix D-2-3-2
2011 Philadelphia Area Emission Summary by Source Type
Annual (Tons/Year)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Bucks	Motorcycle	25,689,051	0.5%	125.07	3.0%	24.36	0.3%	575.93	1.2%
	Passenger Car	2,588,072,036	54.7%	1,230.10	29.9%	1,499.53	18.1%	15,354.74	30.7%
	Passenger Truck	1,363,461,076	28.8%	1,893.46	46.0%	2,862.63	34.5%	23,559.03	47.2%
	Light Commercial Truck	459,573,695	9.7%	634.39	15.4%	1,111.72	13.4%	8,014.21	16.0%
	Intercity Bus	3,338,919	0.1%	2.05	0.0%	51.17	0.6%	13.77	0.0%
	Transit Bus	5,850,837	0.1%	3.92	0.1%	68.01	0.8%	51.53	0.1%
	School Bus	5,974,469	0.1%	7.09	0.2%	46.45	0.6%	102.10	0.2%
	Refuse Truck	2,029,899	0.0%	0.98	0.0%	18.15	0.2%	8.92	0.0%
	Single Unit Short-haul Truck	89,304,860	1.9%	76.63	1.9%	417.38	5.0%	1,369.11	2.7%
	Single Unit Long-haul Truck	12,578,824	0.3%	8.63	0.2%	53.19	0.6%	144.09	0.3%
	Motor Home	5,381,833	0.1%	9.11	0.2%	29.95	0.4%	177.40	0.4%
	Combination Short-haul Truck	69,327,968	1.5%	31.13	0.8%	729.41	8.8%	190.58	0.4%
	Combination Long-haul Truck	97,131,273	2.1%	97.44	2.4%	1,380.82	16.7%	393.40	0.8%
	Total	***4,727,714,740***	***100.0%***	***4,120.01***	***100.0%***	***8,292.77***	***100.0%***	***49,954.81***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Chester	Motorcycle	23,149,433	0.5%	100.56	3.0%	21.70	0.3%	505.87	1.2%
	Passenger Car	2,332,217,366	54.5%	967.54	29.2%	1,279.93	17.3%	12,644.10	30.5%
	Passenger Truck	1,228,672,880	28.7%	1,503.01	45.4%	2,443.06	33.0%	19,376.18	46.7%
	Light Commercial Truck	414,137,170	9.7%	506.35	15.3%	955.28	12.9%	6,554.18	15.8%
	Intercity Bus	2,622,789	0.1%	1.65	0.0%	40.34	0.5%	11.20	0.0%
	Transit Bus	5,956,207	0.1%	4.06	0.1%	68.91	0.9%	53.83	0.1%
	School Bus	3,984,592	0.1%	5.25	0.2%	31.69	0.4%	78.93	0.2%
	Refuse Truck	1,963,847	0.0%	0.96	0.0%	17.66	0.2%	8.75	0.0%
	Single Unit Short-haul Truck	86,310,360	2.0%	75.49	2.3%	409.96	5.5%	1,334.66	3.2%
	Single Unit Long-haul Truck	12,149,896	0.3%	8.52	0.3%	52.18	0.7%	140.37	0.3%
	Motor Home	5,200,483	0.1%	8.98	0.3%	29.23	0.4%	173.23	0.4%
	Combination Short-haul Truck	67,001,309	1.6%	30.68	0.9%	711.02	9.6%	187.19	0.5%
	Combination Long-haul Truck	93,868,330	2.2%	96.67	2.9%	1,352.71	18.2%	388.32	0.9%
	Total	***4,277,234,661***	***100.0%***	***3,309.73***	***100.0%***	***7,413.67***	***100.0%***	***41,456.81***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Delaware	Motorcycle	18,023,707	0.5%	93.36	3.0%	16.27	0.3%	400.77	1.1%
	Passenger Car	1,815,818,800	54.4%	920.04	29.7%	1,091.67	17.5%	11,410.60	30.8%
	Passenger Truck	956,617,900	28.7%	1,418.79	45.8%	2,066.53	33.2%	17,406.79	46.9%
	Light Commercial Truck	322,442,350	9.7%	476.36	15.4%	811.62	13.0%	5,931.64	16.0%
	Intercity Bus	3,775,297	0.1%	2.36	0.1%	59.83	1.0%	15.59	0.0%
	Transit Bus	8,502,848	0.3%	5.88	0.2%	103.09	1.7%	74.13	0.2%
	School Bus	5,940,709	0.2%	6.25	0.2%	47.20	0.8%	79.65	0.2%
	Refuse Truck	1,522,534	0.0%	0.76	0.0%	14.18	0.2%	6.93	0.0%
	Single Unit Short-haul Truck	66,493,530	2.0%	59.72	1.9%	327.42	5.3%	1,055.02	2.8%
	Single Unit Long-haul Truck	9,355,999	0.3%	6.76	0.2%	41.84	0.7%	111.31	0.3%
	Motor Home	4,008,710	0.1%	7.18	0.2%	23.31	0.4%	140.22	0.4%
	Combination Short-haul Truck	51,615,030	1.5%	24.02	0.8%	555.81	8.9%	146.38	0.4%
	Combination Long-haul Truck	72,330,360	2.2%	76.36	2.5%	1,063.49	17.1%	305.64	0.8%
	Total	***3,336,447,774***	***100.0%***	***3,097.85***	***100.0%***	***6,222.26***	***100.0%***	***37,084.67***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Montgomery	Motorcycle	35,852,438	0.6%	159.36	3.1%	32.94	0.3%	779.06	1.2%
	Passenger Car	3,611,994,900	55.5%	1,537.46	29.8%	2,007.12	19.2%	20,123.30	31.1%
	Passenger Truck	1,902,894,242	29.3%	2,388.38	46.3%	3,816.70	36.5%	30,686.86	47.4%
	Light Commercial Truck	641,391,605	9.9%	804.73	15.6%	1,495.95	14.3%	10,374.41	16.0%
	Intercity Bus	2,848,271	0.0%	1.81	0.0%	44.65	0.4%	12.37	0.0%
	Transit Bus	10,257,634	0.2%	7.18	0.1%	120.40	1.2%	93.93	0.1%
	School Bus	4,771,373	0.1%	6.44	0.1%	38.68	0.4%	96.34	0.1%
	Refuse Truck	2,184,470	0.0%	1.09	0.0%	20.10	0.2%	9.92	0.0%
	Single Unit Short-haul Truck	95,676,583	1.5%	85.44	1.7%	463.69	4.4%	1,499.30	2.3%
	Single Unit Long-haul Truck	13,467,829	0.2%	9.67	0.2%	59.08	0.6%	157.79	0.2%
	Motor Home	5,766,570	0.1%	10.21	0.2%	32.85	0.3%	196.09	0.3%
	Combination Short-haul Truck	74,258,624	1.1%	34.59	0.7%	798.39	7.6%	211.07	0.3%
	Combination Long-haul Truck	104,081,671	1.6%	109.85	2.1%	1,527.47	14.6%	440.20	0.7%
	Total	***6,505,446,210***	***100.0%***	***5,156.21***	***100.0%***	***10,458.00***	***100.0%***	***64,680.67***	***100.0%***

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County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Philadelphia	Motorcycle	28,853,973	0.5%	175.29	3.0%	22.61	0.2%	650.52	1.0%
	Passenger Car	2,906,927,384	54.4%	1,698.76	29.2%	1,938.64	16.9%	20,560.74	30.8%
	Passenger Truck	1,531,442,380	28.7%	2,647.10	45.5%	3,597.89	31.3%	31,206.07	46.8%
	Light Commercial Truck	516,193,200	9.7%	899.05	15.5%	1,487.22	13.0%	10,709.20	16.1%
	Intercity Bus	6,369,057	0.1%	5.02	0.1%	113.64	1.0%	31.81	0.0%
	Transit Bus	72,957,860	1.4%	64.93	1.1%	1,012.96	8.8%	687.95	1.0%
	School Bus	12,467,769	0.2%	15.37	0.3%	116.45	1.0%	154.63	0.2%
	Refuse Truck	1,985,896	0.0%	1.30	0.0%	21.25	0.2%	10.63	0.0%
	Single Unit Short-haul Truck	87,215,260	1.6%	99.40	1.7%	525.26	4.6%	1,530.50	2.3%
	Single Unit Long-haul Truck	12,278,738	0.2%	11.62	0.2%	67.25	0.6%	162.43	0.2%
	Motor Home	5,256,358	0.1%	11.92	0.2%	35.09	0.3%	206.64	0.3%
	Combination Short-haul Truck	67,691,680	1.3%	41.61	0.7%	831.46	7.2%	236.50	0.4%
	Combination Long-haul Truck	94,870,930	1.8%	142.66	2.5%	1,712.62	14.9%	531.14	0.8%
	Total	***5,344,510,485***	***100.0%***	***5,814.04***	***100.0%***	***11,482.34***	***100.0%***	***66,678.77***	***100.0%***

