Geosyntec consultants

In-Situ Groundwater Remediation, Remedy Selection and Remedial Design at a Former MGP Site

Northern Virginia

Geosyntec developed a cost-saving in-situ remediation system to treat dissolved contaminants as they migrate toward a nearby river.

Client: Confidential

Services Provided:

- ✓ Bench-scale treatability testing
- ✓ Biosparging pilot testing
- ✓ Remedial strategy and remedy selection
- ✓ Full-scale biosparging system design
- ✓ Permeable reactive barrier design

Project Objective

The Site encompasses a former manufactured gas plant (MGP) in an urban area in Northern Virginia and the right-of-way of a stormwater outfall adjacent to a river. Remediation activities are being implemented under the Virginia Department of Environmental Quality (VADEQ) Voluntary Remediation Program (VRP). Prior characterization efforts detected polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) in soil and groundwater under the facility, as well as in river sediments. MGP-related constituents were determined to have migrated toward the river, with the backfill of the stormwater pipeline acting as a preferential pathway for groundwater flow. The primary soluble constituents are benzene, toluene, ethylbenzene and xylenes (BTEX) and naphthalene, and a previously-proposed groundwater remedy included a costly hydraulic control and groundwater treatment system. Geosyntec was retained to develop an alternate, more cost-effective and sustainable remedial approach to address impacted groundwater and facilitate subsequent sediment remediation.

Geosyntec's Scope of Services

Geosyntec began by designing and performing bench-scale biotreatability studies to evaluate the use of enhanced bioremediation as an alternative remedial technology for the downgradient groundwater plume. Based on favorable results for aerobic biodegradation of BTEX and naphthalene observed in the bench tests, we recommended in-situ aerobic bioremediation via biosparging as an alternative remedial option. We then planned and performed a subsequent biosparging pilot test that demonstrated the feasibility of implementing biosparging at the Site, and provided site-specific data needed for the design of a full-scale system.

Based on the treatability and pilot test results, we incorporated biosparging into a full-scale remedial approach. We included an in-situ oil-water separator and a permeable reactive barrier (PRB) with sorbent materials (organoclay and activated carbon) located upgradient and downgradient of the aerobic biotreatment zone, respectively. This addressed the potential mobilization of free product along the pipeline backfill during storm events. We completed the 60% design and worked closely with our client's primary consultant to complete the final system design. We will continue to support the project during the remedy implementation, and are currently providing technical support for technology evaluation and remedy selection for the impacted river sediments.

Notable Accomplishments

Geosyntec, with our significant experience in in-situ groundwater remediation technologies, delivered to the client a cost-saving and more sustainable alternative to the original approach of hydraulic control with ex-situ treatment. The VADEQ VRP has also accepted our proposed remedial approach for the site. We successfully developed a multi-component in-situ treatment train to address both the dissolved plume and potential mobilization of free product. The overall in-situ remediation system is designed for compatibility with the land use and activity of an urban environment, including, in this case, residential and commercial uses, as well as a nearby city park.