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**MTBE IN MAINE**

**SUMMARY OF FIVE POINT PLAN**

**OCTOBER 13TH, 1998**

**Department of Environmental Protection  
Department of Human Services**

## **Introduction**

On June 3rd, the Maine Departments of Environmental Protection and Human Services announced a five-point plan to respond to incidents of MTBE contamination of public and private wells. This report is an overview of the background and results of that initiative.

## **History of MTBE Use in Maine**

MTBE is an oxygenate that has been used since 1979 when it was first added to gasoline to replace lead as an anti-knock agent and to boost octane. MTBE is now in most conventional and "reformulated" gasoline sold in Maine and in the Northeast. In conventional unleaded gasoline, its concentration ranges from 3 per cent by volume in regular fuel to 8 per cent in premium blends. Reformulated gasoline, as mandated by the Clean Air Act Amendments of 1990, must contain more of the oxygenate-- roughly 10 or 11 per cent by volume.

Maine opted into the Reformulated Gasoline ("RFG") program in 1991 during the McKernan Administration to combat ground level ozone, an air pollutant that causes respiratory problems among children, the elderly and healthy individuals. Federal law allows states to employ this pollution control strategy only in areas that fail to meet the health standard for ozone. As a result, seven counties in southern Maine were required to use RFG. It was first introduced there in November 1994.

When Governor King came into office one month later, the state had not yet met the federal requirement to submit a plan to reduce Maine-generated volatile organic compounds (VOCs) by 15 per cent. This failure prompted EPA to initiate a procedure leading to "sanctions" as prescribed by federal law. If actually imposed, the sanctions would have curbed economic development in southern Maine and halted the transfer of federal transportation funds to the state.

To avert such draconian measures, Governor King convened a stakeholder group to advise him on the elements of a plan that would receive EPA approval. Roughly a dozen VOC control strategies affecting various business segments and consumer products were considered and eventually included in the plan. However, since manmade VOCs are generated in Maine primarily by "mobile sources" (cars, trucks and off-road vehicles), the bulk of the reductions had to come from them.

As a result, the group focused on gains to be achieved through auto emissions testing, reformulated gas, and stage II vapor controls at the gas pump. Maine's CarTest program, an auto emissions testing program involving centralized facilities and use of a dynamometer to test cars during operation, had been initiated during the McKernan Administration and promptly suspended due to strong opposition from the driving public and collection of 50,000 signatures to force a referendum to terminate the program. The stakeholder group recommended to the Governor that he resume the program, with some modifications, and continue the sale of RFG.

Before making a final decision on the plan, Governor King established two task forces to evaluate aspects of reformulated gas that had raised public concerns -- vehicle and small engine performance and health concerns about MTBE. The health effects task force reported to the Governor in May 1995 as follows:

"From a health effects perspective, RFG appears to be a reasonable alternative to regular (conventional) with a modest potential for long-term positive health impacts."

The group also recommended continued review of any health-effects studies and initiation of sampling of public water supplies.

After receiving this recommendation and satisfactory recommendations on engine performance, Governor King chose to continue RFG while meeting with the Administrator of EPA modify federal rules to allow Maine to implement a less burdensome auto testing program in the future. EPA complied with this request authorizing Northern New England states (Maine, Vermont, and New Hampshire) to move forward with limited additions to existing safety inspections (e.g. gas cap check until 2001)

In addition, the Governor committed to tackle the dominant cause of Maine's air quality problems -- pollution transported across state boundaries from other states. Maine led efforts to press EPA to impose controls on upwind states, including the filing of a lawsuit. These efforts resulted in EPA's issuance of rules in September, 1998 to require substantial reductions in emissions from 22 states which affect Maine's air quality.

### **Air Quality Benefits of RFG Program**

The RFG program is considered one of the most successful initiatives ever undertaken in the Northeast to reduce ground-level ozone as well as air toxics.

Federal law requires that emissions resulting from the use of RFG contain 15 per cent less volatile organic compounds and 15 per cent less toxic air pollutants than conventional gasoline. EPA has verified that these reductions have been met and perhaps surpassed. In addition, violations of the federal one hour ozone standard have declined steadily in Maine and other parts of New England during the RFG program despite an increase in ambient temperature--a factor which would otherwise tend to lead to an *increase* in the number of air quality violations.

Possibly the most significant benefit, however, is that the monitored levels of ambient air toxics have declined dramatically during the period since introduction of RFG in Maine and in other areas in the country. (Specifically benzene has declined by 31 per cent between 1994 and 1997, with ethyl benzene declining by 52 per cent.) On a related note, NESCAUM recently issued a study documenting a 12 per cent decrease in cancer risk due to exposure to air toxics from RFG as compared to the risk from exposure to conventional gasoline.

### **Additional Analysis of Health and Ground water Impacts of MTBE**

The State Bureau of Health (BOH) followed the recommendation of the health effects task force, establishing a surveillance program for MTBE in public water supplies in February, 1997, reviewing DEP data on ground water pollution associated with leaking underground storage tanks, and a variety of health studies conducted at the state and national levels.

