

## Project Overview

Site: An operational gas bar in southern Alberta

Contaminant: Petroleum hydrocarbons (PHCs); primarily benzene and F1 fraction PHCs

Subsurface Material: Silty clay

Contaminant Location: Groundwater and soil; 2 to 6 m below ground surface (bgs)

Remediation Partners: Federated Co-operatives Limited and Nichols Environmental (Canada) Ltd.



## Objectives & Challenges

- Fracture emplace a sodium persulfate solution into clay soils to promote chemical oxidation of benzene and F1 fraction PHCs
- Use alkaline activation on half the site
- Compare the activated and un-activated results for decreasing benzene and F1 concentrations
- The contamination is present in fine grained soils and underlying a road

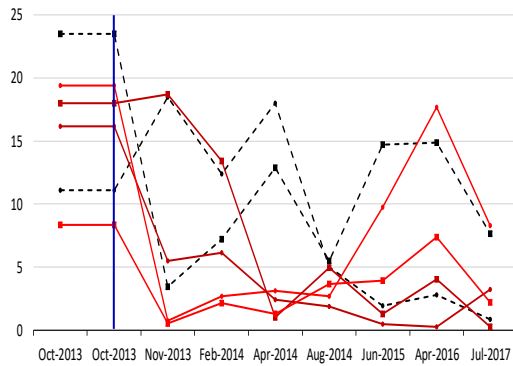
## Field Program

- Fracture emplace persulfate solution containing 12,000 kg of sodium persulfate
- 120 fractures were emplaced from 30 boreholes between 3 and 6.5 m bgs
- The south half of the plume was activated and the north half was un-activated

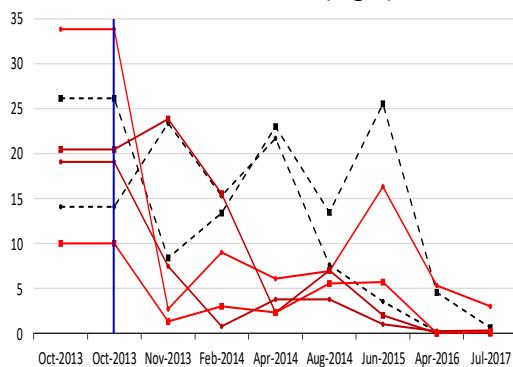
## Technical Evaluation

- Benzene and F1 concentrations decreased approximately 50% to 80% ten months after chemical oxidation work
- The activated persulfate appears to have less rebound, but no significant difference was observed in the long term monitoring
- Oxidation/reduction potential levels were elevated for approximately 6 months, providing conditions that favour oxidation reactions
- The PHC concentrations were reduced to below risk based criteria

Benzene Concentrations (mg/L)



F1 Concentrations (mg/L)



- Monitoring well results in the activated area
- Monitoring well results in the un-activated area
- Chemical oxidation remediation program