Anaerobic Bioremediation of Petroleum Hydrocarbons

**Project Location:** La Ronge, Saskatchewan

**Concern:** In order for the client to be able to sell his property and business, approximately 3000 m$^3$ of gasoline impacted soil and groundwater had to be remediated. Impacts were 300 metres upstream from Lac La Ronge.

**Challenges:**

**Client wanted to sell property within 3 to 5 years:**
- Remediation had to be effective in a limited time frame

**Costs needed to be kept at a minimum:**
- The standard ‘dig and dump’ option was too costly at approximately $500,000 therefore a cost effective alternative option had to be developed

**Client wanted to keep business running as smoothly as possible during remediation process:**
- Remediation had to be non-invasive and minimize site disruption

**Solution:** Enhanced anaerobic bioremediation through the addition of potassium sulphate within the tank excavation and a permeable reactive barrier (PRB) placed near the leading south edge of the gasoline plume to intercept and remove petroleum hydrocarbons (PHCs). Sulphate reducing bacteria were able to “breathe” the oxygen within sulphate under anaerobic conditions while using the gasoline as an energy (carbon) source.

**Enhanced Anaerobic Bioremediation Process- Advantage Through Innovation**

- Bioremediation program occurred concurrently with the planned removal of the underground storage tanks to minimize disruption and costs.
- Design criteria ensured that the lake 300 metres downstream would not be adversely impacted by sulphate or gasoline concentrations.

**Results:**

- Excavation cost estimates were $500,000, PINTER’s solution ended up with all in costs of approximately $50,000. Cost savings of approximately 90% were achieved for the client.
- Site achieved Tier 2 closure from the Ministry of Environment within a two-year timeline which fit within the client’s desired time requirement.
- Distribution of sulphate through remediation area was achieved using natural groundwater flow; there was no ongoing maintenance or power required for operations.
- Average benzene soil removal was approximately 98% and all soil and groundwater concentrations were below the relevant criteria after two years of treatment. Treatment began in fall 2015 and concluded with sampling in fall of 2017.
- Clearance letter received from the Ministry of Environment in March of 2018.