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MTBE in Gasoline: Clean Air and Drinking Water Issues

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James E. McCarthy and Mary Tiemann
Specialists in Environmental Policy
Resources, Science, and Industry Division

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Summary

The 109th Congress continues efforts to address fuel policy and health and environmental issues related to the use of the gasoline additive methyl tertiary butyl ether (MTBE). Concern over water contamination caused by MTBE has raised questions concerning the desirability of using the additive as a means of producing cleaner-burning fuel. MTBE has been used by most refiners to produce the reformulated gasoline (RFG) required under the Clean Air Act in portions of 17 states and the District of Columbia. It is credited with producing marked reductions in carbon monoxide emissions; RFG has also reduced emissions of toxic substances and the volatile organic compounds that react with other pollutants to form smog. However, incidents of drinking water contamination by MTBE have raised concerns and led to calls for restrictions on its use. In 1999, Governor Davis of California ordered a phaseout of MTBE use by December 31, 2002 (later amended to December 31, 2003). Eighteen other states, including New York and Connecticut, now have enacted limits or phaseouts of the substance.

EPA responded to initial reports of water contamination in the mid-1990s by intensifying research and focusing on the need to minimize leaks from underground fuel tanks. However, contamination incidents increased, and in March 2000, EPA began the process of requiring a reduction or phaseout of MTBE use under the Toxic Substances Control Act. Because regulatory action could take years to complete, EPA urged Congress to amend the Clean Air Act to provide specific authority to reduce or eliminate use of MTBE. In the 109th Congress, the House has included such authority in H.R. 6, the comprehensive energy bill. The bill would ban the use of MTBE by December 31, 2014, with some exceptions, and would provide extensive assistance for MTBE producers, including a controversial "safe harbor" from product liability lawsuits. The Congressional Budget Office identified the latter provision as an intergovernmental mandate under the Unfunded Mandates Relief Act, thus making the provision subject to a point of order; however, the House voted to retain the safe harbor provision on a separate vote. In the Senate, the Environment and Public Works Committee has approved S. 606, which would ban MTBE within four years of enactment, and would not provide a safe harbor for MTBE producers.

If MTBE were removed from gasoline without amending the Clean Air Act, refiners would need to use alternative sources of oxygen in RFG. The potential alternatives are other forms of ether, or alcohols such as ethanol. Ethanol is the most likely substitute, but it costs more to produce than MTBE, it poses challenges to the gasoline distribution system, and some studies suggest that it increases the risk of water contamination compared to non-oxygenated gasoline. Gasoline that meets the performance requirements for RFG without using oxygenates at all can be made, but current law requires the use of oxygenates in RFG.

The principal issues for Congress are whether MTBE use should be limited or phased out, and whether there should be a "safe harbor" from product liability lawsuits for gasoline refiners and marketers who have used MTBE. This report reviews MTBE issues and will be updated.

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MTBE in Gasoline: Clean Air and Drinking Water Issues

Introduction

This report provides background information concerning the gasoline additive methyl tertiary butyl ether (MTBE), discusses air and water quality issues associated with it, and reviews options available to congressional and other policy-makers concerned about its continued use. It includes a discussion of legislation in the 109th Congress.

Under the Clean Air Act Amendments of 1990, numerous areas with poor air quality are required to add chemicals called "oxygenates" to gasoline as a means of improving combustion and reducing emissions. The act has two programs that require the use of oxygenates, but the more significant of the two is the reformulated gasoline (RFG) program, which took effect January 1, 1995.[1] Under the reformulated gasoline program, areas with "severe" or "extreme" ozone pollution (124 counties with a combined population of 73.6 million) must use reformulated gasoline; areas with less severe ozone pollution may opt into the program as well, and many have. In all, portions of 17 states and the District of Columbia use reformulated gasoline (see **Table 1** and **Figure 1**); about 30% of the gasoline sold in the United States is RFG.

The law requires that RFG contain at least 2% oxygen by weight. Refiners can meet this requirement by adding a number of ethers or alcohols, any of which contain oxygen and other elements. Because these substances are not pure oxygen, the amount used to obtain a 2% oxygen level is greater than 2% of the gasoline blend. For example, MTBE is only 19% oxygen and, thus, RFG made with MTBE must contain 11% MTBE by volume to meet the 2% requirement.

By far the most commonly used oxygenate has been MTBE. In 1999, 87% of RFG contained MTBE. As restrictions on MTBE use took effect in California, New York, and Connecticut at the end of 2003, this number was reduced, but even with these state bans, 46% of RFG nationally contained MTBE in 2004.

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[1] The requirements for reformulated gasoline (RFG), to reduce air toxics and the emissions that contribute to smog formation, are found in Section 211(k) of the Clean Air Act. Separate requirements for oxygenated fuel, to reduce carbon monoxide formation, are contained in Section 211(m). Of the two programs, that for RFG has a much larger impact on the composition of the nation's gasoline, because RFG requirements are in effect year-round and apply to a larger percentage of the country. The Section 211(m) requirements, by contrast, are in effect during winter months only and affect a small percentage of the nation's gasoline. Ethanol has been the primary oxygenate used in winter oxygenated fuels and MTBE the primary oxygenate used in RFG, although either can be used in both fuels.

Table 1. Areas Using Reformulated Gasoline, as of February 2005

*Mandatory RFG Areas**
Baltimore, MD
Chicago, IL (and portions of Indiana and Wisconsin)**
District of Columbia (and suburbs in MD and VA)
Hartford, CT
Houston, TX
Los Angeles, CA
Milwaukee, WI**
New York, NY (and portions of CT and NJ)
Philadelphia, PA (and portions of DE, MD, and NJ)
Sacramento, CA
San Diego, CA
San Joaquin Valley, CA
Southeast Desert, CA
Ventura County, CA
*Opt-In RFG Areas****
Connecticut (entire state)
Dallas / Fort Worth, TX
Delaware (entire state)
Kentucky portion of Cincinnati metropolitan area
Louisville, KY
Massachusetts (entire state)
New Hampshire portion of Greater Boston
New Jersey (entire state)
New York (counties near New York City)
Rhode Island (entire state)
St. Louis, MO
Virginia (Richmond, Norfolk - Virginia Beach - Newport News)

Source: U.S. EPA.

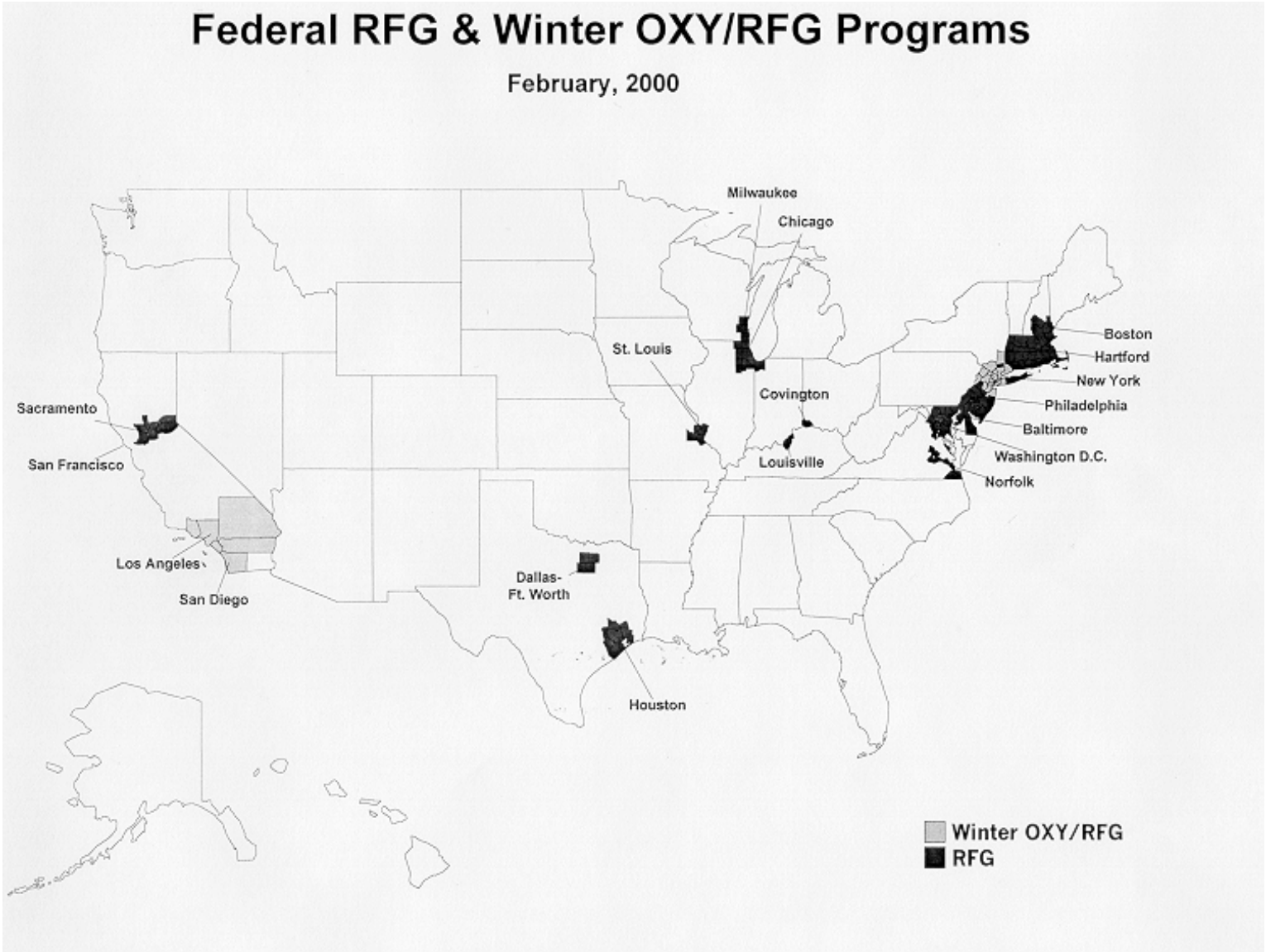
Notes:

* RFG use required by the Clean Air Act. In addition to these areas, Atlanta, GA, and Baton Rouge, LA, are now also required to use RFG because they have been reclassified as severe ozone nonattainment areas; but implementation of the RFG requirement has been stayed in both areas pending the resolution of court challenges.

** In the Chicago and Milwaukee areas, RFG has been made with ethanol rather than MTBE since 1995.

*** RFG use required by State Implementation Plan as a means of attaining the ozone air quality standard. These "opt-in" areas may opt out of the program by substituting other control measures achieving the necessary reductions in emissions.

Figure 1.


Federal RFG & Winter OXY/RFG Programs
February, 2000
Milwaukee
Chicago
St. Louis
Covington
Louisville
Boston
Hartford
New York
Philadelphia
Baltimore
Washington D.C.
Norfolk
Sacramento
San Francisco
Los Angeles
San Diego
Dallas-
Ft. Worth
Houston
Winter OXY/RFG
RFG

Also, MTBE has been used since the late 1970s in gasoline as an octane enhancer. MTBE use grew rapidly in the 1980s, as it replaced lead in gasoline and was used in premium fuels. As a result, gasoline with MTBE has been used virtually everywhere in the United States, whether or not an area has been subject to RFG requirements.

Air Quality Benefits Resulting from MTBE Use

State and local environmental agencies and EPA attribute marked improvements in air quality to the use of fuels containing MTBE and other oxygenates, but the exact role of oxygenates in achieving these improvements is subject to debate. In Los Angeles, which has had the worst air quality in the country, the use of reformulated gasoline was credited with reducing ground-level ozone by 18% during the 1996 smog season, compared to weather-adjusted data for the same period in 1994 and 1995. Use of RFG also reduced the cancer risk associated with exposure to vehicle emissions by 30% to 40%, according to the California EPA, largely because it uses less benzene, a known human carcinogen.[2]

Whether the oxygenates themselves should be given credit for these improvements has been the subject of debate, with the answer depending to some extent on what one assumes would replace the oxygenates if they were removed. Asked to look at the ozone-forming potential of different oxygenates used in reformulated gasoline, a National Academy of Sciences panel concluded that "the addition of commonly available oxygenates to RFG is likely to have little air-quality impact in terms of ozone reduction."[3] An EPA advisory panel, by contrast, concluded that the use of oxygenates "appears to contribute to reduction of the use of aromatics with related toxics and other air quality benefits."[4]

Less controversy exists regarding oxygenates' role in reducing carbon monoxide emissions. Both EPA and an interagency group chaired by the White House Office of Science and Technology Policy (OSTP) have reported improvements in carbon monoxide (CO) levels due to the use of oxygenates. According to the June 1997 OSTP report, "analyses of ambient CO measurements in some cities with winter

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[2] See "Reformulated Fuels Help Curb Peak Ozone Levels in California," *Daily Environment Report*, November 6, 1996, pp. A-1 and A-2.

[3] Committee on Ozone-Forming Potential of Reformulated Gasoline, National Research Council, *Ozone-Forming Potential of Reformulated Gasoline*, May 1999, p. 5. The NAS study concluded that other characteristics of RFG, notably "lowering the Reid Vapor Pressure (RVP) of the fuel, which helps depress evaporative emissions of VOC [volatile organic compounds], and lowering the concentration of sulfur in the fuel, which prevents poisoning of a vehicle's catalytic converter," result in a reduction of about 20% in VOC emissions.

[4] U.S. Environmental Protection Agency, Blue Ribbon Panel on Oxygenates in Gasoline, Executive Summary and Recommendations, July 27, 1999, Appendix A. Available at [http://www.epa.gov/otaq/consumer/fuels/oxypanel/blueribb.htm].

oxygenated gasoline programs find a reduction in ambient CO concentrations of about 10%."[5]

EPA also "believes that the reductions estimated in air quality studies are significant and that these reductions help to protect the public from the adverse health effects associated with high levels of CO in the air."[6] The agency based its conclusions both on its own analysis and on a report prepared for two industry groups. The latter, using hourly data for more than 300 monitoring sites gathered over a nine-year period, concluded that use of oxygenated fuels was associated with a 14% reduction in ambient CO concentrations.[7]

Health-Related Questions

The improvements in measured air quality have not come without questions. After oxygenated fuels containing MTBE were introduced, residents in several cities complained of a variety of health effects from exposure to MTBE/RFG exhaust: headaches, dizziness, nausea, sore eyes, and respiratory irritation. Some complaints centered around the use of MTBE in cold weather; two of the principal areas noting complaints were Alaska and Milwaukee, Wisconsin. The Interagency Task Force examined these complaints and concluded:

> With regard to exposures ... experienced by the general population and motorists, the limited epidemiological studies and controlled exposure studies conducted to date do not support the contention that MTBE as used in the winter oxygenated fuels program is causing significant increases over background in acute symptoms or illnesses.[8]

Additional health effects research is being conducted by EPA, universities, and others. Under the authority of Section 211 of the Clean Air Act, EPA has requested refiners to conduct health effects studies on conventional, reformulated, and oxygenated (particularly MTBE-oxygenated) gasoline. Several of these studies, which look at health effects associated with the inhalation of evaporative emissions, should be completed this year. Very little research has been done to assess the potential health risks associated specifically with drinking water exposure to MTBE.

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[5] Executive Office of the President, National Science and Technology Council, *Interagency Assessment of Oxygenated Fuels*, Washington, D.C., June 1997, p. iv. Referred to hereafter as the OSTP Report. (The executive summary, recommendations, and full report are available at [http://www.ostp.gov/NSTC/html/MTBE/mtbe-top.html]). The report expressed some hesitation about its conclusions, particularly regarding the impacts of MTBE in colder weather. It also noted methodological difficulties in identifying statistically significant reductions smaller than 10%, and recommended additional research.

[6] U.S. EPA Response to *Interagency Assessment of Oxygenated Fuels*, undated, p. 2.

[7] Systems Applications International, Inc., for the Renewable Fuels Association and the Oxygenated Fuels Association, *Regression Modeling of Oxyfuel Effects on Ambient CO Concentrations*, Final Report, January 8, 1997, p. 1.

[8] OSTP Report, p. vi. The report did suggest that "greater attention should be given to the potential for increased symptoms reporting among workers exposed to high concentrations of oxygenated fuels containing MTBE," however.

Much discussion has centered on whether MTBE has the potential to cause cancer. Although there are no studies on the carcinogenicity of MTBE in humans, EPA's Office of Research and Development (ORD) reported in 1994 that:

> inhalation carcinogenicity studies in mice and rats show evidence of three types of animal tumors [testicular, liver, and kidney]. These particular studies are difficult to interpret because of some high-dose general toxicity. Nevertheless, ORD believes the inhalation carcinogenicity evident would support placing MTBE in Group C as a "possible human carcinogen."[9]

Also, one metabolite of MTBE (formaldehyde) is considered a probable human carcinogen, and another metabolite (tertiary butyl alcohol (TBA)) induces male rat kidney tumors.[10]

Based on animal studies, EPA has concluded that MTBE poses a potential for carcinogenicity to humans at high doses; however, because of uncertainties and limitations in the data, EPA has been unable to make a confident estimation of risk at low exposure levels.[11] The Interagency Task Force assessing oxygenated fuels concluded that the weight of the evidence supports regarding MTBE as having a carcinogenic hazard potential for humans.[12] In 1998, the International Agency for Research on Cancer (IARC) and the U.S. National Toxicology Program determined not to list MTBE as a known human carcinogen. The IARC noted that MTBE was "not classifiable as to its carcinogenicity in humans," based on inadequate evidence in humans and limited evidence in experimental animals.[13] In 1999, California's Environmental Protection Agency determined that the MTBE carcinogenicity studies were of similar quality to studies on many other carcinogens, and established a public health goal for MTBE in drinking water based on cancer risk.[14]

Regarding noncancer effects, another California advisory committee determined that there was not clear scientific evidence to support listing MTBE as a toxic

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[9] U.S. Environmental Protection Agency, *Health Risk Perspectives on Fuel Oxygenates*. Office of Research and Development, EPA 600/R-94/217, December 1994, p. 8. Detailed information is available in ORD's 1993 MTBE risk assessment, *Assessment of Potential Health Risks of Gasoline Oxygenated with Methyl Tertiary Butyl Ether (MTBE)*, EPA/600/R-93/206, at [http://www.epa.gov/ncea/pdfs/mtbe/gasmtbe.pdf].

