

FEDERAL ADVISORY COMMITTEE ACT  
CLEAN AIR ACT ADVISORY COMMITTEE  
**MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE**

CO-CHAIRS: MICHAEL WALSH AND ROBERT SAWYER

DESIGNATED FEDERAL OFFICIAL: PHILIP LORANG

**Minutes from the Quarterly Meeting of July 14, 1999**

*(as approved by the Subcommittee on 10/13/99)*

*Key Bridge Marriott*

*Arlington, VA*

**Introductions and Opening Remarks**

Dr. Robert Sawyer and Mr. Michael Walsh, Mobile Source Technical Review Subcommittee (MSTRS) co-chairs, opened the meeting and welcomed the attendees. Mr. Walsh announced that Phil Lorang, Designated Federal Officer, EPA Office of Mobile Sources, will be transferring from OMS-EPA in August to a position at EPA's Office of Air Quality Planning and Standards (OAQPS), and will therefore be leaving the subcommittee in his current capacity. One of the topics Mr. Lorang will be working on at OAQPS is the connection between mobile and non-mobile programs.

MSTRS participants and members introduced themselves. A list of members and non-members attending the meeting is attached at the end of this document. Mr. Michael Kulakowski, Equiva, has joined the MSTRS. He was not able to attend this meeting.

**Update on the CAAAC - Paul Rasmussen, U.S. EPA**

The next CAAAC meeting has been scheduled for July 26 and 27 in Washington, DC. The main topics will be toxics monitoring, court decisions, and the MTBE Blue Ribbon Panel report. A CAAAC web site is being developed and is currently going through a review process. The fall meeting is expected to take place in mid-October in Washington, DC. The CAAAC currently has up to 62 members.

Mr. Lorang stated that the New Source Review Subcommittee of the CAAAC has invited the Air Toxics Workgroup to make a presentation at their meeting Monday, July 26. He and Jason Grumet, NESCAUM, will be there to do so.

**Report from the Phase II RFG Workgroup - John Hornback, State of Kentucky**

Mr. Hornback reported that the Phase II RFG Workgroup met the previous day. At the meeting, the workgroup heard a report on the activities of the Blue Ribbon Panel. Mr. Hornback reported that Phase II RFG is expected at gas pumps as early as September 1999. Previous EPA testing indicated that fuels used last winter in RFG areas closely matched specifications for Phase II RFG, so there may not be too much change in some areas this winter as Phase II officially goes

into place. The announcements of the MTBE panel and EPA's response to panel recommendations may have some impact on public awareness and concern about RFG.

The workgroup has been working with a draft outreach strategy that has been prepared by a consultant. The strategy identifies target audiences, tactics, strategies, and timelines for dealing with implementation issues. The workgroup has been working with newspapers in two areas in Connecticut to test messages, and has collected a library of information to support communication efforts of state agencies and EPA. Some of this information will be presented to the workgroup at the October meeting.

EPA has scheduled training sessions in four areas in August for state and local air pollution control agencies to prepare them for the rollout of Phase II.

### **Discussion**

Dr. Sawyer stated that some of the problems may arise next summer when the RVP requirements come in, rather than this winter, especially if this coincides with the phasedown of MTBE. A related issue is that of the problems that arise when mixing ethanol and non-ethanol fuel. He asked how the workgroup is addressing this. Mr. Hornback replied that the workgroup has addressed the summer issues but has not addressed the mixing issue. He will work with Debbie Wood, EPA, on this issue. In response to other comments, Mr. Hornback stated that the workgroup will incorporate the concerns and issues raised by MTBE into its communications strategies. Bill Becker suggested that outreach materials and press clippings might be able to be accessed on the CAAAC or another web site so that people can be pointed toward useful information and experiences and stay informed. He also stated that there is a significant air toxics reduction benefit from Phase II RFG and this should be highlighted.

