THE
TASK FORCE
on the
ENVIRONMENTAL
EFFECTS
of
Methyl Tertiary Butyl Ether
(MTBE)

Presents the:

FINAL REPORT

December 2001

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Executive Summary

House Bill 823, signed by Governor Parris Glendening on May 11, 2000, created a Methyl Tertiary Butyl Ether (MTBE) Task Force consisting of 16 members from various government agencies, the petroleum and ethanol industries, and health related professionals. The Task Force held a total of 15 working meetings and one evening public meeting to develop the recommendations and present them to the public. Presentations from various experts on air and water quality, and energy and health impacts were made to the Task Force at these meetings. Current reports and technical articles on MTBE from around the nation were shared and discussed. A Preliminary Report was completed in December 2000.

MTBE is a volatile, flammable, colorless liquid with a turpentine-like odor. It may have a pungent foul odor at low concentrations in drinking water. MTBE has been added to gasoline as an octane enhancer to improve automobile performance since the phase-out of leaded gasoline in the late 1970s. MTBE, and other ethers and alcohols used as additives in gasoline, readily dissolves in groundwater. Once MTBE is released into the environment, it can decompose under certain conditions to form another chemical of concern, Tertiary Butyl Alcohol (TBA), which cannot be easily detected by taste and odor at similar low concentrations.

The U.S. Environmental Protection Agency (EPA) has said that MTBE has the potential to be a carcinogenic hazard to human health. However, evidence as to whether MTBE is carcinogenic or has the potential to be a carcinogenic hazard to human health is inconclusive.

The 1990 Clean Air Act (CAA) created the Reformulated Gasoline (RFG) program. The CAA requires refiners distributing gasoline in severe ozone non-attainment areas to reduce volatile organic compounds and toxic emissions and allows other areas not meeting clean air standards to opt into the RFG program. In Maryland, RFG is used in the Baltimore and Washington metropolitan areas and Cecil County. The use of RFG in Maryland has resulted in cleaner burning motor vehicle fuel and is an important part of Maryland's comprehensive strategy to clean the air. The CAA requires that RFG contain a minimum amount of 2 percent oxygen by weight to help reduce emissions that form ground level ozone. This requirement has resulted in the increased use of MTBE and other oxygenates in gasoline. MTBE has been the primary oxygenate used in Maryland RFG and in the other eastern and western states**.** The current use of MTBE in gasoline is estimated to achieve volatile organic compounds emission reductions equivalent to eliminating approximately 780,000 vehicles from Maryland's roadways. In an average year, over 2 billion gallons of gasoline is transferred into the State of Maryland, which results in the consumption of approximately 220 million gallons of MTBE.

Although RFG has improved air quality and reduced toxic emissions such as benzene, MTBE has contaminated drinking water across the State. EPA has not established a primary drinking water standard for MTBE and, therefore, monitoring for its presence in drinking water is not required.

EPA's drinking water advisory for MTBE suggests that levels of contamination at or below 20 to 40 parts per billion (ppb) provide a margin of safety from toxic effects and would likely not produce an unpleasant taste or odor in drinking water. Maryland chose 20 ppb, at or above which drinking water would be treated or replaced to prevent exposure. In addition, MTBE contamination as low as 10 ppb will result in an investigation by the Maryland Department of the Environment (MDE) to determine the source of contamination. The Task Force recommends that the MDE monitor EPA's drinking water health advisory for MTBE and any pertinent health studies for changes, along with any future standard established for the other oxygenates. The Maryland Department of Health and Mental Hygiene (DHMH) should also finalize or develop, as appropriate, a method for testing and analyzing water samples for MTBE, TBA, Ethanol, and other oxygenates.

Since 1995, the MDE has been periodically sampling public water systems for MTBE. Of the 1,203 public water systems tested, MTBE has been detected in about 100 systems. Most detections of MTBE are below the taste and odor threshold of 20 ppb. Only 13 water systems have had detections above the taste and odor threshold. Most of these now have alternate sources or the levels have dropped. In July 1999, the MDE began tracking the presence of MTBE in domestic wells throughout Maryland. The first report from this database showed that 149 domestic water wells were also contaminated with MTBE.

As of September 2001, the database showed a cumulative total of 273 domestic wells that have at one time sampled positive for MTBE. Of these, 240 wells are still under investigation or remediation.

The majority of Maryland residents, 68 percent, are served by public water systems drawing water from surface water sources. MTBE impacts to these surface waters have been negligible. Of the remaining 32 percent of Maryland residents, 16 percent are supplied by community water systems using groundwater and 16 percent by private wells.

The MDE ensures that alternative sources of water or treatment by filtration are provided in cases where MTBE has been detected at or above 20 ppb in drinking water serving private residences. MTBE can be both a "quality of life" issue and an economic issue for those affected. MTBE can be remediated or cleaned up once the extent of contamination has been adequately defined. The length of time to achieve cleanup and the complexity of the remediation method are greater when compared to remediating releases of petroleum that do not contain MTBE.

At the time of construction, private wells may be sampled for volatile organic compounds, including MTBE, if the local environmental health agency has reason to suspect that harmful constituents are present. After construction, private wells are not routinely sampled for MTBE contamination. Some unconfined public well supplies are required to be sampled at least every three years for a wide range of contaminants referred to as volatile organic compounds, which includes MTBE. A significant number of wells serving restaurants, convenience stores, campgrounds, and gasoline service stations, however, are not required to sample for volatile organic compounds under federal or State regulations. These wells are more likely to be located near potential sources of contamination than other public water supplies. The MDE should work with local health departments to expand testing of these wells if they are located in unconfined aquifers (shallow wells).

The MDE should continue the testing and assessment of wells and water supply systems for MTBE and other oxygenates paying particular attention to systems with previous detections and those using aquifers vulnerable to contamination. The MDE should continue to use the MTBE level of 10 ppb in water samples at and above which an investigation into the cause of the contaminant is conducted. The MDE should encourage local governments to protect vulnerable drinking water sources through locally adopted siting restrictions for petroleum storage and dispensing facilities based on the MDE's model wellhead protection zoning ordinance.

Significant efforts to upgrade and replace bare steel underground storage tank (UST) systems have occurred, however, releases from these older tank systems continue to impact groundwater. Even the effectiveness of upgraded UST systems may not be sufficient to prevent releases. The characteristics of MTBE that allow it to readily dissolve in groundwater and migrate away from the source make any spillage of petroleum a potential concern. MTBE has also been found in other fuels besides gasoline, including the more widely distributed and less controlled petroleum product--home heating oil. The MDE should enhance the level of inspection and enforcement of UST systems and spill prevention programs and assess the technology and operation of UST systems, including the piping and distribution system. The MDE should also implement, through public-private partnerships, expanded public outreach programs on the proper handling and disposal of gasoline. These outreach efforts should also include a broad-based program targeting owners and users of private wells on measures to prevent, detect, and treat contaminated water.

A critical factor in ensuring the success of remediation and protection of drinking water receptors is the early detection of releases from UST systems in order to contain and control the release. Owners and operators of UST systems must comply with the regulations governing UST systems, and the State must ensure compliance. To reach these goals, the MDE should work with the petroleum industry and EPA to establish a comprehensive certification and training program for owners, operators, contractors, and employees who work with petroleum storage tank systems to implement procedures and processes that would minimize leaks and groundwater contamination. The MDE should strive to ensure the success of these programs by establishing an inspection frequency goal of once per year for UST systems.

Unless the current CAA 2 percent oxygen-by-weight mandate is revised, the only currently viable wide-scale substitute for MTBE is Ethanol. Ethanol is a renewable fuel because it can be made from grain feed stocks and perhaps even from agricultural waste material in this country. Thus, its use is frequently encouraged to reduce our country's dependence on foreign-produced oil. Ethanol is currently used as an oxygenate in gasoline in the mid-west states and in certain areas where the price is competitive to MTBE or where Ethanol use is required under State law or policy. At this time, a requirement for the widespread use of Ethanol could have significant availability and cost implications to Maryland citizens. There are also environmental impacts from the use of Ethanol, which should be further addressed. In any case, there is general agreement that the use of Ethanol would increase over time in the U.S. under future gasoline formulation scenarios.

Maryland should give careful consideration to a reduction, or even phasing out the use, of MTBE in gasoline sold in the State, provided there is no backsliding on air quality benefits. Alternatives to MTBE, including Ethanol and other ether oxygenates, can be used for the purpose of reformulation of gasoline to reduce air toxic emissions and pollutants that form ground-level ozone.

The petroleum industry has produced a clean burning gasoline in California without the use of 2 percent oxygen by weight, mandated under the CAA. Maryland should work with other states and stakeholders on a regional (multi-state) approach to address MTBE issues, consistent with current national discussions on energy supply and water contamination. The MDE should consider the option of joining northeast states that may be filing a joint petition to EPA to remove their states from the oxygenate requirement in federal law, provided oil companies can supply gasoline to Maryland that maintains current air quality benefits, including no backsliding on air toxics emissions.

