ATTACHMENT 2

MOVES2014 Input Data and Parameters

May 27, 2015

Northwest Indiana Regional Planning Commission (NIRPC) Lake, Porter, and LaPorte Counties

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Northwest Indiana Regional Planning Commission (NIRPC)
Lake, Porter and LaPorte Counties

Developed for:
Indiana Department of Transportation

Developed by:
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1.0 Introduction

This report documents the methods used to create input parameters prior to running a set of MOVES2014 runs for Northwest Indiana Regional Planning Commission (NIRPC) covering the following:

- Lake and Porter Counties 8-hour Ozone Maintenance Area
- Lake and Porter Counties PM 2.5 non-attainment area.
- LaPorte County 8-hour Ozone Maintenance Area

This report contains a discussion of the input settings used in MOVES2014 and the development of the input datasets. These MOVES2014 runs are intended to develop a default set of emission rates that can be used for conformity determination and is part of a statewide effort being conducted by the Indiana Department of Transportation (INDOT) for all participating MPOs or other jurisdictions with air quality conformity needs.

What Has Been Updated?

MOVES Input	Updated?	Notes
Source (Vehicle) Type Population	Yes	*New BMV data*
Vehicle Type VMT (by 13 MOVES Vehicle Types)	Yes	*HourVMTFraction updated using INDOT WIM & ATR data*
Age Distribution (Vehicle Population by Age of Vehicle)	Yes	*New BMV data*
Fuel (AVFT, % Fuel Type/Engine Type by Vehicle Type)	Yes	*New BMV data*
Fuel (all other files)	Yes	*Used MOVES2014 defaults for each county*
Average Speed Distribution (% of VHT in each 5 mph speed bin)	No	*Not Needed for Emission Rate Mode (Dummy Inputs)*
Road Type Distribution (VMT by 5 MOVES Road Types)	No	*Retained inputs from 2012 emission rate development*
Ramp Fraction	No	*Retained inputs from 2012 emission rate development*
Meteorology Data	No	*Retained inputs from 2012 emission rate development*
I/M Program	No	*Retained inputs from 2012 emission rate development*

2.0 Source Type Population

The vehicle populations for light duty vehicles, which include motorcycles, passenger cars, passenger trucks, and light commercial trucks (source types 11, 21, 31, and 32 respectively) were developed from a new vehicle registration dataset provided to INDOT by the Indiana Bureau of Motor Vehicles (BMV) in December of 2014. These are discussed in section 2.1 below. The vehicle populations for heavy duty vehicles, which include trucks and buses (source types 41, 42, 43, 51, 52, 53, 54, 61, and 62 respectively) were developed using procedures recommended in EPA's MOVES guidance. This is discussed in section 2.2 below.

2.1 BMV Vehicle Registration and License Data

A statewide vehicle fleet dataset was provided to the Indiana Department of Transportation (INDOT) from the Indiana Bureau of Motor Vehicles (BMV) in December of 2014. The analysis was performed by the Corradino Group under contract to INDOT. The dataset was processed by BMV and combined attributes of both vehicle title/registration (VIN) and license type.

The raw BMV dataset contained the number of vehicles classified by the combination of:

- Vehicle Type, and
- Vehicle Year, and
- Fuel Type, and
- County

There were approximately 6.67 million VINs in the statewide data set. Out of these, approximately 5.85 million were for On-Road vehicles of interest to this analysis.

BMV Vehicle Type Records Excluded from Further Analysis:

- Low Speed
- Off-Road Vehicle
- RV-Travel Trailer
- Snowmobile
- Special Machinery
- Trailer
- Watercraft

Table 2 shows how the BMV Vehicle Type classifications were cross-mapped to MOVES Source Type ID categories. The vehicle populations for light duty vehicles, which including motorcycles, passenger cars, passenger trucks, and light commercial trucks (source types 11, 21, 31, and 32 respectively) were developed from the 2014 BMV vehicle registration. The vehicle populations for heavy duty vehicles, which include trucks and buses (source types 41, 42, 43, 51, 52, 53, 54, 61, and 62 respectively) used the BMV heavy duty vehicle population as a control total for each county.

Table 2: BMV Data to MOVES2014

BMV Type	MOVES Usage			
	Source Type ID	Source Type Population	Vehicle Age Distribution	AVFT File
MOTORCYCLE	11	X	X	MD
Dealer	21	X	X	X
PASSENGER	21	X	X	X
RV-Truck Camper	31	X	X	X
Truck 7,000	31	X	X	X
Truck 9,000	31	X	X	X
Truck Camper	31	X	X	X
Farm Truck	32	X	X	X
Truck 10,000	32	X	X	X
Truck 11,000	32	X	X	X
City Bus	42	T	MD	MD
Commercial Bus	42	T	MD	MD
Church Bus	43	T	MD	MD
School Bus	43	T	MD	MD
Special Bus	43	T	MD	MD
Recovery Vehicle	52	T	MD	MD
Truck 16,000	52	T	MD	MD
Truck 20,000	52	T	MD	MD
Truck 23,000	52	T	MD	MD
Truck 26,000	52	T	MD	MD
Truck 30,000	52	T	MD	MD
Truck 36,000	53	T	MD	MD
Truck 42,000	53	T	MD	MD
Truck 48,000	53	T	MD	MD
Truck 54,000	53	T	MD	MD
Truck 60,000	53	T	MD	MD
RV	54	T	MD	MD
RV-Motorhome	54	T	MD	MD
Farm Semi Tractor	61	T	MD	MD
Truck 66,000	61	T	MD	MD
Truck 66,000+	61	T	MD	MD
Semi Tractor	62	T	MD	MD
Truck	62	T	MD	MD
SEMI	62	T	MD	MD
Semi	62	T	MD	MD
LOW SPEED	N/A	N/A	N/A	N/A
OFF-ROAD VEHICLE	N/A	N/A	N/A	N/A
RV-Travel Trailer	N/A	N/A	N/A	N/A
SNOWMOBILE	N/A	N/A	N/A	N/A
SPECIAL MACHINERY	N/A	N/A	N/A	N/A
TRAILER	N/A	N/A	N/A	N/A
WATERCRAFT	N/A	N/A	N/A	N/A

Legend	
X	BMV values were used
MD	Moves Defaults used in place of BVM data
T	BMV data used for Heavy Duty Veh. control total applied to MAR method
N/A	Discarded

2.2 Heavy Vehicle Source Types

Vehicle populations for all other source types (buses and heavy vehicles) were derived by applying the Mileage Accumulation Rate (MAR) method documented in EPA's Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity, Section 3.3 Source Type Population.

Mileage Accumulation Rates

Development of the Mileage Accumulation Rates was done during the previous 2011-2012 emission rate development process facilitated by INDOT. The MARs developed at that time have been carried forward into this update, but have been updated to reconcile with current BMV data related to heavy vehicles. The default MARs were extracted from MOVES by running MOVES for a single pollutant and a single year for all vehicles, fuels, months, days, and hours. The activity output was set to report both distance and population. A ratio of population to vehicle-miles-traveled (VMT) was calculated from these outputs. The ratios were calculated for each source type.

The Northwestern Indiana Regional Planning Commission (NIRPC), which is the metropolitan planning organization (MPO) for Lake and Porter Counties, provided VMT by MOVES road types extracted from their travel demand model's base year. Since the default MARs in MOVES vary by year (but not by location), the MOVES run that was executed to extract the MARs was run for a year consistent with the travel demand model's base year. This resulted in MARs that could be applied directly to the validated VMTs reported by the travel demand model. The travel demand model VMTs were converted into annual VMT and distributed by vehicle types using statewide default VMT distribution factors documented in this report in the section on Default VMT Distributions. The MARs were then applied to the annual vehicle type VMTs. The result was an estimated vehicle population for each source type for the travel demand model's base year. Since the vehicle populations for source types 11, 21, 31, and 32 were developed directly from the vehicle registration data, the population estimates derived for those source types using the MAR method were discarded and the observed data were used instead. As a final step, MAR-derived heavy duty vehicle classes were adjusted proportionally to match heavy duty vehicle population totals for each county from BMV data.

2.3 Forecasting Vehicle Populations by Source Types

Future year vehicle populations were developed base on socioeconomic growth rates for the maintenance area. The MPO provided base year and horizon year population and employment data for the area. Annual growth rates were calculated for population growth and employment growth individually. Population growth rates were then used to grow the light vehicle populations (source types 11, 21, 31, and 32). Employment growth rates were used to grow the heavy vehicle populations (source types 41, 42, 43, 51, 52, 53, 54, 61, and 62). Vehicle populations were calculated in 5 year increments from 2015 to 2045. The county level source type values and forecasts are shown in Tables A-1, A-2, and A-3 in Appendix A. When generating MOVES2014 emission rates the vehicle populations for Lake and Porter Counties are

combined into a single input file. LaPorte County emission rates are developed separately, so the county's vehicle population files are not combined with Lake and Porter county files.

2.4 Vehicle Age Distribution

The vehicle age distributions for MOVES source types 11, 21, 31, and 32 (motorcycles, cars, passenger trucks, and light commercial vehicles respectively) were developed through an analysis of Indiana's 2014 vehicle registration data. The BMV dataset allowed the totals for each model year by vehicle type and county to be assembled into the required MOVES 2014 format. Whereby, the vehicles are classified into one year age bins between 0 and 29 years old, and older vehicles into the 30 years old or more bin.

In keeping with previous practice, vehicle age distributions were only derived for light duty vehicles from the BMV data (source types 11, 21, 31, and 32 from the vehicle registration data). Because of the transient nature of the heavy vehicle classes, MOVES2014 default vehicle age distributions specific to each source types were used. Vehicle age distributions for all source types were kept constant for all future years. The vehicle age distributions for Lake and Porter Counties as a combined area are shown in Appendix A of this report.