Governor King requested a report on the findings of this effort, which was provided to him by the Health Bureau in June 1997. The report concluded:

*Based on the most recent review of data on MTBE in Maine public drinking water systems, 23 of 333 tested systems (7%) had detectable levels of MTBE. Of those systems testing positive, the median concentration was 2.8 ppb and the range of detected concentrations was 1 to 16 ppb. The prevalence of drinking water sources testing positive for MTBE was significantly greater in counties using MTBE-RFG; 11% of tested waters (sic) systems from RFG counties tested positive for MTBE, 4 tested positive in non-RFG counties. This increased prevalence may indicate an effect of increased use of MTBE-RFG. However, it may also simply indicate a greater prevalence of pre-RFG leaking underground fuel storage tanks in the more populated counties of Maine. For example, ME DEP has found that the majority (70%) of gasoline spill related monitoring wells testing positive for MTBE prior to the introduction of RFG in Maine were located in counties that would later use RFG.*

BOH added:

*Current conclusion: Current levels of MTBE in Maine public drinking water systems do not appear to pose a significant human health risk. Monitoring of MTBE in public drinking water systems should continue, in part because of the apparent low odor and taste thresholds for this compound, and in part to monitor for any evidence of increased contamination.*

BOH also reviewed the potential health impacts from short-term inhalation of MTBE-RFG Vapors. Their current conclusions provided to the Governor were as follows:

*Epidemiological studies have failed to establish a causal relationship between inhalation exposure to MTBE-RFG and reported acute health symptoms. However, one cannot rule out that exposure to the MTBE-RFG mixture may cause acute health effects among certain individuals, especially those individuals exposed to higher air concentrations (e.g. occupational exposures)...*

The bureau noted that new research was ongoing which would yield additional information on these and related issues.

BOH also investigated the potential health risks associated with chronic exposures to exhaust and evaporative emissions and reported:

*The evidence that MTBE is carcinogenic in animals raises concern that it may be carcinogenic to humans. However, MTBE appears to be no more potent at inducing tumors in test animals than traditional gasoline and thus its addition to gasoline would not be expected to increase the overall carcinogenic hazard of the mixture. It is possible that the MTBE-RFG mixture may result in aggregate evaporative and exhaust emissions that are of less carcinogenic hazard than similar emissions from traditional gasoline. Estimates of the incremental cancer risk from lifetime exposure to MTBE at air concentrations of 2 ppb (likely an overestimate of levels for Maine) are very low, on the order of 1 excess case per one million exposed people.*

## **DEP Gains Right to Opt Out of RFG Program**

Due to ongoing concern in Maine about the health effects and ground water impacts of MTBE, DEP Commissioner Sullivan took action in 1997 to establish Maine's right to opt out of the program. At the time EPA was finalizing rules requiring states already in the RFG program to commit to five additional years of the program -- until the year 2003. EPA's draft rules were aimed at placing restrictions on states' ability to opt out of the program so that oil refineries would have advance assurances of the volume of Phase II RFG which they would need to produce for sales in the year 2000. Phase II RFG is required by law to have lower levels of pollutants than Phase I RFG.

EPA's draft rules required a state to affirmatively opt out of the program by January 1st 1998 or remain in the program through 2003. DEP requested a modification of the rule to allow Maine to exercise its option *after* the end of the 118th legislative session (June, 1998) so that the legislature would have time to fully consider whether Maine should remain in the RFG program. EPA included this extension for Maine in the final rules. No other state requested or received such an extension.

On December 1st, 1997, Governor King notified EPA Administrator Browner of his intent to exercise Maine's authority to take an extension until May 31st, 1998.

On May 21st, 1998 Governor King notified EPA Administrator Browner of his intent to exercise Maine's right to opt out of the program, but asked EPA to withhold its final action on this request until completion of the study he had ordered on MTBE contamination of water supplies in Maine.

## **Legislative Review of RFG Program**

Legislative oversight and initiatives relating to the RFG program have been continuous since its inception in November 1994. Senator Willis Lord and Representative Richard Gould, chairs of the Natural Resources Committee in the 117th legislature, served on the stakeholder group for the 15 per cent VOC plan. A bill in the first session of that legislature which would have terminated Maine's participation in the RFG program was defeated.

A 1996 bill introduced by Representative Verdi Tripp established a committee to review the health effects of RFG, and another in 1997 directed the Bureau of Health to establish a health standard for drinking water. Both of these efforts culminated during the second session of the 118th legislature in 1998.

The Select Committee on Health Effects of RFG conducted hearings throughout southern Maine over two years and gathered extensive data on the topic. DEP staff and many others provided information to the committee on both the air quality benefits of RFG and data on the presence of MTBE in ground water. This information, along with several recommendations, was included in the committee's final report to the Natural Resources Committee.

On the topic of ground water, the report included the following information provided in a letter by DEP Commissioner Sullivan October 27th, 1997 to the committee:

*“For the five-year period of 1992 to 1996, inclusive, the Department’s Bureau of Remediation and Waste Management has documented 345 private wells contaminated with MTBE at concentrations above laboratory detection levels (usually 1 ppb). Half of these wells are contaminated with MTBE only, the other half are contaminated with both gasoline and MTBE. All of these wells were contaminated by discharges of gasoline resulting from subsurface leaks or surface spills, almost all at underground or above ground gasoline storage tank facilities.”*

Maine's experience as of this point was consistent with national trends, as reported in a national study of oxygenates. This report, the Interagency Assessment of Oxygenated Fuels published by the National Science and Technology Council in June 1997, identified leaking underground storage tanks as the predominant source of ground water contamination by MTBE and other oxygenates. The report states, in part:

*“Petroleum storage tanks represent the largest populations of potential point sources of alkyl ether oxygenates to natural waters.... USEPA’s statistics show that slightly over 300,000 sites have been identified with contamination that require corrective action...The current improvement in the physical condition of Underground Storage Tanks and release-detection capabilities, coupled with a reduction in the population of tanks, should contribute to a considerable reduction in the annual volume of oxygenated gasoline released to natural waters from this subset of point sources.”*

Its observation that removal and upgrade of obsolete underground storage facilities and replacement with state-of-the-art equipment would lead to reduced contamination was consistent with Maine's campaign to remove all bare steel tanks and replace them with double lined facilities with leak detection capabilities. DEP, working with gas station owners, public facilities and others, moved forward aggressively with replacement of bare steel tanks. More than 30,000, or 98 percent of them, have been removed, placing Maine in the lead nationally on this initiative.

