

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

CO-CHAIRS: MICHAEL WALSH AND ROBERT SAWYER

DESIGNATED FEDERAL OFFICIAL: GREGORY GREEN

Minutes from the Quarterly Meeting of January 12, 2000

Holiday Inn - Washington on the Hill
Washington, DC

Introductions and Opening Remarks

Dr. Robert Sawyer, MSTRS Co-Chair, opened the meeting and welcomed attendees. MSTRS members, other participants, and observers then introduced themselves. (A list of individuals who attended the meeting is attached to the end of this document.)

Dr. Sawyer requested that representatives of the University of California, Riverside, examine the notes on Dr. Norbeck's remarks. Sam Leonard, General Motors Corporation, and John Elston, New Jersey Department of Environmental Protection, recommended that additions to Dr. Kittelson's and Mr. Greenbaum's presentations and question-response be made to the minutes from the October 10, 1999 MSTRS meeting. Upon making these changes, MSTRS members and other participants will accept the minutes of the October 10, 1999 meeting on the condition that the suggested changes have been made.

General Comments and Discussion of the Priorities of the Office of Transportation and Air Quality

Margo Oge, Director of the Office of Transportation and Air Quality, reviewed the priorities for the Office of Transportation and Air Quality for the upcoming year. The top priority is to make the Tier II program effective and to conclude the efforts regarding the reduction of NOx and PM associated with diesel fuel within the 2004 time frame. The Office also considers the five court-ordered rules a serious issue and top priority; for example, the Mobile Source Air Toxic rule has an April deadline and MOBILE6 will be released to the states in June 2000. Ms. Oge thanked the committee for their help with MOBILE6 and invited the committee to help with the creation of the next model.

William Becker, STAPPA/ALAPCO thanked the Office of Transportation and Air Quality for its efforts to balance the concerns of industry, environmentalists, and other stakeholders.

Administrative Announcements - John T. White, Office of Transportation and Air Quality

John White described the contents of the meeting packets. The handouts included:

- final agenda for the meeting;
- welcome address for observers and non-members;
- an organization chart with the names and phone numbers of the Mobile Sources Technical Review Subcommittee and the workgroup members;
- organization chart of the Office of Transportation and Air Quality;
- year 2000 calendar of MSTRS and workgroup meetings and other related events;
- report from the OMS workgroups;

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

- document on Emission Facts released by the Office of Air and Radiation in November, 1999;
- the Mobile Sources and Technical Review Subcommittee newsletter, edition #1;
- a listing of related websites from the NVFEL library;
- draft minutes of the quarterly meeting of October 13, 1999;
- a letter to MSTRS members from the EPA FACA OBD Evaluation Workgroup;
- minutes from a conference call on 12/15 on the future of MSTRS;
- "Phase II Reformulated Gasoline: The Next Major Step Toward Cleaner Air" brochure; and
- a meeting evaluation form.

Randall Guensler, Georgia Tech (and also chair of the Transportation and Air Quality Committee (AF103) of the Transportation and Research Board), described the workshop on MOBILE6 held on January 9, 2000 and the formation of a subcommittee workgroup to work on MOBILE6 outreach as it pertains to transportation issues. His organization will get in touch with Bill Becker's group.

On-Board Diagnostics (OBD) Workgroup - John Cabaniss, AIAM

John Cabaniss, AIAM, described the OBD Workgroup's mission and briefed meeting attendees on the Workgroup's findings and recommendations to EPA on how to revise the federal OBD I/M rules to provide more procedural flexibility to states. Two handouts were included in the packet regarding OBDs. The first handout is a copy of the slides that were used by Mr. Cabaniss for his presentation. The second handout is an excerpt of the letter that was sent to MSTRS members and alternates in mid-October, 1999.

OBD Mission

OBD was established in fall 1997 to evaluate the real world efficacy of OBD as an I/M tool. The group specifically looks at the feasibility of using OBD 2 (for 1996 and later model year cars) as an inspection tool and the effectiveness of the system in both detecting cars that are high emitters and ensuring that these cars get repaired. The Workgroup tries to identify any OBD operational or special implementation concerns. For example, the Workgroup has found that readiness codes and the location of OBD connectors have been a problem for OBD testing. The OBD Workgroup also suggests operating procedures to implementers, such as states and the EPA.

Findings of the OBD Workgroup

The Workgroup has reviewed the data from States with early implementation such as Colorado; Utah (Davis county); Wisconsin; and several EPA test programs. The Workgroup has looked at a significant amount of data, approximately 10,000 to 15,000 records per month for ten to twelve months. The Workgroup has targeted 200 vehicles that had failed an OBD or I/M test for inspection on the FTP.

A few months ago, the Workgroup recommended that the EPA issue implementation guidance for states that are implementing early. The Workgroup believes that EPA should revise the Federal OBD I/M rules to give states more flexibility than the current I/M regulation allows. Current OBD regulations require an OBD check to be conducted in conjunction with another test such as the I/M test. This requirement does not allow states the flexibility to deal effectively with operating problems.

Because of the inflexible regulation, states cannot take advantage of advancing technology in I/M programs, which lead to consumer problems, such as higher costs, longer lines, and unnecessary

retesting. States need the flexibility to tailor the program to address operational problems while meeting air quality objectives and ensuring consumer acceptance.

The Workgroup has identified the advantages and disadvantages of different options for dealing with various technical problems. EPA could explore these options if it decides to implement the Workgroup's recommendations.

Current regulations require that OBD-checks be used in addition to other tests. The data show that OBD checks are an effective, stand-alone test. Mr. Cabaniss knew of only one instance in which the OBD check missed a high emitting car. The missed car had a cracked oxygen sensor behind the catalyst but passed the continuity check. Mr. Cabaniss noted that these types of incidents are rare.

