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MTBE in Gasoline: Clean Air and Drinking Water Issues

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Summary

Concern over water contamination caused by the gasoline additive methyl tertiary butyl ether (MTBE) has raised questions concerning the desirability of using the additive as a means of producing cleaner burning fuel. MTBE is 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. Over the last few years, however, incidents of drinking water contamination by MTBE, particularly in California, have raised concerns and led to calls for restrictions on its use. In March 1999, Governor Davis of California ordered a phase-out of MTBE use in the state by December 31, 2002 (recently amended to December 31, 2003). Twelve other states, including New York, have subsequently enacted limits or phase-outs of the substance.

EPA responded to initial reports of water contamination by intensifying research and focusing on the need to minimize leaks from underground fuel tanks. As reports of contamination spread in 1998 and 1999, however, EPA's position evolved. On March 20, 2000, the Agency announced it was beginning the process of requiring a reduction or phase-out of MTBE use under Section 6 of 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 the substance. Since then, the Senate Environment and Public Works Committee has twice reported bills to provide such authority (S. 950 in the 107th Congress); the Senate incorporated similar provisions in its version of H.R. 4, which it passed April 25, 2002.

If MTBE were removed from gasoline without amending the Clean Air Act, there would be a need for refiners to use alternative sources of oxygen in RFG. The potential alternatives are other forms of ether, or alcohols such as ethanol. Incomplete research makes conclusions regarding the health and environmental impacts of these substitutes uncertain, but a study by the State of California concluded that switching to ethanol would cause no significant adverse impacts to public health or the environment. Such a switch would not be without problems, however. Ethanol costs more to produce than MTBE, poses challenges to the gasoline distribution system, and, some studies suggest that it increases the risk of water contamination compared to non-oxygenated gasoline. Also, in the short term, ethanol is unlikely to be available in sufficient quantity to replace MTBE nationwide. 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 Clean Air Act provisions concerning reformulated gasoline should be modified to allow refiners to discontinue or lessen their use of oxygenates. Numerous bills have been introduced in Congress to address these and related issues.

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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 107th 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 (82 counties with a combined population of 55 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); a little more than 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 is MTBE. In 1999, 87% of RFG contained MTBE. MTBE has also been used since the late 1970s in non-reformulated

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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 is 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 August 2000)

*Mandatory RFG Areas**

Baltimore, MD
Chicago, IL (and portions of Indiana and Wisconsin)**
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

*Opt-In RFG Areas****

Connecticut (entire state)
Dallas / Fort Worth, TX
Delaware (entire state)
District of Columbia
Kentucky portion of Cincinnati metropolitan area
Louisville, KY
Maryland (DC suburbs)
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 (DC suburbs, Richmond, Norfolk - Virginia Beach - Newport News)

