

# Fate and Remediation of Petroleum Contaminants in Soil and Sediment

Mr. Yao Yao has been an active member of our team since 2009, dedicating for a cleaner future of Canada's oil industry and environment. His research topics include the migration of petroleum contaminants under freeze-thawing process, the sequestration and releasing of hydrophobic pollutants in soil and sediment, the remediation of soil and groundwater using surfactants and microorganisms, and the long-term risk assessment of contaminated sites. By combining his research outcomes with the real-world cases, Yao has contributed a lot in numbers of successful projects in Canada and China, among which, four with the most significance are presented below.

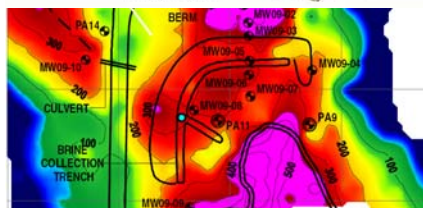
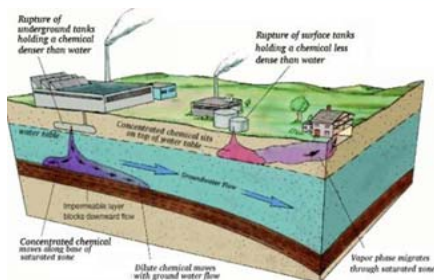
## Petroleum Contamination Risk Assessment for TransGas

Site conditions at Coleville plant were characterized.

Effective modeling system for simulating fate of contaminants in soil and groundwater was developed.

Site-specific risk assessment framework was established.

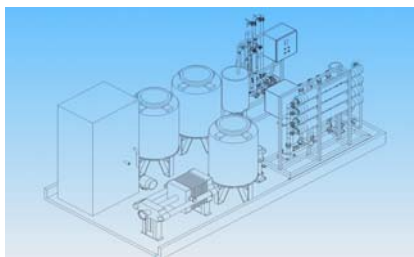
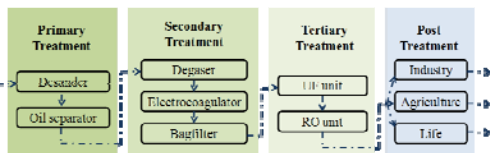
An integrated simulation-optimization method for providing suggestions to site remediation practices was developed.



## Oil Field Produced Water Reclamation with PTRC

A mobile treatment unit for produced water treatment was developed, which is integration of electrocoagulation and membrane filtration.

The treatment of produced water with pilot-scale EC-membrane equipment demonstrated that over 95% of oil, TOC, COD, TSS and turbidity in raw wastewater were removed.

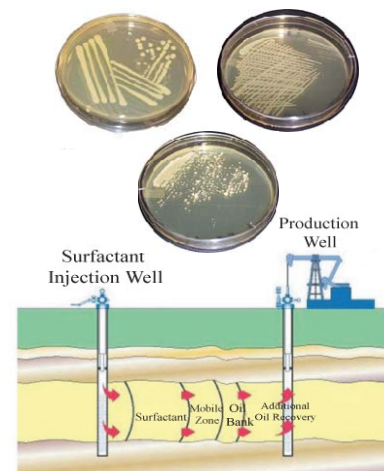


## Soil Remediation by Surfactant and Microbes with Stantec

Microorganism screening was conducted to locate indigenous microbial strains that could adapt to cold-climate conditions and could efficiently degrade petroleum hydrocarbons.

The effectiveness of bio surfactant and other typical surfactants was evaluated, the optimal desorption conditions were obtained.

Injection of supplied electron acceptors at Hoosier site helped create a bio barrier to prevent the impacts from further migrating.



## Oil Field Groundwater Monitoring Guideline

It can be expected that groundwater around oilfields became contaminated from the exploitation of oil. Therefore proper monitoring measurement needs to be taken to prevent drinking water resources from polluted water bodies.

A thorough groundwater monitoring guideline was established for big oil producing areas in China. The guideline setup standard workflows for site investigation, hazard identification, monitoring network design, sampling and testing, and result interpretation.

