

Clean Air Act Advisory Committee  
Mobile Source Technical Advisory Subcommittee  
Dupont Plaza Hotel - Washington, DC

Minutes - July 16, 1997 Meeting

INTRODUCTION

Michael Walsh, Mobile Sources Technical Advisory Subcommittee Co-Chair, opened the meeting. Margo Oge, Director of the Office of Mobile Sources, reviewed some of the major initiatives underway within OMS. She announced that the Administration has decided to go forward with the new NAAQS for ozone and PM. She added that Ms. Nichols, who was scheduled to attend the meeting, would be attending the signing ceremony for the new NAAQS. Ms Nichols will be leaving the Agency at the end of August.

The new NAAQS are part of an already-busy regulatory calendar for OMS. Other initiatives include:

On-road NOx Heavy-Duty Initiative to OMB for review  
Off-road NOx PM Initiative (November 1997)  
Phase II Reformulated Gasoline  
Tier II Study  
Examination of Sulfur Issues

Ms. Oge expects this subcommittee to continue to function for the next year or so and she noted that the efforts of the subcommittee have been critical to assisting the Agency. She asked committee members for suggestions of ways to enhance the subcommittee's efforts.

REPORT OF INNOVATIVE AND INCENTIVES POLICY WORKGROUP

Virginia McConnell, RFF, reviewed the meeting of this new workgroup held on July 15, 1997. She thanked Bruce Bertelsen, MECA, and Eric Herzog, EPA, co-chairs, for their support. This workgroup will work closely with other CAAAC committees and workgroups that are looking at economic incentives. For example, the Regional Haze Subcommittee is focused primarily on off-road and wood-smoke issues. Ms. McConnell's group will look primarily at specific policies to make I/M more cost effective, OBD more effective, and possibly green indexing of vehicles. For example, once the OBDII light is on, what incentives can be used to motivate the owner to bring the vehicle in for repair.

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Five different presentations were made at the meeting on these topics. Follow-up conference calls will take place in the next few weeks. The optimistic goal is to prepare a report in the next six months that will contain specific recommendations on the use of incentives. Bob Slott, Consultant, added that much of

the discussion looked at incentives for motorists and making information available to technicians so that repairs are rapid and effective.

#### TIER II STUDY

James Markey, EPA/OMS, made the presentation. The Tier II study is a requirement of the 1990 CAA Amendments. The study includes a requirement to establish any further air quality need, a review of emission reductions from further light duty controls and the costs, and an evaluation of other mechanisms to achieve these reductions. The air quality needs assessment and technology evaluation are taking place concurrently. In January, a Tier II White Paper was prepared and a workshop was held in April to obtain comments on the white paper. The study is planned for draft completion by March 1998, with a final report delivered June 1998. If a new rulemaking occurs, model year 2004 will be the first model year of vehicles affected.

The air quality assessment will begin with the current NAAQS, and expand the analysis if the new NAAQS become final. New revisions to MOBILE6 will be used for the analysis. The technology assessment is looking at available technologies and their costs. Technology improvements will be examined from input on the California LEV program and input from industry. Other existing sources of alternative controls include the OTAG work and analyses undertaken for the new ozone and PM NAAQS. EPA is partnering with California and MECA to quantify emission reductions from new technologies. Default Tier II standards were included in the Amendments and Congress asked the Agency to review both more and less stringent standards. The Act did not provide default standards for heavier classifications of light duty trucks and this is an important area for Agency review. Kelly Brown, Ford, noted that the g/mile comparison of standards is not appropriate because the tests are performed under different loads. Heavier loads will produce higher NOx levels than lighter load tests. The Tier II study will examine the diesel NOx exemption or waiver that allows a less stringent NOx standard. This exemption ends in the 2003 model year. Sulfur issues also will be examined. For example, what are the effects on in-use emissions, the impacts on LEV, the costs to reduce sulfur, and the prospects for sulfur resistant catalyst technology. AAMA and AIAM are testing 20 LEV and ULEV vehicles using California Phase II fuel with different sulfur levels. Twelve in-use LEVs are also being tested in another test program by CRC. Once the emission impacts are quantified, the costs of potential controls will be assessed. DOE and EPA will assess the refinery costs. A symposium will

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be held by CRC this fall to discuss sulfur issues. Alternative fuel vehicles will also be examined to help evaluate a "fuel-neutral" standard.

