# 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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# MOVES2014 Input Data and Parameters

May 27, 2015

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

Developed for:
**Indiana Department of Transportation**

**Developed by:**
THE CORRADINO GROUP
Engineers • Planners • Program Managers • Environmental Scientists

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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.

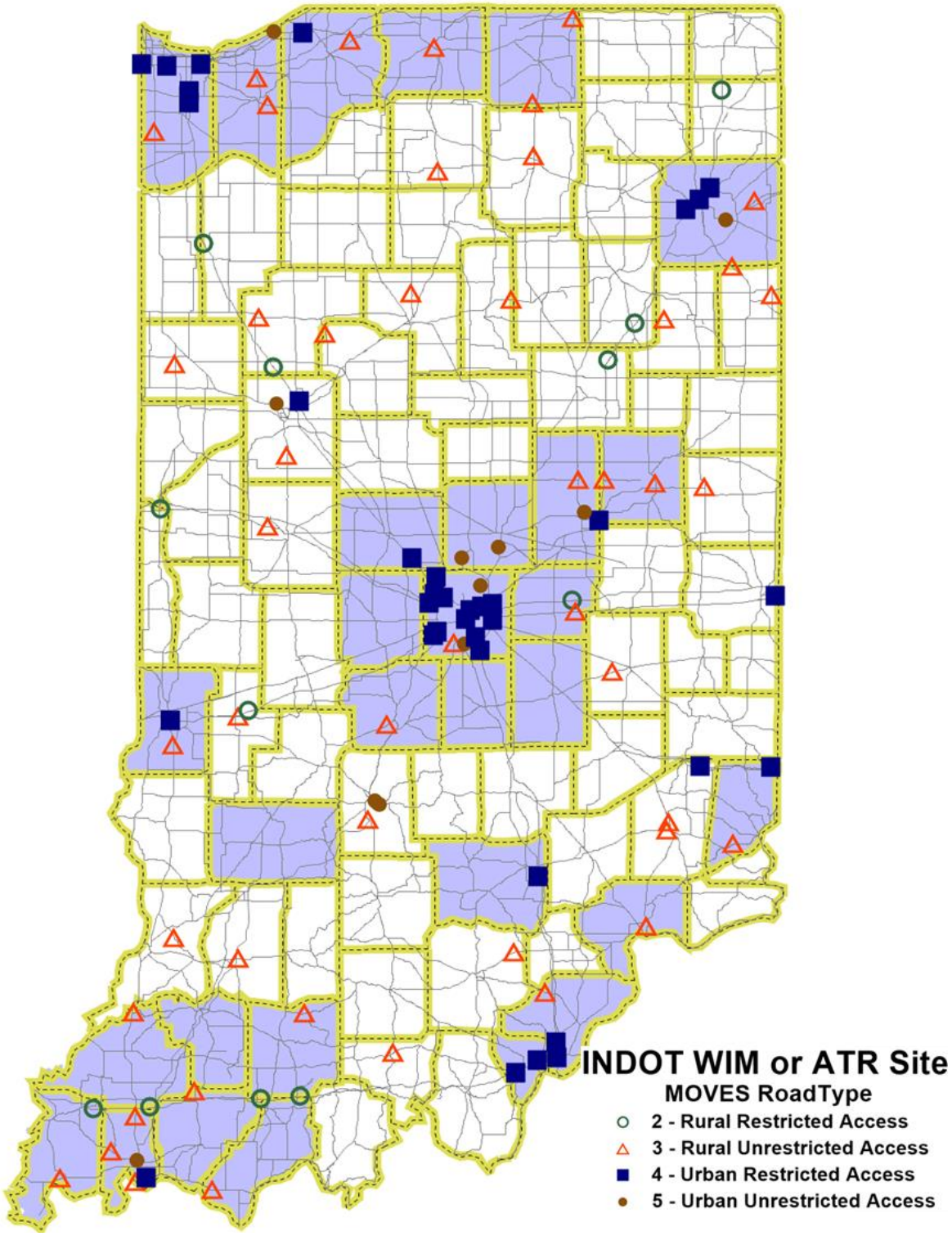
*VehTypeVMT* - When converting files from MOVES 2010 format to MOVES 2014 format, HPMS Base Year VMT by HPMS Vehicle Type ID was converted so that VMT for HPMS vehicle types 20 and 30 were combined and classified as HPMS vehicle type 25.

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.

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.

