WPI

Remediating New Hampshire's Groundwater

A Comprehensive Study of MTBE in New Hampshire and Amicus Curiae Brief for *State of New Hampshire v. Hess Corporation et al.*

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Abstract

New Hampshire's groundwater has been contaminated by the gasoline additive methyl tertiary butyl ether (MTBE), a chemical that has dramatic repercussions on the environment. Once in the groundwater, MTBE can be difficult and expensive to treat and remove. New Hampshire hopes to hold the oil corporations that used MTBE in their gasoline accountable for the pollution caused by the additive through the Superior Court case *State of New Hampshire v. Hess Corporation et al.* This project both summarizes background research on MTBE and its implications on New Hampshire's groundwater, as well as provides an amicus curiae brief in support of the state of New Hampshire in the case against the oil corporations.

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Brief as Amicus Curiae in Support of the State of New Hampshire

Technical Report

Methyl tertiary butyl ether has recently been identified as a significant pollutant to water supplies all across the United States. While the effects of MTBE in these water supplies is still not fully understood, states are already taking precautions to prevent the situation from getting any worse and to protect their citizens health as well as one of their most valuable resources. One such state is New Hampshire, where their Superior Court is currently hearing a case, *State of New Hampshire v. Hess Corporation et al.*, on the issue of MTBE contamination.

What is MTBE?

Methyl tertiary butyl ether, or MTBE, is a chemical compound that is created from the reaction of methanol and isobutylene. Since 1979, MTBE has been used in replacement of lead as an octane enhancer in gasoline. An octane enhancer is used in gasoline to prevent knocking in a car engine, which not only produces an obnoxious noise while driving, but can also damage a car engine and decrease its efficiency.[1] By adding an octane enhancer, the gasoline cannot ignite too early in the combustion cycle in the car engine.[2] In 1992, a new use for MTBE was discovered in regards to gasoline. MTBE was found to be an inexpensive and easy additive to gasoline to help some types of gasoline meet the new oxygenate requirements set by the Clean Air Act 1990 Amendments.[3]

MTBE and United States Legislation

The use of MTBE has been regulated by some legislation in the United States. Both the Clean Air Act mentioned previously and the Energy Policy Act regulate the use of MTBE in certain situations, especially in the case of reformulated and oxygenated fuels.

The Clean Air Act and MTBE

The Clean Air Act was first passed in 1970 and is in place to help protect the nation's air and stratospheric ozone.[4] The last major set of amendments to it came in 1990, with changes to help the

[1] Bortman, 2003
[2] Bortman, 2003
[3] Environmental Protection Agency, MTBE in Fuels, 2012
[4] Environmental Protection Agency, History of the Clean Air Act, 2012

country battle issues with smog, carbon monoxide, and particulate matter, especially in urban areas.[5] Hydrocarbons and nitrogen oxides are significant components of that urban smog and both are released into the atmosphere most frequently from automobile emissions. In these amendments, a ranking system for areas with heavy pollution was created, and depending on the ranking an area has, oxygenated fuels would have to be used to help decrease the smog.[6] It also established two oxygenated gasoline programs. The first is the Winter Oxyfuel Program which requires oxygenated fuels with specifically 2.7% oxygen by weight be used during cold months in cities that have elevated carbon monoxide levels. For this program, ethanol is typically the oxygenate that is used.[7] The second program is the Year-Round Reformulated Gasoline Program, which is in effect in cities that have the worst air quality. The figure below shows the areas of the United States that rely the heaviest on reformulated gasoline:

Table 2. Reformulated and Oxygenated Gasoline Demand by PADD, 1997
(thousands of barrels per calendar day)

PADD Region	Reformulated Gasoline	Oxygenated-Reformulated Gasoline	Oxygenated Gasoline
PADD 1 - East Coast	1,052	138	0
PADD 2 - Midwest	282	0	105
PADD 3 - Gulf Coast	270	0	19
PADD 4 - Rocky Mountain	0	0	36
PADD 5 - West Coast	915	13	73
Subtotal U.S.	**2,522**	**151**	**233**

Sources: Control area gasoline demand calculated from control area population as share of State population and 1997 State gasoline demand from Federal Highway Administration, "Monthly Gasoline Reported by States," *Highway Statistics 1997*, FHWA-PL-98-020 (Washington, DC, Nov. 1, 1998), Table MF-33GA.

Figure 1: Reformulated and Oxygenated Gasoline Demand in United States

Reformulated gasoline is gasoline that is blended to have fewer compounds that pollute the air in it. Currently, approximately thirty percent of the country's gasoline is reformulated gasoline, and of that thirty percent, eighty-seven percent contains MTBE.[8] The figure below summarizes the role MTBE plays in both reformulated and oxygenated gasoline across the country:

[5] Environmental Protection Agency, MTBE in Fuels, 2012
[6] Environmental Protection Agency, MTBE in Fuels, 2012
[7] Environmental Protection Agency, MTBE in Fuels, 2012
[8] Environmental Protection Agency, MTBE in Fuels, 2012

Table 3. Oxygenate Demand in Reformulated and Oxygenated Gasoline Control Areas, 1997
(thousands of barrels per calendar day)

Region	Estimated Oxygenate Volume in Control Area Gasoline		
	MTBE	ETBE or TAME	Ethanol
Reformulated Gasoline			
PADD 1 - East Coast	110.8	8.7	0.7
PADD 2 - Midwest	4.2	0.0	22.4
PADD 3 - Gulf Coast	25.8	3.0	1.0
PADD 4 - Rocky Mountain	0.0	0.0	0.0
PADD 5 - West Coast	97.2	3.3	1.0
Subtotal U.S.	**238.1**	**15.0**	**24.2**
Oxygenated-Reformulated Gasoline			
PADD 1 - East Coast	17.8	0.0	1.6
PADD 5 - West Coast	0.1	0.0	1.2
Subtotal U.S.	**17.9**	**0.0**	**2.8**
Oxygenated Gasoline			
PADD 1 - East Coast	0.0	0.0	0.0
PADD 2 - Midwest	0.0	0.0	9.0
PADD 3 - Gulf Coast	0.0	0.0	1.7
PADD 4 - Rocky Mountain	0.3	1.1	2.5
PADD 5 - West Coast	0.5	0.0	5.1
Subtotal U.S.	**0.8**	**1.1**	**18.3**
Average 1997 Oxygenate Demand for RFG and Oxygenated Gasoline Blending	**257**	**16**	**45**
Imputed Oxygenate Demand for Conventional Gasoline (e.g., octane and gasohol)	**12**	**n.a.**	**37**
Total 1997 Oxygenate Supply	**269**	**n.a.**	**82**

n.a. - not available
Notes: Total oxygenate supply includes domestic production, net imports, and stock change. Imports of RFG (161,000 barrels per day) assumed to contain 11.2 percent MTBE by volume.

Figure 2: Table of MTBE Use in Reformulated and Oxygenated Gasoline

Oxygen is necessary in gasoline because it helps the gasoline to burn more completely. This in turn decreases unhealthy or toxic emissions from tailpipes, dilutes and displaces other harmful gasoline components including sulfur and aromatics like benzene.[9] It also optimizes oxidation during the gasoline combustion in the engine, which ultimately helps the car run better.[10] The new standards set by the

[9] Environmental Protection Agency, MTBE in Fuels, 2012
[10] Environmental Protection Agency, MTBE in Fuels, 2012

Clean Air Act 1990 Amendments encouraged the use of oxygenates, and MTBE's chemical characteristics and cheapness made it a popular choice.[11] It can be shipped through already-existing pipelines to refineries, it has a low volatility, which makes it vaporize quickly and easily at lower temperatures, and meets the emission standards set in the Clean Air Act easier than other oxygenates, like ethanol.[12] The Clean Air Act created a situation where MTBE was the best option for oil refining companies to save money and produce gasoline that was legal.

The Energy Policy Act of 2005 and MTBE

After the Clean Air Act and its amendments, MTBE became a widespread and accepted component in gasoline. Since then, it has moved to the forefront of environmental concern, as research has come out that identifies it as being potentially harmful to the environment and human health. Once the Clean Air Act and its amendments fell under scrutiny for their role in the increases of MTBE in the environment, new legislation was established to set guidelines for fuel use. One important aspect of this new legislation is it erases the oxygen content requirement in reformulated gasoline, which dramatically reduces the need to use MTBE in gasoline.[13] In regards to MTBE, the act also calls for further research and continued studies on other fuel additives besides MTBE that could be used instead and the health effects from being in contact with MTBE and other gasoline additives.[14] The act also addresses underground storage tanks and how to better regulate them so that they do not release gasoline and gasoline additives like MTBE into the environment.[15] The implications here are important, as MTBE in the ground can pose a contamination risk to water sources.[16]

MTBE in Water

Unfortunately, using MTBE the help make air emissions better has actually had a negative impact on the nation's water quality. As MTBE became a component in gasoline, it started to find ways into America's water systems. MTBE can enter a water system through a variety of ways and poses an environmental threat to both surface waters and groundwater systems. The full understanding of the implications having MTBE in a water system are still not fully understood, but many different tests and

[11] Environmental Protection Agency, MTBE in Fuels, 2012
[12] Environmental Protection Agency, MTBE in Fuels, 2012
[13] Energy Policy Act, 2005
[14] Energy Policy Act, 2005
[15] Energy Policy Act, 2005
[16] Environmental Protection Agency, Summary of the Energy Policy Act, 2013

research is being done to better understand how MTBE gets into a water system, how to treat it, and how widespread this problem is.

How MTBE Enters Water Systems

Currently, MTBE contaminates water supplies through leaking underground storage tanks and transportation pipelines for gasoline, gasoline spills, emissions from engines on boats and marine vessels, and occasionally air deposition.[17]

Underground Storage Systems Release MTBE

The main source of MTBE in groundwater is from these underground storage systems.[18] During the 1990s, many of these tanks were removed or replaced, which should help to diminish the MTBE levels in the water over the following years. [19] The MTBE escapes these groundwater tanks and pipes because of equipment malfunctions and installation mistakes.[20] There are regulations in place to try to minimize these malfunctions and stop the release of MTBE and other chemicals from these tanks. These regulations include filing all underground storage tanks with the Environmental Protection Agency, timelines for how frequently tanks need to be inspected, and guidelines for mechanisms to detect leaks from the tanks.[21] When the reformulated gasoline escapes from these underground storage systems, MTBE and other chemicals dissolve into the groundwater.

MTBE Challenges in Groundwater

MTBE is dangerous in groundwater because it is difficult to treat water that is underground and it can stay and spread in groundwater for a great deal of time. Groundwater fills in the space between soil and rock particles, like a sponge, and moves deeper below the surface because of gravity.[22] Once MTBE is released into groundwater, it can travel deeper and deeper beneath the surface, where it will take hundreds of years to complete disappear. MTBE travels in the water, which moves through connected fractures in bedrock.[23] For this reason, how far MTBE can travel from the original contamination site and where it will end up are hard subjects to predict. Right now, the United States

[17] Environmental Protection Agency, MTBE Overview, 2012
[18] Hirsch, 2001
[19] Hirsch, 2001
[20] Underground Storage Tanks, Environmental Protection Agency, 2012
[21] Environmental Protection Agency, Regulations Pertaining To Underground Storage Tanks, 2013
[22] U.S. Geological Survey, The Water Cycle: Groundwater Discharge, 2013.
[23] Jeffrey & Earle, 2013

Geological Survey is conducting studies to further their understanding of its distribution and fate in America's water supplies.

Once MTBE is in the water, it is colorless, so just by sight the water source may not be recognizable as contaminated, and it does not biodegrade quickly out of the water supply.[24] Studies show that MTBE biodegrades at a rate slower than components from gasoline that was not reformulated.[25] Natural microorganisms in the ground are capable of biodegrading MTBE in hydrologic settings, and in some cases, the by-products are not harmful. In other cases though MTBE biodegrades into tert-butyl alcohol (TBA), which can be as dangerous as MTBE in water.[26] Some of the best locations for MTBE biodegradation are in areas with sufficient oxygen concentrations and stream beds.[27]This fact is important to consider, as those sites could become natural MTBE sinks and treatment sites for MTBE-contaminated water.