OBD tests do not have errors of commission. If an OBD light is on, the car either has current emission problems or the car is likely to become a high emitter. Thus, OBD detects not only high emitters, but also catches and prevents cars from becoming high emitters. The OBD tests are objective. Using an OBD test in lieu of other another test will conserve economic resources, take less time, reduce redundant testing, and require less equipment. Because vehicles from model years previous to 1996 cannot be tested using OBD equipment, the tailpipe equipment to do this test will have to remain in use for a significant period of time but will be reduced as cars made before 1996 leave the market.

Potential Problems With Duplicate Testing

Even though the I/M 240 test and other transient tests may be the best technology known for testing tailpipe emissions, there is still the significant problem of false failures. The Workgroup has discovered higher levels of false failures in programs that use other tests such as ASM. False failure is not a problem associated with OBD testing.

Conflicting test results may also arise if OBD testing is done in conjunction with other tests. A vehicle could have its OBD lights on but still pass an I/M test. These conflicting results lead to otherwise avoidable consumer problems when only one criterion test is used. The Workgroup suggests that the states be allowed to choose whether to use OBD testing as stand-alone test or in conjunction with other tests. Some states may choose to use OBD testing with other tests to prevent any errors of commission.

Readiness Codes

The OBD system for some monitors is not ready for inspection. The Workgroup has observed that in the 1996 model year, there are approximately three to four percent of vehicles that are not ready for inspection. In the 1997 model year, one to two percent of cars are not ready for inspection; of the model year 1998 cars tested, less than one percent of vehicles are not ready for inspection. Thus over time, the design issue is becoming a decreasing problem. However, the Workgroup cannot conclusively determine if, as the cars get older, the percent of cars that cannot be inspected will increase. Initial theories suggest that the percent levels will not increase as cars get older.

Over 50 percent of the readiness code problems are caused by evaporation monitors that are not ready. Over 85 percent of readiness code problems are due to a combination of not-ready catalyst monitors and not-ready evaporation models. This is not surprising because these monitors are the most difficult to set. Current regulations specify that not-ready vehicles, which cannot be inspected, are not labeled as failed but the owner of the vehicle is required to bring the vehicle back for inspection at a later date. There is no assurance that when the owner returns for inspection that the monitors will be set; each

time the vehicle is returned for inspection it will not be ready for the inspection. The owner will probably have to take the vehicle to a mechanic to repair the monitors. This pattern of returning to the inspection station and repairing the monitor is the same as if the vehicle had failed the test.

The Workgroup has not found any correlation between the vehicles that are not-ready for inspection and those with high emissions. This is supported by the findings of the Ford Motor Company, which sampled the data and found that there was no statistical difference between the emission of not-ready cars and cars which were inspected.

The Workgroup examined several options that would reduce consumer problems associated with readiness codes. Once again, the Workgroup decided that while there were several good options available, the best party to decide which solution to choose would be the states.

Workgroup Recommendation

From these findings, the Workgroup advised MSTRS that EPA should revise the OBD I/M regulations to allow states and localities the flexibility to consider the merits of OBD checks in lieu of other I/M test, and to establish OBD test procedures to address readiness code issues in a consumer-friendly manner.

Discussion

Bob Sawyer asked if there were any data from California that would be applicable. Mr. Cabaniss replied that there are only a few states that are using an OBD test tool in their I/M program and California at this time is not currently using OBD as a test tool. The Workgroup received data from states that used OBD lights or an OBD scan as a test requirement. Colorado requires cars with its OBD lights on to undergo repairs, thus the result is the same as if the car had failed an I/M 240 test. Davis County, Utah, uses a scan test, but only a small number of cars are tested due to a small population. To supplement the Utah scan data, EPA started a pilot program in Wisconsin which allows 1996 and later cars to undergo an OBD scan test along with another test. These tests provided between 10,000 to 15,000 records a month. But the program is still relatively new and the Workgroup cannot predict what the data will look like five years into the future. However, with respect to readiness codes, the Workgroup believes that the current data are good predictors of the future since readiness code problems mainly result from the design of the car.

Greg Green, MSTRS Designated Federal Official, asked for further clarification on the Workgroup's recommendations on the available options for states to solve not-ready monitors. John Cabaniss replied that there are several options available; the most lenient of these options would be to exempt the small percentage of vehicles that have a *few* not-ready monitors. However, cars that have *all* of their monitors at a not-ready status should not be exempt; these cars should be required to undergo repairs to determine if the OBD system has been disconnected from the battery. Cars that have some monitors working demonstrate that no attempt was made to circumvent the inspection system. Another option would be to require not-ready cars, which cannot be OBD tested, to undergo another tailpipe test. States would choose the option that best suits their needs. For example, states that are concerned with I/M credits will choose the more stringent option.

Patrick Rahe, Hogan and Hartson, commented that the EPA will need to conduct a rulemaking process for states to be allowed to use OBD as a stand-alone test. It would be unwise to start this process without know for certain that the OBD system is better than I/M and without trying to issue guidelines

first. Mr. Cabaniss clarified that the states cannot legally follow any guidelines that deviate from the rule. The rule clearly requires a specific approach for cars in a not-ready state, thus states do not have any flexibility.

Michael Kulakowski, Equiva, asked about the status of exemptions used for overcoming the OBD requirements in the rule. Mr. Cabaniss responded that the OBD requirements continue to change, which means that there is always the possible need for exemptions.

Mike Walsh, MSTRS Co-Chair, commented that it is a little premature to eliminate the I/M test without several cycles of I/M and OBD testing occurring simultaneously to ensure that the OBD system continues to work well when used for a long period of time. There may not be a sufficient amount of data to confirm that the OBD system is durable on a long-term basis. It will be difficult to go back to other tests if the OBD system does not prove to be durable in the long-run. Mr. Cabaniss replied that several cycles have occurred since the program's inception four to five years ago. While the long-term answer may not be complete, the current data does allow the Workgroup to conclude that the OBD system is a good stand-alone test tool and it is better than the I/M test. The OBD test is able to identify and predict cars that are or will become high emitting cars. The equipment for other tests will still be at the inspection station to inspect cars made before model year 1996; the long transition period will allow enough time to finalize the decision on which test to use.

