# Monitoring & Maintenance Engineering, Inc.

PHOSter Case History

Bullard Property

SCDHEC Site #17477

St. Stephen, South Carolina

## Project Management

The management team for this project included Read Miner at South Carolina Department of Health and Environmental Control and Rick Smith of Smith Monitoring and Maintenance Engineering, Inc.

## Site Description:

This site is located in the Outer Coastal Plain of South Carolina near Lake Moultrie. The site was previously a filling station prior to the expansion of the adjacent US highway to four lanes, leaving slight contamination of predominately benzene and naphthalene below the pavement and on either side of the highway. Soils are sandy silt to approximately eight feet below grade, turning to silty-clay and then kaolin to twelve feet. Below the kaolin is sand to more than 30'. The neighboring church and residences used private wells as their primary drinking water source.

## PHOSter System

Due to the shallow groundwater, slight contaminant concentrations and sandy residuum soils, this application was designed using a 49' radius of influence (ROI). A two-injector skid-mounted system was used for bio-sparging and nutrient injection. These systems use less than 500 kWh per month of power.

## Start-up

The PHOSter system was mobilized to the site, connected to the electrical service and the site piping in May 1999. Since the system and injection wells were located in minimal traffic areas, this installation used 3/8" pressure hose anchored to soil between the system and the injection wells. Time required for skid set-up, electrical connection, and in-well diffuser installation was approximately four hours.

## Remediation Progress

Remediation on the west side of the highway was confirmed complete after eight months of operation. The system remained in operation, at injection wells MW-1 and MW-4, for an additional nine months until results showed contaminants of concern below target levels on the east side of the highway (MW-2 and MW-8). Of the primary biologically important components, oxygen will remain dissolved in water until it is used or reacts with soil minerals (easily overcome with constant low-rate air sparge), the phosphate compound is 100 percent miscible in water and while it can bind with certain metals, can usually be assumed to have a 100' or better ROI (we have measured phosphate ROI greater than 200 feet). In this case, the hottest well on this site was remediated by injection wells at a distance of 125 feet.