MTBE in Water Statistics

MTBE can typically go unnoticed in a water supply at levels between twenty to forty parts per billion. Above that benchmark, MTBE can cause the water to have an odor and a taste that renders it undrinkable.[28] Of that data, only one percent of the nation's waters are contaminated at levels above the recommended twenty parts per billion.[29] The United States Geological Survey determined from a 2002 study that thirty-six states had water contaminated with MTBE, after testing fourteen percent of the country's surface water and five percent of the country's groundwater.[30] There is a connection between higher levels of MTBE in the water and areas where the federal reformulated gasoline is sold. Areas using this gasoline in accordance with the oxygenate requirement in the Clean Air Act are five times more likely to have MTBE in their water and to have it at higher concentrations. [31] The US Geological Survey noticed that most of the urban wells in their studies that have been contaminated are in New England, where reformulated gasoline containing MTBE was commonly used.[32] There is enough of a concern with the impact MTBE can have on human health that the US Environmental Protection

[24] Environmental Protection Agency, MTBE Overview, 2012
[25] Hirsch, 2001
[26] Hirsch, 2001
[27] Hirsch, 2001
[28] Environmental Protection Agency, MTBE Overview, 2012
[29] Environmental Protection Agency, MTBE Overview, 2012
[30] American Water Works Association, 2013
[31] Environmental Protection Agency, MTBE Overview, 2012
[32] Hirsch, 2001

Agency now considers it a contaminant to be watched under their Unregulated Water Contaminant Regulation, so all large public drinking water system and a sampling of small systems must report the amount of MTBE in their water to them.[33] In order to understand how MTBE is distributed in waters across the United States, widespread studies will have to continue to be completed.

MTBE Studies by the United States Geological Survey

The US Geological Survey has all undertaken several studies on the topic of MTBE to understand how many of the water systems in the United States have been impacted by MTBE. As part of their National Water Quality Assessment (NAWQA), the US Geological Survey has been studying MTBE. From 1993 to 2000, they have sampled 4,260 wells, including 396 public wells, 1,847 domestic wells, and 2,017 monitoring wells.[34] Of these over four thousand wells, most had MTBE at low concentrations; none of the public wells were over the 20 parts per billion limit and only one domestic well was over.[35] From this data, the US Geological Survey assumes that in high MTBE use areas, like New England, one in five wells will have low concentrations of MTBE in the water.[36]

They also are collaborating with the Metropolitan Water District of Southern California, the Oregon Graduate Institute of Science and Technology, and the American Water Works Association Research Foundation (AWWARF) to conduct a study on Community Water Systems. In this study, they looked into MTBE contamination in 579 wells, 171 rivers, and 204 reservoirs in all the states and Puerto Rico, all which provide water to Community Water Systems.[37] From this study, they noted that MTBE was found in fourteen percent of surface waters and five percent of groundwater sources, and was the second most detected volatile organic compound (VOC) in the water.[38] For Community Water Systems serving less than 10,000 people, MTBE was found in four percent of the waters sampled, and for systems serving 50,000 people, MTBE was found at almost fifteen percent of the waters sampled.[39] In the case of the both of these studies, further research and publications can be expected.

[33] Environmental Protection Agency, MTBE Overview, 2012
[34] Hirsch, 2001
[35] Hirsch, 2001
[36] Hirsch, 2001
[37] Hirsch, 2001
[38] Hirsch, 2001
[39] Hirsch, 2001

Potential Harmful Effects of MTBE

The greatest concern with MTBE contaminating water is how MTBE will interact with the environment, especially humans. There are, currently, public health concerns associated with exposure to MTBE. Studies are now being conducted to look into any potential health risks posed by exposure to MTBE, whether through inhalation or ingestion, like through consumption of contaminated water. According to the US Environmental Protection Agency, much of the research currently has focused more on the inhalation of the chemical than on its ingestion. Studies have pointed towards potentially a correlation between cancer cases and other noncancerous symptoms and the inhalation of high concentrations of MTBE in some test animals.[40] Another study had similar results, finding a potential cancer risk in the rats they tested in the lab, but not having enough information or evidence to apply that risk to humans as well.[41] It cites that while studies concerning the effects on humans that MTBE has are not numerous, some symptoms that have been identified include burning eyes, nose, and throat, nausea, and central nervous system effects including headaches, dizziness, and feelings of disorientation.[42] However, data like that can be hard to extrapolate to apply to all humans. Applying data from rats in a lab to humans is not always accurate, and the studies on humans may have outside influencers to the results that need to be considered. From these studies, the Environmental Protection Agency has determined that there is not enough data to state if there is a dangerous health risk to ingesting MTBE at low concentrations, but there is a carcinogenic risk if the MTBE is ingested at high doses. They have set no health advisory limits regarding MTBE, but suggest that there is a very small chance of negative health effects if MTBE is ingested at levels between twenty to forty parts per billion (ppb) or below.[43]

Treating MTBE in Water

While ideally the Environmental Protection Agency would like to have no gasoline contamination of any kind in their water sources, they also recognize that currently there is no perfect, leak-free system to transporting gasoline and gasoline additives to the locations they need to reach.[44] Many of the qualities that make MTBE a great oxygenate for gasoline make it a dangerous pollutant for

[40] Environmental Protection Agency, MTBE Overview, 2012
[41] Capriano & Togna, 1998
[42] Capriano & Togna, 1998
[43] Environmental Protection Agency, MTBE Overview, 2012
[44] Environmental Protection Agency, MTBE Overview, 2012

water sources. Because MTBE is very volatile and so easily dissolves in water, removing it from water sources becomes complicated quickly and it can spread through water sources quickly. Generally, treating groundwater that has been contaminated with gasoline containing MTBE can cost on average anywhere from $95,000-150,000, while treating groundwater contamination from gasoline not containing MTBE is $50,000-120,000.[45] MTBE can be removed from water sources through processes including air stripping, granular activated carbon, advanced oxidation, and soil vapor extraction.[46]

Air Stripping Techniques

There are two different techniques that can be utilized in air stripping. The first is packed tower, where contaminated water flows downward through a vertical circular or rectangular column that is filled with packing material while air is blown upwards through the column to remove chemicals, as seen in Figure 3.

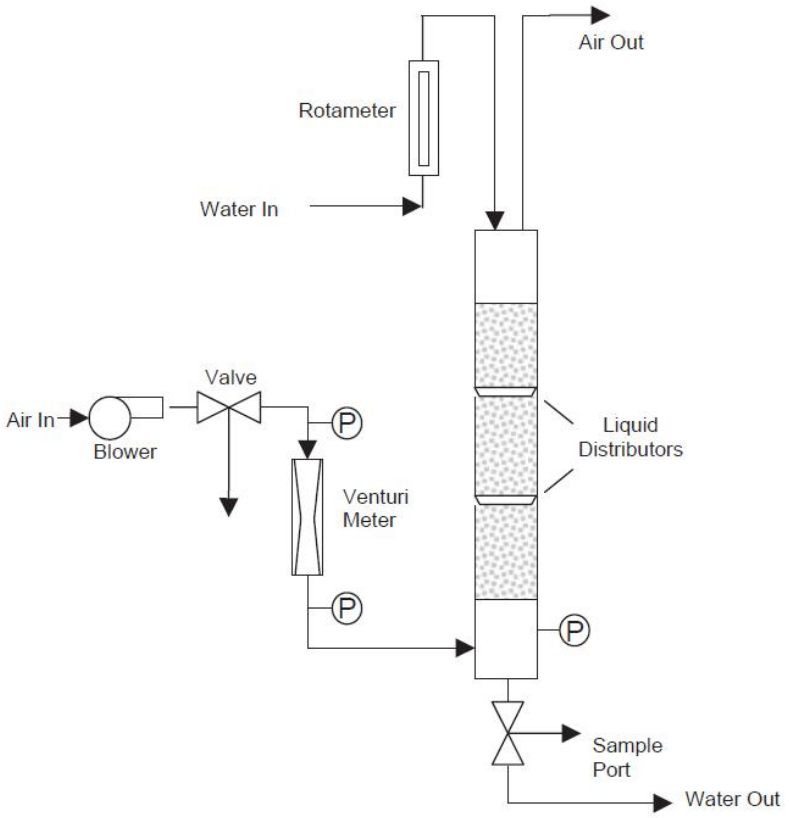

Figure 3: Packed Tower Air Stripping

[45] Keller, et al.
[46] Environmental Protection Agency, MTBE Overview, 2012

The other method is low profile aeration system. In this configuration, the contaminated water is pumped to the top of the stripper and where it then flows over an inlet weir onto a baffled aeration tray. On the baffled aeration tray, there are perforations that air flows through to reach the water and forces the contaminants out of the water.[47] Figure 4 is a picture of a low profile aeration system in Pennsylvania.

Figure 4: Low Profile Aeration System

The cost to use air stripping as a technique for removing MTBE varies, and in one case study, the range was found to be $15,500 to $1.77 million for capital costs for the treatment facility, or $0.47/1,000 to $104/1,000 gallons depending on the plant.[48]

Air stripping is advantageous because it requires no disposal or regeneration of the treatment media. This means that limited waste is produced that needs to then be treated afterwards. It does present some operational problems, however. First, the quality of the water can affect how successful the remediation is. If there are elevated levels of iron or manganese in the water, a rusty precipitate can be formed and it can stain the fixtures and clothing. Also, other chemicals in the water can cause

[47] The California MTBE Research Partnership, 2006
[48] The California MTBE Research Partnership, 2006

bacterial slime to grow in the air stripper. These bacteria may cause clogging, so it will require occasional cleaning or chlorination of the water in the stripper. This process is not ideal for removing MTBE from water. First, MTBE's high ease of dissolving in water means that it does not separate easily into its vapor phase from water, so it would require very high ratios of air to water in order to be successfully removed.[49] Second, the contaminated water typically requires some form of pre-treatment before air stripping can be used successfully and many sites using this treatment method will utilize post treatment processes afterwards as well.[50] Also, when this treatment is used, it simply moves the MTBE from the water into the air, so that air now potentially has to be treated to remove the highly volatile MTBE before it can be released.[51]

Granular Activated Carbon Technique

Granular activated carbon pumps water through a bed of activated carbon in order to remove any organic compounds. A diagram showing this process can be seen in Figure 5 below.

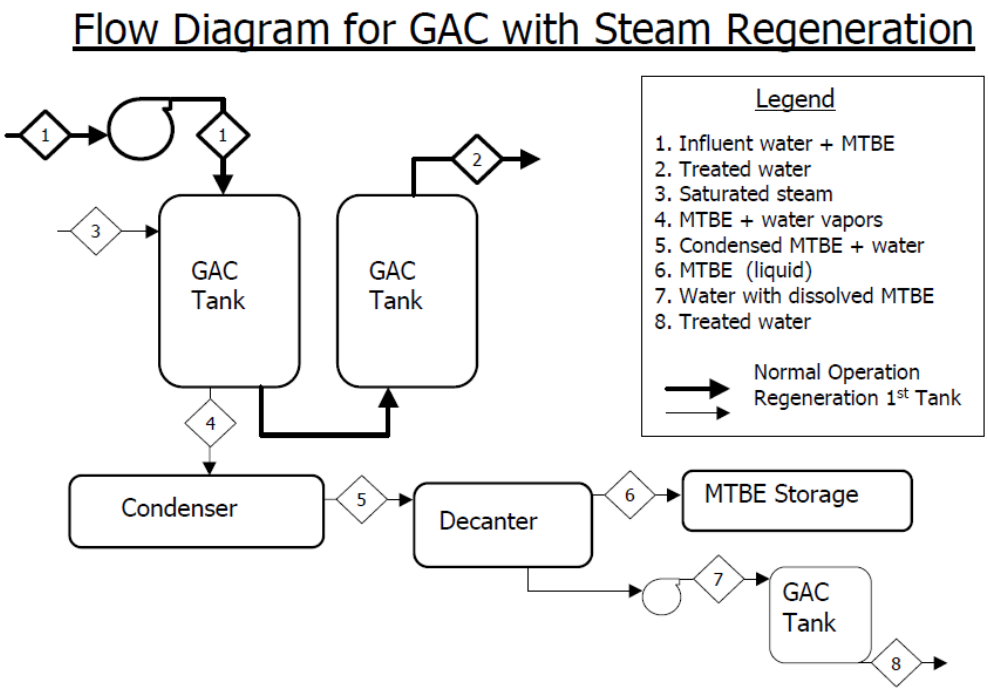

Figure 5: Granular Activated Carbon

[49] Environmental Protection Agency, MTBE Overview, 2012
[50] The California MTBE Research Partnership, 2006
[51] The California MTBE Research Partnership, 2006

Unfortunately, MTBE's ability to dissolve in water makes this treatment process less than ideal, as water must pass through the bed of carbon many times in order to be successful at removing any MTBE.[52] Comparatively, this approach is one of the most cost-efficient methods to removing MTBE for water.[53] The efficiency of granular activated carbon in removing MTBE is greatly affected by the background quality of the water that is being treated.[54] The carbon particle is a material that attracts many types of organic contaminants to its surface, including MTBE. However, using activated carbon also poses some disadvantages. The efficiency of granular activated carbon in removing MTBE is greatly affected by the background quality of the water that is being treated.[55] Activated carbon can foster the growth of bacteria in the water by concentrating other organics on the surface of the particles. Bacteria in the water will use those other organics as a food source.[56] Also, there is also the chance desorption or dumping could occur if the ambient water quality characteristics change, which would release the contaminants initially absorbed from the water by the carbon particles.[57] When treating large quantities of water with activated carbon tanks, a series of tanks may be used, so that whatever contaminant is not picked up by the first tank will be captured by the carbon particles in the second tank.[58] This treatment is also recommended for private water supplies, like wells, that may be contaminated by MTBE, since it can be utilized for private homes through the use of filters.[59]

Advanced Oxidation Technique

Advanced oxidation is the process of treating water with ultraviolet light, chemical oxidants, and catalysts. In the right combination, these can transform contaminants, including organic compounds like MTBE. Figure 6, below, demonstrates this process, using ultraviolet light to remove the contaminant. ultraviolet light is shown below.