Virginia McConnell, Resources for the Future, suggested that a summary of the data used by the Workgroup, and a comparison of the failure rates and the cost of repairs faced by consumers be given to the Subcommittee. This information would be useful to the Subcommittee when trying to determine the difference in effectiveness between the I/M and OBD test. The Workgroup also could recommend that if states elect to use the OBD test only, a small sample of cars could be tested using both I/M and OBD tests to determine if OBD does not compare well with I/M over time.

John Elston, NJ DEP, commented that there is not enough information to determine how the OBD system will work on cars that are older and have significantly more mileage on them.

Mr. Elston also commented that the use of credits and the number of credits given will determine what test the states will choose and at this point, there is no system of credit equality between the OBD and I/M tests. There are two types of OBD checks, the OBD checks lights and the OBD scan coder. Mr. Elston also cautioned against using "loose" language in the workgroup report.

Sam Leonard asked for clarification regarding the fact that the Workgroup had examined a significant amount of data but found only one car was mistakenly passed using the OBD test. Edward Gardetto, EPA, responded that there are two databases, the Wisconsin database and the FTP database. The one example used by John Cabaniss came from the Wisconsin database. The FTP database is very small but accurate. The Wisconsin database is useful for examining issues such as readiness and failed elimination rates. Sam Leonard commented that almost all OBD functions rely on software and thus should not deteriorate over time.

Bob Sawyer remarked that the vehicles being examined are new vehicles and are unlikely to be high emitters. Dr. Sawyer recommended delaying action until more information is available. Sam Leonard commented that from a car manufacturer's point-of-view, false failures with the I/M system are of great concern; with the OBD system, the light allows easy detection of a failure or a fault in the wiring. Roger Orteca, DaimlerChrysler Corporation, commented that, for vehicles made after 1996, the OBD test is better than the I/M 240 test.

Mike Rogers, Georgia Tech, suggested that MSTRS could use multiple approaches to solve these problems. A prescriptive approach to solving readiness code problems is not advisable because of the large number of consumers affected; this issue is best handled by the individual states. The subcommittee cannot wait too long to make a decision because it needs enough time to conduct a rule-making process to deal with the January 1, 2001 implementation deadline for OBD 2 checks.

Margo Oge suggested that the Workgroup try to address some of these issues discussed at the meeting. She stated that the Office of Transportation and Air Quality is committed to fixing the OBD I/M program. The Office is convinced that conducting two systems simultaneously will undesirably lengthen the time that cars are in the lane waiting to be tested and increase the inspection costs. Bob Sawyer responded that the subcommittee needs more information on the emissions implications of using a particular test and the decision process that will be used to decide to switch back to a tailpipe test if the OBD system does not work. Dr. Sawyer recommended that the Subcommittee accept the report of the Workgroup but not act on its recommendations at this time. Mr. Cabaniss responded that the impending 2001 implementation date is an important deadline and that these issues need to be addressed. Ms. Oge asked for the Workgroup to report to the Subcommittee at the next meeting about its recommendations on the issues raised at the meeting.

The Future of MSTRS

Greg Green discussed a series of conference calls on the role of MSTRS and its interaction with the Clean Air Act Advisory Committee (CAAAC). From those conference calls, Mr. Green, John White and the MSTRS Co-Chairs were able to make three primary recommendations: 1) The Subcommittee needs to receive more input from both the Office of Transportation and Air Quality and the Clean Air Act Advisory Committee on their plans and their expectations from the MSTRS Workgroups. 2) The subcommittee needs to speak to a more relevant audience. This means that the appropriate EPA personnel need to be present at the MSTRS meetings, and the subcommittee needs to better communicate with the other subcommittees of the CAAAC. 3) The subcommittee would like more feedback from the CAAAC on the formal recommendations offered by MSTRS, and more direction and accountability regarding the work that the MSTRS undertakes.

Paul Rasmussen, CAAAC DFO, responded that the CAAAC would welcome hearing from MSTRS. Mr. Rasmussen described the interplay between the CAAAC and the four standing subcommittees. The full committee meets quarterly. He suggested a presentation of a formal report on the results of the MSTRS by either the Co-Chairs or Margo Oge and offered to include a spot on the agenda at the next CAAAC meeting on February 15.

Patrick Rahe commented on the importance of transportation issues; the CAAAC acknowledges the impact of transportation on air quality. Historically, the CAAAC has examined transportation issues, such as mass transit systems in the long-term. The subcommittee should educate the CAAAC about the importance of vehicular emissions. Mr. Rahe commented on the beneficial impact the MSTRS could have on other subcommittees. MSTRS is advanced in both data development and involvement of industry.

John Kowalczyk, Oregon Department of Environmental Quality, suggested additional points that could be drawn from the summary of "The Future of MSTRS" conference calls. MSTRS members should be careful not to separate themselves from relevant policy issues. The subcommittee should create

a long-term work plan. The subcommittee should also examine the issues surrounding off-road and non-road vehicles, including the impacts of off-road engines on air quality.

Margo Oge invited members to let the MSTRS know of specific issues related to off-road vehicles that are of interest to them. Most of the work being done on the off-road issue is focused on PM emissions and diesel fuel emissions. Ms. Oge offered to brief the committee at the next meeting on the work her office is doing on off-road engine emissions trends and impending regulations. Three of the four court-ordered deadlines are for the off-road regulations.

Sam Leonard asked when the next emissions report will be released. Ms Oge replied that an issue will be released in the Spring, if not sooner.

Bob Sawyer concluded the "Future of MSTRS" meeting by suggesting that the MSTRS chairing committee examine the suggestions put forth in the discussion and develop a long-term work plan for MSTRS.