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Appendix D-2-3-2
2011 Philadelphia Area Emission Summary by Process
Annual (Tons/Year)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Bucks	Running Exhaust	749.00	18.2%	6,006.66	72.4%	20,883.90	41.8%
	Start Exhaust	2,234.69	54.2%	1,972.63	23.8%	28,941.78	57.9%
	Evap Permeation	257.72	6.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	535.08	13.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	249.32	6.1%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	10.53	0.3%	1.22	0.0%	4.68	0.0%
	Crankcase Start Exhaust	29.52	0.7%	0.07	0.0%	3.77	0.0%
	Crankcase Extended Idle Exhaust	0.82	0.0%	0.10	0.0%	0.21	0.0%
	Extended Idle Exhaust	53.34	1.3%	312.10	3.8%	120.46	0.2%
	Total	***4,120.01***	***100.0%***	***8,292.77***	***100.0%***	***49,954.81***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Chester	Running Exhaust	693.77	21.0%	5,599.48	75.5%	19,217.96	46.4%
	Start Exhaust	1,698.33	51.3%	1,501.29	20.3%	22,111.03	53.3%
	Evap Permeation	195.93	5.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	437.40	13.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	197.99	6.0%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	9.79	0.3%	1.16	0.0%	4.39	0.0%
	Crankcase Start Exhaust	22.44	0.7%	0.05	0.0%	2.92	0.0%
	Crankcase Extended Idle Exhaust	0.82	0.0%	0.10	0.0%	0.21	0.0%
	Extended Idle Exhaust	53.27	1.6%	311.58	4.2%	120.29	0.3%
	Total	***3,309.73***	***100.0%***	***7,413.67***	***100.0%***	***41,456.81***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Delaware	Running Exhaust	577.01	18.6%	4,507.37	72.4%	15,483.82	41.8%
	Start Exhaust	1,660.13	53.6%	1,465.40	23.6%	21,498.55	58.0%
	Evap Permeation	191.52	6.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	407.97	13.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	188.11	6.1%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	8.15	0.3%	0.97	0.0%	3.60	0.0%
	Crankcase Start Exhaust	21.93	0.7%	0.05	0.0%	2.80	0.0%
	Crankcase Extended Idle Exhaust	0.65	0.0%	0.08	0.0%	0.17	0.0%
	Extended Idle Exhaust	42.39	1.4%	248.40	4.0%	95.72	0.3%
	Total	***3,097.85***	***100.0%***	***6,222.26***	***100.0%***	***37,084.67***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Montgomery	Running Exhaust	1,041.90	20.2%	7,729.70	73.9%	29,824.18	46.1%
	Start Exhaust	2,685.78	52.1%	2,369.78	22.7%	34,707.88	53.7%
	Evap Permeation	310.04	6.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	693.17	13.4%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	313.49	6.1%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	14.45	0.3%	1.41	0.0%	6.19	0.0%
	Crankcase Start Exhaust	35.48	0.7%	0.08	0.0%	4.50	0.0%
	Crankcase Extended Idle Exhaust	0.94	0.0%	0.11	0.0%	0.24	0.0%
	Extended Idle Exhaust	60.96	1.2%	356.91	3.4%	137.66	0.2%
	Total	***5,156.21***	***100.0%***	***10,458.00***	***100.0%***	***64,680.67***	***100.0%***

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County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Philadelphia	Running Exhaust	1,246.77	21.4%	8,429.32	73.4%	29,122.18	43.7%
	Start Exhaust	2,897.37	49.8%	2,556.62	22.3%	37,353.56	56.0%
	Evap Permeation	334.91	5.8%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	831.90	14.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	361.45	6.2%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	17.77	0.3%	1.98	0.0%	7.47	0.0%
	Crankcase Start Exhaust	38.28	0.7%	0.09	0.0%	4.86	0.0%
	Crankcase Extended Idle Exhaust	1.30	0.0%	0.15	0.0%	0.34	0.0%
	Extended Idle Exhaust	84.30	1.4%	494.18	4.3%	190.37	0.3%
	Total	***5,814.04***	***100.0%***	***11,482.34***	***100.0%***	***66,678.77***	***100.0%***

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APPENDIX D-2-4
Pittsburgh-Beaver Valley Area Emission Summary Tables

Appendix D-2-4-1
2011 July Weekday Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

Appendix D-2-4-2
2011 Annual Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

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Appendix D-2-4-1
2011 Pittsburgh-Beaver Valley Area Emission Summary
Summer Weekday (Tons/Day)

County	VMT	Speed (mph)	VOC	NOX	CO
Allegheny	25,509,480	35.7	20.40	41.15	208.35
Armstrong	1,793,743	45.1	1.61	3.33	15.76
Beaver	4,066,807	39.3	3.22	6.45	32.45
Butler	5,437,667	44.9	4.44	9.64	46.20
Fayette	2,928,750	45.1	2.91	5.31	27.66
Washington	5,382,187	45.6	4.02	8.71	42.75
Westmoreland	9,523,496	42.6	6.95	14.26	73.47
SPC MPO	*54,642,130*	*-*	*43.54*	*88.85*	*446.64*

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Appendix D-2-4-1
2011 Pittsburgh-Beaver Valley Area Emission Summary by Road Type
Summer Weekday (Tons/Day)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Allegheny	Off-Network	-	-	13.61	9.75	86.73
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	233,881	48	0.05	0.29	0.96
	Urban Restricted Access	6,603,764	58	1.33	7.78	34.19
	Urban Unrestricted Access	18,671,835	31	5.41	23.34	86.48
	Total	***25,509,480***		***20.40***	***41.15***	***208.35***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Armstrong	Off-Network	-	-	1.16	0.79	7.09
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	1,012,522	47	0.25	1.49	4.75
	Urban Restricted Access	127,360	56	0.03	0.21	0.76
	Urban Unrestricted Access	653,862	41	0.17	0.84	3.15
	Total	***1,793,743***		***1.61***	***3.33***	***15.76***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Beaver	Off-Network	-	-	2.21	1.58	14.07
	Rural Restricted Access	161,653	65	0.03	0.13	0.85
	Rural Unrestricted Access	929,198	41	0.22	1.20	3.92
	Urban Restricted Access	547,157	60	0.11	0.61	2.81
	Urban Unrestricted Access	2,428,798	35	0.65	2.93	10.81
	Total	***4,066,807***		***3.22***	***6.45***	***32.45***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Butler	Off-Network	-	-	3.08	2.12	18.80
	Rural Restricted Access	597,848	65	0.14	1.20	3.49
	Rural Unrestricted Access	2,049,834	46	0.50	2.83	9.64
	Urban Restricted Access	579,540	59	0.13	0.90	3.40
	Urban Unrestricted Access	2,210,445	38	0.59	2.59	10.87
	Total	***5,437,667***		***4.44***	***9.64***	***46.20***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Fayette	Off-Network	-	-	2.19	1.44	13.14
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	1,441,378	47	0.35	1.97	6.76
	Urban Restricted Access	422,490	55	0.10	0.50	2.57
	Urban Unrestricted Access	1,064,882	40	0.28	1.40	5.18
	Total	***2,928,750***		***2.91***	***5.31***	***27.66***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Washington	Off-Network	-	-	2.79	1.99	17.90
	Rural Restricted Access	1,040,639	65	0.20	1.32	5.40
	Rural Unrestricted Access	1,481,866	43	0.35	1.99	6.19
	Urban Restricted Access	964,436	59	0.19	1.16	4.97
	Urban Unrestricted Access	1,895,246	37	0.49	2.25	8.28
	Total	***5,382,187***		***4.02***	***8.71***	***42.75***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Westmoreland	Off-Network	-	-	4.72	3.36	30.10
	Rural Restricted Access	347,301	65	0.06	0.30	1.82
	Rural Unrestricted Access	1,949,271	46	0.44	2.52	8.01
	Urban Restricted Access	2,269,473	59	0.43	2.07	11.75
	Urban Unrestricted Access	4,957,450	36	1.29	6.00	21.80
	Total	***9,523,496***		***6.95***	***14.26***	***73.47***

