

Supplemental Investigation of Dilute and Diffuse Chlorinated Solvents in Groundwater: An Innovative Field Screening Approach

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Background/Objectives. The Palermo Wellfield Superfund Site (Site) is located in a light commercial and residential area in the City of Tumwater (City), Washington. Much of the groundwater within the Site is affected by the chlorinated solvents tetrachloroethylene (PCE) and trichloroethene (TCE) at concentrations in the low microgram/liter range. The Palermo Wellfield (Wellfield) provides a portion of the drinking water for the City. Environmental investigations at the Site have been performed since the 1993 discovery of TCE in groundwater samples from the Wellfield. Remediation efforts began in 1998 by EPA, with relatively low concentrations remaining as a continuing potential environmental risk concern. A Supplemental Remedial Investigation Data Gaps Work Plan (Work Plan) prepared and implemented by the Washington State Department of Transportation (WSDOT), a responsible party, included an efficient investigative field screening approach to evaluate the current nature and extent of contamination to inform a future feasibility study.

Approach/Activities. A high-resolution site characterization (HRSC) screening approach, based on multiple lines of evidence, was selected for this investigation to address key data gaps. This approach used the membrane interface probe technology in combination with a hydraulic profiling tool (MiHpt) for field screening and plume delineation. Important features of the HRSC investigation using the MiHpt were:

- Adaptive work planning and field decisions based on historical and real-time information.
- Pre-defined “Key Decision Points” established by the project team.
- A flexible transect-based boring exploration approach and sampling/analytical plan.
- Confirmatory explorations and sampling with rapid fixed-laboratory chemical analysis.
- Application of screening data facilitated new groundwater monitoring well placement and provided certain Site aquifer information including estimated hydraulic conductivity.
- Real-time information enabled regular data reviews and adjustments to an evolving work plan by the project team consisting of state and federal representatives, and consultants.

Results/Lessons Learned. The HRSC approach was successful because of the adaptable MiHpt field platform, the project team’s collaboration and technical input and schedule flexibility during implementation. Other notable results included:

- Enabled screening of chlorinated solvent concentrations to the microgram/liter range as a newer application of direct sensing technology.
- Provided a rapid detailed HRSC evaluation of a large study area, approximately 100 acres.
- Resulted in significant cost savings over traditional drilling and sampling approaches with a substantial increase in high-quality decision-making information.
- Enabled measurable improvements to a complex conceptual site model.
- Completed one of the most comprehensive studies to date of a low level diffuse chlorinated solvent plume using multiple lines of evidence.
- Achieved some of the deepest known MiHpt boring depths (up to 132 feet at one location) below ground surface, advancing the capabilities of this technology.