It has been in the context of major gasoline spills associated with these tanks that MTBE often appeared as the precursor of other toxic gasoline constituents such as benzene.



Among the Select Committee's findings and conclusions, based on review of this information and other related data, was the following:

### *Water Quality*

*Finding: The committee finds that there is cause for great concern that the use of RFG has and will continue to result in the contamination of ground water and drinking water supplies in the State. The committee further finds that this concern is heightened by MTBE's solubility in water, its relative mobility in soils and its resistance to degradation, as well as the lack of consensus in the scientific community regarding the carcinogenicity of MTBE.*

*Recommendation: The committee strongly endorses the adoption by the Department of Human Services of a legally enforceable primary drinking water standard for MTBE in public water systems.*

Though the Select Committee did not recommend an immediate end of the RFG program, the legislature and Governor went on to pass legislation (PL 791) based on this report, which directed the DEP Commissioner to "develop recommendations regarding alternative fuels to reformulated gasoline (RFG) with MTBE that would meet the requirements of the Clean Air Act...." and submit a report to the Natural Resources Committee by January 15th, 2000 with an interim report by January 15th, 1999.

During the same legislative session, the legislature and Governor approved the recommendation of the Bureau of Health that established a maximum health threshold for MTBE in drinking water of 35 parts per billion. During legislative briefings, the DEP indicated it would utilize an action level of 25 ppb for commencing remedial action of contaminated water supplies.

### **Recent Incidents of MTBE Contamination**

In the spring of 1998 elevated levels of MTBE were detected in ground water at a gas station and in monitoring wells near a public water supply in the town of North Windham. A short time thereafter, high levels of MTBE contamination were discovered in a well serving the Whitefield elementary school and in over a dozen private wells in Standish.

While the exact causes of these incidents has not been definitively established, each of them seemed to be related to a spill of a small quantity of gasoline -- most likely the overfilling of gas tanks at a gas station in North Windham, a leak or spill in a parking lot at

the Whitefield school, and an automobile accident in Standish. These contamination incidents from small spills stood in contrast to the known historical causes of MTBE contamination -- point source discharges from leaking underground gas tanks.

In response, Governor King ordered the most comprehensive MTBE water supply testing initiative ever undertaken in the United States -- 1000 private wells and 793 public water supplies in the state. To address other issues raised in the course of addressing the recent contamination discoveries, DEP and DHS added four additional elements to produce a comprehensive "five point plan." A brief overview of each follows.

### **Summary of Results from Water Testing Program**

During the summer of 1998, water samples were taken from 793 public drinking supplies and 946 randomly selected private wells. These were analyzed for the presence of five components of gasoline: MTBE, benzene, toluene, ethyl benzene and xylenes. The detection limit for MTBE was determined to be .1 parts per billion (ppb); previous testing had a limit ten times higher at 1 part per billion.

In 92.3% of the private well samples, MTBE was either non-detectable or detectable at less than one part per billion (1ppb). However, of all the gasoline constituents tested for, MTBE was the most commonly found. It was detectable at some level 15.8% of the samples: it was present at concentrations exceeding the Maine health-based drinking water standard (35 ppb) in 1.1% of the private wells sampled. All of these wells now have filters.

In most (93.9%) of the 793 public supplies tested, MTBE was either non-detectable or present at levels below 1 ppb. However, it was detected at some level in approximately 15.7% of the tested public supplies, although no concentrations exceeded the health-based standard. Benzene was the only analyte detected above the health-based standard (5ppb) for that chemical. Two of the samples showed benzene concentrations above 5 ppb.

MTBE was detected both within and outside of areas where RFG is required. For both private and public wells, location of a water supply within an area required to use RFG was found to be predictive of higher frequency of MTBE detection. Detection was also more likely in areas of high population density. Public water supplies classified as mobile home parks or businesses were twice as likely to have detectable levels of MTBE. The presence of MTBE in private wells seems more closely connected to small spills or mishandling of gasoline than to leaks from underground or above ground gasoline storage tanks. DEP follow-up of wells above the threshold for remedial action led in most cases to evidence of a likely source of a specific spill.

### **Summary of Results of Alternative Fuels Analysis**

Between June and September of 1998, the DEP accelerated the analysis of alternative fuels required by PL 791. The goal was to identify any options that could meet Maine's obligation to reduce VOCs by 15 per cent, while reducing or eliminating MTBE-based RFG.

The Department gathered information on fuels utilized in other areas of the country from the EPA and by directly contacting other state agencies. In addition, the Department obtained information from the Maine Petroleum Association and by directly interviewing refiners and fuel suppliers currently servicing the Maine market. EPA New England, NESCAUM, and the Ozone Transport Commission assisted DEP in its review.

The DEP found that Maine could meet the requirements of the Clean Air Act with a non-RFG fuel known as low volatility fuel. Alternately, the requirement could be met with a moderate volatility with lower sulfur levels than currently found in RFG and conventional fuel. This fuel would be sold only during the months of April through September. By lowering the volatility of the fuel (its Reid Vapor Pressure (rvp)) -- either alone or in conjunction with a lower sulfur content -- VOC (and NOx) emissions would be reduced in sufficient quantity to maintain the integrity of Maine's 15 per cent plan. To maintain the toxic benefits associated with RFG, the state could also specify a benzene cap, if authorized by EPA.

The primary obstacle to implementing a program based on such a fuel is the limited number of suppliers currently indicating the capability to provide it at prices competitive with motor fuels sold in Maine.

