

Using MOVES for Regional Inventory Development

MTAQS

October 28, 2009

Gary Dolce

EPA Office of Transportation and Air Quality

The word "MOVES" is displayed in a stylized, metallic, three-dimensional font with a glowing effect, set against a dark, gradient background.

Outline

- **MOVES SIP and Conformity Policy Guidance**
- **Improvements to MOVES inputs**
- **Enhancement of look-up table feature**
- **MOVES Technical Guidance**

MOVES SIP and Conformity Policy Guidance

- **Guidance will address timing for use of MOVES in SIPs and regional conformity analysis**
 - Expect MOVES to be used for the next round of PM and ozone SIP submissions in 2012 and 2013
 - By regulation, conformity grace period can be 3 to 24 months
- **Guidance will address any other general policy issues that arise with the use of MOVES**
- **Plan to release final guidance with final MOVES2009**
 - Release draft guidance for 30-day comment period soon

Improved VMT Input in MOVES

- **Draft MOVES2009 only allows VMT input as annual VMT**
 - Uses allocation factors to assign VMT to months, days, and hours
 - Allocation factors are difficult to modify
- **We are creating a daily VMT calculator and importer for the County Data Manager**
 - Enter daily VMT in calculator rather than annual
 - Calculator creates allocation factors based on user input
 - Importer allows users to import tables from calculator

VMT Converter – MOBILE6 to MOVES2009

- **User inputs**
 - VMT by MOBILE6.2 vehicle classes (8, 12, 16, or 28 MOBILE6 vehicle classes)
 - MOBILE6 hourly VMT fraction input file
 - MOBILE6 VMT mix input file
- **Converter maps:**
 - MOBILE6 vehicle classes to MOVES2009 source types
 - MOBILE6 road types to MOVES road types
- **Converter/calculator creates MOVES2009 tables**
 - VMT by MOVES2009 HPMS classes
 - MOVES monthly, daily, hourly VMT fractions
 - VMT fractions by MOVES road types and ramp fractions

Other Converters and Tools

- **Making updates to existing MOBILE6/MOVES input converters to improve vehicle type mapping**
 - With VMT converter, these cover almost all fleet and activity inputs
- **Average speed importer**
 - MOBILE format average speed distribution file to MOVES avgSpeedDist table format
- **Registration distribution importer**
 - MOBILE6 format registration distribution file to MOVES SourceTypeAgeDistribution table
- **Temperature calculator**
 - MOBILE6 min/max temperatures to hourly temperatures

Additional Input Improvements

- **Fuel supply importer allows more user control of fuel parameters**
 - Users can create their own fuel formulation inputs
 - Also working to improve default local fuel supply information in MOVES2009 database
- **I/M importer redesigned to be consistent with other importers**
 - New importer creates Excel spreadsheet as template
 - Easier to edit I/M input data
 - More internal checks for invalid inputs

Lookup Table Enhancements

- Final MOVES2009 will produce emission factor lookup tables for all pollutant processes
- Lookup table option will allow wider range of conditions to be modeled with fewer MOVES runs than using inventory output
 - But more post-processing is required
- Running emission factors in g/mi
- Start and vapor venting emission factors in g/veh/hour

Lookup Table Enhancements

- **Emission factors broken down by:**
 - Pollutant process, vehicle type, fuel type, road type, model year, and day type (some fields may be aggregated)
 - Running emissions also broken down by average speed and temperature
 - Start emissions are also broken down by temperature and hour of the day
 - Vapor venting results by hour and daily temperature profile
 - Temperature profile is used because evap emissions depend on both the current temperature and temperatures earlier in the day

Integration of lookup tables with SMOKE and CONCEPT

- Working closely with SMOKE and CONCEPT developers to integrate MOVES lookup table output
- Process steps
 1. Process temperature data to determine what temperatures are needed for MOVES runs
 2. Create data files that define all needed MOVES runs
 3. Use a script to run MOVES in batch mode for all runs
 4. Obtain lookup table output from MOVES
 5. Use script to condense MOVES lookup output for SMOKE or CONCEPT
 6. SMOKE or CONCEPT combines emission factors, activity, and gridded temperatures to produce hourly emissions for air quality model

MOVES Technical Guidance

- **Guidance addresses use of MOVES at the regional/county level for SIPs and conformity analyses**
 - Many user comments have focused on guidance issues
- **Draft guidance covers each model input option**
 - When is local data recommended?
 - When can default data be used?
- **Will also address when it is appropriate to aggregate input or output and when it is not**
- **Plan to release final guidance with final MOVES2009**
 - Release draft guidance for 30-day comment period soon

MOVES Technical Guidance Outline

- Introduction
- Selecting Run Spec inputs
- Using the County Data Manager to enter local data
- Output Issues

Selecting RunSpec inputs

- **Scale selection**

- Regional analysis for SIPs and conformity must be done using the county scale due to limitations of the national database
- Guidance will include provisions for using default data, but users must review that data through use of the county data manager

- **Time span selection**

- Guidance will call for analysis at the hour level to avoid loss of detail due to averaging that occurs when using the day, month, or year options

Using the County Data Manager

- **County Data Manager calls for following data:**
 - Meteorology
 - Age Distribution of vehicle fleet
 - Average Speed Distribution
 - Road Type Distribution
 - Ramp Fraction
 - Vehicle Type VMT
 - Source Type Population
 - Fuel Supply
 - I/M Program