Figure 2-Indiana Fuel Supply Regions



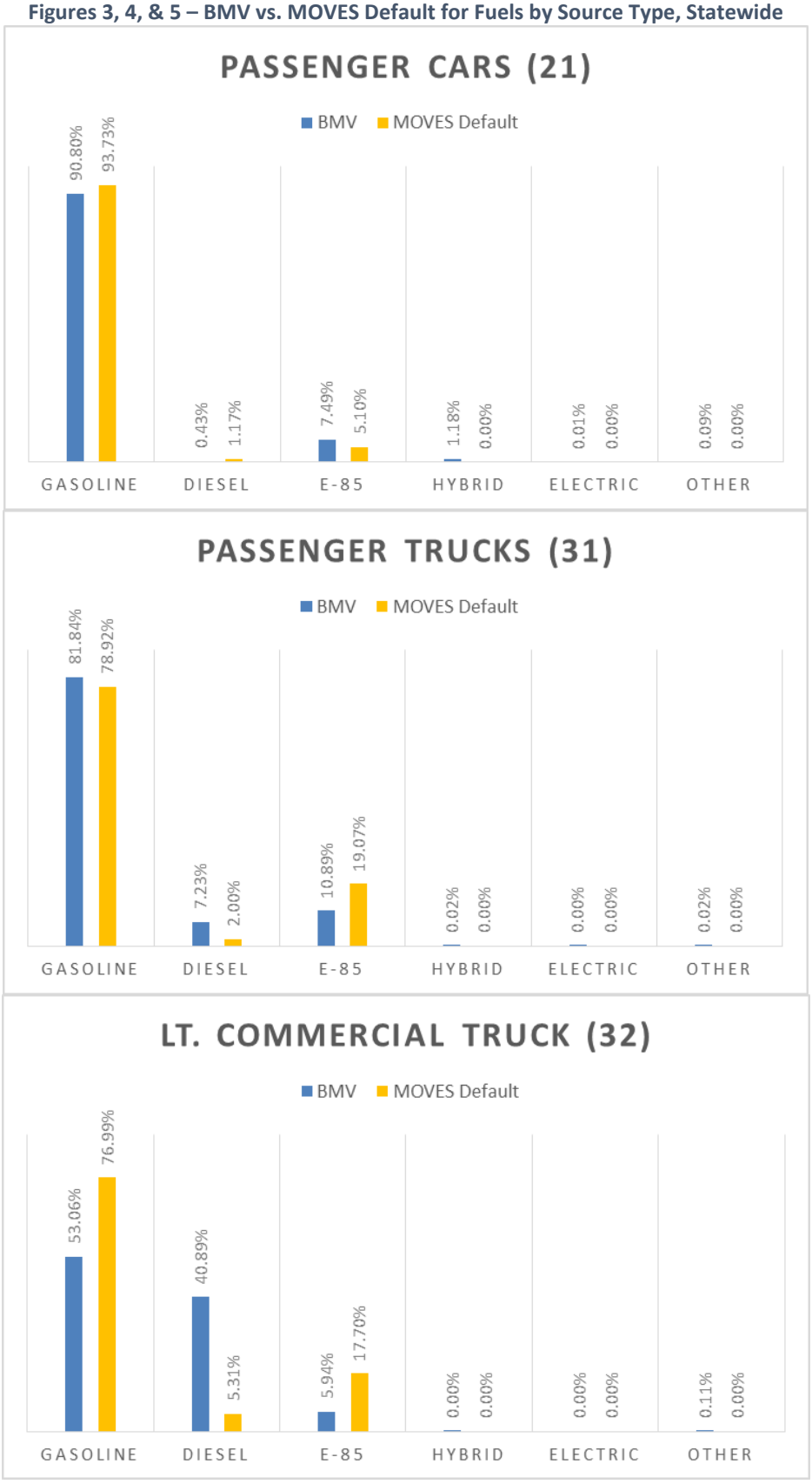
### AVFT Assumptions

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.

**Vehicle Age Distribution for Porter County**

**Table A-5: 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**

| AgeID | SourceTypeID | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 |

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# APPENDIX G

## Classification and Regression Tree (CART) Analysis for Chicago-Naperville, IL-IN-WI, 2008 8-Hour Ozone Nonattainment Area, 2000-2014

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**Classification and Regression Tree (CART) Analysis for Chicago-Naperville, IL-IN-WI, 2008 8-Hour Ozone Nonattainment Area**

A classification and regression tree (CART) analysis is a statistical tool to classify data. Here, it is applied to 8-hour ozone and meteorological data to determine the meteorological conditions most commonly associated with high-ozone days. Once days are classified by their meteorology, ozone concentration trends among days with the same conditions can be developed. By examining trends only on days with similar meteorology, the influence of year-to-year meteorological variability on ozone concentrations is minimized and we assume that any remaining trend is the result of reductions in emissions of ozone precursors and other non-meteorological factors.