A multi-part action plan is recommended to achieve a smooth transition to this fuel. Next steps include:

1. Maine should advocate for a modification of federal law to eliminate the oxygenate mandate in RFG. Eliminating this provision of law would enable Maine to remain in the Federal program with the expectation that fuels with lower MTBE levels would become available in the state and region. On September 16, DEP Commissioner Sullivan testified before Congress in favor of legislation that would eliminate the oxygenate mandate in favor of a performance-based fuel specifications. Maine's congressional delegation should be urged to strongly advocate such legislation.
2. Maine should initiate rule making proposing the adoption of state rules requiring a low rvp or moderate rvp/low sulfur fuel in the seven southern counties where RFG is currently sold. Its State Implementation Plan (SIP) must be modified to substitute this fuel for RFG in its 15 per cent plan. During public hearings input should be sought on several issues including: whether sufficient supply of this product could be made available to the state at competitive prices; on engine performance; environmental and public health issues. On a parallel track input could be sought on alternative strategies for maintaining compliance with Maine's 15 per cent plan.
3. To implement such a program, DEP must apply for a 211 (c) waiver under the Clean Air Act, gaining federal authority to drop the RFG program and permission to enforce a fuel specification with state authority.
4. EPA should be asked to waive required use of RFG between October and April when Maine will not experience ground level ozone problems with or without RFG.
5. The Department of Agriculture should seek adequate funds to enhance its fuel inspection program. A methodology for certifying complying fuels must be established. (Other states have indicated that \$30,000-\$50,000 is needed for such an effort.)
6. A legislative/executive-sponsored task force should be assembled between October and January to develop recommendations on how to phase out use of MTBE in Maine without causing disruption to supplies and price impacts. A timetable and specific measures, including incentives/disincentives should be developed for legislative/executive action.

7. Maine should educate other states regarding the ground water impacts of MTBE and urge them to consider shifting to alternative fuels. A rule change at EPA would likely be needed to allow States which are committed to RFG through 2003 to shift to an alternative fuel, unless the oxygenate mandate in federal law is lifted. Parts of New Hampshire and New York, currently not participating in the RFG program may be interested in an alternative fuel.

### **Wellhead Protection**

A stakeholder group, including business interests, legislators, state and local officials and representatives of public water systems, has been meeting since early in the summer to consider ways in which to strengthen the protection of public water supplies and surface water intakes. Maine has had a "Wellhead Protection Plan" in place since 1993, but it involves only voluntary protective action on the part of the water supplier or the municipality.

The work group has determined that certain changes should be proposed to the current laws including:

- A defined voice for public water supplies in local land use processes;
- A statutory status for public water supplies to appeal local decisions at the local level and to a state authority; and
- A major educational effort to assure that both local officials and the public at large understand the vulnerability of ground water and the importance of ground water to both public health and to economic development.

### **Waste Gasoline Disposal/Education**

A task force was convened to discuss the potential threat to Maine's ground water due to the improper or careless handling of unwanted gasoline. Members of the group included representatives of the petroleum industry, hazardous waste handlers, state agencies, trade and municipal associations, planners and environmental consultants.

The group determined that, for commercial and retail users, existing state and federal hazardous waste programs provide for the proper management, transport, handling treatment and disposal of "waste" or unwanted gasoline. However, residential use is not subject to the same requirements and minimal public interest has been expressed on this issue. Licensed hazardous waste handlers report little contact with residential customers.

Currently, private citizens have few disposal options for small amounts of unwanted gasoline. Community hazardous waste collection programs provide some opportunity, but

these programs are conducted sporadically and at considerable expense. The group could not justify the state expense of funding a collection program solely for gasoline. However it recommended that gasoline collection be added to any household hazardous waste collection activities at the local level with DEP assistance.

The group recommended that educational materials be developed and distributed widely to promote the safe handling of gasoline and to reduce the amount of gasoline eventually considered a “waste” by residential users. A public service announcement is already running on this topic and basic information is being placed on DEP’s Internet web site. More materials will be developed.

### **Communication with Municipalities**

A work group was convened within DEP to review communications with municipalities and legislators, especially at times “when incidents may threaten local services.” Members of the group met with representatives of the Maine Municipal Association and the state legislature to discuss how procedures are now functioning and where opportunities for improvement may exist. The group as a whole also examined the DEP’s outreach procedures and initiatives.

An observation shared by all parties was that communications need to be two-way: state and the local entities both need to share information regarding environmental threats, even though the immediate magnitude may not be readily apparent as in the case of small gasoline spills.

The group concluded that there already are many procedures in place to ensure direct communication with municipal officials and that they are effective most of the time. Nonetheless the group explicitly recognized that the procedures are not fully fail-safe and that improvements need to be instituted under certain circumstances. Although attempting to characterize 100% of the situations that may arise as part of an initiative to establish written communications protocols for *every* possible eventuality would be an impossible exercise, the group recommended that DEP programs have generic communications protocols to address the kinds of circumstances they are likely to encounter.

The work group also recommended formalizing a “key contact” system between municipal officials and the Department that would ensure that the appropriate people on both ends of the communications link are informed situations as they develop and as they are resolved.

### **Conclusion**

Maine people have realized substantial air quality and health benefits from the use of RFG, including reduced ground level ozone during the summer and lower cancer causing air

toxics in the air they breathe throughout the year. Furthermore, Maine has avoided Federal sanctions by implementing the program and maintained its standing to push for EPA action to reduce the transport of pollutants into the state from upwind areas. EPA's recently issued regulation requiring major cuts in emissions from upwind states -- spurred in large part by Maine's leadership and lawsuit -- will have long-term air quality benefits in the state.

However, the incidents of MTBE contamination discovered last spring and in the water supply study have brought to light a previously unknown problem with the federal reformulated gasoline program, and, most particularly, with the federal statute establishing it. Elevated levels of oxygenate in RFG, mandated by Federal law, is leading to higher levels of private well and public water supply contamination by MTBE. Though the majority of "detect" instances in both public water supplies and private wells are at trace levels of no immediate public health concern, a small percentage in private wells are above the health standard. These cases appear to be caused by small spills of gasoline due to "poor housekeeping" or careless disposal practices.