[52] Environmental Protection Agency, MTBE Overview, 2012
[53] Creek, et al., 2001, p. 5
[54] Creek, et al., 2001, p. 48
[55] Creek, et al., 2001, p. 48
[56] New Hampshire Department of Environmental Services, 2009
[57] New Hampshire Department of Environmental Services, 2009
[58] New Hampshire Department of Environmental Services, 2009
[59] Environmental Protection Agency, MTBE Overview, 2012

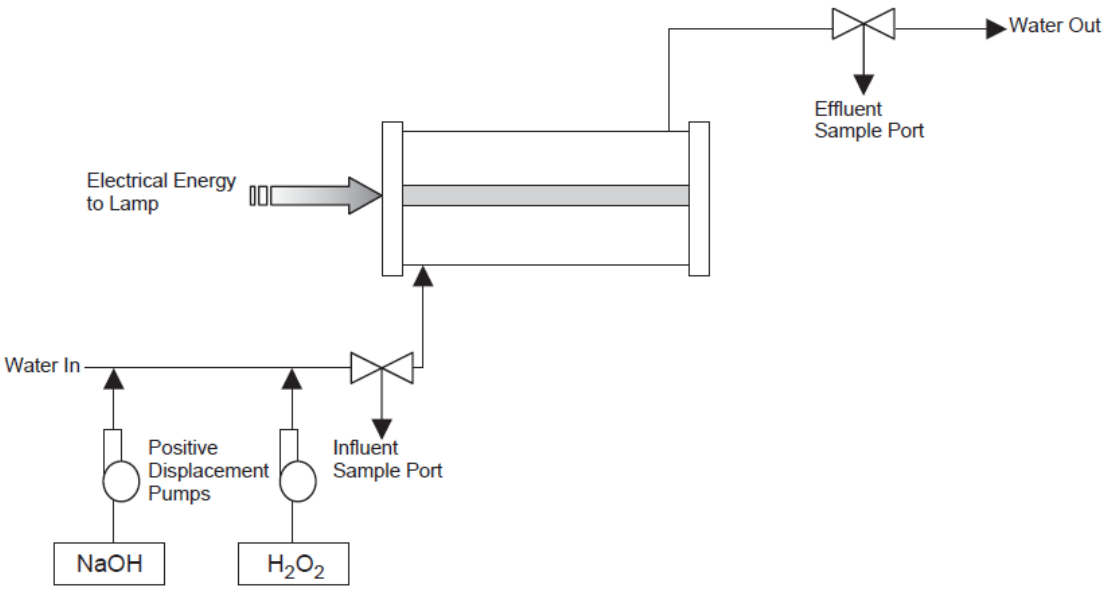

Figure 6: Advanced Oxidation with Ultraviolet Radiation

This treatment process again raises questions about its wide-scale use and uses technologies that can be expensive. Its effectiveness will similarly rely on the initial quality of the water it is treating. Because a reaction is taking place in the water, and the compounds are not just being removed like the other treatments processes, the water quality is significant, as the presence of other chemicals can change the effectiveness of this treatment entirely.[60]

Soil Vapor Extraction Technique

Lastly, soil vapor extraction is the process of blowing air through soil to volatilize any contaminants that may be in the soil.[61] In Figure 7, this process is demonstrated.

[60] Kommineni, et al., p. 111
[61] Environmental Protection Agency, MTBE Overview, 2012

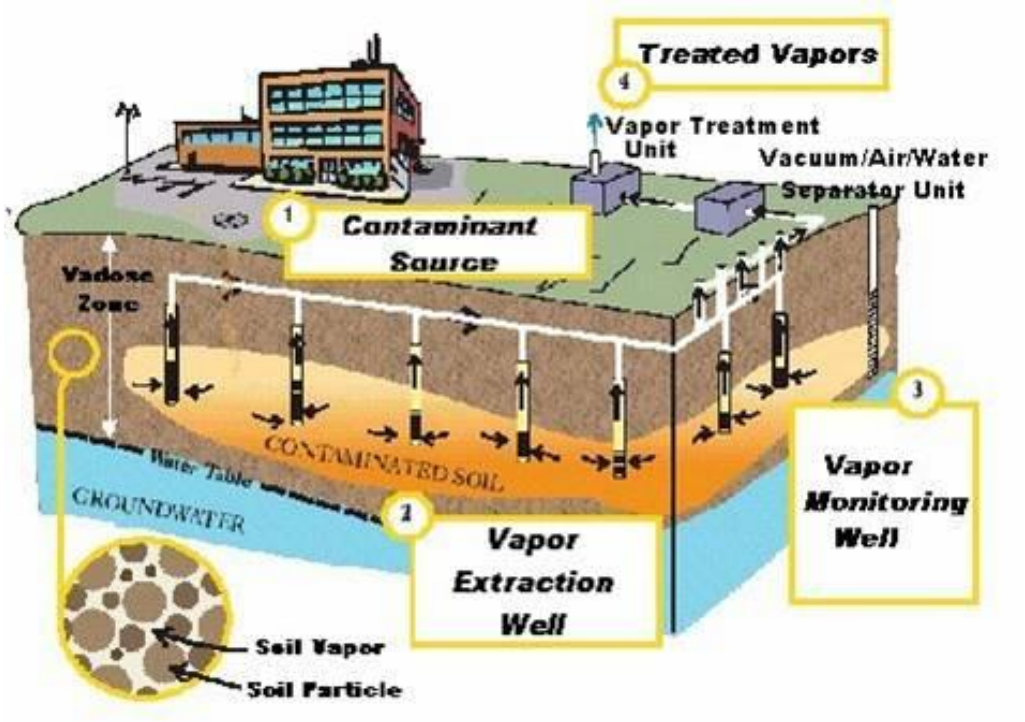

Figure 7: Soil Activation Extraction

This treatment option goes after MTBE in the ground that has yet to reach any water sources. For this treatment, the MTBE that vaporizes has to be collected and then treated before it can be disposed of to prevent any further contamination.[62] It works by creating an air vacuum in the soil through extraction wells. It creates a negative pressure gradient, which pulls the more volatile compounds, like MTBE, towards the wells, where they can then float towards the surface.[63] The effectiveness of this treatment option is dependent on the soil type and its moisture content.[64]

In order to choose the most effective technology for removing the MTBE from the area's groundwater, first a conceptual site model should be created. This written or geographical model of the area identifies the characteristics of the site, how the MTBE is distributed in the area, and the potential transport of MTBE to potential receptors through ail, soil, and water.[65] The conceptual site model should also include a list of the contaminants of concern, not only MTBE, but also any other constituents in the soil that could impact the fate, transport, transformation, and treatment of the MTBE in the area. It should identify any of the potential site-specific sources of contamination, with descriptions of tank

[62] Environmental Protection Agency, Soil Vapor Extraction, 2012
[63] Environmental Protection Agency, Soil Vapor Extraction, 2012
[64] Environmental Protection Agency, Soil Vapor Extraction, 2012
[65] The Interstate Technology & Regulatory Council MTBE and Other Fuel Oxygenates Team, 2005

locations, dispenser islands, subsurface piping, tank fill locations, and service bays.[66] The history of the site should be known as well. The history includes the history of the contaminants release into that specific area as well as the description of the background and upgradient groundwater quality for the site, and an inventory of the upgradient or surrounding pollution sources.[67] Lastly, the conceptual site model should include a description of the previous remediation actions that have been taken at the site to remove MTBE.[68]

The conceptualized site map can help the state to decide which treatment option will be best. It identifies how much MTBE is in the water, and since it is less expensive to remediate a small area of high concentration instead of a large area of low concentration, that can help with deciding which treatment option will be best for the area. Cost can be applied when considering the cost of the actual technology, the implementation, and the cost to keep the technology working effectively. Other factors that affect the ability of the technology to meet remediation goals and the ability of the technology to meet federal, state, and local requirements are those that require evaluation, and include stakeholder acceptance, commercial availability, reliability, implementation effort, and regulatory agency involvement. Stakeholder acceptance is important for treating MTBE contamination in New Hampshire's groundwater because the public will be directly affected by the remediation process, so they need to understand the remedial options and their effectiveness and have the ability to share their opinions on the process. Commercial availability is important, because a technology is only going to be successful if the vendor implements the technology effectively at the site. Reliability is important, as biological process like MTBE degradation are sensitive to any minor changes in their environment, so the proper treatment technology must have an understanding of how those technologies will impact the environment and the MTBE will be important. Lastly, regulatory agency involvement is important, as some technologies will require more oversight from regulatory agencies than other approaches.

MTBE Controversy in the United States

Since the information about how MTBE interacts in the environment, its potential health risks, and costly treatment options has become better understood, many communities are left wondering how they will pay to return their water systems to normal. Many communities and states have begun to point fingers at the large oil companies that first started using the MTBE, blaming them for the

[66] The Interstate Technology & Regulatory Council MTBE and Other Fuel Oxygenates Team, 2005
[67] The Interstate Technology & Regulatory Council MTBE and Other Fuel Oxygenates Team, 2005
[68] The Interstate Technology & Regulatory Council MTBE and Other Fuel Oxygenates Team, 2005

contamination. The best method for this is through the United States judicial system. These communities are looking to find these companies guilty of selling the public a misleading product, and want the multi-million dollar companies to finance the clean-up of the water systems that have been impacted. Several examples of this can be seen throughout the United States court system, on both the state and federal level.

Federal Judicial Action Regarding MTBE

Currently, many of the state cases on the topic of MTBE have been consolidated into one large case based out of New York.[69] The case, In re MTBE Products Liability Litigation, is being heard in New York's Southern District Court.[70] The cases were consolidated in order to facilitate sharing of pretrial evidence as well as motions before the judge.[71] Ideally, these cases are looking to settle.[72] In 2007, the New Hampshire case was supposed to join this consolidation of cases, but the case has been sent back to New Hampshire's Superior Court for trial.[73] A similar fate may be in store for cases from other states in this consolidated group if they are also unable to settle.

Judicial Action by States Regarding MTBE

Several of the states looking at the worst contamination from MTBE have filed cases in their state courts. In 2009, New York City argued their case in the New York District Court against Exxon Mobil. The judge ruled in favor of the city, requiring Exxon Mobil to pay the city $104.7 million after being found guilty of polluting wells in the city.[74] The case continues, as Exxon Mobil has appealed that decision.[75] The case in New York has also expanded into the jurisdiction of New Jersey after the New Jersey Department of Environmental Protection filed their fourth amended complaint this past June.[76] This case may be removed from the consolidated cases and could be heard in the New Jersey federal court instead.[77] Currently, the New York decision is the only precedent concerning MTBE for these future cases to follow, and it holds the oil companies responsible for the cost of the damages done by using MTBE.

