

**MTBE BLUE RIBBON PANEL**  
**Meeting Minutes**  
**March 1-2, 1999**  
**Hyatt Regency Harborside**  
**Boston, Massachusetts**

**OPENING REMARKS**

The second meeting of the Blue Ribbon Panel to review the use of Methyl Tertiary Butyl Ether (MTBE) and oxygenates in gasoline was held March 1-2, 1999, at the Hyatt Regency Harborside, Boston Logan International Airport in Boston, Massachusetts. Dan Greenbaum, Health Effects Institute, welcomed the Panel members and noted that some of the Panel may be delayed due to weather. Mr. Greenbaum informed the Panel that the Tosco representative scheduled to talk on fuels without oxygenates would not be able to attend. Mr. Greenbaum summarized the last meeting by noting two sets of issues that required additional information. The first set of issues in need of more detail, which will be focused on at this meeting, encompasses the topics relating to fuel blending, the role of oxygenates in fuel blending, fuel for air quality, potential alternatives, and how the fuel system works. Further discussions relating to the fuel system will be held at the next meeting in Sacramento, California. The second set of issues includes the realm of water implications, extent of contamination, nature of how fuels function in groundwater, and degrees of remediation and treatment. Some presentations on this issue will be heard at this meeting, however more discussions and presentations will be given regarding water issues at the California meeting. Additional topics to be covered at this meeting include research currently underway, Section 211(b) testing, and any questions relating to complete understanding of the air quality benefits of RFG, including strengths and weaknesses of the reformulated gasoline (RFG) program. Mr. Greenbaum noted that this is a national issue and one purpose of holding this meeting in Boston is to hear questions and concerns from this area of the country. The goal of this meeting is to provide an opportunity for the Panel to become more familiar with the general way fuels are refined, blended and distributed, and to learn about the different perspectives relating to fuel blending and air quality benefits.

Mr. Greenbaum asked that any corrections to the draft minutes from the January 22, 1999, meeting be submitted to Karen Smith of EPA for incorporation. Mr. Greenbaum noted that the minutes are not a formal transcript of the meetings, but will become a public document, so they should be as complete and accurate as possible. The Panel and the audience gave introductions.

**PRESENTATIONS**

## ***Gasoline Blendstocks and Refinery Operation***

Mr. Barry McNutt, U.S. Department of Energy, gave the first presentation covering the basic principles of the fuel blending process. Mr. McNutt presented the fundamentals of fuel blending related to the use of oxygenates. Mr. McNutt spoke of the refinery block diagram, which is used to explain process streams, typical blendstock combinations in gasoline, and grade/volume considerations and constraints. A refinery diagram illustration was briefly explained. Mr. McNutt then spoke of the delicately balanced gasoline process streams, and noted that all streams feed through and effect the entire system. The next issue was the difference between RFG and conventional gasoline (CG). The East Coast refineries produce two pools of gasoline (50 percent RFG and 50 percent CG) and each pool may have multiple grades of gasoline (i.e., premium, regular, etc.) because of different octane requirements. Refineries have different levels of flexibility depending on their configuration to shift production between the two pools of gasoline. In the East Coast, about half of the gasoline is reformulated; while elsewhere in country RFG is less than 20 percent of the gasoline produced. There are emission constraints on all gasoline; therefore, gasoline must not be produced below 1990 baseline emission standards. Bob Campbell, Sunoco, pointed out that one-third of the gasoline consumed in the Northeastern United States is manufactured on the East Coast, one-third is from the Gulf Coast, and one-third is from overseas. Therefore, when you discuss changes in gasoline, it is not just the East Coast refineries that would be affected.

Four categories of constraints on gasoline (both conventional and reformulated) blending include environmental (air quality), commercial, economic, and physical capacity. Environmental constraints on gasoline include the balance between components such as sulfur, aromatics, olefins, RVP, T50/T90 distillation points and benzene. The commercial constraints include startability, driveability, octane, and mileage. The economic constraints include operating costs (crude oil and product prices, product downgrades - decreasing the use of a product normally used only for gasoline production - and purchased blendstocks), and return on investment (clean product prices, capital costs, and alternative uses of capital).

Terms:

RVP = Reid Vapor Pressure (important to startability, heavily constrained by emission requirements)

T50 = Distillation point (temperature at which 50 percent of gasoline is vaporized)

T90 = Distillation point (temperature at which 90 percent of gasoline is vaporized)

(Both distillation temperatures are in the EPA complex model so if blendstocks are changed, T50 and T90 effecting compliance as well as driveability and startability will also change).

## ***U.S. Gasoline Supply/Demand Balance 1998 – 2002: 1998 NPC Study Analysis***

Mr. John Hackworth, Energy Information Administration, gave an overview of the 1998 National Petroleum Council (NPC) Study, which focused on the relationship between inventory

levels and market price dynamics of fuel production. Mr. Hackworth's presentation discussed the gasoline supply in relation to meeting U.S. requirements. In addition, the NPC study analyzed the ability of refiners to respond to market changes because of recent high levels of refinery capacity utilization. The study "U.S. Gasoline Supply/Demand Balance 1998-2002," showed that the growth in gasoline demand has increased average annual capacity utilization from 83 percent in 1986 to 95 percent in 1997. The base case demand outlook for gasoline showed slowing growth due to expected slowing of the economy. The high demand case showed the balance if the high growth of the past five years continues over the next five years. Both gasoline and distillate growth continue, which will drive the need for capacity expansions and high utilization. In conclusion, even with capacity growth, demand growth must be met in the base case by maintaining high utilization similar to those of 1997 and slight increases in imports. If demand growth is stronger than in the base case, both utilization increases and higher imports will be needed to meet demand. U.S. refineries will be operating at high utilization, especially in the high gasoline demand season (spring and summer) and there will be an increase in imports. The utilization rates are very high and can run in excess of 100 percent production capacity during high demand seasons. The NPC has confidence that operations can be adjusted to meet needs throughout the period. However, these assumptions were based on the continued use of MTBE, and no change in product specifications.

