

# Module 2

## Generating Inventories at the County Scale

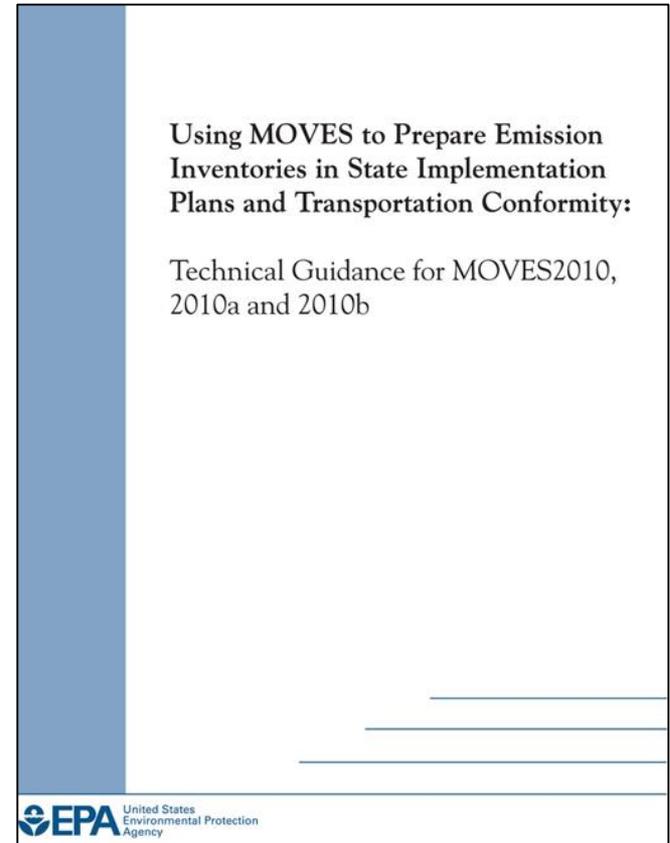


# Module Overview

- Developing a County-scale RunSpec
  - Exercise: Building a county-scale MOVES RunSpec to produce an emissions inventory, including guidance for each panel
- Entering data using the County Data Manager (CDM)
  - What is the CDM and how does it work?
  - Entering local data
  - Using the AADVMT converter
  - Description/guidance for each table in the MOVES input database
- Running MOVES (Executing the RunSpec)
  - Class exercise: Run MOVES for the county inventory scenario
- Available EPA converters

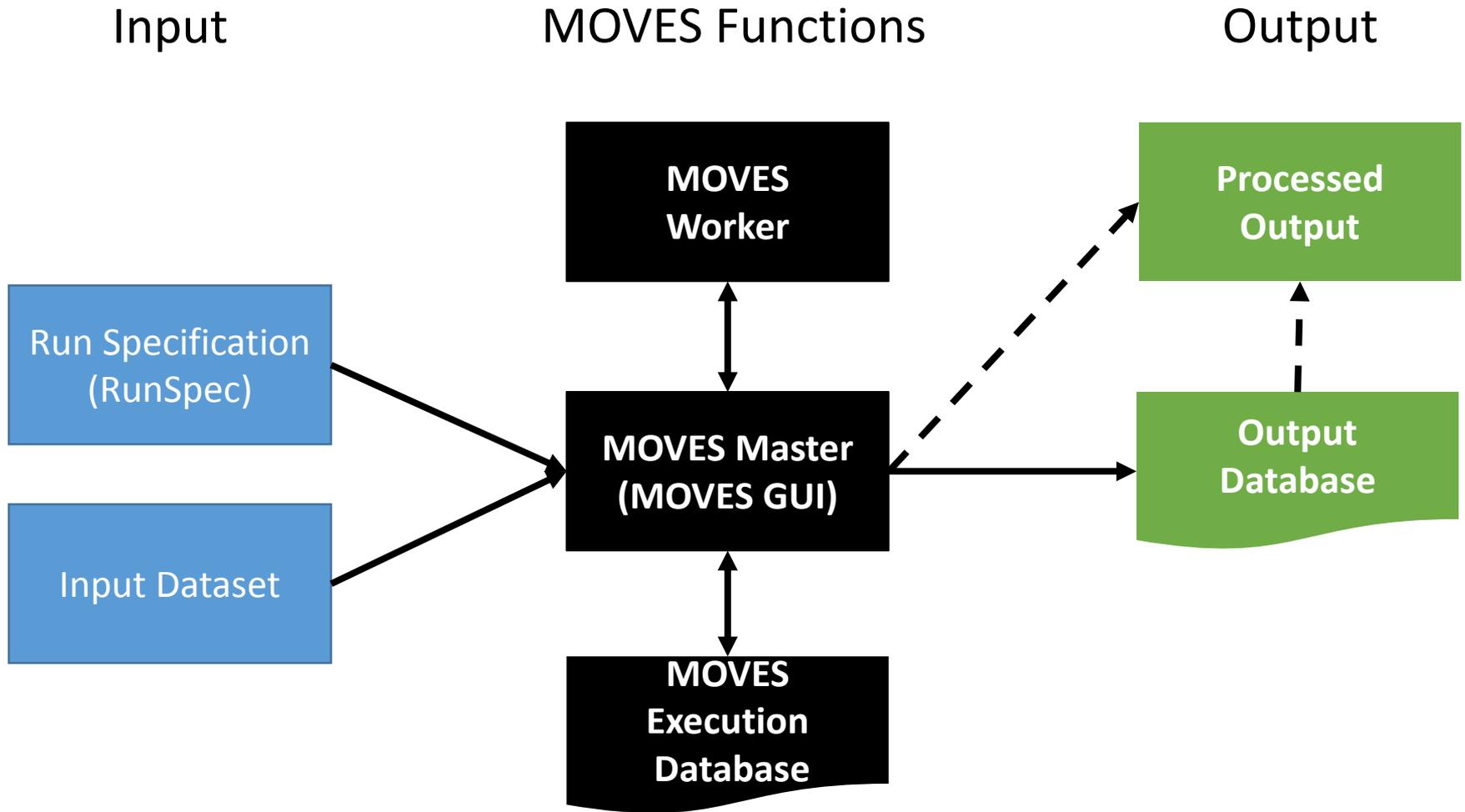
# Key References

- The MOVES Technical Guidance provides guidance on use of local inputs and defaults
- Consult the MOVES User Guide for a basic reference for use of the County Data Manager
- Some input guidance is presented in this course, but refer to Technical Guidance for more detail



[www.epa.gov/otaq/models/moves/index.htm](http://www.epa.gov/otaq/models/moves/index.htm)

# MOVES Process Overview



# Introduction to County Scale

- County Scale is required for State Implementation Plan (SIP) and Conformity analyses
- Local county-specific data must be entered when the County Scale is selected
  - You can import or export data with the County Data Manager
  - Local data should be used for most inputs
  - For some inputs, default data may not be the best or most current information; for other inputs, default data ok

# Developing a County-Scale RunSpec



# Using MOVES at the County Scale

- County scale required for SIP and conformity analyses
- County-specific data must be entered when the County scale is selected
- Data can be exported or imported with the County Data Manager (CDM)
- Local data should be used for most inputs
- Access to default data is limited

# Developing a County-scale RunSpec

- Set up the entire RunSpec file first before the county inputs are added
  - This enables the County Data Manager (CDM) to filter the default database for relevant information
  - CDM also conducts error-checks on imported data based on selections made in the RunSpec
  - Output database must be identified to store the results
- The RunSpec can only have
  - A single county selected
  - A single calendar year selected
- A County input database with local inputs must be provided (can be created/populated with CDM – more later)

# Developing a County-scale RunSpec

- Purpose:
  - Provide hands-on practice building a RunSpec and entering data for a county-scale emissions inventory run
  - Give the user knowledge of guidance related to using MOVES at the county-scale for official purposes
- NOTE: This exercise scenario is intentionally simplified to facilitate learning, limit complexity, and reduce MOVES run time. Therefore, it should **NOT** be used as an example of an official County scale run using MOVES
  - A RunSpec being constructed to calculate an inventory for a SIP or conformity analysis would have to completely address all variables as described in EPA guidance

# Exercise Overview

- Modeling one county: Lake County, Indiana
  - This is a portion of Chicago-Gary ozone nonattainment area
- Typical summer day in 2015
  - Will select month of July and model only “weekday” days, all hours to represent this typical day
- Subset of vehicle types
  - Diesel, gasoline, and ethanol (E-85) passenger cars and trucks
  - Diesel transit buses
  - Normally, all vehicle types would be selected

# Exercise Overview

- All road types
  - Urban restricted and unrestricted
  - Rural restricted and unrestricted
  - Off-network
- Total gaseous hydrocarbons, all processes
  - All processes = starts, running, evaporative, crankcase, etc.
  - One pollutant (THC) selected for training purposes; normally, more pollutants would need to be modeled for a SIP or conformity run

# Developing a County-scale Runspec

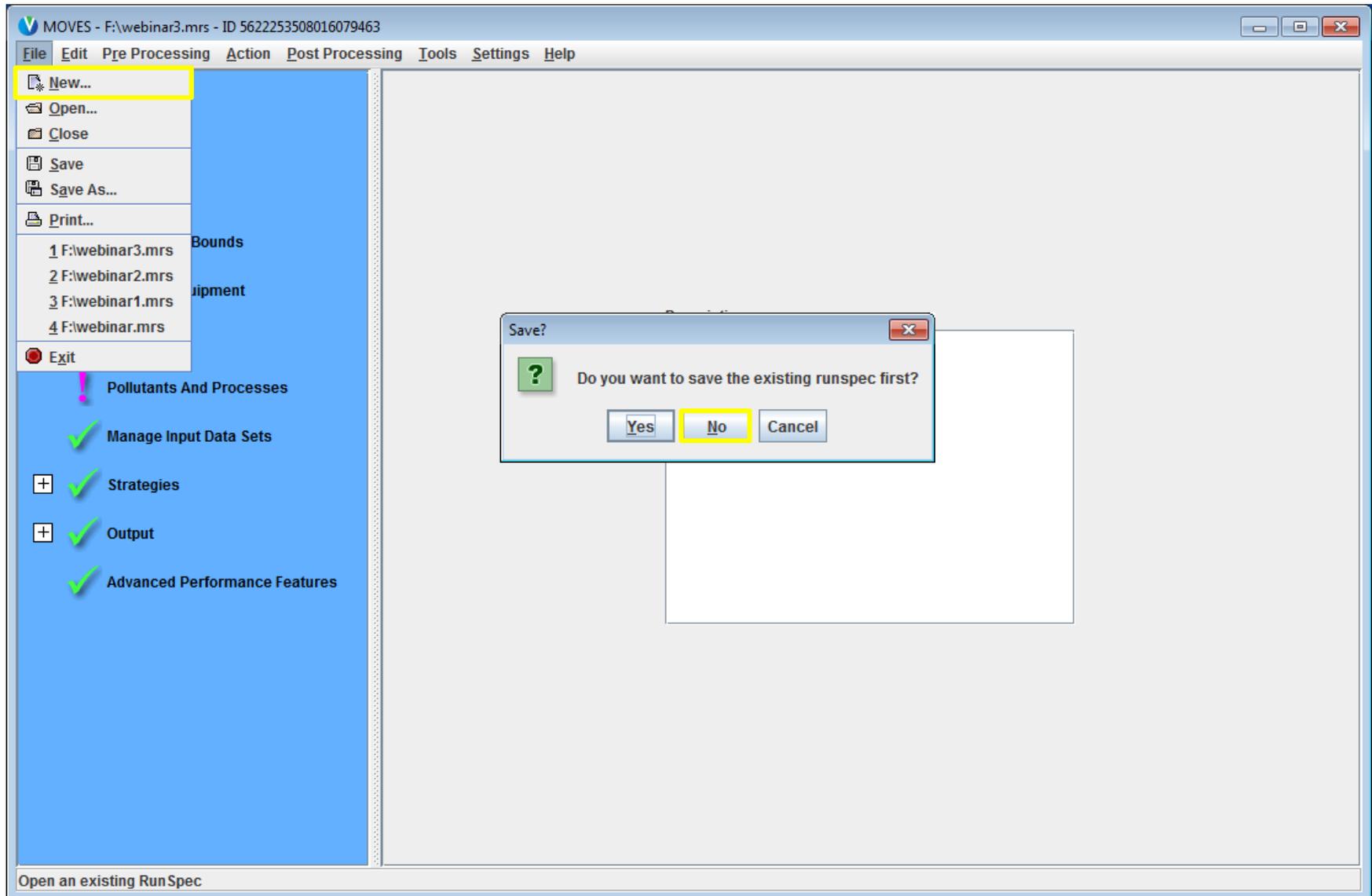
- Instructions for Developing a County-scale RunSpec:

- If you've closed MOVES, open MOVES2014 by double-clicking the "MOVES2014 Master" icon

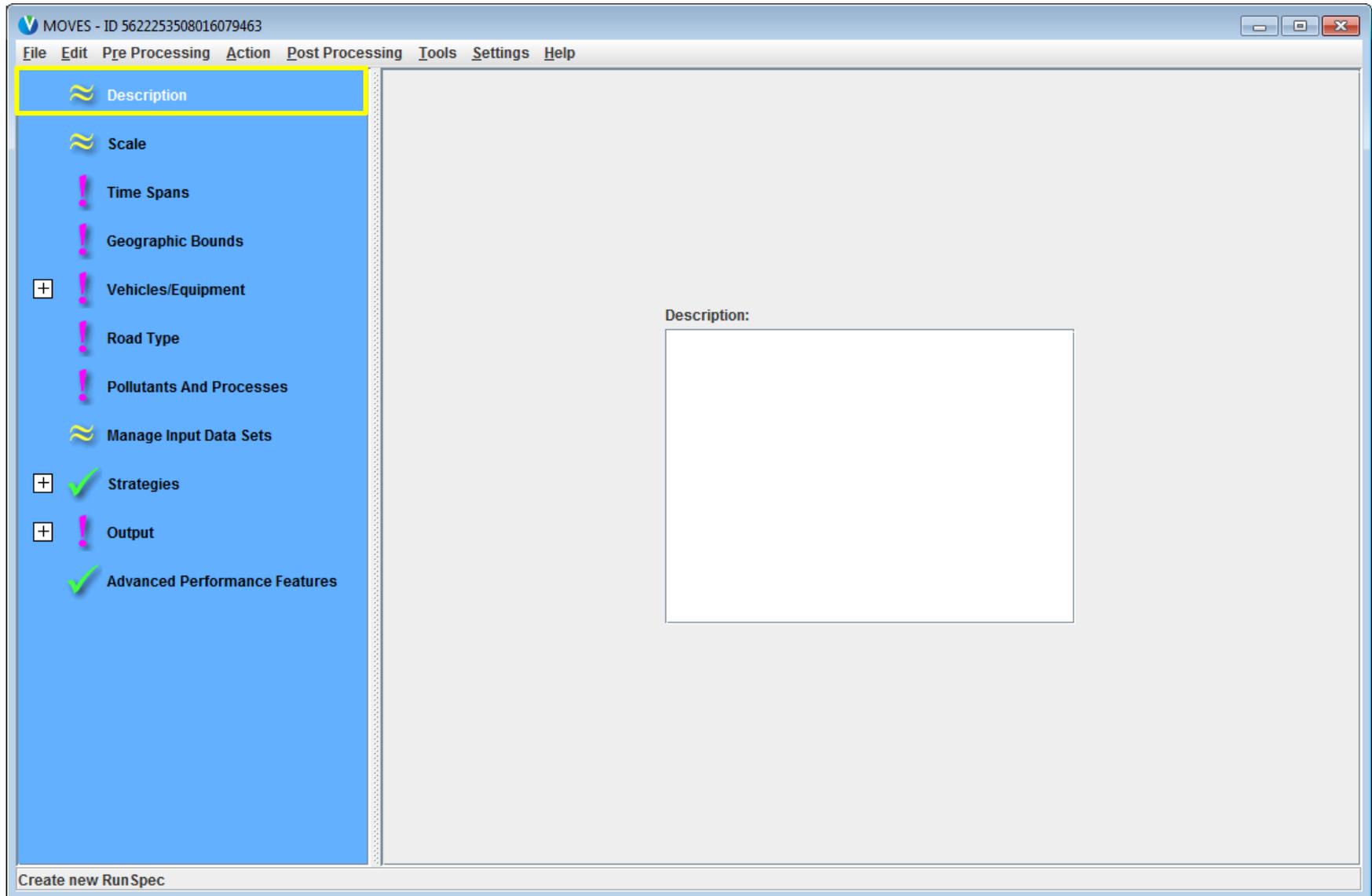


- If MOVES is open, click *File* on the menu bar and click *New...* in the dropdown menu to start building a new RunSpec (and close any current RunSpec)
- Click *No* when prompted to save the existing RunSpec

# File, New... to start a new RunSpec



# Description Panel



# Description Panel

- Allows the user to describe the RunSpec
  - Include details like location, time period, pollutant type, or whatever else is unique about the run
  - Up to 5,000 characters of text, but no quotation marks, ampersand or backslash characters allowed
  - Description appears in the MOVESRun table of the output database
  - Description is optional but useful to keep track of runs
- Instructions for Developing a County-scale RunSpec:
  - Type, “Lake County July 2015 Inventory Training RunSpec”

# Description Panel

The screenshot shows the MOVES software interface with the following elements:

- Window Title:** MOVES - ID 5622253508016079463
- Menu Bar:** File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, Help
- Left Panel (Navigation):**
  - Description (highlighted with a yellow border)
  - Scale
  - Time Spans (with a pink exclamation mark icon)
  - Geographic Bounds (with a pink exclamation mark icon)
  - Vehicles/Equipment (with a pink exclamation mark icon and a plus sign)
  - Road Type (with a pink exclamation mark icon)
  - Pollutants And Processes (with a pink exclamation mark icon)
  - Manage Input Data Sets (with a wavy icon)
  - Strategies (with a green checkmark icon and a plus sign)
  - Output (with a pink exclamation mark icon and a plus sign)
  - Advanced Performance Features (with a green checkmark icon)
- Main Panel:**
  - A yellow callout box with the text: "Enter a description of our inventory training run"
  - A "Description:" label above a text input field containing "Lake County Inventory Training RunSpec"
  - A large empty text area below the input field.
- Bottom Bar:** Create new RunSpec

# Scale Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- ✓ Description
- ✓ Scale
- ! Time Spans
- ! Geographic Bounds
- + ! Vehicles/Equipment
- ! Road Type
- ! Pollutants And Processes
- ≈ Manage Input Data Sets
- + ✓ Strategies
- + ! Output
- ✓ Advanced Performance Features

**Model**

- Onroad
- Nonroad

**Domain/Scale**

- National Use the default national database with default state and local allocation factors.  
 **Caution:** Do not use this scale setting for SIP or conformity analyses. The allocation factors and other defaults applied at the state or county level have not been verified against specific state or county data and do not meet regulatory requirements for SIPs and conformity determinations.
- County Select or define a single county that is the entire domain.  
**Note:** Use this scale setting for SIP and regional conformity analysis. Use of this scale setting requires user-supplied local data for most activity and fleet inputs.
- Project Use project domain inputs.  
**Note:** Use this scale setting for project-level analysis for conformity, NEPA, or any other regulatory purpose. Use of this scale setting requires user-supplied data at the link level for activity and fleet inputs that describe a particular transportation project.

**Calculation Type**

- Inventory Mass and/or Energy within a region and time span.
- Emission Rates Mass and/or Energy per unit of activity.  
MOVES ScenarioID:

 **Caution:** Changing these selections changes the contents of other input panels. These changes may include losing previous data contents.

Create new RunSpec

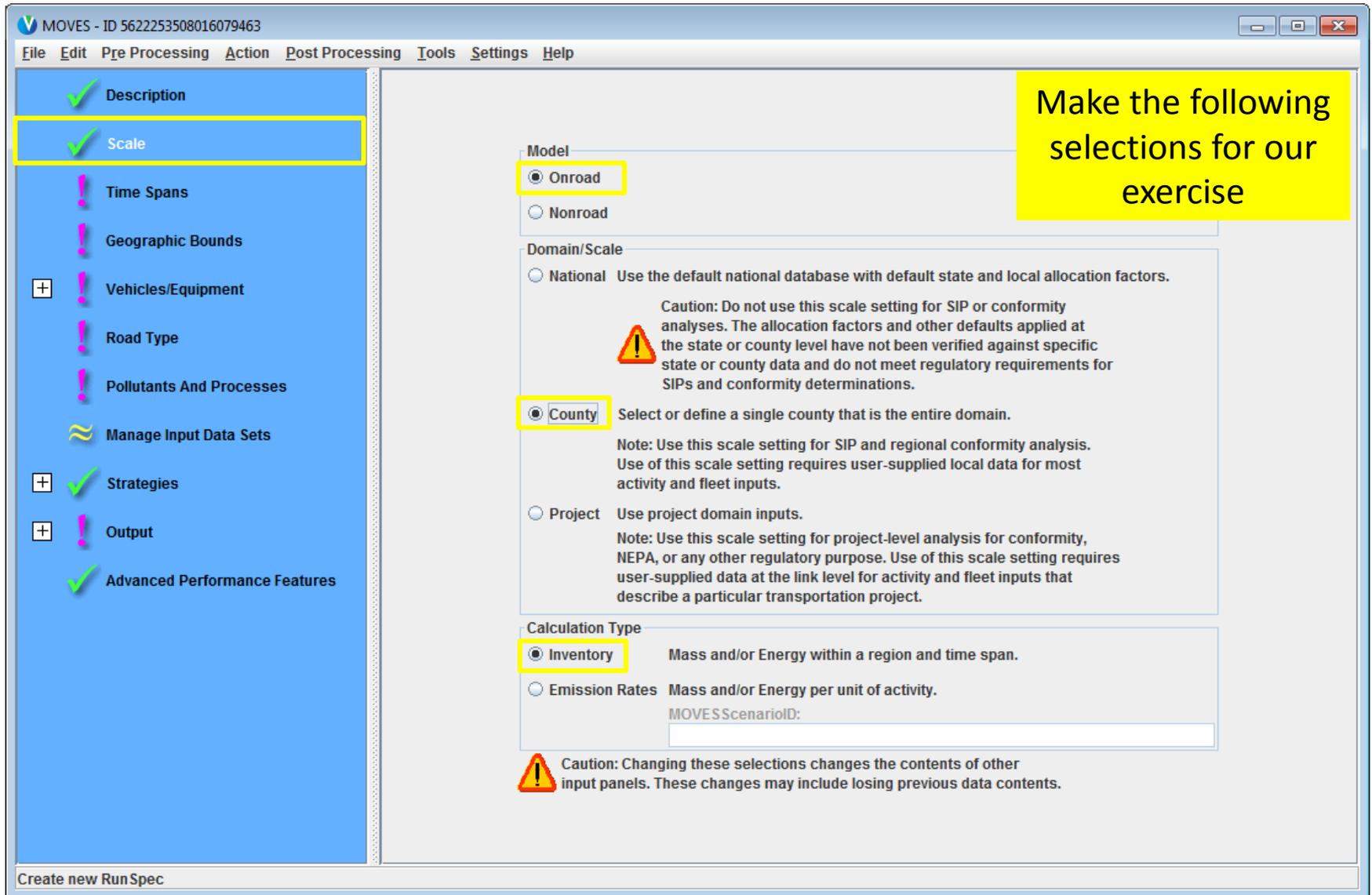
# Scale Panel: Inventory Guidance

- Domain/Scale
  - County scale must be used for SIPs or transportation conformity analyses
  - **NOTE: National scale relies on national defaults and allocation factors that are not appropriate for regulatory purposes**
- Calculation Type
  - Either *Inventory* or *Emission Rates* options may be used for SIPs or transportation conformity analyses
  - Both methods can give the equivalent results, but post-processing errors are more common when using emission rates
  - It is best to use the same approach to compare two or more cases
    - Base year and attainment year
    - Budget and regional conformity analysis
  - Use interagency consultation process to agree upon a common approach or to minimize differences in results if different approaches are used

# Scale Panel

- Instructions for Developing a County-scale RunSpec:
  - Model: Select *Onroad*
  - Domain/Scale: Select *County*
  - Calculation Type: Select *Inventory*

# Scale Panel



MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- Description
- Scale**
- Time Spans
- Geographic Bounds
- Vehicles/Equipment
- Road Type
- Pollutants And Processes
- Manage Input Data Sets
- Strategies
- Output
- Advanced Performance Features

**Model**

- Onroad
- Nonroad

**Domain/Scale**

- National Use the default national database with default state and local allocation factors.  
**Caution:** Do not use this scale setting for SIP or conformity analyses. The allocation factors and other defaults applied at the state or county level have not been verified against specific state or county data and do not meet regulatory requirements for SIPs and conformity determinations.
- County Select or define a single county that is the entire domain.  
**Note:** Use this scale setting for SIP and regional conformity analysis. Use of this scale setting requires user-supplied local data for most activity and fleet inputs.
- Project Use project domain inputs.  
**Note:** Use this scale setting for project-level analysis for conformity, NEPA, or any other regulatory purpose. Use of this scale setting requires user-supplied data at the link level for activity and fleet inputs that describe a particular transportation project.

**Calculation Type**

- Inventory Mass and/or Energy within a region and time span.
- Emission Rates Mass and/or Energy per unit of activity.  
MOVES ScenarioID:

**Caution:** Changing these selections changes the contents of other input panels. These changes may include losing previous data contents.

Create new RunSpec

**Make the following selections for our exercise**

# Time Spans Panel

The screenshot displays the MOVES software interface with the following components:

- Window Title:** MOVES - ID 5622253508016079463
- Menu Bar:** File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, Help
- Left Panel (Navigation):**
  - Description (checked)
  - Scale (checked)
  - Time Spans** (highlighted with a yellow border, marked with a pink exclamation point)
  - Geographic Bounds (marked with a pink exclamation point)
  - Vehicles/Equipment (marked with a pink exclamation point and a plus icon)
  - Road Type (marked with a pink exclamation point)
  - Pollutants And Processes (marked with a pink exclamation point)
  - Manage Input Data Sets (marked with a wavy icon)
  - Strategies (checked, marked with a plus icon)
  - Output (marked with a pink exclamation point and a plus icon)
  - Advanced Performance Features (checked)
- Main Panel (Time Spans Configuration):**
  - Time Aggregation Level:** Radio buttons for Year, Month, Day, and Hour (Hour is selected).
  - Years:** Select Year: [dropdown], Add button, Years: [list box], Remove button.
  - Months:** Checkboxes for January, February, March, April, May, June, July, August, September, October, November, December. Select All and Clear All buttons.
  - Days:** Checkboxes for Weekend and Weekdays. Select All and Clear All buttons.
  - Hours:** Start Hour: [dropdown], End Hour: [dropdown]. Select All and Clear All buttons.
- Footer:** Create new RunSpec

# Time Spans Panel

- For all regulatory purposes
  - Time Aggregation Level should be set to Hour
  - All hours should be selected
  - Only one calendar year can be selected
- Consult with EPA and the MOVES Technical Guidance to determine the appropriate year, month(s), and type of day(s)  
<http://www.epa.gov/otaq/models/moves/#sip>

# Time Spans Panel

- [Instructions for Developing a County-scale RunSpec:](#)
  - Make the following selections for our exercise
    - Time Aggregation Level: Hour
    - Years: 2015
    - Days: Weekdays
    - Months: July
    - Hours: Select All

# Time Spans Panel

The screenshot shows the MOVES software interface with the following elements:

- Window Title:** MOVES - ID 5622253508016079463
- Menu Bar:** File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, Help
- Left Panel (Navigation):**
  - Description (checked)
  - Scale (checked)
  - Time Spans (checked and highlighted)**
  - Geographic Bounds (warning icon)
  - Vehicles/Equipment (+ warning icon)
  - Road Type (warning icon)
  - Pollutants And Processes (warning icon)
  - Manage Input Data Sets (wavy icon)
  - Strategies (+ checked)
  - Output (+ warning icon)
  - Advanced Performance Features (checked)
- Main Panel (Time Spans Configuration):**
  - Time Aggregation Level:** Radio buttons for Year, Month, Day, and **Hour** (selected and highlighted).
  - Years:** Select Year: 2015 (dropdown highlighted), Add button highlighted, Years list: 2015, Remove button.
  - Months:** Checkboxes for January through December. **July** is checked and highlighted. Select All and Clear All buttons.
  - Days:** Checkboxes for Weekend and **Weekdays** (checked and highlighted). Select All and Clear All buttons.
  - Hours:** Start Hour: 00:00 - 00:59 (dropdown), End Hour: 23:00 - 23:59 (dropdown), **Select All** (highlighted) and Clear All buttons.

**Annotation:** A yellow box in the top right corner contains the text: "Make the following selections for our exercise".

**Footer:** Create new RunSpec

# Geographic Bounds Panel

The screenshot shows the MOVES software interface for configuring geographic bounds. The window title is "MOVES - ID 5622253508016079463". The menu bar includes File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, and Help. A left-hand navigation pane contains several options, with "Geographic Bounds" highlighted in yellow. Other options include Description, Scale, Time Spans, Vehicles/Equipment, Road Type, Pollutants And Processes, Manage Input Data Sets, Strategies, Output, and Advanced Performance Features. The main panel is divided into sections for Region, States, Counties, and Selections. The Region section has radio buttons for Nation, State, County (selected), Zone & Link, and Custom Domain. The States section is a list box containing: ALABAMA, ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, CONNECTICUT, DELAWARE, and DISTRICT OF COLUMBIA. Below the States list are "Select All", "Add", and "Delete" buttons. The Selections section is an empty list box. Below these sections is a "Domain Input Database" section with a text box for "Server:" and a dropdown for "Database:". To the right of these fields are "Refresh" and "Enter/Edit Data" buttons. At the bottom, a "Geographic Bounds Requirements" section contains a text box with the instructions: "Please select a state and county." and "Please select a domain database." A status bar at the bottom left says "Create new RunSpec".