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[69] Mouawad, 2008
[70] Mouawad, 2008
[71] Mouawad, 2008
[72] Mouawad, 2008
[73] Jeffrey & Earle, 2013
[74] Jeffrey & Earle, 2013
[75] Jeffrey & Earle, 2013
[76] Jeffrey & Earle, 2013
[77] Jeffrey & Earle, 2013

MTBE in New Hampshire

All of the studies and research into MTBE and how to treat it is currently being applied in states across the country. One of the states that is most affected by MTBE water contamination is New Hampshire. In New Hampshire, over thirty percent of the public water wells have some level of MTBE contamination in them, and specifically seventeen percent of the private wells in their four most southern and most populous counties have contamination from MTBE.[78] There is no other region in the country as greatly impacted by MTBE at this point in time.[79] While currently the contamination in most of the state is below the Environmental Protection Agency's recommended twenty parts per billion and New Hampshire's own established maximum contaminant level of thirteen parts per billion, the full extent of the contamination is not known, as MTBE is estimated to take decades to migrate through water and hundreds of thousands of private wells have not yet been tested.[80]

To protect New Hampshire's waters from further contamination, the state has taken action. By March 2004, they were able to prove to the Environmental Protection Agency that they could achieve lower emissions of volatile organic carbons without using the reformulated gasoline program designed by the agency.[81] This meant that the state was able to stop relying so heavily on gasoline containing MTBE. House Bill 58 was passed in 2005, which bans the importation of gasoline that is more than 0.5 percent MTBE.[82] This basically stops the importation of any MTBE into the state. The New Hampshire Department of Environmental Services has also set the maximum contaminant level for MTBE in New Hampshire's waters at thirteen parts per billion, which is stricter than the level set by the United States Environmental Protection Agency. New Hampshire has taken their MTBE contamination seriously, and the state is doing all they can to study the contaminant and do their best to protect their citizens. With an uncertain understanding of the chemicals health threats and environmental impact, the state knows that this MTBE contamination poses a drastic and costly risk on the state. For this reason, the state is currently pursuing judicial action against oil refining companies including Hess Corporation, Shell

[78] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 1
[79] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 1
[80] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 1
[81] Hadzima, 2006, p. 8
[82] Hadzima, 2006, p. 8

Corporation, and Exxon Corporation for claims of damages against the state for MTBE clean-up and remediation costs.

State of New Hampshire v. Hess Corporation et al.

These damages against large oil companies are part of an on-going case that is currently being heard by the New Hampshire Superior Court, and is titled *State of New Hampshire v. Hess Corporation et al.* While other states, including New York and California have tried to take legal action against the gasoline companies for damages from MTBE, New Hampshire's case is the first one that has made it to trial.[83] Others, typically brought by municipalities or individuals, have mostly been settled or dismissed.[84] As 2013 begins, this case that began ten years earlier is heading to trial, once again bringing MTBE to the forefront of the media as an environmental concern.

Background for *New Hampshire v. Hess Corporation et al.*

The Department of Environmental Services in New Hampshire oversees the health and welfare of New Hampshire's environment, including their water supplies. The maximum contaminant level of thirteen parts per billion referenced above was set by the Department of Environmental Services in New Hampshire, in accordance with the New Hampshire Safe Drinking Water Act of 1989.[85] This law gives the Department of Environmental Services the right to "adopt primary drinking water standards" for any potentially unhealthy contaminants in the water.[86] This includes the ability to set a primary drinking water standard for any contaminants in the water, which includes setting a maximum contaminant level for the amount of contaminant that can be in the water.[87] They also set secondary drinking water standards for contaminants that are less concerned with the health risks and generally more concerned with the aesthetics of the drinking water provided.[88] Lastly, the law enables the Department of Environmental Services to adopt ambient groundwater quality standards for contaminants that could

[83] Tuohy, 2013, Testimony begins in MTBE pollution case in NH
[84] Tuohy, 2013, NH $700M case against 2 oil companies begins
[85] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[86] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[87] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[88] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7

potentially harm the health of humans and the environment, like MTBE.[89] It is important to note that in New Hampshire, the Department of Environmental Services considers all groundwater to be a potential drinking water source and falls under the guidelines of this regulation.[90]

In 2000, the Department of Environmental Services and the New Hampshire Department of Health and Human Services set the maximum contaminant level and ambient groundwater quality standard at thirteen parts per billion.[91] The basis for this decision was the possible carcinogenic effects that had been observed in experiments with animals. When the state decided this level, they followed the guidelines set for them by the Environmental Protection Agency, which is based solely on exposure via ingestion, as well as studies conducted by the Department of Health and Human Services, which included hazard identification, dose-response assessment, and exposure assessment.[92] When setting this limit, the Department of Environmental Services noted that this decision was based off of limited studies to determine the extent of a health risk MTBE posed and that if they were any stricter than thirteen parts per billion, it would lead to significant remediation costs and other economic impacts on the state.[93] These are paid for by the New Hampshire Oil Discharge and Disposal Cleanup Fund.[94] They set the secondary level to be twenty parts per billion based off of the Environmental Protection Agency taste and odor threshold.[95] In 1998, there was a study conducted that concluded that five percent of the United States population could discriminate an odor from water contaminated with MTBE at approximately twenty two parts per billion, and New Hampshire used this data when setting this secondary level.[96] As of January 1, 2007, New Hampshire has banned the use of MTBE and gasoline containing MTBE from their state.[97]

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[89] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[90] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[91] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[92] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[93] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7-8
[94] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8
[95] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8
[96] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8
[97] Court Update, 2011

The process to get the maximum contaminant level established is important to this case. In 1999, an amendment to the Safe Drinking Water Act was passed that stated that it was up to the Department of Environmental Services in collaboration with the Department of Health and Human Services to set the maximum contaminant level, and no longer just the Department of Health and Human Services.[98] In 1997, the Department of Health and Human Services had set the maximum contaminant level for MTBE at seventy parts per billion, but by 1999, the General Court and the governor at the time requested that the Department of Environmental Services set a more stringent maximum contaminant level.[99] They wanted the two departments to collaborate together and to set a level that was stricter and was supported by an actual regulation. In order to accomplish this, House Bill 592 was introduced to the New Hampshire House of Representatives in 1999, calling for the creation of a committee on the topic of MTBE.[100] This bill was supported by testimonies from the Department of Environmental Services commissioner Robert Varney and John Dreisig, a toxicologist for the Department of Health and Human Services.[101]

During the same 1999 session in the House, House Bill 694 was also proposed, which proposed that the maximum contaminant level for MTBE be set at five parts per billion.[102] John Dreisig testified to the General Court against setting it at the low of a level, and the bill was amended.[103] Instead, it then proposed that ambient groundwater quality standard be lowered from the seventy parts per billion the Department of Health and Human Services had previously set in 1997 to thirty five parts per billion. [104]

While this was occurring in the House, the New Hampshire Senate similarly had a bill on MTBE proposed. Senate Bill 70 proposed setting a maximum contaminant level for MTBE at 5 parts per

[98] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8
[99] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 7
[100] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8
[101] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8
[102] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9
[103] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9
[104] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9

billion.[105] Although both the Robert Varney and John Dreisig testified against this bill, it was passed by the Senate.[106] The bill had to be approved by the New Hampshire House of Representatives also, and in committee there the bill was changed into what became the 1999 amendment to the Safe Drinking Water Act, which called for a formal procedure to set a maximum contaminant level for New Hampshire by 2000 through a formal study and studying the formal research on the topic.[107] The findings from this committee, called the MTBE Standards Task Force, are summarized in two reports, titled "Technical Support Document: Derivation of Proposed Primary and Secondary Drinking Water Standards for Methyl tert-Butyl Ether in New Hampshire Drinking Water Supplies" and "Assessment of the Proposed Revision to the Drinking Water and Groundwater Standards for Methyl Tertiary Butyl Ether".[108] From these reports, it was determined that thirteen parts per billion would be the best maximum contaminant level, as well as the secondary level at twenty parts per billion and the ambient groundwater quality standard set at thirteen parts per billion.[109]

The rationale behind the MTBE Standards Task Force's decision to set that MCL has implications towards this case. According to the second document presented by the committee, only four of New Hampshire's 1,114 public water systems actually have MTBE contamination above the thirteen parts per billion, and only ten of the 1,767 wells that are in those systems have MTBE above that level.[110] The cost for remediation of these sites was to come from two sources: the source responsible for the pollution and New Hampshire's Oil Discharge Cleanup Fund.[111] While this regulation would impact other existing legislation on water quality existing in the state, the goal from setting this level was to not create a bigger mess to be dealt with. The Department of Environmental Services specifically stated that it did not want to re-open any cases they had previously seen on water systems that were below the old

[105] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9
[106] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9
[107] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 10
[108] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 11-12
[109] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 12
[110] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 14
[111] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 14

maximum contaminant level of seventy parts per billion but may be above the new level of thirteen parts per billion.[112]

It should also be noted that New Hampshire state law also requires any public water system delivering water that is contaminated at a level higher than five parts per billion of MTBE must notify their customers of the MTBE content of their water.[113] Public water systems are defined as a system for the provision to the public of water that has been piped for human consumption. The system must have at least fifteen service connectors or serve on average at least twenty five individuals daily for at least sixty days out of the year.[114] In New Hampshire, the primary maximum contaminant level only applies to MTBE in public water systems, and the secondary level only applies to certain public water systems.[115] This means that citizens who do not use public water have the responsibility of determining for themselves if their water is contaminated with MTBE and treating it. In New Hampshire, forty percent of the citizens living there rely on private wells to get their water.[116] For private water systems, the Environmental Protection Agency suggests homes takes the initiative themselves to have their water tested for MTBE.[117]

The state's concern for MTBE has grown over the past thirty years. From January 1980 to June 2009, there were 5,088 filed detections of MTBE in water at sites across New Hampshire, according to the Department of Environmental Services.[118] Of those 5,088 detections, 342 of them have had MTBE at or above the level of thirteen parts per billion.[119] With that information, the United States Geological Survey has declared that MTBE existed at a level over one half parts per billion at 12.7% of the sites in 2000 and 15.1% just two years later, in 2002.[120] During this same time period in Rockingham County, the

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[112] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 15

[113] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8

[114] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8

[115] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 8

[116] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9

[117] MTBE Overview, Environmental Protection Agency

[118] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 11

[119] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 11

[120] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 11

most populous county in the state, the MTBE contamination above this level increased from occurring at 20.3% of sites to 23.1% of sites tested.[121] Rockingham County was formerly an area that needed to use reformulated gasoline under the Clean Air Act 1990 Amendments.[122] Even though MTBE had been removed from gasoline in Rockingham County, the percentage of it in the water was still increasing, proving that it could take years for the MTBE's full effect to be seen in areas across the state.

Case Overview

In this case, the plaintiff, the state of New Hampshire, is suing the defendants, these large oil refineries, for claims of damage. Their damage claim is made under common tort theories, including strict product liability, trespass, and negligence.[123] The state alleges that MTBE is a defective product and they are looking to receive comprehensive relief under state statutory and common law for the water systems statewide.[124] If the defendants are found guilty, the state will receive compensation from the refineries for the cost of investigating MTBE in the water systems as well as the remediation and the treatment required to remove MTBE from their water systems. While there are many issues and layers to this case, there are three that have stood out as having the potential to set important precedents for future environmental cases. The first is the idea of maximum contaminant level. Initially, the state was including the water with MTBE below the 13 parts per billion threshold in their damages claim, and was also asking for compensation in the testing and treating of that water as well. As of August 2012, that claim has been removed from the case by the state, but before that happened, that defendants motioned for a partial summary judgment on the topic.

