

Federal Advisory Committee Act
Clean Air Act Advisory Committee
Mobile Sources Technical Review Subcommittee

Co-Chairs: Michael Walsh and Merrylin Zaw-Mon

Designated Federal Official: Joseph Bachman

Minutes of the Subcommittee's Meeting on March 16, 2006
Arlington, VA

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Introduction

Mike Walsh (consultant, co-chair) and Merrylin Zaw-Mon (EPA, co-chair) called the meeting to order at approximately 9:00 a.m. The co-chairs welcomed attendees, introduced the new members, and reviewed the day's agenda. The meeting summary from the September 13, 2005 MSTRS meeting was accepted as final.

Presentations and meeting topics outlined in the agenda were as follows:

- A presentation on the School Bus and Retrofit Work Group Report given by Tim Johnson, Corning
- An update on the Mobile Sources Air Toxics (MSAT) Rule given by Rich Cook, EPA
- An update on the Modeling Work Group given by Gene Tierney, EPA
- A renewable fuels panel, including a presentations by Neil Rossmeissl, DOE, Paul Argyropoulos, EPA, Rick Zalesky, Chevron, Al Weverstad, GM, Bruce Heine, Magellan Midstream Partners, Jeff Buss, Minnesota Pollution Control Agency, Bob Dinneen, RFA, Todd Sneller, Nebraska Ethanol Board for National Ethanol Vehicle Coalition, and Rich Kassel, National Resource Defense Council (NRDC)
- A presentation on the National Research Council (NRC) Report on State Practices in Setting Mobile Source Emissions Standards given by David Dickinson, EPA and David Allen, NRC Committee Chair

Presentations will be posted online at the MSTRS website:

http://www.epa.gov/air/caaac/mobile_sources.html.

Opening Remarks

Merrylin Zaw-Mon delivered comments from Margo Oge on current EPA activities, the new Energy and Transportation Bills, and EPA priorities for the near future. Ms. Zaw-Mon also acknowledged new members John Wall (Cummins) and Sally Allen (Gary-Williams Energy).

Current EPA Activities

OTAQ is currently working to reduce criteria, air toxic, and greenhouse gas emissions from the mobile source sector. Recent activity includes proposing the Locomotive and Marine Rule, which has come on the tails of the 2007 Highway Engine rule and the Clean Air Non-Road Diesel rule in 2004. Ms. Zaw-Mon cited one study projecting that half of all mobile sources nitrogen oxides (NO_x) and a fourth of diesel PM would originate from locomotives and marines in 2030. OTAQ is also working to address air toxic emissions from these sources using technology similar to that developed under the Highway and Non-Road rules. Finally, the Agency is working to reduce emissions from the existing heavy-duty fleet by mandating stringent standards for remanufactured engines. Ms. Zaw-Mon stated that the rule could be adopted as early as 2011.

Ms. Zaw-Mon updated the Subcommittee with current efforts between the EPA and the International Maritime Organization (IMO) to reduce emissions from C3 marine vessels. As C3 vessels travel through international waters, EPA would like to see regulations primarily from the IMO. EPA is prepared to issue a proposal for regulation of U.S. C3 marine vessels pending IMO decisions. Ms. Zaw-Mon commented that these regulations are important as economic growth and activity increases in ports. She cited efforts among ports in the Pacific Rim as successful examples of emission reduction programs.

Ms. Zaw-Mon went on to comment on the small marine engine and spark-ignition rule. This new initiative will result in a 27% decrease in hydrocarbon emissions by 2020, including ozone precursors. The rule will also provide NO_x benefits. A safety study mandated by Congress will be completed soon, and then the rule will be formally proposed. Implementation of the rule is expected in 2009 with full benefits realized in 2015.

As a brief introduction to the MSAT rule update, Ms. Zaw-Mon indicated that the rule will effect decreases in toxic and PM emissions in light duty vehicles. Specifically, it is expected that there will be a 44% decrease in outdoor toxic emissions, a 50% decrease in cancer risk, and a 74% decrease in non-cancer risk. Toxic emissions will be reduced from gasoline, vehicles, and gas cans as a result of MSAT. These will be implemented in 2030 resulting in a reduction of 350 tons per year (tpy) of emissions, including 65,000 tpy of benzene. It is estimated as a 30:1 benefit to cost gain.

Ms. Zaw-Mon commented on the renewable fuels portion of the Energy Policy Act (EPAct). EPAct requires that 7.5 billion gallons of renewable fuel be used by 2012. The use of renewable fuels reduces greenhouse gases, fine PM, and hydrocarbons, with a possible slight increase in NO_x, and decreases the dependence on foreign oil. According to the rule, 2.78% of all fuel should be renewable fuel in 2006. The rules regarding renewable fuels for 2007 are being developed now by a collaboration of DOE, refiners, and agricultural researchers.

Ms. Zaw-Mon concluded by discussing emission reductions in the legacy (or existing) diesel fleet. The program goal is to reduce emissions from the 11 million existing diesel engines by 2014. There are diverse stakeholders in the Retrofit Work Group trying to accomplish this task. There have been \$2 billion dollars in grants and loans approved by Congress for diesel retrofit programs. Of that \$8.6 million is DOT's Congestion Mitigation and Air Quality (CMAQ) program money, and \$50 million has been designated for programs in 2007, including

the Clean School Bus USA program. These programs realize a benefit to cost ratio of \$50 billion to \$500 million. It was the recommendation of the co-chairs to keep the Retrofit Work Group in place until the end of the year.