### **Report from the Air Toxics Workgroup - Phil Lorang, U.S. EPA**

The workgroup met for the second time yesterday. The workgroup heard presentations and obtained feedback on the following: EPA's modeling of exposures to toxics from motor vehicles; the national air toxics assessment being developed by OAQPS; the use of ambient particulate data to estimate exposure to diesel emissions; and the status of EPA's assessment of the carcinogenicity of diesel emissions and non-cancer effects. The meeting ended with a focus on the workgroup's mission. At a minimum, the workgroup is useful as a forum for periodic communication and mutual education. A proposed mission statement covering the next year or two is being developed and will be finalized at the next meeting. The workgroup is currently comprised of over 30 members.

### Discussion

Dr. Sawyer raised the question of weighting toxics and acknowledged the difficulty of picking weighting factors of the various toxic materials, especially with diesel particulates. This is likely to be a very contentious issue that will have to be dealt with and he suggested the workgroup may want to address this issue.

### Summary of Nine-State Smoke Test Enforcement MOU - Coralie Cooper, NESCAUM

Ms. Cooper presented information on the diesel program Memorandum of Understanding (MOU)--an agreement between nine northeastern states to begin roadside inspections of heavy-duty diesels. This regional effort will result in the development and implementation of coordinated state programs for diesels testing. The MOU was developed to ease implementation of smoke enforcement programs, avoid a patchwork of regulations in the region, and assist states in assessing the effectiveness of the programs. Ms. Cooper discussed a regional smoke testing pilot program that led up to the MOU. The pilot program goals were to gain experience using smoke opacity meters, collect data, respond to public complaints about smoking diesel vehicles, and establish a dialogue with the trucking community on the relationship between maintenance and emissions. Over 200,000 vehicles were tested. Results include: 15 percent of vehicles failed the pilot smoke standards; older vehicles were dirtier, although many older vehicles had low opacity readings; and 4 percent of newer vehicles failed. The pilot indicated that development of a regional smoke testing agreement would aid in introduction of enforcement programs, which led to the MOU.

The regional MOU was developed working with the states, EPA, ATA, local trucking associations, and EMA. The agreement established opacity cutpoints for truck and buses, a test method, a 30-day regional compliance period, penalties for tampering, and dates for implementation. The next steps are to identify implementation issues and coordinate implementation in the region.

### Discussion

Ms. Cooper answered several questions about the presentation. Mr. Becker, STAPPA ALAPCO, stated that there is an inequity in that owners of light-duty vehicles in many areas are required to undergo periodic emission tests while heavy-duty trucks generally are not. Janet Hathaway, NRDC, asked how well these heavy-duty tests correlate with in-use driving. Ms. Cooper replied that they correlate well with smoke emissions, but not with other pollutants. Mr. Lorang added that there are very little data to answer this question but major test programs are underway now that will shed light on this. Mr. Lorang asked if the MOU addresses how re-testing will be conducted after non-compliance is found. Ms. Cooper replied that the MOU is not specific on this and this issue will be addressed in implementation.

**Update on the Tier 2 Notice of Proposed Rulemaking (NPRM) and the Advanced Notice of Proposed Rulemaking (ANPRM) On Diesel Fuel - Karl Simon, U.S. EPA**

Mr. Simon began with a brief update on the Tier 2 NPRM. He gave an overview of the NPRM, its goals and objectives, vehicle emission and fuel standards, phase-in and averaging. He stated that there are averaging, banking, trading, and other provisions that allow flexibility for automakers and the petroleum refiners. The NPRM was published on May 13. During June, five days of public hearings were held around the country, with over 250 testifiers representing a wide range of perspectives. On June 30, a supplemental notice was issued that provided data of how Tier 2 interacts with the recent National Ambient Air Quality Standards (NAAQS) court case and reiterated the legal justification for Tier 2. EPA is accepting comments on this documentation until August 2. EPA's intention is to complete response to comments and issue a final Tier 2 rule by the end of 1999.

Mr. Simon stated that EPA recognizes concerns about the relationship between sulfur and diesel and how technologies for reducing diesel engine emissions interact with diesel fuel. As a result, EPA issued an ANPRM on diesel that raises questions and identifies issues related to diesel sulfur control. The comment period closed on July 13; EPA is in the process of addressing comments received. The Agency has not set a specific date to address next steps on this issue.