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Appendix D-2-4-1
2011 Pittsburgh-Beaver Valley Area Emission Summary by Source Type
Summer Weekday (Tons/Day)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Allegheny	Motorcycle	139,314	0.5%	0.79	3.9%	0.10	0.2%	2.26	1.1%
	Passenger Car	14,035,297	55.0%	5.16	25.3%	7.15	17.4%	54.60	26.2%
	Passenger Truck	7,398,111	29.0%	9.78	48.0%	14.42	35.0%	103.16	49.5%
	Light Commercial Truck	2,488,333	9.8%	3.27	16.0%	5.73	13.9%	35.10	16.8%
	Intercity Bus	18,239	0.1%	0.01	0.1%	0.27	0.7%	0.08	0.0%
	Transit Bus	94,859	0.4%	0.07	0.3%	1.02	2.5%	0.83	0.4%
	School Bus	35,265	0.1%	0.04	0.2%	0.25	0.6%	0.59	0.3%
	Refuse Truck	9,552	0.0%	0.01	0.0%	0.08	0.2%	0.05	0.0%
	Single Unit Short-haul Truck	421,073	1.7%	0.45	2.2%	1.97	4.8%	6.95	3.3%
	Single Unit Long-haul Truck	59,277	0.2%	0.05	0.2%	0.25	0.6%	0.70	0.3%
	Motor Home	25,376	0.1%	0.05	0.3%	0.13	0.3%	0.81	0.4%
	Combination Short-haul Truck	326,859	1.3%	0.17	0.8%	3.34	8.1%	1.03	0.5%
	Combination Long-haul Truck	457,924	1.8%	0.56	2.7%	6.43	15.6%	2.20	1.1%
	Total	***25,509,480***	***100.0%***	***20.40***	***100.0%***	***41.15***	***100.0%***	***208.35***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Armstrong	Motorcycle	9,480	0.5%	0.05	3.4%	0.01	0.2%	0.16	1.0%
	Passenger Car	955,088	53.2%	0.41	25.6%	0.54	16.2%	4.00	25.4%
	Passenger Truck	503,424	28.1%	0.77	47.5%	1.05	31.6%	7.69	48.8%
	Light Commercial Truck	169,339	9.4%	0.25	15.3%	0.40	11.9%	2.57	16.3%
	Intercity Bus	1,638	0.1%	0.00	0.1%	0.02	0.7%	0.01	0.0%
	Transit Bus	9,156	0.5%	0.01	0.4%	0.09	2.8%	0.08	0.5%
	School Bus	5,983	0.3%	0.01	0.4%	0.04	1.2%	0.11	0.7%
	Refuse Truck	1,028	0.1%	0.00	0.0%	0.01	0.2%	0.00	0.0%
	Single Unit Short-haul Truck	45,227	2.5%	0.04	2.6%	0.18	5.5%	0.69	4.4%
	Single Unit Long-haul Truck	6,360	0.4%	0.00	0.3%	0.02	0.7%	0.07	0.4%
	Motor Home	2,729	0.2%	0.00	0.3%	0.01	0.4%	0.08	0.5%
	Combination Short-haul Truck	35,124	2.0%	0.02	1.0%	0.33	10.0%	0.10	0.6%
	Combination Long-haul Truck	49,167	2.7%	0.05	3.1%	0.62	18.5%	0.20	1.3%
	Total	***1,793,743***	***100.0%***	***1.61***	***100.0%***	***3.33***	***100.0%***	***15.76***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Beaver	Motorcycle	22,169	0.5%	0.12	3.9%	0.02	0.3%	0.36	1.1%
	Passenger Car	2,233,402	54.9%	0.82	25.3%	1.11	17.2%	8.37	25.8%
	Passenger Truck	1,177,233	28.9%	1.54	47.9%	2.26	35.1%	16.11	49.6%
	Light Commercial Truck	395,973	9.7%	0.51	15.9%	0.89	13.8%	5.50	17.0%
	Intercity Bus	2,238	0.1%	0.00	0.0%	0.03	0.5%	0.01	0.0%
	Transit Bus	6,886	0.2%	0.00	0.1%	0.07	1.1%	0.06	0.2%
	School Bus	2,882	0.1%	0.00	0.1%	0.02	0.3%	0.06	0.2%
	Refuse Truck	1,692	0.0%	0.00	0.0%	0.01	0.2%	0.01	0.0%
	Single Unit Short-haul Truck	73,166	1.8%	0.07	2.3%	0.33	5.1%	1.17	3.6%
	Single Unit Long-haul Truck	10,317	0.3%	0.01	0.3%	0.04	0.6%	0.12	0.4%
	Motor Home	4,411	0.1%	0.01	0.3%	0.02	0.3%	0.13	0.4%
	Combination Short-haul Truck	56,861	1.4%	0.03	0.9%	0.57	8.8%	0.17	0.5%
	Combination Long-haul Truck	79,579	2.0%	0.09	2.9%	1.08	16.7%	0.37	1.1%
	Total	***4,066,807***	***100.0%***	***3.22***	***100.0%***	***6.45***	***100.0%***	***32.45***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Butler	Motorcycle	28,915	0.5%	0.15	3.4%	0.02	0.2%	0.49	1.1%
	Passenger Car	2,913,026	53.6%	1.13	25.6%	1.59	16.5%	12.08	26.1%
	Passenger Truck	1,535,484	28.2%	2.11	47.5%	3.08	31.9%	22.50	48.7%
	Light Commercial Truck	516,447	9.5%	0.68	15.4%	1.17	12.1%	7.43	16.1%
	Intercity Bus	4,708	0.1%	0.00	0.1%	0.07	0.7%	0.02	0.0%
	Transit Bus	9,945	0.2%	0.01	0.1%	0.11	1.1%	0.09	0.2%
	School Bus	5,840	0.1%	0.01	0.2%	0.04	0.4%	0.12	0.2%
	Refuse Truck	3,143	0.1%	0.00	0.0%	0.03	0.3%	0.01	0.0%
	Single Unit Short-haul Truck	137,065	2.5%	0.12	2.8%	0.57	5.9%	2.13	4.6%
	Single Unit Long-haul Truck	19,308	0.4%	0.01	0.3%	0.07	0.7%	0.21	0.5%
	Motor Home	8,261	0.2%	0.02	0.3%	0.04	0.4%	0.25	0.5%
	Combination Short-haul Truck	106,401	2.0%	0.05	1.0%	1.01	10.5%	0.29	0.6%
	Combination Long-haul Truck	149,125	2.7%	0.14	3.2%	1.85	19.2%	0.59	1.3%
	Total	***5,437,667***	***100.0%***	***4.44***	***100.0%***	***9.64***	***100.0%***	***46.20***	***100.0%***

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County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Fayette	Motorcycle	15,724	0.5%	0.10	3.5%	0.01	0.2%	0.27	1.0%
	Passenger Car	1,584,084	54.1%	0.77	26.3%	0.94	17.8%	7.16	25.9%
	Passenger Truck	834,981	28.5%	1.41	48.5%	1.83	34.5%	13.82	50.0%
	Light Commercial Truck	280,845	9.6%	0.45	15.6%	0.69	12.9%	4.61	16.7%
	Intercity Bus	2,062	0.1%	0.00	0.0%	0.03	0.5%	0.01	0.0%
	Transit Bus	6,757	0.2%	0.00	0.1%	0.07	1.3%	0.06	0.2%
	School Bus	2,458	0.1%	0.00	0.1%	0.02	0.3%	0.05	0.2%
	Refuse Truck	1,511	0.1%	0.00	0.0%	0.01	0.2%	0.01	0.0%
	Single Unit Short-haul Truck	65,366	2.2%	0.06	2.1%	0.27	5.1%	1.01	3.6%
	Single Unit Long-haul Truck	9,185	0.3%	0.01	0.2%	0.03	0.6%	0.10	0.4%
	Motor Home	3,935	0.1%	0.01	0.2%	0.02	0.4%	0.11	0.4%
	Combination Short-haul Truck	50,750	1.7%	0.02	0.8%	0.48	9.1%	0.14	0.5%
	Combination Long-haul Truck	71,090	2.4%	0.07	2.5%	0.90	16.9%	0.30	1.1%
	Total	***2,928,750***	***100.0%***	***2.91***	***100.0%***	***5.31***	***100.0%***	***27.66***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Washington	Motorcycle	29,076	0.5%	0.15	3.9%	0.02	0.3%	0.49	1.2%
	Passenger Car	2,929,272	54.4%	1.02	25.3%	1.45	16.6%	11.07	25.9%
	Passenger Truck	1,544,040	28.7%	1.91	47.6%	2.96	34.0%	21.03	49.2%
	Light Commercial Truck	519,335	9.6%	0.63	15.7%	1.14	13.1%	7.08	16.6%
	Intercity Bus	3,680	0.1%	0.00	0.1%	0.05	0.6%	0.02	0.0%
	Transit Bus	12,996	0.2%	0.01	0.2%	0.14	1.6%	0.12	0.3%
	School Bus	5,674	0.1%	0.01	0.2%	0.04	0.5%	0.11	0.3%
	Refuse Truck	2,479	0.0%	0.00	0.0%	0.02	0.2%	0.01	0.0%
	Single Unit Short-haul Truck	109,509	2.0%	0.10	2.5%	0.46	5.3%	1.72	4.0%
	Single Unit Long-haul Truck	15,426	0.3%	0.01	0.3%	0.06	0.7%	0.17	0.4%
	Motor Home	6,597	0.1%	0.01	0.3%	0.03	0.4%	0.20	0.5%
	Combination Short-haul Truck	84,932	1.6%	0.04	0.9%	0.82	9.4%	0.24	0.6%
	Combination Long-haul Truck	119,170	2.2%	0.12	3.0%	1.52	17.4%	0.49	1.1%
	Total	***5,382,187***	***100.0%***	***4.02***	***100.0%***	***8.71***	***100.0%***	***42.75***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Westmoreland	Motorcycle	52,241	0.5%	0.27	3.9%	0.04	0.3%	0.87	1.2%
	Passenger Car	5,263,078	55.3%	1.77	25.4%	2.54	17.8%	19.31	26.3%
	Passenger Truck	2,774,201	29.1%	3.34	48.1%	5.19	36.4%	36.59	49.8%
	Light Commercial Truck	933,104	9.8%	1.11	16.0%	2.02	14.1%	12.36	16.8%
	Intercity Bus	3,662	0.0%	0.00	0.0%	0.05	0.4%	0.02	0.0%
	Transit Bus	7,810	0.1%	0.01	0.1%	0.08	0.6%	0.07	0.1%
	School Bus	2,854	0.0%	0.00	0.1%	0.02	0.1%	0.08	0.1%
	Refuse Truck	3,567	0.0%	0.00	0.0%	0.03	0.2%	0.02	0.0%
	Single Unit Short-haul Truck	157,595	1.7%	0.16	2.2%	0.68	4.8%	2.49	3.4%
	Single Unit Long-haul Truck	22,180	0.2%	0.02	0.2%	0.09	0.6%	0.25	0.3%
	Motor Home	9,499	0.1%	0.02	0.3%	0.05	0.3%	0.28	0.4%
	Combination Short-haul Truck	122,255	1.3%	0.06	0.8%	1.20	8.4%	0.36	0.5%
	Combination Long-haul Truck	171,449	1.8%	0.19	2.7%	2.28	16.0%	0.76	1.0%
	Total	***9,523,496***	***100.0%***	***6.95***	***100.0%***	***14.26***	***100.0%***	***73.47***	***100.0%***