California Air Resources Board's (CARB's) Reformulated Gasoline (RFG) Phase 3 Program- Steve Brisby, CARB

Overview of the CARB's RFG Phase 3 Program

Steve Brisby, California Air Resources Board, presented the history, specifications, costs, and benefits of CARB's RFG Phase 3 Program. The California gasoline program was started in 1971. Oxygenated gasoline has been used since the late 1970s to increase octane levels. In 1992 the Clean Air Act required oxygenated gasoline to be used during winter in CO non-attainment areas. Year-round use of oxygenated gasoline started in 1995 in federal RFG areas; at the time, this accounted for 30 percent of gasoline used nationwide. Based on economic assessments, California chose to use MTBE as an additive to improve the oxygenate qualities of gasoline.

California's rules are flexible; the emission benefit requirements can be met without using oxygenated gasoline except in the southern coastal regions of the state during winter. Currently in the San Francisco Bay area, there is a significant amount of un-oxygenated gasoline being used without any noticeable effect on air quality benefits. The federal minimum oxygen content applies to Federal RFG areas; this is a year-round requirement.

In 1999, California's RFG Phase 3 regulations were adopted. The CaRFG Phase 3:

- prohibits the use of MTBE;
- changes the specifications to ensure that benefits are preserved and flexibility is provided;
- updates the predictive model and adds an evaporative emissions model;
- provides CO credit for oxygen above two percent;
- amends the wintertime oxygenate period to exclude the month of October and the CaRBOB on ethanol blending; and
- allows for early opt-in.

Currently there are no Reid Vapor Pressure (RVP) limits for the wintertime. Ensuring compliance with ethanol blending regulations when transporting ethanol via common carrier pipelines,

which is common in California, will be a problem. (See slides for exact caps and limits regarding the specifications and model for the CaRFG Phase 3 Program.)

Benefits and Cost of CaRFG Phase 2 Program

The benefits of the CaRFG Phase 2 Program include:

- emission reductions equivalent to removing 3.5 million cars from the regional roads;
- reductions of smog by 15 percent;
- reductions in the potential cancer risk by 40 percent;
- reductions in benzene by one half; and
- SIP reductions of one quarter.

CARB estimated the cost of gasoline would increase by 5 to 15 cents per gallon as a result of the Phase 2 Program. In 1996, the California Energy Commission estimated CaRFG Phase 2 actually cost between five to eight cents per gallon. In November of 1999, the California State Attorney General's Office assessed the increase in price to be only four cents per gallon. However, surrounding states did have higher prices than California.

John Elston asked if they could determine the cost of the benzene specification. Mr. Brisby replied that the ARB did not estimate the cost of benzene changes by specification. The cost is determined based on the results of a predictive model. Thus the cost is for all eight specifications and cannot be separated out to find the cost of an individual specification.

Mike Kulakowski asked if the program allowed annual sulfur levels as high as 70 ppmw, and if there were other air quality compensations. Mr. Brisby replied that the Phase 3 cap was at 30ppmw and levels higher than that are not allowed. By 2004, there will be no gasoline with levels higher than 30ppmw, and most refineries are expected to have levels around 10ppmw.

The CaRFG Phase 3 Program capital cost is estimated to be significantly less than one billion dollars. In October, the estimates of ongoing costs were between two to six cents per gallon. The ethanol industry and one refiner believe the costs will be less. The federal oxygen waivers could reduce the cost up to two cents per gallon. If MTBE costs more than ethanol or alkylate blendstocks, then the cost could be zero.

Environmental Impacts of CaRFG3

The removal of MTBE from gasoline will stop the contamination of existing water sources. Increased ethanol use may result in a slightly higher increase in diesel exhaust from trucks transporting ethanol. There is no expected net increase in greenhouse gas emissions. Decreases in NOx and potency-weighted toxics are expected.

The ARB has completed extensive modeling exercises on the effects of the Phase 3 Program on air and water quality. There are no adverse water and air quality impacts associated with the switch to ethanol or non-oxygenated gasoline. The report is available on the internet from CARB's website and will be presented to the Governor's Environmental Policy Council.

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

There are other problems associated with the commingling of gasoline with ethanol and gasoline without ethanol. When the two are blended the RVP increases, which results in slightly higher evaporative emissions. To avoid the problem caused by commingling, the evaporative model baseline is set at one tenth of a pound less. The ARB has committed to further investigate the effect of commingling on RVP, and to lower RVP or reduce sulfur levels to ensure 1998 air quality neutrality. This effect will be a moot point without the oxygen waiver. The effect on emissions depends on factors such as the oxygen waiver, the refiner's fuel mix choices in a given area, and consumer brand and grade loyalty.

External Process

Over the last nine or ten months, the ARB met with all interested stakeholders and held nine public workshops. The ARB was advised by consultants Dr. Sawyer from University of California (UC), Berkeley and Dr. David Rocke from UC, Davis. The findings were then peer-reviewed by three individuals at UC Berkeley and California State University.

Executive Order D-5-99

A study done by the University of California and many public hearings determined that MTBE presented a threat to groundwater, surface waters and drinking water. Most of the threat was due to leaky underground gasoline storage tanks. MTBE is highly soluble in water and is thus transferred to groundwater faster than other constituent gasolines. Small amounts of MTBE will make water undrinkable. MTBE threat to human health has not yet been proven. MTBE is not essential to cleaner-burning gasoline.

Based on these findings, California's Governor Davis issued executive order D-5-99 for the phase-out of MTBE from California's gasoline by the "earliest practical date" but no later than December 31, 2002. The Governor directed the ARB to adopt CaRFG regulations to provide additional flexibility in removing the oxygen from gasoline while preserving air quality benefits. He also directed the ARB to request the U.S. EPA for a waiver that would exempt California from the summertime federal oxygen requirement. The ARB and the State Water Resources Control Board (SWRCB) were also ordered to conduct an analysis of the environmental impact of the transport of ethanol. The Office of Environmental Health Hazard Assessment (OEHHA) shall prepare an analysis on the health risk associated with using ethanol, and the California Energy Commission (CEC) shall look into steps to foster waste-based or other biomass ethanol development in California. These studies will help determine if ethanol is an acceptable substitute for MTBE. The Coordinating Board shall determine if there are any unexplored or undiscovered risks associated with using ethanol and present its findings to the Governor's Environmental Policy Council on January 18, 2000.

