Maryland Department of the Environment
AIR AND RADIATION MANAGEMENT ADMINISTRATION

Maintenance Plan for the Baltimore Carbon Monoxide Attainment Area

(SIP Revision 03-14)

December 15, 2003

Maryland Department of Environment

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1.0 Executive Summary

The federal Clean Air Act, 42 *U.S.C.* §7401 *et seq*. as amended by the Clean Air Act Amendments of 1990 (CAAA), requires all areas of the nation to attain and maintain compliance with the national ambient air quality standards (NAAQS), including the 8-hour carbon monoxide (CO) standard.

The Baltimore area attained the federal carbon monoxide standard in the 1990s and, in accordance with CAAA Section 175A(a), submitted a CO maintenance plan covering the period 1995-2007. EPA approved this maintenance plan effective December 15, 1995. In accordance with Section 175A(b), the region is required to submit a second maintenance plan within eight years of its redesignation as an attainment area. This revised maintenance plan must provide for maintenance of the carbon monoxide standard for an additional ten years. This maintenance plan is submitted in fulfillment of the Section 175A(b) requirement, and provides for continued attainment of the CO standard in the Baltimore attainment area through December 15, 2015.

This maintenance plan demonstrates that the Baltimore area will continue to comply with the 8-hour carbon monoxide standard. Monitoring data for the area show that CO levels have not violated the 9 ppm NAAQS since 1988, when the second highest measurement of CO in the Baltimore nonattainment area was 9.6 ppm. Since 1989, the region's design value has consistently decreased. At 3.3 ppm, it is currently well below the 9 ppm standard. Reductions in CO emissions are permanent and enforceable. As required by EPA, this maintenance plan uses MOBILE6, instead of the previously used MOBILE5b, to calculate the mobile emissions inventory. Emissions projections to the year 2015 are consistent with ambient CO levels below the NAAQS.

2.0 Introduction and Overview

The Baltimore region attained the federal carbon monoxide standard in the 1990s and, in accordance with CAAA Section 175A(a), submitted a CO maintenance plan covering the period 1995-2005. EPA approved this maintenance plan effective December 15, 1995. In accordance with Section 175A(b), the region is required to submit a second maintenance plan within eight years of its redesignation as an attainment area. This revised maintenance plan must provide for maintenance of the carbon monoxide standard for an additional ten years. This maintenance plan is submitted in fulfillment of the Section 175A(b) requirement, and provides for attainment of the CO standard in the Baltimore attainment area through December 15, 2015.

2.1 Background

The federal Clean Air Act, 42 U.S.C. § 7401 et seq. as amended by the Clean Air Act Amendments of 1990 (CAAA) requires all areas of the nation to attain and maintain compliance with the federal ambient air quality standards. These federal standards are designed to protect the public health and welfare from specific pollutants and are referred to as the National Ambient Air Quality Standards (NAAQS).

Federal standards exist for six criteria pollutants, including carbon monoxide. Carbon monoxide is a colorless, odorless gas that most often results from incomplete combustion of a fossil fuel. Exposure to unhealthy levels of carbon monoxide reduces oxygen delivery to the body's organs and tissues. The health threat created by CO is greatest for those who suffer from cardiovascular disease. Exposure to elevated CO levels can impair vision and coordination, and inhibit learning ability including the ability to perform complex tasks. EPA's health-based national air quality standard for CO is 9 parts per million (ppm) measured as an annual second-maximum 8-hour average concentration.

In 1995, the U.S. Environmental Protection Agency (EPA) redesignated two carbon monoxide nonattainment areas in Maryland. One area was in the Baltimore City Central Business District (CBD) within the Baltimore Metropolitan Statistical Area (MSA); it is bordered by the following (starting from the North and continuing clockwise): the Jones Falls Expressway, the Fallsway, the Baltimore Harbor, and Warren, Henrietta, Greene, Pratt, Fremont, Mulberry, Martin Luther King Boulevard, and Howard Streets, comprising Planning District # 118 (See Figure #1). The other CO attainment area in Maryland is part of an interstate CO attainment area in the Washington DC primary MSA. Maryland will submit a separate revised maintenance plan for that area.

The Baltimore area was a pre-1990 carbon monoxide nonattainment area. When the Clean Air Act Amendments were passed in 1990, the region was classified as a moderate nonattainment area with an attainment date of December 31, 1995. Subsequent to the nonattainment designation, Maryland submitted an attainment SIP that was approved by

EPA in September 1994. This plan met all the requirements of Section 110(a)(2)(I) of the Clean Air Act.

The purpose of this document is to request that EPA approve this update to the maintenance plan as required by the redesignation above. The Federal Register notice of approval for redesignation (FR 60, 10/31/95) states on page 55325 that "… the State must submit a revised maintenance SIP eight years after the area is redesignated to attainment. Such a revised SIP will provide for maintenance for an additional ten years." There has not been a violation of the standard from 1988 to the present.

FIGURE #1: Baltimore Carbon Monoxide Attainment Area

2.2 Attainment Redesignation and Maintenance Plan

In August 1995, Maryland submitted a formal revision to its State Implementation Plan. The revision included a request that the Baltimore area be redesignated as attainment for the CO standard. In accordance with CAAA Section 175A(a), the SIP also contained a maintenance plan providing for continued attainment of the CO standard for 10 years after redesignation. On December 15, 1995, EPA redesignated the Baltimore area as an attainment area. In this action, EPA also approved the area's maintenance plan.

In its redesignation approval, EPA determined that the following criteria were met:

(i) The area attained the NAAQS;

(ii) The area has a fully approved implementation plan (SIP);

(iii) The improvement in air quality is due to permanent and enforceable reductions in emissions;

(iii) The area has a fully approved maintenance plan; and

(iv) The State has met all applicable section 110 and part D requirements.

The maintenance plan established a motor vehicle emissions budget of 1689.8 tons per day of CO. New long-range and short-range transportation programs are tested against these budgets by the Baltimore Regional Transportation Board (BRTB).

2.3 Continued Monitoring

The Baltimore area currently has two air quality monitors sampling carbon monoxide. These monitors are located in regions likely to have the highest concentrations of CO. Monitored data are quality assured using precision checks, calibrations, audits, statistical analyses and selective data editing to ensure that readings are valid and useful.

3.0 Revision to the 1990 Base Year Attainment Inventory

The original 1990 Base-Year Carbon Monoxide Inventory was submitted to EPA for approval by Maryland on January 13, 1994. This inventory, which was subsequently approved by EPA in its redesignation notice, was used as the basis for the calculations in the region's first maintenance plan. The emissions inventory covers the carbon monoxide emissions of six jurisdictions in the Baltimore MSA on a typical winter season weekday – Anne Arundel County, Baltimore County, Baltimore City, Howard County, Harford County and Carroll County.

In 2002 and early 2003, Maryland Department of the Environment (MDE) changed the method for calculating emissions from *on-road* mobile sources to use EPA's latest mobile emissions model, MOBILE6. This change, described in the next section, resulted in revisions to the 1990 base year inventory. The revised 1990 base-year inventory is presented in Table 1 (see page 14).

3.1 Revision to Mobile Source Inventory

Per EPA requirements, the mobile emissions inventory was recalculated using MOBILE6, EPA's newest approved mobile emissions model.

The prime activity level of on-road mobile sources, Vehicles Miles Traveled (VMT), was derived from the use of the BRTP travel demand forecasting model called TP Plus, which simulates vehicle travel across the region's transportation system. Travel was simulated on all highways in the region, including both volume and speed of travel for each hour of the day. The other major components of the equation, emission factors, were generated using MOBILE6 EPA's emissions factor model, MOBILE6. Inputs for this emissions model, among others, include locally specific information such as age distribution of registered vehicles, evaporative characteristics of motor fuel, maximum and minimum temperature data, emission control programs in place, etc. The general equation for the estimation of mobile sources is:

(VMT) x (Emission Factors) = Emissions.

In 2002 and early 2003, MDE and BRTB undertook a series of improvements and refinements to the methodology used to calculate mobile emissions in the Baltimore nonattainment area. These improvements included:

? Using the MOBILE6 model to estimate emissions factors;
? Incorporating new travel demand model inputs as explained in the validation of the 2000 Baltimore Region Travel Demand Model.

More detailed explanations of the current methodology can be found in Appendix A, which relates to the 2005 summer time inventory.

We are summarizing below the changes in data parameters, which relate to this 2015 winter time inventory, for purpose of documentation.

a) Travel Demand Modeling: The 2015 link-based network data, with VMT and SPEED information, was simulated by the BMC using TP Plus travel demand model with the appropriate modeling criteria.
b) MOBILE6 modeling: The changes in MOBILE6 parameters are as follows:

1) Minimum/Maximum Temperature:

To model for a worst case scenario during winter time, it was decided to use the maximum and minimum temperatures of 40.9 and 24.1 in degrees Fahrenheit, the data set that was developed for the 1990 CO inventory, based on Maryland's historic data for 30 years.

Historically, in the State of Maryland, coldest temperatures are encountered in the month of January. As recorded in the Local Climatological Data (monthly summary for January 1990), collected at the National Weather Service's BWI monitoring station, the maximum and minimum temperatures were 51.3 and 32.6 respectively. But they were found to be on the higher side when compared to their corresponding 30-year average temperatures values of 40.9 and 24.1 archived by the same source in their 1990 annual summary report.

2) Fuel Reid Vapor Pressure (RVP):

For the wintertime Fuel, a computed value of 12.0 lbs per sq. inch was entered into the model. This value was arrived at using the fuel sampling data collected by the Motor Fuel Tax Division (MFTD) of the State's office of Comptroller for the winter of 1993.

3) Month of Evaluation and Season Parameters:

In accordance with intended purpose of constructing a CO Emission Inventories for wintertime, MDE utilized JANUARY as the EVALUATION MONTH and '2' as SEASON for the MOBILE6 inputs.

c) MOBILE6-PPSuite Post-processing:

The PPSuite post-processing applies an appropriate wintertime condition adjustment factor to the travel to reflect decrease in wintertime travel patterns.

3.2 Revised Base Year Inventory

The revised 1990 base-year inventory is presented in Table 1 (see page 14). The on-road mobile sources portion of the inventory uses all the inputs from the 1990 baseline wintertime inventory; reproduced by using the latest MOBILE6 model. The on-road mobile post-processing was performed by the PPSuite software package for aggregation of emissions from individual link levels to the county/area level resolution.

4.0 Projection Year Inventory

The projected 2015 uncontrolled inventory is derived by applying the appropriate growth factors to the 1990 Base-Year Emissions Inventory. MDE projected future year emissions from area sources by multiplying the base year inventory with household, population and employment growth factors derived from 2000 census data. The

Economic Growth Analysis System (EGAS) model was used to project growth in point and nonroad source emissions. Projections for the on road emissions were developed using TP Plus travel demand model and MOBILE6 emission factor model.

4.1 Growth Projection Methodology

The growth in point source emissions is projected using EGAS. Point source emissions for 1990 are provided from the state data sources and the model is run with the following options selected: projections are run by Source Classification Code; the Bureau of Labor Statistics national economic forecast; and the baseline regional economic forecast.

Base-year area and nonroad source emissions for 1990 were calculated using 1990 population, household, and employment data. Thus, growth factors for the periods of 1990 to 2015 were derived from EGAS. The 2015 emissions for area and non-road sources are calculated by multiplying the 1990 base-year area and non-road emissions by the above growth factors for the appropriate year.

4.2 Controlled Inventory

The projection of 2015 controlled emissions is simply the 2015 uncontrolled emissions minus the emission reductions achieved from the control measures detailed in Section 5.2. The controlled 2015 inventories are presented in Table 1.

5.0 Continued Maintenance of Federal Health Standard

The Baltimore area has maintained attainment of the federal 8-hour standard for carbon monoxide since its redesignation in 1995. Monitor data for the attainment area continue to show downward trends in the ambient levels of CO. Current and projected inventories also remain below the attainment inventory.

5.1 Monitoring Data

The air quality monitoring data for the Baltimore area have shown downward trends in ambient levels of CO since the Clean Air Act Amendments were passed in 1990. Attainment of the 8-hour CO standard is determined by calculating a region’s design value. A CO design value is calculated by comparing the second-highest non-overlapping 8-hour readings at a given monitor for each of two years. The higher of those two readings becomes the monitor’s design value. The regional design value is the highest design value among the region’s monitors. If the regional design value is lower than the standard, then the area is in attainment.

The monitoring data is quality assured in accordance with 40 CFR 58. MDE uses precision checks, calibrations, audits, statistical analyses, and selective data editing to ensure that each data value is valid and useful. MDE uses the Aerometric Information Retrieval System (AIRS) as the permanent database to record this data, which is available to public for review. EPA has repeatedly verified the integrity of Maryland's air monitoring network. In addition, EPA approved the site selection of each CO monitor. The air monitoring network serves as a reliable indicator of ambient concentrations of air pollutants.

Air quality monitoring data indicate that there has not been a violation of the carbon monoxide NAAQS in the Baltimore area since 1988, when the second highest measurement of CO in the CBD was 9.6 ppm. On February 15, 1994 the monitor in Baltimore recorded an exceedance of the standard (See Figure #2). However, one exceedance of the standard is allowed per year. No exceedances of the standard have been measured since that time. The 2001-2002 8-hour average design value for the region was 3.3 ppm, well below the 9 ppm standard for attainment. Figure #3 shows the region's 8-hour design values for the period 1989-2002.

FIGURE #2: NUMBER OF EXCEEDANCES OF THE CO STANDARD IN BALTIMORE CITY (1982 – 2002)

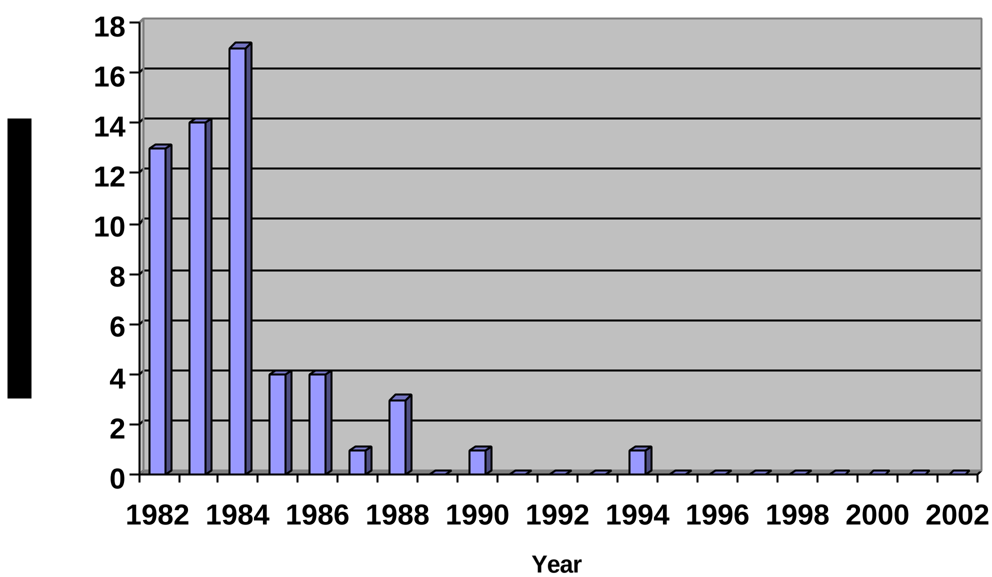
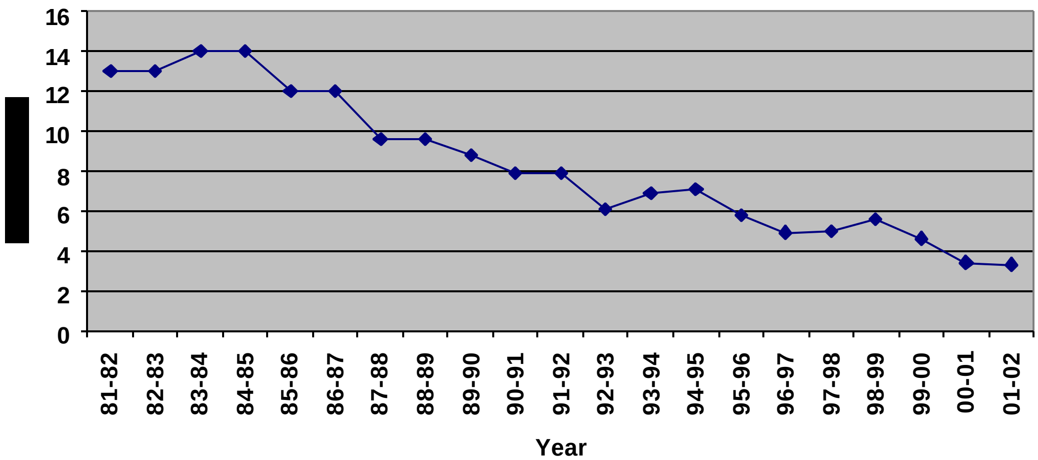


FIGURE #3: CO DESIGN VALUES FOR THE BALTIMORE CO ATTAINMENT AREA (PARTS PER MILLION)



The CO network has been downsized as part of efforts to increase the efficiency of the monitoring network. Although five CO monitors in Maryland were removed between 1997 and 2001, MDE is confident that the remaining two monitors are well placed as a result of saturation studies that MDE conducted with advice from EPA Region III during the winters of 1991-1992 and 1992-1993. Saturation monitoring involves placing a large number of portable monitors in a concentrated area for concurrent sample collection and comparing areas of highest concentration from the portable monitors to areas of highest concentration predicted by the monitoring network. The saturation studies, therefore, insure that the monitoring sites represent the highest concentrations of CO.

In 2003, the CO monitor at Essex, another long-term site, was moved to Padonia to allow new parameters to be monitored at Essex. The Padonia area is a high traffic area and a representative suburban site. The Old Town (Baltimore City) CO monitor has been running at the same site since 1982.

5.2 Emission Control Measures

Another component of the air quality demonstration is to show that the improvement in the air quality is due to permanent and enforceable measures. Maryland contends that the decrease in CO emissions is not a result of favorable meteorology. CO violations usually accompany distinct wintertime weather regimes. Winds are south to southwest at speeds generally less than 10 knots. In some cases, winds are calm. Temperatures tend to be unusually high during CO episodes, with southwest winds bringing warm moist air from the Gulf of Mexico into the region. Skies tend to be overcast with persistent fog and light drizzle. This weather regime is not uncommon in the Baltimore-Washington region, and consistently accompanied CO episodes prior to 1989. However, as CO controls have begun to take effect, this weather pattern no longer results in CO violations.

Improved combustion efficiency is the primary cause of the emissions reductions from stationary sources. CO is a product of incomplete combustion; as stationary sources have improved the effectiveness of their operating controls, combustion efficiency has improved and CO emissions have decreased. MDE must address emissions of CO from new major stationary sources as part of the Best Available Controls Technology (BACT) requirements because CO is a criteria pollutant.

The motor vehicle remains the dominant source of CO emissions in Maryland. The major portion of the decrease in the CO emissions is due to the Federal Motor Vehicle Control Program (FMVCP), which began in the mid-sixties. Over time, the FMVCP required vehicles to meet increasingly stringent CO tailpipe standards. This was facilitated by the introduction of the 3-way catalytic converter. More recently, oxygenates in reformulated fuels have contributed to reductions in CO emissions. Increased combustion efficiency for stationary sources and controls on highway vehicles are permanent and enforceable measures that have caused the reduction of CO emissions during the 1980's that led to attainment of the standard, and new tailpipe standards continue to reduce CO levels from mobile sources in spite of increased travel.

6.0 Revised Maintenance Plan for the Baltimore CO Attainment Area

This revised maintenance plan consists of the necessary requirements as outlined in EPA guidance" an attainment inventory, a maintenance demonstration, a monitoring network, verification of continued attainment and a contingency plan.[1]

6.1 Attainment Inventory

According to EPA guidance, the attainment inventory " should include the emissions during the time period associated with the monitoring data showing attainment.[2] This inventory is based on actual " typical CO season days," which occur during the months of December, January, and February. MDE updated the on-road mobile source portion of the 1990 inventory using MOBILE6, the new EPA emissions model.

6.2 Maintenance Demonstration

MDE's calculations of future emissions of CO from stationary, area, on-road mobile and off-road mobile sources demonstrate that future emissions will not exceed the level of the

[1] *Procedures for processing Requests to Redesignate Areas to Attainment*, EPA memo from John Calcagni, Director of the Air Quality Management Division of OAQPS to all regional Air Directors on September 4, 1992.
[2] Ibid, p.8

attainment inventory (See Table #1). The year selected is 20 years beyond the date EPA redesignated the CO nonattainment areas to attainment. That date was December 15, 1995, so MDE's planning horizon for this maintenance plan is 2015.

TABLE #1: Base Year and Projected CO Emissions Inventories for the Baltimore Metropolitan Statistical Area

Source Category	1990 Base Year CO Emissions (Tons per Day) A	2015 Projected CO Emissions (Tons per Day) B	Difference in CO Emissions B – A = C	% Change from 1990 to 2015 (C/A)
On-Road Mobile	2454.1	956.1	-1,498.00	-61.04%
Off-Road Mobile	223.28	296.756	73.48	32.91%
Area	116.47	129.045	12.57	10.79%
Stationary	375.25	554.237	178.99	47.70%
Total	3169.1	1936.138	-1,232.96	-38.91%

As illustrated in Table #1, MDE predicts that while emissions from off-road mobile, area and stationary sources will increase, emissions from mobile sources will decrease. This results in an overall reduction of 39% by 2015 over 1990 emissions levels. MDE projected future emissions from area sources by using 2000 census projections. MDE projected future emissions from off-road mobile sources and stationary sources by multiplying the 1990 base year inventory with E-GAS factors.

To project future emissions from mobile sources, MDE used the EPA approved emissions model, MOBILE 6, to assess the benefits gained from measures that are required by the Act to be implemented by the State and Federal governments. This estimate assumes the following emissions control programs, which are permanent and enforceable: FMVCP, the 1992 Reid Vapor Pressure Programs, Tier 1 and Tier 2 controls on new vehicles, Evaporative Emissions Control Program, Federal Reformulated Gasoline Program Phase 1 and Phase 2, Enhanced Inspection and Maintenance, Low Emission Vehicles, and On Board Controls. As already discussed, the VMT increase was predicted through use of the Round 6 demographic data and the transportation demand model, TP Plus.

6.3 Monitoring Network

MDE will continue to operate the current air quality monitoring network in accordance with 40 CFR Part 58.

6.4 Verification of Continued Attainment

CO inventories will be included as part of the Consolidated Emission Reporting Rule (CERR) during the maintenance period to make sure that the Baltimore attainment area remains in compliance with the NAAQS for CO. In addition, MDE will periodically conduct a comprehensive review of the factors that were used to develop the attainment inventory and project the CO emissions levels for 2015. If there are significant differences between actual and projected growth, then MDE will create updated emissions inventories to compare with the projections.

6.5 Contingency Plan

MDE in COMAR 03.03.06 adopted the oxygenated fuel program as a contingency measure. If a monitor in the CBD experiences a violation of the CO standard (two exceedances of the standard within one year), then the oxygenated fuel program will be initiated the following CO season.

7.0 Section 110 and Part D Requirements

7.1 Section 110

Section 110 (a)(2) of the Act contains general requirements for nonattainment plans. Most of the provisions of this section are the same as those contained in the pre-amended Act. The state of Maryland has fulfilled all pre-amendment Act requirements pertaining to the Baltimore CO nonattainment area.

7.2 Part D

Part D Subpart 3 of the Act, entitled "Additional Provisions for Carbon Monoxide Nonattainment Areas," requires moderate nonattainment areas, which have design values between 9.1 – 16.4 ppm, to achieve attainment by December 31, 1995. Section 187 (a)(1) under Part D requires the development of a "comprehensive, accurate, and current inventory of actual emissions from all sources, and a permit program for new and modified major stationary sources." As previously noted, MDE completed its CO emissions inventory on September 30, 1993 and achieved attainment well before December 31, 1995. In addition, MDE has a fully implemented new source review permit program outlined under COMAR 26.11.02. As an attainment area, new sources will undergo Prevention of Significant Deterioration (PSD) review. Under PSD regulations also outlined in COMAR 26.11.02, a Best Available Control Technology (BACT) analysis will be required for all new sources of CO that will emit more than 100 tons per year of the pollutant. This analysis will require demonstrations that the new sources will not cause violations of the standard for CO.

8.0 The Conformity Process

In order to balance growing metropolitan regions and expanding transportation systems with improving air quality, EPA established regulations ensuring that enhancements to existing transportation networks will not impair progress towards air quality goals. Under the Transportation Conformity Regulations, transportation plans in a carbon monoxide nonattainment area must not impair progress made in air quality improvements. These regulations, published in EPA's Transportation Conformity rule on November 24, 1993 in the Federal Register and amended in a final rule signed on July 31, 1997, require that transportation modifications "conform" with air quality planning goals established in air quality SIP documents.

To be found in "conformity" with air quality plans, the carbon monoxide emissions generated by mobile sources from a corresponding transportation plan must meet certain requirements:

? When a mobile vehicle emissions budget SIP has been submitted and found adequate, mobile source emissions must not exceed the mobile emissions budget established in the SIP;

? In areas without a mobile source emissions budget, mobile source emissions must be less than mobile source emissions in 1990 and projected emissions with the improvements included in the transportation plan (action scenario) must be less than projected emissions without the improvements (base scenario).

8.1 Mobile Emissions Budget

Maryland’s transportation conformity and general conformity SIPs were submitted to EPA in May 1995 (with revisions in 1999). As part of the conformity process, MDE, along with the Maryland Department of Transportation (MDOT) and the Baltimore Region Transportation Board (BRTB) take part in interagency consultation review of all budgets and conformity actions.

Under 40 CFR Parts 51 and 93, as part of the SIP process, MDE establishes an emissions budget, under the interagency consultation process, to be used for transportation conformity purposes. This motor vehicle emissions budget establishes a cap on emissions, which cannot be exceeded by predicted highway and transit vehicle emissions.

Since mobile sources estimates were updated during the development of this SIP revision, using updated planning assumptions and the MOBILE6 model, MDE now estimates that 2454.1 tons of CO per day were emitted in 1990 from on-road mobile sources. MDE has determined that the existing motor vehicle emissions budget of 1689.8 tons per day CO from the prior approved maintenance plan should be retained as the mobile source emissions budget for the second maintenance plan.[3]

MDE is retaining the mobile budget level of 1689.8 tons per day CO from the first maintenance plan. This level maintains the protection of the MOBILE5b estimate used earlier. In the first maintenance plan, the mobile budget was set at 100 tons/day below the 1990 level, which was the level at which the region attained the standard. This budget now provides a 764 ton buffer from the updated estimate of 1990 emissions using MOBILE6.

Current estimates of CO emissions for the Baltimore region in 2005 are 1504.30 tons/day, much lower than the budget. By 2015, emissions will fall to about 960 tons/day. These emissions reductions are the result of control measures already implemented or set for implementation by 2015. Most of these measures also control ozone precursors and are necessary because of the region's nonattainment status for ozone and will continue to be required under the 8-hour ozone standard. These ozone requirements keep pressure on the transportation system to minimize emissions.

8.2 The Baltimore Area Conformity Process

Mobile source emissions in any Long Range Plan (LRP) and Transportation Improvement Plan (TIP) cannot exceed the mobile emissions budget. These transportation plans are required to conform to the mobile budget established in the SIP for the milestone years identified in the TIP, as well as for the forecast period of the LRP, which must be at least twenty years.

In the Baltimore area, modifications to the existing transportation network are advanced by the BRTB and state, regional and local transportation agencies through a TIP. The Baltimore Region's TIP is continually updated and includes transportation modifications and improvements. Pursuant to the conformity regulations, the TIP and LRP must contain an analysis of the motor vehicle emissions estimates for the region resulting from the transportation improvements. These analyses must show that the transportation improvements in the TIP and the LRP do not result in a deterioration of air quality goals established in the SIP.

[3] For the purposes of determining conformity with this CO motor vehicle emissions budget, the CO "conformity region" is the control region for CO which includes Anne Arundel County, Baltimore County, Baltimore City, Carroll County, Harford County, and Howard County.

Appendix A: Travel Demand Documentation from BMC

Baltimore Metropolitan Council

DOCUMENTATION OF EMISSION ESTIMATION PROCESS AND ASSUMPTIONS IN FORECASTING MOBILE6 1990 AND 2005 MOBILE SOURCE EMISSIONS FOR THE BALTIMORE REGION

Task Report 03-3

March 2003

Baltimore Metropolitan Council ✍ 2700 Lighthouse Point East, Suite 310 ✍ Baltimore, Maryland 21224-4774

DOCUMENTATION OF EMISSION ESTIMATION PROCESS AND ASSUMPTIONS IN FORECASTING MOBILE6 1990 AND 2005 MOBILE SOURCE EMISSIONS FOR THE BALTIMORE REGION

Transportation Planning Division

Harvey S. Bloom, Director
Gene Bandy, Assistant Director

Project Manager

Charles Baber
Senior Transportation Planner

March 2003

Baltimore Metropolitan Council
Paul Farragut, Executive Director
2700 Lighthouse Point East, Suite 310
Baltimore, Maryland 21224

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I. Introduction

This report documents the technical process and local assumptions used in the estimation of mobile source emissions in the Baltimore non-attainment area (Cities of Baltimore and Annapolis, Anne Arundel, Baltimore, Carroll, Harford, and Howard counties). The process culminated in a vast amount of BMC staff time spent in determining the "best" technical approach to use in applying the MOBILE6 model. This was accomplished by sharing information with a Technical Workgroup created by the Interagency Consultation Group (ICG) for the Baltimore region. [The ICG's consist of three members – The Maryland Departments of Transportation and Environment and the Baltimore Regional Transportation Board. Staff of the Baltimore Metropolitan Council provide technical and administrative support to the ICG. The main purpose of the ICG is to coordinate the air quality/transportation planning process in the Baltimore non-attainment area.]

As an overview, the emission estimation process uses:

? Highway Performance Monitoring System (HPMS) adjusted simulated Vehicle Miles of Travel (VMT) from a traditional 4-step travel demand model and hourly travel speed estimation using a modification to the standard Bureau Public Roads (BPR) equation
? Locally derived estimation of vehicle mix and hourly volume distribution from classified and hourly counts
? Vehicle fleet class and age distribution from a July 1, 2002 database provided by the Maryland Motor Vehicle Administration (MVA)
? Environmental conditions such as temperature from regional metrological data
? National and local emission control programs such as heavy duty diesel engine rule and I/M program
? EPA's MOBILE6 emission model

A commercially available software package is used for the generally flow, creating MOBILE input scripts, and then applying the above assumptions in estimating mobile source emissions for the Baltimore region.

The emission estimation process is conducted using the steps outlined below, which are given expanded explanation later in the documentation:

? Output travel demand model estimates of daily, am and peak period link total and truck volumes
? Convert Travel Demand Model estimates of daily link total and truck volume to seasonal HPMS adjusted hourly estimates
? Estimate link volume by vehicle class (motorcycle, 2 axle, bus, and 2 axle 6 tire and 3+ axles).
? Calculate new travel speed
? Prepare MOBILE6 transportation related files
? Prepare MOBILE6 input scripts including transportation assumptions, environmental assumptions, control program specification files, and MOBILE6 operating parameters
? Execute MOBILE6 estimating mobile gram per mile composite emissions for three pollutants and VMT fractional shares for 28 vehicle types

- Apply MOBILE6 VMT fractional shares for 28 vehicle types by accumulated facility type VMT summaries multiplied by composite gram per mile emission factors
- Summaries showing estimated MOBILE source emissions by 28 vehicle types for each pollutant and converted to tons per day

II. Converting Travel Demand Model Link Volume

The Baltimore region maintains a traditional 4-step Travel Demand Model. The model most recently has been updated to a base year of 2000 and incorporates a revision in the estimation of medium and heavy truck trips and commercial vehicles based on a adaptive assignment method. The adaptive assignment method uses observed traffic counts to estimate a trip table that was used to adjust the generation of medium, heavy and commercial vehicle trips. The travel demand model is used to estimate travel demand on a link for a daily, am and pm peak period based on the estimates of socioeconomic data and existing and an envisioned transportation network. These estimates of demand are based on models calibrated with observations made from the 1993 Household Travel Survey and 1996 On-Board Transit Survey. Future demand is predicted based on changes in the underlying transportation system and location of demographic data of households and employment.

The estimates of mobile source emissions used in the MOBILE6 SIP are based on the 2000 travel model and the Round 6 socio economic data. The highway and transit networks include all proposed improvements contained in the current conforming TIP (02-06) and the 2001 Long Range Transportation Plan and any additional project that was identified by the sponsoring agency brought to the attention of the BMC staff. Sponsoring agencies identified transportation projects that could be in operation in the year 2005 for consideration in the MOBILE6 SIP for the 2005 attainment year.

The travel model network estimates of daily, am and pm total volume and truck (medium and heavy truck) volume along with link characteristics of functional type, distance, free flow speed, maximum capacity (service level "E"), urban area, travel lanes for am, pm and off peak, link density code, and VMT area (jurisdiction urban/rural) are converted to common database format. This database is the input into the commercially available air quality post processor.

III. Convert Travel Demand Model Estimates in Preparation for MOBILE

Travel models provide estimates of volume that are in the range of observed values on the upper functional class highway system. In order to capture all potential mobile source emissions, EPA requires that travel model estimates of volume be corrected with observed counts (HPMS) and that estimates of VMT not simulated within the travel model (local facilities) be made. It is suggested that MDOT HPMS estimates of average weekday VMT be the region’s estimate of travel and the travel model outputs be adjusted to match these totals.

BMC staff contacted and received from MDOT the estimates of annual VMT for 1990 and 2000 summarized by the Federal Urban Aid (FUA) System (urban/rural and functional type). Annual estimated HPMS VMT was converted to average weekday through a conversion factor developed from daily traffic counts for the year 2000. A unique conversion factor for facility was developed that converts average daily to average weekday. The reported MDOT HPMS annual VMT was first divided by 366 (number of days in year 2000) and factored by the average daily to weekday factor for each FUA within each Baltimore jurisdiction.

An HPMS average weekday factor is developed dividing the total simulated VMT from the travel model by the observed HPMS estimated VMT at the FUA level within each jurisdiction. Factors derived from the analysis of 2000 are applied to future travel networks in the estimation of mobile source emissions.

For VMT estimates on the local network not contained in the travel model, BMC calculated the share of local 2000 HPMS VMT compared to non-local 2000 HPMS VMT for each jurisdiction within urban and rural areas. This ratio is the estimate of needed local VMT that would be required to obtain the estimates of network VMT. The travel model network VMT is first adjusted to HPMS totals and then the local VMT ratio is applied. The resulting calculation (local VMT) is placed on local links that are added to the travel model network database for air quality consideration. The same ratio of local to non-local calculations using 2000 data is applied to future horizon years. As future estimates of simulated non-local network VMT increase, local VMT would increase.

The highest concentration of ozone occurs during the summer months. Using the MDOT permanent count station database, which estimates the Average Annual Daily Traffic (AADT) along with calculated monthly adjustment factors, BMC staff estimated a seasonal AADT and a yearly AADT summed for all locations in the database with useable data. A comparison of summer months AADT to yearly AADT was calculated yielding a difference of 1.04. The permanent count stations indicate that summer travel is 4% greater than the yearly average. This factor is then applied to the HPMS average weekday VMT, resulting in average summertime weekday VMT.

The EPA MOBILE6 emission model requires the hourly estimate of VMT. The travel model estimated HPMS adjusted summertime weekday VMT for 3 time periods (daily, am, and pm) using both total and truck volume for each directional link is factored to hourly volumes based on MDOT 1999-2001 hourly count database. Observed hourly counts were totaled grouping by hour and FUA (functional type and urban/rural). Dividing each hourly estimate of observed volume by daily volume yields an hourly share for each FUA facility type. These shares are then used as the hourly pattern file (Appendix A) in the post processing software. Each directional travel model total volume and truck volume link is apportioned to each hour based on the observed data.

The travel model estimate of daily, am, and pm volume is directionally specific. Example being that am peak period volume is greater than the pm peak period volume on facilities heading into downtown and the opposite in the pm period. No attempt to distinguish the peaking direction in the MDOT hourly observed volume was made. The pattern files are generic estimating equal am and pm peak period concentrations. Directional link orientation is captured in the air quality post processing software by controlling the hourly pattern file distribution for the peak period hours back to the am and pm simulated HPMS weekday link volume. The supplied hourly pattern files are adjusted internally within the air quality post processing software to match the directional link peaking characteristics estimated using the travel demand model.

IV. Convert Travel Demand Model Hourly Estimates into 4 Vehicle Types

One of the biggest changes in MOBILE emission modeling is the number of vehicle classes (weight and fuel type) that emission estimation is sensitive to. Gram per mile emission factors increase with engine size or Gross Vehicle Weight (GVW) and gasoline vehicles have greater VOC emissions, while diesel vehicles have greater NOx emissions for a gram per mile. MOBILE6 has the ability to estimate emissions for 28 vehicle types. The BMC staff spent time researching and developing methods in converting hourly class count estimates into the various MOBILE vehicle classes. In addition to a conversion of hourly volume into vehicle classes, BMC staff also wanted to capture future changes in SUV usage compared to sedan and the predicted increasing heavy truck VMT estimated in MOBILE defaults and projected for the Baltimore region based on trends and changing demographics. Capturing the future effects of these changes in VMT shares would lesson the possibility that future modification to the VMT mix would result in emissions over SIP budgets, since the region would already be planning for vehicle mix changes in the SIP.

In order to best use the observed local mix and provide changes in mix over time, a process was developed that blends observed data, future simulated truck VMT and MOBILE national defaults. MDOT provided hourly functional classified counts (federal F-13 scheme) for the years 1999 - 2002. In addition to the goals established for estimating VMT mix, the error that exist in the tube counts lead us to the selected method. Under the F-13 scheme, class 2 and class 3 volumes are supposable 2 axle vehicles with class 3 being light trucks (SUVs). The class counters contain significantly greater number of class 2 volume over that of class 3. This difference is contrary to what one would expect based on Baltimore region vehicle registration data and MOBILE6 defaults. It was clear that the tube counts, attempting to classify 2 axle vehicles based on distance between axles, over estimates class 2 volume.

