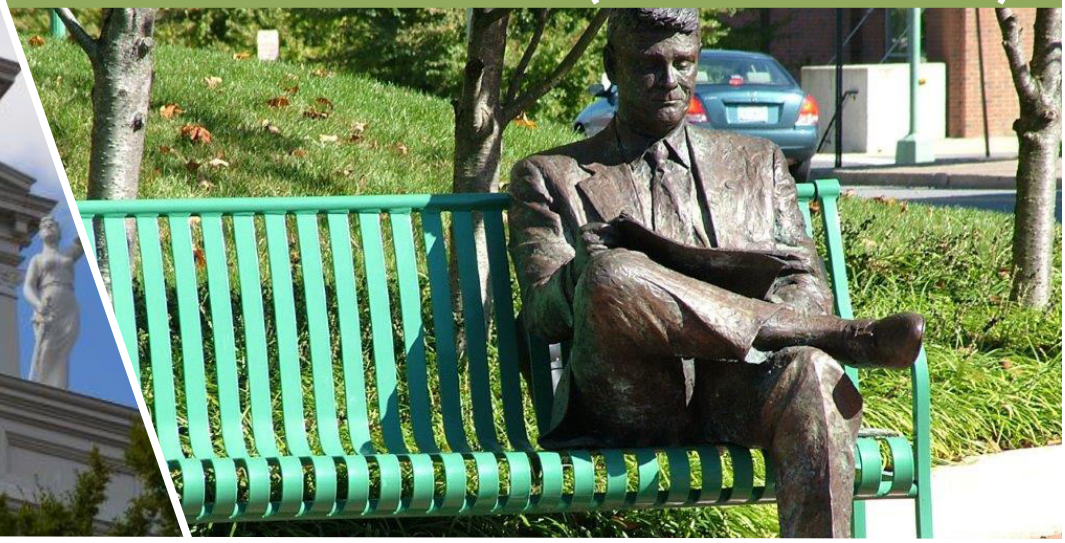
CLARKSVILLE URBANIZED AREA 2045

Clarksville Metropolitan Planning Area
Air Quality Conformity Analysis
(Tennessee Portion)



January 2019

Clarksville Urbanized Area
Metropolitan Planning Organization

Clarksville Urbanized Area MPO
Metropolitan Transportation Plan 2045

Air Quality Conformity Analysis

Prepared By:

In Cooperation With:

TN TDOT Department of Transportation

NEEL-SCHAFFER Solutions you can build upon

U.S. Department of Transportation Federal Highway Administration

Federal Transit Administration

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ES. Executive Summary

This report explains the results of the air quality analysis for Montgomery County, Tennessee. It also describes the methodology used by the Clarksville Urbanized Area MPO (CUAMPO), the Tennessee Department of Transportation (TDOT), and Neel-Schaffer, Inc. to demonstrate transportation conformity under the air quality standards/goals of the Clean Air Act Amendments of 1990. This process is required for the purpose of adopting a new Metropolitan Transportation Plan (MTP) and Transportation Improvement Program (TIP) since the county is designated Attainment with a Maintenance Plan.

Both counties within the Metropolitan Planning Area (MPA) were previously considered non-attainment for the National Ambient Air Quality Standard (NAAQS.) On November 21, 2005, Montgomery County was redesignated as Attainment with a Maintenance Plan for 8-hour National Ambient Air Quality Standard (NAAQS) ozone standard. On February 24, 2006, Christian County was redesignated as Attainment with a Maintenance Plan for 8-hour ozone standard.

There are three (3) subareas for the purpose of transportation air quality conformity analysis:

- Kentucky donut
- Kentucky MPO area
- Tennessee MPO area

The Kentucky donut is any area within Christian County that is not part of the MPA. Transportation planning for the donut area is the responsibility of the Kentucky Transportation Cabinet (KYTC), while transportation planning for the Kentucky and Tennessee MPO areas is the responsibility of the CUAMPO. However, all of the analysis subareas must implement transportation conformity in the same manner.

The Fort Campbell Army base is located within both Montgomery and Christian Counties. However, the base is subject to the general conformity rule (58 FR 63214) and is considered an external station for the purpose of transportation conformity.

The conformity analysis uses the MOVES2014a model, the most recent planning assumptions from KYTC and the MPO's Travel Demand Model (TDM), and the

incorporation of the projects listed in the MTP (shown in Appendix A). The Motor Vehicles Emissions Budgets (MVEB) established in the current State Implementation Plan (SIPs) for the Clarksville-Hopkinsville area are used to determine the region's air quality conformity. The MVEBs were established at the state level, with a separate MVEB established for the county. The MVEBs for Montgomery County are:

- 9.05 tons per day (TPD) for oxide with nitrogen (NOX)
- 3.00 TPD for volatile organic compounds (VOC)

Table ES.1 displays a summary of the MVEB results for Montgomery County. The MTP complies with the Clean Air Act Amendments of 1990, the Transportation Conformity Regulation, the Statewide and Metropolitan Planning Regulation, and other applicable federal and state requirements. The emissions results were developed using the guidance found in "MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity".

Table ES.1: Summary of On-Road Mobile Source Emissions by Year in Tons/Day

Pollutant	SIP MVEB	2026 Tons/Day	2036 Tons/Day	2045 Tons/Day
NOx	9.05	2.46	1.64	1.74
VOC	3.00	2.49	1.74	1.72

Source: NSI, 2018; CUAMPO, 2018

Based on the conformity analysis conducted for the MTP 2045, it can be concluded that:

- The MPO finds no factors in the TIP or MTP that would cause or contribute to a new air quality violation or exacerbate an existing violation in the years before the first analysis year for the Tennessee portion of the maintenance area.
- The MPO finds that no goals, directives, recommendations, or projects within the TIP or MTP contradict any specific requirements or commitments of the Tennessee SIP.

- The applicable implementation plans do not contain any Transportation Control Measures; therefore, nothing in the TIP or MTP can interfere with their timely implementation.
- The VOC and NO_x, emissions in the Tennessee portion of the Clarksville-Hopkinsville area do not exceed the established MVEBs.

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1.0 Background

The Clarksville MPA consists of Montgomery County, Tennessee and the southernmost portion of Christian County, Kentucky. The planning area is shown in Figure 1.2 of the MTP 2045, available from the MPO. On July 18, 1997, the Environmental Protection Agency (EPA) developed a revised 8-hour ozone standard of 0.08 parts per million (ppm), which was more stringent than the previous ozone standard. As a result of the change, the EPA designated the Clarksville-Hopkinsville area (which is made up of Montgomery County, Tennessee and Christian County, Kentucky) as nonattainment for the 8-hour average ozone NAAQS, and designated a basic ozone nonattainment area.

However, both counties have since been redesignated as Attainment with a Maintenance Plan for 8-hour National Ambient Air Quality Standard (NAAQS) ozone standard. The Clarksville-Hopkinsville area is still required to perform conformity analysis for the following three areas:

- The Kentucky donut (which encompasses Christian County but is not part of the MPA)
- The Kentucky MPO area (which is the portion of Christian County within the MPA)
- The Tennessee MPO area (which is the entirety of Montgomery County, with the exception of Fort Campbell)

In 2015, the Clarksville MPO stopped demonstrating conformity for the 2008 8-hour ozone standard due to the revocation of the 1997 8-hour ozone standard by EPA. The decision to revoke the 1997 ozone standard was vacated by the South Coast II Decision on Feb. 16, 2018, via USCA Case No. 15-1123. As a result, the Clarksville MPO must demonstrate conformity for the MTP and TIP. Effective on April 23, 2018, FHWA issued the Interim Guidance on Conformity Requirements for the 1997 ozone standard dated April 23, 2018, which states that new MTP and TIP updates and amendments that include the addition of a project that is not exempt from transportation conformity may not proceed until conformity with the 1997 ozone NAAQS is determined. This conformity determination complies with FHWA's April 23, 2018 guidance until further notice is given.

CUAMPO
Air Quality Conformity Analysis (Tennessee Portion)

While the MPO is designated Attainment with a Maintenance Plan, and thus has a 5-year planning cycle, the conformity analysis must be conducted every four (4) years for MTPs and TIPs, as per 40 CFR 93.104. It must also conduct the analysis each time the MTP or TIP is updated, as per 40 CFR 93. The Fort Campbell Army base is considered an external station for the purpose of transportation conformity. In addition, transportation conformity requirements are applicable for any roadway that receives funding or approved under Title 23 or 49 through the U.S. Department of Transportation (U.S. DOT). Fort Campbell does not contain any roadways that meet these conditions and is therefore exempt from conformity requirements.

2.0 Interagency Consultation and Process

As required by 40 CFR 93.105, the MPO formed an Interagency Consultation (IAC) to guide the conformity analysis. This group includes representatives from:

- EPA Region 4
- Federal Highway Administration (FHWA) Division Offices from both Kentucky and Tennessee
- Federal Transit Administration (FTA)
- KYTC
- Kentucky Division for Air Quality (Ky. DAQ)
- TDOT
- Tennessee Division of Air Pollution Control (TDAPC)
- Tennessee Department of Environment & Conservation (TDEC)
- Clarksville Transit System (CTS)
- CUAMPO
- Members of local governments

Another purpose of the IAC was to approve the planning assumptions (40 CFR 93.110) used to develop the conformity analysis. This was conducted through a series of meetings and phone conferences. The meeting minutes are included in Appendix B. In addition to the IAC, as required by 40 CFR 93.105, the conformity analysis must be made available to the general public during the public commenting period as part of the consultation process.

3.0 Analysis Years, Planning Data, and Assumptions

3.1 Analysis Years

The IAC was responsible for selecting the analysis years used to conduct the air quality conformity. A pre-analysis consensus plan (shown in Appendix C) was developed and proposed to the IAC during a phone call on June 28, 2018. The plan recommended the use of the TDM's scenario years as the conformity analysis years. This recommendation was accepted during the IAC call, with exception to 2016, the model base year, which was in the past. The emissions calculated for each analysis year were then compared to the 2016 MVEBs to determine if the area can meet the conformity test.

3.2 Planning Data and Assumptions

There is no Inspection/Maintenance program within the Clarksville-Hopkinsville area. Furthermore, there are no Transportation Control Measures (TCMs) in the SIP, meaning that the implementation of the projects in the Statewide Transportation Improvement Program (STIP) will not interfere with timely implementation of TCMs.

Regardless of the funding source, all regionally significant projects are included in the regional emissions analysis for their respective analysis year. The projects included in the conformity analysis (listed in Appendix A) are from the MTP's Staged Improvement Program, STIP, or other regionally significant projects. These planning assumptions were agreed upon during the IAC Meetings.

Projects identified in the Metropolitan Transportation Plan or Transportation Improvement Plan must be identified as being exempt, non-exempt, or regionally significant. Projects that are exempt are not subject to the transportation conformity rule. Projects that are non-exempt must be shown in the region's conformity analysis. Projects that are regionally significant are non-exempt projects that are on roadways that serve regional needs, such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals. The transit projects identified in Chapter 10 of the Metropolitan Transportation Plan were determined to be exempt. The ITS project on Wilma Rudolph Boulevard, as identified in the Clarksville Regional Intelligent Transportation Systems Architecture, is also exempt from the conformity rule.

4.0 Emissions Projections

The emission estimates obtained in the analysis were calculated using EPA's MOVES2014a software. Model runs were conducted for the entirety of Montgomery County for each of the analysis years. The model inputs and summary outputs are shown in Appendix D and Appendix E, respectively. The hourly VMT fraction, speed fraction, and AVFT inputs can be obtained from the MPO. The TDM was developed by Neel-Schaffer, Inc. as part of the MTP 2045 update. The following sections describe the MOVES2014a inputs used to calculate the NOx and VOC emissions within Montgomery County.

4.1 RunSpec Settings

For each MOVES model run, the parameters are contained within the RunSpec. These inputs determine the geographic and temporal scale of the model run, as well as the specific emissions to be calculated. The settings used in the conformity analysis were:

- Scale
    - Onroad (for Model)
    - County (for Domain/Scale)
    - Inventory (for Calculation Type)
- Time Spans
    - Hourly (for Time Aggregation Level)
    - Analysis years of 2026, 2036, and 2045
    - Weekdays (for analysis Days)
    - Month of July
    - All hours
- Geographic Bounds
    - Montgomery County, Tennessee

- Vehicles/Equipment
    - All on-road vehicle and fuel combinations selected
- Road Type
    - All road types selected
- Pollutants and Processes
    - NOx
    - VOC
    - Total Gaseous Hydrocarbons (VOC pre-requisite)
    - Non-Methane Hydrocarbons (VOC pre-requisite)
    - Refueling Displacement Vapor Loss and Refueling Spillage Loss are de-selected in the RunSpec as per the pre-analysis consensus plan.
- Strategies/Rate of Progress
    - Rate of Progress is not selected in the RunSpec as the MPO is not required to do so.

4.2 Data Sources

The MOVES model provides many of the necessary inputs through its own internal database or available default data. However, some inputs need to be provided by the MPO and consultant team. Table 1 displays the initial data sources used for the MOVES input data. The development of the model inputs is discussed in Appendix F.

