

MTBE: A PRECAUTIONARY TALE

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In the 1980s and 1990s, methyl tertiary-butyl ether ("MTBE") became the petroleum industry's gasoline additive of choice to replace tetra-ethyl lead. MTBE fuel blends were viewed as an environmental boon; MTBE significantly reduces emissions of smog-producing air pollutants and can be produced relatively cheaply. Yet by the end of the 1990s, MTBE had leaked from tens of thousands of underground storage tanks across the country, polluting groundwater and precipitating a large-scale environmental crisis. This Article explores the spectacular rise and fall of MTBE as a case study in regulatory failure. The Article reviews five critical decision points at which EPA or Congress could have either prevented the MTBE crisis or greatly reduced its severity. Drawing on this history, the Article then explores the explanatory power of eight prominent theories of regulation and regulatory failure and the lessons that can be learned from the MTBE crisis. Similar environmental regulatory disasters may be averted if environmental regulation takes a more multi-media approach, involves broader participation by affected interests, is less deferential to the narrow economic concerns of regulated parties, and generally adopts a more precautionary approach to critical decisions.

I. INTRODUCTION

On March 14, 1990, *Chemical Week* declared methyl tertiary-butyl ether ("MTBE") to be "the fastest-growing chemical in the world."¹ Not only was MTBE the petroleum industry's additive of choice for replacing tetra-ethyl lead for preventing engine "knocking," some companies were beginning to use it to produce "environmentally friendly" fuel blends that were capable of reducing emissions of smog-producing air pollutants. Overlooked in the industry's enthusiasm for MTBE was the unsettling fact that MTBE, a notoriously malodorous chemical, was turning up with increasing frequency in groundwater in the vicinity of underground storage tanks throughout the country. Nine years later, on March 25, 1999, California Governor Gray Davis issued an Executive Order banning MTBE from California gasoline.² Soon thereafter, a finding by a California jury

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¹ *Dramatic Gains for MTBE*, CHEMICAL WK., Mar. 14, 1990, at 50 (quoting energy consultant DeWitt & Co.).

² Cal. Exec. Order No. D-5-99 (Mar. 25, 1999) (on file with the Harvard Environmental Law Review). After the federal Environmental Protection Agency ("EPA") denied California's request for a waiver from federal requirements for "reformulated gasoline," the state challenged that denial, and the Ninth Circuit Court of Appeals set the EPA action aside as arbitrary and capricious. *Davis v. EPA*, 348 F.3d 772 (9th Cir. 2003). In early

that several oil companies were liable for contaminating the water supply of Lake Tahoe led to a \$69 million settlement, and another group of oil companies tentatively agreed to pay the City of Santa Monica \$30 million in damages and spend more than \$200 million for a new water treatment plant.³ Similar lawsuits are pending throughout the country, and fifteen other states have banned MTBE from gasoline.⁴ On July 22, 2003, the *Houston Chronicle* reported that one of the largest manufacturers of MTBE had filed for bankruptcy protection.⁵

The spectacular rise and fall of MTBE is a fascinating story for many reasons, not the least of which is the role that the federal government played in bringing about the enormous growth in its use and in causing the widespread environmental contamination that resulted from that growth. At the same time that MTBE was easing the transition away from tetra-ethyl lead and helping states attain the national ambient air quality standards ("NAAQS") for photochemical oxidants in some of the most heavily polluted areas of the country, it was silently polluting the groundwater feeding the aquifers used by cities throughout the country for their drinking water. Indeed, if taking the lead out of gasoline is a striking example of the virtues of the modern environmental regulatory regime, the addition of MTBE to gasoline in full view of a powerful regulatory agency armed with multiple authorities designed to prevent the kind of environmental damage that MTBE is now causing throughout the country represents one of its most striking failures.

This Article will explore how MTBE has become a poster child for regulatory failure and use that history to probe the explanatory power of several prominent theories of regulatory success and failure. It will first describe MTBE and the important impacts that it has had on air and groundwater quality. This description will focus on the unique properties of MTBE that make it valuable as a gasoline additive and make its use problematic in a product that must be stored in underground tanks. It will also explain how underground storage tank systems ("USTS") work and how they can easily spring leaks that allow their contents to flow into surrounding soil and groundwater.

April 2004, Secretary of Energy Spencer Abraham told Congress that the Bush Administration was "seriously" considering the remanded waiver requests. Elizabeth Douglass, *Oil and Gasoline Futures Tumble*, L.A. TIMES, Apr. 2, 2004, at C3.

³ Richard Simon, *Trying Their Case in Congress*, L.A. TIMES, May 18, 2003, at A1.

⁴ Currently California, Colorado, Connecticut, Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, New York, Ohio, South Dakota, and Washington have banned the use of MTBE in gasoline. Energy Information Administration, *Status and Impact of State MTBE Bans*, at <http://www.eia.doe.gov/oiaf/service/pt/mtbeban/> (last modified Mar. 27, 2003) (on file with the Harvard Environmental Law Review).

⁵ Nelson Antosh, *Declining MTBE Sales Claim Two Local Victims*, HOUSTON CHRON., July 22, 2003, at B1. Another major MTBE plant in the Houston area closed down in early September 2003. Michael Davis, *Company to End Plant's MTBE Production*, HOUSTON CHRON., Sept. 6, 2003, at B2.

The Article will next focus on the role that federal environmental regulation has played in bringing about and limiting the current MTBE crisis. It will examine five critical points at which a different decision by either EPA or Congress could have either prevented the crisis or greatly reduced its severity: the 1979 decision to phase tetra-ethyl lead out of gasoline, the 1979 decision to grant a fuel additive waiver to MTBE, the 1988 decision to impose limited toxicity testing requirements on manufacturers of MTBE, the 1988 decision to promulgate standards for new and upgraded storage tank and leak detection systems, and the 1990 decision to require the use of reformulated gasoline in heavily polluted ozone nonattainment areas. The federal government has made many critical decisions since 1990, but these five decision-making points were the most critical in bringing about the current MTBE problem.

Finally, the Article will explore the explanations offered by eight possible theories of regulation and "regulatory failure" for why the MTBE crisis came about despite an array of comprehensive federal regulatory programs intended to prevent environmental harm. The "perversity thesis" suggests that the MTBE problem may have been an unanticipated result of the decision to remove tetra-ethyl lead from gasoline or the decision to force refiners to make reformulated gasoline. A multi-media focus on environmental regulation suggests a failure to consider the consequences on groundwater of actions designed to protect air quality. Advocates of "sound science" suggest that the problem lies in EPA's failure to use the best available science at the important decision points. The "synoptic approach" suggests a failure to consider costs and benefits carefully at those points. The "agency capture" theory posits overly heavy reliance by EPA on the petroleum refiners and marketers for technical information and solutions. A related "failure of the watchdog" theory suggests that environmental groups and representatives of drinking water suppliers should have been more attentive to EPA's activities. Another possibility is that the underlying laws are crafted in ways that provide incentives to regulated industries to remain ignorant of the risks of their products and activities and to manufacture uncertainty when information indicating their hazardous nature becomes available. The "precautionary approach" suggests that the MTBE crisis resulted from EPA's failure to "err on the side of safety" at critical decision points.

With the help of these eight theories, the Article will ask what lessons the MTBE history has to offer future policymakers who would emulate MTBE's regulatory successes but avoid its regulatory failures. Although many of the theories have some explanatory power, the MTBE story strongly suggests that environmental regulation will be more effective if it adopts a broader multi-media view, encourages broader participation by affected interests, is less deferential to the narrow economic concerns of the regulated interests, and generally adopts a more precautionary approach to critical decisions.

II. THE CURRENT MTBE PROBLEM

A. *MTBE Characteristics and Use*

Methyl Tertiary-butyl Ether ("MTBE") is a widely used gasoline additive.⁶ Chemically, MTBE is an ether that is manufactured by combining methanol (wood alcohol) with isobutylene (a by-product of the petroleum refining process).⁷ Gasoline refining companies have added MTBE to their products for three major purposes. First, some refining companies have since the late 1970s blended MTBE into mid- and high-grade gasoline (at levels of 3–7% by volume) instead of tetra-ethyl lead to enhance octane and thereby prevent engine knocking and resulting performance loss.⁸ Although this was its primary use for a decade, less than 5% of the MTBE currently manufactured is used to enhance octane.⁹ Second, in the late 1980s, petroleum companies began to blend MTBE into gasoline (at levels of 11–15% by volume) to meet state and federal winter oxygenate requirements for a limited number of areas that have not attained the NAAQS for carbon monoxide.¹⁰ In more recent years, MTBE has been replaced

⁶ Methyl Tertiary-Butyl Ether (MTBE); Advance Notice of Intent to Initiate Rule-making Under the Toxic Substances Control Act to Eliminate or Limit the Use of MTBE as a Fuel Additive in Gasoline, 65 Fed. Reg. 16,094, 16,095 (Mar. 24, 2000) [hereinafter MTBE Advance Notice of Intent].

⁷ *Id.* at 16,096. Methanol is reacted with isobutylene in the liquid phase over a sulfonated resin catalyst. The process consists of a fixed-bed reactor with cooling to remove the heat of reaction. *Chemicals Will Ease Octane Pinch*, CHEMICAL WK., Apr. 11, 1979, at 43.

⁸ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,097. Octane is a measure of gasoline's resistance to uncontrolled combustion, which produces engine knock. *Id.* During the 1970s, tetra-ethyl lead was added to virtually all gasoline marketed in the U.S. to allow engines to use higher compression ratios and thereby conserve fuel without "knocking" when the highly compressed fuel exploded prematurely in the cylinder instead of burning evenly. *Unleaded Petrol*, ECONOMIST, Jan. 27, 1979, at 76. Because it is critical to the ability of automobiles to operate properly, this characteristic, referred to in the industry as "octane" rating, was and is in fact the primary performance characteristic considered by refiners in the production of gasoline. ENVIRONMENTAL PROTECTION AGENCY, REP. NO. 420-R-99-021, ACHIEVING CLEAN AIR AND CLEAN WATER: THE REPORT OF THE BLUE RIBBON PANEL ON OXYGENATES IN GASOLINE 27 n.36 (1999) [hereinafter EPA BLUE RIBBON PANEL REPORT], available at <http://www.epa.gov/oms/consumer/fuels/oxypanel/r99021.pdf>.

⁹ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,097.

¹⁰ *Id.* at 16,096; ARTURO KELLER ET AL., HEALTH & ENVIRONMENTAL ASSESSMENT OF MTBE: REPORT TO THE GOVERNOR AND LEGISLATURE OF THE STATE OF CALIFORNIA AS SPONSORED BY SB 521, at 15 (1998) (on file with the Harvard Environmental Law Review). Oxygenates are typically alcohols or ethers. *Id.* at 15. The primary purpose for adding them to gasoline is to "promote more efficient combustion under adverse conditions in the engine, such as cold starts or fuel-rich operations," when fuel would otherwise escape the engine unburned. *Id.* The extra oxygen in oxygenated fuels helps ensure that the engine produces carbon dioxide instead of carbon monoxide, a toxic product of incomplete combustion. *Id.* To a lesser extent, oxygenates can help in the conversion of hydrocarbons in gasoline to carbon dioxide and water. *Id.* Gasoline with very high levels of oxygenates (10–15%), called "oxyfuels," can help reduce emissions of carbon dioxide from automobiles in the winter months when cold starts in some areas of the country contribute to high ambient concentrations of carbon monoxide. *Id.*

with ethanol in almost all of the winter oxygenate programs.¹¹ Third, refiners have used MTBE (at levels of about 11% by volume) to meet the requirements of the 1990 Clean Air Act Amendments for reformulated gasoline (“RFG”) in the ten large metropolitan areas with the most severe summertime photochemical oxidant (ozone) levels.¹² In 2000, more than 30% of the gasoline sold in the U.S. was reformulated, and about 87% of that gasoline contained MTBE.¹³

The winter oxygenate and RFG programs have resulted in significant increases in air quality in parts of the country that badly need improvement.¹⁴ The future air quality benefits of MTBE are, however, open to debate. Although MTBE was instrumental in bringing twenty-seven of the thirty-six carbon monoxide areas implementing the winter oxygenate Wintertime Oxyfuel program into attainment of the NAAQS between 1992 and 1999, only two of the remaining areas employed MTBE in 2000, and one of those areas was in the process of phasing it out.¹⁵ Reformulated gasoline containing MTBE has in the past produced dramatic reductions in emissions of benzene, a known human carcinogen,¹⁶ and it has achieved significant reductions in emissions of carbon monoxide, volatile organic compounds (“VOCs”), and oxides of nitrogen (“NOx”) emissions.¹⁷ Because of improvements in motor vehicle technologies, however, the impact of reformulated gasoline on auto emissions is open to question. Some scientists have concluded that oxygenates like MTBE no longer have a significant effect on exhaust emissions from modern vehicles.¹⁸ Although

¹¹ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,097.

¹² *Id.* at 16,096–97. The ten “severe” and above areas include Baltimore, Chicago, Hartford, Houston, Los Angeles, Milwaukee, New York, Philadelphia, Sacramento, and San Diego. In addition, seventeen states and the District of Columbia voluntarily participate in the RFG program. *Id.* California has enacted separate, and somewhat more restrictive, requirements for “Phase II” reformulated gasoline. KELLER ET AL., *supra* note 10, at 11.

¹³ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,097.

¹⁴ A special Blue Ribbon Panel assembled by EPA in 1998 to evaluate the use of oxygenates in gasoline concluded that reformulated gasoline, more than 85% of which contained MTBE, “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.” EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 1; *see also* KELLER ET AL., *supra* note 10, at 19 (finding “strong evidence” of “significant air quality benefits” associated with the use of reformulated gasoline).

¹⁵ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 33. Los Angeles has phased out the use of MTBE in order to comply with the statewide ban in California. Elizabeth Douglass, *Oil and Gasoline Futures Tumble*, L.A. TIMES, Apr. 2, 2004, at C3.

¹⁶ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 22; KELLER ET AL., *supra* note 10, at 11.

¹⁷ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 1 (finding “evidence from the existing program that increased use of oxygenates results in reduced carbon monoxide emissions, and it appears that additives contribute to reductions in aromatics in fuels and related air benefits”); KELLER ET AL., *supra* note 10, at 11, 17–18.

¹⁸ KELLER ET AL., *supra* note 10, at 11 (finding “there is no significant additional air quality benefit to the use of oxygenates such as MTBE in reformulated gasoline, relative to

MTBE will still improve emissions from older vehicles, this benefit will become moot as older vehicles are phased out of use.

The expanded use of MTBE as a gasoline additive in the 1990s and the deteriorating state of America's sixty-year-old infrastructure of USTS for gasoline combined to yield an MTBE groundwater crisis by the end of the 1990s when studies had documented "the widespread detection of MTBE in the nation's water supplies."¹⁹ The United States Geological Survey ("USGS") in 1999 reported a 27% incidence of MTBE-contaminated groundwater in urban areas where MTBE was used substantially.²⁰ A 1999 EPA Blue Ribbon Panel reported that between 5 and 10% of community drinking water supplies in high MTBE-use areas contained detectable amounts of MTBE.²¹ Because of the "inadequacy of long-term monitoring data," however, the "extent and trends" of groundwater contamination in the country are "still not well known."²²

Several well-publicized incidents involving MTBE contamination of municipal drinking water supplies have increased public awareness of the MTBE problem. In one of the most highly publicized incidents, the City of Santa Monica, California in 1995 discovered MTBE in water drawn from one of the two wellfields that supplied 50% of the city's drinking water. After MTBE levels rose dramatically during the following year, the City closed all five of its wells drawing water from that wellfield.²³ Later investigations discovered MTBE in the second wellfield in a separate aquifer that was likewise contaminated by MTBE from a different leaking underground storage tank.²⁴

In a highly publicized report, the state of Maryland reported that it had detected MTBE in 100 of more than 1200 water systems that it had tested.²⁵ More recent reports of school children in Roselawn, Indiana consuming water contaminated with nearly 10 times the EPA-recommended level for MTBE have kept the additive in the public eye.²⁶

The petroleum industry, however, takes the position that the magnitude of the groundwater contamination caused by MTBE from leaking USTS has been exceedingly modest. Since only a small number of retail

alternative . . . non-oxygenated formulations").

¹⁹ MTBE Advance Notice of Intent, 65 Fed. Reg. 16,094, 16,098 (Mar. 24, 2000).

²⁰ *Id.* at 16,099.

²¹ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 1.

²² *Id.* at 14.

²³ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,098.

²⁴ *Id.* at 16,098-99; see also *MTBE Contamination in Groundwater: Identifying and Addressing the Problem: Hearing Before the Subcomm. on Env't and Hazardous Materials of the House Comm. on Energy and Commerce*, 107th Cong. 25 (2002) [hereinafter *MTBE Hearing*] (statement of John Stephenson, Director of Environmental Issues, General Accounting Office) (noting that by 2001, Santa Monica had closed seven wells supplying more than 50% of the city's water). The discoveries precipitated a lawsuit that resulted in a \$230 million settlement. See *supra* note 3 and accompanying text.

²⁵ *MTBE Hearing*, *supra* note 24, at 25 (statement of John Stephenson).

²⁶ *Id.* at 21.

gasoline establishments inhabit a given area and since the number of such establishments with leaking tanks is even smaller, the industry finds it highly unlikely that much of the groundwater of any given state has been adversely affected. The industry notes that MTBE has been found in measurable levels in only 1.9% of the public water supply systems in California since the legislature required monitoring for MTBE.²⁷

Because MTBE is very soluble in water, it travels much more rapidly in groundwater than the other components of gasoline, such as benzene toluene, ethylbenzene, and xylenes ("BTEX").²⁸ In addition, MTBE is more resistant to biodegradation than BTEX.²⁹ Spills of gasoline not containing MTBE, in contrast, are subject to natural biodegradation by soil microorganisms.³⁰ Consequently, MTBE is much more likely than BTEX to contaminate drinking water,³¹ and it is much more difficult to remove from contaminated groundwater than BTEX.³²

As a result of these problems, MTBE releases "require much more aggressive management and remediation than do spills of conventional gasoline."³³ But "risk-based corrective action," an approach developed by EPA and the petroleum industry to remediate leaking UST sites through monitored "natural attenuation" and a minimum of actual cleanup, is generally not an appropriate approach to MTBE contaminated sites.³⁴

This controversy is not inconsequential for a country that relies upon groundwater for up to 46% of its drinking water.³⁵ The health effect of most concern is cancer. Although no human epidemiological data exists upon which to base an evaluation of MTBE's carcinogenicity, animal studies have demonstrated unequivocally that MTBE is carcinogenic in mice and rats through both inhalation and dietary exposure.³⁶ Given additional

²⁷ Declaration of H. James Reisinger in Support of Joint Defense Case in Chief at 9-10 (July 16, 2001), *Cmtys. for a Better Env't v. Unocal Corp.* (Cal. Super. Ct., S.F. Cty.) (No. 997011).

²⁸ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,097.

²⁹ *Id.* at 16,097.

³⁰ *Id.* at 16,102.

³¹ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 2 ("MTBE, due to its persistence and mobility in water, is more likely to contaminate ground and surface water than the other components of gasoline.")

³² *Id.* at 17 (concluding that "MTBE is more soluble, does not adsorb as readily to soil particles, biodegrades less rapidly, and thus moves more quickly than other components of gasoline"); KELLER ET AL., *supra* note 10, at 17 ("MTBE is quite persistent in the environment, and given its high solubility, its tendency to move as fast as the groundwater, and its tendency to not biodegrade as much as petroleum hydrocarbons, it is capable of contaminating water resources faster than any other gasoline component.")

³³ KELLER ET AL., *supra* note 10, at 17.

³⁴ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 52, 56.

³⁵ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,097.

³⁶ KELLER ET AL., *supra* note 10, at 24 ("[S]ubstantial evidence from studies of chronic exposure by either oral or inhalation routes demonstrate that MTBE is carcinogenic in rats and mice."). The mechanisms by which MTBE caused cancer in laboratory animals are not well understood, although it is certainly possible that formaldehyde and tertiary-butyl alcohol ("TBA") play a role. *Id.* at 25. MTBE moves rapidly into the blood-

studies on the carcinogenicity of formaldehyde and TBA, the two primary metabolites of MTBE, one comprehensive assessment of MTBE's health risks concluded that "MTBE is an animal carcinogen with the potential to cause cancer in humans."³⁷ EPA has concluded that MTBE is a "possible" human carcinogen and has suggested that MTBE "be regarded as posing a potential carcinogenic hazard and risk to humans."³⁸

Not surprisingly, several investigators have "questioned the human relevance of rodent cancer results," suggesting that MTBE's mechanism of carcinogenesis is specific to rodent species and therefore not relevant to human beings.³⁹ For example, a "substantial literature" exists suggesting that kidney tumors of the sort caused by MTBE in rats are attributable to chemical interaction with a particular protein that is present in rats, but not in humans, thus casting doubt on the relevance of rat studies for human exposures.⁴⁰ However, because the data on MTBE fulfill some, but not all, of the criteria that EPA and IARC have identified for determining whether rat kidney tumors are caused exclusively by this mechanism, a comprehensive assessment of MTBE's toxicity prepared by the University of California for the governor of that state deemed it "prudent to consider the renal tubular tumors observed in male rats indicative of potential carcinogenic risk to humans."⁴¹

On the whole, though, there is a dearth of health effects data on MTBE—a worrisome fact given that it has been more than twenty years since its introduction into gasoline on a broad basis. The University of California report observed that "there are important data gaps in our understanding of the acute and chronic toxicity of MTBE."⁴² The extent to which MTBE is absorbed into the body via oral ingestion and the associated metabolites have not been studied in humans.⁴³ Further research is needed on the extent to which the animal studies on MTBE are "predictive for human cancer risk."⁴⁴ Most surprisingly of all, as of early 2000, not a single health effects study of MTBE ingestion in drinking water had been reported.⁴⁵ Given this information gap, EPA in May 2002 said it

stream after inhalation exposure where it metabolizes into TBA and formaldehyde, considered probably carcinogenic in humans. *Id.* at 20; *see also* EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 76.