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

✓ Description  
✓ Scale  
✓ Time Spans  
**Geographic Bounds**  
+ ! Vehicles/Equipment  
! Road Type  
! Pollutants And Processes  
≈ Manage Input Data Sets  
+ ✓ Strategies  
+ ! Output  
✓ Advanced Performance Features

Region:  
 Nation  
 State  
 County  
 Zone & Link  
 Custom Domain

States:  
ALABAMA  
ALASKA  
ARIZONA  
ARKANSAS  
CALIFORNIA  
COLORADO  
CONNECTICUT  
DELAWARE  
DISTRICT OF COLUMBIA

Counties:  
Selections:

Select All Add Delete

Domain Input Database  
The County domain scale requires a database of detailed data.  
Server:   
Database:   
Refresh  
Enter/Edit Data

Geographic Bounds Requirements  
Please select a state and county.  
Please select a domain database.

Create new RunSpec

# Geographic Bounds Panel

- Once you have selected the County scale, you may
  - Choose a single county from the list or
  - Create a Custom Domain (will cover later in course)
- Choosing a county accesses the available default data stored for that county
- The Enter/Edit Data button in the Domain Input Database portion of the panel opens the County Data Manager
  - A County database must be created or selected to store the county specific data (done later)
- Will show ✓ after County database has been provided

# Geographic Bounds Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

✓ Description  
✓ Scale  
✓ Time Spans  
**! Geographic Bounds**  
+ ! Vehicles/Equipment  
! Road Type  
! Pollutants And Processes  
≈ Manage Input Data Sets  
+ ✓ Strategies  
+ ! Output  
✓ Advanced Performance Features

**Region:**  
 Nation  
 State  
 County  
 Zone & Link  
 Custom Domain

**States:**  
CONNECTICUT  
DELAWARE  
DISTRICT OF COLUMBIA  
FLORIDA  
GEORGIA  
HAWAII  
IDAHO  
ILLINOIS  
**INDIANA**

**Counties:**  
INDIANA - Knox County  
INDIANA - Kosciusko County  
INDIANA - La Porte County  
INDIANA - Laaranne County  
**INDIANA - Lake County**  
INDIANA - Lawrence County  
INDIANA - Madison County  
INDIANA - Marion County

**Selections:**  
INDIANA - Lake County

Select All **Add** Delete

**Domain Input Database**  
The County domain scale requires a database of detailed data.  
Server:   
Database:   
Refresh  
Enter/Edit Data

**Geographic Bounds Requirements**  
Please select a domain database.

Create new RunSpec

**Make the following selections for our exercise**

# On Road Vehicle Equipment Panel

The screenshot displays the MOVES software interface. The window title is "MOVES - ID 5622253508016079463". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help".

The left sidebar contains a list of configuration categories, each with a status icon (checkmark or exclamation mark) and a plus/minus icon:

- Description (checked)
- Scale (checked)
- Time Spans (checked)
- Geographic Bounds (warning)
- Vehicles/Equipment (warning)
- On Road Vehicle Equipment (warning)** (highlighted with a yellow border)
- Road Type (warning)
- Pollutants And Processes (warning)
- Manage Input Data Sets (warning)
- Strategies (checked)
- Output (warning)
- Advanced Performance Features (checked)

The main panel is divided into three columns:

- Fuels:** Compressed Natural Gas (CNG), Diesel Fuel, Electricity, Ethanol (E-85), Gasoline, Liquefied Petroleum Gas (LPG)
- Source Use Types:** Combination Long-haul Truck, Combination Short-haul Truck, Intercity Bus, Light Commercial Truck, Motor Home, Motorcycle, Passenger Car, Passenger Truck, Refuse Truck, School Bus, Single Unit Long-haul Truck, Single Unit Short-haul Truck, Transit Bus
- Selections:** (Empty)

Buttons at the bottom of the main panel include "Select All" (under Fuels), "Select All" (under Source Use Types), "Delete" (under Selections), and "Add Fuel/Type Combinations".

Below the buttons, the text reads: "On Road Vehicle Equipment Requirements" and "Please select a Fuel and Source Use Type combination."

The status bar at the bottom left says "Create new RunSpec".

# On Road Vehicle Equipment Panel

For **most** analyses, select all valid **gasoline, ethanol, diesel, and CNG** vehicle combinations

- Invalid combinations: diesel motorcycle, gasoline long-haul combination truck, and gasoline intercity bus

When transit buses are selected, default database allocates some VMT to Compressed Natural Gas (CNG) transit buses

- Therefore, users should either select the CNG transit bus vehicle combination; or
- Edit the AVFT table in the CDM so that no VMT is allocated to CNG buses.
- If one of these approaches is not used, some VMT assigned to buses (HPMS class 40) will be “lost”
- We will cover this more when discussing the CDM

# On Road Vehicle Equipment Panel

## Instructions for Developing a County-scale RunSpec:

- Select
  - Fuels: Diesel Fuel, Ethanol (E-85), and Gasoline
  - Source Use Types: Select Light Commercial Truck, Passenger Car, Passenger Truck
- Click Add Fuel/Type Combinations
  
- Also select
  - Fuels: Diesel Fuel
  - Source Use Type: Transit Bus
- Click Add Fuel/Type Combinations

# On Road Vehicle Equipment Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

Description

Scale

Time Spans

Geographic Bounds

Vehicles/Equipment

On Road Vehicle Equipment

Road Type

Pollutants And Processes

Manage Input Data Sets

Strategies

Output

Advanced Performance Features

**Fuels:**

- Compressed Natural Gas (CNG)
- Diesel Fuel
- Electricity
- Ethanol (E-85)
- Gasoline
- Liquefied Petroleum Gas (LPG)

**Source Use Types:**

- Combination Long-haul Truck
- Combination Short-haul Truck
- Intercity Bus
- Light Commercial Truck
- Motor Home
- Motorcycle
- Passenger Car
- Passenger Truck
- Refuse Truck
- School Bus
- Single Unit Long-haul Truck
- Single Unit Short-haul Truck
- Transit Bus

**Selections:**

- Diesel Fuel - Light Commercial Truck
- Diesel Fuel - Passenger Car
- Diesel Fuel - Passenger Truck
- Diesel Fuel - Transit Bus
- Ethanol (E-85) - Light Commercial Truck
- Ethanol (E-85) - Passenger Car
- Ethanol (E-85) - Passenger Truck
- Gasoline - Light Commercial Truck
- Gasoline - Passenger Car
- Gasoline - Passenger Truck

Select All Select All Delete

Add Fuel/Type Combinations

Create new RunSpec

# Road Type Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- ✓ Description
- ✓ Scale
- ✓ Time Spans
- ! Geographic Bounds
- [-] ✓ Vehicles/Equipment
  - ✓ On Road Vehicle Equipment
- ! Road Type**
- ! Pollutants And Processes
- ≈ Manage Input Data Sets
- [+] ✓ Strategies
- [+] ! Output
- ✓ Advanced Performance Features

Available Road Types:

- Off-Network
- Rural Restricted Access
- Rural Unrestricted Access
- Urban Restricted Access
- Urban Unrestricted Access

Selected Road Types:

Select All Add Delete

Provide separate ramp output

Create new Run Spec

# Road Type Panel

- Generally recommended to select all road types in RunSpec
  - RoadTypeDistribution table in CDM can be used to allocate VMT to the various road types
- Off-network road type captures start, hotelling, and resting evaporative emissions
  - Running evaporative emissions occur on the normal road types
- Some pollutant-process selections automatically select certain road types
- A restricted road type must be selected for the Ramp Fraction tab to appear in the CDM

# Road Type Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- ✓ Description
- ✓ Scale
- ✓ Time Spans
- ! Geographic Bounds
- ☐ ✓ Vehicles/Equipment
  - ✓ On Road Vehicle Equipment
- ✓ Road Type
- ! Pollutants And Processes
- ≈ Manage Input Data Sets
- ☐ ✓ Strategies
- ☐ ! Output
- ✓ Advanced Performance Features

**Make the following selections for our exercise**

Available Road Types:

- Off-Network
- Rural Restricted Access
- Rural Unrestricted Access
- Urban Restricted Access
- Urban Unrestricted Access

Selected Road Types:

- Off-Network
- Rural Restricted Access
- Rural Unrestricted Access
- Urban Restricted Access
- Urban Unrestricted Access

Select All Add Delete

Provide separate ramp output

Create new RunSpec

# Pollutants and Processes Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- Description
- Scale
- Time Spans
- Geographic Bounds
- Vehicles/Equipment
- On Road Vehicle Equipment
- Road Type
- Pollutants And Processes
- Manage Input Data Sets
- Strategies
- Output
- Advanced Performance Features

	Running Exhaust	Start Exhaust	Brakewear	Tirewear	Evap Permeation	Evap Fuel Vapo
<input type="checkbox"/> Total Gaseous Hydrocarbons	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Non-Methane Hydrocarbons	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Non-Methane Organic Gases	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Total Organic Gases	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Volatile Organic Compounds	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Methane (CH4)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Carbon Monoxide (CO)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Oxides of Nitrogen (NOx)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrogen Oxide (NO)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrogen Dioxide (NO2)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrous Acid (HONO)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Ammonia (NH3)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrous Oxide (N2O)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Primary Exhaust PM2.5 - Total	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> [+] Primary Exhaust PM2.5 - Species	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Primary PM2.5 - Brakewear Particulate			<input type="checkbox"/>			
<input type="checkbox"/> Primary PM2.5 - Tirewear Particulate				<input type="checkbox"/>		
<input type="checkbox"/> Primary Exhaust PM10 - Total	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Primary PM10 - Brakewear Particulate			<input type="checkbox"/>			
<input type="checkbox"/> Primary PM10 - Tirewear Particulate				<input type="checkbox"/>		
<input type="checkbox"/> Sulfur Dioxide (SO2)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Total Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Petroleum Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Fossil Fuel Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Atmospheric CO2	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> CO2 Equivalent	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Benzene	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Ethanol	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> MTDC	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>

Create new RunSpec

# Pollutants and Processes Panel

- Consult the MOVES Technical Guidance to determine the pollutants and processes that should be modeled
  - Varies based on purpose of modeling (e.g., What public health standard has been violated? What demonstration is being made?)
  - For SIP/conformity analyses, select all processes associated with a given pollutant
  - Extra pollutants/processes will increase run-time
- Box to the left of the pollutant name has two uses
  - Selects all processes for a pollutant if no processes have been selected for that pollutant; or
  - Unselects all processes for a pollutant if any processes have been selected for that pollutant.
- Some pollutants and processes are “chained”

# Pollutants and Processes Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

Description  
 Scale  
 Time Spans  
 Geographic Bounds  
 Vehicles/Equipment  
 On Road Vehicle Equipment  
 Road Type  
 **Pollutants And Processes**  
 Manage Input Data Sets  
 Strategies  
 Output  
 Advanced Performance Features

	Running Exhaust	Start Exhaust	Brakewear	Tirewear	Evap Permeation	Evap Fuel Vapo
<input checked="" type="checkbox"/> Total Gaseous Hydrocarbons	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Non-Methane Hydrocarbons	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Non-Methane Organic Gases	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Total Organic Gases	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Volatile Organic Compounds	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Methane (CH4)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Carbon Monoxide (CO)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Oxides of Nitrogen (NOx)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrogen Oxide (NO)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrogen Dioxide (NO2)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrous Acid (HONO)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Ammonia (NH3)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Nitrous Oxide (N2O)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Primary Exhaust PM2.5 - Total	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> [+] Primary Exhaust PM2.5 - Species	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Primary PM2.5 - Brakewear Particulate			<input type="checkbox"/>			
<input type="checkbox"/> Primary PM2.5 - Tirewear Particulate				<input type="checkbox"/>		
<input type="checkbox"/> Primary Exhaust PM10 - Total	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Primary PM10 - Brakewear Particulate			<input type="checkbox"/>			
<input type="checkbox"/> Primary PM10 - Tirewear Particulate				<input type="checkbox"/>		
<input type="checkbox"/> Sulfur Dioxide (SO2)	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Total Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Petroleum Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Fossil Fuel Energy Consumption	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Atmospheric CO2	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> CO2 Equivalent	<input type="checkbox"/>	<input type="checkbox"/>				
<input type="checkbox"/> Benzene	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Ethanol	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> MTDC	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>

Select Prerequisites  
Clear All

Create new RunSpec

Check the box to the left of *Total Gaseous Hydrocarbons* to select all processes for our exercise (scroll to see all processes)

# Manage Input Data Sets Panel

The screenshot shows the MOVES software interface with the following components:

- Window Title:** MOVES - ID 5622253508016079463
- Menu Bar:** File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, Help
- Left Panel (Navigation):**
  - ✓ Description
  - ✓ Scale
  - ✓ Time Spans
  - ! Geographic Bounds
  - [-] ✓ Vehicles/Equipment
    - ✓ On Road Vehicle Equipment
    - ✓ Road Type
    - ✓ Pollutants And Processes
    - Manage Input Data Sets** (highlighted with a yellow box)
  - [+] ✓ Strategies
  - [+] ! Output
  - ✓ Advanced Performance Features
- Main Panel (Manage Input Data Sets):**
  - Server:
  - Database:
  - Description:
  - Buttons: Add, Refresh, Create Database...
  - Selections:
  - Buttons: Move Up, Move Down, Delete
- Callout Box:** A yellow box in the top right of the main panel contains the text: "There are no selections in this panel for our exercise".
- Footer:** Create new RunSpec

# Strategies Panel (Rate Of Progress)

- The Rate of Progress panel (ROP) allows users to identify the RunSpec as an “rate of progress run”, which will estimate emissions using the assumption that the 1990 Clean Air Act Amendments had not been implemented
- Note: Earlier versions of MOVES included panels here called Alternative Vehicle and Fuels Technology (AVFT) and Retrofit Data. These inputs have been moves into the CDM.

# Strategies Panel (Rate Of Progress)

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- ✓ Description
- ✓ Scale
- ✓ Time Spans
- ! Geographic Bounds
- [-] ✓ Vehicles/Equipment
  - ✓ On Road Vehicle Equipment
- ✓ Road Type
- ✓ Pollutants And Processes
- ✓ Manage Input Data Sets
- [-] ✓ Strategies**
  - ✓ Rate Of Progress**
- [+] ! Output
  - ✓ Advanced Performance Features

Server:

Database:

Description:

Add Refresh

Create Database...

Selections:

Move Up Move Down Delete

There are no selections in this panel for our exercise

Create new RunSpec

# Output Panel (General Output)

The screenshot displays the MOVES software interface. The window title is "MOVES - ID 5622253508016079463". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help".

The left sidebar contains a list of output options, each with a status icon (checkmark or exclamation mark) and a collapse/expand icon:

- ✓ Description
- ✓ Scale
- ✓ Time Spans
- ! Geographic Bounds
- [-] ✓ Vehicles/Equipment
  - ✓ On Road Vehicle Equipment
- ✓ Road Type
- ✓ Pollutants And Processes
- ✓ Manage Input Data Sets
- [+] ✓ Strategies
- [-] ! Output
  - ! General Output** (highlighted with a yellow box)
  - ! Output Emissions Detail
- ✓ Advanced Performance Features

The main panel shows the configuration for "General Output":

**Output Database**

Server:  Refresh

Database:  Create Database...

**Units**

Mass Units:  Energy Units:  Distance Units:

**Activity**

- Distance Traveled
- Source Hours
- Hotelling Hours
- Source Hours Operating
- Source Hours Parked
- Population
- Starts

At the bottom of the window, there is a button labeled "Create new RunSpec".

# Output Panel (General Output)

- User must identify the output database
  - Best practice is to name output databases ending with “\_out”
  - Manually create the database if it doesn’t already exist
  - Multiple RunSpecs can be stored in the same database
    - Different RunSpecs will be identified by different MOVESrunID’s
    - Generally, there should be a reason to have multiple RunSpecs in the same output database (e.g., each run is a county in a nonattainment area and the results will later be summed)
- Units must be selected
- Activity output selections are optional
  - Selecting “Distance Traveled” and “Population” is recommended
  - Selecting any of the other options is entirely up to the user

# Output Panel (General Output)

The screenshot displays the MOVES software interface with the following components:

- Window Title:** MOVES - ID 5622253508016079463
- Menu Bar:** File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, Help
- Left Panel (Navigation):**
  - ✓ Description
  - ✓ Scale
  - ✓ Time Spans
  - ! Geographic Bounds
  - [-] ✓ Vehicles/Equipment
    - ✓ On Road Vehicle Equipment
    - ✓ Road Type
    - ✓ Pollutants And Processes
    - ✓ Manage Input Data Sets
  - [+] ✓ Strategies
  - [-] ! Output
    - General Output** (highlighted)
    - ! Output Emissions Detail
    - ✓ Advanced Performance Features
- Main Panel (Configuration):**
  - Output Database:**
    - Server: [ ]
    - Database: lake\_2015\_training\_out (highlighted)
    - Buttons: Refresh, Create Database...
  - Units:**
    - Mass Units: Grams (highlighted)
    - Energy Units: Joules (highlighted)
    - Distance Units: Miles (highlighted)
  - Activity:**
    - Distance Traveled (highlighted)
    - Source Hours
    - Hotelling Hours
    - Source Hours Operating
    - Source Hours Parked
    - Population (highlighted)
    - Starts

**Annotation:** A yellow box in the top right of the main panel contains the text: "Input the database name and make the following selections for our exercise".

**Footer:** Create new RunSpec

# Output Panel (General Output)

The screenshot displays the MOVES software interface. The window title is "MOVES - ID 5622253508016079463". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help".

The left sidebar contains a list of output categories, each with a green checkmark or a pink exclamation mark:

- Description
- Scale
- Time Spans
- Geographic Bounds
- Vehicles/Equipment
- On Road Vehicle Equipment
- Road Type
- Pollutants And Processes
- Manage Input Data Sets
- Strategies
- Output
- General Output** (highlighted with a yellow box)
- Output Emissions Detail
- Advanced Performance Features

The main panel shows the "Output Database" configuration area with the following fields and buttons:

- Server: [Text Field]
- Refresh [Button]
- Database: lake\_2015\_training\_out [Dropdown]
- Create Database... [Button]

A "Message" dialog box is overlaid on the main panel, displaying the following text:

Output Database successfully created.

[OK] [Button]

The "Activity" section on the right side of the main panel includes the following checkboxes:

- Distance Traveled
- Source Hours
- Hotelling Hours
- Source Hours Operating
- Source Hours Parked
- Population
- Starts

The status bar at the bottom left of the window reads "Create new RunSpec".

# Output Panel (Output Emission Detail)

The screenshot displays the MOVES software interface. The window title is "MOVES - ID 5622253508016079463". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help".

The left sidebar contains a list of configuration categories, each with a green checkmark: "Description", "Scale", "Time Spans", "Geographic Bounds", "Vehicles/Equipment", "On Road Vehicle Equipment", "Road Type", "Pollutants And Processes", "Manage Input Data Sets", "Strategies", "Output", "General Output", "Output Emission Detail" (highlighted with a yellow border), and "Advanced Performance Features".

The main panel is titled "Output Emission Detail" and contains the following settings:

- Always:**
  - Time: Hour
  - Location: COUNTY
  - Pollutant
- for All Vehicle/Equipment Categories:**
  - Model Year
  - Fuel Type
  - Emission Process
- Estimate Uncertainty
- On Road/Off Road:**
  - On Road/Off Road
  - On and Off Road:**
    - Road Type
    - Source Use Type
    - SCC
    - Regulatory Class
  - Off Road:**
    - Sector
    - Engine Tech.
    - HP Class
- Number of iterations:** 2
- Keep pseudo-randomly sampled input
- Keep output from each iteration

At the bottom left of the window, there is a button labeled "Create new RunSpec".

# Output Panel (Output Emission Detail)

- The aggregation of the Time level is up to the user
  - Generally *Hour* or *24-Hour Day* are recommended, but if *24-Hour Day* is selected detail at the Hour level will be lost
  - If *Hour* or *24-Hour Day* are selected, results must be properly weighted if emissions for longer timeframes are estimated
- At County Scale, selecting Location of *County* is recommended
- The 'for All Vehicle/Equipment Categories' and 'On Road' selections depend on the detail desired by the user
  - More selections means more detail
  - Differentiation by Source (vehicle) Type is likely most useful

# Output Panel (Output Emission Detail)

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

✓ Description  
✓ Scale  
✓ Time Spans  
! Geographic Bounds  
[-] ✓ Vehicles/Equipment  
    ✓ On Road Vehicle Equipment  
    ✓ Road Type  
    ✓ Pollutants And Processes  
    ✓ Manage Input Data Sets  
[+] ✓ Strategies  
[-] ✓ Output  
    ✓ General Output  
    **✓ Output Emissions Detail**  
    ✓ Advanced Performance Features

**Always**

Time Hour  
 Location COUNTY  
 Pollutant

**for All Vehicle/Equipment Categories**

Model Year  
 Fuel Type  
 Emission Process

Estimate Uncertainty

**On Road/Off Road**

On Road/Off Road

**On and Off Road**

Road Type  
 Source Use Type  
 SCC  
 Regulatory Class

**Off Road**

Sector  
 Engine Tech.  
 HP Class

Number of iterations: 2

Keep pseudo-randomly sampled input  
 Keep output from each iteration

Make the following selections for our exercise

Create new RunSpec

# Advanced Performance Features Panel

MOVES - ID 5622253508016079463

File Edit Pre Processing Action Post Processing Tools Settings Help

- ✓ Description
- ✓ Scale
- ✓ Time Spans
- ! Geographic Bounds
- [-] ✓ Vehicles/Equipment
  - ✓ On Road Vehicle Equipment
- ✓ Road Type
- ✓ Pollutants And Processes
- ✓ Manage Input Data Sets
- [+] ✓ Strategies
- [-] ✓ Output
  - ✓ General Output
  - ✓ Output Emissions Detail
  - ✓ **Advanced Performance Features**

**Masterloopable Components**

Component		
Total Activity Generator (TAG)		
Operating Mode Distribution Generator (running OMDG)		
Start Operating Mode Distribution Generator		
Evaporative Operating Mode Distribution Generator		
Tirewear Operating Mode Distribution Generator		
Source Bin Distribution Generator (SBDG)	<input type="checkbox"/>	<input type="checkbox"/>
Meteorology Generator	<input type="checkbox"/>	<input type="checkbox"/>
Tank Temperature Generator	<input type="checkbox"/>	<input type="checkbox"/>
Tank Fuel Generator	<input type="checkbox"/>	<input type="checkbox"/>
Fuel Effects Generator	<input type="checkbox"/>	<input type="checkbox"/>
Lookup Operating Mode Distribution Generator	<input type="checkbox"/>	<input type="checkbox"/>
Emission Calculators	<input type="checkbox"/>	<input type="checkbox"/>
On-Road Retrofit	<input type="checkbox"/>	<input type="checkbox"/>
Project-Domain Total Activity Generator	<input type="checkbox"/>	<input type="checkbox"/>
Project-Domain Operating Mode Distribution Generator (running exhaust)	<input type="checkbox"/>	<input type="checkbox"/>
Rate Of Progress Strategy	<input type="checkbox"/>	<input type="checkbox"/>

**Destination User Dataset**

Copy Saved Generator Data

Server:  Refresh

Database:  Create Database

**Aggregation and Data Handling**

Do Not Perform Final Aggregation

Clear MOVESOutput after rate calculations

Clear MOVESActivityOutput after rate calculations

Clear BaseRateOutput after rate calculations

**Custom Input Database**

Server:  Refresh

Database:  Create Database

Create new RunSpec

There are no selections in this panel for our exercise

# Saving the RunSpec

- We've completed our RunSpec selections for this run. We want to save this before proceeding with the CDM
- Instructions for Developing a County-scale RunSpec:
  - Save as "lake\_2015\_inventory.mrs" in the "MOVES2014 RunSpecs" folder you created earlier

# Saving the RunSpec

The screenshot shows the MOVES software interface with the 'File' menu open. The 'Save' option is highlighted with a yellow box and the number 1. The 'Save File' dialog box is open, showing the save location as 'MOVES2014 RunSpecs' (2). The file name is 'lake\_2015\_inventory.mrs' (3) and the 'Save' button is highlighted with a yellow box and the number 4.

File menu options:

- New...
- Open...
- Close
- Save
- Save As...
- Print...
- Exit

Save File dialog box details:

- Save in: MOVES2014 RunSpecs
- File name: lake\_2015\_inventory.mrs
- Save as type: All Files (\*.\*)
- Buttons: Save, Cancel

Background interface elements:

- Masterloopable Components
- Save Data
- Custom Input Database
- Server: [ ] Refresh
- Database: [ ] Create Database
- Clear BaseRateOutput after rate calculations

Save active RunSpec

# Entering Data Using the County Data Manager

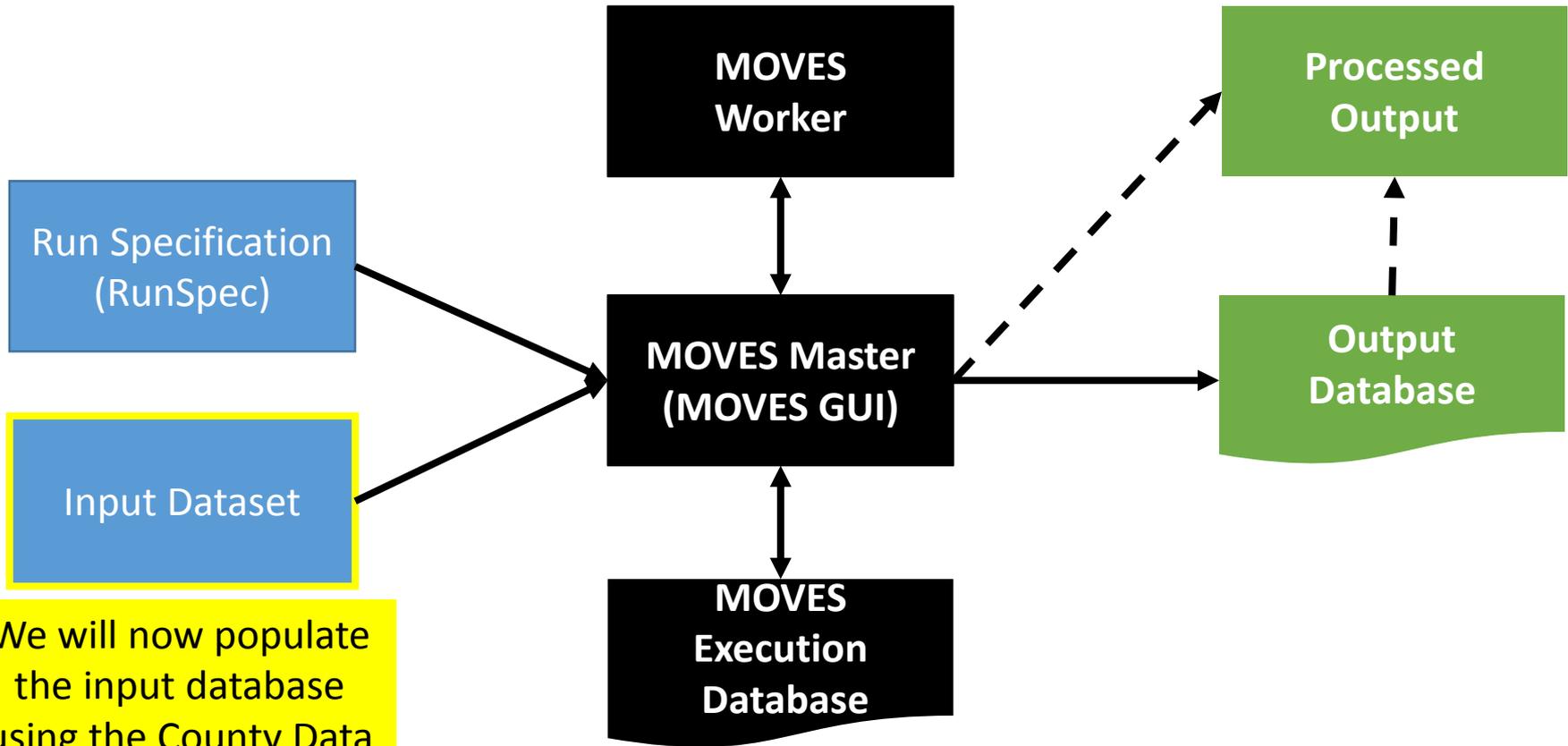


# Using MOVES: Where Are We?

Input

MOVES Functions

Output



We will now populate the input database using the County Data Manager

# What is the County Data Manager?

- The County Data Manager (CDM) is a tool that facilitates the process of entering data into a county input database
  - The data in the input database is used by MOVES when executing the run
- CDM takes the form of a separate Graphical User Interface (GUI) that is used in conjunction with the MOVES Master GUI
  - When the CDM is open, the MOVES Master GUI is frozen and no changes can be made to the RunSpec
- Users manipulate data in Excel, then “Import” worksheets into the CDM
  - Data is not entered directly in the CDM

# County Data Manager Functions

- Use the CDM to
  - Create templates,
  - Export default data (when available), or
  - Export previously imported data
- Using the CDM ensures input tables are properly formatted, which is important
- When exporting default data: review default data for accuracy before conducting a MOVES run
  - At the County scale, MOVES requires users to export and re-import default data (when available) so that users examine each input and the most up-to-date information can be used in modeling

# More CDM Functions

- The CDM imports (enters) the data into the county input database
  - Add descriptions of data being imported
  - Descriptions are useful for documentation of data sources
- Imported data can be cleared for each tab or the entire database can be emptied
  - Should always clear previously-imported data before importing new data for the same input; prevents execution errors

# Opening the County Data Manager

- Two ways to open the CDM:
  - “Enter/Edit Data” button on the Geographic Bounds panel; or
  - Use the “Pre Processing” pull-down menu
- If the input database you want to use already exists, it can be selected in the Domain Input Database drop-down list; otherwise, new input database can be created in CDM
- **Advanced Tip: If the user plans on utilizing the batch import process, the user should not exit the CDM until all data has been imported**
  - The XML script written using the CDM Tools tab will only contain the names of the files that were imported during the active CDM session

# Opening the County Data Manager

The screenshot displays the MOVES software interface. The title bar reads "MOVES - C:\Users\bvangess\Desktop\Ben's MOVES Files\MOVES2014 RunSpecs\lake\_2015\_inventory.mrs - ID 5622253508016079463". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help".

The left sidebar contains several options, each with a green checkmark: "Data Importer", "County Data Manager" (highlighted with a yellow box), "Project Data Manager", "Time Spans", "Geographic Bounds" (highlighted with a yellow box), "Vehicles/Equipment", "On Road Vehicle Equipment", "Road Type", "Pollutants And Processes", "Manage Input Data Sets", "Strategies", "Output", "General Output", "Output Emissions Detail", and "Advanced Performance Features".

