

## BOS 100 AND GEOTAP™: ECONOMICAL REPLACEMENT OF LEGACY REMEDIATION SYSTEM

### ABSTRACT

The subject site is a former dry cleaner in western Canada with adjacent residences and a school. BOS 100 was selected to reduce contamination in the source area and minimize offsite groundwater and vapor migration of PCE, TCE, cis-DCE, and vinyl chloride. The GeoTAP injection method (rotasonic drilling combined with direct push technology) enabled the application of BOS 100 (Figure 1) at the targeted depths in difficult geology. Targeted product placement was based on saturated soil analytical data generated from the sonic drilling phase of GeoTAP. Following a successful pilot test, a full-scale design was prepared and implemented in 2021. A significant reduction in contaminants of concern occurred (Figure 2) following full-scale implementation, and the groundwater treatment system that had been operating since 2015 was decommissioned in 2022.

### PROJECT SNAPSHOT

#### • Key Dates

- A dry cleaner operated at the site from the early 1960s to the late 1980s
- A groundwater treatment system was installed by others in 2015
- A pilot scale injection of BOS 100® was performed in 2019
- Full-scale injection of BOS 100 was completed in 2021
- The groundwater treatment system was decommissioned in 2022

#### • On-Site Treatment Area (Figure 1) = 760 m<sup>2</sup>

- **Lithology:** Dense till with cobbles to 8 meters below grade (mbg); heaving sands 8 to 45 mbg
- **Depth to Water:** Approximately 9 mbg
- **Contaminants:** PCE and daughter products
- **Implementation Method:** High-energy injections following access by GeoTAP™ pre-drill method

### CHALLENGES & OBJECTIVES

The goals were to reduce elevated PCE concentrations in groundwater, eliminate the need to continue operating the groundwater treatment system, facilitate a human health and ecological risk assessment for the site, and obtain risk-based Certificates of Compliance from the BC ENV for the site and off-site affected areas.

GeoTAP was chosen due to the presence of glacial till underlain by heaving sands and silt that rendered direct push drilling infeasible to achieve the targeted depths in the injection area. This methodology was used to access these zones for emplacement and optimal distribution of BOS 100 at the specified depths (max = 21 mbg).

### APPROACH

- A pilot test was implemented in 2019 with six injection points (IPs) using GeoTAP; two postinjection boreholes were drilled to verify the distribution of BOS 100.
- Full-scale injection of BOS 100 was completed in 2021. Following access with the GeoTAP method, 105 IPs were completed on-site.

## RESULTS

The pilot test was successful in reducing PCE concentrations at the target well by 2 orders of magnitude (Figure 2), and optimized emplacement of the amendment was demonstrated using confirmation soil borings. These outcomes supported the plan to move forward with the full-scale injection event. Currently, the PCE concentration at the pilot test target well has been reduced to 1.46 ug/L, a 99.99% reduction compared to baseline (pre-pilot test). The onsite pump and treat system was decommissioned in 2022 based on the results obtained by the full scale remediation effort. The site is currently in a long-term monitoring program.

Figure 1. Site Map

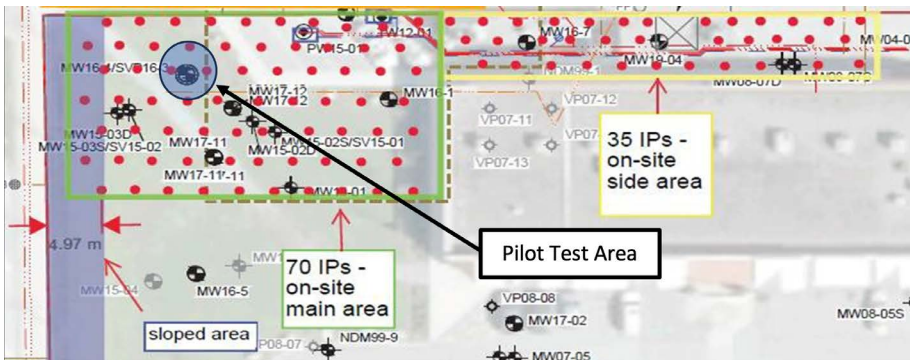
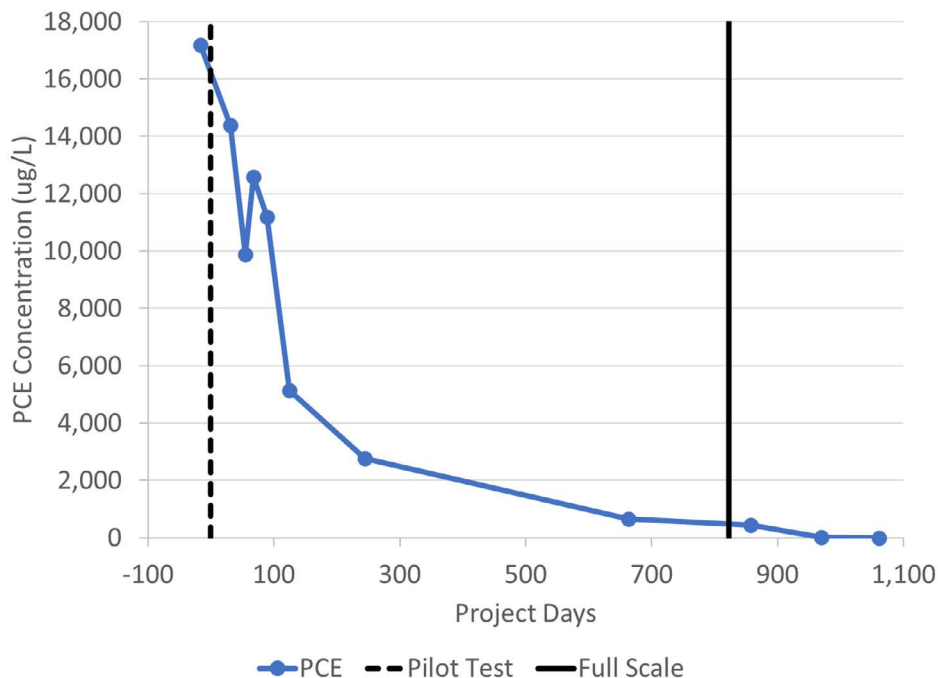


Figure 2. Groundwater Data for Pilot Test Area



A special thank you to [Vertex Environmental](#) for their hard work on this project.

Check out our products online: [BOS100](#), [GeoTAP](#)