³⁷ KELLER ET AL., *supra* note 10, at 24.

³⁸ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,098. EPA has not, however, attempted a quantitative estimate of MTBE's "cancer potency," because of "limitations in the available data." *Id.* Both the International Agency for Research on Cancer ("IARC") and the Department of Health and Human Services have thus far found insufficient data to classify MTBE one way or the other under their classification schemes. *Id.*; EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 77.

³⁹ KELLER ET AL., *supra* note 10, at 25.

⁴⁰ *Id.* at 25–26.

⁴¹ *Id.* at 26.

⁴² *Id.* at 12.

⁴³ *Id.* at 21.

⁴⁴ KELLER ET AL., *supra* note 10, at 25.

⁴⁵ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,098; EPA BLUE RIBBON PANEL

could not establish a health-based drinking water standard for MTBE because of “uncertainties” in assessing MTBE’s health effects.⁴⁶ EPA has recommended that drinking water suppliers keep MTBE below 20–40 ppb based upon its taste and odor characteristics discussed below.⁴⁷ Many states, however, have either banned MTBE in gasoline or established drinking water standards at levels ranging from 5 to 70 ppb.⁴⁸

Like many ethers, MTBE has an extremely unpleasant taste and odor that has been characterized as “turpentine-like,” “objectionable,” “bitter,” “solvent-like,” and “nauseating.”⁴⁹ Moreover, some people are able to detect MTBE in drinking water at levels as low as 2 ug/L.⁵⁰ This very low threshold of tolerance for MTBE in drinking water is frequently cited by the petroleum industry as a virtue because many consumers cannot tolerate drinking water contaminated at levels high enough to pose a large risk to their health.⁵¹ On the other hand, it is certainly possible that people who take their water from their own wells will become “desensitized” to MTBE’s taste and odor and wind up drinking MTBE for years.⁵²

B. Alternatives to MTBE

1. Ethanol

The primary alternative to MTBE for both the winter oxygenate and RFG programs is ethanol. A substance very familiar to consumers of alcoholic beverages, ethanol is commonly produced by distilling mass-produced grains like corn. When blended with gasoline, it is a powerful oxygenate, but it is also quite volatile and is therefore not useful in enhancing gasoline octane levels. Ethanol-blended RFG has achieved significant reductions in “tailpipe” emissions of carbon monoxide, VOCs and benzene.⁵³ Replacing MTBE with higher volatility ethanol, however, can result in greater “evaporative” VOC emissions from gas tanks and engine lines during refueling and normal vehicle operations unless refiners blend it with more expensive low volatility gasoline blendstock.⁵⁴

REPORT, *supra* note 8, at 77. EPA, the Health Effects Institute and the Chemical Industry Institute of Toxicology are all undertaking such studies. EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 77.

⁴⁶ MTBE Hearing, *supra* note 24, at 23 (statement of John Stephenson).

⁴⁷ *Id.* at 25.

⁴⁸ *Id.* at 26.

⁴⁹ MTBE Advance Notice of Intent, 65 Fed. Reg. 16,097 (“turpentine-like”); EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 77 (“turpentine-like”); KELLER ET AL., *supra* note 10, at 20 (“objectionable,” “bitter,” “solvent-like,” and “nauseating”).

⁵⁰ KELLER ET AL., *supra* note 10, at 20.

⁵¹ MTBE Hearing, *supra* note 24, at 25 (statement of John Stephenson).

⁵² *Id.*

⁵³ KELLER ET AL., *supra* note 10, at 17–18.

⁵⁴ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,105. The fact that the Chicago and Milwaukee areas (largely for political reasons) use only ethanol-blended RFG has apparently not interfered with progress toward attaining the ozone ambient air quality standard in

Ethanol is extremely soluble in water and therefore travels in groundwater at about the same rate as MTBE.⁵⁵ Ethanol, however, biodegrades easily and does not persist in groundwater to the same degree as MTBE.⁵⁶ Some evidence suggests that ethanol inhibits the biodegradation of BTEX, because soil microbes seem to metabolize ethanol preferentially to BTEX.⁵⁷ But since BTEX does not migrate as rapidly as MTBE, BTEX plumes in ethanol-blended gasoline are not likely to travel as far as MTBE plumes in MTBE-blended gasoline.⁵⁸

The health effects of drinking ethanol are well-known.⁵⁹ At the levels found in alcoholic drinks (3–50%), ethanol causes developmental defects, adverse neurological effects, and cancer.⁶⁰ At the considerably lower levels to which humans are exposed in contaminated drinking water, the University of California study concluded the risk posed by ethanol was “unclear.”⁶¹ The combustion of ethanol is also associated with increases in emissions of acetaldehyde, formaldehyde, and peroxyacetyl nitrate (“PAN”).⁶² The first two chemicals are probable carcinogens, and the latter causes eye irritation and crop damage.⁶³

One significant practical disadvantage of ethanol is its availability. In order to replace MTBE in gasoline, ethanol production would have to increase from 120,000 barrels per day to about 187,000 barrels per day.⁶⁴ Another practical problem is the inability of transporters to ship ethanol-blended gasoline in pipelines. Because ethanol is very soluble in water and because water is typically found in pipelines, the ethanol tends to separate from the gasoline and dissolve into the water during transport. Consequently, blenders must transport ethanol separately to distribution terminals at the end of gas pipelines for blending closer to the gasoline’s

those areas. *Id.*

⁵⁵ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 17; *see also* MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,105.

⁵⁶ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,104; EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 17.

⁵⁷ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 17–18; *see also* MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,105.

⁵⁸ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,105.

⁵⁹ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 79.

⁶⁰ KELLER ET AL., *supra* note 10, at 27.

⁶¹ *Id.* The University of California report noted that the IARC had determined that alcoholic beverages were carcinogenic, but further observed that “whether this is significant when ethanol is used as a gasoline additive is highly uncertain.” *Id.* It is not likely that inhalation exposure to ethanol in gasoline containing that substance is harmful to human health. EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 79 (“Given that ethanol is formed naturally in the body at low levels, inhalation exposure to ethanol at the low levels that humans are likely to be exposed are generally not expected to result in adverse health effects.”) MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,105.

⁶² KELLER ET AL., *supra* note 10, at 19, 27.

⁶³ *Id.* at 19.

⁶⁴ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,104–05. Ethanol interests, however, predict that ethanol production could be increased to such levels with sufficient lead time. *Id.*

final destination.⁶⁵ A final practical disadvantage of moving to an ethanol alternative is the added cost. A 1999 study by the Department of Energy concluded that a phased elimination of MTBE as an additive for oxygenation in RFG in four years would result in an increase in the price of RFG of between 2.4 cents per gallon and 3.9 cents per gallon.⁶⁶

2. Other Oxygenates

Other oxygenates, such as diisopropyl ether (“DIPE”), ethyl tertiary-butyl ether (“ETBE”), tertiary-amyl methyl ether (“TAME”), and tertiary-butyl alcohol (“TBA”), have been used or considered for RFG, but none have proved commercially successful because they all cost more than MTBE to produce.⁶⁷ In addition, greater volumes of ETBE and TAME are necessary to achieve the statutory 2% oxygen requirement for RFG.⁶⁸ ETBE, which is made from ethanol, also requires larger volumes of ethanol than are required for simply blending ethanol into gasoline.⁶⁹

Although very little data exist on the properties of alternative oxygenates, they are chemically similar to MTBE and therefore might well “move through soil and water in ways and amounts similar to MTBE.”⁷⁰ They would also probably display similar properties like “high solubility in groundwater, poor sorption in soil, and slower biodegradation compared to BTEX.”⁷¹ Health effects data for the ether alternatives are even sparser. For example, no carcinogenicity studies at all have been performed on the most likely ether substitutes for MTBE.⁷²

3. Aromatics and Alkylates

Aromatics, like benzene, toluene, and xylene, are capable of increasing octane and can be produced at the refineries through a process called “catalytic reformulation.”⁷³ As previously discussed, these components of BTEX are less mobile and more easily biodegraded than MTBE. For that reason, they are less likely than MTBE to wind up in drinking water.⁷⁴ They are not, however, innocuous. Benzene is a known human carcinogen, and xylene is a major contributor to the formation of photochemical

⁶⁵ *Id.* at 16,105.

⁶⁶ *Id.* at 16,105. A similar study by the California Energy Commission estimated that the price of gasoline in California would increase by 1.9 to 2.5 cents per gallon over the long term (six years) if ethanol were substituted for MTBE. *Id.*

⁶⁷ *Id.* at 16,097, 16,106.

⁶⁸ *Id.* at 16,106.

⁶⁹ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,106.

⁷⁰ *Id.* at 16,104.

⁷¹ *Id.* at 16,106.

⁷² *Id.*

⁷³ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 27 n.36.

⁷⁴ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,106.

oxidants.⁷⁵ Toluene is probably less toxic than benzene, but it is associated with some very toxic by-products.⁷⁶

Alkylates are a "mix of high octane, low vapor pressure compounds that are produced from crude oil through a catalytic cracking process."⁷⁷ In order to meet octane requirements by increasing the alkylate concentration of gasoline, refiners simultaneously have to adjust the other input streams to keep volatility sufficiently low.⁷⁸ Alkylates are less soluble in water than MTBE, and they behave more like BTEX in groundwater.⁷⁹ Although toxicity information on alkylates is "limited," EPA has concluded that the additional alkylates necessary to replace MTBE for the limited purpose of maintaining octane levels in conventional gasoline would not "pose a significant threat to drinking water resources."⁸⁰

C. The Problem of Leaking USTS

The primary source of MTBE groundwater contamination is leaking USTS at service stations.⁸¹ An underground storage tank system consists of a tank containing a liquid and the piping necessary for filling the tank, removing the liquid, and allowing air to replace the removed liquid.⁸² A modern single-walled USTS consists of a corrosion-resistant tank or tanks buried in an excavation that contains impervious walls and floor and has been backfilled with pea gravel or sand to separate the tank from naturally occurring soil.⁸³ Most USTS also employ an asphalt or concrete cap on top of the excavation.⁸⁴ Modern USTS also contain an automatic shut-off valve on the delivery system to minimize spills, an overfill prevention device to shut off the flow of gasoline when the tank is full, a leak detection system, and observation wells in the fill material within the excavation boundaries.⁸⁵ Unfortunately, the USTS that were installed during the early days of the petroleum marketing industry (prior to the 1960s) never met these modern criteria.

In these early days, service station owners invariably installed "bare steel tanks" constructed of carbon steel with welded seams. Various pri-

⁷⁵ *Id.*

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ *Id.*

⁷⁹ MTBE Advance Notice of Intent, 65 Fed. Reg. at 16,106.

⁸⁰ *Id.*

⁸¹ See EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 41.

⁸² Katherine S. Yagerman, *Underground Storage Tanks: The Federal Program Matures*, 21 *Env'tl. L. Rep.* (Env'tl L. Inst. 10,136 (1991)).

⁸³ NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION, TECHNOLOGY FOR THE STORAGE OF HAZARDOUS LIQUIDS: A STATE-OF-THE-ART REVIEW 41 (1983) [hereinafter STATE-OF-THE-ART REVIEW] (on file with the Harvard Environmental Law Review).

⁸⁴ *Id.*

⁸⁵ *Id.*

vate standard-setting organizations promulgated guidelines for the thickness of the steel, the design of the tank head, the sizes of vents, tank depths, and similar functions.⁸⁶ Because carbon steel tanks quickly sprang leaks in corrosive soil environments, tank manufacturers in later years developed various coatings to be applied to the interior and exterior of steel USTS.⁸⁷ Since coated steel tanks could still leak, companies developed "cathodic protection" devices to neutralize underground electrical currents that contribute to corrosion.⁸⁸ Owners can now eliminate the threat of corrosion altogether by using fiberglass reinforced plastic ("FRP") tanks, but these are brittle and subject to breaking if improperly installed.⁸⁹ As with steel tanks, private standard-setting entities have also suggested specifications for FRP tanks.⁹⁰ The safest systems employ double-walled steel or FRP tanks with leak detection systems in the interstitial space.⁹¹

Because service station owners through the 1960s invariably installed bare steel USTS, the nation began to experience a silent, but very real, leaking USTS problem by the mid-1970s.⁹² The industry was replacing approximately 29,000 USTS each year, a great many of which leaked,⁹³ but about half of the leaking tanks were repaired with an internal lining system rather than replaced.⁹⁴ After the problem attracted increasing public attention over the next decade, Congress enacted the Hazardous and Solid Waste Amendments of 1984 ("HSWA") on November 9, 1984.⁹⁵ EPA's implementing regulations required owners to upgrade existing systems with systems that complied with EPA's new requirements. The upgrade program had barely been completed, however, when EPA began to receive reports of releases from some upgraded systems due to "inadequate

⁸⁶ *Id.* at 46.

⁸⁷ *Id.* at 50.

⁸⁸ See STATE-OF-THE-ART REVIEW, *supra* note 83, at 50.

⁸⁹ *Id.* at 52.

⁹⁰ *Id.*

⁹¹ See *id.* at 54. The piping systems are just as important as the tanks themselves in preventing leaks. A piping system consists of pipe, valves, pumps, and their associated connecting joints and fittings. *Id.* at 63. Piping systems can leak due to corrosion, physical breakage, or loose connections caused by wear or poor installation. Piping systems must be capable of withstanding corrosive forces as well as the stresses caused by mechanical loading, hydraulic pressures from within, thermal expansion and contraction, and other forces that put stress on system components. Like tanks, pipes can be constructed from steel, coated steel, or plastic, and double-walled piping systems are the best way to prevent leaks from those systems. *Id.* at 63, 66.

⁹² EXXON COMPANY, UNDERGROUND LEAK STUDY 1 (1973) [hereinafter EXXON UNDERGROUND LEAK STUDY] (reporting that the "subject of underground leaks at service stations" had become "one of growing concern to petroleum marketers").

⁹³ Affidavit of Marcel Moreau, at 18 (Oct. 6, 2000), Cmty. for a Better Env't v. Unocal Corp., (Cal. Super. Ct.) (No. 997011) (citing the Nov. 4, 1977 issue of TulsaLetter, a newsletter prepared by the Petroleum Equipment Institute) (on file with the Harvard Environmental Law Review).

⁹⁴ *Id.* (citing "Results of API Tank and Piping Leak Survey," Feb. 5, 1981).

⁹⁵ Pub. L. No. 98-616, 98 Stat. 3221 (1984), codified as amended at 42 U.S.C. § 6901 (2000); see Mary Thornton, *Reagan Signs Bill Expanding EPA Authority*, WASH. POST, Nov. 10, 1984, at A4.

design, installation, maintenance, and/or operation.”⁹⁶ A special Blue Ribbon Panel appointed by EPA in 1999 found it impossible to “demonstrate the effectiveness” of the federal UST upgrade program in preventing releases.⁹⁷ In May 2002, the United States General Accounting Office (“GAO”) reported that USTS were continuing to leak throughout the country.⁹⁸ Since about one-third of the tanks associated with service stations contain gasoline blended with MTBE, that chemical is continuing to contaminate groundwater sources to this day.

III. FIVE CRITICAL DECISIONS

The MTBE crisis of the late 1990s resulted from important decisions made by petroleum refiners, petroleum marketers, industry trade associations, various divisions of EPA, and Congress. This Part of the Article will examine the decision-making process at five critical junctures where a different decision by any one of these entities could have avoided some or all of the releases that brought about the crisis.

A. *The Lead Phase-Down Regulations*

The petroleum industry would almost certainly not have introduced MTBE into gasoline as an octane enhancer if EPA had not ordered the gradual phase-out of tetra-ethyl lead, a far cheaper octane booster that the industry had used since the early part of the twentieth century. In prescribing tailpipe emissions standards, Congress in 1970 assumed that the automobile manufacturing industry would meet those standards by installing catalytic converters in the exhaust stream.⁹⁹ Because lead was known to “poison” the catalysts, thereby rendering them ineffective, Congress empowered EPA to require refiners to remove tetra-ethyl lead from gasoline. Congress further empowered EPA to “control or prohibit” the use of a gasoline additive the emissions from which would contribute to air pollution and “endanger” public health.¹⁰⁰

In the early 1970s, EPA began the slow process of phasing lead out of gasoline for the dual purpose of protecting catalytic converters and protecting public health.¹⁰¹ Since lead performed a valuable anti-knock function, EPA hoped that the automobile industry and petroleum refiners would solve the knocking problem with a different formulation of gaso-

⁹⁶ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 1.

⁹⁷ *Id.* at 45.

⁹⁸ *MTBE Hearing*, *supra* note 24, at 23 (statement of John Stephenson).

⁹⁹ 42 U.S.C. § 7545(c)(1)(B) (2000).

¹⁰⁰ 42 U.S.C. § 7545(c)(1)(A) (2000).

¹⁰¹ Regulation of Fuels and Fuel Additives, 38 Fed. Reg. 33,734 (Dec. 6, 1973) (announcing final rules reducing allowable lead levels in leaded gasoline); *see also* *Amoco Oil Co. v. EPA*, 501 F.2d 722 (D.C. Cir. 1974) (upholding EPA’s rules for reducing lead in gasoline to protect catalytic converters).

line that could be burned in redesigned engines.¹⁰² Refiners could, however, enhance octane levels without engine design changes by adding or adjusting pre-existing levels of aromatics, alkylates, and oxygenates like MTBE.¹⁰³

The Clean Air Act (“CAA”) required EPA to consider alternatives to lead at the time that it decided to phase lead out of gasoline. Before EPA could control or prohibit a fuel or fuel additive that caused emissions that endangered public health, it had to first make a finding that

such prohibition will not cause the use of any other fuel or fuel additive which will produce emissions which will endanger the public health or welfare to the same or greater degree than the use of the fuel or fuel additive proposed to be prohibited.¹⁰⁴

At the time it decided to phase lead out of gasoline for health reasons, EPA understood that the industry would use high octane aromatics to achieve necessary octane levels and that the average aromatic content of gasoline would rise from 22 to 29%.¹⁰⁵ The agency concluded, however, that the substitution of aromatic emissions for lead emissions would be less dangerous to the public health because aromatic emissions from automobiles and refineries would still account for only about 2% of total aromatic emissions and the tailpipe standards for hydrocarbons would reduce aromatics as well.¹⁰⁶

A review of the preambles to the various proposed and final rules reveals no evidence that either EPA or refiners focused upon any adverse effects on soil or groundwater of the decision to remove tetra-ethyl lead from gasoline.¹⁰⁷ The assumption on the part of both actors was that leaded gasoline would be replaced by gasoline with a different mix of aromatics and alkylates. Although the industry knew that leaking USTS were contaminating groundwater with gasoline constituents, a different mix in those constituents would not affect the overall threat to drinking water supplies. Neither actor considered any adverse effects of MTBE at the time of the lead phase-down decision because the U.S. petroleum industry had not yet identified MTBE as a potential replacement for tetra-ethyl lead. Fuel manufacturers would have to notify EPA of any new additive,¹⁰⁸ and EPA was empowered to require the manufacturer to “conduct tests to deter-

¹⁰² See generally David Owen, *Octane and Knock*, ATLANTIC MONTHLY, Aug. 1987, 53.

¹⁰³ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 27 n.36.

¹⁰⁴ 42 U.S.C. § 7545(c)(2)(C) (2000).

¹⁰⁵ *Ethyl Corp. v. EPA*, 541 F.2d 1, 33 n.68 (D.C. Cir. 1976).

¹⁰⁶ *Id.* (citing 38 Fed. Reg. 33738).

¹⁰⁷ See generally Regulation of Fuels and Fuel Additives, 37 Fed. Reg. 11,786 (June 14, 1972) (notice of proposed rulemaking), Regulation of Fuels and Fuel Additives, 38 Fed. Reg. 1258 (Jan. 10, 1973) (notice of reproposal), Regulation of Fuels and Fuel Additives, 38 Fed. Reg. 33,734 (Dec. 6, 1973) (notice of final rulemaking).

¹⁰⁸ 42 U.S.C. § 7545(b)(1) (2000).

mine potential public health effects" of emissions from the additive.¹⁰⁹ That would be the appropriate time to consider its adverse environmental impacts.

B. The MTBE Fuel Additive Waiver

Faced with the reality of the impending demise of lead, many refiners began the process of "retuning" their plants to process gasoline at substantially higher temperatures and pressures to produce high octane aromatics.¹¹⁰ Since this not only cost more but was also less energy efficient, it was not an especially attractive option during the OPEC oil embargo years.¹¹¹ Refiners of about one-half of all unleaded gasoline were able to avoid expensive retuning by using a previously registered manganese-based additive, called MMT. This option, however, was not available for long.

The 1977 Amendments to the CAA, which may well have been enacted with MMT in mind, made it unlawful after March 31, 1977 to market a fuel for use in catalyst-equipped automobiles that was not substantially similar to the fuels used in the emissions certification process for those vehicles.¹¹² EPA could waive that prohibition upon a demonstration that the emissions of the fuel would not "cause or contribute" to a failure of the catalytic converter.¹¹³ This effectively created a licensing regime for fuel additives for the purpose of protecting emission control devices. To protect public health, however, EPA had the burden of initiating a rule-making process and demonstrating that the additive "may reasonably be anticipated to endanger" public health.¹¹⁴ In September 1978, EPA ordered refiners to stop using MMT to boost octane levels in gasoline because it interfered with the ability of catalytic converters to control hydrocarbon emissions.¹¹⁵

By that time, European refiners had discovered that a 15% blend of MTBE and gasoline greatly enhanced octane ratings.¹¹⁶ Moreover, MTBE had a significant cost advantage over the option of retuning refineries.¹¹⁷ However, as a post-1977 additive, MTBE could not be used without a

¹⁰⁹ 42 U.S.C. § 7545(b)(2) (2000).

