

GORE™ SURVEYS

ENVIRONMENTAL SITE ASSESSMENT



Delineating Bedrock Fractures for Optimized Well Placement

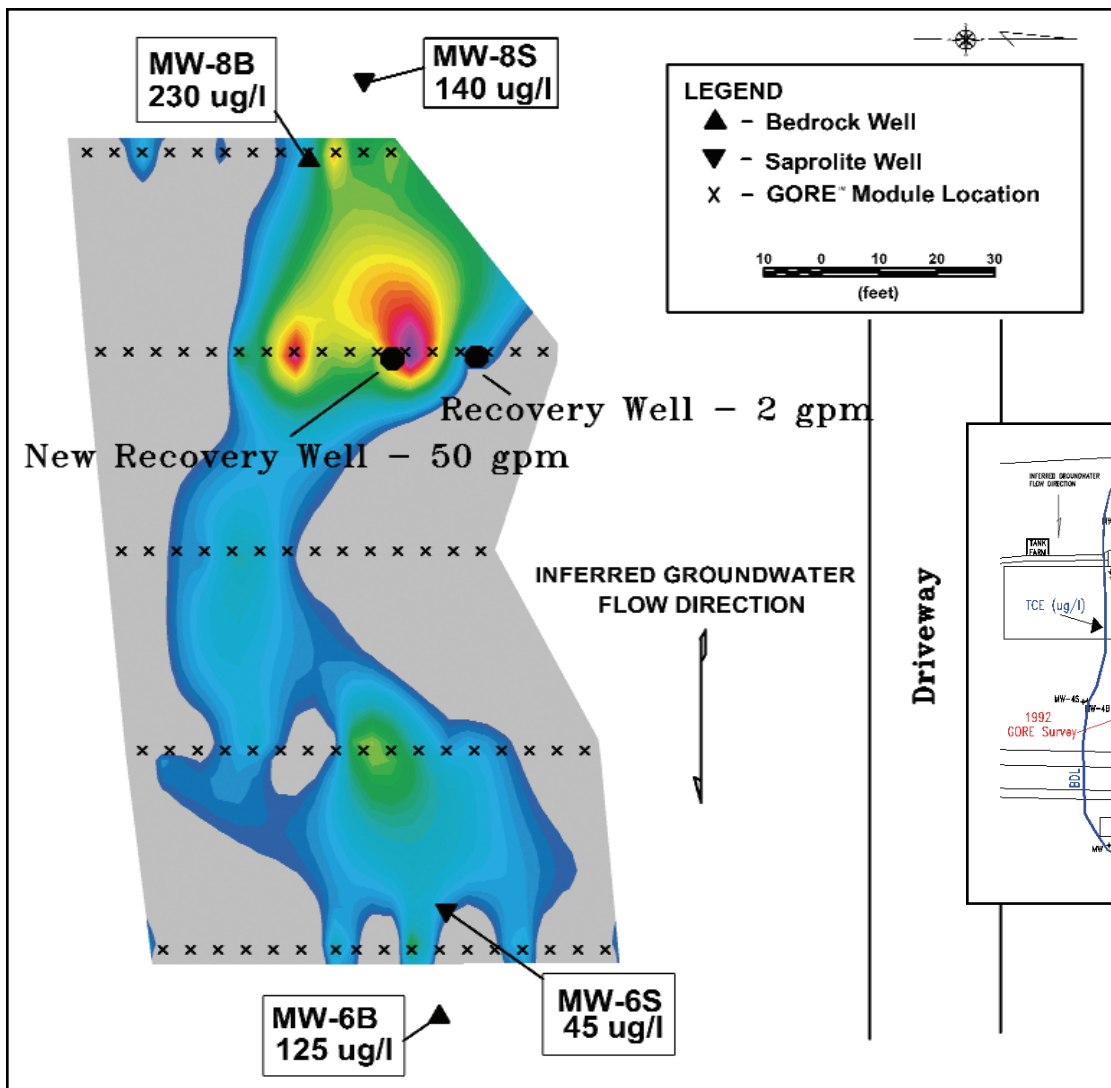


Figure 2. GORE™ Survey results – TCE.