**Discussion**

Sam Leonard, GM, stated that the Tier 2 standards for light-duty vehicles are based on grams per mile, which is a mass-based standard per unit of distance. The Federal test procedure (FTP) tests vehicles at different test weights and different horsepower ratings, so that a large sports utility vehicle (SUV) undergoing an FTP test might be doing up to twice as much work as a passenger car. By setting identical emission standards on a grams per mile basis, these vehicles are expected to be twice as clean on a per unit of work basis. Mr. Leonard stated that this does not appear to be based on scientific rationale. Ms. Hathaway, NRDC, responded that the public has called out for SUV regulation. Mr. Simon responded that the Tier 2 NPRM included evidence showing that engineers have figured out how to meet these standards in a cost-effective manner. Mr. Becker added that these vehicles have up to two additional years to meet the standards under the NPRM, which is consistent to regulation of some stationary sources such as larger or older chemical plants.

**Report on the Diesel Emissions Control Sulfur Effects (DECSE) and other DOE Programs - Steve Goguen, U.S. DOE**

Mr. Goguen presented an overview of DOE's advanced petroleum-based fuels program. The program has four components: the DECSE project; the ARCO EC diesel project; alternative diesel fuels, oxygenates, PM toxicity and lube oil effects; and the multi-year program plan for advanced petroleum-based (APB) fuels.

The objective of the DECSE project is to determine the impact of fuel sulfur levels on emission control systems that could be implemented to lower emissions of NO<sub>x</sub> and PM from on-highway trucks in the 2002-04 timeframe. The project is sponsored by engine OEMs, MECA, and DOE. Independent test labs are also participants. A final report is expected in December 1999. The program is well underway to providing data on effects of sulfur levels in diesel fuel on performance of emission control technologies.

Mr. Goguen next presented several details on ARCO EC diesel project. Demonstration program goals include meeting the regulatory challenges facing diesel, enabling retrofit catalytic technology, enabling catalytic technology for future diesel engines, and reducing emissions from current fleets. He discussed several tests that have been or will be performed and related findings. He also discussed alternative diesel fuels, oxygenates, PM toxicity, and lube oil effects. DOE is trying to answer the questions of whether emission reductions are possible, and if so are more reductions possible. He finished with a discussion of the multi-year program plan for advanced petroleum-based fuels.

### **Discussion**

A comment was made that DOE should look at fuel distribution infrastructure. It may not be a good assumption that we can have both high sulfur and low sulfur systems. Another participant emphasized that researchers should include a look at toxics aspects of the fuels. Ms. Hathaway encouraged DOE to provide to the extent possible early information to the environmental community. She stated that there is a good deal of skepticism of the possibility of diesel to achieve gasoline levels. She also emphasized that durability is key, so an OBD-like system that can monitor durability in conjunction with these after treatment devices is an essential part of making this a systems approach.

### **Comments by Margo T. Oge, U.S. EPA**

Ms. Oge was delayed due to her appearance on Capitol Hill for a hearing on transportation conformity. She provided updates on some of OMS's recent activities:

- **Transportation Conformity:** The Agency testified during a Senate Hearing on transportation conformity during the morning. The hearing concerned the "grandfathering" of projects. EPA lost a court case in March on this topic.
- **Tier 2:** The Agency held four public hearings on Tier 2 which were very successful. EPA is moving forward with the Tier 2 rulemaking and does not expect the rule to be affected by the May 14 decision on EPA's ozone and PM standards.
- **Diesel.** Ms. Oge extended EPA's appreciation for the cooperation and participation by so many parties through EPA's efforts to address pollution from diesel fuel and engines.

**Review of In-Use Emissions from Heavy-Duty Diesel Vehicles - Janet Yanowitz, Colorado School of Mines**

Ms. Yanowitz presented research of emissions data collected from chassis engine testing. The objectives of the analysis are to determine range and variability of emissions, compare the test results to modeled estimates and data from other test methods (e.g, chassis dynamometer), and to try to determine the causes of any differences in estimates. Findings include:

- The NOx and PM standards have dropped over the tested model years. Plotting the in-use results for model years shows that PM tends to drop. However, plotting NOx emissions does not show a drop in emissions, which suggests the NOx regulations have not been very successful;
- There are no large differences in results from different testing methods (i.e., chassis dynamometer, tunnel tests, and remote sensing);
- The data show a significant impact from altitude (altitude is not a factor in MOBILE5);
- There are differences between PART5 and chassis dynamometer VMT estimates particularly for transit buses;
- MOBILE appears to underestimate NOx produced from in-use vehicles; and
- PM emissions are widely variable among and between model years.

