

## CASE STUDY

# CHLORINATED ETHENE REMEDIATION IN NORTHERN QUEBEC



## Background

**LOCATION:** Northern Quebec, Canada

**CLIENT:** Environmental Consultant

**DURATION:** 1 week

Along an active railway in a remote region of Northern Quebec, an historic spill was discovered during environmental investigations. The groundwater impacts required remediation to mitigate potential negative impacts on local receptors. The location, on an active railway line, required careful planning and execution to ensure employee safety without disrupting rail schedules and to ensure safe conditions for staff.

## Approach

An environmental consultant hired by the railway characterized the site and determined that the groundwater was impacted with chlorinated ethenes. The consultant sub-contracted IRSL based on their expertise, health & safety training, and experience in remote regions.

### IN-SITU ABIOTIC AND BIOTIC DECHLORINATION AND ADSORPTION USING PLUMESTOP, PLUME FE AND HYDROGEN RELEASE COMPOUND (HRC)

To treat the chlorinated ethenes with minimal disruption to the surrounding area, IRSL implemented a Direct Push injection program that used PlumeStop® Liquid Activated Carbon™ along with PlumeStop Fe™ and Hydrogen Release Compound (HRC®) to stimulate adsorption and break down the contaminants through abiotic and biotic dechlorination. The bio culture KB1 was also injected to ensure biogradation occurred.



**GEOLOGY:** Sand

**PRZ LENGTH:** Approximately  
100 m long.

### CONSTRUCTION

Based on their analysis, IRSL created and implemented a design that created a permeable reactive zone that intercepted the groundwater plume.

**Direct Push Technology:** To ensure vertical and lateral coverage of the plume, IRSL used Direct Push Technology that extended down to a depth of 16 m, with spacing to provide a continuous barrier, to create a permeable reactive zone that effectively intercepted the groundwater.

### MONITORING

Throughout the project, an independent consultant monitored the process and conducted a rigorous Quality Assurance-Quality Control program.

## Treatment

The Direct Push injection program consisted of one injection of a combination of PlumeStop, PlumeStop Fe and Hydrogen Release Compound (HRC) to stimulate adsorption and abiotic and biotic dechlorination. This combination effectively reduced the contaminants within the groundwater to remedial target levels. It also created a geochemical environment that enhanced biological degradation reactions that should result in the re-generation of the activated carbon itself.

- Adsorption with PlumeStop Liquid Activated Carbon: Once in the subsurface, PlumeStop acted as a colloidal biomatrix, binding to the aquifer matrix and rapidly sorbing contaminants out of the dissolved-phase. Once contaminants were concentrated within the PlumeStop biomatrix, they were biodegraded in place through the following processes.
- Abiotic Dechlorination with PlumeStop Fe: Through the process of chemical reduction, the iron in the PlumeStop Fe donates electrons to the chlorinated ethenes, transforming them into harmless compounds.
- Biotic Dechlorination with Hydrogen Release Compound: HRC enhances naturally occurring anaerobic biodegradation by adding hydrogen (an electron donor) to the groundwater, thereby increasing the number and vitality of the native anaerobic bacteria and enhancing reductive dechlorination reactions.

## Challenges

- Working on an active railway line required careful attention to health & safety practices to ensure employee safety.
- The application of a brand-new product PlumeStop Fe, which had never been used in Canada, required careful planning and implementation .
- At over 16 m deep, the injection depth created significant additional challenges.

## Results

- The remedial program was executed in one week with one injection and no environmental footprint.



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