#### Discussion

How do the new standards affect the calculations and conclusions? The existing NAAQS are the starting point because the new NAAQS are not final. With more stringent NAAQS, the requirement for more stringent Tier II standards is stronger. The goal is to set a fuel neutral standard. The impact of NOx emissions on PM will be examined. The study will also revisit the issue of the light-duty particulate standards because most light-duty vehicles meet this standard. A committee member noted that the secondary effect of gaseous emissions on PM may be more significant than the presentation suggests. Janet Hathaway, NRDC, asked whether technologies that reduce ozone precursors and PM would be assigned greater value in the cost-benefit analysis. A member of the audience asked whether the cost/benefit analysis will examine effects regionally. Mr. Markey responded that the study will examine the national need for more stringent standards and some regional analysis will be included.

#### PHASE II REFORMULATED GASOLINE WORKGROUP

John Hornbeck, Natural Resources and Environmental Protection, Commonwealth of Kentucky, co-chair, led the discussion. Chuck Freed, EPA, is the other co-chair of the workgroup; Debbie Wood, EPA, is supporting the workgroup. The first meeting of 40 members was held in April. The goal is to transition smoothly into Phase RFG (reformulated gasoline). The RFG experiences of Wisconsin, Kentucky, and California will be examined. Two teams will examine: 1) testing, and 2) outreach and education, respectively. The testing team will review existing data and gather additional data in areas as required. The education and outreach team will prepare appropriate messages for release in the Spring of 1999. Localized modeling also may be required to quantify local benefits. Additional evaluation of MTBE issues will be undertaken.

In May, the testing team (led by Chuck Krumbuhl, API; Jim Steiger, AAMA; and Debbie Wood, EPA) reviewed available data on performance, emissions, and economy data from the Phase I program. Additional fuel testing will be beneficial for the outreach portion of Phase II. Customers notice the different aroma, so the team will evaluate whether ethers or other substances will be used. Fleets will be identified for testing should have thorough maintenance records to be useful in the analyses. Centralized fueling and maintenance records are important components. The team needs better information on cold-weather effects, co-mingled gasoline, etc. The testing will be completed over the winter of 1997-98. Different engines (on-road, off-road, small engines) will be examined.

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The education team (led by Janet Hathaway, NRDC and Don Purcell, Portable Power Equipment Manufacturers Association) reviewed EPA outreach efforts for Phase I. Issues concerning opt-outs were discussed. Presentations were made on California's outreach for Phase II. Most drivers are resistant to different types of gasoline and prefer unleaded but recognize that they contribute to air quality. Women (in California) tend to be more supportive of reformulated gasoline than men. Different plans and messages will need to be developed and staff should be trained at the state and local level. The new ozone standard may show that additional VOC controls are important to air quality maintenance in many metropolitan areas. Regarding MTBE, EPA is developing a final report and will assess the groundwater issue that has previously been raised. Focus groups will be used across the country to assess public interest and issues, including areas contemplating opting-in. A draft communication plan is being developed. The next workgroup and team meetings are scheduled for September 24 and 25.

#### Discussion

Janet Hathaway, NRDC, noted that materials compatibility may be examined beyond the work performed for California. A member noted that Inside EPA reported that EPA planned to drop the minimum NOx requirement for RFG. An EPA staff member confirmed that EPA has dropped the per gallon minimum NOx requirement for reformulated gasoline, but the overall environmental benefit has not changed. She characterized the change as a simplification of enforcement.

