

# Evaluation of a Package Plant Advanced Oxidation (UV/Ozone) Process to Remove MTBE from Drinking Water

National Risk Management Research Laboratory,  
Water Supply and Water Resource Division, Water Quality Management Branch

## Background:

Methyl tert-ether (MTBE) is the most common fuel oxygenate that is used in more than 80 percent of oxygenated fuels. One-third of the nation's motor fuel used in 16 states is oxygenated fuel (also known as reformulated gasoline). MTBE-containing oxygenated fuels have significantly reduced carbon monoxide and ozone emission levels in many urban areas. However, MTBE has been identified as a potential carcinogen, and its potential persistence in drinking water supplies has recently raised many environmental and health-related questions.

The Alliance for Proper Gasoline Handling estimates that each year 9 million gallons of gasoline are spilled in the US from leaks, inefficient engines and accidents. Because of its relatively high water solubility and vapor pressure, increasing quantities of MTBE have been detected in lakes, reservoirs, and groundwater used for potable water supplies. The Water Supply and Water Resources Division of USEPA is currently investigating the technical and economic feasibility of utilizing a combination of advanced oxidation technologies, (e.g., UV radiation and ozonation) to remove MTBE from contaminated drinking water supplies.

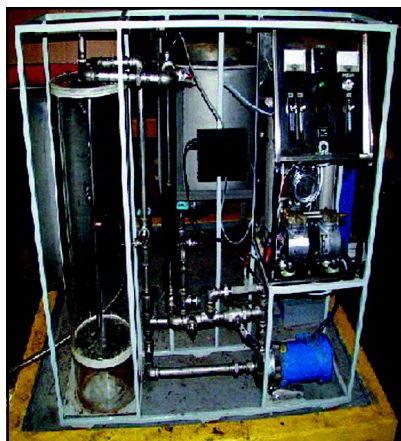


Figure 1 - Pilot-Scale UV/Ozone MTBE Treatment System.

## UV/Ozone System Design and Implementation:

Photolytic ozonation (UV/Ozone) is known to effectively destroy organic compounds. The destruction mechanisms have been extensively researched, demonstrated and documented. Also, the UV/Ozone systems are technologies that have been used historically for disinfection purposes by the drinking water utilities. USEPA has designed and constructed a pilot-scale MTBE treatment system based on minor design modifications to the commercially available UV/Ozone disinfection systems. USEPA is currently in the process of evaluating the MTBE destruction efficiency of the pilot-scale UV/Ozone system. The pilot-scale UV/Ozone system (Figure 1) was installed at the USEPA's Test and Evaluation (T&E) Facility in Cincinnati, Ohio (Figure 2).



Figure 2 - U.S. EPA Test & Evaluation Facility.

## Other Relevant Technology Implementations:

Several treatment technologies are currently being developed, tested and implemented for MTBE abatement. These technologies can broadly be categorized as follows:

- Air-stripping (including thermally assisted systems)
- Chemical oxidation/sorption (granular activated carbon), and
- Biological treatment

USEPA is also in the process of evaluating aeration technology utilizing an air-stripper (Figure 3). The air-stripping process removes MTBE from the groundwater and discharges it directly to the air. Therefore, air-stripping is usually followed by a Granular Activated Carbon (GAC) system. Also, GAC has a low-loading capacity for MTBE. This combined set-up makes the air-stripping system expensive and unsuitable for small-scale implementations. Therefore, USEPA is currently evaluating package-plant type technologies at the T&E Facility to determine their effectiveness in the removal of MTBE from the environment.



Figure 3 - Pilot-Scale Air Stripper Column.

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### EPA Contacts:

Tom Speth  
U.S. EPA  
26 West Martin Luther King Drive  
Cincinnati, Ohio 45268  
Phone: **(513) 569-7208**  
Fax: **(513) 569-7685**  
E-Mail: **speth.thomas@epa.gov**

Roy C. Haught  
U.S. EPA  
26 West Martin Luther King Drive  
Cincinnati, Ohio 45268  
Phone: **(513) 569-7067**  
Fax: **(513) 569-7052**  
E-Mail: **haught.roy@epa.gov**

### IT Contacts:

Sylvana Y. Li  
IT Corporation  
11499 Chester Road  
Cincinnati, Ohio 45246  
Phone: **(513) 569-7074**  
Fax: **(513) 569-7707**  
E-mail: **li.sylvana@epa.gov**

E. Radha Krishnan, P.E.  
IT Corporation  
11499 Chester Road  
Cincinnati, Ohio 45246  
Phone: **(513) 569-7063**  
Fax: **(513) 569-7707**  
E-Mail: **krishnan.radha@epa.gov**