This CART analysis was conducted by LADCO using 8-hour ozone monitoring data for two regions of Chicago-area ozone sites. The first analysis area is comprised of two northern monitors: Chiwaukee (ID number 55-059-0019) and Zion (17-097-1007). The second analysis area is represented by a combination of multiple southern monitoring sites in Cook County, Illinois including: Alsip (ID number 17-031-0001), Chicago-SWFP (17-031-0032), Chicago-Taft (17-031-1003), Lemont (17-031-1601), Cicero (17-031-4002), Northbrook (17-031-4201), and Evanston (17-031-7002). The analysis included data from the years 2000-2014, which encompasses many years prior to the promulgation of the 2008 ozone NAAQS. This analysis therefore addresses long-term trends rather than the direct impacts of the 2008 ozone NAAQS. The goal of the analysis was to determine the meteorological conditions associated with high ozone episodes in the Chicago air-shed and to construct trends for the days identified as sharing similar meteorological characteristics.

The CART analyses for the Chicago-area ozone study processed multiple meteorological variables for each day to determine which are the most effective at predicting ozone concentrations. Meteorological data collected for the Chiwaukee/Zion monitors were taken from Mitchell Field (Milwaukee) NWS station and processed by LADCO. Upper air observations were taken from the Green Bay, Wisconsin NWS site. Meteorological data collected for the analysis of southern monitors was taken from the Chicago O'Hare Airport National Weather Service (NWS) station and processed by LADCO. Upper air observations, taken from Lincoln, Illinois NWS site, were downloaded from the National Climatic Data's Center (NCDC) Integrated Global Radiosonde Archive. Meteorological variables for both analyses included maximum and average daily temperatures, dew points, relative humidity and air pressure at the surface and different levels of the atmosphere, wind directions and wind speeds, change in temperatures and air pressure from the previous day, average wind speeds and temperatures over a 2 or 3-day period, day of the week, cloud cover, daily precipitation, and many other parameters.[1]

[1] The original meteorological database used to support this effort, called MetDat, was developed by EPA Office of Air Quality Planning and Standards (OAQPS) and subsequently revised by both Sonoma Technology and LADCO.

Regression trees, where each branch describes the meteorological conditions associated with different ozone concentrations, were developed to classify each summer day (May – September). Although the exact selection of predictive variables changes from site to site, the universally common predictors are temperature, wind direction, and relative humidity. These are included in the dataset as daily averages and maximums as well as averages at specific times throughout the day (morning 7-10 am, afternoon 1-4 pm, etc.). Similar days were assigned to nodes, which are equivalent to branches of the regression tree. By grouping days with similar meteorology, the influence of meteorological variability on the underlying trend in ozone concentrations is partially removed; the remaining trend is presumed to be due to trends in precursor emissions or other non-meteorological influences. Ozone trends in these nodes were then plotted.

The CART analysis determined that there were four nodes from the Chiwaukee Prairie and Zion monitors and two nodes from the Cook County monitors that demonstrated similar meteorological conditions and had the strongest correlation with high ozone episodes (greater than 55 parts per billion (ppb) of ozone). Tables 1 and 2 categorize each analysis and the shared meteorological conditions for each high-ozone node along with the frequency and average ozone concentrations. All of the high-ozone nodes had high maximum temperatures, and many were distinguished by southerly or southeasterly winds and/or low relative humidity.

**Table 1: Meteorological conditions, occurrence, and average ozone for the four nodes identified with high ozone concentrations for the Chiwaukee Prairie and Zion monitors.**

