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As a contribution to the current debate regarding what to do about MTBE, PIRINC is publishing this report, "Congressional Action to Mandate Use of MTBE In Spite of Known Risks," which addresses the legislative history of the oxygen requirement in the reformulated gasoline (RFG) program, including the regulatory history of MTBE as a fuel additive.

This report was written by Shirley Neff, who served for seven years as the economist for the U.S. Senate Committee on Energy and Natural Resources. She is currently an energy consultant and adjunct lecturer of energy policy at Columbia University. She is on the Advisory Boards of the Center for Energy Economics at the Bureau of Economic Geology, University of Texas, Austin and Goldwyn International Strategies.

In the deliberations preceding the passage of the 1990 amendments to the Clean Air Act, the Senate initially reached a compromise that provided for the setting of emissions performance standards for cleaner fuels. But ultimately, the Senate adopted an amendment proposed by farm state Senators requiring explicit reductions in toxics and the use of an oxygen additive in reformulated fuels. While the main purpose of the amendment was to expand the use of ethanol in gasoline, it was well understood at the time that it would require a significant increase in the use of MTBE. In fact, extensive debate and negotiations occurred to ensure MTBE could and would be used as well as ethanol to meet the mandate.

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Petroleum Industry Research Foundation, Inc.
3 Park Avenue • 26th Floor • New York, NY 10016-5989
Tel.: (212) 686-6470 • Fax: (212) 686-6558

Congressional Action to Mandate Use of MTBE In Spite of Known Risks

Summary

The Clean Air Amendments (CAAA) of 1990 established a rigid national standard for reformulated gasoline (RFG) that has resulted in far greater use of MTBE than would otherwise have occurred. This paper offers a brief legislative history of the oxygen requirement in the reformulated gasoline (RFG) program, including the regulatory history of MTBE as a fuel additive.[1]

In 1990, after nearly eight years of hearings and unsuccessful legislative attempts, the Congress passed sweeping amendments to the Clean Air Act.[2] A compromise, referred to as the Administration-Bipartisan Senate Clean Air Act Agreement, became the basis for Senate action in the spring of 1990.[3] Rather than accepting the performance standards for cleaner fuels in the compromise, the Senate adopted an amendment proposed by farm state Senators requiring explicit reductions in toxics and the use of an oxygen additive in reformulated fuels. While the main purpose of the amendment was to expand the use of ethanol in gasoline, it was well understood at the time that it would require a significant increase in the use of methyl tertiary butyl ether (MTBE), a gasoline additive already in use since first approved by the EPA in 1979. Just two years before passage of the Clean Air Act Amendments, the EPA raised the allowable blending limits for MTBE. In fact, extensive debate and negotiations occurred to ensure MTBE could and would be used as well as ethanol to meet the mandate.

Background

For decades, lead had been added to gasoline to increase octane to ensure more complete combustion. In 1975, catalytic converters were introduced in new automobiles to reduce emissions of nitrogen oxides (NOx) and carbon monoxide (CO). Since lead disabled the catalysts, a new unleaded gasoline formulation had to be developed. Most cars manufactured

[1] For a discussion of evolving issues regarding MTBE in recent years, see the PIRINC report entitled, **MTBE at Center Stage**, released November 2004 and available at www.pirinc.org.

[2] P.L. 101-549, "Changes to the Act in 1990 included provisions to (1) classify nonattainment areas according to the extent to which they exceed the standard, tailoring deadlines, planning, and controls to each area's status; (2) tighten auto and other mobile source emission standards; (3) require reformulated and alternative fuels in the most polluted areas; (4) revise the air toxics section, establishing a new program of technology-based standards and addressing the problem of sudden, catastrophic releases of toxics; (5) establish an acid rain control program, with a marketable allowance scheme to provide flexibility in implementation; (6) require a state-run permit program for the operation of major sources of air pollutants; (7) implement the Montreal Protocol to phase out most ozone-depleting chemicals; and (8) update the enforcement provisions so that they parallel those in other pollution control acts, including authority for EPA to assess administrative penalties." From CRS RL30853, *Clean Air Act: A Summary of the Act and Its Major Requirements*, Updated May 9, 2005.