School Bus and Retrofit Work Group Report

Tim Johnson (Corning) gave an update regarding the September Draft Report of the Retrofit Work Group. The consensus report included viewpoints on all the issues, from all stakeholders. Mr. Johnson focused on changes to the report in this presentation, as the draft report had already been circulated among MSTRS members.

Mr. Johnson stated that one of the main issues was to add more stakeholders, and to include the agricultural sector; however there was no consensus on adding that sector at this time. Another item, inter-sector trading, was removed because the topic had become too controversial and the group did not have time to resolve the issues. Additionally, corrections on technology from sectors were warranted. Finally, tax incentives included updates from government experts.

Discussion

Mike Walsh asked whether recommendations in the report for other sectors could apply to the agricultural sector. Mr. Johnson replied that as there is not a representative from the agricultural sector in the stakeholder group, there was no discussion about the sector. Ms. Zaw-Mon indicated that the sector could benefit from the use of biofuels. She added that the sector was added much later in the Work Group process.

Mr. Walsh asked if there was a feeling among Work Group members that recommendations would be implemented. Mr. Johnson replied that at the beginning of the process, there was a lot of defensiveness and misconceptions among the stakeholders regarding costs and benefits of retrofit technologies and strategies. However, by the end of the process, stakeholders realized that the retrofit initiative was worth pursuing. Recommendations and discussions in the report have been used to help initiatives in Congress such as the Diesel Emission Reduction Act (DERA) and increased funding for retrofit and clean diesel programs in the CMAQ program. Overall, there has been an order of magnitude increase in money authorization.

Mr. Johnson stated that the Work Group is moving forward with soliciting new membership.

Mr. Walsh commented that diesel retrofit efforts are not restricted to the U.S.; other areas pursuing these efforts include Hong Kong; Seoul, Korea; Sweden; Tokyo, Japan; Mexico; India; China; Bangkok, Thailand; and Santiago, Chile. The EPA has aided in the programs in Mexico, India and China. Ms. Zaw-Mon indicated that in Mexico City, a project was undertaken to measure and speciate PM emissions. This was considered a model project for other cities and areas in Latin America. John Guy (EPA), who worked on the project, added that in Mexico City,

20 diesel buses had been retrofitted with Diesel Oxidation Catalysts (DOC) and Diesel Particulate Filters (DPF), and were supplied with Ultra Low Sulfur Diesel (ULSD) imported from Texas (TX). There is a nanotech device that speciates PM by size, and they are currently waiting for the results. The report should be available in 2 months.

Terry Goff (Caterpillar) commented that in Ohio, local retrofit programs are being undertaken by the Mid-Ohio Regional Planning Commission (MORPC), and fit in with the Retrofit Work Group's report recommendations. Other local Regional Planning Commissions (RPCs) and Metropolitan Planning Organizations (MPOs) should be able to implement the recommendations. Nancy Siedman added that the funding mechanisms described in the report for State, local, and Tribal (SLTs) organizations were beneficial. She was also encouraged to see authorization of Federal funds for retrofit programs. Ms. Siedman indicated that some States were not seeing much success in implementing the programs, and indicated that the report will be helpful for States trying to find money to implement the programs.

Tom Cackette (CARB) asked if implementation could go ahead in the absence of funding. There have been mandatory rules adopted in California (CA) for ports, the transit system, municipal and State-owned vehicles, and utility vehicles, which cover about 10% of the diesel engines in that State. Currently, the mandates have been implemented for 2-3% of those engines. Also, incentive money has been used for school bus retrofits. Carl Moyer program funding has been used for NO_x reductions, and has now added PM to the program. However, this money cannot be used for compliance.

Mr. Cackette commented that mandates for retrofitting construction equipment was upcoming. Problems with this mandate arise for small business that cannot afford to upgrade their equipment. He expects that large businesses will bear the brunt of the cost, while small businesses would receive funding help. Ms. Zaw-Mon asked if there were any insurmountable technical issues with the EPA/CARB verification process. Mr. Cackette replied that the largest challenge is retrofit technology for older engines. Currently, DOC is the only verified technology, and it only achieves a 25% reduction in NO_x emissions. Mandatory equipment replacement would occur if no suitable retrofit technology can be found, but that strategy might not work well for the private sector. Technologies work the best on model year 1994 and newer vehicles.

Ms. Zaw-Mon added that there needs to be a call out to emission control device manufacturers to further research potential NO_x reductions, such as through fuel additives. She cited the new TX Low-Emission Diesel (LED) fuel that is mandated in 110 counties, and uses a fuel additive called OR-LED to decrease NO_x emissions. EPA has been working with TX to verify this technology so that benefits from this new fuel can be incorporated into their SIP.

Eric Skelton (NESCAUM) added that CMAQ funding should be a priority concerning diesel retrofits, but it is not automatically allocated for this purpose. Historically, the funding goes towards congestion problems instead. He stated further that there needs to be a strategy for making sure the funds are used for air quality, and that the culture for addressing congestion and not air quality must be overcome in MPOs.