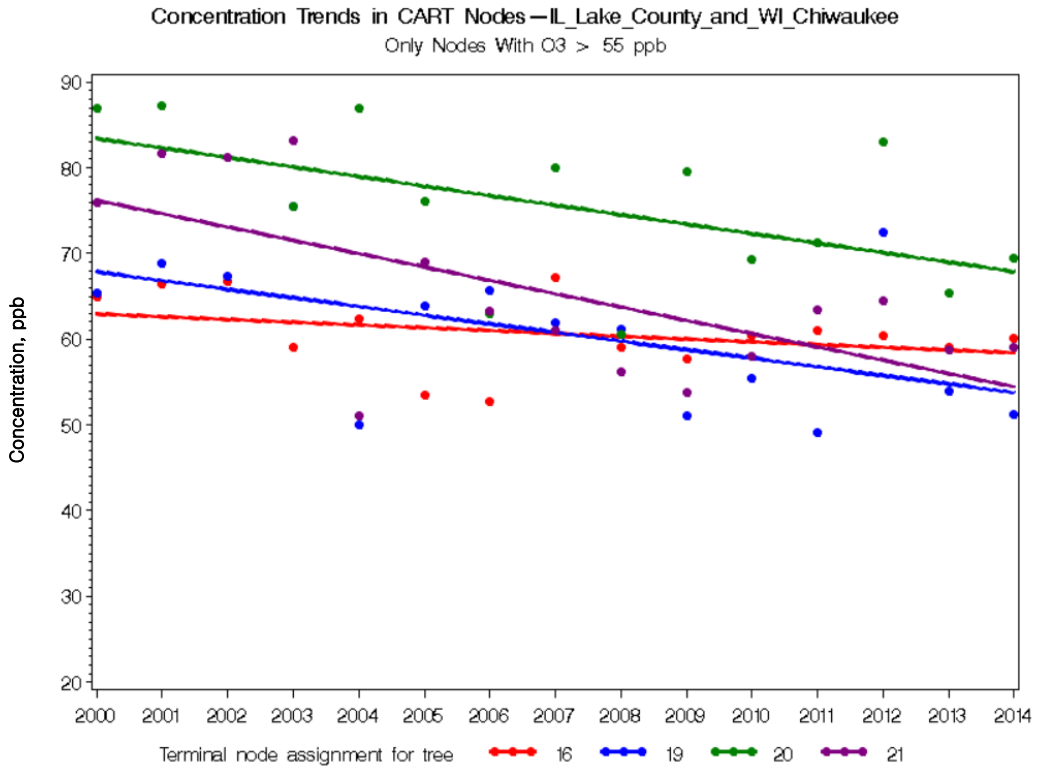
| | Node | | | |
|---|---|---|---|---|
| **Conditions** | **16** | **19** | **20** | **21** |
| Maximum temperature | > 77.56 °F | | | |
| Average morning temperature | ≤ 77.56 °F | > 77.56 °F | | |
| Southerly component of 24-hour transport distance | > -131.21 km | | | |
| Average relative humidity | ≤ 77.09% | | | |
| Deviation in morning height of 700 mb surface from 10-year monthly mean | > -10.75 m | | | |
| Southerly component of average afternoon winds | | ≤ 2.41 m/s | >2.41 m/s | |
| Maximum temperature | | > 85 °F | | |
| Easterly component of average afternoon winds | | | ≤ 1.88 m/s | > 1.88 m/s |
| Average ozone | 59.9 ppb | 62.1 ppb | 76.0 ppb | 65.1 ppb |
| Number of days | 495 | 150 | 191 | 297 |

**Table 2: Meteorological conditions, occurrence, and average ozone for the two nodes identified with high ozone concentrations for the Cook County monitors.**

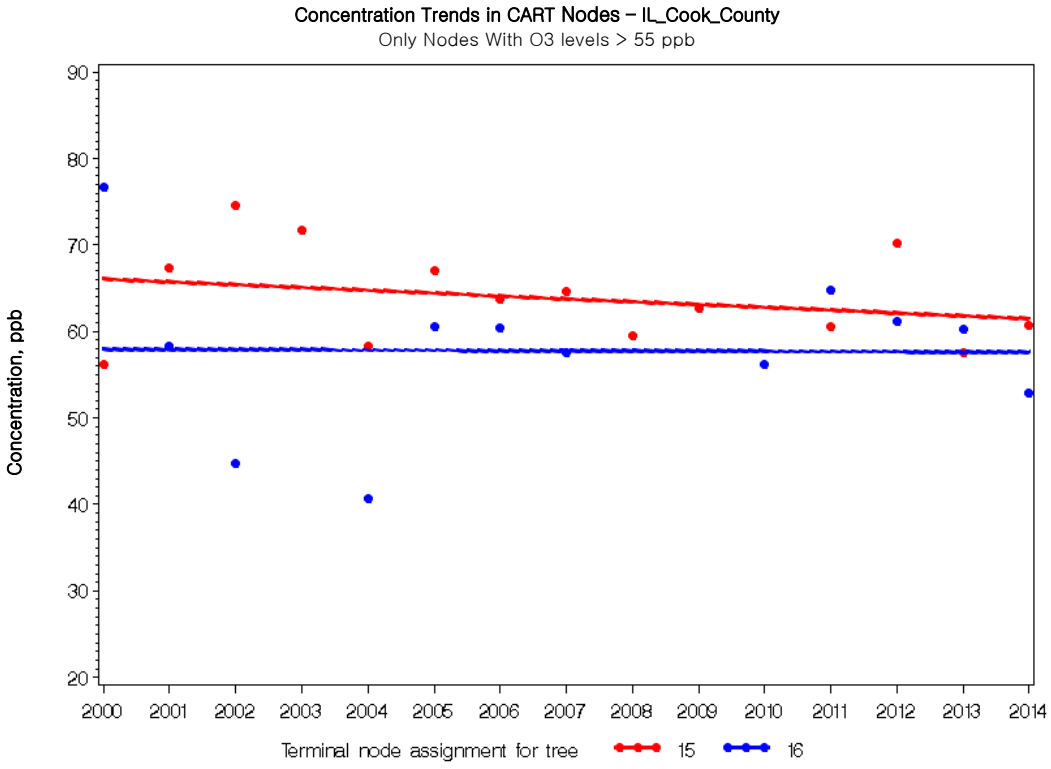
| Conditions | Node | |
|---|---|---|
| | 15 | 16 |
| Maximum temperature | > 77.62 °F | |
| Average afternoon temperature | > 85.27 °F | |
| Midday relative humidity | ≤ 54.48% | |
| 24-hour scalar wind run | ≤ 727.29 km | > 727.29 km |
| Average ozone | 66.1 ppb | 58.3 ppb |
| Number of days | 1352 | 572 |