Despite the substantial air quality benefits of RFG, the risks posed to Maine's ground water by MTBE warrant strong efforts to end the federal oxygenate mandate. In the meantime, Maine should initiate action to terminate its participation in the federal reformulated gasoline program and move to an alternative fuel which will maintain the clean air benefits of RFG. Furthermore, with legislative and stakeholder involvement, we should develop a strategy to phase out the use of MTBE in conventional fuel. Both the move to an alternative fuel and the phase-out of MTBE in conventional fuel should be carried out without causing major supply disruptions and price increases.

The recommendations of the three remaining work groups should be carried out. However, they should be tasked with reexamining their recommendations in light of the newly released data on the extent of MTBE contamination. In particular it is critical to supplement efforts already undertaken to establish a broad based public education initiative on the need for citizens and businesses to properly handle and dispose of gasoline. Furthermore, the wellhead protection task force should be directed to examine steps needed to assist Maine citizens who obtain their water from private wells to periodically test and systematically protect them from contamination by gasoline and other pollutants.

# **Overview of MTBE Study and Plan of Action**

## **What is MTBE?**

MTBE is a fuel additive that has been in gasoline since 1978 to improve engine performance and to replace lead. It is found in both conventional gas (mostly in concentrations of about 3% or less) and in Reformulated Gas (RFG) (11%). Federal law requires programs such as RFG to reduce air pollution from motor vehicles. Governor McKernan opted into Maine's RFG Program in 1991, and RFG started to be sold in Maine in November 1994.

## **What are the results of the MTBE Ground Water Study?**

Of the 951 private wells and the 793 public water supplies which were tested, 93% showed either no MTBE or trace levels only – below 1 ppb (1 part per billion, which is approximately 1 drop in a swimming pool). 16% showed detectable levels of MTBE, while other gasoline constituents were rarely found. 1% of the private wells sampled showed levels above the drinking water health standard of 35ppb. None of the public water supplies tested showed levels above this standard. Detection of MTBE in both the private and public water supply tests was associated with counties where RFG use is required and where there is a high population density.

## **Are the results of this study surprising?**

In some ways yes, in some ways no. The percentage of water supplies showing detectable levels of MTBE is not surprising. Maine's previous data showed that about 7% of tested public water supplies had detectable levels of MTBE, using a threshold of detection at 1 ppb. For this study, the detection limit was lowered to 0.1ppb. If one examines the current data and moves the detection limit to 1ppb, a rate of about 6 – 7% MTBE detection results, similar to our previous data.

However, it is surprising that about 1% of private wells showed levels of MTBE above 35ppb. This was higher than expected. Since there about 300,000 private wells in Maine serving approximately half of Maine's population, this 1% represents an estimated 3000 private wells in Maine, with a range of 1000 – 4300. It is also surprising to learn that when MTBE was detected, other gasoline constituents were rarely found. In addition, the Maine Department of Environmental Protection's investigations of these wells show that many of the waters contaminated with levels of MTBE above the standard of 35ppb appeared to be from relatively small gasoline spills, often backyard type of spills.

These findings are different from previous data from Maine and the nation that indicated when MTBE contaminated groundwater, it was predominantly found with other gasoline constituents. Previous data also indicated contamination was often from larger gasoline spills such as from old storage tanks than from smaller backyard type spills.

## **What does the Department of Human Services' Bureau of Health think about these results?**

While this study does not point to a public health crisis, it does suggest concern about continued and increased contamination of our drinking water supply with MTBE if there is long term use of gasoline with high levels of MTBE. Therefore, this study indicates that steps need to be taken to address this concern.

## **What is Governor King's plan of action based on this study?**

1. Convince the federal government to eliminate its statutory oxygenate requirement for RFG.
2. Opt out of the Federal Environmental Protection Agency's RFG Program.
3. Immediately begin rulemaking to adopt an alternative clean fuel for summer use to replace RFG in Maine, after public review and comments are heard and addressed. This proposed alternative fuel will help protect our groundwater while continuing to clean our air. Ask the Federal EPA to immediately allow us to replace RFG during the winter months with conventional gasoline until a state rule is adopted.
4. Create a legislative and executive-sponsored task force to develop recommendations on how to completely phase out the use of MTBE in Maine without causing disruption to supplies or severe price impacts.
5. Strengthen Maine's wellhead protection plan.
6. Communicate with our neighboring states on the groundwater impacts of MTBE so they may consider alternative fuels as well.
7. Educate the Maine public on the proper handling of gasoline as a hazardous material.
8. Formalize communication between state agencies and municipal officials on gasoline and groundwater issues.



### What can I do to protect my drinking water from MTBE?

If your water comes from a public water supply, you do not need to test. Public water systems are required to routinely test for MTBE. Public water supplies include town or city water and water from a well which serves at least 25 people (many mobile home parks, schools, nursing homes, etc.).

If your drinking water is from a private water supply such as a well, there are some risk factors and action steps you can be aware of to protect your water from being contaminated with MTBE.

Action steps that can be considered by those with private wells include:

1. Handle gasoline very carefully around your property in order to avoid spills. Extra precautions should be taken around driveways that are gravel or within 15 feet of a well. Gasoline has a number of toxic chemicals, and should be handled as such. Even conventional gasoline contains MTBE, although in smaller amounts than RFG. Benzene, a prevalent constituent of all gasoline, is a known human carcinogen.
2. Be sure to empty gas tanks of vehicles you need to store on your property. This is especially true of older vehicles since they are more likely to leak.
3. If you do have a gasoline spill at or near your property, call the Maine Department of Environmental Protection's Spill Report number for reporting the spill as well as for information and assistance on clean up. This number is: 1 – 800 – 482 – 0777.
4. You should consider having your private well drinking water tested for MTBE if:
  - You are aware of any possible gas spills on or near your property in the past two years, even as small as a half gallon (see risk factors below for some common risks for gasoline spills).
  - You have experienced a significant change in taste or odor of your drinking water.