Table 1: Data Sources for MOVES Input Files

Input	Description	Montgomery County
roadTypeDistribution	Distribution of VMT within the modeled area based on MOVES roadway types	University of Tennessee, 2014
sourceTypeYear	Total number of vehicles in MOVES vehicle classes	University of Tennessee, 2014
HPMSVTypeYear	Annual VMT of the modeled area by HPMS vehicle classes	University of Tennessee, 2014
HPMSVTypeDay	Daily VMT of the modeled area by HPMS vehicle classes	University of Tennessee, 2044 HPMS, 2016 TDOT, 2018 TDM, 2018.
monthVMTFraction	Monthly VMT adjustment factors when using annual VMT.	University of Tennessee, 2014
dayVMTFraction	Daily VMT adjustment factors when using annual VMT	University of Tennessee, 2014
hourVMTFraction	Hourly adjustment factors.	Coordinating Research Council A-100 project, 2017 University of Tennessee, 2014
avgSpeedFraction	Speed distribution by MOVES speed bins, hour, and roadway type.	Coordinating Research Council A-100 project, 2017
ageDistribution	Vehicle age breakdown by source type	University of Tennessee, 2014
rampFraction	Percentage of interstate VHT on ramps	TDM, 2018
ZoneMonthHour	Area meteorology data	TDEC, 2018
FuelSupply	Fuels used in the modeled area	MOVES Defaults TDEC, 2018
FuelFormulation	Fuel formulation data within the modeled area	MOVES Defaults TDEC, 2018
FuelUsageFraction	Market share of fuels within the modeled area	MOVES Defaults TDEC, 2018
AVFT	Alternative Vehicle and Fuels Technologies	MOVES Defaults TDEC, 2018

Source: NSI, 2018; CUAMPO, 2018

4.3 Input Data

ageDistribution

Emission factors vary by the age and type of vehicle (shown in Table 2) on the roadway network. The MOVES model requires a vehicle distribution as the fraction of vehicles by age and source type. The age distributions were developed for the following vehicle types based on the state's motor vehicle registration data:

- Motorcycle
- Passenger Car
- Passenger Truck
- Light Commercial Truck
- Single Unit Short-haul Truck

Local data sources were used to develop age distributions for Transit Bus and School Bus. The national default age distributions were used for:

- Intercity Bus
- Refuse Truck
- Single Unit Long-haul Truck
- Motor Home
- Short-haul Combination Trucks
- Long-haul Combination Trucks

Table 2: MOVES Source Types and HPMS Vehicle Types

Source Type ID	Source Type Description	HPMS Vehicle Type ID	HPMS Vehicle Type Description
11	Motorcycle	10	Motorcycles
21	Passenger Car	25	Light Duty Vehicles- Short and Long Wheelbase
31	Passenger Truck		
32	Light Commercial Truck		
41	Intercity Bus	40	Buses
42	Transit Bus		
43	School Bus		
51	Refuse Truck	50	Single Unit Trucks
52	Single Unit Short-haul Truck		
53	Single Unit Long-haul Truck		
54	Motor Home		
61	Combination Short-haul Truck	60	Combination Trucks
62	Combination Long-haul Truck		

Source: EPA

roadTypeDistribution

The MOVES model requires a distribution of VMT as the fraction of vehicles on each road type (shown in Table 3) by source type.

$$VMT\ fraction = \frac{VMT_i\ on\ road\ type}{\Sigma\ VMT_i\ of\ source\ type}$$

Where i = source type

This initial data, closest to the MTP's base year, was developed using statewide vehicle classification summaries of the daily VMT data by the functional classification. However, local data was not available for each source type. The same road type distribution for all source types within the HPMS vehicle (Table 2) class was used (i.e., Intercity Bus, Transit Bus & School Bus from Buses.) A road type fraction was not assigned to the non-road classification.

Table 3: MOVES Road Type

Road Type ID	Road Type Description
1	Off-Network
2	Rural Restricted Access
3	Rural Unrestricted Access
4	Urban Restricted Access
5	Urban Unrestricted Access

Source: EPA

sourceTypeYear

Since each vehicle type has different emission rates, the MOVES model requires the total number of vehicles in each source type. The initial data was provided by the UT, with the forecast data developed based on the TDM.

HPMSVTypeDay

A key input in the MOVES model is the daily VMT on the roadway network; as increased travel means increased emissions. The TDM provides daily VMTs by roadway link, allowing for the daily VMT of the network to be adjusted and calculated for MOVES modeling. The base year VMTs were aggregated by functional classification and compared to the HPMS dataset VMTs. Using this data, adjustment factors were created that match the TDM VMTs to those in the HPMS data. The seasonal adjustment factors provided by TDOT were then used to come up with the VMT by functional classification. These VMTs were then assigned to the daily VMT by HPMS class based on the annual proportions shown in the initial data received from the UT. The HPMS and seasonal adjustment factors are shown in Table 4.

Table 4: VMT and Seasonal Adjustment Factors

Functional Classification	HPMS Adjustment Factor	Seasonal Adjustment Factor
1- Rural Interstate	0.9447	0.931
2- Rural Principal Arterial	0.8756	0.990
6- Rural Minor Arterial	0.9845	0.990
7- Rural Major Collector	0.9116	0.990
8- Rural Minor Collector	0.8990	0.990
9- Rural Local	0.0845	0.990
11- Urban Interstate	1.0165	1.011
14- Urban Principal Arterial	0.9712	1.011
16- Urban Minor Arterial	0.9419	1.011
17- Urban Collector	1.0229	1.011
19- Urban Local	0.9447	1.011
Rural Centroid Connector	1.0000	0.990
Urban Centroid Connector	1.0000	1.011

Source: NSI, 2018; TDOT, 2018

monthVMTFraction

Since the Montgomery County model runs use daily VMT, this model input is not required.

dayVMTFraction

Since the Montgomery County model runs use daily VMT, this model input is not required.

hourVMTFraction

Vehicle emissions are dependent upon the temperature, humidity, and other meteorological factors which can worsen pollutants from travel. The MOVES model applies a fraction distribution of VMT travelled by a given source type by time of day to determine the total number of vehicles on the road during that hour, as well as the emission rates to be applied.

averageSpeedFraction

The MOVES emission factors also vary by vehicle speed. The MOVES model requires the speeds to be input as a fraction of the VHT on the network based on speed bins

(Table 5), road type, and hour. The initial speed data was determined using the data obtained from the CRC, and adjusted using the TDM.

Table 5: MOVES Speed Bins

Speed Bin ID	Speed Bin Range
1	speed < 2.5 MPH
2	2.5 MPH <= speed < 7.5 MPH
3	7.5 MPH <= speed < 12.5 MPH
4	12.5 MPH <= speed < 17.5 MPH
5	17.5 MPH <= speed <22.5 MPH
6	22.5 MPH <= speed < 27.5 MPH
7	27.5 MPH <= speed < 32.5 MPH
8	32.5 MPH <= speed < 37.5 MPH
9	37.5 MPH <= speed < 42.5 MPH
10	42.5 MPH <= speed < 47.5 MPH
11	47.5 MPH <= speed < 52.5 MPH
12	52.5 MPH <= speed < 57.5 MPH
13	57.5 MPH <= speed < 62.5 MPH
14	62.5 MPH <= speed < 67.5 MPH
15	67.5 MPH <= speed < 72.5 MPH
16	speed >=72.5 MPH

Source: EPA

rampFraction

The MOVES model is able to analyze emissions on the ramps differently than those on the main line of the Interstate. The conformity analysis uses the model's ability to provide the ramps as a separate variable for the emissions analysis. The TDM provides outputs on the daily VHT on each roadway link. The percent of the ramp VHT to the total interstate VHT is the rampFraction input. This input is calculated for each individual analysis year.

$$Ramp\ fraction = \frac{VHT\ on\ Interstate\ Ramps}{\text{Total VHT on Interstate}}$$

ZoneMonthHour

The MOVES model requires inputs of minimum and maximum ambient temperature and humidity for the day per hour. This input was provided by converting the MOBILE6.2 meteorological data from the previous conformity analysis into MOVES2014a. This means that the minimum and maximum daily temperatures used in the model for Montgomery County, Tennessee were 69 and 94 degrees Fahrenheit, respectively. The humidity value in the MOVES model also remains the same 75 gr/lb used in the previous conformity analysis.

Fuels and Reid Vapor Pressure

The Montgomery County fuel data was provided by TDEC. These input files (FuelSupply, FuelFormulation, FuelUsageFraction, and AVFT) use the default MOVES data, but contain adjusted market shares to reflect local conditions; including the removal of Compressed Natural Gas (CNG) for transit vehicles since there are no CNG buses in the CTS fleet. The input files contain adjusted Reid Vapor Pressures for fuel subtypes 12 and 15, which are each adjusted to 8.6 PSI. Fuel subtype 12 also contains an additional 1.0 PSI waiver, increasing the Reid Vapor Pressure to 9.6.

5.0 Results and Conclusions

Table 6 summarizes the results of the on-road mobile source emissions obtained from the MOVES model by year. Figure 1 displays the results of the NOx analysis, while Figure 2 displays the results of the VOC analysis. Even with the anticipated growth within the region, the analysis indicates that emissions are expected to be less than the established MVEB for Montgomery County. This is largely due to more stringent emission standards for new cars and trucks. Newer vehicles that meet the emission standards will replace the older vehicles with higher emissions, which will help to improve the air quality.

Table 6: Summary of On-Road Mobile Source Emissions by Year in Tons/Day

Pollutant	SIP MVEB	2026 Tons/Day	2036 Tons/Day	2045 Tons/Day
NOx	9.05	2.46	1.64	1.74
VOC	3.00	2.49	1.74	1.72

Source: NSI, 2018; CUAMPO, 2018

Figure 1: Comparison of NOx Emissions to MVEB by Year in Tons/Day

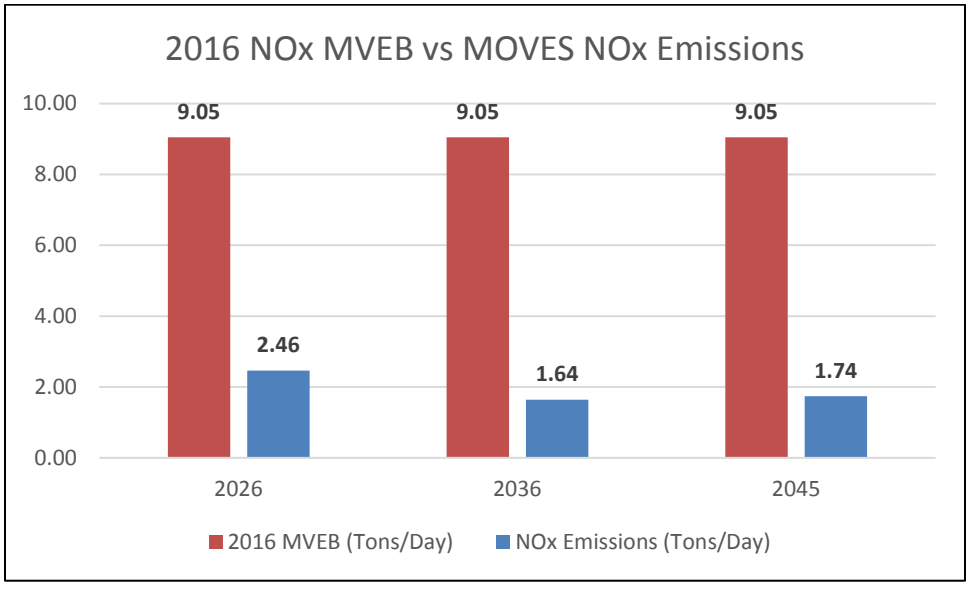
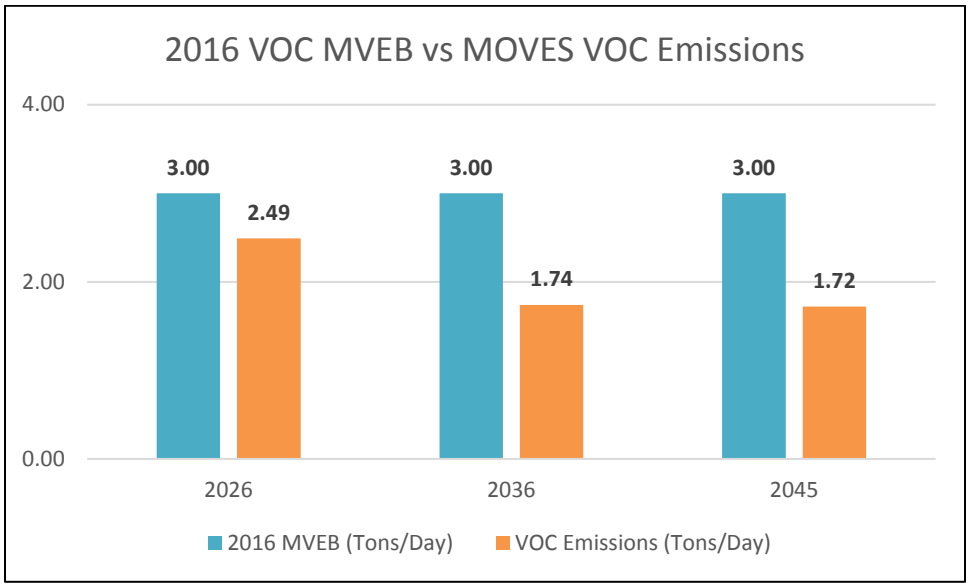


Figure 2: Comparison of VOC Emissions to MVEB by Year in Tons/Day



These reductions show that the county is in conformity with the USEPA's "Budget Emissions Test" for all analysis years. Since the county is within attainment for the NAAQS, and future year emissions are estimated to be less than the MVEB, transportation improvements contained in the MTP should not interfere with future attainment or maintenance of the NAAQS for ozone.