New State Legislation

Senate Bill 989, the Sher Bill, ensures that the CaRFG Phase 3 Regulations maintain or improve emissions and air quality benefits achieved by CaRFG Phase 2 and provide additional flexibility to reduce or remove oxygen from motor vehicle fuel. This bill gave the authority to ban MTBE.

Senate Bill 529, the Bowen Bill, establishes a mechanism for a multi-media review of revisions to ARB's CaRFG standards. The findings of the review must be examined by the Governor's Environmental Policy Council.

Next Steps

The next steps for the CARB will be to:

- follow up on the EPA oxygen waiver;
- adjust the predictive model to reflect the final EMFAC 2000 for RVP and evaporative emissions and vehicle group weightings;
- return to the board by October 2000 with recommendations on the downstream blending regulations, small refiner provisions, and denatured ethanol specifications;
- request the U.S. EPA to consider a national driveability index specification;
- initiate the process to monitor a refiner's progress toward compliance;
- conduct a commingling study in 2001; and
- verify that the air quality benefits are at 1998 levels.

Conclusion

The CARB has adopted the staff proposal to phase out MTBE and to provide refiners with additional production flexibility while maintaining the emissions benefits of the existing reformulated gasoline program. The Board had directed its staff to return no later than October 2000 in order to address the CaRBOB and denatured ethanol specifications and small refiner provisions.

Discussion

John Kowalczyk asked if the cost was above and beyond Phase 2 costs. Mr. Brisby replied that the cost is expected to be approximately five to eight cents for the first year and is expected to drop significantly in later years. The cost is probably overestimated.

Patrick Rahe asked if the goal for maintaining or improving 1998 air quality standards apply only to MTBE removal specifications or to other specifications as well. Mr. Brisby replied that the 1998 goal was for the adoption of the Phase 3 Regulations; any changes to California's gasoline provisions would require a multi-media analysis. This goal was driven by the need to remove MTBE from gasoline. Mr. Rahe asked why the goal was not worded to require improving the air quality beyond 1998 standards. Mr. Brisby replied that while there was support for wording that required improvements to the air quality conditions but the probability of gasoline supply problems was the driving force behind not going beyond the 1998 air emission standards.

Mike Kulakowski asked if the ARB analysis and meetings with stakeholders indicated that there will be a supply problem because of Phase 3. The removal of butanes and pentanes combined with the increase in California gasoline consumption will result in a shortage of supply. Mr. Brisby replied that California is at refinery capacity and will begin importing gasoline in the next couple of years.

Ellen Shapiro, Alliance of Automobile Manufacturers, asked if the CARB was unwilling to go beyond the 1998 limits because of the need to eliminate MTBE but is interested in going beyond the 1998 levels in the future. Mr. Brisby replied in the affirmative and stated that he thought the Board wants to reduce sulfur levels.

Challenges Facing the Domestic Fuels Industry – Mike Kulakowski, Equiva Services, LLC and Bob King, Sun Company

Mr. Mike Kulakowski and Mr. Bob King made a presentation outlining the concerns of the refining industry in complying environmental regulations.

Mr. Kulakowski presented the first half. He began by pointing out the following key facts about the refining industry:

- A refinery is a closely integrated facility.
- There are 115 operating refineries and they are all different from each other. Refineries are designed to handle different grades of crude oil and produce different types of products.
- Although refineries are upgraded, improved, and re-optimized, no new refineries have been built since the 1970s.
- Refineries convert all raw material into a product. For example by-product gas is used to provide heat, larger molecules are broken into smaller molecules or are sold as petroleum coke.
- The refinery industry has a very high capital to labor ratio and relies heavily on automated process control.
- Refineries operate constantly between two major shutdowns, which may be five years apart.

Mr. Kulakowski then talked about four refining processes, namely boiling, breaking, bending, and blending. Boiling is a basic separation process and is the first step in refining. The boiling or fractional distillation process includes heating the crude oil, capturing vapors of different compounds at different crude oil temperatures, and separately condensing different vapors. The boiling process, which is carried out under close to vacuum conditions of 5 to 10 mm of mercury, yields rough separation of the crude oil. Approximately 30 percent of the crude oil is converted into gasoline and diesel. Besides gasoline and diesel, raw crude oil yields a mid-range product that looks like motor oil and which has molecules that are too big to be used by motor vehicle or airplane engines. Molecules of this mid-range product are broken using fluid catalytic cracking (FCC), hydrocracking, and coking. Another group of processes used in the refineries are the “bending” processes. Bending processes involve rearranging the molecular structure of compounds. Alkylation is a bending process in which two small molecules are bonded together to form a bigger molecule. Blending is the last process in refining, wherein the intermediate streams are combined to form the specified product.

Mr. Kulakowski then exhibited a transparency that described the generic timeline of a project in a refinery. The timeline has four sequential steps, namely feasibility study, project scope definition, preliminary engineering, and detailed project execution. Obtaining the environmental permit for the project is an important part of the preliminary engineering step and project execution cannot begin without the permit. Mr. Kulakowski pointed out that some of the critical path items like heavy walled reactors or compressors can take one or two years to obtain. He noted that heavy walled reactors, needed to remove sulfur from diesel, are specialty items that have only six to eight manufacturers in the world (all outside U.S.). Mr. Kulakowski thought that if 115 refiners tried to obtain heavy walled reactors from the manufacturers at the same time, supply problems will ensue.

Mr. Kulakowski then presented a transparency that displayed the fuel regulatory time line and assumed lead times of four years for complying with the regulations. He noted that the four year lead times for permitting, design, and construction of many projects overlapped with the lead times for other

projects. Mr. Kulakowski pointed out that refineries were continuously performing permitting, design, and field construction. He stated that the refineries would prefer to perform the activities for the regulations sequentially rather than concurrently.