¹¹⁰ See Owen, *supra* note 102, at 57.

¹¹¹ *Unleaded Petrol*, ECONOMIST, Jan. 27, 1979, at 76.

¹¹² 42 U.S.C. § 7545(f)(1) (2000).

¹¹³ 42 U.S.C. § 7545(f)(4) (2000).

¹¹⁴ 42 U.S.C. § 7545(c)(1) (2000).

¹¹⁵ *EPA Says No to MMT*, CHEMICAL WK., Sept. 20, 1978, at 20. The CAA Amendments of 1977 had banned all gasoline additives after September 15, 1978 unless refiners could demonstrate that they would not increase hydrocarbon emissions from automobiles. Ethyl Corporation asked EPA for a waiver from the ban, but EPA found that MMT would in fact increase hydrocarbon emissions. *Id.*

¹¹⁶ See, e.g., *Unleaded Petrol*, *supra* note 111, at 76; *MTBE May Help Refiners Maintain Octane While Phasing Out Lead*, CHEMICAL WK., Dec. 1, 1976, at 39.

¹¹⁷ *MTBE Pumps for a Place in Gas Tank*, CHEMICAL WK., June 28, 1978, at 39.

waiver. In December 1978, EPA rejected a waiver request from Texas Petrochemical Corporation because it failed to provide sufficient information on MTBE's effects on catalysts.¹¹⁸ Three months later, on February 23, 1979, EPA approved ARCO's waiver petition for MTBE as a gasoline additive at levels of 7% or less based upon a finding that it would not adversely affect vehicle emissions or damage emission control devices.¹¹⁹ Because the waiver was mandatory for any new fuel that did not interfere with pollution control devices, the agency did not consider any possible adverse effects on air or groundwater quality when it granted the waiver.

C. The TSCA Testing Agreement

ARCO first began producing MTBE in December 1979.¹²⁰ At that time, MTBE's awful taste and odor were no secret, and its high solubility in water was a characteristic that was easily ascertainable by any engineer.¹²¹ However, very little was known about the chronic toxicity of MTBE. Five months after EPA granted the MTBE waiver, representatives from Exxon, Texaco, Phillips, and ARCO met to review existing MTBE toxicology data and to discuss whether further toxicological testing of MTBE would be desirable.¹²² This meeting blossomed into an industry-wide effort, supervised by the American Petroleum Institute ("API"), to conduct core toxicity testing on MTBE.¹²³

EPA had authority under Section 4 of the Toxic Substances Control Act ("TSCA") to order the manufacturer of a chemical substance to conduct specific health and environmental toxicity testing if EPA determined that the sufficient testing was not already available and the chemical might present an unreasonable risk to the environment, or would be produced in substantial quantities and enter the environment in substantial quantities or give rise to significant human exposure.¹²⁴ The statute also created an

¹¹⁸ *EPA Says No, But Keeps Open Mind on MTBE*, CHEMICAL WK., Jan. 3, 1979, at 36.

¹¹⁹ Application for Methyl Tertiary Butyl Ether, Decision of the Administrator, 44 Fed. Reg. 12,242, 12,243. (Mar. 6, 1979); see also *Green Light for Gasoline Additive*, CHEMICAL WK., Mar. 7, 1979, at 18.

¹²⁰ *Cmtys. for a Better Env't v. Unocal Corp.*, No. 997013 (Cal. Super. Ct., S.F. Cty. Apr. 16, 2002) (order re: defendants' joint motion No. 3 for judgment for failure to prove unfair acts) at 4 (on file with the Harvard Environmental Law Review); *ARCO Chemical Co. Reports Start-up of its First Methyl Tertiary Butyl Ether (MTBE) Plant*, OIL & GAS J., Dec. 24, 1979, at 32.

¹²¹ Deposition of Dale Young at 16, *Cmtys. for a Better Env't* (No. 997013) (on file with the Harvard Environmental Law Review). Asked when ARCO Chemical Company first learned that MTBE had the capacity to contaminate groundwater, the ARCO engineer explained that "MTBE, as an ether, similar to any alcohols, as a chemical engineer I would know that they are soluble in water and therefore have the capacity to move to a water source and as a result of that contaminate the water that they come in contact with." *Id.* at 15.

¹²² Trial Brief for Exxon Corp. and Exxon Mobil Corp. at 25 (July 17, 2000), *Cmtys. for a Better Env't* (No. 997013) (on file with the Harvard Environmental Law Review).

¹²³ See *infra* note 129 and accompanying text.

¹²⁴ 15 U.S.C. § 2603(a)(1) (2000).

Interagency Testing Committee ("ITC"), composed of representatives of several federal agencies, to nominate for testing chemicals that met this multi-faceted threshold test.¹²⁵ Once a chemical appears on the ITC "priority list," EPA must decide within one year whether to issue a rule ordering further testing.¹²⁶

By the time that the ITC began its investigation of MTBE in 1985, the industry had already learned a lot about MTBE. First, the industry knew that MTBE was beginning to contaminate groundwater in many states as a result of leaking USTS. Oil companies in the U.S. had been adding MTBE to gasoline for less than a year when it showed up in major gasoline leaks in Rockaway, New Jersey and Jacksonville, Maryland.¹²⁷ Second, the industry had learned that MTBE migrated faster in groundwater than other gasoline constituents and that its pungent odor and unpleasant taste were detectable by human senses at very low concentrations.¹²⁸

The industry was also in the process of learning more about MTBE's toxicology. In October 1980, API's Toxicology Committee had approved several core toxicology tests on MTBE as Phase One of a larger project.¹²⁹ The tests were, however, devoted exclusively to inhalation exposure to MTBE by refinery workers and people in the vicinity of gasoline pumps,¹³⁰ and the industry consistently rejected suggestions by the API Ad Hoc MTBE Toxicology Group to test MTBE in drinking water.¹³¹ When the Phase One

¹²⁵ 15 U.S.C. § 2603(e) (2000).

¹²⁶ 15 U.S.C. § 2603(e)(1)(B).

¹²⁷ Deposition of Frederick Anderson at 35, 45, *Cmtys. for a Better Env't* (No. 997011) (on file with the Harvard Environmental Law Review).

¹²⁸ *Id.* at 45, 53-54. Attendees of an August 1984 meeting of the Health & Environmental Subcommittee of the API Toxicology Committee learned that oxygenates were of "increasing concern" for six primary reasons:

- increased use in motor fuels with lead phasedown
- relatively water soluble compared to other gasoline components
- increasing human exposure through gasoline vapor and groundwater contamination
- increasing public awareness and concern
- limited data available on longer-term health effects of oxygenates, [and]
- cannot predict health effects of oxygenate-gasoline blends from data available on gasoline or oxygenates alone.

HESC Presentation: MTBE (Oxygenate) Gasoline Blends, Exhibit 20 to Deposition of Randy N. Roth, *Cmtys. for a Better Env't* (No. 997011) (on file with the Harvard Environmental Law Review).

¹²⁹ Minutes of the API's Medicine and Biological Science Department Toxicology Committee Meeting of October 23, 1980, Exhibit 4 to Deposition of Randy N. Roth, *Cmtys. for a Better Env't* (No. 997013) (on file with the Harvard Environmental Law Review). The tests were performed by Bio/Dynamics, Inc. and supervised by a private consultant, Tracor-Jitco. *Id.* They included a metabolic disposition study, a 2-species teratology study, and a single generation reproductive/fertility study. Later phases of the program were to include carcinogenesis and neurotoxicity studies among others, but they were never formally approved.

¹³⁰ Deposition of Randy N. Roth at 31, *Cmtys. for a Better Env't* (No. 997011).

¹³¹ *Id.* at 60 (stating that industry did not conduct tests on MTBE in drinking water); Minutes of the API's Medicine and Biological Science Department Toxicology Committee,

studies were completed in mid-1984, the industry concluded that the results were "rather unremarkable in terms of causing harm."¹³² Instead of moving to Phase Two (long-term carcinogenicity studies), the API group hoped that the industry's proactive effort would "preclude . . . an unnecessary test rule by EPA under TSCA."¹³³

The ITC in 1985 entered into a contract with CRCS, Inc. to conduct an "information review" of the existing published and unpublished literature on the health and environmental effects of MTBE.¹³⁴ A March 7, 1986 "Working Draft" reported that although about 1.37 billion pounds of MTBE had been used in 1984 as an octane-enhancing blending component in gasoline, the "toxicological information" on MTBE was limited.¹³⁵ Genotoxicity studies "gave conflicting results," and no chronic toxicity or carcinogenicity studies were found for MTBE.¹³⁶

The survey located no empirical information at all on consumer exposure, which it assumed to come exclusively via the inhalation and dermal routes.¹³⁷ Information on accidental releases of MTBE came exclusively from an unpublished 1985 API report concluding that MTBE "could be released to the environment in fugitive [air] emissions or accidental spills."¹³⁸ The report did not mention the large body of information that the industry possessed on accidental releases of MTBE into the environment via leaking USTS. The CRCS working draft listed leaking USTS as one of three minor sources of releases.¹³⁹

With the distribution of the CRCS report, the industry launched a major effort to avoid an EPA rule requiring "time consuming and expensive" testing.¹⁴⁰ Arco submitted to the ITC a critique of the working draft

Meeting of October 30, 1981, Exhibit 10 to Deposition of Randy N. Roth at 4, *Cmtys. for a Better Env't* (No. 997011) (recommending that MTBE be tested in drinking water) (on file with the Harvard Environmental Law Review).

¹³² American Petroleum Institute, Post Completion Critique at 4 (Aug. 12, 1984), Exhibit 20 to Deposition of Randy N. Roth, *Cmtys for a Better Env't* (No. 997011) [hereinafter API critique] (on file with the Harvard Environmental Law Review).

¹³³ *Id.* at 3.

¹³⁴ CRCS, Inc., Information Review: Tert-Butyl Methyl Ether (Working Draft, Mar. 7, 1986) [hereinafter CRC Report].

¹³⁵ *Id.* at iii.

¹³⁶ *Id.* at iii.

¹³⁷ *Id.* at 6.

¹³⁸ *Id.* at 6.

¹³⁹ CRC Report, *supra* note 134, at 6.

¹⁴⁰ W. J. Kilmartin & J. M. DeJovine, Contact Report at 2 (July 9, 1986), Exhibit of *Cmtys. for a Better Env't v. Unocal Co.* (Cal. Super. Ct., S.F. Cty.) (No. 997011) [hereinafter Kilmartin and DeJovine] (on file with the Harvard Environmental Law Review). On July 9, 1986, the Oxygenated Fuels Association ("OFA") hosted a meeting to discuss health and safety issues related to MTBE in light of the CRS report. *Id.* at 1. On April 3, 1986, API circulated the CRS report to the members of its TSCA/ITC Workgroup and invited them to a meeting to prepare comments to be filed with the ITC. Memorandum to Members of the MCP/Commercial Hexane Workgroup and Members of the TSCA/ITC Workgroup from Robert J. Fensterheim at 1 (Apr. 3, 1986), Exhibit 25 to Deposition of Randy N. Roth, *Cmtys. for a Better Env't* (No. 997011) [hereinafter Fensterheim memorandum] (on file with the Harvard Environmental Law Review).

of the CRCS report that explained its "differences in interpretation of the data" and provided "new information that is expected to be beneficial to the ITC in any further analysis [of] this material."¹⁴¹ ARCO complained that "erroneous assumptions had been made that cause the potential hazards of MTBE to be seriously overestimated."¹⁴² The ARCO submission acknowledged that human exposure "from accidental spills of MTBE could occur," but they "should be regarded as a minimal possibility,"¹⁴³ and it assured the ITC that "MTBE losses would be extremely small" from leaking USTS.¹⁴⁴

On October 31, 1986, the ITC recommended that MTBE be tested for chronic inhalation toxicity including neurotoxic, hematologic, and oncogenic (carcinogenic) effects and that additional monitoring be undertaken of worker and customer exposure in the "breathing zone" during gasoline transfer operations.¹⁴⁵ The report made no reference at all to MTBE-contaminated groundwater due to leaking USTS. In response, ARCO argued that testing for chronic inhalation health effects was "not necessary," because "worst case" exposures to MTBE from gasoline vapors were "well below the 'no observable adverse effect level' even when very conservative safety factors are applied."¹⁴⁶ This did not, of course, answer the question whether testing for oncogenicity, for which there were not necessarily any no-effect levels, would be desirable. ARCO did not mention at all the possibility that chronic exposure might occur via ingestion of contaminated groundwater.¹⁴⁷

On December 17, 1986, EPA hosted a "public focus meeting" on MTBE at which most of the major industrial players gathered to discuss the possibility of arriving at an agreed-upon consent order for performing additional testing on MTBE.¹⁴⁸ There is no evidence that any representatives of environmental groups attended this or any of the subsequent focus

¹⁴¹ Letter to Robert Brink from E.C. Capaldi at 1 (July 21, 1986), Exhibit 25 to Deposition of Randy N. Roth, *Cmtys. for a Better Env't* (No. 997011) (on file with the Harvard Environmental Law Review).

¹⁴² ARCO Chemical Company, Methyl-tertiary Butyl Ether: Critique of the CRS, Inc./Dynamac Corporation Information Review at 1 (July 21, 1986), Exhibit 25 to Deposition of Randy N. Roth, *Cmtys. for a Better Env't* (No. 997011) [hereinafter ARCO critique] (on file with the Harvard Environmental Law Review).

¹⁴³ *Id.* at 4.

¹⁴⁴ *Id.* at 5.

¹⁴⁵ Nineteenth Report of the Interagency Testing Committee to the Administrator; Receipt and Request for Comments Regarding Priority List of Chemicals, 51 Fed. Reg. 41,417, 41,418 (Nov. 14, 1986).

¹⁴⁶ Letter to TSCA Public Information Office from S. A. Ridlon at 1 (Dec. 12, 1984), Exhibit 5 to Deposition of Randy N. Roth, *Cmtys. for a Better Env't* (No. 997011) [hereinafter Ridlon letter] (on file with the Harvard Environmental Law Review).

¹⁴⁷ *Id.*

¹⁴⁸ Environmental Protection Agency, Minutes for the Public Focus Meeting For Methyl tert-Butyl Ether (MTBE) (Dec. 17, 1986), Exhibit 20 to Deposition of George Yogis, *Cmtys. for a Better Env't* (No. 997011) [hereinafter EPA Public Focus Meeting Minutes] (on file with the Harvard Environmental Law Review).

meetings. At the meeting, EPA's project manager noted that "an additional concern" identified by EPA's Test Rules Development Branch was "contamination of ground water supplies by MTBE."¹⁴⁹ She related that more than 700,000 USTS were used for petroleum products and "about 30% of these tanks leak."¹⁵⁰ The ARCO representatives, however, insisted that there was no reason to require any additional testing of MTBE because there should be "very little cause for concern of health hazards with MTBE."¹⁵¹

After more than a year of additional negotiations, EPA published notice of a Consent Order to which EPA and five major oil companies had agreed.¹⁵² The companies agreed to conduct several mutagenicity tests, several pharmacokinetics tests to determine oral, dermal, and inhalation routes of exposure, three neurotoxicity tests, an inhalation oncogenicity test in two species, and an inhalation two-generation reproduction and fertility effects study.¹⁵³ The companies did not agree to do any environmental testing, and they agreed to very little in the way of toxicity testing via the ingestion route through which humans would be exposed to MTBE in drinking water.¹⁵⁴

D. The USTS Implementation Regulations

The industry knew considerably more than EPA about the deteriorating state of USTS at the time that the agency granted the ARCO waiver. In early 1979, the national media had not yet focused on leaking USTS, and Congress had not given EPA any authority to regulate them.¹⁵⁵ Yet as early as 1973, the "subject of underground leaks at service stations" had become "one of growing concern to petroleum marketers."¹⁵⁶ In the mid-1970s, API created three task forces to address what was rapidly becoming a serious problem.¹⁵⁷

¹⁴⁹ *Id.*

¹⁵⁰ *Id.*

¹⁵¹ *EPA Launches Probe of MTBE Potential Adverse Health Effects*, ALCOHOL WK., Dec. 22, 1986, Attachment 2 to Exhibit 1 to Deposition of Samuel Hectrick, *Cmtys for a Better Env't* (No. 997011) (on file with the Harvard Environmental Law Review). An EPA official called the chance for contamination "a major concern." *Id.*

¹⁵² Testing Consent Order on Methyl Tert-Butyl Ether and Response to the Interagency Testing Committee, 53 Fed. Reg. 10,391 (Mar. 31, 1988) (announcing final rule).

¹⁵³ *Id.* at 10,392.

¹⁵⁴ *Id.*

¹⁵⁵ Lawrence Mosher, *A Host of Pollutants Threaten Drinking Water from Underground*, NAT'L J., Aug. 16, 1980, at 1353.

¹⁵⁶ EXXON UNDERGROUND LEAK STUDY, *supra* note 92, at 1.

¹⁵⁷ Exxon Corporation, *Underground Leak Prevention/Detection at Service Stations*, at 1-2 (Apr. 30, 1979) (on file with the Harvard Environmental Law Review). The Leak Prevention Task Force was created to update tank installation procedures and develop a mathematical leak predictor model. *Id.* at 2. The Leak Detection Task Force was assigned the tasks of developing an implementation plan for inventory control procedures and conducting leak detector research. *Id.* The Leak Clean-Up Task Force was to update and publish clean-up procedures and develop the industry's position on how to respond to "unknown source leaks." *Id.*

By mid-1983, contaminated groundwater had become a major environmental issue, and leaking USTS had been identified as a large contributor to the problem.¹⁵⁸ As Congress began to react to public pressure to do something about the leaking USTS problem, API strongly resisted new legislation.¹⁵⁹ If Congress deemed legislation necessary, however, API argued that it should simply require EPA to promulgate "performance standards" based upon API's "recommended practices."¹⁶⁰ For its part, EPA demonstrated a "schizophrenic" attitude toward regulating USTS.¹⁶¹ Its groundwater group was well aware of the risks that USTS posed to groundwater resources, but its hazardous waste division was reluctant to take on the additional responsibility for regulating more than one million USTS.¹⁶² At the time, EPA was in no position to be a forceful advocate for a brand new regulatory program in the anti-regulatory Reagan Administration. The agency urged Congress to refrain from legislating until EPA had a "more refined idea" of how the problem should be addressed.¹⁶³

Having recently clashed with the Administration over EPA's failure under Administrator Anne Gorsuch to implement the hazardous waste laws, Congress was in no mood to heed the agency's advice¹⁶⁴ and the legislation moved rapidly toward enactment. Anxious to have the Gorsuch scandals behind him, President Reagan signed the HSWA on November 9, 1984.¹⁶⁵ Among other things, the statute required EPA to promulgate regulations for new and existing USTS and to establish technical requirements for leak detection and leak prevention "as may be necessary to protect human health and the environment."¹⁶⁶

¹⁵⁸ Cass Peterson, *EPA Maps Plan on Drinking Water*, WASH. POST, Dec. 31, 1983, at A1 (quoting an EPA report finding "substantial anecdotal evidence that leaking storage tanks constitute a problem of national scope"). In November 1983, an EPA Assistant Administrator testified at Congressional hearings that 75,000 to 100,000 storage tanks were leaking 11 million gallons of gasoline annually, and the number of leaking USTS was growing. Philip Shabecoff, *Fuel Leaks Called Threat To Water*, N.Y. TIMES, Nov. 30, 1983, at A1. API agreed with EPA's estimate of the number of leaking USTS, but it could not verify the gallonage lost. *Id.* In early 1984, EPA reported that more than 2000 wells in 20 states had become contaminated. Ronald A. Taylor, *Warning: Your Drinking Water May Be Dangerous*, U.S. NEWS & WORLD REP., Jan. 16, 1984, at 51.

¹⁵⁹ *Hearings on Groundwater Contamination Before the Senate Comm. on the Env't and Pub. Works*, 98th Cong. 1, 5 (statement of William O'Keefe, Vice-President of the API).

¹⁶⁰ *Id.* at 7.

¹⁶¹ STEFFEN W. PLEHN, UNDERGROUND TANKAGE: THE LIABILITIES OF LEAKS 35 (2d ed. 1986).

¹⁶² *Id.* at 36.

¹⁶³ *Id.* at 37 (quoting Alvin Alm, Deputy Administrator, EPA).

¹⁶⁴ See JONATHAN LASH ET AL., A SEASON OF SPOILS 82-130 (1984).

¹⁶⁵ See *supra* note 95; see also Mary Thornton, *Reagan Signs Bill Expanding EPA Authority*, WASH. POST, Nov. 10, 1984, at A4.

