Remediation of a Petrochemical Plant

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Overview

- Location and History
- Site Characterization
- On-Site Remediation
- Off-Site Remediation
History

- Agricultural purposes prior to 1960s
- Plant constructed circa 1960
- Petro Chemical Operations, 1961-1992
  - Mainly benzoic acid, phenol, meta-toluic acid
- A toluene spill of approximately 220,000 lbs. in the process plant area in 1982
Remediation

- Remediation approach for:
  - Process Plant
  - Lagoons
Process Plant

- Extent of Contamination
  - Soil
    - Hydrocarbons - 35,000 tonnes
  - Groundwater
    - Hydrocarbons at 36 locations
    - Phenols at 31 locations

- Recommendation:
  - Remediation / Risk Assessment
Previous Remediation of Equalization Lagoon was conducted

The mixtures of the chemical - DNAPL

Extent of Contamination

- **Soil** 5,000 tonnes (hydrocarbons and phenols)
- **Groundwater** 2,400 m³ (hydrocarbon and phenols)

Recommendation:

- Remediation / Risk Assessment
On-Site Remediation Challenges

- High concentrations of contaminants
  - Toluene at 220,000 µg/L

- Health and safety measures
  - During construction

- Groundwater treatment

- Streambank lupines
  - Protection of endangered plant species

- Permitting
  - Obtain a Hazardous Waste Facility Permit

- Timeline – 1.5 years

- Cost
On-Site Remediation Challenges

- Streambank lupines
  - Rare, endangered plant species on site
  - Worked with Streambank Lupine Society to minimize damage to the vegetation
Solution

- Soil
  - Risk based targets
  - Obtaining hazardous waste approvals
  - Treating soil on-site (Bio-cell)
  - Re-using treated soil as backfill

- Groundwater
  - Utilizing existing water treatment plant

- Health and Safety
  - Continuous monitoring of air
Lagoon

Excavation Area
Health and Safety

- Use of respirators
- Continuous air monitoring
Excavation
Equalization Lagoon
Biocell Construction

- Treating Hazardous Waste and Commercial quality soil on-site
- Using liner and monitoring system for containment
- Completed four rounds of windrow turning
- Completed weekly biocell inspections and monthly settlement surveys
Biocell Construction
BIOCELL RESULTS
Biocell Toluene Concentrations

![Graph showing Biocell Toluene Concentrations from Oct-09 to Oct-10. The graph displays the concentration in ug/g over different months. The highest concentration is marked with a red diamond, the average concentration with a blue square, and the CSR RL and CL standards with green lines.](image)
Post Remediation – Volatile Petroleum Hydrocarbons
Off-Site Challenges

- Active Railway lines
- High Pressure Trunk-Main Potable Water line
- Streambank Lupine
Chemical Injection

- Reduce the hydrocarbon concentrations in groundwater to less than risk based target concentrations

- First round of chemical injection between October and November 2010

- Second round between January and February 2011

- Third round in June 2011
Chemical Injection
Chemical Injection

Graph showing the concentration of toluene over time.
Conclusion

- **Challenges**
  - Contaminants, complexity, access, location, safety, timeline, cost

- **Solutions**
  - Excavation, biocell, chemical injection

- **Results**
  - Achieving risk standards
  - Meeting client needs
Questions?