



COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
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COMMISSIONER
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MOVES Model
United States Environmental Protection Agency
National Vehicle and Fuels Emissions Laboratory
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Ann Arbor, Michigan 48105

TRANSMITTED VIA EMAIL TO: mobile@epa.gov

Dear Sir or Madam:

The Virginia Department of Transportation (VDOT) appreciates the opportunity to comment on the draft Motor Vehicle Emission Simulator model (Draft MOVES2009) and associated documentation released April 4, 2009. Given the critical nature of the associated technical and policy guidance documents that are currently still in development that address application of the model for conformity and State Implementation Plan (SIP) purposes, we would also appreciate the opportunity to comment on those documents when they are released.

In general, we strongly support the comments recently submitted by the American Association of State Highway and Transportation Officials (AASHTO) on the draft model and offer the recommendations below as priorities. It is recognized that the implementation of a number of the recommendations will require close coordination and cooperation between the US Environmental Protection Agency (US EPA) and the US Department of Transportation (US DOT) as well as (for fuel economy related issues) the US Department of Energy (US DOE).

1. Maximize the Grace Period and Complete Categorical Determinations.

- a) Maximize the grace period for application of the new model for any official purpose or regulatory application, including but not limited to State Implementation Plan (SIP) development, inventory development, regional conformity, project-level conformity, fuel economy and related greenhouse gas emission forecasting, and National Environmental Policy Act (NEPA) requirements including project-level analyses.

The implementation of the new model represents a major shift in the general approach to mobile source analyses conducted in support of a variety of regulatory applications. Accordingly, the grace period should be set to the maximum allowed by law for all of these required analyses to help minimize costs and avoid implementation issues such as significant modeling errors affecting SIP, conformity and NEPA approvals. More specifically, time is needed for:

- budget cycles to complete needed computer upgrades,
 - staff training and familiarization with the new model and any associated new models (e.g. for dispersion),
 - staff training and familiarization with the new guidance issued for conformity, NEPA and other applications, and
 - SIP updates to develop new emission budgets based on the new model, including time for US EPA review and approval of the new budgets. This step is critical: many areas will need significant time to update and gain approvals of their respective SIPs and associated motor vehicle emission budgets given the dramatic differences in modeled emissions between MOBILE6.2 and the draft MOVES2009 model for NO_x and particulate.
- i) The grace period to be established in federal regulation for MOVES should specifically cover both conformity and NEPA project-level analysis applications, such that the MOVES model would not be required for application for either conformity or NEPA purposes until after the completion of the specified grace period for MOVES.

If this is not done, a project-level analysis initiated within the grace period for MOVES could include both MOBILE6.2 modeling for conformity purposes and MOVES modeling for NEPA purposes. This would be inconsistent and as such potentially subject to adverse comment during public, agency and stakeholder review for the project in question, which could delay the overall transportation project development process for both highway and transit projects and put at risk needed conformity determinations and NEPA approvals.

- ii) It is imperative that all US EPA and (for NEPA) US DOT technical and policy guidance be released in final form prior to the final release of MOVES. Given the critical nature of the guidance documents, they should undergo an appropriate public, agency and other stakeholder review and comment period of not less than ninety days.

It would otherwise be an undue burden on states and local agencies to have the final version of the MOVES model released, and its grace period initiated, but not have available the final versions of the associated technical and policy guidance documents at the same time.

- iii) If the new project-level guidance yet to be issued for MOVES requires the use of a new dispersion model for mobile source applications (e.g., AERMOD, including revised or screening versions thereof), then the grace period for project-level analyses for MOVES should not begin until that new dispersion model(s) and its associated guidance documents for project-level analyses have also been released in draft form for public, agency and stakeholder review and comment, comments have been received and incorporated as appropriate into a revised dispersion model(s) and associated guidance, and the final version of the new dispersion model(s) and its guidance have been released.

