



**Development and Production of On-Road Mobile
Source Reasonable Further Progress Emission
Inventories for the years 2002, 2008, 2011, 2014,
2017, 2018 and 2019**

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Contents

INTRODUCTION	4
ACKNOWLEDGMENTS	5
Deliverables	5
EMISSION INVENTORIES SUMMARIES AND DESCRIPTIONS	7
OVERVIEW OF METHODOLOGY	9
<i>ESTIMATION OF VMT</i>	<i>10</i>
<i>DATA SOURCES</i>	<i>10</i>
<i>VMT Adjustments</i>	<i>11</i>
<i>2002 Base Year VMT Adjustment</i>	<i>12</i>
<i>2008, 2011, 2014, 2017, 2018 & 2019 Future Year VMT Adjustment</i>	<i>13</i>
<i>HPMS Factor Calculation for Future Analysis Years</i>	<i>16</i>
<i>Introduction</i>	<i>17</i>
<i>Comparison of Estimated VMT</i>	<i>17</i>
<i>Calculation to HPMS Adjustment Factor</i>	<i>17</i>
<i>Ozone Season Weekday Factor for Future Analysis Years:</i>	<i>18</i>
<i>Hourly Travel Factors</i>	<i>18</i>
ESTIMATION OF EMISSION FACTORS	19
<i>MOBILE6 Input and Output Files</i>	<i>20</i>
<i>Control Programs Modeled</i>	<i>20</i>
<i>Aggregation Level of MOBILE6 Emission Factors</i>	<i>22</i>
<i>External Conditions—Locality Specific Inputs to MOBILE6</i>	<i>32</i>
<i>Temperatures (HOURLY TEMPERATURES Command)</i>	<i>33</i>
<i>Humidity (RELATIVE HUMIDITY Command)</i>	<i>34</i>
<i>Barometric Pressure (BAROMETRIC PRES Command)</i>	<i>34</i>
<i>Sunrise and Sunset Times (SUNRISE/SUNSET Command)</i>	<i>34</i>
<i>Vehicle Fleet Characteristics</i>	<i>36</i>
<i>Vehicle Registration Distributions (REG DIST Command)</i>	<i>36</i>
<i>Diesel Fractions (DIESEL FRACTIONS Command)</i>	<i>37</i>
<i>MOBILE6 User-Specified Activity</i>	<i>40</i>
<i>VMT Fractions (Also Known as VMT Mix)</i>	<i>40</i>
<i>Total VMT by Hour (VMT BY HOUR Command)</i>	<i>40</i>
<i>Hourly Trip Length Distributions (WE DA TRI LEN DI Command)</i>	<i>40</i>
<i>State Programs</i>	<i>41</i>
<i>Vehicle ATP (ANTI-TAMP PROG Command)</i>	<i>42</i>
<i>I/M Programs</i>	<i>44</i>
FUELS	47
<i>Fuel Program (FUEL PROGRAM Command)</i>	<i>48</i>
<i>MOBILE6 Alternative Emissions Regulations and Control Measures Commands</i> .	<i>49</i>
<i>NO CLEAN AIR ACT command</i>	<i>49</i>
<i>REBUILD EFFECTS command</i>	<i>50</i>
<i>Emissions Factor Post-Processing Requirements and Procedures</i>	<i>50</i>
<i>Two-Part ATP Post-processing</i>	<i>50</i>

<i>May 1st I/M Post-Processing-Harris 2002 Control Strategy Evaluations</i>	51
<i>May 1st I/M Post-Processing- Urban counties for 2008, 2011, 2014, 2017, 2018 and 2019</i>	51
<i>LED and Motorcycle Post-Processing</i>	52
EMISSIONS CALCULATIONS	54
<i>Hourly Link Emissions</i>	54
<i>Hourly and 24-hour Emissions Summaries</i>	57
EMISSIONS FACTORS AND EMISSIONS FOR INDIVIDUAL CONTROL REDUCTIONS	57
APPENDIX A: ELECTRONIC SUBMITAL DATA SET NAMES and DESCRIPTIONS	62
APPENDIX B: EMISSIONS ESTIMATION PROGRAMS	71
APPENDIX C: VMT MIX ESTIMATES	76
APPENDIX D: MOBILE6 REGISTRATION DISTRIBUTIONS AND DIESEL FRACTIONS INPUT	91
APPENDIX E: MOBILE6 VMT BY HOUR INPUT	115
APPENDIX F: MOBILE6 TRIP LENGTH DISTRIBUTIONS INPUT	121
APPENDIX G: ATP and I/M PARAMETERS FOR ALL RFP SCENARIOS	126
APPENDIX H: EMISSIONS FOR INDIVIDUAL CONTROL REDUCTIONS ..	151

TECHNICAL NOTE
Transportation Air Quality Technical Support
Interagency Contract
with
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To: Mary McGarry-Barber, Project Manager Date: 25 February, 2009

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Subject: Houston-Galveston-Brazoria Eight-Hour Nonattainment Area Reasonable
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INTRODUCTION

This technical note documents the methods used by Houston-Galveston Area Council (H-GAC) to develop the on-road emission inventories for the Reasonable Further Progress 8-hour State Implementation Plan for the eight nonattainment counties (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller) in the Houston-Galveston-Brazoria (HGB) region. The inventories were calculated using the latest version of the mobile program, MOBILE6.2.03 (EPA, September 2003). This task required the development of the following 20 on-road mobile source RFP EI: 2002 base-year EI; 2002, 2008, 2011, 2014, 2017, 2018 and 2019 adjusted base year EIs (ABYEI); 2008, 2011, 2014, 2017, 2018 and 2019 pre-1990 control EIs; and 2008, 2011, 2014, 2017, 2018, 2019 control strategy EIs (CSEI).

This task also required the calculation of emission factors and emissions due to individual control reductions for each post-1990 control strategy used to demonstrate RFP for the HGB area for analysis years 2008, 2011, 2014, 2017, 2018 and 2019. These runs were done at the county level to develop the individual inventories assigned to each control reduction. In total, H-GAC developed 8 different scenarios for each year (2008, 2011, 2014, 2017, 2018 and 2019) at the county level, for a total of 48 different sets of emissions factors. This is discussed under the title “Emissions Factors for Individual Control Reductions”.

These RFP EIs were developed following the general SIP EI methodology using a detailed time-of-day, directional link-based method. For the development of these EIs, the Houston-Galveston Area 2018-Rate-of-Further-Progress SIP Emissions Inventories On-road Mobile Sources MOBILE6 Modeling Information Guidance (December 16, 2008) was used. These inventories will be used with the inventories from other sources to calculate the required reductions for the milestone years. The results can also be used to develop Motor Vehicle Emissions Budgets (MVEB) for conformity determinations.

The inventories represent the hourly emissions of nitrogen oxides (NOx), volatile organic compounds (VOCs), and carbon monoxide (CO) for each county. To develop the inventories the Houston-Galveston Area Council (H-GAC) travel demand model (TDM) network links were used, summarized by county, network functional classification (or road type), and 28 vehicle types.

The temperature, relative humidity and barometric pressure input to MOBILE6 was hourly regional data provided by the TCEQ.

This document provides the RFP EI summaries, descriptions of control models used, the methods used to develop the vehicle miles traveled (VMT), the adjustment factors, link based VMT and speed estimates, speeds, VMT mix used, MOBILE6 emission factors, and the emissions estimates.

ACKNOWLEDGMENTS

David Gao and Chris van Slyke from H-GAC provided the Houston-Galveston-Brazoria area network traffic assignments and intrazonal trips. Dr. Graciela Lubertino from H-GAC produced the MOBILE6 model set-ups, and performed the emission factors and emissions calculations, Christine Smith helped with the emission calculations. Dr. Dennis Perkinson from TTI, developed the VMT mix and the seasonal adjustment factors. Andy Mullins from Parsons Brinckerhoff (now with TTI) developed the HPMS-consistency factors. Marty Boardman from TTI, developed the registration distributions and diesel fractions. Chris Kite from TCEQ calculated the TxLED and motorcycle factors. Mary McGarry-Barber from TCEQ calculated the meteorological parameters. Dr. Lubertino calculated the post processing of the H-GAC TDM data sets to develop the VMT and operational speed estimates. Dr. Lubertino was the principle investigator for this project. This work was performed by H-GAC under contract with TCEQ. Mary McGarry-Barber was the TCEQ project technical manager.

We also want to thank L.D. White and Marty Boardman from TTI for all their technical support.

Deliverables

The RFP EI data sets have been previously submitted to TCEQ by FTP. Appendix A provides a list of data set file names and descriptions. The data sets provided include:

- Hourly and 24-hour, county and region level, functional classification and vehicle classification data summaries for each RFP EI evaluation, including estimates of weekday VMT mix, ozone season weekday VMT, average speed, and composite emissions for each pollutant.
- MOBILE6 emission factor inputs, adjustment factors, and the resulting county level, hourly, and day-specific emissions factor tables.
- Hourly and 24-hour, county level, functional classification and vehicle classification emission factors and emissions for each of the control strategies from pre-1990 control to 2008 control strategies with controls applied one-at-a-time.

EMISSION INVENTORIES SUMMARIES AND DESCRIPTIONS

Table 1 summarizes the results of each HGB RFP EI.

Table 1- HGB RFP Ozone Season Weekday On-Road Mobile Source VMT, Average Speed (mph), and Emissions (tpd)

Emissions Inventory	VMT	Speed*	VOC	CO	NOx
2002 Adjusted Base Year (ABY)	135,716,461	35.4	189.1	2522.7	387.1
2008 ABY	135,716,461	35.4	185.5	2443.8	346.1
2011 ABY	135,716,461	35.4	184.2	2417.3	335.2
2014 ABY	135,716,461	35.4	183.6	2408.3	334.1
2017 ABY	135,716,461	35.4	183.5	2408.1	333.2
2018 ABY	135,716,461	35.4	183.5	2408.2	333.2
2019 ABY	135,716,461	35.4	183.5	2408.3	333.2
2008 Pre-1990 Control (Pre90C)	146,039,120	36.2	194.9	2597.5	359.2
2011 Pre90C	154,332,687	36.2	205.0	2728.0	372.5
2014 Pre90C	168,390,202	36.6	222.4	2982.5	407.0
2017 Pre90C	180,067,224	36.7	237.9	3190.3	432.0
2018 Pre90C	184,010,299	36.6	242.8	3254.4	443.7
2019 Pre90C	186,033,919	36.9	245.0	3300.2	448.4
2002 Base Year	135,716,461	35.4	132.6	1742.3	326.7
2008 Control Strategy (CS)	146,039,120	36.2	86.1	1041.3	175.8
2011 CS	154,332,687	36.2	68.4	864.6	123.4
2014 CS	168,390,202	36.6	56.2	787.8	86.6
2017 CS	180,067,224	36.7	48.4	751.0	61.8
2018 CS	184,010,299	36.6	46.7	743.6	55.4
2019 CS	186,033,919	36.9	45.1	738.0	49.9

* VMT divided by TDM vehicle hours traveled (VHT).

In total there were seven activity data sets and fourteen emission factor data sets used to develop these twenty RFP emissions inventories. Table 2 shows the correlation between activity and emission factors to create the EIs, which are divided in four main categories: Base Year, Adjusted Base Year, Pre-1990 Controls with Growth, and Control Strategy.

Table 2- HGB RFP Emissions Inventories- Activity and Emission Factors associations

VMT/Speeds	VMT Mix	Emissions Inventory	Emissions Factors
2002	2002	2002 Base Year EI	2002 Control Strategy (CS)
		2002 ABYEI	2002 Pre-90 Control (Pre-90C)
	2008	2008 ABYEI	2008 Pre-90C
	2011	2011 ABYEI	2011 Pre-90C
	2014	2014 ABYEI	2014 Pre-90C
	2017	2017 ABYEI	2017 Pre-90C
	2018	2018 ABYEI	2018 Pre-90C
	2019	2019 ABYEI	2019 Pre-90C
2008	2008	2008 Pre-90EI	2008 Pre-90C
		2008 CSEI	2008 CS
2011	2011	2011 Pre-90EI	2011 Pre-90C
		2011 CSEI	2011 CS
2014	2014	2014 Pre-90EI	2014 Pre-90C
		2014 CSEI	2014 CS
2017	2017	2017 Pre-90EI	2017 Pre-90C
		2017 CSEI	2017 CS
2018	2018	2018 Pre-90EI	2018 Pre-90C
		2018 CSEI	2018 CS
2019	2019	2019 Pre-90EI	2019 Pre-90C
		2019 CSEI	2019 CS

The control programs modeled in the emission factors are shown in Table 3.

Table 3- Emissions Factor Modeled Control Programs for RFP Emissions Inventories

Emissions Factor Analysis	Controls Modeled
2002 Base Year	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2002 State programs (I/M and ATP) Harris and urban counties.*
2002 Pre-90 Control	Pre-90 Federal Motor Vehicle Control Program(FMVCP), 1990 State program (Anti-Tampering Program [ATP], Harris County), Federal 1992 summertime Reid Vapor Pressure [RVP= 7.8] applied
2008 Pre-90 Control	
2011 Pre-90 Control	
2014 Pre-90 Control	
2017 Pre-90 Control	
2018 Pre-90 Control	
2019 Pre-90 Control	
2008 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2008 State programs (I/M and ATP) for Harris and Urban counties; LED and Motorcycle rule for all counties.
2011 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2011 State programs (I/M and ATP) for Harris and Urban counties; LED and Motorcycle rule for all counties.
2014 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2014 State programs (I/M and ATP) for Harris and Urban counties; LED and Motorcycle rule for all counties.
2017 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2017 State programs (I/M and ATP) for Harris and Urban counties; LED and Motorcycle rule for all counties.
2018 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2018 State programs (I/M and ATP) for Harris and Urban counties; LED and Motorcycle rule for all counties.
2019 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2019 State programs (I/M and ATP) for Harris and Urban counties; LED and Motorcycle rule for all counties.

* Urban counties: Brazoria, Fort Bend, Galveston and Montgomery.

OVERVIEW OF METHODOLOGY

To develop the RFP EIs, the directional link-based, hourly methodology was applied. For each of the evaluations, the emissions estimates were calculated at the roadway network link level for each hour of the HGB area peak ozone season.

The MOBILE6 model (EPA, September 2003) was used to develop hourly emissions factors by MOBILE6 road type (or drive cycle) and 28 vehicle types. Speed sensitive freeway and arterial emissions factors as well as fixed-speed ramp emissions factors were used. The freeway emissions factors were applied to links with interstate, freeway, and toll road functional classification codes; the ramp emissions factors were used with links

coded as ramp (for freeway, toll roads, and frontage roads); arterial emissions factors were applied to all other links.

The activity basis for the years 2002, 2008, 2011, 2014, 2017, 2018 and 2019 Houston/Galveston/Brazoria directional TDM link-based and intrazonal VMT (or total TDM VMT estimate) developed from H-GAC's newly structured TDMs were adjusted to ozone season weekday activity and for consistency with the Highway Performance Monitoring System (HPMS) VMT, and allocated to each hour of the day. The 2002, 2008, 2011, 2014, 2017, 2018 & 2019 total TDM VMT estimates were seasonally adjusted with ATR-based ozone season weekday adjustment factors, adjusted for consistency with HPMS. As shown in Table 3, the ABYEIs all use 2002 VMT. For all analysis years, seasonally adjusted, HPMS consistent VMT were allocated to each hour of the day with regional, ATR-based, ozone season weekday hourly VMT fractions. Hourly, directional, average operational speeds were modeled by link. Vehicle classification data were used to estimate time-of-day VMT mixes for apportioning fleet wide link VMT for the three road types to the 28 EPA vehicle types. Link level emissions by vehicle type were calculated for each hour.

TTI previously developed a series of computer programs to develop detailed on-road mobile source emissions inventories. These computer programs were used to produce and apply the major emissions inventory elements (adjusted operational time-of-day link VMT by vehicle type, operational link-speeds, VMT mix, and MOBILE6 emissions factors) to calculate the emissions estimates. Appendix B describes these programs and their application.

ESTIMATION OF VMT

The outputs of the VMT estimation process are estimates of HPMS consistent, hourly link VMT by average peak ozone season weekday for the H-GAC 2002, 2008, 2011, 2014, 2017, 2018 and 2019 TDM Networks (each consisting of an AM Peak assignment, Mid-Day assignment, PM Peak assignment and Overnight assignment) and for each of the added intrazonal links. See Table 10 for hours associated with each assignment period. The TRANSVMT_HSPDWKD program was used to produce these VMT estimates (and to estimate operational link speeds, discussed in a following section). Appendix B includes a description of this program.

DATA SOURCES

The TDMs were provided by H-GAC for the following years: 2002, 2008, 2011, 2014, 2017, 2018 and 2019. Each H-GAC travel model consists of four directional time-of-day period assignments. H-GAC also provided trip tables for each travel model year (one for each time-of-day assignment for each travel model year or 28 total trip tables). Since the intrazonal trips are not included in the TDM, the trip tables were used (along with a calculated zonal radii) to estimate the intrazonal VMT. To adjust the TDM VMT to consistency with HPMS VMT and from average non-summer weekday traffic (ANSWT) form to ozone season weekday VMT, as well as to allocate it to ozone season weekday hourly proportions, several other sources of data were needed.

HPMS VMT estimates are based on traffic count data collected according to a statistical sampling procedure specified by the Federal Highway Administration (FHWA) designed to estimate VMT. A wide range of traffic data is collected under the HPMS program. For this study, county total HPMS Annual Average Daily Traffic (AADT) VMT were used to ensure the travel model VMT were consistent with the HPMS VMT estimates. (EPA and FHWA have endorsed HPMS as the appropriate source of VMT and require that VMT used to construct on road mobile source emissions inventories be made consistent with that reported through HPMS.)

Automatic Traffic Recorder (ATR) vehicle counts are collected by the Texas Department of Transportation (TxDOT) at selected locations on a continuous basis throughout Texas. These counts are available by season, month, and weekday, as well as on an annual average daily basis (i.e., AADT). Since they are continuous, they are especially well suited for making seasonal and time-period comparisons (e.g., for seasonal adjustments and hourly allocations), even though there may be relatively few ATR data collection locations in any given area. For VMT adjustment factors requiring season and day-type specificity, multi-year day-type-specific (average Monday through Friday) ATR data for the HGB peak ozone season period (July through September) were grouped from all active ATR stations in the HGB eight-county area. ATR count data were used in developing the HPMS adjustment factor, peak ozone season weekday adjustment factors and ozone season weekday hourly travel factors.

VMT Adjustments

The TDM VMT was adjusted for consistency with HPMS and to ozone season weekday travel. For the base 2002 and other years 2008, 2011, 2014, 2017, 2018 and 2019, the HPMS factor and an ozone season weekday factor were used. Hourly travel factors were also applied to distribute the 24-hr HPMS consistent, seasonally adjusted VMT to each hour of the ozone season weekday.

2002 Base Year VMT Adjustment

To adjust the 2002 travel model VMT to HPMS-consistent, county-level, ozone season weekday VMT estimates, VMT control totals were used. These control totals were calculated using the HPMS AADT VMT (reported by TxDOT in the 2002 Roadway Inventory Functional Classification Record [RIFCREC] Report) for each county and an ATR-based ozone season weekday (July through September, Monday through Friday) adjustment factor.

The ozone season weekday factor was developed using aggregated ATR data from the latest available years (2000-2005) from active ATR stations within HGB area. This regional factor was calculated by dividing the average weekday count by the AADT traffic count. The 2002 evaluation year ozone season weekday factor is 1.07333.

The HPMS AADT VMT for each county was then multiplied by the ozone season weekday factor to produce eight VMT control totals (one for each county). For each county, the TDM total VMT (TDM assignment VMT plus intrazonal VMT estimate) was divided into the county's respective control total, thus producing eight county-level VMT adjustment factors. For each link in the TDM, the volume was multiplied by the corresponding VMT adjustment factor (based on the county in which the link is located). The seasonally adjusted link-volumes were then multiplied by the associated link lengths to produce the 2002 link-level ozone season weekday VMT estimates. Table 4 shows the TDM VMT, and ozone season weekday control total for each county.

**Table 4
HGB 2002 Travel Model VMT and Ozone Season Weekday Control Totals¹**

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	94,620,392	100,232,607
BRAZORIA	5,647,583	5,995,285
FORT BEND	8,154,630	8,577,311
WALLER	1,750,253	1,696,401
MONTGOMERY	9,268,157	9,653,916
LIBERTY	2,195,314	2,248,830
CHAMBERS	2,088,126	1,881,443
GALVESTON	5,054,128	5,430,669
HGB area	128,780,585	135,716,461

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Weekday activity is average Monday through Friday.

2008, 2011, 2014, 2017, 2018 & 2019 Future Year VMT Adjustment

The 2008, 2011, 2014, 2017, 2018 & 2019 TDM VMT was adjusted for consistency with HPMS (using an HPMS factor) and ozone season weekday travel (using an ozone season weekday factor). The HPMS factor and the ozone season weekday factor are discussed in the following two sections. For each link in the travel model, the link volume was multiplied by the HPMS factor and the ozone season weekday factor. These seasonally adjusted and HPMS consistent link-volumes were then multiplied by their respective link lengths to estimate the link-level ozone season weekday VMT estimates for each year. Tables 5 through 10 show the unadjusted TDM VMT and the TDM VMT adjusted to ozone season weekday, HPMS consistent VMT for 2008, 2011, 2014, 2017, 2018 and 2019 respectively.

Table 5
HGB County 2008 Travel Model and Ozone Season Weekday VMT¹

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	108,102,310	104,445,044
BRAZORIA	7,139,498	6,897,746
FORT BEND	10,452,041	10,150,270
WALLER	2,190,506	2,130,655
MONTGOMERY	11,656,055	11,247,497
LIBERTY	2,759,340	2,672,285
CHAMBERS	2,950,948	2,873,545
GALVESTON	5,855,414	5,622,078
HGB area	151,106,113	146,039,120

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Adjusted for consistency with HPMS. Weekday activity is average Monday through Friday.

Table 6
HGB County 2011 Travel Model and Ozone Season Weekday VMT¹

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	114,901,938	109,939,130
BRAZORIA	7,671,115	7,325,070
FORT BEND	11,635,896	11,089,451
WALLER	2,368,795	2,260,645
MONTGOMERY	12,569,892	11,952,880
LIBERTY	2,973,815	2,829,080
CHAMBERS	3,172,214	3,042,091
GALVESTON	6,197,634	5,894,341
HGB area	161,491,301	154,332,688

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Adjusted for consistency with HPMS. Weekday activity is average Monday through Friday.

Table 7
HGB County 2014 Travel Model and Ozone Season Weekday VMT¹

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	123,840,532	118,513,123
BRAZORIA	8,932,868	8,536,920
FORT BEND	13,214,576	12,592,291
WALLER	2,498,596	2,387,235
MONTGOMERY	14,323,590	13,640,320
LIBERTY	3,222,628	3,071,785
CHAMBERS	3,434,841	3,292,305
GALVESTON	6,674,261	6,356,224
HGB area	176,141,892	168,390,202

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Adjusted for consistency with HPMS. Weekday activity is average Monday through Friday.

Table 8
HGB County 2017 Travel Model and Ozone Season Weekday VMT¹

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	131,312,892	125,673,580
BRAZORIA	9,539,686	9,117,364
FORT BEND	14,623,087	13,937,211
WALLER	2,687,369	2,567,952
MONTGOMERY	15,905,325	15,151,513
LIBERTY	3,471,290	3,309,552
CHAMBERS	3,703,849	3,550,421
GALVESTON	7,096,666	6,759,633
HGB area	188,340,165	180,067,224

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Adjusted for consistency with HPMS. Weekday activity is average Monday through Friday.

Table 9
HGB County 2018 Travel Model and Ozone Season Weekday VMT¹

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	134,017,105	128,261,226
BRAZORIA	9,749,751	9,318,160
FORT BEND	15,080,851	14,371,803
WALLER	2,739,172	2,617,208
MONTGOMERY	16,393,002	15,613,037
LIBERTY	3,518,619	3,354,394
CHAMBERS	3,729,050	3,574,465
GALVESTON	7,244,256	6,900,008
HGB area	192,471,804	184,010,300

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Adjusted for consistency with HPMS. Weekday activity is average Monday through Friday

Table 10
HGB County 2019 Travel Model and Ozone Season Weekday VMT¹

County	Travel Model VMT ²	Ozone Season Weekday VMT ³
HARRIS	135,924,424	129,341,326
BRAZORIA	9,783,460	9,325,518
FORT BEND	15,436,571	14,670,143
WALLER	2,806,966	2,680,185
MONTGOMERY	16,776,633	15,960,723
LIBERTY	3,642,965	3,471,928
CHAMBERS	3,819,466	3,660,891
GALVESTON	7,279,485	6,923,207
HGB area	195,469,970	186,033,919

¹ Rounded to whole numbers.

² These are unadjusted 24-hour VMT totals from time-of-day traffic assignments including intrazonal VMT.

³ Adjusted for consistency with HPMS. Weekday activity is average Monday through Friday

HPMS Factor Calculation for Future Analysis Years

The HPMS adjustment factor was used to adjust the 2008, 2011, 2014, 2017, 2018 & 2019 TDMs for HPMS consistency.

Introduction

H-GAC travel models have been validated up to the year 2002. As part of this validation, it was necessary to re-calculate the factor used to make travel model VMT consistent with VMT estimated by the FHWA Highway Performance Monitoring System (HPMS). The H-GAC Regional Travel Models have been validated to observed vehicle miles of travel (VMT) that are estimated based on roughly 14,000 traffic counts. The estimates and forecasts of vehicle miles of travel produced by the model set are used directly in all transportation planning applications conducted by H-GAC and its transportation planning partners. For purposes of air quality conformity analysis of RTPs, TIPs and the development of State Implementations Plans, H-GAC, through consultation with the Texas Department of Transportation (TxDOT), Texas Commission on Environmental Quality (TCEQ), U.S. DOT and EPA, has chosen to reconcile its Base Year (2002) model estimated regional VMT against regional 2002 VMT estimated by HPMS. The factor needed to reconcile model estimated VMT to HPMS estimated VMT is used for all air quality conformity analysis and development of SIPs.

Comparison of Estimated VMT

In order to compare Base Year 2002 estimated regional VMT to HPMS estimated 2002 VMT, an estimate of total model estimated regional VMT is calculated. Model assigned regional network VMT is combined with assigned regional centroid connector VMT and an estimate of travel within each zone (intrazonal VMT). Because the reconciliation is made for estimated non-summer weekday VMT, both VMT estimates (model and HPMS) are made to represent non-summer weekday VMT. The model VMT is produced in its original form as non-summer weekday VMT, as shown. HPMS VMT represents average annual daily travel (AADT) and is adjusted to represent average non-summer weekday travel, based on an adjusted factor developed using TxDOT permanent traffic recorder data.

$$\begin{aligned} &\text{Model estimated average non-summer weekday travel (ANSWT)} \\ &= (\text{Model network VMT}) + (\text{Model Centroid Connector VMT}) + (\text{Model Intrazonal VMT}) \\ &= (117,334,840) + (11,443,779) + (747,712) \\ &= 129,526,331 \end{aligned}$$

$$\begin{aligned} &\text{HPMS estimated average non-summer weekday travel (ANSWT)} \\ &= (\text{HPMS AADT}) * (\text{AADT to Non-Summer Weekday Travel Adjustment Factor}^1) \\ &= (122,832,328) * (1.0558338) \\ &= 129,690,524 \end{aligned}$$

1 – taken from 2002, 2009 and 2012 Emission Inventory Document, TTI, August 2005

Calculation to HPMS Adjustment Factor

The factor used to reconcile model estimated regional VMT to HPMS estimated regional VMT is calculated by dividing the HPMS estimated average non-summer weekday VMT as follows:

HPMS Adjustment Factor

$$\begin{aligned} &= (\text{HPMS estimated ANSWT}) / (\text{Model estimated ANSWT}) \\ &= (129,690,524) / (129,526,331) \\ &= 1.001267641 \end{aligned}$$

Ozone Season Weekday Factor for Future Analysis Years:

The H-GAC regional ATR-based ozone season weekday factor adjusts the travel model and estimated intrazonal VMT to VMT estimates to that of a typical ozone season weekday. The regional seasonal factor is the average ozone season weekday traffic count divided by the ANSWT traffic count. TTI calculated the seasonal adjustment factor using the latest available ATR data (2001-2006). The ozone season weekday adjustment factor applied for 2008, 2011, 2014, 2017, 2018 and 2019 is 0.95942.

Hourly Travel Factors

The adjusted VMT for a given analysis year must be allocated to each hour of the 24-hour period. To accomplish this, hourly travel factors were applied to the link level VMT estimates. These hourly travel factors were developed using the multi-year, eight county region ozone season weekday ATR data. One HGB region-level set of 24 hourly factors was developed and applied for all analysis years. To maintain the analysis year VMT proportions within each of the four assignment time periods, the hourly fractions were normalized within each time period for each analysis year. Table 11 shows the assignment time periods, their respective hours of the day and corresponding hourly travel factors.

Table 11
HGB Area Hourly Ozone Season Weekday Time Period Volume Factors

Assignment	Hour	Weekday
AM Peak	6:00 a.m.	0.317642
	7:00 a.m.	0.373759
	8:00 a.m.	0.308599
Mid-Day	9:00 a.m.	0.158847
	10 :00 a.m.	0.154302
	11:00 a.m.	0.162031
	12:00 p.m.	0.167966
	1:00 p.m.	0.172496
	2:00 p.m.	0.184358
PM Peak	3:00 p.m.	0.23533
	4:00 p.m.	0.261102
	5:00 p.m.	0.278833
	6:00 p.m.	0.224735
Overnight	7:00 p.m.	0.212697
	8:00 p.m.	0.167002
	9:00 p.m.	0.143083
	10:00 p.m.	0.110835
	11:00 p.m.	0.074922
	12:00 a.m.	0.042162
	1:00 a.m.	0.027947
	2:00 a.m.	0.025680
	3:00 a.m.	0.024404
	4:00 a.m.	0.041390
5:00 a.m.	0.129878	

ESTIMATION OF EMISSION FACTORS

The MOBILE6.2.03 model (September 2003) was applied for each county and RFP evaluation to calculate the emission factors (in grams per mile [g/mi]) of NO_x, VOC and CO. Pollutant emission factors were estimated by speed, hour, road type, and vehicle class. Emission factor post processing was required to properly model the vehicle ATP and I/M programs, as well as to model the impacts of the TxLED fuel and motorcycle programs.

For this study, MOBILE6 defaults were replaced by local input values that were developed to yield emission factors characteristic of the HGB area peak ozone season climatic conditions, vehicle fleets, activity, and emission control programs particular to each HGB area evaluation.

The following sections explain the MOBILE6 input/output files, the control programs modeled, the aggregation level of the emission factors, and describe all the MOBILE6 commands that can affect the calculations. It also explains the emission factors post-processing procedures.

MOBILE6 Input and Output Files

The POLFACT62_3 program (see program descriptions in Appendix B) was applied to run MOBILE6 with the associated MOBILE6 command and external data input files to produce the VOC, NOx, and CO emissions factors output tables. Then where post-processing of the emission factors was required, the utilities RATEADJ62 and RATEADJV62 were applied to output of POLFACT62_3.

The final product of the emission factor modeling was 113 emission factor files: one table of hourly emission factors for each county for the 2002 base year (control strategy) analysis, the pre-1990 control analysis for each of the seven milestone years, and the control strategy analysis for 2008, 2011, 2014, 2017, 2018 and 2019.

In addition to the emission factors calculations done for the emission inventories, 384 other emission factors files were developed for each county to calculate the effect of individual control reductions for each post-1990 control strategy for the analysis years 2008, 2011, 2014, 2017, 2018 and 2019. This is discussed in the following chapter.

All MOBILE6 input and output files have been provided to TCEQ by FTP. Appendix A lists the MOBILE6 input and output file names.

Control Programs Modeled

Table 12 shows the controls modeled for each emission factor analysis and identifies the control programs where post-processing was required.

All FMVCPs were modeled (this is the MOBILE6 default), except for the pre-1990 control scenario where the NO CLEAN AIR ACT command was applied (further referenced in Table 23). Also modeled were the federal programs to offset heavy-duty diesel (HDDV), defeat device effects (the low emissions rebuild program), and the HDDV 2004 standard pull-ahead program (MOBILE6 default). The RFG, I/M, ATP, Texas LED, and motorcycle programs were modeled as well.

Post-processing of MOBILE6 emission factors was required for several analyses to properly model the ATP, I/M, TxLED and motorcycle (MC) programs. This process is discussed later in this paper.

**Table 12
Control Programs Modeled in HGB Area RFP MOBILE6 Emissions Factors**

Emissions Factor Analysis	Controls Modeled	Emissions Factor Post Processing
2002 Base Year	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2002 State programs (I/M and ATP) Harris and urban counties	Two part ATP, Harris I/M May 1 st test type change
2008 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2008 State programs (I/M and ATP) Harris and urban counties	One ATP Harris and urban counties, May 1 st I/M start (urban counties) LED and MC all counties
2011 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2011 State programs (I/M and ATP) Harris and urban counties	One ATP Harris and urban counties, May 1 st I/M start (urban counties) LED and MC all counties
2014 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2014 State programs (I/M and ATP) Harris and urban counties	One part ATP Harris and urban counties May 1 st I/M start (urban counties) LED and MC all counties
2017 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2017 State programs (I/M and ATP) Harris and urban counties	One part ATP Harris and urban counties May 1 st I/M start (urban counties) LED and MC all counties
2018 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2018 State programs (I/M and ATP) Harris and urban counties	One part ATP Harris and urban counties May 1 st I/M start (urban counties) LED and MC all counties
2019 Control Strategy	Post-1990 FMVCP, Summer Reformulated Gasoline (RFG), 2019 State programs (I/M and ATP) Harris and urban counties	One part ATP Harris and urban counties May 1 st I/M start (urban counties) LED and MC all counties
2002 Pre-90 Control	Pre-90 FMVCP 1990 State Program (Harris County ATP) Federal 1992 Summertime RVP limit	Two part ATP Harris county
2008 Pre-90 Control		
2011 Pre-90 Control		
2014 Pre-90 Control		
2017 Pre-90 Control		
2018 Pre-90 Control		
2019 Pre-90 Control		

Aggregation Level of MOBILE6 Emission Factors

The by-model-year emissions factors from the MOBILE6 detailed database output were condensed into average fleet emission factors by vehicle class. POLFACT62_3 performed this function for each vehicle type by multiplying each of its age specific emission factors by their corresponding travel fractions (developed from the MOBILE6 database output age-specific registration fractions and miles traveled fractions) and summing the resultant products. Each emissions factor table provides the MOBILE6 emission factors by: 28 vehicle types, 4 road types, 14 speeds (except for two MOBILE6 road types, each with one average speed), 15 pollutant-specific emissions types, and 24 hours time periods.

Table 13 shows the 28 MOBILE6 vehicle types, defined by fuel type (gasoline or diesel) and GVWR category, in sequence by MOBILE6 vehicle type number.

Table 13
EPA Vehicle Types- 28 Categories

Number	Abbreviation	Description	GVWR
1	LDGV	Light-duty gasoline vehicle	≤ 6,000
2	LDGT1	Light-duty gasoline truck	≤ 6,000
3	LDGT2	Light-duty gasoline truck	≤ 6,000
4	LDGT3	Light-duty gasoline truck	6,001-8,500
5	LDGT4	Light-duty gasoline truck	6,001-8,500
6	HDGV2b	Heavy- duty gasoline vehicle	8,501-10,000
7	HDGV3	Heavy- duty gasoline vehicle	10,001-14,000
8	HDGV4	Heavy- duty gasoline vehicle	14,001-16,000
9	HDGV5	Heavy- duty gasoline vehicle	16,001-19,500
10	HDGV6	Heavy- duty gasoline vehicle	19,501-26,000
11	HDGV7	Heavy- duty gasoline vehicle	26,001-33,000
12	HDGV8a	Heavy- duty gasoline vehicle	33,001-60,000
13	HDGV8b	Heavy- duty gasoline vehicle	> 60,000
14	HDGB	Heavy- duty gasoline bus	all
15	LDDV	Light-duty diesel vehicle	≤ 6,000
16	LDDT12	Light-duty diesel truck	≤ 6,000
17	LDDT34	Light-duty diesel truck	6,001-8,500
18	HDDV2b	Heavy- duty diesel vehicle	8,501-10,000
19	HDDV3	Heavy- duty diesel vehicle	10,001-14,000
20	HDDV4	Heavy- duty diesel vehicle	14,001-16,000
21	HDDV5	Heavy- duty diesel vehicle	16,001-19,500
22	HDDV6	Heavy- duty diesel vehicle	19,501-26,000
23	HDDV7	Heavy- duty diesel vehicle	26,001-33,000
24	HDDV8a	Heavy- duty diesel vehicle	33,001-60,000
25	HDDV8b	Heavy- duty diesel vehicle	> 60,000
26	HDDBS	Heavy- duty diesel school bus	all

27	HDDBT	Heavy- duty diesel transit bus	all
28	MC	Motorcycle	all

Table 14 shows the eight MOBILE6 emission type classifications (excluding particulate matter and air toxics since they are not included in the analysis). Expanding the emission types by individual pollutants yields 12 pollutant-specific emissions types. In addition to these, POLFAC62_3 calculates MOBILE6 emission factor tables which contain three composite emission factors (one for each pollutant). In this way, POLFAC62_3 calculates MOBILE6 emission factors for up to 15 pollutant specific emission types. In this case, MOBILE6 emission factors were calculated for 14 pollutant specific emission types because the refueling emission type is excluded as these are classified as an area source emission.