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Appendix D-2-4-1
2011 Pittsburgh-Beaver Valley Area Emission Summary by Process
Summer Weekday (Tons/Day)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Allegheny	Running Exhaust	5.02	24.6%	31.40	76.3%	121.60	58.4%
	Start Exhaust	8.29	40.7%	8.23	20.0%	85.99	41.3%
	Evap Permeation	1.83	9.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	3.54	17.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	1.21	5.9%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.07	0.3%	0.01	0.0%	0.03	0.0%
	Crankcase Start Exhaust	0.11	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.32	1.6%	1.52	3.7%	0.72	0.3%
	Total	***20.40***	***100.0%***	***41.15***	***100.0%***	***208.35***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Armstrong	Running Exhaust	0.35	21.8%	2.54	76.3%	8.66	55.0%
	Start Exhaust	0.74	45.8%	0.66	19.8%	7.03	44.6%
	Evap Permeation	0.14	8.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	0.26	16.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.08	5.2%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.00	0.3%	0.00	0.0%	0.00	0.0%
	Crankcase Start Exhaust	0.01	0.6%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.03	1.7%	0.13	3.9%	0.06	0.4%
	Total	***1.61***	***100.0%***	***3.33***	***100.0%***	***15.76***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Beaver	Running Exhaust	0.75	23.4%	4.87	75.5%	18.38	56.6%
	Start Exhaust	1.34	41.8%	1.33	20.7%	13.95	43.0%
	Evap Permeation	0.30	9.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	0.55	17.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.19	5.9%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.01	0.3%	0.00	0.0%	0.00	0.0%
	Crankcase Start Exhaust	0.02	0.6%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.05	1.6%	0.25	3.8%	0.12	0.4%
	Total	***3.22***	***100.0%***	***6.45***	***100.0%***	***32.45***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Butler	Running Exhaust	1.06	23.9%	7.52	78.0%	27.39	59.3%
	Start Exhaust	1.95	44.0%	1.75	18.1%	18.62	40.3%
	Evap Permeation	0.36	8.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	0.72	16.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.23	5.2%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.01	0.3%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.03	0.6%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.08	1.8%	0.37	3.8%	0.18	0.4%
	Total	***4.44***	***100.0%***	***9.64***	***100.0%***	***46.20***	***100.0%***

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County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Fayette	Running Exhaust	0.56	19.3%	3.87	72.9%	14.51	52.5%
	Start Exhaust	1.40	48.0%	1.25	23.5%	13.05	47.2%
	Evap Permeation	0.26	8.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	0.48	16.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.15	5.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.01	0.3%	0.00	0.0%	0.00	0.0%
	Crankcase Start Exhaust	0.02	0.6%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.04	1.4%	0.19	3.6%	0.09	0.3%
	Total	***2.91***	***100.0%***	***5.31***	***100.0%***	***27.66***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Washington	Running Exhaust	0.94	23.4%	6.71	77.1%	24.84	58.1%
	Start Exhaust	1.69	42.2%	1.68	19.3%	17.75	41.5%
	Evap Permeation	0.37	9.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	0.67	16.8%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.23	5.8%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.01	0.3%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.02	0.6%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.07	1.6%	0.31	3.6%	0.15	0.3%
	Total	***4.02***	***100.0%***	***8.71***	***100.0%***	***42.75***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Westmoreland	Running Exhaust	1.67	24.0%	10.90	76.4%	43.36	59.0%
	Start Exhaust	2.88	41.4%	2.86	20.0%	29.85	40.6%
	Evap Permeation	0.63	9.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	1.19	17.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.41	5.9%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.02	0.3%	0.00	0.0%	0.01	0.0%
	Crankcase Start Exhaust	0.04	0.5%	0.00	0.0%	0.00	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.11	1.5%	0.51	3.6%	0.24	0.3%
	Total	***6.95***	***100.0%***	***14.26***	***100.0%***	***73.47***	***100.0%***

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Appendix D-2-4-2
2011 Pittsburgh-Beaver Valley Area Emission Summary
Annual (Tons/Year)

County	VMT	Speed (mph)	VOC	NOX	CO
Allegheny	8,276,510,090	36.6	7,755.25	14,865.96	98,535.36
Armstrong	582,533,915	45.2	611.63	1,223.02	7,454.79
Beaver	1,320,804,219	39.4	1,232.52	2,365.83	15,550.01
Butler	1,765,362,008	45.2	1,672.83	3,527.63	21,200.51
Fayette	948,403,927	45.2	1,114.77	1,950.20	13,397.21
Washington	1,745,736,483	45.6	1,540.23	3,197.99	20,163.87
Westmoreland	3,087,663,074	42.8	2,657.30	5,229.77	34,579.73
SPC MPO	*17,727,013,716*	*-*	*16,584.53*	*32,360.40*	*210,881.48*

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Appendix D-2-4-2
2011 Pittsburgh-Beaver Valley Area Emission Summary by Road Type
Annual (Tons/Year)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Allegheny	Off-Network	-	-	5,596.01	3,817.82	57,782.90
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	76,304,105	48	16.35	103.73	323.38
	Urban Restricted Access	2,102,755,624	58	420.14	2,792.85	11,223.50
	Urban Unrestricted Access	6,097,450,361	32	1,722.75	8,151.57	29,205.58
	Total	***8,276,510,090***		***7,755.25***	***14,865.96***	***98,535.36***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Armstrong	Off-Network	-	-	467.20	309.39	4,546.56
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	329,141,567	47	80.15	535.16	1,600.15
	Urban Restricted Access	40,554,754	56	9.72	74.24	250.90
	Urban Unrestricted Access	212,837,594	41	54.55	304.23	1,057.17
	Total	***582,533,915***		***611.63***	***1,223.02***	***7,454.79***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Beaver	Off-Network	-	-	907.03	620.74	9,364.19
	Rural Restricted Access	52,114,209	65	9.25	47.46	279.95
	Rural Unrestricted Access	302,407,892	41	72.44	431.00	1,327.59
	Urban Restricted Access	174,268,783	60	33.91	221.10	922.13
	Urban Unrestricted Access	792,013,335	35	209.89	1,045.52	3,656.16
	Total	***1,320,804,219***		***1,232.52***	***2,365.83***	***15,550.01***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Butler	Off-Network	-	-	1,235.95	827.15	12,028.92
	Rural Restricted Access	192,595,513	65	44.64	435.79	1,159.45
	Rural Unrestricted Access	666,158,379	46	161.03	1,012.35	3,244.99
	Urban Restricted Access	184,551,412	59	41.90	321.73	1,117.33
	Urban Unrestricted Access	722,056,703	39	189.31	930.61	3,649.81
	Total	***1,765,362,008***		***1,672.83***	***3,527.63***	***21,200.51***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Fayette	Off-Network	-	-	882.16	561.71	8,542.33
	Rural Restricted Access	0	N/A	0.00	0.00	0.00
	Rural Unrestricted Access	466,633,805	47	111.63	706.40	2,266.81
	Urban Restricted Access	134,579,593	55	30.22	178.83	842.49
	Urban Unrestricted Access	347,190,529	40	90.75	503.25	1,745.57
	Total	***948,403,927***		***1,114.77***	***1,950.20***	***13,397.21***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Washington	Off-Network	-	-	1,143.41	782.63	11,838.96
	Rural Restricted Access	335,237,080	65	64.57	480.61	1,790.10
	Rural Unrestricted Access	482,635,851	43	112.99	713.01	2,096.10
	Urban Restricted Access	307,097,934	59	61.22	414.77	1,630.27
	Urban Unrestricted Access	620,765,618	37	158.04	806.97	2,808.44
	Total	***1,745,736,483***		***1,540.23***	***3,197.99***	***20,163.87***