The MDE should work with Maryland elected officials to urge the U.S. Congress to develop a national solution to MTBE since this is best addressed on a regional multi-state or national level. This includes encouraging the U.S. Congress to repeal the CAA's 2 percent oxygen-by-weight mandate and establishing a renewable fuel program. The air quality benefits that are currently achieved through the RFG program must be maintained.

Finally, addressing the impact of MTBE and other oxygenates in gasoline on Maryland's water resources will require adequate support. Funding will be required to expand DHMH laboratory testing abilities for current and future oxygenates used by the petroleum industry. Resources will be needed for a proactive drinking water sampling program. Enforcement of existing statutes and regulations with regard to UST system integrity, maintenance, record keeping, and remediation will require dedicating appropriate resources. Additional resources from the U.S. Congress and EPA should be pursued.

I. INTRODUCTION

Background

House Bill 823, signed by Governor Glendening on May 11, 2000, created an MTBE Task Force consisting of 16 members from various government agencies, the petroleum and ethanol industries, and health related professionals. Appendix A lists the members of the Task Force. The Task Force responsibilities are as follows:

(1) Determine and assess the environmental and health risks associated with ground and surface water contamination from MTBE;
(2) Examine national and regional efforts concerning ground and surface water contamination from MTBE;
(3) Recommend a plan to minimize and counteract the environmental and health risks associated with ground and surface water contamination from MTBE; and
(4) Explore alternatives to MTBE, including ethanol and oxygenated fuel, which can be used for the purpose of reformulation of gasoline to reduce air toxic emissions and pollutants that form ground level ozone.

The Task Force's Preliminary Report, completed in December 2000, addressed items (1) and (2) above. The Final Report provides brief updates to the extensive information presented in the Preliminary Report and an in-depth discussion of items (3) and (4). The Task Force held a total of 15 working meetings and one evening public meeting to develop the recommendations and present them to the public. Presentations from various experts on air and water quality, and energy and health impacts were made to the Task Force at these meetings, along with current reports and technical articles on MTBE from around the nation.

MTBE: Its Nature, Benefits, and Problems

Methyl Tertiary Butyl Ether (MTBE) is a volatile, flammable, colorless, liquid with a turpentine-like odor. It may have a pungent foul odor at low concentrations in drinking water. MTBE is made as a byproduct of petroleum refinery operations by combining methanol derived from natural gas and isobutylene. Generally, *ethers* are organic substances with two groups linked by an oxygen. MTBE is a synthetic chemical [$CH_3OC(CH_3)_3$] that has been added to gasoline as an octane enhancer since the phase-out of lead in the late 1970s.

More recently, MTBE has been used extensively around the country to reduce motor vehicle emissions. The passage of the 1990 Clean Air Act (CAA) resulted in the increased use of MTBE to reduce carbon monoxide emissions. Beginning in 1995, the CAA also required areas with the worst ground-level ozone air pollution (including the Baltimore and Washington metropolitan areas) use gasoline reformulated to reduce air toxics emissions and pollutants that form ground level ozone. MTBE has been the additive most commonly used by gasoline suppliers throughout most of the country. It has been used because it is cost effective in meeting air quality and gasoline performance goals. The use of cleaner burning gasoline is an important part of Maryland's comprehensive strategy to clean the air. In an average year, over 2 billion gallons of gasoline is

transferred into the State of Maryland, which results in the consumption of approximately 220 million gallons of MTBE.

MTBE is more soluble in water, has a smaller molecular size, has a low tendency to adhere to soil, and is less biodegradable than other components of gasoline. Consequently, MTBE is more mobile in groundwater than other gasoline constituents and may often be present when other components are not. Significant sources of MTBE in the environment are from leaking underground and aboveground petroleum storage tanks and pipelines. Other sources include atmospheric deposition, storm water runoff from paved surfaces, watercraft, spills, and improper disposal of fuels. The physical properties of MTBE, combined with the various ways MTBE can be released into the environment, have resulted in the detection of MTBE in drinking water supplies across the country as well as here in Maryland. Detection of MTBE in private and public water supplies has caused MTBE to become a contaminant of concern and, without specific targeted measures, could continue to threaten drinking water supplies into the future.

MTBE's Role in Improving Maryland's Air Quality

The 1990 CAA created the Reformulated Gasoline (RFG) program. The CAA requires refiners distributing gasoline in severe ozone non-attainment areas to reduce volatile organic compounds and toxic emissions by 15 percent (27 percent and 20 percent respectively in Phase 2 RFG, which began January 1, 2000). RFG is required in Maryland's worst ozone non-attainment areas. These areas include the Baltimore region, comprised of Baltimore City and Baltimore County, Anne Arundel, Carroll, Harford, and Howard counties, as well as Cecil County due to its inclusion in the Philadelphia ozone non-attainment area. As allowed by the CAA, then Governor Schaefer opted-in the other areas of the State that had ozone non-attainment problems into the RFG program, including the Washington metropolitan area counties of Montgomery, Prince George's, Calvert, Charles, and Frederick, together with Kent and Queen Anne's counties. The remaining counties in the State are only required to use conventional gasoline, however, there is "spill-over" into these counties, especially in locations adjacent to the areas where RFG is required.

The RFG program continues to be a critical component in the Maryland Department of the Environment's (MDE) comprehensive air quality plan. Its use has proven to be a very cost-effective control measure for reducing carbon monoxide and ozone precursor emissions from motor vehicles. In addition, RFG used in lawn and garden equipment and other small engines produces further emission reductions, which also helps air quality during our summertime ozone season.

In Maryland, over a third of volatile organic compounds and nitrogen oxides emissions comes from motor vehicles. The MDE estimates that the use of Phase I RFG in the specified areas of Maryland reduced volatile organic compounds emissions from motor vehicles by more than 12 tons per day. This RFG benefit is equivalent to eliminating the emissions from approximately 600,000 of today's vehicles. Currently, the use of Phase II RFG in the specified areas is estimated to reduce volatile organic compounds emissions by an additional 2 tons per day above Phase I rates and nitrogen oxides emissions by almost 7 tons per day in Maryland compared to using conventional gasoline. The emissions reductions of Phase II RFG are equivalent to eliminating the volatile organic compounds emissions of approximately 780,000 vehicles and the nitrogen oxides

emissions of approximately 170,000 vehicles from Maryland's roadways. Only the Vehicle Emissions Inspection Program (VEIP) obtains more reductions from motor vehicles.

In addition to the reduction in emissions of the ozone precursors, volatile organic compounds and nitrogen oxides, the RFG program has also contributed to substantial reductions in the overall emissions of air toxics. Emissions of toxic compounds, such as benzene (a known human carcinogen), were reduced by about 15 percent as a result of the use of Phase I RFG. Toxic compounds in Phase II RFG have been reduced overall by about 25 percent compared to conventional gasoline.

During consideration of the CAA, the U.S. Congress established the oxygenate requirement in the RFG program to achieve several important public policy goals, including environmental benefits from the reduction of vehicle emissions, rural economic benefits to be gained from increased use of agricultural commodities in the production of renewable fuels, and energy security with the increased use of domestically-produced fuels. These public policy drivers remain critically important today.

From an air quality perspective, the oxygenate requirement has been a tremendous success, exceeding the CAA's performance standards for hydrocarbons and toxics. The oxygenate standard has provided additional reductions in carbon monoxide and fine particulates, for which there are no performance standards.

II. FINDINGS OF THE TASK FORCE

Health and Environmental Risks of MTBE

There is presently no federal primary drinking water standard for MTBE; therefore, it is not a regulated contaminant. The U.S. EPA has said that MTBE has the potential for carcinogenic hazards for humans. However, evidence as to whether MTBE is carcinogenic and has the potential to be a carcinogenic hazard to human health is inconclusive. Among its other potential effects, MTBE's presence in drinking water has primarily caused odor and taste concerns. In 1997, as a result of its aesthetic problems, the U.S. EPA issued a drinking water advisory for MTBE of 20 to 40 parts per billion (ppb). The U.S. EPA's Office of Water has placed MTBE on the contaminant candidate list to further evaluate whether it should be included in the Primary Drinking Water Standards.

No additional data has surfaced since submitting the Preliminary Report in December 2000 concerning the toxicity or carcinogenicity of MTBE. MTBE contamination in drinking water appears to be a taste and odor issue, which makes water unacceptable and unusable for human or livestock consumption. While scientific evidence does not conclusively identify MTBE as a carcinogen or serious health threat, at certain low concentrations its objectionable taste/odor can make water unfit for consumption and present a real "quality of life" issue. Thus, careful consideration should be given to eventually reducing or phasing out the use of MTBE in gasoline sold in Maryland.