¹⁶⁶ Resource Conservation and Recovery Act ("RCRA") § 9003(a), 42 U.S.C. § 6991b(a) (2000). The regulations were supposed to contain at least the following requirements: (1) maintenance of a leak detection system, an inventory control system together with tank testing, or a comparable release identification system; (2) maintenance of records for the leak detection, inventory control, or comparable system; (3) reporting of releases and cor-

In early 1985, EPA created a new Office of Underground Storage Tanks (“OUST”) to undertake the necessary implementation efforts.¹⁶⁷ Fearing that it lacked sufficient time and resources to promulgate detailed requirements, the office decided to explore “quicker, less detailed approaches to regulation.”¹⁶⁸ A “Development Plan” proposed to establish “broad, performance-oriented tank technical standards rather than detailed, technology-based operating and design requirements.”¹⁶⁹ In other words, the agency was prepared to specify broad goals and let the regulated industry fill in the details. According to an EPA official who was heavily involved in drafting the regulations, the agency “worked closely with representatives of the major oil companies,” regularly contacting major oil company representatives “for information and input regarding UST issues.”¹⁷⁰

On September 23, 1988, EPA published final regulations establishing technical requirements for USTS.¹⁷¹ The preamble noted somewhat defensively that the statute specifically authorized EPA to “consider industry practices and consensus codes in developing appropriate UST regulations,”¹⁷² and it observed that several important industry codes had been updated in the year since the proposal came out.¹⁷³ This increased activity “support[ed] EPA’s proposed reliance on these codes as providing the most up-to-date consensus practices and expertise concerning what constitutes proper UST system management.”¹⁷⁴ Since “the successful implementation” of the final regulations depended “a great deal on the regulated community’s voluntary compliance,”¹⁷⁵ the final regulations relied “as much as possible” on “familiar industry codes.”¹⁷⁶

rective actions; (4) corrective actions; and (5) requirements for the closure of tanks to prevent future releases. RCRA § 9003(c), 42 U.S.C. § 6991b(c) (2000).

¹⁶⁷ PLEHN, *supra* note 161, at vii; Petroleum Equipment Institute, *PEI Readies for Cincinnati—Tanks, Liability to Top Agenda*, NAT’L PETROLEUM NEWS, Oct. 1985, at 68.

¹⁶⁸ Regulation of Underground Storage Tanks: RCRA Subtitle I, Development Plan (Draft) at V-4 (Mar. 18, 1985) [hereinafter OUST Development Plan] (on file with the Harvard Environmental Law Review).

¹⁶⁹ *Id.*

¹⁷⁰ Declaration of Thomas J. Schruben in Support of Joint Defense Case in Chief at 5 (July 5, 2001), *Cmtys. for a Better Env’t v. Unocal Corp.* (Cal. Super. Ct., S.F. Cty.) (No. 997011) (on file with the Harvard Environmental Law Review).

¹⁷¹ Underground Storage Tanks; Technical Requirements, 53 Fed. Reg. 37,082 (Sept. 23, 1988).

¹⁷² *Id.* at 37,084. The agency did clarify what it meant by a “nationally recognized organization” from which codes would be acceptable. That term was defined to mean “a technical or professional organization that has issued standards formed by the consensus of its members.” *Id.* at 37,185. EPA preferred that the organization ensure the consideration of “all relevant viewpoints and interests, including those of consumers and future or existing and potential industry participants,” but it did not insist. It listed API, the Petroleum Equipment Institute, and the Steel Tank Institute as entities that were clearly nationally recognized organizations. *Id.*

¹⁷³ *Id.* at 37,090.

¹⁷⁴ *Id.* at 37,097.

¹⁷⁵ *Id.* at 37,095.

¹⁷⁶ Underground Storage Tanks, Technical Requirements, 53 Fed. Reg. at 37,095. On the nagging question of whether modified codes would become legally applicable as they

For new and replacement tanks, the final regulations required only protected single-walled tanks with release detection.¹⁷⁷ The protection could come from (1) cathodic protection of a lined steel tank, (2) fiberglass reinforced plastic construction, or (3) fiberglass and steel reinforced plastic.¹⁷⁸ Although the agency agreed with commenters who suggested that "there will probably be more releases to the environment" from single-walled tanks than from double-walled tanks with interstitial monitoring, the more protective option was "not believed to be necessary to protect human health and the environment."¹⁷⁹ In addition, the "widely available" technologies for cleaning up "petroleum products" provided "the means to ensure that adverse impacts from such releases (when they occur) can be managed and remediated."¹⁸⁰ Finally, the preamble mentioned that (1) double-walled systems entailed "greater capital and installation costs" that did not "justify" the environmental benefits and (2) the "current trends in industry" were not in the direction of double-walled tanks.¹⁸¹ The fact that MTBE was not easily remediated through "widely available" cleanup technologies was apparently lost on the agency.

The regulations required a "gradual" upgrade or replacement of existing tanks over a period of ten years.¹⁸² The agency agreed with commenters who argued that a more rapid upgrade schedule would "prevent a significant number of future product releases," but it rejected their argument that industry resources were capable of meeting a more rapid upgrade requirement.¹⁸³ A ten-year upgrade program, on the other hand, would "complement current industry trends towards upgrading or replacing voluntarily."¹⁸⁴ Instead of requiring upgrades to the new tank standards, the

were modified, thus effectively removing EPA's discretion to define the law, the agency concluded that "the industry codes that are in effect at the date of publication of the final rule" were sufficiently protective of human health and the environment. *Id.* at 37,185. The regulations did not require the use of future editions of the codes, but use of such codes by implementing agencies was "encouraged as the updated codes will probably provide for newer, more effective technologies and practices." *Id.* The agency would not, however, allow the use of defunct codes that had been superseded by more recent codes because some of them "were not fully protective of human health and the environment." *Id.*

¹⁷⁷ *Id.* at 37,101.

¹⁷⁸ *Id.* at 37,125.

¹⁷⁹ *Id.* at 37,101.

¹⁸⁰ *Id.*

¹⁸¹ Underground Storage Tanks, Technical Requirements, 53 Fed. Reg. at 37,102. The final rule for new tanks also reduced the specificity of the proposed standards in some important regards. First, it deleted the proposed requirement that the corrosion expert examining new tank installation be "independent." The agency concluded that "the use of in-house personnel is acceptable provided that they meet the definition of 'corrosion expert.'" *Id.* at 37,126. Second, the final regulations replaced the proposed nine specifically required installation steps with a general requirement that nationally applicable industry codes be followed. EPA reached this conclusion in light of the recent revisions in the API and Petroleum Equipment Institute codes to make them compatible with one another. *Id.* at 37,129.

¹⁸² *Id.* at 37,103.

¹⁸³ *Id.*

¹⁸⁴ *Id.* at 37,130.

final rule allowed owners to meet the upgrade requirements by lining the interiors of existing steel tanks in accordance with industry standards so long as the tanks were tested within the next ten years and at five year intervals thereafter.¹⁸⁵

The final rule allowed owners to choose between six broad leak detection technologies, each of which was required to comply with “method-specific” performance standards.¹⁸⁶ In particular, owners were allowed to rely upon semi-annual tightness testing and inventory control as a leak detection mechanism.¹⁸⁷ The agency reached this conclusion despite its own previously expressed “serious reservations” about inventory control as a leak detection technique.¹⁸⁸ The final rule also relaxed the performance requirements for inventory control.¹⁸⁹

The petroleum industry was generally “comfortable with” the technical requirements, and it expressed relief that the regulations turned out to be so flexible.¹⁹⁰ Environmental groups, by contrast, were uncomfortable with the new rules.¹⁹¹ They argued that EPA should have required new and replacement tanks to be double-walled.¹⁹² They also maintained that EPA gave the industry far too long to replace or upgrade steel tanks.¹⁹³ A spokesperson for the Environmental Defense Fund complained that the regulations were designed to minimize the economic impact on the industry, not to protect human health and the environment.¹⁹⁴ Perhaps because they did not want to delay EPA’s implementation of the regulations, however, the environmental groups declined to challenge them in court.

E. The Reformulated Gasoline Requirements

In the late 1980s, many governmental officials in California advocated replacing conventional gasoline with less-polluting “alternative” motor fuels to solve that state’s serious air pollution problems and to help avoid future energy crises.¹⁹⁵ The most prominent fuel at the time was M85,

¹⁸⁵ *Id.* at 37,131.

¹⁸⁶ Underground Storage Tanks; Technical Requirements, 53 Fed. Reg. at 37,142.

¹⁸⁷ *Id.*

¹⁸⁸ Underground Storage Tanks; Technical Requirements, 52 Fed. Reg. 12,662, 12,726 (Apr. 17, 1987); Methods of Release Detection for Tanks, 40 C.F.R. 280.43(c) (2003); see also ENVIRONMENTAL PROTECTION AGENCY, 1 UNDERGROUND MOTOR FUEL STORAGE TANKS: A NATIONAL SURVEY at xviii (1986).

¹⁸⁹ Underground Storage Tanks; Technical Requirements, 53 Fed. Reg. at 37,158.

¹⁹⁰ Angel Abcede, *How Industry Views Impending Underground Tank Regulations; Petroleum Storage*, NATIONAL PETROLEUM NEWS, July 1988, at 40.

¹⁹¹ Philip Shabecoff, *E.P.A. Issues New Rules on Underground Tanks*, N.Y. TIMES, Sept. 14, 1988, at B6.

¹⁹² Conrad B. MacKerron, *EPA Lays Ground Rules for Tanks*, CHEMICAL WK., Sept. 21, 1988, at 13.

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ Declaration of William S. Dickinson at 2 (June 29, 2001), *Cmtys. for a Better Env’t v. Unocal Corp.* (Cal. Super. Ct., S.F. Cty.) (No. 997011) (on file with the Harvard Envi-

a blend of 85% methanol and 15% unleaded gasoline.¹⁹⁶ Fearing that California might ultimately move toward alternative fuels, ARCO created an internal task force and charged it with developing a gasoline product that would burn as cleanly as M85.¹⁹⁷ The result of this effort, an MTBE blend called EC-1, was capable of replacing leaded gasoline with a fuel that produced lower evaporative and tailpipe emissions than conventional gasoline.¹⁹⁸ With encouragement from California environmental agencies, ARCO began to market EC-1 in Southern California in August 1989.¹⁹⁹

Not to be outdone, Shell launched a new "environmentally friendly" gasoline, an MTBE blend called SU2000E, in two California cities and eight other heavily polluted urban markets in April 1990.²⁰⁰ Aware of the increased risks that MTBE posed to groundwater, Shell considered replacing the tankage in service stations selling SU2000E to prevent environmental problems due to leaks.²⁰¹ But the company ultimately concluded that the risks that SU2000E posed to groundwater quality were "manageable" with existing tanks.²⁰² By the end of the summer, the other major companies were, in the words of the head of EPA's fuel regulation office, "to some extent . . . tripping over themselves coming out with cleaner products,"²⁰³ and MTBE had become "the fastest-growing chemical in the world."²⁰⁴ All of this took place without the impetus of the federal reformulated gasoline program, which had not yet been enacted.

Congress's decision to require refiners to produce reformulated gasoline for areas of the country that were seriously out of attainment with the NAAQS for photochemical oxidants was a relatively minor and late-arriving aspect of a multi-year effort to amend the CAA.²⁰⁵ The debates over reformulated gasoline stimulated input from a broad array of interest groups and governmental entities. The three groups most interested in MTBE were the petroleum industry, agricultural concerns, and environmental groups.

The petroleum industry forcefully argued that Congress should not mandate any one fuel, which industry advertisements labeled "government gas," but should instead let market forces (presumably as perceived by

ronmental Law Review).

¹⁹⁶ *Id.* at 2.

¹⁹⁷ *Id.* at 3.

¹⁹⁸ *Id.* at 4.

¹⁹⁹ ARCO, SCRIPT FOR INTRODUCTION OF EC-1 GASOLINE (Aug. 15, 1989) (on file with the Harvard Environmental Law Review); see also Amy Stevens, *Arco to Sell Substitute for Leaded Gas*, WASH. POST, Aug. 16, 1989, at A2.

²⁰⁰ See Michael Arndt, *Shell Starts Selling a Cleaner Gas Here*, CHICAGO TRIB., Apr. 12, 1990, at C1; *Shell Introduces Unleaded "Gas" With Lower Rvp In 10 U.S. Cities*, PLATT'S OILGRAM NEWS, Apr. 12, 1990, at 4.

²⁰¹ Deposition of Paul Cuneo at 41, *Cmtys for a Better Env't v. Unocal Corp.* (No. 997011) (on file with the Harvard Environmental Law Review).

²⁰² *Id.* at 44.

²⁰³ Arndt, *supra* note 200, at C1.

²⁰⁴ *Dramatic Gains for MTBE*, *supra* note 1 (quoting energy consultant DeWitt & Co).

²⁰⁵ See Henry A. Waxman, *The Clean Air Act Amendments of 1990: A Symposium, Overview and Critique*, 21 ENVTL. L. 1721, 1732 (1991).

the petroleum industry) choose the best alternative fuel.²⁰⁶ API testified that although the industry was “committed to cooperative research and study efforts with the government on oxygenated fuels,” it was “opposed to government mandating their use.”²⁰⁷ The industry cited ARCO’s voluntary development of EC-1 gasoline for the proposition that industry-developed reformulated gasoline was a preferable alternative to mandatory use of alternative fuels.²⁰⁸ The National Petroleum Refiners Association warned that any congressional mandate that had the effect of drastically changing the composition of fuel would require refiners to expend huge sums to retool their refineries.²⁰⁹ Finally, the industry argued that a national distribution system for conventional gasoline already existed.²¹⁰ Any congressional mandate for the widespread use of alternative fuels might well require a second extremely costly distribution system for those fuels.

The agricultural interests viewed federally mandated alternative fuel requirements as a critical path out of a decades-long economic slump in American agriculture. Alternate fuel advocates optimistically predicted that CAA fuel requirements could eliminate the grain surplus, return idle farmland to production, and reduce federal farm subsidies, which at the time exceeded \$12 billion.²¹¹ As it became clear to the agricultural interests that they were not likely to persuade Congress to mandate a major change in the existing gasoline delivery infrastructure, they attempted to craft language that would ensure that ethanol was the oxygenate that refiners used in reformulated gasoline.

In early debates, environmental groups urged Congress to continue to tighten emissions standards for automobiles, and they supported alternative fuel requirements. They also emphasized the importance of considering fuel-related pollutants, like formaldehyde, benzene, and toluene, that were toxic in high enough concentrations.²¹² Late in the debates, as

²⁰⁶ Sharon Begley, *Keep Holding Your Breath*, NEWSWEEK, June 4, 1990, at 68; Thomas W. Lippman, *Gasoline Formula Fuels Controversy*, WASH. POST, June 12, 1990, at D1.

²⁰⁷ *Alternative Automotive Fuels: Hearings on H.R. 168, 1595, 2031, and 2052 Before the Subcomm. on Energy and Power of the House Comm. on Energy and Commerce*, 100th Cong. 305 (1987) [hereinafter *1987 Hearings on Alternative Fuels*] (statement of Dixon Smith, Gen. Manager, Chevron USA, on behalf of API). In API’s view mandatory fuel requirements “inject[ed] serious market distortions and inflexibilities, thereby restricting consumer choices and increasing consumer costs.” *Id.*

²⁰⁸ Henry A. Waxman et al., *Cars, Fuels, and Clean Air: A Review of Title II of the Clean Air Act Amendments of 1990*, 21 ENVTL. L. 1947, 1975 (1991).

²⁰⁹ *1987 Hearings on Alternative Fuels*, *supra* note 207, at 315 (statement of Urvan Sternfels, President, National Petroleum Refiners Association).

²¹⁰ *Air Pollution: Critics say Bush, Senate Backtrack on Alternative Fuels Section in Air Bill*, 20 Env’t Rep. (BNA) 1816, 1817 (Mar. 2, 1990) (interview with Allen Kozinski, vice president for research and development at Amoco Oil Co.).

²¹¹ *1987 Hearings on Alternative Fuels*, *supra* note 207, at 134 (statement of Rep. Richard J. Durban).

²¹² See, e.g., *Alternative Motor Vehicle Fuels: Hearing Before the Subcomm. on Energy Research and Dev. of the Senate Comm. on Energy and Natural Res.*, 101st Cong. 105-06 (1989).

the tide shifted away from mandating non-petroleum alternative fuels, and moved closer to allowing MTBE-blended reformulated gasoline, environmental groups became more vocal in their insistence that reformulated fuels reduce levels of benzene as well as VOC emissions.

The bill that ultimately became the CAA Amendments of 1990 was introduced and passed out of committee with no provision for a reformulated gasoline program. It did create a winter oxygenate program, and MTBE was mentioned as a potential oxygenate to be used in that program, as were ethanol and ETBE.²¹³ No mention was made in the Senate Report of the impact of any of the possible additives on groundwater.

The highly contentious deliberations over clean air legislation dragged on in Congress for two years without any sign of significant progress when, on June 12, 1989, the Bush Administration attempted to break the logjam by offering a "Clean Air Plan."²¹⁴ Among the tools for accomplishing the Administration's ambitious goal would be volatility controls on gasoline during the summer months and an alternative fuels program to be implemented in the most heavily polluted urban areas.²¹⁵ The proposal did not contain a program for reformulated gasoline. Indeed, the petroleum industry, noting that White House counsel C. Boyden Gray and some EPA officials had been long-time advocates of alternative fuels, charged that the Bush Administration's CAA proposal was biased against reformulated gasoline.²¹⁶

The Administration ultimately came around to the petroleum industry's preferred "fuel neutral" position, and EPA urged a Senate subcommittee to rely on market forces to sort out the details of low emissions fuel use.²¹⁷ A new draft of the Administration bill, which resulted from closed-door negotiations between Administration and Senate staff, for the first time provided for a reformulated gasoline program in March 1990.²¹⁸ Environmental critics charged that this was a thinly veiled attempt to substitute a weak reformulated gasoline program for a strong clean fuels program.²¹⁹

²¹³ S. REP. NO. 100-231 at 151 (1987); Report of the Committee on Environment and Public Works, Cal No. 453, Clean Air Standards Attainment Act of 1987 (1987), Cong. & Admin. News 9435 (1988), at 9459.

²¹⁴ White House, Fact Sheet: President Bush's Clean Air Plan, 25 WKL. COMP. PRES. DOC. 882 (June 12, 1989).

²¹⁵ *Id.*

²¹⁶ See Mark Emond, *Why Industry is Concerned About Alternative Fuel Plan; Clean Air Rules—Methanol*, NAT'L PETROLEUM NEWS, Nov. 1989, at 60; *Methanol Bias Denied by the Administration; Bush Administration Clean Fuels Program*, CHEM. MKTG. REPORTER, Oct. 23, 1989, at 3.

²¹⁷ *Alternative Fuels: Hearing Before the Subcomm. on Envtl. Prot. of the Senate Comm. on the Env't and Pub. Works*, 101st Cong. 17-34 (1990) (statement of William Rosenberg, Assistant EPA Administrator for Air).

²¹⁸ *Critics Say Bush, Senate Backtrack on Alternative Fuels Section in Air Bill*, *supra* note 210, at 1816.

²¹⁹ *Id.*

As the new bill was being debated on the floor of the Senate, Senators Tom Harkin (D-Iowa), Tom Daschle (D-S.D.) and Bob Dole (R-Kan.) introduced an amendment under which refiners would have to reduce the ozone forming potential of the gasoline sold in the nine most seriously polluted ozone nonattainment areas by 15% while adhering to a 2.7% oxygen requirement and keeping aromatics below 25%.²²⁰ Senator Harkin explained that the measure was a compromise that would “open up a large market for cleaner burning fuel additives such as ethanol, ETBE, and MTBE,” and he promised that the compromise would “begin the process of removing toxic chemicals at the source, before they enter the fuel distribution system, the motor vehicles, and ultimately the air that we breathe.”²²¹ The Daschle amendment passed by voice vote. Nowhere in the House or Senate debates were the adverse environmental effects of MTBE on groundwater even mentioned.

The new statute required EPA to promulgate regulations establishing requirements for “reformulated” gasoline to be used in heavily polluted ozone nonattainment areas.²²² The regulations had to “require the greatest reduction in emissions of ozone-forming VOCs (during the high ozone season) and emissions of toxic air pollutants (during the entire year) achievable through the reformulation of conventional gasoline, *taking into consideration* the cost of achieving such emission reductions, *any nonair-quality* and other air-quality related *health and environmental impacts* and energy requirements.”²²³ EPA’s regulations also had to require that reformulated gasoline have an oxygen content not less than 2.0% by weight, a benzene content of not more than 1.0% by volume, and no heavy metals.²²⁴ EPA could waive the oxygen content requirement if it determined that compliance would interfere with the ozone standard.²²⁵ Finally, the statute provided a specific statutory formula for the content of reformulated gasoline that would apply unless EPA wrote “performance standards” capable of achieving specific statutory goals.²²⁶

IV. EXPLAINING THE MTBE FIASCO

This Part of the Article will explore eight plausible theories for the causes of the MTBE fiasco. Although it has been suggested that some of these theories can help explain the MTBE problem, a number of them have not been tested against the MTBE experience. Some of the suggested theories are, we shall discover, highly implausible to anyone with even a

²²⁰ 136 CONG. REC. S3504, 136 Cong. Rec. 5885 (1990).

²²¹ *Id.*

²²² 42 U.S.C. § 7545(k)(1) (2000).

²²³ *Id.* (emphasis added).

²²⁴ 42 U.S.C. § 7545(k)(2) (2000).

²²⁵ 42 U.S.C. § 7545(k)(2)(A).

²²⁶ 42 U.S.C. § 7545(k)(3) (2000).

passing familiarity with the MTBE facts. Other theories examined below are considerably more compatible with MTBE's regulatory reality. The purpose of this exercise is to gain insights on how MTBE-like crises can be avoided in the future.

A. *The Perversity Thesis*

A frequently encountered theme in the criticism of existing health, safety and environmental regulation is the "perversity thesis." Skeptics of regulation in academia and numerous industry-funded think tanks insist that government intervention into private economic arrangements is generally a bad idea because it usually does more harm than good to the very interests that the government intends to protect.²²⁷ For example, Professor Cass Sunstein has alluded to "paradoxes" of regulation through which, in his view, health and safety regulation increases health and environmental risks.²²⁸ Although the MTBE story at first glance appears to support the perversity thesis at several critical points, a closer examination reveals not perverse regulation but lack of foresight on the part of both government and the regulated industry.