The main window area is titled "County Data Manager" and contains the following sections:

- Region:** Radio buttons for "Nation", "State", "County" (selected), "Zone & Link", and "Custom Domain".
- States:** A list box containing "CONNECTICUT", "DELAWARE", "DISTRICT OF COLUMBIA", "FLORIDA", "GEORGIA", "HAWAII", "IDAHO", "ILLINOIS", and "INDIANA".
- Counties:** An empty list box.
- Selections:** A list box containing "INDIANA - Lake County".

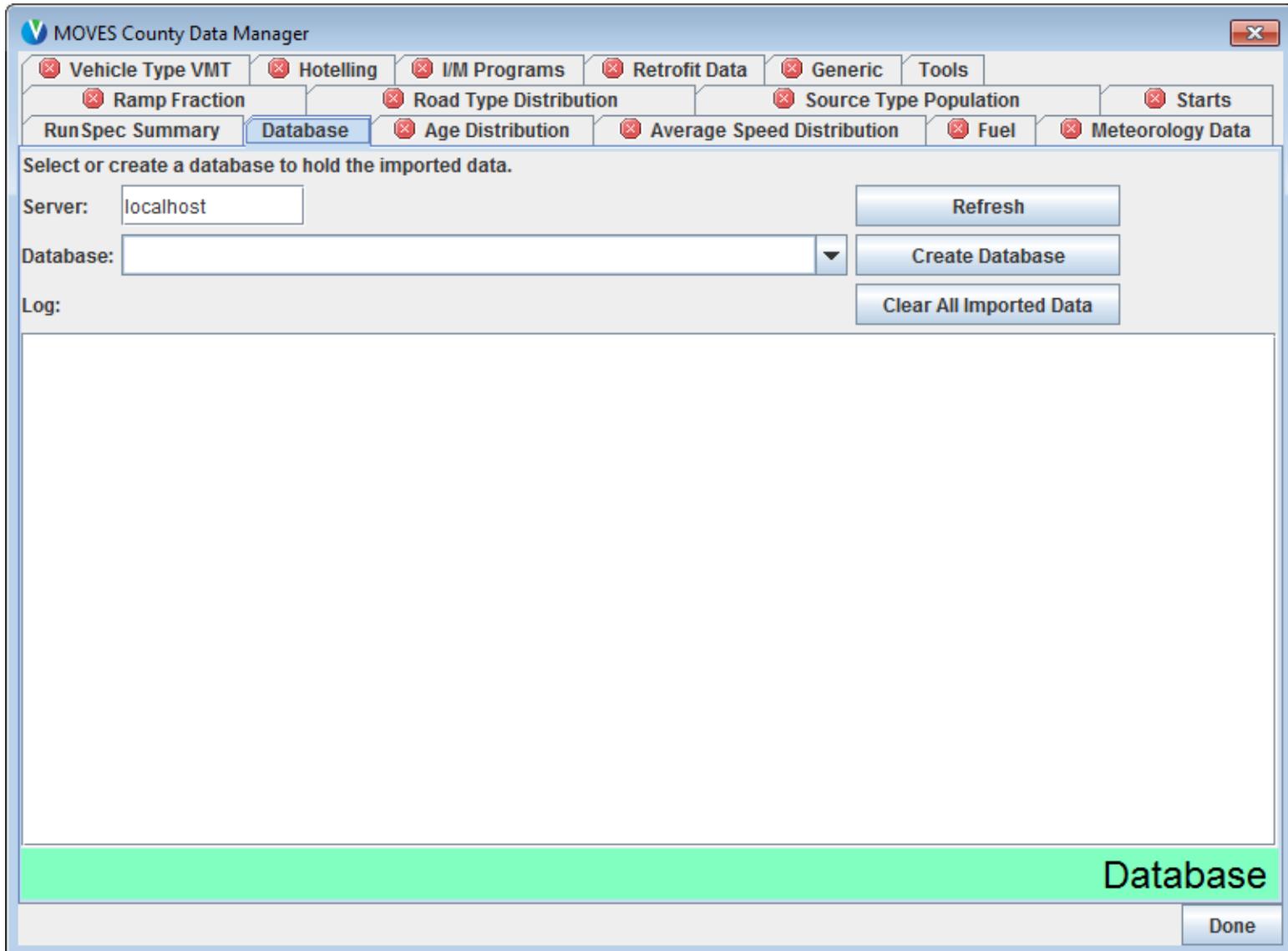
Below the list boxes are three buttons: "Select All", "Add", and "Delete".

The "Domain Input Database" section includes the text "The County domain scale requires a database of detailed data." and two input fields: "Server:" and "Database:". To the right of the "Database:" field is a "Refresh" button and an "Enter/Edit Data" button (highlighted with a yellow box).

The "Geographic Bounds Requirements" section contains the text "Please select a domain database." and an empty text box below it.

At the bottom of the window, a status bar reads "Save active RunSpec as a different name".

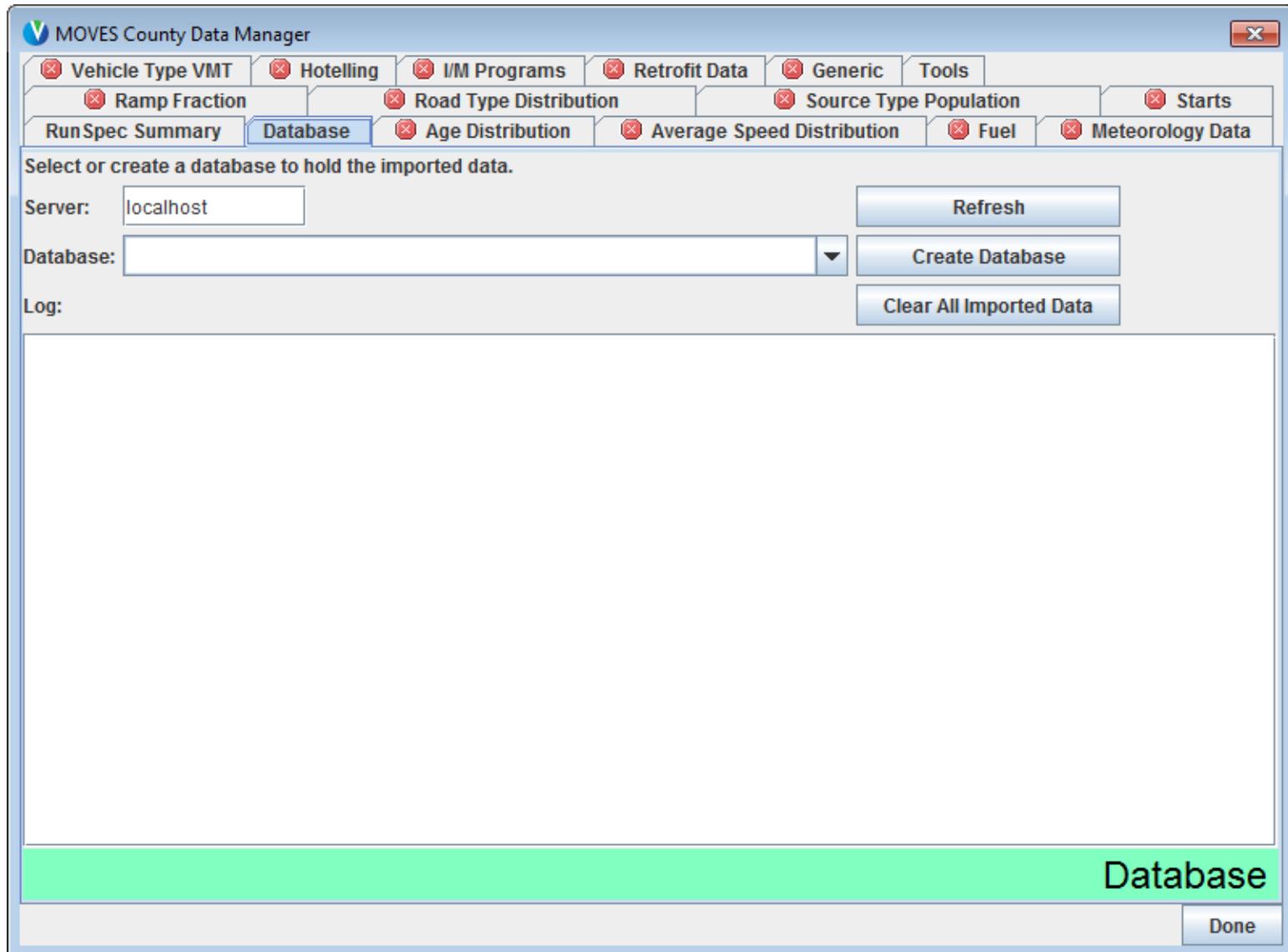
# A Newly Opened CDM



# Using the CDM: General Info

-  and  symbols for each tab are determined by the relationship between the selections made in the RunSpec and the data provided by the user
  -  appears when the user has provided data that is sufficient and passes error checks for all parameters in the RunSpec; note that several tabs begin with a green check (optional inputs)
  -  appears if the user has not provided enough information or if there is an error with the data provided
  - Nothing done in the CDM will affect the selections in the RunSpec
- “RunSpec Summary” tab restates selections made in the RunSpec
  - Helpful reference while using CDM – see next slide
- “Tools” tab (not covered in this course)
  - Used to automate data import process and for batch operation

# Using the CDM: CDM Database Tab



# Using the CDM: CDM Database Tab

- County input database is selected or created here
- Existing county input databases can be selected from the drop-down menu
- Once a county input database has been created or selected, the tables within it can be edited with the other CDM tabs
  - All the tables in the database can be cleared of data with the “Clear All Imported Data” button
- The tab also displays a log of changes

# Creating a New County Input Database

MOVES County Data Manager

Vehicle Type VMT (X) Hotelling (✓) I/M Programs (X) Retrofit Data (✓) Generic (✓) Tools

Ramp Fraction (✓) Road Type Distribution (X) Source Type Population (X) Starts (✓)

RunSpec Summary Database Age Distribution (X) Average Speed Distribution (X) Fuel (X) Meteorology Data (X)

Select or create a database to hold the imported data.

Server: localhost Refresh

Database: lake\_2015\_training\_in 1 Create Database 2

Log: Clear All Imported Data

Message: Database successfully created. OK

Best practice: End input database names with “\_in” to help identify them as input databases

Database Done

# Using the CDM: RunSpec Summary Tab

**MOVES County Data Manager**

Vehicle Type VMT (X) Hotelling (✓) I/M Programs (X) Retrofit Data (✓) Generic (✓) Tools

Ramp Fraction (✓) Road Type Distribution (X) Source Type Population (X) Starts (✓)

**RunSpec Summary** Database (X) Age Distribution (X) Average Speed Distribution (X) Fuel (X) Meteorology Data (X)

Output Database Server Name: [using default]

Output Database Name: lake\_2015\_training\_out

Time Spans:

- Aggregate By: Hour
- Years: 2015
- Months: July
- Days: Weekdays
- Hours: Begin Hour: 00:00 - 00:59, End Hour: 23:00 - 23:59

Geographic Bounds:

- COUNTY geography
- Selection: INDIANA - Lake County

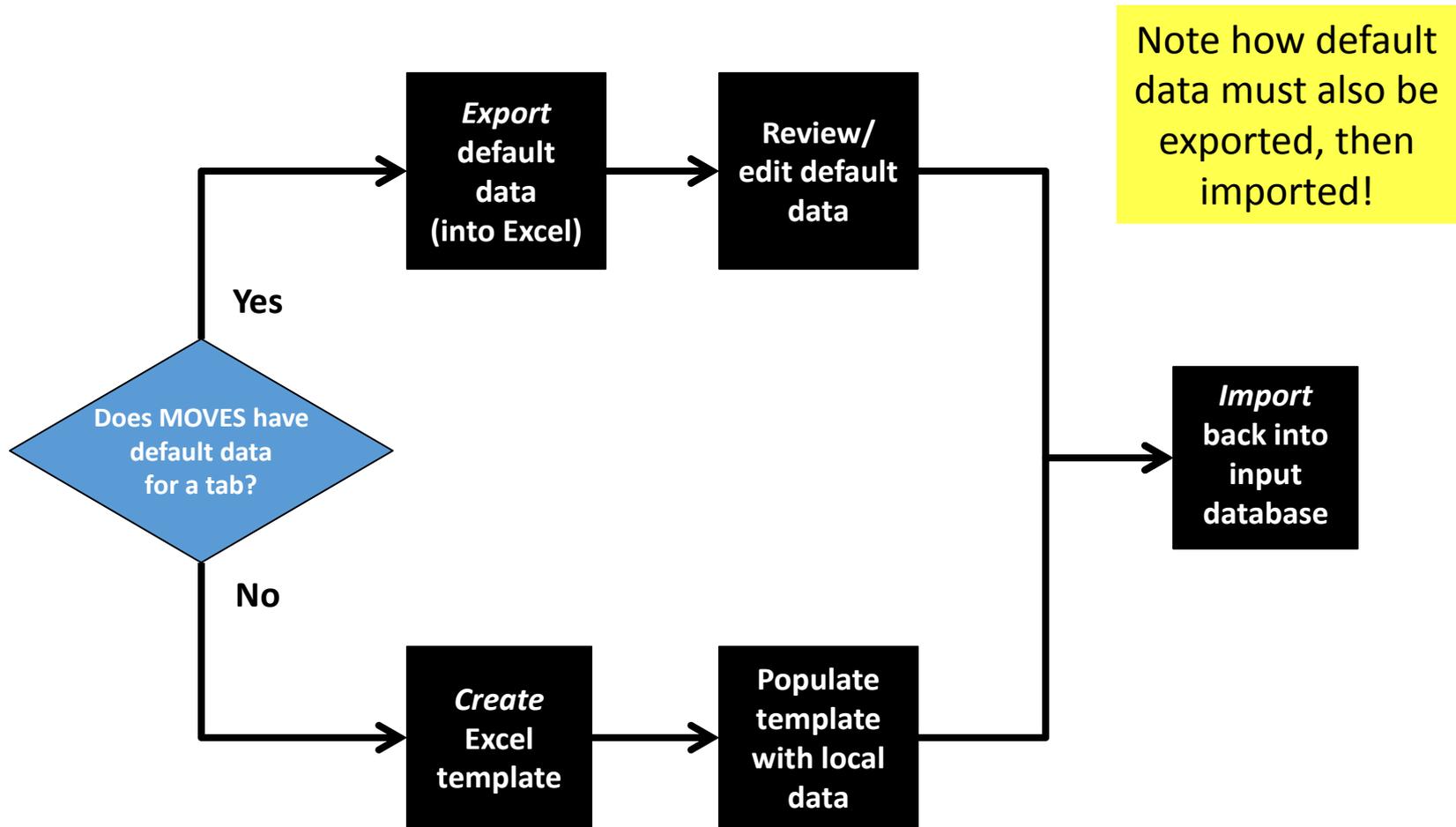
On Road Vehicle Equipment:

- Diesel Fuel - Light Commercial Truck
- Diesel Fuel - Passenger Car
- Diesel Fuel - Passenger Truck
- Diesel Fuel - Transit Bus
- Ethanol (E-85) - Light Commercial Truck
- Ethanol (E-85) - Passenger Car

**RunSpec Summary**

Done

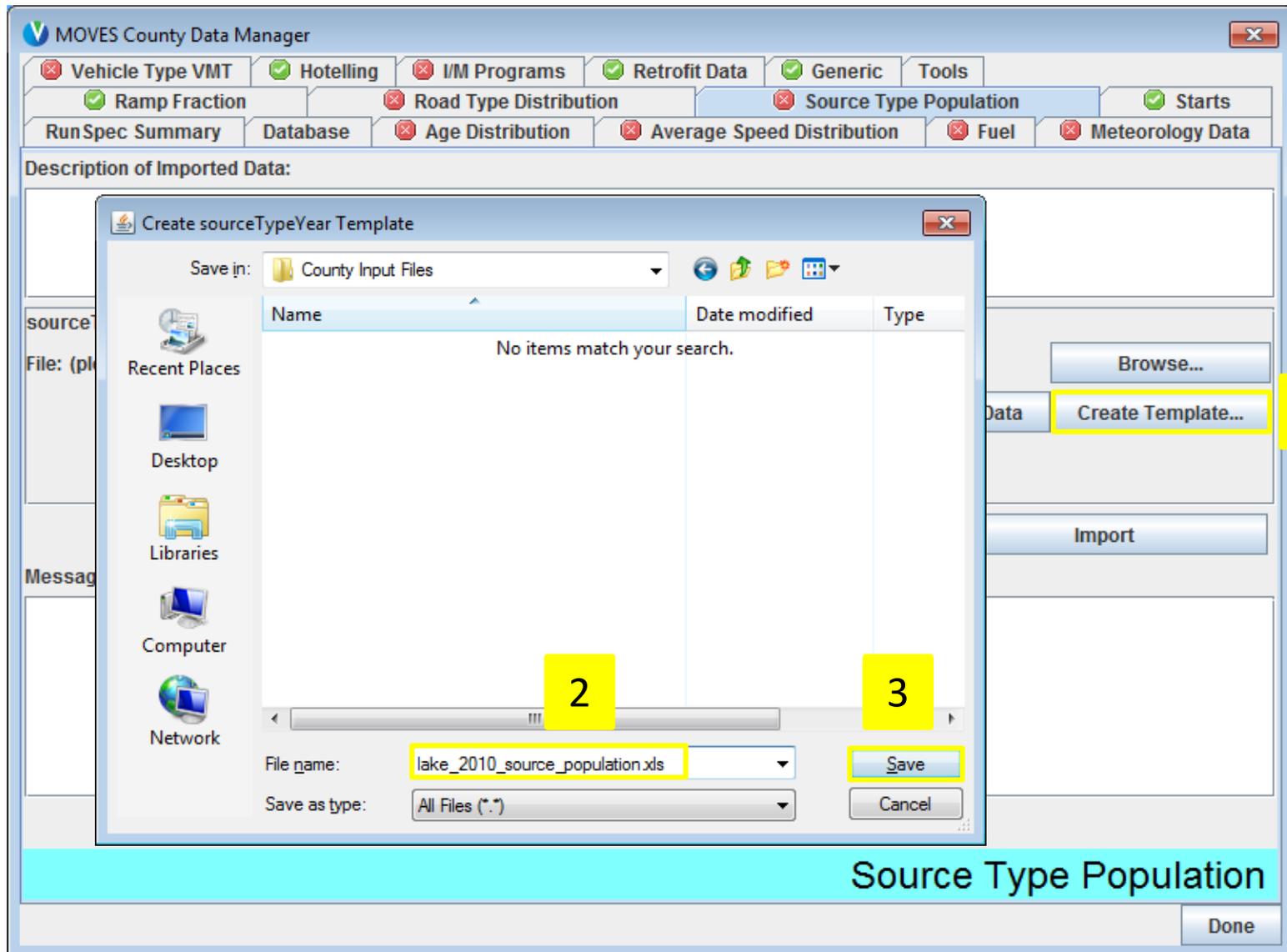
# Using the CDM: Options for Entering Data



# Using the CDM: Creating a Template

- All tabs provide the option of creating an Excel template spreadsheet of the appropriate MOVES table
  - Save as.xls extension to get a spreadsheet format
- Templates contain the proper fields/column headings, but have blank cells for user-specified data
- The template will be pre-populated with some data based on entries made in the RunSpec
  - This is why it's recommended to complete all RunSpec panels first!
- Extra worksheets will help you decipher MOVES codes

# Example: Creating a Template



# Example: Creating a Template

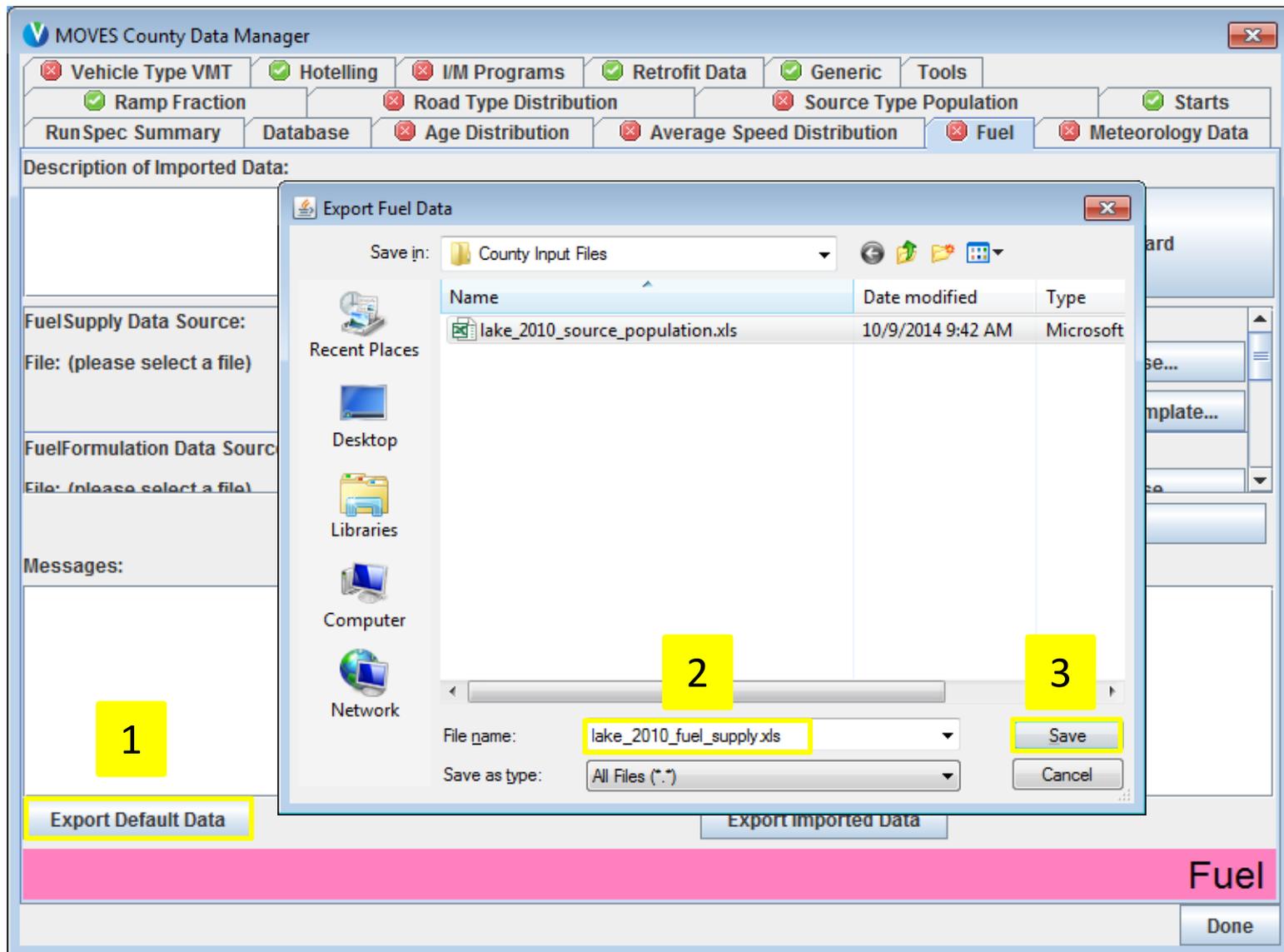
	A	B	C	D	E	F	G	H
1	yearID	sourceTypeID	sourceTypePopulation					
2	2015	21						
3	2015	31						
4	2015	32						
5	2015	42						
6								

- Example template of SourceTypeYear table created from the “Source Type Population” tab of the CDM
- Note that “YearID” and “SourceTypeID” have been pre-populated based on RunSpec selections; “SourceTypePopulation” fields will need to be filled in by the user

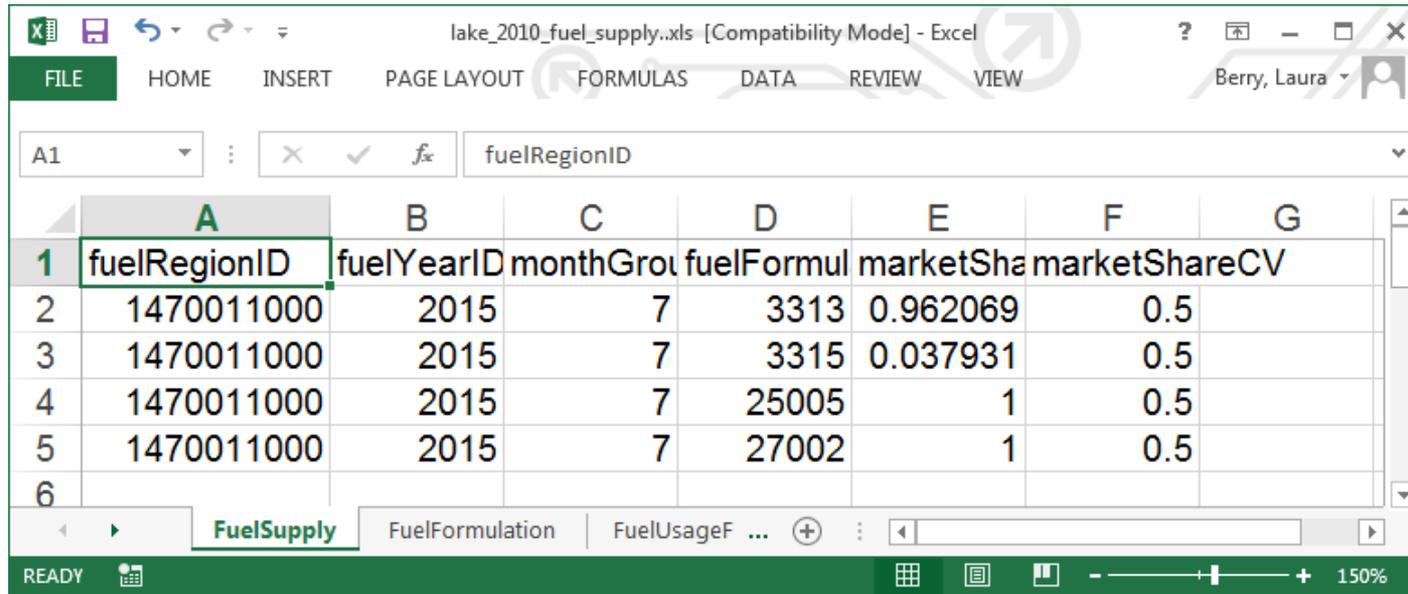
# Using the CDM: Exporting Default Data

- Some tabs have default data available:
  - Average Speed Distribution
  - Ramp Fraction
  - Fuel (Fuel Supply, Fuel Formulation, Fuel Usage, AVFT)
  - Meteorology Data
  - Vehicle Type VMT (Month, Day, and Hour VMT Fractions)
  - I/M Programs
  - Hotelling
- Tabs with default data will have “Export Default Data” option

# Example: Exporting Default Data



# Example: Exporting Default Data



	A	B	C	D	E	F	G
1	fuelRegionID	fuelYearID	monthGroup	fuelFormul	marketShare	marketShareCV	
2	1470011000	2015	7	3313	0.962069	0.5	
3	1470011000	2015	7	3315	0.037931	0.5	
4	1470011000	2015	7	25005	1	0.5	
5	1470011000	2015	7	27002	1	0.5	
6							

- Example of exported default data for FuelSupply table created from the “Fuel” tab of the CDM
- Per MOVES Technical Guidance, user would check default data to ensure applicability and make any changes

# Using the CDM: Importing Data

- Data must be imported back into the CDM from Excel for each tab (even when using default data for a tab)
- Imported data is read from a Excel worksheet that has been properly formatted with the correct columns
- General steps:
  - 1) Recommended: Add a description of the data you are about to import (e.g., the file location or data source)
  - 2) Browse to find the correct Excel file
  - 3) Select the Excel file
  - 4) Select the appropriate worksheet (name should match Data Source in the CDM tab)
  - 5) Click the “Import” button

# Using the CDM: Importing Data

- Check to see if you get an “Import Complete” message
- When the import is successfully completed the  will change to a  on the County Data Manager tab
  - If message says, “Import Complete” but  remains, that means more data is required (e.g., data was not provided for all source types selected in the RunSpec)
  - For many tables, unused data can be imported (e.g., extra months, hours, source types, etc.) with no adverse impacts; however, data for additional counties and years should NOT be imported as this can cause errors when attempting to execute the RunSpec
- The description you entered will appear in the log, which can be viewed on the Database tab

# Example: Importing Data

The screenshot displays the MOVES County Data Manager interface. At the top, a tabbed menu includes 'Vehicle Type VMT', 'Hotelling', 'I/M Programs', 'Retrofit Data', 'Generic', and 'Tools'. Below this, a 'Description of Imported Data:' field contains the text 'Using gasoline 3160 and diesel 20011 based on local fuel survey data', which is highlighted in yellow. A yellow callout box with the text 'Adding a description is recommended' points to this field.

An 'Open FuelSupply Data' dialog box is open in the foreground, showing a file list in the 'County Input Files' directory. The file list has the following columns: Name, Date modified, and Type. The file 'lake\_2010\_fuel\_supply.xls' is selected and highlighted in yellow. A yellow callout box with the number '2' points to this file. Below the list, the 'File name' field contains 'lake\_2010\_fuel\_supply.xls' and the 'Files of type' dropdown is set to 'All Files (\*.\*)'. The 'Open' button is highlighted in yellow, with a yellow callout box containing the number '1' pointing to it.

In the background, the 'Fuels Wizard' panel is visible, featuring a 'Browse...' button highlighted in yellow, a 'Create Template...' button, and an 'Import' button. A yellow callout box with the number '1' points to the 'Browse...' button. At the bottom right of the main window, there is a pink bar with the text 'Fuel' and a 'Done' button.

# Example: Importing Data

The screenshot displays the MOVES County Data Manager interface. At the top, there are several tabs, including 'Fuel', which is currently selected. Below the tabs, a 'Description of Imported Data' section contains the text: 'Using gasoline 3160 and diesel 20011 based on local fuel survey data'. A 'Fuels Wizard' button is visible to the right of this text.

The 'FuelSupply Data Source' section is active, showing 'File: (please select a file)'. A 'Choose XLS Worksheet' dialog box is open over this section, listing the following worksheets: 'FuelSupply', 'FuelFormulation', 'FuelUsageFraction', 'County', 'EngineTech', 'FuelSubtype', 'FuelSupplyYear', and 'FuelType'. The 'FuelSupply' worksheet is highlighted in yellow. A yellow box with the number '3' is positioned to the left of the dialog box, with arrows pointing to the 'FuelSupply' selection and the 'OK' button.