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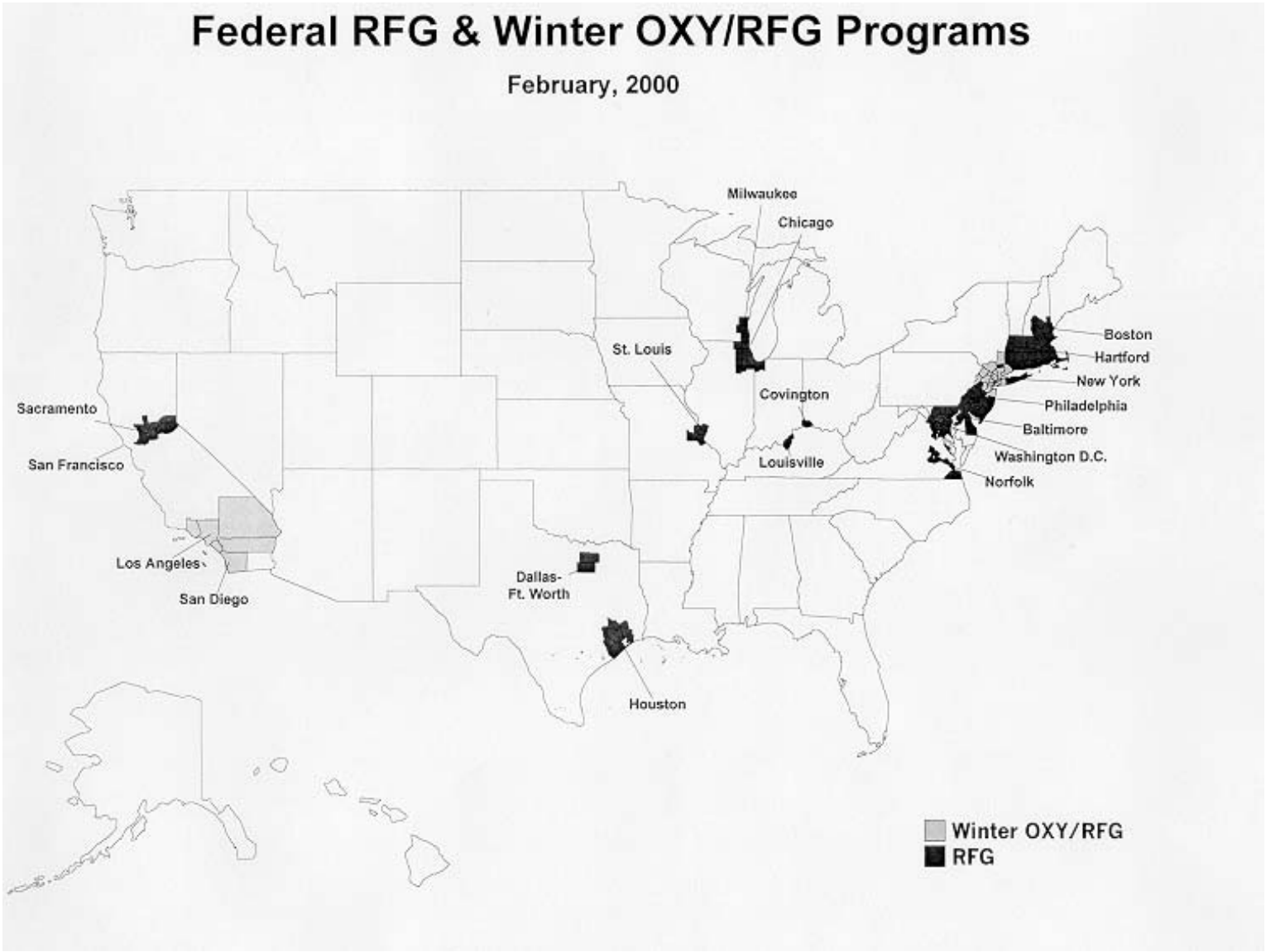
* RFG use required by the Clean Air Act.

** In the Chicago and Milwaukee areas, RFG is made with ethanol rather than MTBE.

*** 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, but not before January 1, 2004.

Source: U.S. EPA


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

gasoline, as an octane enhancer, at lower concentrations. 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 discussion. 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 oxygenated gasoline programs find a reduction in ambient CO concentrations of about 10%."[5]

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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 Internet website: [http://www.epa.gov/otaq/consumer/fuels/oxypanel/blueribb.htm].

[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 (continued...)

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 on both 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 9-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. In several cities, residents have complained of a variety of health effects from exposure to MTBE/gasoline exhaust: headaches, dizziness, nausea, sore eyes, and respiratory irritation. Some complaints have centered around the use of MTBE in cold weather, two of the principal areas noting complaints being 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 research is being conducted by EPA, universities, and others. Under the authority of Section 211 of the Clean Air Act, EPA has requested that refiners conduct a number of health effects studies on oxygenated, reformulated, and conventional gasoline, which should provide additional information.

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, several rodent studies have been done. Based on these animal studies (which looked primarily at inhalation effects), EPA has concluded that MTBE poses a potential for carcinogenicity to humans at high doses; however, because of uncertainties and

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[5](...continued)
as the OSTP Report.(Executive summary and recommendations are available at Internet website [http://wwwsd.cr.usgs.gov/nawqa/pubs/abstracts/zogorski/ostp.exec.sum.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.

limitations in the data EPA has been unable to make a confident estimation of risk at low exposure levels.[9] In 1998, the International Agency for Research on Cancer (IARC), the U.S. National Toxicology Program, and California's Carcinogen Identification Committee all determined not to list MTBE as a human carcinogen.