The highest average ozone concentrations were observed for node 20 of the northern monitors. This node was characterized by maximum temperatures and average morning temperatures above 77.56 °F (7-10 am local time). Node 20 also had an average afternoon "v" wind vector that was greater than 2.41 meters per second (m/s) (i.e. from the south) as well as an average afternoon "u" vector that was less than or equal to -1.88 m/s (i.e. from the east). It contained 191 days of data and an average of 75.969 ppb in the data set under the aforementioned conditions. For Node 16, morning height values measured at 700 millibars altitude. Node 19 represented a maximum surface temperature above 85 °F. Node 21 represented morning temperatures above 77 °F (7-10 am local time), an average afternoon "v" wind vector greater than 2.41 meters per second (m/s) (i.e. from the south) as well as an average afternoon "u" vector equal to or greater than -1.88 m/s (i.e. from the east). It contained 297 days of data and an average of 65.088 ppb for ozone. Chart 1 below shows that for the four nodes identified among the northern monitors ozone values are trending lower for the most recent 15 years (2000-2014). Chart 2 shows the same trends for the Cook County monitors.

## Chart 1




## Chart 2



These analyses demonstrate that ozone concentrations, for a given set of high-ozone meteorological conditions, have decreased over time. In particular, this analysis shows that ozone concentrations have decreased on days with high average temperatures and the right combination of (mostly south-southeasterly) winds, low relative humidity and other characteristics. While maximum temperatures play an important role in the formation of ozone, the CART analysis reveals that other meteorological parameters (such as wind direction, wind speed, and morning temperature) also play significant roles in creating conditions conducive for ozone formation.

By using a CART analysis to analyze 8-hour ozone data in the Chicago-area, the influence of variations in meteorology can be mitigated such that comparisons of high ozone days with similar meteorological conditions can be made to determine if ozone values have decreased over time due to anthropogenic emission reductions. In general, ozone trends in the Chicago-area have declined. Furthermore, under meteorological conditions when monitored 8-hour ozone has historically been at its highest, ozone concentrations are lower under similar meteorological conditions. This analysis demonstrates that the observed reductions in ozone concentrations have not been driven solely by favorable meteorological conditions. These results further suggest that progress in reducing ozone precursor emissions is likely an important driver of the observed reductions in 8-hour ozone concentrations in the Chicago nonattainment area as well as areas to the north and east.

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# APPENDIX H

## Public Participation Process Documentation

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# LEGAL NOTICE OF PUBLIC HEARING

## Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Lake and Porter Counties) of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattainment Area

**Note: Legal notices for public hearings are no longer published in newspapers, but can be found on the Indiana Department of Environmental Management's web site at: http://www.in.gov/idem/6395.htm.**

Notice is hereby given under 40 Code of Federal Regulations (CFR) 51.102 that the Indiana Department of Environmental Management (IDEM) is accepting written comment and providing an opportunity for public hearing regarding the "Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Lake and Porter Counties) of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattainment Area". All interested persons are invited and will be given reasonable opportunity to express their views concerning the submittal of the Draft Redesignation Petition and Maintenance.

Lake and Porter counties, Indiana were designated as "nonattainment" as a portion of the Chicago-Naperville, IL-IN-WI 2008 8-Hour Ozone Nonattainment Area. This area was classified as a "marginal" nonattainment area and subject to the requirements of Section 172 of the Clean Air Act (CAA). One of the compliance requirements mandated by Section 172(c) of the CAA is the development of a plan demonstrating that the area will meet the federal 2008 8-hour air quality standard by the required attainment date. This Redesignation and Maintenance Plan is being drafted and submitted consistent with United States Environmental Protection Agency (U.S. EPA) guidance.

Copies of the draft documents will be available on or before May 4, 2016, to any person upon request at the following locations:

- Indiana Department of Environmental Management, Office of Air Quality, Indiana Government Center North, 100 North Senate, N1003, Indianapolis, Indiana.
- Indiana Department of Environmental Management, Northwest Regional Office, 330 West U.S. Highway 30, Suites E & F, Valparaiso, Indiana.
- Crown Point Community Library, 122 North Main Street, Crown Point, Indiana.
- Gary Public Library, 220 West 5th Avenue, Gary, Indiana.
- Hammond Public Library, 564 State Street, Hammond, Indiana.
- Lake County Public Library-Highland Branch, 2841 Jewett Street, Highland, Indiana.
- Lake Station-New Chicago Branch Public Library, 2007 Central Avenue, Lake Station, Indiana.