[3] Senate Majority Leader George Mitchell (D-ME) offered the substitute on March 5, 1990 as an amendment to S. 1630. Congressional Record. 1990. 101st Cong., 2nd Sess., Vol. 136. No. 20. The measure was debated and amended over the course of the next month, then passed the Senate on April 3, 1990 by a vote of 89-11. Congressional Record. 1990. 101st Cong., 2nd Sess., Vol. 136. No. 39. The Administration referred to here was that of President George H.W. Bush (1989-1992), not that of current President George W. Bush.

before 1975 required leaded gasoline to function properly so a phase out of leaded gasoline occurred over an extended period, from 1975 to 1988, to give refiners the opportunity to develop cleaner nonleaded fuels for older cars.[4] During this period, refiners modified gasoline formulations, which included increasing use of a class of octane enhancers called aromatics[5] as well as MTBE as a substitute for lead.

Prior to the 1990 CAAA, the EPA, California Air Resources Board (CARB), as well as environmental agencies in several other states, had been pressuring refiners to develop cleaner fuels to address serious air quality problems with ground level ozone and CO. In fact, EPA and CARB were already in the midst of regulatory proceedings to set new standards. In the fall of 1989, ARCO, one of the largest gasoline refiners and marketers in California, began selling a cleaner reformulated fuel with a dramatically improved emissions profile.[6] By 1990, Shell, Marathon, Conoco and Diamond Shamrock were all selling reformulated fuels in various markets around the country. Most, if not all, of the fuel formulations included MTBE in areas in nonattainment with the National Ambient Air Quality Standard (NAAQS) for ozone and CO. In both cases the additives served as an octane enhancer and substitute for other additives (aromatics).

Ethanol use had also expanded for CO control, but was still only a small portion of that market. In spite of the fact ethanol had been receiving federal government support since the 1970's to increase the supply of domestic fuels, the market had been growing slowly.[7] Ethanol interests and farm state representatives in Congress saw the 1990 CAAA as an opportunity to expand the market for ethanol by requiring an oxygen additive in gasoline.[8]

As enacted, the 1990 CAAA included two separate oxygenated fuels provisions – oxyfuel and RFG. Oxyfuel is conventional gasoline with a minimum of 2.7% oxygen by weight used to reduce wintertime emissions of CO. Beginning in the fall of 1992, oxyfuel was required in areas that exceeded the 8-hour NAAQS limits for CO. Initially this program was the most significant

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[4] See EPA's fuels timeline at www.epa.gov/otaq/invntory/overview/solutions/milestones.htm

[5] Due to their high octane content, aromatics, including air toxics such as benzene, toluene, and xylene, were used in greater volume as lead was phased out of gasoline.

[6] *"ARCO Offers New Gasoline to Cut Up to 15% of Old Cars' Pollution,"* The New York Times, August 16, 1989. "ARCO said that in tests its new fuel for pre-1975 cars reduced evaporative emissions of smog-causing chemicals from them by 21 percent, cut carbon monoxide by 9 percent, nitrogen oxide by 5 percent and hydrocarbons by 4 percent."

