

## Responses to Charge Questions

### General Questions to Consider:

1. Does the presentation describe the selected data sources sufficiently to allow the reader to form a general view of the quantity, quality, and representativeness of data used in the analysis? Are you able to recommend alternate data sources that might better allow the model to estimate national or regional default values?

*In my opinion, the reports include an adequate presentation of the methods used to update the Nonroad model. As a user of previous versions of Nonroad, I frequently referred to the documents and reports to gain better insight to the application of the model. I believe these reports provide a sufficient explanation of the assumptions and data used in the updated Nonroad model. As a potential user of Nonroad in the future, I am satisfied with the explanations given for the assumptions and data sources provided in the reports. Furthermore, I have no recommendations for alternate data sources.*

2. Is the description of analytic methods and procedures clear and detailed enough to allow the reader to develop an adequate understanding of the steps taken and assumptions made by EPA while developing the model inputs? Are examples selected for tables and figures well-chosen and effective in improving the reader's understanding of approaches and methods?

*Description of the analytical methods are thorough enough for the reader to gain an understanding of the general approaches used to update the Nonroad model; however, it would be somewhat difficult to duplicate the methodologies in their entirety. In order to duplicate the methodologies, I believe more detail is needed, perhaps in the form of sample calculations. I do not believe, however, that duplication is the primary objective of the reports; therefore, I do not recommend adding unnecessary details. I also found the examples provided for tables and figures to be appropriate for their intended use.*

3. Are the methods and procedures employed technically appropriate and reasonable with respect to the relevant disciplines, including physics, chemistry, engineering, mathematics, and statistics? Are you able to suggest or recommend alternate approaches that might better achieve the goal of developing accurate and representative model inputs? In making recommendations, please distinguish between instances involving reasonable disagreement in adoption of methods as opposed to instances where you conclude that current methods involve specific technical errors.

*I believe the methods and procedures are technically and scientifically sound. This is a reasonable approach to predict the future of nonroad equipment on a grand scale. I have no suggestions or recommendations for improving the approach.*

4. Where EPA has concluded that applicable data is meager or unavailable, and consequently has made assumptions to frame approaches and arrive at solutions, do you agree that the assumptions are appropriate and reasonable? If not, and you are able to do so, please suggest alternative assumptions that might lead to more reasonable or accurate model inputs.

*When trying to predict the future, no one has a High Definition crystal ball; therefore, we are left with assumptions. I believe the assumptions chosen to fill in the gaps in data are sufficient enough to provide reasonable model outputs.*

5. Are the resulting model inputs appropriate and, to the best of your knowledge and experience, reasonably consistent with physical and chemical processes involved in mobile source emissions, formation, and control? Are the resulting model inputs empirically consistent with the body of data and literature with which you are familiar?

*Unfortunately, I have limited expertise with the physical and chemical processes associated with the formation and speciation of emissions. I believe the model inputs are empirically consistent and adequate based on my limited knowledge.*

#### Specific Questions:

In addition to the general review, EPA requests specific responses to the following questions:

#### **Nonroad Engine Population Growth Estimates in MOVES201X**

1. This report describes a method for aggregating Fuel Oil and Kerosene Sales (FOKS) data to generate growth indices for various nonroad equipment sectors. Are there better or alternative methods for aggregating time series data such as the FOKS dataset?

*I believe the FOKS methodology is the most direct approach to estimating growth indices for some nonroad equipment sectors. It may be possible to refine the approach in an attempt to gain a higher resolution estimate, although I am not sure the added benefits would justify the extra effort. Considering the Construction sector as an example, it may be possible to use population and GDP data (particularly in specific regions) to estimate the growth in market for construction which would result in the need for more nonroad equipment. Presumably, the FOKS methodology takes this into account but it is not apparent in the report. I believe for the intended use of Nonroad (and ultimately MOVES), the FOKS approach as presented is sufficient.*

2. Are the data sources that EPA selected to serve as surrogates for historical and future growth indices appropriate for the nonroad equipment sectors to which they are assigned?

*To the best of my knowledge, the surrogates are appropriate to the sectors they were assigned. As a general comment, I feel that the approach is rather clever and certainly provides some insight in an area where it is difficult to gain any at all.*

#### **Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression-Ignition in MOVES201X**

1. Due to limited resources and data, EPA has not updated the transient adjustment factors, deterioration factors, sulfur adjustments, and crankcase emission factors for Tier 4 nonroad engines (Sections 6, 7, 8, and 10). For example, for Tier 4 engines, EPA assumes a transient adjustment factor = 1. The current deterioration factors for Tier 4 engines are unchanged from Tier 3 engines. EPA is currently assuming a crankcase emission factor = 0% for Tier 4 engines. How appropriate are the current assumptions for these adjustments and factors for Tier 4 engines? Are there data available for informing updates to these adjustment and factors?

*I have no objections to TAF = 1.0 or crankcase emission factor = 0% for Tier 4 engines. I feel this is a reasonable assumption given the lack of empirical data. I am not*

*convinced that additional study or investigation aimed at improving estimates of these two variables would yield significant results in the model outputs. I am not aware of other data sources that could be used to verify or disclaim these assumptions.*

**ADDITIONAL OVERALL COMMENTS PROVIDED (NOT CHARGE QUESTION-SPECIFIC):**

In general, I believe that these are suitable documents that provide a basic understand of how the Nonroad model was updated. These documents are similar and compatible to the documents that were associated with previous versions of Nonroad. I believe that satisfactory effort has been expended to develop a revised and up-to-date model based on current data and reasonable assumptions. My main conclusion is that, as a user of Nonroad, I am satisfied with the explanations of the procedures that were used to develop the model.

**ADDITIONAL COMMENTS BY SPECIFIC REPORT CHAPTER:**

Nonroad Engine Population Growth Estimates in MOVES201X, Ch. 1 Introduction:

I have a minor qualm with the following phrase:

“Because trends in nonroad engine activity levels are never directly measured, ...”

In my opinion, this phrase makes me think that the data has never been available nor will it ever be available. I agree that heretofore it has been very difficult to acquire real-world activity data from nonroad equipment; however, with the advent of telematics and portable activity measurement systems (PAMS), collecting large amounts of activity data is becoming more of a reality. I realize that future data collection cannot have an impact on this version of Nonroad but EPA should consider sponsoring large scale data collection, storage, management, and analysis efforts to gain this missing component. Real-world activity data will help fill the gaps and refine the assumptions that are inherent in this version of Nonroad.