The 'Import' button in the 'FuelSupply Data Source' section is highlighted in yellow. A yellow box with the number '4' is positioned to the left of this button.

At the bottom of the window, there is a pink bar with the text 'Fuel' and a 'Done' button to its right. Other buttons visible include 'Export Default Data', 'Export Imported Data', 'Browse...', 'Create Template...', and 'Fuels Wizard'.

# Example: Importing Data (Con't)

The screenshot shows the MOVES County Data Manager application window. The title bar reads "MOVES County Data Manager". The interface features a tabbed menu at the top with the following tabs: "Vehicle Type VMT" (marked with a red X), "Hotelling" (marked with a green checkmark), "I/M Programs" (marked with a red X), "Retrofit Data" (marked with a green checkmark), "Generic" (marked with a green checkmark), "Tools", "Ramp Fraction" (marked with a green checkmark), "Road Type Distribution" (marked with a red X), "Source Type Population" (marked with a red X), "Starts" (marked with a green checkmark), "RunSpec Summary", "Database" (highlighted with a yellow box), "Age Distribution" (marked with a red X), "Average Speed Distribution" (marked with a red X), "Fuel" (marked with a green checkmark), and "Meteorology Data" (marked with a red X).

Below the tabs, the text "Select or create a database to hold the imported data." is displayed. The "Server:" field contains "localhost" and the "Database:" dropdown menu is set to "lake\_2015\_training\_in". To the right of these fields are three buttons: "Refresh", "Create Database", and "Clear All Imported Data".

The "Log:" section contains the following text:

```
2014-10-09 11:06:13.0 Fuel Filled avft table  
Using gasoline 3160 and diesel 20011 based on local fuel survey data  
2014-10-09 11:06:12.0 Fuel Filled FuelSupply table  
Using gasoline 3160 and diesel 20011 based on local fuel survey data  
2014-10-09 11:06:12.0 Fuel Filled FuelFormulation table  
Using gasoline 3160 and diesel 20011 based on local fuel survey data  
2014-10-09 11:06:12.0 Fuel Filled FuelUsageFraction table  
Using gasoline 3160 and diesel 20011 based on local fuel survey data  
2014-10-09 11:05:17.0 Fuel Filled FuelSupply table  
Using gasoline 3160 and diesel 20011 based on local fuel survey data
```

A yellow callout box on the right side of the log area contains the text: "Database tab log shows FuelSupply has been imported (with date/time stamp)".

At the bottom of the window, the word "Database" is displayed in a green bar, and a "Done" button is located in the bottom right corner.

# CDM: Entering Local Data



# Entering Data Using the CDM: Overview

- We will go through each data input (MOVES table) that can be accessed through each CDM tab
- We will look at the fields in each input table and go over EPA's MOVES Technical Guidance for that input
- After discussing each input, we will enter the appropriate data for our county-level inventory exercise for Lake County
  - Exercise files can be found in the "County Level Inventory" folder

# Summary of Data Inputs

## Vehicle Type VMT

- Total annual VMT by HPMS vehicle type
- Also month, day and hour VMT fractions
- MOVES table: HPMSVTypeYear (and others)

## Hotelling

- Information on Hotelling activity
- MOVES tables: HotellingActivityDistribution and HotellingHours

## I/M Programs

- Data on I/M program(s), if any
- MOVES table: IMCoverage

## Retrofit Data

- Defines retrofit programs
- MOVES table: onRoadRetrofit

# Summary of Data Inputs

## Ramp Fraction tab

- Fraction of freeway VHT occurring on ramps
- MOVES table: RoadType

## Road Type Distribution

- Fraction of source type VMT on different road types
- MOVES table: RoadTypeDistribution

## Source Type Population

- Number (i.e., population) of local vehicles operating in the area
- Important for start and evaporative emissions
- MOVES table: SourceTypeYear

## Starts

- Provides information on vehicle starts
- MOVES table: Starts (and others)

# Summary of Data Inputs

## Age Distribution

- Age fractions of fleet by age and source type
- MOVES table: SourceTypeAgeDistribution

## Average Speed Distribution

- Speed distribution by road type, hour and source (vehicle) type
- MOVES table: AvgSpeedDistribution

## Fuel

- Market share and composition of fuel blends
- Defaults available by county
- MOVES tables: FuelSupply, FuelFormulation, FuelUsage, and AVFT

## Meteorology Data tab

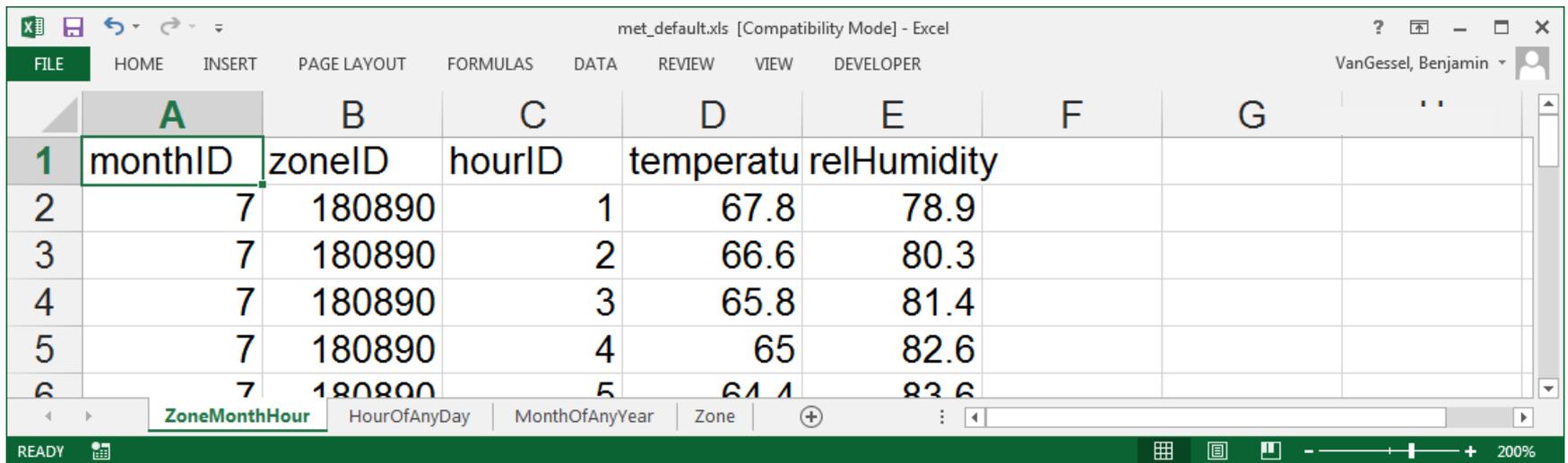
- Temperature and humidity inputs
- MOVES table: ZoneMonthHour

# Summary of Data Inputs (Custom Domain Only)

- Zone Road Activity tab
  - Contains 3 tables to capture activity occurring within each zone
  - MOVES table: Zone
  - MOVES table: ZoneRoadType
  - MOVES table: SCCRoadDistributionData

# Meteorology Data

- Meteorology data should be entered for every month and hour selected in the RunSpec
- Temperatures are in degrees Fahrenheit
- Relative humidity must be between 0 and 100
- ZoneID is simply the countyID + a zero



met\_default.xls [Compatibility Mode] - Excel

	A	B	C	D	E	F	G
1	monthID	zoneID	hourID	temperatu	relHumidity		
2	7	180890	1	67.8	78.9		
3	7	180890	2	66.6	80.3		
4	7	180890	3	65.8	81.4		
5	7	180890	4	65	82.6		
6	7	180890	5	64.4	83.6		

ZoneMonthHour | HourOfAnyDay | MonthOfAnyYear | Zone

# Meteorology Data: Guidance

- Section 4.2 of MOVES Technical Guidance
- Local temperature and humidity data are required inputs for SIP and regional conformity analysis with MOVES
- Default data based on 10 year averages – these may not be appropriate for all types of analysis
- Temperatures for conformity analysis must be consistent with temperatures used to develop SIP emissions budgets

# Meteorology Data: Exercise

- Let's enter meteorology data into the CDM for our county-level exercise
- The template has already been filled out with our met data and is available as file: *met.xls*
- [Instructions for Developing a County-scale RunSpec:](#)
  - Open *met.xls*, review the data, and import the table into the Meteorology tab

# County Inventory Exercise: Entering Meteorology Data

The screenshot shows an Excel spreadsheet with the following data:

1	monthID	zoneID	hourID	temperatur	relHumidity
2	7	180890	1	66.3	78.4
3	7	180890	2	65	80.6
4	7	180890	3	63.9	82.3
5	7	180890	4	62.9	84
6	7	180890	5	62.1	84.9
7	7	180890	6	61.3	86.1
8	7	180890	7	61.6	86.4
9	7	180890	8	65	82.4
10	7	180890	9	69.2	75.7
11	7	180890	10	73	68.9
12	7	180890	11	76.1	63.4
13	7	180890	12	78.6	59.2
14	7	180890	13	80.4	56.1
15	7	180890	14	81.9	53.9
16	7	180890	15	82.9	52.4
17	7	180890	16	83.3	51.7
18	7	180890	17	83.3	51.6
19	7	180890	18	82.6	52.2
20	7	180890	19	81.2	54
21	7	180890	20	79	57.2
22	7	180890	21	75.3	63.4
23	7	180890	22	71.7	69.3
24	7	180890	23	69.6	73.1
25	7	180890	24	67.9	76.1
26					
27					
28					

A yellow box with the text "Contents of Met.xls" is overlaid on the right side of the spreadsheet.

# County Inventory Exercise: Entering Meteorology Data

MOVES County Data Manager

Vehicle Type VMT (X) Hotelling (✓) I/M Programs (X) Retrofit Data (✓) Generic (✓) Tools

Ramp Fraction (✓) Road Type Distribution (X) Source Type Population (X) Starts (✓)

RunSpec Summary Database Age Distribution (X) Average Speed Distribution (X) Fuel (✓) Meteorology Data (✓)

Description of Imported Data:

Look in: County Inventory Exercise

Name	Date modified	Type
answer key	10/20/2014 3:25 PM	File folder
AADVMTCalculator_HPMS		Microsoft Excel 2007
agedistribution.xls		Microsoft Excel 2007
met.xls		Microsoft Excel 2007
post-processing.txt		Text Document
roadtypedistribution.xls		Microsoft Excel 2007
speeddistribution.xls		Microsoft Excel 2007

Choose XLS Worksheet

Select the Worksheet to read:

- ZoneMonthHour
- HourOfAnyDay
- MonthOfAnyYear
- Zone

Note that met worksheet is called "ZoneMonthHour"

File name: met.xls

Files of type: All Files (\*.\*)

Meteorology Data

# Age Distribution

- Age Distribution is entered according to MOVES source types and calendar year
  - AgeFraction must sum to “1” within these fields
- Age Distribution covers new (0) to 30+ year old vehicles
- MOVES does not vary age distribution by month with one run
- EPA has age distribution converters on web, if needed.

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G
1	SourceTypeID	YearID	AgeID	AgeFraction			
2	21	2015	0				
3	21	2015	1				
4	21	2015	2				
5	21	2015	3				
6	21	2015	4				
7	21	2015	5				
8	21	2015	6				
9	21	2015	7				
10	21	2015	8				
11	21	2015	9				
12	21	2015	10				
13	21	2015	11				
14	21	2015	12				
15	21	2015	13				
16	21	2015	14				
17	21	2015	15				
18	21	2015	16				
19	21	2015	17				
20	21	2015	18				
21	21	2015	19				
22	21	2015	20				
23	21	2015	21				
24	21	2015	22				
25	21	2015	23				
26	21	2015	24				
27	21	2015	25				
28	21	2015	26				
29	21	2015	27				
30	21	2015	28				
31	21	2015	29				
32	21	2015	30				
33	31	2015	0				
34	31	2015	1				
35	31	2015	2				
36	31	2015	3				

# Age Distribution: Guidance

- Section 4.4 of MOVES Technical Guidance
- Critical input: emissions are sensitive to age and age distributions vary considerably by locality
- Using local age distribution data is therefore recommended
  - Can be based on registration or I/M data, for instance
- Needed for 31 age groups (0-29 years, 30 years and older), and each of 13 MOVES source types (vehicle types)
  - Age is based on model year relative to calendar year

# Age Distribution: Guidance

- If data not available for individual source types, can use data for similar HPMS classes
- Default distributions can be used in some cases
  - If local data not representative of operating fleet (e.g., combination long-haul truck, intercity bus), no MOBILE6 inputs available, or local data is out of date
  - Default age distributions also on EPA MOVES tools website: <http://www.epa.gov/otaq/models/moves/tools/>
- When modeling a future year, the EPA Age Distribution Projection Tool can be used to adjust base year age distributions
  - The tool accounts for the recession's impact on vehicle sales for a future year
  - The Age Distribution Projection Tool is available on EPA MOVES tools website: <http://www.epa.gov/otaq/models/moves/tools/>

# Age Distribution: Exercise

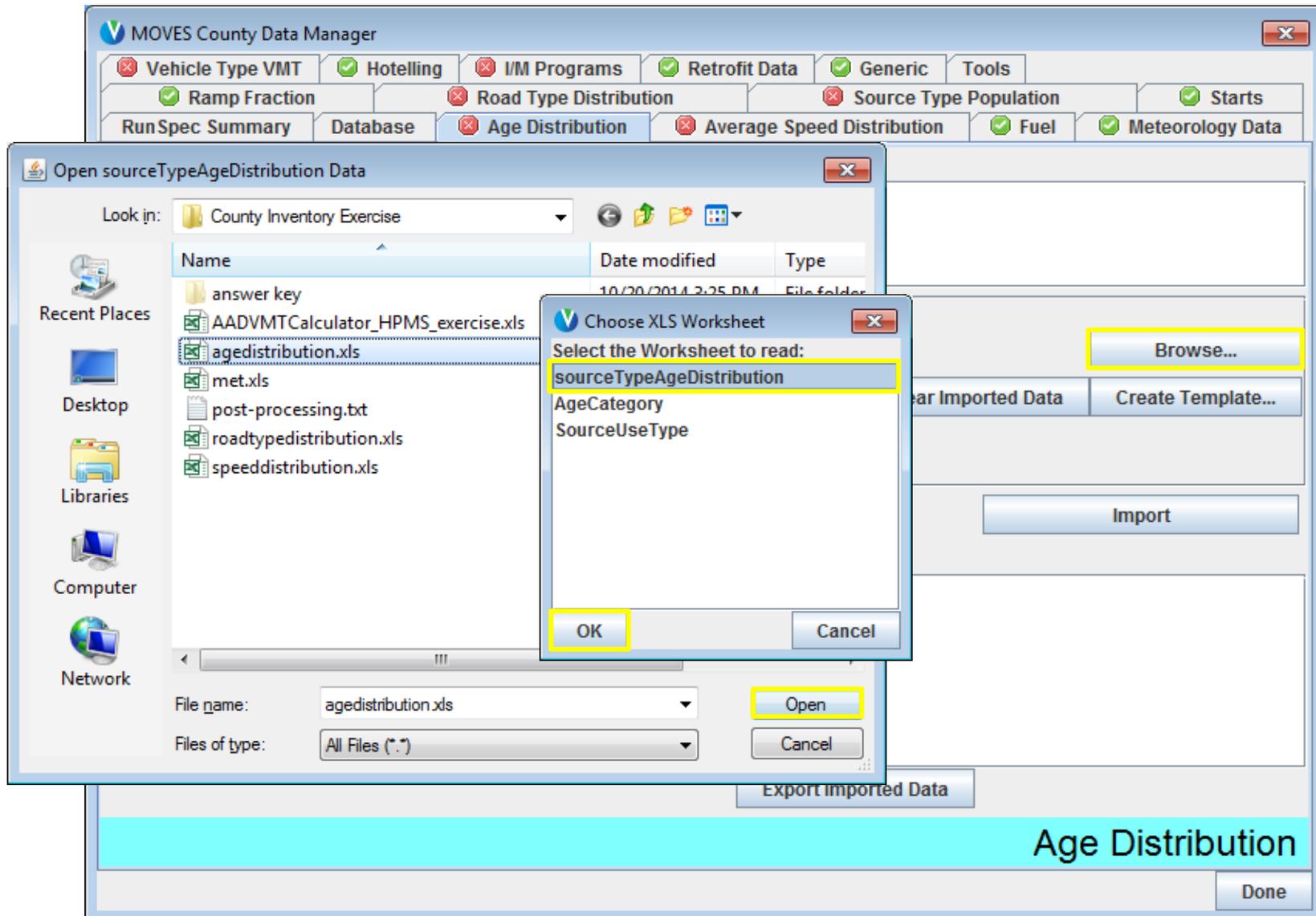
- Let's enter age distribution data into the CDM for our county-level exercise
- We have obtained age distribution data for the passenger cars and trucks from local registration data
- The age of diesel buses is known by the fleet operator
  - 50% are new (<1 year old)
  - 50% are one year old
- The template has already been filled out with our local age distribution and is available as file: *agedistribution.xls*

# Age Distribution: Exercise

The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

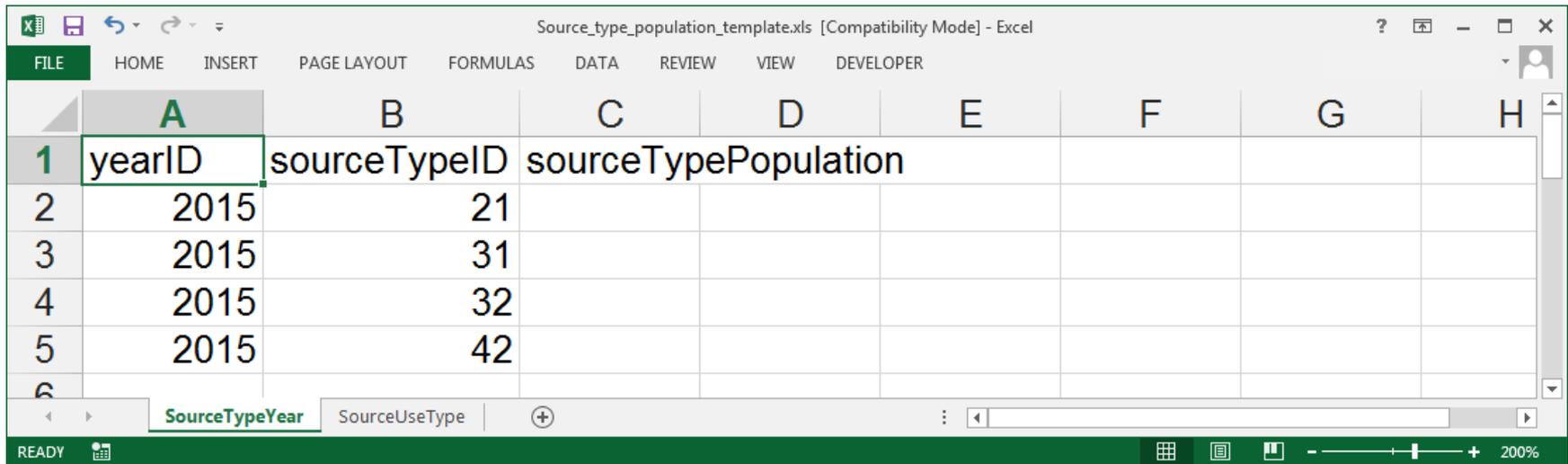
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	SourceTypeID	YearID	AgeID	AgeFraction												
2	21	2015	0	0.076270												
3	21	2015	1	0.093200												
4	21	2015	2	0.092650												
5	21	2015	3	0.080160												
6	21	2015	4	0.074950												
7	21	2015	5	0.070560												
8	21	2015	6	0.064050												
9	21	2015	7	0.069240												
10	21	2015	8	0.055980												
11	21	2015	9	0.052930												
12	21	2015	10	0.046190												
13	21	2015	11	0.042860												
14	21	2015	12	0.037610												
15	21	2015	13	0.031160												
16	21	2015	14	0.024680												
17	21	2015	15	0.018220												
18	21	2015	16	0.014790												
19	21	2015	17	0.012830												
20	21	2015	18	0.009620												
21	21	2015	19	0.005570												
22	21	2015	20	0.004140												
23	21	2015	21	0.003010												
24	21	2015	22	0.002240												
25	21	2015	23	0.002830												
26	21	2015	24	0.003575												
27	21	2015	25	0.004517												
28	21	2015	26	0.005707												

# County Inventory Exercise: Entering Age Distribution Data



# Source Type Population

- Source Type Population is the actual number of vehicles of each “source type” (vehicle type) in the county being modeled



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H
1	yearID	sourceTypeID	sourceTypePopulation					
2	2015	21						
3	2015	31						
4	2015	32						
5	2015	42						
6								

# Source Type Population: Guidance

- Section 4.3 of MOVES Technical Guidance
- Start and evaporative emissions depend upon vehicle population
- Local population data is again recommended
  - Based on registration or I/M data, for instance
- Vehicle population growth must be handled outside the model since MOVES at the county scale only runs one year
  - Vehicle population for future years can be scaled in proportion to VMT or human population growth

# Source Type Population: Guidance

- Only local vehicles need to be included in population
  - Local vehicles are those that have a significant portion of their starts and parked hours in the county
  - Pass-through vehicles do not have to be included in population, but their VMT must be included in the Vehicle Type VMT tab
- Sources of population data
  - Use local registration data for motorcycles, passenger cars and light trucks
  - Use data from transit agencies, school districts, refuse haulers for buses and refuse trucks
  - If information is not available for other vehicle classes, their local population can be estimated by using the ratio of MOVES default population to MOVES default VMT and then applying that same ratio to local VMT.

# Source Type Population: Exercise

- Let's enter source type population data into the CDM for our county-level exercise
- We have passenger car and truck populations from local registration data
  - 50,000 passenger cars
  - 25,000 passenger trucks
  - 25,000 light commercial trucks
- The number of diesel buses is known by the fleet operator
  - 200 buses
- [Instructions for Developing a County-scale RunSpec:](#)
  - Export the template, enter population data, and import the table into the Source Type Population tab

# County Inventory Exercise: Entering Source Type Population Data

MOVES County Data Manager

Vehicle Type VMT Hotelling I/M Programs Retrofit Data Generic Tools

Ramp Fraction Road Type Distribution Source Type Population Starts

RunSpec Summary Database Age Distribution Average Speed Distribution Fuel Meteorology Data

Create sourceTypeAgeDistribution Template

Save in: County Inventory Exercise

Name	Date modified	Type
answer key	10/20/2014 3:25 PM	File folder
AADVMTCalculator_HPMS_exercise.xls	9/4/2014 10:44 AM	Microsoft
agedistribution.xls	10/20/2014 2:20 PM	Microsoft
met.xls	6/4/2012 10:10 AM	Microsoft
post-processing.txt	7/26/2012 2:48 PM	Text Docu
roadtypedistribution.xls	10/20/2014 2:21 PM	Microsoft
sourcetypepopulation.xls	10/20/2014 2:17 PM	Microsoft
speeddistribution.xls	10/20/2014 2:19 PM	Microsoft

File name: sourcetypepopulation.xls Save

Save as type: All Files (\*.\*) Cancel

Browse... Create Template... Import

Save newly created template as sourcetypepopulation.xls

Age Distribution Done

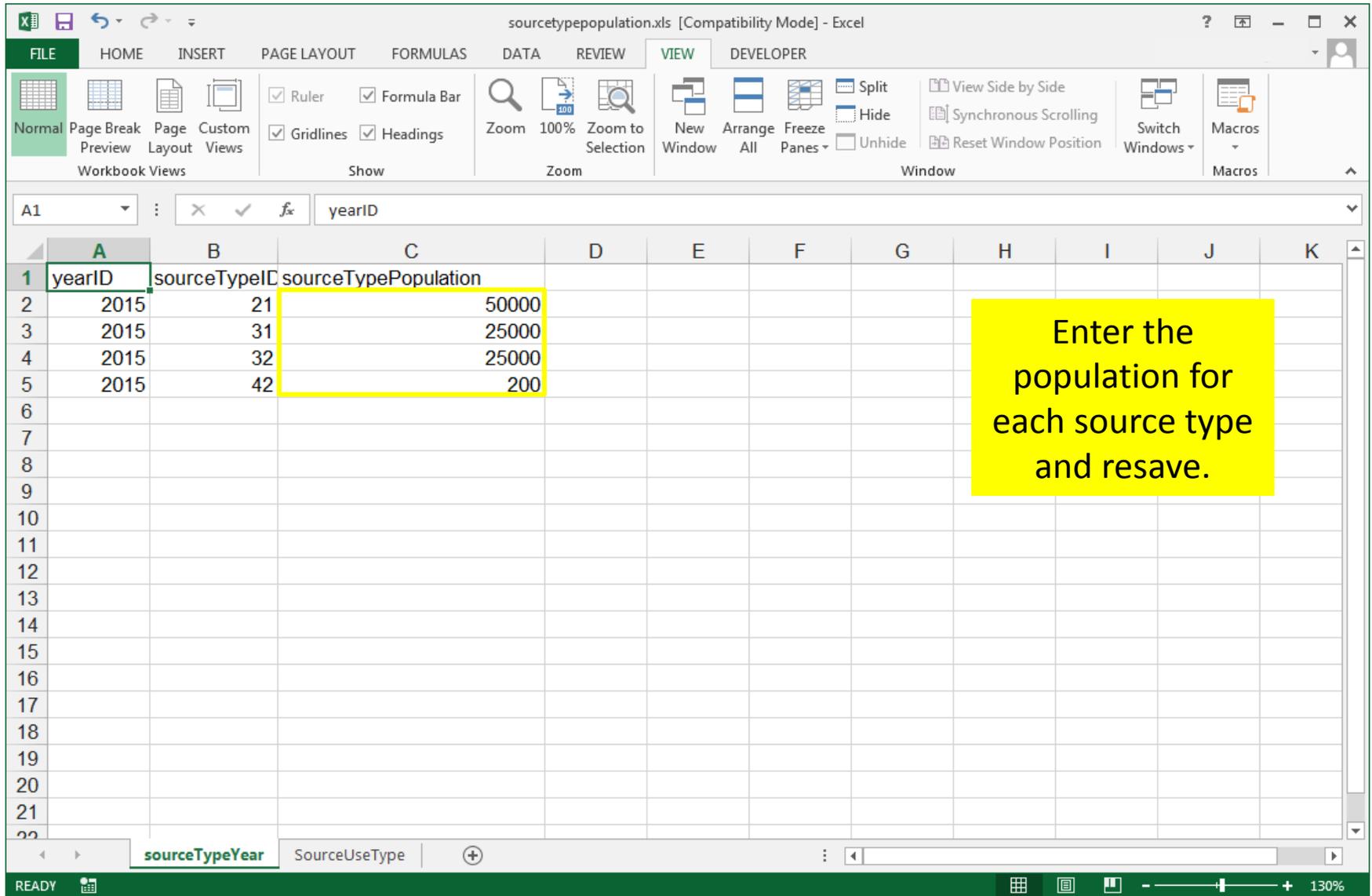
# County Inventory Exercise: Entering Source Type Population Data

The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K
1	yearID	sourceTypeID	sourceTypePopulation								
2	2015	21									
3	2015	31									
4	2015	32									
5	2015	42									
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

A yellow callout box on the right side of the spreadsheet contains the text: "Source type population template, as exported".

# County Inventory Exercise: Entering Source Type Population Data



The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K
1	yearID	sourceTypeID	sourceTypePopulation								
2	2015	21	50000								
3	2015	31	25000								
4	2015	32	25000								
5	2015	42	200								
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

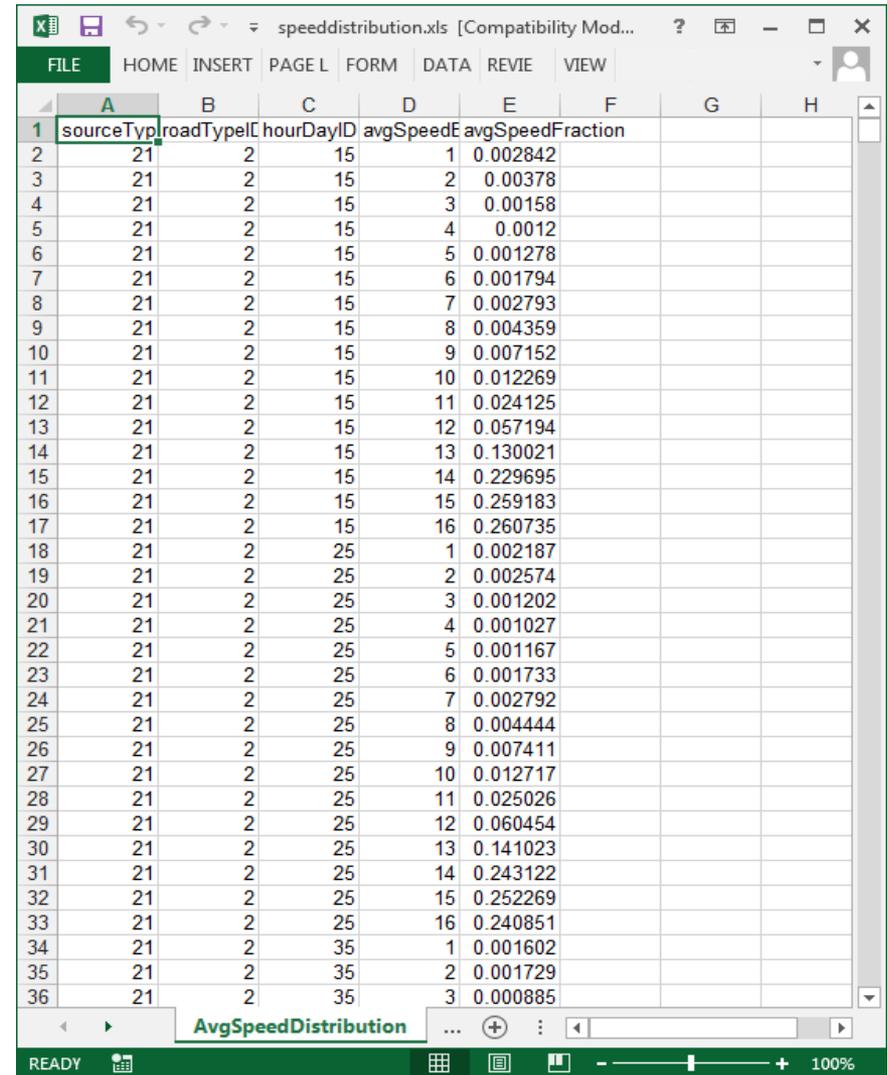
A yellow callout box on the right side of the spreadsheet contains the text: "Enter the population for each source type and resave."