Tim Johnson remarked that the Retrofit Work Group report did not address this concern because the report was completed before the Transportation Bill was finalized. He added that there was much discussion on how to take advantage of CMAQ money at a recent workshop. There is a new initiative for a MPOs which will need some ground work done before any funding is appropriated. Ms. Zaw-Mon added that workshops and guidance were planned to address conformity issues with States and their SIPs. The guidance is expected to be out in 1-2 months.

Mr. Raney asked what was blocking the inter-sector trading recommendation. Mr. Johnson replied that the freight sector group held a brief discussion on the issue. New technologies like GPS could be used to track vehicle use and location in order to determine which areas would receive reduction credit. However, other Work Group members did not agree that trading between stationary and mobile sources was appropriate, especially given the types of reductions that would be achieved. Mr. Raney asked if this was an issue that the Work Group would revisit. Mr. Johnson responded that this is a very contentious issue and for now they would not address it further.

Mr. Walsh asked the MSTRS for consensus on (1) sending the report forward and (2) continuing with the Work Group. Several members wanted to know what it would take to keep the workgroup going and what the group would do in the future. The response was first, to have more workshops and conferences to further educate the stakeholders while also telling them about funding. Second, the group wants to use the report to get more funding at the local, state and national level and to get other groups to be more active in getting Congress to appropriate funding. Rich Kassel (NRDC) added that the report needed to be finalized and presented to Congress, so he suggested a short review period for the updated draft. He also suggested that the Work Group continue as new technologies and fuels were always on the horizon and the Work Group provides a less formal setting, while still using experts, for determining where these new technologies fit in existing programs. Mr. Clay (Koch Industries) also recommended the report being soft pedaled to Congress with lobbying efforts.

It was decided that the review and comment period for the report end one week from today's meeting on March 23, 2006.

Update on Mobile Sources Air Toxics (MSAT) Proposed Rule

Rich Cook (EPA) presented an update on the MSAT proposed rule. He discussed the status of the rule, statutory authority, history, and gave a brief definition of air toxics as they apply to this rule. He specifically discussed the fuel program regarding the new benzene content standards, the vehicle program with new research on cold temperature and evaporative emissions, the gas can program, and technical highlights.

Discussion

Mike Rodgers (Georgia Tech) asked why the focus was on benzene and not more on 1,3-butadiene or diesel particulate matter (DPM). A study done in southern CA indicated that Diesel PM risk to the population is 10 times higher than benzene risk, and 1,3-butadiene risk is

equal to benzene risk. EPA's analyses do not quantify diesel PM risk and estimate a lower risk for 1,3-butadiene. Mr. Cook replied that the CA risk value for 1,3-butadiene was based on rodent data, while the EPA value was based on human data. EPA believes that it is more appropriate to use the human data since rodents metabolize 1,3-butadiene differently. Mr. Cook also pointed out that decisions on control strategies were based on technological feasibility rather than risk. Additionally, it is not as cost-effective to reduce 1,3-butadiene through fuel controls—it would be better to reduce this pollutant through a cold temperature standard. Mr. Cook also commented that risk from diesel PM cannot be quantified, but he agrees that it is one of the worst air toxics, and the 2007 on-road and future non-road rules should help reduce diesel PM emissions.

Mr. Rodgers commented that it is important to quantify Diesel PM risk in order to accurately quantify the benefits of reducing Diesel PM emissions through both the MSAT rule and other programs like the National Clean Diesel Campaign (NCDC). He does not want to diminish the effect that the MSAT rule will have on other pollutants such as benzene or 1,3-butadiene, but emphasized the importance of establishing a risk factor for Diesel PM. Once a factor is established, it will affect priorities within EPA. A solid assessment should be done as soon as possible. Ms. Zaw-Mon commented that EPA is working with ORD to define a risk factor for Diesel PM. In the mean time, the Agency wants to move forward with programs that could reduce Diesel PM emissions.

Mr. Cackette commented that even if the uncertainty is large in quantifying diesel PM risk, it would have to be an order of magnitude of uncertainty before diesel PM would pose less of a risk than benzene. Mr. Cook replied that Diesel PM is addressed in the rule, and that the Agency does not place a lower priority on addressing diesel risks.

Mr. Clay commented that since benzene occurs in the fuel and is not a product of combustion, should manufacturers be able to test and remove the pollutant? Mr. Cook replied that benzene occurs both in the fuel and as a result of incomplete combustion of gasoline, so even if it was not present in the gasoline, it would be present after incomplete combustion. Mr. Clay then asked how Flexible Fuel Vehicles (FFVs) are being treated in the rule and what fuels will be tested. This rule addresses gasoline and not alternative fuels. Will FFVs be exempt? Mr. Cook replied that flexible fuel vehicles will have to meet the same cold temperature standards as other vehicles, but that he did not know whether flexible fuel vehicles would be certified on just gasoline or on a mixture of 15% gasoline and 85% ethanol (E85) fuel as well. Ms. Zaw-Mon said EPA would get back to him on this question.

Mr. Skelton asked if there was going to be a cap on the benzene content in gasoline in the fuel program portion of the rule at the refinery level. Mr. Cook replied that at present, there is no cap proposed; however, comments are being accepted on this portion of the rule. Mr. Skelton commented that without a cap, there could be "hot spots" throughout the country.

Mr. Kassel asked for more clarification as "hot spots" may be hard to predict geographically speaking without incorporating a cap into the Averaging, Banking, and Trading (ABT) program. Caps need to be established to protect public health because without them, "hot spots" could still be created regardless of mass emission reductions. Ms. Zaw-Mon responded

that the overall benzene content in gasoline will be lowered nationally and depending on the geographic locations there may be some elevated risks.

