

METHYL TERTIARY BUTYL ETHER (MTBE) IN ILLINOIS (Revised 2010)

What is MTBE?

MTBE is a natural gas derivative which boosts oxygen to make gasoline burn cleaner.

This fact sheet was originally prepared in 1999. MTBE is a volatile, organic chemical. Since the late 1970's, MTBE has been used as an octane enhancer in gasoline.

Because it promotes more complete burning of gasoline, thereby reducing carbon monoxide and ozone levels, it is commonly used as a gasoline additive in localities with air quality concerns. In the Clean Air Act of 1990 ("Act"), Congress mandated the use of reformulated gasoline ("RFG") in areas of the country with the worst ozone or smog problems. RFG must meet certain technical specifications set forth in the Act, including a specific oxygen content. Ethanol and MTBE are the primary oxygenates used to meet the oxygen content requirement. Prior to December 1997, 32 areas in a total of 18 states were participating in the RFG program. During this same period, RFG accounted for about 30% of gasoline nationwide.

Since this original fact sheet was developed the United States Geological Survey (USGS) has developed a comprehensive web site on MTBE:

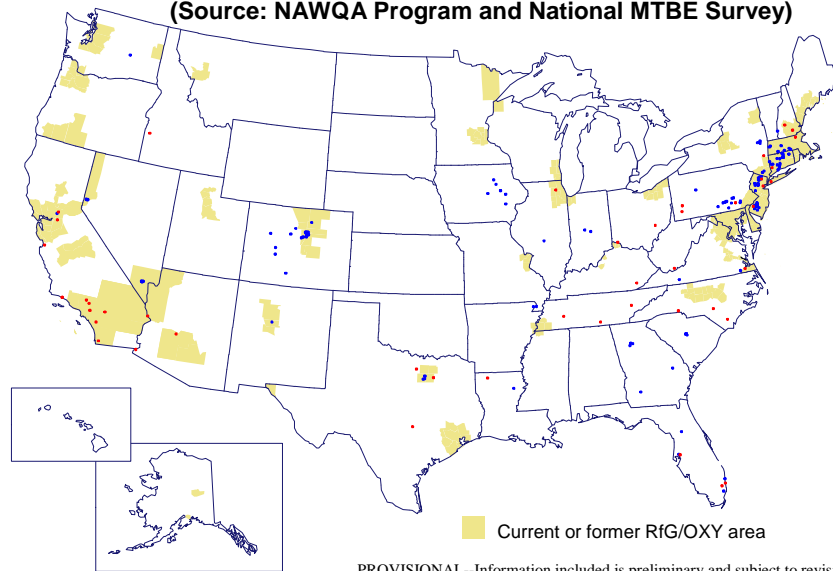
<http://sd.water.usgs.gov/nawqa/vocn/mtbe.html>

Illinois has found minimal evidence of MTBE in surface water sources of drinking water (rivers, streams and lakes).

What is the problem with MTBE?

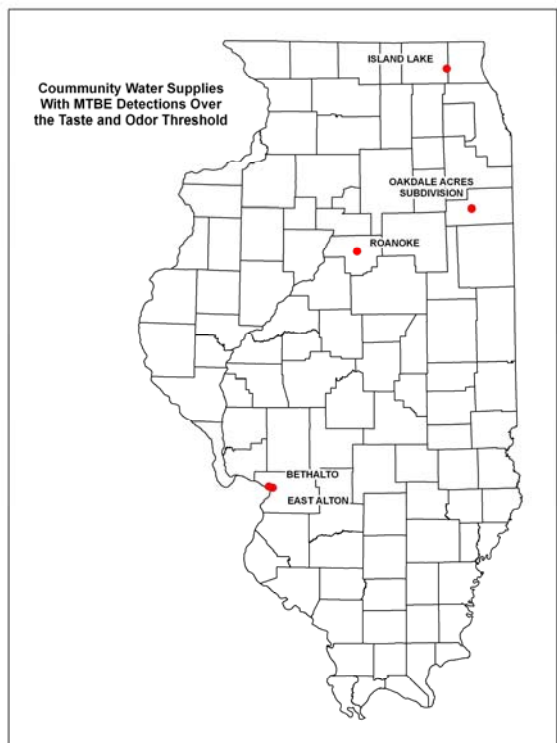
MTBE presents difficulties to water suppliers as a result of its chemical properties. Water treatment techniques including air stripping and activated carbon treatment are inefficient in removing MTBE from groundwater.