[10] U.S. Environmental Protection Agency, *Assessment of Potential Health Risks of Gasoline Oxygenated with Methyl Tertiary Butyl Ether (MTBE)*, EPA/600/R-93/206, p. 30.

[11] U.S. Environmental Protection Agency, *Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Methyl Tertiary-Butyl Ether (MTBE)*, EPA-822-F-97-009, December 1997, pp. 1-2, 9-10. This and other health effects information is available at [http://www.epa.gov/OST/drinking/mtbe.html].

[12] OSTP Report, pp. 4-26.

[13] International Agency for Research on Cancer, *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans and Their Supplements: Methyl tert-Butyl Ether (Group 3)*, World Health Organization, v. 73, 1999, pp. 339-340.

[14] California Environmental Protection Agency, *Public Health Goal for Methyl Tertiary Butyl Ether (MTBE) in Drinking Water*, Office of Environmental Health Hazard Assessment, March 1999, pp. 1-2.

substance affecting human development or reproduction. In reviewing available research on both cancer and noncancer effects, these groups generally noted that research gaps exist, and that the data were particularly limited on health effects associated with MTBE ingestion.

In response to the need for research to evaluate the potential health risks from exposure to MTBE and other oxygenates in drinking water, EPA in 1998 published a document that identified the most critical and immediate research needs. The document was intended to serve as a guide to planning future research; however, EPA has not pursued research to address the needs identified in this document.[15]

For practical purposes, the interpretation of any health risks associated with the addition of MTBE to gasoline could benefit from a comparison to the health risks associated with conventional gasoline. The Interagency Task Force, EPA, and some environmental groups have all argued that current knowledge suggests that MTBE is a less serious pollutant than the gasoline components it replaced. According to the OSTP report, the cancer risk from exposure to MTBE is "substantially less than that for benzene, a minor constituent of gasoline that is classified as a known human carcinogen; and more than 100 times less than that for 1,3-butadiene, a carcinogenic emission product of incomplete fuel combustion."[16] Such a comparison might be of limited usefulness, however, given the data gaps regarding MTBE's health effects and MTBE's ability to reach water supplies more readily than conventional gasoline.

Water Quality and Drinking Water Issues

A major issue regarding the use of MTBE concerns its detection in ground water at thousands of locations nationwide, and, usually at low levels, in various municipal drinking water supplies, private wells, and reservoirs. Although MTBE provides air quality benefits, the inclusion of MTBE in gasoline has been a growing concern as an environmental risk since the 1980s, for several reasons. Specifically, compared to other gasoline components, MTBE (1) is much more soluble in water, (2) has a lower taste and odor threshold, (3) has a higher transport rate, and (4) often requires more time to be remediated and must be treated by more complicated and expensive treatment technologies.[17] MTBE is extremely soluble and, once released, it moves through soil and into water more rapidly than other chemical compounds present in gasoline. Once in ground water, it is slow to biodegrade and is more persistent than other gasoline-related compounds. In surface water, it dissipates more rapidly.

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[15] U.S. Environmental Protection Agency, *Oxygenates in Water: Critical Information and Research Needs*, Office of Research and Development, EPA/600/R-98/048, 1988.

[16] OSTP Report, p. vii.

[17] See, e.g., U.S. Environmental Protection Agency Memorandum from Beth Anderson, Test Rule Development Branch, re. *Division Director Briefing for Methyl tert-Butyl Ether (MTBE)*, April 1987, which notes that "[t]he tendency for MTBE to separate from the gasoline mixture into ground water could lead to widespread drinking water contamination."

Studies show that most of it evaporates from the upper levels of surface water in a few weeks, while it persists longer at greater depths.[18]

The primary source of MTBE in ground water has been petroleum releases from leaking underground storage tank (UST) systems. Other significant sources include leaking above-ground storage tanks, fuel pipelines, refueling facilities, and accidental spills. The most significant source of MTBE in lakes and reservoirs appears to be exhaust from motorized watercraft, while smaller sources include gasoline spills, runoff, and ground water flow.[19]

Occurrence of MTBE in Drinking Water. Available information on the occurrence of MTBE in public drinking water supplies has increased substantially over the past few years, but has been somewhat limited geographically. Although a number of serious contamination incidents have been reported, particularly in California, the available data generally do not indicate a broad presence of MTBE in drinking water supplies at levels of public health concern. However, as monitoring has increased among the states, so has the number of public water systems and private wells showing low-level detections of MTBE.

The most extensive MTBE monitoring data for drinking water are available for California, where testing for MTBE was made mandatory for most public water systems in February 1997. Through April 2002, some 2,957 systems had tested 9,905 sources of drinking water. MTBE was detected in 85 (0.9%) of these sources, including 54 (0.6%) of 9,234 ground water sources and 31 (4.6%) of 671 surface water sources. Overall, 53 (1.8%) of the 2,957 public water systems reported detections of MTBE in at least one of their drinking water sources, and 13 (0.4%) of the systems reported that a total of 21 (0.2%) sources of water had MTBE concentrations exceeding California's MTBE drinking water standard of 13 micrograms per liter (μg/L). As of May 2, 2005, monitoring results had been reported for 13,300 sources, and nearly all of the results were nondetections.[20]

In 1998, the state of Maine tested nearly 800 public water supplies and 950 randomly selected private wells and found detectable levels of MTBE in 16% of the public water supplies and 15.8% of the private wells. None of the public water supply samples exceeded the state drinking water standard of 35 μg/L, while 1% of private well samples contained MTBE concentrations above the standard. Roughly 94% of

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[18] Arturo Keller et al., *Health and Environmental Assessment of MTBE*, Report to the Governor and Legislature of the State of California as Sponsored by SB 521, Volume I, Summary and Recommendations, University of California, November 1998, p. 35.

[19] Keller, pp. 33-34.

[20] California Environmental Protection Agency, *MTBE in California Drinking Water*, April 3, 2002. For more information, see [http://www.dhs.cahwnet.gov/ps/ddwem/chemicals/MTBE/mtbeindex.htm]. (Micrograms per liter(μg/L) are equivalent to parts per billion (ppb) for fresh water.)

public water supply samples showed MTBE levels that were either not detectable or below 1 μg/L; the remaining 6% of samples were between 1 μg/L and 35 μg/L.[21]

Nationwide, the data on the presence of MTBE in drinking water have been more limited. In July 1999, the EPA-appointed Blue Ribbon Panel on Oxygenates in Gasoline reported that between 5% and 10% of drinking water supplies tested in high oxygenate-use areas show at least detectable amounts of MTBE, and that the vast majority of these detections have been well below levels of public health concern, with roughly 1% of detections exceeding 20 μg/L.[22]

Further monitoring efforts have advanced the knowledge about the presence of MTBE in drinking water. The United States Geological Survey (USGS), in cooperation with EPA, assessed the occurrence of MTBE and other volatile organic compounds (VOCs) in public water supplies in 10 mid-Atlantic and northeastern states where MTBE use is common.[23] The study analyzed water from 1,194 randomly selected community water systems. The USGS reported that MTBE was detected in 8.9% of the tested water systems and was strongly associated with areas where reformulated and/or oxygenated (RFG/OXY) fuels are used. Fifteen percent of systems in RFG/OXY areas reported detecting MTBE at concentrations of 1 μg/L or more, while 3% of systems outside of RFG/OXY areas reported such detections. Most MTBE concentrations ranged from 0.5 to 5 μg/L, and less than 1% of the systems reported MTBE at levels equal to or exceeding 20 μg/L, the lower limit of EPA's drinking water advisory.[24]

A 2003 nationwide survey conducted by the American Water Works Association Research Foundation (AWWARF) reported similar results. This survey monitored sources of drinking water for 954 randomly selected community water systems (including 579 samples from groundwater-supplied systems and 375 samples from surface-water-supplied systems). MTBE was found in 8.7% of the community

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[21] Maine Department of Human Services, Department of Environmental Protection, and Department of Conservation, *The Presence of MTBE and Other Gasoline Compounds in Maine's Drinking Water*, preliminary report, October 1998, 24 pp. (Maine was not required to use RFG, but had done so voluntarily; the state opted out of the RFG program in October 1998 because of concerns over MTBE contamination of ground water and drinking water wells.)