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Westmoreland	Off-Network	-	-	1,941.11	1,319.27	20,046.30
	Rural Restricted Access	111,904,248	65	20.16	110.88	600.00
	Rural Unrestricted Access	634,377,842	46	141.39	905.87	2,707.69
	Urban Restricted Access	722,653,599	59	136.36	746.73	3,845.86
	Urban Unrestricted Access	1,618,727,385	36	418.30	2,147.02	7,379.88
	Total	***3,087,663,074***		***2,657.30***	***5,229.77***	***34,579.73***

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Appendix D-2-4-2
2011 Pittsburgh-Beaver Valley Area Emission Summary by Source Type
Annual (Tons/Year)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Allegheny	Motorcycle	45,198,949	0.5%	232.00	3.0%	39.66	0.3%	1,132.85	1.1%
	Passenger Car	4,553,616,638	55.0%	2,242.87	28.9%	2,598.57	17.5%	31,114.65	31.6%
	Passenger Truck	2,400,246,642	29.0%	3,623.47	46.7%	5,153.29	34.7%	46,109.58	46.8%
	Light Commercial Truck	807,316,054	9.8%	1,210.09	15.6%	2,024.28	13.6%	15,609.06	15.8%
	Intercity Bus	5,326,741	0.1%	3.63	0.0%	88.44	0.6%	24.28	0.0%
	Transit Bus	31,264,111	0.4%	22.92	0.3%	373.87	2.5%	277.58	0.3%
	School Bus	11,622,979	0.1%	15.22	0.2%	96.23	0.6%	207.39	0.2%
	Refuse Truck	3,110,997	0.0%	1.73	0.0%	30.71	0.2%	15.83	0.0%
	Single Unit Short-haul Truck	136,638,527	1.7%	137.69	1.8%	723.75	4.9%	2,437.96	2.5%
	Single Unit Long-haul Truck	19,240,454	0.2%	15.73	0.2%	92.12	0.6%	256.89	0.3%
	Motor Home	8,236,889	0.1%	16.56	0.2%	49.93	0.3%	319.31	0.3%
	Combination Short-haul Truck	106,071,345	1.3%	54.65	0.7%	1,210.44	8.1%	328.99	0.3%
	Combination Long-haul Truck	148,619,765	1.8%	178.69	2.3%	2,384.68	16.0%	701.01	0.7%
	Total	***8,276,510,090***	***100.0%***	***7,755.25***	***100.0%***	***14,865.96***	***100.0%***	***98,535.36***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Armstrong	Motorcycle	3,079,443	0.5%	16.12	2.6%	3.07	0.3%	81.96	1.1%
	Passenger Car	310,241,820	53.3%	177.01	28.9%	200.19	16.4%	2,303.52	30.9%
	Passenger Truck	163,527,528	28.1%	284.06	46.4%	382.56	31.3%	3,453.34	46.3%
	Light Commercial Truck	55,006,607	9.4%	92.15	15.1%	143.88	11.8%	1,152.40	15.5%
	Intercity Bus	484,609	0.1%	0.30	0.0%	7.46	0.6%	2.03	0.0%
	Transit Bus	3,009,291	0.5%	2.08	0.3%	34.98	2.9%	26.88	0.4%
	School Bus	1,966,442	0.3%	2.60	0.4%	15.55	1.3%	39.02	0.5%
	Refuse Truck	331,064	0.1%	0.16	0.0%	2.96	0.2%	1.51	0.0%
	Single Unit Short-haul Truck	14,643,106	2.5%	12.86	2.1%	68.20	5.6%	241.59	3.2%
	Single Unit Long-haul Truck	2,063,678	0.4%	1.44	0.2%	8.65	0.7%	25.40	0.3%
	Motor Home	884,431	0.2%	1.52	0.2%	4.92	0.4%	30.58	0.4%
	Combination Short-haul Truck	11,353,989	1.9%	5.17	0.8%	120.76	9.9%	31.50	0.4%
	Combination Long-haul Truck	15,941,907	2.7%	16.16	2.6%	229.85	18.8%	65.03	0.9%
	Total	***582,533,915***	***100.0%***	***611.63***	***100.0%***	***1,223.02***	***100.0%***	***7,454.79***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Beaver	Motorcycle	7,198,525	0.5%	36.77	3.0%	6.59	0.3%	183.16	1.2%
	Passenger Car	725,223,630	54.9%	357.60	29.0%	411.16	17.4%	4,884.80	31.4%
	Passenger Truck	382,267,450	28.9%	574.87	46.6%	820.72	34.7%	7,279.02	46.8%
	Light Commercial Truck	128,579,118	9.7%	191.55	15.5%	319.90	13.5%	2,471.18	15.9%
	Intercity Bus	667,793	0.1%	0.45	0.0%	10.77	0.5%	3.07	0.0%
	Transit Bus	2,287,686	0.2%	1.63	0.1%	26.12	1.1%	20.64	0.1%
	School Bus	957,375	0.1%	1.43	0.1%	7.86	0.3%	21.51	0.1%
	Refuse Truck	551,538	0.0%	0.30	0.0%	5.28	0.2%	2.74	0.0%
	Single Unit Short-haul Truck	23,840,668	1.8%	23.23	1.9%	121.15	5.1%	413.21	2.7%
	Single Unit Long-haul Truck	3,352,050	0.3%	2.64	0.2%	15.35	0.6%	43.31	0.3%
	Motor Home	1,436,152	0.1%	2.77	0.2%	8.38	0.4%	52.93	0.3%
	Combination Short-haul Truck	18,511,428	1.4%	9.27	0.8%	207.35	8.8%	56.04	0.4%
	Combination Long-haul Truck	25,930,807	2.0%	30.01	2.4%	405.18	17.1%	118.41	0.8%
	Total	***1,320,804,219***	***100.0%***	***1,232.52***	***100.0%***	***2,365.83***	***100.0%***	***15,550.01***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Butler	Motorcycle	9,392,426	0.5%	44.58	2.7%	9.16	0.3%	242.09	1.1%
	Passenger Car	946,250,980	53.6%	481.56	28.8%	586.43	16.6%	6,587.58	31.1%
	Passenger Truck	498,778,320	28.3%	778.76	46.6%	1,119.85	31.7%	9,838.77	46.4%
	Light Commercial Truck	167,759,780	9.5%	253.26	15.1%	421.73	12.0%	3,255.60	15.4%
	Intercity Bus	1,387,813	0.1%	0.84	0.1%	21.91	0.6%	5.74	0.0%
	Transit Bus	3,293,723	0.2%	2.29	0.1%	40.15	1.1%	30.48	0.1%
	School Bus	1,934,035	0.1%	2.60	0.2%	16.14	0.5%	40.39	0.2%
	Refuse Truck	1,014,713	0.1%	0.48	0.0%	9.36	0.3%	4.59	0.0%
	Single Unit Short-haul Truck	44,216,371	2.5%	38.09	2.3%	208.56	5.9%	737.98	3.5%
	Single Unit Long-haul Truck	6,230,653	0.4%	4.26	0.3%	26.55	0.8%	77.75	0.4%
	Motor Home	2,665,833	0.2%	4.57	0.3%	15.37	0.4%	97.90	0.5%
	Combination Short-haul Truck	34,321,242	1.9%	15.03	0.9%	365.98	10.4%	92.55	0.4%
	Combination Long-haul Truck	48,116,118	2.7%	46.51	2.8%	686.45	19.5%	189.10	0.9%
	Total	***1,765,362,008***	***100.0%***	***1,672.83***	***100.0%***	***3,527.63***	***100.0%***	***21,200.51***	***100.0%***