Finally, Mr. Kulakowski pointed out the differences between the past and future regulations. He noted that both the nature and the stringency of the present regulations were different from those of the past. Most prior regulations did not impact all production. For example, only 30 percent of the gasoline in the U.S. was required to comply with the RFG regulations. The upcoming regulations are universally applicable and all refiners must participate regardless of economics. Thus, all refiners will have to buy equipment and draw on the construction industry to build the projects. The demand for new equipment is expected to be much higher than before. The refining industry prefers performance-based programs rather than prescriptive programs like the Tier II sulfur regulations. The future regulations are more stringent than the past regulations and that affects the operating capabilities of the refineries.

Mr. King presented the second half of the presentation. He began by outlining the cumulative regulatory impact on refineries. He stated that refineries are required to comply with fuel and stationary source regulations. He noted that in 2002 a refinery would be trying to comply with six to seven independent regulations. He thought there is no synergy between the different regulations and each regulation is unique and has specific stand-alone impacts. He thought that the compressed and overlapping regulations would compete for the limited resources in terms of money, people, and time.

Mr. King presented a transparency stating that the refinery industry is facing massive regulatory project investments both in terms of funding and labor. The costs of complying with the EPA gasoline sulfur, low sulfur diesel (on-road), low sulfur diesel (off-road), and California MTBE removal/Phase 3 RFG were estimated to be 4 to 7, 4 to 8, 1 to 2, and 0.2 to 1 billion dollars respectively. Removal of sulfur from diesel is expected to cost more than removal from gasoline even though gasoline usage is much more widespread. The refineries expect to spend over 10 billion dollars to comply with future fuel requirements. Mr. King then displayed the percent return on investment in the refining industry from 1988 to 1996. From a return on investment in the low teens during the late eighties the returns have slipped recently to the three to four percent range. Mr. King stated that the refinery industry is not financially healthy and that efforts are made to minimize capital investment.

Regulatory Reality Checks

- *Delivery capabilities of very low sulfur fuels in commingled systems.* The refinery industry is concerned about low sulfur level fuel not only from a production standpoint but also from a transportation standpoint. Fuels are transported using barges and pipelines to retail outlets. Different fuels are transported through pipelines in sequence, e.g., gasoline, distillates, jet fuel, and kerosene. Thus, there is a possibility of the contamination/degradation or interruption in delivery of the low sulfur product being transported.
- *Technology demonstration.* The four potential demonstrated technologies to remove sulfur that have been used as the basis for the cost estimate of Tier II standards are Mobil (Octgain), CDTech (CDHDS), Phillips Szorb, and Black and Veatch (IRVAD). Out of the four potential demonstrated sulfur removal technologies only one, Mobil (Octgain), has been commercially demonstrated. Mr. King thought that it is not viable to base the cost of a regulation on a prospective technology that has not been commercially demonstrated. He said that there is a

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

learning curve associated with new technologies and the fifth or sixth unit might achieve the cost estimated by EPA. However, most refineries will be investing in similar facilities at the same time and the learning curve will not have the time to be transferred through the vendor knowledge base or the refining industry or the construction industry. Mr. King expressed his skepticism about these technologies working in their first application.

- *Need for near-perfect refining operations.* The stringent regulation requiring the removal of 95 percent of sulfur would lead to a greater probability of errors in operation.
- *Permitting issues.* Gasoline and diesel facilities and stationary sources will need permits. Mr. King stated that his refinery was having trouble getting permits through local agencies in time for their normal course of business decision-making. He expected an increase in wait time as many refineries try to comply with their regulatory requirements and simultaneously need approvals from state and local agencies. He stated that refineries would be trying to comply with multiple regulations at the same time. He predicted that states with the greatest concentration of refineries would face problems in timely execution of their work.
- *Resource availability.* More regulations means refineries have to hire more personnel and thus increase their cost. More personnel are needed to evaluate and design projects, choose vendors, choose licensors, and choose construction companies. The building trade is presently experiencing a shortage of skilled manpower. The current economic boom and commercial development compete with the refining industry for labor demand. The number of people employed in the construction craft is reducing due to retirements outpacing enrollments. Construction work is not sufficiently attractive to high school graduates and some people think that the wages are low. The manpower shortage is expected to persist in the near future. Mr. King thought that the construction needs for complying with the regulations, the building trade manpower shortages, and permitting delays are expected to cause a lot of companies to seek time extensions.
- *Unanticipated outcomes.* Mr. King stated that past regulations have had unexpected outcomes. He gave the example of on road diesel regulations of 1992 that caused pump failures for a lot of trucks due to the lubricity and expansion characteristics of low sulfur diesel fuel. He also mentioned MTBE as an unexpected outcome of the CAA for oxygenates. Mr. King thought that based on past experience the present set of regulations would also have unanticipated outcomes.

Conclusion

Mr. King ended the presentation by outlining his thoughts and recommendations for EPA to consider while addressing current regulatory development. He stated that the refining industry would prefer fuel and stationary source regulations to be in series rather than parallel. He emphasized the recognition of "reality check" items in regulatory development and implementation. He requested a constant road map and flexibility in fuel rules. Finally, he requested recognition of the fact that refineries and the distribution network are facing simultaneous compliance with a number of rules. Thus, fuel and stationary source regulations and fuel production would be competing with each other for the same internal resources.

Factors Driving and Limiting Future Fuel and Fuel Quality Changes – Barry McNutt, Department of Energy (DOE)

Mr. McNutt works in the policy office at DOE. He formulates DOE's views on fuel issues and often interacts with EPA on fuel related issues. He gave a presentation on factors driving and limiting future fuel and fuel quality changes. Two main factors driving US technology policies for vehicles and fuels were identified as energy security and vehicle emissions, especially their contribution to urban air pollution. The energy security issue is important because transportation accounts for one fourth of total energy use. However, the public is not too concerned about this issue as long as gasoline is reasonably available and the price is stable. Thus, over time the role of fuels as a source of vehicle emissions has become the dominant factor in the U.S. technology policies for vehicle fuels.

