

MOVES2014 User Interface Reference Manual Appendix:

MOVES2014b

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NOTICE

This technical report does not necessarily represent final EPA decisions or positions. It is intended to present technical analysis of issues using data that are currently available. The purpose in the release of such reports is to facilitate the exchange of technical information and to inform the public of technical developments.

Introduction

MOVES is the U.S. Environmental Protection Agency's (EPA) Motor Vehicle Emission Simulator. It is used to create emission factors or emission inventories for both onroad motor vehicles and nonroad equipment. The purpose of MOVES is to provide an accurate estimate of emissions from cars, trucks and non-highway mobile sources under a wide range of user-defined conditions.

This appendix to the MOVES2014 User Interface Reference Manual details the few interface changes made between MOVES2014a (documented in the MOVES2014a User Interface Reference Manual) and MOVES2014b. Full documentation for MOVES2014a can be found on the MOVES web page, <https://www.epa.gov/moves>

The interface changes for MOVES2014b are limited to improvements to the Fuel Wizard and to the Post-Processing menu and scripts. No conversion is needed to run MOVES2014a runspecs or databases using MOVES2014b.

Fuels and Fuel Wizard

Subsequent to MOVES2014a release, a bug in the **Fuel Wizard** was identified. The **Fuel Wizard** in MOVES2014a correctly calculated the changes in fuel properties when the ethanol volume of a fuel was changed from E0 to E10, or from E10 to E0 for an area with a 1 psi Reid Vapor Pressure (RVP) waiver under 40 CFR 80.27(d). However, the **Fuel Wizard** did not produce correct fuel properties when a user in the 1 psi RVP waiver area changed the ethanol volume of a fuel from E10 to E15, or from E15 to E10. The "MOVES2014a November 2016 patch" corrected this issue. Therefore, users who applied the patch or who are using MOVES2014b can use the **Fuel Wizard** tool normally to model the fuels in 1 psi RVP waiver areas.

For areas without the 1 psi waiver, the **Fuel Wizard** in MOVES2014a (and MOVES2014b) produces inaccurate fuel properties when the ethanol volume of a fuel was changed from E0 to E10, E10 to E0, E10 to E15, and E15 to E10. Users who wish to change the ethanol content of the fuel for areas without the 1 psi waiver should follow the instructions below to obtain the correct fuel properties.

1. Import the fuel as usual using the County and Project Data Manager.
2. Select the fuel that ethanol content needs to be changed.
3. From the drop-down menu, select "Ethanol", set the desired ethanol content, then click "Calculate".
4. When the wizard displays the properties of both old and new fuel, click "Accept" (note that the new fuel has an incorrect RVP).
5. Once you are back to the main **Fuel Wizard** screen, select the new fuel that was just created.
6. From the drop-down menu, select "RVP", set RVP to the correct psi, then click "Calculate".
7. The new fuel should now have the correct RVP. If the RVP of the new fuel is accurate, click "Accept".

8. Once you accept, the wizard loads the new fuel into the user input database (the old fuel is replaced). The new fuel now has the correct fuel properties and is consistent with the refinery modeling.

Post Processing

MOVES output databases can be viewed and processed directly using MySQL Query Browser or other database tools. In addition, MOVES provides a few simple options to post-process and view the MOVES results. The menu options have been changed in MOVES2014b to clarify the purposes of the scripts, and the scripts include additional error checking. The **Post Processing** menu provides three menu options, **Run MySQL Script on Onroad Output Database**, **Run MySQL Script on Nonroad Output Database**, **Produce Summary Report**, and **Produce State/County Map**. These features can be used after a successful execution of a MOVES RunSpec to further process the MOVES results into more aggregate or easy-to-use formats.

Note: In MOVES2014b, if the output database results contain only onroad results, the nonroad scripts will not be available from the Post Processing Menu. If the output database results contain only nonroad results, the onroad scripts will not be available. If the output database results contain both onroad and nonroad results, all scripts will be available; however, it is not recommended that you apply these scripts to output databases that contain both onroad and nonroad results, since all results found in the database (both onroad and nonroad) will be processed using the same script.

Run MySQL Script on Onroad Output Database

The **Run MySQL Script on Onroad Output Database** menu option enables you to select from a set of MySQL scripts to further process the MOVES onroad output databases stored in the MySQL database format. After selecting this menu option, click the arrow in the scroll down box to view all the available scripts. Several scripts are distributed with MOVES. Select a post-processing script by clicking to highlight it. To execute the script, click the **OK** button. The script will run on the output database that is selected in the General Output panel of the RunSpec.

The first script, **DecodeMOVESOutput.sql**, is an example script that decodes the SourceUseType and FuelType fields from numerical code classification to the full text description. The script produces two new output tables with the expanded text descriptions: decodedmovesactivityoutput and decodedmovesoutput.

Note: The MOVES Decode script uses the default database supplied with MOVES to decode the numeric values in the tables. If the default database has been replaced, the Decode script will need to be modified with the new database name.

A second script, **TabbedOutput.sql**, takes three MOVES MySQL output tables (MOVESOutput, MOVESActivityOutput and MOVESRun) and converts them into tab-delimited text files that can be read by a spreadsheet program such as Excel or Lotus123. This is

useful if you do not want to work with the results in the MySQL relational database format. In MOVES, this can also be done with the **Summary Reporting** feature. Both scripts work with **Inventory** output, not **Emission Rate** output.

A third script, **EmissionRates.sql**, divides the emission totals in the MOVESOutput table by the distance traveled totals in the MOVESActivityOutput table. The resulting values are in units of grams/vehicle-mile. A rate will be produced for each line of output. Depending on what was selected in the Output Emission Detail panel of the RunSpec, this could be one aggregate rate, or many disaggregate rates (e.g., one rate for each source type, fuel type, and model year). The script produces a new table in the output database called emissionrates.