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County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Fayette	Motorcycle	5,090,795	0.5%	29.54	2.6%	5.10	0.3%	139.19	1.0%
	Passenger Car	512,878,190	54.1%	330.42	29.6%	350.83	18.0%	4,233.51	31.6%
	Passenger Truck	270,341,610	28.5%	526.64	47.2%	666.95	34.2%	6,302.79	47.0%
	Light Commercial Truck	90,929,110	9.6%	170.26	15.3%	249.88	12.8%	2,103.38	15.7%
	Intercity Bus	605,297	0.1%	0.38	0.0%	9.35	0.5%	2.60	0.0%
	Transit Bus	2,237,720	0.2%	1.58	0.1%	26.13	1.3%	20.49	0.2%
	School Bus	814,142	0.1%	1.17	0.1%	6.59	0.3%	18.01	0.1%
	Refuse Truck	485,626	0.1%	0.24	0.0%	4.36	0.2%	2.23	0.0%
	Single Unit Short-haul Truck	21,217,131	2.2%	18.86	1.7%	99.95	5.1%	352.17	2.6%
	Single Unit Long-haul Truck	2,981,275	0.3%	2.12	0.2%	12.64	0.6%	36.91	0.3%
	Motor Home	1,279,627	0.1%	2.23	0.2%	7.17	0.4%	44.62	0.3%
	Combination Short-haul Truck	16,480,171	1.7%	7.59	0.7%	176.03	9.0%	46.11	0.3%
	Combination Long-haul Truck	23,063,232	2.4%	23.74	2.1%	335.23	17.2%	95.20	0.7%
	Total	***948,403,927***	***100.0%***	***1,114.77***	***100.0%***	***1,950.20***	***100.0%***	***13,397.21***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Washington	Motorcycle	9,431,002	0.5%	45.69	3.0%	9.22	0.3%	244.77	1.2%
	Passenger Car	950,137,200	54.4%	446.46	29.0%	537.20	16.8%	6,310.57	31.3%
	Passenger Truck	500,824,170	28.7%	714.28	46.4%	1,077.84	33.7%	9,389.21	46.6%
	Light Commercial Truck	168,451,120	9.6%	236.85	15.4%	412.99	12.9%	3,154.03	15.6%
	Intercity Bus	1,084,098	0.1%	0.67	0.0%	17.31	0.5%	4.60	0.0%
	Transit Bus	4,299,279	0.2%	3.03	0.2%	52.21	1.6%	39.82	0.2%
	School Bus	1,877,130	0.1%	2.59	0.2%	15.75	0.5%	39.95	0.2%
	Refuse Truck	816,172	0.0%	0.40	0.0%	7.64	0.2%	3.78	0.0%
	Single Unit Short-haul Truck	35,499,638	2.0%	31.55	2.0%	171.61	5.4%	600.73	3.0%
	Single Unit Long-haul Truck	4,998,783	0.3%	3.54	0.2%	21.82	0.7%	63.23	0.3%
	Motor Home	2,138,229	0.1%	3.79	0.2%	12.48	0.4%	79.60	0.4%
	Combination Short-haul Truck	27,579,440	1.6%	12.45	0.8%	298.27	9.3%	76.40	0.4%
	Combination Long-haul Truck	38,600,223	2.2%	38.92	2.5%	563.64	17.6%	157.17	0.8%
	Total	***1,745,736,483***	***100.0%***	***1,540.23***	***100.0%***	***3,197.99***	***100.0%***	***20,163.87***	***100.0%***

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Westmoreland	Motorcycle	16,935,055	0.5%	80.05	3.0%	16.06	0.3%	430.73	1.2%
	Passenger Car	1,706,141,922	55.3%	772.77	29.1%	939.84	18.0%	10,908.77	31.5%
	Passenger Truck	899,318,290	29.1%	1,244.31	46.8%	1,885.61	36.1%	16,259.96	47.0%
	Light Commercial Truck	302,486,201	9.8%	414.24	15.6%	728.77	13.9%	5,478.07	15.8%
	Intercity Bus	1,087,104	0.0%	0.73	0.0%	17.37	0.3%	5.06	0.0%
	Transit Bus	2,617,401	0.1%	1.96	0.1%	30.52	0.6%	25.10	0.1%
	School Bus	956,631	0.0%	1.64	0.1%	8.14	0.2%	26.35	0.1%
	Refuse Truck	1,169,548	0.0%	0.61	0.0%	10.98	0.2%	5.65	0.0%
	Single Unit Short-haul Truck	51,207,845	1.7%	48.35	1.8%	253.29	4.8%	873.53	2.5%
	Single Unit Long-haul Truck	7,207,246	0.2%	5.47	0.2%	32.11	0.6%	91.66	0.3%
	Motor Home	3,086,215	0.1%	5.74	0.2%	17.75	0.3%	111.43	0.3%
	Combination Short-haul Truck	39,750,979	1.3%	19.37	0.7%	438.75	8.4%	117.26	0.3%
	Combination Long-haul Truck	55,698,637	1.8%	62.06	2.3%	850.59	16.3%	246.14	0.7%
	Total	***3,087,663,074***	***100.0%***	***2,657.30***	***100.0%***	***5,229.77***	***100.0%***	***34,579.73***	***100.0%***

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Appendix D-2-4-2
2011 Pittsburgh-Beaver Valley Area Emission Summary by Process
Annual (Tons/Year)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Allegheny	Running Exhaust	1,608.95	20.7%	11,045.92	74.3%	40,743.48	41.3%
	Start Exhaust	4,268.72	55.0%	3,209.05	21.6%	57,544.54	58.4%
	Evap Permeation	342.62	4.4%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	936.59	12.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	415.95	5.4%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	22.40	0.3%	2.21	0.0%	8.99	0.0%
	Crankcase Start Exhaust	56.37	0.7%	0.12	0.0%	7.43	0.0%
	Crankcase Extended Idle Exhaust	1.57	0.0%	0.19	0.0%	0.41	0.0%
	Extended Idle Exhaust	102.08	1.3%	608.47	4.1%	230.52	0.2%
	Total	***7,755.25***	***100.0%***	***14,865.96***	***100.0%***	***98,535.36***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Armstrong	Running Exhaust	113.57	18.6%	913.42	74.7%	2,907.52	39.0%
	Start Exhaust	361.22	59.1%	256.82	21.0%	4,525.96	60.7%
	Evap Permeation	25.53	4.2%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	66.96	10.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	29.00	4.7%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	1.62	0.3%	0.21	0.0%	0.70	0.0%
	Crankcase Start Exhaust	4.77	0.8%	0.01	0.0%	0.60	0.0%
	Crankcase Extended Idle Exhaust	0.14	0.0%	0.02	0.0%	0.04	0.0%
	Extended Idle Exhaust	8.84	1.4%	52.54	4.3%	19.97	0.3%
	Total	***611.63***	***100.0%***	***1,223.02***	***100.0%***	***7,454.79***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Beaver	Running Exhaust	244.19	19.8%	1,744.74	73.7%	6,184.45	39.8%
	Start Exhaust	691.15	56.1%	519.45	22.0%	9,324.53	60.0%
	Evap Permeation	55.47	4.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	146.13	11.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	65.80	5.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	3.40	0.3%	0.35	0.0%	1.37	0.0%
	Crankcase Start Exhaust	9.13	0.7%	0.02	0.0%	1.20	0.0%
	Crankcase Extended Idle Exhaust	0.26	0.0%	0.03	0.0%	0.07	0.0%
	Extended Idle Exhaust	17.00	1.4%	101.24	4.3%	38.38	0.2%
	Total	***1,232.52***	***100.0%***	***2,365.83***	***100.0%***	***15,550.01***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Butler	Running Exhaust	342.51	20.5%	2,699.89	76.5%	9,169.52	43.3%
	Start Exhaust	954.41	57.1%	677.44	19.2%	11,970.42	56.5%
	Evap Permeation	67.57	4.0%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	186.14	11.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	79.21	4.7%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	4.82	0.3%	0.58	0.0%	2.07	0.0%
	Crankcase Start Exhaust	12.61	0.8%	0.02	0.0%	1.57	0.0%
	Crankcase Extended Idle Exhaust	0.39	0.0%	0.05	0.0%	0.10	0.0%
	Extended Idle Exhaust	25.17	1.5%	149.65	4.2%	56.83	0.3%
	Total	***1,672.83***	***100.0%***	***3,527.63***	***100.0%***	***21,200.51***	***100.0%***

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County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Fayette	Running Exhaust	181.83	16.3%	1,388.20	71.2%	4,853.80	36.2%
	Start Exhaust	684.72	61.4%	484.05	24.8%	8,511.73	63.5%
	Evap Permeation	48.41	4.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	121.58	10.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	53.40	4.8%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	2.55	0.2%	0.29	0.0%	1.08	0.0%
	Crankcase Start Exhaust	9.04	0.8%	0.02	0.0%	1.09	0.0%
	Crankcase Extended Idle Exhaust	0.20	0.0%	0.02	0.0%	0.05	0.0%
	Extended Idle Exhaust	13.04	1.2%	77.62	4.0%	29.46	0.2%
	Total	***1,114.77***	***100.0%***	***1,950.20***	***100.0%***	***13,397.21***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Washington	Running Exhaust	304.13	19.7%	2,414.86	75.5%	8,323.06	41.3%
	Start Exhaust	870.85	56.5%	655.74	20.5%	11,789.21	58.5%
	Evap Permeation	69.83	4.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	177.07	11.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	80.94	5.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	4.26	0.3%	0.50	0.0%	1.84	0.0%
	Crankcase Start Exhaust	11.50	0.7%	0.02	0.0%	1.54	0.0%
	Crankcase Extended Idle Exhaust	0.33	0.0%	0.04	0.0%	0.09	0.0%
	Extended Idle Exhaust	21.31	1.4%	126.83	4.0%	48.13	0.2%
	Total	***1,540.23***	***100.0%***	***3,197.99***	***100.0%***	***20,163.87***	***100.0%***