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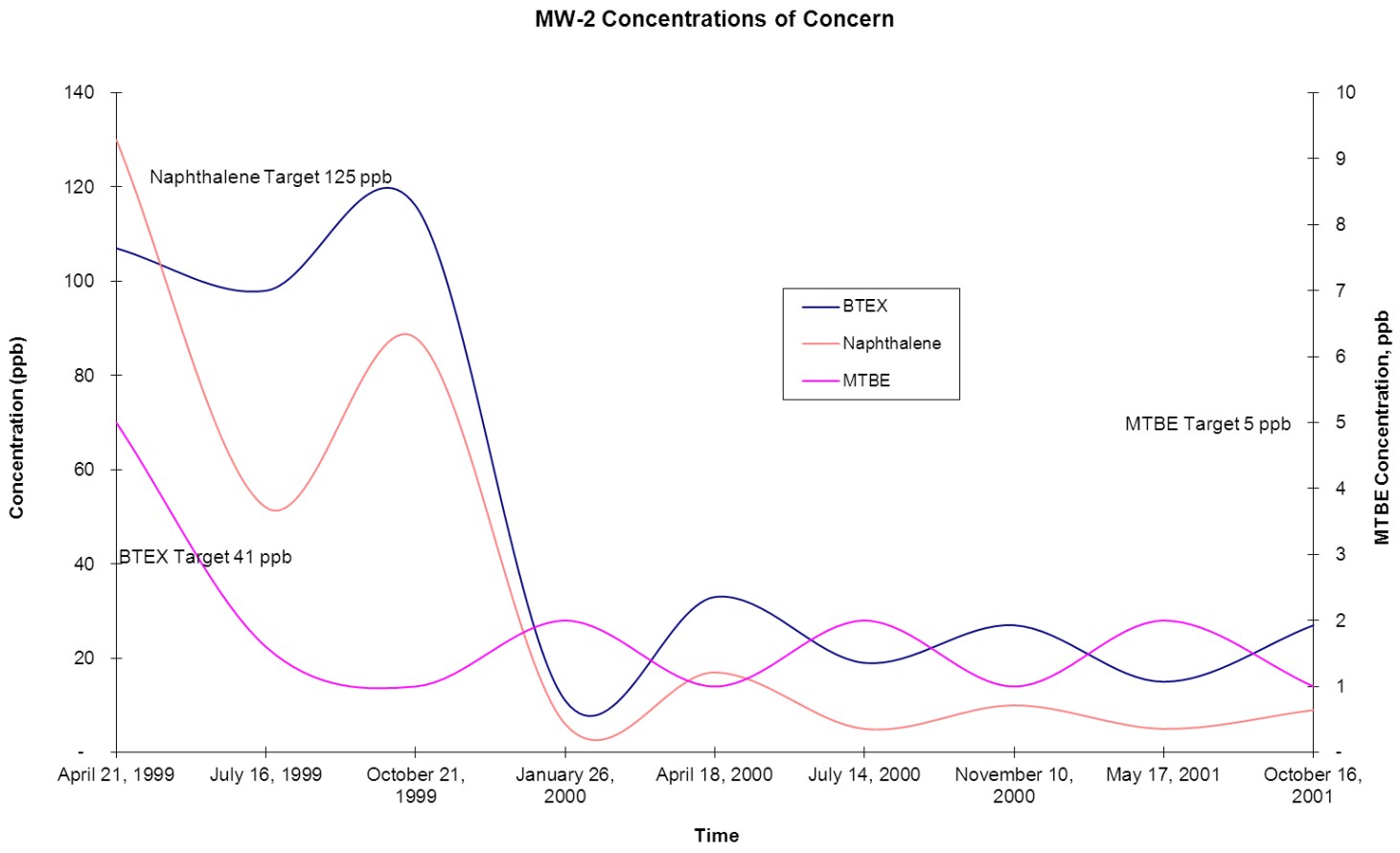
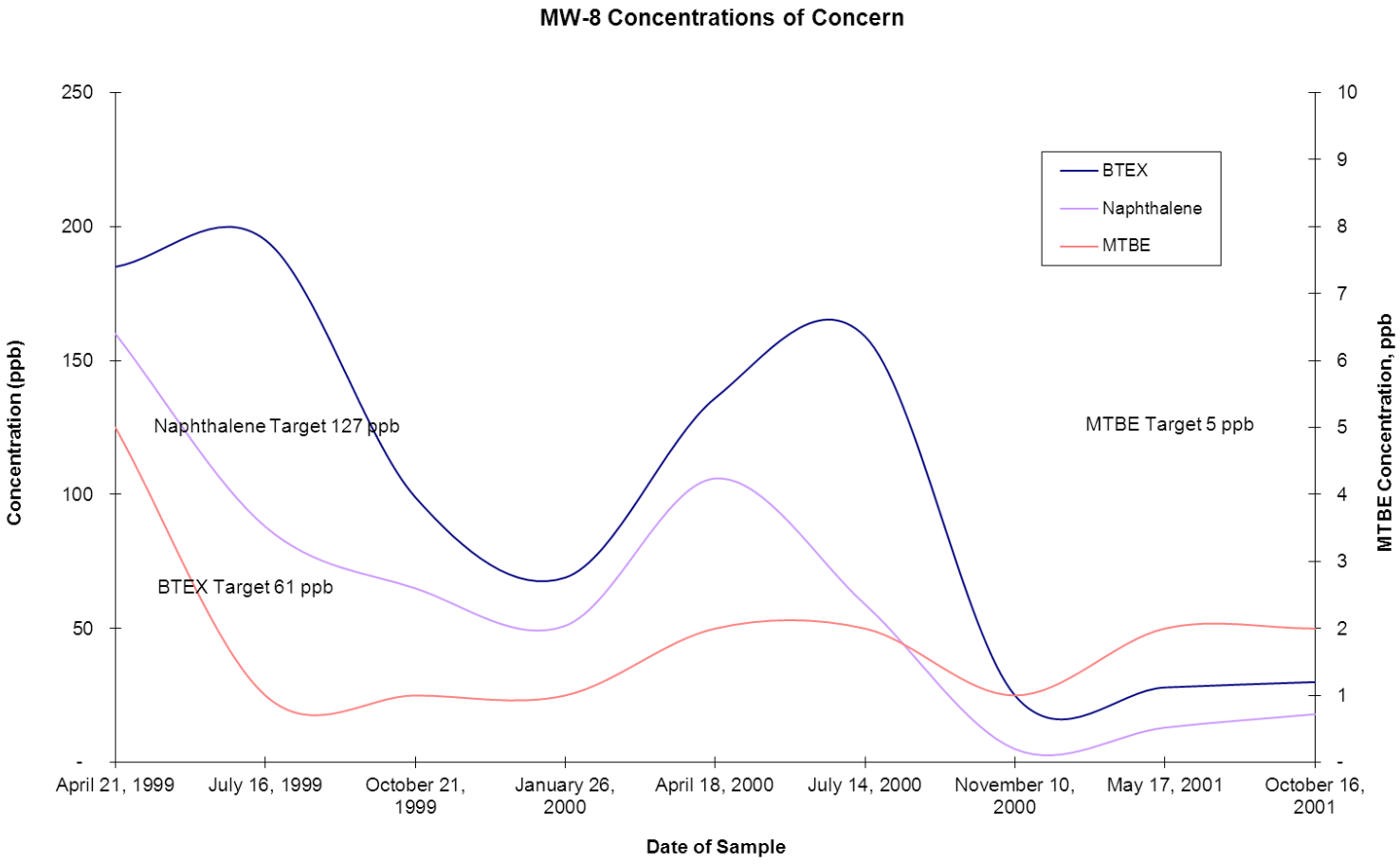
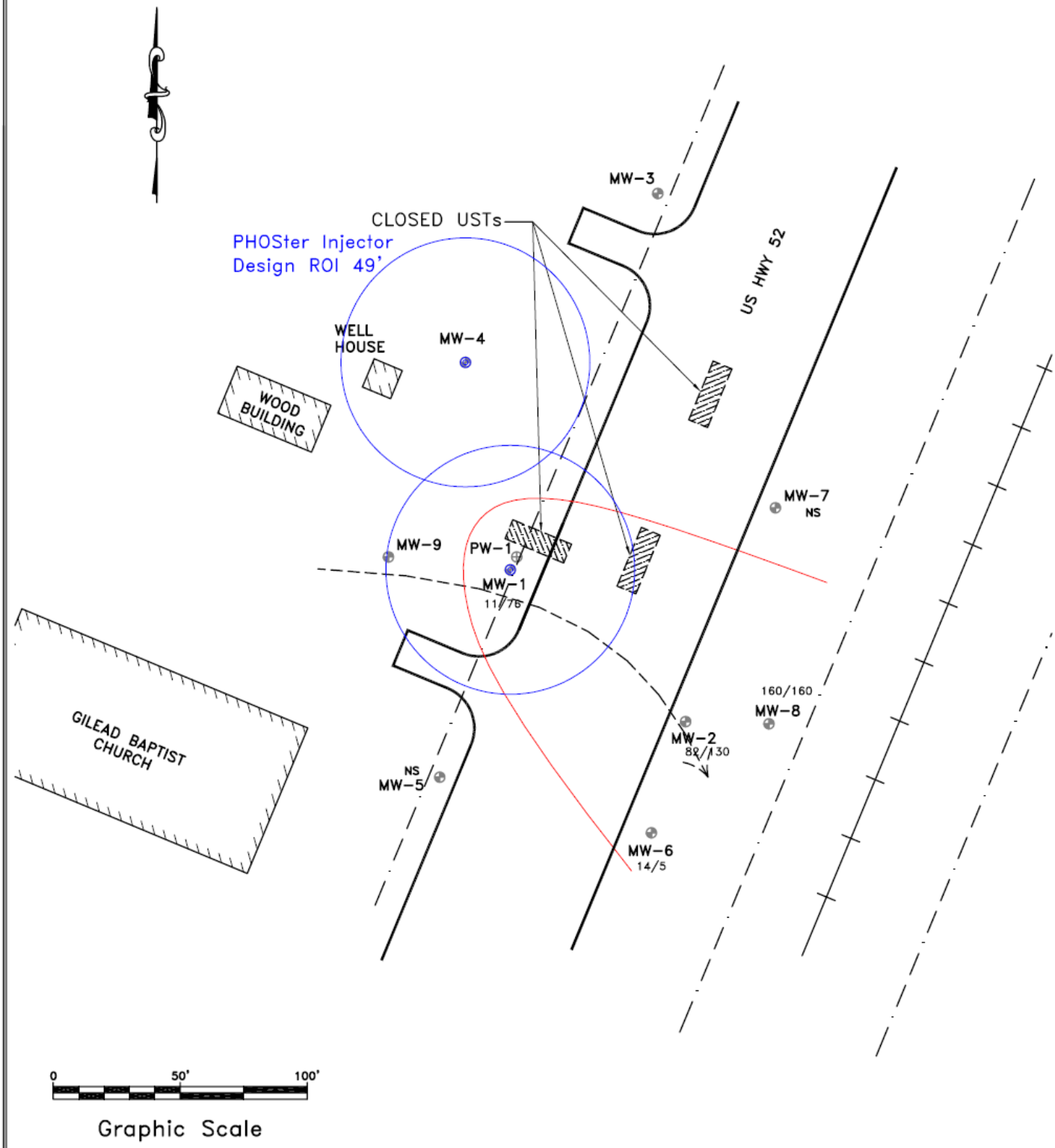
# FIGURES