The following are risk factors for gasoline contamination of private water supplies such as a well, determined from reviewing DEP's investigations of wells with significant gasoline constituent contamination, including MTBE levels over 25 ppb. If any of these are found to be present on or near your property, special precautions or remediations should be considered:

- A gasoline spill, even as little as a half gallon, and sometimes only noticed by a grass stain, in the past two years;
- A vehicle accident within the past two years that might have damaged the vehicle's gas tank;
- Wells located within 15 feet of a driveway;
- Auto and small engine repairs;
- A large number of off road vehicles or other gasoline engines such as ATVs, motorcycles, snowmobiles, tractors, lawn mowers, or a generator;
- A gravel driveway with older vehicles frequently parked there;
- A vehicle fire within the past two years;
- A well within 300 feet of an underground or above ground gasoline storage tank.

MTBE water testing can be determined by a test that costs about \$70. Test kits and testing can be obtained from the Maine State Health and Environmental Testing Laboratory (287-2727), and may also be available from private laboratories found in the yellow pages of your phone directory. Currently, Katahdin Laboratory of Westbrook and Northeast Laboratory of Waterville are both private labs that are certified to perform MTBE testing.

More information and the full report may be found on the web sites of the Department of Human Services' Maine Bureau of Health and the Maine DEP:

[www.state.me.us/dhs/boh](http://www.state.me.us/dhs/boh) or [www.state.me.us/dep](http://www.state.me.us/dep).

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# **ADDITIONAL INFORMATION ON THE MTBE STUDY**

## **What is MTBE and Why is it in gasoline?**

MTBE (methyl tertiary-butyl ether) is a volatile organic compound that has been added to gasoline to improve engine performance and as a replacement for lead since the late 1970s. Conventional gasoline has MTBE in amounts of usually less than 3% by volume, though some premium blends can have MTBE in amounts up to 9%. Reformulated gasoline (RFG), which was developed for use in localities that do not meet national air quality standards, contains 11% MTBE.

RFG has been an element of Maine's Clean Air Plan since 1991 when Governor McKernan opted into RFG for Maine's seven southern counties. RFG has been sold in Maine since November 1994. Its use accounts for 40% of emission reductions required for compliance with the Federal Clean Air Act. These federal requirements are in place to protect public health and the environment from the harmful effects of exposure to elevated concentrations of ground-level ozone.

## **How does MTBE get into drinking water?**

Contamination of drinking water with MTBE is most likely to be the result of a gasoline spill. Spills may be large, such as a leaking underground or above ground gasoline storage tank. Spills may be small, such as those that can occur while refueling, discarding old gasoline improperly, or leaking from vehicles. The larger the spill the greater the potential for widespread contamination of ground water, though small spills can sometimes have significant localized impacts, depending on the vulnerability of nearby wells.

Because of its solubility in water, MTBE moves rapidly in groundwater, indeed faster than do other gasoline components such as benzene, ethyl benzene, toluene and xylene. MTBE is also more difficult to remove from water than other gasoline components.

## **Is MTBE showing up in drinking water a new problem?**

No. Maine, one of the first states to document groundwater contamination with MTBE as a consequence of leaking underground fuel tanks, has been finding MTBE in drinking water since 1984. Between 1992 and 1996, Maine Department of Environmental Protection staff documented more than 200 private wells contaminated with gasoline, mostly due to leaks or spills from underground or above ground storage tanks. About half the time only MTBE was found present, and for the rest, other toxic components of gasoline such as benzene and ethyl benzene were also present.

## **Is MTBE in drinking water harmful?**

The potential for effects of MTBE on human health depend on how much MTBE is present in water, and how often and how much exposure a person has to water containing MTBE. However, it is unlikely that adverse health effects would occur from exposure to water containing MTBE since at water levels that would make it likely for adverse health effects to occur, people would generally find the water undesirable to drink. MTBE has an unpleasant odor and taste, and indeed some individuals can detect the presence of MTBE in water (and air) at very low levels.

MTBE has been shown capable of causing cancer, kidney, reproductive, developmental, and nervous system toxicity in laboratory animals exposed to large amounts.

Maine's current drinking water health-based standard for MTBE of 35 ppb (parts per billion; 1ppb=1 drop in a swimming pool) has been set to provide large margins of safety from these toxic effects. For example, daily consumption of two liters of water containing 35 ppb of MTBE over a lifetime is estimated to increase a person's chance of getting cancer by no more than 3-in-a-million. This same level of consumption is also about 100,000 times smaller than consumption levels found to cause non-cancer effects in animal studies.

## **Before the study, what did we know about how much contamination had already occurred?**

The Department of Human Services' Bureau of Health has been formally monitoring MTBE in public drinking water supplies - which includes community systems, schools, nursing homes, and larger businesses - since early 1997. Before the study, MTBE had been detected in 7% of the more than 600 drinking water systems tested, at levels > 1 ppb. A number of these systems testing positive subsequently were found to have levels below detection in follow-up testing. Two public water systems were found to have levels exceeding the state drinking water standard, and both were associated with gasoline spills.

### **Why was the MTBE Study undertaken?**

In the spring of 1998, two public water supplies were found to be either contaminated or be threatened by MTBE. The Whitefield Elementary School water supply was found to have levels of MTBE above the drinking water standard of 35ppb, requiring bottled water to be used. The apparent source was found to be a small gasoline spill.

Around the same time, some testing wells near North Windham's drinking water supply were also found to have levels of MTBE above the drinking water standard. The apparent source was from spills from a nearby gas station, probably during filling of underground tanks with gasoline. These two incidents illustrated that perhaps even small spills and spills from modern tanks could result in drinking water contamination.

