

PROJECT SYNOPSIS/SITE PROFILE

- Purchase of a active retail service station constructed in 2004
- Benzene in water supply at kiosk resulted in investigation which identified the presence of a hydrocarbon plume across the Property
- Following purchase, the goal was to remediate hydrocarbon impacts with limited business interruptions to the active site
- Designed on-site recovery and injection treatment system
- Silty clay and silt subsoil/groundwater depth ~ 1.0 to 2.5 mbg
- Hydrocarbon groundwater plume ~ 2,850 m²
- Average groundwater plume concentration ~ 47.44 ppm



Figure 1: Site Location and Details



For Further Information: Kyle Jackson, Project Manager, Nichols Environmental (Canada) Ltd. Barry Rakewich, General Manager, Nichols Environmental (Canada) Ltd.

MULTI-FACETED APPROACH TO THE REMEDIATION OF A PETROLEUM HYDROCARBON PLUME AT AN ACTIVE RETAIL SERVICE STATION Kyle Jackson and Barry Rakewich, Nichols Environmental (Canada) Ltd., Edmonton, Alberta, Canada Jay Grosskleg and Trevor Carlson, Federated Co-operatives Limited, Saskatoon, Saskatchewan, Canada

REMEDIATION APPROACH

- Multi-faceted approach allowing for several in situ methods to be utilized independently or simultaneously:
 - Mechanical vapour extraction
 - Air sparge

Overview

- tank, treated via air sparge and carbon filtration
- Treated water stored in batch tank and discharged through 25-micron filter to municipal storm sewer system
- subsurface contaminant plume
- subsurface during groundwater extraction
- Nutrient/oxidant amendments/injections may also be utilized to treat hydrocarbon impacts
- Recovery system can be utilized to mechanically move amendments across the desired treatment area
- Two of five proposed header lines have been installed to date
- Additional installation proposed to be completed in summer of 2015

jackson@nicholsenvironmental.com rakewich@nicholsenvironmental.com

Mechanical groundwater extraction and treatment

 Nutrient amendment to promote bioremediation Oxidant injection to promote chemical decomposition

• Extraction wells create cone of depression mitigating GW flow off-site • Recovered hydrocarbon-impacted groundwater transferred to settling

• Vapour extraction provides removal of volatile hydrocarbons within

• Air compressor provides air sparge capability via injection wells to promote aerobic condition and reduced water tension within





contaminant mass reduction

- Ongoing recovery and on-site treatment of hydrocarbon-impacted groundwater
- Limited hazardous waste disposal (sediment/floc) • Zero downtime for retail service station business operations • Limited operating costs following initial system install investment Sustainable technology





Jay Grosskleg, Environmental Advisor, Federated Co-operatives Limited Trevor Carlson, Environmental Affairs Director, Federated Co-operatives Limited



Sustainable In-Situ Remediation **Co-operative Alliance**

RESULTS/FURTHER WORK



- Continuous hydrocarbon vapour recovery resulting in overall subsurface
 - Enhanced in situ aerobic bioremediation
 - On-site groundwater treatment
 - Water treated and returned to local watershed
 - Passive treatment configuration

j.grosskleg@fcl.ca t.carlson@fcl.ca