[7] The Energy Information Administration website contains a timeline of issues relating to the development of ethanol. http://www.eia.doe.gov/kids/history/timelines/ethanol.html

[8] In the late 1980's as public support for high ethanol tax subsidies was waning, the industry shifted lobbying focus to promoting the environmental benefits of ethanol. The Archer Daniels Midland Company along with several major agricultural organizations coordinated a major lobbying effort in support of an ethanol amendment. "*The High Octane Ethanol Lobby*," The New York Times, April 1, 1990.

for expanding ethanol use. However, as vehicle technologies have improved and reduced emissions, the number of areas implementing the oxyfuel program has diminished from 36 in 1992 to 16 today.[9]

RFG is required in urban areas that are in nonattainment of the NAAQS limits for ozone.[10] Under the 1990 CAAA, RFG must contain at least 2% oxygen by weight and have a reduced content of benzene and other aromatic compounds. Effective in January of 1995, RFG had to be introduced in the nine areas of the United States with the worst ozone levels. Other areas may opt-in to the RFG program as part of a State Implementation Plan (SIP) under the Clean Air Act.

Clean Air Act Debate

After considerable contentious wrangling over amendments to the Clean Air Act in the Senate in 1989 and early in 1990, Majority Leader George Mitchell (D-ME) tabled a substitute proposal, the Administration-Bipartisan Senate Clean Air Act Agreement, for consideration by the full Senate in March of 1990. The Mitchell compromise was sponsored by a bipartisan group of 18 Senators and supported by the Administration (President George H.W. Bush). The substitute, as proposed, would have required EPA to promulgate new RFG performance standards to reduce toxics and to lower the volatility of gasoline in order to reduce ground level ozone in nonattainment areas.

Prior to Senate floor consideration, Senators Thomas Daschle (D-SD) and Robert Dole (R-KS) indicated their intention to offer an amendment to set explicit targets to reduce aromatics and to require a minimum oxygen standard for reformulated fuels sold in the nine most severe ozone nonattainment areas.[11] The standard would have to be met by blending gasoline with a fuel additive classified as an oxygenate, with ethanol and MTBE accepted as the expected options.[12] The rationale given by the sponsors was that under the amendment toxic aromatics would be replaced with more environmentally benign alternatives. Furious lobbying by agricultural and

[9] See Congressional Research Service (CRS) Report RL 31361, "*'Boutique Fuels' and Reformulated Gasoline: Harmonization of Fuel Standards*", December 17, 2004. Hereafter referred to as "CRS Boutique Fuels."

[10] Ozone is formed in the atmosphere by the interaction of volatile organic compounds (VOCs) and nitrogen oxides (NOx) in the presence of sunlight. The control of ozone is based on regulating those emissions and, more specifically, controlling the Reid Vapor Pressure (RVP) of fuels. For a more detailed discussion of the requirements under the RFG program see CRS Boutique Fuels, ibid.

[11] Initially, the proposal for RFG was to cover all areas in ozone nonattainment, approximately 100 cities. By the time the amendment was offered on the floor it had been scaled back to the nine most severe ozone nonattainment areas - Los Angeles, San Diego, Chicago, Houston, Milwaukee, Baltimore, Philadelphia, Hartford, and New York City.

[12] The other possible oxygenates, TAME (tertiary amyl methyl ether), ETBE (ethyl tertiary butyl ether), and DIPE (di-iso propyl ether) are all ethers with the same properties as MTBE with respect to water contamination. TBA (tertiary butyl ether) is used to produce MTBE and only available in small quantities.

ethanol interests in support of the Daschle-Dole amendment ensued for months prior to Senate floor action.[13]

At the time, the petroleum industry was in the midst of an extensive joint study with the major automobile manufacturers and had just begun testing a range of different reformulated fuels.[14] The industry and its supporters in the Senate argued that those tests should be carried out and used to inform a rulemaking by the EPA to set performance criteria for reformulated fuels as prescribed in the Administration-Bipartisan agreement. The American Petroleum Institute (API) adamantly opposed the amendment describing it as "an arbitrary, untested recipe for reformulating gasoline." API argued that the amendment would "make it impossible to continue providing existing reformulated gasolines that have helped reduce air pollution in areas such as southern California," citing the ARCO EC-1 formulation which only used 1% oxygenate (MTBE).[15]