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Westmoreland	Running Exhaust	540.36	20.3%	3,909.77	74.8%	14,530.38	42.0%
	Start Exhaust	1,480.31	55.7%	1,111.96	21.3%	19,964.97	57.7%
	Evap Permeation	118.83	4.5%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	314.15	11.8%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	141.26	5.3%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	7.49	0.3%	0.73	0.0%	3.05	0.0%
	Crankcase Start Exhaust	19.55	0.7%	0.04	0.0%	2.56	0.0%
	Crankcase Extended Idle Exhaust	0.54	0.0%	0.06	0.0%	0.14	0.0%
	Extended Idle Exhaust	34.82	1.3%	207.21	4.0%	78.63	0.2%
	Total	***2,657.30***	***100.0%***	***5,229.77***	***100.0%***	***34,579.73***	***100.0%***

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APPENDIX D-2-5
Berks County Emission Summary Tables

Appendix D-2-5-1
2011 July Weekday Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

Appendix D-2-5-2
2011 Annual Emissions

Emission Summary
Emission Summary by Road Type
Emission Summary by Source Type
Emission Summary by Process

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Appendix D-2-5-1
2011 Berks County Emission Summary
Summer Weekday (Tons/Day)

County	VMT	Speed (mph)	VOC	NOX	CO
Berks	10,470,736	44.1	9.86	22.11	98.88

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Appendix D-2-5-1

2011 Berks County Emission Summary by Road Type
Summer Weekday (Tons/Day)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Berks	Off-Network	-	-	6.71	4.60	37.84
	Rural Restricted Access	1,414,342	64.9	0.39	3.73	8.89
	Rural Unrestricted Access	2,632,956	43.2	0.78	3.98	14.05
	Urban Restricted Access	2,000,510	55.5	0.55	3.58	13.19
	Urban Unrestricted Access	4,422,928	37.2	1.44	6.22	24.90
	Total	***10,470,736***		***9.86***	***22.11***	***98.88***

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Appendix D-2-5-1

2011 Berks County Emission Summary by Source Type

Summer Weekday (Tons/Day)

County	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Berks	Motorcycle	53,974	0.5%	0.34	3.5%	0.04	0.2%	0.89	0.9%
	Passenger Car	5,437,643	51.9%	2.48	25.1%	3.39	15.3%	24.26	24.5%
	Passenger Truck	2,861,906	27.3%	4.63	47.0%	6.60	29.9%	48.48	49.0%
	Light Commercial Truck	968,363	9.2%	1.49	15.1%	2.46	11.1%	15.78	16.0%
	Intercity Bus	13,116	0.1%	0.01	0.1%	0.18	0.8%	0.05	0.1%
	Transit Bus	22,121	0.2%	0.01	0.1%	0.24	1.1%	0.20	0.2%
	School Bus	11,810	0.1%	0.01	0.1%	0.08	0.4%	0.22	0.2%
	Refuse Truck	8,101	0.1%	0.00	0.0%	0.07	0.3%	0.03	0.0%
	Single Unit Short-haul Truck	356,843	3.4%	0.32	3.3%	1.47	6.7%	5.47	5.5%
	Single Unit Long-haul Truck	50,247	0.5%	0.03	0.3%	0.19	0.8%	0.55	0.6%
	Motor Home	21,507	0.2%	0.04	0.4%	0.11	0.5%	0.66	0.7%
	Combination Short-haul Truck	277,044	2.6%	0.12	1.2%	2.58	11.7%	0.74	0.8%
	Combination Long-haul Truck	388,060	3.7%	0.37	3.7%	4.70	21.2%	1.53	1.5%
	Total	***10,470,736***	***100.0%***	***9.86***	***100.0%***	***22.11***	***100.0%***	***98.88***	***100.0%***

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Appendix D-2-5-1
2011 Berks County Emission Summary by Process
Summer Weekday (Tons/Day)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Berks	Running Exhaust	2.42	24.5%	17.51	79.2%	61.02	61.7%
	Start Exhaust	3.75	38.0%	3.69	16.7%	37.38	37.8%
	Evap Permeation	0.98	9.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	1.86	18.9%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	0.57	5.7%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	0.03	0.3%	0.00	0.0%	0.02	0.0%
	Crankcase Start Exhaust	0.05	0.5%	0.00	0.0%	0.01	0.0%
	Crankcase Extended Idle Exhaust	0.00	0.0%	0.00	0.0%	0.00	0.0%
	Extended Idle Exhaust	0.20	2.0%	0.91	4.1%	0.45	0.5%
	Total	***9.86***	***100.0%***	***22.11***	***100.0%***	***98.88***	***100.0%***

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Appendix D-2-5-2
2011 Berks County Emission Summary
Annual (Tons/Year)

County	VMT	Speed (mph)	VOC	NOX	CO
Berks	3,381,679,051	44.7	3,479.35	8,073.19	43,022.47

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Appendix D-2-5-2

2011 Berks County Emission Summary by Road Type

Annual (Tons/Year)

County	Road Type	VMT	Speed (mph)	VOC	NOX	CO
Berks	Off-Network	-	-	2,487.41	1,795.63	23,447.90
	Rural Restricted Access	455,630,812	64.9	122.95	1,366.70	2,858.36
	Rural Unrestricted Access	850,765,567	43.6	246.35	1,420.02	4,527.45
	Urban Restricted Access	636,983,988	57.1	169.32	1,287.24	4,158.49
	Urban Unrestricted Access	1,438,298,684	37.8	453.31	2,203.61	8,030.28
	Total	***3,381,679,051***		***3,479.35***	***8,073.19***	***43,022.47***

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Appendix D-2-5-2

2011 Berks County Emission Summary by Source Type

Annual (Tons/Year)

	Sourcetype	VMT		VOC		NOX		CO	
		Miles	Pct.	Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Berks	Motorcycle	17,438,221	0.5%	93.54	2.7%	16.65	0.2%	439.03	1.0%
	Passenger Car	1,756,833,196	52.0%	972.43	27.9%	1,231.13	15.2%	12,510.13	29.1%
	Passenger Truck	924,645,260	27.3%	1604.56	46.1%	2,374.32	29.4%	20,193.82	46.9%
	Light Commercial Truck	312,865,900	9.3%	518.27	14.9%	876.38	10.9%	6,614.15	15.4%
	Intercity Bus	3,853,491	0.1%	2.30	0.1%	60.93	0.8%	15.76	0.0%
	Transit Bus	7,365,809	0.2%	5.12	0.1%	91.96	1.1%	69.06	0.2%
	School Bus	3,932,516	0.1%	5.00	0.1%	33.45	0.4%	77.74	0.2%
	Refuse Truck	2,603,985	0.1%	1.20	0.0%	24.11	0.3%	11.65	0.0%
	Single Unit Short-haul Truck	114,896,970	3.4%	97.00	2.8%	547.58	6.8%	1,907.60	4.4%
	Single Unit Long-haul Truck	16,177,425	0.5%	10.87	0.3%	69.77	0.9%	201.90	0.5%
	Motor Home	6,924,108	0.2%	11.90	0.3%	40.77	0.5%	259.28	0.6%
	Combination Short-haul Truck	89,172,150	2.6%	38.42	1.1%	944.92	11.7%	237.61	0.6%
	Combination Long-haul Truck	124,970,020	3.7%	118.73	3.4%	1,761.22	21.8%	484.74	1.1%
	Total	***3,381,679,051***	***100.0%***	***3,479.35***	***100.0%***	***8,073.19***	***100.0%***	***43,022.47***	***100.0%***

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Appendix D-2-5-2
2011 Berks County Emission Summary by Process
Annual (Tons/Year)

County	Process	VOC		NOX		CO	
		Emissions	Pct.	Emissions	Pct.	Emissions	Pct.
Berks	Running Exhaust	761.05	21.9%	6,276.10	77.7%	19,569.84	45.5%
	Start Exhaust	1784.51	51.3%	1,419.28	17.6%	23,299.82	54.2%
	Evap Permeation	177.43	5.1%	0.00	0.0%	0.00	0.0%
	Evap Fuel Vapor Venting	461.93	13.3%	0.00	0.0%	0.00	0.0%
	Evap Fuel Leaks	194.92	5.6%	0.00	0.0%	0.00	0.0%
	Crankcase Running Exhaust	10.86	0.3%	1.46	0.0%	4.74	0.0%
	Crankcase Start Exhaust	23.59	0.7%	0.05	0.0%	3.12	0.0%
	Crankcase Extended Idle Exhaust	0.99	0.0%	0.12	0.0%	0.26	0.0%
	Extended Idle Exhaust	64.07	1.8%	376.19	4.7%	144.70	0.3%
	Total	***3,479.35***	***100.0%***	***8,073.19***	***100.0%***	***43,022.47***	***100.0%***

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APPENDIX D-3

MOVES Sample Input Files

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July Weekday MOVES Run Specification File Settings