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

For practical purposes, the interpretation of any health risks associated with the addition of MTBE to gasoline requires 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 replaces. 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."[10]

Water Quality and Drinking Water Issues

A major issue regarding the use of MTBE concerns its detection at low levels in ground water in numerous locations nationwide and at elevated levels in some municipal drinking water wells and reservoirs. MTBE is very 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: 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.[11]

The available data indicate that 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

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[9]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. p. 1-2. This and other health effects information is available at Internet website: [http://www.epa.gov/OST/drinking/mtbe.html]. (Also, see additional drinking water risk discussion on p. 9 and 10 of this report.)

[10]Ibid., p. vii.

[11]Keller, Arturo, 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.

lakes and reservoirs appears to be exhaust from motorized watercraft, while smaller sources include gasoline spills, runoff, and ground water flow.[12]

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. As of April 3, 2002, 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 1 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).[13]

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 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.[14]

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

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[12]Keller. p. 33-34.

[13]California Environmental Protection Agency. *MTBE in California Drinking Water*, August 2, 2000, available at Internet website: [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.)

[14]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*, A Preliminary Report. October 13, 1998. 24 p. Available at Internet website: [http://www.state.me.us/dep/blwq/gw.htm]. (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.)

majority of these detections have been well below levels of public health concern, with roughly 1% of detections exceeding 20 μg/L.[15]

More recent federal and state monitoring efforts have been advancing the knowledge about the presence of MTBE in drinking water. Perhaps most notably, the United States Geological Survey (USGS), in cooperation with EPA, recently 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.[16] 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.[17]

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 1993-1998) 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.[18]

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

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

[16]For further information on MTBE research at the USGS, see Internet website: [http://wwwsd.cr.usgs.gov/nawqa/vocns/].

[17]Grady, Stephen J. and George D. Casey. *MTBE and other VOCs in Drinking Water in the Northeast and Mid-Atlantic Region*. Available at Internet website: [http://sd.water.usgs.gov/nawqa/pubs/abstracts/grady/Grady_iccssw_abs.pdf].
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.

[18]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 Internet website: [http://www.epa.gov/otaq/consumer/fuels/oxypanel/blueribb.htm#Presentations].

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).[19] Moreover, a 1998 report by the Lawrence Livermore National Laboratory found that MTBE was not significantly degrading in the monitoring networks for these leaking UST sites.[20]

The picture nationwide may be similar. As of late 2000, 42 states had begun to require testing for MTBE in ground water at leaking UST sites. 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.[21]

EPA's Responses to MTBE Occurrence in Water

Safe Drinking Water Act Initiatives. To address concerns raised by the detection of MTBE in ground water and drinking water supplies, EPA has undertaken a variety of activities. 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 the Safe Drinking Water Act (SDWA).[22] 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

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

[20] Happel, Anne, 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.

[21]New England Interstate Water Pollution Control Commission (NEIWPCC). *Survey of State Experiences with MTBE Contamination at LUST Sites (August 2000)*. Available at Internet website: [http://www.neiwpcc.org/mtbe1.html]. The survey shows that some states began requiring testing at LUST sites in the 1980s (Maine in 1986 and Minnesota in 1987) while others recently began to do so (Kentucky in 2000 and Washington in 2001).

[22]At least 7 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 5 states have adopted a secondary standard (based on aesthetic qualities, i.e., taste and odor), ranging from 5 ppb to 70 ppb. 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.

> 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.[23]

Additionally, EPA is taking 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 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.[24]

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 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. Based on reporting by states, EPA estimates that, by the end of fiscal year 2001, 82% of facilities were in "significant operational compliance" with the 1998 spill prevention requirements and 77% of facilities were in significant operational compliance with the spill detection requirements. However, MTBE has

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

[24] 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.

been detected at many leaking tank sites, and this additive is proving more difficult and costly to remediate than conventional gasoline. Moreover, many sites have not been tested for MTBE. 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.