Although a final statement on the possible health effects of MTBE cannot be made at this time, the quality of life problems created by MTBE's objectionable taste and odor, coupled with the possibility that it may cause adverse health effects and the need to protect Maryland's water resources, are significant and should drive public policy to adopt the most protective strategy reasonably possible to prevent continued releases of MTBE into the environment. Such a public policy is important to citizens dependent on water from wells who may not be financially equipped to properly address the impacts associated with MTBE contamination.

Extent of MTBE Contamination in Maryland

At the time of legislation creating the Task Force, the MTBE issue had recently risen to national attention. Maryland's public water systems had reported detections of MTBE at various levels. The number of MTBE impacted individual domestic wells in several counties, mainly associated with releases from UST systems, had risen to levels of concern. There was widespread concern that MTBE contamination of the nation's drinking water supplies could occur. Subsequent studies of groundwater by the U.S. Geological Survey in the Northeast and Mid Atlantic states have validated the concern that MTBE is one of the most commonly detected volatile organic compounds in groundwater supplies, but the levels of detection are typically below 20 ppb. Updates, with corrections to the MTBE detections reported in the Preliminary Report, are provided in the following sections.

Public Drinking Water Supply Data: There are several types of public water supply systems that need to be defined to give a frame of reference to the data presented below. A public water supply is a water system that regularly serves an average of 25 people daily at least 60 days of the year. Public water supplies are further grouped into the following categories:

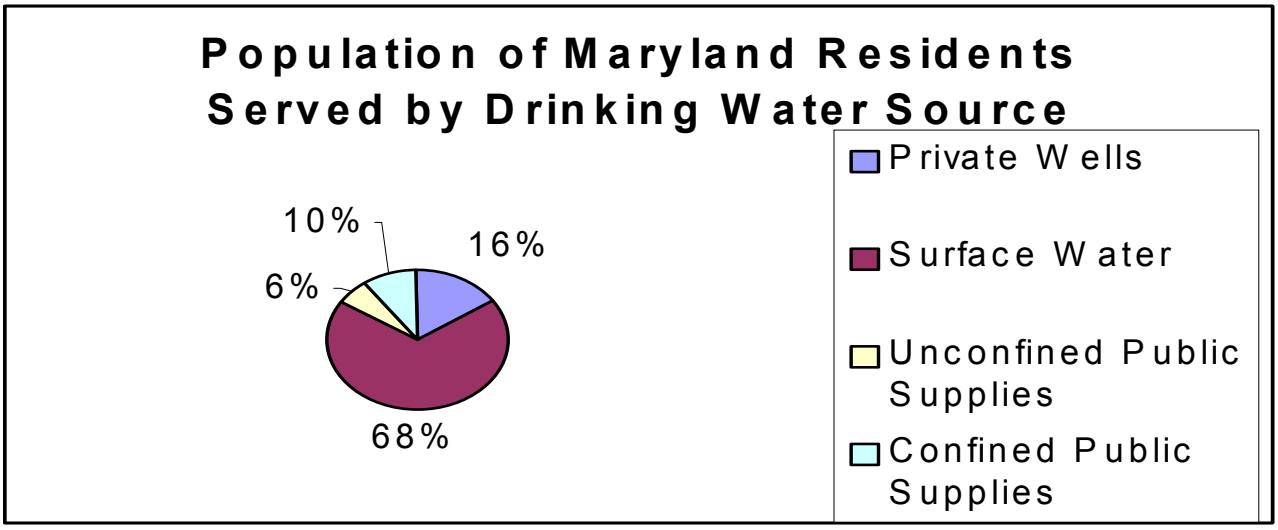
- A community water system is a public water supply that serves at least 25 residents or has at least 15 service connections throughout the year. There are approximately 511 of these systems in Maryland.
- A non-transient, non-community water system is a public water supply that serves 25 of the same individuals daily for at least 6 months of the year. There are approximately 573 of these systems in Maryland.
- A transient non-community water system is a public water supply that does not serve 25 of the same people on a daily basis. There are approximately 2,738 of these systems in Maryland.

Public water systems get water from both surface water and groundwater. Surface water sources are river intakes and reservoirs. Groundwater sources are springs and wells. As reported below, MTBE has only been detected in two water supplies using surface water.

The public water systems served by wells can be further distinguished between those systems that obtain water from a confined or unconfined aquifer. An unconfined aquifer is defined as a formation capable of transmitting significant quantities of water in which the water table or upper surface forms the upper boundary. In other words, this is the water that would be encountered first when drilling a well. An unconfined aquifer is more easily impacted by sources of contamination.

A confined aquifer is defined as an aquifer bounded between two low permeability layers. The water in a confined aquifer is protected from activity on the surface due to the long travel times needed to recharge the aquifer. Contamination of a confined aquifer is very rare.

Six percent of Maryland residents are supplied by community water systems using unconfined aquifers, and 10 percent of Maryland residents are supplied by community water systems using confined aquifers. Data is not available for the additional 16 percent of Maryland residents that obtain water from a private well. The remaining 68 percent of Maryland residents are served by surface water supplied public water systems.



Another factor influencing the completeness of the MTBE detection data presented above is the requirement for testing of public water systems. Community water systems and non-transient, non-community water systems are required to test for volatile organic compounds, which includes MTBE, at the following frequency: upon well installation; quarterly during the first year; annually for the next two years; and then once every three years. Waivers are permitted for systems using a confined aquifer to extend testing requirements to once every six years. Transient non-community water systems, which are the largest number of public water systems and more often located near potential sources of contamination, are not required under federal or state regulations to test for volatile organic compounds, including MTBE.

Since 1995, the MDE has been periodically sampling community and non-transient, non-community public water systems for MTBE. Of the 1,203 public water systems tested, MTBE has been detected in about 99 systems; 13 systems had levels above 20 ppb. Of these 13 systems, 11 now have alternate sources or the levels have dropped below 20 ppb. Alternative sources of water have been used to replace contaminated sources. To date, MTBE has only been found twice in surface supplies; both samples were less than 2 ppb. Figure 1 depicts the locations where MTBE has been detected in Maryland's public water systems. A summary of the findings from the MTBE monitoring of public water systems is as follows:

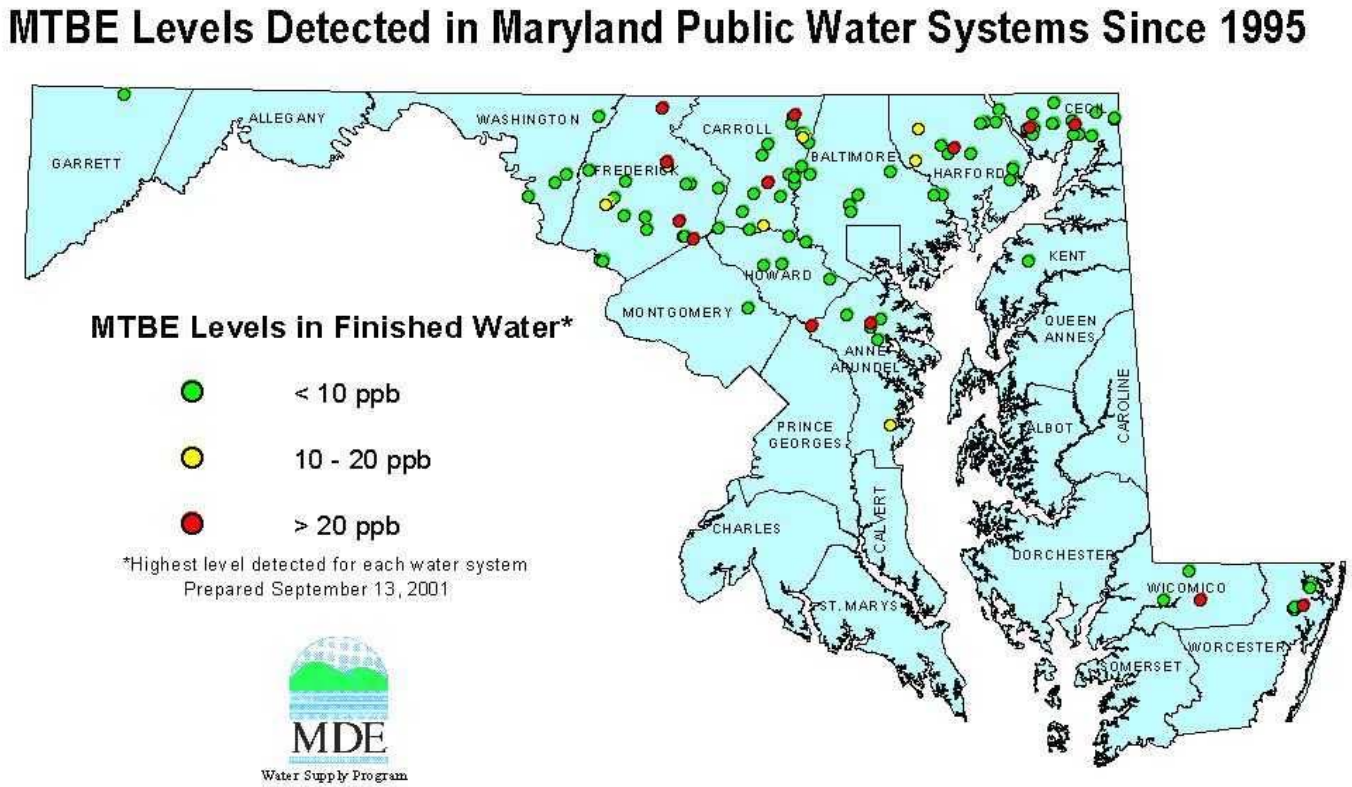

MTBE Levels Detected in Maryland Public Water Systems Since 1995
GARRETT
ALLEGANY
WASHINGTON
FREDERICK
CARROLL
BALTIMORE
HARFORD
CECIL
KENT
HOWARD
MONTGOMERY
QUEEN ANNES
ANNE ARUNDEL
CAROLINE
PRINCE GEORGES
TALBOT
CHARLES
CALVERT
DORCHESTER
WICOMICO
ST. MARYS
WORCESTER
SOMERSET
MTBE Levels in Finished Water*
< 10 ppb
10 - 20 ppb
> 20 ppb
*Highest level detected for each water system
Prepared September 13, 2001
MDE
Water Supply Program

Figure 1

- Approximately 1,069 public water systems supplied by 2,000 wells and intakes serving 84 percent of the Maryland population are routinely sampled for MTBE.
- MTBE is rarely detected in surface supplies, which serve 68 percent of the population.
- MTBE has not been detected in confined aquifer supplies.
- MTBE has been detected at approximately 9 percent of monitored systems.
- Most detections of MTBE are below the taste and odor threshold of 20 ppb.
- Thirteen public water systems have had detections above the taste and odor threshold of 20 ppb as of October 2001.
- Detected MTBE levels are likely to vary over time.

Domestic Well Data: There are an estimated 320,000 domestic wells in Maryland. About 8,000 to 10,000 new wells are drilled each year. A portion of these are replacement wells, and the remainder are for new development. At the time of construction, private wells may be sampled for volatile organic compounds, including MTBE, if the local environmental health agency has reason to suspect that harmful constituents are present in amounts that are significantly adverse to human health, safety, or comfort. After construction, private wells are not routinely, if ever, required to be sampled for MTBE contamination. However, wells are commonly tested during property transfers. The selection of contaminants to be tested for is left to the lending institution or the homebuyer. Data from testing at the time of construction or during property transfers is not available in a central location for retrieval or analysis.

The MDE's Oil Control Program is responsible for performing investigations into the source of petroleum contamination that has impacted domestic water wells. These domestic wells are normally located at private residences and supply the dwelling with potable water. The Oil Control Program, often in conjunction with local authorities, where possible will determine the source of petroleum contamination and require remediation action to occur.

In July 1999, the Oil Control Program established a database to track the presence of MTBE in domestic wells throughout the State of Maryland. The first report from this database, printed July 30, 1999, indicated 149 domestic water wells contaminated with MTBE. Currently, the database shows a cumulative total of 273 domestic wells that have at one time sampled positive for MTBE. Of the cumulative total, 240 wells are Oil Control Program investigation/remediation cases at various locations, including gasoline service stations, churches, transportation facilities, volunteer fire departments, petroleum bulk plants, country stores, and private residences**.** These 240 wells are dispersed among 129 sites/cases. The remaining 33 wells associated with closed cases have either been successfully remediated, an alternative water supply provided, or subsequent sampling no longer detected MTBE. The following table lists the numbers of domestic wells and public water systems with MTBE detections by county.

DOMESTIC WELL AND PUBLIC WATER SYSTEMS
MTBE DETECTIONS BY COUNTY

County	Domestic Well Active	Domestic Well Cumulative Total	Public Water Systems Cumulative Total
Allegany	--	--	--
Anne Arundel	36	41	8
Baltimore	15	24	10
Calvert	0	2	--
Carroll	34	35	16
Cecil	28	28	18
Frederick	53	54	18
Garrett	--	--	1
Harford	36	49	11
Howard	16	17	4
Kent	1	1	1
Montgomery	7	7	2
Prince George's	1	1	--
St. Mary's	2	2	--
Washington	10	10	3
Wicomico	1	2	3
Worcester	--	--	4
Totals	240	273	99

Note: Domestic Well Active column indicates the number of wells currently showing MTBE detections at 129 sites. Domestic Well Cumulative Total column includes the active wells and those wells no longer testing positive for MTBE.

Other Groundwater Impacts: The complete picture of the extent of MTBE contamination in groundwater is greater than the data presented above, which focuses on impacts to public drinking water systems and domestic/private wells. The transportation, storage, and use of petroleum products are common to all areas of Maryland. The groundwater in other counties and in Baltimore City, which are not listed in the above table, has been impacted by MTBE, primarily from leaks from UST systems. The MDE has been approved by the U.S. EPA to implement the Underground Storage Tank Program, authorized by the federal Resource Conservation and Recovery Act, Subtitle I. As part of this authorization, the MDE is required to routinely report to the U.S. EPA the number of releases from UST systems. To date, the MDE has reported over 11,400 releases (revised from Preliminary Report). Not all of these releases were of significant volume to have impacted groundwater, but the potential for MTBE to be a component of these releases is high. For those releases that have reached groundwater and involved petroleum, the groundwater is almost certain to have been impacted by MTBE since it dissolves easily into water relative to other components of gasoline

MTBE, which impacts groundwater in areas where groundwater is not used for drinking water, does not represent as high a risk of exposure as compared to areas where groundwater is directly consumed. However, there remains the possibility of MTBE vapors migrating from released gasoline and, to a lesser extent from the groundwater, accumulating in underground utilities and, in rare cases, in living spaces. Additionally, the presence of MTBE in other petroleum products, such as home heating oil, expands the number of potential sources of contamination well beyond the limits of the federally authorized Underground Storage Tank Program.

Another source of information on the extent of MTBE impact to groundwater is the data that has been voluntarily collected by the petroleum industry when companies merge or acquire new locations. A recent example of environmental information provided to the MDE, obtained from a Phase II environmental audit by a petroleum marketing company prior to the real estate transfer, illustrates the benefit of sampling groundwater prior to purchasing property at locations where petroleum is stored. At 40 locations where groundwater was sampled, all 40 had positive detections of MTBE.

Air Data: Although limited national studies, mainly by the U.S. Geological Survey, on the concentrations of MTBE in ambient air have been conducted, the focus of these studies has been primarily on the concentration of MTBE found in precipitation, both rain and snow. Modeling has predicted that MTBE can be scrubbed from the air, returned to the ground, and eventually reach groundwater. The values predicted by modeling and measuring have been in the single digit parts per billion. These concentrations have been highest in urban areas as compared to rural areas. No data for Maryland is available.

National and Regional Efforts (Legislation in Congress, EPA, and Other States)

The U.S. EPA has solicited comments on reducing the use of or banning the use of MTBE under the authority of the Toxic Substances Control Act (TSCA). The intent of the TSCA is to control problems at the source rather than legislating corrective actions once pollutants are released into the environment. The U.S. EPA expects to publish a proposed rule before the end of the year.

The U.S. Congress is currently debating how to address the long-term energy needs of the country and account for the unexpected degradation of groundwater resources caused by releases of petroleum into the environment. In Congress, more than 22 bills have been introduced to address the unexpected degradation of water resources caused by releases of MTBE and other petroleum products into the environment. A variety of approaches are reflected in these proposals, including a phase out of MTBE use and removing the federal oxygenate requirement in RFG. Recognizing that Congress established the federal oxygenate requirement to achieve several public policy goals (environment, rural economic development, and energy security), which remain equally important today, some proposals recommend replacing the oxygenate requirement with a national renewable fuel standard. Last year, the Northeast States for Coordinated Air Use Management (NESCAUM) and the Governors' Ethanol Coalition submitted a letter to Congress expressing their support for a replacement of the oxygenate requirement with a renewable fuel standard.

Several states have passed laws to ban MTBE and have requested the U.S. EPA release them from the oxygenate requirement. Fourteen states have acted to limit, phase out, or ban the use of MTBE (Arizona, California, Colorado, Connecticut, Illinois, Iowa, Kansas, Maine, Michigan, Minnesota, Nebraska, New York, South Dakota, and Washington). Several others have legislation pending. State requests to the U.S. EPA to waive the oxygenate requirement have so far not made the necessary demonstration that the oxygen requirement prevents attainment of a National Ambient Air Quality Standard, as required by the CAA.

