Secure the Bag: Passive Groundwater Sampling as a Sustainable Remediation Assessment Tool at a Large Chlorinated Solvent Site in Texas

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Background/Objectives. The objective of this study was to implement a sustainability-focused groundwater bioremediation monitoring program at an approximately 2-mile-long groundwater trichloroethene (TCE) plume at a former aluminum extrusion plant in Texas. The remedial approach at the site consists of enhanced in situ biodegradation and monitored natural attenuation and quarterly groundwater monitoring activities in support of remediation are ongoing. Groundwater monitoring activities at the Site have historically relied on low-flow sampling techniques that involved hand-carrying pumps and batteries to a large set of the groundwater monitoring wells located far from roads and 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/Activities. 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) to monitor for dissolved gases (e.g., methane, ethane, and ethene). GSI then designed a field demonstration pilot study to evaluate the use of PDBs and RPSs at the Site, which consisted of 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/Lessons Learned. The results of the field demonstration indicated that the use of 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.