# County Inventory Exercise: Entering Source Type Population Data

The screenshot displays the MOVES County Data Manager interface. The 'Source Type Population' tab is selected. An 'Open sourceTypeYear Data' dialog box is open, showing a file explorer view of the 'County Inventory Exercise' folder. The file 'sourcetypepopulation.xls' is selected. A 'Choose XLS Worksheet' dialog box is also open, showing the 'sourceTypeYear' worksheet selected. A yellow callout box contains the text: 'Browse and import updated worksheet as usual'. A cyan banner at the bottom of the screen contains the text: 'Source Type Population'.

# Average Speed Distribution

- Avg. Speed Distribution entered according to source type, road type, and hour-day
  - AvgSpeedFraction should sum to 1 within these fields
- MOVES has 16 speed bins ranging from 2.5 to 75+ mph



	A	B	C	D	E	F	G	H
1	sourceType	roadType	hourDayID	avgSpeed	avgSpeedFraction			
2	21	2	15	1	0.002842			
3	21	2	15	2	0.00378			
4	21	2	15	3	0.00158			
5	21	2	15	4	0.0012			
6	21	2	15	5	0.001278			
7	21	2	15	6	0.001794			
8	21	2	15	7	0.002793			
9	21	2	15	8	0.004359			
10	21	2	15	9	0.007152			
11	21	2	15	10	0.012269			
12	21	2	15	11	0.024125			
13	21	2	15	12	0.057194			
14	21	2	15	13	0.130021			
15	21	2	15	14	0.229695			
16	21	2	15	15	0.259183			
17	21	2	15	16	0.260735			
18	21	2	25	1	0.002187			
19	21	2	25	2	0.002574			
20	21	2	25	3	0.001202			
21	21	2	25	4	0.001027			
22	21	2	25	5	0.001167			
23	21	2	25	6	0.001733			
24	21	2	25	7	0.002792			
25	21	2	25	8	0.004444			
26	21	2	25	9	0.007411			
27	21	2	25	10	0.012717			
28	21	2	25	11	0.025026			
29	21	2	25	12	0.060454			
30	21	2	25	13	0.141023			
31	21	2	25	14	0.243122			
32	21	2	25	15	0.252269			
33	21	2	25	16	0.240851			
34	21	2	35	1	0.001602			
35	21	2	35	2	0.001729			
36	21	2	35	3	0.000885			

# Average Speed Distribution: Speed Bins

avgSpeedBinID	avgSpeedBinDesc
1	Speed < 2.5mph
2	2.5mph <= speed < 7.5mph
3	7.5mph <= speed < 12.5mph
4	12.5mph <= speed < 17.5mph
5	17.5mph <= speed < 22.5mph
6	22.5mph <= speed < 27.5mph
7	27.5mph <= speed < 32.5mph
8	32.5mph <= speed < 37.5mph
9	37.5mph <= speed < 42.5mph
10	42.5mph <= speed < 47.5mph
11	47.5mph <= speed < 52.5mph
12	52.5mph <= speed < 57.5mph
13	57.5mph <= speed < 62.5mph
14	62.5mph <= speed < 67.5mph
15	67.5mph <= speed < 72.5mph
16	72.5 <= speed

# Average Speed Distribution

- Avg. Speed Distribution is in terms of time, not distance (i.e. fraction of VHT, not VMT, in each speed bin)
- AvgSpeedDistribution table can be very long (~50,000+ rows) if RunSpec covers all source types, road types, day types, and hours
  - Consult MOVES User Guide for info about “wildcards” to provide identical speed inputs for multiple fields (e.g., HPMS classes, both types of day, etc.)

# Average Speed Distribution: Guidance

- Section 4.6 of MOVES Technical Guidance
- Local speed distribution data is recommended
  - The more detail that can be obtained, the better
  - Speed distribution data can be applied to all source types within an HPMS class (e.g., same distribution for 31 and 32) or for more general categories (e.g., same distribution for all light-duty vehicles) if more detailed information is not available
  - For temporal aspects, speed distribution data can be entered at the hourly level, but varying the speed distribution for peak and off-peak hours is also acceptable
  - Freeway speeds should reflect mainline freeway speeds (not ramps)

# Average Speed Distribution: Guidance

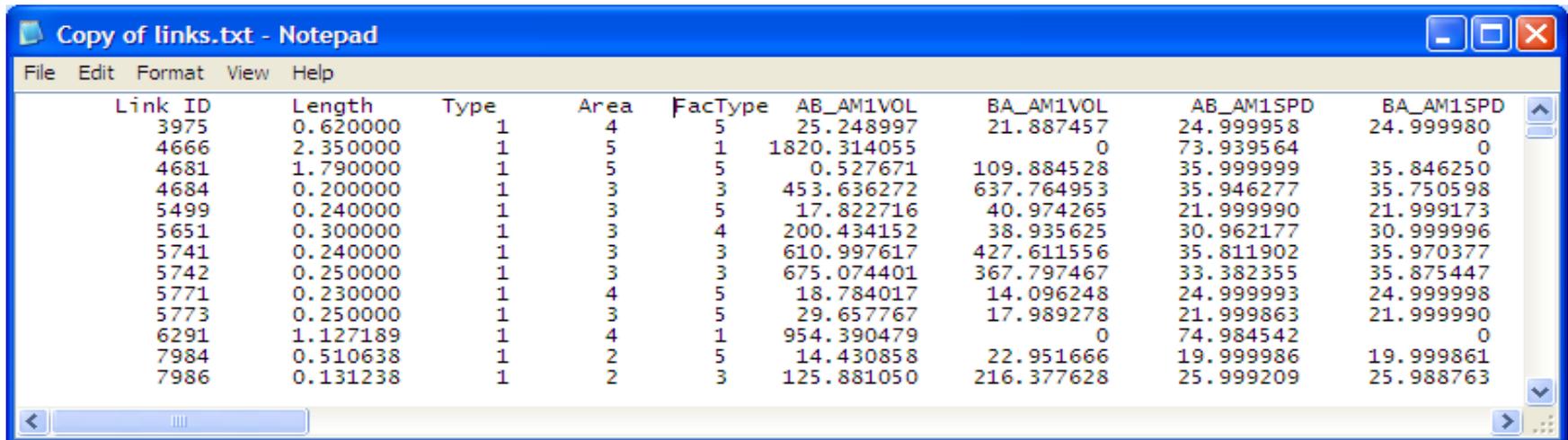
- MOVES has four road types which are affected by the speed distribution
  - Urban restricted and rural restricted road types are generally interstates and highways
  - Urban unrestricted and rural unrestricted road types are generally arterials, collectors, and local roads
- If separate speed distributions are known for arterials, collectors, and local roads, either:
  - Calculate a weighted speed distribution that applies to all urban or rural unrestricted roads, or
  - Do multiple MOVES runs using the appropriate speed and VMT information for arterials, collectors, and local roads separately and combine the results

# Average Speed Distribution: Working with Travel Model Data

- MPO travel demand forecasting (TDF) models typically produce link-level output that can be used to develop speed distributions, road type distributions and ramp fractions
- Depending on model capabilities, speeds may need to be post-processed
- Output will need to be “mapped” to MOVES format
  - Map TDF model road types to MOVES road types
  - Map TDF model time periods to MOVES hours
  - If different vehicle types are modeled, map vehicle types to MOVES source types
  - If different geographic areas modeled (e.g., CBD, urban, suburban, etc.), map to MOVES urban and rural groups

# Average Speed Distribution: Example Travel Model Output

- Type = link type (highway, transit, etc.)
- Area = area type (CBD, urban, suburban, etc.)
- Factype = roadway type (freeway, major arterial, etc.)
- AB\_AM1VOL = traffic volume in the A to B direction during the first a.m. time period (BA\_AM1VOL = volume in the B to A direction)
- AB\_AM1SPD = speed in the A to B direction during the first a.m. time period (BA\_AM1SPD = speed in the B to A direction)
- This example continues for 9 more time periods and ~ 19,000 more links



Link ID	Length	Type	Area	Factype	AB_AM1VOL	BA_AM1VOL	AB_AM1SPD	BA_AM1SPD
3975	0.620000	1	4	5	25.248997	21.887457	24.999958	24.999980
4666	2.350000	1	5	1	1820.314055	0	73.939564	0
4681	1.790000	1	5	5	0.527671	109.884528	35.999999	35.846250
4684	0.200000	1	3	3	453.636272	637.764953	35.946277	35.750598
5499	0.240000	1	3	5	17.822716	40.974265	21.999990	21.999173
5651	0.300000	1	3	4	200.434152	38.935625	30.962177	30.999996
5741	0.240000	1	3	3	610.997617	427.611556	35.811902	35.970377
5742	0.250000	1	3	3	675.074401	367.797467	33.382355	35.875447
5771	0.230000	1	4	5	18.784017	14.096248	24.999993	24.999998
5773	0.250000	1	3	5	29.657767	17.989278	21.999863	21.999990
6291	1.127189	1	4	1	954.390479	0	74.984542	0
7984	0.510638	1	2	5	14.430858	22.951666	19.999986	19.999861
7986	0.131238	1	2	3	125.881050	216.377628	25.999209	25.988763

# Average Speed Distribution: Steps in Developing Speed Inputs

- Map to the four relevant MOVES road types
  - No VMT or VHT on roadtypeid = 1 (“off-network”)
  - Use only roadway links, not rail, bike, walk links
- Sort by speed bin
- Calculate VHT by speed bin and road type (link length times volume divided by speed = VHT)
  - If ramps coded separately, use only freeway mainline segments in VHT calculations, but still need to reflect ramp VMT in VMT inputs
- Sum total VHT by road type and then calculate bin fractions

# Average Speed Distribution: Steps in Developing Speed Inputs

- Repeat for each time period; map to MOVES hours
- If multiple vehicle types modeled, repeat for each vehicle group and map to MOVES source type
  - Some areas do separate traffic assignment for cars, trucks, and other classes
  - If bus transit links modeled separately, calculate speeds separately and use these speeds for the transit bus source type)
- If multiple area types, then map to rural and urban
  - Can also handle as individual “zones”

# Average Speed Distribution: Exercise

- Let's enter average speed distribution data into the CDM for our county-level exercise
- In this case, we have the same speed distribution for all vehicle types
- The template has been filled out and is available as file: *SpeedDistribution.xls*

## Instructions for Developing a County-scale RunSpec:

- Review *SpeedDistribution.xls* and import into the Average Speed Distribution tab

# County Inventory Exercise: Entering Average Speed Distribution Data

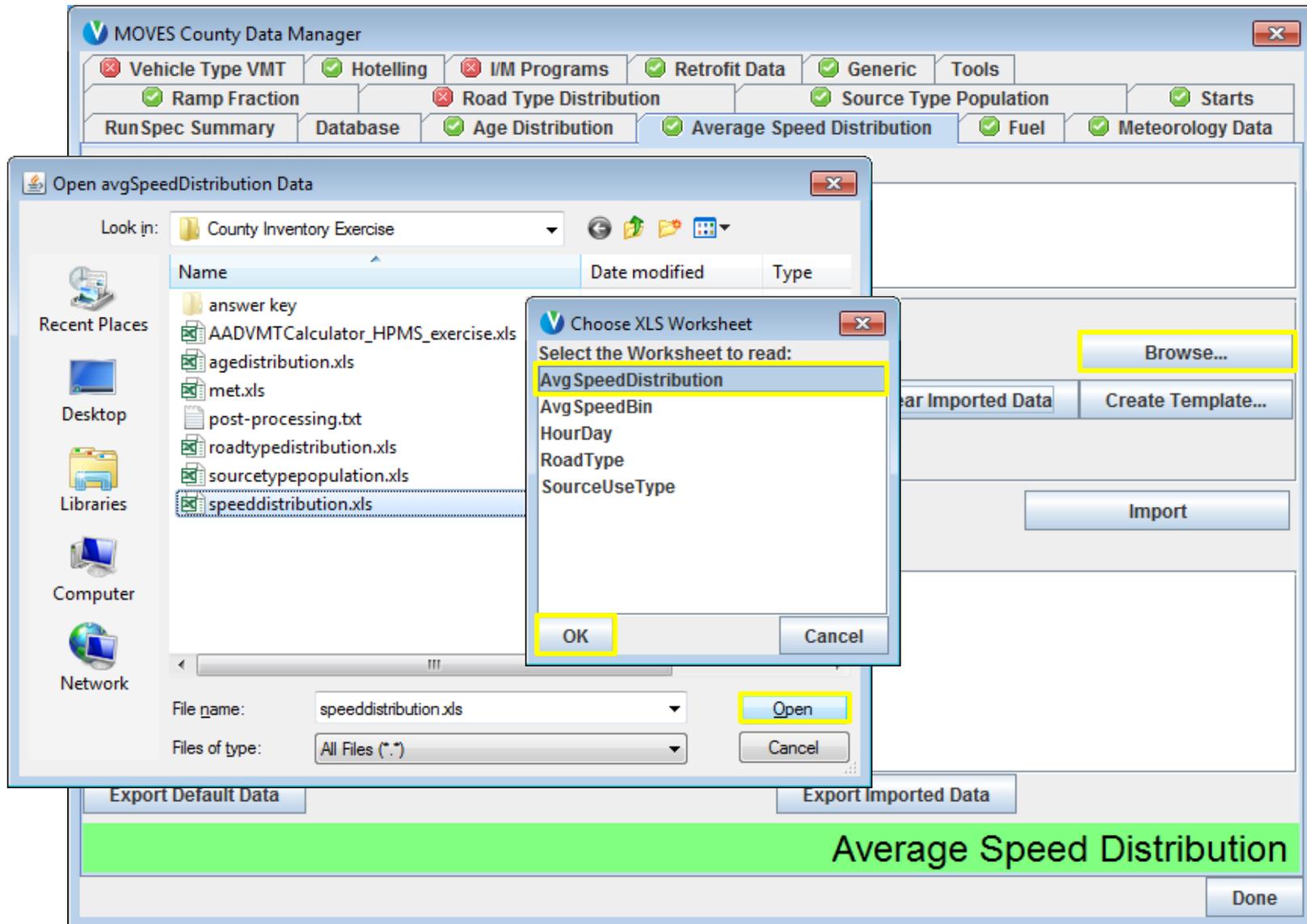
speeddistribution.xls [Compatibility Mode] - Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	sourceType	roadType	hourDayID	avgSpeedE	avgSpeedFraction								
2	21	2	15	1	0.002842								
3	21	2	15	2	0.00378								
4	21	2	15	3	0.00158								
5	21	2	15	4	0.0012								
6	21	2	15	5	0.001278								
7	21	2	15	6	0.001794								
8	21	2	15	7	0.002793								
9	21	2	15	8	0.004359								
10	21	2	15	9	0.007152								
11	21	2	15	10	0.012269								
12	21	2	15	11	0.024125								
13	21	2	15	12	0.057194								
14	21	2	15	13	0.130021								
15	21	2	15	14	0.229695								
16	21	2	15	15	0.259183								
17	21	2	15	16	0.260735								
18	21	2	25	1	0.002187								
19	21	2	25	2	0.002574								
20	21	2	25	3	0.001202								
21	21	2	25	4	0.001027								
22	21	2	25	5	0.001167								
23	21	2	25	6	0.001733								
24	21	2	25	7	0.002792								
25	21	2	25	8	0.004444								
26	21	2	25	9	0.007411								
27	21	2	25	10	0.012717								
28	21	2	25	11	0.025028								

Contents of speeddistribution.xls

AvgSpeedDistribution | AvgSpeedBin | HourDay | RoadType | SourceUs ...

# County Inventory Exercise: Entering Average Speed Distribution Data



# Vehicle Type VMT

- MOVES needs annual VMT and month, day, and hour fractions
- Annual VMT is entered based on HPMS vehicle class, while distribution factors are based on MOVES source type
- Month VMT fractions - Fraction of annual VMT (per source type) occurring per month.
- Day VMT fractions - Fraction of annual VMT (per source type) occurring on one of two day types (weekday or weekend).
- Hour VMT fractions - Fraction of annual VMT (per source type) occurring per hour.

# Vehicle Type VMT

- VMT is entered for each HPMS vehicle class in terms of annual VMT

	A	B	C	D	E	F	G	H	I	J
1	HPMSVTypeID	yearID	HPMSBaseYearVMT							
2	10	2015	0.000							
3	25	2015	0.000							
4	40	2015	0.000							
5	50	2015	0.000							
6	60	2015	0.000							
7										
8										
9										

# Vehicle Type VMT: Month VMT Fraction

- MonthVMTFraction must sum to 1 within each source type over a 12-month period
- If only one month is being modeled, fractions summing to less than one are acceptable

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	sourcetypeID	monthID	monthVMTFraction													
2		11	1	0.0000000												
3		11	2	0.0000000												
4		11	3	0.0000000												
5		11	4	0.0000000												
6		11	5	0.0000000												
7		11	6	0.0000000												
8		11	7	0.0000000												
9		11	8	0.0000000												
10		11	9	0.0000000												
11		11	10	0.0000000												
12		11	11	0.0000000												

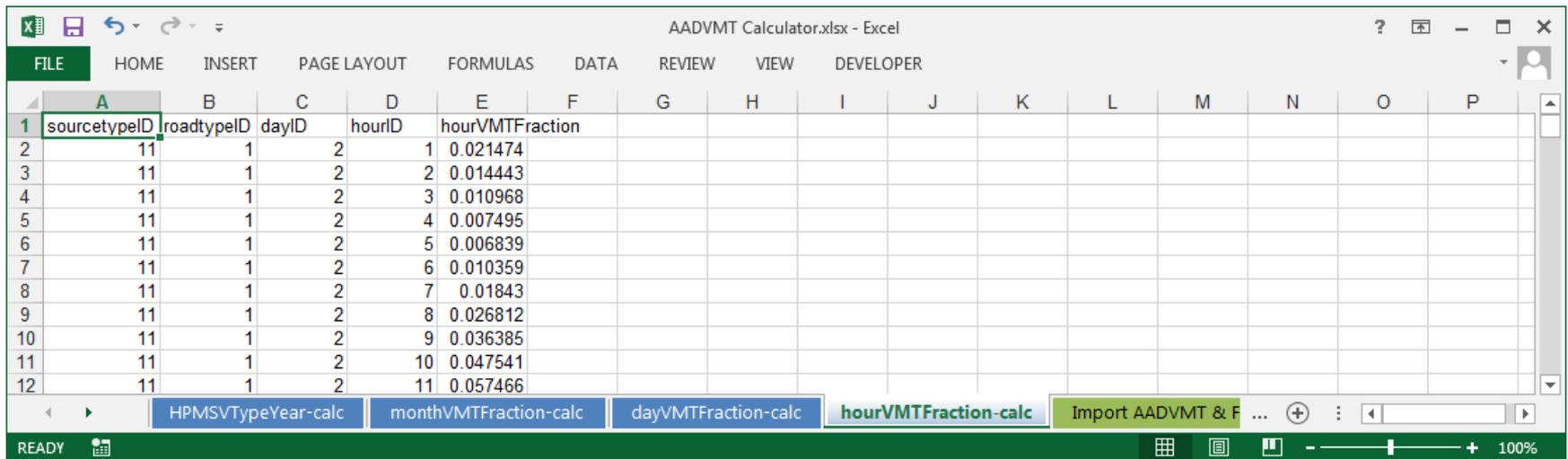
# Vehicle Type VMT: Day VMT Fraction

- DayVMTFraction must sum to 1 within each source type, month, road type combination
- DayVMTFraction is the fraction of VMT occurring on each day, by type, throughout a month (i.e.,  $\approx 22$  weekdays +  $\approx 9$  weekend days in a 31 day month;  $22/31 = 0.71$ , similar to default values)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	sourceTypeID	monthID	roadTypeID	dayID	dayVMTFraction											
2	11	1	1	2	0											
3	11	1	1	5	0											
4	11	1	2	2	0											
5	11	1	2	5	0											
6	11	1	3	2	0											
7	11	1	3	5	0											
8	11	1	4	2	0											
9	11	1	4	5	0											
10	11	1	5	2	0											
11	11	1	5	5	0											
12	11	2	1	2	0											

# Vehicle Type VMT: Hour VMT Fraction

- HourVMTFraction must sum to 1 within each source type, road type, type of day combination
- HourVMTFraction is applied to all months
  - If data varies for different months, you must run different RunSpecs for each



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	sourcetypeID	roadtypeID	dayID	hourID	hourVMTFraction											
2	11	1	2	1	0.021474											
3	11	1	2	2	0.014443											
4	11	1	2	3	0.010968											
5	11	1	2	4	0.007495											
6	11	1	2	5	0.006839											
7	11	1	2	6	0.010359											
8	11	1	2	7	0.01843											
9	11	1	2	8	0.026812											
10	11	1	2	9	0.036385											
11	11	1	2	10	0.047541											
12	11	1	2	11	0.057466											

# Annual VMT & VMT Fractions: Guidance

- Section 4.5 of MOVES Technical Guidance
- Total local VMT data are necessary
- Local VMT month, day, and hour fractions should be used if data are available; otherwise, defaults are acceptable
- Entering annual VMT and the correct month and daily VMT fractions for the entire year allows the same files to be used to model any month or day
  - If VMT is calculated for just a specific month or day (and the monthVMTFraction and dayVMTFraction tables are populated accordingly), this database can only be used with RunSpecs for that month and type of day

# CDM: Using the Average Annual Daily Vehicle Miles Traveled (AADVMT) Converter



# AADVMT Converter

- EPA has developed a spreadsheet based converter to scale up more readily available daily VMT to annual VMT
- Users can enter daily VMT entered using true annual average daily VMT or average weekday VMT
  - Modifying Monthly and Weekend-day Adjustment Factors provide user flexibility to determine the amount of VMT for any HPMS class, in any month, for either type of day

# AADVMT Converter

- Recommended approach is to enter adjustment factors for all HPMS classes, months and days
  - That allows resulting tables to be used for analysis covering any mix of vehicles and time periods
- This converter uses MOVES inputs (not MOBILE), so it can be used with VMT data gathered according to MOVES (or FHWA) vehicle types
- We will use this converter to get VMT inputs for our county inventory exercise

# AADVMT Converter

AADVMT Calculator.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

VanGessel, Benjamin

**1 Welcome**

Welcome to the AADVMT Calculator for MOVES2014. This excel file allows users to define average annual daily vehicle miles traveled (AADVMT) by the five MOVES-HPMS classes and generate the equivalent HPMSVTypeYear, monthVMTFraction, and dayVMTFraction tables for MOVES2014 data inputs. The AADVMT Calculator allows users to specify if their daily VMT (AADVMT) represents an average weekday, or an average day. Additionally, users can specify if their daily VMT (AADVMT) should apply to a specific month (e.g., weekday VMT for July).

NOTE: This converter was designed to work for a single calendar year and AADVMT combination. After entering local AADVMT, the resulting data in the HPMSVTypeYear table will represent the equivalent annual VMT based on selections made by the user, or the manually defined Monthly/Weekend-Day Adjustment Factors. DO NOT DELETE ANY ROWS OR COLUMNS OR CHANGE COLUMN NAMES OR ORDER ON ANY OF THE WORKSHEETS.

Also, note that rural vs. urban Weekend-Day Adjustment Factors will apply to all road types within a county. Users should select the option that describes the majority of roadtypes in the modeled county. After supplying all the necessary information and making the appropriate selections, the HPMSVTypeYear-calc, monthVMTFraction-calc, and dayVMTFraction-calc tables may be imported into the VMT tab of the county data manager in MOVES. Additionally, if no local hourly VMT distribution is available, the hourVMTFraction-calc table may also be imported. This table contains the MOVES default hourly VMT distributions.

**4 Calculation Inputs: follow the numbered steps below and make your selection or input data into the black outlined boxes.**

5 1) Please specify an analysis year:

6

7 2) Enter your AADVMT values by HPMS type below:

			Adjustment Factors by HPMS Vehicle Type & Month				
HPMSVtypeID	yearID	AADVMT	HPMSVtypeID	monthID	Month	Monthly Adjustment Factor	Weekend-Day Adjustment Factor
10	2015		10	1	January	0.3144	1.0000
25	2015		10	2	February	0.2843	1.0000
40	2015		10	3	March	0.6999	1.0000
50	2015		10	4	April	1.2085	1.0000
60	2015		10	5	May	1.4327	1.0000
			10	6	June	1.5229	1.0000
			10	7	July	1.5995	1.0000
			10	8	August	1.6186	1.0000
			10	9	September	1.3589	1.0000
			10	10	October	1.1401	1.0000

14 3) Are your AADVMT values for an average day or  
15 an average weekday?

16

17 4) Is the AADVMT above for an average day in a specific  
18 month (e.g., July average daily VMT)?

monthVMTFraction-calc dayVMTFraction-calc hourVMTFraction-calc Import AADVMT & Factors monthVMTFra ...

READY 100%

# AADVMT Converter

- When daily VMT is entered in VMT converter, annual VMT is generated in **HPMSVTypeYear** table
  - Can be directly imported into the MOVES CDM
- Appropriate Monthly and Weekend Day Adjustment factors should be entered to generate **monthVMTFraction** and **dayVMTFraction** tables that correspond to the calculated annual VMT

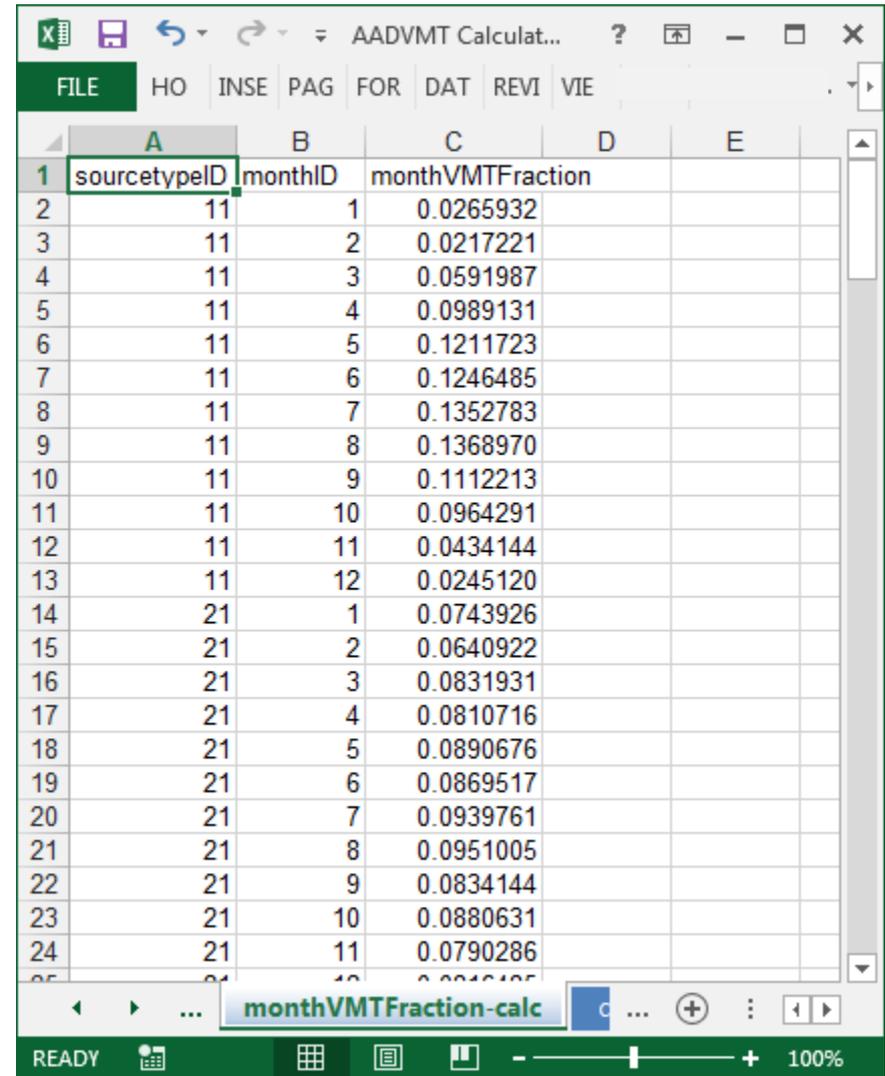
# AADVMT - Input Table: HPMSVTypeYear

	A	B	C	D	E	F	G	H	I	J	K
1	HPMSVTypeID	yearID	HPMSBaseYearVMT								
2		10	2015	366526.313							
3		25	2015	54819683.263							
4		40	2015	73092911.017							
5		50	2015	3654645.551							
6		60	2015	5481968.326							
7											
8											
9											

- HPMSBaseYearVMT is calculated from daily VMT based on month and weekend adjustment factors
- If VMT for an HPMS class was not entered, this table should report a zero for the HPMSBaseYearVMT