By the time the floor debate actually took place, the sponsors of the Daschle-Dole[16] amendment claimed the endorsement of a wide range of organizations, specifically the National Governors Association, the National Clean Air Coalition, California Air Resources Board, the Sierra Club, Citizen Action, the Renewable Fuels Association, the National Corn Growers Association, Renew America, Farm Bureau Federal, SAFER (safer air through fuel enhancement, reformulation and reforestation), National Farmers Union, National Farmers Organization, Arizonans for Clean Air Now, the Idaho Ethanol Fuel Association, and the Clean Fuels Development Coalition.[17]

The proposal was described by its proponents as a "clean octane" amendment that would reduce the use of toxic aromatics to enhance octane. The amendment established the following parameters: no more than 25-volume percent aromatics hydrocarbons (including no more than 1.0-volume percent benzene); a 15-percent reduction in ozone-forming emissions as compared to a similar automobile fueled by conventional gasoline; and an oxygen content of at least 2.7-

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[13] See Footnote 8.

[14] "*Fuels for Tomorrow*", Oil and Gas Journal, June 18, 1990.

[15] "*Senate passes Clean Air Act amendments*", Oil and Gas Journal, April 9, 1990.

[16] The Daschle-Dole amendments cosponsors were Harkin (D-IA), McClure (R-ID), Dixon (D-IL), Durenberger (R-MN), Grassley (R-IA), Simon (D-IL), Exon (D-NB), Kerrey (D-NB), Burns (R-MT), Conrad (D-ND), Wirth (D-CO), Leahy (D-VT), and Pressler (R-SD). Congressional Record. 1990. 101st Cong., 2nd Sess., Vol. 136. No. 36, hereafter referred to as "C.R. March 29, 1990".

[17] The Sierra Club and Citizen Action, two environmental organizations, were primarily concerned about reducing toxic aromatics in gasoline and, along with other environmental organizations, later opposed efforts to bias fuel decisions in favor of ethanol. In October of 1992, President Bush overruled an EPA decision to limit the RVP for fuels blended with ethanol in severe ozone areas. The Sierra Club objected to the changes; see "*Ethanol Exemption Isn't Helpful*", Chicago Sun-Times, October 4, 1992.

volume percent. The aromatics and oxygen content requirements would be phased in over 5 and 3 years, respectively.[18]

During the floor debate, Senator Daschle argued, "Further steps can and should be taken to stipulate what the reformulated gasoline should look like…. Such a standard would allow refiners flexibility in making gasoline, while ensuring that one poison is not replaced by another--an unfortunate and unintended result of lead phaseout." He and the other cosponsors argued extensively that the amendment was not specific to any particular oxygenate citing the fact there were "11 EPA-approved octane-enhancers that can be used to replace aromatics, including MTBE, ETBE, ethanol and other oxygenates. The ethers, especially MTBE and ETBE, are expected to be major components of meeting a clean octane program."[19]

During the debate, Senator Daschle claimed the amendment "does not lock refiners into any particular fuel composition. Refiners can decide how they want to get octane without using the toxic aromatics. They can decide how to achieve the oxygen standard. Specifications should be avoided, and a general percentage reduction approach should be adopted."[20] However, the amendment specifically required that aromatics were to be reduced by using an oxygenate.

Even with an oxygen requirement, ethanol was not likely to be used in most RFG areas due to logistical and cost issues. It was well understood that ethanol's high affinity for absorbing water would prevent shipment through pipelines, the most common and economic form of fuel transportation. In order to avoid contamination, ethanol would have to be transported by barge or rail car then added near the end of the distribution chain. Separate transportation, storage and blending facilities would have to be built to accommodate ethanol use as an oxygenate. (With the exception of Chicago and Milwaukee, the areas in non-attainment for ozone were in coastal areas a considerable distance from Midwestern ethanol supplies.)

