**MAINE’S MOVES MODELING APPROACH FOR CONFORMITY DETERMINATIONS**

A recent court case ruling overturning the revocation of the 1997 8-hour ozone National Ambient Air Quality Standards abruptly changed Maine’s transportation conformity requirements. The re-imposition of the 1997 conformity requirements prevents States and metropolitan planning organizations (MPOs) from approving LRTPs and TIPs and progressing projects in affected areas until the necessary air quality analysis and conformity determinations are completed.

Maine intends to implement the air quality analysis as quickly as possible in the following manner.

1. Maine is asking EPA to verify the use of MOVES2014 for this demonstration. While MOVES2014a is the latest version of the model, an EPA Q&A for MOVES2014a states, “MOVES2014a does not significantly change the criteria pollutant emissions results of MOVES2014 and therefore is not considered a new model for SIP and transportation conformity purposes.” (MOVES2014a Q&A, EPA-420-F-15-046, November 2015)

Maine intends to put the conformity analysis on a faster track then typically provided in the past. Using this version of the model would allow us to utilize inputs we already have constructed from prior projects. For this type of demonstration, EPA has stated that there would be no significant differences in emissions results between the two versions of the model.

1. Maine intends to conduct “Onroad” County Scale Inventory runs to generate NOX and VOC emissions in Tons/Summer Day for the years 2016, 2025, 2035, and 2040. The year 2016 will be considered the base year, the remaining years will represent the build years. Maine will model emissions for the build years by adding project specific vehicle miles traveled growth and vehicle populations as it pertains to each county. APPENDIX A.
2. County emissions results will be combined for the following representative areas to determine conformity based upon the latest set of emissions budgets established for 2016.

**VOC NOX**

**Budget Budget**

**tons/day tons/day**

Portland Area - (York, Cumberland, Androscoggin, Sagadahoc) 16.659 32.837

Midcoast Area - (Lincoln, Knox, Waldo, Hancock) 3.763 6.245

1. Maine intends to apply regulatory limits for all fuel formulations. Fuel formulations are attached in APPENDIX B.
2. Maine intends to apply additional controls to the modeling applications for

* I/M for Cumberland County (All years in the modeling runs) using the MOVES defaults table.
* earlyNLEV, LEV and ZEV – updated for each of the modeling runs.
* **STAGE II NO LONGER APPLIES TO MAINE and has been removed from modeling procedures.**

1. Maine intends to grow out vehicle populations (VPOP) by applying the projected vehicle miles traveled (VMT) to a ratio of VPOP:VMT from our most current inventory (2014). APPENDIX C

(Ex. 2014VPOP/2014VMT x 2016VMT = 2016VPOP)

1. Maine intends to use EPA constructed meteorological data for 2011. This is the most recent data set we have available. EPA developed this data set for one of their more recent modeling platforms. It is a very reputable data set and a representative year.
2. Maine intends to utilize VMT distributions and fractions compiled by MEDOT staff for the base year and build years. DOT will update VMT for each build year to include the VMT from proposed projects. APPENDIX D
3. The remaining input tables will be generated from the MOVES defaults. A complete list of inputs is noted in APPENDIX E

APPENDIX A

**MOVES2014 RUN SPEC INFORMATION**

**County Inventory – LEV Emissions Portion** **County Inventory- ZEV Emissions** **Portion**

**FILE NAME:** **FILE NAME:**

YYYY\_STCTY\_TPSD\_?psi\_LEVZEVmmddyy.mrs YYYY\_STCTY\_TPSD\_?psi\_LEVZEVmmddyy.mrs

**SCALE**- Onroad/County/Inventory **SCALE** – Onroad/County/Inventory

**TIME SPAN**– Hour/YYYY/ Weekdays/July/00:00-23:59 **TIME SPAN**– Hour/YYYY/ Weekdays/July/00:00-23:59

**GEOGRAPHIC BOUNDS**- County **GEOGRAPHIC BOUNDS**- County

YYYY\_STCTY\_TPSD\_?psi\_LEVZEVmmddyy\_in YYYY\_STCTY\_TPSD\_?psi\_LEVZEVmmddyy\_in