MTBE Detections in Ambient Ground Water and Source Waters (Source: NAWQA Program and National MTBE Survey)



However, several communities which utilize groundwater have identified the presence of this contaminant in their water in Illinois.

Community water supplies (“CWS”) in Illinois routinely sample for volatile organic chemicals as a result of Safe Drinking Water Act monitoring requirements. Under Illinois’ CWS Laboratory Fee Program, analyses for MTBE have been reported as a part of standard laboratory methods since 1994. Approximately, 80 percent of the 1,200 CWSs which supply water participate in the program (just over 1100 of these facilities are groundwater dependent). The results of this monitoring indicate that while 51 facilities have had detections of MTBE, only 5 have exceeded the taste and odor threshold of 20 parts per billion (ppb). Three of these five CWSs have had to discontinue use of a well or wells as a result of this MTBE contamination:



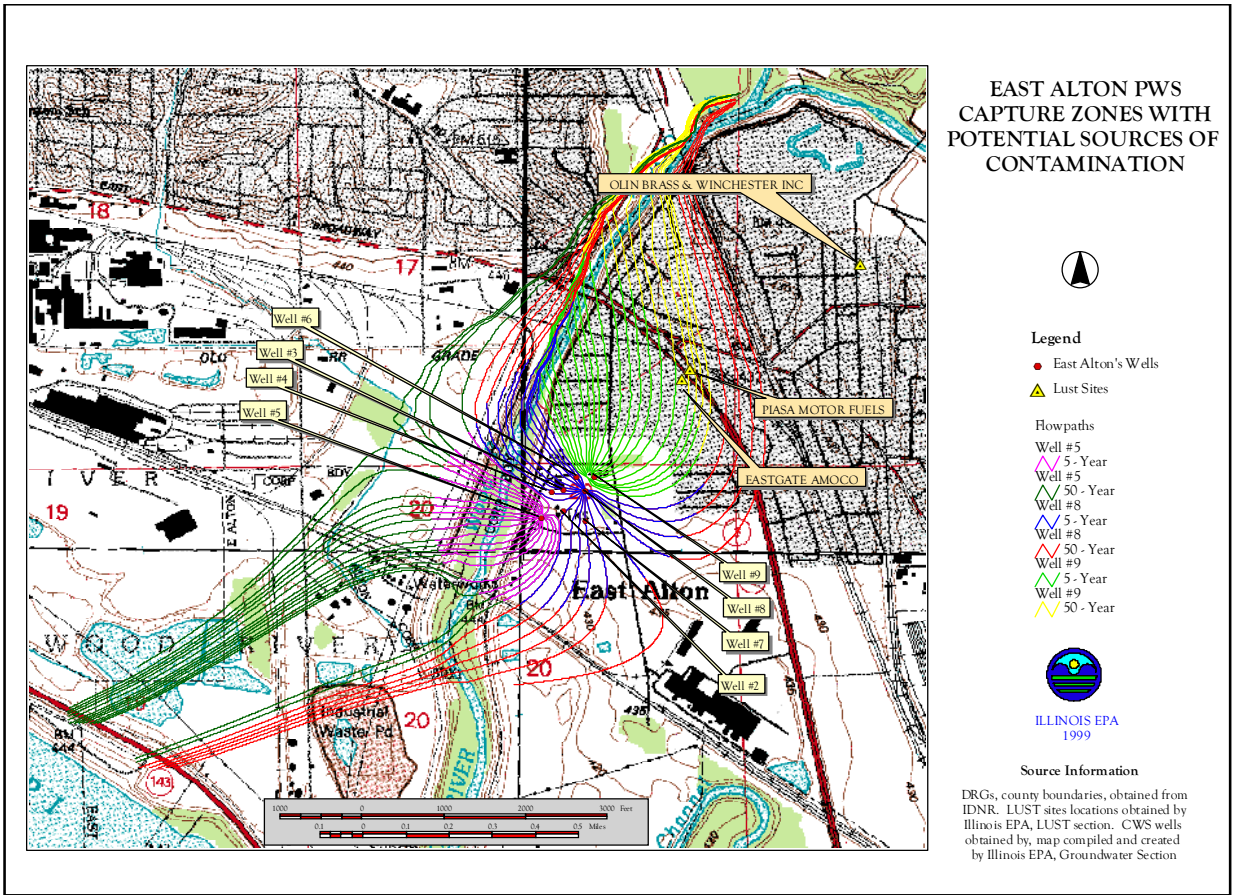
- Oakdale Acres Subdivision (and two other small subdivisions served by private wells), located in Kankakee County, had to discontinue use of their wells and connect to a nearby CWS. A leaking underground pipeline was the source of MTBE in this incident.
- The community of Island Lake had to take a well out of service as a result of elevated levels of MTBE. Nearby leaking underground gasoline storage tank(s) are being investigated as the potential source for this incident.
- The Village of Roanoke also had to take a well out of service due to MTBE contamination.
- The community of East Alton had to use a well as a hydraulic control well to protect the rest of the well field from an MTBE contamination plume. Nearby leaking underground gasoline storage tank(s) have been remediated. See the figure below.