Converting class tube counts based on number of axles for the 2 axle six tire and 3 plus axle observations with that of the MOBILE6 heavy vehicle classification was investigated. One suggestion was to use a combination of Weigh in Motion (WIM) and classified counters. MDOT/MdTA was contacted for the availability of such data. At present time, only the truck weighing station on I-95 Southbound at the Susquehanna River has such a combination, but the information is not recorded in a database. The data is used to inform the scale attendant of potential trucks exceeding the allowable weight limits and requiring a more precise weight using the static scale. In addition to a lack of a database and limitation to one location, the WIM data would provide loaded vehicle weight and not GVW as classified in MOBILE. Attempts to map the various classes to MOBILE GVW using assumptions and MOBILE 5b mapping schemes were initiated. Concern was raised with dump trucks and cement mixers that have 3 and 4 axles, but are some of the heaviest vehicles in operation. What share of 3 axle vehicles would be 60,000 GVW?

The final selected methodology groups the observed classified counts into 4 vehicle types of 1) motorcycle, 2) 2 axle, 3) bus, and 4) 2 axle 6 tire and 3 plus axle vehicles. The 4 vehicle type groupings are estimated for each hour and FUA facility type using the MDOT provided database for the years 1999 – 2002. The 2 axle count by facility type is further subdivided into Light Duty Vehicle (LDV), Light Duty Truck 1 (LDVT1), LDVT2, LDVT3, and LDVT4 using the National Average Vehicle Miles Traveled Fractions By Vehicle Class Using MOBILE6 (Table 4.1.4 contained in the *Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation)*. The same table is used for mapping the heavy trucks into the MOBILE6 classes of Heavy Duty Vehicle 2B (HDV2b), HDV3, HDV4, HDV5, HDV6, HDV7, HDV8A, and HDV8B and to map bus VMT into Heavy Duty Bus School (HDBS) and Heavy Duty Bus Transit (HDBT). The motorcycle share estimated from the class counts is used for the MOBILE input of motorcycle.

Using the observed classified counts grouped into 4 vehicle types and the national defaults yields an estimate of VMT for 16 vehicle types. The VMT shares for the 16 vehicle types is used in MOBILE6 scripts using the VMT FRACTIONS command. Internally within MOBILE6 using diesel sales fractions, vehicle registration, and annual mileage accumulation for 16 vehicle types for 25 years, the split between gas and diesel for common vehicle types (example LDV is LDGasV and LDDeiselV) is estimated for VMT and estimating emission differences for fuel.

The selected shares to allocate the 4 vehicle type groups to the detailed MOBILE6 classes are selected based on the horizon year of analysis from table 4.1.4. The EPA national database contains estimates from 1952/1972 to 2020/2050. Using this methodology, the 2 axle vehicles will increasingly be allocated to the LDT classes in future years based on the assumptions contained in MOBILE6. The predicted increasing share of HDV estimated for the Baltimore region will be captured using the update to the region's medium and heavy truck model. The Baltimore region recently adopted a truck model that uses an adaptive assignment technique where both trip generation rates and a trip matrix are developed and factored to estimate the best trip matrix to match observed traffic counts. This calibrated truck model is then used to estimate future truck activity based on projections of demographic data (mainly employment). The medium and heavy truck VMT is summarized for horizon years 2000 and 2005 at the FUA class system. The growth in estimated medium and heavy trucks for each functional type is applied to the observed HDV classified traffic count database for each FUA and hour. New shares for each FUA and hour for the 4 vehicle types is recalculated. The share for HDV will be increasing based on the growth estimated in the travel model with the remainder being proportioned to the remaining classes based on the existing observations. The pattern file estimated for 2000 and 2005 is displayed in Appendix B for the 4 vehicle types.

The estimate of the 4 vehicle types for the year 2000 are derived from a analysis of MDOT and BMC conducted directional classified counts. Each year's database was screened eliminating weekend observations. Within each year multiple weekday counts at the same location were averaged. A few permanent count stations have the ability to record class. Averaging the year's worth of data prevents the estimate for the final estimate of vehicle class for that particular FUA to be dominated by the permanent count station. The weekday average for each location and each year is averaged grouping by hour and FUA. This yields an average estimate of vehicle class for each hour on all FUAs considering all weekday observations recorded from 1999 thru 2002.

There were only a few observations on roadways classified as local roads, since MDOT is responsible for the state system, which is mostly the upper class facilities. Local jurisdictions were contacted for the availability of providing hourly classified counts on local roadways. No local jurisdiction was able to provide such a database. Using profession judgment including conversations with local engineers, HDV on local roadways was estimated to be 3.9% of the total volume. BMC has begun the planning for local roadway data collection in upcoming fiscal years.

With development of the pattern files complete, the commercial software provided two options in applying the vehicle mix pattern files. In the simplest form, link hourly volume would be indexed by FUA and multiplied by the 4 vehicle type mix for the corresponding FUA. Once all links were completed and summed by FUA, the share of the 4 vehicle types both observed and simulated would match at a regional level. Each link within a FUA would get the same share of HDV. BMC staff felt some of the details within the truck model would be lost, such as the difference in truck VMT on identical facilities with one roadway connecting the Port of Baltimore to the network and the other located in a rural community.

Under the other option, pattern files are used but internally adjusted based on daily, am, and pm volume for all vehicles and trucks. With this option HPMS seasonal adjusted travel model volume for trucks is maintained on each link. Adjusted pattern files are applied using the summed link travel model volume for 4 vehicle types and when summed at the regional level, the simulated relatively equals that of the observed. This is due to the development of the BMC truck model which uses an adaptive assignment method where a trip table is estimated using the classified counts that were used to create the pattern file. Generation and distribution was calibrated along with a delta table to recreate the count adapted trip table. Using the truck model, heavy truck routes are distinguished from that produced using the pattern file. Ultimately, this difference has a impact on travel speed, since Passenger Car Equivalence (PCE) is considered in the volume to capacity calculation.

Both scenarios were evaluated and tested yielding similar results with respect to VMT distribution. Emissions were greater using the truck model adjusted pattern file. This is a result of assigning more accurate truck volumes at the link level resulting in different distribution of speeds. It was felt that the truck model could be more precise and potentially estimating emissions correctly.

V. Estimate Hourly Link Travel Speed

To prevent the need for emission speed lookup tables as completed in the MOBILE5b analysis, EPA incorporated VMT on freeways and arterials within the emission estimation process. Hourly speed is included in the MOBILE6 scripts using the command SPEED VMT, which references an input file containing shares of hourly speed on freeways and arterials grouped into 14 speed bins. The shares are calculated from accumulating hourly link VMT for speeds estimated using an update to the BPR curve. Two separate equations, one for interstates/freeways and one for non- interstates/freeways is used. The equation are as follows:

$$traveltime = speed * \left[1 + 0.2 * \left(\frac{v}{c}\right)^{10}\right] \text{ for interstates/freeways}$$

$$traveltime = speed * \left[1 + 0.05 * \left(\frac{v}{c}\right)^{10}\right] \text{ for non-interstates/freeways}$$

Each link's hourly HPMS adjusted summertime weekday volume is compared to the link's maximum (service level "E") hourly capacity in estimating a hourly travel speed. The vehicle types of bus and HDV are assumed to use more capacity than other vehicles based on defaults provided in the commercial software derived from the Highway Capacity Manual. In previous analysis, BMC has been criticized for failure to recognize peak spreading. The selected commercially available software package used to manage the process, has a built in sub-routine to accomplish estimates of peak spreading. The sub-routine requires the input at what point will peak spreading occur and how many hours before and after the peak will be effected. In the development of the MOBILE6 SIP, assumptions that spreading will occur when a link's hourly capacity is exceeded by 30% and that the excess volume will be distributed 3 hours before and after, was selected.

Exactly how travelers in the Baltimore region react or will react to over capacity situation is not known. Various levels (from no peak spreading thru 50% over capacity) of when peak spreading would occur were tested for the horizon year of 2005 measuring the difference in emission estimation. The maximum range was a difference in .27 tons of VOC and .14 tons of NOx. Although the exact inputs for peak spreading are not known, it was felt that assuming some effects of peak spreading would move the analysis in the correct direction and not severely over or understate emissions.

After hourly link speed is estimated assuming peak spreading, link VMT is accumulated in one of 14 speed bins (bin 1 is idle and the other 13 average speeds range from 5 mph to 65 mph in 5 mph increments) for the FUA functional classes of interstate and freeway, which are allocated to the MOBILE6 class of freeway, and principal and minor arterial, which is allocated to the MOBILE6 class of arterial. The travel model representation of collectors and locals is allocated to the MOBILE6 class of local and all travel model representation of ramps are allocated to MOBILE6 class of ramp. MOBILE6 assumes a set speed for the collector and ramp functional type. The commercial software allows for the development of the MOBILE6 speed file using either a simple or harmonic method. Under the simple method all VMT on a link with a hourly speed between 50 and 54.9 would be allocated to the 50 mph bin. Using the harmonic method, link VMT is distributed between two speed bins in the correct portions so the weight between the two speed bins would equal the estimate speed on the link. This method is similar to the AVERAGE SPEED command in MOBILE6. The harmonic method was chosen to allow for emissions to be sensitive to less than 5 mph speed changes.

VI. Preparing MOBILE6 Transportation Inputs

Although possible to estimate emissions from only one run of MOBILE6, the selected commercial software allows for the ease of estimating emissions using area type and functional type. Using a disaggregation also allows for ease in developing needed transportation files. For the Baltimore analysis four transportation related files are being provided using the following MOBILE6 commands:

> VMT FRACTIONS is the estimate of VMT by 16 vehicle types. This estimation is explained above. Observed data divided in 4 vehicle types and applied against adjusted travel model volume. Then using MOBILE6 national defaults, VMT is allocated to individual vehicle types within a group. Group vehicles of 2 axle is allocated to LDV, LDT1, LDT2, LDT3, and LDT4.
>
> VMT BY FACILITY is the estimated VMT by 28 vehicle types for each hour of the day on one of 4 facility types (freeway, arterial, local, and ramp).
>
> VMT BY HOUR is the share of total VMT for each hour of the day.
>
> SPEED VMT is the share of VMT on freeways and arterials for each hour of the day for 14 speed bins.

In the Baltimore analysis, MOBILE6 scripts are developed for each jurisdiction, area type (urban/rural), and each facility type (interstate, freeway, principal arterial, minor arterial, collector, 5 ramp types, and locals) for a maximum of 132 MOBILE6 runs. After the transportation network is analyzed developing hourly link volumes, speeds, and vehicle type, links are indexed by the above mentioned groupings to begin the estimating of the needed transportation files.

The VMT FRACTION file is simply the sum of VMT for each 16 vehicle types indexing by jurisdiction, urban/rural, and FUA divided by the total VMT for that index. For the VMT BY FACILITY file, the file is developed with 100 percent of the VMT occurring on one facility for each hour of the day for each of the 28 vehicle types. This is possible since we are indexing on facility type and only analyzing that particular facility. When principal arterials are selected, all of the VMT is occurring on the MOBILE6 functional class of arterial and the MOBILE6 functional class is set to 100 percent. The VMT BY HOUR is the sum of all VMT for each hour divided by the daily total for each index. The final file of SPEED VMT is created for each index using the harmonic mean as described above. Since we are indexing on facility type, only the freeway section is used when travel model functional class of interstate and freeway are used and arterial when travel model functional class of principal and minor arterial are used. Other functional types have an assumed speed built into MOBILE6.

VII. Preparing MOBILE6 Input Scripts

In addition to transportation data, MOBILE6 requires both environmental conditions and control strategies. For environmental conditions, a minimum temperature of 67.9 and a maximum temperature of 96.5 is used. The sunrise is at 6 am and the sunset is at 8 pm. The evaluation month is 7 (July) and season is 1 (summer). For other environmental conditions, the national defaults are being used.

For control strategies for years 2005 and later, a value of 7 is used for RVP, which is a measure of fuel volatility. Anti-Tampering Program is used with the following values 89 77 50 22222 21111111 1 12 96. 12211112. Appendix C lists a table with a description of switches for the Anti-Tampering Program. The various I/M programs, a total of 7 for 2005 and later, are used in MOBILE and described in Appendix D. The Light Duty Gasoline Vehicle Standards command using the national default penetration fractions is also being used.
MOBILE6 also allows for the input of regional specific registration data along with diesel sales fractions. The 2005 analysis is using registration data developed from the Maryland Motor Vehicle Administration (MVA) from a July 1, 2002 database. The vehicle registration file can be found in Appendix E. The share of each model year by vehicle type that is diesel is found in Appendix F. The heavy duty vehicles are using the national defaults for diesel sales fractions.

VIII. Execute MOBILE6

With transportation data estimated, control program specified, environmental conditions expected, and vehicle fleet data provided, MOBILE6 is executed for each facility type within urban/rural areas for each jurisdiction. MOBILE6 has two output reports. The first being a REPORT FILE, which list various assumptions used in the header and then gram per mile emissions for the various vehicle types. The other being DATABASE OUTPUT, which is more useful due to fixed format and containing only one header line followed by the various MOBILE6 data. Both reports are generated, but only the database is used in estimating regional mobile source emissions.

The POLLUTANTS of hydrocarbons (HC), which are expressed as volatile organic compounds (VOC), carbon monoxide (CO), and oxides of nitrogen (NOx) are estimated for exhaust and evaporative emissions (Exhaust emission of Running, Start and Hot Soak, Evaporative emissions of Diurnal, Resting Loss, Running Loss and Crankcase). Refueling emissions are not estimated, since refueling is accounted for in the SIP as stationary and not mobile. For the database file, gram per mile emission factors use the AGGREGATED OUTPUT command. This command reduces gram per mile emission factors for a daily estimate considering exhaust and non-exhaust (minus refueling) emissions for each 28 vehicle type. The composite emission factor is weighted considering the following:

? VMT per facility - no effect in the Baltimore analysis since facility type is an index

- Age (25) of the vehicle within vehicle type – the weight is based on the registration data for Baltimore and annual miles accumulated by vehicle type and age from the national database.
- Hour of the day – daily VMT share per hour based on MDOT hourly counts applied to travel model output is provided and used as the hourly weight
- Emission factors for exhaust and non-exhaust

The daily gram per mile database emission factor contains the following variables:

- FILE – MOBILE6 has the ability to batch input files together. File is just the numerical identifier of input file.
- RUN/ SCEN – MOBILE6 scripts are divided into two parts (RUN and SCENario). The RUN section contains data such as control program and registration data, while the SCENario section contains information on transportation data. One can have several SCENarios for one RUN. For Baltimore RUN information is at the jurisdiction and urban/rural level and scenario are the various facility types within. FILE, RUN, and SCEN are indexes for the output database.
- CAL_YEAR – The calendar year that the emissions are based on.
- POL – The pollutant (3) being estimated.
- VTYPE – The vehicle type (28) that the emission are estimate for.
- GM_MILE – The estimated gram per mile emission factor.
- GM_DAY – The daily estimate of emission expressed as gram per mile. Daily is estimated as the gram per mile multiplied by the daily miles travel for that vehicle type.
- STARTS – The estimated number of vehicle starts per day for each vehicle type based on the national defaults.
- ENDS – The estimated number of vehicle ends per day that exceeded the soak time based on the national defaults.
- MILES – The estimated daily miles accumulated based on national defaults.
- MPG – The miles per gallon of gasoline using the national database.
- VMT – The weight for individual vehicle types for each pollutant. A single emission factor can be created for each pollutant by summing the gram per mile multiplied VMT.

Appendix G contains an excerpt 2005 MOBILE6 script for all FUAs in the urbanized area of Baltimore County. Other jurisdiction and urban/rural scripts are similar and are available upon request.

IX. Apply MOBILE6 Output to Travel Model Estimates of VMT

Only select fields are used from the output database. The index fields are used to select the emission factor and VMT (weight) for each jurisdiction, urban/rural area, and functional type. The commercial software used during the transportation file preparation for MOBILE6 summarizes the daily VMT for each index (jurisdiction, urban/rural area, and functional type). The daily VMT is then multiplied by the MOBILE6 output estimate of VMT (weight) for each vehicle type yielding the estimated daily VMT for 28 vehicle types. Individual vehicle types daily VMT is multiplied by the composite gram per mile emission factor to estimate mobile source emissions for each vehicle type for each index.

A new database is created with the index fields of jurisdiction, urban/rural area, and functional type along with estimates of VMT and emission for each of the 28 vehicle types and three pollutants of VOC, CO, and NOx.

X. Summarizing Estimates of Mobile Source Emissions

Using the created database by applying VMT summaries with MOBILE6 outputs, the selected commercial software prepares various reports that summaries VMT and emissions. Reports are developed summarizing emissions by vehicle type, time period, jurisdiction and urban/areas, and facility type. A regional report showing the cumulative total for the region summarized by four vehicle types (Auto/MC, Lt. Truck, Hvy. Truck, and Bus) is prepared listing VMT, and pollutants of VOC, CO, and NOx.

This estimate represents the expected emissions for a horizon year based on the supplied planning assumptions.

XI. Conclusion

The commercial software both used for travel forecasting and air quality modeling has been setup with various batch files for easy of executions and replication. The time consuming work of file preparation and analysis has been completed for the various steps. Both processes, travel forecasting and air quality modeling, allow for the estimate of reasonably expected mobile source emissions with the adoption of different planning assumptions.

Appendix A – BMC Memo
Hourly Pattern Files

```
*  SHA Urban Area HPMS FC            BMC FC
*     1,11   Interstate              1,6,7,8,9
*     12     Other Freeway & Expressway  2
*     2,14   Other Principal Art.      3
*     6,16   Minor Arterial            4,10
*     7,8,17 Collector                 5
*     9,19   Local                     11
* Urban (1)/FC  PATT   Range      1     2     3     4     5     6     7     8     9    10    11    12    13    14    15    16    17    18    19    20    21    22    23    24
* Rural (2), but in model code (0)
* ------  ----  ---- ----------   ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- ----- -----
  1    1    1   0.0 99999  1.405 0.964 0.798 0.728 1.013 2.361 4.549 6.075 5.880 5.067 5.019 5.288 5.524 5.592 6.054 6.664 6.962 6.956 5.955 4.719 3.873 3.471 2.904 2.178
  1    2    1   0.0 99999  1.087 0.627 0.470 0.410 0.781 2.479 5.289 6.955 6.493 4.734 4.346 4.678 5.074 5.132 5.811 6.919 7.803 8.243 6.458 4.767 3.764 3.260 2.573 1.847
  1    3    1   0.0 99999  0.820 0.498 0.360 0.304 0.477 1.256 3.136 5.408 5.595 5.039 5.438 6.192 6.931 6.761 6.716 7.101 7.607 7.845 6.410 4.938 4.187 3.346 2.187 1.447
  1    4    1   0.0 99999  0.621 0.360 0.256 0.251 0.477 1.423 3.979 6.674 6.568 5.364 5.152 5.780 6.362 6.037 6.159 7.145 8.148 8.587 6.832 4.334 3.659 2.854 1.835 1.143
  1    5    1   0.0 99999  0.593 0.346 0.269 0.236 0.483 1.500 3.576 5.917 6.439 5.508 4.956 5.612 6.196 5.908 5.952 7.197 8.104 8.559 6.908 5.214 4.278 3.154 1.932 1.163
  1    6    1   0.0 99999  1.405 0.964 0.798 0.728 1.013 2.361 4.549 6.075 5.880 5.067 5.019 5.288 5.524 5.592 6.054 6.664 6.962 6.956 5.955 4.719 3.873 3.471 2.904 2.178
  1    7    1   0.0 99999  1.405 0.964 0.798 0.728 1.013 2.361 4.549 6.075 5.880 5.067 5.019 5.288 5.524 5.592 6.054 6.664 6.962 6.956 5.955 4.719 3.873 3.471 2.904 2.178
  1    8    1   0.0 99999  1.405 0.964 0.798 0.728 1.013 2.361 4.549 6.075 5.880 5.067 5.019 5.288 5.524 5.592 6.054 6.664 6.962 6.956 5.955 4.719 3.873 3.471 2.904 2.178
  1    9    1   0.0 99999  1.405 0.964 0.798 0.728 1.013 2.361 4.549 6.075 5.880 5.067 5.019 5.288 5.524 5.592 6.054 6.664 6.962 6.956 5.955 4.719 3.873 3.471 2.904 2.178
  1   10    1   0.0 99999  0.621 0.360 0.256 0.251 0.477 1.423 3.979 6.674 6.568 5.364 5.152 5.780 6.362 6.037 6.159 7.145 8.148 8.587 6.832 4.334 3.659 2.854 1.835 1.143
  1   15    1   0.0 99999  0.342 0.169 0.141 0.195 0.269 0.982 3.956 6.626 7.031 6.279 5.772 6.409 6.988 6.687 6.823 7.571 8.247 9.129 7.907 2.622 2.212 1.660 1.187 0.795

  2    1    1   0.0 99999  1.087 0.726 0.598 0.624 0.963 2.669 5.078 6.374 5.999 5.101 4.972 5.103 5.199 5.359 5.888 6.723 7.416 7.550 6.368 4.769 3.843 3.316 2.521 1.755
  2    2    1   0.0 99999  1.087 0.627 0.470 0.410 0.781 2.479 5.289 6.955 6.493 4.734 4.346 4.678 5.074 5.132 5.811 6.919 7.803 8.243 6.458 4.767 3.764 3.260 2.573 1.847
  2    3    1   0.0 99999  0.604 0.376 0.318 0.350 0.792 2.459 6.174 7.960 7.279 5.751 4.774 4.975 5.042 5.043 5.789 7.302 8.213 8.587 6.890 3.556 2.621 2.247 1.770 1.128
  2    4    1   0.0 99999  0.649 0.360 0.229 0.197 0.372 1.238 3.509 5.738 5.790 5.248 5.580 6.092 6.466 6.414 6.585 7.114 7.866 8.207 6.618 4.956 4.260 3.267 1.978 1.267
  2    5    1   0.0 99999  0.575 0.317 0.291 0.341 0.667 2.137 5.452 7.564 6.400 4.816 4.678 4.990 5.310 5.314 5.834 7.084 8.528 9.392 7.148 4.299 3.543 2.638 1.664 1.018
  2    6    1   0.0 99999  1.087 0.726 0.598 0.624 0.963 2.669 5.078 6.374 5.999 5.101 4.972 5.103 5.199 5.359 5.888 6.723 7.416 7.550 6.368 4.769 3.843 3.316 2.521 1.755
  2    7    1   0.0 99999  1.087 0.726 0.598 0.624 0.963 2.669 5.078 6.374 5.999 5.101 4.972 5.103 5.199 5.359 5.888 6.723 7.416 7.550 6.368 4.769 3.843 3.316 2.521 1.755
  2    8    1   0.0 99999  1.087 0.726 0.598 0.624 0.963 2.669 5.078 6.374 5.999 5.101 4.972 5.103 5.199 5.359 5.888 6.723 7.416 7.550 6.368 4.769 3.843 3.316 2.521 1.755
  2    9    1   0.0 99999  1.087 0.726 0.598 0.624 0.963 2.669 5.078 6.374 5.999 5.101 4.972 5.103 5.199 5.359 5.888 6.723 7.416 7.550 6.368 4.769 3.843 3.316 2.521 1.755
  2   10    1   0.0 99999  0.649 0.360 0.229 0.197 0.372 1.238 3.509 5.738 5.790 5.248 5.580 6.092 6.466 6.414 6.585 7.114 7.866 8.207 6.618 4.956 4.260 3.267 1.978 1.267
  2   15    1   0.0 99999  0.374 0.258 0.267 0.401 0.677 1.799 3.223 5.129 4.737 4.951 5.298 5.155 5.939 5.609 6.429 7.586 7.782 8.868 7.978 6.402 4.719 3.811 1.986 0.623
```

Appendix B – BMC Memo
2000 Vehicle Mix Files

* Vehicle Types: 4 vtypes 1 MC, 2 2 axle, 3 Bus, 4 HDV
* Data supplied for 2 area types (urban/rural) 11 facility types by 24 time periods - Does not vary by county
* ramp types 6,7,8,9 has the same mix as ft 1 Interstate
* ramp type 10 has the same mix as ft 3 Principal Arterial
* ---
*

* Urban /rural *urban	FT	VT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	1	0.29	0.41	0.48	0.57	0.4	0.24	0.17	0.17	0.2	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.17	0.17	0.17	0.19	0.2	0.2	0.23	0.23
1	1	2	84.01	77.5	71.89	67.14	73.07	84.82	89.68	92.17	90.87	88.08	86.82	87.02	87.69	87.87	89.17	90.86	92.76	93.93	93.89	93.25	92.77	92.7	91.41	89.28
1	1	3	0.85	1.07	1.46	1.75	1.63	1	0.79	0.66	0.79	1.09	1.09	1.05	0.99	1.05	0.93	0.76	0.61	0.5	0.5	0.52	0.51	0.47	0.53	0.59
1	1	4	14.84	21.02	26.17	30.54	24.9	13.94	9.36	7	8.14	10.64	11.91	11.75	11.14	10.89	9.73	8.21	6.46	5.39	5.44	6.05	6.52	6.63	7.84	9.89
1	2	1	0.35	0.44	0.5	0.56	0.43	0.3	0.19	0.14	0.13	0.17	0.2	0.2	0.2	0.2	0.21	0.19	0.18	0.17	0.18	0.21	0.22	0.22	0.24	0.26
1	2	2	90.55	84.4	80.11	75.68	82.5	90.05	92.54	93.79	92.9	90.51	89.43	89.81	90.77	90.8	91.56	92.97	94.34	95.56	95.69	95.56	95.48	95.46	94.93	93.43
1	2	3	0.56	0.91	1.08	1.23	1.03	0.68	0.62	0.51	0.56	0.82	0.82	0.76	0.7	0.82	0.74	0.52	0.41	0.27	0.29	0.28	0.26	0.23	0.27	0.33
1	2	4	8.54	14.25	18.31	22.54	16.04	8.97	6.65	5.56	6.4	8.5	9.55	9.24	8.34	8.18	7.49	6.32	5.07	4	3.84	3.95	4.04	4.09	4.56	5.98
1	3	1	0.23	0.26	0.31	0.39	0.33	0.22	0.16	0.12	0.12	0.14	0.15	0.14	0.15	0.15	0.15	0.14	0.13	0.13	0.15	0.16	0.15	0.15	0.18	0.21
1	3	2	94.22	92.38	90.84	87.08	88.06	91.17	92.69	93.42	92.67	91.79	91.76	92.22	92.68	92.56	92.73	93.42	94.45	95.37	95.66	95.79	96.05	96.13	96	95.48
1	3	3	0.98	1.1	0.83	1.22	1.51	1.06	1.01	0.97	1.01	1	0.89	0.81	0.75	0.79	0.89	0.82	0.69	0.53	0.5	0.47	0.44	0.47	0.53	0.66
1	3	4	4.57	6.26	8.02	11.31	10.09	7.56	6.14	5.49	6.2	7.07	7.2	6.83	6.42	6.5	6.24	5.62	4.73	3.97	3.69	3.58	3.36	3.26	3.29	3.64
1	4	1	0.33	0.31	0.65	0.55	0.51	0.34	0.25	0.2	0.21	0.22	0.26	0.23	0.24	0.27	0.23	0.21	0.21	0.2	0.23	0.25	0.24	0.24	0.23	0.3
1	4	2	94.22	91.88	89.86	85.8	88.5	91.38	92.69	93.63	92.99	91.74	91.49	92.26	92.66	92.64	92.72	93.36	94.49	95.33	95.84	95.73	96.29	96.16	96.13	95.46
1	4	3	0.66	0.85	0.89	1.26	1.2	0.97	1.03	1.11	1.1	0.98	0.77	0.79	0.81	0.82	0.96	0.99	0.7	0.61	0.48	0.39	0.33	0.37	0.41	0.51
1	4	4	4.79	6.97	8.61	12.39	9.79	7.31	6.03	5.06	5.7	7.05	7.48	6.73	6.28	6.27	6.1	5.44	4.6	3.86	3.46	3.63	3.14	3.23	3.23	3.74
1	5	1	0.61	0.49	0.43	0.69	0.63	0.32	0.26	0.18	0.18	0.23	0.27	0.23	0.28	0.31	0.25	0.32	0.26	0.28	0.32	0.37	0.4	0.35	0.34	0.41
1	5	2	90.34	86.62	84.84	79.56	81.41	87.96	90.18	91.67	91.59	90.7	90.6	91.68	92.24	92.05	92.08	92.4	94.1	95.05	95.35	95.01	95.11	95.28	94.64	92.97
1	5	3	1.41	1.55	1.31	1.46	1.92	1.23	1.06	1.23	1.23	1.05	0.97	0.84	0.79	0.82	1.01	1.01	0.69	0.5	0.49	0.53	0.58	0.5	0.78	0.9
1	5	4	7.64	11.33	13.42	18.29	16.04	10.49	8.5	6.92	7	8.03	8.16	7.25	6.69	6.82	6.66	6.27	4.95	4.17	3.84	4.09	3.92	3.86	4.24	5.72
1	6	1	0.29	0.41	0.48	0.57	0.4	0.24	0.17	0.17	0.2	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.17	0.17	0.17	0.19	0.2	0.2	0.23	0.23
1	6	2	84.01	77.5	71.89	67.14	73.07	84.82	89.68	92.17	90.87	88.08	86.82	87.02	87.69	87.87	89.17	90.86	92.76	93.93	93.89	93.25	92.77	92.7	91.41	89.28
1	6	3	0.85	1.07	1.46	1.75	1.63	1	0.79	0.66	0.79	1.09	1.09	1.05	0.99	1.05	0.93	0.76	0.61	0.5	0.5	0.52	0.51	0.47	0.53	0.59
1	6	4	14.84	21.02	26.17	30.54	24.9	13.94	9.36	7	8.14	10.64	11.91	11.75	11.14	10.89	9.73	8.21	6.46	5.39	5.44	6.05	6.52	6.63	7.84	9.89
1	7	1	0.29	0.41	0.48	0.57	0.4	0.24	0.17	0.17	0.2	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.17	0.17	0.17	0.19	0.2	0.2	0.23	0.23
1	7	2	84.01	77.5	71.89	67.14	73.07	84.82	89.68	92.17	90.87	88.08	86.82	87.02	87.69	87.87	89.17	90.86	92.76	93.93	93.89	93.25	92.77	92.7	91.41	89.28
1	7	3	0.85	1.07	1.46	1.75	1.63	1	0.79	0.66	0.79	1.09	1.09	1.05	0.99	1.05	0.93	0.76	0.61	0.5	0.5	0.52	0.51	0.47	0.53	0.59
1	7	4	14.84	21.02	26.17	30.54	24.9	13.94	9.36	7	8.14	10.64	11.91	11.75	11.14	10.89	9.73	8.21	6.46	5.39	5.44	6.05	6.52	6.63	7.84	9.89

Appendix B – BMC Memo
2000 Vehicle Mix Files

1	8	1	0.29	0.41	0.48	0.57	0.4	0.24	0.17	0.17	0.2	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.17	0.17	0.17	0.19	0.2	0.2	0.23	0.23
1	8	2	84.01	77.5	71.89	67.14	73.07	84.82	89.68	92.17	90.87	88.08	86.82	87.02	87.69	87.87	89.17	90.86	92.76	93.93	93.89	93.25	92.77	92.7	91.41	89.28
1	8	3	0.85	1.07	1.46	1.75	1.63	1	0.79	0.66	0.79	1.09	1.09	1.05	0.99	1.05	0.93	0.76	0.61	0.5	0.5	0.52	0.51	0.47	0.53	0.59
1	8	4	14.84	21.02	26.17	30.54	24.9	13.94	9.36	7	8.14	10.64	11.91	11.75	11.14	10.89	9.73	8.21	6.46	5.39	5.44	6.05	6.52	6.63	7.84	9.89
1	9	1	0.29	0.41	0.48	0.57	0.4	0.24	0.17	0.17	0.2	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.17	0.17	0.17	0.19	0.2	0.2	0.23	0.23
1	9	2	84.01	77.5	71.89	67.14	73.07	84.82	89.68	92.17	90.87	88.08	86.82	87.02	87.69	87.87	89.17	90.86	92.76	93.93	93.89	93.25	92.77	92.7	91.41	89.28
1	9	3	0.85	1.07	1.46	1.75	1.63	1	0.79	0.66	0.79	1.09	1.09	1.05	0.99	1.05	0.93	0.76	0.61	0.5	0.5	0.52	0.51	0.47	0.53	0.59
1	9	4	14.84	21.02	26.17	30.54	24.9	13.94	9.36	7	8.14	10.64	11.91	11.75	11.14	10.89	9.73	8.21	6.46	5.39	5.44	6.05	6.52	6.63	7.84	9.89
1	10	1	0.23	0.26	0.31	0.39	0.33	0.22	0.16	0.12	0.12	0.14	0.15	0.14	0.15	0.15	0.15	0.14	0.13	0.13	0.15	0.16	0.15	0.15	0.18	0.21
1	10	2	94.22	92.38	90.84	87.08	88.06	91.17	92.69	93.42	92.67	91.79	91.76	92.22	92.68	92.56	92.73	93.42	94.45	95.37	95.66	95.79	96.05	96.13	96	95.48
1	10	3	0.98	1.1	0.83	1.22	1.51	1.06	1.01	0.97	1.01	1	0.89	0.81	0.75	0.79	0.89	0.82	0.69	0.53	0.5	0.47	0.44	0.47	0.53	0.66
1	10	4	4.57	6.26	8.02	11.31	10.09	7.56	6.14	5.49	6.2	7.07	7.2	6.83	6.42	6.5	6.24	5.62	4.73	3.97	3.69	3.58	3.36	3.26	3.29	3.64
1	15	1	0.65	1.22	0.38	0.73	0.72	0.41	0.28	0.3	0.33	0.31	0.34	0.3	0.25	0.21	0.32	0.37	0.2	0.18	0.33	0.37	0.38	0.35	0.55	0.56
1	15	2	95.2	91.07	88.04	85.91	87.39	93.4	94.79	94.63	93.8	92.72	92.96	93.65	94.2	93.9	94.59	94.64	95.23	94.84	96.41	97.05	97.44	97.66	97.65	96.2
1	15	3	0.92	1.04	2.49	2.38	3.69	2	1.42	1.27	1.5	1.86	1.3	1.22	1.17	1.18	1.04	0.89	0.79	0.57	0.73	0.46	0.44	0.37	0.22	0.47
1	15	4	3.23	6.67	9.09	10.97	8.2	4.19	3.5	3.79	4.37	5.1	5.41	4.83	4.38	4.71	4.05	4.1	3.78	4.41	2.53	2.11	1.74	1.62	1.58	2.77

*rural

2	1	1	0.35	0.38	0.56	0.56	0.41	0.26	0.16	0.14	0.12	0.16	0.19	0.18	0.16	0.15	0.16	0.15	0.14	0.16	0.17	0.23	0.2	0.19	0.21	0.25
2	1	2	65.03	52.69	45.41	42.58	56.84	75.87	86.03	89.44	87.35	82.59	80.52	81.11	81.78	82.82	84.84	87.81	90.73	92.5	91.71	88.38	87.64	86.29	82.43	77.27
2	1	3	1.29	1.69	1.99	2.11	1.77	1.2	0.79	0.68	0.97	1.23	1.25	0.99	0.97	1.07	0.96	0.75	0.63	0.45	0.49	0.78	0.68	0.56	0.64	0.77
2	1	4	33.33	45.24	52.04	54.76	40.98	22.68	13.02	9.74	11.56	16.02	18.04	17.71	17.09	15.96	14.05	11.29	8.5	6.89	7.62	10.6	11.48	12.97	16.71	21.71
2	2	1	0.35	0.44	0.5	0.56	0.43	0.3	0.19	0.14	0.13	0.17	0.2	0.2	0.2	0.2	0.21	0.19	0.18	0.17	0.18	0.21	0.22	0.22	0.24	0.26
2	2	2	90.55	84.4	80.11	75.68	82.5	90.05	92.54	93.79	92.9	90.51	89.43	89.81	90.77	90.8	91.56	92.97	94.34	95.56	95.69	95.56	95.48	95.46	94.93	93.43
2	2	3	0.56	0.91	1.08	1.23	1.03	0.68	0.62	0.51	0.56	0.82	0.82	0.76	0.7	0.82	0.74	0.52	0.41	0.27	0.29	0.28	0.26	0.23	0.27	0.33
2	2	4	8.54	14.25	18.31	22.54	16.04	8.97	6.65	5.56	6.4	8.5	9.55	9.24	8.34	8.18	7.49	6.32	5.07	4	3.84	3.95	4.04	4.09	4.56	5.98
2	3	1	0.16	0.16	0.1	0.19	0.12	0.09	0.12	0.11	0.11	0.14	0.16	0.15	0.16	0.18	0.17	0.21	0.15	0.21	0.2	0.23	0.21	0.17	0.23	0.19
2	3	2	91.15	87.3	82.36	77.59	84.48	89.8	91.92	92.98	91.82	89.37	88.65	88.92	89.08	89.19	90.47	92.41	94.16	95.61	96.07	95.89	96.18	96.33	95.89	95.14
2	3	3	0.52	0.94	1.31	1.25	0.65	0.49	0.61	0.65	0.69	0.89	0.72	0.71	0.74	0.83	0.83	0.65	0.42	0.25	0.2	0.22	0.26	0.21	0.26	0.25
2	3	4	8.16	11.61	16.23	20.97	14.76	9.62	7.35	6.26	7.38	9.6	10.47	10.21	10.02	9.8	8.53	6.73	5.27	3.94	3.53	3.65	3.35	3.29	3.62	4.42
2	4	1	0.6	0.82	0.78	0.63	0.72	0.67	0.62	0.51	0.59	0.74	0.83	0.88	0.81	0.85	0.91	0.79	0.77	0.66	0.83	1.17	1.02	0.89	0.74	0.67
2	4	2	91.97	89.08	85.77	83.66	86.55	89.62	90.6	89.82	88.37	86.05	85.51	86.01	86.54	86.45	87.37	89.3	91.31	93.02	93.1	93.74	94.3	94.53	94.47	94
2	4	3	0.47	0.69	0.69	0.7	0.58	0.46	0.64	2.05	1.86	1.88	1.79	1.96	1.92	2.04	1.98	1.67	1.3	1.12	1.25	0.29	0.28	0.28	0.19	0.3
2	4	4	6.96	9.41	12.76	15.01	12.14	9.25	8.14	7.62	9.18	11.33	11.88	11.15	10.73	10.67	9.73	8.24	6.62	5.21	4.82	4.81	4.4	4.31	4.6	5.03
2	5	1	0.79	0.63	1.18	0.96	0.80	0.57	0.20	0.20	0.17	0.28	0.34	0.39	0.31	0.32	0.39	0.28	0.24	0.24	0.39	0.31	0.43	0.29	0.38	0.39
2	5	2	89.68	85.38	79.06	74.93	82.09	88.40	90.74	91.49	90.21	88.08	87.75	88.07	89.14	88.95	88.97	91.00	92.96	94.93	95.04	94.83	95.11	95.64	94.69	93.55
2	5	3	0.85	0.96	1.30	1.72	1.23	0.74	0.99	1.19	1.19	1.04	0.82	1.03	0.83	1.01	1.66	1.18	0.62	0.21	0.24	0.21	0.16	0.14	0.23	0.44
2	5	4	8.68	13.03	18.46	22.38	15.88	10.29	8.08	7.12	8.42	10.59	11.10	10.51	9.73	9.72	8.98	7.54	6.18	4.62	4.33	4.65	4.29	3.94	4.71	5.63