3.0 Vehicle Type VMT

As part of the previous 2011-2012 emission rate development effort, INDOT developed a default set of VMT distribution factors by Highway Performance Monitoring System (HPMS) vehicle type and by MOVES road type. The original distribution factors were developed by analyzing four consecutive years of continuous traffic count data ending in 2010 for twenty permanent traffic count stations throughout Indiana. During the current update, the Corradino Group evaluated the latest four years of continuous traffic count data; covering the years 2011, 2012, 2013, and 2014.

The stations were selected to provide a spread of locations corresponding to each of the four MOVES road types. Furthermore, these stations were selected from among sites that were concentrated in nonattainment and maintenance areas. An inventory of the sites used to develop the distributions is shown in Figure 1. Of the available sites, 16 unique Weigh in Motion (WIM) sites and 26 ATR sites were utilized.

The vehicle counts reported at each station were provided by vehicle class. These were aggregated into the six basic HPMS vehicle types: motorcycle, passenger car, light truck, bus, single-unit heavy truck, and combination heavy truck. The distribution of VMT by vehicle type was calculated for each road type by taking each vehicle type's percentage of total traffic.

3.1 Road Type, Daily, and Monthly Distributions

Road Type, Daily and Monthly distribution factors were calculated from INDOT's official count adjustment factors which are more commonly used to develop AADT from raw traffic counts. These factors are based on the set of daily traffic counts collected from all permanent count stations throughout the state. The daily distribution factors determine what percentage of VMT is occurring on weekdays and what percentage is occurring on weekends. The monthly distribution factors determine what percentage of annual VMT is occurring in each month of the year. After comparing results for Daily and Monthly distributions developed using the 2007-2010 data versus the newer 2011-2014 data, the differences were trivial and the previously developed MOVES Daily and Monthly VMT fraction files were retained for use in the MOVES2014 analysis.

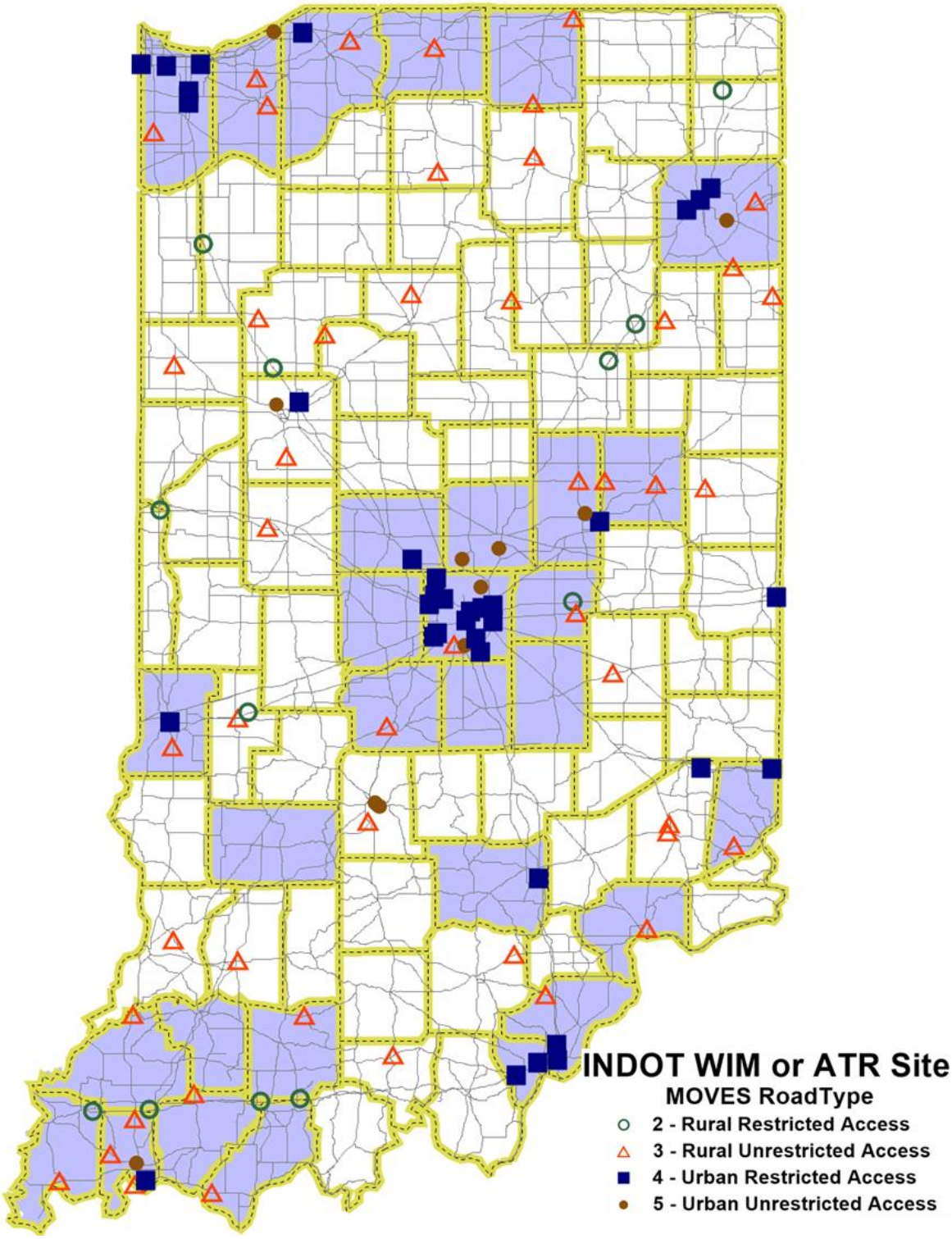
VehTypeVMT - When converting files from MOVES 2010 format to MOVES 2014 format, HPMS Base Year VMT by HPMS Vehicle Type ID was converted so that VMT for HPMS vehicle types 20 and 30 were combined and classified as HPMS vehicle type 25.

The statewide default daily distribution factors are shown in Tables C-1, C-2, and C-4 in Appendix C. The statewide default monthly distribution factors are also shown in Appendix C.

3.2 Hourly Distributions

The same set of forty two permanent traffic count locations discussed in the section on Default VMT Distributions was analyzed to develop a set of hourly distribution factors. These factors were calculated by road type, by HPMS vehicle type. Hourly factors were only calculated for the average weekday. The hourly distribution pattern for each traffic count location was reviewed. Any data that appeared to reflect either an error in the data or an outlier of behavior were removed to prevent bias in the data. The statewide default hourly distribution factors are presented in Appendix B.

Figure 1 - INDOT Continuous Count Locations



4.0 Average Speed Distribution

National MOVES defaults are used for the average speed distribution inputs. Per the *User Guide for MOVES2014*, when running MOVES2014 in emission rate mode, the speed distribution is needed for model setup, but not used in the development of emission rates. The speed distribution for a given scenario is accounted for later in the inventory development process, when the emission rates are applied to detailed travel demand model outputs as part of the INDOT Air Quality Post-Processor.

5.0 Ramp Fraction

The ramp fractions represent the percentage of vehicle-hours-traveled (VHT) for road types 2 (rural restricted access) and 4 (urban restricted access) occurring on the ramps associated with those road types. These fractions were calculated based on the percentage of VHT occurring on ramps reported by the base year travel demand model. These ramp fractions are reported in Appendix C.

6.0 Meteorology Data

The default set of hourly temperatures and hourly relative humidity for use in MOVES 2014 was retained from the MOVES 2010a inputs originally developed using EPA's data converters for changing MOBILE6.2 minimum / maximum temperatures and absolute humidity to the MOVES equivalent formats.

Meteorological data reflect average annual conditions for the PM 2.5 runs. During the previous emission rate update, the MOBILE6.2 meteorological input data for each of the twelve months of the years were averaged together to create average annual temperatures and humidity. These were then passed through the data converters. The data reflect summer conditions for ozone using MOBILE6.2 inputs for July. The MOVES formatted meteorological data for the NIRPC counties of Lake, Porter, and LaPorte as a combined area are presented in Appendix C of this report.

7.0 Fuel

The 2014 version of MOVES has features developed as a result of the EPAct Tier 2 Gasoline Model, impacts of ethanol and other key fuel properties, and incorporates the EPA Sulfur Effects Model. MOVES2014 has a new set of Fuel Supply Regions based on regional fuels, and reduces the number of Fuels in MOVES from approximately 300 to 40. MOVES2014 contains the most current ethanol (E10, E15,E85) and fuel formulation projections based on AEO2014.

Figure 2-Indiana Fuel Supply Regions

Development of the updated NIRPC emission rates uses default MOVES2014 fuel formulation assumptions based on each county's Fuel Supply Region, and defaults to summer conditions.