Mr. McNutt noted that the Tier II standards were the second serious effort by EPA to change fuel quality for enabling vehicle technology thirty years after mandating removal of lead from gasoline. EPA did mandate changes in vehicle fuel quality during the thirty-year period, however, these changes like RVP reduction and Phase II reformulated gasoline were made for their direct emissions benefits. Mr. McNutt stated that the Tier II standards for low sulfur fuel reflect the position that fuels and vehicles are a system and need to be looked at holistically. Thus, fuel quality changes are being carefully integrated with vehicle changes. He stated that because a number of technical, economic, and policy tradeoffs are involved in setting fuel standards, EPA could use some advice from MSTRS meeting attendees.

Mr. McNutt pointed out that in an earlier presentation cost and price were used interchangeably. He stated that cost and price were different. He stated that the government estimated the manufacturing cost of fuel quality changes, the market would determine the price. Mr. McNutt thought that the bottom-line question for the MSTRS to consider is whether the consumers are getting their money's worth. He believed that the consumer's interest would be served by achieving the environmental goals and at the same time ensuring that price is reasonable and does not deviate too much from the cost. Mr. McNutt thought that the subcommittee's activities relative to the fuels subject should try to find fuel and vehicle programs that work for the consumer. He stated that consumer reaction to fuel price and its stability can "tear apart" fuel or vehicle programs because ultimately the consumer pays for these programs. The program can also fail if the refinery cannot meet the specifications because the technology was unproven or if several refiners decide not to make additional investment. Thus, the MSTRS should look at the fuel issue more broadly.

Mr. McNutt agreed with the refiners that their financial performance is poor. He also noted that was the reason why the refining industry is restructuring. Pennzoil is leaving the refining business by closing one refinery and selling two others. Mr. McNutt pointed out that was important because the loss of a potential clean fuel supply source could result in price changes. Mr. McNutt said that DOE's National Petroleum Council is about to finish a major study about the impact of regulation on refining industry. He thought parts of the study might be relevant to the MSTRS agenda.

Discussion

Virginia McConnell, Resources for the Future, asked if all the refiners were subject to the same regulations why the cost of the regulations could not be passed to the public. Mr. Kulakowski replied that all U.S. refiners would be subject to the same low sulfur regulations by 2008. However, globally the refiners face different requirements. He also stated that refining is a commodity business with no product

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

differentiation. Mr. King added that consumers do not behave as their interviews might suggest. He gave the example of the early introduction of RFG at the same cost as regular gasoline; RFG did not attract extra consumer demand. Mr. McNutt pointed out that the cost of the regulations cannot be recovered because the cost of marginal production of a barrel of oil is very low and tends to determine itself. He stated that in the history of environmental regulation no capital recovery had occurred on the environmental part of fuel only capital recovery on variable cost had occurred.

Tim Johnson, Corning, Inc., asked why some refineries are able to produce low sulfur fuel today while others are not. Mr. Kulakowski replied that no two refineries are alike and different refinery configurations result in different products. He stated that installation of a hydro cracking unit at his facility instead of a fluid cracking unit, a choice made 25 to 30 years ago, would have produced gasoline with no sulfur.

Mr. Johnson also wanted to know how refineries in Germany, Sweden, and UK are able to produce 10 ppm diesel fuel. Mr. Kulakowski pointed out that European refineries receive tax subsidies and thus, it costs approximately 19 cents to produce a gallon of low sulfur diesel in UK.

William Becker, STAPPA/ALAPCO, responded to the issues raised by Mr. Kulakowski and Mr. King in their presentation. Mr. Becker commented that the air quality problem is very serious and the refinery industry is a significant contributor to the problem. Stretching the regulations in series will not solve the air pollution, health, and environmental problems as expeditiously as the congress and public demand. He challenged the contention that regulations in series would work better. He thought that economies of scale and the sooner achievement of the end result would probably make regulations in parallel more attractive.

In response to a comment, which suggested that the costs of compliance were based on commercially undemonstrated technologies, Mr. Becker stated that the government had never under-predicted the cost of complying with any fuel standard. He noted that RVP was predicted to cost a nickel a gallon but ultimately cost only a fraction of a cent.

In response to the comment by the industry seeking a constant road map from EPA, Mr. Becker stated that both the EPA and the industry change road maps. He noted that the industry lobbied governors against opting for lower RVP because of problems associated with it. However, when RVP was found to be a cost-effective program the industry lobbied against opting into RFG. The EPA has provided the refineries a lot more time than the state and local agencies wanted for phasing in the program. A significant percent of the refiners are getting extra time either under SBREFA or the geographic initiative.

On the issue of permitting, Mr. Becker admitted that states are behind but he stated that the states are going to catch up. He stated that delays in permitting aren't always the fault of state and local authorities. He thought that part of the blame should be shared by the industry that may not submit a robust permit application.

Mr. Kulakowski agreed with Mr. Becker that refineries are partly to blame for delays in permitting lay with the industry. However, he noted, the main concern with permitting for refineries was that, through this process, any interested party could stop a project, even one that would be beneficial to the environment. He noted that trade and labor unions had held one of his project shostage. Mr. King

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

concurred with Mr. Becker and Mr. Kulakowski that the refiners and the states both share a responsibility with respect to permitting. However, he stated that there is a lot of opportunity for third party intervention and the risk of that happening is growing.

Mr. Kulakowski responded to Mr. Becker's comments that RVP had cost only a fraction of the cost EPA had predicted. He thought that cost and price were being confused. He stated that just because the consumer sees a small cost does not mean that he did not have to spend more to produce the fuel. He stated that his refinery had made an investment but the return on that investment was less than desirable. Mr. Kulakowski still thought that EPA should have justified the program based on commercially demonstrated technologies. By assuming that the technology exists, a promise has been made that benefits will accrue at the stated cost although this might not work out.

Mr. King noted that a lot of the programs including RFG had been voluntary. He stated that the geographic and market impact of RFG was found to be less than predicted. He stated that most economically capable refiners can make RFG and they choose to make it.