Table 14
MOBILE6 Emission Type Classifications

Number	Abbreviation	Description	Pollutants	Vehicle Classes
1	Running	Exhaust Running Emissions	Hydrocarbon (HC), CO, NOx	All
2	Start	Exhaust Engine Start Emissions (trip start)	HC, CO, NOx	All light duty vehicles plus MC
3	Hot Soak	Evaporative Hot Soak Emissions (trip end)	HC	Gas and MC
4	Diurnal	Evaporative Diurnal Emissions (heat rise)	HC	Gas and MC
5	Resting	Evaporative Resting Loss Emissions (leaks and seepage)	HC	Gas and MC
6	Run Loss	Evaporative Running Loss Emissions	HC	Gas less MC
7	Crankcase	Evaporative Crankcase Emissions (blow-by)	HC	Gas and MC
8	Refueling	Evaporative Refueling Emissions (fuel displacement and spillage)	HC	Gas less MC

MOBILE6 calculates emission factors reflective of driving cycles observed on four roadway types as well as emission factors for those emissions types that are not directly applicable to driving cycles such as engine start exhaust and the evaporative component (excluding running losses).

Table 15 shows the driving cycle or the roadway type descriptions. The fifth roadway type, according to MOBILE6 is “none”, which is the index for the emission types that do not apply to the driving cycles and as a consequence do not vary by roadway type or speed. POLFAC62_3, however, categorizes all of the pollutant-specific emissions types

by MOBILE6 roadway types one through four, Freeway, Arterial, Local, and Ramp. In POLFAC62_3 tables, the MOBILE6 g/mi emissions factors corresponding to the “None” roadway type are tabulated as emissions factors under each of the four actual roadway types. The allocation of the MOBILE6 “None” road type emissions factors to the Freeway, Arterial, Local, and Ramp MOBILE6 road types is performed in POLFAC62_3 so that all emissions, regardless of type, may be spatially allocated to the functional class (or roadway type) coded network links.

Table 15
MOBILE6 Roadway Classifications

Number	Abbreviation	Description
1	Freeway	High-speed, limited-access roadways
2	Arterial	Arterial and collector roadways
3	Local	Urban local roadways
4	Fwy Ramp	Freeway on and off ramps
5	None	Not applicable (for start and some evaporative emissions)

MOBILE6 uses several hourly input parameters (hourly temperatures, hourly VMT fractions, etc.) to model hourly emissions factors. MOBILE6 requires that hourly input parameters be sequenced starting from the 6 a.m. hour. Table 16 shows the MOBILE6 sequence for hourly inputs.

Table 16
General Sequence for Calendar Day Hourly Inputs to MOBILE6

Input Sequence Number	Abbreviation	Description
1	6 a.m.	6 a.m. through 6:59 a.m.
2	7 a.m.	7 a.m. through 7:59 a.m.
3	8 a.m.	8 a.m. through 8:59 a.m.
4	9 a.m.	9 a.m. through 9:59 a.m.
5	10 a.m.	10 a.m. through 10:59 a.m.
6	11 a.m.	11 a.m. through 11:59 a.m.
7	12 Noon	12 p.m. through 12:59 p.m.
8	1 p.m.	1 p.m. through 1:59 p.m.
9	2 p.m.	2 p.m. through 2:59 p.m.
10	3 p.m.	3 p.m. through 3:59 p.m.
11	4 p.m.	4 p.m. through 4:59 p.m.
12	5 p.m.	5 p.m. through 5:59 p.m.
13	6 p.m.	6 p.m. through 6:59 p.m.
14	7 p.m.	7 p.m. through 7:59 p.m.
15	8 p.m.	8 p.m. through 8:59 p.m.
16	9 p.m.	9 p.m. through 9:59 p.m.
17	10 p.m.	10 p.m. through 10:59 p.m.
18	11 p.m.	11 p.m. through 11:59 p.m.
19	12 Midnight	12 a.m. through 12:59 a.m.
20	1 a.m.	1 a.m. through 1:59 a.m.

21	2 a.m.	2 a.m. through 2:59 a.m
22	3 a.m.	3 a.m. through 3:59 a.m
23	4 a.m.	4 a.m. through 4:59 a.m
24	5 a.m.	5 a.m. through 5:59 a.m

Tables 17 through 24 list and describe all MOBILE6 commands which affect emissions factor calculations, and some commands that affect the format or content of the output. These tables are: MOBILE6 Pollutants and Emission Rates, MOBILE6 External Conditions, MOBILE6 Vehicle Fleet Characteristics, MOBILE6 Activity, MOBILE6 State Programs, MOBILE6 Fuels, and MOBILE6 Alternative Emissions Regulations and Control Measures. These tables identify the MOBILE6 commands and parameters used. Parameters associated with each MOBILE6 command are, in general, labeled as either EPA default, locality specific, or NOT APPLIED. References to MOBILE6 technical reports (EPA MOBILE6 website: <http://www.epa.gov/otaq/models/mobile6/m6tech.htm>) pertaining to particular commands/input parameters are provided in the tables. Unless otherwise stated, the tabulated commands and input parameters were applied for all counties and evaluations.

Table 17
MOBILE6 Pollutants and Emission Rates

Command	Function/Description	Input Parameter Source/Value
POLLUTANT	Defines the basic set of pollutants to report.	NOT APPLIED (The MOBILE6 default is assumed: HC, CO, NO _x)
PARTICLES	Enables computation of particulate matter (PM) and related emission factors.	NOT APPLIED
PARTICLES EF	Specifies location of files that contain the particulate emissions factors when PARTICULATES command is used.	NOT APPLIED
PARTICLE SIZE	Allows user to specify the maximum particulate size cutoff used by MOBILE6.	NOT APPLIED
EXPRESS HC AS VOC	One of the five possible commands which allow the user to specify the particular HC species (non-methane HC, non-methane organic gases, total HC, total organic gases, and VOC) to report in the exhaust emissions output.	APPLIED Only the command is required
NO REFUELING	Directs MOBILE6 not to calculate refueling emissions factors.	APPLIED Only the command is required
AIR TOXICS	Enables the computation of air toxics emissions factors (six explicit pollutants) and specifies which to calculate.	NOT APPLIED
ADDITIONAL HAPS	Allows entry of emissions factors or air toxic ratios for calculation of additional user-defined air toxic pollutant emissions factors.	NOT APPLIED
MPG ESTIMATES	Allows entry of alternate fuel economy performance data by vehicle class and model year.	NOT APPLIED (The MOBILE6 default values are assumed)

Table 18
MOBILE6 External Conditions

Command	Function/Description	Input Parameter Source/Value
CALENDAR YEAR	Identifies calendar year for which emissions factors are to be calculated. (Required to run model).	Base Year: 2002 Pre1990: 2002, 2008, 2011, 2014, 2017, 2018 & 2019. Control Strategy: 2002, 2008, 2011, 2014, 2017, 2018 & 2019.
EVALUATION MONTH	Provides option of calculating January 1 or July 1 emissions factors for calendar year of evaluation.	7 (for July).
MIN/MAX TEMPERATURE	Sets minimum and maximum daily temperatures. (Required to run model if the HOURLY TEMPERATURES command is not used.)	NOT APPLIED. (See HOURLY TEMPERATURES.)
HOURLY TEMPERATURES	Allows temperatures input for each hour of day. (Required to run model if MIN/MAX TEMPERATURE command is not used.)	For RFP: Region specific ozone season weekday values (provided by TCEQ, see Table 24)
ALTITUDE	Specifies high- or low-altitude for modeling area.	NOT APPLIED. (EPA default, low altitude, is assumed).
ABSOLUTE HUMIDITY	Used to specify daily average humidity. Affects HC, CO, and NOx emissions for the portion of the fleet that MOBILE6 determines is using air conditioning.	NOT APPLIED. (See RELATIVE HUMIDITY.)
<u>Environmental Effects on Air Conditioning:</u>	Commands used to model the extent of vehicle air-conditioning usage.	
CLOUD COVER	Defines average percent cloud cover for given day.	NOT APPLIED. (EPA default assumed.)
PEAK SUN	Specifies Mid-Day hours with peak sun intensity.	NOT APPLIED. (EPA default assumed.)
SUNRISE/SUNSET	Allows user to specify time of sunrise and sunset.	Region-specific values (provided by TCEQ), 7 a.m. and 8 p.m.
RELATIVE HUMIDITY	Specifies use of 24 hourly relative humidity values entered by user. MOBILE6 will perform hour-specific calculations with hourly values rather than use daily default absolute humidity value.	For RFP: Region-specific ozone season weekday values (provided by TCEQ, see Table 24).
BAROMETRIC PRES	Specifies use of user input daily average barometric pressure for use with hourly relative humidity to calculate hourly absolute humidity values.	For RFP: Region-specific ozone season weekday values (provided by TCEQ, see Table 24).

Table 19: MOBILE6 Vehicle Fleet Characteristics, Input to POLFAC62_3

Command	Function/Description	Input Parameter Source/Value
REG DIST	Allows the user to supply registration distributions by age for any of the 16 composite (combined gasoline and diesel) vehicle types.	Locality-Specific/EPA default. TTI developed age distributions (for use with all future evaluation years) input using the latest available TxDOT registrations data and MOBILE6 defaults. Mid-year 2002 and 2008 TxDOT registrations data are applied. LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level. Input values are shown in Table 25 and Appendix D
DIESEL FRACTIONS	Permits user to supply locality-specific diesel fractions for 14 of the 16 composite vehicle categories by age.	Locality-Specific/EPA default. TTI developed the evaluation year-specific diesel fractions inputs with the latest available TxDOT registrations data (2002 & 2008) and MOBILE6 defaults. Input values are shown in Table 26 and Appendix D
MILE ACCUM RATE	Allows the user to supply the annual mileage accumulation rates by vehicle type and age	NOT APPLIED. (EPA defaults assumed)
NGV FRACTION	Lets user specify percent of natural gas vehicles (NGV) in the fleet by type and age certified to operate on either compressed or liquefied natural gas.	NOT APPLIED. (The EPA default, zero percent, is assumed.)
NGV EF	Permits the user to enter alternate NGV emissions factors for each of the 28 vehicle types, for running and start emissions.	NOT APPLIED. (The EPA default, none, is assumed.)

Table 20: MOBILE6 Activity, Input to POLFAC62_3

Command	Function/Description	Input Parameter Source/Value
VMT FRACTIONS	Used in MOBILE6 to weight the emissions of various vehicle types into average rates for groupings of vehicle classes.	NOT APPLIED. (EPA default assumed, used for aggregate results which are not applied in this analysis.)
VMT BY FACILITY	VMT fractions by MOBILE6 road type combine the four road type emissions factors into the “all road types” emissions factors.	EPA default assumed.
VMT BY HOUR	Allows VMT fractions allocation by hour-of-day; applied in conversion of grams per hour (g/hr) to g/mi, as well as in weighting of hourly g/mi rates to obtain daily emissions factors.	The hourly VMT fractions are developed as county hourly total VMT divided by county 24-hour total VMT.
SPEED VMT	Allows user to allocate VMT by average speed (14 pre-selected: 2.5 and 5 through 65 at 5 mph increments) for arterials and freeways for each hour of the day.	Generic input. Same for all counties. Inputs are set up to calculate emissions factors by 14 MOBILE6 speed bin speed scenarios for MOBILE6 Freeway and Arterial road types.
AVERAGE SPEED	Allows a single average speed for combined freeways and arterials for the entire day.	NOT APPLIED.
STARTS PER DAY	Lets user specify the average number of engine starts per vehicle per day by vehicle types for weekend days and weekdays.	NOT APPLIED (EPA weekday defaults are applied)
START DIST	Allows user to allocate engine starts by hour of the day for weekend days and weekdays	NOT APPLIED (EPA weekday defaults are applied).
SOAK DISTRIBUTION	Allows use of alternate vehicle soak duration distributions for weekend days and weekdays.	NOT APPLIED (EPA weekday defaults assumed)
HOT SOAK ACTIVITY	Allows users to specify a hot soak duration distribution for each of 14 daily time periods for weekend days and for weekdays.	NOT APPLIED (EPA weekday defaults assumed)
DIURN SOAK ACTIVITY	Allows user set diurnal soak time distributions for each of 18 daily time periods.	NOT APPLIED. (EPA defaults assumed)
WE DA TRI LEN DI	Specifies alternate fractions of VMT that occur during trips of various durations at each hour of the average weekday.	Locality-Specific. Latest HGB regional TDM-based weekday distributions Developed by H-GAC for each specific analysis year. ¹
WE EN TRI LEN DI	Specifies hourly alternate fractions of VMT for trips of various lengths for weekend days.	NOT APPLIED
WE VEH US	Directs MOBILE6 to use weekend activity data for calculating emissions factors.	NOT APPLIED.

¹: The H-GAC model set is validated to 2002 TxDOT saturation count and METRO ridership. Each SIP analysis year has unique network and demographic data.

Table 21
MOBILE6 State Programs

Command	Function Description	Input Parameter Source/Value
STAGE II REFUELING	Allows modeling of at-the-pump refueling emissions.	NOT APPLIED. Accounted for as an area source category.
ANTI-TAMP PROG	Allows user to model impacts of an ATP.	Locality-Specific. Program design by county. Applied to Harris and urban counties. Rural counties: no ATP.
<u>I/M Commands:</u> I/M PROGRAM I/M MODEL YEARS I/M VEHICLES I/M STRINGENCY I/M COMPLIANCE I/M WAIVER RATES I/M CUTPOINTS I/M EXEMPTION AGE I/M GRACE PERIOD NO I/M TTC CREDITS I/M EFFECTIVENESS I/M DESC FILE	Required for exhaust/evaporative I/M programs. Required for exhaust/evaporative I/M programs. Required for exhaust/evaporative I/M programs. Required for exhaust. Do not use for evaporative. Required for exhaust. Optional for evaporative. Required for exhaust. Optional for evaporative. Optional for exhaust (but required for IM240). Do not use with evaporative. Optional for both exhaust and evaporative. Optional for both exhaust and evaporative. Optional for exhaust. Do not use with evaporative. Optional for exhaust. Do not use with evaporative. Optional for both.	Locality Specific. Program design by county. Applied to Harris and urban counties. Rural counties: no I/M program.

Table 22: Mobile6 Fuels

Command	Function/Description	Input Parameter Source/Value
FUEL PROGRAM	Allows specification of one of four options: 1) Conventional Gasoline East Tier2 sulfur phase-in schedule (includes Texas); 2) RFG; 3) Conventional Gasoline West Tier2 sulfur geographical phase-in area schedule; or 4) Sulfur content for gasoline after 1999.	Option 1: MOBILE6 Default; applied to pre1990 and adjusted base year analyses Option 4: applied to control strategy analyses; sulfur content values from MOBILE6 RFG summer program default.
SULFUR CONTENT	Allows alternate sulfur content for conventional gasoline through calendar year 1999.	NOT APPLIED. (MOBILE6 default assumed.)
DIESEL SULFUR	Allows alternate diesel sulfur levels for all calendar years, for PARTICULATES. No affect on HC, CO, NOx, air toxics (except if calculated as ratio to PM).	NOT APPLIED.
OXYGENATED FUELS	Allows modeling of oxygenated gasoline effects on exhaust for all gasoline-fueled vehicle types. Not for use with AIR TOXICS command.	NOT APPLIED to pre1990 and adjusted base year analyses Applied to control strategy analyses; used MOBILE6 RFG summer values.
FUEL RVP	Allows user to specify fuel RVP for area being modeled (required to run model).	7.8 psi for pre1990 and adjusted base year analyses 6.7 psi for control strategy analyses
SEASON	Identifies effective season for RFG calculation regardless of month modeled.	NOT APPLIED.
GAS AROMATIC%	Only when AIR TOXICS command is used.	NOT APPLIED.
GAS OLEFIN%	Only when AIR TOXICS command is used.	NOT APPLIED.
GAS BENZENE%	Only when AIR TOXICS command is used.	NOT APPLIED.
E200	Only when AIR TOXICS command is used.	NOT APPLIED.
E300	Only when AIR TOXICS command is used.	NOT APPLIED.
OXYGENATE	Only when AIR TOXICS command is used.	NOT APPLIED.
RVP OXY WAIVER	Only when AIR TOXICS command is used.	NOT APPLIED.

Table 23
MOBILE6 Alternative Emissions Regulations and Control Measures

Command	Function/Description	Input Parameter Source/Value
NO CLEAN AIR ACT	Models vehicle emissions as if the Federal Clean Air Act Amendments of 1990 had not been implemented.	NOT APPLIED for control strategy analyses. APPLIED for pre-1990 and adjusted base year analyses.
<u>HDDV NOx Off Cycle Emissions Effects:</u> NO DEFEAT DEVICE	Turns off effects of HDD vehicle NOx offcycle emissions effects (defeat device emissions).	NOT APPLIED.
NO NOX PULL AHEAD	Turns off HDD NOx emissions reduction effects of pull- ahead program.	NOT APPLIED.
NO REBUILD	Turns off HDD NOx emissions reduction effects of rebuild program.	NOT APPLIED.
REBUILD EFFECTS	Allows user change rebuild program effectiveness rate.	APPLIED. MOBILE6 default (0.90) was assumed for years 2011, 2014, 2017, 2018 and 2019. For 2002 and 2008 the 0.032 and 0.178 values were used respectively, based on EPA program trucking data.
<u>Tier 2 Emission Standards and Fuel Requirements:</u> NO TIER2 T2 EXH PHASE-IN T2 EVAP PHASE-IN T2 CERT	Allow the overriding of the default Tier 2 emissions standards and fuel requirements settings. Disables Tier 2 requirements. Allows alternate Tier 2 exhaust standard phase-in schedules. Allows alternate Tier 2 evaporative standard phase-in schedules. Allows user to specify alternate Tier 2 50,000-mile certification standards.	NOT APPLIED.
94+ LDG IMPLEMENTATION	Allows use of alternate 1994 and later fleet penetration fractions for LDGVs under the Tier 1, NLEV (or California LEV 1), and Tier 2 emissions standard programs.	NOT APPLIED.
NO 2007 HDDV RULE	Disables 2007 HDV emissions standards.	NOT APPLIED.

External Conditions—Locality Specific Inputs to MOBILE6

The HGB 8-hour RFP climatic inputs to the MOBILE model were developed by TCEQ, on January 8, 2009, based on guidance from EPA for use in producing HGB RFP EIs with MOBILE6.2.03. The hourly climatic input features of MOBILE6.2.03 are applied for this effort. The hourly features include: hourly temperatures, hourly relative humidity, 24 hour average barometric pressure, and sunrise/sunset times. These inputs were used for all years and all scenarios.

The basic 1990 base year EI temperature development procedure as described in the guidance document "Procedures for Emissions Inventory Preparation, Volume IV: Mobile Sources" (EPA, 1992) was used to produce the climatic inputs to MOBILE6.2.03 for the current HGB RFP EI effort. The most recent three years of weather observation data are used. TCEQ developed these values based on climate data from the 10 highest ozone exceedance days from the period 2006 through 2008.

Temperatures (HOURLY TEMPERATURES Command)

TCEQ developed ambient ozone season hourly temperatures (degrees Fahrenheit) for input to MOBILE6 for the eight-county region. The input temperatures are hourly averages from the 10 highest ozone exceedance days for the period 2006 through 2008. TCEQ used the George Bush-Houston Intercontinental Airport (IAH) weather station data. The number of exceedances for each month were determined. The consecutive three month number of exceedances were calculated for the ozone season months. Three 3-month periods tied for having the highest number of ozone exceedances April, May, June and June, July, August and August, September, October. Since June, July, August is the default ozone season and tied for the highest number of exceedances, those three months were used as the ozone season for HGB for 2006 to 2008. The ozone exceedance days for the nine months of June, July, and August for years 2006, 2007 and 2008 were sorted from highest to lowest ozone reading. The ten highest readings represent the ten days that are used to calculate ozone season meteorology for HGB. The ten days are listed below in ascending order by date. The Day Number indicates the ozone reading in descending order.

Day Number	8 Hr Ozone Max (ppb)	Date
6	111	6/4/2006
8	109	6/5/2006
7	110	6/6/2006
2	122	6/8/2006
10	106	6/9/2006
4	119	6/14/2006
9	108	6/28/2006
3	121	6/29/2006
5	113	8/17/2006
1	126	8/31/2006

For the ten days listed above, averages for hourly temperature, hourly relative humidity, and 24-hour barometric pressure were obtained. Averages of the temperatures and humidities were calculated within each hour, and the 24-hour average barometric pressure was calculated for the 10 days. These calculated average ozone season day climatic inputs to MOBILE6.2.03 are converted to the local time (central daylight time) basis which is required to match time frame used for the transportation related inputs to the emissions inventory.

The temperatures were sequenced as required for input to MOBILE6 starting with the 6 a.m. hour. The temperatures are a MOBILE6 command file input. A summary of the temperature inputs are shown in Table 24.

Humidity (RELATIVE HUMIDITY Command)

The RELATIVE HUMIDITY command was used to specify hourly percent relative humidity values for the region. TCEQ developed hourly relative humidity input values essentially following the hourly temperature input development procedure. A summary of the hourly relative humidity inputs are shown in Table 24.

Barometric Pressure (BAROMETRIC PRES Command)

The BAROMETRIC PRES command was used to specify the 24-hour average barometric value for the region.

Sunrise and Sunset Times (SUNRISE/SUNSET Command)

TCEQ provided the local sunrise and sunset times, which are the same for all counties: 7 a.m. and 8 p.m. local time.

Table 24
HGB Area Peak Ozone Season Average Hourly Temperature, Hourly Relative Humidity, and Daily Barometric Pressure Inputs to MOBILE6 for RFP-2002, 2008, 2011, 2014, 2017, 2018 and 2019

Hour (CDT)	Temperature (°F)	Relative Humidity (%)	Barometric Pressure (inches of Hg)
6 a.m.	72.4	84.5	29.87
7 a.m.	76.0	78.0	29.87
8 a.m.	79.6	68.9	29.87
9 a.m.	83.1	59.5	29.87
10 a.m.	85.6	52.1	29.87
11 a.m.	87.8	47.3	29.87
12 p.m.	89.0	43.0	29.87
1 p.m.	90.1	40.6	29.87
2 p.m.	91.2	39.3	29.87
3 p.m.	91.2	39.5	29.87
4 p.m.	91.4	40.3	29.87
5 p.m.	90.9	40.2	29.87
6 p.m.	88.8	44.3	29.87
7 p.m.	85.4	51.4	29.87
8 p.m.	82.7	57.7	29.87
9 p.m.	81.0	60.1	29.87
10 p.m.	80.3	62.0	29.87
11 p.m.	78.8	66.6	29.87
12 a.m.	77.1	73.0	29.87
1 a.m.	75.7	77.2	29.87
2 a.m.	75.2	78.7	29.87
3 a.m.	74.1	80.1	29.87
4 a.m.	72.7	83.6	29.87
5 a.m.	72.5	84.4	29.87

Vehicle Fleet Characteristics

Vehicle registration (age) distributions and diesel fractions inputs to MOBILE6 were developed from TxDOT county vehicle registration data for those vehicle types where TxDOT registration data were available. For the control strategies of the future years 2008, 2011, 2014, 2017, 2018 and 2019, the latest available mid-year 2008 data set was used. The rest of the calculations used the mid-year 2002 data set. MOBILE6 default distributions and diesel fraction inputs were used for the vehicle classes in which the TxDOT registration data were not available.

The TxDOT data were aggregated at the county- and region-levels to develop age distributions for light-duty and heavy-duty classes, respectively, and at the state-level for developing diesel fractions. These aggregation levels were used to overcome sample size problems that could occur (especially in rural counties) for vehicle classes with minimal registrations.

Vehicle Registration Distributions (REG DIST Command)

The user-supplied vehicle registration distributions input to MOBILE6 are separated by vehicle age for each of the 16 composite (combined gasoline and diesel) vehicle types, as shown in Table 26. EPA default distributions are internally applied by MOBILE6 for vehicle classes in which no other data were available.

The input values for each vehicle class were the 25 age fractions representing the fraction of vehicles by age for that particular vehicle class as of July of the evaluation year. These age fractions begin with the evaluation year as the first age fraction and work back in annual increments to end with the 25th fraction, which represents the fraction of vehicles of age 25 years and older. The fractions were calculated as the model-year-specific registrations in a class divided by the total vehicles registered in that class. Table 25 shows the data source and aggregation level by vehicle type.

**Table 25
Composite Vehicle Classes and Data Sources for Vehicle Age Distributions (REG
DIST Command)**

Number	Abbreviation	Description	Source of Distributions
1	LDV	Light-Duty Vehicles	TxDOT July 2002 and 2008 County Level Registrations
2	LDT1	Light-Duty Trucks 1	TxDOT July 2002 and 2008 County Level Registrations
3	LDT2	Light-Duty Trucks 2	TxDOT July 2002 and 2008 County Level Registrations
4	LDT3	Light-Duty Trucks 3	TxDOT July 2002 and 2008 County Level Registrations
5	LDT4	Light-Duty Trucks 4	TxDOT July 2002 and 2008 County Level Registrations
6	HDV2B	Class 2b Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
7	HDV3	Class 3 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
8	HDV4	Class 4 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
9	HDV5	Class 5 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
10	HDV6	Class 6 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
11	HDV7	Class 7 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
12	HDV8A	Class 8a Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
13	HDV8B	Class 8b Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB County Registrations
14	HDBS	School Buses	MOBILE6 Defaults
15	HDBT	Transit and Urban Buses	MOBILE6 Defaults
16	MC	Motorcycles	TxDOT July 2002 and 2008 HGB County Registrations

2002 registrations have been used for 2002 analyses

2008 registrations have been used for 2008, 2011, 2014, 2017, 2018 and 2019 analyses

Diesel Fractions (DIESEL FRACTIONS Command)

The DIESEL FRACTIONS command allows the user to specify diesel fractions for 14 of the 16 composite (gasoline and diesel) vehicle categories by model year. MOBILE6 assumes that all urban/transit buses are diesel fueled, and that motorcycles are all

gasoline fueled, so these two categories do not require diesel fractions. The diesel fractions represent the portion of diesel vehicles in a composite (gasoline and diesel) vehicle class for each vehicle age. When the user enters diesel fractions, all 14 sets of fractions are required. Each set of fractions contains the diesel fractions for 25 model years, starting with the evaluation year as the first model year, and going back in annual increments to the 25th, or earlier model year fraction.

TTI developed the analysis year diesel fractions input data set for the analysis using a combination of estimated TxDOT statewide diesel fractions (based on the mid-year 2008 registration data sets for the future analysis years and on mid-year 2002 registrations data for the 2002 analysis year) and MOBILE6 default diesel fractions. Table 26 shows the MOBILE6 diesel fractions input sequence and categories with corresponding data sources.

Table 26
Source of Diesel Fractions for Composite Vehicle Types (DIESEL FRACTIONS
Command)

Number¹	Abbreviation	Description	Source of Fractions
1	LDV	Light-Duty Vehicles	EPA MOBILE6 Evaluation Year Default
2	LDT1	Light-Duty Trucks 1	EPA MOBILE6 Evaluation Year Default
3	LDT2	Light-Duty Trucks 2	EPA MOBILE6 Evaluation Year Default
4	LDT3	Light-Duty Trucks 3	EPA MOBILE6 Evaluation Year Default
5	LDT4	Light-Duty Trucks 4	EPA MOBILE6 Evaluation Year Default
6	HDV2B	Class 2b Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
7	HDV3	Class 3 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
8	HDV4	Class 4 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
9	HDV5	Class 5 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
10	HDV6	Class 6 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
11	HDV7	Class 7 Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
12	HDV8A	Class 8a Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
13	HDV8B	Class 8b Heavy-Duty Vehicles	TxDOT July 2002 and 2008 HGB Region Registrations
14	HDBS	School Buses	EPA MOBILE6 Evaluation Year Default.

2002 registrations have been used for 2002 analyses

2008 registrations have been used for 2008, 2011, 2014, 2017, 2018 and 2019 analyses

MOBILE6 User-Specified Activity

The locality-specific activity inputs applied to develop the ozone season weekday MOBILE6 hourly emissions factors were the county-level, fleet total hourly VMT fractions, and HGB area TDM-based regional average hourly weekday trip length distributions (TLDs). Additionally, non-default, but generic activity inputs used in the modeling were hourly fractions of VMT by the 14 speeds for arterials and freeways.

VMT Fractions (Also Known as VMT Mix)

These sets of fractions (VMT fractions attributable to individual vehicle classes) are an input to MOBILE6, however, the method for this study calls for the application of the VMT mix later in the emission calculation process. VMT fractions were developed by TTI for the 2002, 2008, 2011, 2014, 2017, 2018 and 2019 analyses.

Total VMT by Hour (VMT BY HOUR Command)

Hourly fleet total VMT distributions were input to MOBILE6 by using the VMT BY HOUR command. These fractions are used by MOBILE6 to convert the units of the non-travel-related hourly emission factors (such as hot soak, diurnal, start, etc.) to units of g/mi. The VMT by hour fractions were also used to produce the daily emissions factors as composites of the hourly emission factors.

The hourly ozone season weekday link-VMT estimates (discussed previously in the “Estimation of VMT” section) were used to develop the MOBILE6 fleet hourly VMT input. One set of 24 fractions was developed for each county for the 2002, 2008, 2011, 2014, 2017, 2018 and 2019 evaluations. For each year, the fractions were calculated by dividing the county fleet total VMT for each hour by the county fleet total 24-hour VMT. These fractions were provided to TCEQ by FTP and are also tabulated in Appendix E.

Hourly Trip Length Distributions (WE DA TRI LEN DI Command)

The weekday TLD input to MOBILE6 is called using the WE DA TRI LEN DI command. The weekday TLDs specify the percentage of average weekday VMT that occurs during trips of different durations at each hour of the day.

The VMT distributions were entered as percentages of VMT for six trip length ranges, and must sum to 100 percent. The percentage values correspond to VMT accumulated within the following trip duration ranges:

- Under 10 minutes,
- 11-20 minutes,
- 21-30 minutes,
- 31-40 minutes,
- 41-50 minutes, and
- 51 minutes and longer

There are 14 MOBILE6 average TLD distributions inputs required, one each for 13 hours of the day (the 6a.m. hour and up through the 6 p.m. hour) and one for the overnight period of 7 p.m. through 5 a.m.

The HGB area regional TLDs for 2002, 2008, 2011, 2014, 2017, 2018 and 2019 evaluation years were developed by H-GAC based on the 2002, 2008, 2011, 2014, 2017, 2018 and 2019 four-period, time-of-day TDMs. The TLDs for the TDM AM Peak, Midday, and PM Peak assignment periods were applied to the individual hours corresponding to each of those time periods (i.e., 6 a.m. through 6 p.m.); and the TDM Overnight assignment period TLDs were applied to the MOBILE6 7 p.m. through 5 a.m. period, which corresponds exactly to the overnight assignment period. The hourly TLD external data input files to MOBILE6 for each of the seven evaluation years were provided to TCEQ by FTP. Appendix F shows the inputs.

State Programs

The state programs inputs to MOBILE6 model the effects of vehicle ATPs, and exhaust and evaporative I/M programs that apply to the gasoline-fueled vehicle classes, except motorcycles.

To develop the MOBILE6 ATP and I/M program set-ups and post processing procedures particular to each RFP analysis, the Harris and Urban counties were grouped according to their exhaust I/M program start dates as:

- Harris (1997)
- Urban (2003: Brazoria, Fort Bend, Galveston, Montgomery)

Additionally, it was understood that the I/M and ATP programs changed chronologically as follows:

Harris County:

Pre-1984: Original version of the ATP program began (“ATP1”)

1984: Modified ATP program implemented (“ATP2”)

Early 1990s: Rolling model year timeframe introduced to ATP2

1997: Exhaust and evaporative I/M commenced

May 2002: I/M test type modified

Urban Counties:

May 2000: Evaporative I/M commenced

May 2003: Exhaust I/M commenced

Present-day ATP commenced

The I/M and ATP modeling set-ups were developed with information from Houston-Galveston Area 2018 Rate-of-Further-Progress SIP Emission Inventories Guide (TCEQ, December 2008) and based on discussions with the TCEQ Technical Analysis Division.

Vehicle ATP (ANTI-TAMP PROG Command)

Table 27 describes the HGB area ATP set-ups for each RFP evaluation. For Harris and the urban counties, the ATP was composed of two subprograms each compromised of a set of required checks for a given range of vehicle model years. The difference is that beginning with 1984 model years, the catalyst is checked; additionally, a 2-24 rolling timeframe was introduced in the early 1990s which replaced the fixed model year range. As a result of this rolling timeframe, it should be noted that ATP1 was phased out by the 2008 analysis year. The post-processing procedures required to account for the full effects of the two-part ATP are further discussed in the section called “Emissions Factor Post-Processing Requirements”.

Table 27
HGB MOBILE6 ATP Commands and Data Parameter Values

Evaluations:	Pre-1990 controls: 2002, 2008, 2011, 2014, 2017, 2018 and 2019
Geographic Coverage:	Harris
ATP1	ANTI-TAMP PROG 84 68 79 22222 11111111 1 11 085. 21112222
ATP2	ANTI-TAMP PROG 84 80 50 22222 11111111 1 11 085. 22222222
Evaluations:	Adjusted Base Year: 2002; Control Strategies: 2002, 2008, 2011, 2014, 2017, 2018 and 2019
Geographic Coverage:	Harris & Urban Counties
Start Year:	Harris: 84; Urban: 03
First Model Year Covered (AA):	2002: 78; 2008: 84; 2011: 87; 2014: 90; 2017: 93; 2018: 94; 2019: 95
Last Model Year Covered (BB):	2002: 00; 2008: 06; 2011: 09; 2014: 12; 2017:15; 2018:16; 2019:17
ATP1	ANTI-TAMP PROG YY AA 83 22222 22222222 2 11 096. 21112222
ATP2	ANTI-TAMP PROG YY 84 BB 22222 22222222 2 11 096. 22222222

***Data parameter value definitions for ATP:**

- The first number is the last two digits of the program start year.
- The second number is the last two digits of the oldest model year covered in the program.
- The third number is the last two digits of the youngest model year covered in the program.
- The next 14 values are toggles for vehicle types covered (1: no, 2: yes). Order is: LDGV, LDGT1, LDGT2, LDGT3, LDGT4, HDGV2B, HDGV3, HDGV4, HDGV5, HDGV6, HDGV7, HDGV8A, HDGV8B, and GAS BUS.
- The next entry must be one (added credit for test only program no longer available).
- The next data parameter is the program inspection frequency (1 = annual).
- The next number is the program compliance rate in percent.
- The last eight values are checks performed toggles (1: no, 2: yes), in the following order: 1) air pump disablement, 2) catalyst removal, 3) fuel inlet restrictor removal, 4) tailpipe lead deposit, 5) exhaust gas recirculation disablement, 6) evaporative system disablement, 7) positive crankcase ventilation system disablement, and 8) missing gas cap.

I/M Programs

Tables 28 and 29 describe the HGB area I/M set-ups required to model the I/M programs for each RFP control strategy evaluation. The emissions factor post-processing procedure necessary to model the effects of the Harris county May 1st 2002 I/M test type change and the May 1st I/M start date for the urban counties is described in the “Emissions Factor Post-Processing Requirements and Procedures” section. Appendix G shows all I/M parameters used for all the years of this RFP.