At this time, Governor Angus S. King directed DEP, DHS, and DOC to conduct an intensive and comprehensive study of Maine's drinking water supply in order to determine the extent of drinking water contamination by MTBE.

### **How was the MTBE study done?**

There are really two parallel studies: one of Maine's public drinking water supply and one of Maine's private drinking water supply. Since about half of Maine residents obtain their drinking water from public water supplies and half from private water supplies (mostly private wells), it was important to perform adequate testing of both sources of drinking water.

793 public water supplies were tested. This represents virtually all of the community and non-transient public water supplies in Maine. In addition, 951 randomly selected private water supplies from across the state were tested. The vast majority of these were private wells, although a few were springs or lakes that a household used as their primary drinking water supply.

The following tests were performed on each water sample obtained:

1. Tests for MTBE as well as benzene, toluene, ethyl benzene, and xylene (these latter four compounds are referred to as the BTEX compounds and are also gasoline constituents).
2. A questionnaire and survey of each private water supply to determine if any of the following possible risk factors were present:
  - noticeable odor or taste associated with the water;
  - recollection of a recent gasoline spill on or nearby the property;
  - type of well or water supply;
  - proximity to a gasoline storage tank;
  - location in a county with required RFG use; and
  - population density.
3. A survey of each public water supply to determine if any of the following risk factors were present:
  - type of water use (community, business, school, mobile home park, etc.);
  - type of well or water supply;
  - proximity to a gasoline storage tank;
  - location in a county with required RFG use; and
  - population density.

### **What are the results of the MTBE Study?**

#### **Study of Private Water Supplies:**

- MTBE was detected in 150, or 15.8%, of the 951 sampled private water supplies.
- 1.1% of the sampled waters showed levels of MTBE above 35ppb. Extrapolated to statewide data, this represents an estimated 1000 - 4300 private wells in Maine with these levels.
- 92.3% of the sampled waters showed either MTBE levels that were not detectable or below 1ppb; and 6.6% were between 1ppb and 35ppb.
- Compared to MTBE, very few water samples detected other gasoline, and levels of BTEX compounds detected were well below the health-based standards.

- Assessed factors which were found *not* to be associated with MTBE detection included: recollection on a questionnaire of a notice in odor or taste, recollection on a questionnaire of a recent nearby gasoline spill, type of well or water supply, and proximity to gasoline storage tanks (such as a gas station).
- Location of the water supply in counties with required RFG use as well as with high population density were both associated with detectable MTBE levels. Since RFG use is often required in places of high population density, these two factors are difficult to tease apart from each other. However, further data analysis shows that both seem to be separate risk factors.
  - The risk of required RFG use:
    - In areas of high population density (greater than 180 people per square mile), the risk of MTBE detection was 1.3 times higher in areas where RFG use is required compared to other areas;
    - In areas of low population density (less than 180 people per square mile), the risk of MTBE detection was 2.0 times higher in areas where RFG use is required compared to other areas.
  - The risk of high population density:
    - In areas where RFG use is required, the risk of MTBE detection was 1.4 times higher in areas of high population density compared to other areas;
    - In areas where RFG use is not required, the risk of MTBE detection was 2.1 times higher in areas of high population density compared to other areas.

#### Study of Public Water Supplies:

- MTBE was detected in 125, or 16% of the 793 tested public water supplies.
- No samples were found to have MTBE levels above 35ppb.
- 93.9% of the samples showed levels that were either not detectable or below 1ppb; and 6.1% were between 1ppb and 35ppb.
- Toluene was found in 13.1% of public water supplies - higher than seen in private water samples. However, concentrations of toluene were quite low, mostly less than 1ppb and well below the drinking water standard of 1000ppb. With this exception of toluene, very few public water supplies detected BTEX compounds compared with MTBE.
- Assessed factors that were found *not* to be associated with MTBE detection included: type of well or water supply and proximity to gasoline storage tank.
- Type of water use establishment was found to be associated with MTBE detection. Public water supplies that were businesses or mobile home parks were about twice as likely to have detectable levels of MTBE as compared with community and school water supplies.
- Location of the water supply in counties with required RFG use as well as with high population density were both associated with detectable levels of MTBE. Population density itself was a significant risk factor within areas where RFG use was required. However, unlike the private water data, population density was not a significant risk factor in areas where RFG is not required.
  - The risk of required RFG use:
    - In areas of high population density, the risk of MTBE detection was 4.1 times higher in areas where RFG use is required compared to other areas;
    - In areas of low population density, the risk of MTBE detection was 1.7 times higher in areas where RFG use is required compared to other areas.
  - The risk of population density:
    - In areas where RFG use is required, the risk of MTBE detection was 1.6 times higher in areas of high population density compared to other areas;
    - In areas where RFG use is not required, population density appeared to not be a risk factor.

#### **Since arsenic and radon commonly contaminate Maine drinking water, what are the risks associated with these?**

Analysis of arsenic testing of drinking water wells in Maine shows that out of several thousand wells that have been tested, about 10% are above the current health-based drinking water standard of 50 ppb. Arsenic is a known human carcinogen. It has been estimated that a lifetime consumption of water containing the current standard of 50 ppb results in an increase in the risk of cancer by 2 per 1000. It also is known to have neurological and skin toxicities. In addition, the EPA is considering lowering the health standard to 5 ppb. If this were done, the percentage of wells in Maine with levels above this level is estimated to exceed 50%.

About 10% of wells in Maine contain radon levels which give a cancer risk at or greater than 2 per 1000, assuming a lifetime consumption of 2 liters per day. Like arsenic, radon is a known human carcinogen, and is naturally occurring in Maine as well as a number of other states.

**What is this proposed alternative fuel, and what is its toxicity?**

This proposed alternative fuel is made up of conventional fuel but with lower volatility (lower Reid Vapor Pressure, or RVP), lower sulfur content, and with a limit on the amount of benzene comparable to RFG. This fuel both reduces the amount of MTBE in Maine as well as continues Maine's achievements in cleaning our air. Since its constituents are the same as conventional gasoline, its toxicity as a liquid is the same.