- Valparaiso Public Library, 103 Jefferson Street, Valparaiso, Indiana.
- Whiting Public Library, 1735 Oliver Street, Whiting, Indiana.

The draft documents will also be available on the following web page:

http://www.in.gov/idem/airquality/2397.htm.

Any person may submit written comments on the *Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattainment Area - Lake and Porter Counties, Indiana* on or before June 15, 2016. Written comments should be directed to: Mrs. Leslie Ferguson, Office of Air Quality, N1003, Indiana Department of Environmental Management, 100 North Senate Avenue, Indianapolis, Indiana 46204; or fax (317) 233-5967; or email at lferguso@idem.in.gov. Interested parties may also present oral or written comments at the public hearing, if held. Oral statements will be heard, but for the accuracy of the record, statements should be submitted in writing. Written statements may be submitted to the attendant designated to receive written comments at the public hearing.

A public hearing on the *Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattainment Area - Lake and Porter Counties, Indiana*, will be held if a public hearing request is received by June 3, 2016. If a hearing is requested, the hearing will be held on June 8, 2016. The hearing will convene at 6:00 p.m. local time at the Lake Station-New Chicago Branch Public Library located at 2007 Central Avenue, Lake Station, IN 46405. If a request for a public hearing is not received by June 3, 2016, the hearing will be cancelled. Interested parties can check the online calendar at http://www.in.gov/activecalendar/EventList.aspx or contact Mrs. Leslie Ferguson at 317-233-1179, after June 3, 2016, to see if the hearing has been cancelled or will convene.

A transcript of the hearing and all written submissions provided at the public hearing shall be open to public inspection at IDEM and copies may be made available to any person upon payment of reproduction costs. Any person heard or represented at the hearing or requesting notice shall be given written notice of actions resulting from the hearing.

For additional information contact Mrs. Leslie Ferguson, at the Indiana Department of Environmental Management, Office of Air Quality, N1003, Indiana Government Center North, 100 North Senate Avenue, Indianapolis, IN 46204 or call (317) 233-1179 or (800) 451-6027 ext. 3-1179 (in Indiana).

*Speech and hearing impaired callers may contact the agency via the Indiana Relay Service at 1-800-743-3333. Individuals requiring reasonable accommodations for participation in this hearing should contact the IDEM Americans with Disabilities Act (ADA) coordinator at:* Attn: ADA Coordinator, Indiana Department of Environmental Management – Mail Code 50-10, 100 North Senate Avenue, Indianapolis, IN 46204-2251, *or call (317) 233-1785 (voice) or (317) 233-6565 (TDD). Please provide a minimum of 72 hours notification.*

Indiana Department of Environmental Management
*We Protect Hoosiers and Our Environment.*
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**Michael R. Pence**
*Governor*

**Carol S. Comer**
*Commissioner*

April 28, 2016

## CERTIFICATE OF PUBLICATION

This is to certify that the Indiana Department of Environmental Management (IDEM) Notice of the opportunity for a Public Hearing regarding the following:

- Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Lake and Porter Counties) of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattainment Area

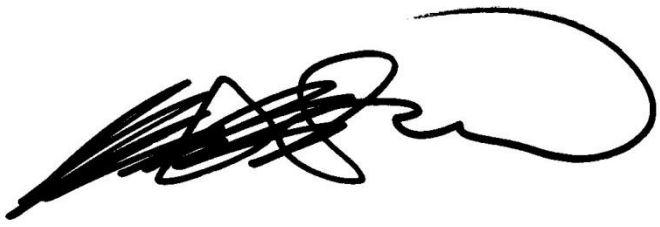
was published on IDEM's web site on April 28, 2016. It is expected that it will remain posted on the site until at least June 15, 2016.

The notice in full was available online at the following web address, under "Northwestern".

http://www.in.gov/idem/5474.htm

Web publication of the notice was at the request of Scott Deloney, Branch Chief, Programs Branch, Office of Air Quality, IDEM.