Partial Summary Judgment-Maximum Contaminant Level

One of the most important issues to be decided so far in this case was on the topic of maximum contaminant level. This was addressed as a partial summary judgment, which means it was a piece of the case that was decided on by the courts, without a trial.[125] Both the plaintiff and the defendants submitted arguments to the court, and based on those arguments, the court decided on this partial

[121] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 11
[122] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 11
[123] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 4
[124]Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 4
[125] Legal Information Institute, Summary Judgment, 2010

summary from the case. As thirteen parts per billion is the maximum contaminant level set by the state's Department of Environmental Services, this distinction is a crucial point to the case. Although currently the state has dropped any claims for damages below the maximum contaminant level, a partial summary judgment on the topic was important to the case and raised several key points for argument. The defendant's filed a motion for a partial summary judgment, hoping the Superior Court would rule on this idea that compensation should be provided to cleanup contamination below the maximum contaminant level without going to trial. The state had the opportunity to reply to the defendant's argument, and based their claim on the idea that these oil companies knew the harmful effects MTBE had, but failed to warn the public properly and did not take the proper steps to prevent and mitigate the MTBE contamination that was occurring because of their gasoline.[126]

The state's argument in support of this idea was based on several points. First, the Attorney General's office argued that the thirteen parts per billion is a maximum contaminant level, emphasizing the idea that it is a maximum, and not a standard that these refineries should be working around. This idea stresses that refineries should be aiming for MTBE contamination of zero parts per billion, not thirteen parts per billion. The evidence for this comes from the regulations previously stated.[127] It is ultimately up to the state government to protect the public water supplies, both surface water and groundwater, and to do this to their best ability, contamination should be as close to zero parts per billion as possible, not thirteen.

The next point is based on the idea that the maximum contaminant level should not be viewed as a license to pollute up to that level. It is stated that water is a limited and precious resource and for that reason, the state has the right to preserve the quality of it to its best extent. It is also stated that because of this, the state is the "trustee of this resource for the public benefit", which entails that the state has the sole responsibility of keeping this resource as clean and healthy for the public as possible.[128] Another important act to consider on this topic is the Groundwater Protection Act, which requires that the natural quality of the groundwater be preserved.[129] In this case, the state is argued

[126] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards
[127] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards
[128] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9
[129] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 9

that any amount of MTBE is an unnatural amount of it in the groundwater. There are also preservation clauses like this for New Hampshire's surface water, which require the state to support a water quality that enables the water to be used for beneficial purposes.[130] Lastly, the law specifically states that any discharge of oil or gasoline into any water systems is prohibited, and whoever is at fault is liable for all remediation associated with getting the water back to its natural state, without any regard for a maximum contaminant level.[131]

The state has the job of protecting their citizens and as MTBE presents a potential threat to their citizens, they have the right to do what they can within their power to protect the safety and well-being of the residents of New Hampshire. Beyond their citizens, the New Hampshire government also has the right to protect any of their resources, which includes their water systems. This power is granted to them through the public trust doctrine, which affirms that the state government is in charge of all public lands, water, and any other natural resources, in order to protect them in trust for their citizens to use.[132] They are a trustee of all of the waters in the state of New Hampshire and are looking to assert that authority within the case. As a fiduciary to the natural resources and to their citizens, the citizens trust the state government to protect those public resources so that by using them the citizens are not putting themselves at risk for any negative health effects.[133]

The state also presented strong evidence against the large oil refineries that they were suing. They claim that these companies knew the risks associated with using MTBE and chose to use it as an oxygenate in their gasoline anyways.[134] The petroleum industry has been aware since the 1950s that their underground storage tanks were not perfect and did have leaks to them.[135] By 1981, Shell Oil was aware that MTBE had the potential to contaminate drinking water and make it undrinkable, and that it had other dangerous environmental risks associated to it, including that it could move through waterways farther and faster than other gasoline additives, it was more resistant to biodegradation, and

[130] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 10
[131] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 10
[132] Court Update, 2011
[133] Court Update, 2011
[134] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 5-6
[135] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 5

that it was expensive to treat and remove from water.[136] In 1984, Exxon recognized the dangers associated with MTBE as well, noting that it migrate farther than the gasoline additives Benzene, Toluene, and Xylene, had a lower taste and odor threshold than those other compounds, that is was very expensive to remediate and would add substantially to the cost of cleaning up gasoline spills and leaks, and that the number of contaminated well incidents was estimated to increase by three times following their widespread implementation of MTBE.[137] While some of the largest oil refineries were already identifying these risks with using MTBE, they were not communicating them. Many of the largest refinery companies, including Shell Oil and Exxon, joined other companies and created the Oxygenated Fuels Association, which had the mission of addressing the environmental issues that were associated with them using MTBE and to provide that information to the necessary regulatory agencies.[138] They presented to the Environmental Protection Agency in February of 1987, and stated that there was no evidence that MTBE posed any significant risk of harm to public health or the environment, contrary to Shell Oil and Exxon's previous research.[139] While these large oil refineries are publicly saying that the Environmental Protection Agency forced them into using MTBE and reformulated gasoline with the Clean Air Act of 1979, ARCO Chemical Company's Manager of Business Development admitted in a testimony from 1987 through 1988 that the Environmental Protection Agency had encouraged the use of methanol previously to reduce toxic emissions, not these reformulated gasolines and MTBE.[140] By 1998, the CEO of Irving Oil recognized the threat MTBE posed and had managers begin developing a business plan that stopped relying on MTBE.[141] Throughout the mid to late 1990's, the potential risks MTBE posed to groundwater become public knowledge, but companies still chose to use MTBE in reformulated gasoline until it's ultimate ban in New Hampshire in 2006.[142] The companies misrepresented the threat MTBE posed, stating that reformulated gasoline

[136] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 5
[137] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 5
[138] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 6
[139] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 6
[140] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 6
[141] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 6
[142] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 6

could be handled like any other gasoline.[143] This negligence and blatant disregard for the environmental welfare of the areas using their gasoline is why the state of New Hampshire is focusing on suing particularly the large oil refineries involved and not the local gas station owners and distributors, as the large companies have had the information for an extended period of time and withheld that information from everyone involved.

While the state of New Hampshire was raising questions about the ethics of these oil corporations, the gasoline refineries presented several strong arguments on why the partial summary judgment should be considered. Ultimately, the defendants were are arguing against this idea that they should be held liable for any contamination below the maximum contaminant level that was set by the state. They believe that all pollution below the thirteen parts per billion should be not be considered, since the state has declared contamination below that level as safe to ingest in water.

First, they stated that by getting involved and casting a ruling in favor of the state of New Hampshire, the courts would be violating the separation of powers our government structure runs on. [144]They would be crossing into legislation, and the Court should not be involved in the policy-making that occurs when setting a maximum contaminant level. The Court is to rule on the existing evidence, not set new policies. If the court ruled that the state could sue the corporations for all levels of MTBE contamination, then the court would be in some way taking away some of the power of the Safe Drinking Water Act and the maximum contaminant level.

Second, the oil companies point out that for the state to make a claim, they must have proof of damage or injury.[145] In order to have proof of damage or injury, the courts usually look for the contaminant to have crossed some kind of boundary. In many cases, this boundary is typically set by the maximum contaminant level that the state itself had chosen.[146] Because most of the contamination New Hampshire is below the maximum contaminant level, the state technically cannot prove that any damage has been done. Ultimately the state set that level in order to determine when the MTBE is considered to be damaging.

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[143] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 6

[144] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 3

[145] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 3

[146] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, pp. 3-4

It would also be against the equal protection clause for the state to sue these particular oil refineries for this damage. The equal protection clause denies states the right to deny equal protection from its laws.[147] The oil corporations believe that this suit is unfairly targeting just them. By asking the court to support their claim for remediation and payment for treatment to get MTBE contamination below thirteen parts per billion, they are asking them to support a standard that is unfair against just the oil refineries involved in the case. There are other refineries in the country, and even in New Hampshire, where that gasoline may have been used and where that MTBE may have come from. The biggest violation of the equal protection is that some of the sites that state is suing about, other companies had contaminated as well and were held to the maximum contaminant level of thirteen parts per billion for their cleanup, not zero parts per billion.[148] The defendants feel that this is unfairly targeting them, and is not equal protection.

According to the primary jurisdiction doctrine, these claims made by the state are unfair. The primary jurisdiction doctrine states that the court will favor letting an agency make an initial ruling on the topic before the courts will step in.[149] With that in mind, the court and the jury do not have the expertise that would be necessary to make a ruling on this about whether or not thirteen parts per billion is low enough to be a safe level of exposure for humans. It took the Department of Environmental Services and the Department of Health and Human Services years and a great deal of toxicological data in order to decide the safest maximum contaminant level, and the court does not have that time or those resources at their disposal. The defendants are asking the court to not allow the states to ask for claims below the maximum contaminant level because it ultimately does not have the expertise to decide if that thirteen parts per billion is the appropriate level or not.

Based on these two arguments, the motion for a partial summary judgment was denied by the court on August 22, 2012.[150] Ultimately, for a partial summary judgment to be granted, the moving party, in this case the defendants, must show that the issue is not of material fact for the case, meaning that it will no part in the final outcome of the case.[151] For this case, that could not be done. The Superior

[147] Legal Information Institute, Equal Protection, 2010
[148] Defendants' Memorandum in Support of Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 4
[149] Primary Jurisdiction Doctrine Law & Legal Definition, 2012
[150] Order on Defendants' Motion for Summary Judgment Dismissing the State's Claims on the Basis of Equitable Estoppel, Waiver, Laches, p. 1
[151] Order on Defendants' Motion for Summary Judgment Dismissing the State's Claims on the Basis of Equitable Estoppel, Waiver, Laches, p. 2

Court denied the motion on two points. First, at a trial on May 30, 2012 on the topic, the state decided they would not seek any damage claims for contamination below the maximum contaminant level, so the main argument for the partial summary judgment was moot.[152] Second, the defendants argued that they only used MTBE at that level because the state told them it was ok and that they had to sell reformulated gasoline, knowing that there were potential risks associated with MTBE. The court denied this argument as well, because the corporations similarly knew that there were risks to using MTBE and may have known even before the state did, and continues to withhold that information and use MTBE anyways.[153]

Equitable Estoppel and Withholding Information

The case should ultimately move forward with charges against the oil refineries for withholding information. As seen in the evidence for the partial summary judgment, these large corporations have known the negative consequences to using MTBE for a long period of time. However, even with that information, they chose to move forward and to continue to use MTBE in their reformulated gasoline, despite other oxygenates being available. They were given opportunity to speak up on their studies and their concerns with reformulated gasoline and the Clean Air Act Amendments, but chose to not. For that reason, they have shown negligence and have concealed material facts.

During the partial summary judgment, the defendants brought up the concept of equitable estoppel against the state. Equitable estoppel is a legal term that applies when a party is misrepresenting material fact that is crucial to the argument the other side is presenting. Equitable estoppel requires three principles:

> (1) representation as to a material fact that is contrary to a later-asserted position;
>
> (2) reliance on that representation; and
>
> (3) a change in position detrimental to the party claiming estoppel that is caused by the representation and reliance thereon[154]

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[152] Order on Defendants' Motion for Summary Judgment Dismissing the State's Claims on the Basis of Equitable Estoppel, Waiver, Laches, pp. 2-3

[153] Order on Defendants' Motion for Summary Judgment Dismissing the State's Claims on the Basis of Equitable Estoppel, Waiver, Laches, p. 2

[154] Jimerson, 2010

While the defendants attempted to use this theory against the state, I believe that the state could potentially apply those three principles and therefore equitable estoppels against the corporations. While the corporations are blaming the Clean Air Act Amendments for forcing them to use MTBE, they are ignoring the evidence that they have had for the past thirty years that MTBE was at the very least dangerous to the environment and may even have detrimental health risks to humans. By leaving out that material fact and focusing on the Environmental Protection Agency's regulations forcing reformulated gasoline use, the corporations are misrepresenting material fact in the case, building an argument that relies on this misrepresentation, and changing the nature of the argument as presented by the plaintiffs. Ultimately, it can be argued that the corporations should be held accountable and charged for damages that withholding this information has had. This concept will be pursued with further research during further project work.

Public and Private Water Systems and MTBE Contamination

The case also includes an interesting dynamic, as the MTBE does not recognize a difference between public and private water systems. MTBE is contaminating groundwater, which is tapped by both public and private wells, all within a similar area. There is no disputing that the state has a right to make claims to protect the public water supplies, supported by the public trust doctrine, as well as the concept of parens patriae.[155] Parens patriae is what allows a state to step in to protect citizens who may not be able to protect themselves.[156] This idea can be applied to resources as well, and lets the state sue on behalf of citizens who have been injured or harmed. In State of New Hampshire v. Hess Corporation et al., the state is suing on behalf of its citizens, specifically those who have been affected by contaminated water.

