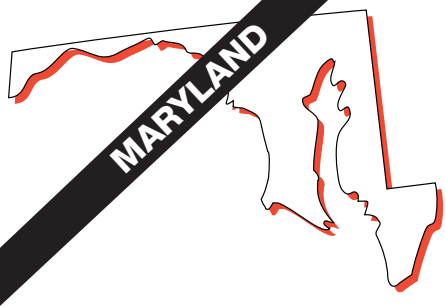

Maryland's MtBE Journey

As States Continue to Tackle the MtBE Problem on Their Own...

by Herbert Meade

The tracking and response to MtBE contaminations in Maryland has been an interesting journey for those of us at the Maryland Department of the Environment (MDE) Oil Control Program. This journey continues with the proposal of changes to Maryland's UST regulations that will increase the level of monitoring associated with gasoline storage tanks.

As background, over the past several years, MDE has seen an increase in groundwater cases that involve the gasoline additive MtBE. MtBE makes up to 11 to 15 percent by volume of the gasoline sold in Maryland as oxygenated gasoline, a.k.a. reformulated gasoline, used to meet the federal Clean Air Act requirement for reducing carbon monoxide and volatile organic compound emissions. In Maryland this type of gasoline is required to be sold in the most highly populated central portions of our state. However, MDE has found that all gasoline in Maryland contains some level of MtBE.

Tracking MtBE

Since 1998, MDE has separately tracked the number of known private wells impacted with MtBE across Maryland. These well impacts come to our attention through data collected from LUST site remediation activities, private homeowner sampling, or sometimes through routine evaluations by local health officials. Our data indicate that more than 600 private wells have been impacted with MtBE at 5 ppb or higher. Additional data show that approximately 20 public water supply wells have been impacted in the state.

Except for Anne Arundel County, the largest impacts tend to be across the top of the state in areas with fractured rock geology—Harford, Cecil, Carroll, Baltimore, and Frederick counties. The geology in these counties allows for the rapid transport and spread of MtBE in the groundwater. The MtBE impacts in Anne Arundel County, which has coastal plain geology, may have to do with the large number of shallow wells still in use.

Action Levels

In the early 1990s, Maryland established a 50 ppb action level for MtBE. The current state action level for MtBE is 20 ppb. This level is not an MCL but a level where a water treatment or alternative source should be secured. Our investigation level, at which we formally open a case for investigation activities, is 10 ppb.

The Sources?

MtBE by its nature is hydrophilic. In the early 1980s, MDE was seeing MtBE as the leading-edge component of groundwater gasoline contamination plumes. MtBE would be the precursor to other gasoline components, such as benzene and toluene. The sources of these early plumes were normally traced back to a liquid release from a gasoline UST system.

In the early 1990s, we noticed MtBE contamination from other sources, such as home heating oil tanks and underground diesel fuel tanks. We determined that MtBE had cross-contaminated into all petroleum products shipped in bulk. Today, approximately half of our groundwater MtBE cases can be traced back to a nongasoline source, such as a privately owned home heating oil tank. However, the largest numbers of impacted wells continue to be gasoline-UST related.

In the late 1990s, MDE observed an unusual occurrence at service stations in our state. We noticed MtBE levels in the groundwater around service stations that were in full compliance with state and federal regulations. All of these stations had complied with the storage system upgrade requirements and deadline of 1998. We attributed these contaminations to poor maintenance of overfill catchment basins, lack of sumps under dispensers, poor product handling by the public, and lack of containment around the Stage I vapor recovery dry break fitting. Even after the stations addressed our concerns and we mandated overfill protection at the Stage I dry-break, we saw the trend of MtBE impacts continue to climb.

Indeed, many UST regulators recognize that a good many compliant tanks are likely to be leaking, but below the leak detection threshold of 0.2 gallons per hour (which is equivalent to 1,752 gallons per year...and at 11 to 15 percent MtBE, this means that 193 to 263 gallons of MtBE per tank may be released into the environment)

In early 2000, MDE technical staff felt that a contributor to MtBE in the groundwater at these stations was the release of enriched MtBE vapors into the storage tank backfill. However, without the resources to conduct scientific studies, our concerns fell on deaf ears. The theory of MtBE vapor causing groundwater contamination has finally been substantiated by studies conducted in other states, such as California, New Hampshire, and Vermont.