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 Leaking Underground Storage Tank (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. In FY2001, the LUST tax generated $181.6 million in revenue, and the Fund earned another $94.8 million in interest; net receipts for the year were $276.4 million. For FY2002, Congress provided $73 million for the program, and the President has requested $73.3 million for FY2003.[25]

In late 2000, EPA launched a new USTfields initiative to address abandoned or idle industrial and commercial properties where redevelopment is hindered by petroleum contamination from abandoned USTs. This program complements EPA's Superfund-related Brownfields program which generally did not cover petroleum contamination until the passage of the new brownfields act (P.L. 107-118). EPA estimates that out of 450,000 brownfields, roughly 100,000 to 200,000 contain abandoned tanks. Under the USTfields initiative, in November 2000, EPA made grants of $100,000 to each of ten communities to clean up abandoned UST sites, with special consideration being given to sites with MTBE contamination. In 2001, the EPA Administrator announced that EPA would provide $100,000 grants from Trust Fund monies to another 40 USTfield pilot projects. In P.L. 107-118, signed into law in January 2002, Congress authorized up to $50 million of the annual brownfields appropriation to be used to clean-up petroleum contaminated sites. [26]

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.

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[25]For more information on the LUST program and related legislation in the 107th Congress, see CRS Report RS21201, *Leaking Underground Storage Tanks: Program Status and Issues*.

[26]For information on Brownfields, see CRS Issue Brief 10078, *Superfund and Brownfields in the 107th Congress*.

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.[27]

The panel was directed to perform the following tasks:

- examine the role of oxygenates in meeting the nation's goal of clean air,
- evaluate the efficiency of each of the available oxygenates in providing clean air benefits and the existence of alternatives,
- assess the behavior of oxygenates in the environment,
- review any known health effects, and
- compare the cost of production and use, and each product's availability.

The panel also was directed to study the causes of ground water and drinking water contamination from motor vehicle fuels, to explore prevention and cleanup technologies for water and soil, and to make recommendations to EPA "on how to ensure public health protection and continued improvement in both air and water quality."

Findings and Recommendations. In releasing its recommendations July 27, 1999, the Blue Ribbon Panel stressed that "RFG has provided substantial reductions in the emissions of a number of air pollutants from motor vehicles, most notably volatile organic compounds (precursors of ozone), carbon monoxide, and mobile-source air toxics (benzene, 1,3-butadiene, and others), in most cases resulting in emissions reductions that exceed those required by law."[28]

However, the panel noted water quality problems associated with MTBE releases and made a number of recommendations. Specifically, 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 phase out), and that 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;

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

[28] Blue Ribbon Panel on Oxygenates in Gasoline, "Panel Calls for Action to Protect Water Quality While Retaining Benefits from National Clean Burning Gas," press release, July 27, 1999, p. 2. Available at [http://www.epa.gov/oms/consumer/fuels/oxypanel/blueribb.htm]. Regarding dissenting views, one member endorsed the water protection reforms but disagreed with the recommendation to limit the use of MTBE, noting that the panel had not identified any increased public health risk associated with MTBE use in gasoline; another member supported maintaining the existing oxygenate standard for the air quality benefits.

- 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 aboveground 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 water craft; and accelerate research for developing cost-effective drinking water treatment and remediation technologies.

With regard to the recommendation to reduce substantially the use of MTBE, the panel noted that accomplishing such a major change in gasoline supply without disruptions to fuel supply and price would require up to 4 years lead time if the use of MTBE were eliminated (or less if use was substantially reduced).

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.

Former 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."[29]

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."[30]

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[29]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.

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

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.[31]

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.[32] 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 phase-out of MTBE in his state, 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."[33]

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,

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

[32]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.

[33]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. Volume 1, Executive summary. P. 1-22. Report is available at Internet website: [http://www-erd.llnl.gov/ethanol/]).

> 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.[34]

The switch from MTBE to ethanol is not without technical problems as well. Ethanol costs substantially more to produce than MTBE; 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); and, in the short term, it is unlikely to be available in sufficient quantity to replace MTBE nationwide.[35]

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, have asked for changes in the rules to allow the sale of RFG not meeting the oxygenate requirement. 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."[36] 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."[37] The company has 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.

