

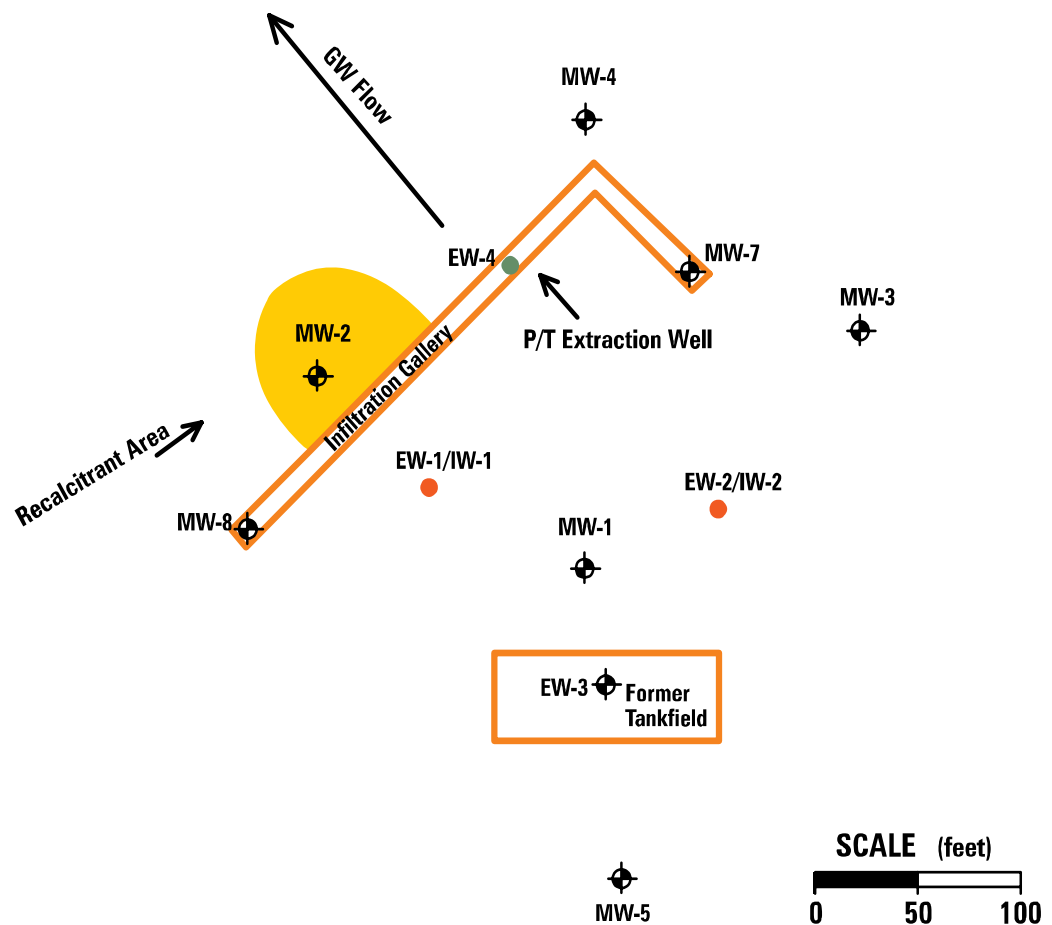


## CASE STUDY: POLISHING OF AN MTBE HOT ZONE IN LOW PERMEABILITY ARTIFICIAL FILL AFTER PUMP AND TREAT

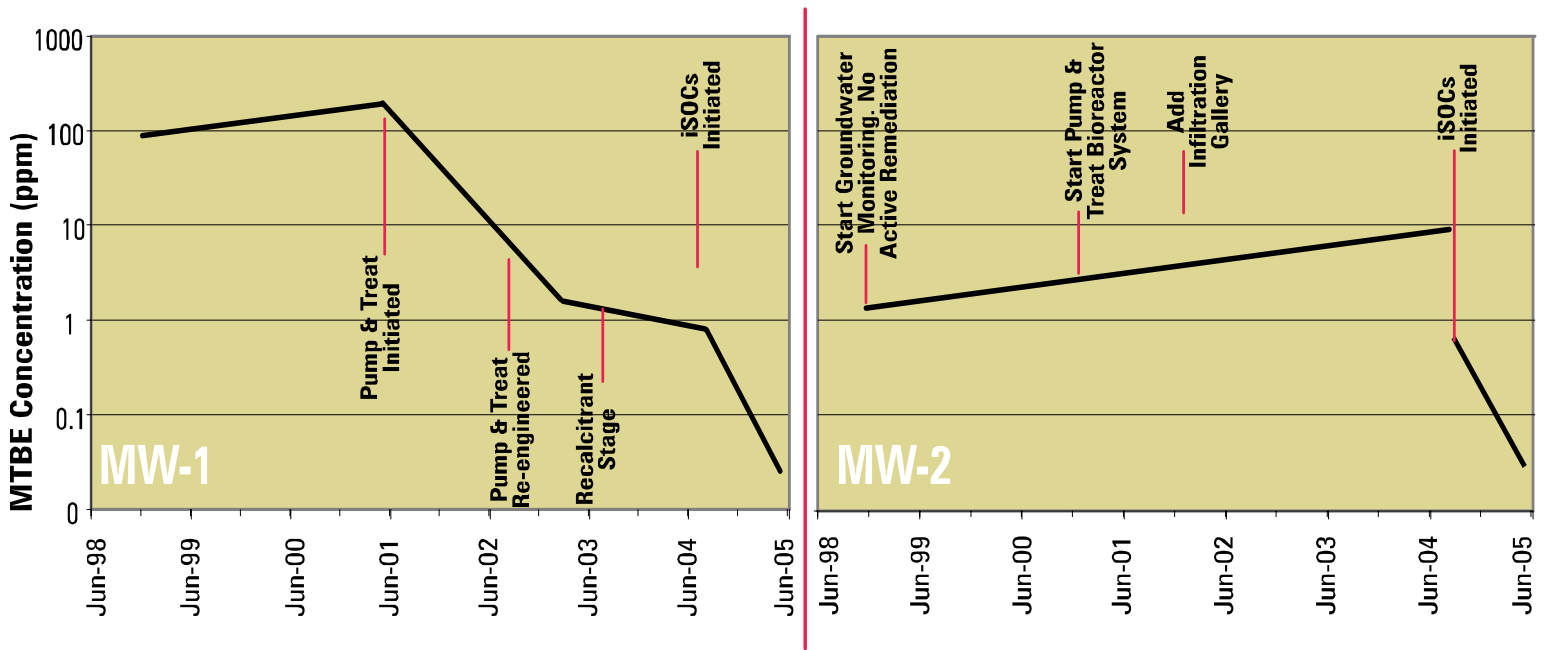
### SITE SUMMARY

- Pump and Treat system operated for 3 years.
- Groundwater in isolated portions of the site remained significantly above cleanup levels for MTBE.
- 2 iSOC<sup>®</sup>s used for 1 year upgradient of MW-2 and sidegradient and slightly downgradient of MW-1.
- MTBE levels were drastically reduced at MW-1 and MW-2: cleanup criteria were met.
- iSOC<sup>®</sup> system removed.
- Site is closed. A No Further Action letter was issued by the Department of Natural Resources and Environmental Control.

### SITE PLAN



# MTBE GROUNDWATER REMEDIATION RESULTS



## OVERVIEW DETAILS

In June 2001, a pump and treat aboveground bioremediation system (bioreactor) was installed along with four extraction wells, EW-1 - EW-4. The primary contaminant of concern (COC) was identified as MTBE. At the time of starting the active remediation system, the highest MTBE concentration was recorded at MW-1, corresponding to 150,000 ppb. The State of Delaware (DNREC) established a risk based cleanup level of 1,000 ppb MTBE.