Appendix B – BMC Memo
2000 Vehicle Mix Files

2	6	1	0.35	0.38	0.56	0.56	0.41	0.26	0.16	0.14	0.12	0.16	0.19	0.18	0.16	0.15	0.16	0.15	0.14	0.16	0.17	0.23	0.2	0.19	0.21	0.25
2	6	2	65.03	52.69	45.41	42.58	56.84	75.87	86.03	89.44	87.35	82.59	80.52	81.11	81.78	82.82	84.84	87.81	90.73	92.5	91.71	88.38	87.64	86.29	82.43	77.27
2	6	3	1.29	1.69	1.99	2.11	1.77	1.2	0.79	0.68	0.97	1.23	1.25	0.99	0.97	1.07	0.96	0.75	0.63	0.45	0.49	0.78	0.68	0.56	0.64	0.77
2	6	4	33.33	45.24	52.04	54.76	40.98	22.68	13.02	9.74	11.56	16.02	18.04	17.71	17.09	15.96	14.05	11.29	8.5	6.89	7.62	10.6	11.48	12.97	16.71	21.71
2	7	1	0.35	0.38	0.56	0.56	0.41	0.26	0.16	0.14	0.12	0.16	0.19	0.18	0.16	0.15	0.16	0.15	0.14	0.16	0.17	0.23	0.2	0.19	0.21	0.25
2	7	2	65.03	52.69	45.41	42.58	56.84	75.87	86.03	89.44	87.35	82.59	80.52	81.11	81.78	82.82	84.84	87.81	90.73	92.5	91.71	88.38	87.64	86.29	82.43	77.27
2	7	3	1.29	1.69	1.99	2.11	1.77	1.2	0.79	0.68	0.97	1.23	1.25	0.99	0.97	1.07	0.96	0.75	0.63	0.45	0.49	0.78	0.68	0.56	0.64	0.77
2	7	4	33.33	45.24	52.04	54.76	40.98	22.68	13.02	9.74	11.56	16.02	18.04	17.71	17.09	15.96	14.05	11.29	8.5	6.89	7.62	10.6	11.48	12.97	16.71	21.71
2	8	1	0.35	0.38	0.56	0.56	0.41	0.26	0.16	0.14	0.12	0.16	0.19	0.18	0.16	0.15	0.16	0.15	0.14	0.16	0.17	0.23	0.2	0.19	0.21	0.25
2	8	2	65.03	52.69	45.41	42.58	56.84	75.87	86.03	89.44	87.35	82.59	80.52	81.11	81.78	82.82	84.84	87.81	90.73	92.5	91.71	88.38	87.64	86.29	82.43	77.27
2	8	3	1.29	1.69	1.99	2.11	1.77	1.2	0.79	0.68	0.97	1.23	1.25	0.99	0.97	1.07	0.96	0.75	0.63	0.45	0.49	0.78	0.68	0.56	0.64	0.77
2	8	4	33.33	45.24	52.04	54.76	40.98	22.68	13.02	9.74	11.56	16.02	18.04	17.71	17.09	15.96	14.05	11.29	8.5	6.89	7.62	10.6	11.48	12.97	16.71	21.71
2	9	1	0.35	0.38	0.56	0.56	0.41	0.26	0.16	0.14	0.12	0.16	0.19	0.18	0.16	0.15	0.16	0.15	0.14	0.16	0.17	0.23	0.2	0.19	0.21	0.25
2	9	2	65.03	52.69	45.41	42.58	56.84	75.87	86.03	89.44	87.35	82.59	80.52	81.11	81.78	82.82	84.84	87.81	90.73	92.5	91.71	88.38	87.64	86.29	82.43	77.27
2	9	3	1.29	1.69	1.99	2.11	1.77	1.2	0.79	0.68	0.97	1.23	1.25	0.99	0.97	1.07	0.96	0.75	0.63	0.45	0.49	0.78	0.68	0.56	0.64	0.77
2	9	4	33.33	45.24	52.04	54.76	40.98	22.68	13.02	9.74	11.56	16.02	18.04	17.71	17.09	15.96	14.05	11.29	8.5	6.89	7.62	10.6	11.48	12.97	16.71	21.71
2	10	1	0.16	0.16	0.1	0.19	0.12	0.09	0.12	0.11	0.11	0.14	0.16	0.15	0.16	0.18	0.17	0.21	0.15	0.21	0.2	0.23	0.21	0.17	0.23	0.19
2	10	2	91.15	87.3	82.36	77.59	84.48	89.8	91.92	92.98	91.82	89.37	88.65	88.92	89.08	89.19	90.47	92.41	94.16	95.61	96.07	95.89	96.18	96.33	95.89	95.14
2	10	3	0.52	0.94	1.31	1.25	0.65	0.49	0.61	0.65	0.69	0.89	0.72	0.71	0.74	0.83	0.83	0.65	0.42	0.25	0.2	0.22	0.26	0.21	0.26	0.25
2	10	4	8.16	11.61	16.23	20.97	14.76	9.62	7.35	6.26	7.38	9.6	10.47	10.21	10.02	9.8	8.53	6.73	5.27	3.94	3.53	3.65	3.35	3.29	3.62	4.42
2	15	1	0	0	0	0	0	0.44	0.6	0.39	0.24	0.58	0.88	0.33	0.41	0.54	0.26	0.57	0.71	0.63	1.08	1.24	0.27	1.72	0.71	1.34
2	15	2	98.69	94.62	88.39	89.04	94.56	91.41	94.73	94.49	93.53	94.92	92.07	94.98	94.23	94.37	94.83	94.84	94.24	96.63	96.1	95.31	96.53	94.38	97.55	92.7
2	15	3	0	0	0	0	0	0.44	0.75	1.66	0.83	0	0	0.66	1.1	0.54	0.39	1.33	1.74	0.56	0.22	0	0.27	0	0	0
2	15	4	1.31	5.38	11.61	10.96	5.44	7.72	3.92	3.46	5.4	4.5	7.05	4.04	4.26	4.56	4.51	3.26	3.31	2.18	2.6	3.45	2.93	3.9	1.74	5.95

Appendix B – BMC Memo
2005 Vehicle Mix Files

* Vehicle Types: 4 vtypes 1 MC, 2 2 axle, 3 Bus, 4 HDV
* Data supplied for 2 area types (urban/rural) 11 facility types by 24 time periods - Does not vary by county
* ramp types 6,7,8,9 has the same mix as ft 1 Interstate
* ramp type 10 has the same mix as ft 3 Principal Arterial
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*

* Urban /rural	FT	VT	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
*urban																										
1	1	1	0.29	0.41	0.47	0.56	0.39	0.24	0.17	0.17	0.19	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.16	0.17	0.17	0.19	0.20	0.20	0.23	0.23
1	1	2	83.47	76.79	71.07	66.26	72.28	84.31	89.32	91.89	90.55	87.67	86.37	86.57	87.26	87.45	88.79	90.53	92.50	93.71	93.67	93.00	92.51	92.43	91.09	88.89
1	1	3	0.85	1.06	1.44	1.73	1.62	0.99	0.79	0.66	0.78	1.09	1.08	1.04	0.98	1.05	0.93	0.76	0.61	0.50	0.49	0.52	0.51	0.47	0.52	0.59
1	1	4	15.39	21.74	27.01	31.46	25.71	14.47	9.73	7.28	8.47	11.05	12.37	12.20	11.58	11.31	10.11	8.54	6.73	5.62	5.67	6.30	6.78	6.90	8.15	10.28
1	2	1	0.35	0.43	0.49	0.55	0.43	0.30	0.19	0.14	0.13	0.17	0.19	0.20	0.20	0.20	0.21	0.19	0.18	0.17	0.18	0.21	0.21	0.21	0.24	0.26
1	2	2	89.99	83.54	79.06	74.46	81.55	89.46	92.10	93.41	92.47	89.96	88.82	89.21	90.23	90.26	91.07	92.55	94.00	95.28	95.43	95.29	95.20	95.18	94.62	93.02
1	2	3	0.56	0.90	1.07	1.21	1.01	0.68	0.62	0.51	0.56	0.81	0.82	0.75	0.69	0.81	0.74	0.52	0.40	0.27	0.29	0.28	0.26	0.23	0.27	0.33
1	2	4	9.10	15.13	19.38	23.78	17.00	9.56	7.10	5.93	6.83	9.06	10.17	9.84	8.89	8.72	7.99	6.74	5.41	4.28	4.11	4.23	4.32	4.37	4.87	6.38
1	3	1	0.23	0.26	0.31	0.39	0.33	0.22	0.16	0.12	0.12	0.14	0.15	0.14	0.15	0.15	0.15	0.14	0.13	0.13	0.15	0.16	0.15	0.15	0.18	0.21
1	3	2	94.20	92.36	90.81	87.04	88.03	91.14	92.67	93.40	92.64	91.76	91.73	92.19	92.66	92.54	92.71	93.40	94.43	95.35	95.65	95.78	96.04	96.11	95.99	95.47
1	3	3	0.98	1.10	0.83	1.22	1.51	1.06	1.01	0.97	1.01	1.00	0.89	0.81	0.75	0.79	0.89	0.82	0.69	0.53	0.50	0.47	0.44	0.47	0.53	0.66
1	3	4	4.59	6.28	8.05	11.35	10.13	7.58	6.16	5.51	6.23	7.10	7.23	6.86	6.44	6.52	6.26	5.64	4.75	3.98	3.70	3.59	3.38	3.27	3.30	3.65
1	4	1	0.33	0.31	0.65	0.55	0.51	0.35	0.25	0.20	0.21	0.22	0.26	0.23	0.25	0.27	0.23	0.21	0.21	0.20	0.23	0.25	0.25	0.24	0.23	0.30
1	4	2	94.43	92.18	90.22	86.30	88.91	91.69	92.95	93.85	93.24	92.04	91.81	92.55	92.93	92.91	92.98	93.60	94.69	95.50	95.99	95.89	96.43	96.31	96.28	95.62
1	4	3	0.66	0.85	0.89	1.27	1.20	0.97	1.03	1.11	1.10	0.99	0.78	0.79	0.82	0.82	0.96	0.99	0.70	0.61	0.48	0.39	0.33	0.37	0.41	0.51
1	4	4	4.57	6.67	8.24	11.88	9.38	6.99	5.76	4.84	5.45	6.75	7.15	6.43	6.01	6.00	5.83	5.20	4.40	3.69	3.30	3.46	3.00	3.08	3.09	3.57
1	5	1	0.61	0.50	0.43	0.69	0.64	0.32	0.26	0.18	0.18	0.23	0.28	0.23	0.28	0.31	0.25	0.32	0.26	0.28	0.32	0.37	0.40	0.35	0.34	0.41
1	5	2	90.64	87.04	85.33	80.18	81.97	88.35	90.50	91.94	91.86	91.01	90.91	91.97	92.51	92.32	92.34	92.64	94.30	95.21	95.51	95.18	95.27	95.44	94.81	93.20
1	5	3	1.42	1.56	1.32	1.47	1.93	1.23	1.07	1.23	1.24	1.05	0.98	0.85	0.79	0.82	1.01	1.01	0.69	0.50	0.49	0.53	0.58	0.50	0.78	0.90
1	5	4	7.34	10.90	12.92	17.65	15.46	10.09	8.17	6.65	6.72	7.72	7.84	6.96	6.42	6.54	6.39	6.02	4.75	4.00	3.68	3.92	3.76	3.71	4.07	5.49
1	6	1	0.29	0.41	0.47	0.56	0.39	0.24	0.17	0.17	0.19	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.16	0.17	0.17	0.19	0.20	0.20	0.23	0.23
1	6	2	83.47	76.79	71.07	66.26	72.28	84.31	89.32	91.89	90.55	87.67	86.37	86.57	87.26	87.45	88.79	90.53	92.50	93.71	93.67	93.00	92.51	92.43	91.09	88.89
1	6	3	0.85	1.06	1.44	1.73	1.62	0.99	0.79	0.66	0.78	1.09	1.08	1.04	0.98	1.05	0.93	0.76	0.61	0.50	0.49	0.52	0.51	0.47	0.52	0.59
1	6	4	15.39	21.74	27.01	31.46	25.71	14.47	9.73	7.28	8.47	11.05	12.37	12.20	11.58	11.31	10.11	8.54	6.73	5.62	5.67	6.30	6.78	6.90	8.15	10.28
1	7	1	0.29	0.41	0.47	0.56	0.39	0.24	0.17	0.17	0.19	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.16	0.17	0.17	0.19	0.20	0.20	0.23	0.23
1	7	2	83.47	76.79	71.07	66.26	72.28	84.31	89.32	91.89	90.55	87.67	86.37	86.57	87.26	87.45	88.79	90.53	92.50	93.71	93.67	93.00	92.51	92.43	91.09	88.89
1	7	3	0.85	1.06	1.44	1.73	1.62	0.99	0.79	0.66	0.78	1.09	1.08	1.04	0.98	1.05	0.93	0.76	0.61	0.50	0.49	0.52	0.51	0.47	0.52	0.59
1	7	4	15.39	21.74	27.01	31.46	25.71	14.47	9.73	7.28	8.47	11.05	12.37	12.20	11.58	11.31	10.11	8.54	6.73	5.62	5.67	6.30	6.78	6.90	8.15	10.28
1	8	1	0.29	0.41	0.47	0.56	0.39	0.24	0.17	0.17	0.19	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.16	0.17	0.17	0.19	0.20	0.20	0.23	0.23
1	8	2	83.47	76.79	71.07	66.26	72.28	84.31	89.32	91.89	90.55	87.67	86.37	86.57	87.26	87.45	88.79	90.53	92.50	93.71	93.67	93.00	92.51	92.43	91.09	88.89
1	8	3	0.85	1.06	1.44	1.73	1.62	0.99	0.79	0.66	0.78	1.09	1.08	1.04	0.98	1.05	0.93	0.76	0.61	0.50	0.49	0.52	0.51	0.47	0.52	0.59

1	8	4	15.39	21.74	27.01	31.46	25.71	14.47	9.73	7.28	8.47	11.05	12.37	12.20	11.58	11.31	10.11	8.54	6.73	5.62	5.67	6.30	6.78	6.90	8.15	10.28

1	9	1	0.29	0.41	0.47	0.56	0.39	0.24	0.17	0.17	0.19	0.19	0.18	0.18	0.18	0.19	0.17	0.17	0.16	0.17	0.17	0.19	0.20	0.20	0.23	0.23
1	9	2	83.47	76.79	71.07	66.26	72.28	84.31	89.32	91.89	90.55	87.67	86.37	86.57	87.26	87.45	88.79	90.53	92.50	93.71	93.67	93.00	92.51	92.43	91.09	88.89
1	9	3	0.85	1.06	1.44	1.73	1.62	0.99	0.79	0.66	0.78	1.09	1.08	1.04	0.98	1.05	0.93	0.76	0.61	0.50	0.49	0.52	0.51	0.47	0.52	0.59
1	9	4	15.39	21.74	27.01	31.46	25.71	14.47	9.73	7.28	8.47	11.05	12.37	12.20	11.58	11.31	10.11	8.54	6.73	5.62	5.67	6.30	6.78	6.90	8.15	10.28
1	10	1	0.23	0.26	0.31	0.39	0.33	0.22	0.16	0.12	0.12	0.14	0.15	0.14	0.15	0.15	0.15	0.14	0.13	0.13	0.15	0.16	0.15	0.15	0.18	0.21
1	10	2	94.20	92.36	90.81	87.04	88.03	91.14	92.67	93.40	92.64	91.76	91.73	92.19	92.66	92.54	92.71	93.40	94.43	95.35	95.65	95.78	96.04	96.11	95.99	95.47
1	10	3	0.98	1.10	0.83	1.22	1.51	1.06	1.01	0.97	1.01	1.00	0.89	0.81	0.75	0.79	0.89	0.82	0.69	0.53	0.50	0.47	0.44	0.47	0.53	0.66
1	10	4	4.59	6.28	8.05	11.35	10.13	7.58	6.16	5.51	6.23	7.10	7.23	6.86	6.44	6.52	6.26	5.64	4.75	3.98	3.70	3.59	3.38	3.27	3.30	3.65
1	15	1	0.65	1.22	0.38	0.73	0.72	0.41	0.28	0.30	0.33	0.31	0.34	0.30	0.25	0.21	0.32	0.37	0.20	0.18	0.33	0.37	0.38	0.35	0.55	0.56
1	15	2	95.20	91.07	88.04	85.91	87.39	93.40	94.79	94.63	93.80	92.72	92.96	93.65	94.20	93.90	94.59	94.64	95.23	94.84	96.41	97.05	97.44	97.66	97.65	96.20
1	15	3	0.92	1.04	2.49	2.38	3.69	2.00	1.42	1.27	1.50	1.86	1.30	1.22	1.17	1.18	1.04	0.89	0.79	0.57	0.73	0.46	0.44	0.37	0.22	0.47
1	15	4	3.23	6.67	9.09	10.97	8.20	4.19	3.50	3.79	4.37	5.10	5.41	4.83	4.38	4.71	4.05	4.10	3.78	4.41	2.53	2.11	1.74	1.62	1.58	2.77

*rural

2	1	1	0.33	0.34	0.51	0.50	0.38	0.25	0.15	0.14	0.12	0.15	0.18	0.18	0.16	0.15	0.15	0.15	0.14	0.15	0.17	0.23	0.20	0.18	0.21	0.24
2	1	2	60.98	48.33	41.15	38.39	52.55	72.59	83.85	87.74	85.38	80.04	77.73	78.35	79.08	80.27	82.53	85.88	89.22	91.24	90.33	86.55	85.68	84.11	79.77	74.07
2	1	3	1.21	1.55	1.80	1.90	1.64	1.15	0.77	0.67	0.95	1.19	1.20	0.96	0.93	1.04	0.93	0.74	0.62	0.45	0.49	0.77	0.66	0.54	0.62	0.73
2	1	4	37.49	49.77	56.55	59.21	45.43	26.02	15.22	11.46	13.56	18.62	20.89	20.52	19.82	18.55	16.39	13.24	10.02	8.15	9.01	12.45	13.46	15.16	19.40	24.96
2	2	1	0.35	0.43	0.49	0.55	0.43	0.30	0.19	0.14	0.13	0.17	0.19	0.20	0.20	0.20	0.21	0.19	0.18	0.17	0.18	0.21	0.21	0.21	0.24	0.26
2	2	2	89.99	83.54	79.06	74.46	81.55	89.46	92.10	93.41	92.47	89.96	88.82	89.21	90.23	90.26	91.07	92.55	94.00	95.28	95.43	95.29	95.20	95.18	94.62	93.02
2	2	3	0.56	0.90	1.07	1.21	1.01	0.68	0.62	0.51	0.56	0.81	0.82	0.75	0.69	0.81	0.74	0.52	0.40	0.27	0.29	0.28	0.26	0.23	0.27	0.33
2	2	4	9.10	15.13	19.38	23.78	17.00	9.56	7.10	5.93	6.83	9.06	10.17	9.84	8.89	8.72	7.99	6.74	5.41	4.28	4.11	4.23	4.32	4.37	4.87	6.38
2	3	1	0.16	0.15	0.10	0.17	0.11	0.09	0.11	0.11	0.11	0.13	0.15	0.15	0.16	0.17	0.17	0.21	0.14	0.20	0.19	0.23	0.21	0.17	0.22	0.19
2	3	2	88.34	83.52	77.46	71.73	79.88	86.55	89.36	90.76	89.25	86.14	85.17	85.52	85.73	85.91	87.55	90.05	92.26	94.16	94.77	94.54	94.95	95.11	94.56	93.53
2	3	3	0.51	0.90	1.23	1.16	0.61	0.48	0.60	0.63	0.67	0.86	0.70	0.69	0.71	0.80	0.81	0.63	0.41	0.24	0.20	0.22	0.26	0.21	0.25	0.24
2	3	4	10.99	15.43	21.21	26.94	19.40	12.88	9.93	8.49	9.97	12.86	13.98	13.64	13.41	13.12	11.47	9.11	7.18	5.39	4.84	5.01	4.59	4.51	4.97	6.04
2	4	1	0.59	0.80	0.75	0.61	0.70	0.66	0.61	0.50	0.58	0.72	0.80	0.86	0.79	0.83	0.89	0.78	0.75	0.65	0.82	1.15	1.01	0.88	0.73	0.67
2	4	2	90.38	87.01	83.09	80.61	83.98	87.57	88.77	88.12	86.36	83.65	83.02	83.65	84.26	84.18	85.28	87.48	89.81	91.81	91.98	92.61	93.26	93.51	93.39	92.82
2	4	3	0.46	0.68	0.66	0.68	0.57	0.45	0.63	2.01	1.82	1.83	1.74	1.91	1.87	1.98	1.94	1.64	1.28	1.10	1.23	0.28	0.28	0.27	0.19	0.29
2	4	4	8.57	11.51	15.49	18.11	14.75	11.32	9.99	9.37	11.24	13.80	14.44	13.58	13.08	13.01	11.89	10.11	8.16	6.44	5.96	5.95	5.45	5.34	5.69	6.22
2	5	1	0.47	0.70	0.54	0.68	0.44	0.21	0.17	0.18	0.15	0.20	0.22	0.27	0.25	0.27	0.31	0.21	0.18	0.21	0.29	0.32	0.34	0.25	0.27	0.37
2	5	2	92.21	87.14	81.31	76.35	81.21	87.80	89.58	90.65	89.18	86.72	86.00	86.40	87.22	87.11	87.72	89.52	91.76	93.94	94.49	94.39	94.97	95.47	95.13	94.13
2	5	3	0.34	0.39	0.59	0.71	0.76	0.49	0.76	0.85	0.84	0.81	0.63	0.84	0.73	0.75	0.85	0.87	0.46	0.19	0.17	0.11	0.12	0.08	0.14	0.22
2	5	4	6.98	11.77	17.56	22.26	17.60	11.50	9.49	8.32	9.84	12.28	13.15	12.49	11.80	11.87	11.12	9.40	7.60	5.66	5.06	5.18	4.57	4.20	4.46	5.29
2	6	1	0.33	0.34	0.51	0.50	0.38	0.25	0.15	0.14	0.12	0.15	0.18	0.18	0.16	0.15	0.15	0.15	0.14	0.15	0.17	0.23	0.20	0.18	0.21	0.24
2	6	2	60.98	48.33	41.15	38.39	52.55	72.59	83.85	87.74	85.38	80.04	77.73	78.35	79.08	80.27	82.53	85.88	89.22	91.24	90.33	86.55	85.68	84.11	79.77	74.07

2	6	3	1.21	1.55	1.80	1.90	1.64	1.15	0.77	0.67	0.95	1.19	1.20	0.96	0.93	1.04	0.93	0.74	0.62	0.45	0.49	0.77	0.66	0.54	0.62	0.73
2	6	4	37.49	49.77	56.55	59.21	45.43	26.02	15.22	11.46	13.56	18.62	20.89	20.52	19.82	18.55	16.39	13.24	10.02	8.15	9.01	12.45	13.46	15.16	19.40	24.96

Appendix B – BMC Memo
2005 Vehicle Mix Files

2	7	1	0.33	0.34	0.51	0.50	0.38	0.25	0.15	0.14	0.12	0.15	0.18	0.18	0.16	0.15	0.15	0.15	0.14	0.15	0.17	0.23	0.20	0.18	0.21	0.24
2	7	2	60.98	48.33	41.15	38.39	52.55	72.59	83.85	87.74	85.38	80.04	77.73	78.35	79.08	80.27	82.53	85.88	89.22	91.24	90.33	86.55	85.68	84.11	79.77	74.07
2	7	3	1.21	1.55	1.80	1.90	1.64	1.15	0.77	0.67	0.95	1.19	1.20	0.96	0.93	1.04	0.93	0.74	0.62	0.45	0.49	0.77	0.66	0.54	0.62	0.73
2	7	4	37.49	49.77	56.55	59.21	45.43	26.02	15.22	11.46	13.56	18.62	20.89	20.52	19.82	18.55	16.39	13.24	10.02	8.15	9.01	12.45	13.46	15.16	19.40	24.96
2	8	1	0.33	0.34	0.51	0.50	0.38	0.25	0.15	0.14	0.12	0.15	0.18	0.18	0.16	0.15	0.15	0.15	0.14	0.15	0.17	0.23	0.20	0.18	0.21	0.24
2	8	2	60.98	48.33	41.15	38.39	52.55	72.59	83.85	87.74	85.38	80.04	77.73	78.35	79.08	80.27	82.53	85.88	89.22	91.24	90.33	86.55	85.68	84.11	79.77	74.07
2	8	3	1.21	1.55	1.80	1.90	1.64	1.15	0.77	0.67	0.95	1.19	1.20	0.96	0.93	1.04	0.93	0.74	0.62	0.45	0.49	0.77	0.66	0.54	0.62	0.73
2	8	4	37.49	49.77	56.55	59.21	45.43	26.02	15.22	11.46	13.56	18.62	20.89	20.52	19.82	18.55	16.39	13.24	10.02	8.15	9.01	12.45	13.46	15.16	19.40	24.96
2	9	1	0.33	0.34	0.51	0.50	0.38	0.25	0.15	0.14	0.12	0.15	0.18	0.18	0.16	0.15	0.15	0.15	0.14	0.15	0.17	0.23	0.20	0.18	0.21	0.24
2	9	2	60.98	48.33	41.15	38.39	52.55	72.59	83.85	87.74	85.38	80.04	77.73	78.35	79.08	80.27	82.53	85.88	89.22	91.24	90.33	86.55	85.68	84.11	79.77	74.07
2	9	3	1.21	1.55	1.80	1.90	1.64	1.15	0.77	0.67	0.95	1.19	1.20	0.96	0.93	1.04	0.93	0.74	0.62	0.45	0.49	0.77	0.66	0.54	0.62	0.73
2	9	4	37.49	49.77	56.55	59.21	45.43	26.02	15.22	11.46	13.56	18.62	20.89	20.52	19.82	18.55	16.39	13.24	10.02	8.15	9.01	12.45	13.46	15.16	19.40	24.96
2	10	1	0.16	0.15	0.10	0.17	0.11	0.09	0.11	0.11	0.11	0.13	0.15	0.15	0.16	0.17	0.17	0.21	0.14	0.20	0.19	0.23	0.21	0.17	0.22	0.19
2	10	2	88.34	83.52	77.46	71.73	79.88	86.55	89.36	90.76	89.25	86.14	85.17	85.52	85.73	85.91	87.55	90.05	92.26	94.16	94.77	94.54	94.95	95.11	94.56	93.53
2	10	3	0.51	0.90	1.23	1.16	0.61	0.48	0.60	0.63	0.67	0.86	0.70	0.69	0.71	0.80	0.81	0.63	0.41	0.24	0.20	0.22	0.26	0.21	0.25	0.24
2	10	4	10.99	15.43	21.21	26.94	19.40	12.88	9.93	8.49	9.97	12.86	13.98	13.64	13.41	13.12	11.47	9.11	7.18	5.39	4.84	5.01	4.59	4.51	4.97	6.04
2	15	1	0.00	0.00	0.00	0.00	0.00	0.44	0.60	0.39	0.24	0.58	0.88	0.33	0.41	0.54	0.26	0.57	0.71	0.63	1.08	1.24	0.27	1.72	0.71	1.34
2	15	2	98.69	94.62	88.39	89.04	94.56	91.41	94.73	94.49	93.53	94.92	92.07	94.98	94.23	94.37	94.83	94.84	94.24	96.63	96.10	95.31	96.53	94.38	97.55	92.70
2	15	3	0.00	0.00	0.00	0.00	0.00	0.44	0.75	1.66	0.83	0.00	0.00	0.66	1.10	0.54	0.39	1.33	1.74	0.56	0.22	0.00	0.27	0.00	0.00	0.00
2	15	4	1.31	5.38	11.61	10.96	5.44	7.72	3.92	3.46	5.40	4.50	7.05	4.04	4.26	4.56	4.51	3.26	3.31	2.18	2.60	3.45	2.93	3.90	1.74	5.95

Appendix C – BMC Memo
Anti-Tampering Program

Program Element	Baltimore
Program Start Year	1989
First Model Year	1977
Last Model Year	2050
LDGV	Yes
LDGT1	Yes
LDGT2	Yes
LDGT3	Yes
LDGT4	Yes
HDGV2B	Yes
HDGV3	No
HDGV4	No
HDGV5	No
HDGV6	No
HDGV7	No
HDGV8A	No
HDGV8B	No
GAS BUS	No
Program Type	Test Only
Inspection Frequency	Biennial
Compliance Rate (%)	96
Vehicle Types	
Inspections Performed	
Air pump system disablement	No
Catalyst removal	Yes
Fuel inlet restrictor disablement	Yes
Tailpipe lead deposit test	Yes
EGR disablement	No
Evaporative system disablement	No
PCV system disablement	No
Missing gas cap	Yes

Appendix D – BMC Memo
Baltimore I/M Program

Program Parameters	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Program Name	Idle older LDGV, LDGT	Idle HDGT	IM240	OBD	Gas Cap for older LDGV, LDGT	Gas Cap for HDGT	Gas Cap for OBD Vehicles
Test Type	Test Only	Test Only	Test Only	Test Only	Test Only	Test Only	Test Only
I/M Program Years	1984 - 2050	1984 - 2050	1984 - 2050	2003 - 2050	2003 - 2050	2003 - 2050	2003 - 2050
Test Frequency	Biennial	Biennial	Biennial	Biennial	Biennial	Biennial	Biennial
Program Type	Idle	Idle	IM240	OBD I/M	GC	GC	EVAP OBD & GC
Model Years	77-83	77-83	84-95	96-50	77-95	77-50	96-50
Stringency Rate (%)	20	20	20	20	N/A	N/A	N/A
Compliance Rate (%)	96	96	96	96	96	96	96
Waiver Rate (%)	3	3	3	3	3	3	3
Grace Period	2	2	2	2	2	2	2
Vehicle Types							
LDGV	Yes	No	Yes	Yes	Yes	No	Yes
LDGT1	Yes	No	Yes	Yes	Yes	No	Yes
LDGT2	Yes	No	Yes	Yes	Yes	No	Yes
LDGT3	Yes	No	Yes	Yes	Yes	No	Yes
LDGT4	Yes	No	Yes	Yes	Yes	No	Yes
HDGV2B	No	Yes	No	No	No	Yes	No
HDGV3	No	Yes	No	No	No	Yes	No
HDGV4	No	Yes	No	No	No	Yes	No
HDGV5	No	Yes	No	No	No	Yes	No
HDGV6	No	Yes	No	No	No	Yes	No
HDGV7	No	No	No	No	No	No	No
HDGV8A	No	No	No	No	No	No	No
HDGV8B	No	No	No	No	No	No	No
GAS BUS	No	No	No	No	No	No	No

Appendix E – BMC Memo
Baltimore Region Motor Vehicle Registration File

```
* LDV
 1 0.0646 0.0842 0.0867 0.0750 0.0732 0.0740 0.0664 0.0726 0.0600 0.0530
   0.0451 0.0401 0.0381 0.0329 0.0281 0.0232 0.0174 0.0116 0.0080 0.0044
   0.0026 0.0021 0.0019 0.0024 0.0324
* LDT1
 2 0.0909 0.1057 0.1137 0.1007 0.0968 0.0874 0.0735 0.0687 0.0538 0.0408
   0.0307 0.0246 0.0229 0.0224 0.0191 0.0145 0.0095 0.0071 0.0049 0.0026
   0.0015 0.0010 0.0009 0.0019 0.0046
* LDT2
 3 0.0909 0.1057 0.1137 0.1007 0.0968 0.0874 0.0735 0.0687 0.0538 0.0408
   0.0307 0.0246 0.0229 0.0224 0.0191 0.0145 0.0095 0.0071 0.0049 0.0026
   0.0015 0.0010 0.0009 0.0019 0.0046
* LDT3
 4 0.0560 0.0815 0.0826 0.0707 0.0654 0.0702 0.0574 0.0628 0.0628 0.0418
   0.0353 0.0340 0.0367 0.0414 0.0406 0.0361 0.0343 0.0204 0.0167 0.0095
   0.0066 0.0053 0.0043 0.0077 0.0201
* LDT4
 5 0.0560 0.0815 0.0826 0.0707 0.0654 0.0702 0.0574 0.0628 0.0628 0.0418
   0.0353 0.0340 0.0367 0.0414 0.0406 0.0361 0.0343 0.0204 0.0167 0.0095
   0.0066 0.0053 0.0043 0.0077 0.0201
* HDV2B
 6 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV3
 7 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV4
 8 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV5
 9 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV6
10 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV7
11 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV8a
12 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV8b
13 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDBS
14 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDBT
15 0.0255 0.0410 0.0624 0.1022 0.0548 0.0826 0.0626 0.0911 0.0484 0.0434
   0.0363 0.0392 0.0476 0.0481 0.0440 0.0429 0.0355 0.0269 0.0152 0.0097
   0.0097 0.0063 0.0064 0.0068 0.0115
* Motorcycles
16 0.0852 0.1120 0.0907 0.0738 0.0526 0.0448 0.0457 0.0373 0.0309 0.0334
   0.0243 0.3692 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
   0.0000 0.0000 0.0000 0.0000 0.0000
```

Appendix F – BMC Memo
Baltimore Region Motor Diesel Sales Fractions

```
* LDV
0.0001 0.0002 0.0006 0.0022 0.0014 0.0015 0.0020 0.0014 0.0015 0.0012
0.0017 0.0032 0.0013 0.0010 0.0005 0.0107 0.0078 0.0361 0.0508 0.0766
0.1184 0.1215 0.0962 0.0370 0.0046
* LDT1
0.0010 0.0010 0.0032 0.0136 0.0048 0.0172 0.0165 0.0153 0.0106 0.0151
0.0163 0.0169 0.0175 0.0250 0.0183 0.0256 0.0553 0.0651 0.0748 0.0877
0.2434 0.1723 0.1120 0.0614 0.0160
* LDT2
0.0010 0.0010 0.0032 0.0136 0.0048 0.0172 0.0165 0.0153 0.0106 0.0151
0.0163 0.0169 0.0175 0.0250 0.0183 0.0256 0.0553 0.0651 0.0748 0.0877
0.2434 0.1723 0.1120 0.0614 0.0160
* LDT3
0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0115 0.0111 0.0145
0.0115 0.0129 0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209
0.0256 0.0013 0.0006 0.0011 0.0001
* LDT4
0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0115 0.0111 0.0145
0.0115 0.0129 0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209
0.0256 0.0013 0.0006 0.0011 0.0001
* HDV2B
0.1998 0.1998 0.1998 0.1998 0.1998 0.1998 0.1998 0.2578 0.2515 0.3263
0.2784 0.2963 0.2384 0.2058 0.1756 0.1958 0.2726 0.2743 0.3004 0.2918
0.2859 0.0138 0.0000 0.0000 0.0000
* HDV3
0.6774 0.6774 0.6774 0.6774 0.6774 0.6774 0.6774 0.7715 0.7910 0.8105
0.8068 0.8280 0.8477 0.7940 0.7488 0.7789 0.7842 0.6145 0.5139 0.5032
0.4277 0.0079 0.0000 0.0000 0.0001
* HDV4
0.8606 0.8606 0.8606 0.8606 0.8606 0.8606 0.8606 0.8473 0.8048 0.8331
0.7901 0.7316 0.7275 0.7158 0.5647 0.3178 0.2207 0.1968 0.1570 0.0738
0.0341 0.0414 0.0003 0.0000 0.0000
* HDV5
0.4647 0.4647 0.4647 0.4647 0.4647 0.4647 0.4647 0.4384 0.3670 0.4125
0.3462 0.2771 0.2730 0.2616 0.1543 0.0615 0.0383 0.0333 0.0255 0.0111
0.0049 0.0060 0.0000 0.0000 0.0000
* HDV6
0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 0.6078 0.5246 0.5767
0.5289 0.5788 0.5617 0.4537 0.4216 0.4734 0.4705 0.4525 0.4310 0.3569
0.3690 0.4413 0.3094 0.1679 0.1390
* HDV7
0.8563 0.8563 0.8563 0.8563 0.8563 0.8563 0.8563 0.8443 0.7943 0.8266
0.7972 0.8279 0.8177 0.7440 0.7184 0.7588 0.7567 0.7431 0.7261 0.6602
0.6717 0.7344 0.6107 0.4140 0.3610
* HDV8A
0.9992 0.9992 0.9992 0.9992 0.9992 0.9992 0.9992 0.9989 0.9987 0.9989
0.9977 0.9984 0.9982 0.9979 0.9969 0.9978 0.9980 0.9979 0.9976 0.9969
0.9978 0.9982 0.9974 0.9965 0.9964
* HDV8B
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000
* MC
0.9585 0.9585 0.9585 0.9585 0.9585 0.9585 0.9585 0.8857 0.8525 0.8795
0.9900 0.9105 0.8760 0.7710 0.7502 0.7345 0.6733 0.5155 0.3845 0.3238
0.3260 0.2639 0.0594 0.0460 0.0291
```

