

GORE™ SURVEYS

ENVIRONMENTAL SITE ASSESSMENT



GORE™ Survey Outperforms Active Soil Gas Sampling

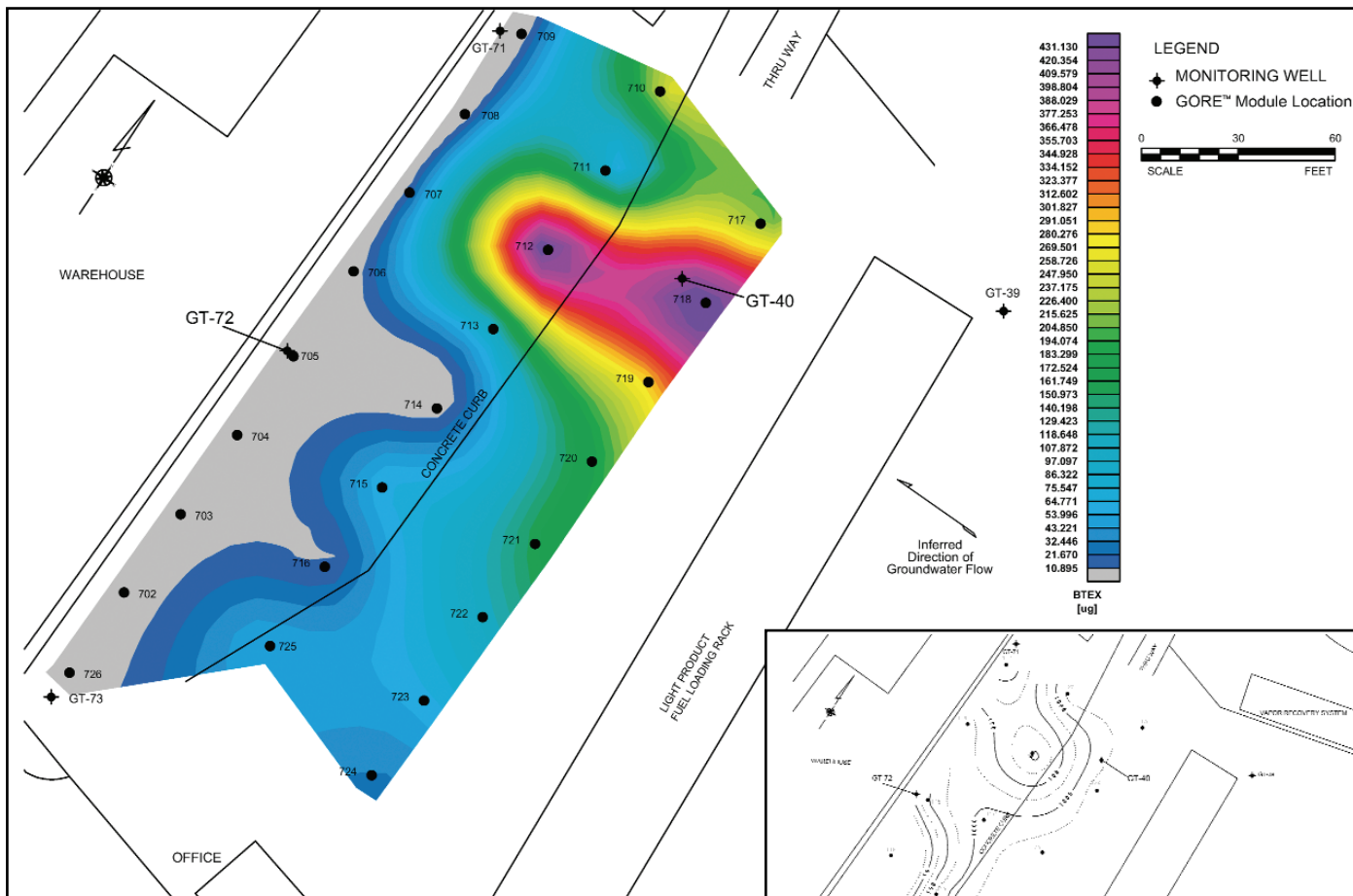
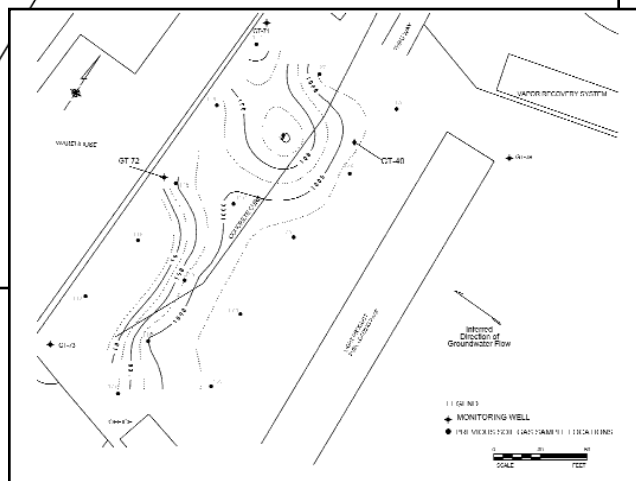


Figure 1. (above) GORE™ Survey results – BTEX. Note elevated soil gas levels immediately downgradient of monitoring well GT-40, a well containing separate phase product. Groundwater data and the soil gas data compare favorably.

