REMEDIATION OF THE MARWELL TAR PIT

USING ENHANCED THERMAL CONDUCTION FOR THE REMEDIATION OF EXTREME HYDROCARBON IMPACTS IN WHITEHORSE, YUKON TERRITORY

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PRESENTATION OVERVIEW

1. Marwell Tar Pit - A Brief History
2. Govt of Yukon Marwell Project
3. Unique Site Challenges
4. On Site Water Treatment
5. Enhanced Thermal Conduction (ETC) Soil Treatment
6. Operations
7. Why it Works – ETC Results
8. Conclusion

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MARWELL TAR PIT
A BRIEF HISTORY

- 1944 – Whitehorse Canol crude oil refinery built in Marwell, closed in 1945
- Late 1940's - Refinery waste tar disposed of at Marwell pit
- 1940's /1960's – Dump site for liquid waste
- 1960's – Pit capped with gravel

PHOTO CREDIT: FINNIE FAMILY FONDS, PHO 141 (81/21) # 456: WHITEHORSE CANOL REFINERY

YUKON MARWELL PROJECT

- 1970's – Yukon began environmental monitoring at Marwell
- 1990's – 27,000 m3 of soil, and groundwater contamination identified
- 1998 – Yukon designated the tar pit a 'Contaminated Site'
- Tar found migrating offsite in groundwater, streams, and soil
- 2010 – $6.8 Million environmental assessment & remediation project funded by Govt of Canada & Yukon
- Federal Contaminated Sites Action Plan & Northern Strategy
- 2018 – Milestone & Iron Creek awarded contract to remediate Marwell Tar Pit

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SITE CHALLENGES

- Location (residential, industrial, Marwell Creek)
- Site hydrology (perched GW, surface flow springs, subsurface flow, shallow aquifer)
- Site geology (fine silt & clay)
- Climate (extreme Northern weather)
- Multiple stakeholders & jurisdictions (Canada, Yukon, First Nations, Municipal Government)

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WATER TREATMENT

- Excavation water
- Surface water runoff
- Municipal & Yukon standards (Aquatic Life Standards)
- Multiple parameters (HC’s, naturally occurring metals)
- Difficult chemical processes
- Volume

ENHANCED THERMAL CONDUCTION (ETC) SOIL TREATMENT

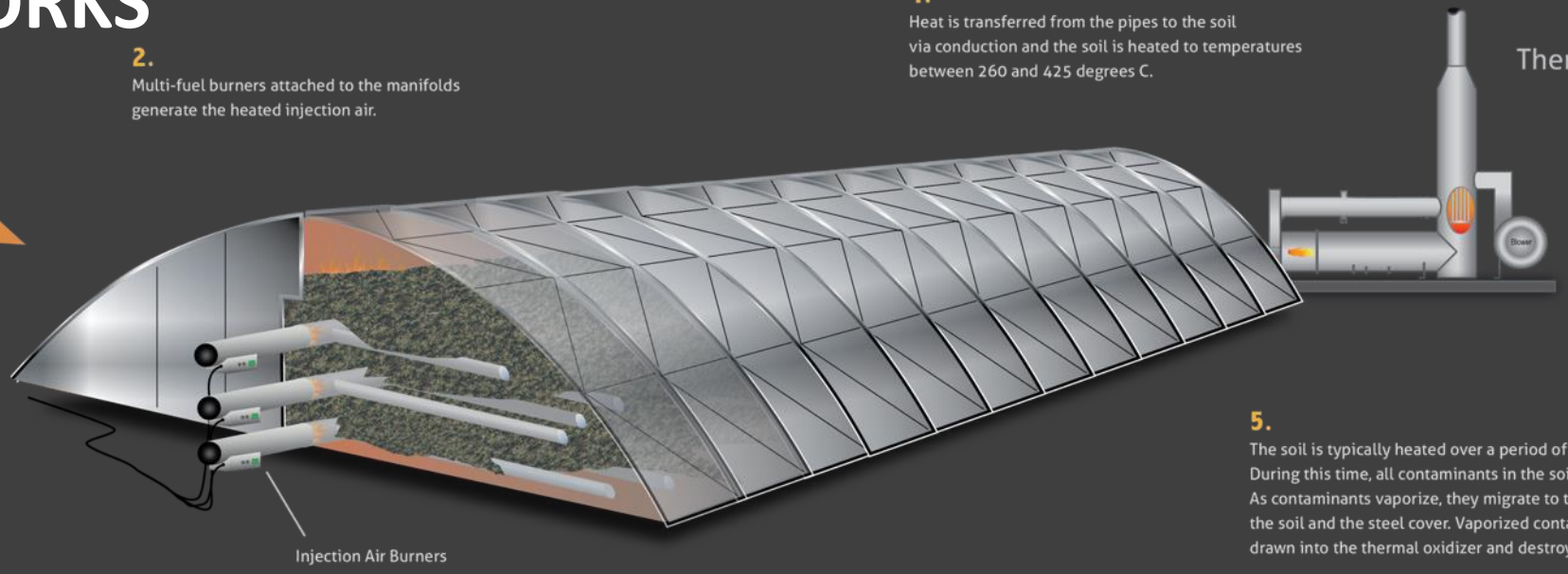
HOW ETC WORKS

1.
Contaminated soil is placed into a three layered soil cell. Each layer contains steel pipes which are attached to larger manifolds running the length of the treatment cell.

2.
Multi-fuel burners attached to the manifolds generate the heated injection air.

3.
A stainless steel Quonset Hut is assembled over the entire soil cell to prevent the escape of air during the soil treatment process.

4.
Heat is transferred from the pipes to the soil via conduction and the soil is heated to temperatures between 260 and 425 degrees C.



5.
The soil is typically heated over a period of 4 to 12 days. During this time, all contaminants in the soil will vaporize. As contaminants vaporize, they migrate to the space between the soil and the steel cover. Vaporized contaminants are drawn into the thermal oxidizer and destroyed.

SIDE VIEW OF BURNERS ATTACHED TO CELL

FRONT VIEW OF ASSEMBLED SOIL CELL

MULTI-FUEL BURNERS

THERMAL OXIDIZER

MULTIPLE CELLS RUNNING

800 CUBIC METER CELL

ETC AT MARWELL

- Approximately 36,000 tonnes of impacted soils excavated, thermally treated and backfilled on site
- Soil treatment operations took place over roughly 11 months
- The ETC process was operated through all seasons including extreme northern winter conditions
- Site setting (topography, urban environment, high visibility) created many unique challenges to overcome for successful project completion

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OPERATIONS

The site was technically challenging from a treatment perspective but also had many peripheral considerations including:

- Public & stakeholder engagement
- Evolving air permitting process
- Extensive air emissions sampling and monitoring
- Routine Yukon Government regulatory and compliance interface

ETC RESULTS

- Site specific remediation targets were originally developed for the site
- ETC process resulted in meeting SSRT's and were well below required levels
- Thermal treatment had improved results allowing revision of target criteria to Yukon CSR Commercial/Industrial limits
- Post-treatment soil analysis confirmed all treated soil met the required criteria with many of the results approaching analytical detection limits

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CONCLUSION

- On site treatment removed the liability from treated material
- Resulted in improved soil treatment targets being implemented
- Approx 1,000 truckloads of soil kept off roads & diverted from landfill
- Thermal soil treatment a timely and guaranteed solution for remediation
- Successful remediation of technically challenging hydrocarbon impacts

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QUESTIONS?

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