Appendix G – BMC Memo
Baltimore County MOBILE6 Script

```
MOBILE6 INPUT FILE
REPORT FILE        :  C:\pptemp\m6output.out       REPLACE
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  C:\BALTAQ\run\m6data\M6OUTPUT.TB1    REPLACE
POLLUTANTS         :  HC CO NOX
AGGREGATED OUTPUT  :
MIN/MAX TEMPERATURE: 67.9 96.5
FUEL RVP           : 7.0
EXPRESS HC AS VOC  :
EXPAND EXHAUST     :
EXPAND EVAPORATIVE :
NO REFUELING       :
ANTI-TAMP PROGRAM  :
89 77 50 22222 21111111 1 12  96. 12211112
I/M DESC FILE      : C:\BALTAQ\M6_Data\im2005.d
94+ LDG IMP        : C:\BALTAQ\M6_Data\nlevne.d
REG DISTRIBUTION   : C:\BALTAQ\M6_Data\regdat02.bal
DIESEL FRACTIONS   :
0.0001 0.0002 0.0006 0.0022 0.0014 0.0015 0.0020 0.0014 0.0015 0.0012
0.0017 0.0032 0.0013 0.0010 0.0005 0.0107 0.0078 0.0361 0.0508 0.0766
0.1184 0.1215 0.0962 0.0370 0.0046
0.0010 0.0010 0.0032 0.0136 0.0048 0.0172 0.0165 0.0153 0.0106 0.0151
0.0163 0.0169 0.0175 0.0250 0.0183 0.0256 0.0553 0.0651 0.0748 0.0877
0.2434 0.1723 0.1120 0.0614 0.0160
0.0010 0.0010 0.0032 0.0136 0.0048 0.0172 0.0165 0.0153 0.0106 0.0151
0.0163 0.0169 0.0175 0.0250 0.0183 0.0256 0.0553 0.0651 0.0748 0.0877
0.2434 0.1723 0.1120 0.0614 0.0160
0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0115 0.0111 0.0145
0.0115 0.0129 0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209
0.0256 0.0013 0.0006 0.0011 0.0001
0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0115 0.0111 0.0145
0.0115 0.0129 0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209
0.0256 0.0013 0.0006 0.0011 0.0001
0.1998 0.1998 0.1998 0.1998 0.1998 0.1998 0.1998 0.2578 0.2515 0.3263
0.2784 0.2963 0.2384 0.2058 0.1756 0.1958 0.2726 0.2743 0.3004 0.2918
0.2859 0.0138 0.0000 0.0000 0.0000
0.6774 0.6774 0.6774 0.6774 0.6774 0.6774 0.6774 0.7715 0.7910 0.8105
0.8068 0.8280 0.8477 0.7940 0.7488 0.7789 0.7842 0.6145 0.5139 0.5032
0.4277 0.0079 0.0000 0.0000 0.0001
0.8606 0.8606 0.8606 0.8606 0.8606 0.8606 0.8606 0.8473 0.8048 0.8331
0.7901 0.7316 0.7275 0.7158 0.5647 0.3178 0.2207 0.1968 0.1570 0.0738
0.0341 0.0414 0.0003 0.0000 0.0000
0.4647 0.4647 0.4647 0.4647 0.4647 0.4647 0.4647 0.4384 0.3670 0.4125
0.3462 0.2771 0.2730 0.2616 0.1543 0.0615 0.0383 0.0333 0.0255 0.0111
0.0049 0.0060 0.0000 0.0000 0.0000
0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 0.6078 0.5246 0.5767
0.5289 0.5788 0.5617 0.4537 0.4216 0.4734 0.4705 0.4525 0.4310 0.3569
0.3690 0.4413 0.3094 0.1679 0.1390
0.8563 0.8563 0.8563 0.8563 0.8563 0.8563 0.8563 0.8443 0.7943 0.8266
0.7972 0.8279 0.8177 0.7440 0.7184 0.7588 0.7567 0.7431 0.7261 0.6602
0.6717 0.7344 0.6107 0.4140 0.3610
0.9992 0.9992 0.9992 0.9992 0.9992 0.9992 0.9992 0.9989 0.9987 0.9989
0.9977 0.9984 0.9982 0.9979 0.9969 0.9978 0.9980 0.9979 0.9976 0.9969
0.9978 0.9982 0.9974 0.9965 0.9964
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000
0.9585 0.9585 0.9585 0.9585 0.9585 0.9585 0.9585 0.8857 0.8525 0.8795
0.9900 0.9105 0.8760 0.7710 0.7502 0.7345 0.6733 0.5155 0.3845 0.3238
0.3260 0.2639 0.0594 0.0460 0.0291


SCENARIO RECORD    :[01 0031]  1
CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
```

```
SEASON              : 1
SUNRISE/SUNSET      : 6 8
CLOUD COVER         : 0.35
*VMT TOTALS          12054790
*                      5138853  940708 3130030  964066  443810  431572   42385   34536
*                        25641   95890  113813  123755  440599   73394   33020   22718
VMT FRACTIONS       :
                       .426291 .078036 .259650 .079974 .036816 .035801 .003516 .002865
                       .002127 .007955 .009441 .010266 .036550 .006088 .002739 .001885
VMT BY FACILITY     :V003101F.def
VMT BY HOUR         :V003101H.def
SPEED VMT           :V003101S.def

SCENARIO RECORD     :[02 0031]  2
CALENDAR YEAR       :2005
EVALUATION MONTH    : 7
ABSOLUTE HUMIDITY   : 69.
FUEL PROGRAM        : 2 S
SEASON              : 1
SUNRISE/SUNSET      : 6 8
CLOUD COVER         : 0.35
*VMT TOTALS            1986636
*                       877240  160586  534318  164573   75762   52285    5135    4184
*                         3106   11617   13788   14993   53379    8128    3657    3885
VMT FRACTIONS       :
                       .441571 .080833 .268956 .082840 .038136 .026318 .002585 .002106
                       .001563 .005848 .006940 .007547 .026869 .004091 .001841 .001956
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VMT BY HOUR         :V003102H.def
SPEED VMT           :V003102S.def


SCENARIO RECORD     :[03 0031]  3
CALENDAR YEAR       :2005
EVALUATION MONTH    : 7
ABSOLUTE HUMIDITY   : 69.
FUEL PROGRAM        : 2 S
SEASON              : 1
SUNRISE/SUNSET      : 6 8
CLOUD COVER         : 0.35
*VMT TOTALS            4506553
*                      2041041  373629 1243180  382906  176272   82047    8058    6566
*                         4875   18230   21637   23527   83764   23398   10527    6896
VMT FRACTIONS       :
                       .452904 .082908 .275861 .084967 .039115 .018206 .001788 .001457
                       .001082 .004045 .004801 .005221 .018587 .005192 .002336 .001530
VMT BY FACILITY     :V003103F.def
VMT BY HOUR         :V003103H.def
SPEED VMT           :V003103S.def


SCENARIO RECORD     :[04 0031]  4
CALENDAR YEAR       :2005
EVALUATION MONTH    : 7
ABSOLUTE HUMIDITY   : 69.
FUEL PROGRAM        : 2 S
SEASON              : 1
SUNRISE/SUNSET      : 6 8
CLOUD COVER         : 0.35
*VMT TOTALS            4315538
*                      1973280  361224 1201907  370194  170420   65451    6428    5238
*                         3889   14542   17260   18768   66820   19970    8985   11162
VMT FRACTIONS       :
                       .457249 .083703 .278507 .085782 .039490 .015166 .001490 .001214
                       .000901 .003370 .004000 .004349 .015484 .004627 .002082 .002586
VMT BY FACILITY     :V003104F.def
VMT BY HOUR         :V003104H.def
SPEED VMT           :V003104S.def


SCENARIO RECORD     :[05 0031]  5
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CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          1764718
*                     803119  147017  489172  150668   69360   29094    2857    2328
*                       1729    6464    7673    8343   29703    7856    3535    5800
VMT FRACTIONS      :
                     .455096 .083309 .277196 .085378 .039304 .016486 .001619 .001319
                     .000980 .003663 .004348 .004728 .016832 .004452 .002003 .003287
VMT BY FACILITY    :V003105F.def
VMT BY HOUR        :V003105H.def
SPEED VMT          :V003105S.def


SCENARIO RECORD    :[06 0031]  6
CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           555387
*                     240185   43967  146293   45059   20743   17926    1761    1435
*                       1065    3983    4727    5140   18301    2551    1148    1103
VMT FRACTIONS      :
                     .432462 .079165 .263407 .081131 .037349 .032277 .003171 .002584
                     .001918 .007172 .008511 .009255 .032952 .004593 .002067 .001986
VMT BY FACILITY    :V003106F.def
VMT BY HOUR        :V003106H.def
SPEED VMT          :V003106S.def


SCENARIO RECORD    :[07 0031]  7
CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           336559
*                     147396   26982   89777   27652   12730    9572     940     766
*                        569    2127    2524    2745    9772    1573     708     726
VMT FRACTIONS      :
                     .437950 .080170 .266749 .082161 .037824 .028441 .002793 .002276
                     .001691 .006320 .007499 .008156 .029035 .004674 .002104 .002157
VMT BY FACILITY    :V003107F.def
VMT BY HOUR        :V003107H.def
SPEED VMT          :V003107S.def


SCENARIO RECORD    :[08 0031]  8

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS            56496
*                      25572    4681   15575    4797    2208    1085     107      87
*                         64     241     286     311    1108     166      75     133
VMT FRACTIONS      :
                     .452630 .082856 .275685 .084909 .039083 .019205 .001894 .001540
```

```
                  .001133 .004266 .005062 .005505 .019612 .002938 .001328 .002354
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VMT BY HOUR        :V003108H.def
SPEED VMT          :V003108S.def


SCENARIO RECORD    :[09 0031]  9
CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           21973
*                      9757    1786    5942    1830     842     542      53      43
*                        32     120     143     155     554      89      40      45
VMT FRACTIONS      :
                  .444039 .081283 .270427 .083285 .038320 .024667 .002412 .001957
                  .001456 .005461 .006508 .007054 .025213 .004050 .001820 .002048
VMT BY FACILITY    :V003109F.def
VMT BY HOUR        :V003109H.def
SPEED VMT          :V003109S.def


SCENARIO RECORD    :[10 0031] 10
CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS            7629
*                      3313     606    2018     621     286     225      22      18
*                        13      50      59      65     230      61      27      15
VMT FRACTIONS      :
                  .434282 .079431 .264509 .081397 .037487 .029492 .002884 .002359
                  .001704 .006554 .007733 .008520 .030147 .007996 .003539 .001966
VMT BY FACILITY    :V003110F.def
VMT BY HOUR        :V003110H.def
SPEED VMT          :V003110S.def


SCENARIO RECORD    :[11 0031] 15
CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
ABSOLUTE HUMIDITY  : 69.
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS         1579960
*                    732534  134096  446180  137426   63264   16571    1627    1326
*                       985    3682    4370    4752   16917    7849    3531    4850
VMT FRACTIONS      :
                  .463640 .084873 .282400 .086981 .040042 .010488 .001030 .000839
                  .000623 .002330 .002766 .003008 .010707 .004968 .002235 .003070
VMT BY FACILITY    :V003111F.def
VMT BY HOUR        :V003111H.def
SPEED VMT          :V003111S.def


END OF RUN         :
```

Appendix B: MOBILE6 Documentation from Baker for Baltimore Region

The Baltimore Ozone Non-Attainment Area

An Explanation of Methodology for Developing Mobile Source Emissions Budgets using MOBILE6

Prepared for:

Mobile Sources Control Program
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Prepared by:
Michael Baker, Jr., Inc.

April 2003

The Baltimore Ozone Non-Attainment Area
State Implementation Plan Revision Using MOBILE6
An Explanation of Methodology
April 2003

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OVERVIEW

This document reflects the highway mobile sources emission estimations for 2005 Baltimore Ozone Non-Attainment Area using EPA's recently approved MOBILE6 emission model that will revise the interim MOBILE5-based (Tier 2) motor vehicle emissions budget. The latest version of MOBILE is a major revision based on new test data and accounts for changes in vehicle technology and regulations. In addition, the model includes an improved understanding of in-use emission levels and the factors that influence them resulting in significantly more detailed input data. The revised motor vehicle emissions budgets using MOBILE6 are presented in the following table.

Table 1 Baltimore Area MOBILE6 Motor Vehicle Emissions Summary

Year	VOC (tons per day)	NO_x (tons per day)
2005	55.3	146.9

As compared to previous MOBILE versions, MOBILE6 has a significant impact on the emission factors, benefits of available control strategies, effects of new regulations and corrections to basic emission rates. As a result, the emissions rates are different and it is difficult to compare the results directly to previous runs conducted with MOBILE5. For this reason, 1990 emission totals are reanalyzed using MOBILE6 and its available input parameters.

Guidance documents from EPA were used to develop the inventory for the Baltimore Non-Attainment area. They include:

? *Policy Guidance on the Use of MOBILE6 for SIP Development and Transportation Conformity*, US EPA Office of Air and Radiation, dated January 18, 2002.
? *Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation,* US EPA Office of Air and Radiation, and Office of Transportation and Air Quality, dated January 2002.
? *User's Guide to MOBILE6.0, Mobile Source Emission Factor Model,* EPA420-R-02-001, dated January 2002.

The methodologies used to produce the MOBILE6 emission results conform to the recommendations provided in EPA's Technical Guidance. A mix of local data and national default input data (internal to MOBILE6) has been used for this submission. Local data has been used for the primary data items that have a significant impact on emissions. This includes VMT, speeds, vehicle mixes, age distributions, diesel sales fractions, hourly distributions, temperatures, and inspection/maintenance and fuel program characteristics.

Some of the planning assumptions and modeling tools have been updated for this inventory effort. The key elements to the modeling protocol which have been updated are outlined below:

Baltimore Regional Travel Demand Model

The roadway data input to the emissions calculations for the Baltimore (5-counties and Baltimore City) ozone non-attainment region is based on the Baltimore Metropolitan Council's (BMC's) latest travel demand model upgrade. The new model utilizes the TP+ software platform and incorporates the following:

? Produces volumes by 5 time periods.
? Calibrated/validated to year 2000 traffic count data. The travel model is validated to 2000, but it was calibrated on 1993 HTS and 1996 transit survey. Truck model was calibrated with 2000 data.
? Contains a truck model calibrated to State Highway Administration (SHA) 2002 vehicle class counts.
? Utilizes BMC's latest land use assumptions and forecasts, Round 6.
? Contains mode choice and transit components to represent the impacts of the region's bus and rail networks.

PPSUITE Post Processor

PPSUITE was used for the first time in Maryland for this SIP. 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, Virginia, New Jersey, and the New York City Metropolitan Area. The software has gone through a significant revision to ensure consistency with the MOBILE6 emissions model. PPSUITE is used to process the outputs from the regional travel demand model runs for 1990 and 2005 including the development of roadway speed estimates, which are supplied as input to the MOBILE6 model. The software is also used to prepare and run the MOBILE6 input files and to process the MOBILE6 outputs.

Baltimore Regional Inspection/Maintenance Program

The 1990 analysis runs assume an idle test on post-1977 gas vehicles up to 26,000 pounds. In addition, an anti-tampering program is included which includes 2 inspections applied to all subject vehicles. The 2005 analysis runs assume a more robust inspection program including the following key elements:

? An OBDII computer check for 1996 and newer model year gas vehicles up to 8,500 pounds.
? An IM240 tail pipe test for 1984 to 1995 gas vehicles and trucks up to 10,000 pounds.
? An Idle test for 1977 to 1983 vehicles up to 10,000 pounds and all gas trucks 10,000 to 26,000 pounds.
? A gas cap test for all vehicles tested.
? An anti-tampering program with 3 inspections for all vehicles receiving an idle test.

I. Regional Fuel Program

For 2005, the Baltimore ozone non-attainment region is required to have federal reformulated gasoline (RFG). Like conventional gasoline, RFG must meet fuel volatility requirements that vary by geographic region. The Baltimore region was modeled using the RFG requirements of the Southern region in summer time. Based on EPA's guidance and using the monthly fuel laboratory data (Source: Motor Fuel Tax Division, Office of the Comptroller), the 1990 analysis year runs for the Baltimore region utilized a computed Reid Vapor Pressure (RVP) value of 8.2.

Vehicle Age/Diesel Sales Distributions

Vehicle age distributions are input to MOBILE for the region based on registered vehicles that reflect July 1 summer conditions. These distributions reflect the percentage of vehicles in the fleet up to 25 years old and are listed by the 16 MOBILE6 vehicle types. As in previous SIP submissions, 1990 information is used in the development of the data input for the 1990 analysis year based on Maryland Motor Vehicle Administration's (MVA's) vehicle registration database download. Updated 2002 vehicle age distributions have been downloaded from the registration database and are used for the 2005 analysis year run. The analysis utilizes light-duty diesel sales fraction data acquired from state registration data for both 1990 and 2002.

Vehicle Mix Patterns

Vehicle mix patterns were developed from a combination of sources. Truck totals for 2005 were determined from the Baltimore regional truck model, which was calibrated against 2002 local count data. 1990 truck estimates were adjusted to reflect regional toll data from the Maryland Transportation Authority (MDTA). Regional vehicle mix patterns, developed by facility type from local count data, were used to split the autos into light-duty vehicles and motorcycles; and the trucks into heavy-duty trucks and buses. MOBILE6 defaults were then used to split the above 4 vehicle categories into the required 16 MOBILE6 vehicle classes. Defaults were used specific to the year being analyzed (1990, 2005). Thus, more sport utility vehicles are assumed in the year 2005 as compared to 1990.

Weather Data

Minimum and maximum daily temperatures were developed following USEPA guidance using information collected from the National Weather's Service BWI monitoring station. The 1990 temperatures used are the same that were used and documented in the official 1990 inventory for the Baltimore area. The 2005 temperatures are those used and documented in the 1999 inventory for the Baltimore area.

Federal Program: Low Emission Vehicle (NLEV), Tier 2/Low Sulfur Fuel, and 2004 Heavy Duty Engine (HDE) Rule

Federal new vehicle emissions control and fuel programs that were modeled separately using MOBILE5 are now incorporated into MOBILE6. The NLEV program had a three-year phase-in starting with 1999 model years. The Tier 2 / Low Sulfur Fuel Program takes effect in 2004 and provides benefit for subsequent years.

Other Changes incorporated into MOBILE6

In addition to the new regulations, a number of improvements (corrections) were incorporated into MOBILE6 that have a significant impact on emission calculations, in particular NO_x emissions. These changes may increase or decrease emissions depending on the pollutant, calendar year, fuel program and locally specified speeds and facility class driving activities. As a result, a MOBILE6 comparison to MOBILE5 emission estimates will be significantly different.

Below is a list of the most important quantitative changes to emissions incorporated into MOBILE6:

- ? Basic Emission Rates (BER) for light-duty cars and trucks are lower from late 1980s and early 1990 model year vehicles due to new data that shows pollution control devices are more durable than expected. This change generally lowers emissions from vehicles of model years in the late 1980's and early 1990's.
- ? Real world driving factors that influence emissions like air conditioning and high acceleration effects.
- ? Fuel content corrections to account for damage inflicted by high levels of sulfur in gasoline in vehicles with advanced catalysts. This leads to increased emissions in the late 1990s and early 2000s. This effect declines as the Tier 2 regulations phase in lower sulfur fuel.
- ? Speed data shows that vehicle emissions are generally less sensitive to speed changes than previously thought. This has a variable effect on emissions.
- ? For heavy-duty trucks, MOBILE6 includes lower base-rate emissions, but excess NO_x emissions under steady state driving conditions can occur due to pollution control defeat devices included in these vehicles in the 1990's. MOBILE6 includes, though, a reduction in these NO_x emissions expected in future years as the result of a consent decree with engine manufacturers. Thus, MOBILE6 heavy-duty truck emissions are significantly higher than MOBILE5 for some model years and pollutants and significantly lower for others.
- ? Heavy-duty diesel vehicle NO_x off-cycle emissions effects are incorporated into MOBILE6. These effects include the Defeat Device, NO_x Pull Ahead, Rebuild Mitigation Program, and Rebuild program effectiveness.
- ? MOBILE6 includes new data for evaporative emissions because this data has indicated a small fraction of older vehicles with leaks in their fuel systems contribute a large quantity of evaporative emissions. MOBILE6 also accounts for the new tests and new regulations that require lower emissions and more durable fuel systems. This has a variable effect on emissions.

INTRODUCTION

The purpose of this document is to explain how Baltimore estimates emissions from highway vehicles for inclusion in its emission inventories and State Implementation Plan.

Highway vehicles contribute significantly to air pollution, particularly to ground-level ozone. Ozone is not created directly but formed in sunlight from VOCs and NO_x. Both VOCs and NO_x are emitted from highway vehicles. Baltimore's ozone-related emission inventory efforts have been focused on these pollutants.

In order to estimate both the rate at which emissions are being generated and to calculate vehicle miles traveled (activity level), Baltimore examines its road network and fleet to estimate vehicle activity. For ozone-related inventories, this is done for a typical summer (July) weekday. 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 region's roadway system. These models then generate emission 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.

MOBILE. The heart of the highway vehicle emission calculation procedure is EPA's highway vehicle emission factor model, MOBILE. This is a FORTRAN program that calculates **average** in-use fleet emission factors for ozone precursors for each of twenty-eight 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. MOBILE produces the "emission rates" referred to in the previous section.

The model was first developed as MOBILE1 in the late 1970s, and has been periodically updated to reflect the collection and analysis of additional emission factor data over the years, as well as changes in vehicle, engine and emission control system technologies, changes in applicable regulations, emission standards and test procedures, and improved understanding of in-use emission levels and the factors that influence them. For this inventory effort, Baltimore utilizes MOBILE6 as approved by EPA.

PPSUITE. The Baltimore region is now using a post processor named PPSUITE (formerly named PPAQ - Post Processor for Air Quality), which consists of a set of programs that perform the following functions:

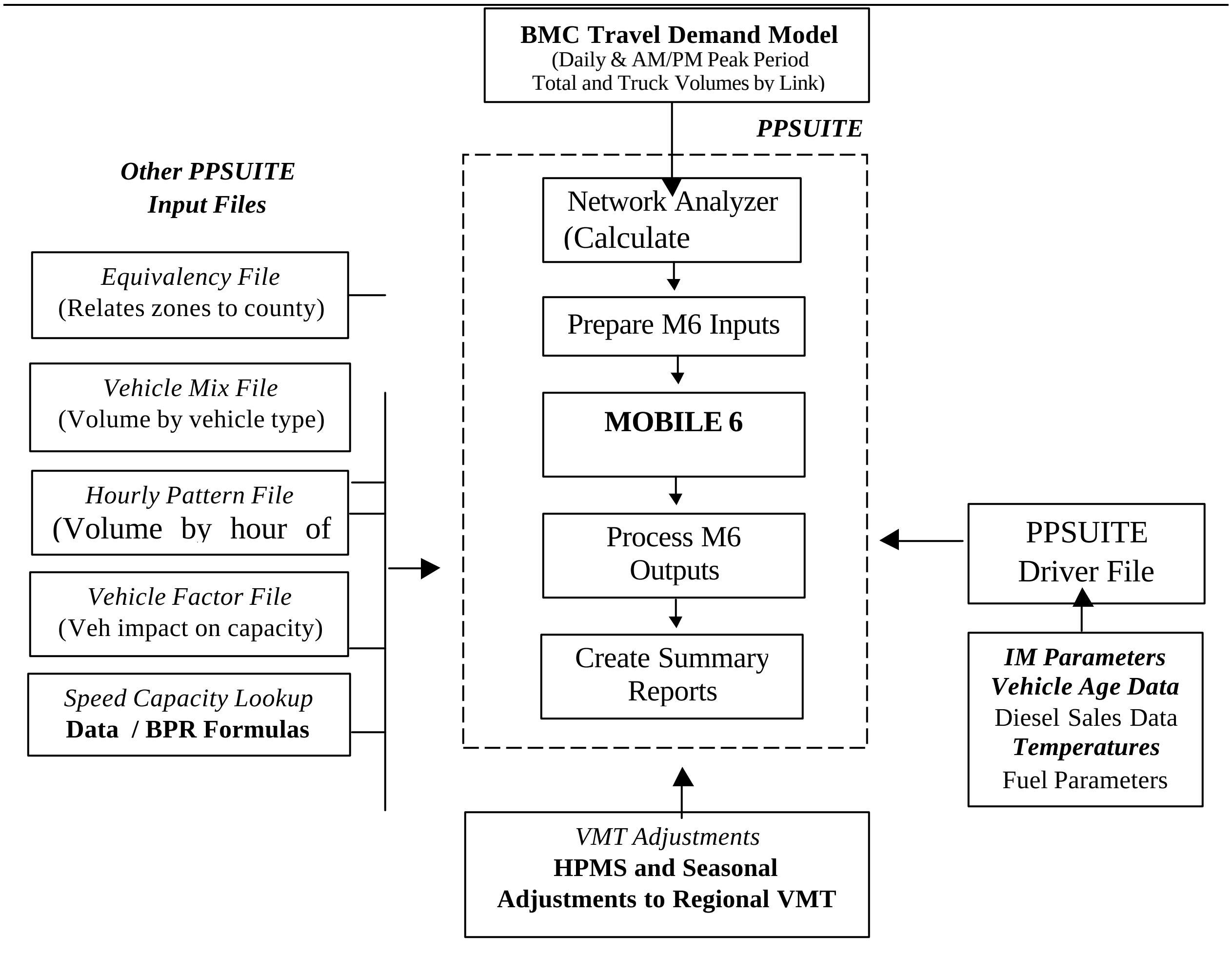
- ? Analyzes highway operating conditions
- ? Calculates highway speeds
- ? Compiles vehicle miles of travel (VMT) and vehicle type mix data
- ? Prepares MOBILE6 runs
- ? Calculates emissions from output MOBILE6 emission rates and accumulated highway VMT.

PPSUITE has become a widely used and accepted tool for estimating speeds and processing MOBILE emission rates. It is currently being used throughout Pennsylvania, for the New York City region, for the north and south New Jersey regions, and in other states including Louisiana, Virginia, and Indiana. The software is based upon accepted transportation engineering methodologies. For example, PPSUITE utilizes speed and delay estimation procedures based on planning methods provided in the <u>2000 Highway</u>

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.

These two computer programs interact as shown in Exhibit 1. PPSUITE replaces the prior MDE-developed post processor, which could not accommodate MOBILE6 requirements without significant revision. In addition, PPSUITE enhances and adds new capabilities regarding the calculation of speed, the preparation of those speeds for input to MOBILE6, and allows for an organized input data storage format.

Exhibit 1 Emission Calculation Process for the Baltimore Region

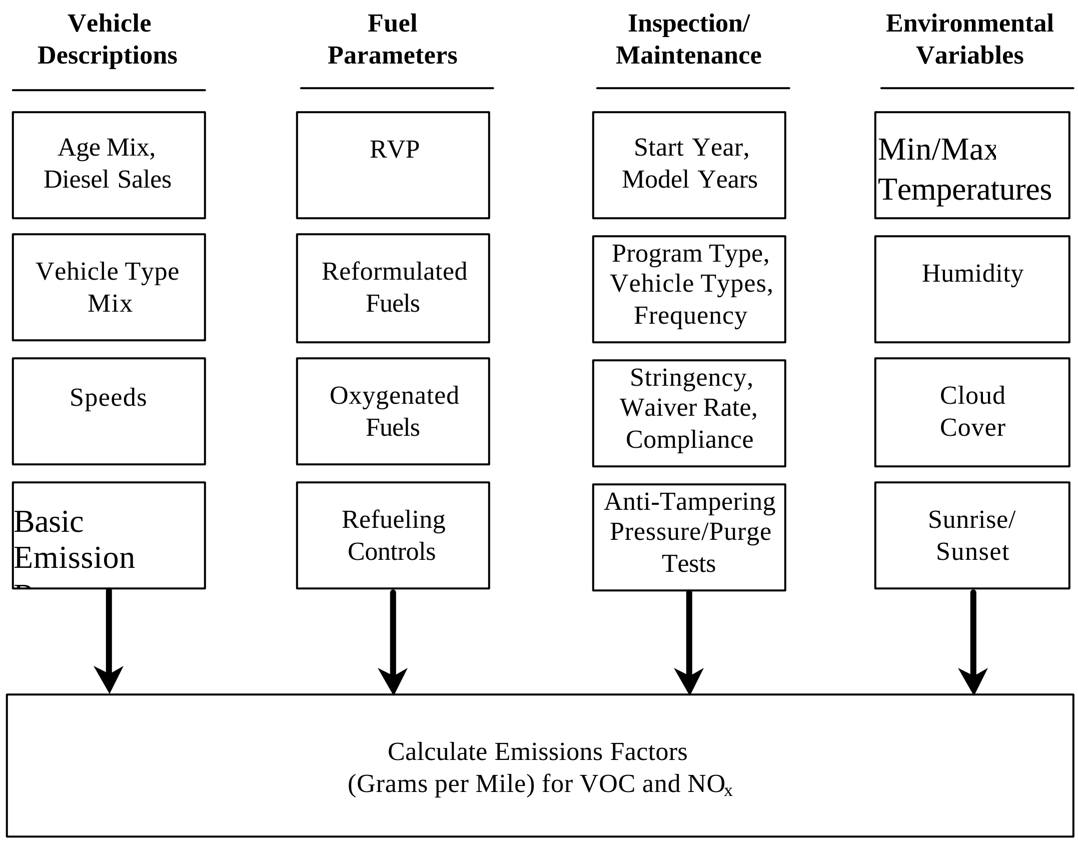


OVERVIEW OF INPUT DATA

Data Inputs to MOBILE

A large number of inputs to MOBILE are needed to fully account for the numerous vehicle and environmental parameters that affect emissions including traffic flow characteristics, vehicle descriptions, fuel parameters, inspection/maintenance program parameters, and environmental variables as shown in Exhibit 2. With some input parameters, MOBILE allows the user to choose default values, while others require area-specific inputs.

Exhibit 2 MOBILE Inputs



For an emissions inventory, area specific inputs are used for all of the items shown in Exhibit 2 except for the basic emission rates, humidity and cloud cover, which are MOBILE defaults. In addition, Baltimore uses the MOBILE6 default starts-per-day data and soak distributions that are used to calculate the number of starts in cold and hot start modes. EPA requires that the number of starts occurring per vehicle be determined from instrumented vehicle counts. Since such local data is not available, the MOBILE6 national defaults are used for the Baltimore region analyses. A vehicle will generate more emissions when it is first operated (cold start). It generates emissions at a different rate when it is stopped and then started again within a short period of time (hot start). Soak distributions are used to determine the time between when an engine is turned off to the next time it is restarted.

Vehicle Descriptions. Vehicle age distributions are input to MOBILE representing the distribution for the MOBILE6 16-vehicle types in the Baltimore region. This data is based on registered vehicles from the Maryland Motor Vehicle Administration's vehicle registration database reflecting July 1 summer conditions. As in previous SIP submissions, 1990 information is used in the development of the data input for the 1990 analysis year for non-trucks. Updated 2002 age data has been prepared and used for the forecast 2005 analysis year.

Vehicle Type Mix is calculated from algorithms using a combination of BMC travel demand model truck assignments, collected 1999-2002 State Highway Administration vehicle class counts, and MOBILE6 default percentages. (See also the discussion of Vehicle Type Pattern Data in the next section.) Speeds are discussed extensively in the next section.

Significant changes have occurred in the MOBILE6 model as compared to previous releases. Some of the information previously applied by post processor routines can now be input directly to the MOBILE6 model run. This includes information on the hourly distribution of VMT and the hourly speeds that occur during the day. Another important change in MOBILE6 is the influence of facility type on output emission factors. For example, MOBILE6 assumes that an average speed on a freeway results in a different emission factor than the same speed on an arterial roadway. Thus MOBILE6 is indirectly accounting for the accelerations and decelerations that typically occur on such roadways. MOBILE6 has four distinct facility types: Freeway, Arterial, Local, and Ramp. For any emission run, the input functional classes analyzed must be mapped to the above facility types. The following mapping scheme is used for the Baltimore runs:

BMC Model Facility Types	***MOBILE6 Facility Type***
1,2 (Interstate/Freeways)	Freeway
3,4 (Major/Minor Arterial)	Arterial
5,11 (Collector/Locals)	Local
6-10 (Ramps)	Ramp

Since ramps are directly represented within the travel demand model, they are mapped directly to the MOBILE6 Ramp category. Since the travel model does not contain all collector and local roadways, the volumes carried by such roadways may not represent the actual travel conditions. As a result, these facilities are mapped to the MOBILE6 Local category, which has a set speed used for all hours of the day. The above assumptions are consistent with the recommendations provided in EPA's Technical Guidance on the Use of MOBILE6 for Emissions Inventory Preparation.

Fuel Parameters. The same vehicle will produce different emissions using a different type of gasoline. Fuel control strategies can be powerful emission reduction mechanisms. An important variable in fuels for VOC emissions is its evaporability, measured by Reid Vapor Pressure.

MOBILE allows the user to choose among conventional, federal reformulated (used in the Baltimore region), oxygenated and low Reid Vapor Pressure (RVP) gasoline. Baltimore chooses the MOBILE inputs appropriate to the year and control strategy for the area being modeled. For 2005 Baltimore region uses Southern region summertime reformulated gasoline, and for 1990 conventional gasoline with an RVP of 8.2.

MOBILE also allows users to calculate refueling emissions - the emissions created when vehicles are refueled at service stations. Baltimore includes refueling emissions in its area source inventory and not in its highway vehicle inventory.

Vehicle Emission Inspection/Maintenance (I/M) Parameters. MOBILE allows users to vary inputs depending on the I/M program in place for the particular analysis year. For the Baltimore Region, the following tables describe the I/M program and anti-tampering program in place for the 1990 and 2005 analysis years.

Table 2 Baltimore Region I/M Program Parameters

Program Parameters	1990	2005						
Program Name	Idle Test	Idle older LDGV, LDGT	Idle HDGT	IM240	OBD	Gas Cap for older LDGV, LDGT	Gas Cap for HDGT	Gas Cap for OBD Vehicles
Test Type	Test Only	Test Only	Test Only	Test Only	Test Only	Test Only	Test Only	Test Only
I/M Program Start Year	1984	1984	1984	1984	2003	2003	2003	2003
Test Frequency	Biennial	Biennial	Biennial	Biennial	Biennial	Biennial	Biennial	Biennial
Program Type	Idle	Idle	Idle	IM240	OBD I/M	GC	GC	EVAP OBD & GC
Model Years	77-50	77-83	77-83	84-95	96-50	77-95	77-50	96-50
Stringency Rate (%)	23	20	20	20	20	N/A	N/A	N/A
Compliance Rate (%)	96	96	96	96	96	96	96	96
Waiver Rate (%)	21 / 23	3	3	3	3	3	3	3
Grace Period	0	2	2	2	2	2	2	2
Vehicle Types								
LDGV	Yes	Yes	No	Yes	Yes	Yes	No	Yes
LDGT1	Yes	Yes	No	Yes	Yes	Yes	No	Yes
LDGT2	Yes	Yes	No	Yes	Yes	Yes	No	Yes
LDGT3	Yes	Yes	No	Yes	Yes	Yes	No	Yes
LDGT4	Yes	Yes	No	Yes	Yes	Yes	No	Yes
HDGV2B	Yes	No	Yes	No	No	No	Yes	No
HDGV3	Yes	No	Yes	No	No	No	Yes	No
HDGV4	Yes	No	Yes	No	No	No	Yes	No
HDGV5	Yes	No	Yes	No	No	No	Yes	No
HDGV6	Yes	No	Yes	No	No	No	Yes	No
HDGV7	No	No	No	No	No	No	No	No
HDGV8A	No	No	No	No	No	No	No	No
HDGV8B	No	No	No	No	No	No	No	No
GAS BUS	No	No	No	No	No	No	No	No

Table 3 Baltimore Region Anti-tampering Program Parameters

Program Element	**Baltimore Region**	
Analysis Year	**1990**	**2005**
Program Start Year	1989	1989
First Model Year	1977	1977
Last Model Year	2050	2050
LDGV	Yes	Yes
LDGT1	Yes	Yes
LDGT2	Yes	Yes
LDGT3	Yes	Yes
LDGT4	Yes	Yes
HDGV2B	Yes	Yes
HDGV3	Yes	No
HDGV4	Yes	No
HDGV5	Yes	No
HDGV6	Yes	No
HDGV7	No	No
HDGV8A	No	No
HDGV8B	No	No
GAS BUS	No	No
Program Type	Test Only	Test Only
Inspection Frequency	Biennial	Biennial
Compliance Rate (%)	96	96
Inspections Performed		
Air pump system disablement	No	No
Catalyst removal	Yes	Yes
Fuel inlet restrictor disablement	Yes	Yes
Tailpipe lead deposit test	No	No
EGR disablement	No	No
Evaporative system disablement	No	No
PCV system disablement	No	No
Missing gas cap	No	Yes

Weather Data. Minimum and maximum daily temperatures were developed following USEPA guidance using information collected from the National Weather's Service BWI monitoring station. The 1990 temperatures used are the same that were used and documented in the official 1990 inventory for the Baltimore area. The 2005 temperatures are those used and documented in the 1999 inventory for the Baltimore area.

Emission and Speed Relationships

Of all the user-supplied input parameters, perhaps the most important is vehicle speed (except for local and ramp roadway types where a constant MOBILE6 speed is assumed).