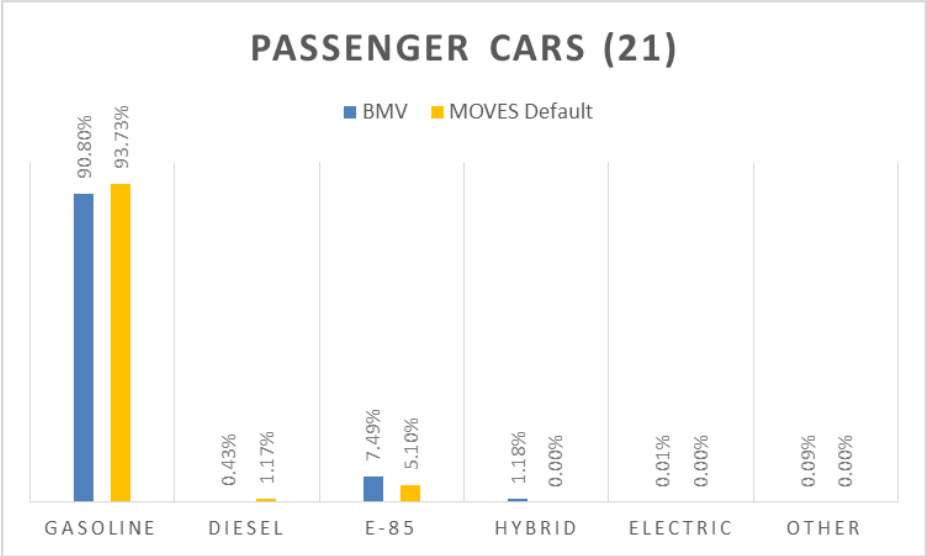
AVFT Assumptions

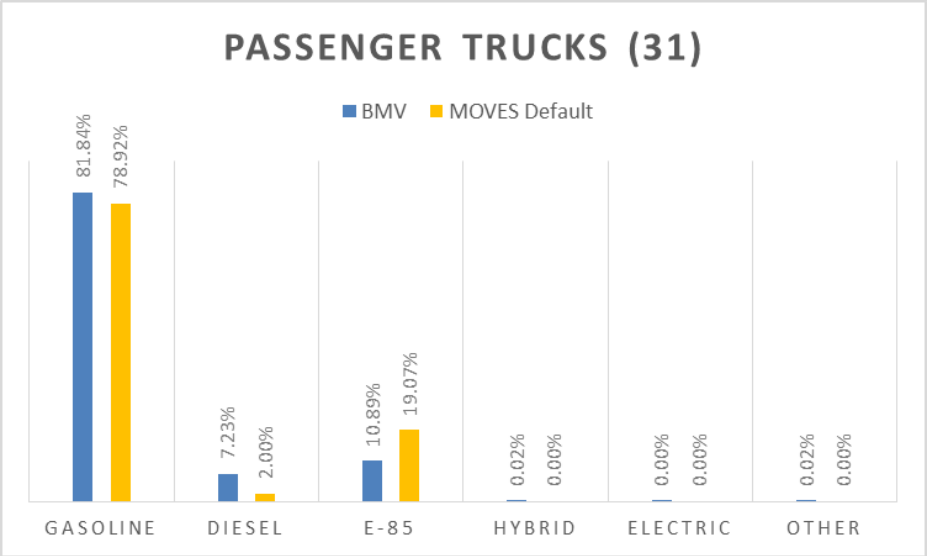
The 2014 BMV fleet mix data allowed the differentiation of vehicle types by fuel types. An evaluation of differences between BMV-derived data and MOVES 2014 defaults was conducted for light duty vehicles. Results showed that in many of the urban counties, the number of hybrid and electric passenger cars is large enough to warrant inclusion in the AVFT input file. The default MOVES file assumes zero hybrid or electric cars statewide. Additionally, BMV data shows a much larger fraction of diesel powered light duty trucks than indicated in the default data. And, the E-85 market share is actually much smaller in Indiana, than assumed in the default data. Statewide results are shown in Table 3, and Figures 3, 4, and 5. Because of these differences, it was decided that the BMV data provides a better set of assumptions for the light duty vehicle classes. Specific AVFT values used for this region are shown in the appendix A.

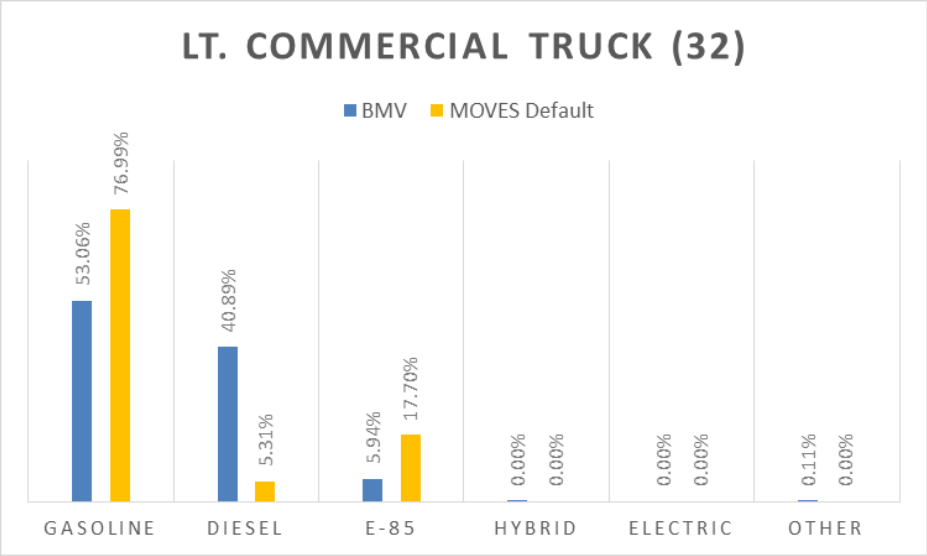
Table 3: Comparison of BMV Data to MOVES2014 AVFT Defaults

Fuel Type and Vehicle Technology									
Statewide			**FuelType -->**	1	2	5	1	9	X
			EngTech -->	1	1	1	12	30	X
Data Source	**Vehicle Type**	**Code**	**Year**	**Gasoline**	**Diesel**	**E-85**	**Hybrid**	**Electric**	**Other**
BMV	Passenger Car	21	2015	90.80%	0.43%	7.49%	1.18%	0.01%	0.09%
BMV	Passenger Truck	31	2015	81.84%	7.23%	10.89%	0.02%	0.00%	0.02%
BMV	Light Commercial Truck	32	2015	53.06%	40.89%	5.94%	0.00%	0.00%	0.11%
MOVES Default	Passenger Car	21	2015	93.73%	1.17%	5.10%	0.00%	0.00%	0.00%
MOVES Default	Passenger Truck	31	2015	78.92%	2.00%	19.07%	0.00%	0.00%	0.00%
MOVES Default	Light Commercial Truck	32	2015	76.99%	5.31%	17.70%	0.00%	0.00%	0.00%

Figures 3, 4, & 5 – BMV vs. MOVES Default for Fuels by Source Type, Statewide







8.0 I/M Program

Vehicles registered in Lake and Porter counties are required to undergo emissions tests and tampering inspections every two years if they were manufactured after 1976 and have a gross vehicle weight rating (GVWR) of 9,000 pounds or less. Vehicles manufactured in odd-numbered years are tested during odd-numbered years and vehicles manufactured in even-numbered years tested during even-numbered years. Exemptions include vehicles manufactured during the four latest model years and antique vehicles. MOVES input coding is consistent with the current local I/M Program in Lake and Porter counties. See Table C-8 in Appendix C.

9.0 Summary of MOVES2014 Runs and Settings

Table 4 –Summary of Lake and Porter Ozone and PM 2.5 Emission Rate Runs

Lake and Porter Runs			
	MOVES Input Item		
	Screen	Ozone	PM 2.5
Description	Description	User Choice	
Scale	Domain/Scale	County	
	Calculation Type	Emission Rate	
Time Spans	Time Aggregation Level	Hour	Hour
	Year	2015, 2020, 2025, 2030, 2035, 2040, 2045	2015, 2020, 2025, 2030, 2035, 2040, 2045
	Months	July	April
	Days	Weekday	Weekday
	Hours	Select All	Select All
Geographic Bounds	Geographic Bounds	Lake County*	Lake County*
Vehicles	Vehicles	All Gas and Diesel Combinations	
Road Type	Road Type	Select All	
Pollutants/ Processes	Pollutants/ Processes	VOC, NOx, and supporting	PM 2.5 with all subspecies; NOx & SO2
General Output	Database Name	LakePorter Ozone	LakePorter PM
	Units	Select "Grams" and "Miles" and "Joules"	
	Activity	Distance, Population	
Output Emissions Detail	On Road	Select "Source Use Type" and "Road Type"	

*Represents both Lake and Porter Counties.

Table 5 –Summary of LaPorte County Ozone Emission Rate Runs

LaPorte Runs MOVES Input Item Screen		Ozone
Description	Description	User Choice
Scale	Domain/Scale	County
	Calculation Type	Emission Rate
Time Spans	Time Aggregation Level	Hour
	Year	2015, 2020, 2025, 2030, 2035, 2040, 2045
	Months	July
	Days	Weekday
	Hours	Select All
Geographic Bounds	Geographic Bounds	LaPorte County
Vehicles	Vehicles	All Gas and Diesel Combinations
Road Type	Road Type	Select All
Pollutants/ Processes	Pollutants/ Processes	VOC, NOx, and supporting
General Output	Database Name	LaPorte Ozone
	Units	Select "Grams" and "Miles" and "Joules"
	Activity	Distance, Population
Output Emissions Detail	On Road	Select "Source Use Type" and "Road Type"

Table 6 –Summary of County Data Manager Inputs

County Data Manager Input	Excel Sheet Tab Name	Ozone	PM 2.5
Source (Vehicle) Type Population	sourceTypeYear	Local Registration for Source Types 11, 21, 31, and 32; Estimated population using default MOVES mileage accumulation rates and local VMT for all other source types. Future year vehicle populations based on population growth rates for source types 11, 21, 31, and 32. Employment growth used for all other source types.	
Vehicle Type VMT (by 13 MOVES Vehicle Types)	HPMSVTypeYear	Statewide default vehicle distributions across road types developed by INDOT using an analysis of permanent count station data from a statewide data set.	
	MonthVMTFraction	Statewide default monthly fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.	
	DayVMTFraction	Statewide default daily fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.	
	HourVMTFraction	Statewide default hourly fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.	
Average Speed Distribution (% of VHT in each 5 mph speed bin)	avgSpeed Distribution	National defaults.	
Road Type Distribution (VMT by 5 MOVES Road Types)	roadType Distribution	Calculated from local VMT data. Use travel demand model base year distributions for all years.	
Age Distribution (Vehicle Population by Age of Vehicle)	sourceTypeAge Distribution	Local age distributions developed from vehicle registration data for source types 11, 21, 31, and 32. Default MOVES age distributions for all other source types.	
Ramp Fraction	RoadType	Based on NIRPC travel demand model.	
Meteorology Data	ZoneMonthHour	MOBILE6 Summer Met Data Converted to MOVES format	MOBILE6 12 month Met Data Converted to MOVES format and averaged to annual meteorology
Fuel (% of Market Share by Fuel Type)	FuelFormulation	MOVES Defaults	
	FuelSupply	County MOVES Defaults for Summer (check if varies among counties)	County MOVES Defaults for annual (check if varies among counties)
I/M Program	IMCoverage	Consistent with current local I/M Program	

MOVES Codes used in the Appendices

Throughout the following appendices, references are made to MOVES2014 codes for two types of data. The values for the source type codes are shown in the Table 7 below. The values for the road type codes are shown in Table 8.