[22] The Blue Ribbon Panel on Oxygenates in Gasoline, Executive Summary and Recommendations, July 27, 1999. Summary and full report are available at [http://www.epa.gov/otaq/consumer/fuels/oxypanel/blueribb.htm].

[23] For information on this 2001 study and other MTBE research at the USGS, see [http://sd.water.usgs.gov/nawqa/vocns/mtbe.html].

[24] Stephen J. Grady and George D. Casey, *MTBE and Other VOCs in Drinking Water in the Northeast and Mid-Atlantic Region*. Available at [http://sd.water.usgs.gov/nawqa/vocns/dw_12state.html]. MTBE was the second most frequently detected VOC in drinking water, after trihalomethanes (disinfection byproducts), which were detected in 45% of systems tested. Chloroform, the most frequently detected trihalomethane, was found in 39% of systems.

water system source waters, at concentrations ranging from 0.2 to 20 μg/L.[25] AWWARF also conducted a focused survey, including 451 samples collected from 134 community water systems source waters (including ground water, reservoirs, lakes, rivers, and streams) that were suspected or known to contain MTBE. The researchers found MTBE in 55.5% of the water systems.[26]

Occurrence of MTBE in Ambient Ground Water. Looking at ground water generally (not only drinking water wells), the data indicate that low levels of MTBE are found often. Nationally, the most comprehensive ground water research has been conducted by the USGS through the National Water Quality Assessment Program (NAWQA). USGS data for some 2,743 monitoring, observation, and water supply wells in 42 states (from 1993 to 1998) showed MTBE present in about 5% (145) of the wells, with MTBE levels exceeding 20 μg/L in 0.5% (12) of the wells. In all, MTBE was detected in ground water in 22 of the 42 states. The USGS further evaluated the occurrence data based on whether or not detections occurred in RFG or winter oxyfuel program areas. The researchers reported that low concentrations of MTBE were detected in 21% of ambient ground water samples in high MTBE-use areas and in 2.3% of samples in low or no-MTBE use areas.[27]

MTBE has been detected most frequently in ground water associated with leaking underground storage tank (UST) sites. The California Environmental Protection Agency has estimated that, based on monitoring information available for these sites, MTBE can be expected to be found in shallow, unused ground water at thousands of UST sites in the state, and often at high concentrations (in the parts per million range).[28] Moreover, a report by the Lawrence Livermore National Laboratory found that MTBE was not significantly degrading in the monitoring networks for these leaking UST sites.[29] The situation in other states may be similar. In a September 2000 survey of state leaking underground storage tank (LUST) programs, 31 states reported that MTBE was found in ground water at 40% or more of gasoline-contaminated sites in their states; 24 states reported MTBE at 60% to 100% of sites.[30]

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[25] American Water Works Association Research Foundation, *Occurrence of MTBE and VOCs in Drinking Water Sources of the United States*, 2003, p. xxiii, p. 101.

[26] Ibid., p. 120.

[27] U.S. Geological Survey, data summary submitted to the EPA Blue Ribbon Panel on the Use of MTBE and Other Oxygenates in Gasoline, January 22, 1999. Available at [http://www.epa.gov/otaq/consumer/fuels/oxypanel/blueribb.htm#Presentations].

[28] California Environmental Protection Agency, *MTBE Briefing Paper*, p. 17.

[29] Anne Happel, E. H. Beckenbach, and R. U. Halden, *An Evaluation of MTBE Impacts to California Groundwater Resources*, Lawrence Livermore National Laboratory and the University of California, Berkeley, June 11, 1998, p. iv.

[30] New England Interstate Water Pollution Control Commission (NEIWPCC), *Survey of State Experiences with MTBE Contamination at LUST Sites (August 2000).* Available at [http://www.neiwpcc.org]. The survey shows that some states began requiring testing at LUST sites in the 1980s (Maine in 1986 and Minnesota in 1987).

A 2003 update to that survey found that, averaged among the states, MTBE was found in groundwater at 60% of gasoline-contaminated sites.[31]

EPA's Responses to MTBE Occurrence in Water

Safe Drinking Water Act Initiatives. MTBE has not been regulated under the Safe Drinking Water Act (SDWA), but to address concerns raised by the detection of MTBE in ground water and drinking water supplies, EPA has pursued several initiatives. In December 1997, the agency issued a drinking water advisory for MTBE based on consumer acceptability (for taste and smell). EPA issues drinking water advisories to provide information on contaminants in drinking water that have not been regulated under SDWA.[32] Advisories are not enforceable, but provide guidance to water suppliers and other interested parties regarding potential health effects or consumer acceptability. While the MTBE advisory is not based on health effects, EPA notes that keeping MTBE levels in the range of 20-40 µg/L or lower for consumer acceptability reasons would also provide a large margin of safety from adverse health effects. Specifically, the advisory states that:

> [c]oncentrations in the range of 20 to 40 µg/L are about 20,000 to 100,000 (or more) times lower than the range of exposure levels in which cancer or noncancer effects were observed in rodent tests. This margin of exposure is in the range of margins of exposure typically provided to protect against cancer effects by the National Primary Drinking Water Standards under the Federal Safe Drinking Water Act. This margin is greater than such standards typically provided to protect against noncancer effects. Thus, protection of the water source from unpleasant taste and odor as recommended will also protect consumers from potential health effects.[33]

In addition, EPA has taken steps that could lead to the development of an enforceable drinking water standard for MTBE. In February 1998, EPA included MTBE on a list of contaminants that are potential candidates for regulation under the Safe Drinking Water Act. Compounds on the contaminant candidate list are categorized as regulatory determination priorities, research priorities, or occurrence priorities. Because of data gaps on MTBE health effects and occurrence, EPA placed MTBE in the category of contaminants for which further occurrence data collection and health effects research are priorities. Thus, while EPA has not selected MTBE

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[31] New England Interstate Water Pollution Control Commission (NEIWPCC), *Survey of State Experiences with MTBE and Other Oxygenate Contamination at LUST Sites (August 2003)*. Available at [http://www.neiwpcc.org/Index.htm?MTBE.htm~mainFrame].

[32] At least seven states have set health-based drinking water standards for MTBE ranging from 13 parts per billion (ppb) to 240 ppb. (Parts per billion are equivalent to µg/L.) At least five states have adopted a secondary standard (based on aesthetic qualities, i.e., taste and odor), ranging from 5 ppb to 70 ppb. At least 10 states have adopted drinking water advisory levels. At least 32 states have adopted a very wide range of ground water cleanup levels; some are guidelines, some are enforceable, and some vary depending on the use of ground water; some states apply these levels to ground-water cleanup at leaking underground storage tank sites where ground water is used for drinking water.

[33] EPA Drinking Water Advisory, p. 2.

for regulation to date, the agency is pursuing research to fill the existing data gaps so that a regulatory determination may be made.

The Safe Drinking Water Act also directed EPA to publish a rule by August 1999 requiring public water systems to conduct monitoring for a list of unregulated contaminants that may require regulation. EPA included MTBE in this rule and directed large public water systems to begin monitoring for MTBE in January 2001.[34]

The occurrence data generated under the Unregulated Contaminant Monitoring Rule, combined with the results of ongoing health effects studies, are intended to provide information needed by EPA to make a regulatory determination for MTBE. Under SDWA, the next round of regulatory determinations will be made in 2006. EPA typically requires roughly three and one-half years to promulgate a drinking water regulation; thus, the earliest EPA would be expected to issue a drinking water regulation for MTBE is 2010.

Underground Storage Tank Regulation. A key EPA and state contamination prevention effort involves implementing the underground storage tank program established by the 1984 amendments to the Resource Conservation and Recovery Act (RCRA). Under this program, EPA has set operating requirements and technical standards for tank design and installation, leak detection, spill and overfill control, corrective action, and tank closure. As of 1993, all tanks were required to comply with leak detection regulations. Additionally, all tanks installed before December 1988 (when standards for new tanks took effect) were required to be upgraded, replaced, or closed by December 22, 1998.

Federal and state regulators anticipate that as tank owners and operators comply with these requirements, the number of petroleum and related MTBE leaks from UST systems should decline significantly. However, MTBE has been detected at thousands of leaking tank sites, and this additive is proving more difficult and costly to remediate than conventional gasoline. A key concern for states is that, as testing increases, it is likely that the number and scope of needed cleanups may increase as well. A 2003 state survey found that many sites have not been tested for MTBE, and most states do not plan to reopen previously closed Leaking Underground Storage Tank (LUST) sites to look for MTBE, although 32 states reported that MTBE plumes are often or sometimes longer than plumes from conventional gasoline leaks.[35] A key concern for community water suppliers and well owners is that fewer than half of the states are taking steps to ensure that MTBE and other oxygenates are not migrating beyond standard monitoring boundaries for LUST cleanup,[36] thus leaving an unknown number of MTBE plumes unremediated and ground water supplies at risk for future contamination.