Table 28

MOBILE6 I/M Inputs: Harris County – May Through December 2002

Geographic Coverage: Harris County		
<p>MOBILE6: The commands (in bold) with their corresponding data parameters values as defined by program design, are described below. Except for the I/M EFFECTIVENESS command, the first data value following each command identified the program number (i.e. 1 through 6) to which the command its associated parameters apply. STRINGENCY applies only to exhaust I/M programs (thus “\$” takes the values 1, 2, and the 3).Compliance and Waiver Rates applies all I/M programs (thus “#” takes values 1 through 6).</p> <p>I/M STRINGENCY: \$ 20 (percent stringency level for pre-1981 automobiles and light trucks) I/M COMPLIANCE: # 96 (percent compliance) I/M WAIVER RATES: # 3 3 (pre-1981 and post-1980 waiver rates in percent) I/M EFFECTIVENESS: 1 1 1 (fractional exhaust I/M effectiveness for HC, CO, and NOx)</p>		
I/M Program	I/M Model Years	I/M Vehicles
1 1997 2050 1 TRC 2500/IDLE	1 1978 2000	1 11111 22222222 2
2 1997 2050 1 TRC ASM 2525/5015 PHASE IN	2 1978 1995	2 22222 11111111 1
3 1997 2050 1 TRC OBD I/M	3 1996 2000	3 22222 11111111 1
4 1997 2050 1 TRC GC	4 1978 2000	4 11111 22222222 2
5 1997 2050 1 TRC GC	5 1978 1995	5 22222 11111111 1
6 1997 2050 1 TRC EVAP OBD & GC	6 1996 2000	6 22222 11111111 1
<p><i>Explanation of command data parameters:</i></p> <p>I/M Program: The parameters, by numerical order, are defined as: 2nd and 3rd are the program start (for overall program, not the new test types) and end years, respectively; 4th is the program frequency (1 = annual, 2 = biennial); 5th is the program type (TRC = test and repair computerized); and 6th is inspection type (2500/IDLE = test at idle, at 2500 rpm; ASM 2525/5015 PHASE-IN = Acceleration Simulated Mode-2 Test with phase-in cut points; OBD I/M and EVAP OBD & GC are on-board diagnostic exhaust and evaporative I/M [with GC], respectively, and GC = gas cap pressure check).</p> <p>I/M MODEL YEARS command: After the program number, the first field is the first model year covered, and the second field is the last model year covered. By program design, vehicles less than two years old and greater than or equal to 25 years old are exempt from testing.</p> <p>I/M VEHICLES command: The 14 data parameters are on/off toggles (1 = no, 2 = yes) indicating which vehicle types are subject to inspection. The 14 corresponding vehicle types, in input order are: LDGV, LDGT1, LDGT2, LDGT3, LDGT4; and HDGV2B, HDGV3, HDGV4, HDGV5, HDGV6, HDGV7, HDGV8A, HDGV8B; and GAS BUS.</p>		

Table 29

MOBILE6 I/M Inputs: HGB – 2008, 2011, 2014, 2017, 2018 and 2019

<p>Geographic Coverage: Harris & Urban counties</p> <p>MOBILE6: The commands (in bold) with their corresponding data parameters values as defined by program design, are described below. The first data value following each command (excluding I/M EFFECTIVENESS) identified the program number (i.e. 1 through 6) to which the command its associated parameters apply. STRINGENCY applies only to exhaust I/M programs, thus “\$” takes the values 1, 2, and the 3 (See I/M PROGRAM command descriptions 1 through 6, below). COMPLIANCE and WAIVER RATES applies all I/M programs (thus “#” takes values 1 through 6).</p> <p>I/M STRINGENCY: \$ 20 (percent stringency level for pre-1981 cars and light trucks)</p> <p>I/M COMPLIANCE: # 96 (percent compliance)</p> <p>I/M WAIVER RATES: # 3 3 (pre-1981 and post-1980 waiver rates in percent)</p> <p>I/M EFFECTIVENESS: 1 1 1 (fractional exhaust I/M effectiveness for HC, CO, and NOx)</p>		
I/M Program	I/M Model Years	I/M Vehicles
1 YYYY 2050 1 TRC 2500/IDLE	1 1981 2003 (1983 2005)	1 11111 22222222 2
2 YYYY 2050 1 TRC ASM 2525/5015 PHASE IN	2 1981 1995 (1983 1995)	2 22222 11111111 1
3 YYYY 2050 1 TRC OBD I/M	3 1996 2003 (1996 2005)	3 22222 11111111 1
4 YYYY 2050 1 TRC GC	4 1981 2003 (1983 2005)	4 11111 22222222 2
5 YYYY 2050 1 TRC GC	5 1981 1995 (1983 1995)	5 22222 11111111 1
6 YYYY 2050 1 TRC EVAP OBD & GC	6 1996 2003 (1996 2005)	6 22222 11111111 1
<p><i>Explanation of command data parameters:</i></p> <p>I/M Program: The parameters, by numerical order, are defined as: 2nd and 3rd are the program start (see “YYYY” explanation, below) and end years, respectively; 4th is the program frequency (1 = annual, 2 = biennial); 5th is the program type (TRC = test and repair computerized); and 6th is inspection type (2500/IDLE = test at idle, at 2500 rpm; ASM 2525/5015 PHASE-IN = Acceleration Simulated Mode-2 Test with phase-in cut points; OBD I/M and EVAP OBD & GC are on-board diagnostic exhaust and evaporative I/M [with GC], respectively, and GC = gas cap pressure check).</p> <p>The start year field, “YYYY”, varies by county grouping and by I/M program emission type as follows: 1, 2, and 3 are exhaust programs for the county/start year: Harris, 1997; Urban, 2003; 4, 5, and 6 are evaporative programs for the county/start year: Harris, 1997; Urban, 2000.</p> <p>I/M MODEL YEARS command: After the program number, the first field is the first model year covered, and the second field is the last model year covered. By program design, vehicles less than two years old and greater than or equal to 25 years old are exempt from testing.</p> <p>I/M VEHICLES command: The 14 data parameters are on/off toggles (1 = no, 2 = yes) indicating which vehicle types are subject to inspection. The 14 corresponding vehicle types, in input order are: LDGV, LDGT1, LDGT2, LDGT3, LDGT4; and HDGV2B, HDGV3, HDGV4, HDGV5, HDGV6, HDGV7, HDGV8A, HDGV8B; and GAS BUS.</p>		

FUELS

User inputs for fuel effects modeling are for the eight-county group for each RFP evaluation year. The fuel effects are modeled using the FUELS PROGRAM and FUEL RVP commands and associated input parameters and options. Additionally, the NO CLEAN AIR ACT command, which was applied for the Pre-90 control emissions factor analyses, changes particular fuel parameter inputs.

Particular MOBILE6 fuel effects commands and parameters were needed to model summer RFG, which applies to all HGB counties. Previously, the MOBILE6 default RFG option was used, however, because of inconsistencies found in the MOBILE6 default RFG option, an alternate RFG modeling technique was used. This alternative method for modeling RFG with MOBILE6 (Section 2.8.10.1, User's Guide, EPA, August 2003) required users-supplied sulfur content, oxygenated fuel parameters and gasoline RVP values.

For the years, 2008, 2011, 2014, 2017, 2018 and 2019, the user-supplied sulfur values, oxygenated fuel parameters, and RVP values were taken from the table entitled, "Reformulated Gasoline Parameters – Summer (1)", found in Section 2.8.10.1 of the MOBILE6 User's Guide. Table 30 shows the sulfur content for each respective year. Alternative diesel fuel parameters are not available in MOBILE6 (except for sulfur content, which only affects PM related emissions), thus emission factor post-processing was performed to model TxLED effects (further discussed in the section entitled "Emissions Factor Post-Processing Requirements and Procedures"). The following MOBILE6 commands were used to apply the fuel parameter values: FUEL PROGRAM Option 1 & 4, FUEL RVP, and OXYGENATED FUELS.

Table 30
Fuel Program Sulfur Content Values

Calendar Year	Average Sulfur Content (ppm)	Maximum Sulfur Content (ppm)
2000	150.0	1000.0
2001	149.0	1000.0
2002	119.0	1000.0
2003	120.0	1000.0
2004	120.0	303.0
2005	90.0	303.0
2006	30.0	87.0
2007	30.0	87.0
2008	30.0	80.0
2009	30.0	80.0
2010	30.0	80.0
2011	30.0	80.0
2012	30.0	80.0
2013	30.0	80.0
2014	30.0	80.0

2015	30.0	80.0
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Fuel Program (FUEL PROGRAM Command)

The MOBILE6 FUEL PROGRAM command provides the user four options for modeling fuels effects. For this analysis, two of the options were used: conventional gasoline east option and the sulfur content option. Fuel oxygenation, sulfur content, and fuel volatility as they relate to the fuel program regime are also described.

The first option, conventional gasoline east, which is the MOBILE6 default, was modeled for the ABY and pre-90 analyses, in combination with the NO CLEAN AIR ACT command. The NO CLEAN AIR ACT command sets the fuel sulfur level to 300 ppm for all model years greater than 1993 (i.e., pre-Tier 2 rule levels). In the absence of the NO CLEAN AIR ACT command, the conventional gasoline east option supplies post-1990 gasoline sulfur levels by year under the Tier 2 rule phase-in schedule for most states (including Texas). Per TCEQ guidance, a 7.8 psi value for FUEL RVP was applied in these modeling cases. Fuel oxygenation was not applicable.

The second option, sulfur content, was modeled for the control strategy analyses. This option was chosen rather than the summer RFG southern region model due to an error discovered in association with this option (personal communication with Mr. Marty Boardman, Sept. 6, 2006). The RFG control program was mimicked via this option by utilizing the FUEL PROGRAM command in combination with the OXYGENATED FUELS and FUEL RVP command to model the sulfur, ether blend, and volatility attributes of the summer RFG fuels as they are described in the MOBILE6 User’s Guide (a minor departure from the User’s Guide RFG characteristics was the value for the FUEL RVP; the User’s Guide shows this attribute varying between 6.7 and 6.8 psi, whereas, in accordance with TCEQ guidance, the FUEL RVP was modeled as a constant 6.7 psi.). Table 31 shows the oxygenated fuels inputs.

Table 31
Oxygenated Fuel Input

OXYGENATED FUELS : 1.000 0.000 0.021 0.000 1

The first number specifies the ether blend market share (expressed as a decimal fraction). The range is 0.000 to 1.000.

The second number specifies the alcohol blend market share (expressed as a decimal fraction). The range is 0.000 to 1.000.

The third number specifies the average oxygen content of ether blend fuels (percent weight, expressed as a decimal fraction). The range is 0.000 to 0.027.

The fourth number specifies the average oxygen content of alcohol blend fuels (percent weight, expressed as a decimal fraction). The range is 0.000 to 0.035.

The fifth number specifies whether a Reid vapor pressure (RVP) waiver has been granted to allow “splash” blending of alcohol-based oxygenates. If a waiver has not been granted (value = 1), then alcohol-based oxygenated fuels must meet the same RVP requirements as nonoxygenated fuels sold in the area. If a waiver has been granted (value = 2), then alcohol-based oxygenated fuels are allowed to exceed the RVP requirements by up to 1 pound per square inch (psi), and the user-input RVP is increased to account for the market share of the higher RVP fuel.

Taken from the MOBILE6 User Guide, dated August 2003

MOBILE6 Alternative Emissions Regulations and Control Measures Commands

There were two commands used for this section of MOBILE6 model commands: NO CLEAN AIR ACT and REBUILD EFFECTS. The NO CLEAN AIR ACT command allows the modeling of vehicle emissions as if the Clean Air Act Amendments of 1990 had not been implemented. The REBUILD EFFECTS command (related to the HDDV NOx off-cycle emission effects) allows the use of alternate effectiveness rates for the program to mitigate HDDV NOx off-cycle emissions effects via low emission rebuilds of existing engines.

NO CLEAN AIR ACT command

As previously discussed, the RFP plans may not take credit for emission reductions from pre-90 CAAA FMVCP. To estimate the “noncreditable” emissions reductions from pre-90 CAAA FMVCP, the ABYEIs for each milestone year are needed. The ABYEIs used the pre-90 control emission factors which were developed, in part, using the NO CLEAN AIR ACT command. *User’s Guide To MOBILE6.2, Mobile Source Emission Factor Model, EPA, August 2003*, discusses the use of this command and the effects that are being disabled when is used.

REBUILD EFFECTS command

In the absence of alternate REBUILD EFFECTS input, the MOBILE6 model uses a default effectiveness rate of 90 percent, which was applied for 2011, 2014, 2017, 2018 and 2019.

For the 2002 and 2008 analysis, H-GAC used the value of 3.2 and 17.8 percent respectively. These values were developed by TTI using available EPA rebuild program tracking data.

Emissions Factor Post-Processing Requirements and Procedures

There are four limitations of the MOBILE6 model that result in the emissions factors post-processing requirements:

- 1) MOBILE6 can only model one ATP program per run;
- 2) MOBILE6 assumes a January 1st start for I/M and ATP start year;
- 3) does not allow user-specified alternate diesel fuel parameters effects on NOx;
- 4) does not allow user-specified alternate motorcycle parameters effects on NOx and VOC.

All evaluations require emissions factor post-processing to account for the full effects of the two-part ATP.

All control strategy evaluations required emissions factor post-processing to account for the effects of the May 1st I/M start dates (or in the case of Harris county, the May 1st I/M test type switch). For the Urban counties, it is assumed that the ATP start dates coincide with the exhaust I/M program start dates for those counties.

The 2008, 2011, 2014, 2017, 2018 and 2019 control strategy evaluations require emissions factors post-processing to account for the Texas LED effects on NOx and for the Motorcycle Rule effects on NOx and VOC. The four post-processing steps for producing the final emissions factor inputs to the emission estimation process are described below.

Two-Part ATP Post-processing

To model the full effects of the two-part ATP (as described in Table 28) for each affected county, emission factors from three runs were combined as follows:

$$EF_{ATP1} + EF_{ATP2} - EF_{NO\ ATP} = EF_{FINAL}$$

Where:

EF_{ATP1} = emissions factor with ATP1 credits

EF_{ATP2} = emissions factor with ATP2 credits

EF_{NO ATP} = emissions factor with no ATP credits

EF_{FINAL} = emissions factor with including estimated credits for both ATP1 and ATP2.

The calculation is performed for each county and evaluation. The calculation is performed for a second set of runs, which is required to develop emissions factor input for the May 1st post-processing step (see $EF_{\text{Start year} + 1}$ definition). The resulting emissions factors after this step include the full effects of the two-part ATP.

There are two different procedures for emissions factor post-processing due to I/M: 1) Harris county May 1st 2002 I/M test type switch; and 2) urban counties May 1st I/M start date. In each procedure, ratio calculations are performed on two sets of emission factors and the results are summed to achieve one set of emission factors with the desired I/M program effects. Each procedure is described in the next two sub-sections below.

May 1st I/M Post-Processing-Harris 2002 Control Strategy Evaluations

Modeling the May 1st program effects for Harris County for the 2002 analysis year: to model the 2002 Harris County emission factors, post-processing is required to account for the proportions of the vehicles in I/M subject fleets assumed to have been tested by the evaluation data (July 1, 2002) under each of the two I/M test types (pre-May TSI I/M test type and May 1st ASM-2 and OBD I/M test types). The assumption is that for annual cycle I/M programs with a test type change within one year of the evaluation date, the proportion of vehicles in the subject fleet that have been tested by the evaluation date under the new test is equal to the ratio of the number of years in the I/M program cycle, or 12 months. Conversely, the proportion of the subject fleet tested under the old program by the evaluation date is 1.0 minus the proportion of the subject fleet tested under the new program. For the 2002 Harris County analysis, the number of months for the test type change to the evaluation date is two months (i.e. May 1st test type switch to the July 1st evaluation date). Thus, the proportions used are: 1) 2/12 or 0.1667, under the new test, and 2) 10/12 or 0.8333 under the old test. After first performing post-processing to account for the full effects of the two-part ATP (as described in Step 1 above), the resulting emissions factors (one set with new I/M test benefit and one with old I/M tests benefit) are combined using these proportions. (Houston-Galveston Area 8-Hour SIP Rate-of-Further-Progress Emissions Inventories MOBILE6 Modeling Information On-Road Mobile Sources, dated May 4, 2006)

May 1st I/M Post-Processing- Urban counties for 2008, 2011, 2014, 2017, 2018 and 2019

In order to model the effects of May 1st program start date for urban counties for the 2008, 2011, 2014, 2017, 2018 and 2019 analysis years, ratio calculations were performed on the emission factors from the first adjustment step. There are two MOBILE6 emissions factor sets required for this calculation: 1) the actual start year and 2) one year after actual start year. The emissions factors from these two sets are combined as:

$$EF_{\text{FINAL}} = \{((N - 1) \cdot 12 + 8) \times EF_{\text{Act. Start Year}} + 4 \times EF_{\text{Start Year} + 1}\} / (12 \times N)$$

Where:

N = evaluation year – start year

$EF_{\text{Act. Start Year}}$ = emissions factor with actual exhaust I/M and ATP start year

$EF_{\text{Start Year} + 1}$ = emissions factor with an exhaust I/M and ATP start one year later

EF_{FINAL} = emissions factor with the estimated May 1 start date of the actual I/M start year

After performing these post-processing steps, the LED and Motorcycle post-processing step was then performed.

LED and Motorcycle Post-Processing

The LED and motorcycle post-processing adjustments are both calculated in one step. This post-processing applies to all counties for the years 2008, 2011, 2014, 2017, 2018 and 2019.

TCEQ provided the HGB LED NOx adjustment factor sets (based on the TxDOT HGB region mid-year 2008 registration data) which were applied to the NOx emissions factors specific to each diesel vehicle class and evaluation year for all the counties. The NOx adjustment factors that H-GAC applied are within the range of 0.9380 through 0.9514 depending on the vehicle class and evaluation year. These factors correspond to the LED NOx benefit range of 4.8 to 6.2 percent (where 4.8% applies to 2002 and later, and 6.2% applies to 2001 and earlier model years). The NOx adjustment factors are in table 32 and their relative emission reductions are in table 33.

Table 32
TxLED Adjustment Factors

<i>Diesel</i> <i>Vehicle Type</i>	<i>NO_x Emission Rate Adjustment Factors</i>					
	<i>2008</i>	<i>2011</i>	<i>2014</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>
<i>LDDV</i>	0.9393	0.9411	0.9428	0.9451	0.9461	0.9464
<i>LDDT12</i>	0.9380	0.9380	0.9380	0.9380	0.9380	0.9380
<i>HDDV2b</i>	0.9496	0.9507	0.9507	0.9511	0.9512	0.9514
<i>HDDV3</i>	0.9474	0.9495	0.9498	0.9509	0.9510	0.9511
<i>HDDV4</i>	0.9457	0.9481	0.9494	0.9503	0.9504	0.9505
<i>HDDV5</i>	0.9470	0.9492	0.9491	0.9490	0.9492	0.9492
<i>HDDV6</i>	0.9444	0.9472	0.9485	0.9495	0.9495	0.9498
<i>HDDV7</i>	0.9439	0.9463	0.9477	0.9489	0.9491	0.9496
<i>HDDV8a</i>	0.9412	0.9429	0.9441	0.9465	0.9470	0.9476
<i>HDDV8b</i>	0.9436	0.9469	0.9486	0.9503	0.9504	0.9505
<i>HDDBT</i>	0.9424	0.9440	0.9462	0.9490	0.9495	0.9497
<i>HDDBS</i>	0.9421	0.9425	0.9429	0.9435	0.9437	0.9439
<i>LDDT34</i>	0.9454	0.9478	0.9491	0.9505	0.9509	0.9511

Table 33
TxLED Relative NO_x Reductions

<i>Diesel</i> <i>Vehicle Type</i>	<i>Relative NO_x Reduction</i>					
	<i>2008</i>	<i>2011</i>	<i>2014</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>
<i>LDDV</i>	6.07%	5.89%	5.72%	5.49%	5.39%	5.36%
<i>LDDT12</i>	6.20%	6.20%	6.20%	6.20%	6.20%	6.20%
<i>HDDV2b</i>	5.04%	4.93%	4.93%	4.89%	4.88%	4.86%
<i>HDDV3</i>	5.26%	5.05%	5.02%	4.91%	4.90%	4.89%
<i>HDDV4</i>	5.43%	5.19%	5.06%	4.97%	4.96%	4.95%
<i>HDDV5</i>	5.30%	5.08%	5.09%	5.10%	5.08%	5.08%
<i>HDDV6</i>	5.56%	5.28%	5.15%	5.05%	5.05%	5.02%
<i>HDDV7</i>	5.61%	5.37%	5.23%	5.11%	5.09%	5.04%
<i>HDDV8a</i>	5.88%	5.71%	5.59%	5.35%	5.30%	5.24%
<i>HDDV8b</i>	5.64%	5.31%	5.14%	4.97%	4.96%	4.95%
<i>HDDBT</i>	5.76%	5.60%	5.38%	5.10%	5.05%	5.03%
<i>HDDBS</i>	5.79%	5.75%	5.71%	5.65%	5.63%	5.61%
<i>LDDT34</i>	5.46%	5.22%	5.09%	4.95%	4.91%	4.89%

New EPA regulations limiting NO_x and VOC emissions from highway motorcycles were also taken into account during post-processing. The TCEQ provided NO_x and VOC adjustment factors (Table 34) for motorcycles based on ratios of EPA calculated figures for "with rule" and "without rule" scenarios.

Table 34
Motorcycle Adjustment Factors for NO_x and VOC

Year	NO_x Reduction	Adjustment Factor	Exhaust VOC	Adjustment Factor	Evaporative VOC	Adjustment Factor
2008	6.51%	0.9349	4.93%	0.9507	7.34%	0.9266
2011	16.79%	0.8321	13.36%	0.8664	28.79%	0.7121

2014	30.91%	0.6909	27.2%	0.7280	49.15%	0.5085
2017	41.89%	0.5811	39.74%	0.6026	67.51%	0.3249
2018	45.34%	0.5466	43.94%	0.5606	73.3%	0.2670
2019	48.43%	0.5157	47.89%	0.5211	79.08%	0.2092

Upon completion of these steps of the emissions factor post-processing procedures, the emissions factors were ready for input to the IMPSUM62 program to calculate the estimated emissions. The modeled emissions factors were provided to TCEQ by FTP. See Appendix A for file names and descriptions.

EMISSIONS CALCULATIONS

Hourly emissions were calculated at the network link level using the IMPSUM62 program (Appendix B). Generally, for each hour the ozone season weekday link-VMT estimates were multiplied by the ozone season weekday emission factors (g/mi) to produce hourly emissions estimates for each of the 28 vehicle types and each pollutant on each network link (the MOBILE6 freeway, arterial, or ramp emission factors were used depending on the link facility type code). Table 2 shows the particular activity and emissions factor elements associated with each RFP EI. For each of the 20 RFP EI evaluations, three files resulted from the emission calculations: a summary file of county-level and area total hourly and 24-hour emissions estimates cross-classified by vehicle type and road type, a tab-delimited version of the emissions summary file, and the emissions calculation programs execution log. These files were provided to TCEQ by FTP. See Appendix A for descriptions of these files.

In addition, the same type of output files were provided for 56 (8 scenarios and 7 years) emission inventories to take into account the emission reductions provided by each control strategy. The description of these files are also in Appendix A.

Hourly Link Emissions

For RFP EI evaluations, the emissions were calculated by hour for each network and intrazonal link (indexed by county and road type) using the following basic inputs:

- MOBILE6 emissions factors indexed by pollutant, speed, emission type, hour, road type and vehicle type, as developed with POLFACT62_3 (and RATEADJ utilities for post-processed emissions factors);
- Records associating the MOBILE6 drive-cycle-specific emissions factors with the appropriate functional classification codes (or facility types codes) used in the network links;
- Link data from the TDM assignment results as developed (for each hour) using the TRANSVMTHSPDWKD or TRANSVMTHSPDWKE program (depending on day type) including: county number, functional classification (or facility type) number, VMT on link, operational link-speed estimate, link node (end point) numbers, and link distance; and
- VMT mix (to allocate link VMT by each of the 28 vehicle types) by time period and roadway type.

For each evaluation, county and hour, the emissions estimates were computed by vehicle type for each link. The emissions factors input were tabulated by pollutant, emissions type, hour, road type (drive cycle), vehicle type, and 14 speeds (2.5 mph and 5 mph to 65 mph at 5 mph intervals) for each county. The county coded hourly fleet total link VMT estimates were first stratified by vehicle type; the time period and functional classification group specific VMT mixes were correlated to the appropriate links (by functional classification code and hour of the day) and were multiplied by the fleet total link VMT to produce the hourly link VMT estimates by the 28 vehicle types. The emissions factors for each pollutant were then matched with appropriate link-level VMT based on road type drive cycle, vehicle class and speed. Freeway, arterial, and ramp drive cycle emissions factors were applied to the appropriate links depending on the link functional classification code (local drive cycle emissions factors were not used). Emissions factors for link speeds that were not represented in the set of 14 speed indexes were calculated by interpolation (see Appendix B), except for ramp links where the emissions factors use a single speed (34.6 mph). For link speed outside of the MOBILE6 model speed range, emissions factors corresponding to the appropriate bounding speeds were applied. The link VMT was then multiplied by the emissions factors to produce the link-level emissions estimates.

Table 35 shows the HGB area TDM network functional classification groupings used to allocate the MOBILE6 drive-cycle-specific emissions factors and VMT mix to the appropriate links based on functional class code. The four-period, time-of-day-specific VMT mixes were applied by peak and off-peak periods

Table 35
H-GAC TDM Functional Classification Groupings
for Application of VMT Mix and MOBILE6 Drive Cycle Emissions Factors

MOBILE6 Drive Cycle	TDM Functional Classification	VMT Mix
Freeway	Urban Interstate	Freeway
	Urban Other Freeway	
	Rural Interstate	
	Rural Other Freeway	
	Toll Roads	
Ramp	Ramps (Freeway, Toll Roads, Frontage)	
Arterial	Urban Principal Arterial	Arterial
	Urban Other Arterial	
	Rural Principal Arterial	
	Rural Other Arterial	
	Urban Collector	Collector
	Rural Major Collector	
	Rural Collector	
	Local (Centroid Connector)	
	Local (Intrazonal)	

Hourly and 24-hour Emissions Summaries

For each RFP EI evaluation, by individual county and for all counties, the link-emission estimates were summed for each hour, and the hourly emissions were summed for the day. The resulting composite NO_x, VOC, and CO emission estimates were summarized by vehicle-type, road-type, and for each vehicle-type and road-type cross-classification. VMT mix, VMT, VHT, and VMT-weighted speeds were included with the emission summaries. These emissions summary files were provided to TCEQ by FTP. See Appendix A for file descriptions.

EMISSIONS FACTORS AND EMISSIONS FOR INDIVIDUAL CONTROL REDUCTIONS

One of the steps required to demonstrate RFP for the HGB area for analysis years 2008, 2011, 2014, 2017, 2018 and 2019, is to develop control reduction emissions factor ratios. For these calculations H-GAC developed emissions factors and emissions due to individual control reductions starting from each pre-1990 controls until the most recent control strategy used, with controls turned on one at a time. These calculations were done hourly, county-level, by vehicle type and by facility type. In total, H-GAC developed 8 different scenarios for each year (2008, 2011, 2014, 2017, 2018 and 2019), for a total of 48 different sets of emissions factors and emissions. To develop this type of emissions factors, it is necessary to use an external data file which excludes the effects of the National Low Emission Vehicle Program and has the certification standard implementation schedule. In our case the file is called `nolev.d` and must be used with the command lines `94+ LDG IMP` and `NO TIER2` to produce emission factors that include Tier 1 controls only. Using the same two command lines but changing the external data file name to the default file, `P94IMP.D`, then the effects of Tier 1 and LEV are presents, but no Tier 2 controls are being modeled.

Table 36 shows the control strategies for HGB area with their corresponding starting years.

**Table 36
HGB Area 8-Hour RFP Control Strategy Start Year Summary for Individual
Control Reduction Emission Factor Ratio Development**

Rule Description	Strategy Notes	Start Year	Individual Control Scenario*
Pre-1990 FMVCP	Pre-1990 Control	Pre-1990	0
1992 Federal Controls on Gasoline Volatility	Pre-1990 Control Max RVP 7.8 psi	1992	0
FMVCP Tier 1		1994	1
Federal Reformulated Gasoline (RFG) Model only Phase 2	Use EPA method to model rather than RFG toggle.	1995 (Phase 1) 2000 (Phase 2)	2
ATP (Harris County Only, credit for changes in program after 1990)		1988	3
I/M Program (Harris county only)		1997	
NLEV		2001	4
Expanded I/M and ATP (Urban county group only)		2003	5
FMVCP Tier 2	Phase in 2004 to 2009	2004	6
Federal Low-Sulfur Highway Diesel	15 ppm maximum sulfur content	2006	7
FMVCP-Heavy-Duty 2007	Phase in 2007 to 2010	2007	
Texas Low Emission Diesel	15 ppm maximum sulfur Low aromatic HC and high cetane number to control NOx	2006	8

*The individual control scenario indicates the number used during modeling to specify each individual control strategy.

Table 37 shows the order the control strategies were implemented. Please note that for control strategies number 3 and 5, only Harris county and urban counties were modeled respectively. Control strategy number 8 was not modeled again because it is the same as those done for the control strategies studies. Appendix H shows all the results for these individual control strategy calculations. See Appendix A for file descriptions

Table 37- Control Strategy Implementation

Rule Description	Strategy Notes	Start Year	Scen0	Scen1	Scen2	Scen3	Scen4	Scen5	Scen6	Scen7	Scen8
Pre-1990 FMVCP	Pre-1990 Control	Pre-1990	X	X	X	X	X	X	X	X	X
1992 Federal Controls on Gasoline Volatility	Pre-1990 Control Max RVP 7.8 psi	1992	X	X	X	X	X	X	X	X	X
FMVCP Tier 1		1994		X	X	X	X	X	X	X	X
Federal Reformulated Gasoline (RFG) Model only Phase 2	Use EPA method to model rather than RFG toggle.	1995 (Phase 1) 2000 (Phase 2)			X	X	X	X	X	X	X
ATP (Harris County Only, credit for changes in program after 1990)		1988				X	X	X	X	X	X
I/M Program (Harris County Only)		1997				X	X	X	X	X	X
NLEV		2001					X	X	X	X	X
Expanded I/M and ATP (Urban County Group Only)		2003						X	X	X	X
FMVCP Tier 2	Phase in 2004 to 2009	2004							X	X	X
Federal Low-Sulfur Highway Diesel	15 ppm maximum sulfur content. No benefits for HC, CO & NOx	2006								X	X
FMVCP - Heavy-Duty 2007	Phase in 2007 to 2010. Add Heavy-Duty 2007 Program to the IM descriptive File.	2007								X	X
Texas Low-Emission Diesel	15 ppm maximum sulfur content. Low aromatic HC and high cetane number to control Nox	2006									X

Table 38 – HGB RFP Ozone Season Weekday On-Road Mobile Source NOx Emissions for Uncontrolled and Controlled Scenarios and the Individual Control Strategy Reductions (tpd) – All counties

Description	Scenario #	2008	2011	2014	2017	2018	2019
Uncontrolled	0	364.58	378.03	413.06	438.41	450.21	454.96
Tier 1 FMVCP	1	72.77	67.52545	62.79175	55.3927	55.77265	53.91
RFG	2	46.81	72.96005	104.4159	128.9438	135.6549	140.74
I/M Harris Co	3	13.29	16.33025	20.91425	25.13	26.4857	27.36
NLEV	4	10.15	9.30675	6.1593	3.41795	2.65575	2.06
Expanded I/M	5	4.01	5.1155	10.1499	8.6292	9.1576	9.51
Tier 2 FMVCP	6	28.03	51.9489	53.78955	91.9826	96.3634	99.28
2007 Heavy Duty Diesel FMVCP	7	8.7	28.2195	66.12885	61.6925	67.541	71.12
On-Road TxLED	8	5.02	3.2145	2.1066	1.44765	1.18965	1.03
Controlled	8	175.80	123.41	86.61	61.78	55.39	49.95

Table 39– HGB RFP Ozone Season Weekday On-Road Mobile Source VOC Emissions for Uncontrolled and Controlled Scenarios and the Individual Control Strategy Reductions (tpd) – All counties

Description	Scenario #	2008	2011	2014	2017	2018	2019
Uncontrolled	0	199.89	210.19	227.88	243.65	248.76	250.95
Tier 1 FMVCP	1	49.69	67.81	84.71	96.93	100.43	101.85
RFG	2	34.54	34.65	37.23	40.00	40.98	41.67
I/M Harris Co	3	10.99	11.57	12.51	13.51	13.91	14.1
NLEV	4	5.33	4.81	3.27	1.97	1.59	1.28
Expanded I/M	5	3.09	3.30	4.44	4.32	4.50	4.61
Tier 2 FMVCP	6	9.91	19.19	16.87	37.20	39.39	40.99
2007 Heavy Duty Diesel FMVCP	7	0.15	0.45	12.53	1.00	1.08	1.12
On-Road TxLED	8	0.04	0.06	0.12	0.33	0.21	0.23
Controlled	8	86.15	68.35	56.21	48.39	46.68	45.10

**APPENDIX A: ELECTRONIC SUBMITAL DATA SET NAMES
and DESCRIPTIONS**

HGB Area RFP ELECTRONIC DATA SUBMITTAL FILE NAMES/DESCRIPTIONS

This appendix describes the HGB area RFP EI electronic data submittal. The HGB area RFP EI data files (emissions, summaries, emissions factor input/output and post-processing factors, and a copy of this data description) was sent to the TCEQ via FTP.

EMISSIONS OUTPUTS FOR EMISSIONS INVENTORIES

The compressed file “hgbRFP_ems.zip” contains three emissions information files for each of the 20 EI evaluations (60 total files):

- County-level and regional hourly and 24-hour EI summaries to include VMT mix, VMT, VHT, average speed, and emissions cross-classified by vehicle type and road type (*.LST file);
- A tab-delimited version of first bullet above (*.TAB file); and
- A log of the emissions estimation program runs (*.LOG extension).

The emissions file names (where “*” is file extensions LST, TAB, LOG) are:

2002ABY_hga_ems.*
2002CS_hga_ems.*
2008ABY_hga_ems.*
2008CS_hga_ems.*
2008pre90_hga_ems.*
2011ABY_hga_ems.*
2011CS_hga_ems.*
2011pre90_hga_ems.*
2014ABY_hga_ems.*
2014CS_hga_ems.*
2014pre90_hga_ems.*
2017ABY_hga_ems.*
2017CS_hga_ems.*
2017pre90_hga_ems.*
2018ABY_hga_ems.*
2018CS_hga_ems.*
2018pre90_hga_ems.*
2019ABY_hga_ems.*
2019CS_hga_ems.*
2019pre90_hga_ems.*

Where:

“ABY” is adjusted base year (pre-1990 control strategy, no growth);

“CS” is control strategy; and
“pre90” is the pre1990 control strategy including growth.

EMISSIONS OUTPUTS FOR INDIVIDUAL CONTROL REDUCTIONS

The compressed file “hgbRFP_ems_individual_controls.zip” contains three emissions information files for each of the 48 EI evaluations for each of the individual control strategies (144 total files):

- County-level and regional hourly and 24-hour EI summaries to include VMT mix, VMT, VHT, average speed, and emissions cross-classified by vehicle type and road type (*.LST file);
- A tab-delimited version of first bullet above (*.TAB file); and
- A log of the emissions estimation program runs (*.LOG extension).

The emissions file names are:

2008Scen#_hga_ems.*
2011Scen#_hga_ems.*
2014Scen#_hga_ems.*
2017Scen#_hga_ems.*
2018Scen#_hga_ems.*
2019Scen#_hga_ems.*

where “*” is file extensions LST, TAB, LOG; and “#” is the scenario number and goes from 0 to 7 since scenario 8 is the same as the control strategy.

EMISSIONS FACTORS OUTPUTS

The zip file “hgaRFP_rates.zip” contains emissions factor output files for the 20 EI evaluations:

- 208 *.RAT files
- 208 county-specific daily emission factors (*.RTD file) grouped by vehicle type, emission source, road type, pollutant type, and speed.
- Twenty (20) logs of the emissions factor program runs (*.LOG extension).
- Twenty (20) summary files containing input and emissions factor information for all the counties in that particular EI evaluation (*.LST file);

Emissions factor output files names are labeled according to the following:

- File name formats include the following: county (“RRRR” for rural counties, “UUUU” for urban counties, and “HARR” for Harris County), applicable I/M program (“II”--only included in the file name if files needed to be distinguished from one another), and applicable ATP (“AA”—only included in the file name if files needed to be distinguished from one another). Please note that the “I1”, “I2”, “A0”, “A1”, and “A2” I/M and ATP distinctions are meant to be understood in

the context of the county and year of the analysis, and should not be assumed to mean the same thing in all cases that they appear. “ATPfull” or “Ifull” indicates an output file in which the various ATP and/or I/M program emission factors have been combined. “LED” indicates an output file in which the TxLED and motorcycle NOx and/or VOC factors have been corrected for. “YYYY” designates the years 2008, 2009, 2011, and 2012. The “*” indicates a .RAT and a .RTD file extension.

- For files with no four letter county abbreviation, the “*” indicates “LST” and “LOG” file extensions.