**VEHICLES/EQUIPMENT**-All vehicles for these fuels **VEHICLES/EQUIPMENT**-All vehicles for these fuels

Compressed Natural Gas Compressed Natural Gas

Diesel Fuel Diesel Fuel

Electricity Electricity

GasolineGasoline

**ROAD TYPE**- ALL Road Types **ROAD TYPE**- ALL Road Types

**POLLUTANTS AND PROCESSES**- No Evap Permeation **POLLUTANTS AND PROCESSES-**EvapPermeation only

VOC- and all prerequisites VOC- and all prerequisites

NOX- and all prerequisites

**MANAGE INPUT DATA SETS MANAGE INPUT DATA SETS**

Apply /MOVES2014\_early\_NLEV/ Remove /MOVES2014\_early\_NLEV/

/moves2014\_mylevs/ /moves2014\_mylevs/

**Clear the default AVFT fuel data in Input the M14\_MEDEP\_AVFT.xlsx table into**

**the CDM fuel tab section when applying these the AVFT fuel data CDM section when**

**databases. applying evap permeation processes.**

**OUTPUT OUTPUT**

**GENERAL OUTPUT GENERAL OUTPUT**

YYYY\_STCTY\_TPSD\_?psi\_LEVZEVmmddyy\_ou YYYY\_STCTY\_TPSD\_?psi\_LEVZEVmmddyy\_ou

**Units-** Grams/Joules/Miles **Units-** Grams/Joules/Miles

**Activity-** Distance Traveled/Population **Activity-** Distance Traveled/Population

**\*OUTPUT EMISSIONS DETAIL- Defaults \*OUTPUT EMISSIONS DETAIL**

**Always-** Time 24-Hour Day **Always-** Time 24-Hour Day

Location County Location County

Pollutant Pollutant

**On Road/Off Road** On Road/Off Road **On Road/Off Road** On Road/Off Road

**On and Off Road** Road Type/Source Use Type **On and Off Road** Road Type/Source Use Type

**Vehicle/Equipment Categories** Emissions Process **Vehicle/Equipment Categories** Emissions Process

**\*These are the only boxes checked off in the OUTPUT profiles for either of these two inventory runs.**

***NOTE: The same run spec, input and output database are used for both runs. The LEV portion is conducted first. The ZEV portion opens the same file, adjusts the run spec information, deletes Manage Input Data Sets, and input the AVFT table allowing the outputs to append to the same output database.***

APPENDIX B

Gasoline Fuel Formulation RVP by County

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **County** | **CountyID** | **RegionID** | **2016  Formulation Sulfur 30 ppm** | **2025  Formulation Sulfur 10 ppm** | **2035  Formulation Sulfur 10 ppm** | **2040  Formulation Sulfur 10 ppm** | **RVP** |
| Androscoggin | 23001 | 178010000 | 3201 (E-10) | 3459 (E-10) | 3459 (E-10) | 3459 (E-10) | <--7.0psi |
| Cumberland | 23005 | 178010000 | 3201 (E-10) | 3459 (E-10) | 3459 (E-10) | 3459 (E-10) | <--7.0psi |
| *Hancock* | *23009* | *100010000* | *3204 (E-10)* | *3462 (E-10)* | *3462 (E-10)* | *3462 (E-10)* | *<--8.8psi* |
| Knox | 23013 | 178010000 | 3201 (E-10) | 3459 (E-10) | 3459 (E-10) | 3459 (E-10) | <--7.0psi |
| Lincoln | 23015 | 178010000 | 3201 (E-10) | 3459 (E-10) | 3459 (E-10) | 3459 (E-10) | <--7.0psi |
| Sagadahoc | 23023 | 178010000 | 3201 (E-10) | 3459 (E-10) | 3459 (E-10) | 3459 (E-10) | <--7.0psi |
| *Waldo* | *23027* | *100010000* | *3204 (E-10)* | *3462 (E-10)* | *3462 (E-10)* | *3462 (E-10)* | *<--8.8psi* |
| York | 23031 | 178010000 | 3201 (E-10) | 3459 (E-10) | 3459 (E-10) | 3459 (E-10) | <--7.0psi |
| NOTE: The market share for (E-10) is set to 100% for all counties for all modeling years. | | | | | | | |
| The fuel usage fraction for (E-85) is set to zero for all counties for all modeling years. | | | | | | | |

All Fuel Formulations Used for this Transportation Conformity Demonstration

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **fuelFormulationID** | **fuelSubtypeID** | **RVP** | **sulfurLevel** | **ETOHVolume** | **MTBEVolume** | **ETBEVolume** | **TAMEVolume** | **aromaticContent** | **olefinContent** | **benzeneContent** | **e200** | **e300** | **BioDieselEsterVolume** | **CetaneIndex** | **PAHContent** | **T50** | **T90** |
| 3201 | 12 | 7 | 30 | 10 | 0 | 0 | 0 | 23.23 | 12.52 | 0.61 | 44.63 | 79.56 | 0 | 0 | 0 | 212.59 | 342.86 |
| 3204 | 12 | 8.8 | 30 | 10 | 0 | 0 | 0 | 23.23 | 12.52 | 0.61 | 46.9 | 80.45 | 0 | 0 | 0 | 207.97 | 338.77 |
| 3459 | 12 | 7 | 10 | 10 | 0 | 0 | 0 | 20.89 | 11.93 | 0.61 | 45.49 | 79.82 | 0 | 0 | 0 | 208.94 | 343.85 |
| 3462 | 12 | 8.8 | 10 | 10 | 0 | 0 | 0 | 20.89 | 11.93 | 0.61 | 47.76 | 80.72 | 0 | 0 | 0 | 204.31 | 339.77 |
| 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 |
| 90 | 90 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Fuel Usage Fractions