Sample xml file format

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	</geographicselections>
	<timespan>
		<year key="2011"/>
		<month id="07"/>
		<day id="2"/>
		<day id="5"/>
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		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor Home"/>
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		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
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		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
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		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
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	<offroadvehicleselections>
	</offroadvehicleselections>
	<offroadvehiclesccs>
	</offroadvehiclesccs>
	<roadtypes>
		<roadtype roadtypeid="1" roadtypename="Off-Network"/>
		<roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
		<roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
		<roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
		<roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
	</roadtypes>
		</filters>
		<databaseselection servername="localhost" databasename="42025_2011_07_05_JulWkd_OZ_CO_mi"/>
		<agedistribution>
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			<parts>
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                        <sourceTypeAgeDistribution>
                                <filename>C:\PAMOVES11\MOVESInputs\AgeDistribution\11Reg_RepCty\2011\42035_2011_SourceTypeAgeDistribution.csv</filename>
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        </avgspeeddistribution>

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          <FuelFormulation>
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</fuel>

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</parts>
</avft>
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</moves>
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Sample mrs file format

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     <modeldomain value="SINGLE"/>
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     <timespan>
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<month id="07"/>
<day id="5"/>
          <beginhour id="1"/>
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<aggregateBy key="Hour"/>
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<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="21" sourcetypename="Passenger Car"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="31" sourcetypename="Passenger Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="11" sourcetypename="Motorcycle"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
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<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="42" sourcetypename="Transit Bus"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="43" sourcetypename="School Bus"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="43" sourcetypename="School Bus"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="41" sourcetypename="Intercity Bus"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
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<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="51" sourcetypename="Refuse Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="54" sourcetypename="Motor Home"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
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     <offroadvehicleselections>
     </offroadvehicleselections>
     <offroadvehiclesccs>
     </offroadvehiclesccs>
     <roadtypes>
          <roadtype roadtypeid="1" roadtypename="Off-Network"/>
          <roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
          <roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
          <roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
          <roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
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<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="90" processname="Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen" processkey="2" processname="Start Exhaust"/>
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<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="11" processname="Evap Permeation"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="12" processname="Evap Fuel Vapor Venting"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="13" processname="Evap Fuel Leaks"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="15" processname="Crankcase Running Exhaust"/>
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<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="12" processname="Evap Fuel Vapor Venting"/>
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<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
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<sourceusetype selected="true"/>
          <movesvehicletype selected="false"/>
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     <outputsho value="true"/>
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          <massfactors selected="false" units="Grams" energyunits="Million BTU"/>
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useParameters       No

]]></internalcontrolstrategy>
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Annual MOVES Run Specification File Settings

Sample xml file format

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	<timespan>
		<year key="2011"/>
		<month id="00"/>
		<day id="2"/>
		<day id="5"/>
		<beginhour id="1"/>
		<endhour id="24"/>
		<aggregateBy key="Hour"/>
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		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="54" sourcetypename="Motor Home"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="11" sourcetypename="Motorcycle"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
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		<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
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		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="41" sourcetypename="Intercity Bus"/>
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		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="11" sourcetypename="Motorcycle"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="51" sourcetypename="Refuse Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="43" sourcetypename="School Bus"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
		<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="42" sourcetypename="Transit Bus"/>
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	<offroadvehicleselections>
	</offroadvehicleselections>
	<offroadvehiclesccs>
	</offroadvehiclesccs>
	<roadtypes>
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		<roadtype roadtypeid="2" roadtypename="Rural Restricted Access"/>
		<roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
		<roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
		<roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
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		</filters>
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			</sourceTypeAgeDistribution>
		</parts>
	</agedistribution>

	<avgspeeddistribution>
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		<parts>
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			</avgSpeedDistribution>
		</parts>
	</avgspeeddistribution>

	<imcoverage>
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			</imcoverage>
		</parts>
	</imcoverage>

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	<parts>
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		</FuelSupply>
		<FuelFormulation>
			<filename>C:\PAMOVES11\MOVESInputs\Fuel\42000_FuelFormulation_MOVES2010a.csv</filename>
		</FuelFormulation>
	</parts>
</fuel>

	<zonemonthhour>
		<description><![CDATA[]]></description>
		<parts>
			<zoneMonthHour>
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			</zoneMonthHour>
		</parts>
	</zonemonthhour>

	<roadtypedistribution>
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			</roadTypeDistribution>
		</parts>
	</roadtypedistribution>

	<sourcetypepopulation>
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		<parts>
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			</sourceTypeYear>
		</parts>
	</sourcetypepopulation>

	<rampfraction>
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		<parts>
		 <roadType>
```

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                                        <filename>C:\PAMOVES11\MOVESInputs\RampFraction\rampfraction_defaults.csv</filename>
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                        </parts>
                </rampfraction>

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                                </hpmsVTypeYear>
                                <monthvmtfraction>
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                                <dayvmtfraction>
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                                </dayvmtfraction>
                                <hourvmtfraction>
                                        <filename>C:\PAMOVES11\Out\PA_2011_Ann_OZ_CO\\42025_2011_00_25_Ann_OZ_CO\CDM\hourvmtfraction.csv</filename>
                                </hourvmtfraction>
                        </parts>
                </vehicletypevmt>
<avft>
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</avft>
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</avft>

        </importer>
</moves>
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Sample mrs file format

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<modelscale value="INV"/>
     <modeldomain value="SINGLE"/>
     <geographicselections>
          <geographicselection type="COUNTY" key="42025" description="PENNSYLVANIA - Carbon County"/>
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     <timespan>
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<month id="3"/>
<month id="4"/>
<month id="5"/>
<month id="6"/>
<month id="7"/>
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<month id="9"/>
<month id="10"/>
<month id="11"/>
<month id="12"/>
<day id="2"/>
<day id="5"/>
          <beginhour id="1"/>
          <endhour id="24"/>
<aggregateBy key="Hour"/>
     </timespan>
```

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<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="21" sourcetypename="Passenger Car"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="31" sourcetypename="Passenger Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="11" sourcetypename="Motorcycle"/>
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<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="31" sourcetypename="Passenger Truck"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="32" sourcetypename="Light Commercial Truck"/>
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<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="21" sourcetypename="Passenger Car"/>
<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="31" sourcetypename="Passenger Truck"/>
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<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="41" sourcetypename="Intercity Bus"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="42" sourcetypename="Transit Bus"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="43" sourcetypename="School Bus"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="41" sourcetypename="Intercity Bus"/>
<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="42" sourcetypename="Transit Bus"/>
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<onroadvehicleselection fueltypeid="1" fueltypedesc="Gasoline" sourcetypeid="41" sourcetypename="Intercity Bus"/>
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<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="51" sourcetypename="Refuse Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="52" sourcetypename="Single Unit Short-haul Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="53" sourcetypename="Single Unit Long-haul Truck"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="54" sourcetypename="Motor Home"/>
<onroadvehicleselection fueltypeid="3" fueltypedesc="Compressed Natural Gas (CNG)" sourcetypeid="61" sourcetypename="Combination Short-haul Truck"/>
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<onroadvehicleselection fueltypeid="2" fueltypedesc="Diesel Fuel" sourcetypeid="51" sourcetypename="Refuse Truck"/>
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     <offroadvehicleselections>
     </offroadvehicleselections>
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     </offroadvehiclesccs>
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          <roadtype roadtypeid="3" roadtypename="Rural Unrestricted Access"/>
          <roadtype roadtypeid="4" roadtypename="Urban Restricted Access"/>
          <roadtype roadtypeid="5" roadtypename="Urban Unrestricted Access"/>
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<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="15" processname="Crankcase Running Exhaust"/>
<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="16" processname="Crankcase Start Exhaust"/>
<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="2" pollutantname="Carbon Monoxide (CO)" processkey="90" processname="Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen" processkey="1" processname="Running Exhaust"/>
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<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
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<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="1" processname="Running Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="2" processname="Start Exhaust"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="11" processname="Evap Permeation"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="12" processname="Evap Fuel Vapor Venting"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="13" processname="Evap Fuel Leaks"/>
<pollutantprocessassociation pollutantkey="79" pollutantname="Non-Methane Hydrocarbons" processkey="15" processname="Crankcase Running Exhaust"/>
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<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="15" processname="Crankcase Running Exhaust"/>
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<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="17" processname="Crankcase Extended Idle Exhaust"/>
<pollutantprocessassociation pollutantkey="87" pollutantname="Volatile Organic Compounds" processkey="90" processname="Extended Idle Exhaust"/>

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<fueltype selected="false"/>
<emissionprocess selected="true"/>
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          <estimateuncertainty selected="false" numberOfIterations="2" keepSampledData="false" keepIterations="false"/>
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          <hpclass selected="false"/>
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     <outputsho value="true"/>
     <outputsh value="true"/>
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     <outputstarts value="true"/>
     <outputpopulation value="true"/>
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```

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]]></internalcontrolstrategy>
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</runspec>
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