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[34] 64 *Federal Register* 50555, September 17, 1999. The law requires monitoring by all large public water systems (serving more than 10,000 people) and requires a representative sampling of smaller systems.

[35] New England Interstate Water Pollution Control Commission (NEIWPCC), *Survey of State Experiences with MTBE and Other Oxygenate Contamination at LUST Sites (August 2003)*, Executive Summary, pp. 1-2.

[36] Ibid.

In 1986, Congress created a federal response program for cleaning up releases from leaking petroleum USTs through the Superfund Amendments and Reauthorization Act, which amended RCRA Subtitle I. These provisions created the LUST Trust Fund and authorized EPA and states to use the fund to clean up underground storage tank spills and leaks in cases where tank owners or operators do not clean up sites. EPA and states use the annual trust fund appropriation primarily to oversee and enforce corrective actions performed by responsible parties. EPA and states also use fund monies to conduct corrective actions where no responsible party has been identified, where a responsible party fails to comply with a cleanup order, or in the event of an emergency, and to take cost recovery actions against parties. The FY2005 omnibus appropriations act, P.L. 108-447, provided nearly $70 million from the LUST Trust Fund for states and EPA to administer the LUST remediation program. EPA allocates approximately 80% of the appropriated amount to the states.[37]

Since the federal underground storage tank program began, nearly 1.6 million of the roughly 2.2 million petroleum tanks subject to regulation have been closed, and, overall, the frequency of leaks from UST systems has been reduced. As of September 30, 2004, some 672,297 tanks subject to UST regulations remained in service, 447,233 releases had been confirmed, 412,657 cleanups had been initiated, and 317,405 cleanups had been completed.[38] During FY2004, 7,850 new releases were confirmed, compared to 12,000 in FY2003.

Blue Ribbon Panel on Oxygenates in Gasoline

As part of its effort to gather information and focus research, in November 1998, EPA established an independent Blue Ribbon Panel on Oxygenates in Gasoline to review the broad range of issues posed by the use of MTBE and other oxygenates. The panel was established under the auspices of the Clean Air Act Advisory Committee, and its membership reflected a broad range of experts and stakeholders.[39] The panel:

- recommended that Congress act to remove the current Clean Air Act requirement that 2% of RFG, by weight, consist of oxygen, in order to ensure that adequate fuel supplies can be blended in a cost-effective manner while reducing usage of MTBE;

- recommended that the winter oxygenated fuels program be continued;

- agreed broadly that use of MTBE should be reduced substantially (with some members supporting its complete phaseout), and that

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[37] For more information on the LUST program and related legislation, see CRS Report RS21201, *Leaking Underground Storage Tanks: Program Status and Issues*.

[38] For state-by-state information, see [http://www.epa.gov/oust/cat/camarchv.htm].

[39] A list of Blue Ribbon Panel members is provided, along with the panel report and related materials, at [http://www.epa.gov/oar/caaac/mtbe.html].

Congress should act to provide clear federal and state authority to regulate and/or eliminate the use of MTBE and other gasoline additives that threaten drinking water supplies;

- recommended that EPA seek mechanisms to ensure that there is no loss of current air quality benefits (i.e., no backsliding); and

- recommended a comprehensive set of improvements to the nation's water protection programs, including over 20 specific actions to enhance Underground Storage Tank, Safe Drinking Water, and private well protection programs.

The panel's numerous water protection recommendations addressed prevention, treatment, and remediation. For example, the panel recommended that EPA work with Congress to determine whether above-ground petroleum storage tanks (which generally are not regulated) should be regulated; work to enhance state and local efforts to protect lakes and reservoirs that serve as drinking water supplies by restricting use of recreational watercraft; and accelerate research for developing cost-effective drinking water treatment and remediation technologies.

The panel also suggested that EPA and others should accelerate ongoing health effects and environmental behavior research of other oxygenates and gasoline components that would likely increase in use in the absence of MTBE.

Then-EPA Administrator Carol Browner concurred with the recommendation of the Blue Ribbon Panel calling for a significant reduction in the use of MTBE. She also stated her commitment to work with Congress for "a targeted legislative solution that maintains our air quality gains and allows for the reduction of MTBE, while preserving the important role of renewable fuels like ethanol."[40]

On March 20, 2000, she announced that EPA would begin the process of issuing regulations to reduce or phase out use of MTBE (discussed at greater length below in the section on "Current Statutory Authority"). Recognizing that this process could take several years to complete, she renewed her call for congressional action to "amend the Clean Air Act to provide the authority to significantly reduce or eliminate the use of MTBE," to "ensure that air quality gains are not diminished," and to "replace the existing oxygen requirement contained in the Clean Air Act with a renewable fuel standard for all gasoline."[41]

In its few public statements on MTBE, the Bush Administration has not indicated any change in the Clinton Administration's policy, although EPA's effort to regulate MTBE using its existing authority has slowed noticeably. Five years after EPA began the development of regulations to reduce or phase out MTBE, regulations

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[40] Statement by former EPA Administrator Carol Browner on findings by the EPA's Blue Ribbon MTBE Panel, July 26, 1999, available on the Blue Ribbon Panel home page, previously cited.

[41] U.S. Environmental Protection Agency, "Clinton-Gore Administration Acts to Eliminate MTBE, Boost Ethanol," EPA Headquarters Press Release, March 20, 2000, pp. 7-8.

have still not been proposed, much less promulgated. This Administration, like the previous one, appears to many to be happy to defer to a legislative solution. As one EPA official described it, "If the ethanol and oil industries can come to an agreement, we'll support it."

Alternatives to MTBE

The major potential alternatives to MTBE are other oxygenates. This is so both for practical and for regulatory reasons: at present, oxygenates are required by the Clean Air Act; and they possess several advantages, including high octane and the ability to replace toxic components of conventional gasoline.

Oxygenates that could replace MTBE include ethers, such as ethyl tertiary butyl ether (ETBE), and alcohols, such as ethanol. These other oxygenates may pose health and environmental impacts, but inadequate data make it difficult to reach definite conclusions. EPA's Blue Ribbon Panel concluded:

> The other ethers (e.g., ETBE, TAME, and DIPE) have been less widely used and less widely studied than MTBE. To the extent that they have been studied, they appear to have similar, but not identical, chemical and hydrogeologic characteristics. The Panel recommends accelerated study of the health effects and groundwater characteristics of these compounds before they are allowed to be placed in widespread use.[42]

Ethanol and other alcohols are considered relatively innocuous on their own; they generally do not persist in ground water and are readily biodegraded. However, research suggests that the presence of ethanol in a gasoline plume can extend the spread of benzene and other toxic constituents of gasoline through ground water.[43] This is largely because ethanol is likely to be degraded preferentially by microorganisms that would otherwise feed on other chemical components of gasoline, including benzene, toluene, ethylbenzene, and xylene (BTEX).

In announcing the phaseout of MTBE in his state on March 25, 1999, California's Governor Davis required three state agencies to conduct additional research on the health and environmental impacts of ethanol, the most likely substitute. In reports approved in January 2000, the agencies concluded that if ethanol were substituted for MTBE, there would be "some benefits in terms of water contamination" and "no substantial effects on public-health impacts of air pollution."[44]

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[42] Blue Ribbon Panel Report, p. 8.

[43] See, for example, "Ethanol-Blended RFG May Cause Small Hike in Gasoline Plume Size," *Mobile Source Report*, December 2, 1999, p. 11, or "Experts Charge Cal/EPA Rushing Approval of Ethanol in RFG," *Inside Cal/EPA*, January 14, 2000, p. 1.

[44] California Air Resources Board, Water Resources Control Board, and Office of Environmental Health Hazard Assessment, *Health and Environmental Assessment of the Use of Ethanol as a Fuel Oxygenate*, Report to the California Environmental Policy Council in Response to Executive Order D-5-99, Dec. 1999, vol. 1, Executive summary, pp. 1-22.

(continued...)