Mr. Skelton asked whether additional sulfur controls could also reduce air toxics. Mr. Cook replied that these controls would reduce hydrocarbons (HC), PM, and polycyclic organic matter (POM). Reducing sulfur would also increase catalytic efficiency in gas vehicles. Mr. Skelton then asked what other toxins were included in the estimated 350,000 ton reduction cited in the presentation. Mr. Cook replied that over half of the estimate is from toluene and xylenes. Reductions will also be achieved in formaldehyde, 1,3-butadiene, acrolein, naphthalene, acetaldehyde, and other pollutants.

Mr. Cackette asked for clarification in how EPA estimated acetaldehyde reductions, since using ethanol fuel may increase acetaldehyde emissions. Mr. Cook agreed that burning ethanol may increase direct emissions of acetaldehyde, and will also impact levels of precursors to acetaldehyde formation in the upper atmosphere, although this is very hard to model right now—just as challenging as modeling formaldehyde. He added that modeling does not reveal acetaldehyde as a national risk drivers in the National Air Toxics Assessment (NATA), but it is on the longer list of pollutants which pose a potential health concern.

Mr. Raney commented that a relatively small percentage of vehicle miles traveled (VMT) occur below 20 degrees. He asked how the agency weighted the fleet calculations to come up with the 20 degree cold standard for the total fleet. Mr. Cook replied that EPA modeled the impacts by modifying the cold temperature adjustment for start temperatures and then ran the Mobile6 model for the entire country. Then they estimated regional and local impacts of temperature on start-up emissions. The cold temperature adjustment factor came from existing EPA data. Mr. Raney asked if EPA had data to extrapolate between the 20 degree and 75 degree modeling. Mr. Cook replied that the bulk of the data was only for 20 degrees, but that data were collected at other temperatures.

Modeling Work Group Update

Gene Tierney (EPA) updated the Subcommittee on the Modeling Work Group progress to date. He mentioned that John Koupal (EPA) will be taking over as Work Group chair, as Mr. Tierney has changed positions within EPA.

The Motor Vehicle Emission Simulator (MOVES2004) program has been released and comprises on-road energy consumption, green house gases, and life cycle analysis. Upcoming releases of MOVES2006 (draft) and MOVES2007 (final) will incorporate criteria pollutants, toxics, ammonia (NH₃) and sulfur dioxide (SO₂) for on-road vehicles, and will replace MOBILE6.2. MOVES 2008 will include those categories currently covered by the NONROAD model as well as aircraft, commercial marine vehicles and locomotive engines..

Discussion

One MSTRS member asked if evaporative emissions had been accounted for in the new model. Mr. Tierney replied that evaporative emissions are treated differently in MOVES than in MOBILE6, and Harold Haskew and Associates had helped develop a new evaporative emissions modeling paradigm. Vehicles using advanced evaporative emission control technologies are modeled differently. When asked if the model was going to be available to vehicle manufacturers, Mr. Tierney responded that it would be released for comment to all stakeholders, and the comment period would be substantial.

Mr. Johnson asked what the impacts would be on current emissions inventories. Mr. Tierney replied that early estimates indicate that MOBILE6 is underestimating the emissions in certain areas, and this will be corrected by using MOVES. There will be an increase in PM emissions for gas and diesel vehicles; however, it is hard to predict the all of the emission changes without completing the data analysis currently in progress.

Mr. Raney asked about on-board diagnostic (OBD) technology effects and benefits in terms of I/M. Mr. Tierney replied that OBD is not being treated differently; each model year is evaluated based on the technology available for that year, which is reflected in the field tests. He mentioned that MOBILE6 has a percent efficiency associated with OBD. MOVES will not be using this approach to modeling OBD making concerns related to the efficiency numbers moot.

Mr. Clay asked for a comparison between MOVES and MOBILE6 regarding OBD. Mr. Tierney demonstrated two main differences: (1) MOBILE6 is based on an engineering approach, and made sometimes unrealistic assumptions about real-world emissions and how drivers respond to illumination of the Malfunction Illumination Light (MIL). MOVES uses a data driven approach and is based on more in-use data. (2) With MOVES, States are able to get credit for their OBD program as part of their I/M program.

Mr. Goff asked if MOVES will be able to do source characterization for mobile emissions. Mr. Goff commented that MOBILE6 is used in a general source characterization capacity for regional planning purposes. He asked if MOVES could be used for the same purpose. Mr. Tierney explained that MOBILE6 combined with the NONROAD model can be used to tell whether emissions are non-road or on-road, but it does not function in a source-apportionment, back-trajectory analysis capacity—and neither does MOVES. Source-apportionment involves collecting monitoring data, and that is not the focus of MOVES.