The study resulted in recommendations for more factors to include in reporting of results. Recommended factors to add are: expanded vehicle information from remote sensing experiments; inertial weight in chassis dynamometer tests; specification of engines at a level of detail beyond simple engine name; and humidity correction factors to normalize data.

**Discussion**

Mr. Walsh asked how much confidence Ms. Yanowitz has in the downward slope of the PM analysis, given the large variability in the data. She replied that the data set is not very good and thus raises questions of statistical validity.

**Current Programs to Measure Emissions from In-Use Heavy-Duty Diesel Vehicles - Nigel Clark, West Virginia University (WVU)**

Dr. Clark remarked that WVU is best known for work with transportable laboratories, emissions characterization, engine development, and in-house dynamometers. The portable laboratories include one medium-duty and two heavy-duty chassis dynamometer units. Because a large part of the university's work is funded by DOE to research performance of alternative fuels, they have a lot of data on alternative fuel emissions. The remainder of their data are on diesel emissions. The goal is to characterize the mass emission rates from regulated and unregulated pollutants from in-use heavy-duty vehicles, using records of 8,000 separate heavy-duty chassis tests and comparing emissions from different driving cycles.

The data indicate that compressed natural gas (CNG) shows better NO<sub>x</sub> and PM emissions than diesel, but HC emissions are higher with CNG. The work has shown the importance of drive cycles on results. For example, the central business district cycle tends to have high emissions compared to other cycles (e.g., the highway cycle). The yard, garbage truck, and city bus cycles tend to have very high emissions, but are tested only for short distances and with very long idle periods.

Other current research includes:

- WVU is conducting a study on size distributions of exhaust PM emissions from in-use heavy-duty vehicles. For a Cummins transit bus, they see a clustering of particles/cc at the 10<sup>5</sup> level with a dilution ratio of 22:1. The results may be driven by the lube oil fraction or the presence of water particles;
- Work will begin in September to study PM plume developments from diesel in a 60 mph tunnel;
- For the state of New York, WVU will study in-use emissions from trucks in Manhattan. They will use 37 vehicles and look at regulated emissions, speciate the emissions across many particle sizes and equipment, and compare different equipment ages and sizes;
- For the NCHRP and the city of Los Alamos, WVU is examining emission inventory approaches using chassis dynamometer data. This effort includes separation of emissions in real time into speed/acceleration bins, which allow different NO<sub>x</sub> readings as a function of speed; and
- Chris Atkinson from WVU will research the applications of neural networks to emission predictions.

### Discussion

Margo Oge asked for some general observations from the research. Mr. Clark replied that they see drops in NO<sub>x</sub> and PM emissions from 1980 to 1990 model year vehicles, but do not see a drop through the 1990s. They also see a general drop in PM and a virtual disappearance of HC during the last decade. These results are based on gross trends, rather than separate fleets.

### Mobile Monitoring System for In-Use Heavy-Duty Vehicle Emissions - Mridul Gautam, West Virginia University (WVU)

This study stems from the Consent Decree between the heavy-duty engine manufacturers and the United States. The objective of the study is to develop a suitcase-sized device to measure in-use emissions from heavy-duty vehicles. The work is divided into two parts:

- Phase I is to develop an evaluation of currently available technologies for on-board measurement of heavy-duty diesel exhaust emissions. Part 1 of Phase I will be to develop a white paper on the in-use testing options for NO<sub>x</sub>, HC, CO, and CO<sub>2</sub>. Part 2 of Phase I will be to develop a diesel mobile emissions modeling system (MEMS); and
- Phase II is to integrate a heavy-duty mobile emissions measuring system. This phase will include the development of in-use testing procedures (identify candidate routes/cycles, conduct on-board tests with a chassis dynamometer, and compare the data with laboratory chassis dynamometer data).