Current Status of Efforts to Minimize and Counteract the Risks of MTBE

Remediation Method Review: During the past decade, several billions of dollars have been invested by federal agencies to develop and test remediation technologies that can be applied to treating or remediating groundwater contaminants. Much of the emphasis of this research and development focused on organic contaminants, especially gasoline components. Consequently, there are many technologies today that have emerged as standard methods for treating organic compounds found in groundwater. These technologies generally fall into two categories: treatment at the wellhead before it is distributed to the public (ex-situ treatment); or treatment in the ground before it is drawn from the subsurface (in-situ treatment). These technologies have been piloted, field tested, and validated by independent third parties over the past decade for their effectiveness in removing organics from groundwater. Today they are commercially available.

Once MTBE became a contaminant of concern in the early to mid-1990s, it was natural to initially use the technologies used to clean up other components of gasoline, such as the BTEX (benzene, toluene, ethylbenzene, and xylene) compounds, for remediating MTBE. The knowledge base developed over the decade regarding how to remove organics from groundwater and soil or surface waters could be applied to MTBE. The proven benefits derived from these technologies were expected to be also applicable to solving the MTBE contamination problem.

However, initial reports have shown that the standard technologies used for removing BTEX are not as effective at removing MTBE. The difference in properties such as solubility, volatility, and others, however slight, can make a big difference in the effectiveness of the technology applied to the different compounds. For example, MTBE is more soluble in water, is more mobile in water, has a higher vapor pressure, does not absorb onto sediments as well, and biodegrades slower than the BTEX compounds. It is differences such as these that have influenced the effectiveness of the standard BTEX treatment technologies for use on MTBE.

To solve some of these problems, significant research is occurring today to modify the technologies to increase their effectiveness on MTBE. For example, since naturally occurring microorganisms are not effective at breaking down MTBE, other organisms that have proven to be very effective at degrading MTBE are being injected into the subsurface to enhance the biodegradation process.

Maryland Department of the Environment's Actions and Response: The main goal of the MDE's efforts has been to define the extent of MTBE contamination in groundwaters of the State. These efforts have consisted of compiling data from public water supplies and release sites, taking follow-up actions as needed, and evaluating data for patterns of occurrence. Efforts to

expand the data collection on MTBE occurrence in domestic wells, in cooperation with local governments, are ongoing.

For water supplies used for providing public drinking water, contamination levels over 10 ppb result in an investigation of the contamination source by the MDE. Sampling frequency increases when MTBE is detected. For private wells, treatment is recommended above 20 ppb at the point of use. However, at higher levels well replacement may be needed. Follow-up action has included providing alternative sources of water, adding treatment, conducting additional monitoring, and changing remediation strategies.

On the preventive side, the MDE's Water Supply Program conducts studies and makes funding available to assist local governments in minimizing the risks of contamination at public supplies. The MDE encourages local governments to establish Wellhead Protection Programs to minimize current and future contamination risks. The MDE has prepared a model wellhead protection zoning ordinance that recommends not placing any new UST systems within a one-year time-of-travel zone to a public supply. The model ordinance further requires that all underground storage tanks and piping systems within a wellhead protection area meet State requirements for secondary containment, double wall tanks, liners, vaults, and underground piping. A description of the program can be found at the MDE's web page (http:/www.mde.state.md.us). Now that MTBE has become more widely known, local government water sampling programs have recently started including MTBE. The MDE is gathering additional information available from major oil companies and other sources and is currently assessing the potential health risks from MTBE.

The November 1998 U.S. EPA Blue Ribbon Panel on Oxygenates in Gasoline Report contains several recommendations that focus on UST systems. The MDE responded to the recommendations in this area by seeking funding to supplement its existing inspection program to more adequately address the concerns of undetected MTBE releases into the environment. These concerns were concurrently addressed by the Oil Funding Work Group established pursuant to Section 4, Chapter 532, Acts 1996, which was charged with assessing funding mechanisms for cleanup of contaminated sites and funding levels of oil related activities. The passage of House Bill 457 (2000 legislative session) and its accompanying note provided funding to implement two special projects targeted at collecting additional MTBE data and protecting drinking water supplies from MTBE impacts. Two of the three contractual positions were filled during the summer of 2001. These two special projects are described below.

Operational Tank Assessment Project (OTAP): Releases of gasoline from UST systems were dramatically improved by the upgrade requirements of the 1998 deadline. Leaks due to corrosion, spills and overfills are now thought to be prevented by these new control technologies. In addition, for those leaks that do occur, the required release detection methods are expected to detect a release very quickly and prevent any damage to human health or the environment. Confirming the accuracy of the previous statements and identifying other components of an UST system that could be leaking gasoline, but might not be detectable by the existing release detection methods, is the goal of this project. An example of one area of concern for the project is the liquid tightness of a catchment basin or spill containment bucket required around the fill pipe of an UST.

This bucket-type device is designed to catch small volumes of gasoline that may spill out of the delivery hose when the delivery driver disconnects it. We know that gasoline periodically enters this type of device, but it is not required to be tested for liquid tightness except at the time of installation. Over the years of use and change of seasons, the device may not remain liquid tight. Part of the project will be to test these catchment basins with water over a set period of time to determine if they are leaking. As of the end of October 2001, the OTAP project began inspections of active UST facilities. The first facilities inspected were State-owned facilities, which allowed inspection procedures to be refined. Of the 24 catchment basins hydrostatically tested, 19 passed, 4 failed, and 1 test was inconclusive. In addition to testing of the basins, the inspection process included sampling of the groundwater for MTBE from the tank field monitoring pipes installed in the backfill around the active USTs. Testing for MTBE is being performed by the DHMH laboratory. Of the four sample results received, two were below 5 ppb, one was 341 ppb, and the other was 10,747 ppb. Appropriate corrective action is being required on a site-specific basis.

Closed Case Assessment Project (CCAP): Prior to approximately mid-1997, the Oil Control Program did not routinely require the sampling of MTBE at sites with known gasoline releases. Many of these leaking underground storage tank (LUST) sites have since been determined to have completed the required cleanup and have been closed by the MDE. Since MTBE has been an additive to gasoline at varying percentages since the 1970s, the MTBE impact of these closed LUST sites is unknown. This project will investigate 10 percent of the closed LUST sites (540 of an approximate total of 5,400) over the next three State fiscal years. This will involve a file review of existing information of 180 sites per year along with a best-fit sampling plan to determine the location and method of sampling groundwater for MTBE years after the site was closed. A report will be prepared on the findings of the study.

During the summer of 2000, the MDE began to pilot the expansion of the testing parameters for other gasoline oxygenates, including the MTBE byproduct, TBA. Test results began to support the U.S. EPA's recommendations to expand testing requirements to all oxygenates used by the petroleum industry. DIPE, TAME, and TBA were detected in groundwater. Of additional concern, TBA was detected breaking through a carbon filtration system installed in a residence to remove MTBE and other petroleum compounds. Replacement of the carbon unit removed TBA, but the finding heightened the need to expand the testing parameters to other similar sites. Issues with the analytical method discussed later in the report have slowed the complete expansion of testing requirements.

Mapping and Data Integration: Global positioning systems (GPS) data and graphic information systems (GIS) software have become powerful tools in defining environmental problems and more importantly in defining solutions to these problems. In the case of MTBE, the mapping of potential sources of contamination and the potential receptors, in most cases wells, provides a visual tool to identify drinking water sources at risk. Additional protection strategies or increased monitoring frequency can readily be applied to areas that become identified.

The current challenge is to provide locational data, latitude and longitude for all the items of concern. Public water system locational data has, for the most part, been collected and is now the most readily available data set for mapping use. However, certain types of wells, specifically domestic wells, have not been mapped. Another missing piece of the equation is the location of all

sources of MTBE contamination. UST facilities have not, as of this time, been routinely mapped with GPS technology. Efforts are ongoing to convert address information to mapping quality locational data. These types of efforts have had limited success.

An example of a successfully implemented mapping and data integration program is California's Geotracker project. This project was funded by the California legislature and implemented by the Lawrence Livermore National Laboratory. To view the capabilities of the system via the Internet, log on to http:\\geotracker.llnl.gov. The U.S. EPA Region III office has funded a pilot project in the State of Virginia to test run the development of systems similar to Geotracker for use by other Region states. The Oil Control Program continues to participate in the U.S. EPA Region III pilot project.

The Maryland Department of Health and Mental Hygiene's Actions and Response: In order to determine the extent of MTBE contamination in the environment, significant reliance on laboratory support is necessary. The majority of MTBE testing currently taking place is being conducted by commercial laboratories upon the request of an UST owner or operator. These owners and operators of UST systems are considered responsible parties for a release of petroleum from an UST system and are being required to investigate and clean up the release by the MDE. The cost of this sampling requirement is born by the UST owner/operator. However, testing of community water systems and other drinking water sources relies on the services provided by DHMH. In contrast to the commercial laboratories, any significant increase in the number or frequency of MTBE testing will greatly stress existing non-commercial testing laboratory services. The following provides additional background and information on existing non-commercial laboratory services and capacity.