# AADVMT - Input Table: MonthVMTFraction

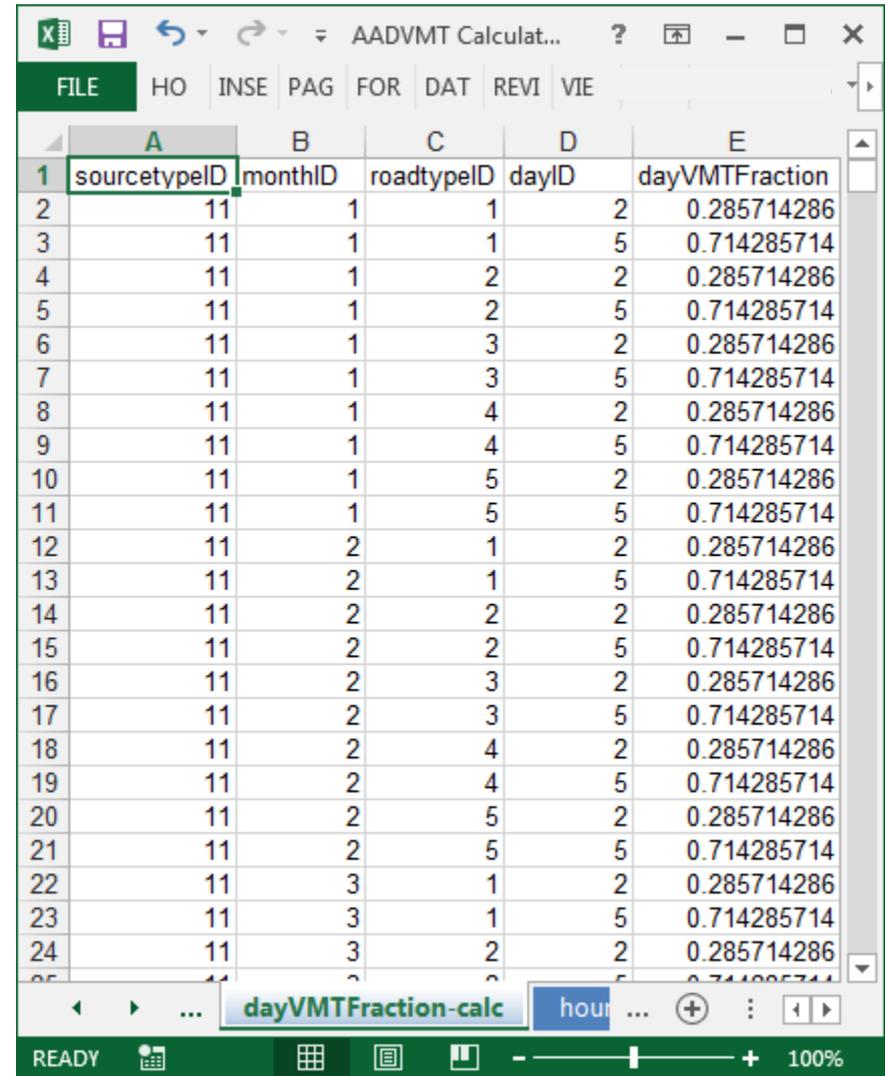
- MonthVMTFraction values are calculated based on adjustment factors provided by the user and number of days in the month
  - Sum of MonthVMTFraction will always total 1 for each source type



	A	B	C	D	E
1	sourcetypeID	monthID	monthVMTFraction		
2	11	1	0.0265932		
3	11	2	0.0217221		
4	11	3	0.0591987		
5	11	4	0.0989131		
6	11	5	0.1211723		
7	11	6	0.1246485		
8	11	7	0.1352783		
9	11	8	0.1368970		
10	11	9	0.1112213		
11	11	10	0.0964291		
12	11	11	0.0434144		
13	11	12	0.0245120		
14	21	1	0.0743926		
15	21	2	0.0640922		
16	21	3	0.0831931		
17	21	4	0.0810716		
18	21	5	0.0890676		
19	21	6	0.0869517		
20	21	7	0.0939761		
21	21	8	0.0951005		
22	21	9	0.0834144		
23	21	10	0.0880631		
24	21	11	0.0790286		
25	21	12	0.0810716		

# AADVMT - Input Table: DayVMTFraction

- DayVMTFraction values are calculated based on adjustment factors provided by the user
  - Sum of DayVMTFraction will always total 1 for each source type, month, road type combination
- DayVMTFraction values will be the same for all road types, but can vary by month



	A	B	C	D	E
1	sourceTypeID	monthID	roadTypeID	dayID	dayVMTFraction
2	11	1	1	2	0.285714286
3	11	1	1	5	0.714285714
4	11	1	2	2	0.285714286
5	11	1	2	5	0.714285714
6	11	1	3	2	0.285714286
7	11	1	3	5	0.714285714
8	11	1	4	2	0.285714286
9	11	1	4	5	0.714285714
10	11	1	5	2	0.285714286
11	11	1	5	5	0.714285714
12	11	2	1	2	0.285714286
13	11	2	1	5	0.714285714
14	11	2	2	2	0.285714286
15	11	2	2	5	0.714285714
16	11	2	3	2	0.285714286
17	11	2	3	5	0.714285714
18	11	2	4	2	0.285714286
19	11	2	4	5	0.714285714
20	11	2	5	2	0.285714286
21	11	2	5	5	0.714285714
22	11	3	1	2	0.285714286
23	11	3	1	5	0.714285714
24	11	3	2	2	0.285714286
25	11	3	2	5	0.714285714

# AADVMT Converter: Exercise

- Let's enter our VMT and VMT fractions data into the CDM for our county-level exercise
- For this example, we don't know annual VMT but we do know daily VMT as follows:
  - Passenger vehicles = 3,000,000
  - Transit buses = 10,000
- Use the Average Annual Daily Vehicle Miles Traveled (AADVMT) converter to generate the annual/ month/day/hour VMT tables for the Vehicle Type VMT tab

# AADVMT Converter: Exercise

## Instructions for entering information into the AADVMT Converter:

- 1) Specify *2015* for the analysis year
- 2) Enter our known daily VMT for each HPMS vehicle type:
  - Passenger vehicles (HPMSVtypeID 25) = 3,000,000
  - Transit buses (HPMSVtypeID 40) = 10,000
  - Enter 0 for all other HPMSVtypeIDs (no VMT for these types)
- 3) For step 3 in the AADVMT Calculator, select *Average weekday*.
- 4) For step 4 in the AADVMT Calculator, select *Yes* to set a monthly adjustment factor (column H) of 1.0 indicating the VMT is from a particular month (e.g., July).
- 5) Skip to step 6.
  - For question 6a, select *Yes*.
  - For question 6b, select *Urban* to use the MOVES urban default Weekend-Day Adjustment Factor (column I) of 0.7793. This indicates that weekend traffic is 77.93% of weekday traffic.
- 6) For step 7, select *Yes* to use default hourVMTFraction values.

# AADVMT Converter: Exercise

AADVMT Calculator.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

**1 Welcome**

Welcome to the AADVMT Calculator for MOVES2014. This excel file allows users to define average annual daily vehicle miles traveled (AADVMT) by the five MOVES-HPMS classes and generate the equivalent HPMSVTypeYear, monthVMTFraction, and dayVMTFraction tables for MOVES2014 data inputs. The AADVMT Calculator allows users to specify if their daily VMT (AADVMT) represents an average weekday, or an average day. Additionally, users can specify if their daily VMT (AADVMT) should apply to a specific month (e.g., weekday VMT for July).

NOTE: This converter was designed to work for a single calendar year and AADVMT combination. After entering local AADVMT, the resulting data in the HPMSVTypeYear table will represent the equivalent annual VMT based on selections made by the user, or the manually defined Monthly/Weekend-Day Adjustment Factors. DO NOT DELETE ANY ROWS OR COLUMNS OR CHANGE COLUMN NAMES OR ORDER ON ANY OF THE WORKSHEETS.

Also, note that rural vs. urban Weekend-Day Adjustment Factors will apply to all road types within a county. Users should select the option that describes the majority of roadtypes in the modeled county. After supplying all the necessary information and making the appropriate selections, the HPMSVTypeYear-calc, monthVMTFraction-calc, and dayVMTFraction-calc tables may be imported into the VMT tab of the county data manager in MOVES. Additionally, if no local hourly VMT distribution is available, the hourVMTFraction-calc table may also be imported. This table contains the MOVES default hourly VMT distributions.

**4 Calculation Inputs: follow the numbered steps below and make your selection or input data into the black outlined boxes.**

5 1) Please specify an analysis year:

6

7 2) Enter your AADVMT values by HPMS type below:

			Adjustment Factors by HPMS Vehicle Type & Month				
HPMSVtypeID	yearID	AADVMT	HPMSVtypeID	monthID	Month	Monthly Adjustment Factor	Weekend-Day Adjustment Factor
10	2015	<input type="text"/>	10	1	January	0.3144	1.0000
25	2015	<input type="text"/>	10	2	February	0.2843	1.0000
40	2015	<input type="text"/>	10	3	March	0.6999	1.0000
50	2015	<input type="text"/>	10	4	April	1.2085	1.0000
60	2015	<input type="text"/>	10	5	May	1.4327	1.0000
			10	6	June	1.5229	1.0000
			10	7	July	1.5995	1.0000
			10	8	August	1.6186	1.0000
			10	9	September	1.3589	1.0000
			10	10	October	1.1401	1.0000

14 3) Are your AADVMT values for an average day or  
15 an average weekday?

16

17 4) Is the AADVMT above for an average day in a specific  
18 month (e.g., July average daily VMT)?

monthVMTFraction-calc dayVMTFraction-calc hourVMTFraction-calc Import AADVMT & Factors monthVMTFra ...

READY 100%

# AADVMT Converter: Exercise

AADVMT Calculator.xlsx - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

4 **Calculation Inputs: follow the numbered steps below and make your selection or input data into the black outlined boxes.**

5 1) Please specify an analysis year: 2015

6

7 2) Enter your AADVMT values by HPMS type below: **Adjustment Factors by HPMS Vehicle Type & Month**

HPMSVtypeID	yearID	AAADVMT	HPMSVtypeID	monthID	Month	Monthly Adjustment Factor	Weekend-Day Adjustment Factor
10	2015	0	10	1	January	1.0000	0.7793
25	2015	3000000	10	2	February	1.0000	0.7793
40	2015	10000	10	3	March	1.0000	0.7793
50	2015	0	10	4	April	1.0000	0.7793
60	2015	0	10	5	May	1.0000	0.7793
			10	6	June	1.0000	0.7793
			10	7	July	1.0000	0.7793
			10	8	August	1.0000	0.7793
			10	9	September	1.0000	0.7793
			10	10	October	1.0000	0.7793
			10	11	November	1.0000	0.7793
			10	12	December	1.0000	0.7793

8 HPMSVtypeID yearID AADVMT

9 10 2015 0

10 25 2015 3000000

11 40 2015 10000

12 50 2015 0

13 60 2015 0

14 3) Are your AADVMT values for an average day or

15 an average weekday? Average weekday

16

17 4) Is the AADVMT above for an average day in a specific

18 month (i.e. July average daily VMT)? Yes

19

20 5) Monthly Adjustment Factors:

21 5a) Use MOVES Defaults? Yes

22 5b) If no to 5a, manually input local adjustment factors by month and

23 HPMS type in column H in the table at right.

24

25 6) Weekend-day Adjustment Factors:

26 6a) Use MOVES Defaults? Yes

27 6b) If yes, specify if urban or rural county: Urban

28 6c) If no to 6a, input a local adjustment factor below:

29 Local user supplied adjustment factor:

30 *Note: If you have local data for weekend-day adjustment factors that vary by*

31 *HPMS type, enter that information into column I manually.*

32 7) Use MOVES defaults for hourVMTFraction? Yes

33 *Note: If you have local data for hourVMTFraction, enter that information into*

34 *column E of the hourVMTFraction-calc sheet manually.*

35

36

37

monthVMTFraction-calc dayVMTFraction-calc hourVMTFraction-calc **Import AADVMT & Factors** monthVMTFra ...

READY

# HPMSVtypeYear-calc Tab

Annual VMT by HPMS type is calculated in the HPMSVtypeYear-calc tab. This tab can be imported into the CDM.

	A	B	C	D	E	F	G	H	I	J
1	HPMSVtypeID	yearID	HPMSBaseYearVMT							
2		10	2015	0.00						
3		25	2015	1025942766.45						
4		40	2015	3419809.22						
5		50	2015	0.00						
6		60	2015	0.00						
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										
28										

# MonthVMTFraction-calc Tab

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	sourcetypeID	monthID	monthVMTFraction													
2	11	1	0.0000000													
3	11	2	0.0000000													
4	11	3	0.0000000													
5	11	4	0.0000000													
6	11	5	0.0000000													
7	11	6	0.0000000													
8	11	7	0.0000000													
9	11	8	0.0000000													
10	11	9	0.0000000													
11	11	10	0.0000000													
12	11	11	0.0000000													
13	11	12	0.0000000													
14	21	1	0.0849315													
15	21	2	0.0767123													
16	21	3	0.0849315													
17	21	4	0.0821918													
18	21	5	0.0849315													
19	21	6	0.0821918													
20	21	7	0.0849315													
21	21	8	0.0849315													
22	21	9	0.0821918													
23	21	10	0.0849315													
24	21	11	0.0821918													
25	21	12	0.0849315													
26	31	1	0.0849315													
27	31	2	0.0767123													
28	31	3	0.0849315													
29	31	4	0.0821918													
30	31	5	0.0849315													
31	31	6	0.0821918													
32	31	7	0.0849315													
33	31	8	0.0849315													
34	31	9	0.0821918													
35	31	10	0.0849315													
36	31	11	0.0821918													

Monthly VMT fractions by MOVES source type is calculated in the monthVMTFraction-calc tab. This tab can be imported into the CDM.

# DayVMTFraction-calc Tab

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	sourcetypeID	monthID	roadtypeID	dayID	dayVMTFraction											
2	11	1	1	2	0											
3	11	1	1	5	0											
4	11	1	2	2	0											
5	11	1	2	5	0											
6	11	1	3	2	0											
7	11	1	3	5	0											
8	11	1	4	2	0											
9	11	1	4	5	0											
10	11	1	5	2	0											
11	11	1	5	5	0											
12	11	2	1	2	0											
13	11	2	1	5	0											
14	11	2	2	2	0											
15	11	2	2	5	0											
16	11	2	3	2	0											
17	11	2	3	5	0											
18	11	2	4	2	0											
19	11	2	4	5	0											
20	11	2	5	2	0											
21	11	2	5	5	0											
22	11	3	1	2	0											
23	11	3	1	5	0											
24	11	3	2	2	0											
25	11	3	2	5	0											
26	11	3	3	2	0											
27	11	3	3	5	0											
28	11	3	4	2	0											
29	11	3	4	5	0											
30	11	3	5	2	0											
31	11	3	5	5	0											
32	11	4	1	2	0											
33	11	4	1	5	0											
34	11	4	2	2	0											
35	11	4	2	5	0											
36	11	4	3	2	0											

Calculated day fractions MOVES source type is available in the dayVMTFraction-calc tab. This tab can be imported into the CDM.

# Default hour fractions – located in HourVMTFraction-default tab

1	sourceTypeID	roadTypeID	dayID	hourID	hourVMTFraction
2	11	1	2	1	0.021474
3	11	1	2	2	0.014443
4	11	1	2	3	0.010968
5	11	1	2	4	0.007495
6	11	1	2	5	0.006839
7	11	1	2	6	0.010359
8	11	1	2	7	0.01843
9	11	1	2	8	0.026812
10	11	1	2	9	0.036385
11	11	1	2	10	0.047541
12	11	1	2	11	0.057466
13	11	1	2	12	0.065079
14	11	1	2	13	0.071323
15	11	1	2	14	0.071492
16	11	1	2	15	0.071723
17	11	1	2	16	0.072006
18	11	1	2	17	0.071149
19	11	1	2	18	0.067887
20	11	1	2	19	0.061772
21	11	1	2	20	0.051688
22	11	1	2	21	0.042866
23	11	1	2	22	0.03803
24	11	1	2	23	0.032207
25	11	1	2	24	0.024568
26	11	1	5	1	0.009862
27	11	1	5	2	0.006272
28	11	1	5	3	0.005058
29	11	1	5	4	0.004667
30	11	1	5	5	0.006995
31	11	1	5	6	0.018494
32	11	1	5	7	0.045957
33	11	1	5	8	0.069644
34	11	1	5	9	0.060828
35	11	1	5	10	0.050286
36	11	1	5	11	0.049935

Hour fractions by MOVES source type are available in the dayVMTFraction-calc tab. For this exercise, we have opted to use MOVES default hour VMT fractions. This tab can be imported into the CDM.

# County Inventory Exercise: Entering Vehicle Type VMT Data

MOVES County Data Manager

Vehicle Type VMT | Hotelling | I/M Programs | Retrofit Data | Generic | Tools

Ramp Fraction | Road Type Distribution | Source Type Population | Starts

RunSpec Summary | Database | Age Distribution | Average Speed Distribution | Fuel | Meteorology Data

Description of Imported Data:

HPMSVTypeYear Data Source:  
File: (please select a file) Browse...

monthVMTFraction Data Source:  
File: (please select a file)

Clear Imported Data | Create Template...

Messages:

Export Default Data | Export Imported Data

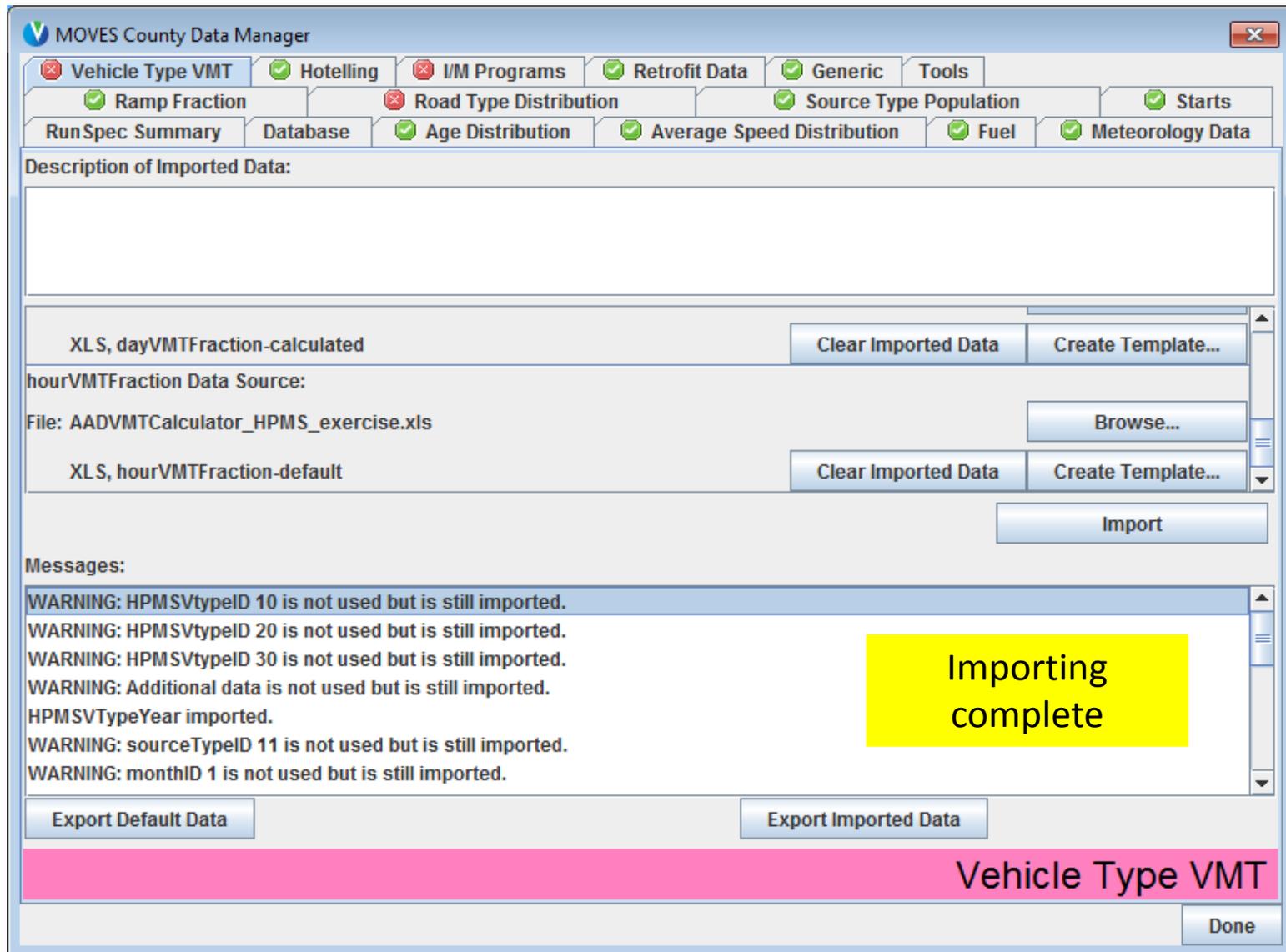
Vehicle Type VMT

Done

Total VMT and month, day, and hour fractions are all imported in this tab

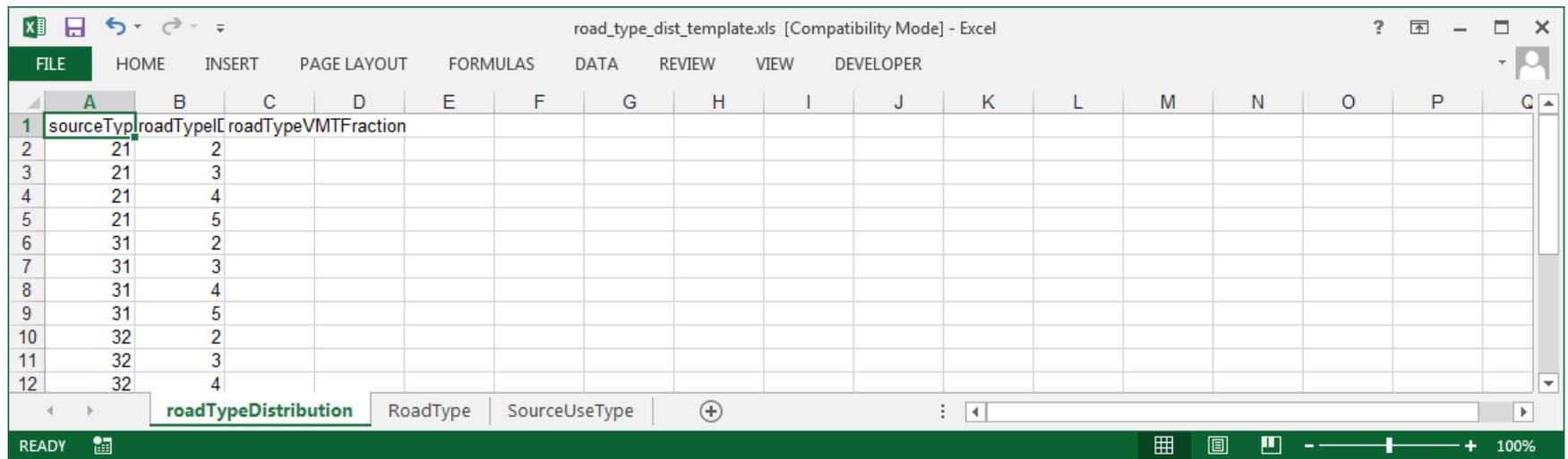
You will have to browse/import 4 separate worksheets to complete this tab

# County Inventory Exercise: Entering Vehicle Type VMT Data



# Road Type Distribution

- RoadTypeVMTFraction is the fraction of VMT (distance, not time) on each road type by a source type



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	sourceType	roadType	roadTypeVMTFraction														
2	21	2															
3	21	3															
4	21	4															
5	21	5															
6	31	2															
7	31	3															
8	31	4															
9	31	5															
10	32	2															
11	32	3															
12	32	4															

# Road Type Distribution

- Fractions should sum to 1 within each source type
- All road types appear in the template even if they were not selected in the RunSpec
  - Any VMT assigned to a road type not selected in the RunSpec will not be accounted for in MOVES output
  - This could lead to misleading or incorrect results
  - Safest approach is to always include all road types in RunSpec

# Road Type Distribution: Guidance

- Section 4.7 of MOVES Technical Guidance
- Users should develop road type distribution data based on local information
- If data are not available, the same road type distribution can be used for all source types in the same HPMS class
  - However, in many cases, road type distributions vary for source types in the same HPMS class (e.g., transit bus vs. intercity bus), so source type specific information is encouraged

# Road Type Distribution: Using Travel Model Outputs

- Travel model link volumes can be used to develop road type distribution fractions
- Map links to MOVES road types
  - If ramps are coded separately, ramps are included as part of restricted access road
- Calculate VMT by link (length x volume)
- Sum by link and road type across all time periods (MOVES inputs do not vary by hour)
- Calculate fractions that sum to one
- Repeat for each vehicle group, as needed

# Road Type Distribution: Exercise

- Let's enter our road type distribution data into the CDM for our county-level exercise
- The template has been filled out with our local road type distribution and is available as file: *RoadTypeDistribution.xls*
- **Instructions for Developing a County-scale RunSpec:**
  - Review *RoadTypeDistribution.xls* and import into the Road Type Distribution tab

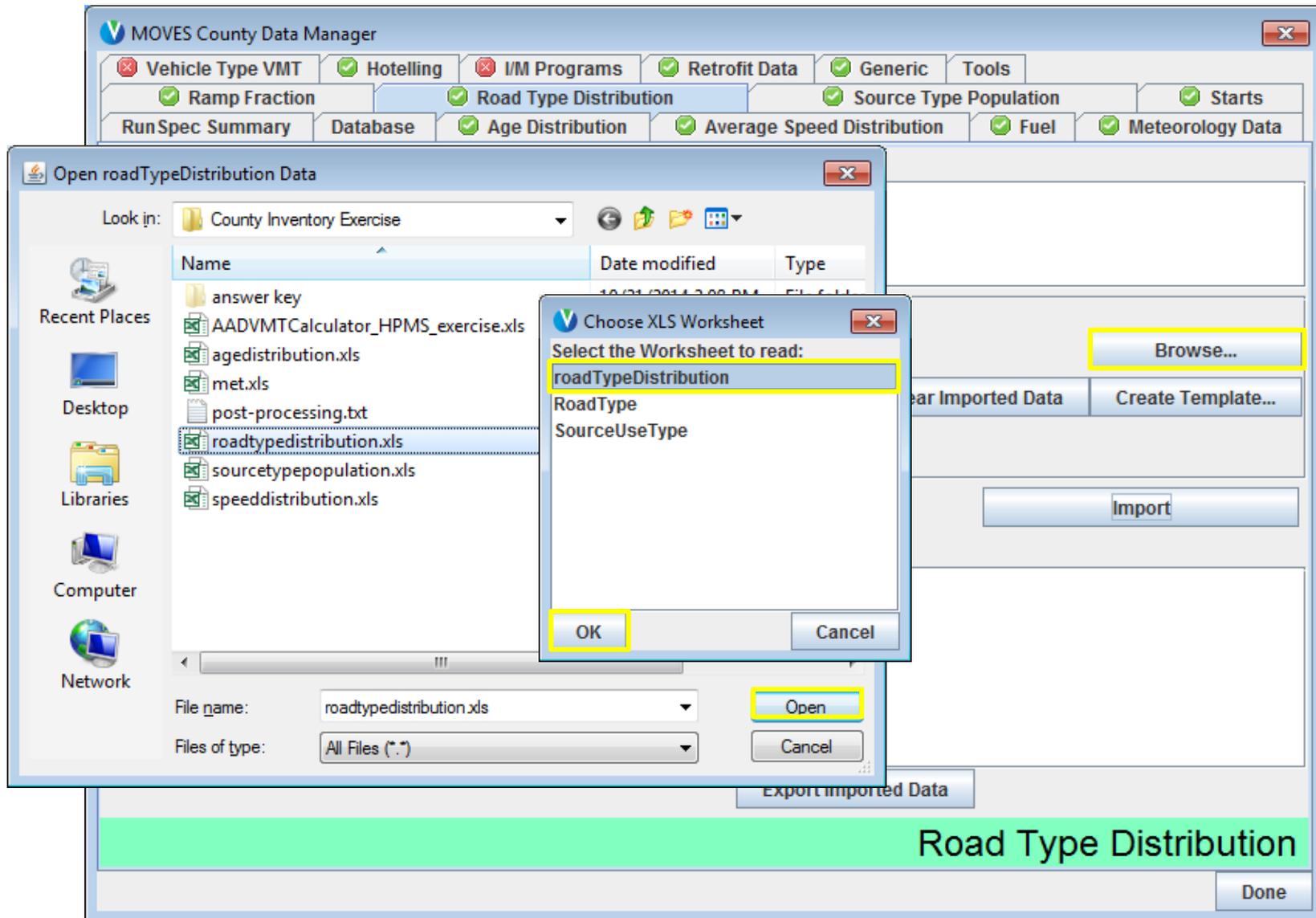
# County Inventory Exercise: Entering Road Type Distribution Data

The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K
1	sourceTypeID	roadTypeID	roadTypeVMTFraction								
2	21	2	0								
3	21	3	0.000320702								
4	21	4	0.311675146								
5	21	5	0.688004152								
6	31	2	0								
7	31	3	0.000320702								
8	31	4	0.311675146								
9	31	5	0.688004152								
10	32	2	0								
11	32	3	0.000320702								
12	32	4	0.311675146								
13	32	5	0.688004152								
14	42	2	0								
15	42	3	0.000320702								
16	42	4	0.311675146								
17	42	5	0.688004152								
18											
19											
20											
21											
22											

A yellow callout box with the text "Contents of roadtypedistribution.xls" is positioned over the right side of the spreadsheet.

# County Inventory Exercise: Entering Road Type Distribution Data



# Ramp Fraction

- RampFraction is the fraction of *time* (daily VHT) – *not* distance – spent on ramps as compared to the total time on restricted roadways and ramps
  - A restricted road type must have been selected in the Road Type panel to be able to import Ramp Fraction data
- This tab starts with a green check. Default ramp fraction of 0.08 (8%) is applied if this fraction is not changed

roadTypeID	rampFraction
2	0.08
4	0.08

# Ramp Fraction: Guidance

- Section 4.8 of MOVES Technical Guidance
- Local data on ramp activity is commonly available from TDM modeling
- Generally it is not acceptable to use the default fractions, as ramp activity has a large impact on emissions - EPA recommends that local data be used

# Ramp Fraction: Using Travel Model Outputs

- If ramps coded separately, ramp fraction can be calculated from travel model link volumes and speeds
- Calculate freeway, ramp, and total freeway + ramp VHT (does not vary by hour or source type)
- Calculate ramp fraction
- Separate calculation for urban and rural

# Ramp Fraction: Exercise

- Let's enter our ramp fraction data into the CDM for our county-level exercise
- Our local ramp fractions for rural and urban unrestricted road types are 12%
- The MOVES ramp fraction default (8%) must therefore be changed
- [Instructions for Developing a County-scale RunSpec:](#)
  - Export the default data, change the fractions to 12%, and import the table into the Ramp Fraction tab

# County Inventory Exercise: Entering Ramp Fraction Data

The screenshot shows the MOVES County Data Manager interface. The 'Export Ramp Fraction Data' dialog box is open, displaying a file list in the 'County Inventory Exercise' folder. The file 'rampfraction.xls' is selected. The 'File name' field is set to 'rampfraction.xls' and the 'Save as type' is 'All Files (\*.\*)'. A yellow callout box highlights the 'Create Template...' button in the background window.