Panel members commented that removing the 250,000 barrels per day of MTBE would add to the supply/demand problems as well as the cost of gasoline. Mr. Campbell added that the refineries have responded to the demand increases in the past and will continue to respond, but determining the amount of cost increase is linked with how much time is allowed for the adjustments to be made.

### ***Estimating the Refining Impacts of Revised Oxygenate Requirements for Gasoline: Summary Findings***

Mr. McNutt re-addressed the Panel with an aggregate modeling analysis of possible cases (listed below) for East Coast refining in years 2000 and beyond using Phase II RFG. The analysis is based on all summer cases and the use of Phase II RFG. Mr. McNutt emphasized the importance of the key premises used to perform the analysis. The findings and key limitations can be found in the presentation along with an interpretation of the analysis results. The analysis shows the price increases that would be expected with each scenario. It was re-emphasized by Mr. Campbell that any significant changes made to the fuel requirements under these scenarios would require significant time (4-5 years) for the refineries to make adjustments and produce the fuel at a comparable cost. It was noted that the price and availability of ethanol would also impact the cost, as will the proposed sulfur changes.

#### **Base Cases**

- #1 – Base Case (Year 2000, all summer cases).
- #2 – No oxygenate requirement.
- #3 – Immediate ether ban. (No oxygenate requirement near term).

- #4 – Ether ban through phase out (No oxygenate requirement longer term).
- #5 – Ether ban with oxygenate requirement (longer term).
- #6 – Ether ban with gasoline sulfur reductions (100 ppm) (No oxygenate requirement, longer term).

### ***Supply and Cost of Alternatives to MTBE in Gasoline***

Mr. Glaviano, California Energy Commission (CEC), presented results from the report "Supply and Cost of Alternatives to MTBE in Gasoline." Mr. Glaviano stated that the CEC has taken no position in the report because the Commission's charge was to look at supply and cost of gasoline if MTBE is phased out and the impacts of different transition time periods. The key findings of the report were: (1) immediate phase out would be drastic with catastrophic impact on consumers, (2) phase out over three years would be costly but feasible, and (3) phase out over six years has the lowest cost. Key findings were given specifically related to ethanol, ethanol with a one pound volatility waiver, ETBE, TBA, mixed oxygenate, reduced use of MTBE, no oxygenate use, and no imports of fuel. Key findings were also given for marine transportation infrastructure and other distribution infrastructure. In summary, an immediate phase out of MTBE, without suspension of State and Federal regulations would be infeasible. An intermediate phase out could cost up to 6.7 cents per gallon, and possibly cost up to 8.8 cents per gallon if all oxygenates were phased out. A long term phase out would be least costly, and could cost up to 3.7 cents per gallon if all oxygenates were phased out. Removal of the minimum oxygen requirement would be beneficial in all cases and at any time period.

A Panel member mentioned that the impacts to groundwater are similar for TAME, ETBE, and DIPE, all of which act similar to MTBE in groundwater; the compounds are mobile and recalcitrant. Additional comments were related to problems with air quality if no oxygenates are used. Mike Kenny, CARB, identified that the time frame of implementation of Cal RFG from adoption to implementation was about five and one-half years with short term cost increases. Dr. Carol Henry, American Petroleum Institute (API), mentioned that the models used in this report do not accurately depict the entire market – only California. Mr. Campbell noted that ample time is required for the cost to decrease after implementation. Further, Mr. Campbell noted that sufficient time would be needed to increase the production of ethanol if it is used.

### ***Ethanol Representative***

Mr. Todd Sneller, Nebraska Ethanol Board, expressed the view that the regulatory framework has made it difficult for ethanol to play a larger role in the oxygenated fuel program. Mr. Sneller discussed areas of the country in which RFG with ethanol and ETBE have been used since 1995, and noted the oxygenated trends in those areas. A series of local decisions must be made to encourage ethanol use in certain areas. The vapor pressure increase caused by adding ethanol to gasoline is one of the major challenges effecting Southern tier cities more than Northern tier cities. Mr. Sneller explained that due to current vapor pressure regulations, it is difficult to use ten percent ethanol blend in some areas of California. Of important note was the distinction

between current ethanol production and the capability of additional future ethanol production. Mr. Sneller stated that many ethanol refineries could add capacity in a short period of time with a modest investment. In addition, there are many biomass products that can be used to produce ethanol aside from corn (rice, bagasse, trees, grass, waste, etc.). The ethanol production capacity can increase from the current 1.4 million gallons (1998) to 1.8 million gallons. The current ethanol tax subsidy (5.4 cents/gallon) makes ethanol a cost-competitive oxygenate. Mr. Sneller stated that with a commitment to use the ethanol, the ethanol industry would respond with increased production.

The Panel members had many questions related to the use and production capabilities of ethanol. There were questions related to the cost of grain in terms of cost for fuel. The Panel discussed the net energy cycle of ethanol production, and whether there is net energy gain. Roger Conway, U.S. Department of Agriculture, responded that there is 30 percent energy savings from using ethanol. Mr. Sneller informed the Panel of a recently released study by Downstream Alternatives, which concludes that the amount of ethanol needed could be shifted to California. Margo Oge, U.S. EPA, asked if increased ethanol production is possible if we assume that demand doubled? And, if so, how fast could ethanol production double? Mr. Sneller answered that if there is a known market for ethanol, it can be done. He then referenced the case in Nebraska where 300 million gallons were added over four years. Panel members questioned whether air quality benefits are the same with ethanol in RFG as with MTBE. Mr. Greenbaum concluded that further discussion is needed to cover questions related to ethanol, such as: supply elasticity, capacity, distribution system, air quality benefits, the report by Downstream Alternatives, and the California market.