RENEWABLE FUELS PANEL: Developing a Business Case for Renewables – Production, Transportations, Emission Issues

The President's Biofuels Initiative

Neil Rossmeissl (DOE) presented the President's Biofuels Initiative. He explained the initiative's goal of focusing on affordable energy, while reducing American's dependence on foreign oil. With this in mind, ethanol can provide the desired result. In the past, the energy effects of fuel ethanol have been the subject of debate. Ethanol, produced from corn, provides

comparable energy as gasoline produced from petroleum, while reducing green house gas emissions and removing the dependency on foreign oil. To make this new kind of ethanol practical and competitive in six years (2012), more funding for cutting edge technologies will be provided for producing ethanol. The President's goal is to replace more than 75% of the oil imports from the Middle East by 2025, and biofuels could meet up to 30% of our present fuel need by 2030. It is estimated that the inclusion of cellulosic ethanol can achieve much greater energy benefits. There are millions of flexible fuel vehicles (FFVs) on the road today, and if they were fueled with E85, there would be significant energy and green house gas benefits.

The Energy Policy Act and the Renewable Fuel Standards

Paul Argyropoulos (EPA) presented the EPAct and the Renewable Fuels Standards (RFS). He stated that by August 6th of this year, the EPA must promulgate regulations that ensure gasoline sold in the US contain applicable volumes of renewable fuels, about 4 billion gallons. The amount sold should increase over the next six years, finally reaching 7.5 billion gallons sold in 2012. The rule must also define liable parties, establish a credit trading program, establish credit for different renewables, establish compliance assurance provisions, and account for deficit carryover from year to year. Small refiner exemptions and State waivers must also be considered as necessary. A default rule went into effect February 28, 2006 that holds all refiners responsible, collectively, to ensure that 2.78% of all gasoline nationwide contains renewables. If this percentage is not met then the deficit would carry into 2007. There are future rules in development regarding the increased use of renewables, which include ongoing stakeholder input and initial concepts for compliance. EPA is working on developing a program with broad based consensus.

Developing a Business Case for Renewable Fuels

In Rick Zalesky's (Chevron) presentation, he stated that we face a new energy equation, one in which capacity must meet growing demands. The challenge is to provide affordable energy to sustain rapid economic growth. The solution includes increasing conservation, improving energy efficiency, and expanding and diversifying our energy supply. Approximately 21% of all retail stations sell some form of ethanol blended gasoline today. Although Chevron does not sell E85 as one of its or Texaco's brands, they do not inhibit retailers from selling this product at their stations. Chevron has partnered with others in the CA demonstration project to learn more about E85 and how it can be used practically. The program goals for Chevron are to assess vehicle performance (i.e. mileage, emissions, climatic effects, maintenance needs, driver feedback), identify production and distribution issues, understand quality and standards, and investigate commercial feasibility. Chevron is committed to investigating E85 as a potential source of energy, in the same way they were committed to the DOE Controlled Hydrogen Fleet and Infrastructure Demonstration and Validation Project.

One MSTRS member asked what price needed to be set to make this fuel competitive. Mr. Zalesky replied that in order to determine a price, the logistics and supply/demand data are needed, which make this more complicated than a simple mathematical equation. Chevron is looking at the whole picture to assess the benefits properly. Alan Weaverstad (GM) added that

there is an inherent 30% energy loss from E85 (but with a 5% recovery because of new technology), so if consumers are able to pay 30% less for the fuel, E85 will be competitive.

GM Perspective on Ethanol

Alan Weaverstad (GM) began his presentation with a discussion on ethanol benefits and challenges. The largest benefits are that ethanol is renewable and reduces US dependence on foreign oil. It also has greenhouse gas benefits, provides a competitive opportunity, and has a much better infrastructure than other alternative fuels such as compressed natural gas (CNG), liquefied petroleum gas (LPG), and hydrogen. Some of the challenges include emissions from E10 and E6 blends, availability of E85, and decreased fuel economy. Some of the good news GM can provide is the increasing number of fleet vehicles that are flexible to use E85 or other traditional fuels as needed. These vehicles include SUVs, trucks, cars and special needs vans for 2006 year model. Also, there are vehicles available in Europe and Brazil that use biofuels.

The use of E10 may adversely affect non-attainment areas given its emissions of VOC. State SIPs, and California Partial Zero Emission Vehicle (PZEV) and Advanced Technology Partial Zero-Emission Vehicle (ATPZEV) emission standards may also slow the use of this fuel. GM is working with the University of Toronto in cellulosic ethanol studies and with the New Delhi University in India on a biodiesel fuel study. GM is also involved in studying E85 with direct injection spark engines, and B20 system analysis. They are promoting education with suppliers, retailers, and States on E85 availability, and are planning to launch outreach programs such as distribution of yellow gas caps and labeling on E85 FFVs, to be completed by the middle of 2006. GM has also been promoting marketing and advertising of the E85 FFV campaign. The GM commitment is to implement propulsion technologies that improve fuel efficiency and reduce the environmental impact, work to assure that new propulsion and fuel technologies are linked, and promote the use of alternative fuels that make sense economically and environmentally including biofuels and hydrogen.

Tim Johnson mentioned that the CRC study results indicate there are high tail pipe emissions of HC and NO_x at low concentrations of ethanol blends. He also wanted to know if it was better to use ethanol as a fuel or as an additive (like ETBE)? Mr. Weaverstad replied that GM would rather promote E85 as a fuel, but ethanol as an additive to create fuels like E10 is needed now to help encourage future capacity.

Renewable Fuels Distribution

Bruce Heine (Magellan Midstream Partners, L.P.) started his presentation by discussing the capacity of the current petroleum products pipeline located in the Midwest. He included marine terminals along the East and Gulf coasts. He also discussed the capacity of terminals located across the Midwest and East coast. He indicated that Magellan has had experience with ethanol blending since the early 1980s. They have numerous blending terminals located throughout the Midwest.