Senator Bennett Johnston (D-LA), Chairman of the Energy and Natural Resources Committee, argued the amendment was overly prescriptive. The agreement under the Mitchell proposal was that "performance standards be set covering total mobile source emissions, including tailpipe, evaporative and running loss emissions, thereby allowing the refiners and automobile scientists and engineers, overseen by EPA and DOE technical experts, to develop the most cost-effective approach to achieve this result." He specifically argued that the amendment would limit

[18] Amendment no. 1423. C.R. March 29, 1990 at p. S3561.

[19] C.R. March 29, 1990 at p. S3510.

[20] C.R. March 29, 1990 at p. S3512.

flexibility, noting that alkylates, a high octane, low RVP additive could not be used in reformulated gasoline if the amendment were adopted.[21]

Efforts by the bill managers to oppose the amendment arguing it was a "deal breaker" were undercut by a letter from the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO).[22] States, especially in the northeast, had been seeking new federal standards to address regional air quality problems for a number of years. While not speaking to the oxygen standard the STAPPA/ALAPCO letter raised concerns that "the agreement[23] sets an unambitious performance standard…The requirements to reduce toxic emissions from motor vehicles are substantially weakened." The proponents of the Daschle-Dole amendment carefully played to state concerns with respect to the ultimate emissions reduction standards and giving EPA too much flexibility.

Oxygenates: MTBE versus ethanol

Senators from the farm states were the major proponents of the amendment; however, others took an active part in the debate and negotiations to be certain MTBE, not just ethanol, could be used in their states. During earlier debate on the oxyfuel provision, Senator Frank Lautenberg (D-NJ) argued against a 3.1 percentage requirement for oxygen as an ethanol only option, "There is one provision in the bill which I do strongly oppose. This concerns the mandatory use of gasohol as an oxygenated fuel within carbon monoxide nonattainment areas…. While the use of gasohol can result in the reduction of carbon monoxide levels, its increased volatility can also contribute to the ozone problem faced by many communities." Senator Lautenberg also objected to the impact on the highway trust fund due to gasohol's exemption from tax. "By setting a minimum oxygen content of fuels during winter months at 2.7 percent, other fuels, such as methyl-tertiary-butyl-ether [MTBE], could be used in nonattainment areas. MTBE is not exempt from the gas tax, and therefore does not have the draining impact on public transportation and highway spending. Importantly, while providing virtually the same carbon monoxide reduction benefits as gasohol, MTBE also can reduce hydrocarbons, and does not contribute to the ozone problem."[24]

Emission concerns related to use of ethanol in ozone non-attainment areas

[21] CR March 29, 1990. (p. S3522) The oil industry is currently considering alkylates as an octane replacement for MTBE if the oxygen mandate is removed.

[22] Congressional Record. 1990. 101st Cong., 2nd Sess., Vol. 136. No. 21. (p. S2162 –S2165)

[23] Refers to the Administration-Bipartisan Senate Clean Air Act Agreement relative to earlier versions of the bill.

[24] Congressional Record. 1990. 101st Cong., 2nd Sess., Vol. 136. No. 2. (p. S218)

Concerns about the negative ozone implications of splash blending ethanol were dismissed by sponsors of the amendment in spite of known EPA concerns.[25] At the time, EPA was carefully reviewing the air quality implications of allowing additional flexibility in the RVP standard in order to accommodate ethanol in Southern California. While EPA was concerned about diminishing the market for ethanol, it was already headed toward disallowing its use in the South Coast Air Basin for air quality reasons.[26] Senator Daschle responded by declaring that "[E]ven if splash blended ethanol did cause more evaporative emissions--an admission I am not willing to make--it cannot increase ozone under terms of this amendment. This amendment requires a 15 percent reduction in ozone forming emissions. If splash blended ethanol causes more NOx, and therefore ozone, it cannot be used."[27] The statement acknowledged that EPA might determine ethanol were not an acceptable additive in certain areas, thereby leaving MTBE or another ether as the only option.