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **fuelFormulationID** | **fuelSubtypeID** | **fuelTypeDesc** | **countyID** | **fuelYearID** | **modelYearGroupID** | **sourceBinFuelTypeID** | **fuelSupplyFuelTypeID** | **usageFraction** |
| 3201, 3204, 3459, 3462 | 12 | Gasohol (E-10) | All Counties | All years | 0 | 1 | 1 | 1 |
| 25005 | 21 | Biodiesel (BD20) | All Counties | All years | 0 | 2 | 2 | 1 |
| 28001 | 30 | Compressed Natural Gas (CNG) | All Counties | All years | 0 | 3 | 3 | 1 |
| 3201, 3204, 3459, 3462 | 12 | Gasohol (E-10) | All Counties | All years | 0 | 5 | 1 | 1 |
| 27002 | 51 | Ethanol (E-85) | All Counties | All years | 0 | 5 | 5 | 0 |
| 90 | 90 | Electricity | All Counties | All years | 0 | 9 | 9 | 1 |

APPENDIX C

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PORTLAND REGION VEHICLE POPULATIONS** | | | | |
| **SOURCE TYPE** | **2016** | **2025** | **2035** | **2040** |
| 11 | 27,064 | 28,329 | 29,807 | 30,576 |
| 21 | 244,281 | 256,063 | 269,840 | 277,011 |
| 31 | 272,434 | 285,451 | 300,665 | 308,582 |
| 32 | 33,499 | 35,149 | 37,081 | 38,087 |
| 41 | 182 | 192 | 202 | 208 |
| 42 | 314 | 329 | 347 | 356 |
| 43 | 1,397 | 1,463 | 1,540 | 1,580 |
| 51 | 529 | 554 | 584 | 599 |
| 52 | 16,296 | 17,078 | 17,993 | 18,469 |
| 53 | 1,695 | 1,779 | 1,876 | 1,927 |
| 54 | 1,647 | 1,723 | 1,812 | 1,859 |
| 61 | 1,105 | 1,158 | 1,221 | 1,254 |
| 62 | 1,268 | 1,330 | 1,404 | 1,442 |
| **Total** | **601,712** | **630,600** | **664,373** | **681,950** |
|  |  |  |  |  |
|  |  |  |  |  |
| **MIDCOAST REGION VEHICLE POPULATIONS** | | | | |
| **SOURCE TYPE** | **2016** | **2025** | **2035** | **2040** |
| 11 | 7,072 | 7,448 | 7,891 | 8,122 |
| 21 | 60,387 | 63,596 | 67,369 | 69,341 |
| 31 | 89,280 | 94,029 | 99,611 | 102,530 |
| 32 | 9,144 | 9,633 | 10,208 | 10,509 |
| 41 | 34 | 36 | 38 | 39 |
| 42 | 109 | 115 | 122 | 126 |
| 43 | 499 | 526 | 558 | 574 |
| 51 | 173 | 182 | 193 | 199 |
| 52 | 6,120 | 6,448 | 6,833 | 7,035 |
| 53 | 88 | 93 | 98 | 101 |
| 54 | 593 | 624 | 660 | 679 |
| 61 | 793 | 837 | 888 | 915 |
| 62 | 276 | 291 | 308 | 317 |
| **Total** | **174,567** | **183,857** | **194,778** | **200,486** |

APPENDIX D

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **PORTLAND REGION VMT** | | | | |
| **HPMS TYPE** | **2016** | **2025** | **2035** | **2040** |
| 10 | 67,655,706 | 70,871,936 | 74,633,763 | 76,591,076 |
| 25 | 6,284,542,909 | 6,585,375,796 | 6,937,335,928 | 7,120,508,202 |
| 40 | 49,066,125 | 51,407,971 | 54,147,431 | 55,572,980 |
| 50 | 266,264,936 | 278,881,723 | 293,637,478 | 301,314,284 |
| 60 | 349,114,982 | 365,470,655 | 384,593,446 | 394,538,914 |
| **Total** | **7,016,644,657** | **7,352,008,081** | **7,744,348,047** | **7,948,525,455** |
|  |  |  |  |  |
|  |  |  |  |  |
| **MIDCOAST REGION VMT** | | | | |
| **HPMS TYPE** | **2016** | **2025** | **2035** | **2040** |
| 10 | 24,673,464 | 26,005,951 | 27,573,609 | 28,393,560 |
| 25 | 1,723,858,201 | 1,816,987,201 | 1,926,553,176 | 1,983,860,980 |
| 40 | 18,152,226 | 19,132,790 | 20,286,428 | 20,889,835 |
| 50 | 92,848,502 | 97,865,416 | 103,767,942 | 106,855,280 |
| 60 | 70,436,383 | 74,239,265 | 78,713,288 | 81,053,378 |
| **Total** | **1,929,968,776** | **2,034,230,622** | **2,156,894,443** | **2,221,053,032** |