Affected industries are not 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.

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

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

[36]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.

[37]"Chevron Seeks Changes to Reformulated Gasolines," Press Release, Chevron Corporation Public Affairs Department, December 1, 1997.

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).[38] 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."[39] 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,"[40] using Section 6 of TSCA. According to the Agency's press release, the Agency expected to issue a proposed rule to ban or phase down MTBE within 6 months. As the Agency 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 24 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.[41] 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,

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[38]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.

[39]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.

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

[41]65 *FR* 16093, March 24, 2000.

- 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.[42] As of April 2002, the Agency is still preparing a proposed rule, with decisions as to its specifics and actual proposal unlikely before summer 2002.

In addition to TSCA authority, Section 303 of the Clean Air Act could possibly have been invoked. Section 303 allows the Administrator to seek a restraining order (and temporarily to issue such orders on her 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.

Legislation

Legislation that could affect MTBE use has been introduced in every Congress since the 104th, but generally has not reached the floor of either chamber.[43] In the 107th Congress, however, the Senate has acted, including MTBE provisions in its version of H.R. 4, the comprehensive energy bill that it passed April 25, 2002. Sections 831 - 839 of the bill would ban the use of MTBE in gasoline within 4 years, eliminate the RFG program's oxygenate requirement, require the maintenance of toxic air pollutant reductions achieved under the RFG program, provide additional funding for the cleanup of contaminated ground water, authorize $750 million in conversion assistance grants to merchant producers of MTBE, and require studies of the health and environmental effects of MTBE substitutes. In Section 820, the bill also mandates a tripling of the use of renewable motor fuels such as ethanol by 2012 and provides a "safe harbor" from lawsuits for producers of renewable fuel. Many of the MTBE provisions were contained in legislation reported December 20, 2001, by the Environment and Public Works Committee (S. 950, S. Rept. 107-131). The rest were added on the Senate floor in S. Amdt. 2917.

The House has not passed comprehensive MTBE or ethanol provisions, but Section 604 of the House version of H.R. 4, passed August 2, 2001, would authorize

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

[43] Prior to this Congress, the only legislation that had reached the floor of either house was a Senate amendment to the FY2000 agricultural appropriations bill (S. 1233), offered by Senator Boxer, expressing the sense of the Senate that use of MTBE should be phased out. The Senate adopted the amendment on August 4, 1999.

the appropriation of $200 million from the Leaking Underground Storage Tank (LUST) Trust Fund to clean up MTBE leaks.

Besides these bills, a dozen other bills related to MTBE had been introduced in the 107th Congress as of the end of the first session. As in previous years, two of the bills in the 107th Congress (H.R. 52 and H.R. 2270) aim to change the regulatory requirements for reformulated gasoline as they pertain to California. Legislation similar to these bills was the focus of House efforts on MTBE in the 104th - 106th Congresses. The House Commerce Committee's Subcommittee on Health and Environment held hearings and approved the 106th Congress version, H.R. 11, with an amendment, September 30, 1999. Concerns that the bill was too narrowly drawn stalled further consideration, however, and developments since then have not been favorable to the California-only approach. Most recently, on August 1, 2001, the House rejected similar language offered by Representative Christopher Cox as an amendment to H.R. 4, on a vote of 300-125.

The difficulties encountered by H.R. 11 and the Cox amendment to H.R. 4 reflect wider concerns over MTBE use. Organizations initially opposed or indifferent to legislation affecting California have come to favor action on a broader scale. These organizations include the U.S. Environmental Protection Agency, the American Petroleum Institute (API), and environmental interests such as the Natural Resources Defense Council (NRDC) and American Lung Association (ALA). API, NRDC, and ALA have supported a set of principles adopted by the Northeast States for Coordinated Air Use Management (NESCAUM). NESCAUM represents the air pollution program directors in New York, New Jersey, and the 6 New England states. It has played a significant role in building consensus among the Northeastern states required to use reformulated gasoline. In a report issued in August 1999,[44] and in subsequent principles adopted by a task force of state air and water officials, NESCAUM called for:

- repealing the two percent oxygen mandate for RFG in the Clean Air Act;
- phasing down and capping MTBE content in all gasoline;
- clarifying state and federal authority to regulate, and/or eliminate, MTBE or other oxygenates if necessary to protect public health or the environment;
- maintaining the toxic emissions reductions benefits achieved to date by the RFG program (Note: the reductions *achieved* are substantially higher than the reductions *required* by the Clean Air Act);
- promoting consistency in fuel specifications through the timely implementation of effective federal requirements; and
- providing adequate lead time for the petroleum infrastructure to insure adequate fuel supply and price stability.

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[44]See *Summary of RFG/MTBE Findings and Program Recommendations,* August 1999, available at web site [http://www.nescaum.org/RFG/RFGPh2.shtml]

While support for waiving the oxygenate requirement is now widespread among environmental groups, the petroleum industry, and states, a potential obstacle to enacting legislation has lain among agricultural interests. About 6% of the nation's corn crop is used to produce the competing oxygenate, ethanol. If MTBE use is reduced or phased out, but the oxygenate requirement remains in effect, ethanol use would likely soar, increasing demand for corn. Conversely, if the oxygenate requirement is waived by EPA or 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 might pose a potent obstacle to its passage. Reflecting these concerns, the Senate version of H.R. 4 eliminates the oxygen requirement but mandates a tripling of the use of renewable fuels such as ethanol over the next decade.

As the deadlines for state phaseout of MTBE move closer, investment decisions involving hundreds of millions of dollars hang on the regulatory framework of the post-MTBE gasoline market. Thus, pressure for congressional action on this issue has increased in the second session of the 107th Congress. Whether this pressure will produce enacted legislation is still not clear.

California and Other 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 phase-out of MTBE from gasoline in California.[45] 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.[46] (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.

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[45]See Keller, Arturo, 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 on the web at [http://www.tsrtp.ucdavis.edu/mtberpt/homepage.html].

[46]Governor Gray Davis, Executive Order D-5-99. The Executive Order and related materials can be found at: [http://www.governor.ca.gov/state/govsite/gov_homepage.jsp]. (Search "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.[47] 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.[48] More than 2 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 will be required to contain another oxygenate (most likely, ethanol) when the MTBE ban takes effect, unless Congress acts to change the oxygenate requirement.

Following California's decision to phase-out MTBE, at least 12 other states (Arizona, Colorado, Connecticut, Illinois, Iowa, Kansas, Michigan, Minnesota, Nebraska, New York, South Dakota, and Washington) have acted to limit or phase out its use. The largest of these, New York, will ban it on January 1, 2004. Maine (which is not required to use RFG, but had chosen to do so) also opted out of the RFG program in October 1998 as a result of concerns over MTBE contamination of ground water, and subsequently substituted a low-volatility gasoline to provide similar reductions in emissions of ozone-forming compounds, without requiring the use of oxygenates.

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). 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 phase-out of MTBE ordered by the Governor of California 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.[49]

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. The NAFTA requires the disputing investor to deliver a written notice of its intent to the NAFTA country involved at least 90 days before the claim is submitted to arbitration under the appropriate international arbitral rules. NAFTA also requires 6 months to elapse "since the events giving rise

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

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

[49]Methanol is a major component of MTBE and is Methanex's only product. The California market for MTBE reportedly accounts for roughly 6% of global demand for methanol.

to a claim" before the investor may proceed with arbitration. Because no settlement was reached within that timeframe, the matter has proceeded to arbitration.[50]

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, increasing 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 should provide additional information to help advance the current understanding of MTBE-related health and environmental issues and those of its potential alternatives.

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 emerge 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 the Northeast, have driven reconsideration of the petroleum industry's reliance on MTBE as the principal means of meeting RFG requirements. These developments are likely to generate continued congressional interest in the issue.

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[50]For more information, see CRS Report RS20904, *International Investor Protection: "Indirect Expropriation" Claims under NAFTA Chapter 11*.