However, this case does present some difficult lines between public and private treatment. First, a great deal of New Hampshire's water is accessed through private, not public wells. For these families, they may have no idea if their water is contaminated with MTBE without paying their own money for someone to go test their well water. What if the family cannot afford to have their well water tested? Is that not an issue of environmental justice? In this case, is it not the responsibility of the state to provide that resource to their citizens, if they do it for others? If the state is going to provide that testing to private wells, it will cost money, and that money should come from the corporations who have caused

[155] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 4
[156] Parens Patriae Definition

the contamination in the first place. This concept has already seen some time in trial for this case and will be pursued further in the future. As the case moves forward, the concept of public and private water systems and MTBE contamination will be furthered discussed, and will be researched further in future project work.

Related Cases

The United States legal system is the common law system, which is based off of precedents. The decisions that courts make come from interpreting past decisions from related cases. There are several cases that can be used as good cases to consider researching further. MTBE lawsuits have become more common, especially in areas such as California and New York, where poor air quality and smog made reformulated gasoline a necessity. One of the largest cases is City of New York v. Exxon Mobil Corporation, which was eventually merged with other MTBE litigation to create In Re: Methyl Tertiary Butyl Ether ("MTBE") Products Liability Litigation, 00-cv-1898, U.S. District Court, Southern District of New York (Manhattan)[157] This case was brought by one hundred and fifty three public water providers in seventeen states against some of the largest oil companies. Many of the defendants in the case chose to settle, paying more than $423 million, as well as seventy percent of the cost for cleanup over the next thirty years.[158] Not all of the defendants chose to settle, and the case continued on to trial after this 2008 decision.[159] This went on to trial in 2009, where the companies that did not settle, including Exxon Mobil Corporation, were found guilty of product liability for not stating the dangers of MTBE in gasoline, trespassing, public nuisance, and negligence and were charged $104.7 million for damages.[160] It did argue, however, that the state did not have a strong enough presentation proving that at the time MTBE was being added to gasoline that there was a better option available.[161] This case specifically could have important implications for the New Hampshire case, especially the argument based on the corporations withholding information.

Another case to consider is State of Connecticut vs. American Electric Power Company, Incorporated. This case was first used as evidence to support the defendants in their work for partial summary judgment, and then the decision used by the defendants was overturned by the Second Circuit

[157] Weidlich, *Exxon Mobil Won't Face Punitive Damages in New York Water Case,* 2009
[158] Mouawad, 2008
[159] Mouawad, 2008
[160] Weidlich, *Exxon Found Liable for Fouling New York City Water With MTBE*, 2009
[161] Weidlich, *Exxon Found Liable for Fouling New York City Water With MTBE*, 2009

Court.[162] Since then, the case has been heard by the Supreme Court, and in 2011 was ruled on. This case was taken up by several states against five large electricity companies, who were suing the companies for their carbon dioxide emissions and the resulting climate change damage the emissions were creating.[163] The states were looking to lessen the contributions of these companies to a public nuisance.[164] When this case was initially heard in the district court, the complaint was dismissed because the ruling was too political in nature and would be better suited to be answered by a different branch of the government, through regulation.[165] This decision was appealed, and the circuit court reversed this decision, explaining that judicial cases can be political or regulatory in nature, and as long as all the necessary information is present, and that the states involved do have a stake in bringing this case because the environmental harm is damaging their natural resources and putting the livelihood of their citizens at risk.[166] The case was again appealed and heard by the Supreme Court, which again reversed the decision. The Supreme Court stated that there were regulations in place that dealt with this topic of climate change, and that it is up to the Environmental Protection Agency and the Clean Air Act to regulate carbon dioxide emissions.[167] It does leave the option available though that if states do not believe the Environmental Protection Agency is upholding their responsibility to make legislation to regulate the climate change, the states can move forward with judiciary action against them.[168] However, because the Environmental Protection Agency as well as New Hampshire's Department of Environmental Services does have regulations in place on the topic on MTBE, the state does still have a right to bring their case against the oil companies. This case, however, could provide a precedent against ruling that the companies should pay to clean up all MTBE contamination, and not just contamination above the maximum contaminant level because the regulations are set at thirteen parts per billion and above requiring treatment and the court should avoid making a regulatory decision.

[162] Notice of Supplemental Authority in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards
[163] State of Connecticut v. American Electric Power et al., 2009
[164] State of Connecticut v. American Electric Power et al., 2009
[165] State of Connecticut v. American Electric Power et al., 2009
[166] State of Connecticut v. American Electric Power et al., 2009
[167] State of Connecticut v. American Electric Power et al., 2009
[168] State of Connecticut v. American Electric Power et al., 2009

Brief as *Amicus Curiae* in Support of the State of New Hampshire

Questions presented

Are the large gasoline refining corporations liable for removing all levels of MTBE from New Hampshire's water because of joint-and-several liability? Was MTBE misrepresented to consumers, and does the state of New Hampshire have a cause of action against these corporations under strict liability? Lastly, can the state of New Hampshire sue for monetary repayment to finance treating the water?

Statement of interest of the a*micus curiae*

This brief is presented on behalf of Susan Brennan, an interested party in Worcester, Massachusetts. As a bachelor's degree candidate at Worcester Polytechnic Institute, this research and brief are part of her degree requirements. Moreover, as a student of Environment & Sustainability Studies, this case presents a unique opportunity to set a precedent for future civil cases on the topic of remediation and clean-up of environments. She recognizes the importance this ruling in New Hampshire could have on environmental law in the future, and therefore presents her findings in support of the state of New Hampshire's argument against these oil corporations.

The mission of the Environmental & Sustainability Studies program at Worcester Polytechnic Institute directly correlates to the theme of issues presented in the case:

"With a growing public demand for governments and the private sector to focus greater attention on the implications of human production and consumption for environmental sustainability, professionals educated in aspects of human-environment interactions will be in increasing demand. Through core courses, projects, and seminars focused on integrated approaches to environmental issues, the environmental studies curriculum helps students to address contemporary environmental problems in creative ways that transcend disciplinary boundaries…" [169]

In *New Hampshire v. Hess Corporation*, the interactions between the public and private sector and their implications on the environment, correlate directly to this mission statement. In this case, the court will have to make a decision about the implications of human activities on the environment. The issue will be addressed through political, social, and economic themes, and the decision will ultimately influence not only future MTBE and groundwater contamination cases, but also cases of environmental degradation in the future.

The state of New Hampshire is not alone in this MTBE contamination. In the United States, thirty-six states have water containing MTBE, according to the United States Geological Survey.[170] New Hampshire is not alone in looking for assistance in groundwater remediation from the large oil corporations. Cases have been filed against these corporations by parties all over the country. *New Hampshire v. Hess Corporation et al.* is unique in that it is not part of the federal court proceeding

[169] Worcester Polytechnic Institute Undergraduate Course Catalog, 2013-2014, p. 74
[170] American Water Works Association, 2013

currently moving forward on the subject of MTBE contamination. This case is unique as it is the first MTBE case being decided on the state level. This case is also further along than similar MTBE cases, so the decision from this case will set the precedent that the federal MTBE case will follow. If the corporations are found liable for the MTBE pollution and the necessary treatment and remediation of the water, this decision will save the federal government, state governments, and tax payers millions of dollars in water treatment in the future. The repercussions for this case are dramatic and far-reaching, and for that reason, I respectfully am submitting this brief to court to consider as evidence in the case.

Summary of argument

New Hampshire Superior Court's determination of the oil corporation's liability should consider these three points: (1) joint-and-several liability, (2) misrepresentation and strict liability, and (3) treatment and payment. These three ideals are questioned in this case, and the court should consider this argument for how to apply them in determining that the oil corporations are liable for cleaning up the MTBE in the environment.

1. Question of Joint-and-Several Liability:

In order for the court to determine if the large oil companies are subject to joint-and-several liability, there is one important fact to consider; these companies have the most money at their disposal. They are wealthier than any other party that can be directly blamed for the MTBE contamination, including the smaller oil distribution companies. In order to pay for the remediation and treatment costs associated with New Hampshire's groundwater, joint-and-several liability must be applied, and damages payment should be based proportionally on wealth and not necessarily on who was the most responsible. The United State's Comprehensive Environmental Response, Compensation, and Liability Act and its applications provide a precedent for "deep pocket" repayment in these situations. Several cases as well as documents from the federal government support these claims and will be explored further.

2. Question of Misrepresentation and Strict Liability:

In regards to the oil corporations, there is no disputing the evidence that they have withheld information from the consumers of their product about the potential negative health and environmental impacts from the reformulated and oxygenated gasoline. The court should consider the withheld information to be a misrepresentation of the product, and under strict liability find the companies guilty

for the damages using the gasoline caused. Had gasoline retailers and consumers known about how damaging MTBE can be to water sources, or that MTBE can be dangerous to health, they may have chosen to not purchase that gasoline. The gasoline companies' decision to misrepresent their product can be compared to the misrepresentation done by tobacco companies. These tobacco companies were found liable for the damages done to consumers of their tobacco products. Connections will be drawn between the actions of the tobacco companies and the oil corporations *New Hampshire v. Hess Corporation et al*. From this precedent, I respectfully encourage the court to find the oil corporations liable for the damage this misrepresentation had.

3. Question of Treatment and Payment:

For New Hampshire to be able to proceed with treating the contaminated groundwater sufficiently, they are going to need monetary support that should be provided from those most at fault for the MTBE pollution. Clean up and remediation for the water will cost millions of dollars. While the state of New Hampshire and the federal government have funds designated for the treatment and remediation of these contaminated waters, these funds may not be enough to cover all of the future treatment MTBE will require. The costs associated with treatment will depend on the clean-up methods chosen by the states. For New Hampshire, treating their water should not be dependent on the monetary resources available to them. For that reason, the federal government has instated laws that protect the states from having to pay the full costs for remediation when a private party can be identified. This case is New Hampshire's method for requiring the oil corporations to do their part with the treatment and clean-up, and for this reason I am respectfully supporting their motives and measures for achieving their goal.

Argument

1. The oil corporations are responsible for MTBE remediation due to joint-and-several liability

When hearing this case, it is important to understand that the oxygenated fuel comes from these large oil companies, and is stored and distributed by other, smaller companies based in New Hampshire. Although these smaller companies have played a part in the spread of MTBE across New Hampshire, the large oil refining companies are the ones the state is suing. The state of New Hampshire has targeted these companies specifically. The oil corporations are considered "deep pocket"

defendants because they are multi-million dollar companies. They have the resources, experience, and monetary support to work with New Hampshire for remediation. I also suggest the court apply joint-and-several liability in this case. These oil corporations are responsible for more than half of the MTBE contamination, as they are the ultimate source of the MTBE in the gasoline in the first place. Therefore, according to joint-and-several liability, the oil corporations are responsible for paying for the remediation of the groundwater.

Deep pocket defendants are important in environmental cases like *New Hampshire v. Hess Corporation, et al.*, because it enables environmental clean-up and public safety to be handled effectively. While these corporations may not have been the last parties to be responsible for the MTBE and the gasoline it was contained in, they were initially responsible for the decision to add MTBE to the gasoline, and are responsible for their product and its effects. For New Hampshire to receive the money necessary to execute remediation programs, such as groundwater testing and treatment, they will need the assistance these large oil corporations can and should provide according to the law.