With the phase out of MTBE and Texas and eastern seaboard and potential mandates in Iowa, Illinois and Missouri there is a need for infrastructure. Magellan is working on creating a

better infrastructure for ethanol. The challenges are local permitting, construction time, and quality control. To make the infrastructure efficient, the supply should be close to the demand area. There is no benefit to using existing pipelines to supply areas that are not downstream, and ethanol cannot be run through petroleum pipelines without incurring high maintenance costs. Additionally, ethanol storage is also difficult as temperature must remain at 60°F or higher, and the filling connections have stricter constraints than petroleum connections.

One participant wanted to know if ethanol blended fuels would run through the pipeline. Mr. Heine replied that presently there is no benefit to running it through the pipeline for several reasons, namely that the ethanol plants do not have a high enough production capacity. Also, ethanol blends cannot be run behind other petroleum formulas due to interface problems. In addition, moisture in the pipeline and coloration issues can make the end product unmarketable.

Another participant wanted to know how Magellan was going to transport ethanol blends outside of the Midwest to the rest of the country. Mr. Heine indicated that that is one of the technical and economic challenges. One way to get it to move is to have States require it, like Minnesota. However, States that do not require ethanol blends would want the flexibility to not sell the product. Constructing a dedicated pipeline would decrease that flexibility.

Overview of Alternative Fuels use in Minnesota

Jeff Buss (Minnesota Pollution Control Agency) described the renewable fuels mandate in place in Minnesota (MN). State vehicles are required to use renewable fuels, and there are nearly 200 refueling stations offering E85 throughout the state. Minnesota is also pursuing the use of E20 and should have mandates in place by 2013. Approximately 275 million gallons of ethanol blends are consumed each year which accounts for 15% of MN's corn crop. There is also a biodiesel mandate in place in the State that says all diesel fuel sold in MN for combustion engines must contain 2% biodiesel by volume. There are a few exceptions to this rule, like locomotives, off-road taconite and copper mining equipment, and motors located at electric generating plants regulated by NRC. Although there were some initial problems with the biodiesel fuels, such as the tendency of the fuel to gel at extremely low temperatures, those have been resolved. MN has an initiative to reduce petroleum use by 25% over the next 9 years. Lastly, E20 has been mandated for use beginning in August 30, 2013 unless (1) the Commissioner of Agriculture certifies that 20% of motor fuel consists of ethanol, or (2) the US EPA denies a waiver for the use of E20 by December 31, 2010.

Mr. Cackette, referring to the question raised about the competitiveness of E85 in an earlier presentation, commented that MN seems to be the only State in which the projected prices for ethanol blends seem to be about 30% below regular gasoline prices. Mr. Buss replied that the competition, because there are a lot of stations, is very high. Regardless of the prices, which fluctuate just like regular petroleum prices, there are also some consumers who will buy the blends regardless of price.

Ms. Robinson asked where MN stood in achieving the E20 waiver. Mr. Buss replied that they are about halfway to achieving this objective, as they have 10-11% ethanol usage now, and because the Governor has passed some new rules to help out. State agencies are being used to

help push for additional fueling stations, and existing requirements are being reinforced to encourage use of E85 in FFVs.

Renewable Fuels Association Presentation

Bob Dinneen (RFA) presented on the future of ethanol-blended gasoline. He brought up the following points:

- There are 96 plants producing 4.2 billion barrels of ethanol every year. Forty-three additional plants are under construction, which will produce 2 billion additional gallons. The EPAct and RFS bills are partly responsible for this increase, but the phase out of MTBE is also forcing the use of ethanol to create ETBE.
- As the ethanol market continues to grow, it is becoming a large part of the motor fuel market. Last year, for example, the market saw \$26 billion in economic activity and created 165,000 jobs.
- California is the largest market for ethanol use. The rail and barge infrastructure is in place now to deliver fuel to coastal markets relatively easily. The Southeast and Mid-Atlantic area infrastructures are being developed.
- 30% of the nation's fuel is ethanol. Technology, consumers, and manufacturers are evolving continuously. It took a long time to increase capacity. The farmer-owned ethanol plants have increased dramatically over the last 10 years because farmers are great innovators. This has political and commercial implications. Ethanol is replacing natural gas in some areas.
- Research programs are strong and growing. Cellulosic ethanol research and development is increasing in the US, and one company has announced the construction of a cellulosic-to-ethanol and grain-to-ethanol plant in Spain that will produce a few million gallons per year. There has been research into corn fractionization coupled with oil extraction research, and a model stack has been built.
- By switching to ethanol blends, the GREET model demonstrated that 8 million tons of GHG emissions were reduced using data from a DOE 2002 survey.
- Ethanol is a blend component in gasoline, and has a lot of competition with other MTBE replacements. How much, how fast, and where to store the blends are the questions on the political landscape right now. Increasing the production and use of E85 vehicles is paramount.
- The current upper bound of ethanol production is 18 million barrels.

Nebraska Ethanol Board for National Ethanol Vehicle Coalition

Todd Sneller began his presentation by saying that 35 years ago, Nebraska (NE) established a program for ethanol-blended fuels. A coalition of 35 States has evolved from that program. However, challenges to infrastructure development for marketing ethanol remain. For example, NE does not have a critical mass to allow the ethanol market to flourish. He is particularly concerned that gas stations will not be willing to take tanks offline and dedicate them to ethanol fuel. Mr. Sneller suggested that private investors may get on board with the ethanol program with tax credits or other incentives.