Appendices

Appendix A: Roadway Projects in MOVES Analysis

Table A-1: Roadway Projects in MOVES Analysis

MTP 2045 ID	MTP Stage	Beginning Analysis Year	Roadway	Location	Improvement	Conformity Status
1	Stage I	2026	SR-374 Ext	Dotsonville Rd to US 79/SR 6 (Dover Rd)	New 4 Lane Roadway	Non-Exempt
2	Stage I	2026	SR-374 Ext/SR-149	Dotsonville Rd to SR-149; SR-374 to River Rd	New 2 Lane Roadway & Bridge, Widen to 5 Lanes	Non-Exempt
3	Stage I	2026	SR-237 (Rossview Rd) & Dunbar Cave Rd	I-24 to 400 ft west of Keysburg Rd	Widen from 2 to 3/5 Lanes & Realignment	Non-Exempt
7	Stage I	2026	SR-48 (Trenton Rd)	SR-374 to I-24	Widen from 2 to 5 Lanes	Non-Exempt
101	Stage I	2026	US 79/SR-13 (Gutherie Hwy)	Cracker Barrel Dr to International Blvd	Widen from 2/3 to 5 Lanes	Non-Exempt
102	Stage I	2026	SR-149/SR-13	River Rd to SR-13; SR-149 to Zinc Plant Rd	Widen from 2/3 to 5 Lanes	Non-Exempt
103	Stage I	2026	SR-374 (North Pkwy)	Dunbar Cave Rd to Stokes Rd	Widen from 2 to 5 Lanes	Non-Exempt
104	Stage I	2026	North-East Connector Ph 1	Ted Crozier Blvd to Wilma Rudolf Blvd to Trenton Rd	New 4/5 Lane Roadway	Non-Exempt
106	Stage I	2026	Lafayette Rd	Walnut Grove Rd through Ft Campbell Gate	Widen from 2 to 5 Lanes	Non-Exempt
107	Stage I	2026	SR-48 (Trenton Rd)	Needmore Rd	Intersection Improvement	Exempt
105	Stage II	2036	Jack Miller Blvd Ext	Tobacco Rd to Peachers Mill Rd	New 4 Lane Roadway	Non-Exempt
201	Stage II	2036	SR-374 (Warfield Blvd)	Memorial Dr to Dunbar Cave Rd	Widen from 2 to 4 Lanes	Non-Exempt
203	Stage II	2036	North-East Connector Ph 2	SR-48 (Trenton Rd) to Peachers Mill Rd	New 4 Lane Roadway	Non-Exempt
204	Stage II	2036	Peachers Mill Rd	Pine Mountain Rd to Stonecrossing Dr	Widen from 3 to 4 Lanes	Non-Exempt
304	Stage II	2036	SR-48 (Trenton Rd)	SR-13/US79 (Wilma Rudolph Blvd) to SR-374	Widen from 2 to 5 Lanes	Non-Exempt

MTP 2045 ID	MTP Stage	Beginning Analysis Year	Roadway	Location	Improvement	Conformity Status
401	Stage II	2036	New Roadway	Fair Brook Place to Needmore Rd	New 3 Lane Roadway	Non-Exempt
402	Stage II	2036	Professional Park Dr Ext	Extension to Cardinal Ln	New 2 Lane Roadway	Non-Exempt
403	Stage II	2036	International Blvd Ext	SR-237 (Rossview Rd) to SR-76 to Trough Springs Rd	New 2 Lane Roadway	Non-Exempt
405	Stage II	2036	SR-374 (Richview Rd) Ext	SR-12 (Madison St) to US 41A Bypass	New 4 Lane Roadway	Non-Exempt
406	Stage II	2036	Kennedy Ln Ext	Extension to Meriwether Rd	New 2 Lane Roadway	Non-Exempt
409	Stage II	2036	8th St connector	Needmore Rd to Patterson Ln	New 2 Lane Roadway	Non-Exempt
411	Stage II	2036	SR-374 (Richview Rd)	Memorial Dr to US 41A (Madison St)	Widen from 3 to 5 Lanes	Non-Exempt
504	Stage II	2036	SR 13/48	River Road to Old Highway 48	Center Turn Lane	Non-Exempt
508	Stage II	2036	I-24	@ Exit 8 EB Off Ramp	Widen to 2 Lanes	Non-Exempt
514	Stage II	2036	Tylertown Road	Trenton Rd to Oakland Rd	Widen to 4 Lanes	Non-Exempt
202	Stage III	2045	US 41A Bypass (Ashland City Rd)	US 41A/SR-112 to SR-13	Widen from 2/3 to 5 Lanes	Non-Exempt
303	Stage III	2045	Needmore Rd	Hazelwood Rd to SR-236 (Tiny Town Rd)	Reconstruct with CTL	Non-Exempt
305	Stage III	2045	Whitfield Rd/Old Trenton Rd	Needmore Rd to SR-374	Reconstruct with CTL	Non-Exempt
404	Stage III	2045	Dixie Bee Rd Ext	Sango Rd to US 41A	New 2 Lane Roadway	Non-Exempt
407	Stage III	2045	SR-236 (Tiny Town Rd) Ext	Extension to Meriwether Rd	New 2 Lane Roadway	Non-Exempt
408	Stage III	2045	New Roadway	9th St to 10th St	New 2 Lane Roadway	Non-Exempt
412	Stage III	2045	Hazelwood Rd	Trenton Rd to Needmore	Widen from 2 to 5 Lanes	Non-Exempt

MTP 2045 ID	MTP Stage	Beginning Analysis Year	Roadway	Location	Improvement	Conformity Status
502	Stage III	2045	Cumberland Dr	Ashland City Rd (SR 12) to Madison St (SR 76)	Widen to 4 Lanes	Non-Exempt
503	Stage III	2045	Dunbar Cave Road	Wilma Rudolph Rd (US 79) to Rossview Rd (SR 37)	Widen to 4 Lanes	Non-Exempt
507	Stage III	2045	I-24	@ Dixie Bee Road	New interchange	Non-Exempt
510	Stage III	2045	Needmore Road	Wilma Rudolph Road to Trenton Road	Widen to 4 Lanes	Non-Exempt
512	Stage III	2045	Rossview Road	SR 374 to Dunbar Cave Rd	Widen to 5 Lanes	Non-Exempt
515	Stage III	2045	Wilma Rudolph Boulevard	Kraft St to SR 374	Widen to 6 Lanes	Non-Exempt

Source: CUAMPO, 2018

Appendix B: IAC Meeting Minutes

Clarksville Urbanized Area
Metropolitan Planning Organization (CUAMPO)
Interagency Committee (IAC)
Conference Call Minutes
May 30, 2018 @ 10:00 am

IAC Members Present:

Dianna Myers	EPA
Richard Wong	EPA
Jane Spann	EPA
Sean Santalla	FHWA
Elizabeth Watkins	FHWA
Mike Claggett	FHWA
Deborah Fleming	TDOT
Justin Harrod	KYTC
Thomas Witt	KYTC
Marc Corrigan	TDEC
Paul LaRock	TDEC
Leslie Poff	KYDAQ
Stan Williams	MPO
Jill Hall	MPO

Mr. Corrigan took roll and discussed the two purposes the IAC call was focused on: 1.What is needed to begin development of the conformity determination in response to the South Coast decision, and 2. the developments of the second 10-year maintenance plan by the states, also in response to the South Coast decision.

Ms. Myers spoke on item #3 on the agenda, the update on South Coast v. EPA petition for rehearing. She stated that in 2015 the Clarksville MPO stopped demonstrating conformity for the 2008 8-hour ozone standard due to the revocation of the 1997 standard by EPA. The February 2018 court decision vacated EPA's revocation of the transportation conformity requirement for the 1997 8-hour ozone standard, which will require the Clarksville MPO to demonstrate conformity for the MTP and TIP. EPA filed for a rehearing on the two aspects of the Court's decision: 1. Section 172(e); 2. Section 176(d)(5) of the Clean Air Act. EPA did not seek a rehearing on the second ten year maintenance plan requirement. If EPA is not granted a rehearing by the court, then a remand relative to the court decision back to the agency is requested so EPA can figure out how to implement the court's decision. The agency does not have a date for the rehearing. FHWA has developed a guidance memorandum to follow during the interim. No questions were asked of Ms. Myers.

Mr. Santalla spoke on item #4 on the agenda, the FHWA memo: Interim Guidance on Conformity Requirements for the 1997 Ozone NAAQS. He stated the memo was an effort by FHWA to comply with the ruling and is waiting for further information. An important part of the memo was that any MTP or TIP amendment for non-exempt projects can't move forward in those areas that were designated nonattainment for the 1997 8-hour ozone NAAQS, and attainment for the 2008 8-hour ozone NAAQS. Adjustments/administrative modifications of non-exempt projects may proceed. NEPA approvals may not proceed unless the project is in the existing MTP and TIP. Exempt projects and projects with a completed NEPA may move forward with no delay.

Mr. Claggett said FHWA has scheduled webinars for Conformity (June 12th) and MOVES (June 18th). Mr. Santalla will send out the link to the webinars when released by FHWA.

Mr. Corrigan asked when FHWA would require conformity determinations for the areas affected by the Court's decision.

Mr. Santalla stated the FHWA guidance memo is dated April 23, 2018 and from that date forward FHWA would no longer accept any documents without a conformity determination for approval based on the memo guidance.

Agenda item #5, Development and timing of the CDR and MTP update and item #6 Discussion of TDM development and socio-economic data development and growth was reviewed by Mr. Williams. He state the Travel Demand Model (TDM) has been developed and approved by TDOT and KYTC modeling divisions. The MTP is in draft form for chapters 1-5 and expects chapters 6-10 within the next two weeks. He expects the completed draft MTP by the end of June and then to send it out to TDOT and KYTC for review. After the states' review, the federal review should begin by mid-September. The MTP then goes to the TCC/Executive Board for approval at the end of November and adoption in January 2019. He said the MTP was currently on schedule. He said MTP with the conformity determination is attainable as long as the budgets can be met.

Mr. Corrigan stated that the IAC calls/meetings need to be inserted into the MTP development schedule. The IAC is responsible to review the MTP and CDR. He suggested that the IAC's 30 day review coincide with the draft review by the Federal agencies to help streamline the process.

Mr. Williams said the CDR adopted March 10, 2010 is on the MPO website at: http://www.cuampo.com/files/TnFinal031010.pdf . He asked the IAC to look at conformity determination developed for the earlier MTP and asked for suggestions or concurrence on the format used in the previous CDR as we review early chapter drafts. Mr. Corrigan was in agreement to review the previous CDR as an outline for the new CDR.

Mr. Santalla asked if the consultants would be able to meet the schedule for the MTP and CDR.

Mr. Williams said yes, they are planning and ready to assist with the CDR and MOVES modeling. He said the MPO/consultants will also handle the urbanized area in Kentucky. It is a very small portion from I-24 south to the TN state line (Oak Grove).

Mr. Harrod said that KYTC is ready and that most planning assumptions that will be done on the Christian Co, KY portions will be conducted with KYTC developed data and that KYTC has a separate model for the rest of Christian County.

Agenda Item #7, the MTP horizon years as currently proposed and Agenda Item #8 Analysis years for CDR. Mr. Williams said 2016 was the base year, 2045 was the final year, and the interim years would be 2026 and 2036.

Ms. Myers stated the budget year is 2016, therefore we must model that year because there is no other year to use for interpolation.

There was discussion on the selection of horizon years for the MTP and CDR. There was general agreement that the CDR should include the years: 2016, 2026, 2036 and 2045.

Mr. Harrod was unsure of the interim years from the 2010 CDR. After reviewing the last CDR, he said KYTC had a 2016 base year, 2026 interim year and planned to interpolate 2035 to 2036 and interpolate 2040 to 2045 for the final year within the Christian County model.

Agenda item #9, Planning assumption and data. Mr. Williams stated all planning assumptions can be provided from the travel demand model, the UT data center, the KY data center; the population from the U.S. Census, state data centers and included in the documentation of the TDM. He asked Mr. Corrigan about the meteorological data.

Mr. Corrigan said the meteorological data in MOVES doesn't work exactly the same as Mobile 6. He said there is a converter for the data between the two models and he can apply the converter and provide the data and KY can do the same. He said he believed this approach would keep the meteorological data consistent with the SIP. He offered to help with the MOVES inputs for the pre-analysis consensus plan.

Mr. Williams asked for something in writing to give to the consultants for requirements/expected of them to deliver for CDR.

Agenda item #10, MVEB/SIP considerations. Mr. Corrigan stated that emissions in the horizon years would need to be compared against the existing 2016 budgets in the respective SIPs.

Mr. Harrod said under the 2016 budget analysis with Mobile6 the values were very close. His concern was that under the MOVES model the 2016 budget can't be met.

Mr. Corrigan said that, as he sees it, there were three options concerning the budget:

1. The modeled emissions meet the budgets – no time delay if on schedule with the MTP development;
2. The model barely exceeds the budget, then the States can look at any available safety margin – this would take roughly 3-5 months, ideally to amend the SIPs.
3. If the model emissions exceed the budgets beyond the reach of the safety margins, then the States would most likely need to address this through the development of a second ten year maintenance plan – this may take approximately 18 months, possibly lowered to 12-15 months.

Ms. Myers said Mr. Corrigan was correct on the three options. She said there is no detailed guidance on how to do the second ten year maintenance plan with respect to the Court's decision. The only guidance EPA can provide is to discuss how it has been done historically. She said she was not advocating doing it as past times but that was the only guidance for now. She said the EPA approved the TN side on September 22, 2005 and had an effective date on November 1, 2005. The second maintenance plan would need to extend, on the Tennessee side, through 2025.

Mr. Corrigan said KY side had an effective date in 2006 and asked if, to be consistent and not require separate network years be developed by the MPO, could the second 10-year maintenance plan extend to 2026 for both TN and KY? He asked if EPA would require States to develop the maintenance plan out to 2030 instead of 2026 due to not having already submitted to EPA the second 10-year maintenance plan.

Ms. Spann said she didn't know but thinks 2026 matches how it has been done in the past based on statutes. The IAC could still wait for headquarters' guidance.

Mr. Corrigan asked what other options are available if the MPO can't meet the budgets?

Ms. Myers said that others who couldn't make their budget when transitioning between Mobile6 and MOVES models were able to allocate from their safety margin. This will require a SIP amendment and does take time.

Mr. Corrigan agreed this would be a better option over the development of a second 10 year maintenance plan. The problem is that if the emissions are not within reach of the safety margins, this would cause an extremely long delay and would likely cause a conformity lapse. He stated it was still important for the states to start on the second 10 year maintenance plan. The IAC was asked to concur to 2026 as the final year for the maintenance plans. The IAC will need a TDM network developed for 2026

Ms. Poff said relying on statute is a safe bet and that KYTC was good with 2026 as the final year for the maintenance plan.

Mr. Corrigan asked the IAC look at the planning assumptions, draft MTP and go over the pre-analysis for consensus plans before we reconvene the IAC. He asked Mr. Williams and Ms. Poff to coordinate with him to set up another IAC call in about one month. He asked Mr. Williams if he could have a pre-analysis consensus plan drafted by then.

Mr. Williams said yes, with his help.

Ms. Poff said to make sure there was enough time to gather the information before the next call in a month.

Mr. Corrigan suggested the call be before July 4, 2018.

There was no date set for the next IAC call. The call was ended.

Clarksville Urbanized Area
Metropolitan Planning Organization (CUAMPO)
Interagency Committee (IAC)
Conference Call Minutes
June 28, 2018 @ 1:00 pm

IAC Members Present:

Dianna Myers	EPA
Sean Santalla	FHWA-TN
Mike Claggett	FHWA
Bernadette Dupont	FHWA-KY
Deborah Fleming	TDOT
Justin Harrod	KYTC
Marc Corrigan	TDEC
Leslie Poff	KYDAQ
Anna Bowman	KYDAQ
Dr. Egide Louis	EPA
Vijay Kunada	Neel-Schaffer Consultant
Nicholas Broussard	Neel-Schaffer Consultant
Stan Williams	MPO
Jill Hall	MPO

Mr. Williams took roll and reviewed the schedule for the development of the 2045 MTP and the CDR. He stated that the draft MTP was sent to KYTC and TDOT for their 30 day review period. The MTP was received by both agencies on June 26, 2018 and the review will be until August 6th, per TDOT email.

