Achievement of Provincial Guidelines for Partially Treated Soils

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Content

- Overview of Bio-Synergy and GSI
- Historical sites; the PHC challenge
- Case studies
Who is Bio-Synergy Resources?

- Specializes in the remediation of hydrocarbon contaminated soils and groundwater as well as the treatment of impacted drilling waste
- Incorporated in January 2000
- Currently working on projects throughout Alberta, Saskatchewan, Manitoba and British Columbia
- Regulatory approvals
Who is GSI Environment?

- Founded in 1987, GSI specializes in engineering services, turnkey waste management, and soil & groundwater bioremediation
- Pioneering source of expertise consisting of engineers, chemists, hydrogeologists, agronomists, microbiologists and biochemists
- Currently serving clients in Canada, USA, France and Africa
- Manage four soil treatment centres in Quebec
Working Relationship

- Bio-Synergy / GSI working relationship expands our capacity:
  - Performance Bonding – Guaranteed Success
  - Research & Development Facilities
  - Depth in Technical Capacity & Experience
Bioremediation Projects
Historical HC Degradation vs Optimized Process

- - - - Optimized process

F3 concentration (mg/kg)

Objective

Treatment period
Historical HC Degradation vs Optimized Process

- - - - Optimized process

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Historical site

F3 concentration (mg/kg)

Objective

Treatment period
Case 1

Achievement of Guidelines on Partially Treated Soils

- 5,000 m³ originating from an abandoned flare pit and a buried pit of unknown origin
- Location was drilled in 1958
- Project conducted between May and September 2002
Site-Specific Challenges

- The region (Rocky Mountain House area) is the second wettest area in Alberta*
- Actively producing oil & gas location
- No electricity on-site

Pre-Treatment Soil Conditions

Composite sampling = 1000 to 2300 mg/kg
Average = 1744 ± 200 mg/kg @ 95% conf.
Tier 1 surface - fine grained: 800 mg/kg
- Phase 1- Preparation of Soils

- Levelling of the subsoil surface
- Confirmatory subsoil sampling
- Placement of bottom liner and installation of forced air system
- Biopile construction
  - Processing and structuring agent/amendment addition
  - Placement of processed material
  - Anchoring of cover liner
Placement of Processed Material
- Phase 2 - Treatment Follow-up

- Periodic monitoring
- Final sampling event on August 8, 2002
- All samples below criteria for fine-grained surface soil in a natural area landuse
F3 Hydrocarbon results

Before = 1744 ± 200 mg/kg @ 95 % conf.

Tier 1 surface - fine grained : 800 mg/kg

After = 427 ± 40 mg/kg @ 95 % conf.
Site Closure

- Biopile dismantling and backfilling
- Disposal and salvage of liners
- Subsoil recontouring
Case 2

Current Project

- On-going project initiated in June 2003
- Volume is approximately 1,350 m³
- Former flare pit containing weathered and potentially burned hydrocarbons
- Average F3 concentrations reached a plateau of 2,425 mg/kg
Site-Specific Challenges

- Heavy clay material
- Treatability study required
- No electricity on site during bio-treatment initiation
Biopile Construction
Forced Aeration System
Expectation

F3 hydrocarbon concentrations below 800 mg/kg by the end of the 2004 field season
Cost

- Projects of this type range from $25 to $65 per tonne

- Variables include: soil volume, level of contamination, contaminants present, moisture, etc.
Conclusion

- Monitoring and maintaining an optimal soil environment for microbial activity is crucial to ensuring the success of any bioremediation project.

- This is done to guarantee results, timeframes, and costs.
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