Dr. Gautam described characteristics of prior portable in-field emissions measurement systems. Issues of concern include:

- Vehicle speed measurements (must make technology choices);
- Torque prediction (variables of importance include speed, timing, temperature, pressure, and humidity);
- Extraneous variables (oil type/condition, engine wear, and off-map operation); and
- Mass flow measurement. (The major issues for mass flow measurements are precision and sensor placement because results vary if the sensors are placed at the intake or the exhaust. The researchers have developed technology recommendations for measuring mass flow given different placements.)

A complete on-board measurement system instrument will be available in November 1999.

**Discussion**

Ms. Hathaway asked if other projects were designed to look at PM. There are other research efforts to look at PM at EPA, but PM was not included in the Consent Decree. EPA has a \$1 million line item in their budget to support PM research at University of California-Riverside. They are looking at a system to tow behind a vehicle while taking PM measurements.

A list of key publications from WVU will be sent to John White and distributed to the subcommittee.

**Report from the Modeling Workgroup - Randall Guensler, Georgia Institute of Technology**

The Modeling Workgroup held a meeting on July 1, 1999 to discuss issues arising in the review of MOBILE6. The meeting followed a two-day workshop on MOBILE6 at EPA's offices in Ann Arbor. The meeting contained discussions regarding the workshop and the stakeholder review on MOBILE6. The contractor, ICF, prepared a summary of the meeting.

EPA's website (<http://www.epa.gov/omswww/models.htm>) contains information pertaining to the MOBILE model. The website contains documentation on baseline emission rates (<93 and >94 MY groups), OBD and I/M credits, temperature and RVP correction factors, sulfur and oxygenated fuel effects, speed correction effects, off-cycle emissions, A/C impacts, supplemental FTP corrections, heavy-duty emissions and new conversion factors, NOx excess from heavy-duty vehicles, evaporative emissions updates, hot soaks, CNG vehicles, and fleet characterizations.

The workgroup's recommendations are:

1. Develop a reasonable schedule for updating basic parts of the new model; and
2. Research needs on emerging technologies and emissions issues (and data collection programs that would provide such information).

Remaining issues and concerns of the workgroup include: possible recruitment bias; high-emitter correction factors; changing CO emissions of NLEV and Tier 1 vehicles due to HC standard changes; use of trip versus link emission estimates; significance of RVP for exhaust; frequency of liquid leakers in fleet; deterioration rate difference between I/M and other vehicles; and the pessimism of current OBD response rates.

**Discussion**

Margo Oge asked about the products that can be expected from the workgroup. The workgroup will prepare a summary of discussions and recommendations for improvements

beyond MOBILE6. However, specific comments on MOBILE6 will be sent to EPA from members as individuals.

### **Innovative and Incentive-Based Policies Workgroup - John T. White, U.S. EPA**

The Recommendations Report from the Innovative and Incentive-Based Policies Workgroup has been finalized and posted on the MSTRS website. John White will write a cover letter for the report and send the recommendations to the CAAAC.

### **Update from the OBD Workgroup - Edward Gardetto, U.S. EPA**

The OBD Workgroup will meet on Thursday, July 16. The agenda for the meeting was included in the meeting packet. The scheduled experiments from the past 18 months are coming to an end this summer. At the next meeting, the OBD workgroup will establish a methodology for the data analysis. The workgroup will hear presentations on the possibility of discontinuing exhaust and evaporative testing once OBD is in place, an update on the CARB OBD Workshop in July, descriptions of MOBILE6 OBD assumptions, and on the status of CE-CERT, CARB, EPA, and Colorado Department of Public Health testing programs.

### **Wrap Up**

The next meetings of the MSTRS will be October 13, 1999 and January 12, 2000 in Washington, DC.

If members have corrections to the minutes from the April meeting, they are to direct them to John White. If no comments are received, the minutes will go into the record as they are written.

The meeting was adjourned.

**Mobile Sources Technical Review Subcommittee**  
**List of Members (or Member Alternates) Attending**

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**Mobile Sources Technical Review Subcommittee**  
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