Documented cases of the perversity theory in action, though rare, are not impossible to find.²²⁹ For example, when the Consumer Product Safety Commission promulgated a flammability standard for children's sleep-

²²⁷ See LESTER LAVE, *THE STRATEGY OF SOCIAL REGULATION* 23-25 (1981); *RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT* 33 (John D. Graham & Jonathan B. Wiener eds., 1995); AARON WILDAVSKY, *SEARCHING FOR SAFETY* (1988). For a comprehensive exposition and critique of the perversity thesis, see ALBERT O. HIRSCHMAN, *THE RHETORIC OF REACTION* (1991).

²²⁸ Cass R. Sunstein, *Paradoxes of the Regulatory State*, 57 U. CHI. L. REV. 407 (1990); Cass R. Sunstein, *Administrative Substance*, 1991 DUKE L.J. 607, 629 (1991); Cass R. Sunstein, *Health-Health Tradeoffs*, 63 U. CHI. L. REV. 1533 (1996); see also John D. Graham & Jonathan B. Wiener, *Confronting Risk Tradeoffs*, in *RISK VERSUS RISK*, *supra* note 227, at 1; Stephen Breyer, *Beyond the Vicious Circle*, 3 N.Y.U. ENVTL. L.J. 251 (1995). Professor Sunstein describes several mechanisms through which regulation may increase health risks:

A regulatory ban may result in independent health risks coming from ancillary replacement risks.

Regulation may produce a new offsetting risk that is qualitatively similar to or indistinguishable from the target risk.

Regulation may force society to forego "opportunity benefits."

Regulated substances may create health benefits as well as health risks.

Regulation of one risk may protect a certain group of people while imposing a new risk on another group.

[T]he economic costs imposed by regulation may create health risks.

Sunstein, *Health-Health Tradeoffs*, *supra* at 1541-42.

²²⁹ See *RISK VERSUS RISK*, *supra* note 227, at 37; WILDAVSKY, *supra* note 227, at 48-49.

wear, some manufacturers responded by treating the sleepwear with the chemical TRIS, which was later found to be carcinogenic.²³⁰ The message of the perversity thesis is that agencies should address ancillary risks that flow from the conduct required or induced by their regulations to ensure that the regulation does not do more harm than good.²³¹

A straightforward application of the perversity thesis would suggest that the MTBE crisis was a perverse and unanticipated result of EPA's decision to phase lead out of gasoline. The agency's decision only made things worse because it paid no attention to how the industry would react to the intervention. The phase-out provided an incentive to the industry to find another fuel additive, and the possibility that the substitute would create an even worse environmental problem was never considered. For several reasons, however, the perversity thesis seems ill-suited to the MTBE facts in the early 1970s.

Congress had, in fact, anticipated the possibility of perverse effects of regulating fuels and fuel additives when it explicitly provided that EPA could only prohibit the use of an existing fuel additive if the ban would "not cause the use of any other fuel or fuel additive which will produce emissions which will endanger the public health or welfare to the same or greater degree than the use of the fuel or fuel additive proposed to be prohibited."²³² The D.C. Circuit found that "the purpose behind" that provision was "avoidance of counterproductive results."²³³ It is hard to imagine a more straightforward injunction to the agency to avoid the perverse effects of regulation. At the same time, it is hard to fault the agency for failing to anticipate MTBE's adverse effects on groundwater at the time that it decided to phase lead out of gasoline. The petroleum industry had not yet attempted to register MTBE as a gasoline additive, and its initial reaction was to change the mix of alkylates and aromatics in gasoline to keep octane levels up in the absence of lead.

The perversity theory explains the MTBE crisis only in the tautological sense that it probably would not have happened if EPA had not phased lead out of gasoline. On this basis, however, the perversity theory explains every unanticipated adverse effect of a regulatory intervention, and it is contradicted by every successful intervention. Indeed, there is no reason to believe that the world is worse off with lead out of gasoline, even if one compares the present MTBE-contaminated world with the hypothetical world that would have existed in the absence of the lead phase-down. That hypothetical world would almost certainly have been

²³⁰ See W. KIP VISCUSI, REGULATING CONSUMER PRODUCT SAFETY 111 (1984).

²³¹ All of the risk-risk tradeoffs described in the case studies of the recent book, RISK VERSUS RISK: TRADEOFFS IN PROTECTING HEALTH AND THE ENVIRONMENT, *supra* note 227, are of this variety. See also Adam M. Finkel, *A Second Opinion on an Environmental Misdiagnosis*, 3 N.Y.U. ENVTL. L.J. 295, 323 n.130.

²³² 42 U.S.C. § 7545(c)(2)(C) (2000).

²³³ Ethyl Corp. v. EPA, 541 F.2d 1, 32 n.67 (D.C. Cir. 1976).

populated with urban children experiencing dramatically increasing levels of lead in their blood instead of the dramatically decreasing levels that we see today. It would have had hundreds of thousands of mentally impaired urban children and tens of thousands of children with lead-induced anemia. Moreover, the proper comparison is arguably not between that hypothetical world and the present world, but rather between the present world and the world that would exist if EPA had done an effective job in regulating USTS and in requiring testing for and regulation of MTBE.

Still, the perversity theory might help explain the greatly expanded scope of the MTBE groundwater contamination problem, especially in California, after Congress amended the CAA to require reformulated gasoline. In trying to accomplish the worthy goal of removing toxic aromatics and photochemical oxidant precursors from the air, Congress may have inadvertently caused massive pollution of groundwater. Congress gave no thought at all to the already well-established threat that MTBE posed to groundwater when it debated the reformulated gasoline program, and it is certainly possible that MTBE would not have been used as widely in the absence of the reformulated gasoline program. On the other hand, the major oil companies were "tripping over themselves" to meet public demand for an "environmentally friendly" gasoline, and MTBE had become the "fastest-growing chemical in the world"²³⁴ almost a year before Congress enacted the reformulated gasoline requirements. Thus, it is not at all clear that wells contaminated with MTBE after the implementation of the reformulated gasoline program would not have been contaminated with MTBE even if the program had never been enacted.

B. Multi-Media Integration

For many years, observers of EPA have complained of the agency's balkanized organization and the tendency of its single-media programs to ignore the impact of their actions on other media.²³⁵ They have urged EPA to pursue a more "integrated" approach under which every decision-maker considers the impacts of the agency's decisions on air quality, water quality, soil quality, and the quality of any other relevant media.²³⁶ Some critics believe that the core of the problem lies in Congress's committee structure and the single-media focus of the statutes that Congress has enacted.²³⁷ An oft-cited study prepared for EPA by the National Academy

²³⁴ *Dramatic Gains for MTBE*, *supra* note 1 (quoting energy consultant DeWitt & Co.).

²³⁵ See TELLUS INSTITUTE, *REINVENTING ENVIRONMENTAL REPORTING: AN INTEGRATED, POLLUTION PREVENTION-BASED APPROACH* at iii (1998) (reporting that "current environmental reporting requirements reflect a medium-specific patchwork of pollution control regulations that do little to achieve the goals of reliable, comparable, timely—and understandable—information reporting").

²³⁶ NATIONAL ACADEMY OF PUBLIC ADMINISTRATION, *SETTING PRIORITIES, GETTING RESULTS: A NEW DIRECTION FOR THE U.S. ENVIRONMENTAL PROTECTION AGENCY* (1995).

²³⁷ See Jan Mazurek, *Back to the Future: How to Put Environmental Modernization*

of Public Administration recommended that EPA “should begin work on a reorganization plan that would break down the internal walls between the agency’s major ‘media’ program offices for air, water, waste, and toxic substances.”²³⁸ The Progressive Policy Institute has recommended that Congress “integrate” all of the pollution control statutes into a single comprehensive law.²³⁹ EPA’s failure to adopt an integrated multi-media approach to MTBE clearly contributed to the MTBE groundwater crisis, but it was difficult for the agency to elevate cross-media impacts to the level they merited when the regulated industry was forcefully pressing ahead with MTBE in “environmentally friendly” gasoline and belittling the risks of leaking USTS.

The “multi-media failure” thesis posits that the MTBE crisis resulted from EPA’s failure to examine the cross-media implications of its actions during the critical regulatory interventions. Thus, the Progressive Policy Institute’s Jan Mazurek suggests that “[b]ecause MTBE was designed to uphold federal air pollution requirements, there was no comparable requirement for regulators to study its potential effects in groundwater”²⁴⁰ and implies that had there been such a requirement, the MTBE crisis would have been avoided. Although the multi-media failure explanation has considerable appeal at first glance, it loses some of its explanatory power under careful scrutiny.

The CAA did not require EPA to consider the cross-media effects of its decision to require the petroleum industry to make unleaded gasoline available to protect catalytic converters. The statute did require EPA to consider the likely alternatives to lead when it removed lead from gasoline to protect public health, but Congress limited that consideration to the *air emissions* produced by alternative fuel additives.²⁴¹ EPA did not consider any adverse effects of potential substitute additives on groundwater. Yet, as suggested above, it is hard to imagine how EPA could have anticipated the move to MTBE at the time that it ordered lead out of gasoline, because the industry had not yet registered MTBE and was not even contemplating its use at that time. For EPA, there was time enough to think about the cross-media impact of MTBE after it became the petroleum industry’s additive of choice to replace lead.

At the critical decision point in 1979 when EPA provided the waiver allowing the petroleum industry to use MTBE in gasoline, however, EPA also failed to consider cross-media impacts. EPA may grant a waiver upon a

Back on Track, 4 (PPI Policy Report 2003) (observing that “the laws to address pollution are . . . extraordinarily *piecemeal*, passed by Congress to control problems as they occur by environmental medium (air, water, and land)”) (emphasis in original), available at http://www.ppionline.org/documents/Enviro_BacktotheFuture_0403.pdf (last visited Mar. 19, 2004).

²³⁸ NATIONAL ACADEMY OF PUBLIC ADMINISTRATION, *supra* note 236.

²³⁹ Mazurek, *supra* note 237, at 12.

²⁴⁰ *Id.* at 4. The claim is made in a three-paragraph section to support the proposition that “[c]ommand-and-control laws merely move pollution around.” *Id.*

²⁴¹ 42 U.S.C. § 7545(c)(2)(C) (2000).

showing that the additive would not poison emission control devices or otherwise increase air emissions.²⁴² The agency also had the authority to limit or prohibit the use of any fuel additive upon a finding that air emissions from that additive "may reasonably be anticipated to endanger" public health or welfare. The provision empowered EPA to consider cross-media impacts, but apparently permitted the Administrator to consider only air emissions.²⁴³ By 1979, EPA could have acted under section 6 of TSCA to limit or prohibit the use of MTBE, but EPA would have been obliged to initiate a lengthy and resource-intensive rule-making proceeding aimed at limiting or prohibiting the use of MTBE. Since manufacturers of MTBE had produced precious little information on the health and environmental effects of the chemical on any receiving medium, there was no way for EPA to know about MTBE's potential cross-media impacts, much less do anything about them. Even if a farsighted EPA employee had connected the dots between MTBE's high solubility and the groundwater beneath leaking USTS, EPA would still have had the burden of demonstrating on a rule-making record that MTBE posed an unreasonable risk to groundwater resources.²⁴⁴

Although the petroleum industry was equally uninformed about the health and environmental effects of MTBE at the time that ARCO received its waiver, it knew a great deal more than EPA about the deteriorating state of leaking USTS throughout the country. By the mid-1970s, API had established three task forces to address the problem. As the refining departments of the major oil companies adopted the MTBE option for enhancing octane, their marketing departments were undoubtedly connecting the dots. They knew full well that groundwater throughout the U.S. would soon become contaminated with MTBE, and they proceeded despite that knowledge.²⁴⁵ Lacking that knowledge and any information on the health or environmental effects of MTBE, EPA was powerless to protect groundwater from MTBE at the critical juncture when it provided the waiver that allowed MTBE to be blended into gasoline.

EPA had the power under TSCA to learn more about MTBE's potential negative impacts on groundwater. TSCA is one of the few statutes that EPA administers that is not oriented toward a single medium, and it

²⁴² 42 U.S.C. § 7545(f)(4) (2000). If EPA does not act to deny a waiver on the grounds articulated in the statute within 180 days, the waiver is deemed granted. *Id.*

²⁴³ 42 U.S.C. § 7545(c)(1) (2000).

²⁴⁴ 15 U.S.C. § 2605 (2000); *Corrosion Proof Fittings v. EPA*, 947 F.2d 1201 (5th Cir. 1991); Thomas McGarity, *The Courts and the Ossification of Rulemaking: A Response to Professor Seidenfeld*, 75 TEX. L. REV. 525 (1997).

²⁴⁵ See Memorandum from B.J. Mickelson to J.M.M. Mixer re: Introduction of Methyl Tertiary Butyl Ether (MTBE) in the Texas Eastern Transmission, Jacksonville, Florida; Charleston, South Carolina; and Wilmington, North Carolina Areas (Apr. 19, 1985) (on file with the Harvard Environmental Law Review). Mickelson, an Exxon engineer, informed a marketing department manager of MTBE's environmentally damaging characteristics in groundwater. *Id.*

encourages EPA to include a broad range of health and environmental considerations in the decision-making process. Once it became clear that the petroleum industry was beginning to use MTBE in very high volumes to replace tetra-ethyl lead as an octane enhancer, the ITC nominated MTBE for further testing.²⁴⁶ At the very first focus meeting on the testing rule, EPA's representative noted that groundwater contamination from as many as 21,000 leaking USTS was "an additional concern."²⁴⁷

The petroleum industry, however, assured EPA that MTBE's low toxicity ensured that it would not pose a public health threat in groundwater where it would, the industry asserted, rapidly degrade. The first observation was entirely circular. EPA could not know whether or not MTBE's toxicity was low until a full range of toxicity tests had been undertaken. EPA understood this and insisted on chronic carcinogenicity testing in two species as part of the agreed-upon testing rule. Subsequent developments have also disproved the industry's biodegradation claim. Had EPA required testing of MTBE's biodegradability in groundwater in the testing agreement, this information would have been available to the agency much sooner. Yet while the industry resisted any attempt by EPA's staff to adopt a multi-media approach to the testing rule, EPA is perhaps more blameworthy in this regard because the agency had a responsibility under TSCA to consider all receiving media in exercising its authority to protect human health and the environment.

At about the same time that EPA's Office of Toxic Substances ("OTS") was preparing the MTBE testing rule and long after its Office of Mobile Sources ("OMS") had granted a waiver for MTBE use in gasoline, EPA's Office of Underground Storage Tanks ("OUST") was concluding in its USTS rule-making that leaks from USTS could be reduced but never prevented entirely. OUST assumed that the threat of release from USTS would continue, albeit at reduced levels, but did nothing to address the threat that MTBE posed to groundwater. To the contrary, in support of its conclusion that double-walled tanks were not "justified," the agency confidently predicted that "widely available" technologies for cleaning up "petroleum products" provided "the means to ensure that adverse impacts from such releases (when they occur) can be managed and remediated."²⁴⁸ The special difficulties of remediating MTBE contaminated sites, which were well known at least to the industry at that time, apparently did not affect this optimistic assessment.

²⁴⁶ The ITC can, perhaps, be faulted for taking so long (almost seven years) to get around to nominating MTBE for further testing, but the use of MTBE in gasoline rose very rapidly in the early 1980s. Government agencies can rarely match the speed with which a huge industry like the petroleum refining industry can change. Absent a gatekeeper statute that prevents a potentially toxic substance from being marketed until it has been adequately tested, the government is always playing catch up.

²⁴⁷ EPA Public Focus Meeting Minutes, *supra* note 148.

²⁴⁸ Underground Storage Tanks, Technical Requirements, 53 Fed. Reg. 37,082, 37,101 (Sept. 23, 1988).

While the USTS technical standard-setting exercise supports the multi-media failure thesis, EPA's USTS technical regulations might not have been more stringent even if OUST had considered MTBE's unique potential to contaminate drinking water supplies. The petroleum industry strongly resisted stringent USTS regulation and pressed ahead with MTBE as the preferred lead substitute and oxygenate, although it was well aware of the inevitability of USTS leaks and of the resistance of MTBE to biodegradation. Meanwhile, EPA was clearly not in the business of enacting stringent regulations over the objections of the industry in 1987 and 1988.

Congress undoubtedly failed to consider the by then well-known potential for MTBE to contaminate groundwater when it enacted the winter oxygenate and reformulated gasoline requirements of the 1990 CAA Amendments. Although Congress was aware of the fact that both of those provisions envisioned the use of MTBE in gasoline, the risks that MTBE posed to groundwater resources were not discussed at any point in the reports or the debates. It is perhaps worth noting that Congress required reformulated gasoline in certain ozone nonattainment areas, but it did not require the industry to use MTBE in that reformulated gasoline. At the petroleum industry's urging, Congress allowed the market to decide how the performance-based requirements that it enacted would be implemented.²⁴⁹ In promulgating the regulations, however, EPA was obliged to take into consideration "*any nonair-quality and other air-quality related health and environmental impacts.*"²⁵⁰ Thus blame for any failure to take into account cross-media considerations adequately may arguably fall on EPA's shoulders for promulgating performance-based regulations that allowed MTBE to be used in reformulated gasoline.

It is also worth noting that the industry may well have adopted "environmentally friendly" MTBE-blended reformulated gasoline even if the CAA had not required it in certain areas. As noted above, the companies were "tripping over themselves" to produce an "environmentally friendly" gasoline in the early 1990s,²⁵¹ and it seems reasonably clear that the industry was not concerned with the cross-media impacts of its decision to use MTBE to reduce air emissions. When asked whether ARCO made any effort to balance the air quality benefits of MTBE, which ARCO conspicuously touted in the advertising brochures for its EC-1 reformulated gasoline, with the risks that it posed to groundwater, a high level ARCO employee replied that "it would have been presumptuous of us to do that."²⁵² He explained that "EPA was doing it They're . . . the ones that were passing those regulations, not us. We were simply providing

²⁴⁹ 42 U.S.C. § 7545(k)(1) (2000).

²⁵⁰ *Id.* (emphasis added).

²⁵¹ Arndt, *supra* note 200, at C1.

²⁵² Deposition of Edward G. Guetens, Jr. at 108, *Cmtys. for a Better Env't v. Unocal Corp.* (Cal. Super. Ct., S.F. Cty.) (No. 997011).

information if they asked for it.”²⁵³ The industry, in other words, did not presume to balance the air quality benefits of MTBE against its groundwater quality risks, even though it was in the best position to produce and evaluate the information on both sides of the balance.

In sum, it is clearly wrong to suggest that EPA’s failure to adopt a multi-media approach stemmed from a failure of the statutory regime. TSCA empowered EPA to do precisely that, and the CAA amendments to which Ms. Mazurek was apparently referring in her critique specifically required EPA to consider nonair-quality impacts in promulgating reformulated gasoline regulations. It is also wrong to suggest that EPA failed to consider cross-media impacts because the right hand did not know what the left hand was doing. EPA’s OTS staff was fully aware of what its OUST staff knew about the presence of MTBE in groundwater near many USTS at the time that EPA negotiated a testing agreement that did not require testing of the health effects of MTBE in groundwater. More importantly, EPA’s OUST staff knew that MTBE was in gasoline when it wrote lenient USTS technical standards that declined to require double-walled tanks and deferred to industry-promulgated national consensus standards. It is by no means clear that a fully “integrated” agency would have reached different decisions at either of those two critical decision points. The problem was not lack of knowledge, but a lack of the political will to address the special problems of MTBE during a deregulatory period of EPA’s existence.

The multi-media failure thesis, however, does help explain Congress’s decision to require reformulated gasoline in badly polluted ozone nonattainment areas. Congress should have considered the cross-media impacts of the reformulated gasoline requirement, and it did not do so. Yet it is not clear how Congress could have informed itself about those impacts in the absence of an interest group with the desire and wherewithal to bring them to the attention of congressional allies. Although Congress has the institutional responsibility to consider all aspects of the public interest, it is a fact of legislative life that interest groups that do not have the knowledge or wherewithal to make themselves heard will be ignored. If the decision to move to reformulated gasoline tends to validate the multi-media failure thesis, it also represents a failure of the interest group pluralism model of congressional decision-making.

C. “Sound Science”

One of the most frequently articulated themes of the so-called “regulatory reform” movement is the asserted need to strengthen the scientific basis for health and environmental regulation. During the extensive debates over regulatory reform legislation in the 104th Congress, regulatory reformers

²⁵³ *Id.* at 109.

argued that agencies like EPA and OSHA ignore “sound science” in their zeal to write stringent regulations to implement ultra-protective regulatory policies.²⁵⁴ In part, the “sound science” critique of federal regulation represents a rejection of the suggestion that public perceptions of risk should guide health and environmental decision-making.²⁵⁵ In part, it also represents a deep skepticism of the quality of science that agencies use in writing regulations with heavy economic consequences. The recently enacted Data Quality Act,²⁵⁶ which was quietly inserted as a rider into a House Appropriations Bill in 2000,²⁵⁷ reflects the judgment of its industry-supported drafter that government-disseminated information “has the potential to do great harm if it is inaccurate, incomplete, or misunderstood.”²⁵⁸ In the case of MTBE, however, the regulated industry, and not the government, is much more responsible for the lack of sound scientific information in the decision-making process.