Figure 2. (right) Active soil gas survey results – BTEX. Note decreasing concentrations downgradient of monitoring well GT-40, a well containing separate phase product.



Survey Summary

Location: Northeastern US

Property: Bulk fuel storage and dispensing terminal

Objective: Determine extent of subsurface migration of fuel-related compounds

- Groundwater impacted by spilled fuels
- Active soil gas survey compared poorly with groundwater data
- GORE™ Survey:
 - unhindered by soil permeability and a high water table
 - compared well with groundwater data
 - also identified previously unreported SVOCs and PAHs

Survey Objective

Existing groundwater data showed areas of a site that had been impacted with compounds indicative of gasoline (BTEX), as well as a mix of polyaromatic hydrocarbons (PAHs). The GORE™ Survey was conducted to determine the subsurface migration of these compounds downgradient from a fuel loading rack at a bulk fuel storage terminal. An active soil gas survey was completed prior to the GORE™ Survey. The results of the two surveys are also compared.

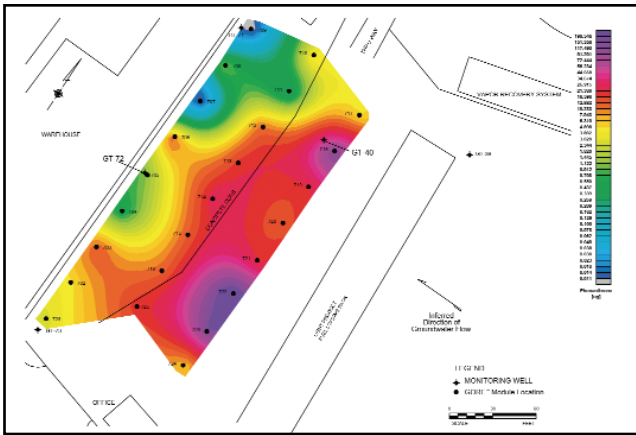


Figure 3. GORE™ Survey results – Phenanthrene.

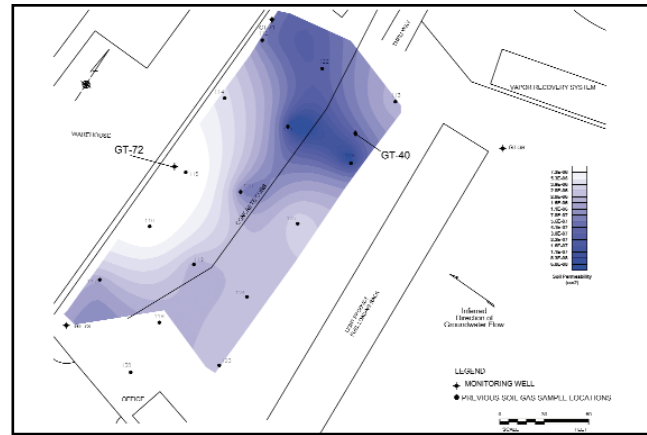


Figure 4. Soil permeability. Note lowest soil permeability exists in the vicinity of GT-40. The GORE™ Survey results did not appear to be impacted by soil permeability.

Site Background & Geology

- Active bulk fuel storage and dispensing terminal, Northeast US
- Fill material and silty clays
- Measured air permeabilities - 1.1×10^{-5} to 1.2×10^{-9} cm²/sec.
- Groundwater depth: 3 – 5 ft., westerly gradient

GORE™ Survey

- 25 GORE™ Modules, 0.64 acres
- Regular grid, 50 ft. spacing, 3 ft. deep
- 14-day exposure
- Modified EPA method 8260/8270 GC/MS analysis at Gore labs

Survey Results

BTEX results from the GORE™ Survey revealed a distinct plume in the area of locations #712 and #718 (Fig. 1), with the highest detected level of 447 µg. These results were well correlated to groundwater data from monitoring well GT-40, which had approximately 1.23 feet of liquid phase floating product. Note that the soil gas plume trend corresponds well with the known groundwater gradient.

Fig. 2 illustrates the results from the active soil gas survey. The BTEX plume indicated by the GORE™ Survey (Fig. 1), was poorly defined by the active soil gas survey and, in

fact, reported a significant decrease in vapor concentration in this area (Fig. 2). Also, active soil gas samples could not be obtained at several locations due to the high water table and saturated soils.

Fig. 3 shows the GORE™ Survey results for heavier petroleum constituents as indicated by the compound phenanthrene. Previous results from a hydrocarbon distillation analysis of the floating product indicated gasoline range hydrocarbons in GT-40, along with diesel/lube oil constituents in GT-72.

Survey Conclusions

The GORE™ Survey revealed the nature and extent of the subsurface impact in the vicinity downgradient of the light fuel loading rack, for light as well as heavier fuel-related compounds. Air permeability tests on soils in this area indicated permeabilities that were 1,000 times lower than the remainder of the site (Fig. 4). This is one possible reason why the active soil gas survey did not delineate the subsurface impact accurately. The active soil gas survey was also negatively affected by high soil moisture conditions. The GORE™ Survey results compared favorably with existing groundwater data, and also revealed the presence and extent of semi-volatile organic compounds, including PAHs, that were not reported by the active soil gas survey.

GORE™ SURVEYS FOCUSING YOUR REMEDIATION EFFORTS.



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