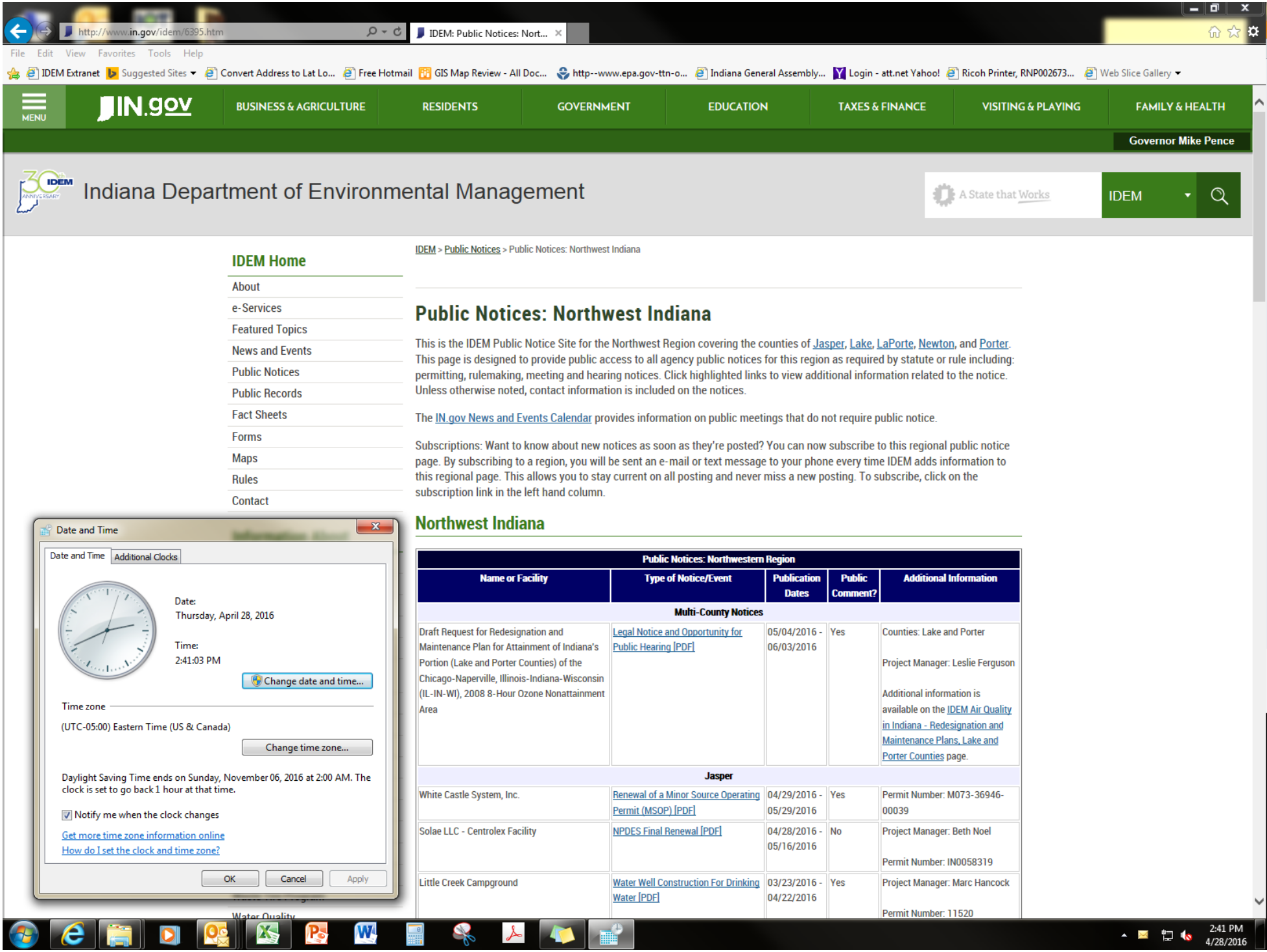
By:



Mike Finklestein
IDEM Webmaster

Attachments:
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http://www.in.gov/idem/6395.htm

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IDEM > Public Notices > Public Notices: Northwest Indiana

# Public Notices: Northwest Indiana

This is the IDEM Public Notice Site for the Northwest Region covering the counties of Jasper, Lake, LaPorte, Newton, and Porter. This page is designed to provide public access to all agency public notices for this region as required by statute or rule including: permitting, rulemaking, meeting and hearing notices. Click highlighted links to view additional information related to the notice. Unless otherwise noted, contact information is included on the notices.

The IN.gov News and Events Calendar provides information on public meetings that do not require public notice.

Subscriptions: Want to know about new notices as soon as they're posted? You can now subscribe to this regional public notice page. By subscribing to a region, you will be sent an e-mail or text message to your phone every time IDEM adds information to this regional page. This allows you to stay current on all posting and never miss a new posting. To subscribe, click on the subscription link in the left hand column.