A more recent article, based on the California ethanol review, focused specifically on the relative risks of ground water contamination by spills of ethanol-blended gasoline, MTBE-blended gasoline, and non-RFG gasoline. The authors concluded that:

> relative to risks associated with standard formulation gasoline, *there is an increase in the risk that wells will be contaminated by RFG using either MTBE or ethanol as an oxygenate* [emphasis added]. With ethanol, the risk of contaminating wells decreases after approximately five years. However, the risk continues to grow for MTBE because of the assumption that this chemical is not degraded in the subsurface. The conservative approach used in this analysis, including the low biodegradation rates and assumption that the gasoline source areas are not remediated, results in an overstatement of the risks associated with these additives to gasoline. Nevertheless, the relative trends do favor ethanol when considering risk associated with RFG spills.[45]

The switch from MTBE to ethanol is not without technical problems, as well. Ethanol costs substantially more to produce than MTBE; and it poses challenges to the gasoline distribution system (it would separate from gasoline if transported long distances by pipeline, so it must be mixed with non-oxygenated gasoline blendstock close to the market in which it is to be sold).[46]

Since late 1997, some refiners have discussed the possibility of making gasoline that meets the performance requirements for RFG without using oxygenates. Tosco and Chevron, two firms with large stakes in the California gasoline market, asked for changes in the rules to allow the sale of RFG not meeting the oxygenate requirement in late 1997. In October 1997, Tosco expressed concern about the growing evidence of the potential for extensive MTBE contamination in asking the California Air Resources Board to "take decisive action" to "begin to move away from MTBE."[47] Chevron, California's largest refiner, followed suit, announcing that it "may be possible to make a cleaner burning gasoline without oxygenates, and still reduce emissions to the same extent achieved with current standards."[48] The company stated its support for legislation allowing it to stop or reduce its use of oxygenates. These statements were supported by the Western States Petroleum Association. The American Petroleum Institute now also supports legislation to remove the RFG oxygenate requirement, which was a key recommendation of the Blue Ribbon Panel.

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[44] (...continued)
Report is available at [http://www-erd.llnl.gov/ethanol/]).

[45] Susan Powers et al., "Will Ethanol-Blended Gasoline Affect Groundwater Quality?" *Environmental Science & Technology*, American Chemical Society, January 1, 2001, p. 28A.

[46] For additional information on ethanol, see CRS Report RL30369, *Fuel Ethanol: Background and Public Policy Issues*.

[47] Letter of Duane B. Bordvick, Vice President, Environmental and External Affairs, Tosco, to John D. Dunlap III, Chairman, California Air Resources Board, October 17, 1997.

[48] "Chevron Seeks Changes to Reformulated Gasolines," press release, Chevron Corporation Public Affairs Department, December 1, 1997.

Affected industries have not been united in seeking authority to replace MTBE, however. The major producers of MTBE have not joined the efforts to promote alternatives, and ethanol producers and agricultural interests (most ethanol is made from corn) are concerned that removing the oxygenate requirement would negatively affect the sales of their products. Nearly 13% of the nation's corn crop is used to produce ethanol. If MTBE use is phased out, and the oxygenate requirement remains in effect, ethanol use will likely soar, increasing demand for corn. Conversely, if the oxygenate requirement were removed by legislation, not only would MTBE use decline, but so, likely, would demand for ethanol.

As a result, Members, Senators, and governors from corn-growing states have taken a keen interest in MTBE legislation. Unless their interests are addressed, they would pose a potent obstacle to its passage. Reflecting these concerns, both the House and Senate versions of MTBE legislation in the 108th Congress eliminated the oxygen requirement, but mandated a more than doubling of the use of renewable fuels such as ethanol by 2012 or 2015. Similar provisions are included in H.R. 6 and S. 606.

Current Statutory Authority to Control the Use of MTBE

Whether EPA has authority to take steps to regulate or ban MTBE use in the absence of specific congressional authorization is a question many have raised as the agency and Congress consider their responses to MTBE contamination. In theory, if the agency determines that MTBE poses what it considers a significant threat to air quality, water quality, or human health, it can take action to restrict or ban the substance using existing authority under the Toxic Substances Control Act (TSCA).[49] Until early 2000, based on its public statements, the agency seemed unlikely to make such a determination. In April 1998 testimony before a House Commerce subcommittee, for example, EPA's then Acting Assistant Administrator for Air and Radiation stated: "One needs to be very cautious about initiating changes to the RFG program that could upset the balance of previous agreements that have led to the significant emissions reductions we are seeing today."[50] Instead, the agency focused attention on the need to prevent leaks from underground fuel storage tanks, which, it argued, would address the major cause of drinking water contamination by MTBE.

On March 20, 2000, however, former EPA Administrator Browner announced that the agency would start a regulatory process "aimed at phasing out MTBE,"[51] using Section 6 of TSCA. According to the agency's press release, EPA expected to issue a proposed rule to ban or phase down MTBE within six months. As the agency

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[49] Under the Clean Air Act, EPA has authority to waive the RFG oxygenate requirement if the oxygenate interferes with the attainment of an air quality standard; however, EPA has no authority to waive the requirement for water quality reasons.

[50] Statement of Richard D. Wilson, former Acting Assistant Administrator, Office of Air and Radiation, U.S. EPA, in "Implementation of the Reformulated Gasoline Program in California," hearing before the Subcommittee on Health and Environment, Committee on Commerce, U.S. House of Representatives, April 22, 1998, Serial No. 105-94, p. 30.

[51] U.S. Environmental Protection Agency, "Clinton-Gore Administration Acts to Eliminate MTBE, Boost Ethanol," EPA Headquarters press release, March 20, 2000, p. 2.

noted, however, a TSCA rulemaking is procedurally burdensome and may take "several years" to complete. To use the authority, the agency will have to conclude that MTBE poses an unreasonable risk to health or the environment. In the 27 years since TSCA was enacted, the agency has successfully invoked this authority against fewer than half a dozen classes of chemicals.

The first step in the TSCA rule-making process was the issuance of an Advance Notice of Proposed Rulemaking (ANPRM) on March 24, 2000.[52] The ANPRM solicited the input of interested parties regarding EPA's course of action, including:

- whether some use of MTBE as a gasoline additive should be allowed to continue,
- how much lead time would be necessary to allow refiners to eliminate MTBE from RFG or from all fuels without unacceptable impacts on the price or supply of fuel,
- whether EPA should eliminate or cap the use of any other gasoline additives (e.g., other ethers) in addition to MTBE, and
- whether MTBE presents significantly greater risk to public health and/or water quality than alternative gasoline additives.

The agency also requested additional information regarding releases of gasoline containing MTBE, the extent of contamination of water resources by the substance, remediation technologies, alternatives to MTBE and their potential impacts on health and the environment, and the cost of limiting or phasing out MTBE over various time frames.[53] As of February 2005, the agency had still not completed a proposed rule. The agency's latest Semiannual Regulatory Agenda as of that date indicated that a rule would be proposed in November 2005, but it listed the activity under Clean Air Act rather than TSCA rules.[54] Agency staff familiar with the rulemaking process have described it as "basically on hold,"[55] with the Administration deferring to what they think will be congressional action.

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[52] 65 *FR* 16093, March 24, 2000.

[53] The specific request for information is found on pp. 16106-16107 of the March 24, 2000 Federal Register notice.

[54] Fall 2004 Regulatory Agenda, Federal Register, December 13, 2004, available at [http://ciir.cs.umass.edu/cgi-bin/ua/web_fetch_doc?dataset=ua&db=agendaFall2004&query=and&doc_id=3208], visited February 20, 2005. The rule, listed at Sequence Number 3208, is listed under Clean Air Act, but for Legal Authority, the entry says "not yet determined." In addition to TSCA authority, Section 303 of the Clean Air Act could possibly be invoked. Section 303 allows the Administrator to seek a restraining order (and temporarily to issue such orders on his own authority) in cases where "a pollution source or combination of sources ... is presenting an imminent and substantial endangerment to public health or welfare, or the environment...." In EPA's assessment, however, studies to date suggest that MTBE is less toxic than certain other gasoline components, such as benzene, so it might be difficult to justify a finding of imminent and substantial endangerment.

[55] Personal communication, U.S. EPA, Office of Transportation and Air Quality, January 6, 2003. Confirmed March 1, 2005.

Legislation

Building on the work of earlier Congresses, legislation to address MTBE issues (Title XV of H.R. 6) passed the House April 21, 2005.[56] In the Senate, a bill addressing MTBE, renewable fuels, and reformulated gasoline (S. 606) was ordered reported by the Environment and Public Works Committee on March 16, 2005. The MTBE-related provisions of the two bills are reviewed below.

MTBE Transition and Renewable Fuels Standard. As in the 108th Congress, H.R. 6 contains a separate title (Title XV) that addresses MTBE, RFG, ethanol, and related issues. The title would amend the Clean Air Act to eliminate the requirement that RFG contain 2% oxygen, and to establish a new requirement that an increasing amount of gasoline contain renewable fuels such as ethanol. The bill would require that 3.1 billion gallons of renewable fuel be used in 2005, increasing to 5.0 billion gallons by 2012. (This compares to 2.1 billion gallons used in 2002 — the latest data available when the bill was first drafted. Ethanol use has since increased to 3.4 billion gallons in 2004.)

