ISCO

# Project Summary

# In-Situ Chemical Oxidation for Home Heating Oil Release

ISOTEC

Case Study 127

Location: Lowell, MA

Site Setting: Residential

Contaminant: Heating Oil

Treatment Area: ~300 $ft^2$

Treatment Interval: 1 - 5 ft bgs

Lithology: fine sand and siltl

Remedy Approach:

- ISCO: Carbohydrate Activated Sodium Persulfate
- 14 Injection Wells
- 2 Injection Events (February & June 2023)

Remediation Results:

- All soil samples collected under the basement were below Massachusetts criteria after 2nd ISCO injection.

## INTRODUCTION

A former fuel oil above ground storage tank (AST) released approximately 40 gallons of fuel into a residential basement. Some of the fuel was sorbed up and removed through sorption mats; however, no soil was removed for disposal. Soil samples collected below the basement floor detected residual petroleum hydrocarbons above Massachusetts Contingency Plan (MCP) criteria. The depth to groundwater is 5 to 6 feet below the basement, and groundwater samples showed only trace to no petroleum hydrocarbon concentrations. A sub-slab depressurization system was installed. In-situ chemical oxidation (ISCO) was selected for treatment of petroleum hydrocarbons in unsaturated soils beneath the basement.

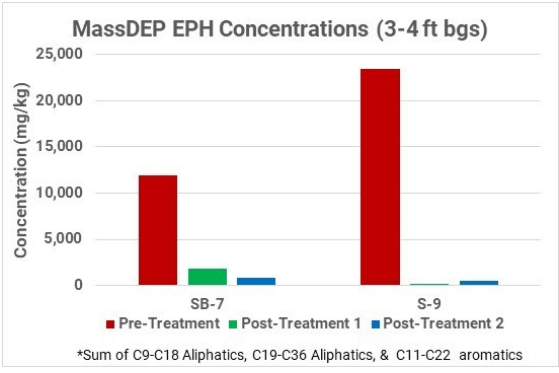
## TREATMENT PROGRAM AND IMPLEMEMENTATION

A network of 14 injection wells (1" PVC) were installed in the basement using a hand-held auger driller. Injection wells had screen intervals of 1-4 and 1-5 feet bgs. Sodium persulfate was selected as the oxidant for its longevity and effectiveness for treatment of petroleum hydrocarbons. In addition, it was assumed that some persulfate solution would sink out of vadose zone soil to the groundwater, which will provide persistent oxidant at the water table to treat petroleum hydrocarbons in shallow groundwater and contamination that may sink towards the water table during liquid injection. Oxidant batching and injection pumping were performed in a small box truck parked outside of the residence. Injection hoses were run through a basement window. Two injection events were completed approximately 4 months apart.

## RESULTS

Soil samples were collected 3 months after each ISCO injection at corresponding locations to baseline soil samples. After the second ISCO event, all soil samples collected under the basement were below Massachusetts criteria.

No adverse impacts to groundwater quality were observed as a result of ISCO injections in unsaturated soils. The project represents a successful combined remedy of vapor extraction (via the SSDS) and ISCO for treatment of unsaturated, fuel oil impacted soils.

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