The emissions factor output file names are:

2002ABY_UUUU.*
2002ABY_RRRR.*
2002ABY_HARR.*
2002ABY_HARR_AA.*
2002ABY_rat.*
2002CS_UUUU.*
2002CS_RRRR.*
2002CS_HARR.*
2002CS_HARR_IIAA.*
2002CS_HARR_IATPfull.*
2002CS_rat.*
YYYYABY_UUUU.*
YYYYABY_RRRR.*
YYYYABY_HARR.*
YYYYABY_HARR_AA.*
YYYYABY_rat.*
YYYYCS_UUUU_II.*
YYYYCS_UUUU_Ifull.*
YYYYCS_UUUU_Ifull_LED.*
YYYYCS_RRRR.*
YYYYCS_RRRR_LED.*
YYYYCS_HARR.*
YYYYCS_HARR_LED.*
YYYYCS_rat.*
YYYYpre90_UUUU.*
YYYYpre90_RRRR.*
YYYYpre90_HARR.*
YYYYpre90_HARR_AA.*
YYYYpre90_rat.*

EMISSIONS FACTORS INPUTS

The zip file “MOB6input.zip” contains 199 emissions factor input files, including post-processing files associated with the I/M, ATP, TxLED and Motorcycle control programs, for the 20 EI evaluations:

- 215 MOBILE6 primary input files (*.IN) containing parameter values and paths to applicable external input files. File name formats include three variables: county (“RRRR” for rural counties, “UUUU” for urban counties, and “HARR” for Harris County), applicable I/M program (“II”--only included in the file name if files needed to be distinguished from one another), and applicable ATP (“AA”—only included in the file name if files needed to be distinguished from one another). Please note that the “I1”, “I2”, “A0”, “A1”, and “A2” I/M and ATP distinctions are meant to be understood in the context of the county and year of the analysis, and should not be assumed to mean the same thing in all cases.

The primary MOBILE6 emissions factor input file names are:

2002ABY_RRRR.in
2002ABY_UUUU.in
2002ABY_HARR_AA.in
2002CS_RRRR.in
2002CS_UUUU.in
2002CS_HARR_IIAA.in
2008ABY_RRRR.in
2008ABY_UUUU.in
2008ABY_HARR_AA.in
2008CS_RRRR.in
2008CS_UUUU_II.in
2008CS_HARR.in
2008pre90_RRRR.in
2008pre90_UUUU.in
2008pre90_HARR_AA.in
2011ABY_RRRR.in
2011ABY_UUUU.in
2011ABY_HARR_AA.in
2011CS_RRRR.in
2011CS_UUUU_II.in
2011CS_HARR.in
2011pre90_RRRR.in
2011pre90_UUUU.in
2011pre90_HARR_AA.in
2014ABY_RRRR.in
2014ABY_UUUU.in
2014ABY_HARR_AA.in
2014CS_RRRR.in
2014CS_UUUU_II.in
2014CS_HARR.in
2014pre90_RRRR.in
2014pre90_UUUU.in

2014pre90_HARR_AA.in
2017ABY_RRRR.in
2017ABY_UUUU.in
2017ABY_HARR_AA.in
2017CS_RRRR.in
2017CS_UUUU_II.in
2017CS_HARR.in
2017pre90_RRRR.in
2017pre90_UUUU.in
2017pre90_HARR_AA.in
2018ABY_RRRR.in
2018ABY_UUUU.in
2018ABY_HARR_AA.in
2018CS_RRRR.in
2018CS_UUUU_II.in
2018CS_HARR.in
2018pre90_RRRR.in
2018pre90_UUUU.in
2018pre90_HARR_AA.in
2019ABY_RRRR.in
2019ABY_UUUU.in
2019ABY_HARR_AA.in
2019CS_RRRR.in
2019CS_UUUU_II.in
2019CS_HARR.in
2019pre90_RRRR.in
2019pre90_UUUU.in
2019pre90_HARR_AA.in

- Inspection/Maintenance input files (*.IM and *.FC); the *.IM files (twenty one in number) include the parameters for the control program, while the *.FC files (six in number) include values used for formula calculations. *.IM file name formats show the county grouping (H = Harris, U = Urban Counties), analysis year, and a reference to which portion of the post-processing correction (“a” or “b”) that the input file adjusts for. *.FC file name formats show the county and year (“YYYY”). The Inspection/Maintenance emissions factor input file names are:

H02a.im
H02b.im
H08.im
H11.im
H14.im
H17.im
H18.im
H19.im
U02.im

U08a.im
U08b.im
U11a.im
U11b.im
U14a.im
U14b.im
U17a.im
U17b.im
U18a.im
U18b.im
U19a.im
U19b.im
YYYYUrb_IMstrt.fc
Harr02May1_IMchg.fc

- One (1) ATP correction factor file with values utilized by the correction formula. This file is:
ATPfull.fc
- Six (6) TxLED and motorcycle NOx adjustment factors input files (*.FC) File name formats reflect the analysis year (“YYYY”) and are as follows:
LED_hgaYYYY_nox.fc
- Seven (7) trip length distribution input files (*.TLD). File name formats reflect the analysis year (“YY”) and are as follows:
HGYR_ROP.tld
- Twenty eight (28) vehicle mile travel fractions input files (*.VMX) grouped by road type, vehicle type, and four time-of-day assignments. File name formats reflect the analysis year (“YY”) and the time-of-day assignment (“DD”), and these files are as follows:
YYYYhga_DD.vmx
- Sixteen (16) registration distribution fraction input files (*.RGD). File name formats reflect the county (“CCCC”) and year (“YY”) from which the registration data was obtained. The emissions factor registration distribution input file names are:
CCCCYY.rgd

EMISSION FACTORS OUTPUTS FOR INDIVIDUAL CONTROL REDUCTIONS

The zip file “EF_rates_individual_controls.zip” contains emissions factor output files for the individual control reduction analysis:

- 336 *.RAT files

- 336 county-specific daily emission factors (*.RTD file) grouped by vehicle type, emission source, road type, pollutant type, and speed.
- Forty two (42) logs of the emissions factor program runs (*.LOG extension).
- Forty two (42) summary files containing input and emissions factor information for all the counties in that particular EI evaluation (*.LST file);

Emissions factor output files names are labeled according to the following:

- For files with a “CCCC” four letter county abbreviation, an “*” indicates “RAT” and “RTD” file extensions.
- For files with no “CCCC” four letter county abbreviation, the “*” indicates “LST” and “LOG” file extensions.
- Scen# means the scenario number being modeled according to the control strategy applied.

In general, emissions factor output file names are:

```

2008Scen#_CCCC.*
2011Scen#_CCCC.*
2014Scen#_CCCC.*
2017Scen#_CCCC.*
2018Scen#_CCCC.*
2019Scen#_CCCC.*
2008Scen#_rat.*
2011Scen#_rat.*
2014Scen#_rat.*
2017Scen#_rat.*
2018Scen#_rat.*
2019Scen#_rat.*

```

Specifically, for scenarios 5, 6 and 7 the file names are:

```

2008Scen#_CCCC_ifull.*
2011Scen#_CCCC_ifull.*
2014Scen#_CCCC_ifull.*
2017Scen#_CCCC_ifull.*
2018Scen#_CCCC_ifull.*
2019Scen#_CCCC_ifull.*
2008Scen#_rat.*
2011Scen#_rat.*
2014Scen#_rat.*
2017Scen#_rat.*
2018Scen#_rat.*
2019Scen#_rat.*

```

EMISSION FACTORS INPUTS FOR INDIVIDUAL CONTROL REDUCTIONS

The zip file “EF_ratios_MOB6in.zip” contains 304 emissions factor input files.

For scenarios 0, 1, 2, 3 and 4 the primary MOBILE6 emissions factor input file names are:

2008Scen#_CCCC.in
2011Scen#_CCCC.in
2014Scen#_CCCC.in
2017Scen#_CCCC.in
2018Scen#_CCCC.in
2019Scen#_CCCC.in

For scenarios 5, 6, and 7 the primary MOBILE6 emission factor input file names are:

2008Scen#_RRRR.in
2008Scen#_UUUU_II.in
2008Scen#_HARR.in
2011Scen#_RRRR.in
2011Scen#_UUUU_II.in
2011Scen#_HARR.in
2014Scen#_RRRR.in
2014Scen#_UUUU_II.in
2014Scen#_HARR.in
2017Scen#_RRRR.in
2017Scen#_UUUU_II.in
2017Scen#_HARR.in
2018Scen#_RRRR.in
2018Scen#_UUUU_II.in
2018Scen#_HARR.in
2019Scen#_RRRR.in
2019Scen#_UUUU_II.in
2019Scen#_HARR.in

These primary MOBILE6 input files use the same files as input as the emission inventory calculations.

APPENDIX B: EMISSIONS ESTIMATION PROGRAMS

EMISSIONS ESTIMATION PROGRAMS

The following is a summary of the series of programs utilized by H-GAC for developing link-based, time-of-day, on-road mobile source emissions estimates for air quality analyses.

These programs produce emissions factors with the latest version of EPA's MOBILE emissions factor model, and apply them to travel model-based activity estimates to calculate emissions at user-specified temporal and spatial scales. The location of emissions by grid, or travel network link coordinates, may also be specified.

The emissions estimation programs are: TRANSVMTHSPDWKD, POLFAC62_3, RATEADJ62, RATEADJV62, IMPSUM62, and SUMALL62. TRANSVMTHSPDWKD prepare activity input for weekdays, POLFAC62_3 prepares emissions factor input, the RATEADJ programs make special adjustments to emissions factors when required, IMPSUM62 calculates emissions by time period, and SUMALL62 summarizes emissions at various levels by 24-hour period.

TRANSVMTHSPDWKD

The TRANSVMTHSPDWKD program is a TRANSCAD-based utility that post-process TDMs to produce time-of-day specific, on-road vehicle, link VMT and speed estimates. The TRANSVMTHSPDWKD program processes a TDM traffic assignment consisting of four time-of-day assignments by scaling the link volumes by the appropriate HPMS, seasonal, or other VMT factors. Time-of-day factors are then applied to distribute the link VMT to each hour in the day. The Houston speed model is used to estimate the operational time-of-day speeds for each link (or by direction if the assignment is not directional). Since intrazonal links are not included in the TDMs, special intrazonal links are created and the VMT specifically designed for estimating VMT and speeds for weekdays (day types weekdays and Friday). The link VMT and speeds produced by these programs are subsequently input to the IMPSUM62 program for the application of MOBILE6 emission factors.

POLFAC62_3

The POLFAC62_3 program is used to apply the EPA's MOBILE6 program (September 2003 version with additional pollutant capabilities) to calculate the on-road mobile emissions factors. The MOBILE6 emissions factors may be produced for each of the pollutant-specific emissions types (e.g., depending on the pollutant and vehicle type, the total composite, exhaust running, exhaust start, plus the six sub-component evaporative rates), 28 vehicle types, four MOBILE6 functional classifications (or drive cycles, i.e., freeway, arterial/collector, local, and ramp), 14 speeds (i.e., 2.5 mph, and 5 mph through 65 mpg at 5 mph increments for freeway and arterial functional classifications—MOBILE6 Local and Ramp functional classification rates are single speed only, 12.9 mph, and 34.6 mph, respectively), and each of the 24 hours of the day. The POLFAC62_3 emissions factors are average vehicle class rates calculated from the MOBILE6 database output by weighting the by-model-year emissions rates within each vehicle class by its corresponding travel function. These emissions factors are tabulated individually by geographic area (county or county group) and analysis day for the

evaluation year. These emissions factors are output to an ASCII file for subsequent input to the IMPSUM62 program. The IMPSUM62 program is then used to apply the hourly emissions factors to hourly VMT estimates by link (POLFAC62_3 also optionally produces a set of daily emissions factors.) POLFAC62_3 also calculates the additional pollutant emissions factors provided by the MOBILE6 October 2002 version.

RATEADJ62

RATEADJ62 is a special utility program that produces a new set of emissions factors by linearly combining the emissions factors from multiple applications of POLFAC62_3. There is one set of linear factors. Each factor is applied to all emissions rates in a single data set.

A practical application of the RATEADJ62 program is the combining of two sets of emissions factors, where each set has different control program credits, into one set including the combined credits. For example, this program may be used to combine different ATP credits from two separate POLFAC62_3 runs into one set of emissions factors that includes the credits for both ATPs.

RATEADJV62

RATEADJV62 is a special utility program that produces a new set of emissions factors by linearly combining the emissions factors from multiple applications of POLFAC62_3 or RATEADJ62. There is a set of factors (that may be different for each pollutant-specific emissions type and vehicle type combination) for each of the input emissions factor data sets.

A practical application of RATEADJV62 is the application of emissions factor credits by individual vehicle class and/or individual pollutant. For example, for analyses requiring the effects of the Texas LED Fuel Program in MOBILE6 emissions factors, RATEADJV62 is used to apply reduction factors to only the NOx emissions factors for diesel-fueled vehicle classes only.

IMPSUM62

The IMPSUM62 program applies the emissions factors obtained from POLFAC62_3 (or from one of the RATEADJ programs, when used) and VMT mixes (fractions of fleet VMT attributable to each vehicle classification in the study) to the time-of-day fleet VMT and speed estimates to calculate emissions by the specified time periods. The five primary inputs to IMPSUM62 are:

- MOBILE6 emissions factors developed with POLFAC62_3 (or a RATEADJ, if used);
- Link-based hourly VMT and speeds developed using the TRANSVMTHSPDWKD or TRANSVMTHSPDWKE program. For each link, the following information is input to IMPSUM62: county number, roadway type number, VMT on link, operational link-speed estimate, and link distance;
- VMT mix by time period, county, and roadway type;
- X-Y coordinates (optional for gridded emissions); and

- Data records associating the MOBILE6 drive cycle (Freeway, Arterial, Local, and Ramp) emissions factors (or percentages thereof) to specific travel model functional classifications. These MOBILE6 drive cycle emissions factor percentages (valid from zero to 100) must sum to 100 percent for each travel model functional classification.

Using these input data, the VMT for each link is stratified by MOBILE6 drive cycle and the 28 vehicle types. The MOBILE6 emissions factors are matched to link VMT by drive cycle, speed, and vehicle type and are interpolated (for the speed that falls between the 14 MOBILE6 speeds, see the MOBILE6 interpolation methodology below) and multiplied by the link VMT to estimate the mobile source emissions for that link. Emissions factors for 65 mph are used for links with speeds greater than 65 mph, and emissions factors for 2.5 mph are used for links with speeds lower than 2.5 mph. The emissions for the county and emissions type are reported by both roadway type and vehicle type for each of the subject time periods. A data set is produced for subsequent input to the SUMALL62 program. Also, link emissions may be written by county at the pollutant-specific emissions type sub-component level and 28 vehicle types level.

A tab delimited output is optionally produced. This output includes all 28 vehicle types (or eight vehicle types in the compressed format) across a single output line. Each field in the output is separated by a tab character.

Example Emissions Factor Interpolation

To calculate emissions factors for average operational speeds that fall between two of the 14 MOBILE6 speed bin speeds, MOBILE6 interpolates each emissions factor using a factor developed from the inverse link speed and the inverse high and low bounding speed bin speeds (Section 5.3.4, *MOBILE6 User's Guide*, January 2002).

Using the MOBILE6 emissions factors tabulated by the 14 speeds, the IMPSUM62 program uses the MOBILE6 method to interpolate emissions factors as shown in the following example. This example interpolates an emissions factor corresponding to an average speed of 41.2 mph.

The interpolated emissions factor

$$(EF_{\text{Interp}} = EF_{\text{LowSpeed}} - FAC_{\text{Interp}} (EF_{\text{LowSpeed}} - EF_{\text{HighSpeed}}))$$

Where:

EF_{LowSpeed} = emission factor (EF) corresponding to tabulated speed below the average link speed;

$EF_{\text{HighSpeed}}$ = EF corresponding to tabulated speed above the average link speed; and

$$FAC_{\text{Interp}} = \{(1/Speed_{\text{link}}) - (1/Speed_{\text{low}})\} / \{(1/Speed_{\text{high}}) - (1/Speed_{\text{low}})\}$$

SUMALL62

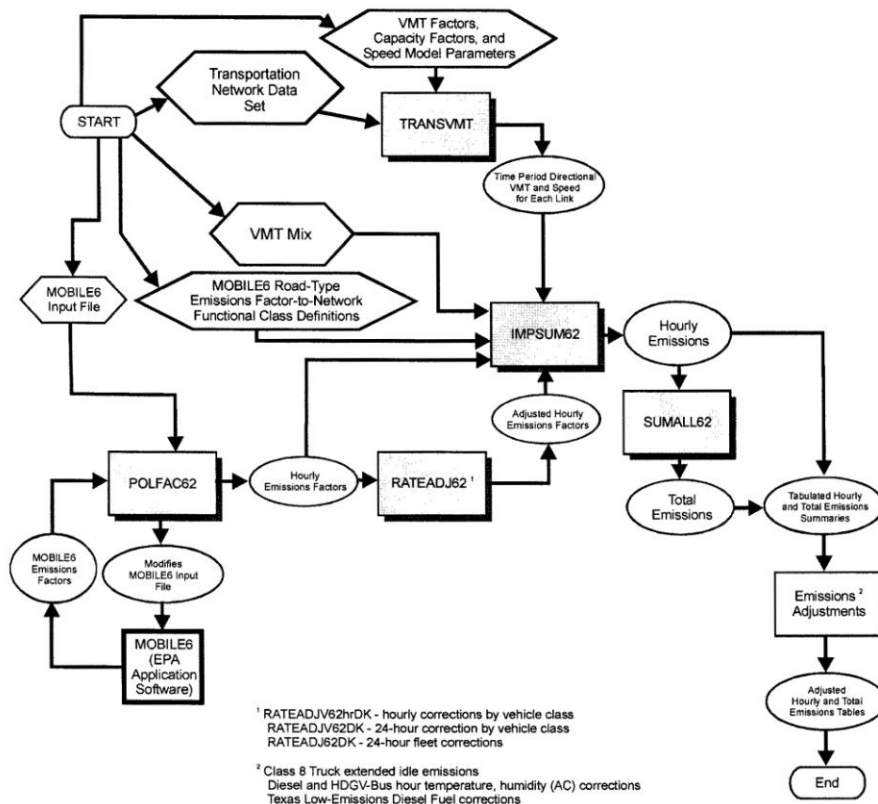
The SUMALL62 program is used to sum the emissions estimates for the time-of-day periods (e.g., 24 periods in the case of hourly analyses) to develop 24-hour emissions estimates. The emissions by pollutant type are reported by roadway type and 28 vehicle types (or optionally condensed to eight vehicle types).

A tab-delimited output is optionally produced. This output includes all 28 vehicle types (or eight vehicle types in the compressed format) across a single output line. Each field in the output is separated by a tab character.

The overall emissions estimate process is shown in the diagram below:

Computational Process Flow

Travel Demand Model Network Link-Based Hourly MOBILE6 Emissions Estimates with Texas Mobile Source Emissions Software



APPENDIX C: VMT MIX ESTIMATES

HGB 2002 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs TP	TP	FC	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	Art	0.6087356	0.0577513	0.1922602	0.0425562	0.0195704	0.0074199	0.0027735	0.0013439	0.0004861
2	AM_Peak	Col	0.5238475	0.0668714	0.2226219	0.0545082	0.0250668	0.0105828	0.0039558	0.0019167	0.0006933
3	AM_Peak	Fway	0.6404145	0.0540861	0.1800585	0.0379808	0.0174663	0.0065673	0.0024548	0.0011895	0.0004302
4	Mid_Day	Art	0.5719093	0.0544267	0.1811924	0.0400736	0.0184288	0.0128209	0.0047924	0.0023221	0.0008399
5	Mid_Day	Col	0.5026044	0.0638461	0.2125504	0.0520627	0.0239423	0.0162212	0.0060634	0.0029379	0.0010627
6	Mid_Day	Fway	0.6074268	0.0513717	0.1710219	0.0361381	0.0166189	0.0110513	0.0041309	0.0020016	0.000724
7	Ovr_Nite	Art	0.6082981	0.0582618	0.1939598	0.0429035	0.0197302	0.005308	0.0019841	0.0009614	0.0003477
8	Ovr_Nite	Col	0.5438097	0.0697157	0.2320909	0.0568072	0.0261241	0.0075691	0.0028293	0.0013709	0.0004959
9	Ovr_Nite	Fway	0.6095817	0.0582868	0.194043	0.0429833	0.0197668	0.0076043	0.0028425	0.0013773	0.0004982
10	PM_Peak	Art	0.6095817	0.0582868	0.194043	0.0429833	0.0197668	0.0076043	0.0028425	0.0013773	0.0004982
11	PM_Peak	Col	0.5336237	0.0682929	0.2273542	0.0556555	0.0255945	0.0099779	0.0037297	0.0018072	0.0006537
12	PM_Peak	Fway	0.6404359	0.0542842	0.1807178	0.0382573	0.0175935	0.0064816	0.0024228	0.0011739	0.0004246
Obs	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5	
1	0.001301	0.0004575	0.0004575	0.0000572	0.0010029	0.0001673	0.0082776	0.0039899	0.0024118	0.0015781	
2	0.0018556	0.0006525	0.0006525	0.0000816	0.0008633	0.0001938	0.0119617	0.0057657	0.0034852	0.0022805	
3	0.0011515	0.0004049	0.0004049	0.0000506	0.001055	0.0001567	0.0066315	0.0031965	0.0019322	0.0012643	
4	0.002248	0.0007905	0.0007905	0.0000988	0.0009423	0.0001577	0.0141395	0.0068155	0.0041198	0.0026957	
5	0.0028442	0.0010002	0.0010002	0.000125	0.0008283	0.000185	0.0185348	0.008934	0.0054004	0.0035336	
6	0.0019377	0.0006814	0.0006814	0.0000852	0.0010007	0.0001489	0.0110953	0.0053481	0.0032328	0.0021153	
7	0.0009307	0.0003273	0.0003273	0.0000409	0.0010022	0.0001688	0.0059433	0.0028648	0.0017317	0.0011331	
8	0.0013271	0.0004667	0.0004667	0.0000583	0.0008961	0.000202	0.0086441	0.0041666	0.0025186	0.001648	
9	0.0008947	0.0003146	0.0003146	0.0000393	0.0010348	0.0001536	0.0051723	0.0024931	0.001507	0.0009861	
10	0.0013333	0.0004689	0.0004689	0.0000586	0.0010043	0.0001689	0.0084594	0.0040776	0.0024648	0.0016128	
11	0.0017495	0.0006152	0.0006152	0.0000769	0.0008793	0.0001979	0.011535	0.00556	0.0033609	0.0021991	
12	0.0011365	0.0003996	0.0003996	0.00005	0.001055	0.0001573	0.0065309	0.003148	0.0019029	0.0012451	
Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34		

1	0.0050023	0.0030371	0.0054787	0.0269317	0.001	0.0008021	0.0015415	0.0024064	0.0012024
2	0.0072286	0.0043888	0.0079171	0.0322248	0.001	0.0013495	0.0025936	0.0040487	0.0013922
3	0.0040075	0.0024332	0.0043892	0.0260497	0.001	0.000692	0.0013299	0.0020761	0.0011261
4	0.0085448	0.0051879	0.0093585	0.0530603	0.001	0.0003565	0.0006851	0.0010695	0.0011331
5	0.0112009	0.0068005	0.0122676	0.0404511	0.001	0.0005528	0.0010625	0.0016586	0.0013293
6	0.0067051	0.0040709	0.0073437	0.0505896	0.001	0.0004068	0.0007818	0.0012204	0.0010695
7	0.0035916	0.0021806	0.0039337	0.0401865	0.001	0.0002819	0.0005419	0.0008459	0.001213
8	0.0052238	0.0031716	0.0057213	0.0208743	0.001	0.0002281	0.0004383	0.0006843	0.0014515
9	0.0031257	0.0018978	0.0034234	0.0536903	0.001	0.0004415	0.0008484	0.0013245	0.0011036
10	0.0051122	0.0031038	0.005599	0.0236625	0.001	0.0005417	0.001041	0.0016251	0.0012135
11	0.0069708	0.0042323	0.0076347	0.0178756	0.001	0.0012473	0.0023972	0.0037421	0.0014218
12	0.0039467	0.0023962	0.0043226	0.0261195	0.001	0.0005519	0.0010607	0.0016557	0.0011302

HGB 2008 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs	TP	FC	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	Art	0.6118889	0.0496299	0.1652202	0.0647631	0.0297807	0.007515	0.0019386	0.0005446	0.000196
2	AM_Peak	Col	0.5180944	0.053976	0.1796888	0.0739427	0.0340018	0.011213	0.0028926	0.0008125	0.0002925
3	AM_Peak	Fwy	0.6387524	0.0475593	0.1583271	0.0610258	0.0280621	0.006571	0.0016951	0.0004762	0.0001714
4	Mid_Day	Art	0.5746295	0.0471587	0.1569937	0.0616095	0.0283305	0.0125485	0.0032372	0.0009093	0.0003274
5	Mid_Day	Col	0.4983093	0.0516553	0.1719632	0.0707656	0.0325409	0.0155511	0.0040117	0.0011269	0.0004057
6	Mid_Day	Fwy	0.6104604	0.0454253	0.1512231	0.0583257	0.0268205	0.0102348	0.0026403	0.0007417	0.000267
7	Ovr_Nite	Art	0.6126765	0.0503322	0.1675583	0.0656177	0.0301737	0.0053227	0.0013731	0.0003857	0.0001389
8	Ovr_Nite	Col	0.5450601	0.0575013	0.1914248	0.0786671	0.0361743	0.006595	0.0017013	0.0004779	0.000172
9	Ovr_Nite	Fwy	0.6268178	0.0465299	0.1549002	0.0596334	0.0274219	0.0049816	0.0012851	0.000361	0.00013
10	PM_Peak	Art	0.6126823	0.0503733	0.1676952	0.0658262	0.0302696	0.0072492	0.0018701	0.0005253	0.0001891
11	PM_Peak	Col	0.5419038	0.0566749	0.1886734	0.0776137	0.0356899	0.0085833	0.0022143	0.000622	0.0002239
12	PM_Peak	Fwy	0.6415065	0.0477865	0.1590837	0.0614182	0.0282426	0.0057833	0.0014919	0.0004191	0.0001509

Obs	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0003921	0.0001089	0.0001743	0.0000218	0.0005819	0.0000195	0.0173424	0.004199	0.00198	0.0017411
2	0.000585	0.0001625	0.00026	0.0000325	0.0004929	0.0000213	0.0323954	0.0078438	0.0036987	0.0032523
3	0.0003428	0.0000952	0.0001524	0.000019	0.0006074	0.0000187	0.012612	0.0030537	0.00144	0.0012662
4	0.0006547	0.0001819	0.000291	0.0000364	0.0005466	0.0000186	0.0284935	0.006899	0.0032532	0.0028606
5	0.0008114	0.0002254	0.0003606	0.0000451	0.0004741	0.0000203	0.0446744	0.0108168	0.0051006	0.004485
6	0.000534	0.0001483	0.0002373	0.0000297	0.0005806	0.0000179	0.0195482	0.0047331	0.0022319	0.0019625
7	0.0002777	0.0000771	0.0001234	0.0000154	0.0005827	0.0000198	0.0122343	0.0029622	0.0013968	0.0012282
8	0.0003441	0.0000956	0.0001529	0.0000191	0.0005185	0.0000226	0.0193593	0.0046874	0.0022103	0.0019436
9	0.0002599	0.0000722	0.0001155	0.0000144	0.0005961	0.0000183	0.0095483	0.0023119	0.0010902	0.0009586
10	0.0003782	0.0001051	0.0001681	0.000021	0.0005827	0.0000198	0.0166302	0.0040266	0.0018987	0.0016696
11	0.0004478	0.0001244	0.000199	0.0000249	0.0005155	0.0000223	0.0252161	0.0061055	0.002879	0.0025315
12	0.0003017	0.0000838	0.0001341	0.0000168	0.0006101	0.0000188	0.0111037	0.0026885	0.0012677	0.0011147

Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0039942	0.0015362	0.0033456	0.0261576	0.001	0.0003973	0.0015696	0.0028821	0.0010794
2	0.0074612	0.0028697	0.0062495	0.0476064	0.001	0.0008177	0.0032306	0.0059322	0.0011739
3	0.0029047	0.0011172	0.002433	0.0251285	0.001	0.0003387	0.0013382	0.0024572	0.0010344
4	0.0065625	0.002524	0.0054968	0.052454	0.001	0.0001604	0.0006336	0.0011634	0.0010257
5	0.0102892	0.0039574	0.0086183	0.0569766	0.001	0.0003844	0.0015187	0.0027886	0.0011235
6	0.0045022	0.0017316	0.0037711	0.0494678	0.001	0.0001948	0.0007694	0.0014129	0.000988
7	0.0028177	0.0010837	0.0023602	0.0373071	0.001	0.0001508	0.0005957	0.0010938	0.0010947
8	0.0044587	0.0017149	0.0037347	0.0361557	0.001	0.0003735	0.0014754	0.0027092	0.0012506
9	0.0021991	0.0008458	0.001842	0.0532617	0.001	0.0002289	0.0009041	0.0016602	0.001012
10	0.0038302	0.0014731	0.0032082	0.0235359	0.001	0.0003012	0.0011901	0.0021854	0.0010956
11	0.0058076	0.0022337	0.0048645	0.0259694	0.001	0.0007068	0.0027924	0.0051276	0.0012326
12	0.0025573	0.0009836	0.002142	0.0255329	0.001	0.0002886	0.0011401	0.0020935	0.0010393

HGB 2011 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs	TP	FC	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	Art	0.6119248	0.049636	0.1652411	0.0647629	0.0297809	0.007515	0.0019386	0.0005446	0.000196
2	AM_Peak	Col	0.5181248	0.0539826	0.1797115	0.0739424	0.0340021	0.011213	0.0028926	0.0008125	0.0002925
3	AM_Peak	Fwy	0.63879	0.0475651	0.1583471	0.0610256	0.0280624	0.006571	0.0016951	0.0004762	0.0001714
4	Mid_Day	Art	0.5746633	0.0471645	0.1570136	0.0616093	0.0283308	0.0125485	0.0032372	0.0009093	0.0003274
5	Mid_Day	Col	0.4983386	0.0516617	0.1719849	0.0707654	0.0325411	0.0155511	0.0040117	0.0011269	0.0004057
6	Mid_Day	Fwy	0.6104963	0.0454309	0.1512422	0.0583255	0.0268207	0.0102348	0.0026403	0.0007417	0.000267
7	Ovr_Nite	Art	0.6127125	0.0503384	0.1675794	0.0656174	0.0301739	0.0053227	0.0013731	0.0003857	0.0001389
8	Ovr_Nite	Col	0.5450921	0.0575084	0.1914489	0.0786668	0.0361746	0.006595	0.0017013	0.0004779	0.000172
9	Ovr_Nite	Fwy	0.6268546	0.0465356	0.1549198	0.0596332	0.0274221	0.0049816	0.0012851	0.000361	0.00013
10	PM_Peak	Art	0.6127182	0.0503795	0.1677164	0.065826	0.0302698	0.0072492	0.0018701	0.0005253	0.0001891
11	PM_Peak	Col	0.5419357	0.0566818	0.1886972	0.0776134	0.0356902	0.0085833	0.0022143	0.000622	0.0002239
12	PM_Peak	Fwy	0.6415442	0.0477924	0.1591038	0.061418	0.0282428	0.0057833	0.0014919	0.0004191	0.0001509

Obs	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0003921	0.0001089	0.0001743	0.0000218	0.000546	0.000001	0.0173424	0.004199	0.00198	0.0017411
2	0.000585	0.0001625	0.00026	0.0000325	0.0004624	0.0000011	0.0323954	0.0078438	0.0036987	0.0032523
3	0.0003428	0.0000952	0.0001524	0.000019	0.0005699	0.0000009	0.012612	0.0030537	0.00144	0.0012662
4	0.0006547	0.0001819	0.000291	0.0000364	0.0005128	0.0000009	0.0284935	0.006899	0.0032532	0.0028606
5	0.0008114	0.0002254	0.0003606	0.0000451	0.0004448	0.000001	0.0446744	0.0108168	0.0051006	0.004485
6	0.000534	0.0001483	0.0002373	0.0000297	0.0005447	0.0000009	0.0195482	0.0047331	0.0022319	0.0019625
7	0.0002777	0.0000771	0.0001234	0.0000154	0.0005467	0.000001	0.0122343	0.0029622	0.0013968	0.0012282
8	0.0003441	0.0000956	0.0001529	0.0000191	0.0004865	0.0000011	0.0193593	0.0046874	0.0022103	0.0019436
9	0.0002599	0.0000722	0.0001155	0.0000144	0.0005593	0.0000009	0.0095483	0.0023119	0.0010902	0.0009586
10	0.0003782	0.0001051	0.0001681	0.000021	0.0005467	0.000001	0.0166302	0.0040266	0.0018987	0.0016696
11	0.0004478	0.0001244	0.000199	0.0000249	0.0004836	0.0000011	0.0252161	0.0061055	0.002879	0.0025315
12	0.0003017	0.0000838	0.0001341	0.0000168	0.0005724	0.0000009	0.0111037	0.0026885	0.0012677	0.0011147

Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0039942	0.0015362	0.0033456	0.0261576	0.001	0.0002416	0.0015811	0.0030262	0.001071
2	0.0074612	0.0028697	0.0062495	0.0476064	0.001	0.0004972	0.0032545	0.0062289	0.0011648
3	0.0029047	0.0011172	0.002433	0.0251285	0.001	0.000206	0.0013481	0.0025801	0.0010264
4	0.0065625	0.002524	0.0054968	0.052454	0.001	0.0000975	0.0006383	0.0012216	0.0010177
5	0.0102892	0.0039574	0.0086183	0.0569766	0.001	0.0002337	0.0015299	0.0029281	0.0011148
6	0.0045022	0.0017316	0.0037711	0.0494678	0.001	0.0001184	0.0007751	0.0014835	0.0009803
7	0.0028177	0.0010837	0.0023602	0.0373071	0.001	0.0000917	0.0006	0.0011485	0.0010862
8	0.0044587	0.0017149	0.0037347	0.0361557	0.001	0.0002271	0.0014863	0.0028447	0.0012409
9	0.0021991	0.0008458	0.001842	0.0532617	0.001	0.0001391	0.0009108	0.0017432	0.0010041
10	0.0038302	0.0014731	0.0032082	0.0235359	0.001	0.0001832	0.0011989	0.0022947	0.0010871
11	0.0058076	0.0022337	0.0048645	0.0259694	0.001	0.0004298	0.002813	0.005384	0.0012231
12	0.0025573	0.0009836	0.002142	0.0255329	0.001	0.0001755	0.0011485	0.0021982	0.0010313

HGB 2014 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs	TP	FC	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	Art	0.6119239	0.0496428	0.1652639	0.0647629	0.0297809	0.007515	0.0019386	0.0005446	0.000196
2	AM_Peak	Col	0.518124	0.0539901	0.1797363	0.0739424	0.0340021	0.011213	0.0028926	0.0008125	0.0002925
3	AM_Peak	Fwy	0.6387889	0.0475717	0.158369	0.0610256	0.0280624	0.006571	0.0016951	0.0004762	0.0001714
4	Mid_Day	Art	0.5746624	0.047171	0.1570352	0.0616093	0.0283308	0.0125485	0.0032372	0.0009093	0.0003274
5	Mid_Day	Col	0.4983378	0.0516688	0.1720086	0.0707654	0.0325411	0.0155511	0.0040117	0.0011269	0.0004057
6	Mid_Day	Fwy	0.6104953	0.0454372	0.1512631	0.0583255	0.0268207	0.0102348	0.0026403	0.0007417	0.000267
7	Ovr_Nite	Art	0.6127115	0.0503453	0.1676026	0.0656174	0.0301739	0.0053227	0.0013731	0.0003857	0.0001389
8	Ovr_Nite	Col	0.5450912	0.0575163	0.1914754	0.0786668	0.0361746	0.006595	0.0017013	0.0004779	0.000172
9	Ovr_Nite	Fwy	0.6268536	0.046542	0.1549412	0.0596332	0.0274221	0.0049816	0.0012851	0.000361	0.00013
10	PM_Peak	Art	0.6127173	0.0503865	0.1677395	0.065826	0.0302698	0.0072492	0.0018701	0.0005253	0.0001891
11	PM_Peak	Col	0.5419348	0.0566897	0.1887233	0.0776134	0.0356902	0.0085833	0.0022143	0.000622	0.0002239
12	PM_Peak	Fwy	0.6415431	0.047799	0.1591258	0.061418	0.0282428	0.0057833	0.0014919	0.0004191	0.0001509

Obs	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0003921	0.0001089	0.0001743	0.0000218	0.000547	0	0.0173424	0.004199	0.00198	0.0017411
2	0.000585	0.0001625	0.00026	0.0000325	0.0004633	0	0.0323954	0.0078438	0.0036987	0.0032523
3	0.0003428	0.0000952	0.0001524	0.000019	0.0005709	0	0.012612	0.0030537	0.00144	0.0012662
4	0.0006547	0.0001819	0.000291	0.0000364	0.0005137	0	0.0284935	0.006899	0.0032532	0.0028606
5	0.0008114	0.0002254	0.0003606	0.0000451	0.0004456	0	0.0446744	0.0108168	0.0051006	0.004485
6	0.000534	0.0001483	0.0002373	0.0000297	0.0005457	0	0.0195482	0.0047331	0.0022319	0.0019625
7	0.0002777	0.0000771	0.0001234	0.0000154	0.0005477	0	0.0122343	0.0029622	0.0013968	0.0012282
8	0.0003441	0.0000956	0.0001529	0.0000191	0.0004873	0	0.0193593	0.0046874	0.0022103	0.0019436
9	0.0002599	0.0000722	0.0001155	0.0000144	0.0005603	0	0.0095483	0.0023119	0.0010902	0.0009586
10	0.0003782	0.0001051	0.0001681	0.000021	0.0005477	0	0.0166302	0.0040266	0.0018987	0.0016696
11	0.0004478	0.0001244	0.000199	0.0000249	0.0004845	0	0.0252161	0.0061055	0.002879	0.0025315
12	0.0003017	0.0000838	0.0001341	0.0000168	0.0005734	0	0.0111037	0.0026885	0.0012677	0.0011147

Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0039942	0.0015362	0.0033456	0.0261576	0.001	0.0001745	0.0015789	0.0030955	0.0010423
2	0.0074612	0.0028697	0.0062495	0.0476064	0.001	0.0003592	0.0032498	0.0063715	0.0011336
3	0.0029047	0.0011172	0.002433	0.0251285	0.001	0.0001488	0.0013462	0.0026392	0.0009989
4	0.0065625	0.002524	0.0054968	0.052454	0.001	0.0000705	0.0006374	0.0012496	0.0009904
5	0.0102892	0.0039574	0.0086183	0.0569766	0.001	0.0001689	0.0015277	0.0029951	0.0010849
6	0.0045022	0.0017316	0.0037711	0.0494678	0.001	0.0000856	0.000774	0.0015175	0.000954
7	0.0028177	0.0010837	0.0023602	0.0373071	0.001	0.0000662	0.0005992	0.0011748	0.0010571
8	0.0044587	0.0017149	0.0037347	0.0361557	0.001	0.0001641	0.0014842	0.0029098	0.0012077
9	0.0021991	0.0008458	0.001842	0.0532617	0.001	0.0001005	0.0009095	0.0017831	0.0009772
10	0.0038302	0.0014731	0.0032082	0.0235359	0.001	0.0001323	0.0011972	0.0023472	0.001058
11	0.0058076	0.0022337	0.0048645	0.0259694	0.001	0.0003105	0.002809	0.0055073	0.0011903
12	0.0025573	0.0009836	0.002142	0.0255329	0.001	0.0001268	0.0011469	0.0022485	0.0010036

HGB 2017 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs	TP	FC	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	Art	0.6119214	0.0496336	0.1652276	0.0647621	0.0297817	0.007515	0.0019386	0.0005446	0.000196
2	AM_Peak	Col	0.5181219	0.0539801	0.1796968	0.0739415	0.034003	0.011213	0.0028926	0.0008125	0.0002925
3	AM_Peak	Fwy	0.6387864	0.0475629	0.1583341	0.0610249	0.0280631	0.006571	0.0016951	0.0004762	0.0001714
4	Mid_Day	Art	0.5746601	0.0471623	0.1570007	0.0616085	0.0283315	0.0125485	0.0032372	0.0009093	0.0003274
5	Mid_Day	Col	0.4983358	0.0516593	0.1719708	0.0707645	0.032542	0.0155511	0.0040117	0.0011269	0.0004057
6	Mid_Day	Fwy	0.6104928	0.0454288	0.1512298	0.0583248	0.0268214	0.0102348	0.0026403	0.0007417	0.000267
7	Ovr_Nite	Art	0.612709	0.050336	0.1675657	0.0656166	0.0301747	0.0053227	0.0013731	0.0003857	0.0001389
8	Ovr_Nite	Col	0.5450891	0.0575057	0.1914333	0.0786658	0.0361755	0.006595	0.0017013	0.0004779	0.000172
9	Ovr_Nite	Fwy	0.6268511	0.0465334	0.1549071	0.0596325	0.0274228	0.0049816	0.0012851	0.000361	0.00013
10	PM_Peak	Art	0.6127148	0.0503772	0.1677027	0.0658252	0.0302706	0.0072492	0.0018701	0.0005253	0.0001891
11	PM_Peak	Col	0.5419326	0.0566792	0.1886818	0.0776125	0.0356912	0.0085833	0.0022143	0.000622	0.0002239
12	PM_Peak	Fwy	0.6415406	0.0477902	0.1590908	0.0614173	0.0282436	0.0057833	0.0014919	0.0004191	0.0001509

Obs	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0003921	0.0001089	0.0001743	0.0000218	0.0005494	0	0.0173424	0.004199	0.00198	0.0017411
2	0.000585	0.0001625	0.00026	0.0000325	0.0004653	0	0.0323954	0.0078438	0.0036987	0.0032523
3	0.0003428	0.0000952	0.0001524	0.000019	0.0005735	0	0.012612	0.0030537	0.00144	0.0012662
4	0.0006547	0.0001819	0.000291	0.0000364	0.000516	0	0.0284935	0.006899	0.0032532	0.0028606
5	0.0008114	0.0002254	0.0003606	0.0000451	0.0004476	0	0.0446744	0.0108168	0.0051006	0.004485
6	0.000534	0.0001483	0.0002373	0.0000297	0.0005481	0	0.0195482	0.0047331	0.0022319	0.0019625
7	0.0002777	0.0000771	0.0001234	0.0000154	0.0005501	0	0.0122343	0.0029622	0.0013968	0.0012282
8	0.0003441	0.0000956	0.0001529	0.0000191	0.0004895	0	0.0193593	0.0046874	0.0022103	0.0019436
9	0.0002599	0.0000722	0.0001155	0.0000144	0.0005628	0	0.0095483	0.0023119	0.0010902	0.0009586
10	0.0003782	0.0001051	0.0001681	0.000021	0.0005501	0	0.0166302	0.0040266	0.0018987	0.0016696
11	0.0004478	0.0001244	0.000199	0.0000249	0.0004867	0	0.0252161	0.0061055	0.002879	0.0025315
12	0.0003017	0.0000838	0.0001341	0.0000168	0.000576	0	0.0111037	0.0026885	0.0012677	0.0011147

Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0039942	0.0015362	0.0033456	0.0261576	0.001	0.000166	0.0015742	0.0031088	0.0010878
2	0.0074612	0.0028697	0.0062495	0.0476064	0.001	0.0003417	0.0032401	0.0063988	0.0011831
3	0.0029047	0.0011172	0.002433	0.0251285	0.001	0.0001415	0.0013421	0.0026505	0.0010425
4	0.0065625	0.002524	0.0054968	0.052454	0.001	0.000067	0.0006355	0.001255	0.0010337
5	0.0102892	0.0039574	0.0086183	0.0569766	0.001	0.0001606	0.0015231	0.003008	0.0011322
6	0.0045022	0.0017316	0.0037711	0.0494678	0.001	0.0000814	0.0007717	0.001524	0.0009957
7	0.0028177	0.0010837	0.0023602	0.0373071	0.001	0.000063	0.0005974	0.0011798	0.0011032
8	0.0044587	0.0017149	0.0037347	0.0361557	0.001	0.000156	0.0014797	0.0029223	0.0012604
9	0.0021991	0.0008458	0.001842	0.0532617	0.001	0.0000956	0.0009068	0.0017908	0.0010199
10	0.0038302	0.0014731	0.0032082	0.0235359	0.001	0.0001259	0.0011936	0.0023573	0.0011041
11	0.0058076	0.0022337	0.0048645	0.0259694	0.001	0.0002953	0.0028006	0.0055309	0.0012423
12	0.0025573	0.0009836	0.002142	0.0255329	0.001	0.0001206	0.0011434	0.0022582	0.0010474

HGB 2018 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs	TP	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	0.0496344	0.1652319	0.0647618	0.029782	0.007515	0.0019386	0.0005446	0.000196
2	AM_Peak	0.0539809	0.1797015	0.0739412	0.0340033	0.011213	0.0028926	0.0008125	0.0002925
3	AM_Peak	0.0475636	0.1583383	0.0610246	0.0280633	0.006571	0.0016951	0.0004762	0.0001714
4	Mid_Day	0.047163	0.1570048	0.0616083	0.0283317	0.0125485	0.0032372	0.0009093	0.0003274
5	Mid_Day	0.05166	0.1719753	0.0707642	0.0325423	0.0155511	0.0040117	0.0011269	0.0004057
6	Mid_Day	0.0454294	0.1512338	0.0583246	0.0268217	0.0102348	0.0026403	0.0007417	0.000267
7	Ovr_Nite	0.0503367	0.1675701	0.0656164	0.0301749	0.0053227	0.0013731	0.0003857	0.0001389
8	Ovr_Nite	0.0575066	0.1914383	0.0786655	0.0361758	0.006595	0.0017013	0.0004779	0.000172
9	Ovr_Nite	0.0465341	0.1549112	0.0596322	0.027423	0.0049816	0.0012851	0.000361	0.00013
10	PM_Peak	0.0503779	0.1677071	0.065825	0.0302709	0.0072492	0.0018701	0.0005253	0.0001891
11	PM_Peak	0.05668	0.1886867	0.0776122	0.0356914	0.0085833	0.0022143	0.000622	0.0002239
12	PM_Peak	0.0477909	0.1590949	0.0614171	0.0282438	0.0057833	0.0014919	0.0004191	0.0001509

Obs	P_HDGV_6	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0003921	0.0000218	0.0005497	0	0.0173424	0.004199	0.00198	0.0017411
2	0.000585	0.0000325	0.0004656	0	0.0323954	0.0078438	0.0036987	0.0032523
3	0.0003428	0.000019	0.0005738	0	0.012612	0.0030537	0.00144	0.0012662
4	0.0006547	0.0000364	0.0005163	0	0.0284935	0.006899	0.0032532	0.0028606
5	0.0008114	0.0000451	0.0004479	0	0.0446744	0.0108168	0.0051006	0.004485
6	0.000534	0.0000297	0.0005484	0	0.0195482	0.0047331	0.0022319	0.0019625
7	0.0002777	0.0000154	0.0005504	0	0.0122343	0.0029622	0.0013968	0.0012282
8	0.0003441	0.0000191	0.0004898	0	0.0193593	0.0046874	0.0022103	0.0019436
9	0.0002599	0.0000144	0.0005631	0	0.0095483	0.0023119	0.0010902	0.0009586
10	0.0003782	0.000021	0.0005504	0	0.0166302	0.0040266	0.0018987	0.0016696
11	0.0004478	0.0000249	0.000487	0	0.0252161	0.0061055	0.002879	0.0025315
12	0.0003017	0.0000168	0.0005763	0	0.0111037	0.0026885	0.0012677	0.0011147

Obs	P_HDDV_6	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0039942	0.0261576	0.001	0.0001667	0.0015801	0.0031022	0.0010828
2	0.0074612	0.0476064	0.001	0.0003431	0.0032523	0.0063852	0.0011776
3	0.0029047	0.0251285	0.001	0.0001421	0.0013472	0.0026449	0.0010376
4	0.0065625	0.052454	0.001	0.0000673	0.0006379	0.0012523	0.0010289
5	0.0102892	0.0569766	0.001	0.0001613	0.0015288	0.0030016	0.001127
6	0.0045022	0.0494678	0.001	0.0000817	0.0007746	0.0015208	0.0009911
7	0.0028177	0.0373071	0.001	0.0000633	0.0005996	0.0011773	0.0010981
8	0.0044587	0.0361557	0.001	0.0001567	0.0014853	0.0029161	0.0012545
9	0.0021991	0.0532617	0.001	0.000096	0.0009102	0.0017869	0.0010152
10	0.0038302	0.0235359	0.001	0.0001264	0.0011981	0.0023522	0.001099
11	0.0058076	0.0259694	0.001	0.0002965	0.0028112	0.0055191	0.0012365
12	0.0025573	0.0255329	0.001	0.0001211	0.0011477	0.0022534	0.0010426

HGB 2019 Weekday VMT Mix by Time Period and Roadway Functional Classification Group input to IMPSUM62

Obs	TP	FC	P_LDGV	P_LDGT1	P_LDGT2	P_LDGT3	P_LDGT4	P_HDGV2b	P_HDGV_3	P_HDGV_4	P_HDGV_5
1	AM_Peak	Art	0.6119194	0.0496342	0.1652309	0.0647625	0.0297813	0.007515	0.0019386	0.0005446	0.000196
2	AM_Peak	Col	0.5181203	0.0539807	0.1797005	0.073942	0.0340025	0.011213	0.0028926	0.0008125	0.0002925
3	AM_Peak	Fwy	0.6387843	0.0475634	0.1583374	0.0610253	0.0280627	0.006571	0.0016951	0.0004762	0.0001714
4	Mid_Day	Art	0.5746582	0.0471628	0.1570039	0.0616089	0.0283311	0.0125485	0.0032372	0.0009093	0.0003274
5	Mid_Day	Col	0.4983342	0.0516599	0.1719743	0.070765	0.0325415	0.0155511	0.0040117	0.0011269	0.0004057
6	Mid_Day	Fwy	0.6104909	0.0454293	0.1512329	0.0583251	0.0268211	0.0102348	0.0026403	0.0007417	0.000267
7	Ovr_Nite	Art	0.6127071	0.0503366	0.1675691	0.0656171	0.0301743	0.0053227	0.0013731	0.0003857	0.0001389
8	Ovr_Nite	Col	0.5450873	0.0575064	0.1914372	0.0786663	0.036175	0.006595	0.0017013	0.0004779	0.000172
9	Ovr_Nite	Fwy	0.6268491	0.0465339	0.1549103	0.0596328	0.0274224	0.0049816	0.0012851	0.000361	0.00013
10	PM_Peak	Art	0.6127128	0.0503777	0.1677061	0.0658256	0.0302702	0.0072492	0.0018701	0.0005253	0.0001891
11	PM_Peak	Col	0.5419309	0.0566798	0.1886856	0.077613	0.0356906	0.0085833	0.0022143	0.000622	0.0002239
12	PM_Peak	Fwy	0.6415385	0.0477907	0.159094	0.0614177	0.0282432	0.0057833	0.0014919	0.0004191	0.0001509

Obs	P_HDGV_6	P_HDGV_7	P_HDGV8a	P_HDGV8b	P_LDDV	P_LDDT12	P_HDDV2b	P_HDDV_3	P_HDDV_4	P_HDDV_5
1	0.0003921	0.0001089	0.0001743	0.0000218	0.0005514	0	0.0173424	0.004199	0.00198	0.0017411
2	0.000585	0.0001625	0.000026	0.0000325	0.000467	0	0.0323954	0.0078438	0.0036987	0.0032523
3	0.0003428	0.0000952	0.0001524	0.000019	0.0005756	0	0.012612	0.0030537	0.00144	0.0012662
4	0.0006547	0.0001819	0.000291	0.0000364	0.0005179	0	0.0284935	0.006899	0.0032532	0.0028606
5	0.0008114	0.0002254	0.0003606	0.0000451	0.0004492	0	0.0446744	0.0108168	0.0051006	0.004485
6	0.000534	0.0001483	0.0002373	0.0000297	0.0005501	0	0.0195482	0.0047331	0.0022319	0.0019625
7	0.0002777	0.0000771	0.0001234	0.0000154	0.0005521	0	0.0122343	0.0029622	0.0013968	0.0012282
8	0.0003441	0.0000956	0.0001529	0.0000191	0.0004913	0	0.0193593	0.0046874	0.0022103	0.0019436
9	0.0002599	0.0000722	0.0001155	0.0000144	0.0005648	0	0.0095483	0.0023119	0.0010902	0.0009586
10	0.0003782	0.0001051	0.0001681	0.000021	0.0005521	0	0.0166302	0.0040266	0.0018987	0.0016696
11	0.0004478	0.0001244	0.000199	0.0000249	0.0004884	0	0.0252161	0.0061055	0.002879	0.0025315
12	0.0003017	0.0000838	0.0001341	0.0000168	0.000578	0	0.0111037	0.0026885	0.0012677	0.0011147

Obs	P_HDDV_6	P_HDDV_7	P_HDDV8a	P_HDDV8b	P_MC	P_HDGB	P_HDDBT	P_HDDBS	P_LDDT34
1	0.0039942	0.0015362	0.0033456	0.0261576	0.001	0.0001546	0.0015731	0.0031212	0.0010839
2	0.0074612	0.0028697	0.0062495	0.0476064	0.001	0.0003182	0.0032379	0.0064244	0.0011788
3	0.0029047	0.0011172	0.002433	0.0251285	0.001	0.0001318	0.0013412	0.0026611	0.0010387
4	0.0065625	0.002524	0.0054968	0.052454	0.001	0.0000624	0.000635	0.00126	0.0010299
5	0.0102892	0.0039574	0.0086183	0.0569766	0.001	0.0001496	0.0015221	0.00302	0.0011281
6	0.0045022	0.0017316	0.0037711	0.0494678	0.001	0.0000758	0.0007712	0.0015301	0.0009921
7	0.0028177	0.0010837	0.0023602	0.0373071	0.001	0.0000587	0.000597	0.0011845	0.0010993
8	0.0044587	0.0017149	0.0037347	0.0361557	0.001	0.0001453	0.0014788	0.002934	0.0012558
9	0.0021991	0.0008458	0.001842	0.0532617	0.001	0.0000891	0.0009062	0.0017979	0.0010162
10	0.0038302	0.0014731	0.0032082	0.0235359	0.001	0.0001172	0.0011928	0.0023667	0.0011002
11	0.0058076	0.0022337	0.0048645	0.0259694	0.001	0.0002751	0.0027987	0.005553	0.0012378
12	0.0025573	0.0009836	0.002142	0.0255329	0.001	0.0001123	0.0011427	0.0022672	0.0010437

**APPENDIX D: MOBILE6 REGISTRATION
DISTRIBUTIONS AND DIESEL FRACTIONS INPUT**

2002 Brazoria County Registration Distribution

REG DIST

* Brazoria County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.05692 0.08330 0.09762 0.08624 0.07802 0.07438 0.06549 0.07075 0.05858 0.05588 0.04479 0.04224 0.03488
0.03343 0.02372 0.01807 0.01552 0.01322 0.01002 0.00597 0.00407 0.00362 0.00262 0.00295 0.01771

* LDT1

2 0.06766 0.09415 0.08536 0.07439 0.07124 0.07221 0.05732 0.06306 0.06362 0.04889 0.04209 0.04052 0.03613
0.03447 0.02783 0.01899 0.02015 0.01603 0.01514 0.00814 0.00857 0.00694 0.00315 0.00401 0.01994

* LDT2

3 0.06766 0.09415 0.08536 0.07439 0.07124 0.07221 0.05732 0.06306 0.06362 0.04889 0.04209 0.04052 0.03613
0.03447 0.02783 0.01899 0.02015 0.01603 0.01514 0.00814 0.00857 0.00694 0.00315 0.00401 0.01994

* LDT3

4 0.11380 0.15439 0.11567 0.14052 0.05244 0.08493 0.06129 0.05050 0.03711 0.03081 0.02492 0.02291 0.01695
0.01735 0.01259 0.00750 0.01105 0.01025 0.00770 0.00516 0.00610 0.00268 0.00241 0.00234 0.00864

* LDT4

5 0.11380 0.15439 0.11567 0.14052 0.05244 0.08493 0.06129 0.05050 0.03711 0.03081 0.02492 0.02291 0.01695
0.01735 0.01259 0.00750 0.01105 0.01025 0.00770 0.00516 0.00610 0.00268 0.00241 0.00234 0.00864

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

*HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

*HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

*HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.11023 0.13916 0.10445 0.08191 0.06090 0.05512 0.05024 0.03593 0.03745 0.03015 0.02284 0.01583 0.01675
0.01705 0.01248 0.01340 0.02467 0.02284 0.01340 0.01340 0.02375 0.01523 0.01797 0.01248 0.05238

2008 Brazoria County Registration Distribution REG DIST

* Brazoria County
 * Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data
 * LDV, LDT, MC: based on Brazoria County data only
 * HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)
 * HDV8b: based on statewide aggregate data
 * LDV
 1 0.05681 0.08925 0.08656 0.08294 0.07447 0.07097 0.07054 0.06662 0.06897 0.05980 0.05054 0.04190 0.03299
 0.03257 0.02408 0.01993 0.01548 0.01203 0.00861 0.00741 0.00515 0.00337 0.00279 0.00225 0.01397
 * LDT1
 2 0.02720 0.04999 0.06261 0.05952 0.06118 0.07572 0.08625 0.07993 0.07159 0.06101 0.05513 0.05093 0.03831
 0.03950 0.03710 0.02522 0.02066 0.01767 0.01565 0.01412 0.01106 0.00586 0.00582 0.00490 0.02307
 * LDT2
 3 0.02720 0.04999 0.06261 0.05952 0.06118 0.07572 0.08625 0.07993 0.07159 0.06101 0.05513 0.05093 0.03831
 0.03950 0.03710 0.02522 0.02066 0.01767 0.01565 0.01412 0.01106 0.00586 0.00582 0.00490 0.02307
 * LDT3
 4 0.07536 0.12963 0.09181 0.07877 0.10171 0.09047 0.07951 0.07360 0.05383 0.06045 0.02298 0.03633 0.02384
 0.01957 0.01312 0.01061 0.00936 0.00658 0.00493 0.00376 0.00345 0.00129 0.00211 0.00137 0.00556
 * LDT4
 5 0.07536 0.12963 0.09181 0.07877 0.10171 0.09047 0.07951 0.07360 0.05383 0.06045 0.02298 0.03633 0.02384
 0.01957 0.01312 0.01061 0.00936 0.00658 0.00493 0.00376 0.00345 0.00129 0.00211 0.00137 0.00556
 * HDV2b
 6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909 0.01039
 0.01255 0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754
 * HDV3
 7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330 0.02046
 0.03844 0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278
 * HDV4
 8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591 0.04342
 0.03520 0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167
 * HDV5
 9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189 0.01548
 0.01602 0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483
 * HDV6
 10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806 0.03053
 0.04155 0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497
 * HDV7
 11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249 0.03978
 0.05110 0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597
 * HDV8a
 12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959 0.04920
 0.06892 0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328
 * HDV8b
 13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611 0.03143
 0.03281 0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020
 * HDBS is MOBILE6 default
 * HDBT is MOBILE6 default
 * MC
 16 0.07783 0.13750 0.12534 0.09025 0.07168 0.08534 0.07441 0.06090 0.04192 0.03673 0.02403 0.01898 0.01843
 0.01679 0.01475 0.01010 0.00833 0.00546 0.00614 0.00573 0.00464 0.00396 0.00942 0.00410 0.04724

2002 Chambers County Registration Distribution

REG DIST

* Chambers County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.03525 0.06987 0.09984 0.09127 0.08052 0.07618 0.06832 0.07235 0.05778 0.05736 0.04630 0.04124 0.03359
0.03607 0.02739 0.01902 0.01592 0.01509 0.01261 0.00724 0.00548 0.00465 0.00279 0.00382 0.02005

* LDT1

2 0.04175 0.08415 0.08945 0.07497 0.08260 0.07898 0.05701 0.06476 0.06761 0.04977 0.04498 0.04240 0.03775
0.03051 0.02650 0.01823 0.01745 0.01680 0.01732 0.00995 0.00995 0.00892 0.00375 0.00465 0.01978

* LDT2

3 0.04175 0.08415 0.08945 0.07497 0.08260 0.07898 0.05701 0.06476 0.06761 0.04977 0.04498 0.04240 0.03775
0.03051 0.02650 0.01823 0.01745 0.01680 0.01732 0.00995 0.00995 0.00892 0.00375 0.00465 0.01978

* LDT3

4 0.08050 0.15215 0.12782 0.14640 0.05705 0.09686 0.06900 0.06103 0.03892 0.03450 0.02875 0.01902 0.01460
0.01194 0.01150 0.00265 0.01194 0.00929 0.00663 0.00531 0.00310 0.00133 0.00088 0.00265 0.00619

* LDT4

5 0.08050 0.15215 0.12782 0.14640 0.05705 0.09686 0.06900 0.06103 0.03892 0.03450 0.02875 0.01902 0.01460
0.01194 0.01150 0.00265 0.01194 0.00929 0.00663 0.00531 0.00310 0.00133 0.00088 0.00265 0.00619

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

*HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

*HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

*HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.11833 0.13921 0.14617 0.09049 0.07889 0.04408 0.06265 0.04176 0.02784 0.03480 0.02088 0.00928 0.01160
0.01392 0.01160 0.00000 0.00928 0.02088 0.01392 0.01160 0.02320 0.01392 0.00928 0.01624 0.03016

2008 Chambers County Registration Distribution

REG DIST

* Chambers County

* Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data

* LDV, LDT, MC: based on Chambers County data only

* HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)

* HDV8b: based on statewide aggregate data

* LDV

1 0.05175 0.09063 0.09981 0.08927 0.07431 0.06511 0.06847 0.06079 0.06471 0.05639 0.04647 0.04079 0.03303 0.03351
0.02096 0.01896 0.01488 0.01344 0.01120 0.00952 0.00600 0.00432 0.00328 0.00296 0.01944

* LDT1

2 0.02675 0.04767 0.06290 0.05770 0.06748 0.07046 0.08606 0.07813 0.06674 0.06216 0.05857 0.05126 0.03628 0.03764
0.03789 0.02526 0.02204 0.01820 0.01758 0.01226 0.01053 0.00632 0.00607 0.00656 0.02749

* LDT2

3 0.02675 0.04767 0.06290 0.05770 0.06748 0.07046 0.08606 0.07813 0.06674 0.06216 0.05857 0.05126 0.03628 0.03764
0.03789 0.02526 0.02204 0.01820 0.01758 0.01226 0.01053 0.00632 0.00607 0.00656 0.02749

* LDT3

4 0.06493 0.13437 0.09683 0.08245 0.10559 0.08942 0.08470 0.08335 0.05549 0.06156 0.01797 0.03190 0.02112 0.01752
0.01123 0.01146 0.00629 0.00517 0.00315 0.00562 0.00247 0.00067 0.00157 0.00090 0.00427

* LDT4

5 0.06493 0.13437 0.09683 0.08245 0.10559 0.08942 0.08470 0.08335 0.05549 0.06156 0.01797 0.03190 0.02112 0.01752
0.01123 0.01146 0.00629 0.00517 0.00315 0.00562 0.00247 0.00067 0.00157 0.00090 0.00427

* HDV2b

6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909 0.01039 0.01255
0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754

* HDV3

7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330 0.02046 0.03844
0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278

* HDV4

8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591 0.04342 0.03520
0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167

* HDV5

9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189 0.01548 0.01602
0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483

* HDV6

10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806 0.03053 0.04155
0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497

* HDV7

11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249 0.03978 0.05110
0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597

* HDV8a

12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959 0.04920 0.06892
0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328

* HDV8b

13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611 0.03143 0.03281
0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.06170 0.14201 0.13320 0.08423 0.07444 0.09207 0.08227 0.05583 0.05289 0.05485 0.02449 0.02057 0.01567 0.01371
0.01371 0.00881 0.00490 0.00588 0.00196 0.00686 0.00392 0.00098 0.00294 0.00881 0.03330

2002 Fort Bend County Registration Distributions

REG DIST

* Fort Bend County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.06039 0.09244 0.11074 0.09468 0.08593 0.07829 0.07126 0.07266 0.05683 0.05155 0.04237 0.03857 0.03227
0.02394 0.01864 0.01380 0.01108 0.00993 0.00744 0.00438 0.00342 0.00243 0.00183 0.00217 0.01299

* LDT1

2 0.08257 0.10718 0.10682 0.08561 0.08232 0.07434 0.05470 0.05934 0.05788 0.04452 0.03598 0.03256 0.02856
0.02518 0.02084 0.01492 0.01500 0.01380 0.01204 0.00638 0.00751 0.00626 0.00323 0.00449 0.01796

* LDT2

3 0.08257 0.10718 0.10682 0.08561 0.08232 0.07434 0.05470 0.05934 0.05788 0.04452 0.03598 0.03256 0.02856
0.02518 0.02084 0.01492 0.01500 0.01380 0.01204 0.00638 0.00751 0.00626 0.00323 0.00449 0.01796

* LDT3

4 0.13641 0.18885 0.13110 0.15918 0.05389 0.07845 0.04961 0.04561 0.02870 0.02532 0.01932 0.01207 0.00959
0.01097 0.00787 0.00317 0.00738 0.00690 0.00607 0.00304 0.00428 0.00159 0.00172 0.00297 0.00593

* LDT4

5 0.13641 0.18885 0.13110 0.15918 0.05389 0.07845 0.04961 0.04561 0.02870 0.02532 0.01932 0.01207 0.00959
0.01097 0.00787 0.00317 0.00738 0.00690 0.00607 0.00304 0.00428 0.00159 0.00172 0.00297 0.00593

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

* HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

* HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

* HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.15191 0.14145 0.10763 0.09102 0.06919 0.04674 0.04551 0.03721 0.03659 0.03106 0.01907 0.01476 0.01199
0.01353 0.01046 0.01169 0.01753 0.01384 0.01107 0.01630 0.01814 0.01261 0.01015 0.00830 0.05228

2008 Fort Bend County Registration Distributions

REG DIST

* Fort Bend County
 * Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data
 * LDV, LDT, MC: based on Fort Bend County data only
 * HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)
 * HDV8b: based on statewide aggregate data
 * LDV
 1 0.05889 0.08876 0.08853 0.08268 0.07667 0.07420 0.07321 0.06903 0.07044 0.05765 0.05036 0.04185
 0.03381 0.03105 0.02268 0.01846 0.01442 0.01171 0.00866 0.00565 0.00393 0.00284 0.00195 0.00184 0.01073
 * LDT1
 2 0.02874 0.05437 0.06649 0.06000 0.06752 0.07926 0.09473 0.08188 0.07366 0.06061 0.05943 0.05011
 0.03432 0.03486 0.03225 0.02197 0.01745 0.01370 0.01274 0.01080 0.00818 0.00528 0.00535 0.00411 0.02219
 * LDT2
 3 0.02874 0.05437 0.06649 0.06000 0.06752 0.07926 0.09473 0.08188 0.07366 0.06061 0.05943 0.05011
 0.03432 0.03486 0.03225 0.02197 0.01745 0.01370 0.01274 0.01080 0.00818 0.00528 0.00535 0.00411 0.02219
 * LDT3
 4 0.07372 0.15083 0.09463 0.09117 0.12697 0.10677 0.08135 0.06933 0.04378 0.04765 0.01971 0.02627
 0.01567 0.01464 0.00866 0.00708 0.00498 0.00326 0.00278 0.00233 0.00174 0.00087 0.00090 0.00116 0.00375
 * LDT4
 5 0.07372 0.15083 0.09463 0.09117 0.12697 0.10677 0.08135 0.06933 0.04378 0.04765 0.01971 0.02627
 0.01567 0.01464 0.00866 0.00708 0.00498 0.00326 0.00278 0.00233 0.00174 0.00087 0.00090 0.00116 0.00375
 * HDV2b
 6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909
 0.01039 0.01255 0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754
 * HDV3
 7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330
 0.02046 0.03844 0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278
 * HDV4
 8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591
 0.04342 0.03520 0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167
 * HDV5
 9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189
 0.01548 0.01602 0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483
 * HDV6
 10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806
 0.03053 0.04155 0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497
 * HDV7
 11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249
 0.03978 0.05110 0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597
 * HDV8a
 12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959
 0.04920 0.06892 0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328
 * HDV8b
 13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611
 0.03143 0.03281 0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020
 * HDBS is MOBILE6 default
 * HDBT is MOBILE6 default
 * MC
 16 0.07896 0.15017 0.13298 0.09795 0.07257 0.08504 0.07688 0.05907 0.04497 0.03710 0.02508 0.01707
 0.01751 0.01425 0.00846 0.00980 0.00594 0.00327 0.00327 0.00371 0.00356 0.00416 0.00445 0.00445 0.03933

2002 Galveston County Registration Distribution

REG DIST

* Galveston County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.05907 0.08244 0.09060 0.08452 0.07640 0.07128 0.06550 0.07049 0.05810 0.05554 0.04622 0.04305 0.03724
0.03320 0.02459 0.01927 0.01665 0.01458 0.01185 0.00626 0.00461 0.00338 0.00286 0.00345 0.01886

* LDT1

2 0.07892 0.09503 0.08227 0.07526 0.07242 0.07031 0.05323 0.06084 0.06129 0.04913 0.04237 0.03820 0.03495
0.03361 0.02616 0.01909 0.01900 0.01683 0.01638 0.00906 0.00962 0.00694 0.00343 0.00475 0.02088

* LDT2

3 0.07892 0.09503 0.08227 0.07526 0.07242 0.07031 0.05323 0.06084 0.06129 0.04913 0.04237 0.03820 0.03495
0.03361 0.02616 0.01909 0.01900 0.01683 0.01638 0.00906 0.00962 0.00694 0.00343 0.00475 0.02088

* LDT3

4 0.12174 0.16515 0.11558 0.14461 0.04993 0.08074 0.05725 0.05377 0.03680 0.03099 0.02528 0.01885 0.01429
0.01447 0.01125 0.00634 0.00857 0.00884 0.00947 0.00438 0.00420 0.00277 0.00143 0.00366 0.00965

* LDT4

5 0.12174 0.16515 0.11558 0.14461 0.04993 0.08074 0.05725 0.05377 0.03680 0.03099 0.02528 0.01885 0.01429
0.01447 0.01125 0.00634 0.00857 0.00884 0.00947 0.00438 0.00420 0.00277 0.00143 0.00366 0.00965

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

* HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

* HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

* HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.11853 0.12716 0.10254 0.09162 0.06117 0.04188 0.05254 0.03934 0.03426 0.02716 0.01574 0.01345 0.01980
0.01396 0.01396 0.01472 0.02487 0.02132 0.01675 0.02030 0.01904 0.01371 0.01802 0.01168 0.06650

2008 Galveston County Registration Distribution

REG DIST

* Galveston County

* Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data

* LDV, LDT, MC: based on Galveston County data only

* HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)

* HDV8b: based on statewide aggregate data

* LDV

1 0.05714 0.08506 0.08546 0.08166 0.07308 0.07313 0.07214 0.06676 0.06666 0.05815 0.04845 0.04111 0.03305 0.03336 0.02468 0.02004 0.01575 0.01280 0.01028 0.00831 0.00513 0.00409 0.00319 0.00304 0.01748

* LDT1

2 0.03223 0.05427 0.06408 0.05905 0.06398 0.07751 0.09227 0.08155 0.06770 0.05976 0.05666 0.04743 0.03643 0.03637 0.03569 0.02471 0.01759 0.01572 0.01502 0.01313 0.00832 0.00601 0.00627 0.00444 0.02381

* LDT2

3 0.03223 0.05427 0.06408 0.05905 0.06398 0.07751 0.09227 0.08155 0.06770 0.05976 0.05666 0.04743 0.03643 0.03637 0.03569 0.02471 0.01759 0.01572 0.01502 0.01313 0.00832 0.00601 0.00627 0.00444 0.02381

* LDT3

4 0.07954 0.15114 0.09838 0.07954 0.11632 0.09517 0.07457 0.07244 0.04587 0.05581 0.01925 0.02924 0.01848 0.01681 0.00908 0.01003 0.00592 0.00402 0.00352 0.00330 0.00158 0.00099 0.00127 0.00136 0.00637

* LDT4

5 0.07954 0.15114 0.09838 0.07954 0.11632 0.09517 0.07457 0.07244 0.04587 0.05581 0.01925 0.02924 0.01848 0.01681 0.00908 0.01003 0.00592 0.00402 0.00352 0.00330 0.00158 0.00099 0.00127 0.00136 0.00637

* HDV2b

6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909 0.01039 0.01255 0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754

* HDV3

7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330 0.02046 0.03844 0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278

* HDV4

8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591 0.04342 0.03520 0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167

* HDV5

9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189 0.01548 0.01602 0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483

* HDV6

10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806 0.03053 0.04155 0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497

* HDV7

11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249 0.03978 0.05110 0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597

* HDV8a

12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959 0.04920 0.06892 0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328

* HDV8b

13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611 0.03143 0.03281 0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.07292 0.13344 0.13002 0.09557 0.06903 0.08461 0.07414 0.05296 0.04468 0.03689 0.02715 0.01972 0.01850 0.01814 0.01205 0.00877 0.00670 0.00645 0.00609 0.00487 0.00572 0.00536 0.00633 0.00730 0.05259

2002 Harris County Registration Distribution

REG DIST

* Harris County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.07627 0.09319 0.09265 0.08016 0.07495 0.07056 0.06405 0.06924 0.05598 0.05293 0.04619 0.04286 0.03761
0.03116 0.02468 0.01822 0.01479 0.01283 0.00962 0.00557 0.00414 0.00301 0.00224 0.00283 0.01426

* LDT1

2 0.08992 0.09874 0.08913 0.07863 0.07599 0.07446 0.05400 0.06141 0.06026 0.04917 0.04024 0.03446 0.02894
0.02839 0.02315 0.01653 0.01649 0.01535 0.01317 0.00749 0.00886 0.00667 0.00338 0.00457 0.02062