Dr. Sawyer asked about the chances of world fuel supply and demand getting out of balance. Mr. McNutt responded that in the 25 to 30 year future horizon relevant to the Subcommittee, he did not see a crunch. He expected environmental and quality performance requirements for fuels to reduce pressure on supply.

Mr. Elston noted that the paradigm for the rulemaking process has been constantly changing and the government would be happy to hear suggestions for a better paradigm. He pointed out that the government had gathered the power industry and suggested combining all the CAA rules and sequencing them as long as the industry met the intent of the CAA rules. The power industry had refused the offer.

Ms. McConnell asked if MSTRS could look at in the context of Tier II and its position in the regulatory process. Mr. McNutt mentioned on-road diesel to off-road diesel, technology movement between industries and sectors, and policies maximizing technology uptake.

Wrap-Up

The next MSTRS meeting will be held on April 12 at facility in the Washington DC area. Mr. Walsh adjourned the meeting about 3:15.

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

List of Attendees (Members or Alternates)

Gordon Allardyce	Daimler Chrysler Corporation	248-576-8053
William Becker	STAPPA/ ALAPCO	202-624-7864
Kelly Brown	Ford Motor Company	313-322-0033
Robert Brown	Ford Motor Company	313-3223198
John Cabaniss	Assoc. Of Int. Auto Mfgs. Inc.	703 525-8817
Tom Durbin	University of California, Riverside	909-781-5794
John Elston	New Jersey Dept. of Env. Protection	609-292-6710
Jerry Gallagher	Colorado Dept. of Public Health	303-692-3128
Richard Gibbs	New York Dept. Of Environmental Protection	518-485-8913
Greg Green	EPA-Office of Transportation and Air Quality	734-214-4488
Randall Guensler	Georgia Institute of Technology	404-894-0405
John Johnson	Michigan Technological University	906-487-2576
Tim Johnson	Corning, Inc.	607-974-7184
Bob King	Sun Company	215-977-6599
John Kowalczyk	Oregon Dept. of Environmental Quality	503-229-6459
Mike Kulakowski	Equiva Services, LLC	310-522-6199
James Lents	University of California, Riverside	908-781-5731
Sam Leonard	General Motors Corporation	313-556-7711
Virginia McConnell	Resources For the Future	202-939-3406
Margo Oge	EPA-Office of Transportation and Air Quality	202-260-7645
Roger Orteca	DaimlerChrysler Corporation	248-576-7935
Patrick Rahe	Hogan & Hartson	202-637-5682
Mike Rodgers	Georgia Institute of Technology	404-894-5609
Robert Sawyer	University of California, Berkeley	510-642-5573
Timothy Tindall	Detroit Diesel	313-592-7041
Mike Walsh	Consultant	703-241-1297
John White	EPA-Office of Transportation and Air Quality	734-214-4353

MOBILE SOURCES TECHNICAL REVIEW SUBCOMMITTEE
DRAFT MINUTES FROM THE MEETING OF JANUARY 12, 2000

List of Attendees (interested parties and other observers who identified themselves)

David Andress	David Andress & Associates	301-933-7179
Andrew Beck	National Automobile Dealers Assn.	703-821-7040
Matthew Best	Automotive Service Association	202-543-1440
Steve Brisby	California Air Resources Board	916-322-6019
James Cigler	PPMA	301-652-0774
David Codevilla	Sutherland, Asbill, & Brennan	202-383-0554
James Corbett	Carnegie Mellon University	412-268-2670
Bob Dinneen	Renewable Fuels Association	202-289-3835
Roger Fairchild	Shutler & Low	703-818-1320
Tom Frankiewicz	Ozone Transport Commission	202-508-3840
Susan Field	Toyota	734-995-2086
Charles Freed	Vehicle & Fuel Emissions	301-572-5023
John Garbak	Dept. Of Energy	202-586-1723
Edward Garetto	EPA-Office of Transportation and Air Quality	734-214-4322
Jeffery Hazle	National Petrochemical & Refiners Assoc.	202-457-0480
John Holmes	National Research Council	202-334-2045
Takuya Ikeda	Nissan	202-659-7737
Bridget Joyce	Porsche	770-290-3516
Dale Kardos	Dale Kardos & Associates	202-466-3649
James Kennedy	Bureau of Environmental News	202-452-5362
Sharon Kirk	National Petrochemical & Refiners Assoc.	202-457-0480
Tammy Klein	Information Resources Inc.	703-528-2500
Robert Larson	EPA-Office of Transportation and Air Quality	734-214-4277
David Lax	American Petroleum Institute	202-682-8479
Peter Lidiak	EPA-Office of Transportation and Air Quality	202-564-1091
Phillip Lorang	U.S. EPA - AQSSD	919-541-5463
Mary Manners	EPA-Office of Transportation and Air Quality	734-214-4873
Barry McNutt	Department of Energy	202-586-4448
Clayton Miller	Air Quality Coalition	909-612-5705
Arvon Mitcham	EPA-Office of Transportation and Air Quality	734-214-4522
Aki Nakamura	Honda	202-554-1650
Frank O'Donnell	Clean Air Trust	202-785-9625
Paul Rasmussen	U.S. EPA	202-564-1306
Stuart Romanow	EPA-Office of Transportation and Air Quality	202-564-9296
Nicole Safar	Trainum, Snowden & Deane	202-783-5488
Ellen Shapiro	Alliance of Automobile Manufacturers	202-326-5533
Mike Shields	EPA-Office of Transportation and Air Quality	202-564-1104
Andrew Stewart	Latham & Watkins	202-637-2158
Susanne Thomas	Volkswagen of America	248-340-4706
Gene Tierney	EPA-Office of Transportation and Air Quality	734-214-4456
Andy Vaichekauskas	Mitsubishi	703-525-4800 x226
Britt Waldon	Hunton & Williams	202-955-1681
John Williams	Eastern Research Group	703-633-1717
Merrylin Zaw-Mon	EPA-Office of Transportation and Air Quality	202-564-8991
Andrew Zemba	PA Dept of Env. Protection	717-783-9269