Operational Profile: The Division of Environmental Chemistry, a unit in the Laboratories Administration of the Department of Health and Mental Hygiene (DHMH), is located in the J. Mehsen Joseph Laboratory Tower of the O'Conor Building at 201 West Preston Street in Baltimore. The Division serves as a public health analytical laboratory for various State departments and program offices such as Environment, Natural Resources, General Services, Licensing and Regulations, Office of the Attorney General, Food Control, Drug Control, Oil Control, Hazardous Waste Enforcement, Water Quality Monitoring, Maryland Occupational Health Administration, and the State Highway Administration. Laboratory services are also provided to each of the State's 23 county health departments as well as the Baltimore City Health Department.

The Sample Management Area is staffed with experienced personnel and is responsible for sample receipt and registration, handling, distribution to appropriate labs, forms review and documentation, workload tabulation, sample tracking, storage of results, and chain-of-custody protocols required to ensure an effective quality assurance program. The Office of the Division Chief serves as the main customer interface for all laboratory activities with regards to sampling, test scheduling, test methods, quality assurance/quality control protocols, turnaround times, data reporting formats, and sample retention and storage. The Trace Organics Section is the laboratory that routinely analyzes multi-media samples for volatile organic compounds such as MTBE.

Trace Organics Section: The Trace Organics laboratory routinely analyzes volatile and semi-volatile organic compounds in drinking water, wastewater, soils, sediments, sludges and hazardous wastes. The laboratory also analyzes petroleum contamination (gasoline or fuel oil) samples as a result of leaking underground storage tanks in water, groundwater and soils. The laboratory is presently equipped with purge and traps attached to capillary gas chromatographs and purge and traps attached to capillary gas chromatographs/mass spectrometers. U.S. EPA Methods 524.2, 624, 8260 and 8270 are currently the test methods being employed for the analysis of volatiles and semi-volatiles in multi-media samples. MTBE is currently added in the mixture of standard compounds being analyzed in environmental samples submitted for volatile organics testing using U.S. EPA Methods 524.2, 624 and 8260. The laboratory can analyze an average of 90 environmental multi-media samples per week for volatile organics, which includes MTBE. The laboratory has provided various program offices in the Maryland Department of the Environment with MTBE data since 1995.

Presently, the Trace Organics Section is carrying out revalidation studies for U.S. EPA Methods 524.2, 624, and 8260 with Ethyl Tertiary-Butyl Ether (ETBE), Tertiary-Amyl Methyl Ether (TAME), and Dissopropyl Ether (DIPE) included in the mixes. Method development and validation for Tertiary Butyl Alcohol (TBA) will begin after completion of the revalidation studies for the ethers. These studies will ensure a high level of precision and accuracy of results when determining the extent of contamination from the various gasoline oxygenates. The results will be repeatable and will ensure quality data is used to support the decision making process. However, in order to provide analytical services for TBA and to increase capacity beyond 90 samples per week for the gasoline oxygenates, MTBE, ETBE, and TAME, funding in the amount of $265,000 is needed to obtain the following additional resources:

- Gas chromatograph/mass spectrometer equipped with a headspace analyzer for the analysis of TBA in multi-media environmental samples. ($130,000)
- In the event of increased workload, i.e., more than 90 samples/week, additional gas chromatograph/spectrometer equipped with purge and trap for the analysis of MTBE, ETBE, and TAME in multi-media environmental matrices. ($120,000)
- Explosion-proof Refrigerator (1) and Freezer (1) with electronic security locks for the storage of samples and chemicals. ($7,200)
- Laboratory Supplies and Reagents including solvents, columns, chemicals, etc. ($7,800)

III PROPOSED PLAN

Because of the potential for MTBE to contaminate sources of drinking water, a high priority must be placed on its containment, avoiding spills, and preventing, detecting, and immediately fixing leakage from petroleum storage tank systems. The underground storage tank industry completed a significant 10-year effort to upgrade and replace bare steel UST systems by the December 1998 deadline. MTBE was introduced into the fuel supply before this upgrade work was completed. Leaks from older bare steel tank systems, along with spills and overfills during fuel delivery, will continue to result in positive detections of MTBE in groundwater. MTBE may be the first indicator of the contamination plume, which may contain contaminants much more dangerous, such as benzene, a known carcinogen.

It is expected that the number of significant releases from UST systems, which will fail to be detected in time to prevent migration to a drinking water receptor, will diminish as these newer systems are monitored for releases. However, accidental spills and the cross contamination of other petroleum products with MTBE results in MTBE being present in storage tank systems not required to meet upgrade standards or to be monitored for leaks. This increases the potential for MTBE impacts to individual domestic drinking water wells in our more rural communities. Careful consideration should be given to eventually reducing or phasing out the use of MTBE in gasoline sold in Maryland.

The MTBE Task Force's proposed plan to minimize and counteract environmental and health risks associated with ground and surface water contamination from MTBE has four main components. The components are summarized below. It is important to note that, regardless of the extent of the adoption of the plan components, it is critical to periodically measure the effectiveness of any plan. It is clear that petroleum will continue to play a key role in America's energy strategy in the foreseeable future and, regardless of the makeup of gasoline, our drinking water resources will always be at risk from transportation, storage, distribution, and use of petroleum products.

A. Ensure the State has adequate resources to monitor groundwater for petroleum contamination, and prevent exposure to the public when positive test results are at or above levels of concern. The current strategy is to periodically monitor drinking water wells for petroleum contamination.

B. Ensure the State has adequate resources to monitor compliance with the regulations governing UST systems and respond to releases threatening waters of the State and public safety.

C. Educate the general public, with special emphasis on owners of petroleum storage tanks not subject to State requirements, on the impact of petroleum products on groundwater resources.

D. Initiate efforts with regional states, especially if the U.S. Congress does not develop a national approach, to address MTBE issues. This work will begin with requesting relief from the CAA's 2 percent oxygen by weight requirement as long as the resulting gasoline produced maintains current air quality benefits, including no backsliding on air toxic emissions.

IV. ALTERNATIVES TO MTBE

As described previously in this report, MTBE has been the oxygenate most widely added to RFG by gasoline manufacturers to meet the requirements of the federal CAA in much of Maryland, as well as in the eastern and western states of the country. Ethanol has been the oxygenate generally used in RFG in many mid-west states.

Maryland does not have gasoline refining capacity. Roughly 2.5 billion gallons of gasoline used in Maryland each year is imported into the State by pipeline, barge, truck, or rail. The Task Force agrees that Maryland should continue to work with other states and stakeholders on a regional (multi-state) or national approach to issues involving motor vehicle fuels, including the MTBE issue in gasoline.

The Task Force explored the alternatives to MTBE currently available in Maryland that would maintain the current air quality benefits achieved by the use of RFG, with MTBE as the primary oxygenate. These benefits have included significant reduction of air toxic emissions and pollutants that form ground level ozone.

The Task Force heard presentations from the Renewable Fuels Association, representing the ethanol industry, the MDE's Air and Radiation Management Administration charged with implementing the requirements of the CAA, and representatives from the Oxygenated Fuels Association, representing the MTBE industry. The Task Force also reviewed information provided by stakeholders in California and certain other states that have previously taken action to ban the use of MTBE in gasoline in the future (currently, California's ban starts in 2003). Information provided during the U.S. Congress' ongoing debate about the MTBE and alternative fuels issues was also shared and discussed.

The issues addressed by this Task Force are not unique to Maryland and are, in fact, being addressed by many other states. The alternatives to the continued use of MTBE in RFG that are available to Maryland and other concerned states are complex, but can be summarized as follows:

A. Request a waiver from the current RFG requirements under a provision in the CAA and require the sale of a new gasoline in Maryland (other than the current RFG) that maintains all the current clean air benefits, including air toxics benefits.

The CAA provides for such a waiver but requires a state to provide substantial justification and demonstrations. The state of California has been the only state to submit a waiver, but the U.S. EPA denied the request in June 2001. That EPA denial is being litigated. Certain gasoline manufacturers indicated that a new gasoline could be provided to California that does not contain MTBE but still maintains the air quality benefits of RFG. Additional work must be conducted to determine if such a new gasoline can be manufactured for use in Maryland and the other northeast states that must currently use RFG. Several northeast states are currently considering submitting individual waiver requests or a joint request for consideration by the U.S. EPA.

B. Work with Maryland's elected representatives to change the current CAA mandate that RFG contain a minimum 2 percent by weight oxygen. Revisions to this federal law could take various forms, including removing the current mandate to include oxygenates, adding a new mandate for a minimum amount of renewable fuels, etc. However, it is critical that any future Maryland gasoline still maintain air quality benefits.