### ***MTBE Representative – Overview of Clean Burning Fuels with Oxygenates***

Mr. Bill Piel, Lyondell Chemical Company, presented information on the importance of the chemical composition in clean gasoline and the air quality benefits provided by oxygenates. Mr. Piel stated that limiting distillation temperatures (T50/T90) and aromatic content are the most important parameters for controlling emissions during the vehicle's "cold cycle" and for the build-up of combustion chamber deposits (CCD's). Oxygenates in RFG reduce T50 and aromatics and dilute other contaminants providing excess emission reductions above compliance in regular and premium grade RFG. The addition of oxygenates to gasoline is one of the most effective means for decreasing aromatics and distillation temperatures and lowering atmospheric reactivity of evaporative volatile organic compounds (VOCs). Mr. Piel expressed the importance of "full" vaporization during cold engine operation, and that sulfur reductions in gasoline only improve catalytic converter efficiency after warm-up (hot-cycle), but not combustion efficiency or engine-out emissions. Benefits from the use of 11 volume percent MTBE improve many gasoline properties, and result in cleaner burning, lowest pollution RFG. In summary, MTBE: is widely used throughout the world; commercialized and proven for 27 years; not able to be duplicated by other hydrocarbon options to get the low air pollution properties and gasoline performance; provides refinery flexibility and RFG supplies will decrease without MTBE; and actual RFG performance will deteriorate toward compliance equivalency minimums without

MTBE.

Panel members noted that other compounds may meet compliance, but they will not provide the additional air quality benefits gained by MTBE use in RFG.

### ***What is California Cleaner-Burning Gasoline and Why is Flexibility Required in California?***

Mike Kenny, California Air Resources Board (CARB), presented a history of California's vehicle fuels program, California's Cleaner-Burning Gasoline (CBG) program, and spoke of recent and future activities. Mr. Kenny expressed that California does not need the oxygenate requirement in order to achieve their air quality standards, however flexibility is needed in California. Flexibility has helped California reduce capital expenditure by refiners, allowed refiners to adjust to unexpected events without interruptions, minimized production costs and increased supplies, and achieved no loss in emissions benefits (on average produces a modest decrease in emissions). California uses a systematic approach to clean air quality by looking at both fuels and vehicles. The objective of the California CBG program is to obtain the best possible air quality benefit from the fuel formulation (using the predictive model) based on fuel parameter limits on RVP, T50, T90, olefins, sulfur, benzene, aromatic hydrocarbons, and oxygen content. Mr. Kenny stated that if MTBE is no longer an option, then ethanol is the only effective alternative. However, this raises issues of increased volatility and ozone. Ethanol will need to meet the 7.0 RVP requirement in order to prevent increased evaporative emissions. Future activities include updating the predictive model to incorporate ethanol benefits. Mr. Kenny emphasized the need for oxygenate flexibility in California.

The Panel questioned if oxygenates are removed from gasoline, will that solve the usage of MTBE and groundwater problems? Mr. Kenny stated that California Governor Gray Davis is dealing with the entire MTBE issue including both the air quality benefits from oxygenates, and groundwater issues, and trying to come up with a reasoned policy choice. Mr. Kenny stated that he believes there will be no break in the 7.0 RVP requirement. However, if oxygenates continue to be required in California gasoline, and if MTBE must be replaced, then the State will need either a 1.0 pound RVP waiver (psi break) or change the California refining capacity to produce 6.0 RVP (ethanol) fuel. Another issue discussed at length was the potential increase in carbon monoxide (CO) if oxygenates are removed in California gasoline and the ozone forming potential from ethanol use.

### ***Manufacturing Gasoline with and without Oxygenates: Challenges & Timing***

Joe Marcinek, Mobil, presented information on the many different types of gasolines produced (RFG, conventional, etc.), different grades of gasoline (premium, intermediate, regular), and different volatility grades. Each type and grade of gasoline must be made and moved to the customer while maintaining Federal, State and American Society of Testing Measurements

(ASTM) specifications. When confronted with a change in gasoline standards, there are two major hurdles – manufacture and supply – which must be kept completely separate. Because no two refineries in the United States are identical, problems are caused when trying to get the entire industry to achieve similar goals.

Mr. Marcinek posed the question, "What will replace MTBE?" The four options of MTBE replacement include: another ether, alcohol, mix, or use no oxygenate. If no oxygenate is used, alkylates may be suggested as a replacement for MTBE. Mr. Marcinek noted that alkylate capacity is fully utilized, and in order for alkylates to be considered as an option, a solution must be found to satisfy the needed capacity and to round up necessary feedstocks. Mr. Marcinek stated that the Federal oxygen mandate is an obstacle, which should be removed in order to reduce or eliminate MTBE from gasoline. Two scenarios were presented for supporters of the oxygen mandate: (1) if choose to support use of oxygenates, why is a mandate necessary, and (2) if choose not to use oxygenates, provide the flexibility to reduce oxygenate use. Regardless of the decision made regarding MTBE, it must be ensured that emissions standards continue to be met and effects on octane must be compensated. Challenges will exist if MTBE is removed because capacity is strained and utilization is running at a very high level. Without MTBE, requirements of capital money, time and change are needed in order to bring the gasoline quality back to where it is today.

Ethanol use has challenges such as unfavorable vapor pressure effects, partially finished gasoline at the refinery requiring splash blending of ethanol at the terminal in order to produce a finished gasoline product, and supply logistic problems. Mr. Marcinek suggested that the Panel look closely at the ethanol capacity and supply issue because if California changes from MTBE, the use of ethanol could double. In addition, RFG made with ethanol cannot be mixed with RFG made with any other oxygenate. There would be significant refinery modifications requiring capital, which would take at least four years to be completed. Supply issues also exist because there are facilities that do not lend to distribution of additional gasoline types and boutique fuels, and ethanol use requires terminal modifications to receive, store, and blend gasoline. Mr. Marcinek noted that the current delivery system is very efficient. The system today accommodates disruptions because of the fungible nature of the product. In summary, Mr. Marcinek will continue to support: clean gasoline and sustaining environmental standards for RFG, removal of oxygenate mandate, national solution rather than state boutique gasoline, one hundred percent underground storage tank compliance, the Blue Ribbon Panel to provide guidance for national remedy, and support the minimum four year requirement needed to make significant modifications to refineries.