Comprehensive Environmental Response, Compensation, and Liability Act

For situations like this groundwater contamination in New Hampshire, the federal government has legislation to assist in the clean-up of these potential hazards. The Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §1906 et seq, is in place for situations like this in New Hampshire, when widespread environmental contamination has occurred and the remediation costs go beyond the capabilities of a local or state institution. CERCLA should be applied to the MTBE contamination in New Hampshire as presented in this case. An important aspect of CERCLA is to hold whoever is responsible for the contamination at the site fiscally responsible for the monetary resources necessary to return the site to acceptable conditions. According to Section 107 of CERCLA, a party is liable for the pollution at a site if it meets certain qualifications, including "the owner and operator of a vessel or a facility" and "any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment, of hazardous substances owned or possessed by such person, by any other party or entity, at any facility or incineration vessel owned or operated by another party or entity and containing such hazardous substances".[171] In regards to the MTBE in New Hampshire, the oil corporations both own and operate some of these storage and distribution centers for their gasoline, as well as transport to other facilities

[171] Comprehensive Environmental Response, Compensation, and Liability Act, 1980

their treated gasoline. CERCLA, in Section 107, declares those liable for the costs associated with the clean-up work are specifically responsible for several costs, including:

> "(A) all costs of removal or remedial action incurred by the United States Government or a State or an Indian tribe not inconsistent with the national contingency plan;
>
> (B) any other necessary costs of response incurred by any other person consistent with the national contingency plan;
>
> (C) damages for injury to, destruction of, or loss of natural resources, including the reasonable costs of assessing such injury, destruction, or loss resulting from such a release; and
>
> (D) the costs of any health assessment or health effects study carried out under section 104(i)"[172]

For New Hampshire, CERCLA could be the answer to maximize their groundwater remediation. By holding these large gasoline corporations liable for the damage their product caused, the state can be reimbursed for the extensive costs treating the MTBE-contaminated water will entail.[173]

Burlington Northern & Santa Fe Railways Co. et al. v. United States et al.

Several cases provide examples of the importance of joint-and-several liability defendants in environmental law cases. In *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al.*, the federal government searched out deep pocket defendants in order to help with a major environmental problem. Brown & Bryant, Incorporated, an agricultural chemical distributor, was purchasing and storing various hazardous chemicals, including the pesticide D-D, from the Shell Oil Company. Unfortunately, in the process of handling these hazardous chemicals, many of the chemicals were spilt and released into the environment during transfers, deliveries, and equipment malfunctions. By 1998, the government had spent over eight million dollars on the on-site remediation, and the government began looking for other options to pay help pay for the site's remediation. The United States filed a case against both Brown & Bryant and Shell Corporation for their parts in the contamination. Initially, the lower courts held that Shell was responsible for site remediation, but the Supreme Court ruled that the full responsibility should be placed solely on Brown & Bryant, since Shell knew there was accidental spilling of their chemicals occurring and took the initiative to warn Brown &

[172] Comprehensive Environmental Response, Compensation, and Liability Act, 1980
[173] Comprehensive Environmental Response, Compensation, and Liability Act, 1980

Bryant to take the proper precautions. In the ruling, the Supreme Court stated that CERCLA "…is designed to promote the cleanup of hazardous waste sites and to ensure that cleanup costs are borne by those responsible for the contamination".[174] Ultimately, joint-and-several liability was imposed on Brown & Bryant and they did have to contribute money to cleaning up the site because they did not take the proper precautions to prevent contamination by their product. [175]

There are a few key components of this case that are especially applicable to *New Hampshire v. Hess Corporation et al.* First, to assist with site clean-up when it reached the point where the government could no longer afford to fund it, the state turned to corporations as deep pocket defendants to hold them accountable for their actions and to help fund the remediation work the state needs to do to protect the public. The case is also important to *New Hampshire v. Hess Corporation et al.* because it sets a precedent that in order to not be found liable, the company must have done all they could to prevent the contamination from occurring. In *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al.*, the charges against Shell Corporations were dropped because it was proven that they were not liable.[176] However, for the exact reasons Shell Corporation was not liable in the case, Hess Corporation and the other oil refineries are responsible as deep pocket defendants in *New Hampshire v. Hess Corporation*. These companies were aware that their product was releasing a dangerous chemical into the environment, but continued to use MTBE in their gasoline anyways and did not advise the other companies that came in contact with this gasoline to handle it any differently. For that reason, the charges for monetary assistance towards cleaning up MTBE are reasonable, despite other parties being involved in the distribution of MTBE gasoline. Ultimately, these large corporations hold some responsibility and as deep pocket defendants should be held accountable for paying for the clean up because they have the largest income.

United States v. General Electric, Co.

Another important case that establishes this deep pocket precedent is *United States v. General Electric, Co.* This is again a case centered on CERCLA and the liability for cleaning up the environmental damage from chemicals. The Superfund site referenced in the case happened to be in New Hampshire, and the case was recently ruled on by the First Circuit Court of Appeals. General Electric was storing "scrap" pyranol, a type of polychlorinated biphenyl (PCB) in large drums on the site, and over a ten year

[174] *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al*., 2009
[175] *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al*., 2009
[176] *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al*., 2009

period was selling the pyranol to Fletcher Paint Works and Storage Facility to use as an additive in their paints. This pyranol was not of the quality General Electric needed for their processes, so they were able to dispose of this unwanted pyranol at this site, through their business relationship with Fletcher. When this relationship began deteriorating, General Electric stopped receiving payment from Fletcher but continued to send their scrap pyranol to the site. The pyranol in the drums at this site was leaking into the environment, and posed a danger to the public health. Under CERCLA, the Environmental Protection Agency identified the area as one that needed remediation, and began the process of treating it and cleaning it up. To pay for the cleanup, the Environmental Protection Agency sued both Fletcher Paint Works and General Electric as liable parties. Though General Electric argued their role as an arranged disposer on the site, previous cases including the decision made in *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al.* define the arranged disposer as the party that took intentional steps to dispose of their hazardous substance. This clarification is important in the understanding of deep pocket defendants. As the ruling explains, "there necessarily remains a range of cases in which arranger liability is proper but the parties' intent will not be obvious."[177] Ultimately, while these large corporations may be indirectly connected to how the MTBE escaped into the environment, and contaminating the groundwater was not their intention, that does not mean they are not liable. The interpretation of liability in this case, especially in regards to CERCLA, is a direct consequence of deep pocket defendants. It enables CERCLA to be more adequately funded by widening the scope of who is liable for cleanup at sites to include the more-distant, larger corporations. While Fletcher may have been the company directly handling these storage drums, General Electric, which has a great deal more money, is also liable because the product came from them.[178]

This case expands upon the precedent set in *Burlington Northern & Santa Fe Railways Co. et al. v. United States et al.* and continues to broaden the definition of liability in environmental cases. By widening the scope, more companies, especially more large, wealthy companies, are being liable for environmental harm from their products.[179] In *New Hampshire v. Hess Corporation et al.*, this pattern should continue to be applied. While other, smaller companies may have been involved in distributing the gasoline, the primary liability should be on the large corporations to pay for the remediation of the

[177] *United States v. General Electric, Company*, 2012
[178] *United States v. General Electric, Company*, 2012
[179] *United States v. General Electric, Company*, 2012

environment.[180] By holding these gasoline companies responsible, the state can afford to pay for the cleanup costs that are inevitable in removing MTBE from their groundwater.

2. The oil companies are guilty of misrepresenting their product and under strict liability are responsible for all damages from their product

A crucial issue this case raises is on the topic of deception and fraud. Ultimately, there is significant evidence that these oil refineries knew that MTBE posed dangerous environmental consequence and that its effects on human health were potentially negative. However, the companies chose to withhold that information from the public, both the consumers and companies working with the oxygenated fuel, in order to meet a government regulation in the cheapest and easiest way possible. This manipulation from these companies has contaminated the groundwater, and ultimately put a large portion of the New Hampshire population at risk. Evidence is in place that if the state had known about the risks of using MTBE fuel, they would have banned it sooner in the state. For this reason, the oil refineries should be held accountable for their decision to misrepresent their gasoline.

Racketeer Influenced and Corrupt Organizations Act

In 1970, the United States government created a way to hold corporations accountable for their disreputable behavior in business. They did so in the form of the Racketeer Influenced and Corrupt Organizations (RICO) Act. The effects from the act have been far-reaching, and have been useful in situations like the one presented in this case. In most court cases against tobacco companies, not abiding by the RICO Act is cited as a reason the tobacco industry has been found guilty, and those reasons can be applied to the oil companies in *New Hampshire v. Hess Corporation*.

Racketeering Behavior

For a company to be convicted of racketeering, it must be proven that the company has participated in two or more examples of racketeer behavior over a ten year period, and they must be directly invested in, maintain an interest in, or have participated in criminal activities that would affect interstate or foreign commerce.[181] The actions qualifying as racketeering must also be related to each

[180] *United States v. General Electric, Company*, 2012
[181] United States Third Judicial Circuit, p.18, p. 18

other in order for the RICO Act to be applied.[182] In the future, as the environment becomes any area of greater concern to the public, the RICO Act could have dramatic impact, in terms of holding private corporations responsible for their environmental impacts. There is an extensive list of behavior that is unlawful according to this act, but in application to the case in New Hampshire, behavior that is regulated according to the RICO Act includes fraud, as well as potentially bribery and counterfeiting.[183] The evidence presented so far in the case shows that the oil companies misrepresented their gasoline with the MTBE additive because they withheld their research and lied about what they had uncovered about the environmental dangers of MTBE. This decision can be perceived as irresponsible, and their decisions qualify as racketeering. Their deception is part of a single scheme to keep using MTBE in gasoline because it is cheaper and easier for the companies. The fraud was over many years, and did not end until enough other research had been published that states began banning MTBE in their gasoline. Because this proves continuity, the oil companies have violated the regulations as stated in RICO.

Misrepresentation Precedent & Tobacco

One area to consider in regards to this issue in the case is the similarity it shares to previous actions by tobacco corporations. Since the 1950s, tobacco companies have been aware of the dangers of tobacco and smoking cigarettes, and they chose to conceal that information from the public in order to protect their profit.[184] It was not until the past twenty years that tobacco companies started to be held responsible for this unethical decision and the millions of lives withholding that information has affected.[185] Recent court cases have focused on the state and federal level looking for injunctive and monetary relief from the actions of these tobacco companies, and I suggest following a similar pattern in regards to the recent actions concerning MTBE and oil corporations. The RICO Act was ultimately applied in several significant tobacco lawsuits that have applicability to this similar area of concern in New Hampshire's groundwater contamination case, including *United States v. Philip Morris et al.*, *Blue Cross Blue Shield New Jersey v. Philip Morris et al.*, *Minnesota et al. v. Philip Morris et al.*

Significance of the party that files the case

As stated above, there are three cases that have successfully brought charges of racketeering up against large corporations and won. The cases, *Minnesota et al. v. Philip Morris et al*, *New Jersey v. R.J.*

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[182] United States Third Judicial Circuit, p.18
[183] Legal Information Institute, 18 USC § 1961-Definitions
[184] Public Health Law Center, 2010
[185] Public Health Law Center, 2010

Reynolds Tobacco Company et al, and *United States v. Philip Morris et al,* each shares an important commonality with the issue of deception and withholding information presented in *New Hampshire v. Hess Corporation et al*. This significant connection between these three tobacco cases and the MTBE contamination case is the party that filed the case. All of these cases have been focused on fraud and withholding information within large corporations. The damages were brought against these companies not as individual people seeking compensation for damages, but rather as state or federal government entities. State Attorney Generals have begun bringing cases against the tobacco companies on the basis of misrepresenting, marketing tobacco products to children under the legal smoking age of eighteen, and conspiracy to conceal their research into the health effects of smoking. These cases, and the application of the RICO Act in this context, have been a much stronger approach to dealing with the issues with the tobacco corporations, and I suggest it be used for cases on MTBE now.

Minnesota et al. v. Philip Morris et al.