Table 7 - MOVES (vehicle) Source Types

SourceTypeID	Description
11	Motorcycles
21	Passenger Car
31	Passenger Truck
32	Light Commercial Truck
41	Intercity Bus
42	Transit Bus
43	School Bus
51	Refuse Truck
52	Single Unit Short-haul Truck
53	Single Unit Long-haul Truck
54	Motor Home
61	Combination Short-haul Truck
62	Combination Long-haul Truck

Table 8 - MOVES Road Types

RoadTypeID	Description
1	Off Network
2	Rural Restricted Access
3	Rural Unrestricted Access
4	Urban Restricted Access
5	Urban Unrestricted Access

Appendix A – Updated Vehicle Fleet Assumptions Derived from BMV Data

Table A-1: Vehicle Population for Lake County

	Year									
sourceTypeID	2010	2012	2014	2015	2020	2025	2030	2035	2040	2045
11	12,337	12,527	12,718	12,840	13,283	13,742	14,218	14,710	15,218	15,667
21	196,949	199,987	203,025	204,970	212,059	219,394	226,982	234,833	242,954	250,115
31	107,894	109,559	111,223	112,289	116,172	120,190	124,347	128,648	133,098	137,020
32	33,033	33,543	34,052	34,379	35,567	36,797	38,071	39,387	40,750	41,951
41	231	236	240	244	253	264	276	288	299	310
42	123	125	128	130	134	140	146	153	159	164
43	1,584	1,614	1,645	1,666	1,736	1,810	1,886	1,966	2,050	2,121
51	41	42	43	44	45	47	49	51	54	55
52	2,695	2,748	2,800	2,835	2,955	3,079	3,211	3,346	3,488	3,609
53	321	327	334	338	352	367	383	399	416	431
54	616	628	640	648	675	703	734	764	797	824
61	4,978	5,075	5,171	5,236	5,458	5,689	5,930	6,182	6,443	6,668
62	5,680	5,790	5,901	5,975	6,227	6,491	6,767	7,053	7,352	7,608

Table A-2: Vehicle Population for Porter County

	Year									
sourceTypeID	2010	2012	2014	2015	2020	2025	2030	2035	2040	2045
11	6,612	6,714	6,816	6,881	7,119	7,365	7,620	7,882	8,157	8,396
21	69,425	70,496	71,567	72,253	74,752	77,336	80,012	82,779	85,642	88,166
31	45,870	46,578	47,285	47,739	49,389	51,098	52,865	54,694	56,586	58,254
32	14,044	14,260	14,477	14,616	15,121	15,644	16,185	16,745	17,324	17,834
41	58	59	60	61	63	66	68	71	74	76
42	30	31	31	32	33	34	36	37	39	40
43	397	405	413	418	435	454	474	493	514	532
51	13	13	14	14	14	15	15	16	17	17
52	897	915	932	944	983	1,025	1,069	1,114	1,161	1,202
53	106	108	110	112	116	121	126	132	138	142
54	204	208	212	215	223	233	243	254	265	274
61	1,435	1,463	1,490	1,509	1,573	1,639	1,709	1,781	1,856	1,921
62	1,637	1,669	1,700	1,722	1,794	1,870	1,949	2,032	2,118	2,191

Table A-3: Vehicle Population for LaPorte County

	Year									
sourceTypeID	2010	2012	2014	2015	2020	2025	2030	2035	2040	2045
11	2,820	2,846	2,871	2,886	2,947	3,009	3,073	3,138	3,204	3,266
21	50,742	51,200	51,658	51,927	53,025	54,146	55,291	56,461	57,655	58,760
31	33,729	34,034	34,338	34,517	35,247	35,992	36,753	37,530	38,324	39,058
32	10,327	10,420	10,513	10,568	10,791	11,019	11,252	11,490	11,733	11,958
41	48	49	50	50	52	53	55	57	59	61
42	26	26	27	27	28	29	30	31	32	33
43	329	334	339	342	353	365	377	389	402	413
51	13	14	14	14	14	15	15	16	16	17
52	842	854	866	874	902	932	962	993	1,025	1,054
53	100	102	103	104	108	111	115	119	122	126
54	192	195	198	200	206	213	220	227	235	241
61	1,616	1,639	1,662	1,677	1,731	1,788	1,845	1,905	1,967	2,022
62	1,845	1,871	1,897	1,914	1,976	2,040	2,106	2,174	2,244	2,307

Data Sources: SourceTypes 11, 21, 31, and 32 use 2014 Indiana BMV summary statistics for vehicle registration & license plate data by county. All other Source Types use Mileage Accumulation Rate (MAR) method.

Table A-4: Vehicle Age Distribution for Lake County

Vehicle Age Distribution for Lake County

	SourceTypeID												
AgeID	11	21	31	32	41	42	43	51	52	53	54	61	62
0	0.001374	0.008340	0.002494	0.012087	0.064302	0.054574	0.062222	0.049424	0.058853	0.078754	0.061510	0.053563	0.067085
1	0.024433	0.054402	0.040446	0.021072	0.062673	0.053191	0.060645	0.048172	0.057361	0.076759	0.059951	0.053563	0.067085
2	0.035352	0.060541	0.040612	0.031768	0.062485	0.053032	0.060464	0.048028	0.057190	0.076529	0.059772	0.054105	0.067762
3	0.036191	0.058054	0.039864	0.033480	0.062423	0.052979	0.060403	0.047980	0.057133	0.076453	0.059712	0.057558	0.072087
4	0.028403	0.052297	0.046681	0.033907	0.061737	0.052397	0.059740	0.047452	0.056505	0.075612	0.059056	0.056418	0.070660
5	0.026418	0.047029	0.032839	0.016579	0.055917	0.047458	0.054108	0.042979	0.051178	0.068485	0.053488	0.048929	0.061280
6	0.046652	0.041365	0.026146	0.022890	0.046837	0.039751	0.045321	0.035999	0.042867	0.057363	0.044802	0.036603	0.045843
7	0.054974	0.060531	0.048842	0.060327	0.042579	0.036137	0.041201	0.032727	0.038970	0.052148	0.040729	0.034074	0.042676
8	0.065053	0.066109	0.053955	0.042357	0.046827	0.039743	0.045312	0.035992	0.042858	0.057351	0.044793	0.035809	0.044849
9	0.064213	0.059333	0.050796	0.064820	0.053438	0.045353	0.051709	0.041073	0.048909	0.065448	0.051117	0.052629	0.065914
10	0.060854	0.065959	0.058632	0.057867	0.053271	0.045212	0.051548	0.040945	0.048756	0.065244	0.050958	0.062452	0.078217
11	0.048484	0.056773	0.061126	0.060862	0.040795	0.053620	0.041108	0.031356	0.039149	0.052388	0.030273	0.047826	0.059899
12	0.061923	0.058270	0.058715	0.052733	0.033192	0.048994	0.038293	0.025512	0.029448	0.039407	0.046610	0.038913	0.048735
13	0.050928	0.052756	0.058278	0.055942	0.027735	0.045609	0.033375	0.054598	0.031640	0.019477	0.029167	0.032515	0.046299
14	0.044132	0.049197	0.056491	0.055835	0.036429	0.037775	0.043086	0.063266	0.036444	0.019469	0.034780	0.042708	0.046207
15	0.040467	0.042045	0.050110	0.055086	0.028351	0.033295	0.021016	0.039565	0.035789	0.031185	0.033520	0.033237	0.030044
16	0.032832	0.039475	0.050360	0.042037	0.023588	0.027913	0.025367	0.034157	0.025999	0.023020	0.023315	0.027654	0.023052
17	0.025960	0.025040	0.038679	0.033586	0.017564	0.024497	0.020683	0.014635	0.019796	0.005226	0.020675	0.020591	0.013845
18	0.020463	0.025352	0.042566	0.036047	0.020119	0.025048	0.026689	0.040196	0.019374	0.003721	0.015546	0.023587	0.010007
19	0.021303	0.013446	0.023465	0.029522	0.022579	0.036661	0.030145	0.034228	0.022734	0.017578	0.020363	0.026470	0.009860
20	0.015194	0.014957	0.027684	0.025350	0.022641	0.028197	0.017388	0.027008	0.028940	0.018387	0.026594	0.026543	0.009576
21	0.014278	0.008204	0.022758	0.025136	0.021297	0.022441	0.020903	0.036743	0.025509	0.012162	0.023847	0.024967	0.008340
22	0.012827	0.006517	0.015962	0.016793	0.022137	0.020761	0.021174	0.029424	0.021171	0.002921	0.023292	0.025952	0.002197
23	0.007788	0.003712	0.008314	0.011766	0.018775	0.017685	0.018686	0.036737	0.025574	0.000660	0.017364	0.022011	0.002282
24	0.006795	0.003360	0.007732	0.010696	0.016580	0.015344	0.016222	0.019537	0.018134	0.001323	0.018639	0.019438	0.002895
25	0.008017	0.001969	0.004967	0.010375	0.013046	0.011961	0.012527	0.020286	0.010153	0.001326	0.018907	0.015295	0.001496
26	0.006490	0.002357	0.006214	0.012943	0.005207	0.011471	0.004628	0.005879	0.015824	0.000000	0.012386	0.006104	0.000305
27	0.005116	0.001262	0.003679	0.009306	0.004438	0.006255	0.003427	0.006619	0.008243	0.000585	0.007312	0.005202	0.000237
28	0.008628	0.001418	0.002245	0.005883	0.003853	0.002715	0.004023	0.005865	0.007845	0.000422	0.004020	0.004518	0.000754
29	0.010460	0.000880	0.001164	0.007594	0.005020	0.007381	0.003956	0.001470	0.008291	0.000000	0.000530	0.005885	0.000248
30	0.113996	0.019050	0.018186	0.045352	0.004164	0.002547	0.004629	0.002149	0.009364	0.000597	0.006972	0.004882	0.000264

Data Sources: SourceTypes 11, 21, 31, and 32 were obtained directly from Dec. 2014 Indiana BMV summary statistics for vehicle registration & license plate data by county. All other Source Types use MOVES defaults.