Mr. Corrigan asked if the September 3rd date on the schedule for the IAC review of the CDR and the September 17th date for the federal review of the MTP could be consolidated for both to be reviewed beginning September 3rd to save some time. The new TIP will not be updated until late spring 2019 after the completion of the MTP and the CDR.

Mr. Santalla agreed with the consolidation of the September dates for the IAC and federal review of the documents. He reminded everyone that after the MPO adopts the documents on January 17, 2019 then FHWA has 30 days after the adoption along with EPA for a final review. This may cause a lapse. Mr. Williams agreed that it was a tight schedule and the lapse would begin in the middle of February if not approved.

Discussion of the MOVES modeling and the draft MTP review was led by Mr. Williams. He stated that changes to the MOVES inputs due to changes in project descriptions were expected to be minor. The MPO is small and the majority, if not all, of the projects have been modeled previously. There could be changes required to the draft MTP after the MOVES model is run. Ms. Fleming said that changes to the projects could come from the Programming office at TDOT with changes to termini of existing projects.

Mr. Corrigan asked FHWA and EPA members if they had heard that another action needs to be taken by the Court regarding the South Coast Decision to actually make the decision effective. Mr. Claggett and Ms. Myers had not heard this but would check with headquarters to confirm. Regardless, the MPO should proceed with the schedule and documents.

Mr. Williams spoke on item #3 on the agenda, the planning assumptions and data. He thanked Mr. Corrigan for putting the draft planning assumptions together and Mr. Kunada and Mr. Broussard for their continued work on the planning assumptions. Mr. Williams reviewed the planning assumption document and stated that KY and TN have separate budgets. He said there were no changes to the first page between Mr. Corrigan's draft and the consultants work to the draft. On the second page Section 1: Item 4) the date for the May 30th IAC call was added.

On the second page, Section 1: Item 3) Conformity Analysis Years, Mr. Corrigan asked if it was necessary to show conformity for 2016. He stated that his understanding was that conformity would apply only to future years. Ms. Myers agreed with Mr. Corrigan. She said that 2016 does not have to be an analysis year. The first analysis year is 2026. Mr. Williams stated that 2016 is the base year for the SE data the Plan is being update from.

Under Section 3: Emissions Model Assumptions, the consultants added the July weekday factors. Mr. Kunada used the average weekday factor provided to him by Lia Prince with TDOT. Mr. Corrigan, Mr. Kunada and Mr. Louis discussed the use of UT and/or TDOT factors since the MVEBs were developed using a typical July day, not weekday. To remain consistent with the SIP, we should consider using an average July day factor. Mr. Corrigan said he sent the UT data that included July day factors to Mr. Williams by email a day earlier. Ms. Hall forwarded the email with the UT data attached to Mr. Kunada. Mr. Corrigan stated that TDOT has developed the adjustment factor for all months, including July. Mr. Harrod said Kentucky used seasonal average week day and Mr. Williams said Tennessee used average July day in the last CDR. Mr. Kunada will double check the information from the existing budgets.

Mr. Louis said that all four types of fuel: gas, diesel, E85 and CNG should be included in the MOVES run specifications. Mr. Corrigan noted that if the AVFT is adjusted to account for the lack of CNG in the transit fleet and replaced with diesel (or other appropriate fuel) in the AVFT file, it should be OK to include or omit the CNG vehicles since the AVFT file should properly address the lack of CNG buses in the transit fleet. Mr. Louis asked Mr. Kunada to send him the files from the MOVES runs once it is finished running and he will review them.

Under Section 3: Items 9 and 10, Mr. Corrigan asked how the 'donut' area outside of the TDM are will have the VMT forecasted. Mr. Harrod said the Kentucky side is currently going through the Christian County model and updating to 2045 for the entire County. Once the model is run the report breaks out the area between the MPO area and the rest of Christian County. Mr. Williams said the Tennessee model represents all of Montgomery County.

Mr. Kunada reviewed Table 1. Proposed MOVES input Data for Montgomery County. The input data for Table 1was provided by TDOT, KYTC, TDEC and UT. Mr. Corrigan explained he had taken the Mobile6 inputs used in the original maintenance plan and ran them through EPA's converter for the meteorological data. Mr. Louis stressed to use MOVES2014a for emissions modeling. Mr. Corrigan suggested the use of the hour fractions that EPA developed if the TDM does not have the capability of developing reasonable hour VMT distribution factors. Mr. Corrigan stated that he emailed those to Ms. Hall for consideration, which were forwarded on to the consultants.

Item 4 on the agenda regarded discussion of the Second 10 Year Maintenance Plan and MVEB/SIP considerations. Mr. Corrigan stated that since EPA is not planning to appeal (confirmed by EPA on the call) the requirement for the second 10 year maintenance plans, the

states must develop the second 10 year maintenance plan and look at the budgets and safety margins. Mr. Corrigan explained that on the previous IAC call, some of the general planning assumptions had been discussed and agreed upon, for example the last year of the maintenance plan and the base year (2026 and 2014, respectively). Mr. Corrigan explained they needed discussion and agreement on some of the more detailed MOVES inputs.

Several MOVES inputs were discussed with the group, including using adjusted HPMS data for 2014 for VMT, as well as 2014 CRC A-100 data for hour fractions and speeds. Source type population data for 2014 would come from MOVEs inputs developed by UT for TDOT. Growth factors would be developed from TDM growth rates for various source types to establish out-year sourcetype populations.

One of the questions posed to EPA was: in the second 10 year maintenance plan, how do we address the existing budgets to 'remove' the old budgets? Will a new budget need to be established for 2016? Could a different year be used, say for example, 2014, to replace the existing 2016 MVEB? Ms. Myers said in order to address older budgets they would need to be updated with newer budgets in the maintenance plan. The new budgets, no matter the analysis years set, would supersede, the 2016 budget already established. Mr. Corrigan posed the question to the group: what year would we want another budget established for, if the 2016 budget was found to be insufficient? Ms. Poff said she would wait to see data to decide which budget year to use for KY.

Mr. Corrigan asked which year would be used to calculate safety margins from: either the 2004 base year or 2014. Ms. Myers said she thinks the base year will be 2004, but will research the question. Ms. Dupont asked if there was anything more recent. Mr. Corrigan said yes but the base year determines the emissions at which the area attained the NAAQS, and thus from that there is a 'reserve' if emissions have declined to use as addition to the MVEB.

There were no other questions or comments from the IAC attendees. Mr. Williams said the next call would be approximately four weeks from now. He will check with the IAC members on times and availability. The call ended.

Clarksville Urbanized Area
Metropolitan Planning Organization (CUAMPO)
Interagency Committee (IAC)
Conference Call Minutes
October 9, 2018 @ 10:30 am

IAC Members Present:

Deborah Fleming	TDOT
Marc Corrigan	TDEC
Vijay Kunada	Neel-Schaffer Consultant
Nicholas Broussard	Neel-Schaffer Consultant
Stan Williams	MPO
Jill Hall	MPO

Mr. Williams took roll and did a quick review of the schedule for the development of the 2045 MTP and the CDR.

The second item on the agenda was the review, discussion and concurrence on the project list. Mr. Williams said that as a result of the discussion with Mr. Broussard, that projects #507 and #508 will show a non-exempt status. He further explained that all of the projects on the list were included in the modeling. Ms. Fleming indicated that she also questioned the exempt status of projects #507 and #508 but that question has been addressed. Mr. Corrigan suggested that project #107 was small enough to be exempt but the project #507 and #508 appear to be non-exempt. Additionally, Mr. Corrigan stated that the project list needs to indicate the regional significance status of the projects.

The third item on the agenda was the discussion of any other comments on the Draft CDR and/or the Draft 2045 MTP. Mr. Corrigan asked to have included in the CDR all of the projects, even those that are groupings and transit projects included in the project list for the IAC to make determinations on the exempt and regional significance status. He had concerns related to regional significant projects that may not be shown. Mr. Williams stated that the funding for projects included in the grouping list is described in Chapter 9, pgs. 1 - 6 and the transit projects are in Chapter 10, pgs. 4-6 in the Draft 2045 MTP. Ms. Fleming asked if CTS may be building a new Transit Transfer Station, and does that need to be shown as a separate project. She indicated that Knoxville Transit built a downtown transit center a few years back and it had to be shown separately in the Plan and there was some type of analysis required. We can't assume that every transit project is exempt. Mr. Williams indicated that upon review of the transit list, he deemed said projects were exempt. Mr. Corrigan stressed that these projects needed to be enumerated in the list of projects (including applicable groupings) for the IAC to be able to make exempt and regional significance determinations. All agreed that the IAC needed to be able to comment on regionally significance determinations.

Item four on the agenda was a brief discussion on the updated interim guidance on conformity requirements for the 1997 Ozone NAQQs. Mr. Corrigan stated that it appears that amendments to the current Plan or TIP, including non-exempt status projects, appear to be able to move forward through the process so long as FHWA makes final determinations on them before February 16th, 2019. Mr. Williams stated that the two CMAQ projects (ITS and Transit) for the October 18th MPO meeting were both exempt. In addition, the two amendments (SR734) from the April 19th meeting were non-exempt thus sent back to TDOT and FHWA for review and approval.

Mr. Williams thanked everyone for their, hard work, participation and help to keep to the tight schedule. He stated that currently the documents are on schedule to be adopted in January 2019.

There were no other questions or comments from the IAC attendees. Mr. Williams said he would send out the minutes to the IAC for any additional comments. The call ended.

Clarksville Urbanized Area Metropolitan Planning Organization (CUAMPO)

Interagency Committee (IAC) Conference Call Minutes

December 7, 2018, 1:00 PM CST

Members Present:

Elizabeth Watkins	FHWA, TN Div.
Michael Claggett	FHWA,
Richard Wong	EPA, Reg. 4
Bernadette Dupont	FHWA, KY Div.
Dianna Myers	EPA, Reg. 4
Justin Harrod	KYTC
Kwabena Aboagye	TDOT
Marc Corrigan	TDEC
Nicholas Broussard	Neel-Schaffer, Inc.
Sean Santalla	FHWA, TN Div.
Vijay Kunada	Neel-Schaffer, Inc.
Stan Williams	CUAMPO

Mr. Williams took roll call and thanked everyone for their participation. He began with agenda item #2, update on comments received during the Federal and IAC review of the Draft 2045 Major Transportation Plan (MTP) and Conformity Determination Report CDR. These most recent revisions incorporate changes to project descriptions related to SR149 & SR374 from a proposed amendment to the 2017-2020 Transportation Improvement Program (TIP) back in April, 2018. As per Mr. Santalla October 22nd email, TDOT would not be able to move forward with the FONSI or other Federal actions on this project until the MTP, TIP and CDR are amended with the corrected project description/scope. Mr. Williams stated after a discussion with the consultants he decided to revise the Draft 2045 MTP and CDR. Thus the Travel Demand Model (TDM) and the MOVES emissions model were rerun; the results showed that with these changes, conformity with the emission budget was demonstrated. Mr. Santalla asked Mr. Corrigan if he had the opportunity to run the MOVES model. Mr. Corrigan replied that yes he had replicated some of the MOVES runs and drew the same conclusions.

The MTP, CDR and TIP amendment are scheduled to be adopted during the January Executive Board meeting. Mr. Corrigan suggested that these actions, amendment to the project description and scope, relating to SR149 & SR374, be represented in the comment and

responses documented in the Appendix of the MTP. In addition, he asked that the modeling files and input and output databases be made available to any member of the general public by means of a statement on the MPO's website or adding the files to the website. Mr. Williams confirmed they would be.

Ms. Dupont asked which of the MOVES version was utilized. Mr. Kunada stated it was MOVES2014a. The modeling began before the release of MOVES2014b. General discussion from the members indicated that was fine. Mr. Aboagye conveyed that after the documents were adopted at the January 17, 2019 MPO meeting, he would be delivering them to TN FHWA.

Previously, per Mr. Corrigan and Ms. Fleming suggestions, the list of all the projects with a determination of the projects' regional significance or exempt status was provided. Mr. Williams reminded the members that all of the non-exempt projects in the MTP have been modeled in MOVES as the members concurred. Mrs. Myers' request for specific text was added in paragraph 1.0, Background, in the CDR.

Mr. Santalla thanked Mr. Williams and all of the consultant team for all their efforts.

Appendix C: Pre-Analysis Consensus Plan

Clarksville Area Summary of Planning Assumptions Used in Regional Emissions Analysis for the 1997 8-hour Ozone NAAQS

On July 18, 1997, the Environmental Protection Agency (EPA) promulgated a revised 8-hour ozone standard of 0.08 parts per million (ppm). This new standard is more stringent than the previous 1-hour ozone standard (See 69 FR 23857). The EPA designated the Clarksville-Hopkinsville area (Montgomery County Tennessee and Christian County, Kentucky, see Figure 1) nonattainment for the 8-hour average ozone National Ambient Air Quality Standard (NAAQS) on April 30, 2004, effective June 15, 2004. The Clarksville area was designated a basic ozone nonattainment area, following designation under Subpart 1 of the 1990 Clean Air Act Amendments (Federal Register Notice published April 30, 2004).

On August 10, 2005, the State of Tennessee requested redesignation to attainment for the 8-hour ozone standard for the Montgomery County, Tennessee portion of the Clarksville-Hopkinsville 8-hour ozone area. The redesignation request included three years of complete, quality-assured ambient air quality data for the ozone seasons of 2002 through 2004, indicating the 8-hour ozone NAAQS had been achieved for the Clarksville-Hopkinsville area.

On September 22, 2005 the US EPA approved Tennessee's request for redesignation of the Tennessee portion (Montgomery County) of the Clarksville-Hopkinsville nonattainment area to attainment (183 FR 55559). The redesignation request had an effective date of November 21, 2005.