* LDT2

3 0.08992 0.09874 0.08913 0.07863 0.07599 0.07446 0.05400 0.06141 0.06026 0.04917 0.04024 0.03446 0.02894
0.02839 0.02315 0.01653 0.01649 0.01535 0.01317 0.00749 0.00886 0.00667 0.00338 0.00457 0.02062

* LDT3

4 0.14705 0.18228 0.12654 0.14564 0.05791 0.07428 0.04776 0.04732 0.02870 0.02556 0.01903 0.01517 0.01247
0.01181 0.00922 0.00512 0.00687 0.00692 0.00667 0.00370 0.00445 0.00225 0.00184 0.00314 0.00831

* LDT4

5 0.14705 0.18228 0.12654 0.14564 0.05791 0.07428 0.04776 0.04732 0.02870 0.02556 0.01903 0.01517 0.01247
0.01181 0.00922 0.00512 0.00687 0.00692 0.00667 0.00370 0.00445 0.00225 0.00184 0.00314 0.00831

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

*HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

*HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

*HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.13399 0.14592 0.11404 0.09350 0.06670 0.05159 0.04948 0.04329 0.03351 0.03109 0.01874 0.01266 0.01314
0.01224 0.01245 0.01069 0.02026 0.01566 0.01279 0.01407 0.01781 0.01151 0.01117 0.00927 0.04440

2008 Harris County Registration Distribution

REG DIST

* Harris County

* Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data

* LDV, LDT, MC: based on Harris County data only

* HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)

* HDV8b: based on statewide aggregate data

* LDV

1 0.06845 0.08584 0.07715 0.07414 0.06700 0.06645 0.06913 0.06779 0.07036 0.06010 0.05294 0.04522
0.03643 0.03533 0.02614 0.02164 0.01707 0.01371 0.01056 0.00736 0.00509 0.00361 0.00282 0.00252 0.01315

* LDT1

2 0.03627 0.05275 0.05972 0.05870 0.06254 0.07502 0.08910 0.08024 0.07322 0.06557 0.05968 0.05261
0.03474 0.03678 0.03283 0.02321 0.01783 0.01475 0.01289 0.01159 0.00865 0.00553 0.00555 0.00480 0.02543

* LDT2

3 0.03627 0.05275 0.05972 0.05870 0.06254 0.07502 0.08910 0.08024 0.07322 0.06557 0.05968 0.05261
0.03474 0.03678 0.03283 0.02321 0.01783 0.01475 0.01289 0.01159 0.00865 0.00553 0.00555 0.00480 0.02543

* LDT3

4 0.09315 0.15095 0.09164 0.08389 0.11083 0.09534 0.07652 0.07041 0.04769 0.05294 0.02157 0.02744
0.01727 0.01640 0.00966 0.00794 0.00551 0.00375 0.00300 0.00278 0.00199 0.00103 0.00123 0.00133 0.00574

* LDT4

5 0.09315 0.15095 0.09164 0.08389 0.11083 0.09534 0.07652 0.07041 0.04769 0.05294 0.02157 0.02744
0.01727 0.01640 0.00966 0.00794 0.00551 0.00375 0.00300 0.00278 0.00199 0.00103 0.00123 0.00133 0.00574

* HDV2b

6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909
0.01039 0.01255 0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754

* HDV3

7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330
0.02046 0.03844 0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278

* HDV4

8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591
0.04342 0.03520 0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167

* HDV5

9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189
0.01548 0.01602 0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483

* HDV6

10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806
0.03053 0.04155 0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497

* HDV7

11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249
0.03978 0.05110 0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597

* HDV8a

12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959
0.04920 0.06892 0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328

* HDV8b

13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611
0.03143 0.03281 0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.08187 0.15333 0.12541 0.09708 0.07066 0.08568 0.07062 0.05535 0.04367 0.03504 0.02617 0.01855
0.01812 0.01508 0.01239 0.00941 0.00614 0.00428 0.00443 0.00405 0.00461 0.00352 0.00650 0.00561 0.04243

2002 Liberty County Registration Distributions

REG DIST

* Liberty County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.04244 0.07366 0.08724 0.07812 0.07058 0.06553 0.05996 0.06793 0.05585 0.05688 0.04724 0.04908 0.04261
0.04056 0.03062 0.02544 0.02163 0.02069 0.01503 0.00942 0.00647 0.00441 0.00304 0.00510 0.02047

* LDT1

2 0.06862 0.08873 0.07710 0.06902 0.06952 0.07289 0.05178 0.06014 0.05857 0.04515 0.04274 0.03982 0.03392
0.03510 0.03010 0.01893 0.02106 0.02061 0.01915 0.01297 0.01303 0.01005 0.00438 0.00826 0.02836

* LDT2

3 0.06862 0.08873 0.07710 0.06902 0.06952 0.07289 0.05178 0.06014 0.05857 0.04515 0.04274 0.03982 0.03392
0.03510 0.03010 0.01893 0.02106 0.02061 0.01915 0.01297 0.01303 0.01005 0.00438 0.00826 0.02836

* LDT3

4 0.12003 0.15912 0.10500 0.12712 0.05991 0.08417 0.06356 0.05411 0.03629 0.03607 0.02040 0.01782 0.01439
0.01589 0.01181 0.00601 0.01245 0.01310 0.01202 0.00623 0.00623 0.00429 0.00236 0.00429 0.00730

* LDT4

5 0.12003 0.15912 0.10500 0.12712 0.05991 0.08417 0.06356 0.05411 0.03629 0.03607 0.02040 0.01782 0.01439
0.01589 0.01181 0.00601 0.01245 0.01310 0.01202 0.00623 0.00623 0.00429 0.00236 0.00429 0.00730

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

*HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

*HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

*HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.09639 0.12985 0.11513 0.10040 0.06560 0.04819 0.05890 0.04819 0.03882 0.02945 0.02008 0.01071 0.00937
0.01071 0.01473 0.01473 0.02276 0.02142 0.01071 0.01874 0.02008 0.02142 0.01606 0.00402 0.05355

2008 Liberty County Registration Distributions

REG DIST

* Liberty County

* Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data

* LDV, LDT, MC: based on Liberty County data only

* HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)

* HDV8b: based on statewide aggregate data

* LDV

1 0.04832 0.07531 0.07642 0.07538 0.05755 0.05607 0.05845 0.06113 0.06573 0.06211 0.05362 0.04945 0.04229 0.04159
0.03275 0.02897 0.02453 0.02056 0.01565 0.01203 0.00942 0.00553 0.00495 0.00424 0.01795

* LDT1

2 0.02572 0.04902 0.05507 0.05173 0.05524 0.06724 0.07485 0.07433 0.06418 0.05398 0.05824 0.05703 0.03950 0.04452
0.04325 0.02924 0.02549 0.02232 0.01851 0.01857 0.01401 0.00946 0.00900 0.00732 0.03218

* LDT2

3 0.02572 0.04902 0.05507 0.05173 0.05524 0.06724 0.07485 0.07433 0.06418 0.05398 0.05824 0.05703 0.03950 0.04452
0.04325 0.02924 0.02549 0.02232 0.01851 0.01857 0.01401 0.00946 0.00900 0.00732 0.03218

* LDT3

4 0.07889 0.13130 0.09562 0.06885 0.09369 0.08674 0.06860 0.07426 0.05174 0.05701 0.02857 0.03591 0.02934 0.02510
0.01338 0.01403 0.00901 0.00772 0.00553 0.00489 0.00309 0.00154 0.00335 0.00309 0.00875

* LDT4

5 0.07889 0.13130 0.09562 0.06885 0.09369 0.08674 0.06860 0.07426 0.05174 0.05701 0.02857 0.03591 0.02934 0.02510
0.01338 0.01403 0.00901 0.00772 0.00553 0.00489 0.00309 0.00154 0.00335 0.00309 0.00875

* HDV2b

6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909 0.01039 0.01255
0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754

* HDV3

7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330 0.02046 0.03844
0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278

* HDV4

8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591 0.04342 0.03520
0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167

* HDV5

9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189 0.01548 0.01602
0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483

* HDV6

10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806 0.03053 0.04155
0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497

* HDV7

11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249 0.03978 0.05110
0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597

* HDV8a

12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959 0.04920 0.06892
0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328

* HDV8b

13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611 0.03143 0.03281
0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.08385 0.13820 0.12733 0.10197 0.06781 0.07195 0.07298 0.05383 0.04451 0.03882 0.03468 0.02536 0.01863 0.01449
0.01398 0.01139 0.00828 0.00362 0.00362 0.00569 0.00621 0.00518 0.00414 0.00673 0.03675

2002 Montgomery County Registration Distribution

REG DIST

* Montgomery County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.05880 0.09185 0.10237 0.08808 0.07964 0.07432 0.06595 0.07031 0.05664 0.05235 0.04295 0.03922 0.03393
0.02926 0.02300 0.01737 0.01400 0.01284 0.00956 0.00591 0.00426 0.00314 0.00251 0.00318 0.01858

* LDT1

2 0.07928 0.10346 0.09150 0.07901 0.07596 0.07352 0.05397 0.06193 0.05729 0.04635 0.03844 0.03500 0.03009
0.02705 0.02265 0.01582 0.01734 0.01659 0.01546 0.00841 0.00950 0.00750 0.00327 0.00606 0.02454

* LDT2

3 0.07928 0.10346 0.09150 0.07901 0.07596 0.07352 0.05397 0.06193 0.05729 0.04635 0.03844 0.03500 0.03009
0.02705 0.02265 0.01582 0.01734 0.01659 0.01546 0.00841 0.00950 0.00750 0.00327 0.00606 0.02454

* LDT3

4 0.12172 0.18209 0.12673 0.14447 0.05659 0.07242 0.05580 0.04876 0.03373 0.03144 0.01913 0.01604 0.01268
0.01252 0.00911 0.00549 0.00842 0.00767 0.00906 0.00528 0.00501 0.00213 0.00176 0.00325 0.00869

* LDT4

5 0.12172 0.18209 0.12673 0.14447 0.05659 0.07242 0.05580 0.04876 0.03373 0.03144 0.01913 0.01604 0.01268
0.01252 0.00911 0.00549 0.00842 0.00767 0.00906 0.00528 0.00501 0.00213 0.00176 0.00325 0.00869

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

*HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

*HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

*HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.10041 0.14590 0.12630 0.09848 0.07210 0.04912 0.04960 0.04234 0.03533 0.02758 0.01549 0.01210 0.01573
0.01476 0.01089 0.01428 0.02008 0.01911 0.01621 0.01645 0.01887 0.01355 0.01210 0.01113 0.04210

2008 Montgomery County Registration Distribution

REG DIST

* Montgomery County

* Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data

* LDV, LDT, MC: based on Montgomery County data only

* HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)

* HDV8b: based on statewide aggregate data

* LDV

1 0.06436 0.09464 0.09188 0.08534 0.07683 0.07182 0.07166 0.06754 0.06678 0.05650 0.04690 0.04051 0.03016 0.02904 0.02162 0.01701 0.01373 0.01072 0.00854 0.00665 0.00435 0.00339 0.00262 0.00216 0.01525

* LDT1

2 0.03161 0.05824 0.06709 0.06488 0.06791 0.08152 0.09099 0.08102 0.06889 0.05807 0.05507 0.04924 0.03447 0.03489 0.03091 0.02193 0.01617 0.01427 0.01286 0.01062 0.00801 0.00503 0.00498 0.00475 0.02658

* LDT2

3 0.03161 0.05824 0.06709 0.06488 0.06791 0.08152 0.09099 0.08102 0.06889 0.05807 0.05507 0.04924 0.03447 0.03489 0.03091 0.02193 0.01617 0.01427 0.01286 0.01062 0.00801 0.00503 0.00498 0.00475 0.02658

* LDT3

4 0.08210 0.14930 0.09951 0.08469 0.11338 0.09649 0.07480 0.07256 0.04736 0.04921 0.01984 0.02650 0.01932 0.01771 0.00998 0.00956 0.00591 0.00448 0.00337 0.00340 0.00166 0.00102 0.00083 0.00122 0.00580

* LDT4

5 0.08210 0.14930 0.09951 0.08469 0.11338 0.09649 0.07480 0.07256 0.04736 0.04921 0.01984 0.02650 0.01932 0.01771 0.00998 0.00956 0.00591 0.00448 0.00337 0.00340 0.00166 0.00102 0.00083 0.00122 0.00580

* HDV2b

6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909 0.01039 0.01255 0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754

* HDV3

7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330 0.02046 0.03844 0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278

* HDV4

8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591 0.04342 0.03520 0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167

* HDV5

9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189 0.01548 0.01602 0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483

* HDV6

10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806 0.03053 0.04155 0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497

* HDV7

11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249 0.03978 0.05110 0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597

* HDV8a

12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959 0.04920 0.06892 0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328

* HDV8b

13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611 0.03143 0.03281 0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.07457 0.13322 0.12910 0.10051 0.07703 0.08754 0.07163 0.05738 0.04618 0.03950 0.02761 0.02083 0.01926 0.01317 0.01238 0.01081 0.00658 0.00462 0.00442 0.00393 0.00422 0.00324 0.00698 0.00442 0.04087

2002 Waller County Registration Distribution

REG DIST

* Waller County

* LDV, LDT, and MC are county level; HDV (except bus) are HGB 8-county area level

* Calculated from Mid-Year (July) 2002 Registration data (from TTI)

* LDV

1 0.04159 0.06836 0.08629 0.07061 0.07139 0.06723 0.06160 0.06143 0.05562 0.05476 0.04583 0.04696 0.04627
0.03561 0.03648 0.02833 0.02088 0.02045 0.01785 0.01109 0.00797 0.00537 0.00529 0.00658 0.02617

* LDT1

2 0.06535 0.08317 0.07657 0.06931 0.07076 0.06455 0.05637 0.05954 0.06297 0.04884 0.04040 0.03802 0.03314
0.03168 0.02917 0.02191 0.01980 0.01875 0.02020 0.01320 0.01452 0.01083 0.00568 0.00858 0.03670

* LDT2

3 0.06535 0.08317 0.07657 0.06931 0.07076 0.06455 0.05637 0.05954 0.06297 0.04884 0.04040 0.03802 0.03314
0.03168 0.02917 0.02191 0.01980 0.01875 0.02020 0.01320 0.01452 0.01083 0.00568 0.00858 0.03670

* LDT3

4 0.10125 0.14410 0.10732 0.13349 0.05575 0.09177 0.06333 0.06560 0.03527 0.03527 0.02503 0.01858 0.01593
0.01669 0.00948 0.00910 0.00986 0.01138 0.01327 0.00721 0.00569 0.00683 0.00341 0.00531 0.00910

* LDT4

5 0.10125 0.14410 0.10732 0.13349 0.05575 0.09177 0.06333 0.06560 0.03527 0.03527 0.02503 0.01858 0.01593
0.01669 0.00948 0.00910 0.00986 0.01138 0.01327 0.00721 0.00569 0.00683 0.00341 0.00531 0.00910

* HDV2b

6 0.12549 0.14885 0.14233 0.12668 0.08635 0.05306 0.07035 0.03391 0.04193 0.02309 0.02385 0.01715 0.01441
0.01259 0.01113 0.01082 0.00656 0.00771 0.00700 0.00749 0.00359 0.00660 0.00448 0.00310 0.01148

* HDV3

7 0.04688 0.07526 0.10778 0.11846 0.12478 0.03849 0.07928 0.04102 0.07687 0.06182 0.04171 0.03194 0.02631
0.02792 0.01999 0.01666 0.00770 0.00804 0.00965 0.00609 0.00264 0.00437 0.00345 0.00218 0.02068

* HDV4

8 0.06016 0.09553 0.10019 0.14277 0.12434 0.04914 0.08685 0.06397 0.07626 0.03919 0.02881 0.02288 0.01758
0.01695 0.01440 0.00932 0.00551 0.00360 0.00424 0.00466 0.00212 0.00424 0.00339 0.00191 0.02203

* HDV5

9 0.06186 0.09005 0.10650 0.13665 0.15857 0.04542 0.04307 0.03054 0.04150 0.02819 0.02193 0.02467 0.02153
0.02075 0.01879 0.02193 0.01684 0.01410 0.01135 0.01175 0.00901 0.00979 0.01096 0.00783 0.03641

* HDV6

10 0.03500 0.05167 0.08642 0.10604 0.11463 0.07886 0.05334 0.04924 0.07334 0.03590 0.04334 0.02847 0.03398
0.03654 0.02500 0.02090 0.01949 0.01693 0.01641 0.01334 0.00769 0.01244 0.00962 0.00487 0.02654

*HDV7

11 0.04494 0.04805 0.06479 0.08941 0.09897 0.06933 0.06503 0.06240 0.09037 0.04279 0.03514 0.03705 0.05570
0.04375 0.02606 0.02247 0.01721 0.01387 0.01458 0.01458 0.00669 0.00693 0.00837 0.00478 0.01673

*HDV8a

12 0.02072 0.03495 0.03827 0.05153 0.04808 0.04490 0.03468 0.05001 0.07267 0.06314 0.05982 0.04615 0.05443
0.05665 0.06148 0.05057 0.03426 0.02404 0.03081 0.02445 0.00746 0.01534 0.01644 0.01603 0.04311

*HDV8b

13 0.05676 0.04757 0.08054 0.09135 0.13243 0.07351 0.06595 0.03676 0.08973 0.06595 0.05568 0.01892 0.02973
0.02649 0.05405 0.01622 0.01459 0.00865 0.00649 0.00919 0.00162 0.00378 0.00324 0.00162 0.00919

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.08150 0.11599 0.09404 0.09091 0.05643 0.06270 0.05329 0.05329 0.03135 0.04389 0.00627 0.01881 0.02194
0.02508 0.02821 0.01567 0.01254 0.03135 0.02821 0.01881 0.01567 0.01254 0.01567 0.01567 0.05016

2008 Waller County Registration Distribution

REG DIST

* Waller County

* Vehicle Age Distributions Calculated from Mid-Year (July) 2008 Registrations data

* LDV, LDT, MC: based on Waller County data only

* HDVs (less HDV8b): based on 8-county nonattainment area aggregate data (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller)

* HDV8b: based on statewide aggregate data

* LDV

1 0.04418 0.06425 0.07303 0.07297 0.05985 0.05694 0.06120 0.05857 0.06730 0.05779 0.05042 0.04964 0.04127
0.04503 0.03482 0.03290 0.02560 0.02319 0.01737 0.01071 0.01007 0.00745 0.00397 0.00581 0.02567

* LDT1

2 0.02350 0.04358 0.05819 0.04991 0.06099 0.07865 0.07816 0.07365 0.05430 0.05369 0.05637 0.05284 0.04005
0.04395 0.04115 0.02995 0.02666 0.02082 0.01729 0.01619 0.01461 0.00986 0.00816 0.00901 0.03847

* LDT2

3 0.02350 0.04358 0.05819 0.04991 0.06099 0.07865 0.07816 0.07365 0.05430 0.05369 0.05637 0.05284 0.04005
0.04395 0.04115 0.02995 0.02666 0.02082 0.01729 0.01619 0.01461 0.00986 0.00816 0.00901 0.03847

* LDT3

4 0.06503 0.11358 0.08816 0.07373 0.10534 0.08198 0.07671 0.07305 0.05793 0.06183 0.02771 0.04122 0.02633
0.02450 0.01443 0.01328 0.01191 0.00710 0.00641 0.00504 0.00343 0.00275 0.00229 0.00389 0.01237

* LDT4

5 0.06503 0.11358 0.08816 0.07373 0.10534 0.08198 0.07671 0.07305 0.05793 0.06183 0.02771 0.04122 0.02633
0.02450 0.01443 0.01328 0.01191 0.00710 0.00641 0.00504 0.00343 0.00275 0.00229 0.00389 0.01237

* HDV2b

6 0.16537 0.11950 0.13154 0.13570 0.08431 0.07228 0.05704 0.05499 0.04220 0.03330 0.01564 0.01909 0.01039
0.01255 0.00772 0.00663 0.00536 0.00440 0.00383 0.00287 0.00209 0.00153 0.00262 0.00151 0.00754

* HDV3

7 0.10236 0.08821 0.11499 0.06656 0.06247 0.05037 0.05753 0.07193 0.07628 0.07176 0.02233 0.04330 0.02046
0.03844 0.02600 0.01739 0.01270 0.00886 0.01091 0.00878 0.00605 0.00307 0.00281 0.00366 0.01278

* HDV4

8 0.07689 0.10499 0.09526 0.05968 0.06695 0.06236 0.06025 0.06389 0.08569 0.07823 0.03213 0.04591 0.04342
0.03520 0.01875 0.01339 0.00995 0.00708 0.00803 0.00689 0.00593 0.00344 0.00230 0.00172 0.01167

* HDV5

9 0.08302 0.12734 0.12894 0.09690 0.06647 0.06273 0.05526 0.06620 0.06407 0.06967 0.01789 0.02189 0.01548
0.01602 0.00934 0.00828 0.01175 0.00854 0.01014 0.01068 0.01255 0.00427 0.00454 0.00320 0.02483

* HDV6

10 0.03522 0.09695 0.08386 0.06794 0.05834 0.04253 0.04209 0.07099 0.08779 0.08408 0.06609 0.03806 0.03053
0.04155 0.02094 0.02083 0.01549 0.01734 0.01745 0.01156 0.00872 0.00665 0.00589 0.00414 0.02497

* HDV7

11 0.03674 0.08508 0.05304 0.05304 0.04890 0.05193 0.05635 0.05994 0.08232 0.07624 0.05525 0.05249 0.03978
0.05110 0.02818 0.02818 0.02210 0.02541 0.02265 0.01354 0.00939 0.01188 0.00608 0.00442 0.02597

* HDV8a

12 0.01736 0.06117 0.04209 0.03289 0.02894 0.02802 0.03223 0.03986 0.06380 0.05446 0.04986 0.03959 0.04920 0.06892
0.06196 0.05275 0.03920 0.03946 0.03670 0.03749 0.03236 0.02118 0.01368 0.01355 0.04328

* HDV8b

13 0.04990 0.14013 0.10871 0.09153 0.04383 0.05321 0.03327 0.06460 0.09722 0.08179 0.04999 0.03611 0.03143 0.03281
0.02362 0.01682 0.00505 0.00680 0.00524 0.00625 0.00331 0.00303 0.00239 0.00276 0.01020

* HDBS is MOBILE6 default

* HDBT is MOBILE6 default

* MC

16 0.07547 0.13326 0.10849 0.09552 0.06486 0.09198 0.06604 0.05542 0.04717 0.04363 0.02712 0.01769 0.02358 0.01297
0.01769 0.01533 0.00590 0.01061 0.00825 0.00590 0.00354 0.00943 0.00708 0.00590 0.04717

2002 Houston-Eight-County Region Diesel sales Fraction Estimates

- * 2002 Statewide Diesel Sales Fractions Estimates
- * HDV fractions are estimated from TxDOT registration data (Mid-year July 2002)
- * LDV, LDT and Bus fractions are EPA defaults
- * One record per vehicle type. The order of vehicle types is: LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8a, HDV8b, HDBS

DIESEL FRACTIONS :

0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00060 0.00010 0.00030 0.00060 0.00130 0.00040
 0.00040 0.00010 0.00270 0.00320 0.00970 0.01620 0.02410 0.05100 0.07060 0.03900 0.02690 0.01140
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00070 0.00330 0.00480 0.01200 0.02230 0.06560 0.06160 0.04390 0.03160 0.02590
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00070 0.00330 0.00480 0.01200 0.02230 0.06560 0.06160 0.04390 0.03160 0.02590
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290 0.00960
 0.00830 0.00720 0.00820 0.01240 0.01350 0.01690 0.02090 0.02560 0.00130 0.00060 0.00110 0.00010
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290 0.00960
 0.00830 0.00720 0.00820 0.01240 0.01350 0.01690 0.02090 0.02560 0.00130 0.00060 0.00110 0.00010
 0.81361 0.75050 0.61397 0.66232 0.57703 0.47784 0.45121 0.20063 0.39808 0.37552 0.32844 0.35352 0.27226
 0.22309 0.17730 0.14483 0.20196 0.17056 0.19074 0.17148 0.14044 0.00323 0.00000 0.00382 0.00303
 0.68374 0.64723 0.65615 0.64013 0.51450 0.57439 0.54389 0.32661 0.55020 0.58601 0.62333 0.51890 0.51653
 0.46856 0.35294 0.25512 0.29752 0.17664 0.22368 0.21759 0.16066 0.03297 0.01508 0.00373 0.00406
 0.75174 0.71334 0.72152 0.63857 0.67967 0.73075 0.66667 0.44671 0.70203 0.69632 0.65581 0.65789 0.57317
 0.60350 0.35745 0.24855 0.13542 0.12313 0.18852 0.13253 0.17797 0.14583 0.05000 0.03185 0.01034
 0.92205 0.86775 0.89367 0.88016 0.75422 0.72991 0.80476 0.45659 0.67857 0.72535 0.65432 0.70483 0.60383
 0.59509 0.41699 0.33654 0.25337 0.30960 0.25418 0.28244 0.20767 0.23790 0.14394 0.12340 0.03350
 0.92645 0.87176 0.86671 0.86169 0.81933 0.74312 0.78239 0.54923 0.77170 0.75818 0.57117 0.66954 0.72241
 0.69427 0.56318 0.62198 0.54717 0.46968 0.43758 0.40440 0.37461 0.43137 0.18953 0.14992 0.04644
 0.93134 0.87037 0.90479 0.88593 0.84672 0.75646 0.81899 0.48829 0.82916 0.84387 0.84789 0.85788 0.83389
 0.82784 0.81143 0.81176 0.78571 0.74359 0.73051 0.70909 0.63052 0.70608 0.36715 0.27615 0.20888
 0.95095 0.93265 0.93355 0.94685 0.94189 0.86917 0.90694 0.67588 0.96360 0.95187 0.94895 0.93046 0.94083
 0.94469 0.95000 0.94092 0.91551 0.91340 0.92834 0.91875 0.91908 0.88970 0.56726 0.56641 0.55152
 0.98020 0.98603 0.99167 0.98288 0.98189 0.95390 0.99119 0.78746 0.96058 0.98670 0.96262 1.00000 0.95333
 0.97500 0.95238 0.92424 0.92958 0.98969 0.95455 0.97143 0.94286 0.96296 0.40000 0.44444 0.51064
 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.88570 0.85250 0.87950 0.99000 0.91050 0.87600
 0.77100 0.75020 0.73450 0.67330 0.51550 0.38450 0.32380 0.32600 0.26390 0.05940 0.04600 0.02910

2008 Houston-Eight-County Region Diesel sales Fraction Estimates

* Statewide Diesel Sales Fractions Estimates - 2008

* HDV fractions are estimated from TxDOT registration data (Mid-year July 2008)

* LDV, LDT and Bus fractions are MOBILE6 defaults

* One record per vehicle type. The order of vehicle types is: LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8a, HDV8b, HDBS

DIESEL FRACTIONS :

0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090
0.00090 0.00090 0.00060 0.00010 0.00030 0.00060 0.00130 0.00040 0.00040 0.00010 0.00270
0.00320 0.00970 0.01620
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00070
0.00330 0.00480 0.01200
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00070
0.00330 0.00480 0.01200
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290 0.00960 0.00830 0.00720 0.00820
0.01240 0.01350 0.01690
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290 0.00960 0.00830 0.00720 0.00820
0.01240 0.01350 0.01690
0.70322 0.78104 0.77701 0.81682 0.81511 0.76617 0.73412 0.69588 0.56999 0.61149 0.50315
0.43662 0.43485 0.21653 0.38548 0.37156 0.34646 0.35309 0.30994 0.27199 0.19841 0.15719
0.17719 0.16390 0.06132
0.74662 0.76231 0.77903 0.69612 0.67721 0.64307 0.63080 0.63362 0.64799 0.60707 0.47338
0.55825 0.52783 0.34291 0.53182 0.52291 0.57774 0.45914 0.57234 0.48033 0.40374 0.27124
0.29474 0.20900 0.06041
0.73586 0.81109 0.85643 0.81755 0.76618 0.72768 0.68040 0.69225 0.72295 0.64021 0.69839
0.74090 0.63828 0.42593 0.64985 0.62319 0.61650 0.69008 0.54545 0.66507 0.22222 0.23485
0.07071 0.09551 0.05836
0.92575 0.95141 0.90925 0.89474 0.87500 0.86012 0.87187 0.85993 0.88254 0.85745 0.67610
0.71290 0.78273 0.50820 0.65254 0.67943 0.60494 0.77816 0.64437 0.60662 0.39063 0.34706
0.20000 0.26882 0.13065
0.93032 0.96050 0.90586 0.90150 0.92612 0.90040 0.89068 0.90190 0.86905 0.84467 0.81289
0.80214 0.81021 0.61876 0.79980 0.77519 0.63392 0.67824 0.74766 0.75401 0.60082 0.72383
0.55579 0.44589 0.25804
0.94107 0.97920 0.92161 0.95933 0.95374 0.97698 0.91315 0.92151 0.92472 0.91502 0.86901
0.79577 0.82879 0.60778 0.85789 0.88491 0.86417 0.88006 0.86066 0.89568 0.81509 0.84942
0.71831 0.79909 0.53004
0.98712 0.99475 0.97008 0.97429 0.94836 0.96204 0.94725 0.94588 0.94226 0.95460 0.94282
0.90690 0.92136 0.80184 0.94711 0.94987 0.95597 0.93807 0.93607 0.93810 0.94471 0.94615
0.89885 0.93212 0.75101
0.99632 0.99672 0.99070 0.99799 0.99161 0.99827 0.97514 0.98578 0.98771 0.97978 0.98162
0.95165 0.97076 0.73669 0.96498 0.97814 0.98182 0.89189 0.94737 0.94118 0.94444 0.90909
0.96154 0.96667 0.73874
0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850
0.95850 0.95850 0.88570 0.85250 0.87950 0.99000 0.91050 0.87600 0.77100 0.75020 0.73450
0.67330 0.51550 0.38450

2011 Houston-Eight-County Region Diesel sales Fraction Estimates

* Statewide Diesel Sales Fractions Estimates - 2011

* HDV fractions are estimated from TxDOT registration data (Mid-year July 2008)

* LDV, LDT and Bus fractions are MOBILE6 defaults

* One record per vehicle type. The order of vehicle types is: LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8a, HDV8b, HDBS

DIESEL FRACTIONS :

0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090
0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00060 0.00010 0.00030 0.00060 0.00130
0.00040 0.00040 0.00010 0.00270
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00070
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00070
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290
0.00960 0.00830 0.00720 0.00820
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290
0.00960 0.00830 0.00720 0.00820
0.70322 0.70322 0.70322 0.70322 0.78104 0.77701 0.81682 0.81511 0.76617 0.73412
0.69588 0.56999 0.61149 0.50315 0.43662 0.43485 0.21653 0.38548 0.37156 0.34646 0.35309
0.30994 0.27199 0.19841 0.15719
0.74662 0.74662 0.74662 0.74662 0.76231 0.77903 0.69612 0.67721 0.64307 0.63080
0.63362 0.64799 0.60707 0.47338 0.55825 0.52783 0.34291 0.53182 0.52291 0.57774 0.45914
0.57234 0.48033 0.40374 0.27124
0.73586 0.73586 0.73586 0.73586 0.81109 0.85643 0.81755 0.76618 0.72768 0.68040
0.69225 0.72295 0.64021 0.69839 0.74090 0.63828 0.42593 0.64985 0.62319 0.61650 0.69008
0.54545 0.66507 0.22222 0.23485
0.92575 0.92575 0.92575 0.92575 0.95141 0.90925 0.89474 0.87500 0.86012 0.87187
0.85993 0.88254 0.85745 0.67610 0.71290 0.78273 0.50820 0.65254 0.67943 0.60494 0.77816
0.64437 0.60662 0.39063 0.34706
0.93032 0.93032 0.93032 0.93032 0.96050 0.90586 0.90150 0.92612 0.90040 0.89068
0.90190 0.86905 0.84467 0.81289 0.80214 0.81021 0.61876 0.79980 0.77519 0.63392 0.67824
0.74766 0.75401 0.60082 0.72383
0.94107 0.94107 0.94107 0.94107 0.97920 0.92161 0.95933 0.95374 0.97698 0.91315
0.92151 0.92472 0.91502 0.86901 0.79577 0.82879 0.60778 0.85789 0.88491 0.86417 0.88006
0.86066 0.89568 0.81509 0.84942
0.98712 0.98712 0.98712 0.98712 0.99475 0.97008 0.97429 0.94836 0.96204 0.94725
0.94588 0.94226 0.95460 0.94282 0.90690 0.92136 0.80184 0.94711 0.94987 0.95597 0.93807
0.93607 0.93810 0.94471 0.94615
0.99632 0.99632 0.99632 0.99632 0.99672 0.99070 0.99799 0.99161 0.99827 0.97514
0.98578 0.98771 0.97978 0.98162 0.95165 0.97076 0.73669 0.96498 0.97814 0.98182 0.89189
0.94737 0.94118 0.94444 0.90909
0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850
0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.88570 0.85250 0.87950 0.99000 0.91050
0.87600 0.77100 0.75020 0.73450

2014 Houston-Eight-County Region Diesel sales Fraction Estimates

- * Statewide Diesel Sales Fractions Estimates - 2014
- * HDV fractions are estimated from TxDOT registration data (Mid-year July 2008)
- * LDV, LDT and Bus fractions are MOBILE6 defaults
- * One record per vehicle type. The order of vehicle types is: LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8a, HDV8b, HDBS

DIESEL FRACTIONS :

0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090
 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00060 0.00010 0.00030 0.00060 0.00130 0.00040
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290 0.00960
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150 0.01110 0.01450 0.01150 0.01290 0.00960
 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.78104 0.77701 0.81682 0.81511 0.76617 0.73412
 0.69588 0.56999 0.61149 0.50315 0.43662 0.43485 0.21653 0.38548 0.37156 0.34646 0.35309 0.30994
 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.76231 0.77903 0.69612 0.67721 0.64307 0.63080
 0.63362 0.64799 0.60707 0.47338 0.55825 0.52783 0.34291 0.53182 0.52291 0.57774 0.45914 0.57234
 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.81109 0.85643 0.81755 0.76618 0.72768 0.68040
 0.69225 0.72295 0.64021 0.69839 0.74090 0.63828 0.42593 0.64985 0.62319 0.61650 0.69008 0.54545
 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.95141 0.90925 0.89474 0.87500 0.86012 0.87187
 0.85993 0.88254 0.85745 0.67610 0.71290 0.78273 0.50820 0.65254 0.67943 0.60494 0.77816 0.64437
 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.96050 0.90586 0.90150 0.92612 0.90040 0.89068
 0.90190 0.86905 0.84467 0.81289 0.80214 0.81021 0.61876 0.79980 0.77519 0.63392 0.67824 0.74766
 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.97920 0.92161 0.95933 0.95374 0.97698 0.91315
 0.92151 0.92472 0.91502 0.86901 0.79577 0.82879 0.60778 0.85789 0.88491 0.86417 0.88006 0.86066
 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.99475 0.97008 0.97429 0.94836 0.96204 0.94725
 0.94588 0.94226 0.95460 0.94282 0.90690 0.92136 0.80184 0.94711 0.94987 0.95597 0.93807 0.93607
 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99672 0.99070 0.99799 0.99161 0.99827 0.97514
 0.98578 0.98771 0.97978 0.98162 0.95165 0.97076 0.73669 0.96498 0.97814 0.98182 0.89189 0.94737
 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850
 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.88570 0.85250 0.87950 0.99000 0.91050 0.87600

2017 Houston-Eight-County Region Diesel sales Fraction Estimates

* Statewide Diesel Sales Fractions Estimates - 2017

* HDV fractions are estimated from TxDOT registration data (Mid-year July 2008)

* LDV, LDT and Bus fractions are MOBILE6 defaults

* One record per vehicle type. The order of vehicle types is: LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8a, HDV8b, HDBS

DIESEL FRACTIONS :