Table A-5: Vehicle Age Distribution for Porter County

Vehicle Age Distribution for Porter County

	SourceTypeID												
AgeID	11	21	31	32	41	42	43	51	52	53	54	61	62
0	0.001004	0.009873	0.003318	0.007176	0.064302	0.054574	0.062222	0.049424	0.058853	0.078754	0.061510	0.053563	0.067085
1	0.029682	0.059695	0.043803	0.017096	0.062673	0.053191	0.060645	0.048172	0.057361	0.076759	0.059951	0.053563	0.067085
2	0.034270	0.068999	0.045440	0.026171	0.062485	0.053032	0.060464	0.048028	0.057190	0.076529	0.059772	0.054105	0.067762
3	0.038428	0.070466	0.046016	0.032503	0.062423	0.052979	0.060403	0.047980	0.057133	0.076453	0.059712	0.057558	0.072087
4	0.026670	0.060969	0.047962	0.023217	0.061737	0.052397	0.059740	0.047452	0.056505	0.075612	0.059056	0.056418	0.070660
5	0.029825	0.053993	0.033273	0.017307	0.055917	0.047458	0.054108	0.042979	0.051178	0.068485	0.053488	0.048929	0.061280
6	0.045311	0.045523	0.029335	0.017729	0.046837	0.039751	0.045321	0.035999	0.042867	0.057363	0.044802	0.036603	0.045843
7	0.054058	0.065727	0.052741	0.044322	0.042579	0.036137	0.041201	0.032727	0.038970	0.052148	0.040729	0.034074	0.042676
8	0.062661	0.068834	0.058493	0.047699	0.046827	0.039743	0.045312	0.035992	0.042858	0.057351	0.044793	0.035809	0.044849
9	0.064812	0.058347	0.052830	0.054031	0.053438	0.045353	0.051709	0.041073	0.048909	0.065448	0.051117	0.052629	0.065914
10	0.056352	0.064049	0.063316	0.050232	0.053271	0.045212	0.051548	0.040945	0.048756	0.065244	0.050958	0.062452	0.078217
11	0.047892	0.056037	0.061856	0.059519	0.040795	0.053620	0.041108	0.031356	0.039149	0.052388	0.030273	0.047826	0.059899
12	0.062518	0.053003	0.060484	0.049388	0.033192	0.048994	0.038293	0.025512	0.029448	0.039407	0.046610	0.038913	0.048735
13	0.050473	0.046128	0.055750	0.049599	0.027735	0.045609	0.033375	0.054598	0.031640	0.019477	0.029167	0.032515	0.046299
14	0.040436	0.041416	0.051900	0.054031	0.036429	0.037775	0.043086	0.063266	0.036444	0.019469	0.034780	0.042708	0.046207
15	0.029682	0.035467	0.047255	0.058041	0.028351	0.033295	0.021016	0.039565	0.035789	0.031185	0.033520	0.033237	0.030044
16	0.032836	0.032341	0.047299	0.047066	0.023588	0.027913	0.025367	0.034157	0.025999	0.023020	0.023315	0.027654	0.023052
17	0.024089	0.019966	0.033583	0.033347	0.017564	0.024497	0.020683	0.014635	0.019796	0.005226	0.020675	0.020591	0.013845
18	0.020648	0.019324	0.040175	0.038413	0.020119	0.025048	0.026689	0.040196	0.019374	0.003721	0.015546	0.023587	0.010007
19	0.019644	0.010459	0.020486	0.030393	0.022579	0.036661	0.030145	0.034228	0.022734	0.017578	0.020363	0.026470	0.009860
20	0.018497	0.011541	0.024070	0.037358	0.022641	0.028197	0.017388	0.027008	0.028940	0.018387	0.026594	0.026543	0.009576
21	0.013192	0.006087	0.018052	0.028704	0.021297	0.022441	0.020903	0.036743	0.025509	0.012162	0.023847	0.024967	0.008340
22	0.013479	0.005051	0.012920	0.023639	0.022137	0.020761	0.021174	0.029424	0.021171	0.002921	0.023292	0.025952	0.002197
23	0.008603	0.003163	0.006770	0.012241	0.018775	0.017685	0.018686	0.036737	0.025574	0.000660	0.017364	0.022011	0.002282
24	0.007886	0.002906	0.006991	0.011397	0.016580	0.015344	0.016222	0.019537	0.018134	0.001323	0.018639	0.019438	0.002895
25	0.007456	0.001815	0.004115	0.015407	0.013046	0.011961	0.012527	0.020286	0.010153	0.001326	0.018907	0.015295	0.001496
26	0.006883	0.001971	0.004425	0.013719	0.005207	0.011471	0.004628	0.005879	0.015824	0.000000	0.012386	0.006104	0.000305
27	0.006453	0.001146	0.002832	0.011397	0.004438	0.006255	0.003427	0.006619	0.008243	0.000585	0.007312	0.005202	0.000237
28	0.007169	0.001274	0.001770	0.005910	0.003853	0.002715	0.004023	0.005865	0.007845	0.000422	0.004020	0.004518	0.000754
29	0.011758	0.000843	0.001150	0.008020	0.005020	0.007381	0.003956	0.001470	0.008291	0.000000	0.000530	0.005885	0.000248
30	0.127330	0.023586	0.021592	0.074926	0.004164	0.002547	0.004629	0.002149	0.009364	0.000597	0.006972	0.004882	0.000264

Data Sources: SourceTypes 11, 21, 31, and 32 were obtained directly from Dec. 2014 Indiana BMV summary statistics for vehicle registration & license plate data by county. All other Source Types use MOVES defaults.

Table A-6: Vehicle Age Distribution for LaPorte County

Vehicle Age Distribution for LaPorte County

	SourceTypeID												
AgeID	11	21	31	32	41	42	43	51	52	53	54	61	62
0	0.001111	0.005958	0.002961	0.010617	0.064302	0.054574	0.062222	0.049424	0.058853	0.078754	0.061510	0.053563	0.067085
1	0.020894	0.037845	0.025235	0.022561	0.062673	0.053191	0.060645	0.048172	0.057361	0.076759	0.059951	0.053563	0.067085
2	0.024228	0.047465	0.026829	0.030524	0.062485	0.053032	0.060464	0.048028	0.057190	0.076529	0.059772	0.054105	0.067762
3	0.033785	0.049478	0.030154	0.036496	0.062423	0.052979	0.060403	0.047980	0.057133	0.076453	0.059712	0.057558	0.072087
4	0.026006	0.046586	0.035574	0.041141	0.061737	0.052397	0.059740	0.047452	0.056505	0.075612	0.059056	0.056418	0.070660
5	0.021116	0.041844	0.026419	0.017253	0.055917	0.047458	0.054108	0.042979	0.051178	0.068485	0.053488	0.048929	0.061280
6	0.041565	0.034521	0.019450	0.016589	0.046837	0.039751	0.045321	0.035999	0.042867	0.057363	0.044802	0.036603	0.045843
7	0.052456	0.054490	0.040494	0.059721	0.042579	0.036137	0.041201	0.032727	0.038970	0.052148	0.040729	0.034074	0.042676
8	0.055568	0.057422	0.042999	0.043796	0.046827	0.039743	0.045312	0.035992	0.042858	0.057351	0.044793	0.035809	0.044849
9	0.071127	0.057247	0.045686	0.055740	0.053438	0.045353	0.051709	0.041073	0.048909	0.065448	0.051117	0.052629	0.065914
10	0.058902	0.063908	0.052610	0.036496	0.053271	0.045212	0.051548	0.040945	0.048756	0.065244	0.050958	0.062452	0.078217
11	0.052901	0.059922	0.059215	0.049104	0.040795	0.053620	0.041108	0.031356	0.039149	0.052388	0.030273	0.047826	0.059899
12	0.065570	0.058165	0.054887	0.024552	0.033192	0.048994	0.038293	0.025512	0.029448	0.039407	0.046610	0.038913	0.048735
13	0.054679	0.059354	0.058531	0.040478	0.027735	0.045609	0.033375	0.054598	0.031640	0.019477	0.029167	0.032515	0.046299
14	0.043565	0.050802	0.055434	0.044459	0.036429	0.037775	0.043086	0.063266	0.036444	0.019469	0.034780	0.042708	0.046207
15	0.040009	0.050951	0.059169	0.035833	0.028351	0.033295	0.021016	0.039565	0.035789	0.031185	0.033520	0.033237	0.030044
16	0.029562	0.042128	0.052656	0.045123	0.023588	0.027913	0.025367	0.034157	0.025999	0.023020	0.023315	0.027654	0.023052
17	0.028006	0.032737	0.049148	0.027870	0.017564	0.024497	0.020683	0.014635	0.019796	0.005226	0.020675	0.020591	0.013845
18	0.021338	0.029279	0.045914	0.028534	0.020119	0.025048	0.026689	0.040196	0.019374	0.003721	0.015546	0.023587	0.010007
19	0.023783	0.021375	0.033798	0.018580	0.022579	0.036661	0.030145	0.034228	0.022734	0.017578	0.020363	0.026470	0.009860
20	0.013336	0.018429	0.035984	0.037160	0.022641	0.028197	0.017388	0.027008	0.028940	0.018387	0.026594	0.026543	0.009576
21	0.013114	0.012363	0.032204	0.016589	0.021297	0.022441	0.020903	0.036743	0.025509	0.012162	0.023847	0.024967	0.008340
22	0.014225	0.009242	0.020862	0.021898	0.022137	0.020761	0.021174	0.029424	0.021171	0.002921	0.023292	0.025952	0.002197
23	0.008224	0.006377	0.014394	0.014599	0.018775	0.017685	0.018686	0.036737	0.025574	0.000660	0.017364	0.022011	0.002282
24	0.007557	0.005175	0.009429	0.009290	0.016580	0.015344	0.016222	0.019537	0.018134	0.001323	0.018639	0.019438	0.002895
25	0.006446	0.003932	0.009839	0.015926	0.013046	0.011961	0.012527	0.020286	0.010153	0.001326	0.018907	0.015295	0.001496
26	0.006890	0.003797	0.009930	0.015926	0.005207	0.011471	0.004628	0.005879	0.015824	0.000000	0.012386	0.006104	0.000305
27	0.006446	0.002756	0.007197	0.015926	0.004438	0.006255	0.003427	0.006619	0.008243	0.000585	0.007312	0.005202	0.000237
28	0.010002	0.002351	0.005147	0.007299	0.003853	0.002715	0.004023	0.005865	0.007845	0.000422	0.004020	0.004518	0.000754
29	0.016893	0.002283	0.004054	0.007963	0.005020	0.007381	0.003956	0.001470	0.008291	0.000000	0.000530	0.005885	0.000248
30	0.130696	0.031819	0.033798	0.151958	0.004164	0.002547	0.004629	0.002149	0.009364	0.000597	0.006972	0.004882	0.000264