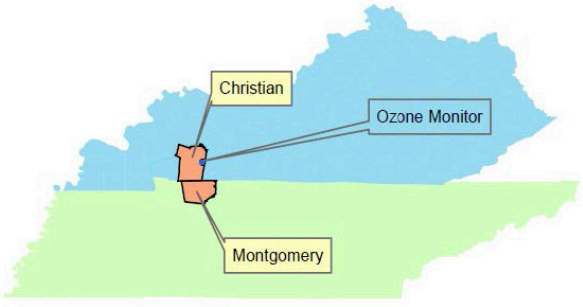


Figure 1. Clarksville–Hopkinsville TN-K

This document seeks to provide a detailed listing of the procedures and planning

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assumptions for the upcoming conformity analysis. This summary is submitted to Interagency Consultation (IAC) in accordance with Section 93.105(c)(1)(i) of the Transportation Conformity Rule which requires interagency review of the model(s) and associated methods and assumptions used in the regional emissions analysis. All assumptions apply to the LRTP, TIP, and conformity analysis documents.

An interagency consultation call was held May 30, 2018 to discuss some of the protocols and parameters outlined in this report. This report will be modified to reflect any modifications suggested as a part of the interagency consultation. Interagency consultation on methods and assumptions that affect the conformity analysis will continue to be an ongoing process.

Section 1: General Methods and Assumptions

1) Subject Plans
   a. 2045 Clarksville Area MPO Metropolitan Transportation Plan
   b. 2017-2020 Transportation Improvement Program

2) Conformity Test
   a. Analysis is conducted for NOx and VOCs.
   b. Determined using State Implementation Plan (SIP) 2016 motor vehicle emission budgets (MVEBs) for VOC and NOx established in the Federal Register, Vol. 183 FR 55559, September 22, 2005.
      i. VOC – 3.00 tons/day
      ii. NOx – 9.05 tons/day
   c. Emissions estimated using the methodology presented in Sections 3 and 4 of this memorandum.

3) Conformity Analysis Year(s)
   a. 2016, 2026, 2036, 2045
   b. Travel Demand Model will be run for all analysis years.

4) IAC Consensus on Planning Assumptions: Interagency call was held on May 30 and June 28, 2018 to discuss planning assumptions.

Section 2: Travel Demand Modeling and LRTP Assumptions

1) Base/Validation Year: 2016

2) Project Listing: Provided as a part of the Name of MTP 2045: Clarksville Urban Area MPO Long-Range Transportation Plan; includes
   a. Regionally Significant and Federally Funded
   b. Regionally Significant and Non-Federally Funded
   c. Conforms to Federal SAFETEA-LU guidelines, including a fiscally constrained Travel Demand Model is state of the practice and described in a separate document.

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3) Demographic Data: Provided in a separate document

4) Transit Modeling
   a. Transit mode split is estimated using trip end mode choice
      i. Estimates trips from the person trips developed in trip generation
      ii. Determines transit-oriented person trips prior to conversion of region's person trips to vehicle trips

Section 3: Emissions Model Assumptions

1. Emission Factor Model: MOVES2014a
2. Pollutants: NOx, and VOC.
3. Geographic area: Montgomery County.
4. Base Year: 2016
5. Final year: 2045
6. Interim horizon years: 2026, 2036
7. Typical summer day VMT may need to be developed by means of an adjustment factor applied to TDM output.
   i. Adjustment factors are shown in the table below:

Function Class	Region	Average July Ozone Season Weekday Factor
Freeway	Rural	0.963
Arterial	Rural	0.960
Ramp	Rural	0.960
Local	Rural	0.960
Interstate	Urban	0.957
Freeway	Urban	0.957
Arterial	Urban	0.957
Ramp	Urban	0.957
Local	Urban	0.957

Source: TDOT

8. Calculated for Year 2016:
   a. Reflects Section 93.122(b)(3) of the Transportation Conformity Rule which recommends that HPMS adjustment factors be developed to reconcile travel model estimates of VMT in base year of validation

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(2016) to HPMS estimates for the same period.
b. Compare 2016 base year travel demand model with 2016 HPMS to obtain HPMS scaling factor
    i. 2016 base year travel demand model was validated using 2016 HPMS data

9. Reconcile travel demand model functional classifications with functional classifications available in MOVES
    a. Combine Travel Demand Model classes into applicable MOVES urban classes
    b. Combine Travel Demand Model classes into applicable MOVES rural classes

10. Obtain Daily Vehicle Miles Traveled (DVMT) from the travel demand model for all MOVES functional classifications. Local road DVMT will be determined from HPMS data.
    a. The percentage of local road DVMT in the 2016 base year will be applied to all future years
    b. Ramp VHT will be determined using travel demand model data

11. Apply HPMS scaling factor to DVMTs to obtain HPMS-adjusted DVMTs for each model year.

Section 4: MOVES Runspec Development:

- Scale: County level scale – Inventory mode
- Vehicles/Equipment: Gasoline and diesel fuels, all vehicle combinations (the AVFT file needs to be edited to remove CNG to hybrid diesel from the transit bus fleet)
- Road type: All
- Pollutants and Processes: NOx and VOC and any supporting pollutants. Uncheck the Re-Fueling Displacement Locks and Spilling Loss
- Output:
    - General:
        - Units: grams, joules, miles;
        - Activity: Distance Traveled, Population
    - Output Emissions Detail:
        - On road: Road Type, Source Use Type

Table 1 lists the inputs needed to populate the County Data manager in MOVES.

Table 1. Proposed MOVES Input Data for Montgomery County.

	Input Data Requirement:	Source:	Comments:
1.	Road type distribution: VMT fractions by road type.	Data from TDM for other year(s)?	In the base year, the TDM values will be compared to the 2016 HPMS data to develop VMT adjustment factors for the TDM. These adjustment factors will be applied to the forecast TDM volumes to generate future year VMTs. Forecast donut area VMTs will be developed based on the ratio of donut VMTs to model area VMTs in the base year.
2.	Source type population: number of vehicles in the area to be modeled.	sourceType Population: Data developed by TDOT from Dept. of Revenue data for 2014. How do we generate future populations? Use TDM vehicle ownership submodel to grow some source types, and employment growth for commercial vehicles?	The TDM can be used to determine the growth in personal automobiles, commercial vehicles, and trucks for each model year. These vehicles would then be allocated to the source types they belong to.
3.	Vehicle type VMT (several different types): 1. VMT by 5 HPMS vehicle types (HPMSvTypeYear) 2. VMT fraction by hour by road type and sourcetype.	Can 2016 HPMS can be adjusted to summer day from HPMS data; will this be calibrated to TDM? Hour fractions can be developed from the TDM	The HPMS data can be calibrated using VMT/ADT adjustment factors provided by TDOT and KYTC. TDM calibrations are based on the HPMS data. Hour fractions have been provided through the UT data.
4.	I/M Programs	NA	
5.	Age distribution: 1 to 30 years for MOVES source types (13 types).	UT data available for 2014. Assume same age distribution for all future years.	This data can be used as-is and was received from TDEC.

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6.	Average speed distribution: fraction of driving time in each speed bin for each sourcetype by roadtype for each hour of the day.	Obtained from TDM.	NSI will develop this data for all four analysis years using the TDM. INRIX data will be used to compare base year TDM speeds to NPMRDS data to develop speed adjustment factors for future years.
7.	Fuel supply and formulation information if different from default information.	For historical years, use the MOVES defaults since it is based on sampling data. For future years, develop 'worst case' fuel formulations (maximum RVP) as per EPA guidance.	TDEC has provided this data.
8.	Meteorological data: temperature and humidity for each hour of the day for a typical day in the month.	Convert current MOBILE6.2 values in the SIP using EPA's Meteorologicaldataconverter_mobile6.xls.	TDEC has provided this data.
9.	Ramp fraction: percent VHT on the ramp for controlled access facilities.	Obtain from TDM.	NSI will develop this data for each analysis year using the TDM.

Appendix D: MOVES Model Inputs

Table D-1: Road Type Distribution by Year

sourceTypeID	roadTypeID	roadTypeVMTFraction		
		2026	2036	2045
11	1	0.0000	0.0000	0.0000
11	2	0.0833	0.0840	0.0825
11	3	0.1414	0.1403	0.1443
11	4	0.0488	0.0483	0.0482
11	5	0.7266	0.7273	0.7250
21	1	0.0000	0.0000	0.0000
21	2	0.0320	0.0323	0.0318
21	3	0.1214	0.1206	0.1240
21	4	0.0777	0.0770	0.0768
21	5	0.7688	0.7700	0.7675
31	1	0.0000	0.0000	0.0000
31	2	0.0320	0.0323	0.0318
31	3	0.1214	0.1206	0.1240
31	4	0.0777	0.0770	0.0768
31	5	0.7688	0.7700	0.7675
32	1	0.0000	0.0000	0.0000
32	2	0.0320	0.0323	0.0318
32	3	0.1214	0.1206	0.1240
32	4	0.0777	0.0770	0.0768
32	5	0.7688	0.7700	0.7675
41	1	0.0000	0.0000	0.0000
41	2	0.2077	0.2097	0.2067
41	3	0.0827	0.0821	0.0847
41	4	0.2727	0.2704	0.2706
41	5	0.4370	0.4378	0.4380
42	1	0.0000	0.0000	0.0000
42	2	0.2077	0.2097	0.2067
42	3	0.0827	0.0821	0.0847
42	4	0.2727	0.2704	0.2706
42	5	0.4370	0.4378	0.4380
43	1	0.0000	0.0000	0.0000
43	2	0.2077	0.2097	0.2067
43	3	0.0827	0.0821	0.0847
43	4	0.2727	0.2704	0.2706
43	5	0.4370	0.4378	0.4380
51	1	0.0000	0.0000	0.0000
51	2	0.0666	0.0672	0.0660
51	3	0.1273	0.1265	0.1300
51	4	0.1276	0.1265	0.1262

sourceTypeID	roadTypeID	roadTypeVMTFraction		
		2026	2036	2045
51	5	0.6785	0.6798	0.6777
52	1	0.0000	0.0000	0.0000
52	2	0.0666	0.0672	0.0660
52	3	0.1273	0.1265	0.1300
52	4	0.1276	0.1265	0.1262
52	5	0.6785	0.6798	0.6777
53	1	0.0000	0.0000	0.0000
53	2	0.0666	0.0672	0.0660
53	3	0.1273	0.1265	0.1300
53	4	0.1276	0.1265	0.1262
53	5	0.6785	0.6798	0.6777
54	1	0.0000	0.0000	0.0000
54	2	0.0666	0.0672	0.0660
54	3	0.1273	0.1265	0.1300
54	4	0.1276	0.1265	0.1262
54	5	0.6785	0.6798	0.6777
61	1	0.0000	0.0000	0.0000
61	2	0.2040	0.2060	0.2031
61	3	0.0671	0.0667	0.0688
61	4	0.2683	0.2660	0.2663
61	5	0.4606	0.4613	0.4617
62	1	0.0000	0.0000	0.0000
62	2	0.2040	0.2060	0.2031
62	3	0.0671	0.0667	0.0688
62	4	0.2683	0.2660	0.2663
62	5	0.4606	0.4613	0.4617

Table D-2: Source Type Population by Year

sourceTypeID	sourceTypePopulation		
	2026	2036	2045
11	14,244	16,865	19,389
21	141,415	167,431	192,494
31	112,731	133,470	153,449
32	26,790	31,718	36,466
41	2	3	3
42	43	51	59
43	591	700	805
51	117	138	159
52	4,628	5,468	6,301
53	177	210	241
54	1,111	1,313	1,512
61	1,655	1,956	2,254
62	1,794	2,120	2,443

Table D-3: Vehicle Age Distribution by Year

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
11	0	0.0494	0.0494	0.0494
11	1	0.0539	0.0539	0.0539
11	2	0.0557	0.0557	0.0557
11	3	0.0393	0.0393	0.0393
11	4	0.0319	0.0319	0.0319
11	5	0.0739	0.0739	0.0739
11	6	0.0784	0.0784	0.0784
11	7	0.0953	0.0953	0.0953
11	8	0.0859	0.0859	0.0859
11	9	0.0727	0.0727	0.0727
11	10	0.0521	0.0521	0.0521
11	11	0.0621	0.0621	0.0621
11	12	0.0422	0.0422	0.0422
11	13	0.0318	0.0318	0.0318
11	14	0.0274	0.0274	0.0274
11	15	0.0223	0.0223	0.0223
11	16	0.0142	0.0142	0.0142
11	17	0.0125	0.0125	0.0125
11	18	0.0134	0.0134	0.0134
11	19	0.0100	0.0100	0.0100

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
11	20	0.0058	0.0058	0.0058
11	21	0.0065	0.0065	0.0065
11	22	0.0042	0.0042	0.0042
11	23	0.0036	0.0036	0.0036
11	24	0.0049	0.0049	0.0049
11	25	0.0030	0.0030	0.0030
11	26	0.0033	0.0033	0.0033
11	27	0.0028	0.0028	0.0028
11	28	0.0053	0.0053	0.0053
11	29	0.0033	0.0033	0.0033
11	30	0.0329	0.0329	0.0329
21	0	0.0573	0.0573	0.0573
21	1	0.0725	0.0725	0.0725
21	2	0.0728	0.0728	0.0728
21	3	0.0532	0.0532	0.0532
21	4	0.0568	0.0568	0.0568
21	5	0.0503	0.0503	0.0503
21	6	0.0632	0.0632	0.0632
21	7	0.0674	0.0674	0.0674
21	8	0.0592	0.0592	0.0592
21	9	0.0553	0.0553	0.0553
21	10	0.0495	0.0495	0.0495
21	11	0.0479	0.0479	0.0479
21	12	0.0432	0.0432	0.0432
21	13	0.0388	0.0388	0.0388
21	14	0.0397	0.0397	0.0397
21	15	0.0305	0.0305	0.0305
21	16	0.0250	0.0250	0.0250
21	17	0.0205	0.0205	0.0205
21	18	0.0153	0.0153	0.0153
21	19	0.0151	0.0151	0.0151
21	20	0.0111	0.0111	0.0111
21	21	0.0090	0.0090	0.0090
21	22	0.0068	0.0068	0.0068
21	23	0.0057	0.0057	0.0057
21	24	0.0037	0.0037	0.0037
21	25	0.0035	0.0035	0.0035
21	26	0.0029	0.0029	0.0029
21	27	0.0027	0.0027	0.0027
21	28	0.0022	0.0022	0.0022
21	29	0.0020	0.0020	0.0020