In addition, each of the other community water supplies with MTBE detections has been preliminarily evaluated using geographic information systems to determine the proximity of leaking underground storage tanks with incident numbers, and of potential sources inventoried under Illinois wellhead protection program. In the majority of cases it appears that the contamination could be due to a nearby leaking underground storage tank.

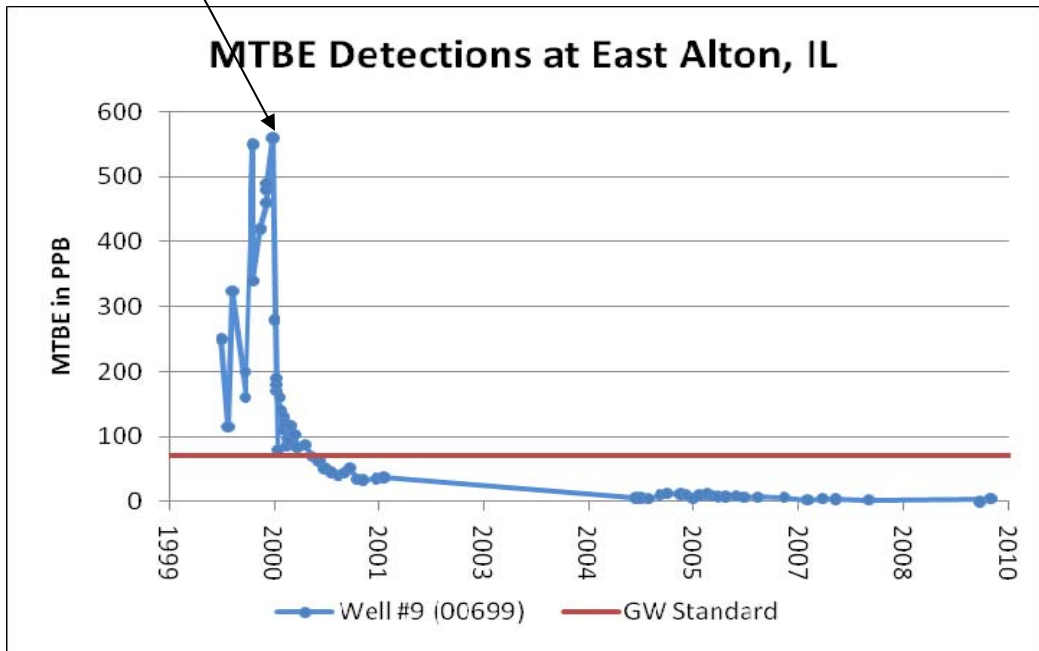
Nationally, in a limited number of instances, significant contamination of drinking water with MTBE has occurred due to leaks from underground and above ground petroleum storage tank systems and pipelines. Due to its small molecular size and solubility in water, MTBE moves rapidly into groundwater, faster than do other constituents of gasoline. MTBE, however, degrades much more slowly in groundwater than other components of gasoline. As such, it can travel farther and much more quickly than other components. Non-point sources, such as recreational water craft, industrial and automotive emissions are most likely to be the cause of small amounts of contamination in a large number of shallow aquifers and surface waters.