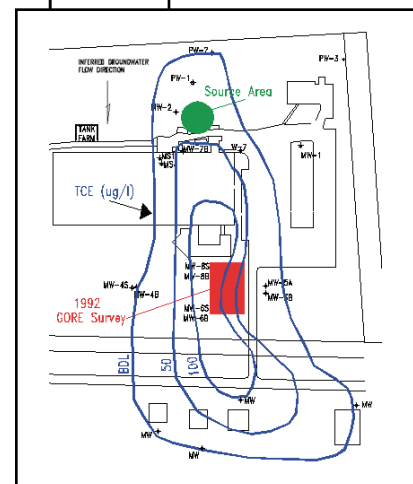


Figure 1. Groundwater concentrations of TCE, source area, and 1992 GORE™ Survey location.

Survey Summary

Location: Mid-Atlantic, US

Property: Light manufacturing facility

Objective: Optimize site selection for new recovery well

- 30 ft. low permeability clays above fractured bedrock
- Prior investigations identified low groundwater concentrations of chlorinated VOCs (<250ppb)
- GORE™ Survey identified TCE exiting the groundwater
- High flow bedrock fracture identified
- New recovery well installed, flow rate increased from 2 to 50 gpm
- TCE removal increased by 70%

Survey Objective

The property owner wanted to install a down-gradient recovery well within a high flow bedrock fracture, to optimize a pump and treat remediation system. GORE™ Survey methods were utilized to map a soil gas plume, indicating the presence of a bedrock fracture.

Site Background & Geology

- Light manufacturing facility, Mid-Atlantic, US
- Routine degreasing & maintenance activities
- 25 to 30 ft. of low permeability clays, above fractured bedrock
- Vertical fractures oriented east-west in bedrock (seismic data)
- Groundwater depth: 30 ft.; flow controlled by fractures
- TCE in groundwater (<250 ppb)
- TCE in soils near the loading docks and storage pads only (source area, Fig. 1)

Prior Investigations

- 1986 - Contaminant plume migration to off-site receptors identified
- 1986 - active soil gas survey, no usable data
- 1989 - Petrex® survey identified known source area; failed to delineate the contaminant plume in the groundwater
- 1990 - Seismic investigation provided insufficient data for optimized well placement
- 1992 - Recovery well installed based on seismic data, pumping 2 gpm
- By 1992 - Sixteen monitoring wells installed to determine extent of groundwater contamination

GORE™ Survey

- 77 GORE™ Modules
- Regular grid pattern, 30 ft. by 4 ft. spacing, 4 ft. deep
- 21-day exposure
- Modified EPA method 8260/8270 GC/MS analysis at Gore labs

Survey Results

GORE™ Survey detected low concentrations (<250 ppb) of TCE in groundwater through thick, low permeability clays. Mapping the data identified a TCE soil gas plume that was restricted to a narrow region in-line with the groundwater flow direction (Fig. 2). This suggested the location of a high flowing bedrock fracture. Using this information, a new recovery well was installed, successfully penetrating the high flowing fracture zone and increasing pumping rates from 2 gpm to 50 gpm.

Survey Conclusions

The first recovery well, installed prior to the GORE™ Survey, did not provide adequate pumping rates to remove contaminated groundwater effectively. The GORE™ Survey identified a high flow bedrock fracture that prior investigations, including a seismic survey, failed to identify. With this information, the site owner was able to place a recovery well in a location that resulted in a 25-fold increase in fluid removal, and a 70% increase in TCE recovery. Long-term sampling, remediation, and monitoring costs were subsequently reduced.

GORE™ SURVEYS FOCUSING YOUR REMEDIATION EFFORTS.



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