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
21	30	0.0167	0.0167	0.0167
31	0	0.0470	0.0470	0.0470
31	1	0.0527	0.0527	0.0527
31	2	0.0453	0.0453	0.0453
31	3	0.0475	0.0475	0.0475
31	4	0.0405	0.0405	0.0405
31	5	0.0296	0.0296	0.0296
31	6	0.0492	0.0492	0.0492
31	7	0.0579	0.0579	0.0579
31	8	0.0585	0.0585	0.0585
31	9	0.0647	0.0647	0.0647
31	10	0.0683	0.0683	0.0683
31	11	0.0573	0.0573	0.0573
31	12	0.0538	0.0538	0.0538
31	13	0.0446	0.0446	0.0446
31	14	0.0448	0.0448	0.0448
31	15	0.0394	0.0394	0.0394
31	16	0.0292	0.0292	0.0292
31	17	0.0280	0.0280	0.0280
31	18	0.0198	0.0198	0.0198
31	19	0.0218	0.0218	0.0218
31	20	0.0192	0.0192	0.0192
31	21	0.0132	0.0132	0.0132
31	22	0.0097	0.0097	0.0097
31	23	0.0082	0.0082	0.0082
31	24	0.0071	0.0071	0.0071
31	25	0.0070	0.0070	0.0070
31	26	0.0062	0.0062	0.0062
31	27	0.0043	0.0043	0.0043
31	28	0.0045	0.0045	0.0045
31	29	0.0035	0.0035	0.0035
31	30	0.0171	0.0171	0.0171
32	0	0.1069	0.1069	0.1069
32	1	0.1002	0.1002	0.1002
32	2	0.0950	0.0950	0.0950
32	3	0.0979	0.0979	0.0979
32	4	0.0790	0.0790	0.0790
32	5	0.0539	0.0539	0.0539
32	6	0.0835	0.0835	0.0835
32	7	0.0835	0.0835	0.0835
32	8	0.0617	0.0617	0.0617

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
32	9	0.0537	0.0537	0.0537
32	10	0.0434	0.0434	0.0434
32	11	0.0300	0.0300	0.0300
32	12	0.0263	0.0263	0.0263
32	13	0.0164	0.0164	0.0164
32	14	0.0126	0.0126	0.0126
32	15	0.0129	0.0129	0.0129
32	16	0.0056	0.0056	0.0056
32	17	0.0083	0.0083	0.0083
32	18	0.0046	0.0046	0.0046
32	19	0.0060	0.0060	0.0060
32	20	0.0049	0.0049	0.0049
32	21	0.0022	0.0022	0.0022
32	22	0.0015	0.0015	0.0015
32	23	0.0015	0.0015	0.0015
32	24	0.0014	0.0014	0.0014
32	25	0.0014	0.0014	0.0014
32	26	0.0011	0.0011	0.0011
32	27	0.0007	0.0007	0.0007
32	28	0.0008	0.0008	0.0008
32	29	0.0005	0.0005	0.0005
32	30	0.0025	0.0025	0.0025
41	0	0.0555	0.0555	0.0555
41	1	0.0498	0.0498	0.0498
41	2	0.0460	0.0460	0.0460
41	3	0.0422	0.0422	0.0422
41	4	0.0373	0.0373	0.0373
41	5	0.0311	0.0311	0.0311
41	6	0.0400	0.0400	0.0400
41	7	0.0523	0.0523	0.0523
41	8	0.0534	0.0534	0.0534
41	9	0.0551	0.0551	0.0551
41	10	0.0535	0.0535	0.0535
41	11	0.0493	0.0493	0.0493
41	12	0.0461	0.0461	0.0461
41	13	0.0440	0.0440	0.0440
41	14	0.0418	0.0418	0.0418
41	15	0.0406	0.0406	0.0406
41	16	0.0306	0.0306	0.0306
41	17	0.0248	0.0248	0.0248
41	18	0.0204	0.0204	0.0204

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
41	19	0.0265	0.0265	0.0265
41	20	0.0203	0.0203	0.0203
41	21	0.0166	0.0166	0.0166
41	22	0.0123	0.0123	0.0123
41	23	0.0138	0.0138	0.0138
41	24	0.0155	0.0155	0.0155
41	25	0.0153	0.0153	0.0153
41	26	0.0142	0.0142	0.0142
41	27	0.0147	0.0147	0.0147
41	28	0.0123	0.0123	0.0123
41	29	0.0107	0.0107	0.0107
41	30	0.0141	0.0141	0.0141
42	0	0.0000	0.0000	0.0000
42	1	0.0000	0.0000	0.0000
42	2	0.0000	0.0000	0.0000
42	3	0.0000	0.0000	0.0000
42	4	0.2609	0.2609	0.2609
42	5	0.0000	0.0000	0.0000
42	6	0.0000	0.0000	0.0000
42	7	0.0000	0.0000	0.0000
42	8	0.1304	0.1304	0.1304
42	9	0.2609	0.2609	0.2609
42	10	0.0000	0.0000	0.0000
42	11	0.1304	0.1304	0.1304
42	12	0.0000	0.0000	0.0000
42	13	0.2174	0.2174	0.2174
42	14	0.0000	0.0000	0.0000
42	15	0.0000	0.0000	0.0000
42	16	0.0000	0.0000	0.0000
42	17	0.0000	0.0000	0.0000
42	18	0.0000	0.0000	0.0000
42	19	0.0000	0.0000	0.0000
42	20	0.0000	0.0000	0.0000
42	21	0.0000	0.0000	0.0000
42	22	0.0000	0.0000	0.0000
42	23	0.0000	0.0000	0.0000
42	24	0.0000	0.0000	0.0000
42	25	0.0000	0.0000	0.0000
42	26	0.0000	0.0000	0.0000
42	27	0.0000	0.0000	0.0000
42	28	0.0000	0.0000	0.0000

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
42	29	0.0000	0.0000	0.0000
42	30	0.0000	0.0000	0.0000
43	0	0.0000	0.0000	0.0000
43	1	0.0448	0.0448	0.0448
43	2	0.0402	0.0402	0.0402
43	3	0.0541	0.0541	0.0541
43	4	0.0699	0.0699	0.0699
43	5	0.0459	0.0459	0.0459
43	6	0.0536	0.0536	0.0536
43	7	0.0849	0.0849	0.0849
43	8	0.0742	0.0742	0.0742
43	9	0.0504	0.0504	0.0504
43	10	0.0567	0.0567	0.0567
43	11	0.0668	0.0668	0.0668
43	12	0.0539	0.0539	0.0539
43	13	0.0675	0.0675	0.0675
43	14	0.0848	0.0848	0.0848
43	15	0.0797	0.0797	0.0797
43	16	0.0381	0.0381	0.0381
43	17	0.0258	0.0258	0.0258
43	18	0.0085	0.0085	0.0085
43	19	0.0003	0.0003	0.0003
43	20	0.0000	0.0000	0.0000
43	21	0.0000	0.0000	0.0000
43	22	0.0000	0.0000	0.0000
43	23	0.0000	0.0000	0.0000
43	24	0.0000	0.0000	0.0000
43	25	0.0000	0.0000	0.0000
43	26	0.0000	0.0000	0.0000
43	27	0.0000	0.0000	0.0000
43	28	0.0000	0.0000	0.0000
43	29	0.0000	0.0000	0.0000
43	30	0.0000	0.0000	0.0000
51	0	0.0648	0.0648	0.0648
51	1	0.0583	0.0583	0.0583
51	2	0.0535	0.0535	0.0535
51	3	0.0290	0.0290	0.0290
51	4	0.0230	0.0230	0.0230
51	5	0.0303	0.0303	0.0303
51	6	0.0234	0.0234	0.0234
51	7	0.0814	0.0814	0.0814

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
51	8	0.0606	0.0606	0.0606
51	9	0.0570	0.0570	0.0570
51	10	0.0342	0.0342	0.0342
51	11	0.0334	0.0334	0.0334
51	12	0.0241	0.0241	0.0241
51	13	0.0295	0.0295	0.0295
51	14	0.0403	0.0403	0.0403
51	15	0.0577	0.0577	0.0577
51	16	0.0527	0.0527	0.0527
51	17	0.0254	0.0254	0.0254
51	18	0.0328	0.0328	0.0328
51	19	0.0420	0.0420	0.0420
51	20	0.0293	0.0293	0.0293
51	21	0.0133	0.0133	0.0133
51	22	0.0119	0.0119	0.0119
51	23	0.0184	0.0184	0.0184
51	24	0.0131	0.0131	0.0131
51	25	0.0201	0.0201	0.0201
51	26	0.0115	0.0115	0.0115
51	27	0.0103	0.0103	0.0103
51	28	0.0053	0.0053	0.0053
51	29	0.0053	0.0053	0.0053
51	30	0.0081	0.0081	0.0081
52	0	0.0313	0.0313	0.0313
52	1	0.0350	0.0350	0.0350
52	2	0.0428	0.0428	0.0428
52	3	0.0282	0.0282	0.0282
52	4	0.0152	0.0152	0.0152
52	5	0.0277	0.0277	0.0277
52	6	0.0549	0.0549	0.0549
52	7	0.0695	0.0695	0.0695
52	8	0.0711	0.0711	0.0711
52	9	0.0637	0.0637	0.0637
52	10	0.0449	0.0449	0.0449
52	11	0.0402	0.0402	0.0402
52	12	0.0423	0.0423	0.0423
52	13	0.0340	0.0340	0.0340
52	14	0.0528	0.0528	0.0528
52	15	0.0512	0.0512	0.0512
52	16	0.0313	0.0313	0.0313
52	17	0.0272	0.0272	0.0272

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
52	18	0.0167	0.0167	0.0167
52	19	0.0392	0.0392	0.0392
52	20	0.0209	0.0209	0.0209
52	21	0.0110	0.0110	0.0110
52	22	0.0125	0.0125	0.0125
52	23	0.0068	0.0068	0.0068
52	24	0.0110	0.0110	0.0110
52	25	0.0115	0.0115	0.0115
52	26	0.0136	0.0136	0.0136
52	27	0.0089	0.0089	0.0089
52	28	0.0089	0.0089	0.0089
52	29	0.0078	0.0078	0.0078
52	30	0.0679	0.0679	0.0679
53	0	0.0649	0.0649	0.0649
53	1	0.0585	0.0585	0.0585
53	2	0.0538	0.0538	0.0538
53	3	0.0207	0.0207	0.0207
53	4	0.0130	0.0130	0.0130
53	5	0.0153	0.0153	0.0153
53	6	0.0267	0.0267	0.0267
53	7	0.0465	0.0465	0.0465
53	8	0.0412	0.0412	0.0412
53	9	0.0381	0.0381	0.0381
53	10	0.0281	0.0281	0.0281
53	11	0.0238	0.0238	0.0238
53	12	0.0200	0.0200	0.0200
53	13	0.0490	0.0490	0.0490
53	14	0.1206	0.1206	0.1206
53	15	0.1046	0.1046	0.1046
53	16	0.0175	0.0175	0.0175
53	17	0.0144	0.0144	0.0144
53	18	0.0160	0.0160	0.0160
53	19	0.0274	0.0274	0.0274
53	20	0.0224	0.0224	0.0224
53	21	0.0622	0.0622	0.0622
53	22	0.0110	0.0110	0.0110
53	23	0.0169	0.0169	0.0169
53	24	0.0104	0.0104	0.0104
53	25	0.0422	0.0422	0.0422
53	26	0.0134	0.0134	0.0134
53	27	0.0048	0.0048	0.0048

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
53	28	0.0050	0.0050	0.0050
53	29	0.0043	0.0043	0.0043
53	30	0.0073	0.0073	0.0073
54	0	0.0649	0.0649	0.0649
54	1	0.0584	0.0584	0.0584
54	2	0.0537	0.0537	0.0537
54	3	0.0400	0.0400	0.0400
54	4	0.0353	0.0353	0.0353
54	5	0.0294	0.0294	0.0294
54	6	0.0379	0.0379	0.0379
54	7	0.0494	0.0494	0.0494
54	8	0.0503	0.0503	0.0503
54	9	0.0519	0.0519	0.0519
54	10	0.0503	0.0503	0.0503
54	11	0.0464	0.0464	0.0464
54	12	0.0433	0.0433	0.0433
54	13	0.0413	0.0413	0.0413
54	14	0.0392	0.0392	0.0392
54	15	0.0380	0.0380	0.0380
54	16	0.0222	0.0222	0.0222
54	17	0.0341	0.0341	0.0341
54	18	0.0209	0.0209	0.0209
54	19	0.0247	0.0247	0.0247
54	20	0.0233	0.0233	0.0233
54	21	0.0160	0.0160	0.0160
54	22	0.0140	0.0140	0.0140
54	23	0.0103	0.0103	0.0103
54	24	0.0135	0.0135	0.0135
54	25	0.0174	0.0174	0.0174
54	26	0.0154	0.0154	0.0154
54	27	0.0150	0.0150	0.0150
54	28	0.0110	0.0110	0.0110
54	29	0.0116	0.0116	0.0116
54	30	0.0207	0.0207	0.0207
61	0	0.0481	0.0481	0.0481
61	1	0.0428	0.0428	0.0428
61	2	0.0423	0.0423	0.0423
61	3	0.0209	0.0209	0.0209
61	4	0.0156	0.0156	0.0156
61	5	0.0202	0.0202	0.0202
61	6	0.0181	0.0181	0.0181