Much of the discussions in Congress about making revisions to this provision in the CAA have involved the future role that renewable fuels, like Ethanol, would have. Another alternative available if the law is changed is to replace MTBE with increased use of alkylates in RFG to make up for the loss of octane and volume that would be lost with the removal of MTBE. Under this alternative, RFG would still need some component regulation in the law to ensure there will be no backsliding of air quality benefits. Various national legislation proposed within the last two years would remove the existing oxygenate mandate, and some include a renewable fuels standard. A central issue being debated is if and how the CAA should include any mandates for specific components of gasoline provided the industry is able to manufacture gasoline that meets performance standards and achieves current air quality benefits, including air toxics benefits.

The contentious issues involve the need for increased energy security for the country, the extent of increased financial opportunities for farming and farming-related industries, the desire to limit the toxic components in gasoline, and the future supply and costs of gasoline for citizens.

C. Ban the use of MTBE in gasoline sold in Maryland effective some time in the future, as some other states have done. This action would require the replacement of MTBE with an oxygenate other than MTBE that still meets current CAA requirements and maintains clean air benefits, but does not create a potential threat to drinking water.

There are currently available alternatives to MTBE including other ethers that act as oxygenates. However, because these ethers will likely present similar water quality impact issues as MTBE because of their similar chemical compositions, they are considered unacceptable as an alternative to MTBE and were not addressed by the Task Force.

Unless the current CAA provisions are revised, the only currently viable wide-scale substitute for MTBE as an oxygenate in Maryland and the other northeast states is Ethanol. Ethanol is considered a renewable fuel because it can be made from grain feed stocks and perhaps even from agricultural waste material. Ethanol is used as the oxygenate of choice in the mid-west states and in certain spot areas where the price is competitive to MTBE, or where Ethanol use is required under state policy or law. Nearly all current Ethanol production facilities in the United States are located in the grain-producing mid-west and central states, but facilities are being planned for locations in the eastern and western parts of the country for the future. There is general agreement that Ethanol use will dramatically increase in this country under any possible future scenarios.

Impacts of Ethanol Use

California has been studying the impacts of the increased use of Ethanol since the state banned the use of MTBE beginning in 2003. Study efforts were greatly enhanced as a result of the U.S. EPA's decision to reject California's request for a Section 211(c) waiver. California has been especially concerned about the use of Ethanol in that state and resulting cost implications. The results of California's studies and the decision as to how California intends to proceed were not available in time for this Final Report.

However, in addition to many other technical papers and reports regarding Ethanol, the Task Force makes note of the June 2001 report produced by the New England Interstate Water Pollution Control Commission (NEIWPCC) and the Northeast States for Coordinated Air Use Management (NESCAUM) entitled, "Health, Environmental, And Economic Impacts of Adding Ethanol to Gasoline in the Northeast States." The report is comprehensive in its presentation of the issues associated with expanded Ethanol use in the northeast states and would be directly applicable to Maryland. Therefore, the Task Force has chosen to include a brief summary of certain Key Findings included in the NEIWPCC/NESCAUM Report. (See Appendix B)

V. RECOMMENDATIONS

Recommendation #1: The Maryland Department of the Environment (MDE) should continue the testing and assessment of wells and water supply systems for Methyl Tertiary Butyl Ether (MTBE) and other oxygenates used by the petroleum industry. Positive test results should result in the MDE conducting a source investigation as appropriate. Specific steps include:

- Continuing to use the MTBE level of 10 parts per billion (ppb) in water samples at and above which a source investigation is conducted.
- Monitoring the U.S. EPA's drinking water health advisory for MTBE for changes, along with any future standard established for the other oxygenates. The MDE should review U.S. EPA advisories and standards and modify State requirements as appropriate.
- Finalizing a method for testing and analyzing water samples for MTBE, TBA, ETBE, and TAME contamination. (Maryland Department of Health and Mental Hygiene)
- Developing laboratory-testing methods for the determination of DIPE and Ethanol in water samples. (Maryland Department of Health and Mental Hygiene)
- Working with local health departments to expand testing of wells not currently tested in unconfined aquifers. (shallow wells)
- Encouraging local governments to protect drinking water sources through locally adopted siting restrictions.

Recommendation #2: The MDE should enhance the level of inspection and enforcement of underground storage tank (UST) systems and spill prevention programs and control the escape of MTBE and other gasoline constituents through improving technology and operation of UST systems, including the piping and distribution system. Specific steps include:

- Establishing an inspection frequency for UST systems with a goal of once per year.
- Amending regulations as necessary to prohibit petroleum deliveries to UST systems that are not properly registered and do not meet federal or State UST upgrade requirements.
- Working with stakeholders to develop a method for the onsite display of the registration status of the UST systems at all UST facilities.
- Working with industry and the U.S. EPA to establish comprehensive certification and training programs for owners, operators, contractors, and employees who work with petroleum storage tank systems to implement procedures and processes that would minimize leaks and groundwater contamination.

Recommendation #3: Maryland should give careful consideration to eventually reducing or phasing out the use of MTBE in gasoline sold in Maryland. Since this is best addressed as a regional multi-state or national issue, specific steps should include:

- Working with other states and stakeholders on a regional (multi-state) approach to address MTBE issues, consistent with current discussions on energy supply. The MDE should consider the option of joining northeast states that may be filing a joint petition to the U.S. EPA to remove their states from the oxygenate requirement in federal law, provided oil companies can supply gasoline to Maryland that maintains current air quality benefits, including no backsliding on air toxics emissions.

- Working with Maryland elected officials to urge the U.S. Congress to develop a national solution to MTBE, which should include repealing the federal Clean Air Act 2 percent oxygen-by-weight mandate and establishing a renewable fuel program. The actual air quality benefits that are currently achieved through the Reformulated Gasoline (RFG) program must be maintained.

Recommendation #4: Additional health and energy studies on MTBE, Ethanol, other oxygenates, and alternative gasoline formulations are being conducted by the U.S. Department of Energy, the U.S. EPA, other agencies, and industry. The MDE should review those studies when completed and use conclusions and recommendations to modify MDE policy, if appropriate.

Recommendation #5: The MDE should implement, through public-private partnerships, expanded public outreach programs on the proper handling and disposal of gasoline. The programs should include warning the public that improper handling of petroleum products and filling of vehicle tanks and containers could lead to groundwater contamination. In addition, the MDE should require facilities dispensing gasoline to include signage informing the users that the gasoline is oxygenated to reduce air pollution, and any spillage may result in contamination of water resources. These outreach efforts should also include a broad-based program targeting owners and users of private wells on measures to prevent, detect, and treat contaminated water.

Recommendation #6: Maryland should provide adequate support to address the impact of MTBE and other oxygenates in gasoline on Maryland's water resources. Specific steps include:

- Providing funding to DHMH laboratories for testing of MTBE, TBA, ETBE, TAME, and Ethanol in water samples.
- Providing resources for a proactive drinking water sampling program.
- Dedicating appropriate resources to enforce all existing statutes and regulations with regard to UST system integrity, maintenance, record keeping, and remediation.
- Working with Maryland's Congressional delegation to expand resources available from the U.S. Congress and EPA.

VI PUBLIC MEETING

Although all Task Force meetings have been open to the public and advertised, members of the Task Force agreed to hold an evening public information meeting. The meeting was held at 7 p.m. on November 13, 2001 at the Anne Arundel Community College near Annapolis. The public meeting was widely advertised to encourage attendance of interested parties. Approximately 30 people attended the meeting, including six members of the Task Force.

The meeting's purpose and agenda were introduced by the Chairperson, Merrylin Zaw-Mon, who was followed by Delegate Virginia Clagett, one of the Task Force legislative sponsors. The MDE staff presented a Power Point presentation summarizing the findings of the Task Force and its draft of the final recommendations. The Task Force offered one week to receive any comments on the recommendations. See Appendix C for comments submitted to the Task Force.

VII. APPENDIX A

Task Force on the Environmental Effects of MTBE
Task Force Members

Representing the Maryland House of Delegates, Appointed by the Speaker of the House:

Delegate Virginia P. Clagett, District 30, Anne Arundel County
Delegate Mary Ann Love, District 32, Anne Arundel County

Representing the Maryland Senate, Appointed by the President of the Senate:

Senator Brian E. Frosh, District 16, Montgomery County
Senator Nancy Jacobs, District 34, Harford County

Representing the Secretary of the Maryland Department of the Environment:

Merrylin Zaw-Mon, Deputy Secretary [for Secretary Jane T. Nishida]

(*Replaced former Deputy Secretary and Chairperson of the MTBE Task Force Arthur W. Ray in June 2001*)

Representing the Secretary of the Maryland Department of Health and Mental Hygiene:

Dr. Prince Kassim for Secretary Georges C. Benjamin, M.D.