In recent testimony to a House Subcommittee on legislation to elevate EPA to Cabinet status, the vice president of the U.S. Chamber of Commerce recommended that the bill include substantive provisions for ensuring that EPA practice “sound science” in regulatory decision-making.²⁵⁹

²⁵⁴ According to Chairman of the Republican National Committee Haley Barbour, “[w]e want to protect the environment, but environmental protection must be risk-based. It must be based on science, and not on scare tactics or popular politics.” *Republican Win May Mean Overhaul in Regulatory System*, 246 CHEM. MKTG. REP., Nov. 14, 1994, at 3; see also John D. Graham, *The Risk Not Reduced*, 3 N.Y.U. ENVTL. L.J. 382, 393–95 (1994); *Hearings on H.R. 9, Section III, Risk Assessment and Cost/Benefit Analysis for New Regulations before the Subcomm. on Health and Env’t and the Subcomm. on Commerce, Trade, and Hazardous Materials of the House Comm. on Commerce*, 104th Cong. (1995) [hereinafter *Risk Assessment Hearings*] (statement of Roger O. McClellan, President of Chemical Industry Institute of Toxicology) (“Risk assessments that are scientifically sound are required as major input for making decisions intended to reduce health or environmental risks in an effective and efficient manner.”); *id.* at 301 (statement of Don Ritter) (“Currently, neither Congress nor the agencies make the most effective use of science to help them make decisions in the early stages of the legislative or policy process, and all too often to use science inappropriately to justify decisions made on policy or political grounds.”).

²⁵⁵ See Frank B. Cross, *The Risk of Reliance on Perceived Risk*, 3 RISK—ISSUES IN HEALTH AND SAFETY 59 (1992) (warning that reliance on public perceptions of risk invites powerful elites to attempt to manipulate risk perception); Richard B. Belzer, *Is Reducing Risk the Real Objective of Risk Management?*, in *WORST THINGS FIRST? THE DEBATE OVER RISK-BASED NATIONAL ENVIRONMENTAL PRIORITIES* 167, 178 (Adam M. Finkel & Dominic Golding eds., 1994). Professor Sunstein suggests that the tendency of members of the lay public to demand regulation when apprised in the media of particular instances of environmental degradation is a function of the “availability heuristic,” through which people tend to prefer options that readily come to mind. Cass R. Sunstein, *Which Risks First?* 1997 U. CHI. LEGAL F. 101, 118.

²⁵⁶ Consolidated Appropriations Act of 2001, Pub. L. No. 106-554, § 515, 114 Stat. 2763, 2763A153 to -154 (2000).

²⁵⁷ See Donald T. Hornstein, *Accounting for Science: The Independence of Public Research in the New, Subterranean Administrative Law*, 66 LAW & CONTEMP. PROBS. 227, 232 (2003).

²⁵⁸ Center for Regulatory Effectiveness, *Draft Outline for Legislation on Integrity and Dissemination of Federal Information* (Nov. 12, 1997) (on file with the Harvard Environmental Law Review).

²⁵⁹ *EPA Elevation: Hearings Before the Subcomm. on Energy Policy, Natural Res. and*

In support of that position, its spokesman asserted that "EPA's failure to adequately familiarize itself with the oxygenate MTBE led oil companies to spend \$7 billion converting refineries." He complained that "[o]nly after these funds had been invested did EPA recommend reducing the use of MTBE because it could leak from gas stations and underground storage tanks into groundwater."²⁶⁰ The Chamber also blamed EPA for the billions of dollars that would have to be spent cleaning up MTBE-contaminated groundwater.²⁶¹ When read against the history of EPA's efforts to regulate MTBE and the industry's consistent and vigorous attempts to prevent or forestall that regulation, the Chamber's "unsound science" explanation for the MTBE crisis seems grossly misplaced.

The industry forcefully challenged the factual basis for EPA's decisions to require unleaded gasoline to protect catalytic converters and to phase lead out of gasoline to protect public health. Indeed, some of the classic administrative law statements on the nature of judicial review of the factual basis for rule-making were uttered during the D.C. Circuit's resolution of those very disputes. For example, in the appeal of EPA's decision on unleaded gasoline, the court observed that "a rule-making agency necessarily deals less with 'evidentiary' disputes than with normative conflicts, projections from imperfect data, experiments and simulations, educated predictions, differing assessments of possible risks, and the like."²⁶² Because the rule-making process is "*quasi*-legislative in character," the agency was not obliged to refrain from regulating until perfect scientific data became available.²⁶³ In the lead phase-down case, the agency sifted through thousands of pages of documents, three lengthy published health documents, and hundreds of comments. Not all of the studies would have passed the most stringent tests of scientific validity, but the agency considered them all in concluding from the "totality of the evidence" that lead in gasoline endangered public health.²⁶⁴ A deeply divided court held that this analysis passed the "arbitrary and capricious" test of the Administrative Procedure Act.²⁶⁵ The majority found "the Administrator's analysis of the evidence and assessment of the risks to be well within the flexibility allowed by the 'will endanger' standard."²⁶⁶ The evidence before the agency would probably not have passed the stringent tests for data quality offered by modern proponents of "sound science" in regulatory decision-making, but it was enough at the time to survive judicial review.

Regulatory Affairs of the House Comm. on Gov't Reform, 107th Cong. 275 (2002) (statement of William L. Kovacs), available at [http://reform.house.gov/UploadedFiles/Printed%20Hearing_9-21-01_3-21-02_7-16-02_EPA%20Elev.%20\(107-135\).pdf](http://reform.house.gov/UploadedFiles/Printed%20Hearing_9-21-01_3-21-02_7-16-02_EPA%20Elev.%20(107-135).pdf).

²⁶⁰ *Id.* at 274.

²⁶¹ *Id.*

²⁶² *Amoco Oil Co. v. EPA*, 501 F.2d 722, 735 (D.C. Cir. 1974).

²⁶³ *Id.*

²⁶⁴ *Ethyl Corp. v. EPA*, 541 F.2d 1, 47 (D.C. Cir. 1976).

²⁶⁵ *Id.*

²⁶⁶ *Id.*

In EPA's decision to grant the 1979 MTBE waiver, science played only a very limited role. Under the statute, the entity requesting a waiver had to provide EPA with sufficient data to demonstrate that the new fuel would not interfere with pollution control devices. When Texas Petrochemical failed to provide adequate data, EPA denied its waiver request. When ARCO provided adequate data, it got a waiver. No one suggested at the time that the data upon which EPA based the waiver was "unsound," and later experience has demonstrated that MTBE does not interfere with catalytic converters. Thus, the failure to employ "sound science" does not explain MTBE's presence in gasoline after 1979. Indeed, had EPA attempted to regulate MTBE at that juncture for the purpose of protecting public health, the industry would certainly have objected to any attempt to employ the statutory "will endanger" test because of the dearth of toxicological data on MTBE at that time. Thus "sound science" principles would have operated to keep MTBE in gasoline, not to remove it, in 1979.

If "sound science" means anything in the context of the MTBE experience, it means decision-making informed by a complete set of relevant toxicological and environmental fate data. Yet throughout EPA's three-year attempt to require the manufacturers of high-use chemicals to test for adverse health and environmental impacts, the industry strongly resisted any additional testing. Four years before the ITC began to consider whether to list MTBE, the industry had initiated a fairly comprehensive set of toxicity tests, but it later decided not to complete Phase Two of the testing program in the hope that the Phase One tests (which did not even include carcinogenicity testing) would be enough to "preclude . . . an unnecessary test rule by EPA under TSCA."²⁶⁷ After the ITC consultant issued a report identifying many significant data gaps and recommending additional testing to fill those gaps, the industry launched a major initiative to avoid an EPA rule requiring "time consuming and expensive" testing.²⁶⁸ Although it is unclear why the testing rule that did emerge in 1988 did not require testing of MTBE in drinking water, one plausible explanation is the industry's assurances that MTBE losses from leaking USTS would be "extremely small"²⁶⁹ and would present "very little cause for concern of health hazards with MTBE."²⁷⁰

If "sound science" required more or better information on MTBE's potential risks to health and the environment at critical decision points, it was the industry, not EPA, that prevented that information from becom-

²⁶⁷ API critique, *supra* note 132, at 3.

²⁶⁸ Kilmartin & DeJovine, *supra* note 140, at 2. On July 9, 1986, the Oxygenated Fuels Association (OFA) hosted a meeting to discuss health and safety issues related to MTBE in light of the CRS report. *Id.* at 1. On April 3, 1986, API circulated the CRS report to the members of its TSCA/ITC Workgroup and invited them to a meeting to prepare comments to be filed with the ITC. Fensterheim Memorandum, *supra* note 140, at 1.

²⁶⁹ ARCO Critique, *supra* note 142, at 5.

²⁷⁰ EPA Launches Probe of MTBE Potential Adverse Health Effects, *supra* note 151.

ing available.²⁷¹ Hence, if the MTBE fiasco is attributable to EPA's failure to employ "sound science" in regulatory decision-making, as the Chamber of Commerce asserts, then EPA's experience with the 1988 testing agreement demonstrates that the industry itself is largely to blame.

D. The Synoptic Paradigm

Many observers have argued that environmental regulation could be improved considerably if agencies adopted a "synoptic" approach under which the agency considers a broad range of regulatory options, carefully assesses, quantifies, and monetizes the costs and benefits of each of those options, and adopts the option for which the benefits most exceed the costs.²⁷² Proponents of the synoptic paradigm maintain that cost-benefit analysis is the only "rational" way to go about managing health and environmental risks.²⁷³ The information contained in the analyses should make agency decision-makers aware of all of the impacts of their decisions, thereby reducing the tendency of mission-oriented agencies to reach irrational results.²⁷⁴ In addition, cost-benefit analysis should produce "efficient" regulatory interventions because the analysis ensures that a dollar spent on environmental protection buys a dollar's worth of environmental benefit.²⁷⁵ Thus some versions of the regulatory reform legislation of the 104th Congress would have made cost-benefit balancing a decision criterion for all regulatory agencies.²⁷⁶ To the extent, however, that the synoptic paradigm played a role in the regulation of MTBE, it did more harm than good.

²⁷¹ To the extent that "sound science" played a role in the promulgation of EPA's USTS regulations, it was an exceedingly modest one. Because it was under serious time pressure, EPA did not engage in a scientific assessment of the available leak prevention and detection requirements. In the end it deferred to nationally applicable industry standards. If those standards failed, and it appears that they did fail, it was due to the industry's failure to employ sound science, not the agency's failure.

²⁷² See, e.g., Colin S. Diver, *Policy Making Paradigms in Administrative Law*, 95 HARV. L. REV. 393, 396 (1981); Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562, 569-84 (1992).

²⁷³ THOMAS O. MCGARITY, REINVENTING RATIONALITY 117 ("Many proponents of regulatory analysis believe that it can go a long way toward specifying a result that is the 'correct' solution to the regulatory problem."); S. REP. NO. 104-87, at 10 (1995). ("Improving risk assessment and requiring cost-benefit analysis in the regulatory process will provide a more understandable and rational basis for government officials to manage risk through the regulatory process."); HOUSE REP. NO. 104-33, at 58 (1995) (explaining that the cost-benefit analysis requirement "aims to ensure rationality in both the decisionmaking process and the ultimate decisions by Federal agencies").

²⁷⁴ See MCGARITY, *supra* note 273, at 75, 114-15; Robert W. Hahn, *The Whole Story*, WALL ST. J., Feb. 27, 1995, at A12 ("[T]he requirement for mandatory cost-benefit analyses of regulations whose economic impacts exceed \$50 million will help sensitize regulators to the cost side of the equation—the side that is often hidden from view when bureaucrats and legislators promote pet regulations.").

²⁷⁵ See David M. Driesen, *The Economic Dynamics of Environmental Law* (2003); Lave, *supra* note 227, at 23-25; E. J. MISHAN, ECONOMICS FOR SOCIAL DECISIONS 11-13 (1973).

²⁷⁶ See Robert L. Glicksman & Stephen B. Chapman, *Regulatory Reform and (Breach of) the Contract With America: Improving Environmental Policy or Destroying Environ-*

The synoptic paradigm played little role at all in the original lead phase-down decision in the early 1970s. The statute required EPA to remove additives that would "endanger public health," without any consideration of the economic costs of doing so. Although EPA was required to consider the availability of alternatives, that exercise was only to ensure that the alternatives did not also endanger human health. As the *Ethyl* court later held, the "will endanger" standard allowed EPA to engage in an broad non-quantitative assessment of the health risks posed by fuel additives and to limit or prohibit them if they posed a significant risk to human health.²⁷⁷ Nowhere in the *Ethyl* majority opinions is there any suggestion that EPA had to monetize those risks and balance the monetary value of the health loss to children against the higher costs of alternative fuels and fuel additives. If this decision was ill-considered under the synoptic paradigm because a cost-benefit balancing approach would have considered the potential adverse effects of MTBE on groundwater, then a conclusion that the MTBE crisis stemmed at least in part from EPA's failure to adopt the synoptic approach might be warranted.

John D. Graham, a strong advocate of the synoptic approach and the current Director of OMB's Office of Information and Regulatory Affairs, however, has praised EPA's lead phase-down decision as an example of a successful application of a sound regulatory decision guided by cost-benefit analysis.²⁷⁸ Indeed, the decision that Graham applauds was EPA's 1985 decision to withdraw an earlier proposal to end the phase-down (issued during the fallow Gorsuch years) and to accelerate the phase-down instead. Unlike the original phase-down decision, EPA prepared a complete cost-benefit analysis to support the latter decision.²⁷⁹ The decision itself was an easy one because by then some of the major oil companies had already modified their refineries to make unleaded gasoline (with many employing MTBE as an additive) and were opposed to continued lead use.²⁸⁰ The costs of the decision were comparatively low and were borne mainly by small independent refiners and an odd group of lead blenders that had sprung into existence as a result of the flexibility allowed by the averaging provisions of the original phase-down regulations.²⁸¹

mental Protection?, 5 KAN. J.L. & PUB. POL'Y 9, 16-17 (1996) (explaining how the "supermandate" provision of the House regulatory reform bill "would supersede the standards for making regulatory decisions contained in preexisting environmental statutes by, for example, requiring that regulators justify regulations through cost-benefit analysis even if the governing substantive statute mandated protection of the public health, regardless of the cost of doing so").

²⁷⁷ *Ethyl Corp. v. EPA*, 541 F.2d 1, 13-48 (D.C. Cir. 1976).

²⁷⁸ See George M. Gray et al., *The Demise of Lead in Gasoline*, in *THE GREENING OF INDUSTRY: A RISK MANAGEMENT APPROACH* 17 (J. D. Graham & J. K. Hartwell eds., 1997) (suggesting that the 1985 acceleration of the lead phase-out was a case in which the benefits clearly outweighed the costs).

²⁷⁹ *Id.* at 30.

²⁸⁰ *Id.* at 35.

²⁸¹ MCGARITY, *supra* note 273, at 30.

Interestingly, the analytical documents so highly praised by strong advocates of the synoptic approach did not even mention MTBE, much less analyze its costs and benefits. EPA's decision to accelerate the lead phase-down was apparently not ill-considered under the synoptic paradigm, even though MTBE had by then been in use for several years as an octane enhancer and a wholesale move toward MTBE as a replacement for lead as an octane enhancer was easily foreseeable. If a praiseworthy application of the synoptic paradigm in 1985 failed to address MTBE, a conclusion that the MTBE crisis stemmed from EPA's failure to employ the synoptic approach in 1975, when MTBE was not a credible option, seems misplaced.

EPA did not adopt a synoptic approach to the 1979 waiver, because it was obliged to grant the waiver so long as MTBE would not foul catalytic converters, whatever the resulting costs and benefits. Although EPA could have simultaneously banned or limited MTBE under its "will endanger" authority, there is no reason to believe that the application of the synoptic paradigm could have identified, quantified, and monetized the risks that MTBE posed to groundwater at the time that EPA granted the waiver.²⁸² As discussed above, if a highly praised regulatory analysis prepared in 1985 did not consider MTBE's effects on groundwater, there is little reason to believe that a cost-benefit analysis prepared in 1979 would have considered those effects.

TSCA empowered EPA to order testing upon a finding that sufficient testing was not already available and that the chemical might present an unreasonable risk to the environment or would be produced and enter the environment in substantial quantities or give rise to significant human exposure.²⁸³ Although the statute arguably required a cost-benefit approach to determining whether MTBE might present an unreasonable risk to the environment, it did not require EPA to balance costs against benefits in ordering testing for high-volume chemicals.²⁸⁴ Had EPA undertaken a cost-

²⁸² Even the most prescient regulatory analyst would have encountered huge practical difficulties in attempting a detailed *ex ante* analysis of the costs and benefits of MTBE as an octane enhancer at the time that EPA issued the waiver for MTBE. The benefits analysis would not have been limited to calculating the benefits of removing lead from gasoline, because other alternatives could have accomplished the same result. The proper measure would have been the marginal benefit of MTBE, which on the assumption that other alternatives worked equally well would have been the marginal cost savings of MTBE over the next less expensive alternative. The cost of MTBE would have been the marginal damage that MTBE would predictably cause to groundwater resources over the damage caused by BTEX and other gasoline constituents already present in gasoline. If the agency had anticipated the possibility that MTBE would be flowing into groundwater from thousands of USTS, a good chemist could have predicted that MTBE would disperse farther and faster in groundwater at the time. It would have been virtually impossible, however, for the agency to make even the roughest of estimates of the number of leaking USTS and the number of drinking water facilities within reach of the leakers.

²⁸³ 15 U.S.C. § 2603(a)(1) (2000).

²⁸⁴ The use of the word "unreasonable" in a statute typically connotes a congressional preference for cost-benefit balancing. See Thomas O. McGarity, *Substantive and Proce-*

benefit analysis of alternative testing requirements in 1988, the cost calculation would have been comparatively simple because the costs of various laboratory tests of a chemical's physical characteristics and animal tests of its toxicity can be easily ascertained from the contractors that routinely conduct such tests. Estimating the benefits of additional tests, on the other hand, would have been an exceedingly complex exercise. With the knowledge available to EPA in 1988 of the essential physical characteristics of MTBE and the fact that it was getting into groundwater in the vicinity of service stations, it could have predicted that humans might be exposed to MTBE in drinking water. Quantifying the value of the additional information that those studies would yield would have been much more difficult. It seems clear, however, that a cost-benefit approach, if anything, would not have resulted in EPA requiring more testing requirements than it did pursuant to the testing agreement. The industry negotiated a relatively modest set of testing requirements that did not include testing MTBE in groundwater under a statute that allowed EPA to order testing for high volume chemicals without a detailed consideration of the costs and benefits of that testing. It would certainly have held out for less stringent testing requirements if EPA had been required to justify every test with a detailed quantification and monetization of its costs and benefits.

Under RCRA, as amended by the 1984 HSWA, EPA was required to promulgate leak detection, prevention, and correction regulations "as may be necessary to protect human health and the environment."²⁸⁵ That standard clearly required EPA to consider the health and environmental benefits of alternative technical standards because requirements with few benefits would not be necessary. Costs were not explicitly mentioned in the statute, but it is clear that EPA did take costs into account in promulgating the regulations. Although the statute did not require EPA to balance costs against benefits in promulgating the regulations, the agency explicitly invoked the synoptic paradigm when it concluded that more protective double-walled tank systems entailed "greater capital and installation costs" that did not justify the environmental benefits.²⁸⁶ Thus, insofar as the synoptic paradigm played a role in the promulgation of the USTS regulations, it helped ensure that the MTBE continued to flow into

dural Discretion in Administrative Resolution of Science Policy Questions: Regulating Carcinogens in EPA and OSHA, 67 GEO. L.J. 729, 785-88 (1979).

²⁸⁵ RCRA § 9003(a), 42 U.S.C. § 6991b(a) (2000). The regulations were supposed to contain at least the following requirements: (1) maintenance of a leak detection system, an inventory control system together with tank testing, or a comparable release identification system; (2) maintenance of records for leak detection, inventory control, or comparable system; (3) reporting of releases and corrective actions; (4) corrective actions; and (5) requirements for the closure of tanks to prevent future releases. RCRA § 9003(c), 42 U.S.C. § 6991b(c) (2000).

²⁸⁶ Underground Storage Tanks, Technical Requirements, 53 Fed. Reg. 37,082, 37,102 (Sept. 23, 1988).

groundwater as new and replacement single-walled tanks continued to spring undetected leaks.

Ironically, the synoptic paradigm may have directed congressional attention away from MTBE at the time when Congress considered whether to require reformulated gasoline in certain ozone nonattainment areas. EPA had just completed a widely publicized and much heralded *Unfinished Business* report that represented the agency's first comprehensive attempt to rank the relative risks addressed by the many regulatory programs that EPA administered.²⁸⁷ That report, however, suggested that EPA's UST program was one of a few in which EPA was exerting a high degree of effort to address a low-risk environmental problem.²⁸⁸ The report recommended that resources be shifted from EPA's Superfund and UST programs to other programs.²⁸⁹ Not only were the risks posed by leaking USTs not prominent on the "radar screen" as Congress debated CAA amendments, they were affirmatively being downplayed by EPA's synopticians.²⁹⁰

Analyzing the costs and benefits of large-scale environmental decisions can yield dramatically different estimates, depending upon the assumptions that go into the models employed in the analysis. Since cost-benefit analysis is notoriously manipulable, an application of the synoptic paradigm at any of the critical decision points could well have dictated precisely the result that EPA actually reached. Indeed, it is altogether possible that an analysis of the costs and benefits of the *current* use of MTBE would suggest that governmental action was not appropriate then and is not appropriate now. Perhaps a little MTBE in a small number of drinking water wells is the price that Americans are willing to pay for a relatively inexpensive oxygenate and octane enhancer in gasoline. Since the synoptic paradigm ignores distributional considerations,²⁹¹ it is irrelevant that the benefits of MTBE are enjoyed by all consumers of gasoline while the costs are intensely borne by a small number of neighbors of service stations.

E. Agency Capture

One of the most powerful and persuasive early critiques of the federal regulatory regime of the 1960s was that the agencies charged with protecting the public had become captured by the very industries that posed the threats that the agencies were created to address.²⁹² Early regulatory

²⁸⁷ OFFICE OF POLICY ANALYSIS, EPA, REP. NO. EPA/230/2-87/025a, UNFINISHED BUSINESS: A COMPARATIVE ASSESSMENT OF ENVIRONMENTAL PROBLEMS 94-100 (1987).