In *Minnesota et al. v. Philip Morris et al.*, the state of Minnesota as well as Blue Cross Blue Shield Insurance Company filed a civil suit against the tobacco companies for misrepresenting their product to their consumers, stating that the companies were not fulfilling their responsibility to their customers to inform them of the dangers of their product and were intentionally lying and being deceitful to the public in order to protect their profit.[186] The state imposed the RICO Act against the defendants, which included several tobacco research organizations, like the Council for Tobacco Research -U.S.A., Inc. and the Tobacco Institute, Inc., as well as the "Big Six" cigarette manufacturing companies: Philip Morris Incorporated, R.J. Reynolds Tobacco Company, Brown & Williamson Tobacco Corporation, B.A.T. Industries P.L.C., Lorillard Tobacco Company, American Tobacco Company, and Liggett Group, Inc.[187] The basis for the argument included newspaper ads and other publications from these tobacco companies and interest groups that created doubted in consumers, with statements that stated that research did not prove a causal link and that the health of the consumers was these companies' top priority.[188] They withheld information, citing attorney-client privilege, and created these interest groups as fronts to protect against the truth getting out and ruining their thirty percent profit margins.[189]

[186] *Minnesota v. Philip Morris et al.*, 1994, Complaint
[187] *Minnesota v. Philip Morris et al.*, 1994, Complaint
[188] *Minnesota v. Philip Morris et al.*, 1994, Complaint
[189] *Minnesota v. Philip Morris et al.*, 1994, Complaint

Of the nine counts the plaintiffs were citing as causes for action, three were on this topic, and included consumer fraud, unlawful trade practices, deceptive trade practices, and false advertising.[190] These all stem from withholding information from consumers and not marketing their product appropriately for its health hazards. Count eight for cause for action in this case is also interesting, as it calls for restitution on behalf of these companies to the public as part of their duty, in the form of monetary and future action. It states:

> "Defendants assumed and owe a duty to pay for the harm caused by their wrongful conduct, yet defendants have repeatedly refused to do so. Instead, these defendants embarked on a campaign of denial, subterfuge, and deceit to deny responsibility and to avoid paying for the consequences of the harm they have caused. Plaintiffs have been and will be required by statutory and contractual obligations to expend large sums of money to pay for the harm caused by the wrongful conduct of defendants…"[191]

In count nine, this idea is expanded, and the plaintiffs point out that the companies have experienced an unfair amount of money from sales due to their fraud. These counts, specifically eight and nine, are looking for the tobacco companies to be held at strict liability for the damages from their product. Ultimately, this case ended with the defendants settling in 1998, after almost four years of debating and deciding the role a state can play in protecting the health of their citizens.[192] In 1998, the agreement was reached, with many of the state's wishes met, including monetary support from all of the companies totaling $240,000,000 and to not stand in the way of future legislation to better protect the public from the dangers of cigarette use and tobacco.[193]

This case can be used as an example for similar cases involving MTBE, like the case in New Hampshire. Again, the oil corporations committed similar counts of fraud to what the state of Minnesota was suing the tobacco companies for. This case also raises the point that the monetary benefit the companies have experienced from the tobacco sales is unfair. I believe this is a topic to consider in the future of *New Hampshire v. Hess Corporations et al,* since the major contributing factor for the oil companies' fraud was to continue to improve their profit margin by selling MTBE gasoline

[190] *Minnesota v. Philip Morris et al.*, 1994, Complaint
[191] *Minnesota v. Philip Morris et al.*, 1994, Complaint
[192] *Minnesota v. Philip Morris et al.*, 1994, Settlement
[193] *Minnesota v. Philip Morris et al.*, 1994, Settlement

because it was a cheap method to reach the EPA standards in some areas. The state should consider pursuing this as an avenue for enforcing strict liability upon the oil companies.

New Jersey v. R.J. Reynolds Tobacco Company et al.

A similar case to *Minnesota v. Philip Morris* is *New Jersey v. R.J. Reynolds Tobacco Company et al.* Like in the previous case, the plaintiffs were suing the "Big Six" tobacco corporations, as well as some of the interest groups working to protect the tobacco companies.[194] This case also considered similar evidence against the tobacco companies in terms of withholding information, committing fraud, and false advertising.[195] For the cause of action, many of the reasons the plaintiffs were filing matched the reasons the plaintiffs in *Minnesota v. Philip Morris*, including unjust enrichment, protecting the consumer, and other actions that qualify as racketeering.[196] *New Jersey v. R.J. Reynolds Tobacco Company et al*. can be used as another precedent to be cited in *New Hampshire v. Hess Corporation et al* for many of the same reasons as the case in Minnesota. Again, the case clearly shows that this fraud and withholding information is a form of racketeering and can be pursued in court against the corporations because of RICO.

United States v. Philip Morris et al.

On a much larger scale, the federal government has also taken action against the tobacco companies. In *United States v. Philip Morris et al.*, the tobacco companies were found guilty of racketeering according to the RICO Act.[197] The tobacco companies were guilty of hiding information, lying, disposing of important data, and tampering with scientific evidence all to keep making money, and all considered illegal according to this federal law.[198] Because of this, the Supreme Court ruled that the companies were:

- prohibited from committing any other actions that could be consider racketeering in regards to tobacco and its health effects on humans[199]
- banned from using advertisements that included the words "light", "natural", and "mild", among others, that made the tobacco seem less dangerous than it is[200]

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[194] *State of New Jersey v. R.J. Reynolds Tobacco Company, et al*., 1996
[195] *State of New Jersey v. R.J. Reynolds Tobacco Company, et al*., 1996
[196] *State of New Jersey v. R.J. Reynolds Tobacco Company, et al*., 1996
[197] *United States v. Phillip Morris et al.*, 1999
[198] *United States v. Phillip Morris et al.*, 1999
[199] Campaign for Tobacco-Free Kids, 2010

- required to issue corrective statements about the negative health effects from smoking and secondhand smoke through television commercials, newspaper advertisements, their web sites, and cigarette packaging[201]
- required to make public their internal documents that were presented in litigation[202]
- required to report their marketing data to the federal government annually[203]

This ruling was far-reaching and has ultimately had to change how tobacco companies market their product. In the case of MTBE, this case again adds support that their conduct with the information on MTBE was not acceptable from a business. This case and the ruling from it can be used as a guideline for *New Hampshire v. Hess Corporation et al* when considering how to properly handle a punishment for this type of indiscretion by the companies. MTBE testing should consider to be done in order to further understand the health implications it may have on humans, and the results from all MTBE testing should be made public. Once racketeering behavior has been proven, the law states that the injured parties cannot seek out compensation for past actions, only future.[204] This is well within the requests of the state in *New Hampshire v. Hess Corporation et* al, as they are asking for compensation from the oil companies for their future clean-up and remediation efforts.

From these cases, a precedent is set that individual states have the right to keep large corporations, like the tobacco companies or gasoline companies, in check in regards to their actions when they pose a public health risk. These cases also reveal that states can file claims for monetary and injunctive relief when corporations operating within the state are not following the guidelines laid out in RICO. Because both tobacco and gasoline corporations operate on a national and international scale, RICO can be applied and the corporations can be monitored by the government, as these corporations are affecting interstate commerce. In *New Hampshire v. Hess et al.*, the gasoline companies are similarly guilty of withholding information from consumers, hiding scientific research on the dangerous environmental effects MTBE can have on the environment, and unjust enrichment from a product that had unpublished dangers. RICO is in place to prevent corporations from acting this way, and should be utilized to hold the oil corporations responsible under strict liability for their actions.

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[200] Campaign for Tobacco-Free Kids, 2010
[201] Campaign for Tobacco-Free Kids, 2010
[202] Campaign for Tobacco-Free Kids, 2010
[203] Campaign for Tobacco-Free Kids, 2010
[204] Denniston, 2006

3. Question of treatment and payment

By targeting deep pocket defendants like Hess Corporation and ExxonMobil Corporation in this case, the state of New Hampshire is finding ways to fund the significant groundwater cleanup from the MTBE contamination. While both public and private water sources have been affected by this contamination, the highest amounts of contamination are in public water sources, so the responsibility for most of this cleanup is on the government.[205] Currently, understaffing has been a significant hindrance to the cleanup programs the state is implementing, an issue that could be solved with a larger budget.[206] Ultimately, this case is expected to be the best way to subsidize the remediation programs New Hampshire has already begun to put into effect.

The oil corporations, once strict liability is proven, should be responsible for a generous portion of the monetary expenses clean up with entail. The state and the country have already taken advantage of their monetary options to help fund the groundwater cleanup. The United States has the Gasoline Remediation and Elimination of Ethers Fund (GREE), which is a part of the Petroleum Reimbursement Fund.[207] This money is in place to help facilitate the treatment and cleanup of water supplies in the state that have been contaminated by petroleum ethers like MTBE.[208] This fund is financed through a tax of $.025/gallon on gasoline that is sold in the state and contains these petroleum ethers.[209] For the year 2006, the fund had an annual budget of over two million dollars and had been involved in funding one hundred projects since it had been established.[210] The Clean Water State Revolving Fund (CWSRF) is another funding mechanism New Hampshire has relied on to help support their remediation efforts. This fund is part of a federal program that was created by the Clean Water Act of 1987 and has over thirty billion dollars in assets and annual funds.[211] It allocates approximately three billion dollars towards water quality projects, like MTBE contamination treatment.[212] The Environmental Protection Agency also sponsors the MTBE Blue Ribbon Panel on Oxygenates in Gasoline, which encouraged states, like New Hampshire, to consider targeting State Revolving Funds in their findings in order to accelerate

[205] Memorandum of Law in Support of State of New Hampshire's Objection to Defendants' Motion for Partial Summary Judgment on Claims Below New Hampshire's MTBE Standards, p. 1
[206] Hadzima, 2006, pp. 2, 27
[207] Hadzima, 2006, p. 21
[208] Hadzima, 2006, p. 21
[209] Hadzima, 2006, p. 21
[210] Hadzima, 2006, p. 20
[211] Hadzima, 2006, p. 20
[212] Hadzima, 2006, p. 20

treatment and remediation in high priority areas.[213] Leaking underground storage tanks, like those responsible for much of the MTBE groundwater contamination in New Hampshire, can potentially create Superfund sites, and also qualify for Brownfield remediation from the Environmental Protection Agency. There is also the Leaking Underground Storage Tanks (LUST) Trust Fund, which is replenished through a $.001/gallon federal tax on gasoline and other fuel purchases in the United States.[214] This tax generates about seventy million dollars in annual revenue.[215] By the close of fiscal year 2001, this fund contained over $1.7 billion.[216] Of that money, eighty percent is allocated to the states for administration, oversight, and cleanup of these LUST sites, such as the situation in New Hampshire.[217] The states receive this funding based on their cleanup workload. Usually about a third of the funding is for state administration, a third for state oversight and enforcement, and the last third for the actual cleanup process.[218] These payment options have already done their part in helping treat New Hampshire's water supplies. This money, however, is provided by the taxpayers, who are not at fault for using gasoline they were misinformed about. It also pays for water contamination projects all over the state and the country. Therefore, the oil corporations should be accountable for contributing to these remediation efforts as well, and use their resources for a problem that is directly correlated to their product. Funds like these, both on the state and national level, can help to relieve some of the cost for cleanup of MTBE, but the situation in New Hampshire cannot be addressed to the level the state would like without additional funds from the parties liable.

Once New Hampshire has a better understanding for the funding available for treatment, they should begin to find the best water treatment option for the area. There are a variety of treatment options available for removing MTBE from the water, and different sites in New Hampshire will require different types of treatment. There are two standards for MTBE treatment: ex situ and in situ treatments. The environment surrounding the contaminated water supply, along with many other conditions, will change which removal option is best for each site. The different treatment options also have different price tags associated with them. Ultimately, cost should not be factor for New Hampshire when determining the most effective and efficient method for remediating their groundwater, and that is why payments from these large oil companies are so important to the success of the clean up.

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[213] Hadzima, 2006, p. 20
[214] Hadzima, 2006, p. 24
[215] Hadzima, 2006, p. 24
[216] Hadzima, 2006, p. 24
[217] Hadzima, 2006, p. 24
[218] Hadzima, 2006, p. 24

Conclusion

MTBE has the potential to wreak unforeseen havoc on the United State's water systems. Its chemical properties make it almost impossible to remove from water systems without it being a costly and time consuming undertaking. Also, because the health effects are not fully understood yet, it is unclear just how dangerous this chemical is. For this reason, it understandable why states like New Hampshire are doing everything within their power to stop the further use of MTBE and locate resources to help clean up their water supplies. *New Hampshire v. Hess Corporation et al.* will have a long-lasting impact not only on the quality of water in the state, but potentially on the lives of its citizens. It also could set important precedents for future environmental cases.

With all of these precedents and legislation available, the oil corporations in *New Hampshire v. Hess Corporation et al.* will in the end have to be held responsible for their actions. While they may have had good intentions for their gasoline and air quality, they neglected to act on their sources about the dangers it posed on groundwater supplies. This decision has put the residents of New Hampshire at risk and has created a considerable problem for the state to solve. The decision made in this case could help New Hampshire to alleviate many of the issues associated with the MTBE as well as create precedents that will hopefully help other states facing similar contamination by MTBE to receive the proper treatment and remediation necessary to keep their residents safe.

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