Mr. Campbell, Sunoco, reiterated that given enough time and money, the refining industry can achieve anything. However, fuel supply in the U.S. is a delicate and complex balance. Therefore, a reasonable amount of time (four years) is needed in order to adjust to changes. The industry will already be going through changes because of the many regulatory actions that may effect the refiners in the upcoming years (sulfur, diesel, MTBE phase out, global climate change, etc.). A ban on MTBE would create chaos and greatly impact the entire industry.

Important notes from this presentation include:

- there are a wide variety of gasolines;
- different gasolines must all be kept separate as they are distributed around the country;
- there is a wide variety of refinery assets - no two refineries are the same.

From a logistical stand point the system is tight, in balance, and complex. One or two percent change in supply would greatly effect the system, but given enough time and money the system could be adjusted. Capacity utilization is full, and at high levels never seen before. An unplanned fuel outage (supply disruptions) would impact both the industry and consumers. The current economics of the refining industry are not good, return on investment in the refining industry has been less than the cost of capital. Refiners are going to be forced to rationalize and make decisions whether or not to stay in business. The upcoming regulations are going to make this an exciting time for the industry. Final comment - with enough time (four years) and money the industry can accomplish anything.

Panel questions were related to the many differences between refineries on the East and West Coast of the United States. Due to regulatory pressures in California, refineries have already made many changes that have occurred over a long period of time. There is nothing prohibiting refineries outside of California from making similar changes other than time and money. It was clarified that although it is very expensive to make refinery changes, it will be more expensive to make refinery changes outside of California because of the delayed starting point of the refineries. California refineries have already implemented many changes because of the more stringent parameters on their fuel, and have adjusted to those changes over many years. The cost depends on the economic condition of the refining industry.

Also discussed at length was the issue of providing flexibility to state fuel programs. The concerns expressed by Mr. Marcinek regarding individual state fuel programs (boutique fuels), include the lack of flexibility of the entire delivery system to produce and supply many different fuels, and the dependence on fewer refineries to supply the fuel. If there is a plant closure, supply flow would be a large problem and greatly effect consumers. The two hurdles are manufacture and supply of the fuel, which both must be taken into consideration when discussing the issue of individual state fuel programs. Mr. Marcinek strongly supported a national solution rather than an individual state solution. It was clarified that the two main issues of concern include: maintaining the Federal RFG program requirements, and considering whether the use of fuel with no-oxygenates is an option for California.

### ***Clean Air Act 211(b) Health Testing on Gasoline and Oxyfuel Emissions***

Dave Kortum, U.S. EPA, presented information on the Fuel/Fuel Additive Health Testing Rule that was finalized in May 1994. The purpose of the Rule was to determine the potential adverse health effects of fuel and fuel additive exhaust and evaporative emissions, and to evaluate the effects of inhalation exposure to the whole complex emission mixtures. The American Petroleum Institute (API) sponsored consortium work on testing for baseline gasoline,

oxygenated gasolines (several types including MTBE), and diesel fuel. Other oxygenates studied were tertiary butyl alcohol (TBA), tertiary amyl methyl ether (TAME), ethyl tertiary butyl ether (ETBE), ethanol, and diisopropyl ether (DIPE). Tier 1 included a literature search and emissions speciation, which was submitted in May 1997. Tier 2 is a short-term toxicology testing (90-day inhalation exposure, some of which has been completed) with provisions for Alternative Tier 2 testing, which EPA has the authority to modify, and Tier 3 includes follow-up testing (if needed) on case-by-case basis.

The Panel questioned the timing of results from the testing. It was stated that the testing began November 1998, and will continue through 2002. It was also noted that the consortium debated, and decided not to look at water issues in these tests. Tier 2 results are not yet known, and all data will be peer reviewed carefully before developing Tier 3 testing needs. Mr. Kortum stated that it must first be made certain that people are breathing the materials before moving forward with additional Tier 3 testing. There was concern voiced by the Panel regarding waiting until 2006 to deal with ingestion related testing. Mr. Kortum answered that the results from this data testing may provide information for strong risk based decisions.

#### ***API Section 211(b) Research Group Data***

Dr. Henry presented more detailed information about Tier 1 and Tier 2 testing. Dr. Henry noted that over 140 companies were involved in the API sponsored consortium that was formed to share the cost of the testing. The testing was completed for both exhaust and evaporative emissions. Because there are many unique issues to be considered (complex mixture, explosive test articles, evaporative and combustion exposure patterns, etc.), close collaboration with EPA is required. The current status of the Tier 2 testing is listed below:

Exposure assessment –

- Remains in the reviewing and assembling existing literature;
- Developing state of the art study protocol; and
- Peer reviewers are under consideration.

Toxicology –

- Test article manufacture underway;
- Contractor list updated;
- Resource needs are under review; and
- Peer reviewers are under consideration.

#### ***Oxygenates in Water: Critical Information and Research Needs***

Dr. Michael Davis, U.S. EPA, presented information highlighting the document *Oxygenates in Water: Critical Information and Research Needs*, which was finalized December 1998. The purpose of the document was to identify key issues and information needed to support risk

assessment and risk management and to foster action by serving as a general guide for planning research.

Primary research needs include:

- Point and non-point sources of oxygenates;
- Biodegradation rates and pathways;
- Identification of by-products and environmental fate;
- Adding oxygenates to VOC analyte lists;
- Estimating population distributions of exposures;
- "High-end" microenvironmental exposure scenarios;
- Completion of PBPK modeling and cancer mechanistic studies;
- Long-term oxygenate effects on tanks;
- Optimizing best available technologies; and
- Developing innovative approaches.