At a lot of our sites we are seeing that underground gasoline storage systems that utilize Stage II vacuum-assist vapor recovery systems, which recover gasoline vapors from motor vehicles during fueling and return those vapors to the facility's storage system, are being continuously pressurized. These storage tanks were never designed as pressure vessels but as liquid-containing devices. The pressure is forcing MtBE-enriched gasoline vapors into the tank backfill area.

■ *continued on page 16*

■ Maryland and MtBE *from page 15*

Once out of the storage system, hydrophilic MtBE seeks soil moisture, attaches to the soil water droplets, and ultimately contaminates the groundwater. By the nature of service station construction, soils surrounding the storage tanks do not vent into the atmosphere. The vapors are retained subsurface by the concrete caps over the tank field and the asphalt over the majority, if not all, of the service station lot. MDE has found MtBE as the only contaminant in water under UST backfill at levels as high as 900,000 ppb.

What is MDE doing?

MDE has taken several steps to address the MtBE problem. First, we formally investigate any detection of MtBE at or over 10 ppb. We have a policy agreement with the local county health departments to share all case data for detections over 10 ppb. Historically, we have been able to find a point source for levels over 10 ppb. However, our ability to properly staff such investigations is becoming strained. Levels below 10 ppb are becoming very common across the state and may be attributed to contaminated stormwater runoff, poor petroleum handling, and groundwater recharge.

In August 2004, in response to citizen concerns, Governor Ehrlich asked MDE to write technical regulations that will require early detection and better containment of MtBE within underground gasoline storage systems in "high-risk groundwater use areas." These high-risk groundwater-use areas were defined by MDE in direct response to the MtBE issue in Maryland. All UST construction, containment, and leak detection regulations to date have focused on liquid releases, not vapor. We met with the regulated community, heard citizen concerns, and published our proposed regulations in December 2004. A legislative committee, under emergency conditions, approved these regulations on January 26, 2005.

Emergency Regulations

The emergency regulations focus on all existing and new underground gasoline storage systems in "high-risk groundwater-use areas" of Maryland:

Requirements for New Gasoline UST Systems within the High-Risk Areas

- Install double-walled piping and containment sumps with interstitial monitoring (statewide).
- Install four monitoring pipes in the tank field with connected soil-vapor extraction (SVE) piping.
- Use state-of the art leak detection, including detection for vapor releases, by performing a helium test yearly.
- Sample site water supply well yearly.
- Use of one of the following methods for improved control, detection, and prevention of releases:
  a. three or more monitoring wells and sample yearly
  b. a pressure-control device that maintains the UST's < negative pressure
  c. an SVE system on the tank field
  d. an alternative method approved by the MDE.
- Submit a Corrective Action Plan to MDE if "levels of concern" are detected at any time.

Requirements for Existing Gasoline UST Systems

- Test for vapor leaks by performing a helium test yearly, and test UST catchment basins and containment sumps yearly.
- Install three or more groundwater-monitoring wells.
- Sample site supply well and monitoring wells twice a year.
- Install one of the following:
  a. an SVE system on the tank field
  b. a tank-pressure-control device
  c. an alternative method approved by the MDE.
- Submit a Corrective Action Plan to MDE if "levels of concern" are detected at any time.

Other MDE Actions

- Working with industry to develop new programs to educate the public on petroleum-product handling and home heating oil storage.
- Developing a third-party inspection program that will require the detailed inspection of motor-fuel UST systems across the state. MDE's staffing levels do not allow for frequent inspections. We are averaging three to five years in our current cycle. We hope that this inspection program will note deficiencies in UST operations and ensure that those problems are corrected before releases occur. Our target for implementation is July 2006.
- Continuing to require the remediation of MtBE and other petroleum-contaminated sites across the state. MtBE can be cleaned up; however, the plumes of contamination tend to be larger than petroleum plumes without MtBE, and MtBE resists natural biodegradation. So MtBE cleanups take longer and are more costly.