Similarly, if either the existing models (CAL3QHC and CALINE3) or their respective guidance documents are updated to suit the release of MOVES, then the same comment applies: the beginning of the grace period for the application of MOVES for project-level analyses should not precede the final release of those revised models and/or guidance, and the extent of the grace period for MOVES should also allow for the transition to these associated models.

This contingent initiation of the grace period for MOVES may also be stated generally: if there are related new models or models newly required in regulatory applications (for conformity, NEPA, etc.) in conjunction with the MOVES model, the grace period for MOVES should be scheduled to follow (i.e. not precede) the release of the final versions of those associated models along with their respective guidance documents and to extend for the maximum time allowed under law the grace period for MOVES to facilitate the federally required transition to those associated models.

- iv) States and local agencies should be provided (as done previously) the option of applying the existing MOBILE6.2 and CAL3QHC/CALINE3 models and associated existing regulatory requirements and guidance for any analysis (conformity and/or NEPA) initiated within the maximized grace period for MOVES.
- b) Federal categorical determinations for carbon monoxide (CO) and particulate matter (PM) hot-spot analyses should be developed pursuant to the federal transportation conformity rule and finalized before the end of the grace period for MOVES, i.e. before MOVES is required for project-level applications.

The completion of federal categorical determinations for CO and PM will help in reducing resource demands on state and local agencies by eliminating project-specific modeling for smaller projects or ones with low potential impacts.

- i) Projects qualifying as exempt from project-specific modeling requirements for conformity under the new federal categorical determinations should also be made exempt by federal regulation from project-specific modeling requirements for NEPA for the same pollutants.

It is impractical and an inefficient use of resources to conduct project-level analyses for purposes of NEPA when such analyses would not be required under conformity based on the federal categorical determinations.

- ii) Extending this concept, detailed air quality analyses for NEPA should not be required for projects located entirely outside of air quality nonattainment and maintenance areas for any pollutant for which a national ambient air quality standard (NAAQS) has been established by EPA.
- iii) The federal categorical determinations should be comprehensive and serve as an example for best practices for application of the new MOVES and associated dispersion models, both in terms of the level of analysis and in documentation that is clear and concise and meets all of the applicable new and revised regulatory requirements and guidance.

To this end, the new federal categorical determinations for conformity should not only be based on the finalized version of the MOVES model but also on any associated updated or new dispersion models and their respective updated or new guidance documents.

Additionally, it would be helpful if the documentation for the new federal conformity determinations could be designed to serve as a template or guide for project-level analyses to be conducted by state and local agencies for projects that do not qualify for a categorical determination.

2. Provide Transition Support.

Support the transition process from MOBILE6.2 to MOVES with comprehensive and continuous training opportunities, detailed technical and policy guidance including best practices, and appropriate software utilities.

- a) The release of the next generation MOVES model represents the beginning of a new era in mobile source modeling, with a corresponding need for more systematic and comprehensive training.

- i) Training should be both a near-term and ongoing priority and conducted as a joint effort with the US DOT.
 - ii) Training on-demand should be facilitated with online presentations and webinars.
 - iii) The model itself should also support ongoing user education with context-sensitive help and guidance that would also be embedded into the new scenario manager that is recommended in the next section.
 - iv) The training should not only address the mechanics of running the model but also provide appropriate understanding of related areas including (not necessarily in order of priority):
 - the underlying physical processes being modeled,
 - the chronology of federal vehicle emission, fuel quality, and fuel economy standards implemented to reduce emissions,
 - the theoretical or conceptual modeling approach (equations and algorithms) as implemented in the model,
 - key data/sensitivities, i.e. variables and data to which the modeling results are sensitive,
 - sources of and/or means to collect key data needed for modeling,
 - troubleshooting modeling issues,
 - quality control and assurance, and
 - all applicable US EPA and US DOT guidance and regulatory requirements for application of the model for all federally required applications (SIP, conformity, NEPA, etc.).
- b) Detailed policy and technical guidance for MOVES and related applications (e.g., related dispersion modeling requirements, and NEPA) should be released for public review and comment and the initiation of training at the earliest opportunity. It is imperative as noted previously that the guidance be released in final form (after revisions as needed based on comments received) prior to the final release of MOVES.
- i) A best practices web page should be established that would go beyond the minimum requirements for compliance with the applicable guidance and regulation and highlight particularly noteworthy practices or approaches observed at the state or local levels for gathering input data or otherwise addressing modeling and related issues.