Currently, NE's ethanol program is focused on State fleets because it is easier to acquire and fuel these vehicles at the State pumps. Recently, however, it has been easier to refuel at other stations, because the State has a cooperative agreement to use a State credit card for the purchase of E85.

Other challenges include the need to precisely measure the ethanol content in fuel blends. For example, there seems to be some seasonality in E85, so there may be E70 use in the winter and E85 in other months. He also mentioned that there is price discrimination when ethanol is first introduced. This was seen in the Northeast, until fuel stations offering ethanol increased from 2 to 35 in one year. Now, though, stations have seen a drop in ethanol sales, and ethanol fuel costs have become uncompetitive.

Mr. Sneller's main point was a challenge to Federal agencies to comply with motor fleet use of biofuels just like the State agencies. There also needs to be an increase in visibility and awareness, which can be facilitated by the Federal agencies.

One participant asked whether ethanol blending tanks would be available alongside the gasoline blending tanks at service stations. Mr. Sneller replied that new tanks would be available and that gasoline/ethanol tanks were available now, which allowed the consumer to choose the blend they wanted (e.g., consumers could choose E10 or E85).

Growing Energy: A Vision for Dramatically Reducing Oil Dependence

Mr. Kassel began his presentation by stating that the NRDC is working with technical experts on sustainable biofuels in an effort to reduce the nation's dependence on foreign oil. To do this, biofuels need to be cost competitive, and need to include cellulosic ethanol in the economic forecasting. The strategy needs to include a large investment in biofuels, in conjunction with improvements in land use and travel patterns, and more efficient vehicles.

Mr. Kassel commented that biofuel needs to become a gasoline alternative instead of just an additive. In the mean time, air quality impacts of low-blend ethanol fuel must be addressed. There are many unresolved questions to consider regarding low-blend fuels. The trade off between benzene and aldehydes may not be good. Will new climate change concerns be created if NO_x emissions increase from low blend fuels? What are the other aggregate and public health concerns? The ultimate solution to these issues is increasing E85 use. By increasing its use nationally, air quality will be protected, and increased use encourages the development of ethanol infrastructure. To reach the goals of 2050, ethanol should be more than just an additive, and EPA should work with States to promote high-blend ethanol use. There should be more flexibility for refiners to blend ethanol in non-ozone seasons, and EPA should update its Complex model as soon as possible.

Entire Panel Discussion

Mr. Johnson wanted to know if ethanol is really the "silver bullet" solution to decreasing dependence on foreign oil and reducing emissions, or if other options would be more viable.

Other options could include using Ethyl Tertiary-butyl Ether (ETBE) as an additive like some European countries, or converting farm stock to other fuels like a gasoline blend. Mr. Sneller replied that using ethanol as a fuel increases rural development and is essential to State economics. The NE has no petroleum refining capacity, so economically ethanol is successful and makes the most sense. Mr. Johnson continued his line of questioning by asking whether biodiesel would have the same benefit. Mr. Sneller replied that biodiesel has value, but it is not as great as ethanol. Biofuels are part of the holistic view, however.

Mike Walsh asked if various analyses of biofuels in EPA call on EPA to look at other types of renewable fuels, or are they skewed towards ethanol? Mr. Argyropoulos replied that the marketplace will make decisions on fuels based on competition and availability, but Congress is looking at it as an ethanol program without excluding the other opportunities with biofuels. Mr. Dinneen added that ethanol is not the perfect fuel, but it is a starting point in reducing foreign oil dependency, and we have to start somewhere. We have to have a business model to allow the market to grow, so for now ethanol is a blended product. There will be a transition when the market is saturated.

John Wall commented that E85 will displace gasoline sales more than diesel sales, and asked whether E85 will impact other products. Mr. Argyropoulos replied that EPA has not researched its impact on other fuels.

Mr. Rossmeissl commented that the National Energy Modeling System (NEMS) predicts that ethanol will always come out on top as the most viable option of renewable fuels. Ethanol could displace Fischer-Tropsch diesel production, but indicated that feedstock is the most important issue. Refineries will typically keep everything in their portfolio unless it is entirely worthless. Currently, refiners are not that invested in biodiesel because a lot of waste is generated in the form of glycerin. However, interest in biodiesel production may increase; one lab has demonstrated that glycerin can be converted to glycerol, which can be removed. Direct conversion technologies are expensive and risky, and would only be available in the long-term.

Mr. Raney wanted to know what the consumer response would be to the increased trips to the gas pump given the decreased mpg capability of ethanol. Jeff Buss replied that there hasn't been a lot of concern so far in MN. This gets back to the role of alternative fuels. Alternative fuels do not solve problems, but in the future vehicle emission standards will be tighter. Hybrids are still important part of the picture, and will be as important as alternative fuels. Mobility is also important, as people will want to travel in similar patterns. The best thing to do would be to create as many different options as possible to increase diversity.