Unfinished Business

Even with the measures mentioned, the ability of our state to respond to groundwater contamination is lacking in many ways. Our current needs include:

- Improved state laboratory support to analyze samples and turn reports around in a timely manner
- Funding for alternative water supplies or point-of-use filtration systems, where appropriate
- Adequate staff to investigate and oversee groundwater contamination cases.
- Increased oversight of heating oil tanks that should be required to have tightness testing and system upgrades
- A review of Stage II vapor recovery technology
- A review of the use of MtBE as an oxygenate and the overall need for oxygenates in our nation's gasoline supply
- A requirement for VOC sampling before property transfer and occupancy

Actions by Our Elected Officials/MtBE Ban

We suspect that there will be several MtBE-related bills introduced in the Maryland General Assembly this year. These bills may range from resolutions to Congress asking for help to the outright ban on MtBE.

It is simple to say, "Let's just ban MtBE." However, such an action must be carefully considered. If MtBE is banned and the RFG requirement is still in place, then an MtBE ban is the equivalent of mandating ethanol. Both chemicals have environmental and health concerns that need to be weighed, not to mention supply, transport, and market concerns. MDE has not taken a position on the MtBE-versus-ethanol discussion.

Are We in Crisis?

From a public perception standpoint, and if MtBE is in your well water, the answer is yes. Health studies, which are admittedly old, do not show adverse health effects from MtBE at levels that we normally see in impacted drinking water wells. However, we find that any degree of impact is unacceptable to the public involved. We feel that our new technical regulations and increased oversight can prevent and provide early detection of petroleum releases. ■

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USGS Study Looks at MtBE Occurrence in Rockingham County, New Hampshire

by Gary Lynn

The U.S. Geological Survey, in cooperation with the state Department of Environmental Services Waste Management Division, completed a cooperative study on the occurrence of MtBE in randomly sampled private and public water supply wells in Rockingham County, New Hampshire. The full study was published in the January 2005 edition of *Environmental Science and Technology* and can be accessed at *http://nh.water.usgs.gov/Publications/2005/es049549e.pdf.*

The occurrence of MtBE in Rockingham County was studied because of the county's high risk for MtBE contamination of water supplies due to its heavy dependence on groundwater for water supplies (94% of residents) and participation in the reformulated gasoline program. The major findings of the report are as follows.

- The frequency of MtBE detections in public water supplies in New Hampshire continues to increase both statewide (12.7% in 2000 to 15.1% in 2002) and in Rockingham County (20.3% to 23.1% in the same time period), based on a 0.5 µg/L detection limit.
- MtBE was frequently detected in both public (40%) and private (21%) water supplies above a 0.2 µg/L detection limit.
- MtBE detections correlated well with the degree of urbanization.
- Public water supply wells located further from underground storage tanks had statistically significantly lower levels of MtBE than wells located closer to tanks.
- MtBE concentrations were higher in relatively deep bedrock wells with low water yields.

In New Hampshire, the percentage of public water supplies with MtBE detections continues to increase. All of the MtBE detections in the study's randomly sampled private wells were below the state's drinking water standard of 13 µg/L; however, 4 of the 120 public water supply wells exceeded the MtBE standard.

The detection of higher concentrations of MtBE in deep bedrock wells was an unexpected finding. There are a number of potential explanations; one of the most plausible explanations is that the deeper wells are in tighter bedrock formations with lower yield. For this reason, they are less likely to significantly dilute water in fractures containing MtBE.

The private well detections did not correlate well with distance from underground storage tanks. These data suggest that there are significant sources of MtBE contamination unrelated to tank-system releases. Based on my personal communications with the study's primary author, Joseph Ayotte, the public water supply MtBE contamination detections correlated better with UST installations than known LUST sites. This unpublished finding establishes that a stronger statistical relationship exists for UST installations versus LUST sites, but does not establish a causal relationship. A potential explanation could be that the UST installations are more commonly associated with high urban densities or other factors that also correlate with MtBE water supply detections.

Another plausible explanation, however, is that UST sites pose a potentially more significant threat to public water supplies than known LUST sites because, (a) existing leak-detection technologies do not detect vapor and small liquid releases from sumps/spill buckets at active installations, (b) UST installations are more numerous than LUST sites, and (c) LUST sites are being actively remediated, while undiscovered releases at active UST installations are not. DES believes that the Rockingham County data tend to confirm the need for our stepped up inspection and leak prevention efforts. ■

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L.U.S.T.Line

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NEIWPCC was established by an Act of Congress in 1947 and remains the oldest agency in the Northeast United States concerned with coordination of the multi-media environmental activities of the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont.

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