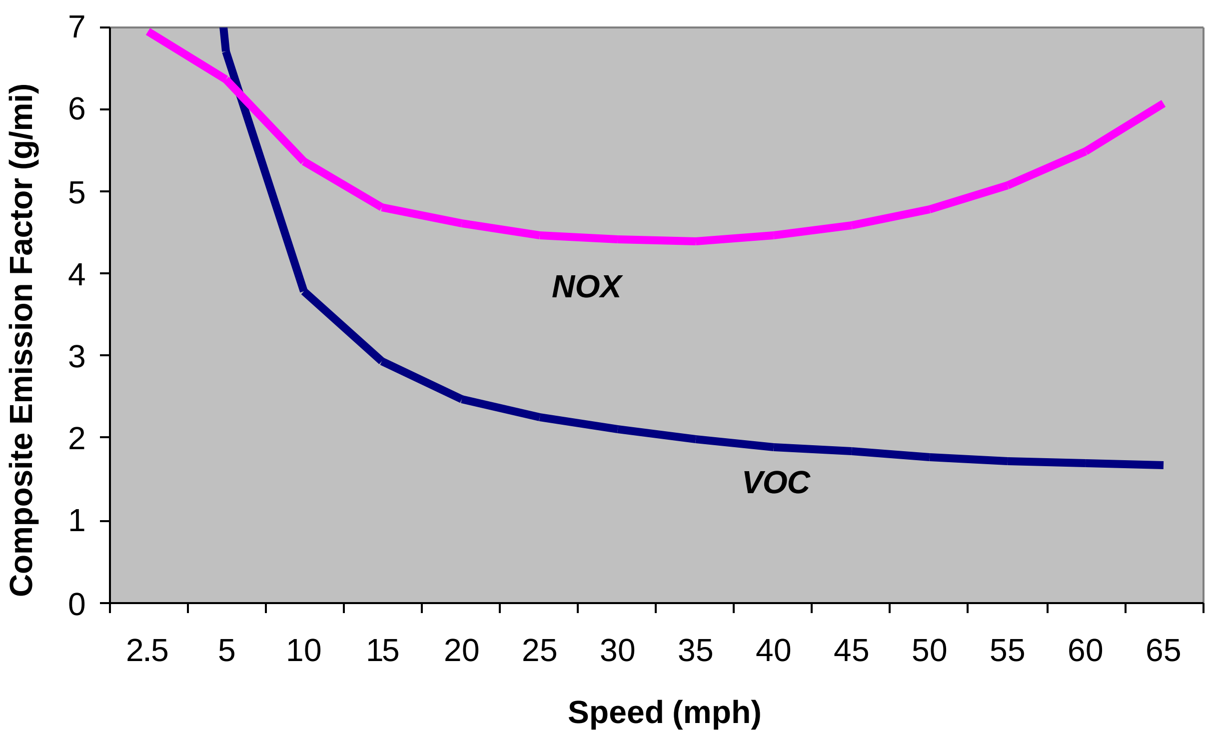
To obtain the best estimate of vehicle speeds, Baltimore uses the PPSUITE set of programs, whose primary function is to calculate speeds and to organize and simplify the handling of large amounts of data needed for calculating speeds and for preparing MOBILE input files. MOBILE6 uses hourly speeds that are grouped into 14 speed bins. The shares are calculated from accumulating hourly link VMT for speeds estimated using an update to the BPR curve. Two separate equations, one for interstates/freeways and non- interstates/freeways are used. The equations are as follows:

$$traveltime = speed * \left[1 + 0.2 * \left(\frac{v}{c}\right)^{10}\right]$$ for interstates/freeways

$$traveltime = speed * \left[1 + 0.05 * \left(\frac{v}{c}\right)^{10}\right]$$ for non-interstates/freeways

Emissions of both VOC and NO_x vary significantly with speed, but the relationships are not linear, as shown in Exhibit 3. While VOCs generally decrease as speed increases, NO_x decreases only at the low speed range and increases steeply at higher speeds.

Exhibit 3 MOBILE6 VOC and NO_x Speed vs. Emissions



Roadway Data

The roadway data input to the emissions calculations for the Baltimore ozone non-attainment region is based on the Baltimore Metropolitan Council's (BMC's) latest travel demand model upgrade. The new model utilizes the TP+ software platform and incorporates the following:

- ? Produces volumes by 5 time periods.
- ? Calibrated/validated to year 2000 traffic count data. The travel model is validated to 2000, but was calibrated on 1993 HTS and 1996 transit survey. Truck model was calibrated with 2000 data.
- ? Contains a truck model calibrated to State Highway Administration (SHA) 2002 vehicle class counts.
- ? Utilizes BMC's latest land use assumptions and forecasts (Round6).
- ? Contains mode choice and transit components to represent the impacts of the region's bus and rail networks.

The travel model contains all state highways and arterials, most of the major collectors, and some minor collector and local roadways divided into links of varying lengths. Each of these link segments contains descriptive data that is used in the calculation of the congested speeds input to the MOBILE emissions model. The PPSUITE post processor calculates the congested speeds based on the following model network fields:

- ? Number of Lanes
- ? Distances
- ? Daily, AM/PM Peak Period Volumes
- ? Daily, AM/PM Peak Period Truck Volumes
- ? Facility Type
- ? Area Type (Urban/Rural)
- ? Link capacity which includes impact of signals and other intersection controls
- ? Link free-flow speeds
- ? Zones to relate each link to the county in which it belongs

The model 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 July weekday. Lane and capacity values are an important input for determining the congestion and speeds for individual highway segments. Truck volumes are used in the speed determination process and are used to split volumes to the individual vehicle types used by the MOBILE software.

The travel demand model classifies its road segments by function, in addition to whether it is located in an urban or rural area, as indicated below in Exhibit 4. The facility types are important indicators of the type and function of each roadway segment. The variables provide insights into other characteristics not contained in the model network fields that are used for speed and emission calculations. In addition, VMT and emission quantities are aggregated and reported using both facility types and urban/rural codes.

Exhibit 4 Baltimore Model Classification Scheme: Urban/Rural and Facility Type Codes

Urban/Rural Code 1 = Urban

	2 = Rural	
Facility Type Class	1 = Interstate	7 = Ramp 2
	2 = Freeway	8 = Ramp 3
	3 = Primary Arterial	9 = Ramp 4
	4 = Minor Arterial	10 = Ramp5
	5 = Collector	11 = Local
	6 = Ramp 1	

Additions and Adjustments to Roadway Data

Before the travel model data can be used by PPSUITE for speed and emission calculations, several adjustments and additions must be made to the roadway data.

HPMS Adjustments. According to EPA guidance, baseline inventory VMT computed from the travel demand model must be adjusted to be consistent with Highway Performance Monitoring System (HPMS) VMT totals. Although it has some limitations, the HPMS system is currently in use in all 50 states and is being improved under FHWA direction.

A transportation model must be validated against real world observations to be an accurate predictor of total area VMT. Since the USEPA has designated HPMS as the "official" VMT estimation methodology for air quality purposes, the Baltimore regional travel model outputs were compared to 1990 and 2000 HPMS totals.

Adjustment factors are calculated which adjust the 1990 Model VMT to be consistent with 1990 HPMS totals. In addition, the travel model is also run for the 2000 analysis year and compared to 2000 HPMS reported VMT totals. 2000 HPMS adjustments are calculated as factors and are carried forward to the 2005 analysis year run. These factors are developed for each county, urban/rural code, and facility group combination. "Lower" classes (e.g. local roads) require greater adjustment since a large part of the local system is not contained within the travel demand model. Local roadways require no adjustments since they are not in the travel model. HPMS data is used to estimate the amount of local VMT, which is added to the travel model database.

Seasonal Adjustments to Volumes. The Baltimore travel demand model produces volumes that represent an average weekday. An ozone emission analysis, however, is based on a typical July weekday. Therefore, those volumes must be seasonally adjusted. A seasonal factor of 1.04 was developed from SHA count data and is applied to all link volumes in the network before the calculation of speeds for 2005. The 1990 factor was estimated at 1.05.

24-hour Pattern Data. Speeds and emissions vary considerably depending on the time of day (because of temperature) and congestion. 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 was developed from SHA 24-hour count data between 1999 and 2002.

Vehicle Type Pattern Data. Basic emission rates may differ by vehicle type. These types are listed below in Exhibit 5.

Exhibit 5 MOBILE6 Input Composite Vehicle Classes

1.	LDV	- Light-Duty Vehicles (Passenger Cars)
2.	LDT1	- Light-Duty Trucks 1 (<6,000 lbs)
3.	LDT2	- Light-Duty Trucks 2 (<6,000 lbs, LVW=3,751-5,750)
4.	LDT3	- Light-Duty Trucks 3 (6,001-8,500 lbs)
5.	LDT4	- Light-Duty Trucks 4 (6,001-8,500 lbs, LVW>5,751)
6.	HDV2B	- Class 2b Heavy Duty Vehicles
7.	HDV3	- Class 3 Heavy Duty Vehicles
8.	HDV4	- Class 4 Heavy Duty Vehicles
9.	HDV5	- Class 5 Heavy Duty Vehicles
10.	HDV6	- Class 6 Heavy Duty Vehicles
11.	HDV7	- Class 7 Heavy Duty Vehicles
12.	HDV8A	- Class 8a Heavy Duty Vehicles
13.	HDV8B	- Class 8b Heavy Duty Vehicles
14.	HDBS	- School Buses
15.	HDBT	- Transit and Urban Buses
16.	MC	- Motorcycles

MOBILE summary reports by vehicle type are also useful in knowing what kinds of vehicles generate emissions. The vehicle type pattern data is supplied to MOBILE for each run (county, urban/rural combination) and scenario (facility type) within the MOBILE6 input file. The data is generated by PPSUITE based on the following sources:

? Vehicle Mix Patterns for light-duty vehicles, heavy-duty vehicles, buses, and motorcycles based on SHA vehicle class counts taken between 1999 and 2002.
? Baltimore travel demand truck model results for 2005
? MOBILE6 default vehicle type breakdowns for the analysis year
? MDTA Statement of Annual Traffic Volume and Toll Income and Resulting Percentages 1990 through 2000 data.

The vehicle type pattern percentages are developed for each county and functional class combination and are input to MOBILE using the VMT FRACTIONS keyword. First, the travel model truck volumes are used to divide individual link volumes to auto and truck categories. PPSUITE uses the input vehicle mix pattern data based on SHA counts to calculate the number of motorcycles and buses within each of those categories. Finally, MOBILE6 defaults, specific to the analysis year being run, are used to divide the 4 vehicle groupings into the 16 MOBILE6 vehicle types. PPSUITE then aggregates this link specific information to the area, facility scenario groupings input to the MOBILE model. Note that the MOBILE6 defaults used vary by analysis year; as a result, each forecast year utilizes a unique vehicle mix distribution. The VMT mixes used for 1990 and 2005 are provided in Tables 4 and 5.

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 must be accounted for in the model. Capacity is adjusted based on the factors provided in this data. Values are developed from information in the 2000 Highway Capacity Manual and are specific to the various facility types.

Table 4 2005 Vehicle Mix Inputs to MOBILE6

Run Area	Facility Scenario	LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC
		MOBILE6 VEHICLE TYPES															
Baltimore City (Urban)	Interstate	41.98%	7.69%	25.57%	7.88%	3.63%	4.03%	0.40%	0.32%	0.24%	0.89%	1.06%	1.15%	4.11%	0.60%	0.27%	0.19%
	Freeway	43.51%	7.96%	26.50%	8.16%	3.76%	3.05%	0.30%	0.24%	0.18%	0.68%	0.81%	0.88%	3.12%	0.46%	0.20%	0.19%
	Principal Arterial	44.57%	8.16%	27.15%	8.36%	3.85%	2.27%	0.22%	0.18%	0.14%	0.51%	0.60%	0.65%	2.32%	0.59%	0.27%	0.16%
	Minor Arterial	44.49%	8.14%	27.10%	8.35%	3.84%	2.25%	0.22%	0.18%	0.13%	0.50%	0.59%	0.64%	2.30%	0.70%	0.31%	0.25%
	Collector	44.34%	8.12%	27.01%	8.32%	3.83%	2.35%	0.23%	0.19%	0.14%	0.52%	0.62%	0.67%	2.40%	0.67%	0.30%	0.29%
	Ramp 1	43.30%	7.93%	26.37%	8.12%	3.74%	3.19%	0.31%	0.25%	0.19%	0.71%	0.84%	0.91%	3.25%	0.47%	0.21%	0.20%
	Ramp 2	43.11%	7.89%	26.26%	8.09%	3.72%	3.31%	0.32%	0.26%	0.20%	0.73%	0.87%	0.95%	3.38%	0.47%	0.21%	0.22%
	Ramp 3	41.71%	7.64%	25.40%	7.82%	3.60%	4.20%	0.41%	0.34%	0.25%	0.93%	1.11%	1.20%	4.29%	0.61%	0.27%	0.21%
	Ramp 4	42.48%	7.77%	25.85%	7.96%	3.66%	3.74%	0.37%	0.29%	0.21%	0.83%	0.99%	1.07%	3.82%	0.48%	0.21%	0.27%
	Ramp 5	42.98%	7.86%	26.19%	8.07%	3.69%	3.21%	0.32%	0.27%	0.21%	0.69%	0.86%	0.91%	3.31%	0.80%	0.37%	0.27%
	Local	46.36%	8.49%	28.24%	8.70%	4.00%	1.02%	0.10%	0.08%	0.06%	0.23%	0.27%	0.29%	1.04%	0.56%	0.25%	0.31%
Anne Arundel County (Urban)	Interstate	42.35%	7.75%	25.80%	7.95%	3.66%	3.79%	0.37%	0.30%	0.23%	0.84%	1.00%	1.09%	3.87%	0.57%	0.26%	0.19%
	Freeway	44.73%	8.19%	27.25%	8.39%	3.86%	2.27%	0.22%	0.18%	0.14%	0.50%	0.60%	0.65%	2.32%	0.34%	0.15%	0.20%
	Principal Arterial	44.80%	8.20%	27.29%	8.40%	3.87%	2.13%	0.21%	0.17%	0.13%	0.47%	0.56%	0.61%	2.18%	0.56%	0.25%	0.15%
	Minor Arterial	45.40%	8.31%	27.65%	8.52%	3.92%	1.70%	0.17%	0.14%	0.10%	0.38%	0.45%	0.49%	1.73%	0.55%	0.25%	0.26%
	Collector	45.77%	8.38%	27.88%	8.59%	3.95%	1.47%	0.14%	0.12%	0.09%	0.33%	0.39%	0.42%	1.51%	0.44%	0.20%	0.33%
	Ramp 1	42.91%	7.85%	26.13%	8.05%	3.71%	3.44%	0.34%	0.28%	0.20%	0.76%	0.91%	0.99%	3.51%	0.50%	0.22%	0.20%
	Ramp 2	44.61%	8.17%	27.17%	8.37%	3.85%	2.35%	0.23%	0.19%	0.14%	0.52%	0.62%	0.67%	2.40%	0.32%	0.15%	0.24%
	Ramp 3	44.57%	8.16%	27.15%	8.36%	3.85%	2.38%	0.23%	0.19%	0.14%	0.53%	0.63%	0.68%	2.43%	0.32%	0.15%	0.24%
	Ramp 4	45.94%	8.41%	27.99%	8.62%	3.97%	1.50%	0.15%	0.12%	0.09%	0.33%	0.39%	0.43%	1.53%	0.20%	0.09%	0.24%
	Ramp 5	45.31%	8.29%	27.59%	8.50%	3.91%	1.83%	0.18%	0.15%	0.11%	0.41%	0.48%	0.52%	1.87%	0.45%	0.20%	0.18%
	Local	46.36%	8.49%	28.24%	8.70%	4.00%	1.02%	0.10%	0.08%	0.06%	0.23%	0.27%	0.29%	1.04%	0.56%	0.25%	0.31%
Anne Arundel County (Rural)	Interstate	41.93%	7.67%	25.54%	7.87%	3.62%	4.11%	0.40%	0.33%	0.24%	0.91%	1.08%	1.18%	4.20%	0.50%	0.23%	0.18%
	Principal Arterial	43.02%	7.88%	26.20%	8.07%	3.72%	3.42%	0.34%	0.27%	0.20%	0.76%	0.90%	0.98%	3.49%	0.39%	0.18%	0.16%
	Minor Arterial	43.06%	7.88%	26.23%	8.08%	3.72%	2.91%	0.29%	0.23%	0.17%	0.65%	0.77%	0.84%	2.97%	0.97%	0.44%	0.80%
	Collector	44.97%	8.23%	27.39%	8.44%	3.88%	2.11%	0.21%	0.17%	0.13%	0.47%	0.56%	0.60%	2.15%	0.29%	0.13%	0.28%
	Ramp 1	43.52%	7.97%	26.51%	8.17%	3.76%	3.11%	0.30%	0.25%	0.19%	0.69%	0.82%	0.89%	3.17%	0.32%	0.15%	0.20%
	Ramp 2	43.61%	7.98%	26.56%	8.18%	3.77%	3.03%	0.30%	0.24%	0.18%	0.67%	0.80%	0.87%	3.10%	0.35%	0.16%	0.19%

		MOBILE6 VEHICLE TYPES															
Run Area	**Facility Scenario**	**LDV**	**LDT1**	**LDT2**	**LDT3**	**LDT4**	**HDV2B**	**HDV3**	**HDV4**	**HDV5**	**HDV6**	**HDV7**	**HDV8A**	**HDV8B**	**HDBS**	**HDBT**	**MC**
	Ramp 4	41.81%	7.67%	25.36%	7.78%	3.62%	4.26%	0.43%	0.32%	0.21%	0.96%	1.17%	1.17%	4.37%	0.43%	0.21%	0.21%
	Ramp 5	45.28%	8.28%	27.56%	8.50%	3.92%	1.96%	0.19%	0.16%	0.13%	0.44%	0.51%	0.57%	2.02%	0.19%	0.09%	0.19%
	Local	46.21%	8.46%	28.14%	8.67%	3.99%	1.09%	0.11%	0.09%	0.06%	0.24%	0.29%	0.31%	1.11%	0.41%	0.18%	0.63%
Baltimore County (Urban)	Interstate	42.63%	7.80%	25.96%	8.00%	3.68%	3.61%	0.35%	0.29%	0.21%	0.80%	0.95%	1.04%	3.69%	0.54%	0.24%	0.19%
	Freeway	44.16%	8.08%	26.90%	8.28%	3.81%	2.64%	0.26%	0.21%	0.16%	0.59%	0.70%	0.76%	2.70%	0.39%	0.18%	0.20%
	Principal Arterial	45.29%	8.29%	27.59%	8.50%	3.91%	1.84%	0.18%	0.15%	0.11%	0.41%	0.48%	0.53%	1.88%	0.48%	0.22%	0.16%
	Minor Arterial	45.72%	8.37%	27.85%	8.58%	3.95%	1.50%	0.15%	0.12%	0.09%	0.33%	0.40%	0.43%	1.54%	0.49%	0.22%	0.27%
	Collector	45.50%	8.33%	27.71%	8.54%	3.93%	1.63%	0.16%	0.13%	0.10%	0.36%	0.43%	0.47%	1.66%	0.48%	0.22%	0.35%
	Ramp 1	43.24%	7.92%	26.34%	8.11%	3.73%	3.22%	0.32%	0.26%	0.19%	0.72%	0.85%	0.92%	3.29%	0.47%	0.21%	0.21%
	Ramp 2	43.79%	8.02%	26.67%	8.21%	3.78%	2.88%	0.28%	0.23%	0.17%	0.64%	0.76%	0.82%	2.93%	0.40%	0.18%	0.23%
	Ramp 3	45.27%	8.29%	27.57%	8.49%	3.91%	1.94%	0.19%	0.15%	0.11%	0.43%	0.51%	0.56%	1.98%	0.25%	0.11%	0.24%
	Ramp 4	44.38%	8.12%	27.03%	8.32%	3.83%	2.50%	0.24%	0.20%	0.15%	0.56%	0.66%	0.72%	2.55%	0.34%	0.15%	0.24%
	Ramp 5	43.40%	7.95%	26.45%	8.14%	3.75%	2.98%	0.30%	0.25%	0.18%	0.67%	0.79%	0.86%	3.05%	0.72%	0.32%	0.19%
	Local	46.36%	8.49%	28.24%	8.70%	4.00%	1.02%	0.10%	0.08%	0.06%	0.23%	0.27%	0.29%	1.04%	0.56%	0.25%	0.30%
Baltimore County (Rural)	Interstate	42.30%	7.74%	25.76%	7.94%	3.65%	3.89%	0.38%	0.31%	0.23%	0.86%	1.02%	1.11%	3.97%	0.44%	0.20%	0.19%
	Principal Arterial	43.26%	7.92%	26.35%	8.12%	3.74%	3.27%	0.32%	0.26%	0.19%	0.73%	0.86%	0.94%	3.34%	0.37%	0.17%	0.17%
	Minor Arterial	43.85%	8.03%	26.71%	8.23%	3.79%	2.45%	0.24%	0.20%	0.15%	0.54%	0.65%	0.70%	2.50%	0.81%	0.36%	0.81%
	Collector	44.49%	8.14%	27.10%	8.35%	3.84%	2.40%	0.24%	0.19%	0.14%	0.53%	0.63%	0.69%	2.45%	0.32%	0.15%	0.33%
	Ramp 1	42.26%	7.74%	25.75%	7.93%	3.65%	3.89%	0.38%	0.31%	0.23%	0.87%	1.03%	1.12%	3.98%	0.47%	0.21%	0.18%
	Ramp 2	42.80%	7.83%	26.06%	8.03%	3.70%	3.56%	0.34%	0.28%	0.22%	0.80%	0.94%	1.02%	3.64%	0.34%	0.16%	0.28%
	Ramp 3	43.87%	8.02%	26.71%	8.22%	3.79%	2.88%	0.28%	0.23%	0.17%	0.64%	0.76%	0.83%	2.94%	0.25%	0.11%	0.30%
	Local	46.21%	8.46%	28.15%	8.67%	3.99%	1.09%	0.11%	0.09%	0.06%	0.24%	0.29%	0.31%	1.12%	0.40%	0.18%	0.63%
Carroll County (Urban)	Principal Arterial	43.90%	8.04%	26.74%	8.24%	3.79%	2.68%	0.26%	0.21%	0.16%	0.60%	0.71%	0.77%	2.74%	0.70%	0.31%	0.15%
	Minor Arterial	44.60%	8.16%	27.16%	8.37%	3.85%	2.17%	0.21%	0.17%	0.13%	0.48%	0.57%	0.62%	2.21%	0.71%	0.32%	0.25%
	Collector	44.60%	8.16%	27.17%	8.37%	3.85%	2.16%	0.21%	0.17%	0.13%	0.48%	0.57%	0.62%	2.21%	0.63%	0.28%	0.38%
	Ramp 2	44.40%	8.13%	26.90%	8.25%	3.83%	2.63%	0.24%	0.24%	0.12%	0.60%	0.72%	0.72%	2.63%	0.36%	0.12%	0.12%
	Ramp 5	43.12%	7.89%	26.27%	8.09%	3.73%	3.15%	0.32%	0.25%	0.19%	0.70%	0.84%	0.91%	3.22%	0.80%	0.36%	0.18%
	Local	46.36%	8.48%	28.24%	8.70%	4.00%	1.04%	0.10%	0.08%	0.06%	0.23%	0.28%	0.30%	1.06%	0.52%	0.23%	0.32%

Run Area	Facility Scenario	MOBILE6 VEHICLE TYPES															
		LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC
Carroll County (Rural)	Interstate	38.64%	7.07%	23.53%	7.25%	3.34%	6.22%	0.61%	0.50%	0.37%	1.38%	1.64%	1.79%	6.35%	0.78%	0.35%	0.17%
	Principal Arterial	41.52%	7.60%	25.29%	7.79%	3.59%	4.39%	0.43%	0.35%	0.26%	0.98%	1.16%	1.26%	4.49%	0.49%	0.22%	0.17%
	Minor Arterial	43.54%	7.97%	26.52%	8.17%	3.76%	2.63%	0.26%	0.21%	0.16%	0.58%	0.69%	0.75%	2.68%	0.88%	0.40%	0.81%
	Collector	43.95%	8.05%	26.77%	8.25%	3.80%	2.75%	0.27%	0.22%	0.16%	0.61%	0.72%	0.79%	2.80%	0.32%	0.14%	0.40%
	Ramp 2	43.12%	7.89%	26.24%	8.07%	3.72%	3.37%	0.33%	0.27%	0.21%	0.74%	0.89%	0.95%	3.42%	0.36%	0.15%	0.27%
	Ramp 5	44.74%	8.32%	27.33%	8.32%	3.86%	2.08%	0.30%	0.30%	0.00%	0.59%	0.59%	0.59%	2.08%	0.00%	0.00%	0.89%
	Local	46.21%	8.46%	28.14%	8.67%	3.99%	1.09%	0.11%	0.09%	0.06%	0.24%	0.29%	0.31%	1.11%	0.41%	0.19%	0.64%
Harford County (Urban)	Interstate	40.79%	7.47%	24.85%	7.65%	3.52%	4.78%	0.47%	0.38%	0.28%	1.06%	1.26%	1.37%	4.88%	0.72%	0.32%	0.19%
	Freeway	44.42%	8.13%	27.06%	8.33%	3.84%	2.48%	0.24%	0.20%	0.15%	0.55%	0.65%	0.71%	2.53%	0.36%	0.16%	0.20%
	Principal Arterial	43.82%	8.02%	26.69%	8.22%	3.78%	2.73%	0.27%	0.22%	0.16%	0.61%	0.72%	0.78%	2.79%	0.71%	0.32%	0.16%
	Minor Arterial	44.40%	8.13%	27.04%	8.33%	3.83%	2.28%	0.22%	0.18%	0.14%	0.51%	0.60%	0.65%	2.33%	0.75%	0.34%	0.26%
	Collector	45.15%	8.27%	27.50%	8.47%	3.90%	1.83%	0.18%	0.15%	0.11%	0.41%	0.48%	0.53%	1.87%	0.55%	0.25%	0.35%
	Ramp 2	43.26%	7.92%	26.35%	8.11%	3.74%	3.21%	0.32%	0.26%	0.19%	0.71%	0.85%	0.92%	3.28%	0.48%	0.21%	0.20%
	Ramp 3	42.57%	7.74%	25.97%	7.98%	3.69%	3.69%	0.36%	0.24%	0.24%	0.83%	0.95%	1.07%	3.69%	0.48%	0.24%	0.24%
	Ramp 4	43.87%	8.04%	26.74%	8.24%	3.79%	2.79%	0.28%	0.23%	0.16%	0.63%	0.74%	0.81%	2.85%	0.31%	0.15%	0.36%
	Ramp 5	52.11%	7.98%	27.94%	7.98%	3.99%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Local	46.36%	8.49%	28.24%	8.70%	4.00%	1.02%	0.10%	0.08%	0.06%	0.23%	0.27%	0.29%	1.04%	0.56%	0.25%	0.32%
Harford County (Rural)	Interstate	40.75%	7.46%	24.82%	7.64%	3.52%	4.87%	0.48%	0.39%	0.29%	1.08%	1.28%	1.40%	4.97%	0.60%	0.27%	0.18%
	Principal Arterial	44.00%	8.05%	26.80%	8.25%	3.80%	2.79%	0.27%	0.22%	0.17%	0.62%	0.74%	0.80%	2.85%	0.30%	0.14%	0.19%
	Minor Arterial	43.15%	7.90%	26.28%	8.10%	3.73%	2.86%	0.28%	0.23%	0.17%	0.63%	0.75%	0.82%	2.92%	0.96%	0.43%	0.79%
	Collector	43.55%	7.97%	26.53%	8.17%	3.76%	3.00%	0.29%	0.24%	0.18%	0.67%	0.79%	0.86%	3.06%	0.42%	0.19%	0.33%
	Ramp 2	42.33%	7.76%	25.79%	7.94%	3.66%	3.84%	0.38%	0.31%	0.24%	0.86%	1.02%	1.11%	3.93%	0.46%	0.20%	0.16%
	Ramp 3	41.43%	7.59%	25.24%	7.77%	3.58%	4.44%	0.44%	0.36%	0.26%	0.98%	1.17%	1.27%	4.53%	0.51%	0.23%	0.20%
	Local	46.20%	8.46%	28.14%	8.67%	3.99%	1.09%	0.11%	0.09%	0.06%	0.24%	0.29%	0.31%	1.11%	0.41%	0.18%	0.65%
Howard County (Urban)	Interstate	40.10%	7.34%	24.42%	7.52%	3.46%	5.23%	0.51%	0.42%	0.31%	1.16%	1.38%	1.50%	5.34%	0.78%	0.35%	0.18%
	Freeway	44.64%	8.17%	27.19%	8.38%	3.86%	2.33%	0.23%	0.19%	0.14%	0.52%	0.61%	0.67%	2.38%	0.35%	0.16%	0.19%
	Principal Arterial	43.12%	7.89%	26.26%	8.09%	3.72%	3.15%	0.31%	0.25%	0.19%	0.70%	0.83%	0.90%	3.22%	0.84%	0.38%	0.15%

		MOBILE6 VEHICLE TYPES															
Run Area	**Facility Scenario**	**LDV**	**LDT1**	**LDT2**	**LDT3**	**LDT4**	**HDV2B**	**HDV3**	**HDV4**	**HDV5**	**HDV6**	**HDV7**	**HDV8A**	**HDV8B**	**HDBS**	**HDBT**	**MC**
	Minor Arterial	45.87%	8.40%	27.94%	8.61%	3.96%	1.41%	0.14%	0.11%	0.08%	0.31%	0.37%	0.41%	1.44%	0.47%	0.21%	0.26%
	Collector	45.46%	8.32%	27.69%	8.53%	3.93%	1.65%	0.16%	0.13%	0.10%	0.37%	0.44%	0.47%	1.69%	0.48%	0.22%	0.38%
	Ramp 1	44.10%	8.07%	26.86%	8.27%	3.81%	2.67%	0.26%	0.21%	0.16%	0.59%	0.70%	0.77%	2.73%	0.39%	0.17%	0.21%
	Ramp 2	44.41%	8.13%	27.05%	8.33%	3.84%	2.48%	0.24%	0.20%	0.15%	0.55%	0.65%	0.71%	2.53%	0.34%	0.15%	0.24%
	Ramp 3	45.19%	8.27%	27.53%	8.48%	3.90%	1.99%	0.19%	0.16%	0.12%	0.44%	0.52%	0.57%	2.03%	0.25%	0.12%	0.24%
	Ramp 4	44.27%	8.10%	26.97%	8.31%	3.83%	2.56%	0.25%	0.20%	0.15%	0.57%	0.68%	0.73%	2.61%	0.36%	0.16%	0.25%
	Ramp 5	45.68%	8.36%	27.83%	8.57%	3.94%	1.60%	0.16%	0.13%	0.09%	0.35%	0.42%	0.46%	1.64%	0.40%	0.18%	0.19%
	Local	46.36%	8.49%	28.24%	8.70%	4.00%	1.02%	0.10%	0.08%	0.06%	0.23%	0.27%	0.29%	1.04%	0.56%	0.25%	0.30%
Howard County (Rural)	Interstate	39.50%	7.23%	24.06%	7.41%	3.41%	5.67%	0.56%	0.45%	0.34%	1.26%	1.50%	1.63%	5.79%	0.71%	0.32%	0.17%
	Principal Arterial	44.06%	8.06%	26.83%	8.26%	3.80%	2.77%	0.27%	0.22%	0.16%	0.61%	0.73%	0.79%	2.82%	0.29%	0.13%	0.18%
	Minor Arterial	44.02%	8.06%	26.82%	8.26%	3.80%	2.34%	0.23%	0.19%	0.14%	0.52%	0.62%	0.67%	2.38%	0.79%	0.36%	0.81%
	Collector	44.98%	8.23%	27.40%	8.44%	3.88%	2.09%	0.21%	0.17%	0.12%	0.46%	0.55%	0.60%	2.13%	0.28%	0.13%	0.32%
	Ramp 1	44.27%	8.11%	26.97%	8.30%	3.83%	2.58%	0.25%	0.21%	0.15%	0.57%	0.68%	0.74%	2.63%	0.30%	0.13%	0.27%
	Ramp 2	44.64%	8.18%	27.20%	8.38%	3.86%	2.38%	0.23%	0.18%	0.14%	0.53%	0.62%	0.68%	2.42%	0.21%	0.08%	0.27%
	Ramp 3	44.16%	8.08%	26.90%	8.28%	3.82%	2.67%	0.27%	0.21%	0.16%	0.59%	0.70%	0.76%	2.72%	0.29%	0.13%	0.27%
	Ramp 4	44.12%	8.14%	27.01%	8.33%	3.89%	2.41%	0.19%	0.19%	0.19%	0.56%	0.74%	0.74%	2.59%	0.19%	0.00%	0.74%
	Local	46.22%	8.46%	28.15%	8.67%	3.99%	1.09%	0.11%	0.09%	0.06%	0.24%	0.29%	0.31%	1.11%	0.41%	0.19%	0.62%

Table 5 1990 Vehicle Mix Inputs to MOBILE6

Run Area	Facility Scenario	LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC
		MOBILE6 VEHICLE TYPES															
Baltimore City	Interstate	60.81%	4.07%	13.52%	5.48%	2.51%	4.19%	0.43%	0.25%	0.20%	0.81%	1.00%	1.19%	4.25%	0.77%	0.36%	0.17%
(Urban)	Freeway	63.10%	4.22%	14.03%	5.68%	2.61%	3.18%	0.33%	0.19%	0.15%	0.61%	0.76%	0.90%	3.22%	0.55%	0.26%	0.21%
	Principal Arterial	64.53%	4.32%	14.35%	5.81%	2.67%	2.44%	0.25%	0.15%	0.12%	0.47%	0.58%	0.69%	2.48%	0.70%	0.33%	0.11%
	Minor Arterial	64.79%	4.34%	14.40%	5.84%	2.68%	2.29%	0.23%	0.14%	0.11%	0.44%	0.54%	0.65%	2.33%	0.67%	0.32%	0.24%
	Collector	64.41%	4.31%	14.32%	5.80%	2.66%	2.48%	0.25%	0.15%	0.12%	0.48%	0.59%	0.70%	2.52%	0.64%	0.30%	0.25%
	Ramp 1	62.87%	4.21%	13.98%	5.66%	2.60%	3.26%	0.33%	0.20%	0.16%	0.63%	0.78%	0.92%	3.31%	0.61%	0.29%	0.19%
	Ramp 2	62.53%	4.18%	13.90%	5.63%	2.59%	3.41%	0.35%	0.20%	0.17%	0.66%	0.81%	0.97%	3.46%	0.60%	0.28%	0.25%
	Ramp 3	62.19%	4.16%	13.82%	5.60%	2.57%	3.57%	0.36%	0.21%	0.17%	0.69%	0.85%	1.01%	3.62%	0.62%	0.29%	0.25%
	Ramp 4	61.55%	4.15%	13.72%	5.53%	2.57%	3.80%	0.39%	0.25%	0.20%	0.74%	0.89%	1.09%	3.85%	0.49%	0.25%	0.54%
	Ramp 5	62.43%	4.16%	13.86%	5.68%	2.63%	3.33%	0.28%	0.14%	0.14%	0.69%	0.83%	0.97%	3.33%	0.83%	0.42%	0.28%
	Local	67.22%	4.50%	14.95%	6.05%	2.78%	1.16%	0.12%	0.07%	0.06%	0.22%	0.28%	0.33%	1.18%	0.55%	0.26%	0.27%
Anne Arundel County	Interstate	61.35%	4.10%	13.64%	5.53%	2.54%	3.95%	0.40%	0.24%	0.19%	0.76%	0.94%	1.12%	4.01%	0.72%	0.34%	0.17%
(Urban)	Freeway	63.79%	4.27%	14.18%	5.75%	2.64%	2.87%	0.29%	0.17%	0.14%	0.55%	0.68%	0.81%	2.91%	0.51%	0.24%	0.19%
	Principal Arterial	64.95%	4.35%	14.44%	5.85%	2.69%	2.26%	0.23%	0.14%	0.11%	0.44%	0.54%	0.64%	2.29%	0.66%	0.31%	0.11%
	Minor Arterial	65.69%	4.40%	14.61%	5.92%	2.72%	1.91%	0.20%	0.11%	0.09%	0.37%	0.45%	0.54%	1.94%	0.56%	0.27%	0.24%
	Collector	66.03%	4.42%	14.68%	5.95%	2.73%	1.77%	0.18%	0.11%	0.09%	0.34%	0.42%	0.50%	1.80%	0.46%	0.22%	0.31%
	Ramp 1	61.95%	4.15%	13.77%	5.58%	2.56%	3.67%	0.38%	0.22%	0.18%	0.71%	0.87%	1.04%	3.73%	0.69%	0.32%	0.18%
	Ramp 2	64.66%	4.33%	14.38%	5.82%	2.67%	2.48%	0.25%	0.15%	0.12%	0.48%	0.59%	0.70%	2.52%	0.44%	0.21%	0.21%
	Ramp 3	64.63%	4.33%	14.37%	5.82%	2.67%	2.48%	0.26%	0.15%	0.12%	0.48%	0.59%	0.70%	2.52%	0.44%	0.21%	0.23%
	Ramp 4	65.29%	4.37%	14.52%	5.88%	2.70%	2.19%	0.23%	0.13%	0.11%	0.42%	0.52%	0.62%	2.23%	0.27%	0.13%	0.38%
	Ramp 5	65.15%	4.36%	14.49%	5.87%	2.69%	2.18%	0.22%	0.13%	0.11%	0.42%	0.52%	0.62%	2.22%	0.55%	0.25%	0.23%
	Local	67.22%	4.50%	14.95%	6.05%	2.78%	1.16%	0.12%	0.07%	0.06%	0.22%	0.28%	0.33%	1.18%	0.55%	0.26%	0.27%
Anne Arundel County	Interstate	60.76%	4.07%	13.51%	5.47%	2.51%	4.31%	0.44%	0.26%	0.21%	0.83%	1.03%	1.22%	4.38%	0.58%	0.27%	0.14%
(Rural)	Principal Arterial	62.38%	4.17%	13.87%	5.62%	2.58%	3.54%	0.36%	0.21%	0.17%	0.68%	0.84%	1.00%	3.59%	0.58%	0.27%	0.13%
	Minor Arterial	62.53%	4.18%	13.90%	5.63%	2.59%	3.01%	0.31%	0.18%	0.15%	0.58%	0.72%	0.85%	3.06%	1.10%	0.52%	0.69%
	Collector	65.11%	4.36%	14.48%	5.86%	2.69%	2.21%	0.23%	0.13%	0.11%	0.43%	0.53%	0.63%	2.25%	0.47%	0.22%	0.30%
	Ramp 1	63.08%	4.22%	14.02%	5.68%	2.60%	3.27%	0.33%	0.20%	0.16%	0.63%	0.78%	0.92%	3.32%	0.41%	0.19%	0.19%
	Ramp 2	63.14%	4.23%	14.04%	5.69%	2.61%	3.25%	0.33%	0.19%	0.16%	0.63%	0.77%	0.92%	3.29%	0.40%	0.19%	0.17%
	Ramp 4	60.25%	4.05%	13.42%	5.44%	2.53%	4.43%	0.51%	0.25%	0.25%	0.89%	1.01%	1.27%	4.56%	0.63%	0.25%	0.25%
	Ramp 5	65.72%	4.40%	14.57%	5.89%	2.70%	2.08%	0.21%	0.12%	0.08%	0.42%	0.50%	0.58%	2.12%	0.29%	0.12%	0.21%