Competition within the oil industry

While ARCO was a member of the API and was on record opposing the oxygenate amendment, it was actively touting the benefits of EC-1, its new reformulated fuel. ARCO had a vested interest in expanding use of MTBE since ARCO Chemical was the largest producer of MTBE in the U.S. and controlled about 40% of the global production.[28] In support of the Daschle-Dole amendment, the proponents cited the analysis of William Piel, a scientist with ARCO Chemical, who claimed that high levels of aromatics in gasoline undermined the functioning of an automobile's catalytic converter.[29] Further, the proponents cited the fact ARCO and others were

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[25] Senator John Breaux (D-LA) cited analyses by EPA that the evaporation of ethanol fuel as it is loaded into the vehicle could increase VOC's by 13%. Congressional Record, March 29, 1990 at p. S3516. A February 2005 draft staff report for the California Air Resources Board, "*A Summary Of The Staff's Assessment Regarding The Effect Of Ethanol In California Gasoline On Emissions*", found significant concerns with evaporative emissions of ethanol after the state banned the use of MTBE effective in 2004. "The presence of ethanol in gasoline results in a significant increase in the permeation of gasoline constituents through a motor vehicle's fuel system soft components. This increases evaporative hydrocarbon emissions by about 45 tons per day (tpd) on a typical ozone day or 75 tpd on a high-ozone day from on-road motor vehicles statewide in 2004. 3 percent higher NOx emissions than a non-oxygenated CaRFG3." http://www.arb.ca.gov/fuels/gasoline/meeting/2005/030105etohrpt.pdf Hereafter referred to as "CARB 2005 Staff Report."

[26] In order to accommodate the higher volatility of ethanol, EPA generally granted a one pound (psi) waiver of the RVP requirements. "As discussed above under the proposed Oxygenated Fuels Program, EPA allows a one psi increase in RVP from the summer volatility standards for ethanol blends. Since this allowance could potentially decrease the VOC benefit to be obtained from the further reduction in the RVP standards proposed here, EPA is proposing to discontinue the one psi summertime RVP exemption for ethanol blends in the South Coast Air Basin." *Environmental Protection Agency, Approval and Promulgation of Implementation Plans; California (South Coast Air Basin); Plans for Ozone and Carbon Monoxide, Notice of Proposed Rulemaking and Notice of Public Hearing*, September 5, 1990, at 55 FR 36458. See also CARB 2005 Staff Report.

[27] C.R. March 29, 1990 (p. S3512)

[28] "*Shortage of Additive Limits Clean Gasoline*," Thomas C. Hayes, The New York Times, April 18, 1990. Arco Chemical was also the original petitioner seeking a tax break for production of ETBE.

[29] In an article published in the Oil and Gas Journal, December 4, 1989, ARCO scientist William Piel cited data that indicated gasoline containing more than 25-percent aromatics content results in dramatically increased levels of carbon monoxide [CO], hydrocarbons [HC] and nitrogen oxides [NOx].

selling such fuels for only a few pennies more than other fuels in response to industry claims that "clean octane" fuels would be too expensive.[30] However, the reformulated fuels then being sold in the market used only about 1% oxygen, well below the requirement ultimately included in the CAAA.

Final Agreement On An Oxygenate Mandate

The successful adoption of the oxygenate amendment in the Senate was a foregone conclusion before the floor debate. Between the aggressive support from the agricultural sector and broader concerns on the part of the environmental community and state air officials with respect to giving too much discretion to EPA, the Senate amendment was overwhelming adopted by a vote of 69 to 30. The House counterpart amendment was accepted on a voice vote.[31] The House-Senate conference committee spent the summer of 1990 locked in contentious negotiations on a final bill.