The Panel questioned if risks of ethanol in water were included in the study. Dr. Davis stated that ethanol in water was not heavily addressed. Mr. Greenbaum noted that health effects of ethanol have been studied; however, effects of ethanol in groundwater or the environmental fate of ethanol are not yet well known. A Panel member made the point that this information will not be available to the Panel prior to June in order to aid in the Panel's decision making.

## **PUBLIC TESTIMONY**

Reverend Joe Parrish, Rector of St. John's Episcopal and Ph.D. in biological chemistry from Harvard University, expressed his concern about the overall toxicity of gasoline and additives. Reverend Parrish mentioned several reasons why the Panel should not permit the continued use of MTBE, and asked the Panel to remove the toxin from American gasoline. Reverend Parrish heads an environmental consortium called New Jersey/New York Environmental Watch, based in New York City and New Jersey. Mr. Parrish submitted his prepared statement.

### ***Lessons to be Learned***

Dr. Bernard Goldstein, Environmental and Occupational Health Sciences Institute, presented a list of the many completed studies related to MTBE and oxygenates. Dr. Goldstein expressed his opinion that MTBE is not a harmful carcinogenic, and that the goal of the Clean Air Act should be to protect public health, not meet standards. Further, Dr. Goldstein suggested that the criteria for more toxicity testing should include exposure. Mr. Goldstein expressed that any other oxygenates should be subjected to a complete toxicological evaluation prior to use, as MTBE should have prior to its introduction. Dr. Goldstein emphasized that science should lead policy, there must be agreement on what research is needed, and the data should be examined closely. Comments from the Panel included topics relating to the toxicity of gasoline, standards for adding another toxic compound to the mix of gasoline, ensuring that gasoline is not harmful,

refinery demand changes, and priority research needs.

### ***The Presence of MTBE and other Gasoline Compounds in Maine's Drinking Water***

Ned Sullivan, Commissioner of the Maine Department of Environmental Protection, described the successful attributes of the RFG program on Maine's air quality. However, the people of Maine have expressed concern about the additive MTBE, and many hearings were held to receive public comments. Due to the elevated MTBE detection levels in groundwater and public concern, recent legislation was passed to end the RFG program in Maine (opt-out date is March 10, 1999). As stated by Mr. Sullivan in his written public testimony, "We would like to rejoin the Federal RFG program and urge you to endorse the elimination of the oxygenate mandate in federal law."

EPA has pledged to approve a fuel strategy to be implemented in two phases:

*Phase I* – For the 1999 ozone season, fuel with Reid Vapor Pressure of 7.8 psi would be sold in Maine's seven southern counties.

*Phase II* – Beginning May 1, 2000, and continuing every ozone season thereafter, the fuel sold in Southern Maine would have an RVP of 7.2 or less.

Disadvantages to this fuel strategy:

- Air toxic concentrations will increase to pre-RFG levels (including benzene);
- 7.2 RVP fuel is considered boutique fuel;
- Maine must enforce its fuel rule, rather than rely on federal government; and
- Fuel industry predicts fuel storage problems for the region because of limited bulk storage facilities in Portland.

Dr. Andrew Smith, Maine's State Toxicologist, presented information on the goals of the Maine MTBE drinking water study. The goals include:

- 1) Determining the frequency of occurrence and concentrations of MTBE and other gasoline related compounds in private household water supplies and regulated public water supplies;
- 2) Making statewide predictions of extent of contamination based on sample of private household wells; and
- 3) Investigating risk factors for increased likelihood of MTBE contamination of drinking water supplies.

Dr. Bruce Hunter, geologist from Maine's DEP Bureau of Remediation and Waste Management, spoke about the sources of MTBE contamination, and design elements of the test. The site investigation included locating the well and sampling of groundwater, searching for the source of contamination, looking for nearby gas stations and checking against the gasoline storage tanks database, judging the direction of groundwater flow, and interviewing the home owner and neighbors. The sources of MTBE contamination was noted as an issue, and in some cases considerable levels of MTBE were detected in locations with no possibility of leaking

underground or above ground storage tanks. MTBE was detected in 15.8 percent of the 951 randomly selected household (private) wells, (92.3 percent of sampled waters showed MTBE levels that were at 1 ppb or not detectable; and 6.6 percent were between 1 ppb and 35 ppb). MTBE was detected in 16 percent of the 793 tested public water supplies (no samples were found above 35 ppb, 93.9 percent showed levels below 1 ppb, 6.1 percent were between 1 ppb and 35 ppb). Water samples were analyzed for the occurrence and concentration of the following five gasoline constituents: MTBE, benzene, toluene, ethyl benzene, and xylenes. It was noted that the results were similar for both the Maine data and the USGS Northeast data. Conclusions were made that new "state of the art" storage tanks that were thoroughly investigated still showed signs of tank leakage or overfill.

Comments from the Panel included the need for a balance between air and water quality. It was noted that the occurrence of MTBE detection levels at the nine well areas not near a LUST or LAST site needed more clarification. There was also mention that small spills can impact the shallow wells near private homes.

### ***Other Public Comments***

John Elston, presented the history of MTBE in New Jersey, and gave information on MTBE studies completed in New Jersey. The studies were undertaken by the Environmental Occupational Health Science Institute, U.S. Geological Survey, and the New Jersey Department of Environmental Protection. Mr. Elston strongly urged the Panel to develop a policy, which weighs the benefits and disbenefits of MTBE today and assesses the possible changes in the future given the criteria of vehicle technology, energy policy, and environmental benefits versus risk.

Dr. Peter Joseph, Department of Radiology, University of Pennsylvania, gave a presentation expressing his views and personal experiences of health effects caused by MTBE. Dr. Joseph stated that MTBE byproduct chemicals in the ambient air have the ability to sensitize the nervous or respiratory systems in some people leading to various inflammatory diseases. Dr. Joseph expressed his view that there should be an immediate discontinuation of mandatory MTBE-RFG because the risk/benefit ratio clearly favors the increasing likelihood of harm as compared with vanishing evidence for benefit.