Run Area	Facility Scenario	MOBILE6 VEHICLE TYPES															
		LDV	LDT1	LDT2	LDT3	LDT4	HDV2B	HDV3	HDV4	HDV5	HDV6	HDV7	HDV8A	HDV8B	HDBS	HDBT	MC
	Local	67.02%	4.48%	14.90%	6.04%	2.77%	1.24%	0.13%	0.07%	0.06%	0.24%	0.29%	0.35%	1.25%	0.40%	0.19%	0.56%
Baltimore County (Urban)	Interstate	61.81%	4.14%	13.74%	5.57%	2.56%	3.75%	0.38%	0.23%	0.18%	0.72%	0.89%	1.06%	3.80%	0.68%	0.32%	0.17%
	Freeway	63.90%	4.28%	14.21%	5.76%	2.64%	2.83%	0.29%	0.17%	0.14%	0.54%	0.67%	0.80%	2.87%	0.49%	0.23%	0.20%
	Principal Arterial	65.56%	4.39%	14.58%	5.90%	2.71%	2.01%	0.21%	0.12%	0.10%	0.39%	0.48%	0.57%	2.04%	0.58%	0.27%	0.11%
	Minor Arterial	66.08%	4.42%	14.69%	5.95%	2.73%	1.74%	0.18%	0.11%	0.08%	0.34%	0.41%	0.49%	1.77%	0.50%	0.24%	0.26%
	Collector	66.13%	4.42%	14.70%	5.96%	2.73%	1.73%	0.18%	0.10%	0.08%	0.33%	0.41%	0.49%	1.76%	0.46%	0.22%	0.30%
	Ramp 1	62.68%	4.19%	13.94%	5.65%	2.59%	3.35%	0.34%	0.20%	0.16%	0.65%	0.80%	0.95%	3.40%	0.62%	0.29%	0.19%
	Ramp 2	63.44%	4.24%	14.10%	5.71%	2.62%	3.02%	0.31%	0.18%	0.15%	0.58%	0.72%	0.85%	3.06%	0.53%	0.25%	0.22%
	Ramp 3	65.52%	4.38%	14.57%	5.90%	2.71%	2.10%	0.22%	0.13%	0.10%	0.40%	0.50%	0.59%	2.13%	0.35%	0.17%	0.24%
	Ramp 4	64.22%	4.30%	14.28%	5.79%	2.65%	2.68%	0.28%	0.16%	0.13%	0.52%	0.63%	0.76%	2.72%	0.47%	0.22%	0.20%
	Ramp 5	61.30%	4.08%	13.61%	5.52%	2.51%	3.83%	0.38%	0.25%	0.19%	0.75%	0.88%	1.07%	3.83%	0.88%	0.44%	0.50%
	Local	67.22%	4.50%	14.95%	6.05%	2.78%	1.16%	0.12%	0.07%	0.06%	0.22%	0.28%	0.33%	1.18%	0.55%	0.26%	0.27%
Baltimore County (Rural)	Interstate	61.27%	4.10%	13.62%	5.52%	2.53%	4.09%	0.42%	0.25%	0.20%	0.79%	0.97%	1.16%	4.15%	0.53%	0.25%	0.16%
	Principal Arterial	62.82%	4.20%	13.97%	5.66%	2.60%	3.33%	0.34%	0.20%	0.16%	0.64%	0.79%	0.94%	3.38%	0.56%	0.26%	0.15%
	Minor Arterial	63.56%	4.25%	14.13%	5.72%	2.63%	2.59%	0.26%	0.16%	0.12%	0.50%	0.62%	0.73%	2.62%	0.95%	0.45%	0.70%
	Collector	64.44%	4.31%	14.33%	5.80%	2.66%	2.51%	0.26%	0.15%	0.12%	0.48%	0.60%	0.71%	2.54%	0.47%	0.22%	0.39%
	Ramp 1	61.28%	4.10%	13.62%	5.51%	2.53%	4.09%	0.42%	0.24%	0.20%	0.79%	0.98%	1.16%	4.15%	0.53%	0.25%	0.16%
	Ramp 2	61.74%	4.13%	13.74%	5.57%	2.56%	3.86%	0.40%	0.24%	0.18%	0.75%	0.91%	1.10%	3.91%	0.44%	0.20%	0.26%
	Ramp 3	63.70%	4.26%	14.17%	5.74%	2.64%	2.98%	0.31%	0.18%	0.15%	0.57%	0.71%	0.84%	3.03%	0.28%	0.14%	0.32%
	Local	67.06%	4.49%	14.91%	6.04%	2.77%	1.24%	0.13%	0.07%	0.06%	0.24%	0.29%	0.35%	1.26%	0.40%	0.19%	0.51%
Carroll County (Urban)	Principal Arterial	63.57%	4.25%	14.13%	5.73%	2.63%	2.84%	0.29%	0.17%	0.14%	0.55%	0.68%	0.80%	2.89%	0.82%	0.39%	0.13%
	Minor Arterial	64.52%	4.32%	14.34%	5.81%	2.67%	2.39%	0.24%	0.14%	0.12%	0.46%	0.57%	0.68%	2.43%	0.70%	0.33%	0.29%
	Collector	65.04%	4.35%	14.46%	5.86%	2.69%	2.18%	0.22%	0.13%	0.11%	0.42%	0.52%	0.62%	2.21%	0.43%	0.20%	0.57%
	Ramp 2	64.06%	4.24%	14.32%	5.84%	2.63%	2.78%	0.29%	0.15%	0.15%	0.58%	0.58%	0.73%	2.78%	0.58%	0.29%	0.00%
	Ramp 5	62.43%	4.17%	13.87%	5.63%	2.59%	3.33%	0.35%	0.20%	0.15%	0.63%	0.78%	0.94%	3.37%	0.96%	0.46%	0.15%
	Local	67.16%	4.49%	14.93%	6.05%	2.78%	1.18%	0.12%	0.07%	0.06%	0.23%	0.28%	0.34%	1.20%	0.51%	0.24%	0.36%
Carroll County (Rural)	Interstate	55.97%	3.75%	12.44%	5.04%	2.31%	6.49%	0.66%	0.39%	0.31%	1.25%	1.54%	1.84%	6.59%	0.88%	0.41%	0.13%
	Principal Arterial	60.25%	4.03%	13.40%	5.43%	2.49%	4.48%	0.46%	0.27%	0.22%	0.86%	1.07%	1.27%	4.55%	0.61%	0.29%	0.33%
	Minor Arterial	63.27%	4.23%	14.07%	5.70%	2.62%	2.70%	0.28%	0.16%	0.13%	0.52%	0.64%	0.77%	2.74%	1.00%	0.47%	0.69%
	Collector	63.69%	4.26%	14.16%	5.74%	2.63%	2.84%	0.29%	0.17%	0.14%	0.55%	0.67%	0.80%	2.88%	0.48%	0.23%	0.48%
	Ramp 2	62.62%	4.19%	13.96%	5.68%	2.59%	3.39%	0.40%	0.20%	0.20%	0.70%	0.80%	1.00%	3.49%	0.30%	0.10%	0.40%
	Ramp 5	66.22%	4.05%	14.19%	6.08%	2.70%	2.03%	0.00%	0.00%	0.00%	0.68%	0.68%	0.68%	2.03%	0.00%	0.00%	0.68%

		MOBILE6 VEHICLE TYPES															
Run Area	**Facility Scenario**	**LDV**	**LDT1**	**LDT2**	**LDT3**	**LDT4**	**HDV2B**	**HDV3**	**HDV4**	**HDV5**	**HDV6**	**HDV7**	**HDV8A**	**HDV8B**	**HDBS**	**HDBT**	**MC**
	Local	67.06%	4.49%	14.91%	6.04%	2.77%	1.23%	0.13%	0.07%	0.06%	0.24%	0.29%	0.35%	1.25%	0.41%	0.19%	0.51%
Harford County (Urban)	Interstate	59.10%	3.96%	13.14%	5.32%	2.44%	4.95%	0.51%	0.30%	0.24%	0.95%	1.18%	1.40%	5.02%	0.90%	0.43%	0.17%
	Freeway	65.00%	4.35%	14.45%	5.85%	2.69%	2.33%	0.24%	0.14%	0.11%	0.45%	0.56%	0.66%	2.37%	0.41%	0.19%	0.19%
	Principal Arterial	63.29%	4.24%	14.07%	5.70%	2.62%	2.96%	0.30%	0.18%	0.14%	0.57%	0.70%	0.84%	3.00%	0.87%	0.41%	0.11%
	Minor Arterial	64.42%	4.31%	14.32%	5.80%	2.66%	2.44%	0.25%	0.15%	0.12%	0.47%	0.58%	0.69%	2.48%	0.71%	0.34%	0.26%
	Collector	65.33%	4.37%	14.52%	5.88%	2.70%	2.07%	0.21%	0.12%	0.10%	0.40%	0.49%	0.59%	2.10%	0.54%	0.25%	0.31%
	Ramp 2	62.96%	4.21%	14.00%	5.67%	2.60%	3.22%	0.33%	0.19%	0.15%	0.62%	0.77%	0.91%	3.27%	0.59%	0.28%	0.21%
	Ramp 3	61.63%	4.18%	13.73%	5.52%	2.54%	3.73%	0.45%	0.30%	0.15%	0.75%	0.90%	1.05%	3.88%	0.60%	0.30%	0.30%
	Ramp 4	63.55%	4.26%	14.13%	5.73%	2.62%	2.96%	0.31%	0.18%	0.14%	0.57%	0.70%	0.84%	3.01%	0.49%	0.23%	0.27%
	Ramp 5	62.72%	4.66%	13.98%	4.66%	4.66%	4.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.66%	0.00%	0.00%	0.00%
	Local	67.19%	4.50%	14.94%	6.05%	2.78%	1.16%	0.12%	0.07%	0.06%	0.22%	0.28%	0.33%	1.18%	0.56%	0.26%	0.32%
Harford County (Rural)	Interstate	59.10%	3.95%	13.14%	5.32%	2.44%	5.06%	0.52%	0.31%	0.24%	0.98%	1.20%	1.43%	5.14%	0.68%	0.32%	0.14%
	Principal Arterial	63.81%	4.27%	14.19%	5.75%	2.64%	2.89%	0.30%	0.17%	0.14%	0.56%	0.69%	0.82%	2.93%	0.49%	0.23%	0.15%
	Minor Arterial	62.48%	4.18%	13.89%	5.63%	2.58%	3.03%	0.31%	0.18%	0.15%	0.58%	0.72%	0.86%	3.07%	1.11%	0.52%	0.71%
	Collector	63.06%	4.22%	14.02%	5.68%	2.61%	3.11%	0.32%	0.19%	0.15%	0.60%	0.74%	0.88%	3.15%	0.62%	0.29%	0.37%
	Ramp 2	61.34%	4.10%	13.63%	5.52%	2.54%	4.05%	0.42%	0.25%	0.20%	0.78%	0.96%	1.16%	4.12%	0.51%	0.25%	0.18%
	Ramp 3	60.11%	4.02%	13.36%	5.41%	2.49%	4.61%	0.47%	0.28%	0.22%	0.89%	1.10%	1.31%	4.68%	0.59%	0.28%	0.18%
	Local	67.05%	4.49%	14.91%	6.04%	2.77%	1.24%	0.13%	0.07%	0.06%	0.24%	0.29%	0.35%	1.25%	0.40%	0.19%	0.51%
Howard County (Urban)	Interstate	58.10%	3.89%	12.92%	5.23%	2.40%	5.39%	0.55%	0.33%	0.26%	1.04%	1.28%	1.53%	5.47%	0.98%	0.46%	0.16%
	Freeway	64.88%	4.34%	14.42%	5.84%	2.68%	2.39%	0.24%	0.14%	0.12%	0.46%	0.57%	0.68%	2.42%	0.42%	0.20%	0.19%
	Principal Arterial	63.27%	4.23%	14.07%	5.70%	2.62%	2.97%	0.30%	0.18%	0.14%	0.57%	0.71%	0.84%	3.01%	0.88%	0.41%	0.10%
	Minor Arterial	66.68%	4.46%	14.83%	6.01%	2.76%	1.49%	0.15%	0.09%	0.07%	0.29%	0.36%	0.42%	1.52%	0.44%	0.21%	0.23%
	Collector	65.90%	4.41%	14.65%	5.94%	2.72%	1.81%	0.19%	0.11%	0.09%	0.35%	0.43%	0.51%	1.83%	0.36%	0.17%	0.53%
	Ramp 1	63.95%	4.28%	14.22%	5.76%	2.64%	2.79%	0.28%	0.17%	0.13%	0.54%	0.67%	0.79%	2.84%	0.50%	0.24%	0.21%
	Ramp 2	64.18%	4.29%	14.27%	5.78%	2.65%	2.69%	0.28%	0.16%	0.13%	0.52%	0.64%	0.76%	2.73%	0.45%	0.21%	0.25%
	Ramp 3	64.91%	4.34%	14.43%	5.85%	2.68%	2.38%	0.24%	0.14%	0.11%	0.46%	0.56%	0.67%	2.41%	0.40%	0.19%	0.23%
	Ramp 4	63.87%	4.27%	14.19%	5.76%	2.65%	2.81%	0.30%	0.16%	0.14%	0.55%	0.66%	0.80%	2.86%	0.41%	0.18%	0.39%
	Ramp 5	66.24%	4.43%	14.75%	5.98%	2.75%	1.72%	0.17%	0.09%	0.09%	0.34%	0.39%	0.47%	1.72%	0.43%	0.22%	0.22%
	Local	67.20%	4.50%	14.94%	6.05%	2.78%	1.16%	0.12%	0.07%	0.06%	0.22%	0.28%	0.33%	1.18%	0.56%	0.26%	0.30%
Howard County (Rural)	Interstate	57.17%	3.83%	12.71%	5.15%	2.36%	5.94%	0.61%	0.36%	0.29%	1.15%	1.41%	1.68%	6.03%	0.81%	0.38%	0.14%
	Principal Arterial	63.85%	4.27%	14.20%	5.75%	2.64%	2.86%	0.29%	0.17%	0.14%	0.55%	0.68%	0.81%	2.90%	0.48%	0.22%	0.17%

Run Area	Facility Scenario	*MOBILE6 VEHICLE TYPES*															
		LDV	**LDT1**	**LDT2**	**LDT3**	**LDT4**	**HDV2B**	**HDV3**	**HDV4**	**HDV5**	**HDV6**	**HDV7**	**HDV8A**	**HDV8B**	**HDBS**	**HDBT**	**MC**
	Minor Arterial	63.45%	4.25%	14.11%	5.71%	2.62%	2.62%	0.27%	0.16%	0.13%	0.51%	0.62%	0.74%	2.66%	0.96%	0.45%	0.73%
	Collector	65.15%	4.36%	14.49%	5.87%	2.69%	2.18%	0.22%	0.13%	0.11%	0.42%	0.52%	0.62%	2.22%	0.40%	0.19%	0.42%
	Ramp 1	64.23%	4.31%	14.29%	5.79%	2.67%	2.71%	0.28%	0.16%	0.12%	0.52%	0.64%	0.76%	2.75%	0.36%	0.16%	0.26%
	Ramp 2	64.67%	4.31%	14.39%	5.81%	2.66%	2.59%	0.26%	0.15%	0.11%	0.49%	0.60%	0.75%	2.62%	0.22%	0.11%	0.26%
	Ramp 3	63.60%	4.26%	14.15%	5.74%	2.63%	3.03%	0.30%	0.18%	0.14%	0.59%	0.73%	0.85%	3.07%	0.32%	0.16%	0.24%
	Local	67.04%	4.49%	14.90%	6.04%	2.77%	1.24%	0.13%	0.07%	0.06%	0.24%	0.29%	0.35%	1.25%	0.40%	0.19%	0.55%

SPEED/EMISSION ESTIMATION PROCEDURE

The previous sections have summarized the input data used for computing speeds and emission rates for the Baltimore Non-Attainment region. This section explains how PPSUITE and MOBILE use that input data to produce emission estimates. Exhibit 6 on the following page summarizes PPSUITE's analysis procedure used for each of the nearly 15,000 roadway links contained in the travel demand model.

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 first be aggregated into categories so that a reasonable number of MOBILE scenarios can be run, and then further aggregated and/or re-sorted into summary information that is useful for emission inventory reporting.

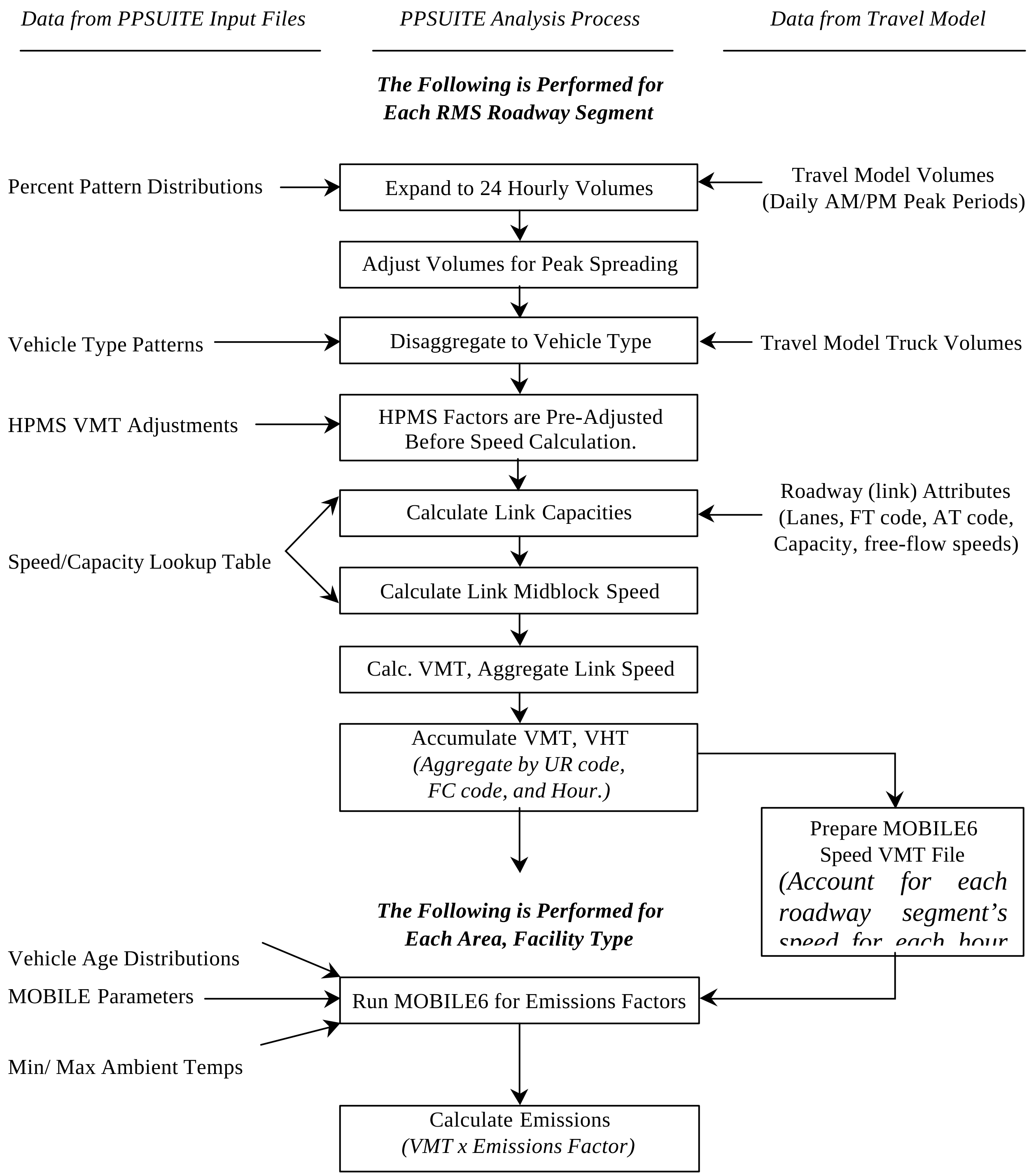
One of the major enhancements of MOBILE6 is the increased detail of traffic speed data that can be input to the emissions model. The PPSUITE post processor calculates hourly speeds for each roadway segment. Since previous versions of MOBILE only allowed one average speed as input for each scenario, a lookup table was created for speeds from 2.5 to 65 MPH in 0.1 MPH increments. MOBILE6 allows for direct input of the 24 hourly speeds as well as options to account for each link's speed separately. These added features utilize the full extent of the information output from the speed processing programs and provide for more accurate emission estimates of the available traffic data.

Volume/VMT Development

Before speeds can be calculated and MOBILE run, volumes acquired from the travel demand model must be adjusted and disaggregated. Such adjustments include factoring to HPMS VMT, seasonal adjustments, and disaggregating daily volumes to each hour of the day and to each of the sixteen MOBILE6 vehicle types.

Future Year Volumes. Future year volumes are based on projected land use files that the Baltimore Regional Transportation Board (BRTB) endorse and expected changes to the future transportation network. The model is run using the future year inputs and assigned volumes are produced for each roadway link contained within the model network.

Exhibit 6 PPSUITE Speed/Emission Estimation Procedure



Seasonal Adjustments. PPSUITE takes the 24 hr model volumes from the travel demand model, which represents an average annual weekday that has been adjusted for seasonal variance to represent an average summer weekday. A comprehensive adjustment factor of 1.04 is applied to the entire region. Using the adjusted weekday volumes, VMT is calculated for each model link.

Example:

Assume a sample Baltimore Arterial link: The average annual weekday traffic for this link in 2005 is 13,355 vehicles/day.

A seasonal factor of 1.04 is then applied.
Average Weekday summer Volume = 13,355 x 1.04 = 13,889 vehicles/day

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

2005 VMT = 13,889 vehicles/day x 0.286 miles = 4,111 vehicle-miles / day

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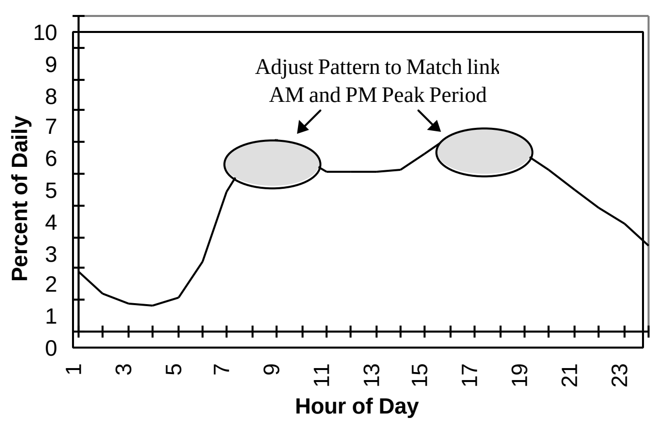
Disaggregation to 24 Hours. After seasonally adjusting the link volume, the volume is split to each hour of the day. This allows for more accurate speed calculations (effects of congested hours) and allows PPSUITE to prepare the hourly VMT and speeds for input to the MOBILE6 model.

Example:

To support speed calculations and emission estimates by time of day, the summer weekday volume is disaggregated to 24 hourly volumes. Temporal patterns by facility type were previously developed from SHA 1999-2001 count data and input to PPSUITE. A sample distribution is illustrated below and can be applied to the daily link volume to produce hourly volumes. Additional features within PPSUITE allow for the input pattern to be adjusted ensuring peak period volumes for the AM and PM are consistent with values supplied for each link.



Using the sample link, the resulting typical hourly volumes 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

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 vehicle type, reflecting specific local characteristics. As a result, for Baltimore's emission inventory runs, the hourly volumes are disaggregated to the sixteen MOBILE6 vehicle types based on a combination of model truck volume assignments, SHA count pattern data, and MOBILE6 defaults.

Example:

Disaggregation of the total sample link volume (by hour) to the various vehicle types would include the following:

Total Model Volume 8-9 am = 833 vph; Model Truck Volume 8-9 am = 90 vph
From above, Auto Volume 8-9 am = 833-90 = 743 vph

From the SHA counts for hour 8-9am (Based on Facility Type):

Light-duty vehicles (LDV)	= 89.52%
Motorcycles (MC)	= 00.17%
Heavy-duty vehicles (HDV)	= 09.52%
Bus	= 00.79%

The above is renormalized into Auto and Truck groupings:

AUTO:	LDV = 99.8%,	MC = 0.2%
TRUCK:	HDV = 92.3%,	Bus = 7.7%

Using the above information, the following vehicle type volumes are calculated for 8-9 am:

LDV	=	743 x 99.8%	=	741 vph
MC	=	743 x 00.2%	=	2 vph
HDV	=	90 x 92.3%	=	83 vph
BUS	=	90 x 7.7%	=	7 vph

Finally, MOBILE6 defaults are used to break the above categories into the 16 input vehicle types. Defaults vary by the analysis year being run. For example, the following factors have been developed from 2005 MOBILE6 defaults:

LDV	0.4840 of LDV Group	=	359 vph
LDT1	0.0885 of LDV Group	=	66 vph
LDT2	0.2948 of LDV Group	=	218 vph
LDT3	0.0908 of LDV Group	=	67 vph
LDT4	0.0418 of LDV Group	=	31 vph
HDV2B	0.3299 of HDV Group	=	27 vph
HDV3	0.0324 of HDV Group	=	3 vph
HDV4	0.0264 of HDV Group	=	2 vph
HDV5	0.0196 of HDV Group	=	2 vph
HDV6	0.0733 of HDV Group	=	6 vph
HDV7	0.0870 of HDV Group	=	7 vph
HDV8A	0.0946 of HDV Group	=	8 vph
HDV8B	0.3367 of HDV Group	=	28 vph
HDBS	0.6897 of BUS Group	=	5 vph
HDBT	0.3103 of BUS Group	=	2 vph
MC	1.0000 of MC Group	=	2 vph

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 according to roadway facility class.

The computational framework used for this analysis meets and exceeds that recommendation. Speeds are individually calculated for each roadway segment and hour based on the physical characteristics of the roadway and the assigned capacities to each model link. Rather than accumulating the roadway segments into area/functional groupings and calculating an average speed, each individual link hourly speed is represented in the MOBILE6 speed VMT file. This represents a significant enhancement in the MOBILE model since past versions only allowed input of one average speed for each scenario. MOBILE6 allows the input of a distribution of hourly speeds. For example, if 5% of a county's arterial VMT operate at 5 mph during the AM peak hour and the remaining 95% operate at 65mph, this can be represented in the MOBILE6 speed input file. For the Baltimore runs, distributions of speeds are input to MOBILE6 for separate scenarios representing county/area and facility type groupings; VMT 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 travel demand model data. Other data needed for the speed calculations including the BPR parameters (speed – congestion relationships) are obtained from a lookup table input to PPSUITE. This lookup data contains default roadway information indexed by the urban/rural code and facility type.

Example:

For the sample arterial link, the free-flow speeds and capacity is obtained from the travel demand model:

free flow speed = 65 mph
capacity = 1800 vph per lane

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 sample 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

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

HPMS and VMT Adjustments

Link volumes from the traffic model assignment 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 1990 and 2000 HPMS data; however, the 2000 factors are also applied to any future year runs. The VMT added or subtracted to the travel model links are applied before the calculation of speeds. Therefore, the final congested speed that is used by MOBILE6 accounts for the HPMS VMT adjustments. However, for "local" facility, a constant speed is assumed within MOBILE6 for the calculation of emission factors and the HPMS adjustments will not impact its speeds.

Example:

Assuming the sample arterial link example is in Harford County, the daily assigned volume is adjusted to account for reconciliation with the HPMS VMT. HPMS VMT for Harford County urban arterials is 721,411 vehicle miles in 1990. The total VMT for all urban arterial model links in Harford County is 744,471 vehicle miles. A factor is developed by dividing the HPMS VMT by the travel model link VMT:

HPMS adjustment factor = 721,411 / 744,471 = 0.969

This factor is applied in the 1990 run. Separate factors are calculated for the year 2000 and carried forward to all future years.

Thus for the sample link:

VMT (8-9am) = 833 vph x 0.296 miles x 0.969 = 239 vehicle miles

VMT and Speed Aggregation

As discussed in previous sections, MOBILE6's ability to handle input distributions of hourly speeds has eliminated the need to aggregate speed data. For the Baltimore runs, PPSUITE has been set up to automatically accumulate VMT and VHT by geographic areas and highway facility type. The speed files input to MOBILE6 for each scenario contain the actual distribution of roadway speeds for that aggregation group. Exhibit 7 illustrates the scenario aggregation scheme used with MOBILE6.

Exhibit 7 VMT/VHT Aggregation Scheme

County -	1 = Baltimore City 3 = Baltimore County 5 = Harford County	2 = Anne Arundel County 4 = Carroll County 6 = Howard County	6 entries
Urban/Rural Code -	1=Urban 2=Rural		2 entries
Facility Type -	1 = Interstate 2 = Freeway 3 = Principal Arterial 4 = Minor Arterial	5 = Collector 6-10 = Ramps 11= Local	11 entries
			132 potential combinations

Geographic aggregation is performed according to urban and rural areas of each county. Facility class aggregation is according to the facility types contained in the travel demand model. For an individual county, this creates a potential for 22 possible combinations, each of which becomes an input MOBILE6 scenario. This allows each MOBILE6 scenario to represent the actual VMT mix and speed for that geographic/highway combination. Altogether then, there are potentially 132 combinations for which speeds and VMT are computed and emissions are calculated with MOBILE.

MOBILE Emissions Run

After computing speeds and aggregating VMT and VHT, PPSUITE prepares input files to be run in EPA's MOBILE6 program, which is used to produce VOC and NO_x emission factors in grams of pollutant per vehicle mile.

The MOBILE input file prepared by PPSUITE contains the following:

? MOBILE template containing appropriate parameters and program flags
? Temperature data specific to the Baltimore region.
? Vehicle age and diesel sales fraction data for the Baltimore region.
? Scenario data - contains VMT mix, speed distributions specific to scenario as produced by PPSUITE

Example:

A MOBILE input file is created by PPSUITE for each county in the Baltimore region. This file contains separate scenarios for each urban/rural code, facility type. A scenario represents a separate MOBILE run with different emission factors calculated and output for each run.

For this example, Harford County arterials will be run as a scenario with a specific VMT mix file and a speed distribution file accounting for all the roadway speeds within the grouping.

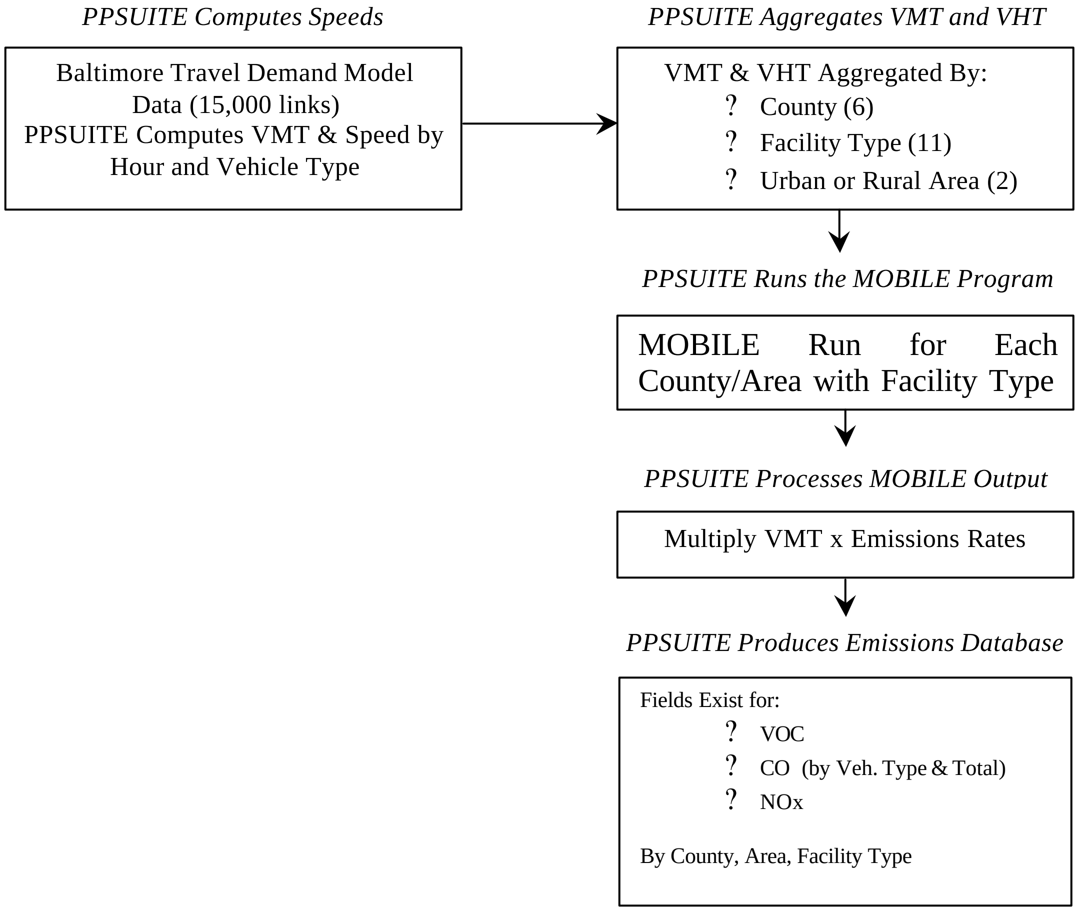
Time of Day Emissions

Unlike in the past using MOBILE5, VMT and speeds are no longer aggregated as separate scenarios representing time periods. This was done in the past to account for the unique speeds encountered during each time period in the day. Diurnal emissions were estimated on a daily period. Since MOBILE6 allows for hourly roadway speeds to be represented in the speed VMT file, such a process is no longer needed. MOBILE6 will internally account for the emissions during each hour in the day and make the necessary calculations.

MOBILE Output Post-Processing

After MOBILE has been run, PPSUITE processes the MOBILE output files and compiles the emission factors for each scenario. Using the MOBILE emission factors, PPSUITE calculates emission quantities by multiplying the emission factors by the aggregated VMT totals. PPSUITE then produces an emissions database summarizing VMT, VHT, VOC, and NO_x emissions as shown in Exhibit 8.

Exhibit 8 Summary of PPSUITE's Methodology in Producing Emissions Summary



Example:

Harford County urban arterials were run as a scenario in MOBILE. Based on the input information, MOBILE6 outputs emission factors by vehicle type for this scenario as shown below:

Composite Emission Factors (grams/mile) from MOBILE6 output

Vehicle Type:	LDGV	LDGT1	LDGT2	LDGT3	LDGT4	HDDV	For all 28 M6 types
VOC:	1.22	1.86	2.42	3.68	0.36	1.13	
NO_X:	2.41	3.16	3.66	7.14	1.84	5.84	

PPSUITE reads these emission factors from the MOBILE6 output file and multiplies them by the Harford County urban arterial VMT to obtain emission totals for this scenario. (Note: emissions shown in kg/day, which is converted to tons/day in SIP narratives)

PPSUITE computes emissions as follows for this scenario:

			Emission Factors (g/mi)			**Emissions (kg/day)**	
Veh Type	**VMT**		**VOC**	**NOX**		**VOC**	**NOX**
LDGV	84,344	x	1.22	2.41	=	102.9	203.3
LDGT1	30,713	x	1.86	3.16	=	57.1	97.1
LDGT2	21,515	x	2.42	3.66	=	52.1	78.7
LDGT3	4,209	x	3.68	7.14	=	15.5	30.1
LDGT4	3,586	x	0.36	1.84	=	1.3	6.6
HDDV7	7,483	x	1.13	5.84	=	8.5	43.7
….. Repeated for all 28 MOBILE6 vehicle types							
Total	155,903					244.6	482.0

The emissions for this scenario are reported and stored in an output database file that contains a record for each scenario with fields containing VMT, VHT, VOC emissions, and NO_x emissions. Fields exist for each vehicle type and for the total of all vehicle types as shown below.

Reported by Vehicle Type 1-28 and Total --- Repeated for VHT,HC,NOX

Cnty	**UR**	**FC**	**VMT1**	**VMT2**	**VMT3**	**VMT4**	**VMT5**	**VMT6**	**VMT7**	**VMT8**	**VMT28**
Harf	1	3	84,344	30,713	21,515	4,209	3,586	2,806	7,483	1,248	
			VHT1	**VHT2**	**VHT3**	**VHT4**	**VHT5**	**VHT6**	**VHT7**	**VHT8**	**VHT28**
			1,298	473	331	65	55	43	115	19	
			VOC1	**VOC2**	**VOC3**	**VOC4**	**VOC5**	**VOC6**	**VOC7**	**VOC8**	**VOC28**
			102.9	57.1	52.1	15.5	1.3	1.5	8.5	5.7	
			NO_x1	**NO_x2**	**NO_x3**	**NO_x4**	**NO_x5**	**NO_x6**	**NO_x7**	**NO_x8**	**NO_x28**
			203.3	97.1	78.7	30.1	6.6	11.6	43.7	10.9	

RESOURCES

MOBILE Model

EPA – OTAQ - Modeling and Inventories. Feb. 12, 2003. U. S. Environmental Protection Agency. April 3, 2003. <http://www.epa.gov/omswww/models.htm>

This site contains a downloadable model, MOBILE users guide, and other information.

U.S. Environmental Protection Agency. *User's Guide to MOBILE6.0 (Mobile Source Emission Factor Model)*. Office of Mobile Sources. January 2002.

U.S. Environmental Protection Agency. *Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation.* Office of Transportation and Air Quality. January 2002.

U.S. Environmental Protection Agency. *Policy Guidance on the Use of MOBILE6 for Emission Inventory Preparation.* Office of Air and Radiation. January 18, 2002.

Traffic Engineering

Transportation Research Board. *2000 Highway Capacity Manual.* Committee on Highway Capacity and Quality of Service. 2000.

This manual presents current knowledge and techniques for analyzing the transportation system.