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
61	7	0.0586	0.0586	0.0586
61	8	0.0430	0.0430	0.0430
61	9	0.0418	0.0418	0.0418
61	10	0.0262	0.0262	0.0262
61	11	0.0232	0.0232	0.0232
61	12	0.0180	0.0180	0.0180
61	13	0.0348	0.0348	0.0348
61	14	0.0476	0.0476	0.0476
61	15	0.0425	0.0425	0.0425
61	16	0.0429	0.0429	0.0429
61	17	0.0348	0.0348	0.0348
61	18	0.0480	0.0480	0.0480
61	19	0.0541	0.0541	0.0541
61	20	0.0445	0.0445	0.0445
61	21	0.0323	0.0323	0.0323
61	22	0.0246	0.0246	0.0246
61	23	0.0227	0.0227	0.0227
61	24	0.0281	0.0281	0.0281
61	25	0.0284	0.0284	0.0284
61	26	0.0261	0.0261	0.0261
61	27	0.0205	0.0205	0.0205
61	28	0.0142	0.0142	0.0142
61	29	0.0143	0.0143	0.0143
61	30	0.0208	0.0208	0.0208
62	0	0.0474	0.0474	0.0474
62	1	0.0420	0.0420	0.0420
62	2	0.0404	0.0404	0.0404
62	3	0.0436	0.0436	0.0436
62	4	0.0345	0.0345	0.0345
62	5	0.0455	0.0455	0.0455
62	6	0.0353	0.0353	0.0353
62	7	0.1223	0.1223	0.1223
62	8	0.0904	0.0904	0.0904
62	9	0.0853	0.0853	0.0853
62	10	0.0509	0.0509	0.0509
62	11	0.0494	0.0494	0.0494
62	12	0.0359	0.0359	0.0359
62	13	0.0411	0.0411	0.0411
62	14	0.0653	0.0653	0.0653
62	15	0.0483	0.0483	0.0483
62	16	0.0320	0.0320	0.0320

sourceTypeID	ageID	ageFraction		
		2026	2036	2045
62	17	0.0180	0.0180	0.0180
62	18	0.0194	0.0194	0.0194
62	19	0.0172	0.0172	0.0172
62	20	0.0103	0.0103	0.0103
62	21	0.0069	0.0069	0.0069
62	22	0.0041	0.0041	0.0041
62	23	0.0032	0.0032	0.0032
62	24	0.0025	0.0025	0.0025
62	25	0.0025	0.0025	0.0025
62	26	0.0015	0.0015	0.0015
62	27	0.0025	0.0025	0.0025
62	28	0.0007	0.0007	0.0007
62	29	0.0007	0.0007	0.0007
62	30	0.0010	0.0010	0.0010

Table D-4: Daily VMT by Year

HPMSVtypeID	monthID	dayID	Daily VMT		
			2026	2036	2045
10	7	5	34,039	37,257	43,779
25	7	5	4,705,564	5,150,469	6,052,073
40	7	5	3,056	3,345	3,930
50	7	5	97,430	106,642	125,310
60	7	5	303,893	332,625	390,852

Table D-5: Ramp Fraction by Year

roadTypeID	rampFraction		
	2026	2036	2045
2	0.0000	0.0000	0.0000
4	0.0566	0.0533	0.0428

Table D-6: Humidity and Temperature

monthID	zoneID	HourID	temperature	relHumidity
7	471250	1	74.4	60.0
7	471250	2	73.0	63.0
7	471250	3	71.8	65.5
7	471250	4	71.0	67.4
7	471250	5	70.4	68.9
7	471250	6	69.6	70.6
7	471250	7	69.0	72.1
7	471250	8	69.5	70.8
7	471250	9	72.6	63.7
7	471250	10	77.6	53.9
7	471250	11	82.8	45.6
7	471250	12	87.1	39.6
7	471250	13	91.0	35.1
7	471250	14	93.1	32.9
7	471250	15	93.8	32.2
7	471250	16	94.0	32.0
7	471250	17	93.5	32.5
7	471250	18	92.0	34.0
7	471250	19	89.5	36.7
7	471250	20	86.3	40.7
7	471250	21	83.1	45.1
7	471250	22	80.3	49.5
7	471250	23	78.3	52.8
7	471250	24	76.3	56.4

Table D-7: Fuel Supply

fuelRegionID	fuelYearID	monthGroupID	fuelFormulationID	marketShare	marketShareCV
2026					
200000000	2026	7	90	1.000000	0.5
200000000	2026	7	4631	0.881478	0.5
200000000	2026	7	4633	0.118522	0.5
200000000	2026	7	25005	1.000000	0.5
200000000	2026	7	27002	1.000000	0.5
200000000	2026	7	28001	1.000000	0.5
2036					
200000000	2036	7	90	1.000000	0.5
200000000	2036	7	5921	0.716553	0.5
200000000	2036	7	5923	0.283447	0.5
200000000	2036	7	25005	1.000000	0.5
200000000	2036	7	27002	1.000000	0.5
200000000	2036	7	28001	1.000000	0.5
2045					
200000000	2045	7	90	1.000000	0.5
200000000	2045	7	7082	0.618510	0.5
200000000	2045	7	7084	0.381490	0.5
200000000	2045	7	25005	1.000000	0.5
200000000	2045	7	27002	1.000000	0.5
200000000	2045	7	28001	1.000000	0.5

Table D-8: Fuel Formulation

Fuel Formulat -ion ID	Fuel Subtype ID	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content	Benzene Content	e200	e300	BioDiesel EsterVolume	Cetane Index	PAH Content	T50	T90
2026																	
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.409
97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195.735	324.864
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
4631	12	9.6	10	10	0	0	0	23.4	6.67	0.63	50.6759	82.6309	0	0	0	198.437	331.087
4633	15	8.6	10	15	0	0	0	22.06	5.49	0.63	56.7666	83.1523	0	0	0	186.007	328.717
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2036																	
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.409
97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195.735	324.864
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
5921	12	9.6	10	10	0	0	0	23.4	6.67	0.63	50.6759	82.6309	0	0	0	198.437	331.087

Fuel Formulat -ion ID	Fuel Subtype ID	RVP	Sulfur Level	ETOH Volume	MTBE Volume	ETBE Volume	TAME Volume	Aromatic Content	Olefin Content	Benzene Content	e200	e300	BioDiesel EsterVolume	Cetane Index	PAH Content	T50	T90
5923	15	8.6	10	15	0	0	0	22.06	5.49	0.63	56.7666	83.1523	0	0	0	186.007	328.717
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2045																	
10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
90	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199.816	329.409
97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195.735	324.864
98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	218	329
7082	12	9.6	10	10	0	0	0	23.4	6.67	0.63	50.6759	82.6309	0	0	0	198.437	331.087
7084	15	8.6	10	15	0	0	0	22.06	5.49	0.63	56.7666	83.1523	0	0	0	186.007	328.717
25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0	0
27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	200	300
28001	30	0	7.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table D-9: Fuel Usage

countyID	modelYearGroupID	sourceBinFuelTypeID	fuelSupplyFuelTypeID	usageFraction
2026				
47125	0	1	1	1.000000
47125	0	2	2	1.000000
47125	0	3	3	1.000000
47125	0	5	1	0.759473
47125	0	5	5	0.240527
47125	0	9	9	1.000000
2036				
47125	0	1	1	1.000000
47125	0	2	2	1.000000
47125	0	3	3	1.000000
47125	0	5	1	0.747799
47125	0	5	5	0.252201
47125	0	9	9	1.000000
2045				
47125	0	1	1	1.000000
47125	0	2	2	1.000000
47125	0	3	3	1.000000
47125	0	5	1	0.791668
47125	0	5	5	0.208332
47125	0	9	9	1.000000

Appendix E: MOVES Summary Outputs

Table E-1 2026 Summary Outputs

Month	Day	Hour	State	County	Run	NMHC	NOx	TotalHC	VOC	Distance
2026	7	5	1	47	47125	5	25,756	37,286	29,715	28,940
2026	7	5	2	47	47125	5	25,244	34,714	29,049	28,388
2026	7	5	3	47	47125	5	21,557	31,974	25,102	24,448
2026	7	5	4	47	47125	5	21,604	33,161	24,990	24,360
2026	7	5	5	47	47125	5	25,146	37,891	28,498	27,950
2026	7	5	6	47	47125	5	36,594	51,410	40,436	39,779
2026	7	5	7	47	47125	5	80,523	86,099	86,757	85,364
2026	7	5	8	47	47125	5	120,239	120,025	127,987	127,121
2026	7	5	9	47	47125	5	121,510	128,743	129,239	128,874
2026	7	5	10	47	47125	5	99,089	120,075	104,756	106,774
2026	7	5	11	47	47125	5	115,434	116,487	120,844	125,381
2026	7	5	12	47	47125	5	138,371	138,379	144,595	149,721
2026	7	5	13	47	47125	5	145,866	136,800	151,909	158,124
2026	7	5	14	47	47125	5	131,857	131,141	137,820	142,834
2026	7	5	15	47	47125	5	118,741	133,598	124,799	127,942
2026	7	5	16	47	47125	5	129,841	146,900	136,949	138,841
2026	7	5	17	47	47125	5	130,434	143,140	137,511	139,722
2026	7	5	18	47	47125	5	141,639	141,462	149,037	151,884
2026	7	5	19	47	47125	5	130,379	119,391	137,258	140,755
2026	7	5	20	47	47125	5	102,672	95,552	108,602	111,574
2026	7	5	21	47	47125	5	83,859	84,073	89,782	90,943
2026	7	5	22	47	47125	5	59,619	64,449	64,675	65,330
2026	7	5	23	47	47125	5	49,839	55,486	54,754	54,587
2026	7	5	24	47	47125	5	38,721	44,902	43,118	42,914
							2,233,138.00		2,262,550.00	Grams
							4,923.22		4,988.06	Pounds
							2.46		2.49	Tons

Table E-2 2036 Summary Outputs

Month	Day	Hour	State	County	Run	NMHC	NOx	TotalHC	VOC	Distance
2036	7	5	1	47	47125	7	21,271	35,194	25,523	24,247
2036	7	5	2	47	47125	7	21,238	33,466	25,351	24,205
2036	7	5	3	47	47125	7	18,820	31,522	22,697	21,574
2036	7	5	4	47	47125	7	18,487	31,684	22,163	21,102
2036	7	5	5	47	47125	7	20,329	33,265	23,861	22,953
2036	7	5	6	47	47125	7	27,346	39,659	31,178	30,268
2036	7	5	7	47	47125	7	50,223	57,916	55,460	54,164
2036	7	5	8	47	47125	7	75,802	75,705	82,046	81,436
2036	7	5	9	47	47125	7	76,260	81,048	82,521	82,281
2036	7	5	10	47	47125	7	67,859	77,415	72,594	74,483
2036	7	5	11	47	47125	7	82,398	75,735	86,961	91,063
2036	7	5	12	47	47125	7	96,057	85,795	101,060	105,780
2036	7	5	13	47	47125	7	103,327	83,388	108,190	113,952
2036	7	5	14	47	47125	7	90,720	80,565	95,485	99,988
2036	7	5	15	47	47125	7	79,456	81,995	84,418	87,060
2036	7	5	16	47	47125	7	81,729	87,094	87,193	88,901
2036	7	5	17	47	47125	7	84,111	85,084	89,706	91,683
2036	7	5	18	47	47125	7	92,150	83,215	97,929	100,617
2036	7	5	19	47	47125	7	87,487	74,448	93,112	96,255
2036	7	5	20	47	47125	7	72,160	63,685	77,393	79,903
2036	7	5	21	47	47125	7	57,595	58,218	62,913	63,715
2036	7	5	22	47	47125	7	43,828	49,386	48,767	48,941
2036	7	5	23	47	47125	7	36,043	44,865	40,892	40,262
2036	7	5	24	47	47125	7	30,180	39,830	34,755	34,030
							1,490,177.00		1,578,863.00	Grams
							3,285.27		3,480.79	Pounds
							1.64		1.74	Tons

Table E-3 2045 Summary Outputs

Month	Day	Hour	State	County	Run	NMHC	NOx	TotalHC	VOC	Distance
2045	7	5	1	47	47125	6	21,933	40,110	26,832	25,142
2045	7	5	2	47	47125	6	21,939	38,268	26,682	25,140
2045	7	5	3	47	47125	6	19,621	36,280	24,105	22,595
2045	7	5	4	47	47125	6	19,172	36,361	23,418	21,994
2045	7	5	5	47	47125	6	20,841	37,707	24,900	23,663
2045	7	5	6	47	47125	6	27,591	43,739	31,946	30,730
2045	7	5	7	47	47125	6	48,108	61,607	53,814	52,246
2045	7	5	8	47	47125	6	72,484	79,010	79,193	78,381
2045	7	5	9	47	47125	6	72,821	84,460	79,586	79,122
2045	7	5	10	47	47125	6	66,656	82,087	71,832	73,698
2045	7	5	11	47	47125	6	82,001	80,573	87,001	91,265
2045	7	5	12	47	47125	6	94,435	89,609	99,843	104,740
2045	7	5	13	47	47125	6	102,657	86,568	107,905	114,013
2045	7	5	14	47	47125	6	89,645	84,024	94,791	99,506
2045	7	5	15	47	47125	6	77,851	85,380	83,233	85,893
2045	7	5	16	47	47125	6	78,698	89,418	84,527	86,230
2045	7	5	17	47	47125	6	81,275	87,208	87,272	89,219
2045	7	5	18	47	47125	6	89,071	84,791	95,236	97,949
2045	7	5	19	47	47125	6	84,991	77,059	91,065	94,176
2045	7	5	20	47	47125	6	70,997	67,121	76,761	79,162
2045	7	5	21	47	47125	6	56,499	61,875	62,387	62,977
2045	7	5	22	47	47125	6	43,729	53,860	49,303	49,172
2045	7	5	23	47	47125	6	35,850	49,446	41,335	40,350
2045	7	5	24	47	47125	6	30,562	44,817	35,795	34,690
							1,581,378.00		1,562,053.00	Grams
							3,486.34		3,443.73	Pounds
							1.74		1.72	Tons

Appendix F: MOVES Model Input Development Report

Clarksville Urbanized Area MPO
Metropolitan Transportation Plan 2045

MOVES Model Input Development

Prepared For:

Prepared By:

NEEL-SCHAFFER
Solutions you can build upon

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LIST OF TABLES

MOVES Model Documentation

This report includes a description of the data and procedures used to develop the inputs for the MOVES2014a model to determine air quality conformity for the CUAMPO 2045 Metropolitan Transportation Plan. This report does not include how to operate the model.