Data Sources: SourceTypes 11, 21, 31, and 32 were obtained directly from Dec. 2014 Indiana BMV summary statistics for vehicle registration & license plate data by county. All other Source Types use MOVES defaults.

Table A-7: AVFT percentages for Light Duty Vehicles

Fuel Type and Vehicle Technology									
Lake, Porter, and LaPorte Counties			FuelType -->	1	2	5	1	9	X
			engTech -->	1	1	1	12	30	X
Data Source	Vehicle Type	Code	Year	Gasoline	Diesel	E-85	Hybrid	Electric	Other
BMV	Passenger Car	21	2015	90.55%	0.38%	7.93%	1.02%	0.02%	0.11%
BMV	Passenger Truck	31	2015	81.89%	4.19%	13.87%	0.01%	0.00%	0.04%
BMV	Light Commercial Truck	32	2015	68.26%	24.96%	6.73%	0.01%	0.00%	0.04%

Appendix B – Updated Hourly VMT Fractions Derived from INDOT Data

Table B-1: Hourly VMT Fraction: RoadType 1, Off Network

	SourceTypeID												
Hr	11	21	31	32	41	42	43	51	52	53	54	61	62
1	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
2	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006	0.006
3	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
4	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
5	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
6	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
7	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046	0.046
8	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
9	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061	0.061
10	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
11	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
12	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054	0.054
13	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058
14	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058	0.058
15	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062	0.062
16	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071	0.071
17	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077
18	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077	0.077
19	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060
20	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
21	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
22	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
23	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
24	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018

- RoadType1 uses default values

Table B-2: Hourly VMT Fraction: RoadType 2, Rural Restricted Access

	SourceTypeID												
Hr	11	21	31	32	41	42	43	51	52	53	54	61	62
1	0.017	0.010	0.008	0.008	0.017	0.017	0.017	0.010	0.010	0.007	0.007	0.038	0.027
2	0.012	0.006	0.005	0.005	0.019	0.019	0.019	0.008	0.008	0.010	0.010	0.019	0.024
3	0.010	0.004	0.004	0.004	0.026	0.026	0.026	0.008	0.008	0.006	0.006	0.023	0.025
4	0.010	0.004	0.004	0.004	0.019	0.019	0.019	0.009	0.009	0.008	0.008	0.036	0.023
5	0.010	0.006	0.007	0.007	0.033	0.033	0.033	0.012	0.012	0.013	0.013	0.025	0.026
6	0.012	0.016	0.021	0.021	0.036	0.036	0.036	0.032	0.032	0.025	0.025	0.028	0.031
7	0.028	0.035	0.042	0.042	0.064	0.064	0.064	0.065	0.065	0.046	0.046	0.039	0.036
8	0.052	0.050	0.049	0.049	0.044	0.044	0.044	0.073	0.073	0.056	0.056	0.047	0.037
9	0.055	0.046	0.048	0.048	0.060	0.060	0.060	0.056	0.056	0.057	0.057	0.048	0.041
10	0.055	0.046	0.049	0.049	0.052	0.052	0.052	0.050	0.050	0.058	0.058	0.043	0.050
11	0.055	0.053	0.057	0.057	0.067	0.067	0.067	0.051	0.051	0.060	0.060	0.061	0.056
12	0.051	0.058	0.061	0.061	0.057	0.057	0.057	0.049	0.049	0.060	0.060	0.065	0.061
13	0.059	0.059	0.063	0.063	0.074	0.074	0.074	0.053	0.053	0.069	0.069	0.063	0.062
14	0.060	0.061	0.062	0.062	0.050	0.050	0.050	0.052	0.052	0.063	0.063	0.057	0.059
15	0.064	0.064	0.066	0.066	0.052	0.052	0.052	0.055	0.055	0.065	0.065	0.048	0.057
16	0.064	0.074	0.074	0.074	0.075	0.075	0.075	0.063	0.063	0.073	0.073	0.051	0.057
17	0.069	0.084	0.083	0.083	0.071	0.071	0.071	0.075	0.075	0.073	0.073	0.051	0.055
18	0.069	0.090	0.083	0.083	0.036	0.036	0.036	0.076	0.076	0.066	0.066	0.041	0.049
19	0.066	0.073	0.066	0.066	0.026	0.026	0.026	0.065	0.065	0.053	0.053	0.032	0.043
20	0.059	0.052	0.049	0.049	0.034	0.034	0.034	0.046	0.046	0.043	0.043	0.033	0.038
21	0.038	0.041	0.037	0.037	0.030	0.030	0.030	0.034	0.034	0.036	0.036	0.034	0.035
22	0.036	0.031	0.028	0.028	0.024	0.024	0.024	0.024	0.024	0.023	0.023	0.033	0.040
23	0.025	0.023	0.021	0.021	0.020	0.020	0.020	0.020	0.020	0.016	0.016	0.047	0.036
24	0.023	0.015	0.013	0.013	0.014	0.014	0.014	0.014	0.014	0.013	0.013	0.038	0.033

Source: INDOT Selected Weigh in Motion and ATR site data

Table B-3: Hourly VMT Fraction: RoadType 3, Rural Unrestricted Access

	SourceTypeID												
Hr	11	21	31	32	41	42	43	51	52	53	54	61	62
1	0.009	0.005	0.005	0.005	0.002	0.002	0.002	0.003	0.003	0.005	0.005	0.010	0.006
2	0.005	0.003	0.002	0.002	0.002	0.002	0.002	0.020	0.020	0.007	0.007	0.007	0.004
3	0.004	0.003	0.002	0.002	0.002	0.002	0.002	0.014	0.014	0.007	0.007	0.005	0.003
4	0.004	0.004	0.003	0.003	0.002	0.002	0.002	0.008	0.008	0.008	0.008	0.005	0.004
5	0.018	0.010	0.008	0.008	0.004	0.004	0.004	0.003	0.003	0.011	0.011	0.009	0.009
6	0.016	0.017	0.023	0.023	0.015	0.015	0.015	0.034	0.034	0.030	0.030	0.021	0.021
7	0.009	0.023	0.032	0.032	0.025	0.025	0.025	0.062	0.062	0.063	0.063	0.033	0.033
8	0.009	0.040	0.044	0.044	0.088	0.088	0.088	0.096	0.096	0.051	0.051	0.038	0.046
9	0.036	0.044	0.050	0.050	0.077	0.077	0.077	0.073	0.073	0.047	0.047	0.047	0.044
10	0.018	0.055	0.066	0.066	0.053	0.053	0.053	0.084	0.084	0.072	0.072	0.058	0.054
11	0.027	0.065	0.074	0.074	0.134	0.134	0.134	0.073	0.073	0.072	0.072	0.067	0.067
12	0.091	0.075	0.088	0.088	0.108	0.108	0.108	0.107	0.107	0.083	0.083	0.069	0.077
13	0.118	0.077	0.084	0.084	0.050	0.050	0.050	0.067	0.067	0.076	0.076	0.071	0.079
14	0.132	0.075	0.071	0.071	0.093	0.093	0.093	0.062	0.062	0.065	0.065	0.072	0.079
15	0.146	0.076	0.072	0.072	0.105	0.105	0.105	0.076	0.076	0.049	0.049	0.072	0.083
16	0.036	0.086	0.085	0.085	0.015	0.015	0.015	0.059	0.059	0.050	0.050	0.065	0.088
17	0.064	0.089	0.081	0.081	0.066	0.066	0.066	0.076	0.076	0.042	0.042	0.065	0.085
18	0.046	0.083	0.071	0.071	0.034	0.034	0.034	0.037	0.037	0.055	0.055	0.074	0.072
19	0.073	0.056	0.053	0.053	0.056	0.056	0.056	0.011	0.011	0.063	0.063	0.068	0.049
20	0.046	0.041	0.034	0.034	0.031	0.031	0.031	0.008	0.008	0.055	0.055	0.052	0.034
21	0.027	0.028	0.023	0.023	0.005	0.005	0.005	0.008	0.008	0.037	0.037	0.037	0.025
22	0.028	0.022	0.014	0.014	0.028	0.028	0.028	0.003	0.003	0.025	0.025	0.027	0.017
23	0.018	0.014	0.011	0.011	0.002	0.002	0.002	0.011	0.011	0.017	0.017	0.016	0.012
24	0.018	0.008	0.005	0.005	0.002	0.002	0.002	0.006	0.006	0.010	0.010	0.013	0.008