MW-2 Concentrations of Concern
Naphthalene Target 125 ppb
BTEX Target 41 ppb
MTBE Target 5 ppb
BTEX
Naphthalene
MTBE
Concentration (ppb)
MTBE Concentration, ppb
Time
140
120
100
80
60
40
20
-
10
9
8
7
6
5
4
3
2
1
-
April 21, 1999
July 16, 1999
October 21, 1999
January 26, 2000
April 18, 2000
July 14, 2000
November 10, 2000
May 17, 2001
October 16, 2001


MW-8 Concentrations of Concern
Naphthalene Target 127 ppb
BTEX Target 61 ppb
MTBE Target 5 ppb
BTEX
Naphthalene
MTBE
Concentration (ppb)
MTBE Concentration, ppb
Date of Sample
250
200
150
100
50
-
10
9
8
7
6
5
4
3
2
1
-
April 21, 1999
July 16, 1999
October 21, 1999
January 26, 2000
April 18, 2000
July 14, 2000
November 10, 2000
May 17, 2001
October 16, 2001

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|---|---|
| PROJECT #: | DRAWN BY: RBS |
| SCALE: 1" = 50' | DATE: April 1999 |

Pre-Remediation Plan
Benzene/Naphthalene Isopleth Map
Bullard Property
St. Stephen, South Carolina

may 2001.dwg

FIGURE
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