- ii) Guidance (and potentially regulatory support) is needed to address the critical issue of updating SIPs to establish new emission budgets using the final MOVES model. Emission forecasts for NO_x and particulate matter are significantly higher for the draft MOVES2009 model than with MOBILE6.2, and many areas will as a result not be able to demonstrate conformity using MOVES until the budgets are updated and approved for use by EPA.
 - iii) Guidance is needed to address the critical issue of updating SIPs to establish emission trading mechanisms pursuant to 40 CFR 93.124(b) of the federal conformity rule in order to meet future year budgets specified in maintenance plans for pollutants (e.g. PM_{2.5}) for which the long term trend is upward. While the federal conformity regulation as cited permits emission trading to meet conformity budgets, EPA has not as yet issued either comprehensive guidance or recommended best practices for the establishment of such trading mechanisms in SIPs. Given that many jurisdictions will be updating SIPs to establish new budgets using the new MOVES model, they should be guided to take the opportunity to establish at the same time appropriate emission trading mechanisms as needed and as permitted in federal regulation already under 40 CFR 93.124(b).
 - iv) States and local agencies should be surveyed periodically to determine other priority areas of interest for guidance and best practices.
- c) Software utilities to be provided with the final version of the model should not only assist with importing all needed data but also, to the extent feasible, address potential quality control issues. Quality control issues are addressed further in the next section.

3. New/Added Features.

Recommendations for new and/or improved features to be incorporated into the final 2009 model and future updates as appropriate are summarized below.

- a) Additional Quality Control and Assurance: As a general objective, and given the complexity of the model and the associated guidance for a number of regulatory applications, additional quality control and assurance features should be a major consideration for the final (2009) version of the model as well as future updates. Many regions and states with limited experience and understanding of the model will be applying the model for the first time for SIP revisions as well as other regional and project-level analyses so the potential for inadvertent and unrecognized error will be relatively high.

While any number of steps can be taken to continuously improve quality, two specific improvements or features for the model are recommended as a priority that would not only help meet specific user needs but also assist help with quality control and assurance: the development of a much more complete set of standardized output tables that can be included directly in documentation submitted for regulatory review and approval, and the development of a new scenario manager. These are reviewed further below.

- b) Additional Standard Output Tables: Scripts should be provided with the final version of the MOVES model (and in a Scenario Manager proposed below for inclusion in future versions of the model) to read model output data and generate a standard set of tables and charts formatted for inclusion in SIPs, inventories, regional and project-level analyses, and other documents that may be submitted for regulatory review and approval. The standard tables and charts as recommended here are intended to help both quality control and user education.

It would help quality control by ensuring that users – and ultimately the US EPA and US DOT - would be provided correctly tabulated results for review. The standard tables may also be applied in automated comparisons to standard or reference case EPA (or DOT)-generated modeling results for reasonableness checks. The standard tables and charts as recommended here can serve also help as an audit tool by listing or otherwise demonstrating that the correct input and output databases were selected for the results presented with the SIP, conformity, NEPA or other document submitted for review and approval.