In late September, President George H.W. Bush sent a letter to the conference committee with a comprehensive proposal as a compromise. The Administration's compromise on fuels endorsed a "[M]odified Senate reformulated gasoline program to include: (1) a 15 percent reduction in VOC and toxic emissions, as defined in the Senate bill; (2) a minimum 2 percent oxygenate requirement; and (3) a general equivalency program starting in 1993, with full phase-in by 1995."[32]

Known Problems with MTBE Prior To Passage Of the Oxygenate Mandate

The EPA had been regulating and monitoring MTBE as an additive in gasoline for well over a decade prior to passage of the 1990 CAAA. EPA had reviewed and approved use of MTBE several times as a fuel additive. In 1979, EPA authorized blending up to 7% MTBE in gasoline. Then, in 1988, the allowable MTBE volume was expanded to 15%.[33]

While the air quality benefits were acknowledged and accepted by EPA, potential problems with MTBE contamination of groundwater were also well known. Various instances of groundwater contamination in Maine, North Caroline, New Jersey and New Hampshire had raised concerns as

[30] C.R. March 29, 1990 (p. S3512)

31 A House counterpart, the Richardson-Madigan Amendment, required that the ozone-forming potential of the gasoline be reduced by 15%, and establishes minimum oxygen content (2.7%) and maximum aromatic content (25%) limits for the fuel. The requirement was to be effective in 1994. The amendment was included in a package of amendments offered to House Bill 3030 en bloc by Mr. Dingle, the Chairman of the Energy and Commerce Committee, on May 23, 1990.

[32] The letter dated September 29, 1990 was addressed to Senators Max Baucus and John H. Chafee and Representatives John D. Dingell and Norman F. Lent.

[33] 44 FR 12242 (March 6, 1979) and 53 FR 33946 (September 1, 1988).

to the potential for contamination of drinking water supplies.[34] In 1986, MTBE was added to the priority list for health effects under the Toxic Substances Control Act (TSCA).[35] It was well known by EPA that MTBE's properties as an ether made it more soluble in water and more difficult to remove once contamination occurred. As recently as 1988, EPA had added MTBE to the Drinking Water Priority List (DWPL) under the Safe Drinking Water Act.[36] Then nine months after identifying MTBE as "a high-risk-chemical for contamination of drinking water supplies and their sources" EPA approved an expansion of up to 15% MTBE blends in gasoline.[37]

A major cause for MTBE contamination of groundwater, leaking underground storage tanks, had already been recognized by the Congress and the EPA as a serious environmental problem. In 1984, Congress amended the Resource Conservation and Recovery Act (RCRA) to require new underground storage tanks installed as of 1988 to meet stricter standards, older tanks had another ten years to be upgraded or replaced. The extent of the problem was so serious that two years

[34] "North Carolina authorities have found MTBE in ground water in test wells along the Cape Fear River (Ref. 18, Taylor, 1986) at concentrations of 0.18 to 3.0 parts per million. This ground water contamination is probably due to spills during transfer of gasoline from seagoing tankers to onshore storage facilities. The largest environmental release sources appear to be through fugitive emissions at gasoline terminals and service stations where distribution to and dilution in the atmosphere will be strongly dependent on local conditions….Persistence in ground water following spills is unknown, but it may persist for long periods if volatilization is prevented, since MTBE is not likely to be readily biodegraded or otherwise transformed in ground water." *EPA Notice. Nineteenth Report of the Interagency Testing Committee to the Administrator; Receipt and Request for Comments Regarding Priority List of Chemicals, November 14, 1986 (51 FR 41417)* Hereafter referred to as "TSCA Listing."

