

MTBE PAPER – GROUNDWATER RESOURCES ASSOCIATION OF CALIFORNIA TECHNICAL COMMITTEE

The environmental impact of MTBE is a controversial issue critical to the protection of groundwater resources. A January 16, 2000 airing of the “60 Minutes” television program on MTBE highlighted the problem posed by this chemical to national groundwater resources. Last year, the Groundwater Resources Association of California (GRA) endorsed Governor Davis’ decision to phase out MTBE and the governor was awarded the GRA’s Kevin Neese Memorial Award for that action. The following summary of facts and issues was prepared by the GRA Technical Committee to promote rational discussion and assist in sound groundwater policy implementation. A reference list is also attached.

- **PERSISTENCE IN GROUNDWATER:** Sampling of groundwater in California and other states has shown that MTBE is more persistent and more mobile than other fuel compounds.
- **TASTE AND ODOR:** Having a taste and odor like turpentine has made MTBE-contaminated ground water sources unusable for human consumption. Supplying bottled water for impacted areas, and/or other large-scale treatment, or water importation options may cost the nation billions of dollars over the next 50 years. Blending clean water with MTBE-impacted water will continue into the future. A secondary drinking water standard of 5 ug/L has been adopted in California.
- **HEALTH RISK:** Although MTBE is considered a potential health risk, there is inadequate evidence in humans that MTBE causes cancer. The strong odor and taste of MTBE at relatively low concentrations would make drinking of large amounts of high-level MTBE contaminated water unlikely, thus reducing the potential for exposure and resulting human health risks from MTBE. MTBE is not listed as a human carcinogen by the U.S. National Toxicology Panel, the California Proposition 65 Committee or the International Agency for Research on Cancer. Limited evidence from an older Italian MTBE rodent study indicated that MTBE caused cancer in the experimental animals when administered in unrealistic doses of hundreds of times greater than probable human exposure. A MCL of 13 ug/L has been adopted in California.
- **FATE AND TRANSPORT:** The MTBE problem is associated with gasoline leaking from underground storage tanks, leaking pipelines and surface spills or from small gasoline engines equipment. Even though the majority of underground tanks in this country have been upgraded, the amount of MTBE already released with gasoline into the environment is so large that the problem of ruined drinking water sources will persist for several decades. Compared to other fuel compounds, MTBE adsorbs to soils much less, is poorly biodegraded, and dissolves in groundwater at much higher concentrations. Due to these characteristics, MTBE migrates much

faster and further in the groundwater than equal amounts of other gasoline compounds.

- **GROUNDWATER INVESTIGATION:** The investigation of a groundwater resource impacted with MTBE requires more detailed and more rapid sampling of soil and groundwater than other fuel-impacted sites due to the potential for faster and deeper migration of MTBE compared to other compounds. The presence of other oxygenates or breakdown products, such as tertiary-butyl alcohol (TBA), should also be tested at all sites containing MTBE.
- **REMEDIATION:** Due to the chemical characteristics of MTBE, remediation or clean up of the contaminant can be of equal or higher expense and duration than other gasoline related chemicals, such as benzene, toluene, ethylbenzene or xylenes. Clean up costs can be very high at sites where the presence of MTBE is the trigger for remediation. Due to the high mobility of MTBE in the environment, remediation of sites impacted with MTBE has to be rapidly implemented. MTBE can be remediated in-situ by a variety of technologies including but not limited to chemical oxidation and enhanced bioremediation. Surface treatment of MTBE has been proven to be successful. Extraction technologies, such as pump and treat systems and soil vapor extraction systems, have been used to remove the MTBE from the subsurface and treat the chemical with above ground systems, including but not limited to, advanced oxidation equipment, bioreactors, air strippers and adsorption technologies such as granular activated carbon.
- **MTBE-SPECIFIC REGULATORY GUIDELINES:** In March 2000, the California State Water Resources Control Board (SWRCB) prepared guidelines on prioritization of the investigation and remediation of MTBE-impacted sites. The guidelines are based on potential risks of impact to water supply wells and aquifers. Site-specific groundwater supply conditions or hydrogeologic characteristics must also be critically considered in prioritization of sites and during evaluation of risk-based approaches to site closures.
- **AIR POLLUTION:** There is still controversy as to the effectiveness of MTBE in reducing air pollution in recent years. Reformulated gasoline containing MTBE, may be related to some of the improvement in air quality, however, various conflicting air studies exist. Part of the improvement is attributable to newer and more efficient vehicle engines with computer-controlled ignition.
- **COST OF REPLACEMENTS:** There is still considerable doubt whether MTBE or other oxygenates will significantly lower vehicle emissions. Therefore, the federal policy requiring the continued use of oxygenates in gasoline should be reevaluated. If other oxygenates are added to gasoline, the price and availability of the replacements, such as ethanol, will increase the cost of fuel over the costs of

MTBE. Replacements for MTBE must be evaluated carefully as to their fate and transport once released into the subsurface. Life cycle studies focusing on the potential release into the air, soil and groundwater environments should be performed prior to introducing any new chemicals into a product as widely used as gasoline.

- **RECOMMENDATIONS:** The characteristics of MTBE in the subsurface make assessment and remediation of MTBE-impacted sites challenging. Therefore, competent environmental professionals should be used in the assessment and remediation of MTBE impacted soil and groundwater resources. The GRA Board urges continued state and federal legislative support for the ban of MTBE.

The GRA Technical Committee prepared this document. GRA is a multi-disciplinary professional organization dedicated to the study and protection of groundwater resources and is comprised of 700 members statewide.

REFERENCES

General Health Risks

1. California Dept. of Health Services

<http://www.dhs.cahwnet.gov/ps/ddwem/chemicals/mtbe/mtbeindex.htm>

2. US EPA FACT SHEET: Drinking water advisory: Consumer Acceptability Advice and Health Effects Analysis on MTBE.

Fact Sheet EPA-822-F-97-009 December 1997

MTBE and Groundwater Resources

3. USGS has a reference site for MTBE:

<http://water.wr.usgs.gov/mtbe/>

4. Environmental Behavior and Fate of MTBE:

<http://water.wr.usgs.gov/mtbe/fs20396/>

5. The California State Resources Control Board's Draft Guidelines on MTBE contains technical documentation on MTBE fate and transport in the subsurface:

http://www.swrcb.ca.gov/cwphome/ust/mtbe_finaldraft.doc

GENERAL BASIC REFERENCE

Jacobs, J., Guertin, J., and Herron, C., ed., 2000, MTBE: Effects on Soil and Groundwater Resources, CRC Press/Lewis Publishers, Boca Raton, FL, 250 p.