Name	Date modified	Type
answer key	10/21/2014 2:08 PM	File folder
AADVMTCalculator_HPMS_exercise.xls	9/4/2014 10:44 AM	Microsoft
agedistribution.xls	10/20/2014 2:20 PM	Microsoft
met.xls	6/4/2012 10:10 AM	Microsoft
post-processing.txt	7/26/2012 2:48 PM	Text Docu
rampfraction.xls	10/21/2014 2:26 PM	Microsoft
roadtypedistribution.xls	10/20/2014 2:21 PM	Microsoft
sourcetypepopulation.xls	10/20/2014 2:17 PM	Microsoft
speeddistribution.xls	10/20/2014 2:19 PM	Microsoft

Export Default Data      Export Imported Data

**Ramp Fraction**

Done

Export default data, save as rampfraction.xls

# County Inventory Exercise: Entering Ramp Fraction Data

The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	roadTypeID	rampFraction											
2	2	0.08											
3	4	0.08											
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													

A yellow callout box on the right side of the spreadsheet contains the text: "rampfraction.xls as exported with default data".

# County Inventory Exercise: Entering Ramp Fraction Data

The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	roadTypeID	rampFraction											
2	2	0.12											
3	4	0.12											
4													
5													
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													

A yellow callout box on the right side of the spreadsheet contains the text: "Change both fractions to 12% (0.12) and re-save".

# County Inventory Exercise: Entering Ramp Fraction Data

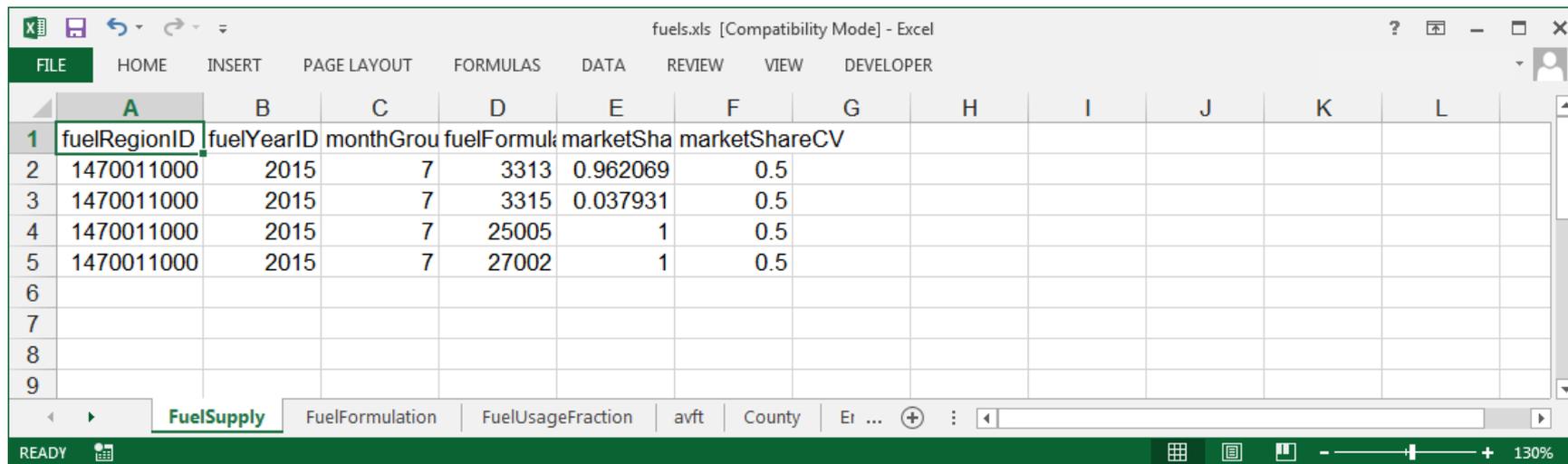
The screenshot displays the MOVES County Data Manager interface. The 'Ramp Fraction' tab is selected in the top navigation bar. A file explorer window titled 'Open roadType Data' is open, showing the file 'rampfraction.xls' selected in the 'County Inventory Exercise' folder. A 'Choose XLS Worksheet' dialog box is overlaid on the file explorer, with 'RoadType' selected in the list of worksheets. A yellow callout box with the text 'Browse and import the updated worksheet as usual' is positioned over the 'Import' button in the background software window. The 'Ramp Fraction' section at the bottom of the software window is highlighted in orange.

# Fuel

- The Fuel tab contains four data tables
  - Fuel Supply
  - Fuel Formulation
  - Fuel Usage Fraction
  - AVFT
- Data must be selected/entered for each table
- Notes about MOVES versions
  - In MOVES2010, these tables were separate tabs; they are combined under one “Fuel” tab in MOVES2010b and MOVES2014

# Fuel: Fuel Supply Data

- Fuel Supply entered by county, year, month, fuel type
  - marketShare (column E) must sum to 1 within these fields
  - marketShare CV (column F) is inactive; ignore any values
- If defaults are exported, they will contain gasoline, diesel, ethanol (E-85), and CNG formulations
  - Users should add entries for alt. fuels if selected in RunSpec



	A	B	C	D	E	F	G	H	I	J	K	L
1	fuelRegionID	fuelYearID	monthGroup	fuelFormulation	marketShare	marketShareCV						
2	1470011000	2015	7	3313	0.962069	0.5						
3	1470011000	2015	7	3315	0.037931	0.5						
4	1470011000	2015	7	25005	1	0.5						
5	1470011000	2015	7	27002	1	0.5						
6												
7												
8												
9												

# Fuel: Fuel Formulation Data

- Use only existing FuelFormulationID's with the appropriate FuelSubTypeID for the fuel properties being entered
  - However, properties can be changed for existing formulations
  - Gasoline FuelFormulationIDs are 500-9419; diesel 20011-20491
- Consult MOVES Technical Guidance for information about the requirements for populating each field

fuels.xls [Compatibility Mode] - Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	fuelFormul	fuelSubtyp	RVP	sulfurLevel	ETOHVolu	MTBEVolu	ETBEVolu	TAMEVolu	aromaticC	olefinCont	benzeneC	e200	e300	BioDieselE	CetaneInd	PAHCont	T50
2	10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	0
3	20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0
4	50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	0
5	96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199
6	97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195
7	98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	0
8	99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	0
9	3313	12	7.06	30	10	0	0	0	17.13	7.85	0.77	50.98	85.24	0	0	0	1
10	3315	15	6.06	30	15	0	0	0	15.79	6.67	0.77	57.11	85.76	0	0	0	18
11	25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	0
12	27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	0

READY 100%

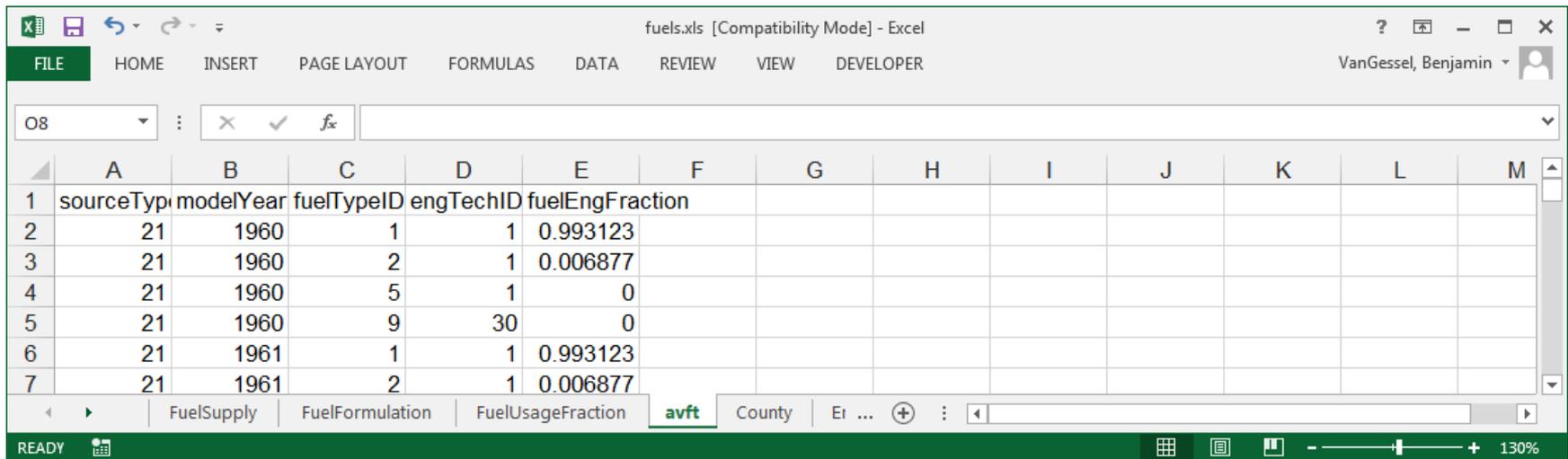
# Fuel: Fuel Usage Fraction

- Fuelusagefraction is a new required input that specifies the fraction of E-85 capable (flex-fuel) vehicles that use E-85 (sourcebinfueltypeid 5) vs. conventional gasoline
- The table below shows that 98.7% of E-85 capable vehicles use conventional gasoline and 1.3% use E-85 for Lake County, IN
- Fractions of 1 are required for sourcebinfueltypeid 1, 2, and 3 (gas, diesel, and CNG fuel types)

countyID	fuelYearID	modelYear	sourceBin	fuelSupply	usageFraction
18089	2015	0	1	1	1
18089	2015	0	2	2	1
18089	2015	0	5	1	0.986574
18089	2015	0	5	5	0.013426

# Fuel: AVFT

- The Alternate Vehicle and Fuel Technology (AVFT) input allows users to define the split between diesel, gasoline, CNG, and electricity, for each vehicle source type and model year.
- Combinations of sourceTypeID and modelyearID must sum to 1.



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	sourceType	modelYear	fuelTypeID	engTechID	fuelEngFraction								
2	21	1960	1	1	0.993123								
3	21	1960	2	1	0.006877								
4	21	1960	5	1	0								
5	21	1960	9	30	0								
6	21	1961	1	1	0.993123								
7	21	1961	2	1	0.006877								

# Fuel: Guidance

- Section 4.9 of MOVES Technical Guidance
- Review default data and only make changes when local volumetric fuel property information is available
  - Recommended approach is to modify existing fuel formulations and assign each the appropriate market share
  - Another acceptable approach is to calculate a weighted average of the fuel properties, but this will result in differences from the first approach where non-linear relationships exist
  - Straight averages should NEVER be used
- If only certain properties are known (e.g., RVP, sulfur, ethanol), but others are not (e.g., olefins), then
  - Defaults can be used for the other parameters or
  - Fuels in the same fuel PADD can be used if they have the desired composition for the known properties

# Fuel: Guidance

- RVP should always be reviewed by the user
  - In some cases, the 1 psi ethanol waiver was not taken into account; in other years, the RVP was interpolated in default database
  - Therefore, assumptions were made to populate the database that should be corrected by the user
  - The RVP should be set to the regulatory limit applicable in the area, making sure RVP reflects whether the 1 psi ethanol waiver is present for 10% ethanol blends
- RFG fuel property data is available on the EPA website at:  
<http://www.epa.gov/otaq/fuels/gasolinefuels/rfg/>
- When adjusting individual fuel properties, the Fuel Wizard should be used (accessed in the Fuels tab of the CDM)
  - Appropriately adjusts other fuel properties based on known fuel properties (e.g., RVP)

# Fuel: Exercise

- Let's enter fuel data into the CDM for our county-level exercise
- There is only one gasoline, one ethanol (E-85), and one diesel fuel formulation in our area.
- **Instructions for Developing a County-scale RunSpec:**
  - Export the default fuel information MOVES has for Lake County, check the values, adjust AVFT to reflect a 100% diesel transit bus fleet, then import into the Fuel tab

# County Inventory Exercise: Entering Fuel Data

The screenshot shows the MOVES County Data Manager application. The 'Export Fuel Data' dialog box is open, displaying a file list in the 'County Inventory Exercise' folder. The file 'fuels.xls' is selected. The 'File name' field is set to 'fuels.xls' and the 'Save as type' is 'All Files (\*.\*)'. The 'Fuels Wizard' interface is visible in the background, with the 'Fuel' tab selected. A yellow callout box highlights the text 'Save as fuels.xls'.

Name	Date modified	Type
answer key	10/21/2014 2:08 PM	File folder
AADVMTCalculator_HPMS_exercise.xls	9/4/2014 10:44 AM	Microsoft
agedistribution.xls	10/20/2014 2:20 PM	Microsoft
fuels.xls	10/21/2014 2:42 PM	Microsoft
met.xls	6/4/2012 10:10 AM	Microsoft
post-processing.txt	7/26/2012 2:48 PM	Text Docu
rampfraction.xls	10/21/2014 2:26 PM	Microsoft
roadtypedistribution.xls	10/20/2014 2:21 PM	Microsoft
sourcetypepopulation.xls	10/20/2014 2:17 PM	Microsoft
speeddistribution.xls	10/20/2014 2:19 PM	Microsoft

Save as  
fuels.xls

# County Inventory Exercise: Checking Default Data

The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L
1	fuelRegionID	fuelYearID	monthGroup	fuelFormulation	marketShare	marketShareCV						
2	1470011000	2015	7	3313	0.962069	0.5						
3	1470011000	2015	7	3315	0.037931	0.5						
4	1470011000	2015	7	25005	1	0.5						
5	1470011000	2015	7	27002	1	0.5						
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												
21												
22												
23												
24												
25												
26												
27												
28												

A yellow callout box on the right side of the spreadsheet contains the text: "Check fuel supply default values for Lake County".

The bottom tab bar shows the following tabs: FuelSupply (highlighted), FuelFormulation, FuelUsageFraction, avft, County, Et ...

The status bar at the bottom indicates "READY" and a zoom level of "130%".

# County Inventory Exercise: Checking Default Data

fuels.xls [Compatibility Mode] - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

Clipboard Font Alignment Number Styles Cells Editing

A1 : fuelFormulationID

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	fuelFormul	fuelSubtyp	RVP	sulfurLevel	ETOHVolu	MTBEVolu	ETBEVolu	TAMEVolu	aromaticC	olefinConte	benzeneC	e200	e300	BioDieselE	CetaneInde	PAHConte	T50
2	10	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	
3	20	20	0	11	0	0	0	0	0	0	0	0	0	0	0	0	
4	50	51	7.7	11	85	0	0	0	0	0	0	49.9	89.5	0	0	0	
5	96	10	8.7	338	0	0	0	0	26.4	11.9	1.64	50	83	0	0	0	199
6	97	10	6.6	150	0	11.7581	0	0	24	11	0.8	52	84	0	0	0	195
7	98	10	6.9	30	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	
8	99	10	6.9	90	0	0	0	0	26.1	5.6	1	41.09	83.09	0	0	0	
9	3313	12	7.06	30	10	0	0	0	17.13	7.85	0.77	50.98	85.24	0	0	0	1
10	3315	15	6.06	30	15	0	0	0	15.79	6.67	0.77	57.11	85.76	0	0	0	18
11	25005	21	0	15	0	0	0	0	0	0	0	0	0	5	0	0	
12	27002	51	7.7	8	74	0	0	0	0	0	0	49.9	89.5	0	0	0	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	

FuelSupply FuelFormulation FuelUsageFraction avft County Er ...

READY 100%

# County Inventory Exercise: Checking Default Data

The screenshot shows the Microsoft Excel interface with the following data in the spreadsheet:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	countyID	fuelYearID	modelYear	sourceBinF	fuelSupply	usageFraction							
2	18089	2015	0	1	1	1							
3	18089	2015	0	2	2	1							
4	18089	2015	0	5	1	0.986574							
5	18089	2015	0	5	5	0.013426							
6													
7													
8													
9													
10													
11													
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
22													

The taskbar at the bottom shows the following tabs: FuelSupply, FuelFormulation, FuelUsageFraction (highlighted in yellow), avft, County, Et ... The status bar at the bottom right indicates 130% zoom.

# County Inventory Exercise: Checking Default Data

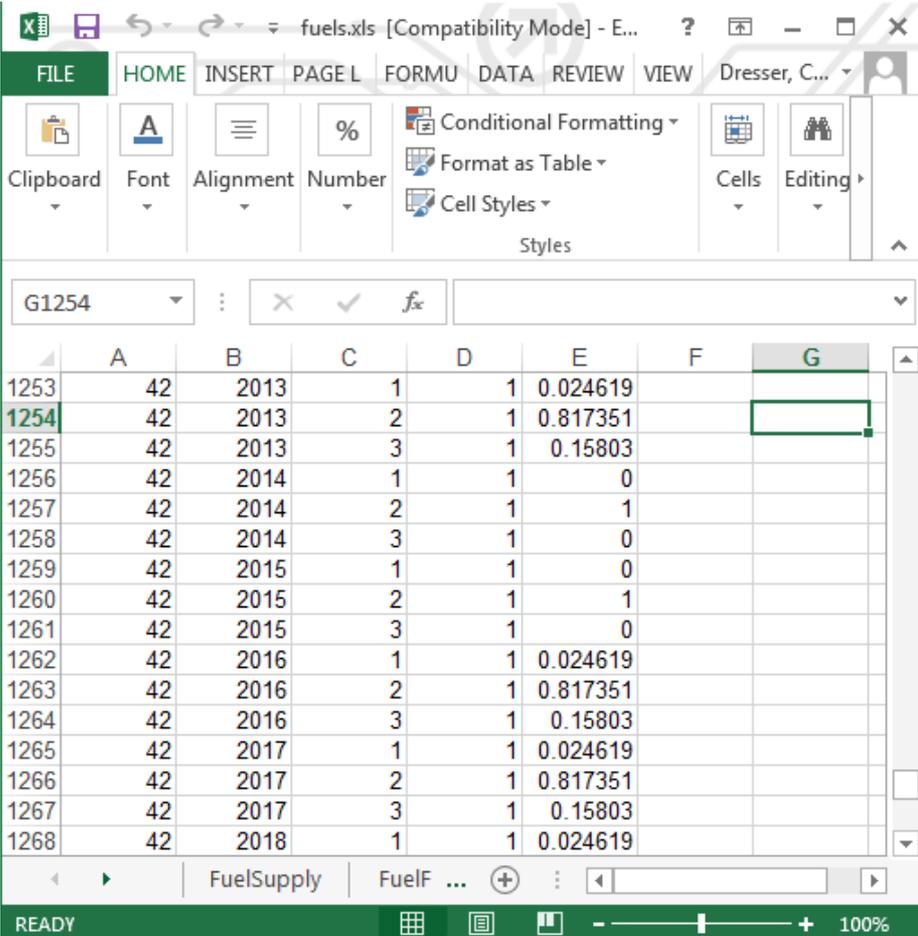
The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	sourceType	modelYear	fuelTypeID	engTechID	fuelEngFraction								
2	21	1960	1	1	0.993123								
3	21	1960	2	1	0.006877								
4	21	1960	5	1	0								
5	21	1960	9	30	0								
6	21	1961	1	1	0.993123								
7	21	1961	2	1	0.006877								
8	21	1961	5	1	0								
9	21	1961	9	30	0								
10	21	1962	1	1	0.993123								
11	21	1962	2	1	0.006877								
12	21	1962	5	1	0								
13	21	1962	9	30	0								
14	21	1963	1	1	0.993123								
15	21	1963	2	1	0.006877								
16	21	1963	5	1	0								
17	21	1963	9	30	0								
18	21	1964	1	1	0.993123								
19	21	1964	2	1	0.006877								
20	21	1964	5	1	0								
21	21	1964	9	30	0								
22	21	1965	1	1	0.993123								

The bottom sheet navigation bar shows the following tabs: FuelSupply, FuelFormulation, FuelUsageFraction, **avft**, County, Et ...

# Fuel: AVFT Exercise

- Input fractions of 1.0 for FuelTypeID 2 and SourceTypeID 42 (years 2014 and 2015 only)
- Indicates a 100% diesel fueled transit bus fleet



The screenshot shows an Excel spreadsheet with the following data:

	A	B	C	D	E	F	G
1253	42	2013	1	1	0.024619		
1254	42	2013	2	1	0.817351		
1255	42	2013	3	1	0.15803		
1256	42	2014	1	1	0		
1257	42	2014	2	1	1		
1258	42	2014	3	1	0		
1259	42	2015	1	1	0		
1260	42	2015	2	1	1		
1261	42	2015	3	1	0		
1262	42	2016	1	1	0.024619		
1263	42	2016	2	1	0.817351		
1264	42	2016	3	1	0.15803		
1265	42	2017	1	1	0.024619		
1266	42	2017	2	1	0.817351		
1267	42	2017	3	1	0.15803		
1268	42	2018	1	1	0.024619		

# County Inventory Exercise: Entering Fuel Supply Data

The screenshot displays the MOVES County Data Manager interface. The 'Fuel' tab is selected in the top navigation bar. The 'Fuels Wizard' dialog is open, showing a 'Browse...' button highlighted in yellow. A file explorer window titled 'Open FuelSupply Data' is open, showing the file 'fuels.xls' selected in the 'County Inventory Exercise' folder. A 'Choose XLS Worksheet' dialog box is also open, with 'Fuel Supply' selected in the list of worksheets. A yellow callout box with the text 'Browse and import the FuelSupply worksheet' is positioned over the 'Browse...' button and the 'Fuel Supply' worksheet selection. The 'Import' button is also visible in the wizard. At the bottom of the wizard, a pink bar contains the word 'Fuel' and a 'Done' button.

# County Inventory Exercise: Entering Fuel Formulation Data

The screenshot displays the MOVES County Data Manager interface. The 'Fuel' tab is selected in the top navigation bar. The 'Fuels Wizard' dialog is open, showing a 'Browse...' button highlighted in yellow. A file explorer window is open to the 'County Inventory Exercise' folder, with 'fuels.xls' selected. A 'Choose XLS Worksheet' dialog is also open, with 'FuelFormulation' selected in the list of worksheets. A yellow callout box with the text 'Browse and import the FuelFormulation worksheet' is positioned over the 'Browse...' button and the 'FuelFormulation' selection. The bottom of the screen shows a pink bar with the word 'Fuel' and a 'Done' button.

# County Inventory Exercise: Entering Fuel Usage Fraction

The screenshot displays the MOVES County Data Manager interface. At the top, a tabbed menu includes 'Vehicle Type VMT', 'Hotelling', 'I/M Programs', 'Retrofit Data', 'Generic', and 'Tools'. Below this, a row of sub-tabs shows 'Ramp Fraction', 'Road Type Distribution', 'Source Type Population', and 'Starts'. A second row of sub-tabs includes 'RunSpec Summary', 'Database', 'Age Distribution', 'Average Speed Distribution', 'Fuel', and 'Meteorology Data'. The 'Fuel' tab is currently selected.

An 'Open FuelSupply Data' dialog box is open, showing a file explorer view of the 'County Inventory Exercise' folder. The file list includes 'answer key', 'AADVMTCalculator\_HPMS\_exercise.xls', 'agedistribution.xls', 'fuels.xls', 'met.xls', 'post-processing.txt', 'rampfraction.xls', 'roadtypedistribution.xls', 'sourcetypepopulation.xls', and 'speeddistribution.xls'. The 'fuels.xls' file is selected.

A 'Choose XLS Worksheet' dialog box is overlaid on the file explorer, listing the worksheets available in 'fuels.xls': 'Fuel Supply', 'FuelFormulation', 'FuelUsageFraction', 'avft', 'County', 'EngineTech', 'FuelSubtype', 'FuelSupplyYear', and 'FuelType'. The 'FuelUsageFraction' worksheet is highlighted.

In the background, the 'Fuels Wizard' dialog box is visible, with the 'Browse...' button highlighted in yellow. A yellow text box with the instruction 'Browse and import the FuelUsageFraction worksheet' is positioned over the 'Import' button area.

At the bottom of the main window, a pink bar contains the word 'Fuel' in white text, and a 'Done' button is visible in the bottom right corner.

# County Inventory Exercise: Entering Fuel Formulation Data

The screenshot displays the MOVES County Data Manager interface. The 'Fuel' tab is selected in the top navigation bar. The 'Fuels Wizard' dialog is open, showing a 'Browse...' button highlighted in yellow. A file explorer window titled 'Open FuelSupply Data' is open, showing the 'County Inventory Exercise' folder with 'fuels.xls' selected. A 'Choose XLS Worksheet' dialog box is also open, showing a list of worksheets with 'avft' selected and highlighted in yellow. A yellow callout box with the text 'Browse and import the AVFT worksheet' is positioned over the 'avft' selection. At the bottom of the wizard, a pink bar contains the word 'Fuel' and a 'Done' button.

# Inspection & Maintenance (I/M) Programs

- Only one I/M program can be applied to each pollutant-process, source type, fuel type, model year combination
- IMProgramID is arbitrary number but must be unique for each fuel type, inspection frequency, test standard combination

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	polProcess	stateID	countyID	yearID	sourceType	fuelTypeID	IMProgram	inspectFreq	testStandard	begModelYear	endModelYear	useIMyn	complianceFactor				
2	101	18	18089	2015	21	1	1	2	11	1976	1980	Y	95				
3	101	18	18089	2015	21	1	6	2	33	1981	1995	Y	95				
4	101	18	18089	2015	21	1	10	2	51	1996	2013	Y	95				
5	101	18	18089	2015	21	5	1	2	11	1976	1980	Y	95				
6	101	18	18089	2015	21	5	6	2	33	1981	1995	Y	95				
7	101	18	18089	2015	21	5	10	2	51	1996	2013	Y	95				
8	101	18	18089	2015	31	1	1	2	11	1976	1980	Y	95				
9	101	18	18089	2015	31	1	6	2	33	1981	1995	Y	95				
10	101	18	18089	2015	31	1	10	2	51	1996	2013	Y	95				
11	101	18	18089	2015	31	5	1	2	11	1976	1980	Y	95				
12	101	18	18089	2015	31	5	6	2	33	1981	1995	Y	95				

# I/M Programs: Guidance

- Section 4.11 of MOVES Technical Guidance
- MOVES uses a single “compliance factor” (compliance rate). The general equation for finding compliance factor is:

$$\text{Compliance Factor} = \text{\% Compliance Rate} \times (\text{100\% - waiver rate}) \times \text{Regulatory class coverage adjustment}$$

- Regulatory class coverage adjustment is used to account for I/M programs which may not cover an entire source type because the program only applies to certain weight classes

# I/M Programs: Guidance

- If separate I/M programs apply to different weight classes within the same source type, the two programs cannot be accounted for in a single RunSpec
  - If such a situation exists, assume the I/M program that covers a larger amount of the VMT within the source type applies to all weight classes for which there is an I/M program
- Consult MOVES Technical Guidance (Section 4.11) and User Guide for detailed instructions on how to construct I/M inputs (Section 2.3.3.4.16)

# I/M Programs: Exercise

- Let's enter our I/M data into the CDM for our county-level exercise
- MOVES will have default data for our county I/M program. However, we need to update the compliance factor to 95%
- **Instructions for Developing a County-scale RunSpec:**
  - Export the default I/M data for Lake County, change the compliance factors to 95%, and import the table into the I/M Programs tab

# County Inventory Exercise: Entering I/M Programs Data

The screenshot displays the MOVES County Data Manager interface. The 'I/M Programs' tab is active. An 'Export I/M Programs Data' dialog box is open, showing a file list with 'im.xls' selected. The dialog box has a 'Save' button highlighted in yellow. A yellow callout box contains the text: 'Export default data, save as im.xls'. Below the dialog box, the 'Export Default Data' button is also highlighted in yellow. The main data entry area is titled 'I/M Programs' and has a 'Done' button at the bottom right.

Name	Date modified	Type
answer key	10/21/2014 2:08 PM	File folder
AADVMTCalculator_HPMS_exercise.xls	9/4/2014 10:44 AM	Microsoft
agedistribution.xls	10/20/2014 2:20 PM	Microsoft
fuels.xls	10/21/2014 2:42 PM	Microsoft
im.xls	10/21/2014 2:57 PM	Microsoft
met.xls	6/4/2012 10:10 AM	Microsoft
post-processing.txt	7/26/2012 2:48 PM	Text Docu
rampfraction.xls	10/21/2014 2:26 PM	Microsoft
roadtypedistribution.xls	10/20/2014 2:21 PM	Microsoft
sourcetypepopulation.xls	10/20/2014 2:17 PM	Microsoft
speeddistribution.xls	10/20/2014 2:19 PM	Microsoft

File name:  Save

Save as type:  Cancel

Export Default Data Export Imported Data

I/M Programs Done

# County Inventory Exercise: Entering I/M Programs Data

im.xls [Compatibility Mode] - Excel

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

Clipboard Font Alignment Number Styles Cells Editing

A1 polProcessID

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	polProcessID	stateID	countyID	yearID	sourceType	fuelTypeID	IMProgram	inspectFreq	testStandard	begModelYear	endModelYear	useIMYN	complianceFactor				
2	101	18	18089	2015	21	1	1	2	11	1976	1980	Y	93.12				
3	101	18	18089	2015	21	1	6	2	33	1981	1995	Y	93.12				
4	101	18	18089	2015	21	1	10	2	51	1996	2013	Y	93.12				
5	101	18	18089	2015	21	5	201	2	11	1976	1980	Y	93.12				
6	101	18	18089	2015	21	5	206	2	33	1981	1995	Y	93.12				
7	101	18	18089	2015	21	5	210	2	51	1996	2013	Y	93.12				
8	101	18	18089	2015	31	1	1	2	11	1976	1980	Y	93.12				
9	101	18	18089	2015	31	1	6	2	33	1981	1995	Y	93.12				
10	101	18	18089	2015	31	1	10	2	51	1996	2013	Y	93.12				
11	101	18	18089	2015	31	5	201	2	11	1976	1980	Y	93.12				
12	101	18	18089	2015	31	5	206	2	33	1981	1995	Y	93.12				
13	101	18	18089	2015	31	5	210	2	51	1996	2013	Y	93.12				
14	101	18	18089	2015	32	1	1	2	11	1976	1980	Y	93.12				
15	101	18	18089	2015	32	1	6	2	33	1981	1995	Y	93.12				
16	101	18	18089	2015	32	1	10	2	51	1996							
17	101	18	18089	2015	32	5	201	2	11	1976							
18	101	18	18089	2015	32	5	206	2	33	1981							
19	101	18	18089	2015	32	5	210	2	51	1996							
20	102	18	18089	2015	21	1	1	2	11	1976							
21	102	18	18089	2015	21	1	6	2	33	1981							
22	102	18	18089	2015	21	1	10	2	51	1996							
23	102	18	18089	2015	21	5	201	2	11	1976							
24	102	18	18089	2015	21	5	206	2	33	1981							
25	102	18	18089	2015	21	5	210	2	51	1996							
26	102	18	18089	2015	31	1	1	2	11	1976							
27	102	18	18089	2015	31	1	6	2	33	1981							
28	102	18	18089	2015	31	1	10	2	51	1996	2013	Y	93.12				

IMCoverage CountyState FuelType IMInspectFreq IMPollutantProc ...