Dr. Jonathan Borak, Associate Clinical Professor of Medicine at Yale University, expressed his concerns over the difficulties of distinguishing scientific issues from social and political debate. Dr. Borak conveyed three major concerns. First, Dr. Borak is concerned that the reviewed science stating that there is little or no evidence that MTBE causes adverse health effects or poses as a cancer risk to humans will "serve mainly as a distraction." Second, Dr. Borak is concerned that the opposition to MTBE is not based on issues of science, but based on conflicts that are political, social, and philosophical in nature. The third concern is the manner in which new chemicals are tested prior to commercial use, and regulatory requirements for testing new

chemicals. Dr. Borak asked the Panel to listen to the message and address the underlying philosophical and regulatory concerns.

Rick Hydrick, South Lake Tahoe Public Utility District, expressed his concern for the people not from a health standpoint, but from a water resources standpoint. Lake Tahoe has closed fourteen out of thirty-five wells due to MTBE contamination. The contamination is mainly due to service station releases and some from new underground storage tanks. Mr. Hydrick stated that it is very hard to treat water from the well head, and remediation is very expensive. Mr. Hydrick requested to make a presentation at the Panel meeting in Sacramento, CA.

Clint Norris, BC International, presented information on the increased availability of ethanol production from biomass and renewables. Mr. Norris mentioned three companies that have implemented biomass conversion plants and the sources of biomass available (food and feed, waste and byproducts). Other ethanol production issues that have been addressed include RVP, global warming, fuel distribution, and air quality trade-offs. Mr. Norris closed by asking the Panel not to get rid of the oxygenate requirement because of problems with MTBE.

Dr. Elizabeth Champeon, Senior Geologist at S.W. Cole Engineering, Inc., commented on the review by S.W. Cole Engineering of the Maine study on MTBE in groundwater. Dr. Champeon's concerns were that the MTBE report does not represent the "statewide occurrence of MTBE." Dr. Champeon concluded that the sampling was concentrated in the southern, more populated areas of the State. According to the S.W. Cole review, the percentage of private wells in which MTBE was detected is closer to 5 rather than the 15 percent, as indicated in the report. Dr. Champeon recommended that the Panel thoroughly review the data prior to taking action.

Phillippe Boissonneault, Portland, ME Water District, expressed concern that two of the wells in question were 850 feet from a gas station and 350 feet from a monitoring well. 500 ppb MTBE was detected and there were no detections of BTEX or any other compounds. Mr. Boissonneault conveyed that the cost of daily monitoring exceeded \$180,000 and they have one production well to rely on.

Andrew Stocking, Malcolm Pirnie, Inc., presented material on the Fate and Transport of MTBE Following a Small Spill. Mr. Stocking explained that there are many hydrocarbon vaporization models that have been completed. Mr. Stocking illustrated the MTBE evaporation from four gallons of spilled gasoline. Mr. Stocking concluded that under typical conclusions, MTBE would rapidly vaporize from a small gasoline spill on the surface and there is a good chance that most of the MTBE will not enter the groundwater.

Mark Beuhler, Metropolitan Water District of Southern California, presented public comments on behalf of the Connecticut Water Company concerning MTBE contamination of public water supply wells in Thomaston, Connecticut. Mr. Beuhler stated that some small communities with dispersed systems abandoned their water wells and water resource rather than impose cost increases or inform consumers of the MTBE detection in the water. This is not the case for all

water utilities; many other water utilities do not have the option to abandon the water resource because their water resources may be limited. There are two important factors to consider. The first factor is that only MTBE and ethylene dibromide (EDB) migrated as far as the production wells. BTEX compounds were found in substantial amounts in monitoring wells; they were never detected in the production wells. The second factor is that treatment for removing MTBE was already in place at the location, otherwise the treatment costs would have been increased to between \$3 and \$5 million, meaning that each typical family within the city of Thomaston would have to pay \$2000-\$3000. The lesson to learn from Connecticut is that when MTBE becomes a problem, it will be expensive to fix.

Dr. Bob Tardiff, Sapphire Group, presented information on behalf of the Oxygenated Fuels Association on the *Conclusions of Authoritative Bodies Concerning the Carcinogenic Properties of MTBE*. Dr. Tardiff made a few points about what is known regarding the health consequences of MTBE. The first point relates to whether there is enough data to draw conclusions about the health consequences, and the second point is to share conclusions from several authoritative bodies that have examined the data that relate to the determination of whether MTBE has been shown clearly to cause cancer in humans or laboratory animals. Dr. Tardiff noted that the sources provide substantial consistency that scientific knowledge about MTBE and possible carcinogenicity is too limited to conclude and does not support the conclusion that MTBE caused cancer in a manner relevant to humans or that MTBE might pose a cancer risk to humans exposed by inhalation or ingestion. Dr. Tardiff welcomed the Panel to contact him if they are interested in more detailed information about a particular study.

Mr. Robert Cunningham, Turner, Mason & Company, presented the report *Costs of Potential Ban of MTBE in Gasolines* that was prepared for Lyondell Chemical Company. Mr. Cunningham focused his presentation on the different scenarios that could exist. The scenarios include both long and short-term costs of banning MTBE in gasoline. The scenarios include: either using ethanol in RFG or using no oxygenates. Costs were calculated for the different scenarios on both the East and West Coast. The investments required would be very substantial (costs were up to \$5.5 million for U.S. and \$10 million in a no oxygenate case). The major points for short and long term changes are listed below.