**How will the proposed alternative fuel be supplied to Maine? Will it be widely available?**

We have received assurances from some suppliers that this alternative fuel can be produced and delivered to Maine without a significant access or market problem. Several other states such as Alabama use similar alternative fuels and do not have access or market problems. However, information will be gathered during the rule-making process on steps to ensure a smooth transition in a reasonable time frame.

This proposed alternative fuel would be for use in the summer as our alternative to RFG, probably primarily required for Maine's seven southern counties. Since there are cold weather performance issues associated with it because of its low volatility, conventional gasoline is proposed for use during the winter months for now.

**Are other alternative fuels being investigated for possible use?**

Yes. The Interim Alternative Fuels Report prepared by the Maine DEP details the many alternatives that are being considered, including: current RFG with MTBE, RFG with Ethanol instead of MTBE, RFG with ETBE or TAME, low RVP fuel, low sulfur fuel, and fuel with a benzene cap. There are significant air or water quality issues and availability or cost issues associated with these other alternatives. This has led DEP at this time to propose an alternative that combines a low RVP, a low sulfur content, and a benzene cap. DEP will seek comment on *all* the alternatives during the rule-making process, including other ways to maintain Maine's compliance with the Federal Clean Air Act.

**Can you delineate your well head protection plan?**

Maine has had a Wellhead Protection Plan in place since 1993 - 1994. It requires public water suppliers to determine the vulnerable areas around their wells, and catalog the potential sources of contamination within that zone. Any protective action by the water supplier or the municipality is entirely voluntary.

A stakeholder work group (made up of public water supply, petroleum industry, and municipal representatives, as well as applicable state agencies) has been working since early summer 1998 to consider ways to strengthen the protection of public water supply wells and surface water intakes.

The work group has proposed a three component plan to increase the level of wellhead protection of public water supplies. The three components that make up this proposal are:

- Statutory changes to assure that public water suppliers are notified of and have influence on any land use decisions impacting their wellhead protection area;
- Statutory changes to allow an appeal process for public water suppliers who believe a land use decision poses unacceptable public health risks; and
- A major educational effort to ensure public recognition and local regulatory knowledge of the vulnerability of public water supplies, including watershed districts.

**What would happen if MTBE was banned immediately?**

Since MTBE is found even in conventional gasoline, although in smaller amounts than in RFG, and is sold throughout the United States, any attempt to completely rid of MTBE needs to be phased in. However, since RFG contains a large amount of MTBE and areas of required RFG use are associated with more frequent detection of MTBE in our water supplies, Governor King's plan of action to rid Maine of RFG and replace it with an alternative is a bold step to maintain safe groundwater as well as clean air. A legislative and executive-sponsored task force will develop recommendations on how to completely phase out the use of MTBE in Maine without causing disruption to supplies or severe price impacts.

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October 12, 1998

Edward O. Sullivan, Commissioner  
Maine Department of Environmental Protection  
17 State House Station  
Augusta, Maine 04333

Dear Commissioner Sullivan:

During our recent communications you have advised us that your Department is examining the feasibility of introducing an all-hydrocarbon gasoline specification to be used in place of or alongside RFG.

As a major supplier of quality fuels to the Maine marketplace, I can assure you of Irving Oil's commitment to providing gasolines that provide environmental benefits at affordable prices. Specifically, we have a strong interest in supplying the particular formulation you have been discussing, a 7.8 RVP, 150ppm Sulphur, 1% Benzene fuel.

We believe that such a fuel, if specified by a state regulation, would be a tough but fair standard that would achieve air quality benefits equal to or greater than RFG in all three major air quality dimensions while meeting your goals of availability and affordability.

If a "Maine" gasoline specification is adopted, every one of the three parameters above must be carefully specified; RVP to take account of Maine's climate, particularly during the shoulder season, and sulphur and benzene to ensure that Maine does not become a dumping ground for components refiners cannot blend into RFG sold in neighboring states. Air quality has improved in recent years, in a large part due to the RFG program. Failure to appropriately control sulphur and benzene would unnecessarily expose Maine to the risk of losing these hard-won gains at a time when the public is expecting both industry and Government to take strong action to protect the environment.

Sincerely,

James A. Dufour  
Corporate Counsel

/bcm





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Ann Farmer Miller  
Vice President  
Government Relations

October 7, 1998

Mr. Edward O. Sullivan  
Commissioner  
Department of Environmental Protection  
17 State House Station  
Augusta, Maine 04333

Dear Mr. Sullivan:

I am writing on behalf of Tosco Corporation regarding your efforts to explore alternative clean fuels for the State of Maine. Tosco shares Maine's concern about potential MTBE contamination of water supplies, and we strongly support your efforts to develop alternatives to federal reformulated gasoline and its mandatory oxygen content.

We believe that an alternative to federal RFG can be developed which will have equivalent emissions but which will reduce the threat of contamination of the state's water supplies by MTBE. I understand that you are considering a low-sulfur, low-RVP, low-benzene fuel as an alternative to federal RFG. Tosco supports adoption of such a fuel for Maine and we believe that, based on our current production capabilities and supply obligations, we could produce this fuel to meet our customer needs in Maine at a competitive price.

Tosco announced its support earlier this year for an 80 ppm nationwide, year-round sulfur specification for gasoline. We are also supporting efforts in California and in Congress to provide refiners additional oxygenate flexibility so that we can move away from use of MTBE.

We stand ready to work with you and your staff to develop a fuel for Maine that will provide both clean air and clean water. Please call me at 203/977-1016 if you have any questions.

Very truly yours,

A handwritten signature in cursive script that reads "Ann Farmer Miller".