

US EPA ARCHIVE DOCUMENT

Mobile Source Emission Models

MOVES



Outline

- **Why do we need emission models for mobile sources?**
- **Current EPA mobile source emission models**
- **MOVES2009**
- **NONROAD2008a**
- **NMIM2008**

Why Do We Need Emission Models for Mobile Sources?

- **We can't directly measure emissions from mobile sources**
 - Millions of individual emission sources (onroad and nonroad)
- **Many variables affect emissions**
 - Differences in operation and activity
 - Temperature and humidity
 - Changes in control technologies applied over time
 - Deterioration as vehicles and equipment age
 - Fuel characteristics
- **Emission models simulate local environmental, fleet, and activity characteristics to estimate and predict emissions from mobile sources**

EPA Emission Models for Mobile Sources

- **MOVES2009**
 - Draft released April 2009, final release at end of 2009
 - Estimates total emissions and emission factors for onroad vehicles (cars, trucks, buses, motorcycles)
 - Replaces MOBILE6.2, later versions will also replace NONROAD
- **NONROAD2008a**
 - Estimates emission inventories at the county level for nonroad equipment (agricultural, construction, industrial, recreational, lawn and garden)
- **NMIM2008**
 - Inventory tool that incorporates MOBILE6.2 and NONROAD2008a to simplify inventory development process for both onroad and nonroad emissions
 - MOVES2009 will replace onroad portion of NMIM, later versions of MOVES will replace NMIM entirely

MOVES

- **MO**tor **V**ehicle **E**mission **S**imulator
- State-of-the-art modeling framework
- Will replace current models (MOBILE & NONROAD) and expand capabilities
- Designed to allow easier incorporation of large amounts of in-use data from a variety of sources
 - MOBILE structure limited ability to incorporate new emissions data

Why Is EPA Developing MOVES?

- CAA requires EPA to regularly update emission factors and emission factor models
- FORTRAN code used in MOBILE6.2 is obsolete and increasingly difficult to maintain
- Modular database structure more modern, easier to update with new emissions, fleet and activity data
- MOVES will eventually incorporate functions of the current NONROAD model, providing a single, comprehensive modeling system

MOVES Schedule

- **January 2005**
 - **MOVES2004 released**
 - Includes energy consumption, greenhouse gases
- **May 2007**
 - **MOVES Demo released**
 - Basic structure of MOVES without criteria pollutant emission factors
- **April 2009**
 - **Release of Draft MOVES2009**
 - Adds draft criteria pollutant emission factors
- **End of 2009**
 - **Planned release of official MOVES2009**
 - Final onroad criteria pollutant model
- **2009+**
 - **Begin adding nonroad emissions to MOVES**

Draft MOVES2009 – New Capabilities

- First release of MOVES that includes criteria pollutant emissions and toxics
- Adds more features to simplify regional and project-level analysis for SIPs and conformity
 - **County Data Manager**
 - **Project Level Data Manager**
 - **Data Importers**

Draft MOVES2009 - Caveats

- **Draft model**
 - **No official use requiring Draft MOVES2009**
 - **Cannot be used for SIPs or conformity analyses**
- **Does not include all data or features planned for official MOVES2009 and has known and unknown bugs, for example:**
 - Motorcycle emissions not yet included
 - Plan to add more flexibility for VMT input
 - Known bugs in refueling vapor and spillage processes and project level scale

Official MOVES2009

- Official MOVES2009 planned for release at the end of 2009
- Will be official version of MOVES for on-road vehicles outside of California
- Use will be required for:
 - State Implementation Plans (SIPs)
 - Transportation conformity analysis

Future Guidance Documents

- **EPA expects to release several guidance documents that will help with the transition for final MOVES**
 - MOVES Technical Guidance for SIPs and conformity
 - Project Level Conformity Guidance for PM
 - MOVES SIP and Conformity Policy Guidance
- **Will release draft guidance for comment sometime after release of Draft MOVES2009**
- **Final guidance documents will be available when Official MOVES2009 is released**

MOVES Technical Guidance for SIPs and Conformity

- **Answers these questions:**
 - When can model defaults be used?
 - When is local information needed?
 - What are acceptable sources of local information?
- **See MOBILE6.2 Technical Guidance for examples of past answers to these questions**
 - Registration (age) distribution
 - Mileage accumulation

Project Level Guidance for PM

- **How to do project level analysis for PM_{2.5} and PM₁₀ with MOVES for conformity**
- **Similar to Technical Guidance, but focused on specific needs for project level analysis**
- **Will also address how to use air quality dispersion models for project level conformity analysis**

MOVES SIP and Conformity Policy Guidance

- **Answers these questions:**
 - When should MOVES be used for development of new SIPs?
 - When should MOVES be used for new conformity determinations?
 - Conformity grace period can be 3 to 24 months
 - Any other general policy questions for the transition from MOBILE to MOVES
- **Actual date that MOVES becomes official for SIP and conformity purposes is based on Federal Register notice announcing availability**

NONROAD2008a

- EPA's most current model for estimating emissions from most categories of nonroad equipment is NONROAD2008a
- Equipment categories (and examples) in NONROAD2008a include:
 - Agricultural (tractors, harvesters)
 - Commercial (generator sets, pumps)
 - Construction (backhoes, excavators)
 - Industrial (forklifts, sweepers)
 - Logging equipment (chainsaws, shredders)
 - Residential and commercial lawn and garden (mowers, leaf blowers)
 - Recreational vehicles (snowmobiles, golf carts)
 - Recreational marine vessels (outboard engines, personal watercraft)

Other Nonroad Emissions

- **Locomotives, commercial marine, and aircraft emissions are not included in NONROAD2008a**
- **Links to methods for estimating emissions for these categories can be found on EPA's NONROAD model web page**
- **EPA plans to eventually incorporate all emissions from mobile sources into the MOVES model**

NMIM2008

- **NMIM2008 is an inventory development tool that runs MOBILE6.2 and NONROAD2008a and processes the results to create an emission inventory for onroad and nonroad sources**
- **Use of NMIM2008 is optional**
- **The onroad portion of NMIM is being replaced by MOVES2009 and should not be used for upcoming SIPs**
- **When nonroad emissions are incorporated in MOVES, NMIM will be obsolete**

Where to Find More Information

- These web pages include current emission models, user guides, technical documentation, guidance documents, and training materials
- EPA's general mobile source modeling web page:
 - www.epa.gov/otaq/models.htm
- MOVES web page:
 - www.epa.gov/otaq/models/moves/index.htm
- NONROAD web page:
 - www.epa.gov/otaq/nonrdmdl.htm
- Questions?
 - mobile@epa.gov