#### SULFUR IN GASOLINE

Richard Gibbs, Director of the Bureau of Mobile Sources, New York Department of Environmental Conservation, led the presentation. A subcommittee workgroup has prepared a report making recommendations to the Subcommittee regarding sulfur in fuels. The issues are difficult and complex. Sulfur discussions began in June 1996. Since then, auto and oil industry participants have made presentations on varying sides of the issue. Numerous teleconferences were held to draft recommendations and these were presented to the Subcommittee. On June 30, 1997, Tom Cackette, CARB, chaired a teleconference where all recommendations were unanimously approved. Key findings include:

- Sulfur in gasoline increases the emissions of all pollutants.
- The sulfur content in U.S. gasoline is relatively high.
- There is refinery technology to reduce sulfur.
- LEV technology vehicles tend to be more sensitive to sulfur.
- The cost to reduce sulfur is about the same as the cost for an I/M test.

Regarding the reversibility of the sulfur effect, Dr. Gibbs noted that studies show a short-term recovery but long-term/high-mileage studies have not been undertaken to

demonstrate similar reversibility. Dr. Gibbs showed some recent data on the effect of sulfur changes on vehicle emissions. The U.S. currently uses a 1,000 ppm voluntary sulfur standard. In comparison, California is 80, Japan is 100, Australia is 500, and Europe is 500 ppm sulfur. Lower standards are under consideration in other developing countries. The 49-state fuel sulfur average is 340 ppm. Sulfur-resistant catalysts are at a developmental stage. The Workgroup recommendations suggest that EPA should set a sulfur cap (using Level III controls as described in his slide), and examine the potential effect of sulfur on LEV technology vehicles. If the differential effect on LEVs is identified, EPA should set a more stringent cap (Level IV). Dr. Gibbs displayed a step function highlighting the sulfur controls (and costs) available to refiners. Each refiner may be affected differently to achieve these sulfur reduction goals. Dr. Gibbs highlighted that the recommendations strive to balance the environmental needs and the flexibility required by refiners.

API believes that sulfur controls should not be undertaken for Tier 0/Tier I vehicles. The issue is emissions control, and sulfur reduction should be compared with other emission control strategies. API believes that the MOBILE model should contain specific deterioration rate corrections for the sulfur effect. API also believes that the effects are not well documented and not demonstrated to be irreversible. Mike Walsh asked what the average sulfur level might be for Phase II reform. An industry representative responded that it would be 180 ppm. Tina Vujovich, Cummins, asked whether there was any opportunity to reduce sulfur in both diesel and gasoline. A Marathon representative commented that sulfur exists in several forms and various techniques are available for its removal. Some remove the sulfur from diesel, while leaving it in gasoline. Mike Walsh commented that it may be worthwhile for the subcommittee to examine this issue. A committee member asked what authority EPA has to undertake such a rulemaking. Margo Oge responded that EPA has general authority to set controls for fuels at the national level. The air quality needs and benefits would be examined. The subcommittee member asked whether the energy considerations of these refinery changes were considered (e.g., CO effects). Dr. Robert Sawyer asked whether there were any long-term studies. Bob Slott responded that no studies were identified that looked at similar vehicles running for long periods on either high- or sulfur fuels. Another committee member added that a history of refueling would be needed because of the differences among fuel providers, and these histories are probably not available for many vehicles. Dr. Gibbs reiterated that the recommendations also include a realization that the effect on small refiners may be significant and should be considered.

#### EVAPORATIVE EMISSIONS

Harold Haskew, GM, made the presentation. He reviewed real-time evaporative

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emission tests. In the summer of 1996, diurnal (CRC) and hot soak (Auto Oil) test programs were undertaken. The CRC study used 150 light-duty trucks from 1971-91. Vehicles were recruited from the Mesa, Arizona I/M program before they were tested and no adjustments were made to the vehicles.

