SECURE THE BAG: TRANSITIONING TO PASSIVE GROUNDWATER SAMPLING AS A SUSTAINABLE REMEDIATION ASSESSMENT TOOL AT A LARGE CHLORINATED SOLVENT SITE IN TEXAS

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GSI ENVIRONMENTAL

CHALLENGE

The objective of this study was to implement a sustainability-focused groundwater bioremediation monitoring program at an approximately two-mile-long groundwater trichloroethene (TCE) plume at a former aluminum extrusion plant in Texas. Groundwater monitoring activities at the Site historically relied on low-flow sampling techniques that involved hand-carrying pumps and batteries to groundwater monitoring wells located far from roads in plowed agricultural fields. Therefore, to reduce the effort and associated resources required to monitor groundwater, GSI evaluated alternative passive groundwater sampling methods at the Site.

APPROACH

After evaluating several potential alternative sampling methods, GSI opted to further evaluate the use of two passive groundwater sampling technologies in parallel: (1) passive diffusion bags (PDBs) to monitor for volatile organic compounds (VOCs); and (2) rigid porous polyethylene (RPP) samplers to monitor for dissolved gases (e.g., methane, ethane, and ethene). GSI then designed a field demonstration pilot study to evaluate the use pf PDBs and RPPs at the Site, which consisted to a two-tiered approach: (1) an evaluation of site-specific criteria to evaluate the applicability of passive sampling; and (2) as a conservative measure, a side-by-side field comparison of the passive sampling method and the traditional low-flow purging and sampling method. GSI submitted a report documenting the results of this study to the regulatory agency for approval.

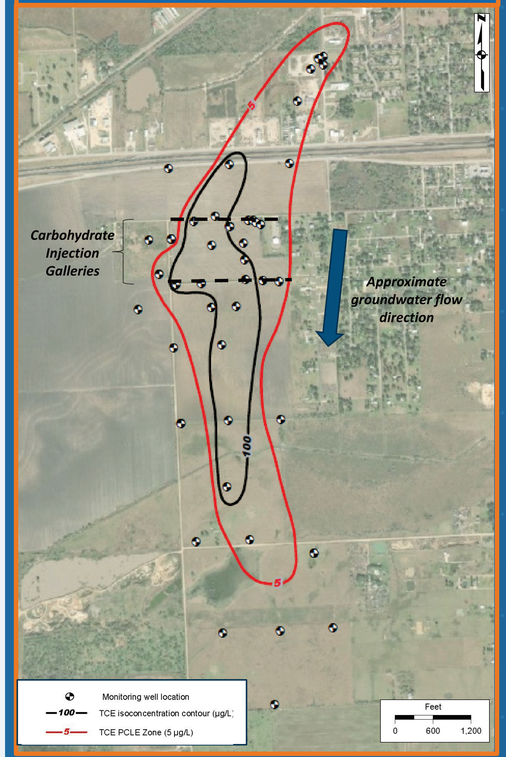
RESULTS

The results of the field demonstration indicated that PDBs and RPPs are a suitable alternative to the low-flow groundwater sampling technique currently used at the Site. GSI received regulatory approval to fully implement PDBs and RPPs at the Site in late 2021. The groundwater analytical results obtained from PDBs and RPPs were not statistically different from those obtained via low-flow sampling. Preliminary results from full-scale implementation indicate that passive sampling nearly eliminates the production of investigation derived waste, reduces labor costs and associated time in the field by approximately 50%, requires less use of field trucks to perform sampling (and hence a lower carbon footprint), and decreases occupational risk related to carrying equipment.

NEXT STEPS

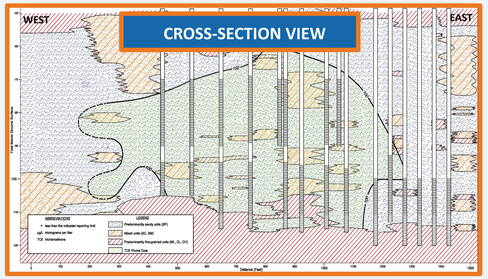
In 2022 GSI fully transitioned the site to groundwater monitoring using PDBs. Next steps for the Site include continued monitoring of cost savings from passive sampling, and continued long-term monitoring optimization.

TRICHLOROETHENE PLUME



FIELD DEMONSTRATION

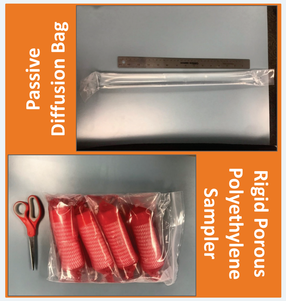
1 EVALUATE SITE-SPECIFIC CRITERIA



- Lithology
- Complete Site Characterization
- Compatible VOCs
- Suitable GW Temperature
- Discussed with & Accepted by Agency
- Suitable Hydrogeologic Conditions
- Evaluation of Cost Savings
- Sufficient Sample Volume
- Lack of Stratification of COCs

2 DESIGN & IMPLEMENT STUDY

We piloted passive samplers at 20 wells with variable CVOC concentrations located across the plume.



3 ANALYZE DATA & SEEK REGULATORY APPROVAL

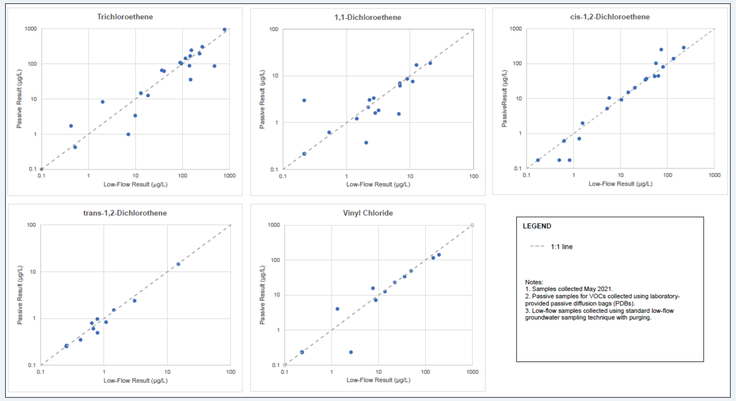
Overall, the datasets were comparable. After several rounds of correspondence, we gained approval from the regulatory agency.

ADVANTAGES

- Ease of Use
- Increased Occupational Safety
- Time, Fuel, & Cost Savings
- Improvements in Field Team Morale

DISADVANTAGES

- Equilibration Time
- Loss of Certain Field Parameters
- Reliance on Specific Vendors



PROJECT TIMELINE

PLANT OPERATIONS
Late 1960's – Unknown: Degreaser Operations at Former Aluminum Manufacturing Facility

MONITORING & ASSESSMENT

- 1997: Assessment of soil & groundwater impacts begins
- 2002: Private water well investigation
- 2005: Continued delineation of on-site soil impacts
- 2014: Depth-discrete sampling to determine necessity of additional injection wells
- 2021: Approval of use of passive diffusion bags (PDBs) for long-term groundwater monitoring

REMEDIATION

- 1997: On-Site soil remediation
- 2002: Install filtration systems at private water wells
- 2003: Installation of soil vapor extraction system at former plant
- 2008: Class V injection well pilot study to assess in situ bioremediation of groundwater.
- 2015-2017: Expansion of molasses injection system
- 2021: Transition from weekly to quarterly molasses injections

NEXT STEPS
Monitor cost savings passive sampling methods & continue to optimize groundwater sampling program