Mobile Source Emission Models
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

- MOtor Vehicle Emission Simulator
- 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- FORTRAN code used in MOBILE6.2 is obsolete and increasingly difficult to maintain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 PM2.5 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**
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