The diurnal (CRC) study found wide variability among the vehicles. One vehicle ran 0.9 grams for a 24-hour day and another measured 36 grams. Eighty percent of the newer vehicles were "clean" and 20 percent were not. He discussed the findings for several vehicles that went off the scale of his charts. A 1977 sport utility vehicle measured 770 g/day. A 1982 pickup measured almost 500 g/day. When these vehicles were inspected and the mechanic's narrative was reviewed, liquid leaks and vapor leaks predominated. The highest measured vehicle was dripping gasoline on the floor. The next highest had a hole in the gasoline tank. In the diurnal study, high emissions were identified from a variety of leak sources.

The hot soak study also found a large "normal" population with a number of outliers in the 300 vehicles. One vehicle that measured approximately 50g/hr had cut 0 rings leaking fuel. There were a number of different problems leading to high emission and no one problem was routinely identified. These data have been shared with EPA for their work with MOBILE6.

Mr. Haskew raised another issue. Vehicles are currently being built with ORVR. There may be some incompatibility with these vehicles and Vacuum Assist Stage II at fuel pumps. If a vacuum-assist system draws air and the ORVR captures emissions, the excess air may create a flammable range vapor. Fuel delivery system providers are trying to create a system that recognizes the different types of vehicles to eliminate this problem. A test program is underway to test the excess air in current systems and California has developed test vehicles for this program. Early data show vehicles in the 6 percent range, which is in the flammable range, but there is no source of ignition. 0 vehicles measure lower (mostly air) and others measure higher (too rich to burn).

### Discussion

The number of liquid leaks was surprising. Mr. Haskew believes that a half-hour inspection by a trained technician for 12-year-old cars would solve many of these problems. There is a real question of whether the public would wait that long for a test. He recommended that about half of these older vehicles would benefit from such a test. Janet Hathaway, NRDC, asked about gas cap failures and whether aftermarket caps are a problem. Mr. Haskew replied that, in his experience, vehicles tested with non-OEM caps leak. One committee member asked whether the leak detection systems used by stationary sources might be applicable to vehicles. He added that the incentive committ

might also look at this issue. Mr. Haskew also noted that all of these data are from Arizona and may not fully represent the nation. Testing in other locales would be beneficial. Mr. Haskew suggested that a well-trained technician could perform this examination better than a leak detection system. Ms. McConnell asked about repairs. About 20 percent of the vehicles were repaired, with significantly improved emissions, and none of these repairs were very expensive. Margo Oge added that the Agency has attempted to develop a non-intrusive evaporative test for I/M programs, but none have been successful. Other efforts are underway (e.g., at universities) to develop an alternative to the current purge test.

#### HEAVY-DUTY IN-USE TESTING

Tom Stricker, EPA, made the presentation. OMS has begun an in-use testing program for heavy-duty engines. Vehicles 14,000 lbs or under are part of a chassis screening program. The Agency will be able to rank engine families on a competitive basis. Manufacturers will be contacted if problems are identified. An effort is also underway to harmonize heavy-duty gasoline vehicles with California standards. For larger vehicles, there are limited dynamometer facilities. EPA is developing an in-house system, ROVER (real time on vehicle emissions recorder). It is a PC-based emission recorder to measure gaseous emissions. Particulate sampling capability is under development. This system also interrogates the on-board computer for vehicle variables. The Agency has used the system successfully for some compliance efforts. It is anticipated that ROVER could be used on various courses on vehicles with different trailer weights. Recalls would be undertaken as necessary. Other tools also are being developed to help states to reduce in-use emissions. OBD feasibility and I/M concepts are being evaluated. EPA is also working with NESCAUM to look at a retrofit program for heavy-duty engines.