With the limited field-tested data available for most recently researched methods of MTBE treatment, few viable options exist that have wide applicability and are cost-effective. It is important to note that for traditional technologies such as GAC or air stripping, the average costs for treating MTBE-contaminated water is 40-80% higher than treating waters containing benzene or other organic chemicals. East Alton located in Madison County had to use one of their wells as a hydraulic containment well with treatment and discharge to surface water to protect their well-field from a MTBE plume with a concentration exceeding 1,000 ppb. Two leaking under ground storage tanks located with the recharge area of the East Alton well filed spent nearly \$1,000,000 each to complete remediation. Further, the following table details the cost-benefit analyses that East Alton's consultant performed on treating for MTBE in Well #9.

COST COMPARISON SUMMARY						
(a) Assume Illinois EPA loan, 20 years, 3%, Level debt (no coverage)						
(b) Increase over and above current annual cost of \$590,000, excluding depreciation						
Case	Description	Capital Cost	Debt Service (a)	O&M Cost Increase	Annual Cost Increase	% Revenue Increase (b)
1a	Pump, Treat, Discharge (Iron & Manganese Reduction)	\$41,700	\$2,803	\$89,900	\$92,603	15.7%
1b	Pump, Treat, Discharge (Iron & Manganese Reduction: MTBE Reduction with Air Stripper)	\$658,300	\$44,254	\$156,900	\$201,154	34.1%
1c	Pump, Treat, Discharge (Iron & Manganese Reduction: MTBE Reduction with GAC)	\$1,048,600	\$70,492	\$738,200	\$808,692	137.1%
2	Pump, Treat, Discharge (Iron & Manganese Reduction: MTBE Reduction with Air Strippers & GAC)	\$2,904,500	\$195,255	\$1,561,000	\$1,756,255	297.7%
3	New Well Field	\$2,727,100	\$183,329	\$51,400	\$234,729	39.8%
4	Alternate Treated Water Supply	\$1,505,000	\$101,174	\$568,900	\$670,074	113.6%



Remediation Implemented



Since MtBE has a very unpleasant taste and odor (like turpentine), most people can detect very low concentrations of the contaminant.

In Illinois, most of the concentrations of MTBE that have been found in drinking water sources are unlikely to cause adverse human health effects. However, the U.S. EPA is continuing to evaluate the available

information and is doing additional research to seek more definitive estimates of potential risks to humans. One of the main concerns is determining what is the cancer causing potential of MTBE. Furthermore, studies have been conducted on the concentrations of MTBE in drinking water at which individuals can detect the odor or taste of the chemical. Since consumers can taste or smell as little as 20 to 40 parts per billion of MTBE, very low concentrations of the contaminant may be unacceptable.

Based on the occurrence of MTBE in public drinking water systems, the U.S. EPA has included it on a candidate list of chemicals that may require future regulation:

Illinois has established a preventive notice and response level of 20 ppb for MTBE, a groundwater standard for 70 ppb of MTBE, and MTBE is covered under the Tiered Approach for Corrective Action Objectives, the LUST regulations and the site remediation program. Further, the use of MTBE has been banned in Illinois under the MTBE Elimination Act.

- Illinois's MTBE Elimination Act was signed into law on July 24 2001;
- The Board adopted revisions on January 24, 2002 to the Tiered Approach to Corrective Action Objectives (35 Ill. Adm. Code 742), Voluntary Site Remediation Regulations (35 Ill. Adm. Code 740), Leaking Underground Storage Tank Regulations (35 Ill. Adm. Code 732) and Groundwater Quality Standards (35 Ill. Adm. Code 620); and
- The preventive notice and response level adopted for MTBE, under the Board's groundwater standards is 20 ppb which is based on the taste and odor threshold; and the groundwater standard that has been established for MTBE is 70 ppb.