The bill would ban the use of MTBE in motor vehicle fuel, except in states that specifically authorize its use, not later than December 31, 2014. The ban includes two possible exceptions. First, EPA could allow MTBE in motor fuel up to 0.5 percent by volume, in cases that the Administrator determined to be appropriate; and second, the President would be able to make a determination, not later than June 30, 2014, that the restrictions on the use of MTBE shall not take place.

The bill would also authorize $2.0 billion to assist the conversion of merchant MTBE production facilities to the production of other fuel additives, and preserves the reductions in emissions of toxic substances achieved by the RFG program.

As approved in committee, S. 606 contains similar provisions. It also would repeal the oxygenate requirement, require the use of renewable fuel, ban MTBE use in fuels, and provide conversion assistance, although the specifics are different. The renewable fuel requirement would increase to 6.0 billion gallons in 2012. The ban on MTBE would take effect four years after the date of enactment, rather than at the end of 2014, and would have fewer possible exceptions. And conversion assistance would be limited to $1 billion and could only be used to produce two types of additive.

Safe Harbor Provision. Perhaps the most controversial element of H.R. 6 is its inclusion of a "safe harbor" provision protecting manufacturers and distributors of renewable fuels and fuels containing MTBE from product liability claims. S. 606 contains a safe harbor for renewable fuels, but not MTBE.

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[56] Legislation that could affect MTBE use has been introduced in every Congress since the 104th. In the 108th Congress, both the House and Senate passed comprehensive energy bills (H.R. 6) that addressed MTBE. A conference report on the legislation (H.Rept. 108-375) was adopted by the House, November 18, 2003, on a vote of 246-180. In the Senate, however, a cloture vote on the conference report, November 21, 2003, failed to achieve the 60 votes necessary to limit debate.

The effect of this provision would be to protect anyone in the product chain, from manufacturers to retailers, from liability for damages for contamination related to MTBE and renewable fuels, or for personal injury or property damage based on the nature of the product. The safe harbor provision would apply retroactively to September 5, 2003, potentially barring lawsuits filed on or after that date, including those filed by the State of New Hampshire and various cities, towns, counties, municipal water suppliers, and schools. Prior to that date, five lawsuits had been filed. After that date, roughly 150 suits were filed on behalf of 210 communities in 15 different states. This provision is highly controversial and contributed to the failure of the conference report in the Senate in the 108th Congress.

The safe harbor provision states that the defective products liability shield would not affect the liability of a person for environmental cleanup costs, drinking water contamination, negligence for spills, or other liabilities other than liability based upon a claim of defective product. However, MTBE manufacturers and those who blend fuels would likely be more difficult to reach under these other bases of liability.[57] State attorneys general, local governments, and drinking water suppliers note that providing a products liability shield would effectively leave only gas station owners liable for cleanup, and because these businesses often have very limited resources, the effect of the safe harbor provision is that the burden for cleanup would fall to local communities, drinking water utilities, and the states. In light of this, the Congressional Budget Office identified the safe harbor provision an intergovernmental and private-sector mandate in its review of H.R. 6.[58] The Attorneys General for at least 14 states, including states where RFG is heavily used, strongly oppose the MTBE safe harbor provision. Others have questioned the fairness of placing the liability burden primarily on gas station owners, who were not made aware of MTBE's exceptional contamination potential.

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[57] For a more detailed discussion, see CRS Report RS21676, *The Safe-Harbor Provision for Methyl Tertiary Butyl Ether (MTBE)*.

[58] Congressional Budget Office, "Cost Estimate for H.R. 6, the Energy Policy Act of 2005, as Introduced in the House of Representatives." Addressed to Honorable David Dreier, Chairman of the Committee on Rules, U.S. House of Representatives, April 19, 2005, 4 pp. This document is available at [http://www.cbo.gov]. The CBO determined that the MTBE and renewable fuels liability safe harbor "would impose both an intergovernmental and private-sector mandate as it would limit existing rights to seek compensation under current law.... Under current law, plaintiffs in existing and future cases may stand to receive significant amounts in damage awards, based, at least in part, on claims of defective product. Because section 1502 would apply to all such claims filed on or after September 5, 2003, it would affect more than 100 existing claims filed by local communities, states, and some private companies against oil companies. Individual judgments and settlements for similar lawsuits over the past several years have ranged from several million dollars to well over $100 million. Based on the size of damages already awarded and on information from industry experts, CBO anticipates that precluding existing and future claims based on defective product would reduce the size of judgments in favor of state and local governments over the next five years. CBO estimates that those reductions would exceed the threshold established in UMRA (Unfunded Mandates Relief Act) [$62 million] in at least one of those years."

Oil companies and other proponents of the provision argue that a safe harbor provision is reasonable, given that the fuels have been used to meet the 1990 federal oxygenated fuels mandate, and that the key problem lies not with MTBE, but with leaking underground storage tanks, which are the primary source of MTBE contamination. Even so, MTBE producers appear to remain concerned about potential liability exposure. MTBE production and use grew rapidly during the 1980s, and several oil companies experienced some incidents of MTBE contamination of groundwater and drinking water wells. In 1984, oil company engineers estimated that, if MTBE use in gasoline became widespread, the number of well contamination incidents would triple, and treatment costs would increase by a factor of five compared to conventional gasoline incidents.[59] In 1985, Exxon engineers "recommend[ed] that from an environmental risk point of view MTBE not be considered as an additive to Exxon gasolines on a blanket basis throughout the United States.[60] The total costs of treating MTBE contaminated drinking water are unknown but are expected to be in the billions. This provision and its potential consequences continue to be the subject of intense debate.

Leaking Underground Storage Tank Issues. H.R. 6 also addresses the issue of MTBE and other fuel leaks from underground storage tanks (USTs). Title XV, Subtitle B, would make extensive amendments to Subtitle I of the Solid Waste Disposal Act to enhance the leak prevention and enforcement provisions of the federal UST regulatory program and broaden the allowable uses of the Leaking Underground Storage Tank (LUST) Trust Fund. Among other things, H.R. 6 would require EPA or the state to conduct compliance inspections of USTs every three years; prohibit fuel delivery to ineligible tanks; and require EPA, with Indian tribes, to develop a strategy to address releases on tribal lands. It also would direct states to develop training requirements for persons responsible for operating and maintaining tanks and responding to spills. Further, it would require that, when determining the portion of cleanup costs to recover from a tank owner or operator, EPA or a state must consider the owner or operator's ability to pay for cleanup and still maintain basic business operations. Also, states would have to do one of the following: (1) require that new tanks are secondarily contained if located within 1,000 feet of a community water system or potable well; or (2) require that UST manufacturers and installers maintain evidence of financial responsibility to pay for corrective actions; and require persons installing USTs to be certified or licensed, or the installation to be certified by an engineer or approved by the state, or compliant with a code of practice or other method that is no less protective of health and the environment.

Both H.R. 6 and S. 606 authorize appropriations from the trust fund for EPA and states to use for remediation of MTBE and enforcement of the tank program.

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[59] Memorandum from B. J. Mickelson to V. M. Dugan, *MTBE Contamination of Ground Water*, Exxon Oil Company, August 23, 1985, presented in *South Tahoe Public Utility District v. Atlantic Richfield Co.*, Case No. 999128 (San Fran. Super. Ct. Aug. 5, 2002).

[60] Memorandum from B. J. Mickelson to Mr. J. M. E. Mixtar, *Introduction of Methyl Tertiary Butyl Ether (MTBE) in the Texas Eastern Transmission, Jacksonville, Florida; Charlston, South Carolina; and Wilmington, North Carolina Areas*, Exxon Oil Company, April 19, 1985, presented in *South Tahoe Public Utility District v. Atlantic Richfield Co.*, Case No. 999128 (San Fran. Super. Ct. Aug. 5, 2002).

H.R. 6 would authorize annually, from the LUST Trust Fund for FY2005 through FY2009, the appropriation of $200 million for the LUST clean-up program for petroleum tanks, and another $200 million specifically for responding to tank leaks involving MTBE or other oxygenated fuel additives (e.g., ethanol). S. 606 would authorize a one-time appropriation of $200 million for the cleanup of MTBE and other ether fuels (but not ethanol) from USTs and other sources. (For a detailed discussion of the MTBE and ethanol provisions of the two bills, see CRS Report RL32865, *Renewable Fuels and MTBE: A Comparison of Selected Legislative Initiatives*.)

State Initiatives

Among the states, California has arguably been the most active in addressing MTBE issues. Actions taken by the state legislature and the governor helped propel the issue to national prominence. Legislation signed October 8, 1997, required the state to set standards for MTBE in drinking water, and required the University of California to conduct a study of the health effects of MTBE and other oxygenates and risks associated with their use. The UC report, which was issued in November 1998, recommended a gradual phaseout of MTBE from gasoline in California.[61] Based on the report and on public hearings, Governor Davis issued a finding that "on balance, there is a significant risk to the environment from using MTBE in gasoline in California," and required the state's Energy Commission to develop a timetable for the removal of MTBE from gasoline at the earliest possible date, but not later than December 31, 2002. (This date was amended, in March 2002, to December 31, 2003.) The governor also required the California Air Resources Board (CARB) to make a formal request to U.S. EPA for a waiver from the requirement to use oxygenates in reformulated gasoline and required three state agencies to conduct additional research on the health and environmental impacts of ethanol, the most likely substitute for MTBE.