- i) The final MOVES model should include standard tables (i.e., look-up tables) and charts for emission factors or rates by speed for each vehicle type to be applied in project-level analyses, ideally that could also be read in by EPA dispersion modeling software directly or via publicly available utility/interface software. Scripts for such standard tables were not included with the Draft MOVES model, which we view as a significant omission.
- ii) Standard tables and charts are needed for the results of regional emissions analysis such as emission inventories, conformity analyses and regional transportation plan scenario testing. A simple set of scripts were provided with the draft model but these should be expanded and improved.
- iii) With the exception of fuel economy as explained below, a longer term need to be met with the first update to MOVES (or the new scenario manager recommended below) is for set of tables and charts that provide a clear and concise (or “simplified”) summary of the vehicle emission, fuel economy and fuel quality standards by year of implementation. The tables and charts should note whether the standards are the defaults (i.e. modeled implicitly using federally-specified default data) or are user-

specified and therefore not necessarily ones corresponding to federal or state/regional standards either implemented or planned.

This is especially important for fuel economy, for which regulations continue to evolve. Users need both to be aware of the fuel economy data and assumed future trends that are implicitly applied in MOVES runs and to be able to document that information for reporting purposes. A simplified set of tables or charts presenting the fuel economy data and trends is therefore needed for the final version of the MOVES model.

Note the standard set of tables and charts as recommended here for emission, fuel economy and fuel quality standards will not only help with documentation for modeling runs conducted for official purposes such as SIP development and conformity analyses, it would serve as an educational resource and help reduce the “black box” effect for users of the model as well as users of the model results.

- iv) The concept suggested above for documenting the assumed emission, fuel quality and fuel economy standards using a standard tables and charts can be extended to show the incremental benefits obtained from successive emission control programs. This would serve to provide a standardized means of calculating incremental benefits for mobile source emission controls that would be recognized by EPA and DOT.

For example, states or regions could use this feature to more easily conduct analyses showing the incremental benefits to be obtained if more stringent vehicle emission, fuel quality and/or fuel economy standards were to be adopted. A scenario manager such as proposed below is the suggested means for setting up and managing the series of modeling runs needed to perform this task and process the results.

- c) Scenario Manager(s): Future updates of the model should incorporate a fully-featured scenario manager (SM) to assist users in the development of mobile source analyses meeting all the requirements (including the increasingly more complicated technical and policy guidance) for SIP revisions, inventory development, regional and project level conformity analyses, NEPA and other regulatory applications. The SM would incorporate the quality control and additional reporting recommendations as noted above.

Development and implementation of a fully-featured SM is a significant undertaking that would require the involvement of technical and policy staff from the US EPA, US DOT and (for energy related aspects of the model) the US DOE. Corresponding resources therefore would need to be allocated to this task by each agency.

Additionally, given the potential need for more frequent updates to the SM than to the main model, it is preferable that the SM be designed as an add-on (combination of pre- and post-processor) to the MOVES model that can be updated separately. The design of

the SM can progress from relatively simple versions initially and then be updated over time to include more sophisticated and user friendly scenario management tools such as provided with the traffic model CUBE Voyageur from Citilabs.

Successful “simple” examples of the SM approach include, in concept, the interface models EMIT and Cal3Interface developed by the US DOT to facilitate mobile source analyses for the MOBILE and CAL3QHC/CALINE3 models following US EPA and US DOT guidance. The EMIT interface software guides users in the development of appropriate speed-lookup tables hot-spot analyses for carbon monoxide and particulate and the development of long range emission forecasts including seasonal weighting for mobile source air toxics (MSATs) required for NEPA. The Cal3Interface software guides users in the development of worst-case screening analyses for dispersion modeling. Though misleadingly simple to apply, experience at the state level in numerous project-level studies has demonstrated that these interface models significantly reduce learning curves for new staff, reduce the time and resources required to conduct studies, assist in the accurate designation of appropriate default data and assumptions to comply with federal guidance for specific applications, assist report documentation through the inclusion of standard tables and charts and, as a result, significantly aid overall quality control, efficiencies and throughput in project-level environmental documentation and clearances.