## Northwest Indiana

| Public Notices: Northwestern Region | | | | |
|---|---|---|---|---|
| **Name or Facility** | **Type of Notice/Event** | **Publication Dates** | **Public Comment?** | **Additional Information** |
| **Multi-County Notices** | | | | |
| Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Lake and Porter Counties) of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattainment Area | Legal Notice and Opportunity for Public Hearing [PDF] | 05/04/2016 - 06/03/2016 | Yes | Counties: Lake and Porter<br><br>Project Manager: Leslie Ferguson<br><br>Additional information is available on the IDEM Air Quality in Indiana - Redesignation and Maintenance Plans, Lake and Porter Counties page. |
| **Jasper** | | | | |
| White Castle System, Inc. | Renewal of a Minor Source Operating Permit (MSOP) [PDF] | 04/29/2016 - 05/29/2016 | Yes | Permit Number: M073-36946-00039 |
| Solae LLC - Centrolex Facility | NPDES Final Renewal [PDF] | 04/28/2016 - 05/16/2016 | No | Project Manager: Beth Noel<br><br>Permit Number: IN0058319 |
| Little Creek Campground | Water Well Construction For Drinking Water [PDF] | 03/23/2016 - 04/22/2016 | Yes | Project Manager: Marc Hancock<br><br>Permit Number: 11520 |

Date and Time

Date and Time | Additional Clocks

Date:
Thursday, April 28, 2016

Time:
2:41:03 PM

Change date and time...

Time zone

(UTC-05:00) Eastern Time (US & Canada)

Change time zone...

Daylight Saving Time ends on Sunday, November 06, 2016 at 2:00 AM. The clock is set to go back 1 hour at that time.

Notify me when the clock changes

Get more time zone information online
How do I set the clock and time zone?

OK | Cancel | Apply

2:41 PM
4/28/2016

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Air Quality in Indiana > Redesignations and Maintenance Plans > Redesignations and Maintenance Plans: Lake and Porter Counties

## Lake And Porter Counties

### 2008 8-Hour Ozone Standard

- Draft Request for Redesignation and Maintenance Plan for Attainment of Indiana's Portion (Lake and Porter Counties) of the Chicago-Naperville, Illinois-Indiana-Wisconsin (IL-IN-WI), 2008 8-Hour Ozone Nonattinment Area [PDF]
  - Appendix A [PDF]
  - Appendix B [PDF]
  - Appendix C [PDF]
  - Appendix D [PDF]
  - Appendix E [PDF]
  - Appendix F [PDF]
    - Attachment 1 [PDF]
    - Attachment 2 [PDF]
  - Appendix G [PDF]
  - Appendix H [PDF]
- U.S. EPA's Disapproval of the Redesignation Request and Maintenance Plan for Lake and Porter Counties, Indiana under the 2008 8-Hour Ozone Standard effective January 9, 2015
- Indiana's Response to U.S. EPA's Proposed Disapproval of the Request and Maintenance Plan for Lake and Porter Counties, Indiana under the 2008 8-Hour Standard (July 29, 2014) [PDF]
- U.S. EPA's Proposed Disapproval of the Redesignation Request and Maintenance Plan for Lake and Porter Counties, Indiana under the 2008 8-Hour Ozone Standard (June 30, 2014)
- Request for Redesignation Petition and Maintenance Plan Under the National Ambient Air Quality Standard for 2008 8-Hour Ozone Nonattainment Area (Lake and Porter Counties, Indiana), December 5, 2012 [PDF]
  - Appendix A [PDF]
  - Appendix B [PDF]
  - Appendix C [PDF]
  - Appendix D [PDF]
  - Appendix E [PDF]

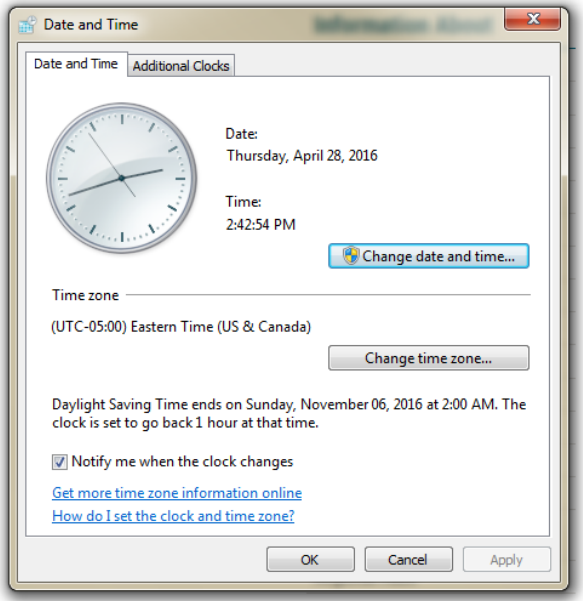
### 1997 8-Hour Ozone Standard

- Approval and Promulgation of Lake and Porter Counties 8-Hour Ozone State

**Online Services**

- Acronyms List
- Electronic Permitting
- Enforcement Database
- Forms.IN.gov
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2. How do I file an IDEM complaint?
3. How do I request or where can I find public records/files?
4. Where can I find information about available IDEM grants, loans, or funds?
5. How can I find my local Solid Waste Management District?
6. Where can I get information on confined animal feeding?

Risk Assessment

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