

CASE STUDY

GASOLINE, BTEX, PHC F1 & F2 REMEDIATION WITH AIR SPARGING



Background

CLIENT: National Retailer

DURATION: Ongoing, 3 Years

LOCATION: Barrie Ontario

PROJECT VALUE: \$375,000 CDN

At an active gas bar on a high-profile, busy commercial site in a populated urban area, petroleum hydrocarbon impacts, in the form of gasoline along with BTEX (Benzene, Toluene, Ethylbenzene, and Xylenes) and PHC (Petroleum Hydrocarbons) F1 & F2 compounds were discovered in the groundwater and soil. The busy location combined with a large natural seasonal water table variation and deep water table, created a challenging remediation environment.

Approach

The owner, a large national retailer, contracted IRSL directly to complete initial pilot testing and recommend a remedial solution. IRSL then earned the project based on their superior design, which incorporated numerical modeling, and a detailed analysis of the distribution of the LNAPL and dissolved phase plume within the source area.

AIR SPARGING

To contain and remove the LNAPL in the form of gasoline, along with controlling and reducing the mass of BTEX and PHC F1 & F2 in the groundwater, IRSL designed, implemented, maintained, and continuously optimized, an air sparging system.

GEOLOGY: Sand

PLUME SIZE: Approx. 4,000 m²

INITIAL TESTING

IRSL developed a site-specific numerical model to characterize the site. Through the process, they explored various design parameters, such as screen placement, screen lengths, screen diameters, extraction rates, and injection rates, to determine the best system as well as estimate the remedial timeframe, and set project milestones.

APPLIED TECHNOLOGIES

To remove the free-phase gasoline and dissolved phase BTEX, PHC F1 & F2 fractions, IRSL installed, operated, and continuously optimized, a system of 18 sparge wells located around the property and installed to various depths within the plume, targeting the LNAPL and volatile components dissolved within the groundwater.

The wells were connected to an automated specialized blower system, designed to accommodate the deep water table (approximate 20 m below ground surface). The injected air volatilized the organic compounds and provided additional oxygen required to stimulate aerobic biodegradation, completing the remediation process in-situ. The above-ground systems covered a footprint of less 10 m² and consisted entirely of explosion-proof components. The system was also enhanced with sound proofing to reduce the noise signature.

MONITORING & OPTIMIZATION

The installed system enabled remote monitoring and adjustments. Based on monitoring results provided by an independent consultant, IRSL customized pressures and flow rates to individual sparge wells on a bi-weekly basis.

Various fail-safe monitoring networks and devices ensured that the vapours did not migrate into the atmosphere and/or basements of nearby buildings.

Challenges

- Operation at the high-profile commercial site required continuous collaboration with the facility's staff to minimize disruption.
- Preventing migration of vapours into the atmosphere and/or basements of nearby buildings required incorporating various fail-safe monitoring networks and devices.
- Seasonal water table variations required constant monitoring to optimize mass recovery.
- Depth to water (~20 mbgs) created challenges for monitoring and pumping.

Results

- Within two months of operation, the LNAPL plume was eliminated.
- Within 8 months of operation, the dissolved phase plume decreased by 88% on average.
- Within a year of operation, mass balance calculations indicated that over 2,800 kg of LNAPL had been recovered by the system.
- Operational run time exceeded 98%.



InSitu Remediation Services Ltd. (IRSL) is one of Canada's most experienced remediation companies. Our team has designed, implemented, and optimized, soil and groundwater remediation programs in diverse geological environments in North, Central, and South America, Asia, Europe, and the Middle East.

We confidently implement innovative solutions, based on sound knowledge, using seasoned field staff. Our pragmatic, flexible approach reduces effort, cost to our clients, and environmental risk.

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