"EPA has an additional concern about MTBE contamination of ground water. Although only a few cases of ground water contamination are currently documented, the rapid growth in production, transport, and use of MTBE will probably contribute to an increase in incidents of contamination….MTBE is relatively water soluble (40,000 to 51,260 mg/L) compared to other gasoline components (Ref. 1). This solubility, coupled with the fact that an estimated 35 percent of the approximately 638,000 non-farm underground motor fuel tanks would not pass the EPA tightness test, indicates the potential ground water contamination problem (Ref. 1)."
"The largest identified population affected by MTBE-contaminated water was Rockaway Township in New Jersey, population 20,000 (Ref. 6). The level of MTBE contamination in the township wells ranged from 25 to 40 ppb and required aeration treatment before delivery to the township's residents. EPA has received requests for information on MTBE as a result of other well water contamination reports in New Jersey and New Hampshire (Ref. 7). A leaking underground storage tank in a rural area of Maine has contaminated household wells in the vicinity with MTBE concentrations as high as 690 ppb (Ref. 8). Maine and New Jersey have set a maximum contaminant level of 50 ppb for MTBE (Refs. 6 and 8)." *EPA Testing Consent Order on Methyl Tert-Butyl Ether and Response to the Interagency Testing Committee.* March 31, 1988. (53 FR 10391) Hereafter referred to as "MTBE Testing".

[35] See TSCA Listing, ibid.

[36] "EPA is adding methyl-tertiary butyl ether (MTBE) to the first DWPL (Drinking Water Priority List.). This substance was not included in the July 1987 notice. However, the Agency has recently identified MTBE as a high-risk-chemical for contamination of drinking water supplies and their sources. MTBE is used widely as a gasoline component, and as such is stored, transported, and used all over the country. MTBE has been detected in a number of groundwaters, probably as a result of leaking underground storage tanks, disposal facilities, or spills. Manufacturers of MTBE have initiated a battery of toxicological evaluations for MTBE. Because of the potential for widespread contamination, EPA is listing MTBE on the first DWPL." *EPA Notice of substituted contaminants and first Drinking Water Priority List.* (53 FR 1892, January 22, 1988.) Hereafter referred to as "DWPL Listing".

[37] See DWPL Listing, ibid.

later in 1986, Congress set up the Leaking Underground Storage Tank (LUST) Trust Fund.[38] EPA had specifically identified concerns with the condition of underground storage tanks, 35% of which would not pass EPA tests, as a source of MTBE contamination as recently as 1988.[39] Yet, at the time the 1990 CAAA amendments were being considered, remediation and replacement of older tanks was just beginning.

Conclusion

The oxygenate requirement in the RFG program was proposed as a "clean octane" amendment to reduce the use of toxic additives in gasoline. The amendment, proposed by farm state Senators, required the toxic reductions be achieved by adding an oxygenate to RFG. The oxygenate standard was intended as a mechanism to guarantee an expanded market for ethanol.

The petroleum industry, which was engaged in studies with the auto industry to develop and test new clean fuel formulations, actively opposed the amendment. Several petroleum companies were already marketing clean fuels in various U.S. markets. The clean reformulated fuels then being sold in the marketplace had lower levels of toxics and VOCs with a much lower oxygenate component then under consideration in the 1990 CAAA. The petroleum industry argued against the amendment as overly prescriptive and limiting.

State air regulation officials and Senators from coastal regions with severe ozone problems argued for greater flexibility under the program to ensure MTBE could be used in lieu of ethanol to minimize ozone problems. The sponsors of the amendment, while refusing to concede any increased ozone problems related to ethanol use, acknowledged that MTBE would be extensively used to meet the standard.

EPA had raised environmental concerns about both ethanol and MTBE. Evaporative emissions from ethanol were a concern with respect to ozone problems. The water solubility of MTBE had been recognized as a potential groundwater contamination especially from leaking underground storage tanks. Yet, in the end, the 1990 CAAA included an oxygen mandate in the RFG program. The provision, originally intended to require greater use of ethanol, resulted in a significant expansion of MTBE beyond what would otherwise have occurred.

[38] For a more detailed discussion see CRS Report for Congress, *Leaking Underground Storage Tanks: Program Status and Issues*, RS21201, March 16, 2004.

[39] (51 FR 41417, November 14, 1986) and (53 FR 1892, January 22, 1988.)