Source: INDOT Selected Weigh in Motion and ATR site data

Table B-5: Hourly VMT Fraction: RoadType 4, Urban Restricted Access

	SourceTypeID												
Hr	11	21	31	32	41	42	43	51	52	53	54	61	62
1	0.003	0.014	0.012	0.012	0.018	0.018	0.018	0.010	0.010	0.018	0.018	0.017	0.026
2	0.004	0.008	0.007	0.007	0.017	0.017	0.017	0.007	0.007	0.012	0.012	0.013	0.024
3	0.004	0.005	0.005	0.005	0.013	0.013	0.013	0.005	0.005	0.009	0.009	0.011	0.024
4	0.007	0.005	0.005	0.005	0.013	0.013	0.013	0.006	0.006	0.008	0.008	0.012	0.024
5	0.012	0.006	0.009	0.009	0.015	0.015	0.015	0.009	0.009	0.011	0.011	0.015	0.027
6	0.007	0.014	0.023	0.023	0.027	0.027	0.027	0.020	0.020	0.017	0.017	0.018	0.033
7	0.009	0.029	0.049	0.049	0.038	0.038	0.038	0.040	0.040	0.027	0.027	0.032	0.040
8	0.016	0.046	0.058	0.058	0.042	0.042	0.042	0.053	0.053	0.051	0.051	0.062	0.045
9	0.112	0.061	0.058	0.058	0.058	0.058	0.058	0.057	0.057	0.080	0.080	0.079	0.049
10	0.214	0.056	0.054	0.054	0.076	0.076	0.076	0.059	0.059	0.058	0.058	0.055	0.048
11	0.109	0.049	0.052	0.052	0.071	0.071	0.071	0.057	0.057	0.059	0.059	0.058	0.053
12	0.029	0.050	0.051	0.051	0.061	0.061	0.061	0.058	0.058	0.055	0.055	0.055	0.056
13	0.030	0.052	0.053	0.053	0.061	0.061	0.061	0.059	0.059	0.058	0.058	0.054	0.057
14	0.033	0.056	0.056	0.056	0.065	0.065	0.065	0.060	0.060	0.058	0.058	0.053	0.056
15	0.040	0.060	0.060	0.060	0.067	0.067	0.067	0.065	0.065	0.058	0.058	0.051	0.058
16	0.040	0.066	0.067	0.067	0.068	0.068	0.068	0.072	0.072	0.062	0.062	0.055	0.056
17	0.029	0.076	0.079	0.079	0.058	0.058	0.058	0.080	0.080	0.064	0.064	0.068	0.055
18	0.147	0.081	0.078	0.078	0.052	0.052	0.052	0.075	0.075	0.055	0.055	0.066	0.049
19	0.085	0.076	0.067	0.067	0.048	0.048	0.048	0.063	0.063	0.068	0.068	0.065	0.045
20	0.022	0.058	0.049	0.049	0.039	0.039	0.039	0.047	0.047	0.057	0.057	0.051	0.042
21	0.016	0.043	0.036	0.036	0.028	0.028	0.028	0.035	0.035	0.039	0.039	0.036	0.039
22	0.012	0.035	0.029	0.029	0.023	0.023	0.023	0.026	0.026	0.028	0.028	0.029	0.035
23	0.007	0.030	0.025	0.025	0.021	0.021	0.021	0.020	0.020	0.024	0.024	0.025	0.031
24	0.012	0.022	0.018	0.018	0.019	0.019	0.019	0.015	0.015	0.023	0.023	0.022	0.029

Source: INDOT Selected Weigh in Motion and ATR site data

Table B-6: Hourly VMT Fraction: RoadType 5, Urban Unrestricted Access

	SourceTypeID												
Hr	11	21	31	32	41	42	43	51	52	53	54	61	62
1	0.009	0.009	0.006	0.006	0.013	0.013	0.013	0.004	0.004	0.004	0.004	0.011	0.011
2	0.006	0.005	0.004	0.004	0.010	0.010	0.010	0.004	0.004	0.004	0.004	0.012	0.012
3	0.005	0.004	0.003	0.003	0.007	0.007	0.007	0.004	0.004	0.004	0.004	0.012	0.012
4	0.005	0.004	0.004	0.004	0.011	0.011	0.011	0.006	0.006	0.006	0.006	0.014	0.014
5	0.008	0.008	0.009	0.009	0.015	0.015	0.015	0.009	0.009	0.009	0.009	0.021	0.021
6	0.023	0.020	0.024	0.024	0.026	0.026	0.026	0.019	0.019	0.019	0.019	0.030	0.030
7	0.044	0.048	0.054	0.054	0.045	0.045	0.045	0.042	0.042	0.042	0.042	0.044	0.044
8	0.060	0.072	0.068	0.068	0.069	0.069	0.069	0.073	0.073	0.073	0.073	0.059	0.059
9	0.056	0.057	0.064	0.064	0.075	0.075	0.075	0.088	0.088	0.088	0.088	0.064	0.064
10	0.049	0.047	0.060	0.060	0.080	0.080	0.080	0.092	0.092	0.092	0.092	0.068	0.068
11	0.050	0.047	0.059	0.059	0.077	0.077	0.077	0.094	0.094	0.094	0.094	0.070	0.070
12	0.057	0.052	0.062	0.062	0.075	0.075	0.075	0.091	0.091	0.091	0.091	0.070	0.070
13	0.061	0.056	0.063	0.063	0.074	0.074	0.074	0.090	0.090	0.090	0.090	0.069	0.069
14	0.061	0.056	0.063	0.063	0.078	0.078	0.078	0.091	0.091	0.091	0.091	0.067	0.067
15	0.065	0.061	0.067	0.067	0.076	0.076	0.076	0.091	0.091	0.091	0.091	0.065	0.065
16	0.072	0.072	0.075	0.075	0.073	0.073	0.073	0.078	0.078	0.078	0.078	0.061	0.061
17	0.077	0.080	0.076	0.076	0.053	0.053	0.053	0.046	0.046	0.046	0.046	0.056	0.056
18	0.077	0.083	0.068	0.068	0.035	0.035	0.035	0.026	0.026	0.026	0.026	0.051	0.051
19	0.064	0.064	0.053	0.053	0.029	0.029	0.029	0.017	0.017	0.017	0.017	0.040	0.040
20	0.048	0.046	0.037	0.037	0.022	0.022	0.022	0.011	0.011	0.011	0.011	0.031	0.031
21	0.038	0.039	0.029	0.029	0.017	0.017	0.017	0.008	0.008	0.008	0.008	0.027	0.027
22	0.031	0.033	0.024	0.024	0.014	0.014	0.014	0.006	0.006	0.006	0.006	0.023	0.023
23	0.021	0.024	0.017	0.017	0.014	0.014	0.014	0.005	0.005	0.005	0.005	0.019	0.019
24	0.015	0.016	0.011	0.011	0.012	0.012	0.012	0.005	0.005	0.005	0.005	0.016	0.016

Source: INDOT Selected Weigh in Motion and ATR site data

Appendix C – Inputs Carried Over from MOVES2010a Rate Development

Table C-1: Indiana Default VMT Distributions by Vehicle Type and Road Type

Road Type	Motorcycle	Passenger Car	Light Duty Truck	Bus	Single Unit Truck	Combination Truck
2	0.00703	0.50641	0.16379	0.00417	0.00777	0.31082
3	0.00173	0.65975	0.22577	0.00079	0.01096	0.10099
4	0.00397	0.56995	0.25420	0.00283	0.00908	0.15996
5	0.00279	0.70275	0.24524	0.00140	0.00976	0.03805

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Table C-2: Indiana Default Daily Distribution Factors

	dayID	
monthID	2	5
1	0.232541	0.767459
2	0.238055	0.761945
3	0.239340	0.760660
4	0.239605	0.760395
5	0.248476	0.751524
6	0.248974	0.751026
7	0.248115	0.751885
8	0.252703	0.747297
9	0.249608	0.750392
10	0.246281	0.753719
11	0.243974	0.756026
12	0.225878	0.774122

Source: Statewide averages developed from Indiana Department of Transportation traffic count data

Table C-3: Lake, Porter, and LaPorte Counties Ramp Fractions

Road Type	Ramp Fraction
2	0.79%
4	6.66%

Source: Analysis of VHT from the CMAP travel demand model.