#### Discussion

David Merrion, Detroit Diesel Corporation, noted that some in-use testing is being done, in cooperation with EPA, on several vehicles. He added that the deterioration is minimal if not negative in many cases. The original program looked at vehicles at 250,000 miles. A second phase will look at even higher mileage vehicles and these tests are not complete. Mike Walsh asked EPA to make a presentation on the ROVER system at the next meeting. Janet Hathaway asked about the success of ROVER. Chet France, EPA, answered that the system has been demonstrated to detect gross emitters. Mr. France added that EPA is working with states to identify standards for heavy-duty I/M programs and quantifying the benefits of a series of cutpoints in the I/M program. An OBD system is also being discussed for its feasibility. Margo Oge added that EPA is working with SAE to identify credits potentially available from the SAE smoke test. Thi

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work is expected to be complete in the next six months. John Elston, New Jersey State Dept. of Environmental Protection, added that the RCRA program has delisted crankcase oil as a hazardous material, and encourages it to be burned in diesel fuel. One manufacturer certifies their engines with a bleeding system to allow crankcase oil into diesel fuel for consumption. He asked whether there are studies that support this practice in all kinds of diesel vehicles. He is worried that there are crankcase deposits that may be burned in these engines. Margo Oge responded that the issue is being examined within EPA by the Enforcement Office of OMS.

#### OMS TEST LABORATORY UPGRADE WORKGROUP

Michael Sabourin, Director of Testing Services at OMS-EPA, made the presentation. OMS is looking at future data needs of the organization and the testing capabilities that need to be in place over the next three to five years. EPA would like to establish a workgroup of experienced laboratory staff and managers to help guide the Agency. The workgroup would review current OMS plans and provide additional recommendations and insight. New vehicles and engine families have such low-emission levels that new equipment is required to adequately measure at these detection levels. Driving patterns have changed because of the performance of these engines and the Agency needs to mirror these driving conditions. Alternative fuels and reformulated gasoline also pose new challenges for testing. In addition, significant advances have been made in analytical techniques and digital output. Advancing the information systems is also a goal. A move from the current mainframe to a PC network is envisioned. EPA would also like to examine the efficiency and effectiveness of the laboratory. Automated systems could help to better utilize staff time. More standardization in testing and quality control will be revisited. The Agency is constrained in both people and resources, and some contracting will continue. An important question is which capabilities need to remain in-house and which can be contracted. The workgroup is expected to meet for the first time on August 20 at the Ann Arbor Laboratory. A meeting is expected for each following month. He anticipates that four months will be needed to complete the document reviewing the OMS plan and make recommendations. The auto industry, engine industry, states, and academics are represented on the workgroup. Bob Jorgensen, Cummins, has agreed to co-chair this effort with Mr. Sabourin.

#### MEETING WRAP-UP

The Co-Chairs brought the meeting to a close. The following schedule was proposed for future subcommittee meetings:

October 15, 1997

January 14, 1998

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April 15, 1998  
July 15, 1998  
October 14, 1998

Phil Lorang added that there may be an effort to coordinate the subcommittee meeting on the day before the Clean Air Act Advisory Committee.

The meeting was then adjourned.

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

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Bruce Bertelsen	Manufacturers of Emissions Controls	(202) 296-4797
Kelly Brown	Ford Motor Company	(313) 322-0033
Tom Cackette	California Air Resources Board	(916) 322-2892
Joe Colucci	General Motors	(810) 986-2526
Gregory Dana	AIAM	(703) 525-7788
John Elston	STAPPA/ECOS	(202) 624-7864
Richard Gibbs	New York DEC	(518) 485-8913
Randall Guensier	Georgia Institute of Technology	(404) 894-0405
Janet Hathaway	Natural Resources Defense Council	(415) 777-0220
John Johnson	Michigan Technological University	(906) 487-2576
John Kowalczyk	Oregon Dept. of Environmental Quality	503) 229-6459
Sam Leonard	General Motors	(313) 556-7710
Alan Lloyd	SCAQMD/Desert Research Institute	(909) 396-3245
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