#### Short Term Options:

- Drastic and politically unacceptable impacts
- Lower quality RFG with significantly increased air emissions and smog
- Alternative is big loss of RFG supply meeting emissions limits
- Inability to supply premium grade RFG meeting emissions limits
- Major reformulated gasoline shortages
- RFG shortages would hurt economy and cause recession
- Increase costs of gasoline several fold for force rationing and gasoline station lines
- Public anger and outcry
- Increased gasoline imports and exports; shipping traffic and port congestion

### Long Term Options:

- Costs and investment about 3 times those in CEC study
- Wastes large MTBE investment – \$12 billion
- Requires large U.S. refining industry investment - \$5 – 10 billion
- Base returns on refining assets have been extremely low at 2-6%
- Probably no return on added refining investments
- Destroys marginal and small refineries and increases product imports
- Significantly increases driveability/distillation index

In conclusion, it is very costly to change the refining system and would require at least four years lead time for the industry to make a change.

Marcel Moreau, Marcel Moreau Associates, addressed the perception that once the nation's storage systems are brought into compliance with the State and EPA regulatory programs, leaks from storage systems will stop. Mr. Moreau expressed his concern that the regulatory programs in place today are not enough to protect groundwater from MTBE. His reasoning is that the national regulatory program is not a leak prevention program; it is a leak detection program. Maine currently has 99 percent compliance for replacing (not upgrading) all storage systems installed without corrosion protection. Mr. Moreau expressed the view that leaks come from many different places (fuel transfers, lawn mowers, snowmobiles, snow blowers, chain saws, etc.) and with the large amounts of motor fuel consumed for transportation, leaks and spills are going to happen.

Fred Potter, Information Resources, Inc., gave a historical reference to passage of the Clean Air Act Amendments and RFG amendments, and noted that the issue of oxygenates in RFG was heavily debated prior to passage of the Act. Mr. Potter made three points: (1) the Federal RFG program is performing well beyond the minimum standards in the Clean Air Act (toxics, VOCs, NOx, reactivity, CO2, and reduced foreign oil dependence), (2) the oxygen mandate allows six commercial oxygenates to be used by refiners including MTBE, ETBE, ethanol, TBA, DIPE, and TAME, and (3) the Feinstein/Bilbray bill should be implemented for two years to help California get a handle on leaking underground storage tank compliance. Mr. Potter concluded by asking the Panel for thoughtful policy options in the range between natural attenuation and a ban of MTBE.

### **CONCLUDING REMARKS FROM PANEL MEMBERS**

Mr. Greenbaum closed the public comment session and thanked the group for submitting comments to the Panel. The last hour included discussions on how the Panel will proceed. Mr. Greenbaum presented five draft "first cut ideas" on the criteria and options that the Panel might consider and work towards.

- 1) Panel Charter – To provide independent advise and council to the EPA through the parent Clean Air Act Advisory Committee on policy issues associated with the use of oxygenates in gasoline, and to provide specific recommendations on how to ensure public health protection and continued improvement in environmental quality in both air and drinking water quality.
- 2) First attempt to identify criteria for specific policy options (not in priority order)
  - Options that provide the same or better air quality benefits;
  - Options that prevent or minimize risk of future ground or surface water contamination and accelerate the remediation of existing contamination;
  - Options that achieve the same or better (lower level) of toxicity of the fuel; and
  - Options that minimize degree to which any option would provide disruption of the fuel supply or price disruptions.(Options may need to be considered for both California and Federal regulations.)
- 3) Range of options (legislation, proposals, etc.), including:
  - Leave fuel program as it is today;
  - Provide flexibility in the oxygenate mandate (permanent or temporary, California or entire country);
  - Provide flexibility and phase out use of MTBE by ban or other mechanisms; and
  - Use of other fuel programs (i.e. RVP).
- 4) Items the Panel may agree on need to be included regardless of policy option decided upon, including:
  - Regulatory or other system in place to ensure that fuel option maintains or enhances air benefits;
  - Process to assess toxicity and hydrogeologic characteristics of any new element that may be used; and
  - Consider the range of existing issues with water supplies, as well as prevention and early detection (accelerate or enhance prevention and detection programs currently in place to develop new programs or methods).
- 5) Next steps? Continue to gather facts, and focusing fact questions at specific areas where we need the best available data from a range of people.

Mr. Greenbaum asked the Panel to begin sorting-out what has been suggested at this meeting and start to create documents that list criteria to judge the success (or likely success) of any one option. Mr. Greenbaum asked the Panel to begin preparing a list for the next meeting to refine these criteria or needs for more detailed information. Mr. Greenbaum prepared the Panel to expect break-out groups at the Sacramento meeting to start refining the options and criteria, and to gather the information needed. The Panel's information will be based on the best assessment of the information that is currently available today.

Mr. Greenbaum asked the Panel members for comments on his suggestions.

Dr. Greer suggested that each Panel member identify a short list of questions in attempt to agree on the facts of the matter. She suggested that EPA develop a balanced representation of the key issues, because if the Panel can agree on the fact pattern then making recommendations for

policy options is much easier. Dr. Greer suggested creating individual lists stating the issues that need further clarification. There may be issues that are controversial, or there may be no specific answer to the issue/question. Regardless, the Panel needs to know if answers to their questions exist. Dr. Greer gave some examples of the types of questions she has listed throughout the day.

### Example

Questions:

- Is MTBE providing important air benefits? More specifically – has MTBE affected CO and ozone?
- How much of the air benefits will be taken care of with vehicle/fleet turn over?)
- Is MTBE causing adverse health effects (acute, asthma, cancer)?
- Is MTBE providing air benefits on one set of contaminants, and presenting health problems?

Scenarios:

- 1) If MTBE is not providing air benefits, and it is affecting water quality...
  - We would like to get it out of the gasoline as soon as possible
  - What is as soon as possible? How fast could it be removed?
  - What will happen to the fuel supply? (disruptions, market, alternatives, etc.)
- 2) If MTBE is providing important air benefits...
  - Can we achieve equal performance with an alternative?
  - Is ethanol a real alternative? (capacity, RVP restrictions, etc.)
  - What fuel is produced or available that meets the air quality requirements without oxygenates?
- 3) Policy questions...
  - Is the decision a matter of flexibility?
  - Is the decision based on a certain set of fuel standards?