0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090
0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00090	0.00060	0.00010	0.00030	
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260
0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01150	0.01110	0.01450	
0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260
0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01260	0.01150	0.01110	0.01450	
0.70322	0.70322	0.70322	0.70322	0.70322	0.70322	0.70322	0.70322	0.70322	0.70322	0.70322	0.78104	0.77701	0.81682
0.81511	0.76617	0.73412	0.69588	0.56999	0.61149	0.50315	0.43662	0.43485	0.21653	0.38548	0.37156		
0.74662	0.74662	0.74662	0.74662	0.74662	0.74662	0.74662	0.74662	0.74662	0.74662	0.74662	0.76231	0.77903	0.69612
0.67721	0.64307	0.63080	0.63362	0.64799	0.60707	0.47338	0.55825	0.52783	0.34291	0.53182	0.52291		
0.73586	0.73586	0.73586	0.73586	0.73586	0.73586	0.73586	0.73586	0.73586	0.73586	0.73586	0.81109	0.85643	0.81755
0.76618	0.72768	0.68040	0.69225	0.72295	0.64021	0.69839	0.74090	0.63828	0.42593	0.64985	0.62319		
0.92575	0.92575	0.92575	0.92575	0.92575	0.92575	0.92575	0.92575	0.92575	0.92575	0.92575	0.95141	0.90925	0.89474
0.87500	0.86012	0.87187	0.85993	0.88254	0.85745	0.67610	0.71290	0.78273	0.50820	0.65254	0.67943		
0.93032	0.93032	0.93032	0.93032	0.93032	0.93032	0.93032	0.93032	0.93032	0.93032	0.93032	0.96050	0.90586	0.90150
0.92612	0.90040	0.89068	0.90190	0.86905	0.84467	0.81289	0.80214	0.81021	0.61876	0.79980	0.77519		
0.94107	0.94107	0.94107	0.94107	0.94107	0.94107	0.94107	0.94107	0.94107	0.94107	0.94107	0.97920	0.92161	0.95933
0.95374	0.97698	0.91315	0.92151	0.92472	0.91502	0.86901	0.79577	0.82879	0.60778	0.85789	0.88491		
0.98712	0.98712	0.98712	0.98712	0.98712	0.98712	0.98712	0.98712	0.98712	0.98712	0.98712	0.99475	0.97008	0.97429
0.94836	0.96204	0.94725	0.94588	0.94226	0.95460	0.94282	0.90690	0.92136	0.80184	0.94711	0.94987		
0.99632	0.99632	0.99632	0.99632	0.99632	0.99632	0.99632	0.99632	0.99632	0.99632	0.99632	0.99672	0.99070	0.99799
0.99161	0.99827	0.97514	0.98578	0.98771	0.97978	0.98162	0.95165	0.97076	0.73669	0.96498	0.97814		
0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850
0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.95850	0.88570	0.85250	0.87950

2019 Houston-Eight-County Region Diesel sales Fraction Estimates

- * Statewide Diesel Sales Fractions Estimates - 2019
- * HDV fractions are estimated from TxDOT registration data (Mid-year July 2008)
- * LDV, LDT and Bus fractions are MOBILE6 defaults
- * One record per vehicle type. The order of vehicle types is: LDV, LDT1, LDT2, LDT3, LDT4, HDV2B, HDV3, HDV4, HDV5, HDV6, HDV7, HDV8a, HDV8b, HDBS

DIESEL FRACTIONS :

0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090
0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00090 0.00060
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260
0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01260 0.01150
0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.70322 0.78104
0.77701 0.81682 0.81511 0.76617 0.73412 0.69588 0.56999 0.61149 0.50315 0.43662 0.43485 0.21653
0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.74662 0.76231
0.77903 0.69612 0.67721 0.64307 0.63080 0.63362 0.64799 0.60707 0.47338 0.55825 0.52783 0.34291
0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.73586 0.81109
0.85643 0.81755 0.76618 0.72768 0.68040 0.69225 0.72295 0.64021 0.69839 0.74090 0.63828 0.42593
0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.92575 0.95141
0.90925 0.89474 0.87500 0.86012 0.87187 0.85993 0.88254 0.85745 0.67610 0.71290 0.78273 0.50820
0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.93032 0.96050
0.90586 0.90150 0.92612 0.90040 0.89068 0.90190 0.86905 0.84467 0.81289 0.80214 0.81021 0.61876
0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.94107 0.97920
0.92161 0.95933 0.95374 0.97698 0.91315 0.92151 0.92472 0.91502 0.86901 0.79577 0.82879 0.60778
0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.98712 0.99475
0.97008 0.97429 0.94836 0.96204 0.94725 0.94588 0.94226 0.95460 0.94282 0.90690 0.92136 0.80184
0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99632 0.99672
0.99070 0.99799 0.99161 0.99827 0.97514 0.98578 0.98771 0.97978 0.98162 0.95165 0.97076 0.73669
0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850
0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.95850 0.88570

APPENDIX E: MOBILE6 VMT BY HOUR INPUT

VMT by Hour for 2002-RFP

Brazoria	Chambers	Fort Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.082330	0.060255	0.073721	0.076679	0.078278	0.069482	0.074817	0.058824
0.096159	0.070376	0.086103	0.089560	0.091427	0.081151	0.087383	0.068704
0.079241	0.057995	0.070955	0.073803	0.075341	0.066875	0.072011	0.056617
0.047278	0.052993	0.049477	0.050722	0.050019	0.049061	0.048472	0.053382
0.045612	0.051126	0.047734	0.048935	0.048257	0.047333	0.046765	0.051501
0.047691	0.053456	0.049909	0.051166	0.050456	0.049490	0.048896	0.053848
0.049234	0.055185	0.051523	0.052820	0.052088	0.051091	0.050477	0.055590
0.050586	0.056701	0.052939	0.054271	0.053519	0.052494	0.051864	0.057117
0.054058	0.060593	0.056572	0.057996	0.057192	0.056097	0.055423	0.061037
0.073484	0.070960	0.073526	0.073403	0.073347	0.072970	0.073535	0.071102
0.082344	0.079516	0.082391	0.082254	0.082191	0.081768	0.082401	0.079674
0.088978	0.085922	0.089027	0.088880	0.088812	0.088354	0.089039	0.086090
0.070784	0.068353	0.070824	0.070706	0.070652	0.070289	0.070832	0.068489
0.028267	0.037748	0.031063	0.027537	0.027455	0.034964	0.031659	0.038059
0.022082	0.029489	0.024267	0.021512	0.021448	0.027314	0.024732	0.029732
0.018861	0.025187	0.020727	0.018374	0.018319	0.023329	0.021124	0.025395
0.014042	0.018752	0.015431	0.013679	0.013639	0.017369	0.015727	0.018907
0.009097	0.012148	0.009996	0.008862	0.008835	0.011252	0.010188	0.012248
0.005752	0.007682	0.006321	0.005604	0.005587	0.007115	0.006442	0.007745
0.003776	0.005042	0.004149	0.003678	0.003667	0.004670	0.004229	0.005084
0.003440	0.004594	0.003780	0.003351	0.003341	0.004255	0.003853	0.004632
0.003278	0.004377	0.003602	0.003193	0.003183	0.004054	0.003671	0.004413
0.005646	0.007540	0.006205	0.005500	0.005484	0.006984	0.006323	0.007602
0.017980	0.024010	0.019758	0.017515	0.017463	0.022239	0.020137	0.024208

VMT by Hour for 2008-RFP

Brazoria	Chambers	Ft. Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.073399	0.051319	0.066546	0.072419	0.071421	0.060362	0.066948	0.051546
0.086366	0.060385	0.078302	0.085213	0.084038	0.071026	0.078776	0.060652
0.071309	0.049858	0.064651	0.070357	0.069387	0.058644	0.065042	0.050078
0.042427	0.048954	0.044024	0.043447	0.044068	0.045779	0.043642	0.049444
0.041214	0.047553	0.042764	0.042204	0.042807	0.044469	0.042393	0.048029
0.043278	0.049935	0.044906	0.044318	0.044951	0.046697	0.044516	0.050435
0.044863	0.051764	0.046551	0.045941	0.046598	0.048407	0.046147	0.052282
0.046073	0.053160	0.047806	0.047180	0.047854	0.049713	0.047392	0.053692
0.049241	0.056816	0.051094	0.050424	0.051145	0.053131	0.050651	0.057385
0.077826	0.067644	0.075741	0.078609	0.078090	0.072095	0.075855	0.068270
0.086349	0.075052	0.084035	0.087218	0.086642	0.079990	0.084163	0.075747
0.092211	0.080150	0.089742	0.093141	0.092522	0.085422	0.089878	0.080891
0.074322	0.064599	0.072331	0.075070	0.074574	0.068849	0.072440	0.065197
0.036397	0.051645	0.040733	0.034980	0.035287	0.045819	0.040871	0.050271
0.028578	0.040550	0.031982	0.027465	0.027706	0.035975	0.032091	0.039471
0.024485	0.034742	0.027401	0.023531	0.023738	0.030822	0.027494	0.033818
0.018966	0.026912	0.021226	0.018228	0.018388	0.023876	0.021298	0.026196
0.012821	0.018192	0.014348	0.012322	0.012430	0.016139	0.014397	0.017708
0.007215	0.010237	0.008074	0.006934	0.006995	0.009082	0.008102	0.009965
0.004782	0.006786	0.005352	0.004596	0.004636	0.006020	0.005370	0.006605
0.004394	0.006235	0.004918	0.004223	0.004260	0.005532	0.004935	0.006070
0.004176	0.005926	0.004674	0.004013	0.004049	0.005257	0.004689	0.005768
0.007083	0.010050	0.007926	0.006807	0.006867	0.008916	0.007953	0.009783
0.022225	0.031536	0.024873	0.021360	0.021547	0.027978	0.024957	0.030697

VMT by Hour for 2011-RFP

Brazoria	Chambers	Ft. Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.074006	0.052192	0.068136	0.073037	0.072093	0.061293	0.067893	0.052658
0.087081	0.061413	0.080174	0.085941	0.084829	0.072121	0.079887	0.061961
0.071899	0.050706	0.066197	0.070958	0.070040	0.059548	0.065960	0.051159
0.043135	0.049761	0.044743	0.043914	0.044551	0.046591	0.044190	0.050225
0.041900	0.048337	0.043462	0.042658	0.043276	0.045258	0.042926	0.048788
0.043999	0.050759	0.045640	0.044794	0.045444	0.047525	0.045076	0.051232
0.045611	0.052618	0.047311	0.046435	0.047108	0.049266	0.046727	0.053109
0.046841	0.054037	0.048587	0.047687	0.048379	0.050595	0.047987	0.054541
0.050062	0.057753	0.051928	0.050967	0.051706	0.054074	0.051287	0.058292
0.078669	0.068935	0.077253	0.079266	0.078822	0.073068	0.077014	0.069492
0.087284	0.076484	0.085713	0.087947	0.087454	0.081070	0.085449	0.077103
0.093214	0.081677	0.091534	0.093922	0.093393	0.086575	0.091251	0.082338
0.075127	0.065831	0.073774	0.075698	0.075273	0.069779	0.073547	0.066364
0.034281	0.048813	0.037339	0.033346	0.033528	0.043228	0.038457	0.047375
0.026916	0.038327	0.029317	0.026182	0.026325	0.033941	0.030195	0.037198
0.023061	0.032837	0.025118	0.022432	0.022555	0.029079	0.025870	0.031870
0.017864	0.025436	0.019457	0.017376	0.017471	0.022526	0.020040	0.024687
0.012075	0.017194	0.013152	0.011746	0.011810	0.015227	0.013546	0.016688
0.006795	0.009676	0.007401	0.006610	0.006646	0.008569	0.007623	0.009391
0.004504	0.006414	0.004906	0.004381	0.004405	0.005680	0.005053	0.006225
0.004139	0.005893	0.004508	0.004026	0.004048	0.005219	0.004643	0.005720
0.003933	0.005601	0.004284	0.003826	0.003847	0.004960	0.004412	0.005436
0.006671	0.009499	0.007266	0.006489	0.006524	0.008412	0.007484	0.009219
0.020933	0.029807	0.022800	0.020362	0.020473	0.026396	0.023483	0.028929

VMT by Hour for 2014-RFP

Brazoria	Chambers	Ft. Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.073739	0.052653	0.068240	0.072806	0.072068	0.061175	0.068114	0.053344
0.086767	0.061956	0.080296	0.085668	0.084800	0.071983	0.080147	0.062768
0.071640	0.051154	0.066298	0.070733	0.070016	0.059434	0.066175	0.051825
0.043309	0.049503	0.044707	0.044015	0.044544	0.046788	0.044080	0.049880
0.042070	0.048086	0.043428	0.042755	0.043269	0.045449	0.042818	0.048453
0.044177	0.050495	0.045603	0.044897	0.045437	0.047726	0.044963	0.050880
0.045795	0.052345	0.047274	0.046542	0.047101	0.049474	0.046610	0.052744
0.047030	0.053756	0.048549	0.047797	0.048371	0.050808	0.047867	0.054166
0.050264	0.057453	0.051887	0.051084	0.051698	0.054302	0.051159	0.057891
0.078819	0.069119	0.077312	0.079330	0.078802	0.072993	0.077291	0.070137
0.087450	0.076689	0.085779	0.088018	0.087432	0.080986	0.085755	0.077818
0.093390	0.081895	0.091606	0.093992	0.093371	0.086485	0.091579	0.083103
0.075270	0.066007	0.073831	0.075759	0.075255	0.069706	0.073811	0.066980
0.034091	0.048684	0.037263	0.033309	0.033571	0.043112	0.038207	0.046795
0.026767	0.038225	0.029257	0.026153	0.026359	0.033850	0.029999	0.036742
0.022933	0.032750	0.025067	0.022407	0.022584	0.029002	0.025702	0.031480
0.017765	0.025369	0.019417	0.017357	0.017494	0.022465	0.019909	0.024385
0.012009	0.017149	0.013126	0.011733	0.011825	0.015186	0.013458	0.016484
0.006758	0.009650	0.007386	0.006603	0.006655	0.008546	0.007574	0.009276
0.004479	0.006397	0.004896	0.004377	0.004411	0.005665	0.005020	0.006149
0.004116	0.005878	0.004499	0.004022	0.004053	0.005205	0.004613	0.005650
0.003911	0.005586	0.004275	0.003822	0.003852	0.004946	0.004384	0.005369
0.006634	0.009474	0.007251	0.006482	0.006533	0.008389	0.007435	0.009106
0.020817	0.029727	0.022753	0.020339	0.020499	0.026325	0.023330	0.028575

VMT by Hour for 2017-RFP

Brazoria	Chambers	Ft. Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.073668	0.052827	0.068233	0.072787	0.072066	0.061115	0.068368	0.053627
0.086683	0.062160	0.080287	0.085646	0.084798	0.071913	0.080446	0.063101
0.071571	0.051323	0.066290	0.070715	0.070014	0.059376	0.066422	0.052100
0.043402	0.049430	0.044701	0.044010	0.044532	0.046819	0.044050	0.049719
0.042160	0.048016	0.043422	0.042751	0.043258	0.045479	0.042789	0.048297
0.044272	0.050421	0.045597	0.044892	0.045425	0.047757	0.044932	0.050716
0.045893	0.052268	0.047267	0.046537	0.047088	0.049506	0.046578	0.052573
0.047131	0.053678	0.048542	0.047792	0.048358	0.050842	0.047834	0.053991
0.050372	0.057369	0.051880	0.051078	0.051684	0.054338	0.051124	0.057704
0.078691	0.069218	0.077395	0.079392	0.078803	0.073019	0.077188	0.070234
0.087309	0.076798	0.085871	0.088086	0.087433	0.081015	0.085641	0.077926
0.093238	0.082016	0.091705	0.094070	0.093370	0.086516	0.091458	0.083217
0.075148	0.066101	0.073910	0.075818	0.075255	0.069731	0.073713	0.067072
0.034130	0.048575	0.037201	0.033271	0.033589	0.043087	0.038170	0.046735
0.026797	0.038139	0.029209	0.026124	0.026372	0.033830	0.029970	0.036694
0.022959	0.032677	0.025025	0.022382	0.022595	0.028985	0.025677	0.031439
0.017785	0.025312	0.019385	0.017338	0.017503	0.022452	0.019890	0.024353
0.012022	0.017110	0.013104	0.011720	0.011831	0.015177	0.013445	0.016462
0.006765	0.009629	0.007374	0.006595	0.006658	0.008541	0.007566	0.009264
0.004484	0.006382	0.004888	0.004372	0.004413	0.005661	0.005015	0.006141
0.004121	0.005865	0.004491	0.004017	0.004055	0.005202	0.004608	0.005642
0.003916	0.005573	0.004268	0.003817	0.003854	0.004944	0.004380	0.005362
0.006642	0.009452	0.007239	0.006474	0.006536	0.008385	0.007428	0.009094
0.020841	0.029661	0.022716	0.020316	0.020510	0.026310	0.023308	0.028537

VMT by Hour for 2018-RFP

Brazoria	Chambers	Ft. Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.073693	0.053230	0.068351	0.072881	0.072151	0.061383	0.068509	0.054055
0.086712	0.062635	0.080427	0.085757	0.084897	0.072227	0.080612	0.063605
0.071595	0.051715	0.066405	0.070806	0.070096	0.059635	0.066559	0.052517
0.043414	0.049303	0.044654	0.043967	0.044491	0.046714	0.043950	0.049516
0.042172	0.047893	0.043376	0.042709	0.043218	0.045377	0.042693	0.048099
0.044284	0.050292	0.045549	0.044848	0.045383	0.047650	0.044831	0.050508
0.045906	0.052134	0.047218	0.046491	0.047045	0.049395	0.046473	0.052358
0.047144	0.053540	0.048491	0.047745	0.048314	0.050728	0.047727	0.053770
0.050386	0.057222	0.051826	0.051028	0.051637	0.054216	0.051009	0.057468
0.078649	0.069346	0.077443	0.079388	0.078828	0.073138	0.077334	0.070444
0.087262	0.076940	0.085924	0.088082	0.087460	0.081148	0.085803	0.078159
0.093187	0.082161	0.091759	0.094066	0.093400	0.086659	0.091631	0.083469
0.075108	0.066223	0.073956	0.075814	0.075279	0.069846	0.073852	0.067273
0.034135	0.048360	0.037142	0.033270	0.033564	0.042940	0.038077	0.046529
0.026802	0.037970	0.029162	0.026122	0.026353	0.033715	0.029896	0.036533
0.022963	0.032532	0.024985	0.022381	0.022579	0.028886	0.025614	0.031301
0.017788	0.025200	0.019354	0.017337	0.017490	0.022376	0.019841	0.024246
0.012024	0.017035	0.013083	0.011719	0.011823	0.015126	0.013412	0.016390
0.006766	0.009586	0.007362	0.006595	0.006653	0.008512	0.007548	0.009223
0.004485	0.006354	0.004880	0.004371	0.004410	0.005642	0.005003	0.006114
0.004121	0.005839	0.004484	0.004017	0.004052	0.005184	0.004597	0.005618
0.003917	0.005549	0.004261	0.003817	0.003851	0.004927	0.004369	0.005339
0.006643	0.009411	0.007228	0.006474	0.006531	0.008356	0.007410	0.009054
0.020844	0.029530	0.022680	0.020315	0.020495	0.026220	0.023250	0.028412

VMT by Hour for 2019-RFP

Brazoria	Chambers	Ft. Bend	Galveston	Harris	Liberty	Montgomery	Waller
0.073788	0.053306	0.068257	0.072876	0.071975	0.061729	0.068226	0.053822
0.086824	0.062724	0.080316	0.085751	0.084690	0.072634	0.080279	0.063331
0.071687	0.051789	0.066314	0.070801	0.069926	0.059972	0.066284	0.052290
0.043276	0.049275	0.044577	0.043975	0.044528	0.046568	0.044182	0.049553
0.042038	0.047865	0.043301	0.042717	0.043254	0.045235	0.042918	0.048135
0.044144	0.050262	0.045470	0.044856	0.045421	0.047501	0.045068	0.050546
0.045761	0.052103	0.047136	0.046500	0.047084	0.049241	0.046719	0.052398
0.046995	0.053509	0.048407	0.047754	0.048354	0.050569	0.047979	0.053811
0.050227	0.057188	0.051736	0.051037	0.051680	0.054047	0.051278	0.057511
0.078671	0.069466	0.077564	0.079374	0.078799	0.073268	0.077113	0.070629
0.087287	0.077073	0.086058	0.088067	0.087428	0.081292	0.085558	0.078364
0.093214	0.082308	0.091902	0.094046	0.093365	0.086814	0.091369	0.083684
0.075129	0.066338	0.074072	0.075801	0.075251	0.069970	0.073641	0.067449
0.034236	0.048238	0.037198	0.033275	0.033658	0.042786	0.038155	0.046469
0.026881	0.037875	0.029207	0.026127	0.026427	0.033594	0.029958	0.036486
0.023031	0.032450	0.025024	0.022385	0.022642	0.028783	0.025667	0.031260
0.017840	0.025137	0.019384	0.017340	0.017539	0.022296	0.019882	0.024215
0.012059	0.016992	0.013103	0.011721	0.011856	0.015071	0.013440	0.016369
0.006786	0.009562	0.007374	0.006596	0.006672	0.008481	0.007563	0.009211
0.004498	0.006338	0.004888	0.004372	0.004422	0.005622	0.005013	0.006106
0.004133	0.005824	0.004491	0.004017	0.004064	0.005166	0.004607	0.005611
0.003928	0.005535	0.004268	0.003818	0.003862	0.004909	0.004378	0.005332
0.006662	0.009387	0.007239	0.006475	0.006550	0.008326	0.007425	0.009043
0.020905	0.029456	0.022714	0.020319	0.020553	0.026126	0.023298	0.028375

**APPENDIX F: MOBILE6 TRIP LENGTH DISTRIBUTIONS
INPUT**

2002-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	11.81	26.53	25.66	17.53	9.74	8.73
7 a.m.	11.81	26.53	25.66	17.53	9.74	8.73
8 a.m.	11.81	26.53	25.66	17.53	9.74	8.73
9 a.m.	18.54	33.69	25.08	13.23	5.35	4.11
10 a.m.	18.54	33.69	25.08	13.23	5.35	4.11
11 a.m.	18.54	33.69	25.08	13.23	5.35	4.11
12 a.m.	18.54	33.69	25.08	13.23	5.35	4.11
1 p.m.	18.54	33.69	25.08	13.23	5.35	4.11
2 p.m.	18.54	33.69	25.08	13.23	5.35	4.11
3 p.m.	15.60	30.53	25.26	15.11	7.30	6.20
4 p.m.	15.60	30.53	25.26	15.11	7.30	6.20
5 p.m.	15.60	30.53	25.26	15.11	7.30	6.20
6 p.m.	15.60	30.53	25.26	15.11	7.30	6.20
7 p.m. through 5 a.m.	17.02	31.75	24.72	14.06	6.57	5.88

2008-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	10.78	24.87	24.37	17.11	10.33	12.54
7 a.m.	10.78	24.87	24.37	17.11	10.33	12.54
8 a.m.	10.78	24.87	24.37	17.11	10.33	12.54
9 a.m.	14.31	28.50	23.15	13.97	07.81	12.26
10 a.m.	14.31	28.50	23.15	13.97	07.81	12.26
11 a.m.	14.31	28.50	23.15	13.97	07.81	12.26
12 a.m.	14.31	28.50	23.15	13.97	07.81	12.26
1 p.m.	14.31	28.50	23.15	13.97	07.81	12.26
2 p.m.	14.31	28.50	23.15	13.97	07.81	12.26
3 p.m.	13.07	27.40	23.98	15.41	08.73	11.41
4 p.m.	13.07	27.40	23.98	15.41	08.73	11.41
5 p.m.	13.07	27.40	23.98	15.41	08.73	11.41
6 p.m.	13.07	27.40	23.98	15.41	08.73	11.41
7 p.m. through 5 a.m.	13.49	27.14	22.51	14.10	08.31	14.45

2011-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	10.66	24.78	24.49	17.25	10.38	12.44
7 a.m.	10.66	24.78	24.49	17.25	10.38	12.44
8 a.m.	10.66	24.78	24.49	17.25	10.38	12.44
9 a.m.	14.16	28.43	23.29	14.06	7.83	12.23
10 a.m.	14.16	28.43	23.29	14.06	7.83	12.23
11 a.m.	14.16	28.43	23.29	14.06	7.83	12.23
12 a.m.	14.16	28.43	23.29	14.06	7.83	12.23
1 p.m.	14.16	28.43	23.29	14.06	7.83	12.23
2 p.m.	14.16	28.43	23.29	14.06	7.83	12.23
3 p.m.	12.92	27.31	24.12	15.54	8.77	11.34
4 p.m.	12.92	27.31	24.12	15.54	8.77	11.34
5 p.m.	12.92	27.31	24.12	15.54	8.77	11.34
6 p.m.	12.92	27.31	24.12	15.54	8.77	11.34
7 p.m. through 5 a.m.	13.34	27.05	22.68	14.21	8.34	14.38

2014-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	10.23	24.65	25.01	17.69	10.50	11.92
7 a.m.	10.23	24.65	25.01	17.69	10.50	11.92
8 a.m.	10.23	24.65	25.01	17.69	10.50	11.92
9 a.m.	13.64	28.31	23.81	14.42	07.97	11.85
10 a.m.	13.64	28.31	23.81	14.42	07.97	11.85
11 a.m.	13.64	28.31	23.81	14.42	07.97	11.85
12 a.m.	13.64	28.31	23.81	14.42	07.97	11.85
1 p.m.	13.64	28.31	23.81	14.42	07.97	11.85
2 p.m.	13.64	28.31	23.81	14.42	07.97	11.85
3 p.m.	12.42	27.18	24.66	15.93	08.89	10.92
4 p.m.	12.42	27.18	24.66	15.93	08.89	10.92
5 p.m.	12.42	27.18	24.66	15.93	08.89	10.92
6 p.m.	12.42	27.18	24.66	15.93	08.89	10.92
7 p.m. through 5 a.m	12.84	26.94	23.24	14.60	08.47	13.91

2017-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	10.10	24.51	25.12	17.89	10.56	11.82
7 a.m.	10.10	24.51	25.12	17.89	10.56	11.82
8 a.m.	10.10	24.51	25.12	17.89	10.56	11.82
9 a.m.	13.43	28.11	23.94	14.64	08.06	11.82
10 a.m.	13.43	28.11	23.94	14.64	08.06	11.82
11 a.m.	13.43	28.11	23.94	14.64	08.06	11.82
12 a.m.	13.43	28.11	23.94	14.64	08.06	11.82
1 p.m.	13.43	28.11	23.94	14.64	08.06	11.82
2 p.m.	13.43	28.11	23.94	14.64	08.06	11.82
3 p.m.	12.21	26.97	24.81	16.16	08.98	10.87
4 p.m.	12.21	26.97	24.81	16.16	08.98	10.87
5 p.m.	12.21	26.97	24.81	16.16	08.98	10.87
6 p.m.	12.21	26.97	24.81	16.16	08.98	10.87
7 p.m. through 5 a.m	12.62	26.72	23.40	14.86	08.58	13.82

2018-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	9.99	24.31	25.17	18.01	10.67	11.85
7 a.m.	9.99	24.31	25.17	18.01	10.67	11.85
8 a.m.	9.99	24.31	25.17	18.01	10.67	11.85
9 a.m.	13.40	28.09	24.02	14.73	08.10	11.66
10 a.m.	13.40	28.09	24.02	14.73	08.10	11.66
11 a.m.	13.40	28.09	24.02	14.73	08.10	11.66
12 a.m.	13.40	28.09	24.02	14.73	08.10	11.66
1 p.m.	13.40	28.09	24.02	14.73	08.10	11.66
2 p.m.	13.40	28.09	24.02	14.73	08.10	11.66
3 p.m.	12.16	26.89	24.87	16.24	09.05	10.79
4 p.m.	12.16	26.89	24.87	16.24	09.05	10.79
5 p.m.	12.16	26.89	24.87	16.24	09.05	10.79
6 p.m.	12.16	26.89	24.87	16.24	09.05	10.79
7 p.m. through 5 a.m	12.58	26.70	23.51	14.95	08.64	13.62

2019-RFP HGB Percent of VMT by Trip Length, Hourly input to POLFAC62_3

Hour	<i>Trip Length Ranges (minutes)</i>					
	< 10	11-20	21-30	31-40	41-50	>51
6 a.m.	9.92	24.04	25.02	18.21	10.86	11.95
7 a.m.	9.92	24.04	25.02	18.21	10.86	11.95
8 a.m.	9.92	24.04	25.02	18.21	10.86	11.95
9 a.m.	13.33	27.83	23.98	14.88	08.25	11.73
10 a.m.	13.33	27.83	23.98	14.88	08.25	11.73
11 a.m.	13.33	27.83	23.98	14.88	08.25	11.73
12 a.m.	13.33	27.83	23.98	14.88	08.25	11.73
1 p.m.	13.33	27.83	23.98	14.88	08.25	11.73
2 p.m.	13.33	27.83	23.98	14.88	08.25	11.73
3 p.m.	12.07	26.59	24.78	16.44	09.22	10.90
4 p.m.	12.07	26.59	24.78	16.44	09.22	10.90
5 p.m.	12.07	26.59	24.78	16.44	09.22	10.90
6 p.m.	12.07	26.59	24.78	16.44	09.22	10.90
7 p.m. through 5 a.m	12.48	26.41	23.47	15.14	08.80	13.70

**APPENDIX G: ATP and I/M PARAMETERS FOR ALL RFP
SCENARIOS**

2002 Control Strategies Before May 2002 I/M Testing Shift:

Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2002 Exhaust and Evaporative I/M setups for Harris County between Jan.-April 2002
* Program began in 1997; switched to different tests in May 2002

> Exhaust I/M: 2002; 2500/IDLE
I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1978 2000
I/M VEHICLES : 1 22222 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2002: GC
I/M PROGRAM : 2 1997 2050 1 TRC GC
I/M MODEL YEARS : 2 1978 2000
I/M VEHICLES : 2 22222 22222222 2
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

**2002 Control Strategies After May 2002 I/M Testing Shift:
Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62**

- * 2002 Exhaust and Evaporative I/M setups for Harris County beginning in May 2002
- * Shifted LDG to different testing methods
- * HDG remained on the same testing methods

> Exhaust I/M: 2002; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1978 2000
I/M VEHICLES : 1 11111 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2002; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS : 2 1978 1995
I/M VEHICLES : 2 22222 11111111 1
I/M STRINGENCY : 2 20
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2002; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M
I/M MODEL YEARS : 3 1996 2000
I/M VEHICLES : 3 22222 11111111 1
I/M STRINGENCY : 3 20
I/M COMPLIANCE : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2002: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC
I/M MODEL YEARS : 4 1978 2000
I/M VEHICLES : 4 11111 22222222 2
I/M COMPLIANCE : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2002: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC
I/M MODEL YEARS : 5 1978 1995
I/M VEHICLES : 5 22222 11111111 1
I/M COMPLIANCE : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2002: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS : 6 1996 2000
I/M VEHICLES : 6 22222 11111111 1
I/M COMPLIANCE : 6 96
I/M WAIVER RATES : 6 3 3

2008 Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2008 Exhaust and Evaporative I/M setups for Harris County

> Exhaust I/M: 2008; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1984 2006

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2008; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1984 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2008; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2006

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2008: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC

I/M MODEL YEARS : 4 1984 2006

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2008: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC

I/M MODEL YEARS : 5 1984 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2008: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2006

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

2011 Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2011 Exhaust and Evaporative I/M setups for Harris County

> Exhaust I/M: 2011; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1987 2009

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2011; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1987 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2011; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2009

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2011: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC

I/M MODEL YEARS : 4 1987 2009

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2011: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC

I/M MODEL YEARS : 5 1987 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2011: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2009

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

2014 Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2014 Exhaust and Evaporative I/M setups for Harris County

> Exhaust I/M: 2014; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1987 2012

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2014; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1987 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2014; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2012

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2014: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC

I/M MODEL YEARS : 4 1987 2012

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2014: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC

I/M MODEL YEARS : 5 1987 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2014: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2012

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

2017 Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2017 Exhaust and Evaporative I/M setups for Harris County

> Exhaust I/M: 2017; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1987 2015

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2017; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1987 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2017; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2015

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2017: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC

I/M MODEL YEARS : 4 1987 2015

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2017: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC

I/M MODEL YEARS : 5 1987 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2017: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2015

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

2018 Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2018 Exhaust and Evaporative I/M setups for Harris County

> Exhaust I/M: 2018; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1987 2016

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2018; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1987 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2018; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2016

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2018: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC

I/M MODEL YEARS : 4 1987 2016

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2018: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC

I/M MODEL YEARS : 5 1987 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2018: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2016

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

2019 Exhaust and Evaporative I/M setups for Harris County input to RATEADJ62

* 2019 Exhaust and Evaporative I/M setups for Harris County

> Exhaust I/M: 2019; 2500/IDLE (all HDG)

I/M PROGRAM : 1 1997 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1987 2017

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2019; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 1997 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1987 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2019; OBD I/M (LDG 96+)

I/M PROGRAM : 3 1997 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2017

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2019: GC (all HDG)

I/M PROGRAM : 4 1997 2050 1 TRC GC

I/M MODEL YEARS : 4 1987 2017

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2019: GC (LDG 95-)

I/M PROGRAM : 5 1997 2050 1 TRC GC

I/M MODEL YEARS : 5 1987 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2019: EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 1997 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2017

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

2002 Evaporative I/M setups for HGB Urban County Group (Brazoria, Fort Bend, Galveston, and Montgomery) input to RATEADJ62

> Urban County (Brazoria, Fort Bend, Galveston, & Montgomery) Evaporative I/M: 2002; GC
I/M PROGRAM : 1 2000 2050 1 TRC GC
I/M MODEL YEARS : 1 1978 2000
I/M VEHICLES : 1 22222 22222222 2
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

**2008 Exhaust and Evaporative I/M setups for HGB Urban County Group:
Brazoria, Fort Bend, Galveston, Montgomery input to RATEADJ62**

* 2008 Exhaust and Evaporative I/M setups for
* HGA Urban County Group (Brazoria, Fort Bend, Galveston, Montgomery)

> Exhaust I/M: 2008 eval; 2003 start; 2500/IDLE (all HDG)

I/M PROGRAM : 1 2003 2050 1 TRC 2500/IDLE

I/M MODEL YEARS : 1 1984 2006

I/M VEHICLES : 1 11111 22222222 2

I/M STRINGENCY : 1 20

I/M COMPLIANCE : 1 96

I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2008 eval; 2003 start; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 2003 2050 1 TRC ASM 2525/5015 PHASE-IN

I/M MODEL YEARS : 2 1984 1995

I/M VEHICLES : 2 22222 11111111 1

I/M STRINGENCY : 2 20

I/M COMPLIANCE : 2 96

I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2008 eval; 2003 start; OBD I/M (LDG 96+)

I/M PROGRAM : 3 2003 2050 1 TRC OBD I/M

I/M MODEL YEARS : 3 1996 2006

I/M VEHICLES : 3 22222 11111111 1

I/M STRINGENCY : 3 20

I/M COMPLIANCE : 3 96

I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2008 eval; 2000 start; GC (all HDG)

I/M PROGRAM : 4 2000 2050 1 TRC GC

I/M MODEL YEARS : 4 1984 2006

I/M VEHICLES : 4 11111 22222222 2

I/M COMPLIANCE : 4 96

I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2008 eval; 2000 start; GC (LDG 95-)

I/M PROGRAM : 5 2000 2050 1 TRC GC

I/M MODEL YEARS : 5 1984 1995

I/M VEHICLES : 5 22222 11111111 1

I/M COMPLIANCE : 5 96

I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2008 eval; 2000 start; EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC

I/M MODEL YEARS : 6 1996 2006

I/M VEHICLES : 6 22222 11111111 1

I/M COMPLIANCE : 6 96

I/M WAIVER RATES : 6 3 3

**2008 Exhaust and Evaporative I/M setups for HGB Urban County Ratio
Calculation to get May 1 start (actual Urban County start year is 2003) input to
RATEADJ62**

```

* 2008 Exhaust and Evaporative I/M setups for
* HGA Urban County Ratio Calculation to get May 1 start
* (actual Urban County start year is 2003)

> Exhaust I/M: 2008 eval; 2004 start; 2500/IDLE (all HDG)
I/M PROGRAM      : 1 2004 2050 1 TRC 2500/IDLE
I/M MODEL YEARS  : 1 1984 2006
I/M VEHICLES     : 1 11111 22222222 2
I/M STRINGENCY   : 1 20
I/M COMPLIANCE   : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2008 eval; 2004 start; ASM 2525/5015 PHASE-IN (LDG 95-)
I/M PROGRAM      : 2 2004 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS  : 2 1984 1995
I/M VEHICLES     : 2 22222 11111111 1
I/M STRINGENCY   : 2 20
I/M COMPLIANCE   : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2008 eval; 2004 start; OBD I/M (LDG 96+)
I/M PROGRAM      : 3 2004 2050 1 TRC OBD I/M
I/M MODEL YEARS  : 3 1996 2006
I/M VEHICLES     : 3 22222 11111111 1
I/M STRINGENCY   : 3 20
I/M COMPLIANCE   : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2008 eval; 2000 start; GC (all HDG)
I/M PROGRAM      : 4 2000 2050 1 TRC GC
I/M MODEL YEARS  : 4 1984 2006
I/M VEHICLES     : 4 11111 22222222 2
I/M COMPLIANCE   : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2008 eval; 2000 start; GC (LDG 95-)
I/M PROGRAM      : 5 2000 2050 1 TRC GC
I/M MODEL YEARS  : 5 1984 1995
I/M VEHICLES     : 5 22222 11111111 1
I/M COMPLIANCE   : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2008 eval; 2000 start; EVAP OBD & GC (LDG 96+)
I/M PROGRAM      : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS  : 6 1996 2006
I/M VEHICLES     : 6 22222 11111111 1
I/M COMPLIANCE   : 6 96
I/M WAIVER RATES : 6 3 3