The SM envisaged for MOVES would be designed to be similarly very beneficial to state and local agencies. It would have the following key features:

- It would allow the selection of the type of analysis to be conducted, e.g. regional conformity analysis, project-level conformity and/or NEPA analysis (CO, PM and/or MSATs), SIP development, etc., and provide a user interface appropriate for that application.
 - It would provide input forms to match the type of analysis and pollutants selected. The input forms and as appropriate any associated default data would be consistent to the extent feasible with all applicable US EPA and US DOT technical and policy guidance for those types of analyses. It would provide links to all associated training, guidance and best practices websites for further information.
 - It would provide a set of standardized output tables and charts appropriate for the type of application. These tables and charts would then be included with standard reports to be submitted for regulatory review and approval, such as conformity analysis, SIP revisions etc.
 - Standard output files would be generated as needed to be read in by other software, e.g. EPA-specified dispersion models or utility/interface software such as new versions of Cal3Interface or EMIT (for MSATs).

- It would facilitate not only batch or sequential processing of input files but also batch processing of output results with automatic generation of summary results, including incremental benefits as appropriate for the introduction of new emission control programs.
 - The user interface would show progress not only in a given run in more detail (e.g. using a process flow diagram to show which modules are currently processing data), it would also show progress for a series of modeling runs.
- It would provide context-sensitive help to the user.
- It would conduct error and reasonableness checks on both input data and output results.
- It would automatically check online for updates for both the model (as is commonly done with other software) and the associated guidance. At a minimum, email notifications from the US EPA and US DOT of guidance and SM updates could be provided that would prompt the user to download and install the updates.
- It would provide a simple and direct means to submit suggestions for improvements to the US EPA, US DOT and others as appropriate that could be incorporated into future updates of the model and associated guidance.

Overall, the SM would provide a modeling environment that assists and streamlines the modeling process, helps ensure current and appropriate technical and policy guidance is followed, and creates standard output files that can be used in other applications along with standard tables and charts that can be included in report documentation. This guided process would help maintain and improve overall quality control at minimum cost to the user and as a result will help maximize the accuracy, reliability and utility of the modeling results.

4. Key Technical Issues.

- a) The final MOVES model should include significantly improved capabilities to handle traffic data for regional analyses such as needed for emission inventories, regional conformity analyses and other potential applications such as regional transportation plan scenario testing.
 - i) MOVES should be enabled to conduct regional emissions analyses based on imported detailed (link-by-link) network traffic data such as exported by common transportation network models (e.g. CUBE Voyageur), including the aggregation of results by jurisdiction (city, town, county, and other) using data imported with the traffic database.
 - ii) Consistent with the recommendation above to enable MOVES to conduct regional emissions analyses using imported link-based traffic data, utilities should be provided with MOVES to facilitate the importation of the detailed (link-by-link) network

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- traffic data from commonly-used transportation network models (e.g. CUBE Voyageur as well as other network models).
- b) Provide standard scripts for summarizing emissions of commonly grouped emissions including diesel particulate matter (DPM) and mobile source air toxic (MSAT) emissions.
 - c) Increase field lengths on input screens to allow for longer file names.
 - d) The input table for pollutants should be reduced in size to fit on one screen. The table in the current draft MOVES2009 model is too large to fit on one screen so the user has to scroll both to the right and to the bottom to ensure that all appropriate pollutants have been checked for a given run. This can lead to errors if and when the user overlooks this needed check.

Note these comments are provided with the caveat that the compressed schedule and lack of complete documentation and guidance unavoidably limits the scope and detail of the review. As the comments may as a result not address all potential concerns that may arise with the new model and its required applications, we therefore reserve comment for later when complete model documentation and associated guidance is released and more experience has been obtained with the new model and guidance.

Once again, thank you for the opportunity to comment on the draft MOVES2009 model. If you have any questions about these comments, please feel free to contact me at (804) 371-6764 or by email to christopher.voigt@VDOT.virginia.gov.

Sincerely,

ORIGINAL SIGNED

Christopher Voigt
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