Representing the Secretary of the Maryland Department of Natural Resources:

Dr. Paul Massicot for Secretary J. Charles Fox

Representing the Petroleum Industry, Appointed by the Governor:

E. Elliott Burch Jr., President, Burch Oil Company

Task Force Members

Representing the Gasoline Refining Industry:

ExxonMobil Corporation/BP Exploration & Oil, Inc.

(*Datus Wall of ExxonMobil resigned and replaced by Alan Seese of BP Amoco in March 2001. Mr. Seese resigned in September 2001 and was not replaced. Mike Goellner of BP Amoco attended the Task Force meetings.)*

Representing Local Government (urban), Appointed by the Governor:

Betty H. Francis, Director, Public Works & Transportation, Prince George's County

Representing Local Government (rural), Appointed by the Governor:

Larry A. Bohn, Director, Environmental Health, Frederick County Health Department

Representing Environmental Action Groups, Appointed by the Governor:

Andrew J. Bowen, Vice President, MD Rural Water Association
(*Andrew Bowen replaced Wayne Winebrenner in August 2001.*)

Joan S. Willey, Board Member, League of Conservation Voters

Representing the Underground Storage Tank Industry, Appointed by the Governor:

Dr. Caroline B. Purdy, S2C2, Inc.
(Resigned in September 2001 and was not replaced.)

Representing Environmental Health Risk Assessment, Appointed by the Governor:

Dr. James D. Yager, Professor of Toxicology, Maryland Department of Environmental Health Sciences, Bloomburg School of Public Health, Johns Hopkins University

Representing the Ethanol Industry:

Robert M. Dinneen, President, Renewable Fuels Association

VII. APPENDIX B

Select Key Findings of the NEIWPCC/NESCAUM Report

Health Effects

- Given current information, ethanol appears to be one of the least toxic of the major components of gasoline when considering common toxicological endpoints, such as carcinogenicity and central nervous system depression.
- Preliminary analyses indicate that direct exposure to fuel ethanol in the air and in contaminated drinking water is not expected to pose public health risks.
- The potential for other adverse impacts, including developmental effects, associated with large-scale exposure to low levels of ethanol is uncertain.
- Additional analyses to estimate ambient exposure to ethanol and its atmospheric breakdown products, including highly toxic constituents such as acetaldehyde and peroxyacetylnitrates (PAN), are needed to assess the potential public health impacts of ethanol use in the northeast.

Environmental Impacts

- Because it biodegrades quickly in the environment, ethanol poses significantly less risk to water resources than MTBE. However, the following environmental transport properties of ethanol are cause for some concern: (1) at high concentrations ethanol can make other gasoline constituents more soluble in groundwater; (2) when present in a gasoline spill, ethanol can delay the degradation of other, more toxic components in gasoline; and (3) ethanol can cause greater lateral spread of the layer of gasoline on top of the water table.
- While ethanol is likely to have fewer adverse impacts than MTBE in small-volume gasoline spill scenarios, the relative impacts of large-volume gasoline spills are harder to generalize due to the uncertainties in quantifying the effects of ethanol on Benzene, Toluene, Ethylbenzene, and total Xylene (BTEX) plume length, the concentration of terminal electron acceptors, and secondary effects on groundwater quality, such as increased levels of dissolved iron.
- The breakdown of ethanol in surface waters could potentially result in the consumption of significant quantities of dissolved oxygen in the surface water body. Depending on conditions in the surface water body and the amount of ethanol introduces, this could result in fish kills.
- Much of the technology developed to clean-up gasoline and MTBE in soil should work in remediating spills of neat ethanol and ethanol-blends. However, until these technologies are field tested, it is difficult to determine the cost and effective efficiency of the various options.
- Due to its high solubility, treatment technologies that rely on the physical separation of ethanol from water (e.g. adsorptive filters) will not be effective.
- It is premature to speculate on how the presence of ethanol blends will affect soil and groundwater remediation costs since several significant factors regarding the fate and transport of ethanol in the environment are unknown.

Ethanol Infrastructure

- Due to ethanol's affinity for water, ethanol-containing gasoline cannot be transported through existing pipelines.
- Ethanol will need to be transported and stored separately from gasoline until the point where it is loaded into tanker trucks for delivery to retail stations.
- Segregated ethanol storage tanks and new blending equipment will be needed at distribution terminals.
- To accommodate the amount of ethanol that would be needed to meet RFG demand, barge, rail, and truck facilities would need to be added or expanded at bulk terminal and port facilities in the region.
- The materials used to fabricate underground and aboveground storage tank systems have evolved over time to accommodate the storage of ethanol and ethanol-blend fuels. However, some existing single-walled fiberglass reinforced plastic tanks fabricated prior to January 1, 1984, as well as some gaskets, sealants, adhesives and other component materials, may not be compatible with ethanol. The degradation of non-compatible materials may lead to new releases.
- Ethanol will enhance the suspension of water and loosen rust and deposits from the interior walls of storage systems. Water and scoured deposits could cause or contribute to premature failure of some leak monitoring systems, submersible pumps, fuel dispensers, piping, hoses, nozzles and swivels.

Economic Impacts

- Removing MTBE from the region's gasoline pool is likely to increase fuel costs and may create a near-term volume supply shortfall, whether the oxygen mandate is retained or not. However, costs increases and potential supply shortfalls are likely to be more severe with the mandate than without the mandate.
- Existing information suggests that producing RFG with ethanol will increase per gallon costs by 3 to 11 cents in the near-term. These cost estimates are likely to be conservative because they do not reflect the combined demand for ethanol in both the northeast and California; and they do not reflect the maintenance of full air quality benefits provided by the RFG program. Incremental cost increases are expected to decline with a longer MTBE phase-out period.
- There may be significant adverse impacts on the state highway funds due to the structure of the federal subsidy program to encourage fuel ethanol use.
- The development of cellulosic biomass ethanol production capability in the northeast presents a potential economic opportunity that could reduce the long-term cost and increase the economic and environmental benefits of fuel ethanol use in our region.

NOTE: For the complete report, entitled: "Health, Environmental, and Economic Impacts of Adding Ethanol to Gasoline in the Northeast" visit the NEIWPCC website at www.neiwpcc.org

VII. APPENDIX C: Public Meeting Comment

Maryland Grain Producers Association
53 Slama Road • Edgewater • Maryland 21037-1423

November 16, 2001

Ms. Merrylin Zaw-Mon, Deputy Secretary
Department of the Environment
2500 Broening Highway
Baltimore, MD 21224

Dear Merrylin,

On behalf of the Maryland Grain Producers Association, I would like to commend the MTBE Task force for their diligence in evaluating the presence of MTBE in Maryland and options available to deal with the problems associated with this product. In its role as an oxygenate MTBE has proven to provide clean air benefits and yet when released into the environment it becomes a major pollutant that must ultimately be dealt with. We too believe that this will be addressed at the federal level.

Our obvious interest is in the role of ethanol as a replacement oxygenate. Studies conducted by California's Environmental Policy Council concluded that ethanol maintains air quality benefits and does not pose a risk to ground or surface water. Thus ethanol is certainly an effective replacement for MTBE that would maintain air quality benefits without sacrificing water quality benefits.

We feel strongly that if Maryland seeks to eliminate the oxygenate requirement it will send a very negative message to farmers and investors in a potential economic development project to build a small grains ethanol plant in the state. Understand that policy decisions are rarely made on single issues, and the inclusion of the oxygenate requirement in the Clean Air Act was seen as providing both air quality benefits and an increased market opportunity for ethanol. Recently, there has been increased support for replacing the oxygenate requirement with a nationwide renewable fuels standard. Last year the North East State's for Coordinated Air Use Management (NESCAUM) and the Governor's Ethanol Coalition wrote a letter to the congress in support of a renewable fuels standard.

In light of the events on September 11, 2001 and the Governor's desire to see an increased use in alternative fuels (Executive Order 01.01.2001.02 – Sustaining Maryland's Clean Power, Green Buildings and Energy Efficiency), I believe it would be prudent for the MTBE Task Force to add a third bullet under General Recommendation #3:

- The Task Force supports a national renewable fuel standard to replace the oxygenate requirement on the understanding that this will maintain the energy security and economic development opportunities for ethanol that would be lost by removing the oxygenate requirement from reformulated gasoline.

Although we are disappointed that the MTBE committee did not fully appreciate the benefits of replacing MTBE with ethanol, we believe that if the MTBE task force would make this amendment to the report that it would be acceptable to Maryland's grain farmers and would not be seen as deterrent to Maryland's budding ethanol industry. Many diverse groups are supporting ethanol production in Maryland. Not only will it provide economic and energy security benefits but the use of small grains will also provide additional water quality benefits by providing winter cover crops on farmland.

Sincerely,

Donnie Tennyson
President

cc: The Honorable Virginia Clagett