```

**2011 Exhaust and Evaporative I/M setups for HGB Urban County Group:
Brazoria, Fort Bend, Galveston, Montgomery input to RATEADJ62**

* 2011 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery

> Exhaust I/M: 2011 eval; 2003 start; 2500/IDLE (all HDG)

I/M PROGRAM : 1 2003 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1987 2009
I/M VEHICLES : 1 11111 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2011 eval; 2003 start; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 2003 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS : 2 1987 1995
I/M VEHICLES : 2 22222 11111111 1
I/M STRINGENCY : 2 20
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2011 eval; 2003 start; OBD I/M (LDG 96+)

I/M PROGRAM : 3 2003 2050 1 TRC OBD I/M
I/M MODEL YEARS : 3 1996 2009
I/M VEHICLES : 3 22222 11111111 1
I/M STRINGENCY : 3 20
I/M COMPLIANCE : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2011 eval; 2000 start; GC (all HDG)

I/M PROGRAM : 4 2000 2050 1 TRC GC
I/M MODEL YEARS : 4 1987 2009
I/M VEHICLES : 4 11111 22222222 2
I/M COMPLIANCE : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2011 eval; 2000 start; GC (LDG 95-)

I/M PROGRAM : 5 2000 2050 1 TRC GC
I/M MODEL YEARS : 5 1987 1995
I/M VEHICLES : 5 22222 11111111 1
I/M COMPLIANCE : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2011 eval; 2000 start; EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS : 6 1996 2009
I/M VEHICLES : 6 22222 11111111 1
I/M COMPLIANCE : 6 96
I/M WAIVER RATES : 6 3 3

**2011 Exhaust and Evaporative I/M setups for HGB Urban County Ratio
Calculation to get May 1 start (actual Urban County start year is 2003) input to
RATEADJ62**

* 2011 Exhaust and Evaporative I/M setups for
 * HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery
 * (actual Urban County start year is 2003)

> Exhaust I/M: 2011 eval; 2004 start; 2500/IDLE (all HDG)

I/M PROGRAM : 1 2004 2050 1 TRC 2500/IDLE
 I/M MODEL YEARS : 1 1987 2009
 I/M VEHICLES : 1 11111 22222222 2
 I/M STRINGENCY : 1 20
 I/M COMPLIANCE : 1 96
 I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2011 eval; 2004 start; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 2004 2050 1 TRC ASM 2525/5015 PHASE-IN
 I/M MODEL YEARS : 2 1987 1995
 I/M VEHICLES : 2 22222 11111111 1
 I/M STRINGENCY : 2 20
 I/M COMPLIANCE : 2 96
 I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2011 eval; 2004 start; OBD I/M (LDG 96+)

I/M PROGRAM : 3 2004 2050 1 TRC OBD I/M
 I/M MODEL YEARS : 3 1996 2009
 I/M VEHICLES : 3 22222 11111111 1
 I/M STRINGENCY : 3 20
 I/M COMPLIANCE : 3 96
 I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2011 eval; 2000 start; GC (all HDG)

I/M PROGRAM : 4 2000 2050 1 TRC GC
 I/M MODEL YEARS : 4 1987 2009
 I/M VEHICLES : 4 11111 22222222 2
 I/M COMPLIANCE : 4 96
 I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2011 eval; 2000 start; GC (LDG 95-)

I/M PROGRAM : 5 2000 2050 1 TRC GC
 I/M MODEL YEARS : 5 1987 1995
 I/M VEHICLES : 5 22222 11111111 1
 I/M COMPLIANCE : 5 96
 I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2011 eval; 2000 start; EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
 I/M MODEL YEARS : 6 1996 2009
 I/M VEHICLES : 6 22222 11111111 1
 I/M COMPLIANCE : 6 96
 I/M WAIVER RATES : 6 3 3

**2014 Exhaust and Evaporative I/M setups for HGB Urban County Group:
Brazoria, Fort Bend, Galveston, Montgomery input to RATEADJ62**

* 2014 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery

> Exhaust I/M: 2014 eval; 2003 start; 2500/IDLE (all HDG)

I/M PROGRAM : 1 2003 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1987 2012
I/M VEHICLES : 1 11111 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2014 eval; 2003 start; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 2003 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS : 2 1987 1995
I/M VEHICLES : 2 22222 11111111 1
I/M STRINGENCY : 2 20
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2014 eval; 2003 start; OBD I/M (LDG 96+)

I/M PROGRAM : 3 2003 2050 1 TRC OBD I/M
I/M MODEL YEARS : 3 1996 2012
I/M VEHICLES : 3 22222 11111111 1
I/M STRINGENCY : 3 20
I/M COMPLIANCE : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2014 eval; 2000 start; GC (all HDG)

I/M PROGRAM : 4 2000 2050 1 TRC GC
I/M MODEL YEARS : 4 1987 2012
I/M VEHICLES : 4 11111 22222222 2
I/M COMPLIANCE : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2014 eval; 2000 start; GC (LDG 95-)

I/M PROGRAM : 5 2000 2050 1 TRC GC
I/M MODEL YEARS : 5 1987 1995
I/M VEHICLES : 5 22222 11111111 1
I/M COMPLIANCE : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2014 eval; 2000 start; EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS : 6 1996 2012
I/M VEHICLES : 6 22222 11111111 1
I/M COMPLIANCE : 6 96
I/M WAIVER RATES : 6 3 3

**2014 Exhaust and Evaporative I/M setups for HGB Urban County Ratio
Calculation to get May 1 start (actual Urban County start year is 2003) input to
RATEADJ62**

* 2014 Exhaust and Evaporative I/M setups for
 * HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery
 * (actual Urban County start year is 2003)

> Exhaust I/M: 2014 eval; 2004 start; 2500/IDLE (all HDG)

I/M PROGRAM : 1 2004 2050 1 TRC 2500/IDLE
 I/M MODEL YEARS : 1 1987 2012
 I/M VEHICLES : 1 11111 22222222 2
 I/M STRINGENCY : 1 20
 I/M COMPLIANCE : 1 96
 I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2014 eval; 2004 start; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 2004 2050 1 TRC ASM 2525/5015 PHASE-IN
 I/M MODEL YEARS : 2 1987 1995
 I/M VEHICLES : 2 22222 11111111 1
 I/M STRINGENCY : 2 20
 I/M COMPLIANCE : 2 96
 I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2014 eval; 2004 start; OBD I/M (LDG 96+)

I/M PROGRAM : 3 2004 2050 1 TRC OBD I/M
 I/M MODEL YEARS : 3 1996 2012
 I/M VEHICLES : 3 22222 11111111 1
 I/M STRINGENCY : 3 20
 I/M COMPLIANCE : 3 96
 I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2014 eval; 2000 start; GC (all HDG)

I/M PROGRAM : 4 2000 2050 1 TRC GC
 I/M MODEL YEARS : 4 1987 2012
 I/M VEHICLES : 4 11111 22222222 2
 I/M COMPLIANCE : 4 96
 I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2014 eval; 2000 start; GC (LDG 95-)

I/M PROGRAM : 5 2000 2050 1 TRC GC
 I/M MODEL YEARS : 5 1987 1995
 I/M VEHICLES : 5 22222 11111111 1
 I/M COMPLIANCE : 5 96
 I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2014 eval; 2000 start; EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
 I/M MODEL YEARS : 6 1996 2012
 I/M VEHICLES : 6 22222 11111111 1
 I/M COMPLIANCE : 6 96
 I/M WAIVER RATES : 6 3 3

**2017 Exhaust and Evaporative I/M setups for HGB Urban County Group:
Brazoria, Fort Bend, Galveston, Montgomery input to RATEADJ62**

* 2017 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery

> Exhaust I/M: 2017 eval; 2003 start; 2500/IDLE (all HDG)
I/M PROGRAM : 1 2003 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1987 2015
I/M VEHICLES : 1 11111 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2017 eval; 2003 start; ASM 2525/5015 PHASE-IN (LDG 95-)
I/M PROGRAM : 2 2003 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS : 2 1987 1995
I/M VEHICLES : 2 22222 11111111 1
I/M STRINGENCY : 2 20
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2017 eval; 2003 start; OBD I/M (LDG 96+)
I/M PROGRAM : 3 2003 2050 1 TRC OBD I/M
I/M MODEL YEARS : 3 1996 2015
I/M VEHICLES : 3 22222 11111111 1
I/M STRINGENCY : 3 20
I/M COMPLIANCE : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2017 eval; 2000 start; GC (all HDG)
I/M PROGRAM : 4 2000 2050 1 TRC GC
I/M MODEL YEARS : 4 1987 2015
I/M VEHICLES : 4 11111 22222222 2
I/M COMPLIANCE : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2017 eval; 2000 start; GC (LDG 95-)
I/M PROGRAM : 5 2000 2050 1 TRC GC
I/M MODEL YEARS : 5 1987 1995
I/M VEHICLES : 5 22222 11111111 1
I/M COMPLIANCE : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2017 eval; 2000 start; EVAP OBD & GC (LDG 96+)
I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS : 6 1996 2015
I/M VEHICLES : 6 22222 11111111 1
I/M COMPLIANCE : 6 96
I/M WAIVER RATES : 6 3 3

**2017 Exhaust and Evaporative I/M setups for HGB Urban County Ratio
 Calculation to get May 1 start (actual Urban County start year is 2003) input to
 RATEADJ62**

```

* 2017 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery
* (actual Urban County start year is 2003)

> Exhaust I/M: 2017 eval; 2004 start; 2500/IDLE (all HDG)
I/M PROGRAM      : 1 2004 2050 1 TRC 2500/IDLE
I/M MODEL YEARS  : 1 1987 2015
I/M VEHICLES     : 1 11111 22222222 2
I/M STRINGENCY   : 1 20
I/M COMPLIANCE   : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2017 eval; 2004 start; ASM 2525/5015 PHASE-IN (LDG 95-)
I/M PROGRAM      : 2 2004 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS  : 2 1987 1995
I/M VEHICLES     : 2 22222 11111111 1
I/M STRINGENCY   : 2 20
I/M COMPLIANCE   : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2017 eval; 2004 start; OBD I/M (LDG 96+)
I/M PROGRAM      : 3 2004 2050 1 TRC OBD I/M
I/M MODEL YEARS  : 3 1996 2015
I/M VEHICLES     : 3 22222 11111111 1
I/M STRINGENCY   : 3 20
I/M COMPLIANCE   : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2017 eval; 2000 start; GC (all HDG)
I/M PROGRAM      : 4 2000 2050 1 TRC GC
I/M MODEL YEARS  : 4 1987 2015
I/M VEHICLES     : 4 11111 22222222 2
I/M COMPLIANCE   : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2017 eval; 2000 start; GC (LDG 95-)
I/M PROGRAM      : 5 2000 2050 1 TRC GC
I/M MODEL YEARS  : 5 1987 1995
I/M VEHICLES     : 5 22222 11111111 1
I/M COMPLIANCE   : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2017 eval; 2000 start; EVAP OBD & GC (LDG 96+)
I/M PROGRAM      : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS  : 6 1996 2015
I/M VEHICLES     : 6 22222 11111111 1
I/M COMPLIANCE   : 6 96
I/M WAIVER RATES : 6 3 3
  
```

**2018 Exhaust and Evaporative I/M setups for HGB Urban County Group:
Brazoria, Fort Bend, Galveston, Montgomery input to RATEADJ62**

* 2018 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery

> Exhaust I/M: 2018 eval; 2003 start; 2500/IDLE (all HDG)
I/M PROGRAM : 1 2003 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1987 2016
I/M VEHICLES : 1 11111 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2018 eval; 2003 start; ASM 2525/5015 PHASE-IN (LDG 95-)
I/M PROGRAM : 2 2003 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS : 2 1987 1995
I/M VEHICLES : 2 22222 11111111 1
I/M STRINGENCY : 2 20
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2018 eval; 2003 start; OBD I/M (LDG 96+)
I/M PROGRAM : 3 2003 2050 1 TRC OBD I/M
I/M MODEL YEARS : 3 1996 2016
I/M VEHICLES : 3 22222 11111111 1
I/M STRINGENCY : 3 20
I/M COMPLIANCE : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2018 eval; 2000 start; GC (all HDG)
I/M PROGRAM : 4 2000 2050 1 TRC GC
I/M MODEL YEARS : 4 1987 2016
I/M VEHICLES : 4 11111 22222222 2
I/M COMPLIANCE : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2018 eval; 2000 start; GC (LDG 95-)
I/M PROGRAM : 5 2000 2050 1 TRC GC
I/M MODEL YEARS : 5 1987 1995
I/M VEHICLES : 5 22222 11111111 1
I/M COMPLIANCE : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2018 eval; 2000 start; EVAP OBD & GC (LDG 96+)
I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS : 6 1996 2016
I/M VEHICLES : 6 22222 11111111 1
I/M COMPLIANCE : 6 96
I/M WAIVER RATES : 6 3 3

**2018 Exhaust and Evaporative I/M setups for HGB Urban County Ratio
Calculation to get May 1 start (actual Urban County start year is 2003) input to
RATEADJ62**

```

* 2018 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery
* (actual Urban County start year is 2003)

> Exhaust I/M: 2018 eval; 2004 start; 2500/IDLE (all HDG)
I/M PROGRAM      : 1 2004 2050 1 TRC 2500/IDLE
I/M MODEL YEARS  : 1 1987 2016
I/M VEHICLES     : 1 11111 22222222 2
I/M STRINGENCY   : 1 20
I/M COMPLIANCE   : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2018 eval; 2004 start; ASM 2525/5015 PHASE-IN (LDG 95-)
I/M PROGRAM      : 2 2004 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS  : 2 1987 1995
I/M VEHICLES     : 2 22222 11111111 1
I/M STRINGENCY   : 2 20
I/M COMPLIANCE   : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2018 eval; 2004 start; OBD I/M (LDG 96+)
I/M PROGRAM      : 3 2004 2050 1 TRC OBD I/M
I/M MODEL YEARS  : 3 1996 2016
I/M VEHICLES     : 3 22222 11111111 1
I/M STRINGENCY   : 3 20
I/M COMPLIANCE   : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2018 eval; 2000 start; GC (all HDG)
I/M PROGRAM      : 4 2000 2050 1 TRC GC
I/M MODEL YEARS  : 4 1987 2016
I/M VEHICLES     : 4 11111 22222222 2
I/M COMPLIANCE   : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2018 eval; 2000 start; GC (LDG 95-)
I/M PROGRAM      : 5 2000 2050 1 TRC GC
I/M MODEL YEARS  : 5 1987 1995
I/M VEHICLES     : 5 22222 11111111 1
I/M COMPLIANCE   : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2018 eval; 2000 start; EVAP OBD & GC (LDG 96+)
I/M PROGRAM      : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS  : 6 1996 2016
I/M VEHICLES     : 6 22222 11111111 1
I/M COMPLIANCE   : 6 96
I/M WAIVER RATES : 6 3 3

```

**2019 Exhaust and Evaporative I/M setups for HGB Urban County Group:
Brazoria, Fort Bend, Galveston, Montgomery input to RATEADJ62**

* 2019 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery

> Exhaust I/M: 2019 eval; 2003 start; 2500/IDLE (all HDG)

I/M PROGRAM : 1 2003 2050 1 TRC 2500/IDLE
I/M MODEL YEARS : 1 1987 2017
I/M VEHICLES : 1 11111 22222222 2
I/M STRINGENCY : 1 20
I/M COMPLIANCE : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2019 eval; 2003 start; ASM 2525/5015 PHASE-IN (LDG 95-)

I/M PROGRAM : 2 2003 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS : 2 1987 1995
I/M VEHICLES : 2 22222 11111111 1
I/M STRINGENCY : 2 20
I/M COMPLIANCE : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2019 eval; 2003 start; OBD I/M (LDG 96+)

I/M PROGRAM : 3 2003 2050 1 TRC OBD I/M
I/M MODEL YEARS : 3 1996 2017
I/M VEHICLES : 3 22222 11111111 1
I/M STRINGENCY : 3 20
I/M COMPLIANCE : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2019 eval; 2000 start; GC (all HDG)

I/M PROGRAM : 4 2000 2050 1 TRC GC
I/M MODEL YEARS : 4 1987 2017
I/M VEHICLES : 4 11111 22222222 2
I/M COMPLIANCE : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2019 eval; 2000 start; GC (LDG 95-)

I/M PROGRAM : 5 2000 2050 1 TRC GC
I/M MODEL YEARS : 5 1987 1995
I/M VEHICLES : 5 22222 11111111 1
I/M COMPLIANCE : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2019 eval; 2000 start; EVAP OBD & GC (LDG 96+)

I/M PROGRAM : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS : 6 1996 2017
I/M VEHICLES : 6 22222 11111111 1
I/M COMPLIANCE : 6 96
I/M WAIVER RATES : 6 3 3

**2019 Exhaust and Evaporative I/M setups for HGB Urban County Ratio
 Calculation to get May 1 start (actual Urban County start year is 2003) input to
 RATEADJ62**

```

* 2019 Exhaust and Evaporative I/M setups for
* HGA Urban County Group: Brazoria, Fort Bend, Galveston, Montgomery
* (actual Urban County start year is 2003)

> Exhaust I/M: 2019 eval; 2004 start; 2500/IDLE (all HDG)
I/M PROGRAM      : 1 2004 2050 1 TRC 2500/IDLE
I/M MODEL YEARS  : 1 1987 2017
I/M VEHICLES     : 1 11111 22222222 2
I/M STRINGENCY   : 1 20
I/M COMPLIANCE   : 1 96
I/M WAIVER RATES : 1 3 3

> Exhaust I/M: 2019 eval; 2004 start; ASM 2525/5015 PHASE-IN (LDG 95-)
I/M PROGRAM      : 2 2004 2050 1 TRC ASM 2525/5015 PHASE-IN
I/M MODEL YEARS  : 2 1987 1995
I/M VEHICLES     : 2 22222 11111111 1
I/M STRINGENCY   : 2 20
I/M COMPLIANCE   : 2 96
I/M WAIVER RATES : 2 3 3

> Exhaust I/M: 2019 eval; 2004 start; OBD I/M (LDG 96+)
I/M PROGRAM      : 3 2004 2050 1 TRC OBD I/M
I/M MODEL YEARS  : 3 1996 2017
I/M VEHICLES     : 3 22222 11111111 1
I/M STRINGENCY   : 3 20
I/M COMPLIANCE   : 3 96
I/M WAIVER RATES : 3 3 3

I/M EFFECTIVENESS : 1 1 1

> Evaporative I/M: 2019 eval; 2000 start; GC (all HDG)
I/M PROGRAM      : 4 2000 2050 1 TRC GC
I/M MODEL YEARS  : 4 1987 2017
I/M VEHICLES     : 4 11111 22222222 2
I/M COMPLIANCE   : 4 96
I/M WAIVER RATES : 4 3 3

> Evaporative I/M: 2019 eval; 2000 start; GC (LDG 95-)
I/M PROGRAM      : 5 2000 2050 1 TRC GC
I/M MODEL YEARS  : 5 1987 1995
I/M VEHICLES     : 5 22222 11111111 1
I/M COMPLIANCE   : 5 96
I/M WAIVER RATES : 5 3 3

> Evaporative I/M: 2019 eval; 2000 start; EVAP OBD & GC (LDG 96+)
I/M PROGRAM      : 6 2000 2050 1 TRC EVAP OBD & GC
I/M MODEL YEARS  : 6 1996 2017
I/M VEHICLES     : 6 22222 11111111 1
I/M COMPLIANCE   : 6 96
I/M WAIVER RATES : 6 3 3
  
```

MOBILE6 Command and Data Parameter Values input to RATEADJ62

MOBILE6 Inputs: The command and data parameter values for the two ATP sub-programs, ATP1 and ATP2, respectively , are:

Harris County:

ANTI-TAMP PROG :
84 81 83 22222 22222222 2 11 096. 21112222

ANTI-TAMP PROG :
84 84 03 22222 22222222 2 11 096. 22112222

Urban Counties:

ANTI-TAMP PROG :
03 81 83 22222 22222222 2 11 096. 21112222

ANTI-TAMP PROG :
03 84 03 22222 22222222 2 11 096. 22112222

Rural Counties: no ATP programs.

Data parameter value definitions:

- the first number is the last two digits of the program start year.
- the second number is the last two digits of earliest model year covered* by the program. The program is designed to cover 24-year-old vehicles and newer.
- the third number is the final model year covered by the program.* Vehicles less than two years old are exempt from the program.
- the next 14 values are on/off toggles to identify the vehicle types covered (1 = no, 2 = yes). The vehicle are in input string order are: LDGV, LDGT1, LDGT2, LDGT3, LDGT4; and HDGV2B, HDGV3, HDGV4, HDGV5, HDGV6, HDGV7, HDGV8A, HDGV8B; and GAS BUS.
- the next entry must be one (EPA no longer supports additional credit for test only program). A “2” will cause ATP credit to be discontinued.
- the next data parameter is the program inspection frequency (1 = annual, 2 = biennial).
- the next number is the program compliance rate in percent.
- the last eight data parameters in the input string are on/off toggles (1 = no, 2 = yes) indicating which checks are performed, in the following order: 1) air pump disablement; 2) catalyst removal; 3) fuel inlet restrictor removal; 4) tailpipe lead deposit; 5) exhaust gas recirculation disablement; 6) evaporative system disablement; 7) positive crankcase ventilation system disablement; and 8) missing gas cap.

*Note: Vehicles less than two years old and 25 years old and older are exempt from inspection.

HGB Counties (Control Strategies) ATP: 2002, 2008, 2011, 2014, 2017, 2018, and 2019

MOBILE6 Command and Data Parameter Values input to RATEADJ62

<p>2002-ATP inputs: Harris County: ATP1: 84 78 83 22222 22222222 2 11 096. 21112222 ATP2: 84 84 00 22222 22222222 2 11 096. 22112222 Urban Counties: No ATP program</p>
<p>2008-ATP inputs: Harris County: ATP2: 84 84 06 22222 22222222 2 11 096. 22112222 Urban Counties: ATP2: 03 84 06 22222 22222222 2 11 096. 22112222 *ATP2: 04 84 06 22222 22222222 2 11 096. 22112222</p>
<p>2011-ATP inputs: Harris County: 84 87 09 22222 22222222 2 11 096. 22112222 Urban Counties: ATP2: 03 87 09 22222 22222222 2 11 096. 22112222 *ATP2: 04 87 09 22222 22222222 2 11 096. 22112222</p>
<p>2014-ATP inputs: Harris County: 84 90 12 22222 22222222 2 11 096. 22112222 Urban Counties: ATP2: 03 90 09 22222 22222222 2 11 096. 22112222 *ATP2: 04 90 09 22222 22222222 2 11 096. 22112222</p>
<p>2017-ATP inputs: Harris County: 84 93 15 22222 22222222 2 11 096. 22112222 Urban Counties: ATP2: 03 93 15 22222 22222222 2 11 096. 22112222 *ATP2: 04 93 15 22222 22222222 2 11 096. 22112222</p>
<p>2018-ATP inputs: Harris County: 84 94 16 22222 22222222 2 11 096. 22112222 Urban Counties: ATP2: 03 94 16 22222 22222222 2 11 096. 22112222 *ATP2: 04 94 16 22222 22222222 2 11 096. 22112222</p>
<p>2019-ATP inputs: Harris County: 84 95 17 22222 22222222 2 11 096. 22112222 Urban Counties: ATP2: 03 95 17 22222 22222222 2 11 096. 22112222 *ATP2: 04 95 17 22222 22222222 2 11 096. 22112222</p>
<p><i>*Used for the ratio calculation for the May 1st program start date</i></p>

**Harris County pre-1990 and Adjusted Base Year ATP: 2002, 2008, 2011, 2014, 2017,
2018, and 2019**

MOBILE6 Command and Data Parameter Values input to RATEADJ62

**2002, 2008, 2011, 2014, 2017, 2018 & 2019 pre-1990 and Adjusted Base Year ATP
inputs:**

Harris County:

ATP1: 84 68 79 22222 11111111 1 11 085. 21112222

ATP2: 84 80 50 22222 11111111 1 11 085. 22222222

**APPENDIX H: EMISSIONS FOR INDIVIDUAL CONTROL
REDUCTIONS**

2008 Emission Inventories for individual control strategies

VOC (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	292048.7	17801.39	26443.02	15170.55	28219.99	7338.753	6873.013	5888.101	399783.6
1	218191.2	13629.88	19620.59	11444.75	21244.91	5919.454	5508.321	4847.041	300406.1
2	168088.3	10469.88	14994.16	8829.815	16232.01	4654.009	4217.12	3837.524	231322.8
3	146108.1	10469.88	14994.16	8829.815	16232.01	4654.009	4217.12	3837.524	209342.6
4	138655.7	9941.161	14167.65	8375.751	15360.09	4475.179	4018.056	3691.77	198685.4
5	138655.7	8679.622	12290.22	7296.099	13392.95	4475.179	4018.056	3691.77	192499.6
6	124744.3	7712.3	10885.52	6529.537	11752.72	4109.279	3553.439	3398.072	172685.1
7	124519.3	7698.837	10863.27	6517.594	11729.18	4104.56	3549.103	3394.585	172376.4
8	124445.2	7696.848	10860.59	6515.983	11734.97	4103.795	3548.233	3386.575	172292.2

NOx (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	508381.1	36367.53	50899.63	28069.9	59493.13	15368.69	17469.47	13109.31	729158.8
1	408190.1	28982.55	40562.87	22422.3	47087.75	12188.92	13818.68	10366.39	583619.5
2	341913.8	24442.29	34026.97	18826.6	39649.69	10438.26	11753.12	8948.434	489999.2
3	315324.5	24442.29	34026.97	18826.6	39649.69	10438.26	11753.12	8948.434	463409.9
4	301000.5	23453.55	32526.91	18001.17	38031.22	10090.79	11355.54	8658.694	443118.4
5	301000.5	21779.54	30124.5	16639.14	35441.16	10090.79	11355.54	8658.694	435089.9
6	261782.2	19029.11	26129.9	14461.44	30776.27	9020.25	10036.71	7798.081	379034
7	250157.5	18082.26	24864.91	13776.82	29202.53	8598.503	9529.708	7427.575	361639.8
8	243343.6	17550.12	24144.49	13387.59	28350.48	8365.844	9237.072	7217.594	351596.8

2011 Emission Inventories for individual control strategies

VOC (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	306074.6	18798.79	28777.56	15794.32	29735.22	7736.175	7245.783	6210.815	420373.3
1	205163	13125.46	19332.13	10801.78	20547.77	5679.419	5415.481	4683.952	284749.0
2	155349.6	9896.729	14517.63	8191.319	15425.45	4379.363	4063.157	3628.245	215451.5
3	132205.2	9896.729	14517.63	8191.319	15425.45	4379.363	4063.157	3628.245	192307.1
4	125402.9	9425.685	13772.28	7805.532	14698.28	4201.135	3892.986	3494.518	182693.3
5	125402.9	8084.493	11721.43	6683.164	12618.86	4201.135	3892.986	3494.518	176099.5
6	98559.62	6201.893	8899.814	5201.463	9480.202	3475.215	2998.408	2897.528	137714.1
7	97909.89	6162.91	8833.456	5167.393	9412.025	3461.478	2985.553	2887.255	136820.0
8	97832.62	6157.323	8825.665	5162.931	9403.224	3459.329	2983.099	2885.373	136709.6

NOx (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	524526	38007.57	54660.85	28946.51	62128.05	16057.97	18070.84	13657.33	756055.2
1	432448.1	31083.58	44775.86	23784.2	50449.95	12934.69	14569.66	10958.29	621004.3
2	329683.0	23945.44	34158.88	18175.92	38793.61	10231.81	11366.07	8729.511	475084.2
3	297022.5	23945.44	34158.88	18175.92	38793.61	10231.81	11366.07	8729.511	442423.7
4	283637.1	23063.5	32828.11	17485.08	37448.24	9880.508	11010.93	8456.689	423810.2
5	283637.1	20948.1	29695.63	15790.81	34159.39	9880.508	11010.93	8456.689	413579.2
6	211276.1	15842.3	22028.8	11777.86	25629.29	7826.738	8537.408	6762.919	309681.4
7	173730.1	12761.41	17788.56	9573.731	20468.6	6458.712	6900.992	5560.301	253242.4
8	169439.2	12414.8	17309.86	9324.984	19880.32	6306.657	6713.457	5424.133	246813.4

2014 Emission Inventories for individual control strategies

VOC (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	328035.5	21724.05	32437.58	16927.2	33902.44	8376.656	7819.036	6542.771	455765.2
1	203142.8	14252.5	20371.23	10772.93	22018.84	5671.47	5569.672	4555.604	286355.0
2	150526.9	10486.22	14967.75	7991.904	16173.06	4256.867	4069.979	3430.645	211903.3
3	125515.2	10486.22	14967.75	7991.904	16173.06	4256.867	4069.979	3430.645	186891.6
4	120966.3	10144.93	14456.24	7728.636	15667.46	4113.347	3954.108	3322.243	180353.2
5	120966.3	8084.493	11721.43	6683.164	12618.86	4113.347	3954.108	3322.243	171463.9
6	98559.62	6201.893	8899.814	5201.463	9480.202	3475.215	2998.408	2897.528	137714.1
7	79250.57	5420.679	7553.5	4241.302	8268.077	2943.457	2586.089	2395.048	112658.7
8	79082.64	5407.61	7535.584	4231.63	8247.842	2938.756	2580.742	2391.065	112415.9

NOx (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	566174.9	44373.52	62409.98	31263.45	70640.82	17440.69	19456.76	14362.63	826122.7
1	483137.6	37400.74	52550.65	26438.28	58754.32	14432.82	16026.24	11798.5	700539.2
2	337205.1	26515.56	36909.99	18593.87	41690.78	10543.96	11557.4	8690.739	491707.4
3	295376.6	26515.56	36909.99	18593.87	41690.78	10543.96	11557.4	8690.739	449878.9
4	286598.8	25901.8	36043.02	18146.37	40802.5	10270.89	11321.9	8475.006	437560.3
5	286598.8	20948.1	29695.63	15790.81	34159.39	10270.89	11321.9	8475.006	417260.5
6	211276.1	15842.3	22028.8	11777.86	25629.29	7826.738	8537.408	6762.919	309681.4
7	119814.4	9500.544	12859.3	6627.227	14748.19	4848.989	4988.744	4036.319	177423.7
8	117037.5	9257.81	12529.09	6465.687	14348.89	4750.324	4869.75	3951.509	173210.5

2017 Emission Inventories for individual control strategies

VOC (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	348004.3	23251.29	35883.31	18036.19	37583.73	9064.856	8435.252	7047.98	487306.9
1	205959.8	14703.37	21791.08	11007.08	23644.99	5837.251	5816.659	4681.051	293441.3
2	150079.4	10625.51	15755.7	8029.927	17073.63	4280.143	4153.606	3438.656	213436.6
3	123064.8	10625.51	15755.7	8029.927	17073.63	4280.143	4153.606	3438.656	186422.0
4	120370	10411.91	15446.36	7864.559	16768.61	4177.486	4082.443	3357.501	182478.8
5	120370	8641.873	12731.48	6508.638	13976.78	4177.486	4082.443	3357.501	173846.2
6	69116.18	4776.939	6996.809	3749.456	7683.75	2637.584	2350.58	2133.805	99445.1
7	67683.01	4686.843	6839.114	3676.05	7518.604	2607.38	2320.729	2110.886	97442.62
8	67272.23	4635.588	6773.457	3636.452	7461.972	2583.219	2310.984	2100.774	96774.68

NOx (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	596221.4	46685.33	68435.97	32778.11	78090.8	18391.97	20900.22	15328.38	876832.2
1	524596.5	40587.11	59281.74	28611.35	66453.5	15863.73	17621.42	13031.38	766046.8
2	345483.1	27243.75	39471.16	19037.17	44875.79	10896.36	12091.52	9060.363	508159.2
3	295223.1	27243.75	39471.16	19037.17	44875.79	10896.36	12091.52	9060.363	457899.2
4	290410.2	26895.75	38993.52	18781.13	44387.98	10719.57	11961.13	8914.074	451063.3
5	290410.2	23264.76	33652.31	16148.47	38734.37	10719.57	11961.13	8914.074	433804.9
6	164642.5	13698.25	19404.51	9318.934	23049.57	6639.898	7419.048	5666.977	249839.7
7	84091.72	6669.528	9402.856	4683.296	10868.2	3759.158	3843.168	3136.811	126454.7
8	82224.97	6495.646	9160.426	4566	10582.8	3686.007	3764.319	3079.241	123559.4

2018 Emission Inventories for individual control strategies

VOC (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	355035.0	23687.34	36914.15	18346.78	38723.86	9150.068	8490.265	7173.745	497521.2
1	208043.7	14833.18	22222.72	11079.28	24147.38	5812.251	5815.277	4716.932	296670.7
2	150889.7	10654.1	15988.43	8035.145	17352.76	4226.156	4128.438	3438.43	214713.1
3	123074.8	10654.1	15988.43	8035.145	17352.76	4226.156	4128.438	3438.43	186898.3
4	120908.5	10482.77	15740.09	7903.456	17107.63	4139.223	4069.132	3368.019	183718.8
5	120908.5	8647.81	12905.56	6499.936	14186.39	4139.223	4069.132	3368.019	174724.6
6	66694.46	4555.578	6800.219	3580.586	7498.762	2498.468	2261.504	2055.355	95944.93
7	65150.46	4456.89	6627.017	3500.107	7318.863	2465.263	2230.025	2030.752	93779.38
8	64860.23	4434.236	6594.299	3483.413	7281.784	2457.085	2220.74	2023.813	93355.6

NOx (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	610470.4	48293.87	71219.91	33903.1	80796.55	18986.2	21046.15	15696.73	900412.9
1	539297.4	41927.88	61674.05	29552.5	68853.9	16339.98	17808.55	13413.25	788867.6
2	350985.0	27905.39	40704.74	19492.0	46057.51	11115.2	12092.43	9205.665	517557.9
3	298013.6	27905.39	40704.74	19492.0	46057.51	11115.2	12092.43	9205.665	464586.5
4	294280.3	27637.61	40335.68	19295.8	45681.4	10971.69	11988.67	9083.885	459275.0
5	294280.3	23796.03	34657.51	16514.9	39666.84	10971.69	11988.67	9083.885	440959.8
6	162707.1	13778.34	19640.82	9368.3	23160.58	6667.905	7277.586	5632.297	248233.0
7	74961.11	5959.852	8485.509	4195.7	9758.317	3450.555	3464.013	2875.95	113151.0
8	73412.72	5822.642	8289.249	4104.489	9520.884	3394.975	3398.347	2828.353	110771.7

2019 Emission Inventories for individual control strategies
VOC (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	357182.1	23737.98	37671.34	18405.11	39388.46	9459.337	8701.72	7354.939	501901.0
1	208567.8	14772.76	22578.83	11047.23	24544.73	5966.311	5929.614	4797.453	298204.8
2	150594.5	10569.3	16184.32	7977.714	17554.36	4312.653	4188.949	3474.119	214856.0
3	122400.5	10569.3	16184.32	7977.714	17554.36	4312.653	4188.949	3474.119	186661.9
4	120673.7	10433.0	15982.87	7870.807	17353.19	4237.589	4136.873	3414.87	184102.9
5	120673.7	8571.755	13058.93	6446.028	14343.00	4237.589	4136.873	3414.87	174882.7
6	64369.66	4372.386	6675.252	3438.36	7330.702	2473.729	2234.283	2014.479	92908.85
7	62773.75	4270.285	6494.635	3355.367	7145.145	2438.558	2200.987	1988.491	90667.22
8	62456.0	4245.749	6458.485	3337.221	7104.419	2429.449	2190.685	1980.824	90202.84

NOx (pounds/day)

Control Scenario	Harris	Brazoria	Fort Bend	Galveston	Montgomery	Liberty	Chambers	Waller	Total
0	616461	48127.38	72351.21	33958.66	81976.2	19541.33	21497.36	15998.9	909912.0
1	547821.7	42029.43	63037.96	29765.85	70396.95	16966.71	18278.15	13802.74	802099.4
2	352753.2	27683.64	41167.15	19427.92	46565.42	11391.59	12291.1	9341.862	520621.9
3	298029.9	27683.64	41167.15	19427.92	46565.42	11391.59	12291.1	9341.862	465898.6
4	295156.8	27480.06	40879.65	19275.11	46268.55	11272.82	12204.41	9243.81	461781.2
5	295156.8	23537.32	34953.73	16413.4	39977.51	11272.82	12204.41	9243.81	442759.0
6	159897.8	13356.19	19407.58	9122.644	22842.48	6691.309	7281.193	5599.112	244198.3
7	67352.21	5268.254	7661.09	3732.691	8777.045	3256.055	3226.208	2681.748	101955.3
8	66011.14	5151.721	7491.433	3654.59	8572.965	3207.453	3169.306	2640.596	99899.2