READY 100%

im.xls as exported with default data

Default compliance factor = 93.12%

# County Inventory Exercise: Entering I/M Programs Data

The screenshot shows an Excel spreadsheet with the following data table:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	polProcess	stateID	countyID	yearID	sourceTyp	fuelTypeID	IMProgram	inspectFre	testStand	begModelY	endModelY	uselMyn	compliance	Factor			
2	101	18	18089	2015	21	1	1	2	11	1976	1980	Y	95				
3	101	18	18089	2015	21	1	6	2	33	1981	1995	Y	95				
4	101	18	18089	2015	21	1	10	2	51	1996	2013	Y	95				
5	101	18	18089	2015	21	5	1	2	11	1976	1980	Y	95				
6	101	18	18089	2015	21	5	6	2	33	1981	1995	Y	95				
7	101	18	18089	2015	21	5	10	2	51	1996	2013	Y	95				
8	101	18	18089	2015	31	1	1	2	11	1976	1980	Y	95				
9	101	18	18089	2015	31	1	6	2	33	1981	1995	Y	95				
10	101	18	18089	2015	31	1	10	2	51	1996	2013	Y	95				
11	101	18	18089	2015	31	5	1	2	11	1976	1980	Y	95				
12	101	18	18089	2015	31	5	6	2	33	1981	1995	Y	95				
13	101	18	18089	2015	31	5	10	2	51	1996	2013	Y	95				
14	101	18	18089	2015	32	1	1	2	11	1976	1980	Y	95				
15	101	18	18089	2015	32	1	6	2	33	1981	1995	Y	95				
16	101	18	18089	2015	32	1	10	2	51	1996	2013	Y	95				
17	101	18	18089	2015	32	5	1	2	11	1976	1980	Y	95				
18	101	18	18089	2015	32	5	6	2	33	1981	1995	Y	95				
19							10	2	51	1996	2013	Y	95				
20							1	2	11	1976	1980	Y	95				
21							6	2	33	1981	1995	Y	95				
22							10	2	51	1996	2013	Y	95				
23							1	2	11	1976	1980	Y	95				
24							6	2	33	1981	1995	Y	95				
25							10	2	51	1996	2013	Y	95				
26	102	18	18089	2015	31	1	1	2	11	1976	1980	Y	95				
27	102	18	18089	2015	31	1	6	2	33	1981	1995	Y	95				
28	102	18	18089	2015	31	1	10	2	51	1996	2013	Y	95				

A yellow callout box is overlaid on the spreadsheet with the text: "Change the compliance rate to 95% for all source types and re-save". The column labeled "complianceFactor" (column M) is highlighted with a yellow border.

# County Inventory Exercise: Entering I/M Programs Data

MOVES County Data Manager

Vehicle Type VMT | Hotelling | **I/M Programs** | Retrofit Data | Generic | Tools

Ramp Fraction | Road Type Distribution | Source Type Population | Starts

RunSpec Summary | Database | Age Distribution | Average Speed Distribution | Fuel | Meteorology Data

Description of Imported Data:

Open IMCoverage Data

Look in: County Inventory Exercise

Name	Date modified	Type
answer key		
AADVMTCalculator_HPMS_exercise.xls		
agedistribution.xls		
fuels.xls		
<b>im.xls</b>		
met.xls		
post-processing.txt		
rampfraction.xls		
roadtypedistribution.xls		
sourcetypepopulation.xls		
speeddistribution.xls		

File name: im.xls | Open | Cancel

Files of type: All Files (\*.\*)

Choose XLS Worksheet

Select the Worksheet to read:

- IMCoverage**
- County State
- FuelType
- IMInspectFreq
- IMPollutantProcessAssoc
- IMTestStandards
- SourceUseType

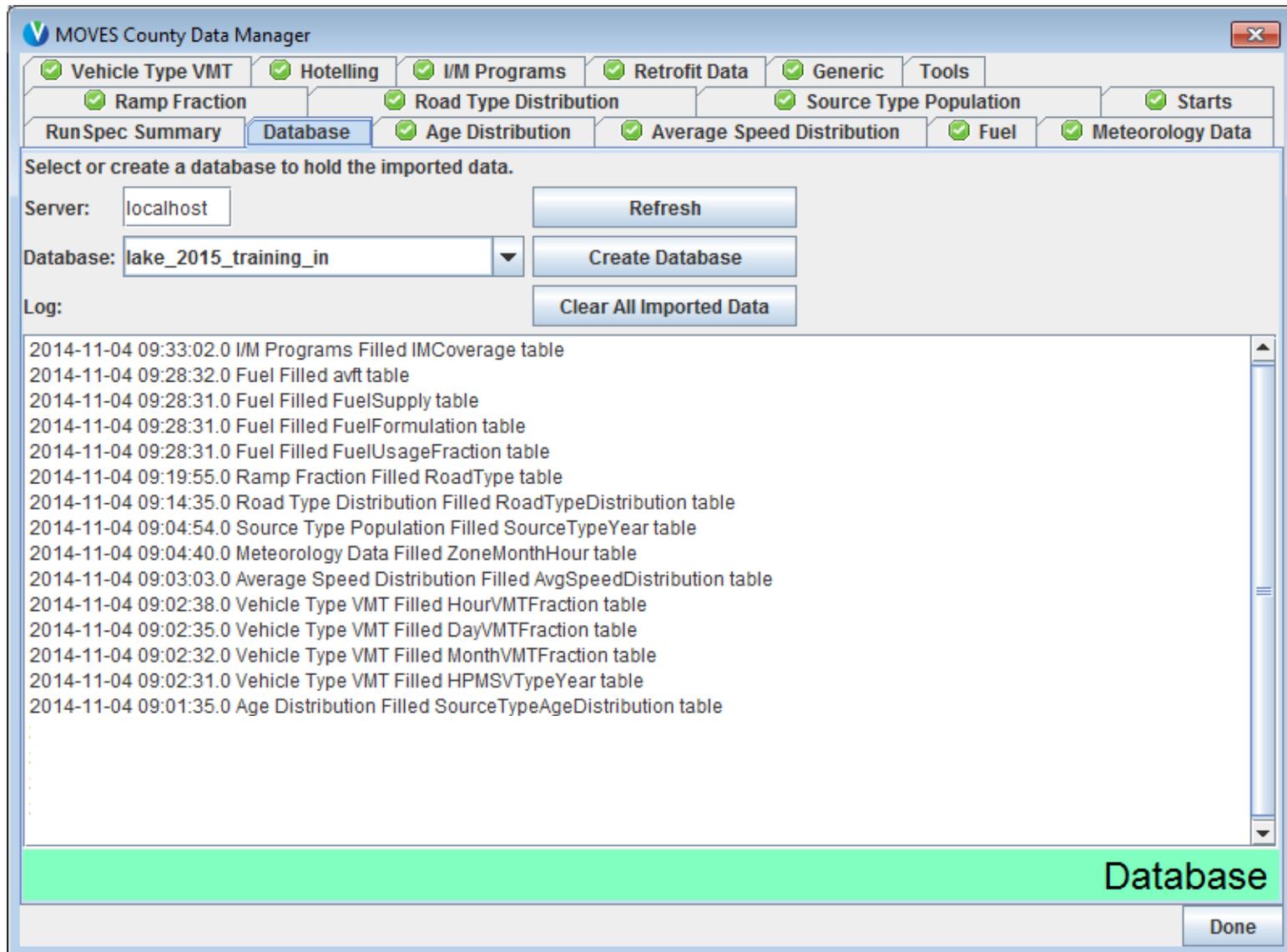
OK | Cancel

Browse and import the updated worksheet as usual

I/M Programs

Done

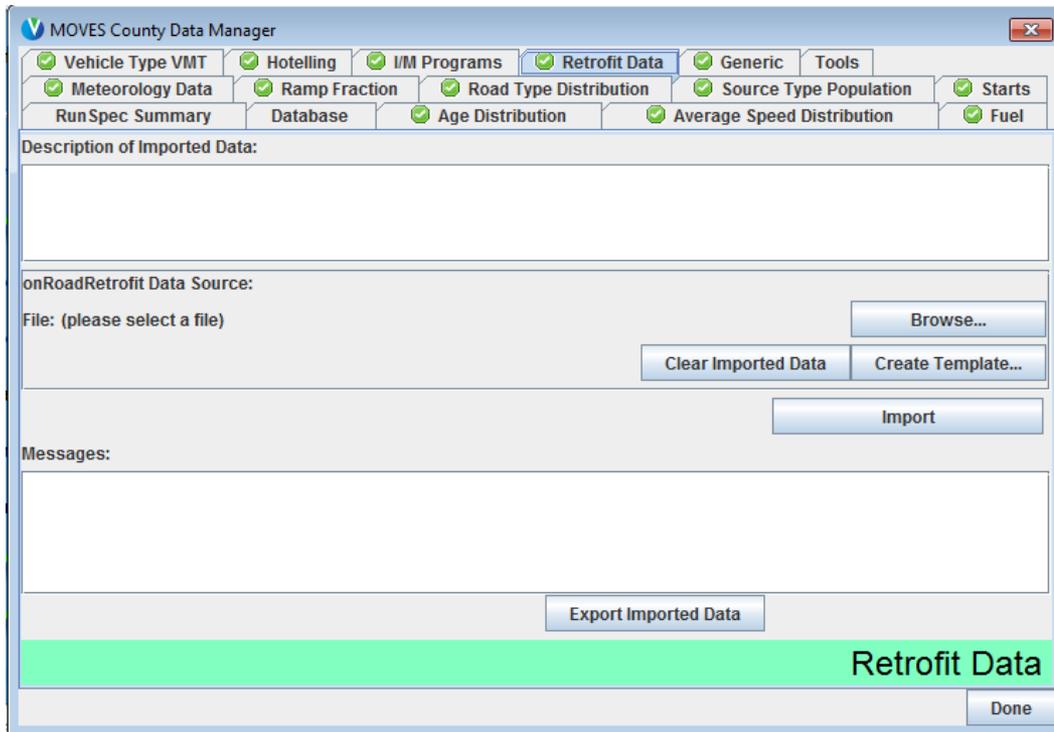
# County Inventory Exercise: All Data Imported



# Other CDM Tabs: Generic

- The Generic tab allows advanced users to enter data into the many tables used by MOVES to complete its calculations
- In general, most users will not have a reason to enter data through this tab

# Other CDM Tabs: Retrofit



- The retrofit importer (formerly in the runspec of MOVES2010b) is now located in the CDM/PDM
- Use to model diesel retrofit programs
- This is an optional input

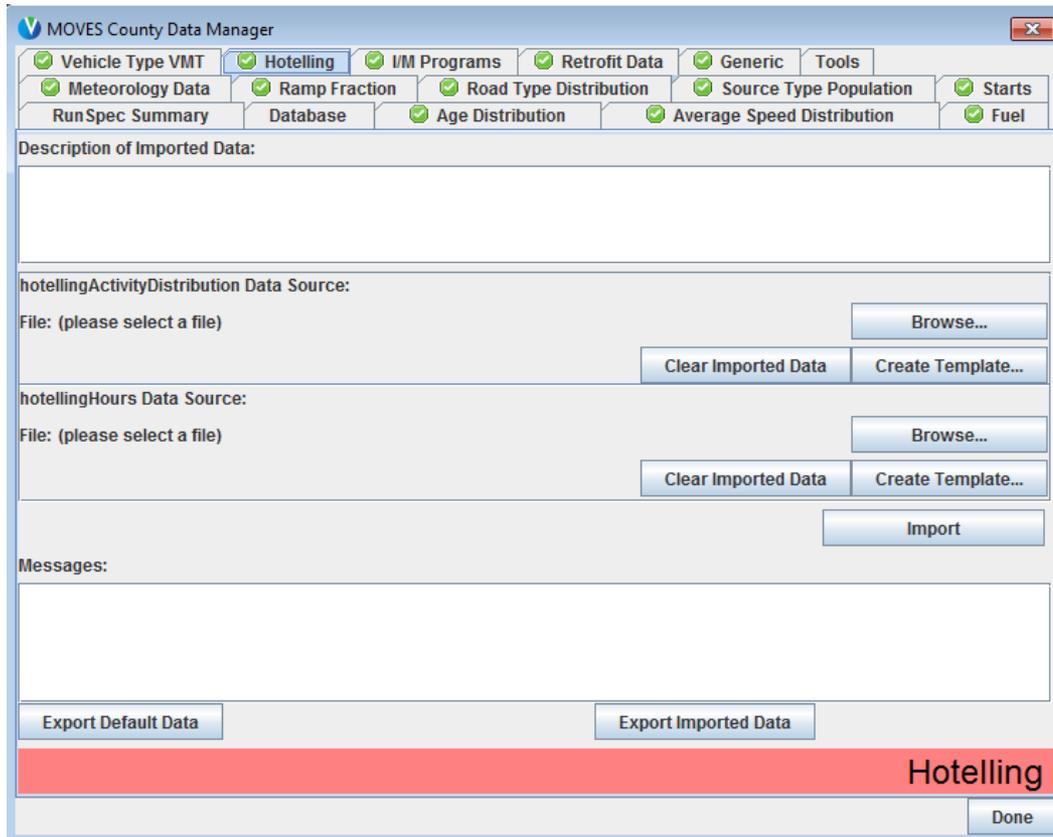
# Other CDM Tabs: Retrofit

pollutantID	processID	fuelTypeID	sourceTypeID	retrofitYearID	beginModelYearID	endModelYearID	cumFractionRetrofit	retrofitEffectiveFraction
3	1	2	62	2024	2020	2024	0.5	0.3

The example above describes a retrofit program:

- Applying to diesel combination long-haul trucks (sourceTypeID 62)
  - Affecting running emissions (process ID 1) of NOx (pollutantID 3)
  - For model years 2020 through 2024 (beginModelYearID/endModelYearID)
  - Where 50% of all vehicles in that MY range are retrofitted (cumFractionRetrofit 0.5)
  - And the retrofit technology reduces emissions 30% (retrofitEffectiveFraction 0.3)
- The retrofitYearID should always be the analysis year
  - Consult EPA guidance material for more information on when to use the Retrofit input

# Other CDM Tabs: Hotelling



- The Hotelling input allows users to describe long-haul combination truck hotelling behavior
- The two panels are:
  - `hotellingactivitydistribution` and
  - `hotellinghours`
- Both are optional inputs
- Output in Rates mode is provided in the `ratepervehicle` table, but also in a new `rateperhour` table. *Only one should be used* depending on if activity is available in terms of vehicle population or hotelling hours

# Other CDM Tabs: Hotelling

- The **hotellingactivitydistribution** table is used to define the fraction of trucks in each of four modes of hotelling activity:
- 200 – Extended Idling
- 201 – Auxiliary Power Units (APUs)
- 203 – Battery Power
- 204 – Engine Off
- The example shows the national default fractions

beginModelYearID	endModelYearID	opModelID	opModeFraction
1960	2009	200	1
1960	2009	201	0
1960	2009	203	0
1960	2009	204	0
2010	2050	200	0.7
2010	2050	201	0.3
2010	2050	203	0
2010	2050	204	0

# Other CDM Tabs: Hotelling

hourDayID	monthID	yearID	ageID	zoneID	sourceTyp	hotellingHo
15	1	2024	30	131210	62	0
15	1	2024	29	131210	62	0
15	1	2024	28	131210	62	0
15	1	2024	27	131210	62	0
15	1	2024	26	131210	62	0
15	1	2024	25	131210	62	0.033932
15	1	2024	24	131210	62	0.146956
15	1	2024	23	131210	62	0.141804
15	1	2024	22	131210	62	0.113281
15	1	2024	21	131210	62	0.129963
15	1	2024	20	131210	62	0.23111
15	1	2024	19	131210	62	0.102025
15	1	2024	18	131210	62	0.409672
15	1	2024	17	131210	62	0.397336
15	1	2024	16	131210	62	0.402312
15	1	2024	15	131210	62	0.737026
15	1	2024	14	131210	62	0.82595
15	1	2024	13	131210	62	1.388
15	1	2024	12	131210	62	1.41376
15	1	2024	11	131210	62	1.52765
15	1	2024	10	131210	62	1.05556
15	1	2024	9	131210	62	2.35206
15	1	2024	8	131210	62	1.73303
15	1	2024	7	131210	62	3.48606
15	1	2024	6	131210	62	1.39675
15	1	2024	5	131210	62	2.19772
15	1	2024	4	131210	62	2.56074
15	1	2024	3	131210	62	5.66776
15	1	2024	2	131210	62	4.5037
15	1	2024	1	131210	62	3.1559
15	1	2024	0	131210	62	3.07248

- The **hotellinghours** table is used to define the total number of hotelling hours in your modeling domain
- In MOVES2014 extended idle hours are allocated to counties based on rural combination truck VMT – in MOVES2010b it was based on long-haul combination truck population
- This input can be used to override the defaults and provide local hotelling hours (if available)
- Note that hotelling hours are by “day-type”
  - day 5 = 5 weekdays
  - day 2 = 2 weekend days

# Other CDM Tabs: Starts

- MOVES2014 offers the option to import local vehicle start information
- Input is optional: if no data are provided, MOVES calculates starts from the user defined source type population input
- Depending on the data available, users can use one or more of the following panels:
- **starts** – use when you have all information: starts by source type, hourdayid, modelyear, monthid. If **starts** table used, no other tables below should be used
- **startsPerDay** – use when you have the number of starts per day
- **startsHourFraction** – use when you know the distribution of starts throughout the day
- **startsSourceTypeFraction** – use when you know how to allocate starts among the different source types
- **startsMonthAdjust** – use to adjust start activity by month

An importer is also available to provide information on vehicle soak time

- **importStartsOpModeDistribution** – defines vehicles soak times

# Other CDM Tabs: Starts

- An entire “**starts**” table can be imported. This will completely replace the MOVES generated default starts profile.
- Note that this input requires all information on starts for all hours, dayIDs, age (model year), and source type selected in the runspec

hourDayID	monthID	yearID	ageID	zoneID	sourceTypeID	starts	startsCV
15	1	2024	0	131210	11		
15	1	2024	0	131210	21		
15	1	2024	0	131210	31		
15	1	2024	0	131210	32		
15	1	2024	0	131210	41		
15	1	2024	0	131210	42		
15	1	2024	0	131210	43		
15	1	2024	0	131210	51		
15	1	2024	0	131210	52		
15	1	2024	0	131210	53		
15	1	2024	0	131210	54		
15	1	2024	0	131210	61		
15	1	2024	0	131210	62		
15	1	2024	1	131210	11		
15	1	2024	1	131210	21		
15	1	2024	1	131210	31		
15	1	2024	1	131210	32		

# Other CDM Tabs: Starts

- The startspersday importer is used to provide total starts by day type
- Starts should be entered for all vehicles and all days within the day type (day 5 represents five weekdays, and day 2 represents two weekends)
- This input can be used independently, or in combination with **startsHourFraction**, **startsSourceTypeFraction**, and **startsMonthAdjust**

zoneID	dayID	yearID	startsPerDay
131210	5	2024	

# Other CDM Tabs: Starts

zoneID	dayID	hourID	allocationFraction
131210	5	1	
131210	5	2	
131210	5	3	
131210	5	4	
131210	5	5	
131210	5	6	
131210	5	7	
131210	5	8	
131210	5	9	
131210	5	10	
131210	5	11	
131210	5	12	
131210	5	13	
131210	5	14	
131210	5	15	
131210	5	16	
131210	5	17	
131210	5	18	
131210	5	19	
131210	5	20	

- The **startshourfraction** importer is used to define the distribution of total starts across the day
- Different distributions can be provided for each day type
- This input can be used independently, or in combination with **startspersday**, **startsSourceTypeFraction**, and **startsMonthAdjust**

# Other CDM Tabs: Starts

sourceTypeID	allocationFraction
11	
21	
31	
32	
41	
42	
43	
51	
52	
53	
54	
61	
62	

- The **startssourcetypefraction** importer is used to define the distribution of total starts by source type
- This input can be used independently, or in combination with **startspersday**, **startshourfraction**, and **startsMonthAdjust**

# Other CDM Tabs: Starts

monthID	monthAdjustment
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

- The **startsmothadjust** importer is used to define the distribution of total starts by month
- A fraction of 1 for all months indicates every month has an equal number of starts
- These can be varied to adjust for a scenario where there is greater start activity in the summer months vs. winter months
- This input can be used independently, or in combination with **startspersday**, **startshourfraction**, and **startssourcetypefraction**

# Other CDM Tabs: Starts

sourceTyp	hourDayID	linkID	polProcess	opModelID	opModeFraction
11	15	1312101	302	101	
11	15	1312101	302	102	
11	15	1312101	302	103	
11	15	1312101	302	104	
11	15	1312101	302	105	
11	15	1312101	302	106	
11	15	1312101	302	107	
11	15	1312101	302	108	
11	25	1312101	302	101	
11	25	1312101	302	102	
11	25	1312101	302	103	
11	25	1312101	302	104	
11	25	1312101	302	105	
11	25	1312101	302	106	
11	25	1312101	302	107	
11	25	1312101	302	108	
11	35	1312101	302	101	
11	35	1312101	302	102	
11	35	1312101	302	103	
11	35	1312101	302	104	
11	35	1312101	302	105	
11	35	1312101	302	106	
11	35	1312101	302	107	
11	35	1312101	302	108	

- The **startsopmodedistribution** importer is used to define the distribution of soak times by sourcetype, hour, and dayID
- For each combination of sourcetype, hourDayid, and polprocessID, opmodefractions should sum to 1
- The table below shows the available soak times

opModelID	opModeName
101	Soak Time < 6 minutes
102	6 minutes <= Soak Time < 30 minutes
103	30 minutes <= Soak Time < 60 minutes
104	60 minutes <= Soak Time < 90 minutes
105	90 minutes <= Soak Time < 120 minutes
106	120 minutes <= Soak Time < 360 minutes
107	360 minutes <= Soak Time < 720 minutes
108	720 minutes <= Soak Time

# Other CDM Tabs: Starts

- In the General Output panel of the RunSpec, checking output by “Starts” allows you to confirm that MOVES used the correct number of starts
- For Rates runs, two new tables are created called “**startpervehicle**” and “**rateperstart**”
  - The **startpervehicle** table is primarily informational and can be used for diagnostic purposes

*Only one of these tables should be used for developing a starts emissions inventory:*

  - The **rateperstart** table can be used as an alternative for the **ratepervehicle** table if start information is available
  - If you have start info: Multiply **rateperstart** rates x [# of vehicle starts]
  - If you don't: Multiply **ratepervehicle** rate x [vehicle population]

# Running MOVES (Executing the RunSpec)



# Executing the RunSpec

The screenshot shows the MOVES software interface. The title bar reads: MOVES - C:\Users\lvangess\Desktop\BVG MOVES Files\MOVES2014 RunSpecs\lake\_2015\_inventory.mrs - ID 7264774216681310049. The menu bar includes File, Edit, Pre Processing, Action, Post Processing, Tools, Settings, and Help. The 'Action' menu is open, showing options: Execute (highlighted), Stop, Pause, Resume, and MOVES Run Error Log... The left sidebar contains a list of categories with checkboxes and green checkmarks: Description, Scale, Time Spans, Geographic Bounds, Vehicles/Equipment, On Road Vehicle, Road Type, Pollutants And Proces, Manage Input Data Se, Strategies, Output, and Advanced Performanc. The main window area is divided into sections: Region (Nation, State, County, Zone & Link, Custom Domain), States (ALABAMA, ALASKA, ARIZONA, ARKANSAS, CALIFORNIA, COLORADO, CONNECTICUT, DELAWARE, DISTRICT OF COLUMBIA), Counties (empty), and Selections (INDIANA - Lake County). Below these are buttons for Select All, Add, and Delete. The 'Domain Input Database' section contains a message: 'The County domain scale requires a database of detailed data.' It has fields for Server (localhost) and Database (lake\_2015\_training\_in, highlighted in yellow). There are also Refresh and Enter/Edit Data buttons. At the bottom, there is a 'Geographic Bounds Requirements' section with an empty text box. A yellow callout box at the bottom right contains the text: 'Ensure correct input database is selected'. The status bar at the bottom left reads: Select and Import County-Level Data.

# MOVES Running

The screenshot displays the MOVES (Motor Vehicle Emission Simulator) software interface. The main window title is "MOVES - C:\Users\lvangess\Desktop\BVG MOVES Files\MOVES2014 RunSpecs\lake\_2015\_inventory.mrs - ID 7264774216681310049". The menu bar includes "File", "Edit", "Pre Processing", "Action", "Post Processing", "Tools", "Settings", and "Help". The MOVES logo, a stylized 'V' with a green triangle, is positioned to the left of the text "MOVES Motor Vehicle Emission Simulator".

A dialog box is open in the foreground with the following text:

Estimated Time Remaining [Close]  
Generating bundles [OK]  
estimating completion...

A "MOVES Worker" window is also visible, showing the following information:

MOVES Worker - ID 2191793588216402479

Status: Idle

Number of Files Processed: 0

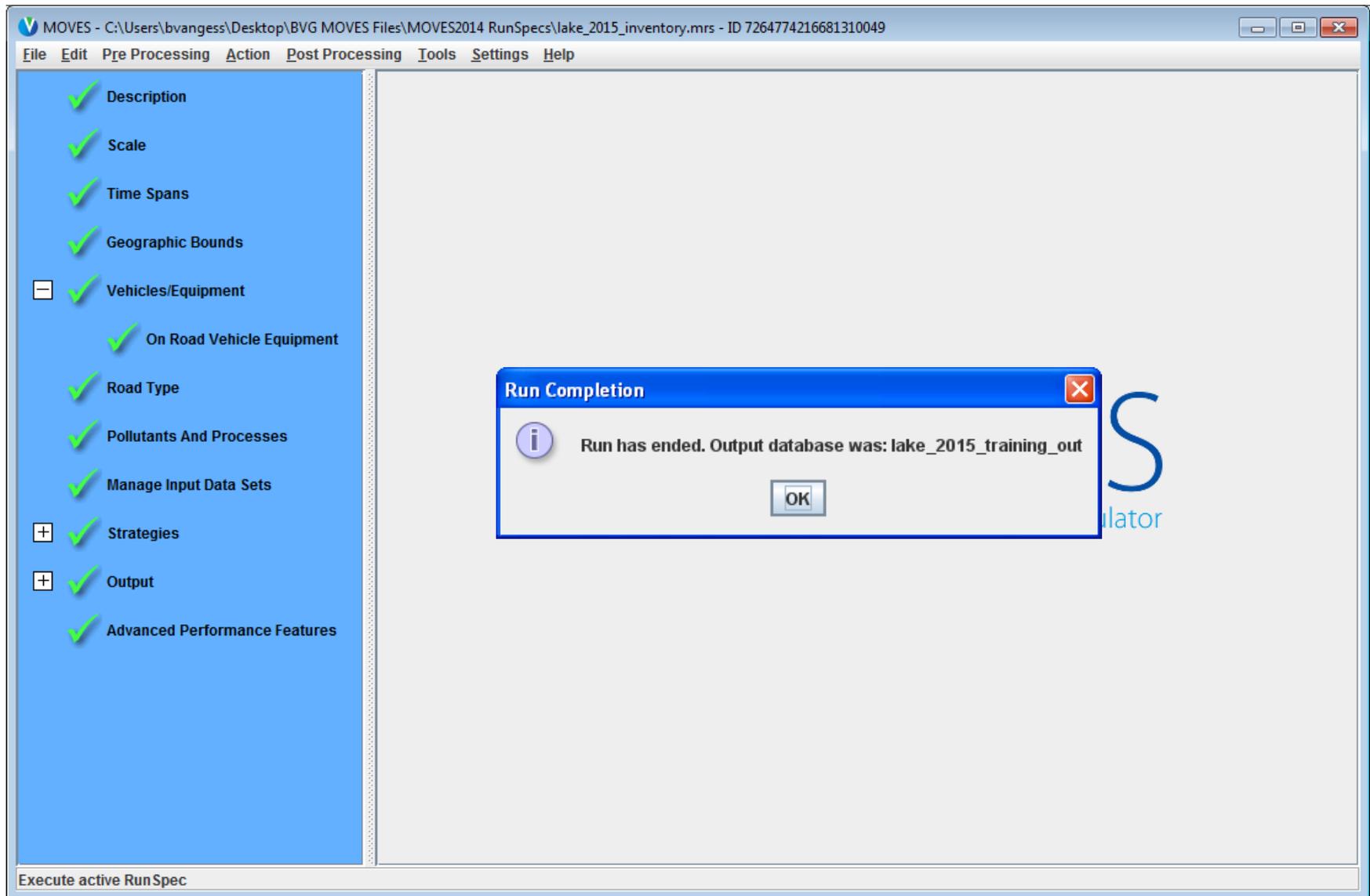
Number of Interruptions: 0

Computer ID: LC2756FBVANGESS Worker Release: MOVES2014-20141021

Shared Distributed Folder Path: C:\Users\Public\MOVES2014\SharedWork

At the bottom of the main window, there is a button labeled "Execute active RunSpec".

# Run Complete



# Helpful MOVES Tools

- Three new tools available for MOVES2014:
  - AADVMT Converter
  - Age Distribution Projection Tool
  - Default Age Distribution Tool
  - Tools can be found at:  
[www.epa.gov/otaq/models/moves/tools.htm](http://www.epa.gov/otaq/models/moves/tools.htm)
- Note, the tools website also contains several MOBILE6 to MOVES converters. Generally, these should not be used with MOVES2014

# Questions?