1.0 Required Model Inputs

The MOVES2014a model requires the user to provide the following inputs for the RunSpec:

- Scale
- Time Spans
- Geographic Bounds
- Vehicles/Equipment
- Road Type
- Pollutants and Processes
- Strategies/Rate of Progress

The MOVES2014a model requires the user to provide the following inputs for the County Data Manager:

- Age Distribution
- Average Speed Distribution
- Fuel Data
- Meteorology Data
- Ramp Fraction
- Road Type Distribution
- Source Type Population

- Vehicle Type VMT
- I/M Programs

2.0 RunSpec Settings

For each MOVES model run, the parameters are contained within the RunSpec. These inputs determine the geographic and temporal scale of the model run, as well as the specific emissions to be calculated. The settings used in the conformity analysis were:

- Scale
    - Onroad (for Model)
    - County (for Domain/Scale)
    - Inventory (for Calculation Type)
- Time Spans
    - Hourly (for Time Aggregation Level)
    - Analysis years of 2026, 2036, and 2045
    - Weekdays (for analysis Days)
    - Month of July
    - All hours
- Geographic Bounds
    - Montgomery County, Tennessee
- Vehicles/Equipment
    - All on-road vehicle and fuel combinations selected
- Road Type
    - All road types selected
- Pollutants and Processes
    - NOx
    - VOC
    - Total Gaseous Hydrocarbons (VOC pre-requisite)

- Non-Methane Hydrocarbons (VOC pre-requisite)
- Refueling Displacement Vapor Loss and Refueling Spillage Loss are de-selected in the RunSpec as per the pre-analysis consensus plan.

- Strategies/Rate of Progress
  - Rate of Progress is not selected in the RunSpec as the MPO is not required to do so.

3.0 County Data Manager Inputs

3.1 Data Sources

The MOVES model provides many of the necessary inputs through its own internal database or available default data. However, some inputs need to be provided by the model user. Table 1 displays the initial data sources used for the Montgomery County, Tennessee MOVES input data.

Table 1: Data Sources for MOVES Input Files

Input	Description	Source(s)
roadTypeDistribution	Distribution of VMT within the modeled area based on MOVES roadway types	University of Tennessee, 2014
sourceTypeYear	Total number of vehicles in MOVES vehicle classes	University of Tennessee, 2014
HPMSVTypeYear	Annual VMT of the modeled area by HPMS vehicle classes	University of Tennessee, 2014
HPMSVTypeDay	Daily VMT of the modeled area by HPMS vehicle classes	University of Tennessee, 2014 HPMS, 2016 TDOT, 2018 TDM, 2018
monthVMTFraction	Monthly VMT adjustment factors when using annual VMT.	University of Tennessee, 2014
dayVMTFraction	Daily VMT adjustment factors when using annual VMT	University of Tennessee, 2014
hourVMTFraction	Hourly adjustment factors.	Coordinating Research Council A-100 project, 2017 University of Tennessee, 2014
avgSpeedFraction	Speed distribution by MOVES speed bins, hour, and roadway type.	Coordinating Research Council A-100 project, 2017
ageDistribution	Vehicle age breakdown by source type	University of Tennessee, 2014
rampFraction	Percentage of interstate VHT on ramps	TDM, 2018
ZoneMonthHour	Area meteorology data	TDEC, 2018
FuelSupply	Fuels used in the modeled area	MOVES Defaults TDEC, 2018
FuelFormulation	Fuel formulation data within the modeled area	MOVES Defaults TDEC, 2018
FuelUsageFraction	Market share of fuels within the modeled area	MOVES Defaults TDEC, 2018
AVFT	Alternative Vehicle and Fuels Technologies	MOVES Defaults TDEC, 2018

3.2 Input Development Methodology

This section describes the methodology used to develop the necessary inputs for each model year.

roadTypeDistribution

The UT data provided the distribution of VMT by MOVES' source type and road type. This was accomplished using statewide vehicle classification summaries by the functional classification specific daily VMT data. Local data was not available for each source type. Where necessary, the same road type distribution for all source types within the HPMS vehicle (Table 2) class was used (i.e., Intercity Bus, Transit Bus & School Bus from Buses.) A road type fraction was not assigned to the non-road classification.

Table 2: MOVES Source Types and HPMS Vehicle Types

Source Type ID	Source Type Description	HPMS Vehicle Type ID	HPMS Vehicle Type Description
11	Motorcycle	10	Motorcycles
21	Passenger Car	25	Light Duty Vehicles- Short and Long Wheelbase
31	Passenger Truck		
32	Light Commercial Truck		
41	Intercity Bus	40	Buses
42	Transit Bus		
43	School Bus		
51	Refuse Truck	50	Single Unit Trucks
52	Single Unit Short-haul Truck		
53	Single Unit Long-haul Truck		
54	Motor Home		
61	Combination Short-haul Truck	60	Combination Trucks
62	Combination Long-haul Truck		

Source: EPA

However, the UT data reflects the MTP's base year (2016). As traffic patterns change due to growth, congestion, and construction, these distributions also change as roadway users select different roadway facilities to meet their needs. The distribution for each analysis year was created by:

1.) Using the MTP 2045 Travel Demand Model (TDM) to determine the VMT assigned to each MOVES roadway class for the base year and analysis years.

2.) Calculating the change in VMT, by MOVES roadway class, from the base year to each analysis year.

3.) Dividing the VMT change for each MOVES roadway class by the total VMT change between years to develop a growth factor for each MOVES roadway class.

4.) Applying the growth factor to the original distribution and normalizing the values (so that all values summed up to 1.0) to create a future year distribution, reflecting the "shift" in volume to other roadway classes.

sourceTypeYear

The UT data provides the base year number of vehicles in each of the 13 source types used in MOVES. As the region grows, the number of personal automobiles, commercial vehicles, and freight trucks in the modeled area will increase. The source types for the analysis years were created by:

1.) Using the TDM to obtain the household crossclassification counts, number of commercial vehicles, and number of freight trucks for the TDM base year and analysis years.

2.) Using the household classes to determine how many personal autos were in the county during each year.

3.) Summing the change in household autos and commercial vehicles from the base year to an analysis year to represent growth in total automobiles.

4.) Calculating the change in freight truck trips between the base year and an analysis year to represent the growth in total trucks.

5.) Using the calculated change in each category to determine the percent growth from the base year to an analysis year for the total auto and total trucks.

6.) Using the percent growth in total autos and total trucks to forecast the analysis year's total autos and total trucks by multiplying the percent growth by the original input data.

7.) Multiplying the analysis year's total auto and total truck populations by the proportions of each original data source type (within the total auto or total

truck population that they belong to) to produce the updated analysis year source type populations.

HPMSVTypeYear

This input data was developed by the UT in 2014. The vehicle class VMTs were developed using a modified version of the US EPA AADVMT calculator. It used state activity data, such as:

- Vehicle classification summaries by the functional classification
- County specific daily VMT
- Adjustment factors for day of the week and month

The Montgomery County MOVES model runs conducted for the conformity analysis use daily VMT. However, the annual VMT by vehicle class developed by the UT provides the proportion of daily VMT to be assigned to each HPMS vehicle class.

HPMSVTypeDay

The TDM provides daily VMTs by roadway link. Within the roadway network, each link contains information about its functional classification. The base year VMTs were aggregated by functional classification and compared to the HPMS dataset VMTs. Using this data, adjustment factors (shown in Table 3) were created that match the TDM VMTs to those in the HPMS data.

For Montgomery County, the entirety of the MOVES model area is covered by the TDM; meaning these VMTs can be used in the MOVES model after seasonal adjustment factors are applied. The seasonal adjustment factors are shown in Table 4. The sum of the VMTs were then applied to the proportion of the annual VMT by HPMS vehicle class to obtain the daily VMT by HPMS vehicle class.

Table 3: VMT Adjustment Factors

Functional Classification	Montgomery County Adjustment Factor
1	0.9447
2	0.8756
6	0.9845
7	0.9116
8	0.8990
9	0.0845
11	1.0165
14	0.9712
16	0.9419
17	1.0229
19	0.9447
Rural Centroid Connector	1.0000
Urban Centroid Connector	1.0000

Source: NSI, HPMS

Table 4: Seasonal Adjustment Factors

Functional Classification	Montgomery County Adjustment Factor
1	0.931
2	0.990
6	0.990
7	0.990
8	0.990
9	0.990
11	1.011
14	1.011
16	1.011
17	1.011
19	1.011
Rural Centroid Connector	0.990
Urban Centroid Connector	1.011

Source: TDOT

monthVMTFraction

Since the Montgomery County model runs use daily VMT, this model input is not required.

dayVMTFraction

Since the Montgomery County model runs use daily VMT, this model input is not required.

hourVMTFraction

This input was developed using data from the Coordinating Research Council (CRC) and the UT. In 2017, the CRC initiated the A-100 project, which sought to create county-level data for MOVES input files. This project resulted in developing hourly VMT distributions for source types 11, 21, 31, 32, 52, 53, 61, and 62. The CRC data for those source types was used in the Montgomery County MOVES model runs. The data for the remaining source types were provided by the 2014 UT dataset, which use the default values from the US EPA AADVMT calculator.

averageSpeedFraction

The CRC data was also used to determine the base year speed distribution. As with the hourly VMT, the speed data covers source types 11, 21, 31, 32, 52, 53, 61, and 62. Data for source types 41, 42, and 43 (buses) use the same distribution as source type 32 (light commercial trucks) since they are the closest equivalent. Data for source types 51 and 54 use the same distribution as source type 52 since they are all in the single unit truck category.

The speed distributions were updated by:

1.) Using the TDM to obtain the average daily speeds (by link) for each model year.

2.) Assigning each link to a MOVES speed bin and MOVES roadway type.

3.) Summing the total VHT for each speed bin and roadway type.

4.) For each roadway type, calculating the change in VHT for each speed bin from the base year to an analysis year.

5.) Using the calculated change to develop the relative percent of the total change for each speed bin.

6.) Creating an adjustment factor based on the relative percent of change to be applied to the base year distribution to create an adjusted distribution for the analysis year.

7.) Normalizing the analysis year distribution so that the percentages for all speed bins add up to 1.0.

ageDistribution

This input data was developed by the UT in 2014. As stated in the EPA guidance, this data is not adjusted between analysis years. The UT developed age distributions for the following vehicle types based on the state's motor vehicle registration data:

- Motorcycle
- Passenger Car
- Passenger Truck
- Light Commercial Truck
- Single Unit Short-haul Truck

Local data sources were used to develop age distributions for Transit Bus and School Bus. The national default age distributions were used for:

- Intercity Bus
- Refuse Truck
- Single Unit Long-haul Truck
- Motor Home
- Short-haul Combination Trucks
- Long-haul Combination Trucks

rampFraction

The TDM provides outputs on the daily VHT on each roadway link. The percent of the ramp VHT to the total interstate VHT is the rampFraction input. This input was calculated for each individual analysis year.

$$Ramp\ fraction = \frac{VHT\ on\ Interstate\ Ramps}{\text{Total VHT on Interstate}}$$

ZoneMonthHour

This input was provided by the Tennessee Department of Environment & Conservation (TDEC) by converting the MOBILE6.2 meteorological data from the previous conformity analysis into MOVES2014a format. The minimum and maximum daily temperatures previously used with MOBILE6.2 for Montgomery County were 69 and 94 degrees Fahrenheit, respectively, which were converted to a 24-hour distribution with the MOVES conversion tool. The humidity value in the MOVES model also remained consistent; using the previously used 75 gr/lb absolute humidity. No forecasting was needed on this input.

FuelSupply

This model input used the default MOVES data.

FuelFormulation

This model input was also provided by TDEC. The input files used the default MOVES data, but contains adjusted Reid Vapor Pressures (RVP) for fuel subtypes 12 and 15, which were each adjusted to 8.6. Fuel subtype 12 also contains an additional 1.0 PSI waiver, increasing the RVP to 9.6. The RVP was adjusted to remain consistent with that used in the maintenance plan, which was developed from sampling data gathered by Kentucky.

FuelUsageFraction

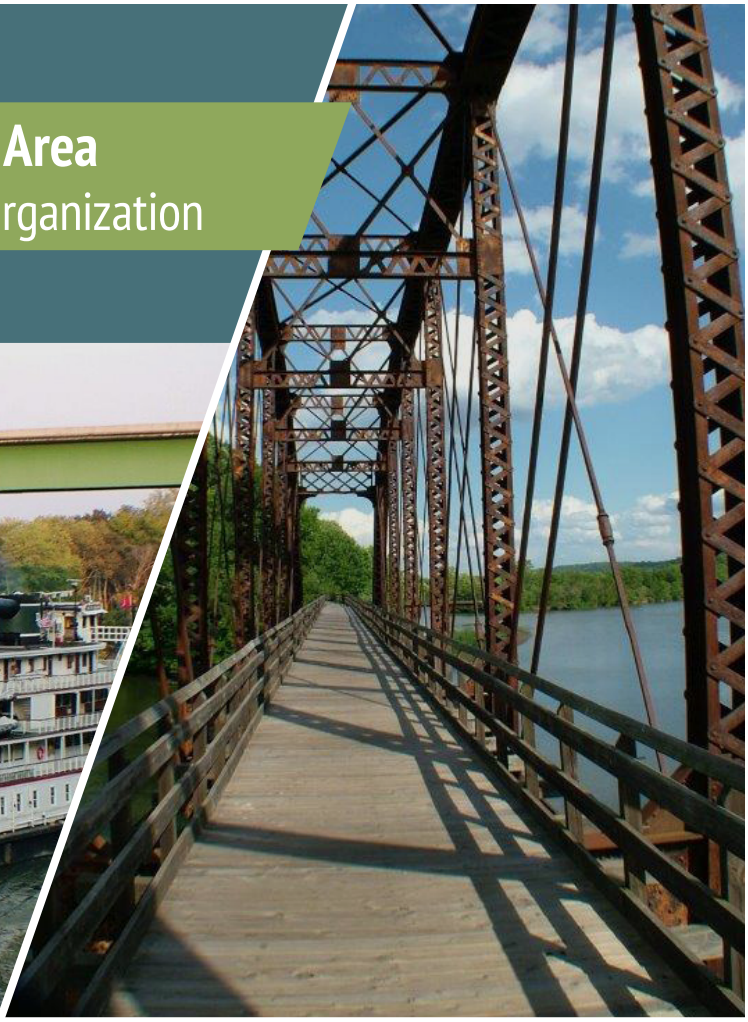
This model input used the default MOVES data.

AVFT

This input file used the default MOVES data, with adjustments provided by TDEC. The changes include adjusted fuelEngFraction to reflect the removal of Compressed Natural Gas (CNG) for transit vehicles as there are no CNG buses in the Clarksville Transit System fleet. The CNG fraction was added to the diesel fraction. Each analysis year used the MOVES default data and implements the changes described above.

Clarksville Urbanized Area

Metropolitan Planning Organization



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