Module 5
Review and Best Practices

Module Overview

- Day 1 Review
- Best Practices and tips
- Common mistakes
- Reviewing your work, or someone else's
  - Checking a RunSpec
  - Checking an input database
  - Checking the output database

MOVES
Motor Vehicle Emission Simulator

EPA

Day 1 Review

- What is MOVES and how does it work?
- Using MOVES at the national scale
  - Developing a simple RunSpec
  - Using the Summary Reporter
- Using MOVES at the County Scale
  - Required for SIPs and regional conformity analyses
  - Guidance on RunSpec parameters
  - Introduction to the CDM
  - Guidance on CDM inputs
- Processing MOVES output in MySQL
  - Using MySQL Workbench to view and process MOVES output

MOVES
Motor Vehicle Emission Simulator

EPA

Important References

- Know the basic regulatory requirements
- Refer to the User Guide
  - Answers basic questions about using MOVES
- Read the Technical Guidance
  - Contains important information on what local inputs are needed and when national defaults can be used
  - Consistency with guidance is a key thing reviewers will look at
- Check the FAQ on the MOVES website
  - Includes answers to many user questions
- Send questions to mobile@epa.gov

MOVES
Motor Vehicle Emission Simulator

EPA

Best Practices

- Document everything
  - Use the Description panel in the RunSpec to describe run
  - Use the Description of Imported Data box in each CDM tab to describe input data used
- Develop a consistent naming convention
  - Use a consistent file extension (e.g., .mrs) for RunSpec files
  - Use a consistent system to identify input and output databases (e.g., _in and _out)
  - Use a consistent system to identify related RunSpecs and databases (e.g. Lake2015BaseCase.mrs, Lake2015BaseCase_in, Lake2015BaseCase_out)

Important Tips

- Finish the RunSpec before creating the input database
  - Creating the input database too early can result in conflicts with RunSpec
- Always include all processes for a particular pollutant in a SIP or conformity analysis
  - Make sure every box in the row for the pollutant you are analyzing is checked
  - Be sure to include brake and tire wear in PM runs
  - Include all chained pollutants

MOVES
Motor Vehicle Emission Simulator

EPA

Some Common MOVES Mistakes

- Output has “missing VMT”
  - VMT reflected in MOVES output does not match input
  - One possible cause: not adjusting transit bus fuel fractions in Fuel Type and Technology table to match local data
  - Another possible cause: not selecting “Ethanol (E-85)” on the On Road Vehicle Equipment panel

- Not selecting all required/applicable pollutants and processes when developing the RunSpec

MOVES
Motor Vehicle Emission Simulator

EPA

Reviewing Your Work or Someone Else's

- All elements needed to complete a MOVES scenario are usually required to complete a review (should be able to recreate, if needed)
  - RunSpec
  - Input database
  - Output database
- Review Inputs and RunSpec against guidance to ensure they are complete and correct
  - Use interagency consultation process to do this before you begin runs
  - E.g., all required pollutants and processes selected, correct age and speed distribution(s) used…
- Outputs should appear logical and complete
  - E.g., no missing VMT

MOVES
Motor Vehicle Emission Simulator

EPA

Checking a RunSpec

- Scale
  - County scale for SIPs or regional conformity analysis
  - Project scale for hotspot analysis
  - National scale not appropriate (expect for some GHG analyses)

- Time Span
  - Time aggregation should be “hour”
  - Are the year, month, day, and hours appropriate for the analysis?

Checking a RunSpec

- Geographic Bounds
  - Correct county?
  - Does the input database name match the input database file supplied?
- On Road Vehicle Equipment
  - For a county level analysis, all valid combinations should be selected
- Pollutants and Processes
  - Have the appropriate pollutants been selected?
  - For SIP/conformity analyses, all processes associated with a given pollutant must be selected

Checking a RunSpec

- General Output
  - Does the output database name match the output file supplied?
  - Are the units appropriate?
    - Hourly emissions should use grams, larger units may result in rounding down to zero
- Output Emission Detail
  - Is level of detail appropriate to how the results are post-processed?
    - E.g., If hourly output, are the results properly summed during post-processing to determine daily emissions?