Table C-4: Indiana Default Monthly Distribution Factors

monthID	monthVMTFraction
1	0.07334
2	0.06937
3	0.08270
4	0.08318
5	0.08913
6	0.08882
7	0.09080
8	0.09185
9	0.08542
10	0.08752
11	0.08124
12	0.07664

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Table C-5: Meteorology Assumptions, Lake, Porter, and LaPorte Counties

Ozone					PM 2.5				
monthID	zoneID	HourID	temperature	relHumidity	**monthID**	zoneID	HourID	temperature	relHumidity
7	180890	1	67.0	88.0	4	180890	1	43.7	100.0
7	180890	2	65.8	91.8	4	180890	2	42.5	100.0
7	180890	3	64.9	94.9	4	180890	3	41.6	100.0
7	180890	4	64.2	97.2	4	180890	4	41.0	100.0
7	180890	5	63.6	99.0	4	180890	5	40.5	100.0
7	180890	6	63.0	100.0	4	180890	6	39.9	100.0
7	180890	7	62.5	100.0	4	180890	7	39.4	100.0
7	180890	8	62.9	100.0	4	180890	8	39.8	100.0
7	180890	9	65.5	92.6	4	180890	9	42.3	100.0
7	180890	10	69.7	80.2	4	180890	10	46.2	97.2
7	180890	11	74.0	69.4	4	180890	11	50.3	83.5
7	180890	12	77.7	61.4	4	180890	12	53.8	73.5
7	180890	13	80.9	55.3	4	180890	13	56.8	65.8
7	180890	14	82.6	52.2	4	180890	14	58.5	62.0
7	180890	15	83.2	51.2	4	180890	15	59.0	60.7
7	180890	16	83.4	50.9	4	180890	16	59.2	60.3
7	180890	17	83.0	51.6	4	180890	17	58.8	61.2
7	180890	18	81.7	53.7	4	180890	18	57.6	63.8
7	180890	19	79.7	57.5	4	180890	19	55.7	68.6
7	180890	20	77.0	62.9	4	180890	20	53.1	75.3
7	180890	21	74.3	68.8	4	180890	21	50.5	82.7
7	180890	22	71.9	74.5	4	180890	22	48.3	89.9
7	180890	23	70.3	78.8	4	180890	23	46.7	95.4
7	180890	24	68.6	83.4	4	180890	24	45.2	100.0

Source: Mobile 6.2 reported meteorological data from Air Quality Conformity Determination Between the 2040 Regional Transportation Plan, the Fiscal Year 2012 to 2015 Transportation Improvement Program, and the Indiana State Implementation Plan for Air Quality, Appendix E, developed by NIRPC in June, 2011 converted using EPA data converter.

Table C-6: Fuel

countyID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
18089	2010	7	20011	1	0.5
18089	2010	7	3160	1	0.5

Source: MOVES defaults for this region.

Table C-7: Fuel Formulation

Fuel Formulation ID	Fuel Sub type ID	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content
20011	20	0	11	0	0	0	0	0
3160	12	6.983	30	10	0	0	0	19.443
Fuel Formulation ID	**Fuel Sub type ID**	**Olefin Content**	**Benzene Content**	**e200**	**e300**	**BioDiesel EsterVol**	**Cetane Index**	**PAH Content**
20011	20	0	0	0	0	0	0	0
3160	12	7.262	0.633	50.756	83.915	0	0	0

Source: MOVES defaults for this region.

Table C-8: Lake and Porter County Inspection and Maintenance Program

polProcessID	stateID	countyID	yearID	sourceTypeID	fuelTypeID	IMProgramID	inspectFreq	testStandardsID	begModelYearID	endModelYearID	useIMyn	complianceFactor
101	18	18089	2010	21	1	1	2	11	1976	1980	N	93.12
101	18	18089	2010	31	1	1	2	11	1976	1980	N	93.12
101	18	18089	2010	32	1	1	2	11	1976	1980	N	93.12
102	18	18089	2010	21	1	1	2	11	1976	1980	N	93.12
102	18	18089	2010	31	1	1	2	11	1976	1980	N	93.12
102	18	18089	2010	32	1	1	2	11	1976	1980	N	93.12
101	18	18089	2010	21	1	6	2	33	1981	1995	N	93.12
101	18	18089	2010	31	1	6	2	33	1981	1995	N	93.12
101	18	18089	2010	32	1	6	2	33	1981	1995	N	93.12
102	18	18089	2010	21	1	6	2	33	1981	1995	N	93.12
102	18	18089	2010	31	1	6	2	33	1981	1995	N	93.12
102	18	18089	2010	32	1	6	2	33	1981	1995	N	93.12
301	18	18089	2010	21	1	6	2	33	1981	1995	N	93.12
301	18	18089	2010	31	1	6	2	33	1981	1995	N	93.12
301	18	18089	2010	32	1	6	2	33	1981	1995	N	93.12
302	18	18089	2010	21	1	6	2	33	1981	1995	N	93.12
302	18	18089	2010	31	1	6	2	33	1981	1995	N	93.12
302	18	18089	2010	32	1	6	2	33	1981	1995	N	93.12
101	18	18089	2010	21	1	10	2	51	1996	2008	N	93.12
101	18	18089	2010	31	1	10	2	51	1996	2008	N	93.12
101	18	18089	2010	32	1	10	2	51	1996	2008	N	93.12
102	18	18089	2010	21	1	10	2	51	1996	2008	N	93.12
102	18	18089	2010	31	1	10	2	51	1996	2008	N	93.12
102	18	18089	2010	32	1	10	2	51	1996	2008	N	93.12
301	18	18089	2010	21	1	10	2	51	1996	2008	N	93.12
301	18	18089	2010	31	1	10	2	51	1996	2008	N	93.12
301	18	18089	2010	32	1	10	2	51	1996	2008	N	93.12
302	18	18089	2010	21	1	10	2	51	1996	2008	N	93.12
302	18	18089	2010	31	1	10	2	51	1996	2008	N	93.12
302	18	18089	2010	32	1	10	2	51	1996	2008	N	93.12
112	18	18089	2010	21	1	7	2	41	1976	1995	N	93.12
112	18	18089	2010	21	1	8	2	43	1996	2008	N	93.12
112	18	18089	2010	31	1	7	2	41	1976	1995	N	93.12
112	18	18089	2010	31	1	8	2	43	1996	2008	N	93.12
112	18	18089	2010	32	1	7	2	41	1976	1995	N	93.12
112	18	18089	2010	32	1	8	2	43	1996	2008	N	93.12
113	18	18089	2010	21	1	7	2	41	1976	1995	N	93.12
113	18	18089	2010	21	1	8	2	43	1996	2008	N	93.12
113	18	18089	2010	31	1	7	2	41	1976	1995	N	93.12
113	18	18089	2010	31	1	8	2	43	1996	2008	N	93.12
113	18	18089	2010	32	1	7	2	41	1976	1995	N	93.12
113	18	18089	2010	32	1	8	2	43	1996	2008	N	93.12
101	18	18089	2010	21	1	11	2	11	1976	1980	Y	95
101	18	18089	2010	31	1	11	2	11	1976	1980	Y	95
101	18	18089	2010	32	1	11	2	11	1976	1980	Y	95
102	18	18089	2010	21	1	11	2	11	1976	1980	Y	95
102	18	18089	2010	31	1	11	2	11	1976	1980	Y	95
102	18	18089	2010	32	1	11	2	11	1976	1980	Y	95
301	18	18089	2010	21	1	11	2	11	1976	1980	Y	95
301	18	18089	2010	31	1	11	2	11	1976	1980	Y	95
301	18	18089	2010	32	1	11	2	11	1976	1980	Y	95
302	18	18089	2010	21	1	11	2	11	1976	1980	Y	95
302	18	18089	2010	31	1	11	2	11	1976	1980	Y	95
302	18	18089	2010	32	1	11	2	11	1976	1980	Y	95
101	18	18089	2010	21	1	12	2	33	1981	1995	Y	95
101	18	18089	2010	31	1	12	2	33	1981	1995	Y	95
101	18	18089	2010	32	1	12	2	33	1981	1995	Y	95
102	18	18089	2010	21	1	12	2	33	1981	1995	Y	95
102	18	18089	2010	31	1	12	2	33	1981	1995	Y	95
102	18	18089	2010	32	1	12	2	33	1981	1995	Y	95
301	18	18089	2010	21	1	12	2	33	1981	1995	Y	95
301	18	18089	2010	31	1	12	2	33	1981	1995	Y	95
301	18	18089	2010	32	1	12	2	33	1981	1995	Y	95
302	18	18089	2010	21	1	12	2	33	1981	1995	Y	95
302	18	18089	2010	31	1	12	2	33	1981	1995	Y	95
302	18	18089	2010	32	1	12	2	33	1981	1995	Y	95
112	18	18089	2010	21	1	13	2	41	1976	1995	Y	95
112	18	18089	2010	31	1	13	2	41	1976	1995	Y	95
112	18	18089	2010	32	1	13	2	41	1976	1995	Y	95
113	18	18089	2010	21	1	13	2	41	1976	1995	Y	95
113	18	18089	2010	31	1	13	2	41	1976	1995	Y	95
113	18	18089	2010	32	1	13	2	41	1976	1995	Y	95
101	18	18089	2010	21	1	14	2	51	1996	2006	Y	95
101	18	18089	2010	31	1	14	2	51	1996	2006	Y	95
101	18	18089	2010	32	1	14	2	51	1996	2006	Y	95
102	18	18089	2010	21	1	14	2	51	1996	2006	Y	95
102	18	18089	2010	31	1	14	2	51	1996	2006	Y	95
102	18	18089	2010	32	1	14	2	51	1996	2006	Y	95
301	18	18089	2010	21	1	14	2	51	1996	2006	Y	95
301	18	18089	2010	31	1	14	2	51	1996	2006	Y	95
301	18	18089	2010	32	1	14	2	51	1996	2006	Y	95
302	18	18089	2010	21	1	14	2	51	1996	2006	Y	95
302	18	18089	2010	31	1	14	2	51	1996	2006	Y	95
302	18	18089	2010	32	1	14	2	51	1996	2006	Y	95
112	18	18089	2010	21	1	15	2	45	1996	2006	Y	95
112	18	18089	2010	31	1	15	2	45	1996	2006	Y	95
112	18	18089	2010	32	1	15	2	45	1996	2006	Y	95
113	18	18089	2010	21	1	15	2	45	1996	2006	Y	95
113	18	18089	2010	31	1	15	2	45	1996	2006	Y	95
113	18	18089	2010	32	1	15	2	45	1996	2006	Y	95