

Discussion of CRC & NYDEC Comments

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Recent Comments

- **New York Dept of Env Conservation**
 - 11/6 Email from Mike Keenan to workgroup
- **Environ Review for CRC**
 - Presented earlier



NYDEC Comment Highlights

- **National defaults not adequate for local areas, but data requirements for local areas appear burdensome**
- **High emitters require stratified sampling**
- **Remote sensing effectiveness uncertain**
- **More clarification on the application of uncertainty needed**



Environ/CRC Comment Highlights

- **Vehicle classification leads to large number of bins**
- **High emitter definition needs to be resolved**
- **RSD can be used to quantify high emitter distribution**
- **Data requirements appear burdensome**
- **VSP can be improved on, e.g. $d(\text{VSP})/d(t)$**
- **Should consider regression approach instead of bins**



Data Requirements

- **MOVES allows an unprecedented degree of disaggregation in user-supplied input.....BUT**
- **Tailored to accommodate aggregate data inputs from traditional sources, e.g.**
 - VMT, vehicle registration, average speed distribution
 - Designed for consistency with MOBILE6 inputs
 - This includes mesoscale and microscale
- **Users should become familiar with “Generator” concept from October 2002 design plan**
 - Generators provide a link between data most users have and the data the MOVES core model needs



Data Requirements, cont

- **Default inputs are used in any model**
- **Users don't like hard-coded assumptions**
 - e.g. Local Roadways in MOBILE6
 - MOVES designed to virtually eliminate these
- **Mobile source emission inventories are affected by hundreds of variables**
 - No magic bullet - the better the data, the better the estimates
 - Realistically, best local inputs will be developed by states/locals
- **EPA will make sensitivity analysis a routine aspect of model release**



Vehicle Classification

- **Source bin approach classifies vehicles according to important emission differences**
- **Bin definitions can vary by pollutant and process**
 - Will result in far fewer bins than ENVIRON estimates
- **Number of bins in MOVES will not vary substantially from MOBILE for criteria pollutants**
 - Both account for standards, technology, age, emitter class
- **Flexible design allows continued refinement to optimize balance between number of bins while accounting for important differences**



High Emitters

- **The MOVES high emitter approach not yet determined (not needed for MOVES2004)**
 - Will be a primary focus in the coming year
- **What is a high emitter?**
 - A vehicle that has high emissions all the time?
 - A vehicle that has high emissions intermittently?
 - A vehicle that has high emissions only in certain modes?
- **How should a high emitter be defined?**
 - Based on aggregate emissions?
 - Relative to its certification standard?
 - Relative to emissions of the fleet ?
 - Within each driving mode?



High Emitters, cont.

- Are we characterizing high emitters or high emissions ?
- MOVES approach will depend on the answers to these questions, e.g.:
 - Approach 1: high emitters are high all the time and are defined relative to their certification standard
 - Find these vehicles and test them over all driving modes to populate high emitter source bins
 - Approach 2: high emissions are caused in some driving modes by some vehicles some of the time
 - Make sure the distribution of emissions within each operating mode bin is representative, using RSD to check or provide data



Remote Sensing Devices

- **Modal bin approach lends itself to direct comparison with RSD results**
 - RSD data can be characterized by VSP/Speed bins
- **At a minimum RSD can be used as a validation check on MOVES emission rates**
- **Further use of RSD depends on how high emitters are characterized**
 - RSD less useful for characterizing high emitters over all driving modes
 - RSD potentially very useful for characterizing high emissions by operating mode



Enhancing Vehicle Specific Power

- **Our analysis agrees that VSP needs to be supplemented with additional variables**
- **Several options available**
 - our analysis shows adding speed improves prediction significantly
- **VSP, speed and acceleration are correlated; only need to choose 2 of the 3**
 - Fixing VSP and speed also fixes acceleration
 - $D(\text{VSP})/d(t)$ closely correlated with acceleration



Binning vs. Regression

- **Binning approach is preferred because it is simple and data-driven; supports NRC recommendation to update models more frequently**
- **Not certain that regression approach would improve model accuracy or reduce uncertainty relative to binning approach**
- **Binning concept is needed even with “continuous regression” approach, unless every moment of operation is modeled for every vehicle on the road**



Uncertainty Estimation

- **MOVES2004 will include uncertainty estimation**
- **Both Propagation of Error and Monte Carlo methods have been investigated**
 - Recently determined that Propagation of Error is likely unworkable with MOVES design; focus is now on Monte Carlo
 - Plan separate workgroup call in December to discuss
- **Calculation of uncertainty is optional**
 - Not something most users would use; long processing time
- **Initial purpose is to diagnose sources of uncertainty**
 - SIP/Conformity implications TBD