NRC Report on State and Federal Standards for Mobile Source Emissions

David Dickerson gave the presentation "State and Federal Standards for Mobile Source Emissions." David Allen (NRC) and John Holmes (NRC) participated by phone. The NRC has recently published a report examining the benefits and issues involved with other States adopting mobile source standards separate from EPA's standards. CA has been authorized to develop separate standards for decades, and other States have been allowed to adopt identical standards. The NRC examined scientific and technical practices of setting and adopting separate standards,

factors that cause States to move to more stringent standards, impacts that those standards may have on economics, air quality, and human health, and the effects that separate State standards have had on Federal standards. The NRC concluded that CA should continue in their pioneering role of setting more stringent standards, despite the inevitable costs. In addition, EPA should consistently participate in the process of helping other States adopt California standards.

Tim Johnson asked if the NRC had considered the National Low Emission Vehicle (NLEV) program established in the 1990s. This program came about through a collaborative effort between Ozone Transport Commission (OTC) States, environmentalists, fuel providers, auto manufacturers, and other stakeholders to adopt the California LEV program throughout the Northeast OTC and on a national level. David Allen replied that the NRC examined that program in depth as part of several case studies, and reported it as a success story.

Mr. Walsh asked how the report will be available to participants. Mr. Dickerson replied that the report can be viewed on the NAS website. Participants can also request a copy of the pre-published report by emailing Mr. Holmes at jholmes@nas.edu.

Ms. Zaw-Mon asked if the NRC had received feedback from Congress on the report. Mr. Allen replied that there has been much interest from staff of House and Senate representatives, including Bond (S), Boxer (S), Feinstein (S), and Blackburn (H).

Vaughn Burns (DaimlerChrysler) asked about California's Zero Emission Vehicle (ZEV) program. Mr. Allen replied that the report did include some legislative and regulatory history of whether ZEV is part of LEV, as well as rulings regarding whether ZEV is part of the California LEV program. The report also examined the testing techniques California used in the ZEV program. Mr. Burns asked whether the ZEV mandate was separate from LEVII or Tier II, indicating that there did not seem to be much difference between the LEVII and Tier II programs. Mr. Allen replied that the NRC received information on the programs, and the report discusses the differences between them in the report. For example, the programs include different assumptions about how the fleet mix will affect meeting the standards.

Michele Robinson (Union of Concerned Scientists) asked for clarification as to why the committee disagreed on which approach would be most effective for State adoption of CA standards.¹ Mr. Allen replied that it would be more accurate to say that the committee disagreed on formally recommending either option. There was general agreement, however, that the process needs improvement. Mr. Allen stated that the official document is the committee's report, and the committee stands by what appears in the report. The committee discussed two methods of improving the process, and concluded that the methods are a policy decision that is outside the technical scope of the report.

Mr. Walsh asked if alternative fuels were included in the comparison of CA and EPA programs. Mr. Allen replied that the full report documents all methods of comparison.

¹ See slide 15: "Recommendations—State Adoption" in the presentation for a description of these options.

Wrap-Up

Mr. Walsh and Ms. Zaw-Mon acknowledged Deborah Wood for her hard work supporting the MSTRS. Ms. Wood is moving to a different department within EPA and will no longer be working with the MSTRS. Mr. Walsh introduced John Guy (EPA) as the new liaison for the MSTRS.

The meeting adjourned at approximately 3:30 p.m.

Participant List

Name	Affiliation
Mike Walsh* (co-chair)	Consultant
Merrylin Zaw-Mon* (co-chair)	EPA
Sally Allen*	Gary-Williams Energy
Cass Andary	Alliance
Paul Argyropoulos (fuel panel)	EPA
Joe Bachman (Designated Federal Official)	EPA
Robin Barrows (contractor support)	EC/R
Joel Beauvais	Latham & Watkins
Kathy Boyer (contractor support)	EC/R
Robert Brown*	Ford
Vaughn Burns (alt. for Reg Modlin*)	DaimlerChrysler
Jeff Buss	MPCA
Tom Cackette*	CARB
Nick Cernansky*	Drexel University
Don Clay*	Koch Industries, Inc.
Rich Cook	EPA/OTAQ
Hugh Dickey*	Chevron
Bob Dinneen (fuel panel)	RFA
Sarah Dunham	EPA
Randy Evans	Infineum USA L.P.
Roger Fairchild	Consultant
Chuck Freed	Consultant
Karl Freund	Volkswagen of America, Inc.
Herb Fox*	Murphy Oil Company

Participant List

Name	Affiliation
Sarah Froman	EPA
Terry Goff*	Caterpillar
John Guy	EPA
Bruce Heine (fuel panel)	Magellan
John Johnson*	Michigan Tech University
Tim Johnson*	Corning
Rich Kassel* (fuel panel)	NRDC
Joe Kubsh	MECA
Rich Olin	Virginia DEQ
Vickie Patton*	Environmental Defense
David Raney*	Honda
Jessica Robinson	Mitsubishi Motors R&D of America
Michele Robinson*	Union of Concerned Scientists
Michael Rodgers*	Georgia Tech
Neil Rossmeissl (fuel panel)	DOE
Ichiro Sakai	Honda
Antonio Santos	MECA
Nancy Seidman*	Massachusetts DEP
Ellen Shapiro	Auto Alliance
Eric Skelton (alt. for Coralie Cooper*)	NESCAUM
Lori Stewart	EPA
John C Wall*	Cummins, Inc.
Rob Wilson	Sensors, Inc.
Debbie Wood	EPA

***Indicates MSTRS member.**