Appendix A – BMC Memorandum – included as Appendix A of SIP Revision

Appendix B – Baker – Baltimore Mobile6 Input Files

```
2005 MOBILE6 INPUT File Script for the Baltimore Region

MOBILE6 INPUT FILE

REPORT FILE         :  C:\pptemp\m6output.out       REPLACE
DATABASE OUTPUT     :
WITH FIELDNAMES     :
EMISSIONS TABLE     :  d:\BALTAQ\RUN\m6data\M6OUTPUT.TB1    REPLACE
POLLUTANTS          :  HC CO NOX
AGGREGATED OUTPUT   :
RUN DATA            : 0011

MIN/MAX TEMPERATURE: 67.9 96.5
FUEL RVP            : 7.0
EXPRESS HC AS VOC   :
EXPAND EXHAUST      :
EXPAND EVAPORATIVE  :
NO REFUELING        :
ANTI-TAMP PROGRAM   :
89 77 50 22222 21111111 1 12  96. 12211112
I/M DESC FILE       : d:\BALTAQ\M6_Data\im2005.d
94+ LDG IMP         : d:\BALTAQ\M6_Data\nlevne.d
REG DISTRIBUTION    : d:\BALTAQ\M6_Data\regdat02.bal
DIESEL FRACTIONS    :
0.0001 0.0002 0.0006 0.0022 0.0014 0.0015 0.0020 0.0014 0.0015 0.0012
0.0017 0.0032 0.0013 0.0010 0.0005 0.0107 0.0078 0.0361 0.0508 0.0766
0.1184 0.1215 0.0962 0.0370 0.0046
0.0010 0.0010 0.0032 0.0136 0.0048 0.0172 0.0165 0.0153 0.0106 0.0151
0.0163 0.0169 0.0175 0.0250 0.0183 0.0256 0.0553 0.0651 0.0748 0.0877
0.2434 0.1723 0.1120 0.0614 0.0160
0.0010 0.0010 0.0032 0.0136 0.0048 0.0172 0.0165 0.0153 0.0106 0.0151
0.0163 0.0169 0.0175 0.0250 0.0183 0.0256 0.0553 0.0651 0.0748 0.0877
0.2434 0.1723 0.1120 0.0614 0.0160
0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0115 0.0111 0.0145
0.0115 0.0129 0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209
0.0256 0.0013 0.0006 0.0011 0.0001
0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0126 0.0115 0.0111 0.0145
0.0115 0.0129 0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209
0.0256 0.0013 0.0006 0.0011 0.0001
0.1998 0.1998 0.1998 0.1998 0.1998 0.1998 0.1998 0.2578 0.2515 0.3263
0.2784 0.2963 0.2384 0.2058 0.1756 0.1958 0.2726 0.2743 0.3004 0.2918
0.2859 0.0138 0.0000 0.0000 0.0000
0.6774 0.6774 0.6774 0.6774 0.6774 0.6774 0.6774 0.7715 0.7910 0.8105
0.8068 0.8280 0.8477 0.7940 0.7488 0.7789 0.7842 0.6145 0.5139 0.5032
0.4277 0.0079 0.0000 0.0000 0.0001
0.8606 0.8606 0.8606 0.8606 0.8606 0.8606 0.8606 0.8473 0.8048 0.8331
0.7901 0.7316 0.7275 0.7158 0.5647 0.3178 0.2207 0.1968 0.1570 0.0738
0.0341 0.0414 0.0003 0.0000 0.0000
0.4647 0.4647 0.4647 0.4647 0.4647 0.4647 0.4647 0.4384 0.3670 0.4125
0.3462 0.2771 0.2730 0.2616 0.1543 0.0615 0.0383 0.0333 0.0255 0.0111
0.0049 0.0060 0.0000 0.0000 0.0000
0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 0.6300 0.6078 0.5246 0.5767
0.5289 0.5788 0.5617 0.4537 0.4216 0.4734 0.4705 0.4525 0.4310 0.3569
0.3690 0.4413 0.3094 0.1679 0.1390
0.8563 0.8563 0.8563 0.8563 0.8563 0.8563 0.8563 0.8443 0.7943 0.8266
0.7972 0.8279 0.8177 0.7440 0.7184 0.7588 0.7567 0.7431 0.7261 0.6602
0.6717 0.7344 0.6107 0.4140 0.3610
0.9992 0.9992 0.9992 0.9992 0.9992 0.9992 0.9992 0.9989 0.9987 0.9989
0.9977 0.9984 0.9982 0.9979 0.9969 0.9978 0.9980 0.9979 0.9976 0.9969
0.9978 0.9982 0.9974 0.9965 0.9964
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000
0.9585 0.9585 0.9585 0.9585 0.9585 0.9585 0.9585 0.8857 0.8525 0.8795
0.9900 0.9105 0.8760 0.7710 0.7502 0.7345 0.6733 0.5155 0.3845 0.3238
0.3260 0.2639 0.0594 0.0460 0.0291
```

```
SCENARIO RECORD    :[01 0011]  1

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          2581303
*                    1083679  198376  660060  203302   93591  103898   10204    8314
*                       6173   23085   27400   29793  106071   15544    6993    4820
VMT FRACTIONS      :
                     .419820 .076851 .255708 .078759 .036257 .040250 .003953 .003221
                     .002391 .008943 .010615 .011542 .041092 .006022 .002709 .001867
VMT BY FACILITY    :V001101F.def
VMT BY HOUR        :V001101H.def
SPEED VMT          :V001101S.def


SCENARIO RECORD    :[02 0011]  2

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           430271
*                     187190   34267  114016   35118   16167   13142    1291    1052
*                        781    2920    3466    3768   13416    1959     881     837
VMT FRACTIONS      :
                     .435054 .079640 .264986 .081618 .037574 .030544 .003000 .002445
                     .001815 .006786 .008055 .008757 .031180 .004553 .002048 .001945
VMT BY FACILITY    :V001102F.def
VMT BY HOUR        :V001102H.def
SPEED VMT          :V001102S.def


SCENARIO RECORD    :[03 0011]  3

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          3471070
*                    1547152  283219  942357  290251  133618   78916    7751    6315
*                       4689   17534   20812   22630   80567   20570    9255    5434
VMT FRACTIONS      :
                     .445728 .081594 .271489 .083620 .038495 .022735 .002233 .001819
                     .001351 .005051 .005996 .006520 .023211 .005926 .002666 .001566
VMT BY FACILITY    :V001103F.def
VMT BY HOUR        :V001103H.def
SPEED VMT          :V001103S.def


SCENARIO RECORD    :[04 0011]  4

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          2387720
*                    1062297  194462  647035  199290   91744   53675    5271    4295
*                       3189   11926   14155   15391   54797   16677    7503    6013
VMT FRACTIONS      :
                     .444899 .081443 .270984 .083465 .038423 .022480 .002208 .001799
```

```
                   .001336 .004995 .005928 .006446 .022950 .006984 .003142 .002518
VMT BY FACILITY   :V001104F.def
VMT BY HOUR       :V001104H.def
SPEED VMT         :V001104S.def


SCENARIO RECORD   :[05 0011]  5

CALENDAR YEAR     :2005
EVALUATION MONTH  : 7
FUEL PROGRAM      : 2 S
SEASON            : 1
SUNRISE/SUNSET    : 6 8
CLOUD COVER       : 0.35
*VMT TOTALS         684233
*                   303369   55534  184779   56913   26200   16104    1582    1289
*                      957    3578    4247    4618   16441    4563    2053    2007
VMT FRACTIONS     :
                   .443370 .081162 .270053 .083178 .038291 .023536 .002312 .001884
                   .001399 .005229 .006207 .006749 .024028 .006669 .003000 .002933
VMT BY FACILITY   :V001105F.def
VMT BY HOUR       :V001105H.def
SPEED VMT         :V001105S.def


SCENARIO RECORD   :[06 0011]  6

CALENDAR YEAR     :2005
EVALUATION MONTH  : 7
FUEL PROGRAM      : 2 S
SEASON            : 1
SUNRISE/SUNSET    : 6 8
CLOUD COVER       : 0.35
*VMT TOTALS         215347
*                    93241   17068   56792   17492    8053    6865     674     549
*                      408    1525    1811    1969    7009    1003     451     437
VMT FRACTIONS     :
                   .432981 .079258 .263723 .081227 .037395 .031879 .003130 .002549
                   .001895 .007082 .008410 .009143 .032547 .004658 .002094 .002029
VMT BY FACILITY   :V001106F.def
VMT BY HOUR       :V001106H.def
SPEED VMT         :V001106S.def


SCENARIO RECORD   :[07 0011]  7

CALENDAR YEAR     :2005
EVALUATION MONTH  : 7
FUEL PROGRAM      : 2 S
SEASON            : 1
SUNRISE/SUNSET    : 6 8
CLOUD COVER       : 0.35
*VMT TOTALS          85325
*                    36781    6734   22405    6901    3177    2821     277     226
*                      168     627     744     809    2880     403     181     191
VMT FRACTIONS     :
                   .431070 .078922 .262584 .080879 .037234 .033062 .003246 .002649
                   .001969 .007348 .008720 .009481 .033753 .004723 .002121 .002239
VMT BY FACILITY   :V001107F.def
VMT BY HOUR       :V001107H.def
SPEED VMT         :V001107S.def


SCENARIO RECORD   :[08 0011]  8

CALENDAR YEAR     :2005
EVALUATION MONTH  : 7
FUEL PROGRAM      : 2 S
SEASON            : 1
SUNRISE/SUNSET    : 6 8
CLOUD COVER       : 0.35
```

```
*VMT TOTALS            42277
*                      17634    3228   10740    3308    1523    1776     174     142
*                        105     395     468     509    1813     257     115      90
VMT FRACTIONS      :
                     .417103 .076354 .254040 .078246 .036024 .042009 .004116 .003359
                     .002484 .009343 .011070 .012040 .042884 .006079 .002720 .002129
VMT BY FACILITY    :V001108F.def
VMT BY HOUR        :V001108H.def
SPEED VMT          :V001108S.def


SCENARIO RECORD    :[09 0011]  9

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS             3745
*                       1591     291     968     298     137     140      14      11
*                          8      31      37      40     143      18       8      10
VMT FRACTIONS      :
                     .424769 .077712 .258507 .079582 .036586 .037387 .003739 .002938
                     .002136 .008279 .009881 .010682 .038188 .004807 .002136 .002671
VMT BY FACILITY    :V001109F.def
VMT BY HOUR        :V001109H.def
SPEED VMT          :V001109S.def


SCENARIO RECORD    :[10 0011] 10

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS             1871
*                        804     147     490     151      69      60       6       5
*                          4      13      16      17      62      15       7       5
VMT FRACTIONS      :
                     .429799 .078556 .261854 .080694 .036873 .032064 .003206 .002672
                     .002138 .006947 .008550 .009085 .033133 .008016 .003741 .002672
VMT BY FACILITY    :V001110F.def
VMT BY HOUR        :V001110H.def
SPEED VMT          :V001110S.def


SCENARIO RECORD    :[11 0011] 15

CALENDAR YEAR      :2005
EVALUATION MONTH   : 7
FUEL PROGRAM       : 2 S
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          1076490
*                     499105   91365  304001   93634   43105   10969    1077     878
*                        652    2437    2893    3145   11199    6021    2709    3300
VMT FRACTIONS      :
                     .463640 .084873 .282400 .086981 .040042 .010190 .001000 .000816
                     .000606 .002264 .002687 .002922 .010403 .005593 .002517 .003066
VMT BY FACILITY    :V001111F.def
VMT BY HOUR        :V001111H.def
SPEED VMT          :V001111S.def


END OF RUN         : 0021
```

INPUT SCRIPTS CONTINUE FOR EVERY COUNTY AREA TYPE COMBINATION………

Attachment 1 to Appendix C

2005 I/M Input File to MOBILE6 for the Baltimore Region

```
*IM Program 2005.  Idle, IM240, and OBD.
*IM240  Final Cutpoints.
*HDGT1 receives IM240, but is modeled as idle test to allow single run.
*Describes IM emissions program beginning Summer 2004.
*Includes gas cap testing, which will be advisory until summer 2003, and
*should become pass/fail then.
*Waiver rates are based on the assumption that a $450 waiver expenditure will
*result in a  3% waiver rate.
*Gas Cap for OBD Vehicles
*
I/M PROGRAM        : 7 2003 2050 2 T/O EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 96.0
I/M WAIVER RATES   : 7  3.0  3.0
I/M GRACE PERIOD   : 7 2
*Gas Cap for HDGT
I/M PROGRAM        : 6 2003 2050 2 T/O GC
I/M MODEL YEARS    : 6 1977 2050
I/M VEHICLES       : 6 11111 22222111 1
I/M COMPLIANCE     : 6 96.0
I/M WAIVER RATES   : 6  3.0  3.0
I/M GRACE PERIOD   : 6 2
*Gas Cap for older LDGV, LDGT
I/M PROGRAM        : 5 2003 2050 2 T/O GC
I/M MODEL YEARS    : 5 1977 1995
I/M VEHICLES       : 5 22222 11111111 1
I/M COMPLIANCE     : 5 96.0
I/M WAIVER RATES   : 5  3.0  3.0
I/M GRACE PERIOD   : 5 2
*OBD
I/M PROGRAM        : 4 2003 2050 2 T/O OBD I/M
I/M MODEL YEARS    : 4 1996 2050
I/M VEHICLES       : 4 22222 11111111 1
I/M STRINGENCY     : 4 20.0
I/M COMPLIANCE     : 4 96.0
I/M WAIVER RATES   : 4  3.0  3.0
I/M GRACE PERIOD   : 4 2
*IM240
I/M PROGRAM        : 3 1984 2050 2 T/O IM240
I/M MODEL YEARS    : 3 1984 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 20.0
I/M COMPLIANCE     : 3 96.0
I/M WAIVER RATES   : 3  3.0  3.0
I/M CUTPOINTS      : 3 d:\BALTAQ\M6_Data\cutpnt05.d
I/M GRACE PERIOD   : 3 2
*Idle HDGT
I/M PROGRAM        : 2 1984 2050 2 T/O Idle
I/M MODEL YEARS    : 2 1977 2050
I/M VEHICLES       : 2 11111 22222111 1
I/M STRINGENCY     : 2 20.0
I/M COMPLIANCE     : 2 96.0
I/M WAIVER RATES   : 2  3.0  3.0
I/M GRACE PERIOD   : 2 2
*Idle older LDGV, LDGT
I/M PROGRAM        : 1 1984 2050 2 T/O Idle
I/M MODEL YEARS    : 1 1977 1983
I/M VEHICLES       : 1 22222 11111111 1
I/M STRINGENCY     : 1 20.0
I/M COMPLIANCE     : 1 96.0
```

```
I/M WAIVER RATES   : 1  3.0  3.0
I/M GRACE PERIOD   : 1 2
Attachment 2 to Appendix C

2002 Vehicle Age Distribution Inputs to MOBILE6 for the Baltimore Region

REG DIST
* This file contains the default MOBILE6 values for the distribution of
* vehicles by age for July of any calendar year.  There are sixteeen (16)
* sets of values representing 16 combined gasoline/diesel vehicle class
* distributions.  These distributions are split for gasoline and diesel
* using the separate input (or default) values for diesel sales fractions.
* Each distribution contains 25 values which represent the fraction of
* all vehicles in that class (gasoline and diesel) of that age in July.
* The first number is for age 1 (calendar year minus model year plus one)
* and the last number is for age 25.  The last age includes all vehicles
* of age 25 or older.  The first number in each distribution is an integer
* which indicates which of the 16 vehicle classes are represented by the
* distribution.  The sixteen vehicle classes are:
*
*  1  LDV    Light-Duty Vehicles (Passenger Cars)
*  2  LDT1   Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3750 lbs. LVW)
*  3  LDT2   Light Duty Trucks 2 (0-6,001 lbs. GVWR, 3751-5750 lbs. LVW)
*  4  LDT3   Light Duty Trucks 3 (6,001-8500 lbs. GVWR, 0-3750 lbs. LVW)
*  5  LDT4   Light Duty Trucks 4 (6,001-8500 lbs. GVWR, 3751-5750 lbs. LVW)
*  6  HDV2B  Class 2b Heavy Duty Vehicles (8501-10,000 lbs. GVWR)
*  7  HDV3   Class 3 Heavy Duty Vehicles (10,001-14,000 lbs. GVWR)
*  8  HDV4   Class 4 Heavy Duty Vehicles (14,001-16,000 lbs. GVWR)
*  9  HDV5   Class 5 Heavy Duty Vehicles (16,001-19,500 lbs. GVWR)
* 10  HDV6   Class 6 Heavy Duty Vehicles (19,501-26,000 lbs. GVWR)
* 11  HDV7   Class 7 Heavy Duty Vehicles (26,001-33,000 lbs. GVWR)
* 12  HDV8A  Class 8a Heavy Duty Vehicles (33,001-60,000 lbs. GVWR)
* 13  HDV8B  Class 8b Heavy Duty Vehicles (>60,000 lbs. GVWR)
* 14  HDBS   School Busses
* 15  HDBT   Transit and Urban Busses
* 16  MC     Motorcycles (All)
*
* The 25 age values are arranged in two rows of 10 values followed by a row
* with the last 5 values.  Comments (such as this one) are indicated by
* an asterisk in the first column. Empty rows are ignored.  Values are
* read "free format," meaning any number may appear in any row with as
* many characters as needed (including a decimal) as long as 25 values
* follow the initial integer value separated by a space.
*
* If all 28 vehicle classes do not need to be altered from the default
* values, then only the vehicle classes that need to be changed need to
* be included in this file.  The order in which the vehicle classes are
* read does not matter, however each vehicle class set must contain 25
* values and be in the proper age order.
*
* Based on the 2002 MVA Data received during July 2002
* LDV
 1 0.0646 0.0842 0.0867 0.0750 0.0732 0.0740 0.0664 0.0726 0.0600 0.0530
   0.0451 0.0401 0.0381 0.0329 0.0281 0.0232 0.0174 0.0116 0.0080 0.0044
   0.0026 0.0021 0.0019 0.0024 0.0324
* LDT1
 2 0.0909 0.1057 0.1137 0.1007 0.0968 0.0874 0.0735 0.0687 0.0538 0.0408
   0.0307 0.0246 0.0229 0.0224 0.0191 0.0145 0.0095 0.0071 0.0049 0.0026
   0.0015 0.0010 0.0009 0.0019 0.0046
* LDT2
 3 0.0909 0.1057 0.1137 0.1007 0.0968 0.0874 0.0735 0.0687 0.0538 0.0408
   0.0307 0.0246 0.0229 0.0224 0.0191 0.0145 0.0095 0.0071 0.0049 0.0026
   0.0015 0.0010 0.0009 0.0019 0.0046
* LDT3
 4 0.0560 0.0815 0.0826 0.0707 0.0654 0.0702 0.0574 0.0628 0.0628 0.0418
   0.0353 0.0340 0.0367 0.0414 0.0406 0.0361 0.0343 0.0204 0.0167 0.0095
   0.0066 0.0053 0.0043 0.0077 0.0201
* LDT4
 5 0.0560 0.0815 0.0826 0.0707 0.0654 0.0702 0.0574 0.0628 0.0628 0.0418
   0.0353 0.0340 0.0367 0.0414 0.0406 0.0361 0.0343 0.0204 0.0167 0.0095
   0.0066 0.0053 0.0043 0.0077 0.0201
```

```
* HDV2B
 6 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV3
 7 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV4
 8 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV5
 9 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV6
10 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV7
11 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV8a
12 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDV8b
13 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDBS
14 0.0503 0.0815 0.0989 0.0959 0.0546 0.0757 0.0505 0.0712 0.0421 0.0327
   0.0263 0.0293 0.0395 0.0401 0.0381 0.0328 0.0293 0.0222 0.0145 0.0090
   0.0081 0.0064 0.0069 0.0083 0.0360
* HDBT
15 0.0255 0.0410 0.0624 0.1022 0.0548 0.0826 0.0626 0.0911 0.0484 0.0434
   0.0363 0.0392 0.0476 0.0481 0.0440 0.0429 0.0355 0.0269 0.0152 0.0097
   0.0097 0.0063 0.0064 0.0068 0.0115
* Motorcycles
16 0.0852 0.1120 0.0907 0.0738 0.0526 0.0448 0.0457 0.0373 0.0309 0.0334
   0.0243 0.3692 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
   0.0000 0.0000 0.0000 0.0000 0.0000
```

Appendix C – Baker – 1990 Baltimore Mobile6 Input Files

```
1990 MOBILE6 INPUT File Script for the Baltimore Region

MOBILE6 INPUT FILE

REPORT FILE        :  C:\pptemp\m6output.out       REPLACE
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  d:\SIP1990.M6\RUN90\m6data\M6OUTPUT.TB1    REPLACE
POLLUTANTS         :  HC CO NOX
AGGREGATED OUTPUT  :
RUN DATA           : 0011

MIN/MAX TEMPERATURE: 69.1  98.4
```

FUEL RVP : 8.2

```
EXPRESS HC AS VOC  :
EXPAND EXHAUST     :
EXPAND EVAPORATIVE :
NO CLEAN AIR ACT   :
NO REFUELING       :
ANTI-TAMP PROGRAM  :
89 77 50 22222 22222111 1 12  96. 12211111
I/M DESC FILE      : d:\SIP1990.M6\M6_Data\MDIm1990.d
REG DISTRIBUTION   : d:\SIP1990.M6\M6_Data\MD90.reg
DIESEL FRACTIONS   :
0.0004 0.0005 0.0003 0.0033 0.0043 0.0136 0.0178 0.0206 0.0396 0.0546
0.0479 0.0230 0.0111 0.0078 0.0102 0.0142 0.0067 0.0032 0.0044 0.0014
0.0019 0.0016 0.0003 0.0003 0.0007
0.0022 0.0128 0.0113 0.0150 0.0316 0.0370 0.0637 0.0867 0.2519 0.2094
0.1066 0.0391 0.0181 0.0038 0.0019 0.0023 0.0054 0.0000 0.0017 0.0025
0.0000 0.0000 0.0120 0.0000 0.0209
0.0022 0.0128 0.0113 0.0150 0.0316 0.0370 0.0637 0.0867 0.2519 0.2094
0.1066 0.0391 0.0181 0.0038 0.0019 0.0023 0.0054 0.0000 0.0017 0.0025
0.0000 0.0000 0.0120 0.0000 0.0209
0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209 0.0256 0.0013
0.0006 0.0011 0.0001 0.0000 0.0000 0.0000 0.0001 0.0001 0.0001 0.0001
0.0001 0.0001 0.0001 0.0001 0.0001
0.0096 0.0083 0.0072 0.0082 0.0124 0.0135 0.0169 0.0209 0.0256 0.0013
0.0006 0.0011 0.0001 0.0000 0.0000 0.0000 0.0001 0.0001 0.0001 0.0001
0.0001 0.0001 0.0001 0.0001 0.0001
0.2384 0.2058 0.1756 0.1958 0.2726 0.2743 0.3004 0.2918 0.2859 0.0138
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000 0.0000 0.0000 0.0000
0.8477 0.7940 0.7488 0.7789 0.7842 0.6145 0.5139 0.5032 0.4277 0.0079
0.0000 0.0000 0.0001 0.0003 0.0010 0.0028 0.0248 0.0000 0.0000 0.0000
0.0000 0.0000 0.0000 0.0000 0.0000
0.7275 0.7158 0.5647 0.3178 0.2207 0.1968 0.1570 0.0738 0.0341 0.0414
0.0003 0.0000 0.0000 0.0000 0.0259 0.0078 0.0004 0.0090 0.0112 0.0112
0.0112 0.0112 0.0112 0.0112 0.0112
0.2730 0.2616 0.1543 0.0615 0.0383 0.0333 0.0255 0.0111 0.0049 0.0060
0.0000 0.0000 0.0000 0.0000 0.0037 0.0011 0.0001 0.0013 0.0016 0.0016
0.0016 0.0016 0.0016 0.0016 0.0016
0.5617 0.4537 0.4216 0.4734 0.4705 0.4525 0.4310 0.3569 0.3690 0.4413
0.3094 0.1679 0.1390 0.0808 0.0476 0.0365 0.0288 0.0274 0.0297 0.0297
0.0297 0.0297 0.0297 0.0297 0.0297
0.8177 0.7440 0.7184 0.7588 0.7567 0.7431 0.7261 0.6602 0.6717 0.7344
0.6107 0.4140 0.3610 0.2353 0.1489 0.1170 0.0940 0.0897 0.0966 0.0966
0.0966 0.0966 0.0966 0.0966 0.0966
0.9982 0.9979 0.9969 0.9978 0.9980 0.9979 0.9976 0.9969 0.9978 0.9982
0.9974 0.9965 0.9964 0.9949 0.9920 0.9936 0.9819 0.9812 0.9720 0.9720
0.9720 0.9720 0.9720 0.9720 0.9720
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000 1.0000 1.0000 1.0000 1.0000
0.8760 0.7710 0.7502 0.7345 0.6733 0.5155 0.3845 0.3238 0.3260 0.2639
0.0594 0.0460 0.0291 0.0240 0.0086 0.0087 0.0000 0.0000 0.0000 0.0000
0.0000 0.0000 0.0000 0.0000 0.0000
```

```
SCENARIO RECORD    :[01 0011]  1

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          2185899
*                    1329189   88940  295522  119720   54950   91581    9368    5519
*                       4415   17659   21778   25924   92954   16812    7911    3657
VMT FRACTIONS      :
                     .608074 .040688 .135195 .054769 .025138 .041896 .004286 .002525
                     .002020 .008079 .009963 .011860 .042524 .007691 .003619 .001673
VMT BY FACILITY    :V001101F.def
VMT BY HOUR        :V001101H.def
SPEED VMT          :V001101S.def


SCENARIO RECORD    :[02 0011]  2

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           160915
*                     101540    6794   22575    9146    4198    5109     523     308
*                        246     985    1215    1446    5185     889     419     337
VMT FRACTIONS      :
                     .631015 .042221 .140292 .056838 .026088 .031750 .003250 .001914
                     .001529 .006121 .007551 .008986 .032222 .005525 .002604 .002094
VMT BY FACILITY    :V001102F.def
VMT BY HOUR        :V001102H.def
SPEED VMT          :V001102S.def


SCENARIO RECORD    :[03 0011]  3

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          3991427
*                    2575687  172347  572660  231991  106482   97473    9971    5874
*                       4699   18796   23179   27592   98934   28068   13208    4466
VMT FRACTIONS      :
                     .645305 .043179 .143472 .058122 .026678 .024421 .002498 .001472
                     .001177 .004709 .005807 .006913 .024787 .007032 .003309 .001119
VMT BY FACILITY    :V001103F.def
VMT BY HOUR        :V001103H.def
SPEED VMT          :V001103S.def


SCENARIO RECORD    :[04 0011]  4

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          1638649
*                    1061606   71035  236030   95618   43888   37547    3841    2263
*                       1810    7240    8929   10628   38110   11011    5182    3911
VMT FRACTIONS      :
                     .647854 .043350 .144039 .058352 .026783 .022913 .002344 .001381
```

```
                  .001105 .004418 .005449 .006486 .023257 .006720 .003162 .002387
VMT BY FACILITY    :V001104F.def
VMT BY HOUR        :V001104H.def
SPEED VMT          :V001104S.def


SCENARIO RECORD    :[05 0011]  5

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS          652180
*                    420057   28107   93393   37834   17366   16201    1657     976
*                       781    3124    3853    4586   16444    4180    1967    1654
VMT FRACTIONS      :
                  .644080 .043097 .143201 .058012 .026628 .024841 .002541 .001497
                  .001198 .004790 .005908 .007032 .025214 .006409 .003016 .002536
VMT BY FACILITY    :V001105F.def
VMT BY HOUR        :V001105H.def
SPEED VMT          :V001105S.def


SCENARIO RECORD    :[06 0011]  6

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           83201
*                     52312    3500   11631    4712    2163    2714     278     164
*                       131     523     645     768    2755     508     239     158
VMT FRACTIONS      :
                  .628742 .042067 .139794 .056634 .025997 .032620 .003341 .001971
                  .001574 .006286 .007752 .009231 .033113 .006106 .002873 .001899
VMT BY FACILITY    :V001106F.def
VMT BY HOUR        :V001106H.def
SPEED VMT          :V001106S.def


SCENARIO RECORD    :[07 0011]  7

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS           40538
*                     25350    1696    5636    2283    1048    1383     141      83
*                        67     267     329     392    1404     244     115     100
VMT FRACTIONS      :
                  .625342 .041837 .139029 .056317 .025852 .034116 .003478 .002047
                  .001653 .006586 .008116 .009670 .034634 .006019 .002837 .002467
VMT BY FACILITY    :V001107F.def
VMT BY HOUR        :V001107H.def
SPEED VMT          :V001107S.def


SCENARIO RECORD    :[08 0011]  8

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
```

```
*VMT TOTALS             17317
*                       10769     721    2394     970     445     618      63      37
*                          30     119     147     175     627     108      51      43
VMT FRACTIONS      :
                      .621869 .041636 .138247 .056015 .025698 .035688 .003638 .002137
                      .001732 .006872 .008489 .010106 .036208 .006237 .002945 .002483
VMT BY FACILITY    :V001108F.def
VMT BY HOUR        :V001108H.def
SPEED VMT          :V001108S.def


SCENARIO RECORD    :[09 0011]  9

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS              2026
*                        1247      84     278     112      52      77       8       5
*                           4      15      18      22      78      10       5      11
VMT FRACTIONS      :
                      .615461 .041465 .137230 .055287 .025669 .038010 .003949 .002468
                      .001975 .007404 .008885 .010860 .038503 .004936 .002468 .005430
VMT BY FACILITY    :V001109F.def
VMT BY HOUR        :V001109H.def
SPEED VMT          :V001109S.def


SCENARIO RECORD    :[10 0011] 10

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS               721
*                         450      30     100      41      19      24       2       1
*                           1       5       6       7      24       6       3       2
VMT FRACTIONS      :
                      .624314 .041589 .138629 .056838 .026340 .033271 .002773 .001386
                      .001386 .006931 .008318 .009704 .033271 .008318 .004159 .002773
VMT BY FACILITY    :V001110F.def
VMT BY HOUR        :V001110H.def
SPEED VMT          :V001110S.def


SCENARIO RECORD    :[11 0011] 15

CALENDAR YEAR      :1990
EVALUATION MONTH   : 7
FUEL PROGRAM       : 1
SEASON             : 1
SUNRISE/SUNSET     : 6 8
CLOUD COVER        : 0.35
*VMT TOTALS            892600
*                      600005   40148  133401   54042   24805   10380    1062     625
*                         500    2001    2468    2938   10535    4930    2320    2440
VMT FRACTIONS      :
                      .672198 .044979 .149452 .060544 .027790 .011629 .001190 .000700
                      .000560 .002242 .002765 .003292 .011803 .005523 .002599 .002734
VMT BY FACILITY    :V001111F.def
VMT BY HOUR        :V001111H.def
SPEED VMT          :V001111S.def


END OF RUN         : 0021
```

INPUT SCRIPTS CONTINUE FOR EVERY COUNTY AREA TYPE COMBINATION………

Attachment 1 to Appendix D

1990 I/M Input File to MOBILE6 for the Baltimore Region

```
*MD IM Program for 1990.  Idle Test All Vehicles
*Idle for all vehicles
I/M PROGRAM        : 1 1984 2050 2 T/O Idle
I/M MODEL YEARS    : 1 1977 2050
I/M VEHICLES       : 1 22222 22222111 1
I/M STRINGENCY     : 1 23.0
I/M COMPLIANCE     : 1 96.0
I/M WAIVER RATES   : 1 21.0 23.0
```

Attachment 2 to Appendix D

1990 Vehicle Age Distribution Inputs to MOBILE6 for the Baltimore Region

```
REG DIST
*
* This file contains the default MOBILE6 values for the distribution of
* vehicles by age for July of any calendar year.  There are sixteeen (16)
* sets of values representing 16 combined gasoline/diesel vehicle class
* distributions.  These distributions are split for gasoline and diesel
* using the separate input (or default) values for diesel sales fractions.
* Each distribution contains 25 values which represent the fraction of
* all vehicles in that class (gasoline and diesel) of that age in July.
* The first number is for age 1 (calendar year minus model year plus one)
* and the last number is for age 25.  The last age includes all vehicles
* of age 25 or older.  The first number in each distribution is an integer
* which indicates which of the 16 vehicle classes are represented by the
* distribution.  The sixteen vehicle classes are:
*
*  1  LDV    Light-Duty Vehicles (Passenger Cars)
*  2  LDT1   Light-Duty Trucks 1 (0-6,000 lbs. GVWR, 0-3750 lbs. LVW)
*  3  LDT2   Light Duty Trucks 2 (0-6,001 lbs. GVWR, 3751-5750 lbs. LVW)
*  4  LDT3   Light Duty Trucks 3 (6,001-8500 lbs. GVWR, 0-3750 lbs. LVW)
*  5  LDT4   Light Duty Trucks 4 (6,001-8500 lbs. GVWR, 3751-5750 lbs. LVW)
*  6  HDV2B  Class 2b Heavy Duty Vehicles (8501-10,000 lbs. GVWR)
*  7  HDV3   Class 3 Heavy Duty Vehicles (10,001-14,000 lbs. GVWR)
*  8  HDV4   Class 4 Heavy Duty Vehicles (14,001-16,000 lbs. GVWR)
*  9  HDV5   Class 5 Heavy Duty Vehicles (16,001-19,500 lbs. GVWR)
* 10  HDV6   Class 6 Heavy Duty Vehicles (19,501-26,000 lbs. GVWR)
* 11  HDV7   Class 7 Heavy Duty Vehicles (26,001-33,000 lbs. GVWR)
* 12  HDV8A  Class 8a Heavy Duty Vehicles (33,001-60,000 lbs. GVWR)
* 13  HDV8B  Class 8b Heavy Duty Vehicles (>60,000 lbs. GVWR)
* 14  HDBS   School Busses
* 15  HDBT   Transit and Urban Busses
* 16  MC     Motorcycles (All)
*
* The 25 age values are arranged in two rows of 10 values followed by a row
* with the last 5 values.  Comments (such as this one) are indicated by
* an asterisk in the first column. Empty rows are ignored.  Values are
* read "free format," meaning any number may appear in any row with as
* many characters as needed (including a decimal) as long as 25 values
* follow the initial integer value separated by a space.
*
* If all 28 vehicle classes do not need to be altered from the default
* values, then only the vehicle classes that need to be changed need to
* be included in this file.  The order in which the vehicle classes are
* read does not matter, however each vehicle class set must contain 25
* values and be in the proper age order.
*
* LDV
 1 0.0690 0.0776 0.0771 0.0739 0.0873 0.0747 0.0693 0.0616 0.0586 0.0580
```

```
   0.0544 0.0510 0.0450 0.0356 0.0247 0.0174 0.0098 0.0056 0.0044 0.0037
   0.0044 0.0034 0.0025 0.0018 0.0293
* LDT1
 2 0.0995 0.1223 0.1073 0.0994 0.1017 0.0812 0.0663 0.0504 0.0434 0.0411
   0.0403 0.0363 0.0300 0.0206 0.0168 0.0122 0.0069 0.0041 0.0034 0.0025
   0.0042 0.0031 0.0021 0.0016 0.0035
* LDT2
 3 0.0995 0.1223 0.1073 0.0994 0.1017 0.0812 0.0663 0.0504 0.0434 0.0411
   0.0403 0.0363 0.0300 0.0206 0.0168 0.0122 0.0069 0.0041 0.0034 0.0025
   0.0042 0.0031 0.0021 0.0016 0.0035
* LDT3
 4 0.0626 0.0748 0.0805 0.0688 0.0763 0.0769 0.0522 0.0452 0.0451 0.0477
   0.0559 0.0577 0.0540 0.0528 0.0326 0.0265 0.0156 0.0106 0.0085 0.0073
   0.0127 0.0101 0.0076 0.0044 0.0137
* LDT4
 5 0.0626 0.0748 0.0805 0.0688 0.0763 0.0769 0.0522 0.0452 0.0451 0.0477
   0.0559 0.0577 0.0540 0.0528 0.0326 0.0265 0.0156 0.0106 0.0085 0.0073
   0.0127 0.0101 0.0076 0.0044 0.0137
* HDV2B
 6 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV3
 7 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV4
 8 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV5
 9 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV6
10 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV7
11 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV8a
12 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDV8b
13 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDBS
14 0.0924 0.0690 0.0955 0.0648 0.0969 0.0599 0.0443 0.0318 0.0336 0.0504
   0.0542 0.0550 0.0451 0.0406 0.0327 0.0227 0.0128 0.0104 0.0103 0.0116
   0.0140 0.0097 0.0072 0.0050 0.0305
* HDBT
15 0.0483 0.0434 0.0882 0.0813 0.1221 0.0698 0.0619 0.0404 0.0395 0.0543
   0.0580 0.0602 0.0539 0.0447 0.0361 0.0224 0.0131 0.0106 0.0105 0.0109
   0.0102 0.0059 0.0041 0.0014 0.0087
* Motorcycles
16 0.0799 0.0780 0.0674 0.0638 0.0535 0.0441 0.0414 0.0348 0.0249 0.0235
   0.0267 0.4620 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
   0.0000 0.0000 0.0000 0.0000 0.0000
```

Appendix C: Emissions Information

AA County Data

Baltimore County - 24005										
			CO	**CO**	**C0**	**CO**	**CO**	**CO**	**CO**	**CO**
Category		**Indicato**	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
Incinerators		POP	0.04	0.0423569	0.0433234	0.0442289	0.0451039			0.0457212
POTWs		HHS	0	0	0	0	0			0
Structure Fires		POP	0.05	0.0529462	0.0541543	0.0552861	0.0563798			0.0571515
Slash/Prescribed Burning		NONE	0	0	0	0	0			0
Forest Fires		NONE	0.01	0.01	0.01	0.01	0.01			0.01
Open Burning		NONE	7.09	7.09	7.09	7.09	7.09			7.09
Leaking U.S.T.		NONE	0	0	0	0	0			0
R/C/I Fuel Use - Coal		POP	0.69	0.7306571	0.7473294	0.7629487	0.7780415			0.7886904
R/C/I Fuel Use - Fuel Oil		POP	0.67	0.7094786	0.7256677	0.7408343	0.7554896			0.7658298
R/C/I Fuel Use - Wood		POP	15.24	16.137991	16.506231	16.851215	17.18457			17.419771
R/C/I Fuel Use - Natural Gas		POP	0.66	0.6988894	0.7148368	0.729777	0.7442136			0.7543995
R/C/I Fuel Use - LPG		POP	0.02	0.0211785	0.0216617	0.0221145	0.0225519			0.0228606
Bakeries		EMP	0							
Breweries		EMP	0							
Wineries		EMP	0							
Oil Spills		POP	0							
Biogenic*		NONE	0							
Total			**24.470**	**25.493**	**25.913**	**26.306**	**26.686**			**26.954**
Category		**Indicator**								
Recreational Equipment		EGAS	0.25	0.271	0.283	0.295	0.303			0.311
Construction Equipment		EGAS	5.21	5.872	6.273	6.714	7.188			6.486
Industrial Equipment		EGAS	30.35	33.597	36.010	38.751	41.598			42.942
Light Commercial Equipment		EGAS		0.000	0.000	0.000	0.000			0.000
Lawn & Garden Equipment		EGAS	19.46	21.172	22.044	22.846	23.580			24.189
Farm Equipment		NONE	1.87	1.870	1.870	1.870	1.870			1.870
Logging Equipment		EGAS	0.29	0.306	0.328	0.350	0.381			0.431
Aircraft Support		EGAS	2.25	2.560	2.875	3.200	3.600	2.25		3.961
Commercial Aviation		EGAS	0	0.000	0.000	0.000	0.000			0.000
General Aviation		EGAS	3.39	4.021	4.315	5.037	5.404			5.968
Air Taxis		EGAS	0	0.000	0.000	0.000	0.000			0.000
Military Aviation		NONE	3.48	3.480	3.480	3.480	3.480			3.480
Vessels		EGAS	0	0.000	0.000	0.000	0.000			0.000
Pleasure Boats		EGAS	0	0.000	0.000	0.000	0.000			0.000
Railroads		EGAS	0.28	0.272	0.269	0.269	0.269			0.280
Total			**66.830**	**73.421**	**77.748**	**82.810**	**87.671**			**89.919**