Mr. White commented that the objective of the Panel is to look at oxygenates in gasoline and not specifically at RFG. The Panel may want to address other issues related to air quality such as: other toxics or PM benefits. Further, the Panel should look at mandated emission reductions versus actual emission reductions (it has been stated that RFG provides additional emission reductions) to determine the baseline that the Panel should be using.

Mr. Greenbaum added another important point that if MTBE is phased out, what are the other uses of MTBE, which are being used outside of RFG and oxygenated fuels? And do we as a Panel have any authority over those uses of MTBE?

Mr. Grumet, NESCAUM, pointed out that many of the issues discussed are confusing and only become clear when two issues are compared to each other in very specific circumstances. He suggested that it would be helpful to come up with some policy options earlier in the process, and then try to compare those discrete policy options and imagine one compared to the other with hopes to determine what kind of toxic benefits or costs may be incurred. Mr. Grumet suggested attempting to define choices and then reach the questions through the comparison of options.

Mr. Greenbaum suggested some baseline questions may also be helpful to form some direction to the options. For example, what can we or can't we say is true at this point.

Dr. Happel suggested that smaller subcommittee groups would be helpful to get a more cohesive viewpoint rather than a summary of the information available.

Dr. Greer mentioned that contractors would be best to provide this role because the Panel members will each have a particular point of view.

Mr. Greenbaum acknowledged that there is a large body of knowledge on the Panel, and that a dynamic can exist where contractors begin the process and work with Panel members to add expertise.

Ms. Oge suggested the best way to gain knowledge and expertise from the Panel would be to identify Panel members to work with technical staff at EPA to frame the issues and present them at the next meeting.

Mr. Greenbaum acknowledged that it would be helpful in some instances to have an impartial summary without recreating work that has been completed.

Mr. Kenny stated that Dr. Greer's questions were good, and to follow Mr. Grumet's suggestion to put the questions in the context of policy options. Mr. Kenny also expressed concern that the discussions may become too abstract without having something to use for assessment.

Mr. Campbell suggested that the Panel consider the question "What would prevent me from making a decision today?" There is a large amount of information that has been presented and in order to make a decision it usually comes down to a few questions that must be answered. Mr. Campbell suggested that each Panel member should submit a list of questions, and have them sorted by topic and try to find the consensus of questions that the group needs to have answered in order to make a decision. Mr. Campbell concluded his comments by asking, "To what degree will Panel deliberations be interrupted by the Governor of California?"

Mr. Greenbaum noted that regardless of what the Governor says, there is a continuous intersection between what California desires, the situation in Congress, and the Federal RFG program. The Panel will need to have input as they go along. The health effects comments may be slightly different in California, which the Panel will need to incorporate into the current information. If the Panel starts to shape questions, the contractor could begin to draw out data, and at the next meeting the Panel will further refine the issues.

Mr. McNutt expressed concern and clarified that the Panel was not tasked with evaluating air quality benefits of the RFG program, but rather tasked to look more narrowly at the question (given the RFG program and other changes), "Can or should we limit the role of oxygenates (in particular ethers) in gasoline as we move forward with air quality programs."

Mr. Greenbaum stated that if we want to move forward and think about policy options, we need to have some baseline of comparison by which to evaluate how the options fit. Mr. Greenbaum agreed that the Panel would not re-create detailed air quality benefits, however the Panel questions must be satisfied that the measurements used to support a policy are reasonable.

Mr. McNutt, reiterated that a set of standards exist for RFG and for conventional gasoline. However, the issue remains, "Does water quality protection require that we confront the use of ethers in motor gasoline, and if so how do we proceed down that road?"

Dr. Henry supported Barry McNutt in reference to revisiting why the Panel was formed. Dr. Henry clarified that the Panel was formed because MTBE has threatened the water supplies around the country with no cheap or easy way of removing it. Dr. Henry expressed confusion about the level of MTBE that causes contamination in water. Dr. Henry noted that the Panel continues to discuss MTBE at either zero or eleven percent, but questioned if there is a gradation that could exist in the options to be considered. Focus must be on water before we get to the other issues.

Mr. Kenny stated that we need a balance between air quality benefits and water contamination to figure out the appropriate path to take. He suggested acquiring as much information as possible to make a reasoned assessment, which does require that we have a good sense of air quality benefits from Cleaner Burning Gasoline in California and the benefits of Federal RFG.

Dr. Happel restated that Dr. Henry wanted to know the extent of the contamination in groundwater before we try to fix it. Dr. Happel commented that it is a controversial issue, however, there has been a lot of evidence given to support that.

Mr. Beuhler stated that water utilities tried to stay out of the air/water debate. But, now most of the utilities feel that they must take a position to phase out MTBE. In addition, the issue of legal liability needs to be discussed. The Panel needs to be talking about a flexible mechanism for addressing a problem that is not defined. But, we do know it will cost a lot of money and many liability issues. There have been toxic tort law suits in California, and a reasonable water utility may attempt to pass on the cost of the law suits to the ultimate source of the contaminants.

Mr. Grumet suggested inviting lawyers to the Blue Ribbon Panel meetings because the Panel may decide on an option that has some legal boundaries.

Mr. White suggested getting a sense from the Panel, and supported Mike Kenny's point of view, to take a balanced point of view, and look at the bigger issues which can be agreed upon by the Panel.

Mr. Sneller asked for clarification regarding the comment about the expensive cost for remediation techniques and strategies. He noted that there has not been information presented to make that conclusion.

Mr. Greenbaum closed the meeting by requesting that each Panel member submit a list of questions about information that is lacking information or that needs clarification in order to clearly understanding the facts. The lists should be submitted to Karen Smith within the next week so that the contractors can organize the questions and present them at the meeting in Sacramento.

**Sign-In-Sheet**  
**MTBE BLUE RIBBON PANEL**  
**March 1-2, 1999**  
**Boston, Massachusetts**

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