The remaining scripts were developed to automate the process of calculating emission factors for use in air quality modeling. Once MOVES has been run at the project-level, the scripts may be used to appropriately sum emissions from each of the relevant processes into one aggregate link emission rate.

For CO analyses, the following three scripts are available: **CO_Grams_Per_Hour.sql**, **CO_Grams_Per_Veh_Mile.sql**, and **CO_CAL3QHC_EmissionFactors.sql**. Each script automates the post-processing steps described in Section 2.5 of the EPA guidance document, Using MOVES in Project-Level Carbon Monoxide Analyses. Depending on the purpose of the CO analysis, you can choose to generate link specific emission rates for CO as either grams per hour or grams per vehicle-mile. Additionally, a script is available that produces both free flow emission rates (grams per vehicle-mile) and idle emission rates (grams per vehicle-hour) which may be used in the CAL3QHC dispersion model. Running a script will produce a table in the output database that matches the name of the selected script (e.g., CO_grams_per_hour).

For PM analyses, the following four scripts are available:

PM25_Grams_Per_Veh_Mile.sql, **PM25_Grams_Per_Hour.sql**, **PM10_Grams_Per_Veh_Mile.sql**, and **PM10_Grams_Per_Hour.sql**. Each script automates the post-processing steps described in Section 4.6 of the EPA guidance document, Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas. You can generate link-specific emission rates or PM_{2.5} and PM₁₀ as either grams per vehicle-mile or grams per hour, whichever may be needed for dispersion modeling. Running a script will produce a table in the output database that matches the name of the selected script (e.g., PM25_grams_per_veh_mile).

Each script has limited error checking and you should ensure that you follow all recommendations in the relevant EPA guidance document when running MOVES and executing a post-processing script.

Tip! The **Run MySQL Script on Onroad Output Database Post Processing** feature of MOVES also allows you to run user-created MySQL scripts. Each user-created post-processing script must be a text file containing Structured Query Language (SQL) commands, and must have a .SQL file extension. Detailed instructions on writing a MySQL script are beyond the scope of this document. To access a user-created script from the tool bar, the completed script must be saved to the OutputProcessingScripts subfolder of the

Database subfolder of the MOVES program folder. In other words, the path should be similar to the following: C:\...\MOVES\Database\OutputProcessingScripts.

Run MySQL Script on Nonroad Output Database Nonroad Post-Processing Scripts List

The Run MySQL Script on Nonroad Output Database menu option enables you to select from a set of MySQL scripts to further process the MOVES nonroad output databases stored in the MySQL database format. The scripts are applied to the current output database selected in the current RunSpec. The Nonroad scripts require that MOVES be run in specific ways, so read the documentation associated with each script before using it.

It is strongly recommended that the underlying MOVES nonroad output database should be relatively small in terms of total number of records. To achieve this, the user may want to restrict the number of calendar years, month/day combinations, pollutants, equipment sectors /fuel types combinations or select more aggregation of the results prior to running the scripts. Depending on the user's computing system, an output database of (>300,000) records may produce long execution times for some of the nonroad post-processing scripts.

After selecting **Run MySQL Script on Nonroad Output Database**, click the arrow in the scroll down box to view all the available scripts. Select a post-processing script by clicking to highlight it. To execute the script, click the **OK** button. The script will run on the output database that is selected in the General Output panel of the RunSpec. Type a name for the post-processing script output in the **File name** field and click **Save**. When the script has completed (this may take some time), click **OK**.

Nonroad Script Title	Description
EmissionFactors_per_hphr_by_Equipment.sql	Generates emission factors for each selected pollutant per horsepower-hour by fuel type and equipment type
EmissionFactors_per_hphr_by_Equipment_and_Horsepower.sql	Generates emission factors for each selected pollutant per horsepower-hour by fuel type, equipment type, and horsepower bin
EmissionFactors_per_hphr_by_SCC.sql	Generates emission factors for each selected pollutant per horsepower-hour by SCC
EmissionFactors_per_OperatingHour_by_Equipment.sql	Generates emission factors for each selected pollutant per operating hour by fuel type and equipment type
EmissionFactors_per_OperatingHour_by_Equipment_and_Horsepower.sql	Generates emission factors for each selected pollutant per operating hour by fuel type, equipment type, and horsepower bin
EmissionFactors_per_OperatingHour_by_SCC.sql	Generates emission factors for each selected pollutant per operating hour by SCC
EmissionFactors_per_Vehicle_by_Equipment.sql	Generates emission factors for each selected pollutant per vehicle by fuel type and equipment type
EmissionFactors_per_Vehicle_by_Equipment_and_Horsepower.sql	Generates emission factors for each selected pollutant per vehicle by fuel type, equipment type, and horsepower bin
EmissionFactors_per_Vehicle_by_SCC.sql	Generates emission factors for each selected pollutant per vehicle by SCC
Inventory_by_County_and_Pollutant.sql	Generates an aggregate inventory of each selected pollutant
Inventory_by_County_FuelType_Pollutant.sql	Generates an aggregate inventory of each selected pollutant by fuel type
Inventory_by_Equipment_Horsepower_Pollutant.sql	Generates an aggregate inventory of each selected pollutant by equipment type and horsepower bin
Inventory_by_EquipmentType_Pollutant.sql	Generates an aggregate inventory of each selected pollutant by equipment type
Inventory_by_Sector_Horsepower_Pollutant.sql	Generates an aggregate inventory of each selected pollutant by sector and horsepower bin
Inventory_by_Sector_SCC_Pollutant.sql	Generates an aggregate inventory of each selected pollutant by sector and SCC
Population_by_Sector_and_SCC.sql	Generates population numbers by sector and SCC