Draft Guidance for Specific Inputs

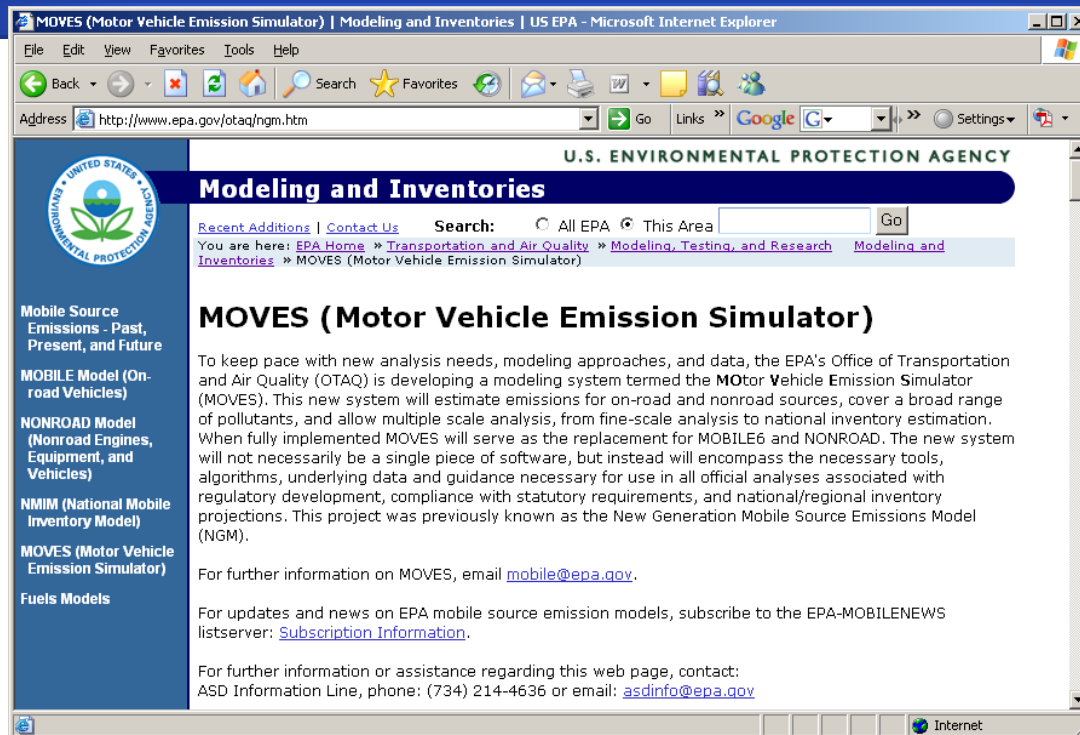
- **Following MOBILE6 guidance as much as possible**
- **Use local data as much as possible, but guidance will recognize limitations**
 - Example – Should use local data to develop age distributions for light duty vehicles, but local data on heavy duty vehicle ages may not be available or accurate
 - Will provide spreadsheet with default age distributions by calendar year
 - Example – Should use local VMT by HPMS classes, but may not have local data for subclasses such as refuse truck or motorhomes
 - Use default VMT for subclasses to create a distribution of VMT within the HPMS class

Specific County Data Issues

- **Source Type Population**

- Vehicle population used to calculate start, evap, and extended idle emissions
- New input for users – concerns about how to collect data
- Light duty vehicle populations could come from DMV information
- Guidance will give options for calculating population from surrogate information, such as VMT

Visit the MOVES website:
<http://www.epa.gov/otaq/ngm.htm>



The screenshot shows a Microsoft Internet Explorer browser window displaying the MOVES website. The browser's address bar shows the URL <http://www.epa.gov/otaq/ngm.htm>. The website header includes the U.S. Environmental Protection Agency logo and the text "U.S. ENVIRONMENTAL PROTECTION AGENCY" and "Modeling and Inventories". A search bar is present with the text "Search: All EPA This Area" and a "Go" button. Below the search bar, the breadcrumb trail reads: "You are here: EPA Home » Transportation and Air Quality » Modeling, Testing, and Research » Modeling and Inventories » MOVES (Motor Vehicle Emission Simulator)". The main content area features the heading "MOVES (Motor Vehicle Emission Simulator)" and a detailed description of the system. The description states: "To keep pace with new analysis needs, modeling approaches, and data, the EPA's Office of Transportation and Air Quality (OTAQ) is developing a modeling system termed the Motor Vehicle Emission Simulator (MOVES). This new system will estimate emissions for on-road and nonroad sources, cover a broad range of pollutants, and allow multiple scale analysis, from fine-scale analysis to national inventory estimation. When fully implemented MOVES will serve as the replacement for MOBILE6 and NONROAD. The new system will not necessarily be a single piece of software, but instead will encompass the necessary tools, algorithms, underlying data and guidance necessary for use in all official analyses associated with regulatory development, compliance with statutory requirements, and national/regional inventory projections. This project was previously known as the New Generation Mobile Source Emissions Model (NGM)." Below the description, there are three contact information sections: "For further information on MOVES, email mobile@epa.gov."; "For updates and news on EPA mobile source emission models, subscribe to the EPA-MOBILENEWS listserver: [Subscription Information](#)."; and "For further information or assistance regarding this web page, contact: ASD Information Line, phone: (734) 214-4636 or email: asdirfo@epa.gov". A left-hand navigation menu lists various models: "Mobile Source Emissions - Past, Present, and Future", "MOBILE Model (On-road Vehicles)", "NONROAD Model (Nonroad Engines, Equipment, and Vehicles)", "NMIM (National Mobile Inventory Model)", "MOVES (Motor Vehicle Emission Simulator)", and "Fuels Models".

- Software, technical documentation, conference and meeting presentations, and other helpful background materials