The waiver request resulted in months of negotiation between EPA and CARB, with EPA expressing skepticism that it had authority to grant a waiver under the circumstances.[62] The Clean Air Act authorizes waiver of the RFG oxygenate requirement only if the Administrator determines that oxygenates would prevent or interfere with the attainment of a National Ambient Air Quality Standard.[63] The law does not address other impacts, such as drinking water contamination. More than two years later, on June 12, 2001, the agency finally denied California's request. Without a waiver, gasoline sold in ozone nonattainment areas in the state has been required to contain another oxygenate since the MTBE ban took effect. During 2003, California's motor fuels gradually phased out MTBE in favor of ethanol.

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[61] See Arturo Keller et al., *Health & Environmental Assessment of MTBE*, Report to the Governor and Legislature of the State of California As Sponsored by SB 521, November 1998. Available at [http://www.tsrtp.ucdavis.edu/mtberpt/homepage.html].

[62] See statements of Robert Perciasepe, former Assistant Administrator for Air and Radiation, U.S. EPA, at the May 6, 1999 House Commerce subcommittee hearing, previously cited, pp. 47-52.

[63] The waiver language is found in Section 211(k)(2)(B).

In January 2004, Governor Schwarzenegger again requested EPA to grant California a waiver from the oxygenate requirement. The governor noted that EPA's Blue Ribbon Panel concluded that a minimum oxygen content is not needed in California, and that CARB had demonstrated that the oxygen requirement is detrimental to the state's efforts to improve air quality. Governor Schwarzenegger further stated that the oxygenate requirement greatly increases fuel costs and "is no longer required to ensure substantial and sustained ethanol use in California."[64] As of April 2005, EPA had not yet responded to this request.

Following California's decision to phase out MTBE, at least 18 other states (Colorado, Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Michigan, Minnesota, Missouri, Nebraska, New Hampshire, New York, Ohio, South Dakota, Washington, and Wisconsin) have acted to limit or phase out its use. The largest of these, New York, set a date of January 1, 2004, to ban MTBE. (**Table 2**, below, summarizes state actions to ban MTBE.)

NAFTA Arbitration

Another MTBE issue that emerged in the wake of California's decision to phase out the use of MTBE in gasoline concerns the applicability of certain provisions in the North American Free Trade Agreement (NAFTA). Chapter 11, Article 1110, of the NAFTA requires the United States, Canada, and Mexico to treat each other's investors and investments in accordance with the principles set out in the chapter. It also allows these investors to submit to arbitration a claim that a NAFTA party has breached Chapter 11 obligations and to recover damages from any such breach.

In June 1999, the Methanex Corporation, a Canadian company that produces methanol in the United States and Canada, notified the U.S. Department of State of its intent to institute an arbitration against the United States under the investor-state dispute provisions of the NAFTA, claiming that the phaseout of MTBE ordered by the governor of California on March 25, 1999, breaches U.S. NAFTA obligations regarding fair and equitable treatment and expropriation of investments, entitling the company to recover damages which it estimated at $970 million. (Methanol is a major component of MTBE and is Methanex's only product. The California market for MTBE reportedly accounted for roughly 6% of global demand for methanol.) The 1999 Methanex claim asserted that California's phaseout was motivated by a desire to favor an MTBE competitor, ethanol, which is produced in the United States. In August 2002, an arbitration panel ordered Methanex to file a fresh claim more specifically relating the actions of California to the company's manufacture of methanol. Methanex filed a new claim in November 2002, and a hearing was held in June 2004. A ruling is pending.[65]

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[64] See [http://www.governor.ca.gov/state/govsite/gov_homepage.jsp] (search "MTBE").

[65] See also CRS Report RL31638, *International Investor Protection: "Indirect Expropriation" Claims under NAFTA Chapter 11*.

Table 2. State Actions Banning MTBE

State	Phaseout date	Complete or partial ban?
IA	7/1/00	Partial: no more than trace amounts (0.5% by vol.) MTBE in motor vehicle fuel
MN	7/2/00 (partial) 7/2/05 (full)	Partial/then complete: no more than 1/3 of 1% oxygenate as of 7/2/00; complete ban as of 7/2/05. Ban also applies to ethyl tertiary butyl ether (ETBE) and tertiary amly methyl ether (TAME)
NE	7/13/00	Partial: no more than 1% (vol.) MTBE in any petroleum product
SD	7/1/01	Partial: no more than trace amounts (less than 0.5% vol.) resulting from commingling during storage or transfer
CO	4/30/02	Complete ban by 4/30/02
CA	12/31/03	Complete ban by 12/31/02, an Exec. Order on 3/15/02 required Cal. Air Resources Board (CARB) to implement by 7/31/02, a 1 year delay in ban. On 7/25/02, CARB delayed ban by 1 year
MI	6/1/03	Complete ban by 6/1/03; can be extended if determined by 6/1/02 that phaseout date is not achievable
CT	1/1/04	Complete ban by 1/1/04, coordinated with NESCAUM (North East States for Coordinated Air Use Management) regional fuels task force
NY	1/104	Complete ban as of 1/1/04
WA	1/1/04	Partial: may not be intentionally added to fuel, or knowingly mixed in gasoline above 0.6% (vol.)
KS	7/1/04	Partial: may not sell or deliver any motor vehicle fuel containing more than 0.5% (vol.) MTBE
IL	7/24/04	Partial: may not use, sell or manufacture MTBE as a fuel additive; may sell motor fuel containing no more than 0.5% (vol.) MTBE
IN	7/24/04	Partial: no more than 0.5% (vol.) MTBE in gasoline
WI	8/1/04	Partial: no more than 0.5% (vol.) MTBE in gasoline
OH	7/1/05	Partial: no more than 0.5% (vol.) MTBE in motor vehicle fuels
MO	7/31/05	Partial: no more than 0.5% (vol.) MTBE in gasoline sold or stored
KY	1/1/06	Partial: no more than trace amounts of MTBE in fuel
ME	1/1/07	Partial: no more than 0.5% (vol.) MTBE in gasoline sold
NH	Latter of 1/1/07 or 6 months after EPA approval to opt out of RFG program	Partial: no more than 0.5% (vol.) MTBE in gasoline sold or stored. Ban also applies to other gasoline ethers, and tertiary butyl alcohol (TBA).

Source: Environmental Protection Agency, EPA 420-B-04-009, June 2004.
Note: Arizona adopted legislation on 4/28/00 calling for a complete phaseout of MTBE as soon as feasible but no later than six months after California's phaseout. This legislation expired on June 30, 2001. Although, it is no longer official state policy, the state still encourages phaseout of MTBE.

Conclusion

Controversy continues to surround the use of MTBE in gasoline. Research conducted to date suggests that the air quality benefits of its use are substantial. However, numerous detections of MTBE in ground and surface water, and particularly in municipal and private drinking water wells, have raised significant concerns about the use of this oxygenate. Research on MTBE and other oxygenates is ongoing and is expected to provide additional information to help advance the current understanding of MTBE-related health and environmental issues and those of its potential alternatives. However, because small amounts of MTBE in water can make it noxious to consumers, many states have imposed limits on its use.

Legislation introduced in Congress initially focused on the limited issue of MTBE use in California, where federal requirements have prevented refiners from adopting a more flexible approach permitted by state regulations. Modifying the federal requirements as they pertain to California has had substantial support among the California congressional delegation. As MTBE has been detected in drinking water wells in other parts of the country, and in surface waters in addition to underground sources, broader legislation has been introduced. These bills emerged in a context of ongoing activities aimed at reducing releases of petroleum generally or MTBE specifically. The effectiveness and sufficiency of these efforts (such as the continued implementation of UST regulations and stricter emissions standards for marine engines), combined with concerns and uncertainties about potential replacements for MTBE, add complexity to the debate. Also, some lawmakers have cautioned against acting precipitously to replace MTBE with other additives without adequate research and consideration of potential adverse consequences. Others view the debate over MTBE as an opportunity to encourage the greater use of ethanol, a competing oxygenate generally made from corn.

Developments in the states, particularly California and several northeastern ones, have driven reconsideration of the petroleum industry's reliance on MTBE as the principal means of meeting the Clean Air Act's reformulated gasoline requirements. These developments have generated continued congressional interest in the issue. Differences remain over whether to ban MTBE, whether to provide a product liability safe harbor for MTBE (or renewable fuels) producers, and other issues that may delay or prevent enactment of legislation.