²⁸⁸ *Id.*

²⁸⁹ *EPA Report Advises Shift in Priorities*, J. COMMERCE, Mar. 6, 1987, at 8.

²⁹⁰ See Philip Shabecoff, *E.P.A. Report Says Agency Focuses on Lesser Problems*, N.Y. TIMES, Feb. 19, 1987, at B6.

²⁹¹ See Thomas O. McGarity, *A Cost-Benefit State*, 50 ADMIN. L. REV. 7, 31 (1998).

²⁹² See, e.g., ROBERT C. FELLMETH, *THE INTERSTATE COMMERCE OMISSION* (1972) (Nader's Raiders report); George J. Stigler, *The Theory of Economic Regulation*, 2 BELL J.

reformers, ranging from Ralph Nader to George Stigler, observed that if an agency only hears from the regulatees, it will become sympathetic to the regulatee's point of view and vulnerable to manipulation. Even an agency that is thoroughly dedicated to its statutory mission knows that, with the limited resources available, it "cannot go to the mat every time" it disagrees with the regulated industry. As a result, decision-making outcomes will tend to reflect the economic needs of the regulated industry rather than the broader and more diffuse public interest that the agency was created to protect.²⁹³ The risk of capture is, of course, much greater when the leadership of the agency is appointed by a president that is sympathetic to the economic interests of the regulated industries or is ideologically committed to a limited governmental role in society.²⁹⁴ One very plausible view of the MTBE fiasco is that it is the story of a pliant agency attempting to implement several very complex regulatory programs with limited resources under constant pressure from a very powerful regulated industry that was accustomed to having its way.

The decision to phase tetra-ethyl lead out of gasoline was definitely not an instance of agency capture by the regulated industry. Operating during its early activist years with the broad support of the American public, EPA imposed the phase-down upon an industry that offered resistance at every turn. Agency capture might, however, help explain the 1979 MTBE waiver. The agency was apparently hoping that someone would come up with an acceptable alternative to lead, and it had recently rejected the most likely candidate, MMT. On the other hand, agency capture does not explain EPA's earlier decision to deny the same waiver to Texas Petroleum on the grounds that more information was necessary. Limited authority and information explains this decision much more convincingly than agency capture.

Agency capture only partially explains the 1988 TSCA testing agreement. In fact, EPA rejected the industry position that no additional testing of MTBE was required, and it negotiated several quite burdensome testing requirements from the industry. At the same time, EPA neither forced the industry to conduct toxicity testing of MTBE in drinking water, nor did it require testing to validate the industry's assertion that MTBE degraded rapidly in groundwater. This may have been because EPA felt forced to compromise with the industry, and these were the requirements that EPA was willing to abandon. It is by no means clear, however, that EPA would

ECON. & MGMT. SCI. 3 (1971); Roderick A. Cameron, *Federal Regulatory Agencies—The Need for a Broader Constituency*, 4 *Envtl. L. Rep. (Envtl. L. Inst.)* 50,132 (1974) (calling for broadening public participation in regulatory decision-making because of risk of agency capture).

²⁹³ See PAUL J. QUIRK, *INDUSTRY INFLUENCES IN FEDERAL REGULATORY AGENCIES* 4–21 (1981); Cass R. Sunstein, *Constitutionalism After the New Deal*, 101 *HARV. L. REV.* 421, 448–49 (1987); Richard B. Stewart, *The Reformation of American Administrative Law*, 88 *HARV. L. REV.* 1667, 1684–87 (1975).

²⁹⁴ See QUIRK, *supra* note 293, at 17–19.

have required additional testing of MTBE-contaminated drinking water if the industry had been less recalcitrant.

There is much in the story of EPA's 1988 USTS regulations, however, that supports the agency capture thesis. Although the statute allowed the agency to "consider" industry codes, EPA deferred to an astonishing degree throughout the regulations to those codes. A cynic might conclude that the industry's "resurgence of interest" in promulgating and amending industry codes that EPA noted in the preamble to the final rule could have been inspired by the strong suggestion in the proposed regulations that EPA was prepared to defer to such codes in lieu of promulgating its own technical standards. The agency also deferred to the industry on the big issues. It did not require double-walled tanks; it allowed a ten-year upgrade period, knowing that a more rapid upgrade schedule would "prevent a significant number of future product releases;"²⁹⁵ and it allowed the industry to use inventory control with periodic tightness testing for leak detection, even though the preamble to the proposed rules had expressed "serious reservations" about inventory control as a leak detection technique.²⁹⁶

It is not at all surprising that the industry was "comfortable with" EPA's USTS regulations.²⁹⁷ Regulated industries are usually comfortable with the decisions of captive agencies. If, as one prominent environmental group has suggested, the MTBE crisis was not a result of the decision to allow MTBE to be used in gasoline but was attributable instead to the incredibly poor state of federal regulation of USTS,²⁹⁸ then the agency capture theory goes a long way toward explaining the crisis. Had EPA done a better job of promulgating USTS regulations, MTBE would no doubt still have found its way into groundwater, but in much smaller quantities that would be decreasing over the years even if remaining in gasoline indefinitely.

F. Interest Group Pluralism

Twenty-five years ago, Professor Richard Stewart noted the emergence of a new model of Administrative Law in which administrative outcomes reflected the pulls and tugs of the interest groups that were affected by agency action.²⁹⁹ Under this "interest group pluralism" model, Professor

²⁹⁵ Underground Storage Tanks, Technical Requirements, 53 Fed. Reg. 37,082, 37,103 (Sept. 23, 1988).

²⁹⁶ Underground Storage Tanks, Technical Requirements, 52 Fed. Reg. 12,662, 12,726 (Apr. 17, 1987); *see also* ENVIRONMENTAL PROTECTION AGENCY, *supra* note 188, at xviii.

²⁹⁷ *See* Abcede, *supra* note 190, at 40.

²⁹⁸ *See* Hearings Before the Subcomm. on Health and Env't of the House Comm. on Commerce, 106th Cong. 2-3 (1999) (testimony of Janet Hathaway and David Hawkins of the Natural Resources Defense Council).

²⁹⁹ *See* Stewart, *supra* note 293, at 1683 ("Today, the exercise of agency discretion is inevitably seen as the essentially legislative process of adjusting the competing claims of

Robert Reich noted a decade later, the agency's job was "to accommodate—to the extent possible—the varying demands placed upon government by competing groups."³⁰⁰ The agency was to be "a referee, a skillful practitioner of negotiation and compromise," making itself "accessible to all organized interests while making no independent judgment of the merits of their claims."³⁰¹ The "public interest" under this model was simply the "aggregation and reconciliation" of the various interest group claims.³⁰² At several points, the MTBE story suggests a failure of the interest group pluralism model because the relevant negotiations did not include representatives of all of the relevant interests.

Many observers bemoan the fractious nature of the interest group pluralism model, under which interest groups advancing their own economic interests vie for power in the political and regulatory process.³⁰³ Civic republicans, for example, believe that the model admits the possibility that "bad preferences" will prevail, and it accepts without question "preferences [that] are formed against the backdrop of disparities in power and limitations in both opportunities and information."³⁰⁴ Nevertheless, some form of interest-group pluralism may be the most effective way to avoid the negative consequences of the tendency of agencies toward capture under other models.

Ironically, as Administrative Law has embraced the interest group pluralism model, the regulatory state has come to depend upon the presence of nonprofit public interest groups to ensure outcomes that are in the best interest of the general public. For example, the collaborative approaches, like regulatory negotiation, that have evolved to reduce the strains and inefficiencies of the interest group pluralism model are built upon the assumption that all affected interests (or at least all interests that have the power to affect the final outcome) are represented at the negotiating table. The notice-and-comment rule-making model also allows regulatory agencies to assume that all affected interests have had their say. If an important interest group fails to show up at the negotiations or fails to participate in the decision-making process, the agency, viewing itself as umpire, may fail to fill the void in the policymaking process. The outcome can be decisions that do not reflect the policies articulated in the agency's statutes.

The decision to phase tetra-ethyl lead out of gasoline was a classic example of the beneficial role that nongovernmental watchdog groups can

various private interests affected by agency policy.").

³⁰⁰ Robert B. Reich, *Public Administration and Public Deliberation: An Interpretive Essay*, 94 YALE L.J. 1617, 1620 (1985).

³⁰¹ *Id.*

³⁰² *Id.*

³⁰³ See Cass R. Sunstein, *Beyond the Republican Revival*, 97 YALE L.J. 1539, 1544 (1988); Frank Michelman, *Law's Republic*, 97 YALE L.J. 1493, 1503 (1988); Mark Seidenfeld, *A Civic Republican Justification for the Bureaucratic State*, 105 HARV. L. REV. 1512 (1992).

³⁰⁴ Sunstein, *supra* note 303, at 1544.

play under the interest group pluralism model. Although EPA initially proposed to prohibit or limit lead in gasoline to protect public health at the same time that it proposed the requirement that industry make unleaded gasoline available to protect catalytic converters, it re-proposed the former regulations at the same time that it finalized the latter.³⁰⁵ It then made very little progress toward finalizing the re-proposed rule until the Natural Resources Defense Council (NRDC) persuaded the D.C. Circuit to order the agency to reach a decision within thirty days.³⁰⁶ It is certainly likely that EPA would have promulgated final regulations without the impetus of a court order, but it surely would have taken much longer. More importantly, the willingness of NRDC to go to court to speed up EPA's dilatory pace undoubtedly sent a message to the agency that NRDC would be more than willing to challenge a lenient regulation on its merits.

No public interest group, however, was represented in either the 1979 waiver rule-making or the 1988 TSCA testing consent agreement negotiations. The potential adverse effects of MTBE on groundwater were mentioned (by EPA's OUST staff) in the TSCA testing context, but EPA did not order groundwater-related testing even then. That decision may be attributable to the absence of an environmental group at the bargaining table when EPA negotiated the testing agreement with the petroleum industry.³⁰⁷ EPA's anemic response to the risks posed by MTBE in both of these decision-making contexts is therefore consistent with the watchdog failure theory.³⁰⁸

Environmental groups were present at the 1988 UST rulemaking, and they strongly urged EPA to require double-walled tanks to prevent leaks. In taking that position, however, they did not focus particularly on the risks of MTBE. They did not, for example, counter the industry's argument that single-walled tanks were appropriate because nature would gradually remediate any leaks. Although it is not clear why environmental groups did not raise the special risks of MTBE, one plausible explanation is that they were unaware of those risks; these risks were known to the industry

³⁰⁵ Ethyl Corp. v. EPA, 541 F.2d 1, 10 (D.C. Cir. 1976).

³⁰⁶ *Id.* at 14.

³⁰⁷ An environmental group would have been entitled to a seat at the table if it had asked for one. In the early 1980s, EPA had been sued by NRDC for conducting "closed-door" negotiations over TSCA testing agreements. After the court ruled for NRDC, EPA agreed to craft procedures for such testing agreements that would make all such negotiations open to public participation; see Testing Consent Agreement Development for Chemical Substances; Public Meetings, 51 Fed. Reg. 41,331 (Nov. 14, 1986).

³⁰⁸ The failure of watchdog groups to monitor MTBE at the time probably did not represent a conscious decision to ignore MTBE's potential effects on groundwater resources. It more likely reflects the difficulties such groups face in determining priorities in the context of overwhelming demands on their limited time and resources. Many very important battles were taking place on the environmental front in 1986, including a major skirmish over the 1986 amendments to the Comprehensive Environmental Response Compensation and Liability Act. The TSCA testing program was, in truth, an environmental backwater. Keeping up with the progress of every TSCA test rule negotiation would overwhelm even the most liberally funded environmental group.

and to experts in groundwater remediation, but had not received any significant media attention prior to 1988.

Environmental groups were very much involved in the 1990 Congressional debates over the CAA Amendments. The reformulated gasoline program, however, came up very late in the deliberations, and it emerged from a closed-door negotiating session between the Administration and the Senate staff. It would be naive to suggest, however, that the major environmental groups did not have input into those negotiations, where the primary negotiators on the Senate side had strong ties to environmentalists. The more likely explanation for why MTBE did not come up in those negotiations and in the later floor debates over the Daschle amendment is, once again, that MTBE groundwater contamination had not emerged on the radar screens of the major environmental groups.

The failure of environmental groups to raise MTBE at a time when raising it could have made at least some difference may represent a failure of the interest group pluralism model. In today's exceedingly complex regulatory environment, public interest groups are spread very thin, and it is impossible for them to keep up with every scientific development relevant to the regulatory process. They must focus on the issues they (and their funders) deem most important at the time. MTBE in groundwater did not become one of those issues until the late 1990s, when it began to show up in the groundwater of Santa Monica, California.

Those most severely adversely affected in the MTBE story, the owners of water wells threatened with MTBE contamination, were not represented in any of the decision processes studied here. From an interest-group perspective, this is not surprising. Groundwater contamination by MTBE had apparently not attained a sufficient notoriety by 1990 to put those entities on notice of the threat that a reformulated gasoline requirement posed to them. Since reformulated gasoline emerged rather late in the debates as the petroleum industry's alternative to the alternative fuels provisions favored by agricultural interests at the outset of the debates, it is even less surprising that well owners did not weigh into the battle.³⁰⁹ There has never been an organized interest group of landowners surrounding service stations, although some local coalitions have formed after private wells were contaminated with MTBE. There are national associations of municipal drinking water suppliers, but they did not become involved in the regulation of gasoline additives and USTS until the late

³⁰⁹ One might fault EPA for failing to raise MTBE's adverse effects on groundwater during the congressional debates over reformulated gasoline. Since the Bush Administration's original bill did not contain a reformulated gasoline provision, however, there was no reason to consider MTBE at the outset. The Administration initially supported the alternative fuels program advocated by the ethanol interests and environmental groups. Only after it became clear that no bill would be enacted over the opposition of the petroleum industry did the Administration, in closed-door Senate negotiations, agree to a reformulated gasoline requirement. Whether the Administration raised MTBE's adverse effects on groundwater to support its original bill during the closed-door negotiations is unknown.

1990s, after many thousands of gallons of MTBE were already in the ground and the regulations that guaranteed that many more leaks of gasoline would go undetected had already been promulgated.

If the MTBE fiasco does not necessarily suggest a wholesale failure of the interest group pluralism model, it may suggest situations in which it might be expected to fail. First, when there is a long latency period between the regulatory action and the adverse consequences of that action, it is not likely that an agency under the interest group pluralism model will anticipate and address those consequences because interest groups typically do not congeal until their members are faced with a common threat. Second, an interest that is diverse and diffuse is likely to be politically weak. When the interest on the other side is unified, focused, and politically powerful, the situation is a prime candidate for regulatory failure under the interest group pluralism model.³¹⁰

G. Choosing Ignorance and Manufacturing Uncertainty

In a forthcoming article, Professor Wendy Wagner suggests that industries continue to impose externalities on the rest of society, despite extensive regulatory programs, because the legal system sends perverse signals to those industries regarding the information needed for effective health, safety, and environmental regulation.³¹¹ Existing liability and regulatory laws “perpetuate ignorance” about externalities, even though generating knowledge is critical to the ability of legal actors to address them effectively.³¹² The regulatory laws permit regulated entities to ignore large gaps in knowledge about the adverse effects of their activities, and the existing regulatory and liability regimes provide little incentive for those actors to spend resources filling those gaps. Their reluctance to invest in the production of such information is understandable, because any documentation of externalities will generate pressure to do something about them on behalf of those who suffer their adverse effects. Moreover, existing liability and regulatory laws create perverse incentives on the part of externality-producing actors to conceal the information that they do possess and “to actively discredit and obfuscate damaging information” produced by others.³¹³ The overall result is a regulatory regime that is lacking in precisely the kind of information that is critical for designing and defending effective health, safety, and environmental protections.

At several critical decision-making junctures, the MTBE story resonates strongly with Professor Wagner’s account of the lack of useful sci-

³¹⁰ See MANCUR OLSON, *THE LOGIC OF COLLECTIVE ACTION: PUBLIC ACTION AND THE THEORY OF GROUPS* 5–52 (1971); C. WRIGHT MILLS, *THE POWER ELITE* 28 (1956).

³¹¹ Wendy E. Wagner, *Commons Ignorance: How the Environmental Laws Have Failed Us*, 53 *DUKE L.J.* (forthcoming 2004).

³¹² *Id.*

³¹³ *Id.*

entific information for regulatory decision-making. Because tetra-ethyl lead had been used ubiquitously for many decades, much was known about its adverse health effects at the time that EPA decided to phase it out of gasoline. Subsequent tort litigation, however, has revealed documents demonstrating that the lead industry knew much more than the rest of the public and that it had covered up a large body of knowledge that it had obtained over the years on the adverse health effects of lead.³¹⁴ Indeed, the history of lead prior to the phase-out is paradigmatic of the perverse incentives that the common law provided to industry to ignore data gaps and hide existing data prior to the creation of the modern regulatory regime.

The enactment of the CAA Amendments of 1970 shifted those incentives only slightly. Because EPA did not have to meet a large factual burden under the “will endanger” test and was allowed, instead, to assess risks and act on a broad determination that lead in gasoline posed a “significant risk” to the health of urban children, the agency was able to act despite palpable scientific uncertainties. As it turned out, a great deal of subsequently developed scientific information has borne out the wisdom of EPA’s original decision. On the other hand, the burden was still on EPA to come up with the scientific information necessary to meet the “significant risk” standard, and the industry was free to continue adding tetra-ethyl lead to gasoline until the agency did so.

The petroleum industry had no incentive to produce or share information on the externalities that MTBE-containing gasoline would impose on the owners of nearby water wells at the time EPA granted the 1979 MTBE waiver because the existing regulatory regime allowed EPA to consider only the adverse effect that MTBE might have on catalytic converters.³¹⁵ The very same authority that EPA had used to phase tetra-ethyl lead out of gasoline was available to EPA to initiate a proceeding to limit or prohibit the use of MTBE for the purpose of protecting human health.³¹⁶ That authority, however, was limited to “emissions” that would endanger human health, and it placed the burden on EPA to come forward with information showing that they posed a “significant risk” to humans. Yet even under the *Ethyl* opinion’s generous reading of the threshold “will endanger” standard, EPA needed some evidence that MTBE posed a “significant risk” to human health.³¹⁷ In 1979, EPA had very little toxicological evidence on MTBE, certainly not enough evidence to support a sustained attack by the petroleum industry in court, because no one had provided that information.³¹⁸ The existing regulatory regime allowed the petroleum industry to put MTBE in gasoline if it provided information on the adverse

³¹⁴ See GERALD MARKOWITZ & DAVID ROSNER, *DECEIT AND DENIAL: THE DEADLY POLITICS OF INDUSTRIAL POLLUTION* 108–38 (2002).

³¹⁵ See 42 U.S.C. § 7545(f)(3) (2000); see also *supra* text accompanying note 113.

³¹⁶ See 42 U.S.C. § 7545(c)(1)(A) (2000); see also *supra* text accompanying note 114.

³¹⁷ See *supra* note 277.

³¹⁸ See *supra* text accompanying note 121.

effects of MTBE on catalytic converters, but it did not require the industry to produce information on the adverse effects of MTBE on human health and the environment. Since the industry was well aware of the deteriorating state of USTS in the late 1970s, the tort liability regime provided a strong incentive to remain ignorant of any unique health or environmental effects of MTBE in groundwater, and the industry initiated only a very rudimentary set of toxicological tests at that time.

As the Interagency Testing Committee was considering whether to add MTBE to its list of fifty chemicals that should receive additional testing, and as EPA was considering how to react to MTBE's appearance on the list, the petroleum industry took the position that no additional information on real world exposure was necessary since EPA could trust ARCO's "worst case" calculations.³¹⁹ The industry further argued that no chronic toxicity testing was needed because ARCO's calculated exposures were below the "no observed effect" level in the few toxicity studies that it had conducted. Throughout this time period, however, the industry failed to provide information it possessed on the extent of MTBE groundwater contamination or the deteriorating state of a USTS infrastructure. Indeed, the industry insisted that MTBE losses from leaking USTS would be "extremely small."³²⁰ An industry trade association took the position that MTBE was a harmless chemical and that any human exposure through inhalation at gas stations or through consumption of contaminated drinking water was so minuscule as to be ignorable.³²¹ In sum, the industry went to considerable lengths to "perpetuate ignorance" about the long-term health effects of MTBE and the extent of human exposure to MTBE through drinking water at precisely the time that EPA was considering whether to require the industry to do the testing necessary to become better informed about MTBE's health and environmental risks.

Despite the industry's desire to perpetuate ignorance, however, the existing statutory regime did give EPA the wherewithal to require more studies on MTBE's environmental fate and toxicological properties. If EPA had been prepared to "go to the mat," it almost certainly could have justified additional toxicity testing for inhalation exposures in 1988. Knowledge of the extent to which the industry was rapidly converting from tetra-ethyl lead to MTBE was available to EPA, as was information on MTBE's volatility and likely exposures to service station attendants and drivers. The industry knew this and ultimately acquiesced to more testing of MTBE's toxicity via the inhalation route. However, EPA may well have lacked sufficient information on MTBE exposure through drinking water to justify a requirement for additional toxicity testing via that route, and the industry was determined to perpetuate that ignorance. The negotiated testing rule did

³¹⁹ Ridlon Letter, *supra* note 146.

³²⁰ ARCO Critique, *supra* note 142, at 5.

³²¹ API Critique, *supra* note 132.

not require testing of MTBE in drinking water, resulting in ignorance that remains to this day.