Other representative MTBE levels were 35,000 ppb, 22,000 ppb, and 7,000 ppb for monitoring points MW-4, EW-3 and MW-2. After three years of pump and treat, MTBE levels at MW-1, MW-4, EW-3 and MW-2 were 310 ppb, 49 ppb, Non Detect (ND), and 1,040 ppb respectively. These results illustrate limitations of a pump and treat system for treatment locations with extreme heterogeneous soil conditions. Areas with porous soils clean up readily but groundwater contamination in tight soil conditions often proves to be difficult to remediate.

This DE high school site demonstrates that implementation of strategically located iSOCs will effectively treat recalcitrant areas utilizing in situ, enhanced natural attenuation. After 1 year of enhanced bioremediation, the concentrations of MTBE in MW-1, MW-4, EW-3 and MW-2 were: ND, 229 ppb, 13.5 ppb and 21.5 ppb respectively.

STATE OF DELAWARE  
DEPARTMENT OF NATURAL RESOURCES  
AND ENVIRONMENTAL CONTROL  
DIVISION OF AIR & WASTE MANAGEMENT  
391 LUKENS DRIVE  
NEW CASTLE, DELAWARE 19720-2774



WASTE MANAGEMENT SECTION  
TANK MANAGEMENT BRANCH  
TELEPHONE: (302) 395-2500  
FAX NO.: (302) 395-2555

May 9, 2007

Doyle Tiller  
State of Delaware  
Department of Administrative Services  
Thomas Collins Building  
540 S. Dupont Highway, Suite 1  
Dover, DE 19901

RECEIVED

MAY 11 2007

RE: Christina School District  
Maintenance and Operations Facility  
200 Salem Church Road  
Newark, DE 19713

Facility ID #3-001119  
Project ID #N9809161  
File Code 30

SUBJECT: No Further Action Required - Conditional

Dear Mr. Tiller:

The Department of Natural Resources and Environmental Control, Tank Management Branch (the Department) has reviewed for project file for the above-referenced facility and the "Closure Report" prepared by GHR Consulting Services, Inc. dated April 2007.

**Background**

In September 1998, the 4000 gallon gasoline tank system failed a tightness test. The cause of the failure appeared to be a loose fitting and a malfunctioning line-leak detector. The piping was repaired and a Veeder Root monitoring system was installed. In October, a subsurface investigation was conducted to determine the extent of soil and groundwater contamination. Subsequently, five monitoring wells were installed and quarterly monitoring initiated. GHR conducted a Tier II site assessment at the direction of the Department and a site specific cleanup standard of 1 mg/l of MTBE was established. A point-of-compliance well was installed at the downgradient property boundary.

In January 2001, the Department approved the installation and operation of a pump-and-treat system, with the water treated in an above-ground bioreactor and then discharged into an infiltration gallery located in the source area. The system became operational in June 2001, and successfully remediated groundwater in the vicinity of the source area.

In April 2001, the 4000 gallon gasoline underground storage tank was removed. During the excavation, free phase petroleum product was observed in the soil and groundwater.

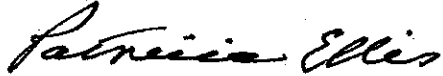
In July 2002, an additional extraction well was installed, but by July 2004, concentrations of MTBE were higher in some wells than they had been in 2002. When pumping rates were increased to improve remediation efficiency, the infiltration gallery was unable to handle the increased flow and flooding occurred. Permission was obtained to discharge treated water to surface water.

*Delaware's good nature depends on you!*

Doyle Tiller  
May 9, 2007  
Page 3

If you have any further questions about your facility please feel free to call (302) 395-2500 or visit us on the web at <http://sirb.awm.dnrec.state.de.us/deusthom.htm>.

Sincerely,



Patricia Ellis  
Hydrologist  
Tank Management Branch

JSR:PME/lma  
pme2007-042

Pc: Beverly Bartlett, State of Delaware  
James Morrow, GHR Consulting Services, Inc.