Baltimore County Data

Carroll County - 24013									
		CO	CO	C0	CO	CO	CO	CO	CO
Category	**Indicato**	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
Incinerators	POP	0	0	0	0	0			0
Structure Fires	POP	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Slash/Prescribed Burning	NONE	0	0	0	0	0			0
Forest Fires	NONE	0	0	0	0	0			0
Open Burning	NONE	9.67	9.67	9.67	9.67	9.67			9.67
R/C/I Fuel Use - Coal	POP	0.96	1.0165663	1.0397626	1.0614939	1.0824926			1.0973084
R/C/I Fuel Use - Fuel Oil	POP	0.12	0.1270708	0.1299703	0.1326867	0.1353116			0.1371636
R/C/I Fuel Use - Wood	POP	22.14	23.444561	23.979525	24.480702	24.964985			25.306676
R/C/I Fuel Use - Natural Gas	POP	0.02	0.0211785	0.0216617	0.0221145	0.0225519			0.0228606
R/C/I Fuel Use - LPG	POP	0	0	0	0	0			0
Total		**32.920**	**34.290**	**34.852**	**35.378**	**35.887**			**36.245**
Category	**Indicator**								
Recreational Equipment	EGAS	0.04	0.043	0.045	0.047	0.048			0.050
Construction Equipment	EGAS	0.93	1.048	1.120	1.198	1.283			1.158
Industrial Equipment	EGAS	5.42	6.000	6.431	6.920	7.429			7.669
Light Commercial Equipment	EGAS		0.000	0.000	0.000	0.000			0.000
Lawn & Garden Equipment	EGAS	3.48	3.786	3.942	4.086	4.217			4.326
Farm Equipment	NONE	0.33	0.330	0.330	0.330	0.330			0.330
Logging Equipment	EGAS	0.05	0.053	0.057	0.060	0.066			0.074
Aircraft Support	EGAS	0.4	0.455	0.511	0.569	0.640	0.4		0.704
Commercial Aviation	EGAS	0.17	0.202	0.216	0.253	0.271			0.299
General Aviation	EGAS	1.24	1.471	1.579	1.842	1.977			2.183
Air Taxis	EGAS	0	0.000	0.000	0.000	0.000			0.000
Military Aviation	NONE	0	0.000	0.000	0.000	0.000			0.000
Vessels	EGAS	0	0.000	0.000	0.000	0.000			0.000
Pleasure Boats	EGAS	0	0.000	0.000	0.000	0.000			0.000
Railroads	EGAS	0.09	0.087	0.086	0.086	0.086			0.090
Total		**12.150**	**13.475**	**14.317**	**15.392**	**16.346**			**16.883**

Carroll County Data

Harford County - 24025									
		CO	CO	C0	CO	CO	CO	CO	CO
Category	**Indicato**	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
Incinerators	POP	0.02	0.0211785	0.0216617	0.0221145	0.0225519			0.0228606
Structure Fires	POP	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Slash/Prescribed Burning	NONE	0	0	0	0	0			0
Forest Fires	NONE	0.01	0.01	0.01	0.01	0.01			0.01
Open Burning	NONE	3.49	3.49	3.49	3.49	3.49			3.49
Leaking U.S.T.	NONE	0	0	0	0	0			0
R/C/I Fuel Use - Coal	POP	0.8	0.8471386	0.8664688	0.8845782	0.9020772			0.9144237
R/C/I Fuel Use - Fuel Oil	POP	0.17	0.180017	0.1841246	0.1879729	0.1916914			0.194315
R/C/I Fuel Use - Wood	POP	12.36	13.088292	13.386944	13.666733	13.937092			14.127846
R/C/I Fuel Use - Natural	POP	0.08	0.0847139	0.0866469	0.0884578	0.0902077			0.0914424
R/C/I Fuel Use - LPG	POP	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Total		**16.950**	**17.743**	**18.068**	**18.372**	**18.666**			**18.874**
Category	**Indicator**								
Recreational Equipment	EGAS	0.07	0.07581	0.079296	0.082502	0.084819			0.08701
Construction Equipment	EGAS	1.36	1.53272	1.63744	1.752632	1.876392			1.6932
Industrial Equipment	EGAS	7.93	8.77851	9.408945	10.125024	10.868858			11.220157
Light Commercial Equip	EGAS		0	0	0	0			0
Lawn & Garden Equipme	EGAS	5.08	5.52704	5.754624	5.96392	6.155436			6.31444
Farm Equipment	NONE	0.49	0.49	0.49	0.49	0.49			0.49
Logging Equipment	EGAS	0.07	0.073927	0.079282	0.08442	0.091889			0.104118
Aircraft Support	EGAS	0.59	0.671243	0.753902	0.83898	0.944	0.59		1.038754
Commercial Aviation	EGAS	0.04	0.047448	0.05092	0.059432	0.06376			0.070424
General Aviation	EGAS	0.58	0.687996	0.73834	0.861764	0.92452			1.021148
Air Taxis	EGAS	0	0	0	0	0			0
Military Aviation	NONE	1.56	1.56	1.56	1.56	1.56			1.56
Vessels	EGAS	0	0	0	0	0			0
Pleasure Boats	EGAS	0	0	0	0	0			0
Railroads	EGAS	0.06	0.0582	0.057552	0.057552	0.057552			0.06
Total		**17.830**	**19.503**	**20.610**	**21.876**	**23.117**			**23.659**

Harford County Data

Howard County - 24027									
		CO	**CO**	**C0**	**CO**	**CO**	**CO**	**CO**	**CO**
Category	**Indicato**	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
Incinerators	POP	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Structure Fires	POP	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Slash/Prescribed Burning	NONE	0	0	0	0	0			0
Forest Fires	NONE	0	0	0	0	0			0
Open Burning	NONE	1.18	1.18	1.18	1.18	1.18			1.18
Leaking U.S.T.	NONE	0	0	0	0	0			0
R/C/I Fuel Use - Coal	POP	0.1	0.1058923	0.1083086	0.1105723	0.1127596			0.114303
R/C/I Fuel Use - Fuel Oil	POP	0.17	0.180017	0.1841246	0.1879729	0.1916914			0.194315
R/C/I Fuel Use - Wood	POP	4.66	4.9345825	5.047181	5.1526681	5.2545994			5.326518
R/C/I Fuel Use - Natural G	POP	0.09	0.0953031	0.0974777	0.099515	0.1014837			0.1028727
R/C/I Fuel Use - LPG	POP	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Total		**6.230**	**6.528**	**6.650**	**6.764**	**6.874**			**6.952**
Category	**Indicator**								
Recreational Equipment	EGAS	0.07	0.076	0.079	0.083	0.085			0.087
Construction Equipment	EGAS	1.41	1.589	1.698	1.817	1.945			1.755
Industrial Equipment	EGAS	8.24	9.122	9.777	10.521	11.294			11.659
Light Commercial Equipm	EGAS		0.000	0.000	0.000	0.000			0.000
Lawn & Garden Equipment	EGAS	5.28	5.745	5.981	6.199	6.398			6.563
Farm Equipment	NONE	0.51	0.510	0.510	0.510	0.510			0.510
Logging Equipment	EGAS	0.07	0.074	0.079	0.084	0.092			0.104
Aircraft Support	EGAS	0.61	0.694	0.779	0.867	0.976	0.61		1.074
Commercial Aviation	EGAS	0	0.000	0.000	0.000	0.000			0.000
General Aviation	EGAS	0.06	0.071	0.076	0.089	0.096			0.106
Air Taxis	EGAS	0	0.000	0.000	0.000	0.000			0.000
Military Aviation	NONE	0	0.000	0.000	0.000	0.000			0.000
Vessels	EGAS	0	0.000	0.000	0.000	0.000			0.000
Pleasure Boats	EGAS	0	0.000	0.000	0.000	0.000			0.000
Railroads	EGAS	0.15	0.146	0.144	0.144	0.144			0.150
Total		**16.400**	**18.026**	**19.124**	**20.314**	**21.539**			**22.008**

Howard County Data

Baltimore City - 24510										
			CO	CO	C0	CO	CO	CO	CO	CO
Category		**Indicator**	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
Incinerators		POP	0.04	0.0423569	0.0433234	0.0442289	0.0451039			0.0457212
Structure Fires		POP	0.17	0.180017	0.1841246	0.1879729	0.1916914			0.194315
Slash/Prescribed Burning		NONE	0	0	0	0	0			0
Forest Fires		NONE	0	0	0	0	0			0
Open Burning		NONE	0	0	0	0	0			0
Leaking U.S.T.		NONE	0	0	0	0	0			0
R/C/I Fuel Use - Coal		POP	1.08	1.1436371	1.1697329	1.1941806	1.2178042			1.234472
R/C/I Fuel Use - Fuel Oil		POP	0.71	0.7518355	0.7689911	0.7850632	0.8005935			0.811551
R/C/I Fuel Use - Wood		POP	1.72	1.821348	1.862908	1.9018432	1.9394659			1.9660109
R/C/I Fuel Use - Natural Gas		POP	0.89	0.9424417	0.9639466	0.9840933	1.0035608			1.0172964
R/C/I Fuel Use - LPG		POP	0.03	0.0317677	0.0324926	0.0331717	0.0338279			0.0342909
Total			**4.640**	**4.913**	**5.026**	**5.131**	**5.232**			**5.304**
Category		**Indicator**								
Recreational Equipment		EGAS	0.27	0.292	0.306	0.318	0.327			0.336
Construction Equipment		EGAS	5.53	6.232	6.658	7.127	7.630			6.885
Industrial Equipment		EGAS	32.23	35.679	38.241	41.151	44.174			45.602
Light Commercial Equipment		EGAS		0.000	0.000	0.000	0.000			0.000
Lawn & Garden Equipment		EGAS	20.67	22.489	23.415	24.267	25.046			25.693
Farm Equipment		NONE	1.98	1.980	1.980	1.980	1.980			1.980
Logging Equipment		EGAS	0.3	0.317	0.340	0.362	0.394			0.446
Aircraft Support		EGAS	2.39	2.719	3.054	3.399	3.824	2.39		4.208
Commercial Aviation		EGAS	0	0.000	0.000	0.000	0.000			0.000
General Aviation		EGAS	0	0.000	0.000	0.000	0.000			0.000
Air Taxis		EGAS	0	0.000	0.000	0.000	0.000			0.000
Military Aviation		NONE	0	0.000	0.000	0.000	0.000			0.000
Vessels		EGAS	0.75	0.822	0.876	0.933	0.995			1.231
Pleasure Boats		EGAS	0	0.000	0.000	0.000	0.000			0.000
Railroads		EGAS	0.73	0.708	0.700	0.700	0.700			0.730
Total			**64.850**	**71.238**	**75.570**	**80.236**	**85.070**			**87.111**

Baltimore City Data

Queen Anne's County - 24035								
	CO	**CO**	**C0**	**CO**	**CO**	**CO**	**CO**	**CO**
Category	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
Incinerators	0	0	0	0	0			0
Structure Fires	0	0	0	0	0			0
Slash/Prescribed Burning	0	0	0	0	0			0
Forest Fires	0.02	0.02	0.02	0.02	0.02			0.02
Open Burning	1.66	1.66	1.66	1.66	1.66			1.66
Leaking U.S.T.	0	0	0	0	0			0
R/C/I Fuel Use - Coal	0.13	0.13766	0.1408012	0.143744	0.1465875			0.1485939
R/C/I Fuel Use - Fuel Oil	0.03	0.0317677	0.0324926	0.0331717	0.0338279			0.0342909
R/C/I Fuel Use - Wood	7.3	7.7301399	7.9065282	8.0717762	8.231454			8.3441162
R/C/I Fuel Use - Natural Gas	0	0	0	0	0			0
R/C/I Fuel Use - LPG	0.01	0.0105892	0.0108309	0.0110572	0.011276			0.0114303
Total	**9.150**	**9.590**	**9.771**	**9.940**	**10.103**	**0.000**	**0.000**	**10.218**
Category								
Recreational Equipment	0.01	0.011	0.011	0.012	0.012			0.012
Construction Equipment	0.25	0.282	0.301	0.322	0.345			0.311
Industrial Equipment	1.46	1.616	1.732	1.864	2.001			2.066
Light Commercial Equipment		0.000	0.000	0.000	0.000			0.000
Lawn & Garden Equipment	0.94	1.023	1.065	1.104	1.139			1.168
Farm Equipment	0.09	0.090	0.090	0.090	0.090			0.090
Logging Equipment	0.01	0.011	0.011	0.012	0.013			0.015
Aircraft Support	0.11	0.125	0.141	0.156	0.176	0.11		0.194
Commercial Aviation	0	0.000	0.000	0.000	0.000			0.000
General Aviation	0.96	1.139	1.222	1.426	1.530			1.690
Air Taxis	0	0.000	0.000	0.000	0.000			0.000
Military Aviation	0	0.000	0.000	0.000	0.000			0.000
Vessels	0	0.000	0.000	0.000	0.000			0.000
Pleasure Boats	0	0.000	0.000	0.000	0.000			0.000
Railroads	0	0.000	0.000	0.000	0.000			0.000
Total	**3.830**	**4.296**	**4.573**	**4.986**	**5.306**			**5.547**

QA County Data

			CO	CO	C0	CO	CO	CO	CO	CO
SCC	**Category**	**Indicator**	**1990**	**1996**	**1999**	**2002**	**2005**	**2007**	**2010**	**2015**
26-01-000-000	Incinerators	POP	0.110	0.116	0.119	0.122	0.124	0.000	0.000	0.126
28-10-030-000	Structure Fires	POP	0.290	0.307	0.314	0.321	0.327	0.000	0.000	0.331
28-10-005-000, 28-10-015-000	Slash/Prescribed Burning	NONE	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
28-10-001-000	Forest Fires	NONE	0.040	0.040	0.040	0.040	0.040	0.000	0.000	0.040
26-10-000-000	Open Burning	NONE	28.510	28.510	28.510	28.510	28.510	0.000	0.000	28.510
21-02-002-000, 21-03-002-000, 21-04-002-	R/C/I Fuel Use - Coal	POP	4.410	4.670	4.776	4.876	4.973	0.000	0.000	5.041
21-02-004-000, 21-03-004-000, 21-04-004-	R/C/I Fuel Use - Fuel Oil	POP	2.280	2.414	2.469	2.521	2.571	0.000	0.000	2.606
21-02-004-000, 21-03-004-000, 21-04-004-	R/C/I Fuel Use - Wood	POP	78.790	83.433	85.336	87.120	88.843	0.000	0.000	90.059
21-03-006-000, 21-04-006-000	R/C/I Fuel Use - Natural Gas	POP	1.950	2.065	2.112	2.156	2.199	0.000	0.000	2.229
21-03-007-000, 21-04-007-000	R/C/I Fuel Use - LPG	POP	0.090	0.095	0.097	0.100	0.101	0.000	0.000	0.103
	Total		**116.470**	**121.651**	**123.775**	**125.765**	**127.688**	**0.000**	**0.000**	**129.045**

SCC	**Category**	**Indicator**							
22-60-001-xxx, 22-65-001-xxx, 22-70-001-x	Recreational Equipment	EGAS	0.860	0.921	0.963	1.002	1.030	0.000	0.000	1.057
22-60-002-xxx, 22-65-002-xxx, 22-70-002-x	Construction Equipment	EGAS	17.890	19.880	21.239	22.733	24.338	0.000	0.000	21.962
22-60-003-xxx, 22-65-003-xxx, 22-70-003-x	Industrial Equipment	EGAS	104.300	113.844	122.020	131.306	140.953	0.000	0.000	145.508
22-60-006-xxx, 22-65-006-xxx, 22-70-006-x	Light Commercial Equipment	EGAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-60-004-xxx, 22-65-004-xxx, 22-70-004-x	Lawn & Garden Equipment	EGAS	66.880	71.743	74.697	77.414	79.899	0.000	0.000	81.963
22-60-005-xxx, 22-65-005-xxx, 22-70-005-x	Farm Equipment	NONE	6.420	6.330	6.330	6.330	6.330	0.000	0.000	6.330
22-60-007-xxx, 22-65-007-xxx, 22-70-007-x	Logging Equipment	EGAS	0.960	1.003	1.076	1.146	1.247	0.000	0.000	1.413
22-60-008-xxx, 22-65-008-xxx, 22-70-008-x	Aircraft Support	EGAS	7.740	8.681	9.750	10.850	12.208	7.630	0.000	13.433
22-75-020-000	Commercial Aviation	EGAS	1.580	1.874	2.011	2.348	2.519	0.000	0.000	2.782
22-75-050-000	General Aviation	EGAS	7.300	7.521	8.071	9.420	10.106	0.000	0.000	11.162
22-75-060-000	Air Taxis	EGAS	1.720	2.040	2.190	2.556	2.742	0.000	0.000	3.028
22-75-001-000	Military Aviation	NONE	5.510	5.510	5.510	5.510	5.510	0.000	0.000	5.510
22-80-002-000, 22-80-002-020, 22-80-003-	Vessels	EGAS	0.760	0.833	0.888	0.945	1.009	0.000	0.000	1.248
22-82-005-xxx, 22-82-010-xxx, 22-82-020-x	Pleasure Boats	EGAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
22-85-002-000	Railroads	EGAS	1.360	1.319	1.305	1.305	1.305	0.000	0.000	1.360
	Total		**223.280**	**241.498**	**256.048**	**272.863**	**289.194**	**7.630**	**0.000**	**296.756**

County Total Page 1

	Total for Baltimore NAA						
			VOC	**VOC**	**VOC**	**VOC**	**VOC**
SCC	**Category**	**Indicator**	**1990**	**1996**	**1999**	**2002**	**2005**
25-01-060-050	Service Station Refueling	GAS	13.200	14.124	14.560	15.035	15.510
25-01-060-051, 25-01-060-053	Tank Truck Unloading	GAS	0.800	0.856	0.882	0.911	0.940
25-01-060-201	Tank Breathing	GAS	1.050	1.124	1.158	1.196	1.234
25-05-030-120	Tank Trucks in Transit	GAS	0.180	0.193	0.199	0.205	0.212
22-75-900-000	Aircraft Refueling	EMP	0.410	0.516	0.561	0.597	0.627
25-05-020-xxx	Pet. Vessel Unloading	EMP	0.040	0.037	0.036	0.035	0.034
24-15-300-000	Cold Cleaning Degreasing	EMP	10.420	3.109	3.104	3.096	3.086
24-01-001-000	Architectural Surface Coati	POP	19.230	16.290	16.662	17.010	17.347
24-01-005-000	Auto Refinishing	EMP	10.390	6.503	6.853	7.140	7.395
24-25-000-000	Graphic Arts	EMP	4.496	4.909	5.095	5.241	5.367
24-61-800-000	Pesticide Application	NONE	6.410	6.410	6.410	6.410	6.410
24-65-000-000	Commercial/Consumer Solv	POP	20.260	21.454	21.943	22.402	22.845
24-61-021-000	Cutback Asphalt	POP	0.000	0.000	0.000	0.000	0.000
24-61-022-000	Emulsified Asphalt	POP	0.024	0.025	0.026	0.027	0.027
24-01-008-000	Traffic Marking	POP	0.610	0.517	0.529	0.540	0.550
24-01-015-000	Factory Finished Wood	EMP	0.320	0.322	0.328	0.330	0.328
24-01-025-000	Furntiure and Fixtures	EMP	3.450	3.471	3.534	3.555	3.555
24-01-065-000	Electrical Insulation	EMP	0.000	0.000	0.000	0.000	0.000
24-01-040-000	Metal Cans	EMP	3.696	3.205	3.042	2.893	2.750
24-01-050-000	Misc. Finished Metals	EMP	0.710	0.710	0.710	0.704	0.696
24-01-055-000	Machinery and Equipment	EMP	1.152	1.152	1.152	1.150	1.146
24-01-060-000	Appliances	EMP	0.000	0.000	0.000	0.000	0.000
24-01-070-000	New Motor Vehicles	EMP	1.780	1.747	1.726	1.704	1.683
24-01-990-000	OtherTransportation Equipr	EMP	0.264	0.271	0.274	0.276	0.278
24-01-080-000	Marine Coatings	EMP	1.208	1.239	1.253	1.263	1.270
24-01-090-000	Misc. Manufacturing	EMP	2.715	2.715	2.715	2.715	2.715
24-01-110-000	Industrial Maintenance Ctgs	EMP	3.617	2.509	2.382	2.265	2.153
24-01-120-000	Other Coatings	EMP	3.617	2.509	2.382	2.265	2.153
26-20-030-000	Municipal Landfills	POP	2.510	2.658	2.719	2.775	2.830
26-01-000-000	Incinerators	POP	0.036	0.038	0.039	0.040	0.041
26-30-020-000, 26-30-030-000	POTWs	HHS	2.520	2.668	2.729	2.786	2.842
28-10-030-000	Structure Fires	POP	0.050	0.053	0.054	0.055	0.056
28-10-005-000, 28-10-015-000	Slash/Prescribed Burning	NONE	0.000	0.000	0.000	0.000	0.000
28-10-001-000	Forest Fires	NONE	0.020	0.020	0.020	0.020	0.020
26-10-000-000	Open Burning	NONE	3.640	3.640	3.640	3.640	3.640
26-60-000-000	Leaking U.S.T.	NONE	3.360	3.360	3.360	3.360	3.360
21-02-002-000, 21-03-002-000, 21-04-002-000	R/C/I Fuel Use - Coal	POP	0.054	0.057	0.058	0.060	0.061
21-02-004-000, 21-03-004-000, 21-04-004-000, 21	R/C/I Fuel Use - Fuel Oil	POP	0.074	0.078	0.080	0.081	0.083
21-03-006-000, 21-04-006-000	R/C/I Fuel Use - Natural Ga	POP	0.114	0.121	0.123	0.126	0.129
21-03-007-000, 21-04-007-000	R/C/I Fuel Use - LPG	POP	0.002	0.002	0.002	0.002	0.002
23-02-050-000	Bakeries	EMP	0.000	0.000	0.000	0.000	0.000
23-02-070-001	Breweries	EMP	0.000	0.000	0.000	0.000	0.000
23-02-070-005	Wineries	EMP	0.000	0.000	0.000	0.000	0.000
28-30-000-000	Oil Spills	POP	0.000	0.000	0.000	0.000	0.000
27-01-001-000	Biogenic*	NONE	180.090	180.090	180.090	180.090	180.090
	Total		122.489	126.707	128.742	130.559	132.243

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	Total for Baltimore NAA						
			1990 VOC	1999 VOC			
SCC	Category	Indicator	Emissions	Reductions			
25-01-060	Stage II	GAS	13.20	7.30			
24-15-300	Cold Cleaning Degreas	EMP	10.42	7.24			
24-01-001	Architectural Surface C	POP	19.23	4.17		1999 Reductions	
24-01-005	Auto Refinishing	EMP	10.39	5.61		40.8	
24-65-000	Commercial/Consumer	POP	20.26	2.72			
24-01-008	Traffic Marking	POP	0.61	0.13			
24-01-110	Industrial Maintenance	EMP	3.62	0.60			
24-01-120	Other Coatings	EMP	3.62	0.60			
26-20-030	Municipal Landfills	POP	2.51	0.18			
26-10-000	Open Burning	NONE	3.64	3.64			
Total				32.18			
			VOC	VOC		NOx	NOx
SCC	Category	Indicator	1990	1999		1990	1999
22-60-001-	Recreational Equipmer	EGAS	0.86	0.97		0.00	0.00
22-60-002-	Construction Equipmer	EGAS	5.48	6.60		37.04	44.60
22-60-003-	Industrial Equipment	EGAS	1.77	2.10		3.68	4.37
22-60-006-	Light Commercial Equ	EGAS	3.80	4.62		0.51	0.62
22-60-004-	Lawn & Garden Equipr	EGAS	17.68	20.03		0.29	0.33
22-60-005-	Farm Equipment	NONE	1.72	1.72		7.87	7.87
22-60-007-	Logging Equipment	EGAS	0.33	0.37		0.00	0.00
22-60-008-	Aircraft Support	EGAS	0.88	1.12		5.38	6.85
22-75-020	Commercial Aviation	EGAS	0.49	0.62		1.44	1.84
22-75-050	General Aviation	EGAS	0.14	0.18		0.01	0.01
22-75-060	Air Taxis	EGAS	0.08	0.10		0.01	0.01
22-75-001	Military Aviation	NONE	2.81	2.81		0.98	0.98
22-80-002	Vessels	EGAS	0.41	0.48		2.78	3.25
22-82-005-	Pleasure Boats	EGAS	7.71	8.73		0.92	1.05
22-85-002	Railroads	EGAS	0.49	0.48		10.58	10.19
	Total		44.65	50.94		71.49	81.96

INFIPS	INPLNT	PLNTNM	INPNT	INSCC	SCC1N	SCC3N	SCC6N	IPEROD	INPOL
24005	0147	BETHLEHEM STEEL	24	30510403	MINERAL PRODUCTS	BULK MATERIALS	UNLOADING OPERATN	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	7	30300910	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	8	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	9	30300912	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	10	30300933	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	11	30300931	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	12	30300933	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	13	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	15	30300922	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	16	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	17	30300910	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	18	30300934	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	19	30300910	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	20	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	23	30300302	PRIMARY METALS	IRON & STEEL	BY-PRODUCT COKE	PO	42101
24005	0147	BETHLEHEM STEEL	26	30300302	PRIMARY METALS	IRON & STEEL	BY-PRODUCT COKE	PO	42101
24005	0147	BETHLEHEM STEEL	27	30300315	PRIMARY METALS	IRON & STEEL	BY-PRODUCT COKE	PO	42101
24005	0147	BETHLEHEM STEEL	28	30300825	PRIMARY METALS	IRON & STEEL	BLAST FURNACE	PO	42101
24005	0147	BETHLEHEM STEEL	29	30300825	PRIMARY METALS	IRON & STEEL	BLAST FURNACE	PO	42101
24005	0147	BETHLEHEM STEEL	30	30300841	PRIMARY METALS	IRON & STEEL	FLUE DUST	PO	42101
24005	0147	BETHLEHEM STEEL	31	30300819	PRIMARY METALS	IRON & STEEL	SINTERING	PO	42101
24005	0147	BETHLEHEM STEEL	32	30300901	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24005	0147	BETHLEHEM STEEL	33	30300913	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24005	0147	BETHLEHEM STEEL	35	30300935	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0147	BETHLEHEM STEEL	36	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	37	30300931	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0147	BETHLEHEM STEEL	38	30300935	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0147	BETHLEHEM STEEL	39	30300936	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24005	0147	BETHLEHEM STEEL	40	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	42	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	45	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	46	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	47	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24005	0147	BETHLEHEM STEEL	48	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	7	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	9	30300999	PRIMARY METALS	IRON & STEEL	NOT CLASSIFIED	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	10	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	11	30300933	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	12	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	13	30300931	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	14	30300931	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	15	30300933	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	16	30300912	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	17	30300904	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	18	30300931	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	19	30300910	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	20	30300931	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	21	30300922	PRIMARY METALS	IRON & STEEL	STEEL FURNACES	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	22	30300912	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101

Point Source Totals Page 1

INFIPS	INPLNT	PLNTNM	INPNT	INSCC	SCC1N	SCC3N	SCC6N	IPEROD	INPOL
24510	0340	BALTIMORE SPECIALTY STEELS	24	30300910	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	25	30300912	PRIMARY METALS	IRON & STEEL	STEEL ROLL/FINISH	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	1	30500613	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	2	30500606	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	3	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	4	30500606	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	5	30500616	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	6	30500617	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	7	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	8	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	9	30500614	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	10	30500614	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	11	30500614	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	12	30500606	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	13	30500606	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	14	30500606	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	15	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	16	30500616	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	17	30500609	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	18	30500610	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	19	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	20	30500611	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	21	30500611	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	22	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	23	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	24	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	25	30500618	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	26	30500619	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	27	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	28	30500612	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	29	30500617	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	30	30500617	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	31	30500617	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	32	30500619	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24013	0012	LEHIGH PORTLAND CEMENT	33	30500616	MINERAL PRODUCTS	CEMENT MFG	DRY PROCESS	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	8	40600402	PETROLEUM MARKTNG	SERVICE STATIONS	STAGE II	PO	42101
24005	0147	BETHLEHEM STEEL	43	40600307	PETROLEUM MARKTNG	SERVICE STATIONS	STAGE I	PO	42101
24510	0109	S C M CHEMICALS	11	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	12	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	13	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	14	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	15	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	16	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	22	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	23	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	24	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	25	30103599	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	27	30103501	CHEMICAL MFG	INORGANIC CHEMCLS	TI02 PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	29	30103553	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	30	30103553	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101

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INFIPS	INPLNT	PLNTNM	INPNT	INSCC	SCC1N	SCC3N	SCC6N	IPEROD	INPOL
24510	0109	S C M CHEMICALS	31	30103554	CHEMICAL MFG	INORGANIC CHEMCLS	INORGANIC PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	32	30103501	CHEMICAL MFG	INORGANIC CHEMCLS	TI02 PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	33	30103501	CHEMICAL MFG	INORGANIC CHEMCLS	TI02 PIGMENT	PO	42101
24510	0109	S C M CHEMICALS	34	30102399	CHEMICAL MFG	INORGANIC CHEMCLS	H2S04-CONTACT	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	9	49099999	ORGANIC SOLVENT	MISCELLANEOUS	NOT CLASSIFIED	PO	42101
24510	0071	GAF BUILDING PRODUCTS	16	49099999	ORGANIC SOLVENT	MISCELLANEOUS	NOT CLASSIFIED	PO	42101
24510	0071	GAF BUILDING PRODUCTS	17	30601101	PETROLEUM INDRY	PETROLEUM REFNG	ASPHALT BLOWING	PO	42101
24003	0014	BALTO. GAS & ELEC. - WAGNER STATION	1	10100202	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL	PO	42101
24003	0014	BALTO. GAS & ELEC. - WAGNER STATION	4	10100202	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL	PO	42101
24003	0014	BALTO. GAS & ELEC. - WAGNER STATION	5	10100202	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL	PO	42101
24003	0468	BALTO. GAS & ELEC. - BRANDON SHORES	1	10100202	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	5	10100203	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	6	10100203	EXTCOMB BOILER	ELECTRIC GENERATN	BITUMINOUS COAL	PO	42101
24005	0147	BETHLEHEM STEEL	8	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	9	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	12	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	13	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	14	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	15	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	20	10500106	EXTCOMB BOILER	SPACE HEATER	INDUSTRIAL	PO	42101
24005	0147	BETHLEHEM STEEL	21	10500106	EXTCOMB BOILER	SPACE HEATER	INDUSTRIAL	PO	42101
24027	0223	TRANSCONTINENTAL GAS PIPE LINE	1	20200202	INTERNLCOMBUSTION	INDUSTRIAL	NATURAL GAS	PO	42101
24510	0071	GAF BUILDING PRODUCTS	2	10200603	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24510	0071	GAF BUILDING PRODUCTS	18	10200603	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24510	0071	GAF BUILDING PRODUCTS	19	10200602	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24510	0071	GAF BUILDING PRODUCTS	20	10200603	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24510	0109	S C M CHEMICALS	1	10200601	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24510	0109	S C M CHEMICALS	6	10200602	EXTCOMB BOILER	INDUSTRIAL	NATURAL GAS	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	2	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	3	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	4	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	5	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24005	0126	EASTERN STAINLESS STEEL CORPORATION	6	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24005	0147	BETHLEHEM STEEL	1	10300799	EXTCOMB BOILER	COMMERCL-INSTUTNL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	2	10300799	EXTCOMB BOILER	COMMERCL-INSTUTNL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	3	10300799	EXTCOMB BOILER	COMMERCL-INSTUTNL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	4	10200707	EXTCOMB BOILER	INDUSTRIAL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	5	10200707	EXTCOMB BOILER	INDUSTRIAL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	6	10200707	EXTCOMB BOILER	INDUSTRIAL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	7	10200707	EXTCOMB BOILER	INDUSTRIAL	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	16	10100701	EXTCOMB BOILER	ELECTRIC GENERATN	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	17	10100701	EXTCOMB BOILER	ELECTRIC GENERATN	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	18	10100701	EXTCOMB BOILER	ELECTRIC GENERATN	PROCESS GAS	PO	42101
24005	0147	BETHLEHEM STEEL	19	10100701	EXTCOMB BOILER	ELECTRIC GENERATN	PROCESS GAS	PO	42101
24027	0223	TRANSCONTINENTAL GAS PIPE LINE	2	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24027	0223	TRANSCONTINENTAL GAS PIPE LINE	3	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24510	0006	BALTO. GAS & ELEC. - WESTPORT	4	20100201	INTERNLCOMBUSTION	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24510	0109	S C M CHEMICALS	9	30301201	MINING OPERATIONS	METAL ORE MINING	TITANIUM ORE	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	1	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24510	0340	BALTIMORE SPECIALTY STEELS	2	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101

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INFIPS	INPLNT	PLNTNM	INPNT	INSCC	SCC1N	SCC3N	SCC6N	IPEROD	INPOL
24510	0340	BALTIMORE SPECIALTY STEELS	3	10100602	EXTCOMB BOILER	ELECTRIC GENERATN	NATURAL GAS	PO	42101
24510	0498	PULASKI COMPANY	1	50200102	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-GENL	PO	42101
24510	0498	PULASKI COMPANY	2	50200102	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-GENL	PO	42101
24510	0498	PULASKI COMPANY	3	50200102	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-GENL	PO	42101
24510	0498	PULASKI COMPANY	4	50200102	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-GENL	PO	42101
24510	0498	PULASKI COMPANY	5	50200102	SOLID WASTE DISPL	COMMERCL/INSTITNL	INCINERATION-GENL	PO	42101
24003	0014	BALTO. GAS & ELEC. - WAGNER STATION	2	20100101	INTERNLCOMBUSTION	ELECTRIC GENERATN	DIST.OIL/DIESEL	PO	42101
24003	0014	BALTO. GAS & ELEC. - WAGNER STATION	3	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	1	20100101	INTERNLCOMBUSTION	ELECTRIC GENERATN	DIST.OIL/DIESEL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	2	20100101	INTERNLCOMBUSTION	ELECTRIC GENERATN	DIST.OIL/DIESEL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	3	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	4	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	5	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	6	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	7	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24005	0078	BALTO. GAS & ELEC. - RIVERSIDE	8	20100101	INTERNLCOMBUSTION	ELECTRIC GENERATN	DIST.OIL/DIESEL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	1	20100102	INTERNLCOMBUSTION	ELECTRIC GENERATN	DIST.OIL/DIESEL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	2	10100501	EXTCOMB BOILER	ELECTRIC GENERATN	DISTILLATE OIL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	3	10100501	EXTCOMB BOILER	ELECTRIC GENERATN	DISTILLATE OIL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	4	10100501	EXTCOMB BOILER	ELECTRIC GENERATN	DISTILLATE OIL	PO	42101
24510	0006	BALTO. GAS & ELEC. - WESTPORT	2	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24510	0006	BALTO. GAS & ELEC. - WESTPORT	3	10100401	EXTCOMB BOILER	ELECTRIC GENERATN	RESIDUAL OIL	PO	42101
24510	0071	GAF BUILDING PRODUCTS	5	30500111	PETROLEUM INDRY	ASPHALT ROOFING	FELT SATURATION	PO	42101
24510	0071	GAF BUILDING PRODUCTS	15	30500102	PETROLEUM INDRY	ASPHALT ROOFING	ASPHALT BLOWING	PO	42101
24510	0071	GAF BUILDING PRODUCTS	21	30500198	PETROLEUM INDRY	ASPHALT ROOFING	NOT CLASSIFIED	PO	42101
24510	0071	GAF BUILDING PRODUCTS	22	30500102	PETROLEUM INDRY	ASPHALT ROOFING	ASPHALT BLOWING	PO	42101
24005	0147	BETHLEHEM STEEL	10	10500105	EXTCOMB BOILER	SPACE HEATER	INDUSTRIAL	PO	42101
24005	0147	BETHLEHEM STEEL	11	10500105	EXTCOMB BOILER	SPACE HEATER	INDUSTRIAL	PO	42101
24005	0147	BETHLEHEM STEEL	22	10500110	EXTCOMB BOILER	SPACE HEATER	INDUSTRIAL	PO	42101
24510	0006	BALTO. GAS & ELEC. - WESTPORT	1	10200501	EXTCOMB BOILER	INDUSTRIAL	DISTILLATE OIL	PO	42101
24510	0109	S C M CHEMICALS	2	10200401	EXTCOMB BOILER	INDUSTRIAL	RESIDUAL OIL	PO	42101
24510	0109	S C M CHEMICALS	3	10200401	EXTCOMB BOILER	INDUSTRIAL	RESIDUAL OIL	PO	42101
24510	0109	S C M CHEMICALS	4	10200401	EXTCOMB BOILER	INDUSTRIAL	RESIDUAL OIL	PO	42101
24510	0109	S C M CHEMICALS	5	10200401	EXTCOMB BOILER	INDUSTRIAL	RESIDUAL OIL	PO	42101
24510	0109	S C M CHEMICALS	7	10200501	EXTCOMB BOILER	INDUSTRIAL	DISTILLATE OIL	PO	42101
24003	0468	BALTO. GAS & ELEC. - BRANDON SHORES	2	10300501	EXTCOMB BOILER	COMMERCL-INSTUTNL	DISTILLATE OIL	PO	42101
24003	0468	BALTO. GAS & ELEC. - BRANDON SHORES	3	10300501	EXTCOMB BOILER	COMMERCL-INSTUTNL	DISTILLATE OIL	PO	42101
24005	0079	BALTO. GAS & ELEC. - CRANE	7	10300501	EXTCOMB BOILER	COMMERCL-INSTUTNL	DISTILLATE OIL	PO	42101

Appendix D: MOBILE6 Electronic Files

MOBILE6 ELECTRONIC FILES FOR THE BALTIMORE OZONE NONATTAINMENT AREA

Electronic files related to this SIP Revision can also be obtained by contacting:

Doug Austin
Air and Radiation Management Administration
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, Maryland 21230
(410) 537-4218
daustin@mde.state.md.us