H. The Precautionary Principle

In recent years, an approach to health, safety, and environmental regulation that has been around for a very long time has received a great deal of attention in international circles under the label "precautionary principle."³²² While this is not the place for an extended description of the many, sometimes contradictory, attempts to give content to this much-debated idea,³²³ its essence, in this author's view, can be captured in three familiar phrases: look before you leap; it is better to be safe than sorry; and when in doubt, err on the side of safety.³²⁴ Although the precautionary principle is sufficiently vague to support many conclusions, it does seem clear that a more precautionary approach to MTBE may well have avoided much environmental and economic damage.

When, as is usually the case in environmental regulation, the analysis of alternative courses of action is clouded by scientific uncertainty, a

³²² Various bodies have attempted, not always consistently, to capture the precautionary principle in a single statement. The 1992 Rio Declaration on Environment and Development states the principle as follows: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." *Rio Declaration on Environment and Development*, U.N. Conference on Environment and Development, Annex I, at princ. 15, U.N. Doc. A/Conf.151/26 (1992), reprinted in 31 I.L.M. 874 (1992). The EU Treaty adopts the precautionary principle as the guide for environmental policy, see Treaty of Amsterdam, Oct. 2, 1997, tit. XVI, art. 130r, O.J. L (C 340) (1997), available at <http://www.europarl.eu.int/topics/treaty/pdf/amst-en.pdf>, and a recent communication by the European Commission elaborates the principle as follows:

Whether or not to invoke the Precautionary Principle is a decision exercised where scientific information is insufficient, inconclusive, or uncertain and where there are indications that the possible effects on the environment, or human, animal or plant health may be potentially dangerous and inconsistent with the chosen level of protection.

European Commission Communication on Precautionary Principle at 7 (Feb. 2, 2000), available at http://europa.eu.int/eur-lex/en/com/cnc/2000/com2000_0001en01.pdf. See also ROYAL SOCIETY OF CANADA, ELEMENTS OF PRECAUTION: RECOMMENDATIONS FOR THE REGULATION OF FOOD BIOTECHNOLOGY IN CANADA 194 (2001) (noting that the precautionary principle "advises that, in the face of scientific uncertainty or lack of knowledge, it is better to err on the side of protecting human and environmental safety than to err on the side of the risks").

³²³ One highly placed Bush Administration official is sufficiently mystified by the precautionary principle to characterize it as "a mythical concept, perhaps like a unicorn." John D. Graham, *The Role of Precaution in Risk Assessment and Management: An American's View* (Jan. 11-12, 2002), at <http://www.useu.be/RiskManagement/Jan1102GrahamUSRiskManagementPrecPrin.html> (last visited Feb. 29, 2004) (on file with the Harvard Environmental Law Review).

³²⁴ See, e.g., *American Trucking Ass'ns v. EPA*, 283 F.3d 355, 378 (D.C. Cir. 2002) (remarking that in the CAA context, "EPA must err on the side of caution . . . taking into account both the available evidence and the inevitable scientific uncertainties").

precautionary approach leans toward the more protective option. In the case of a product, byproduct, or activity that has not yet been introduced into the environment, an agency employing the precautionary approach carefully examines its potential risks before allowing it to be introduced. If an initial core set of information about such risks is not available, the agency requires its proponents to conduct the studies necessary to produce that information prior to its introduction. If information suggests the potential for long-term or irreversible harm or if significant uncertainty remains after that initial information is compiled, then more testing may be in order. If, at the end of the testing, serious uncertainty still remains about the potential for long-term or irreversible risks, then the product or activity is not allowed or is allowed only under carefully limited and well-monitored controls.

In the case of a product, byproduct, or activity that is already present in the environment, the existence of scientific uncertainty should not be used as an excuse to forestall protective action.³²⁵ The agency employing the precautionary approach engages in a “credible worst-case” analysis of the risks that it poses based upon existing information. If those risks are determined to be acceptable under a standard that applies an adequate margin of safety, the agency allows the activity to proceed unabated. If the risks are unacceptable, the agency takes action to reduce those risks to an acceptable level until such time as sufficient information becomes available to demonstrate that a lesser degree of control will offer adequate protection. In all cases, the precautionary approach assigns the burden of producing the information necessary to reduce the uncertainties to the proponent of the product, byproduct, or activity.³²⁶

Just as the advocates of the synoptic paradigm applaud the decision to phase tetra-ethyl lead out of gasoline as a successful example of decision-making guided by cost-benefit analysis, proponents of the precautionary principle hail it as a paradigm of this principle in action. The *Ethyl* Court specifically alluded to the “precautionary nature” of the risk assessment exercise that EPA was permitted to employ under the “will endanger” statutory standard.³²⁷ EPA took regulatory action to protect human health despite substantial uncertainty, and the subsequent scientific data has generally validated the wisdom of that precautionary decision.³²⁸

³²⁵ See generally PROTECTING PUBLIC HEALTH & THE ENVIRONMENT: IMPLEMENTING THE PRECAUTIONARY PRINCIPLE (Carolyn Raffensperger & Joel Tickner eds., 1999); Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003 (2003) (generally criticizing the precautionary principle).

³²⁶ *Wingspread Statement on the Precautionary Principle*, in PROTECTING PUBLIC HEALTH & THE ENVIRONMENT, *supra* note 325, at 353–54 (“When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause-and-effect relationships are not established scientifically. In this context the proponent of the activity, rather than the public, should bear the burden of proof.”).

³²⁷ *Ethyl Corp. v. EPA*, 541 F.2d 1, 15 (D.C. Cir. 1976).

³²⁸ Martin Krayer con Kraus & Poul Harremoës, *MTBE in Petrol as a Substitute for*

When EPA approved ARCO's MTBE application in 1979, neither EPA nor the petrochemical industry knew much about the properties of MTBE relevant to the risks that it might pose to human health and the environment. Under the law, ARCO only had to show that MTBE would not poison catalytic converters or otherwise increase tailpipe emissions. Under the existing statutory regime, EPA would have had to initiate any assessment of the direct risks that MTBE posed to human health under its separate authority to limit or ban fuel additives that could endanger public health or the environment. EPA's experience with using that authority to remove tetra-ethyl lead from gasoline, while ultimately successful, was not encouraging. It took many years of lengthy hearings and stacks of thick studies and analyses to support that decision. Given the complete absence of any data on the long-term health and environmental effects of breathing and/or ingesting MTBE and the lack of any experience from which to derive information on the nature and extent of human and environmental exposure, EPA was in no position to assume the burden of initiating a proceeding to require MTBE to be removed from gasoline before it was ever placed in gasoline to begin with. In any event, EPA's authority to protect groundwater under a statute that focuses exclusively on emissions was not altogether clear.

Despite clear authority under TSCA to do so, EPA also failed to take a precautionary approach toward the testing requirements that it imposed on the industry in 1988. Especially as applied to high volume chemicals, the essence of the testing provisions of TSCA is the precautionary slogan: "Look before you leap." EPA did attempt to look at the potential adverse health and environmental effects of MTBE as its use was dramatically expanding in the late 1980s, but it did not look closely enough. It limited itself to inhalation exposure and ignored drinking water exposure, even though its staff was aware at the time of many instances of MTBE groundwater contamination. Arguably, EPA began to look at MTBE very late in the game. It took two years to reach an agreement on a testing rule, and the tests were not completed until after the critical congressional decision to require reformulated gasoline in heavily polluted ozone nonattainment areas, a decision that resulted in even greater expansion of MTBE use.

If the decision to phase tetra-ethyl lead out of gasoline was a paradigm of precaution, the promulgation of the USTS technical requirements bordered on recklessness. EPA deferred to "nationally applicable" industry codes of practice for many of the critical technical requirements. On the all-important issue of new and replacement tanks, the regulations allowed owners to continue to install single-walled tanks with release detection. In rejecting the easily available double-walled tank option strongly advocated by environmental groups, the agency concluded that greater pro-

tection was not necessary to protect human health and the environment because petroleum constituents were easily removed from soil and groundwater with available clean-up technologies. This approach could hardly be less consistent with a precautionary “better safe than sorry” approach to protective regulation. The preamble did not mention MTBE, which was by 1988 widely used throughout the U.S. as a substitute for tetra-ethyl lead, nor did it address the fact that MTBE was not easily removed from contaminated groundwater. It did note that the double-walled tank option was more expensive and concluded that the benefits of the extra degree of precaution offered by double-walled tanks did not, in the agency’s opinion, justify the added costs. The agency clearly did not “err on the side of safety.”

In retrospect, it is clear that the environmental groups’ misgivings about the industry-friendly regulations were well-justified. The program established by the technical regulations is quite possibly the weakest of all of EPA’s regulatory programs. As an EPA enforcement official later observed, the regulations achieved “flexibility” at the “expense of stringency and enforceability.”³²⁹ In addition, EPA’s leak detection regulations were not at all adequate to the task. EPA’s Blue Ribbon Panel concluded that the regulations had allowed tank owners to install less expensive and therefore less effective leak detection technology than was available at the time based on its assumption that “hydrocarbon plumes are generally self-limiting (primarily due to intrinsic bioremediation).”³³⁰ The problem with this approach was that EPA did not “address the use of oxygenates [like MTBE] although they were used as octane enhancers at this time.”³³¹ Since some releases will undoubtedly continue to occur as a result of “improper installation or upgrading, improper operation and maintenance, and accidents,” the inadequate state of leak detection systems ensures that further groundwater contamination will continue.³³²

Like most of the environmental statutes, the CAA is filled with precautionary measures. For example, the national primary ambient air quality standards must protect the public health with an “adequate margin of safety.”³³³ As the product of a last-minute closed-door deal among Bush Administration officials, Senators from petroleum-producing states who supported MTBE, and Senators from farm states who wanted to ensure that reformulated gasoline could contain ethanol, the reformulated gasoline requirement was precautionary only in the sense that it required the “greatest reduction in emissions of” VOCs and toxic pollutants “achievable through the reformulation of conventional gasoline.”³³⁴ Congress dele-

³²⁹ Yagerman, *supra* note 82, at 10,146.

³³⁰ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 46.

³³¹ *Id.* at 47.

³³² *Id.* at 45.

³³³ 42 U.S.C. § 7409(b)(1) (2000).

³³⁴ 42 U.S.C. § 7545(k)(1) (2000).

gated to EPA the critical task of determining the meaning of "reformulation of conventional gasoline" subject to narrowly reticulated performance goals that Congress specified in the statute. In limiting total benzene to 1% and total aromatics to 25% by volume and by requiring that reformulated gasoline contain 2% oxygen, the statute was quite protective of air quality.³³⁵ In relegating "nonair-quality and other air-quality related health and environmental impacts" to mere afterthoughts that EPA could take into account, along with costs, in choosing among options that met the threshold numerical tests, the statute was not at all precautionary with respect to groundwater quality.³³⁶

In sum, the MTBE fiasco can be attributed in part to the failure of Congress and EPA to adopt a precautionary approach. Congress did not prescribe precaution in the fuel additives provisions of the CAA. Had Congress adopted a precautionary approach, it would have required the additive's proponents to conduct sufficient testing and analysis to demonstrate that the additive would *not* endanger public health or the environment. EPA's Blue Ribbon Panel appeared to recommend such a precautionary approach when it "highlight[ed] the importance of exploring the potential for adverse effects in all media (air, soil, and water), and on human and ecosystem health, *before* widespread introduction of any new, broadly-used product."³³⁷ Had EPA adopted such a precautionary approach in 1979, it would have discovered that MTBE is a carcinogen in laboratory animals, and it would almost certainly have been a good deal more reluctant to allow its widespread use in gasoline.

TSCA adopts a somewhat more precautionary approach. One of TSCA's stated goals is to ensure that "adequate [safety] data [is] . . . developed . . . and that the development of such data should be the responsibility of those who manufacture and those who process such chemical substances and mixtures."³³⁸ Yet the law does not actually make manufacturers and processors responsible for developing health and safety testing data prior to marketing chemicals. They need only conduct testing when ordered to do so by EPA, and EPA may only order them to do so after sustaining the affirmative burden of justifying that requirement to the satisfaction of a reviewing court.³³⁹ Because EPA is usually reluctant to expend the time

³³⁵ 42 U.S.C. § 7545(k)(3)(A) (2000).

³³⁶ 42 U.S.C. § 7545(k)(1) (2000).

³³⁷ EPA BLUE RIBBON PANEL REPORT, *supra* note 8, at 9 (emphasis added). In particular, the Panel recommended that EPA "[c]onduct a full, multi-media assessment (of effects on air, soil, and water) of any major new additive to gasoline prior to its introduction." *Id.* In addition, the Panel recommended that EPA put greater effort into assessing the real-world air pollution benefits in terms of emissions reductions and pollutant concentration levels of fuel additives once they are allowed in gasoline. *Id.* It is unclear whether the Panel meant for the burden of testing to fall on the industry or EPA.

³³⁸ 15 U.S.C. § 2601(b)(1) (2000).

³³⁹ See *Chem. Mfrs. Ass'n v. EPA*, 859 F.2d 977, 984-85 (D.C. Cir. 1988); Wagner, *supra* note 311. Section 5 of TSCA requires manufacturers of new chemical substances to put EPA on notice of its plans to market them, but EPA may only order pre-market testing

and expense necessary to accomplish this task,³⁴⁰ it nearly always negotiates testing agreements with those responsible for chemicals.³⁴¹ In the case of MTBE, these negotiations resulted in a testing agreement that was not especially precautionary because it did not focus on drinking water exposure. The tests revealed that MTBE causes cancer in laboratory animals. It is not clear, however, that EPA would have elected to ban MTBE from gasoline had it been shown that MTBE also caused cancer in laboratory animals via the ingestion route.

The subject of testing requirements is an appropriate place to probe the outer boundaries of the precautionary principle. There is, of course, no limit to the number of studies that EPA could require an industry to perform prior to allowing the introduction of a product or byproduct into the environment.³⁴² At some point, EPA must decide when the benefit of additional information is outweighed by the loss of availability of a potentially commercially valuable product. EPA does not, however, have to come up with an algorithm that decides this issue in every case as a precondition to applying a precautionary approach to individual cases. EPA was well aware of the threat that MTBE posed to groundwater in 1986 when it was deciding what testing to order. EPA certainly could have anticipated in 1988 that if the tests the industry did agree to conduct showed that MTBE was in fact carcinogenic, the industry would take the position that more testing would be required before EPA could ban MTBE because of the risks that it posed through groundwater contamination. A precautionary approach to the decisions that EPA had to make in 1986 and 1987 would have demanded carcinogenicity testing of MTBE in drinking water and environmental fate testing to determine the scientific legitimacy of the industry's contention that MTBE rapidly degraded in groundwater.

of chemicals if it can support a finding that they may cause unreasonable adverse effects on the environment.

³⁴⁰ GENERAL ACCOUNTING OFFICE, Pub. No. GAO/RC EO-94-103, TOXIC SUBSTANCES CONTROL ACT: LEGISLATIVE CHANGES COULD MAKE THE ACT MORE EFFECTIVE 4:2.1 (1994) (citing interviews with EPA officials for the proposition that "the agency has not used its authority to require more testing, largely because it must undergo a lengthy and costly rule-making process").

³⁴¹ EPA's recently implemented "High Production Volume (HPV) Challenge Program" is apparently an attempt to adopt a more protective approach with respect to chemicals, such as fuel additives, that are used in high volumes throughout the country. See *EPA High Production Volume (HPV) Challenge Program*, at <http://www.epa.gov/opptintr/chemrtk/volchall.htm> (last visited Feb. 16, 2004) (on file with the Harvard Environmental Law Review).

³⁴² See Richard J. Pierce, Jr., *Causation in Government Regulation and Toxic Torts*, 76 WASH. U. L.Q. 1307, 1325 (1998) (observing that "there is no finite limit on the amount of testing that can enhance our understanding of the potential risks that are posed by a substance").

V. CONCLUSION

When applied to the MTBE experience, some theories have much better explanatory power than others. The perversity, sound science, and synoptic theories have very little explanatory power. Although MTBE almost certainly would not be in groundwater today if EPA had not phased lead out of gasoline, MTBE groundwater contamination is not a perverse result of that governmental action. Rather, it is a consequence of ineffective governmental action at later stages when effective action would have prevented most or all of the environmental damage caused by MTBE. If MTBE in groundwater is a consequence of "unsound science," that is entirely the fault of a regulated industry that consistently resisted EPA's attempts to gather more scientific information about MTBE's toxicity and environmental fate. It is difficult to speculate about whether widespread MTBE contamination would have resulted had EPA adhered strictly to the synoptic paradigm. Most likely, tetra-ethyl lead would still be in gasoline, and it, instead of MTBE, would be contaminating urban air and polluting groundwater. Assuming that cost-benefit analysis would have supported removing lead from gasoline, as the proponents of cost-benefit analysis suggest, it is highly unlikely that it would have supported a decision to keep MTBE out of gasoline or a decision to remove it once it began to contaminate groundwater. At the one decision-making juncture where EPA did employ a rudimentary form of cost-benefit analysis (the USTS technical requirements), it pointed in the direction of less stringent regulation resulting in more undetected releases of MTBE into soil and groundwater.

The multi-media failure theory appears generally applicable to the critical decisions concerning MTBE. EPA rarely considered the cross-media impacts of its decisions, and Congress clearly did not consider the impact on groundwater of its decision to require RFG to protect air quality. Had EPA been more attuned to multi-media considerations in 1988 when it negotiated the TSCA testing rule and the USTS technical requirements, much of the damage produced by MTBE could have been avoided. The petroleum industry was insisting at that time, however, that any adverse impacts on groundwater due to MTBE would be slight. EPA's fault may not lie so much in its failure to consider multi-media impacts as in its credulous receptivity to industry reassurances. The agency's failure to consider the cross-media implications of its early decisions, however, did not so much represent a failure of communications within the agency or an absence of authority to gather relevant cross-media information as it reflected EPA's general lack of political will to require the industry to produce in a timely fashion the information necessary to understand the multi-media aspects of its decisions.

It is not necessary, of course, that a single theory provide the best explanation for all of the critical decisions. It is certainly possible that one theory explains one decision-making outcome while a different theory better

explains a later decision-making outcome. Likewise, a combination of theories may best explain a particular decision-making outcome. The “choosing ignorance and manufacturing uncertainty” thesis is especially useful in explaining EPA’s failure to act to remove MTBE from gasoline prior to 1988 and its failure to require groundwater testing in its 1988 testing rule. A combination of the agency capture and watchdog failure theories goes a long way toward explaining both EPA’s tepid TSCA testing requirements and the critical failure of EPA’s USTS technical standards, both of which took place in an election year toward the end of the Reagan Administration, when EPA’s leadership was in no mood to upset a powerful industry. Lacking the resources to “go to the mat,” EPA’s small technical staff accommodated the industry interests. Because the regulations addressed latent risks, the interests most affected by the action did not participate. To the rather limited extent that national environmental groups involved themselves, they were easily “rolled” by the opposition. This failure of the interest group pluralism model left in place an inexcusable ignorance of MTBE’s critical characteristics and a USTS infrastructure that still cannot be trusted.

Although EPA’s decision to phase lead out of gasoline stands as a good example of the precautionary approach in action, the agency had neither the authority nor the inclination to take a fully precautionary approach to regulating MTBE at later critical decision-making junctures. EPA could have removed MTBE from gasoline at any time under the same authority that it used to remove tetra-ethyl lead, but only if MTBE “emissions” had endangered the environment; EPA’s authority under the CAA to protect groundwater resources was unclear. The agency had the authority under TSCA to require the industry to produce the needed toxicity and environmental fate information, but it failed to require any information at all for many years. When EPA finally acted, it did not require information on MTBE’s fate and toxicity in groundwater. The agency had clear authority to take a precautionary approach when it wrote the USTS technical standards, but it declined to do so. It did not require the industry to install the best available technology (double-walled tanks), and it deferred to industry-promulgated standards throughout the regulations.

If a single answer is needed, it is that the MTBE groundwater disaster happened because a powerful industry had a very great influence on all of the critical decisions during a period of time in which government was especially attentive to complaints about over-regulation, and both the government and public interest watchdog groups were not especially attentive to the potential cross-media impacts of what appeared at first glance to be environmentally protective actions. It may be simplistic, however, to suggest that had EPA been a bit less sympathetic to industry complaints about over-regulation, the MTBE crisis never would have happened. Even had the agency leadership taken a more aggressive stance toward the industry, it is by no means certain that EPA could have prevented the MTBE

crisis. The general difficulties that EPA faces in regulating *anything* in an administrative law regime that has come to demand an enormous amount of information and analysis to justify protective regulatory action suggests the virtue of precautionary statutes that place the burden on those who would impose risks on others for economic gain.

As MTBE follows tetra-ethyl lead to the fuel additive junkyard, EPA could go a long way toward preventing the next fuel additive crisis by revising its USTS regulations to require double-walled tanks and upgraded leak detection systems. This is ultimately not a complete solution, however, because the tanks that are still in the ground will continue to leak until they are replaced, and as a practical matter, EPA will have to give the industry another substantial period of time to accomplish the task of replacing the tanks that it upgraded less than a decade ago pursuant to the original USTS technical standards. The best way to prevent the next crisis is for Congress to amend the CAA to require the manufacturer of a fuel additive to demonstrate that the additive will not endanger human health or the environment before hundreds of millions of gallons of it are allowed to be blended into gasoline for distribution throughout the country.

Congress and regulatory agencies like EPA can also learn from the MTBE crisis as they address future health and environmental threats. They must better understand that the law can unwittingly provide regulated industries with incentives to choose ignorance and manufacture uncertainty. They must also understand that agencies face great difficulties in avoiding capture while simultaneously accommodating a broad range of interests and environmental considerations. These regulatory pitfalls may suggest that a precautionary regime, where the burden of producing information and justifying change falls on the regulated industries, is preferable to a *laissez faire* regime in which that burden falls on the government.