Checking an Input Database

- An input database is more complicated than a RunSpec and more difficult to review
- Documentation is key
  - Which data are defaults and which are local?
  - What is the source of the local data?
  - How recent are the local data?
- Refer to EPA's Technical Guidance when reviewing
  - Guidance on choice of default vs. local data
  - Guidance on sources of local data
- In general, input database should contain the most recent and best local data available for fleet and activity inputs

Looking at Specific Inputs

- Meteorology (ZoneMonthHour)
  - Temperature and humidity inputs
  - Local data needed
    - Default data based on 10 year averages that may not be appropriate for all types of analysis
- Source type population (SourceTypeYear)
  - Number ("population") of local vehicles operating in the area
  - Important for start and evaporative emissions
  - Local data needed
    - Default data likely to be inaccurate
  - Technical guidance provides suggestions for sources

Looking at Specific Inputs

- Age distribution (SourceTypeAgeDistribution)
  - Age fractions of fleet by age and source type
  - Local data needed
    - Default distribution is a national average
    - Default data may be used for categories not locally registered, e.g., combination long-haul trucks, intercity buses
  - Vehicle registration data are best source

- Vehicle Type VMT (HPMSVTypeYear and others)
  - Total annual VMT by HPMS vehicle type
  - Also month, day and hour VMT fractions
  - Local data needed
    - Default data likely to be inaccurate
  - Transportation demand models and HPMS are sources

Looking at Specific Inputs

- Average Speed Distribution (AvgSpeedDistribution)
  - Speed distribution by road type, hour and source (vehicle) type
  - Local data needed
    - Default is a national average, not appropriate for local conditions
  - Recommended source is post-processed output from a travel demand model

- Road Type Distribution (RoadTypeDistribution)
  - Fraction of source type VMT on different road types
  - Local data needed
    - Default is a national average, not appropriate for local conditions

- Ramp Fraction (RoadType)
  - Fraction of freeway VHT occurring on ramps

MOVES
Motor Vehicle Emission Simulator

EPA

Looking at Specific Inputs

- Fuels (FuelSupply, FuelFormulation, FuelUsage, AVFT)
  - Market share and composition of fuel blends
  - Defaults available by county and recommended
    - Change RVP if necessary to reflect ethanol content using Fuel Wizard
    - Other changes only if local volumetric fuel property data are available

- I/M Programs (IMCoverage)
  - Data on I/M programs at the county level
  - Check to make sure defaults are accurate, change if not

MOVES
Motor Vehicle Emission Simulator

EPA

Looking at Specific Inputs

- Fuels (FuelSupply, FuelFormulation, FuelUsage, AVFT)
  - Market share and composition of fuel blends
  - Defaults available by county and recommended
    - Change RVP if necessary to reflect ethanol content using Fuel Wizard
    - Other changes only if local volumetric fuel property data are available

- I/M Programs (IMCoverage)
  - Data on I/M programs at the county level
  - Check to make sure defaults are accurate, change if not

MOVES
Motor Vehicle Emission Simulator

EPA

Reviewing Inventory Output

- Output database contains multiple tables

- Will need to review user documentation to understand how results were postprocessed

- Movesrun
  - Run ID
  - Distance and mass units
  - RunSpec file name
  - RunSpec description
  - Default database used
  - MOVES version date
  - Domain database name (input database used)

MOVES
Motor Vehicle Emission Simulator

EPA

Reviewing Inventory Output

- Movesactivityoutput
  - Activity type ID
  - Activity
    - VMT or vehicle population

- Movesoutput
  - Run ID
  - Emission Quant
    - Broken down by whatever detail was specified in the RunSpec
    - Units are specified in the RunSpec and echoed in the movesrun table

Questions?

EPA