APPENDIX E

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **MOVES MODELING INPUTS FOR TRANSPORTATION CONFORMITY ANALYSIS** | | | | | | | | | | |
| **County Data Manager Tabs** | **MOVES2014 INPUT TABLES** | **MDOT** | **2011 MET** | **Grow  out 2014 NEI** | **Build for each year** | **MOVES Defaults** | **Requires adjustments for each inventory year** | | | |
| **2016** | **2025** | **2035** | **2040** |
| Age Distribution | sourcetypeagedistribution |  |  | x |  |  | Y | Y | Y | Y |
| Average Speed Distribution | avgspeeddistribution | x |  |  |  |  | N | N | N | N |
| Fuel | fuelsupply |  |  |  | x |  | Y | Y | Y | Y |
| fuelformulation |  |  |  | x |  | Y | Y | Y | Y |
| fuelusagefraction |  |  |  | x |  | Y | Y | Y | Y |
| AVFT SEE LEV and ZEV footnotes below | - | - | - | - | - | - | - | - | - |
| Meteorology Data | zonemonthhour |  | x |  |  |  | N | N | N | N |
| Ramp Fraction | roadType |  |  |  |  | x | N | N | N | N |
| Road Type Distribution | roadtypedistribution | x |  |  |  |  | N | N | N | N |
| Source Type Population | sourcetypeyear |  |  | x |  |  | Y | Y | Y | Y |
| Starts | startsperday |  |  |  |  | x | - | - | - | - |
| startshourfraction |  |  |  |  | x | - | - | - | - |
| startssourcetypefraction |  |  |  |  | x | - | - | - | - |
| startsmonthadjust |  |  |  |  | x | - | - | - | - |
| importstartsopmodedistribution |  |  |  |  | x | - | - | - | - |
| starts |  |  |  |  | x | - | - | - | - |
| Vehicle Type VMT | Hpmsvtypeyear | x |  |  |  |  | Y | Y | Y | Y |
| monthvmtfraction | x |  |  |  |  | N | N | N | N |
| dayvmtfraction | x |  |  |  |  | N | N | N | N |
| hourvmtfraction | x |  |  |  |  | N | N | N | N |
| Hotelling | hotellingactivitydistribution |  |  |  |  | x | - | - | - | - |
| hotellinghours |  |  |  |  | x | - | - | - | - |
| I/M Programs | imcoverage |  |  |  |  | x | N | N | N | N |
| Retrofit Data | onroadretrofit |  |  |  |  | x | - | - | - | - |
|  |  |  |  |  |  |  |  |  |  |  |
| Run #1 Apply LEV in MIDS | MOVES2014earlyNLEV/moves2014\_mylevs |  |  | x |  |  | N | N | N | N |
| Run #2 Apply ZEV AVFT in CDM | M14\_MEDEP\_AVFT.xlsx |  |  | x |  |  | N | N | N | N |
|  |  |  |  |  |  |  |  |  |  |  |
| **Two runs are required to capture LEV and ZEV emissions reductions benefits.** | | | |  |  |  |  |  |  |  |
| 1. LEV -select VOC, NOX pollutants for all processes except evaporative permeation emissions. | | | | |  |  |  |  |  |  |
| Clear out the default AVFT table in the County Data Manager fuel tab, | |  |  |  |  |  |  |  |  |  |
| Import the MOVES2014\_early\_NLEV and moves2014\_mylevs databases using Manage Input Data sets in the GUI. | | | | | | |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |
| 2. ZEV- select VOC pollutants for evaporative permeation emissions only. | |  |  |  |  |  |  |  |  |  |
| Input M14\_MEDEP\_AVFT.xlsx for the AVFT inputs in the County Data Manager fuel tab. | | | |  |  |  |  |  |  |  |
| Delete the MOVES2014\_early\_NLEV and moves2014\_mylevs databases from the Manage Input Data sets in the GUI. | | | | | | | |  |  |  |