

WEATHER, STAFF AND EQUIPMENT

A TRIFECTA OF SUCCESS FOR CLOSURE WORK ON REMOTE WINTER ACCESS SITES

PRESENTED BY:

Jeff Biegel, B.Sc., P.Ag.
Senior Advisor
360 Energy Liability Management

Rob Thompson, P.Eng., P.Biol.
Manager Environment
Orphan Well Association



INTRODUCTION TO AB OWA

Alberta Orphan Well Association (AB OWA)

MANDATE:

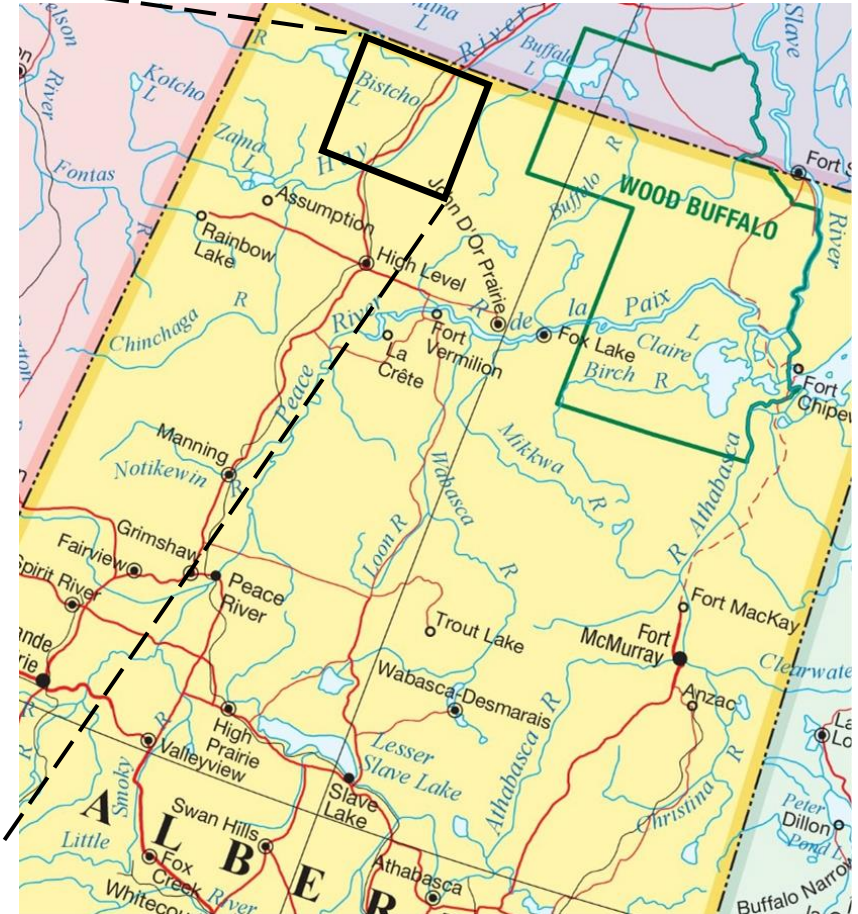
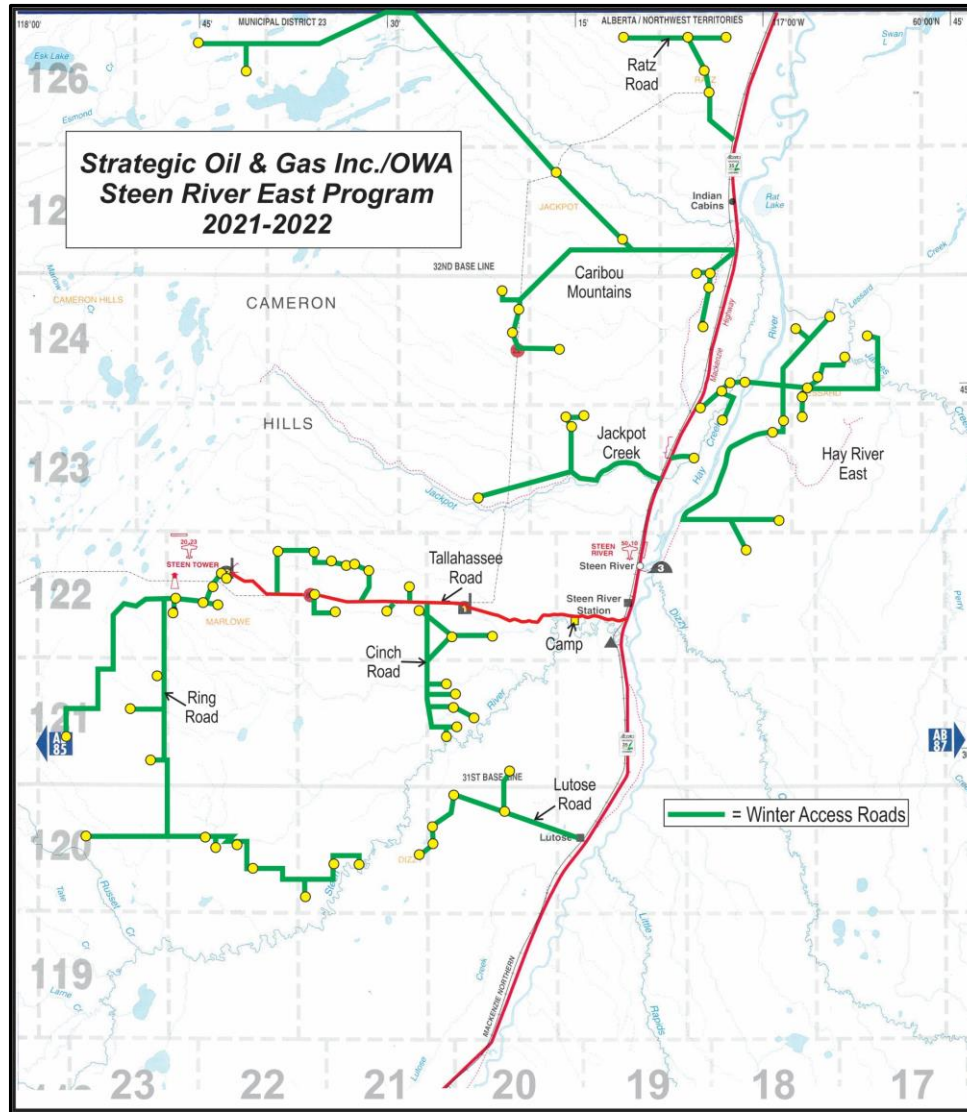
To decommission all Orphan oil and gas infrastructure and reclaim the land similar to its original state. We do this while operating in a manner that is:

- Safe
- Principled
- Cost-efficient



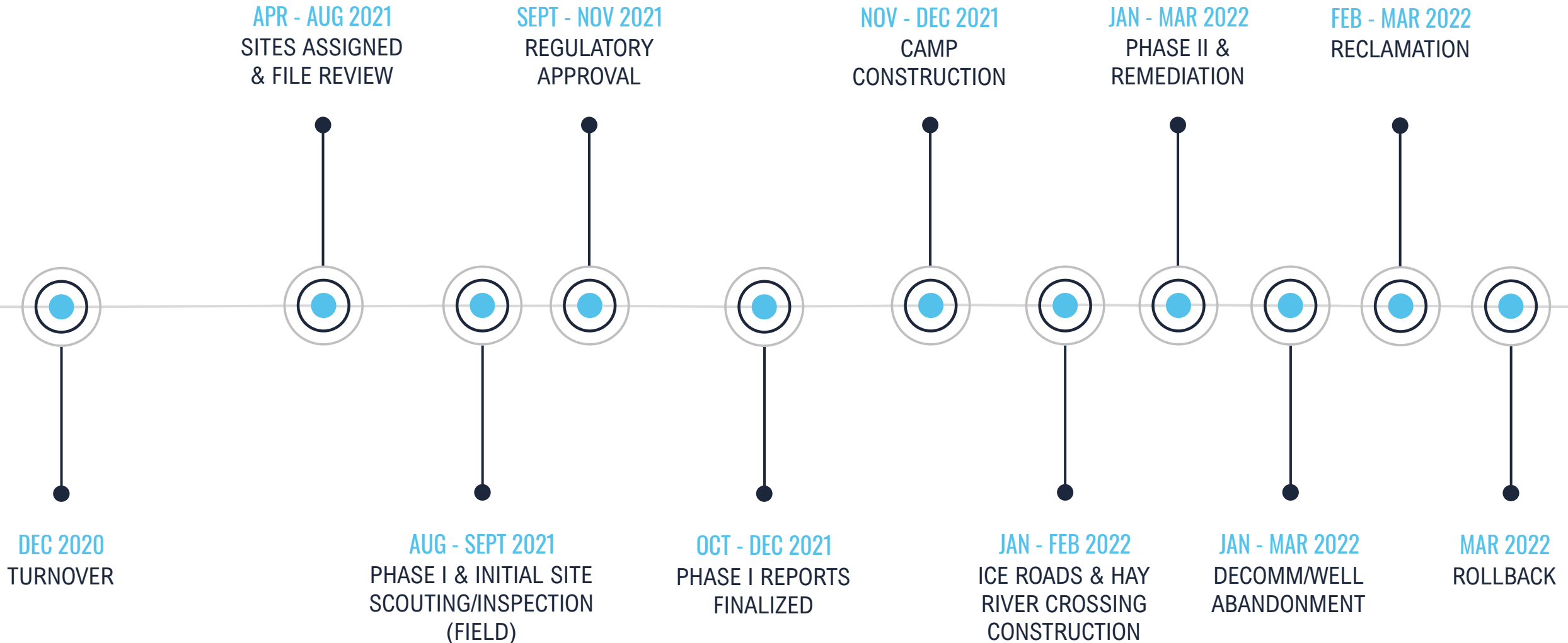
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MAP OF ALBERTA & STEEN PROGRAM





PROJECT TIMELINE



PHASE I

- a. File review
- b. Site inspection
- c. Results:
 - Phase II – yes/no
 - Outstanding reclamation obligation
 - Determine reclamation costs
 - Major or minor reclamation

INITIAL INSPECTION

- a. Take inventory of facilities
 - Well vintage 1960's to 2008
 - Varying degrees of facility neglect
- b. Wellhead pressure tubing/casing
- c. Issues (leaks, surface casing vent flow (SCVF) and gas migration)
- d. Scout access
 - Creeks/rivers
 - Ground type (muskeg, upland and permafrost)



TAKING STOCK OF FACILITIES



ONSITE PIPING



RISER



FLARE STACK



TANKS



FACILITIES



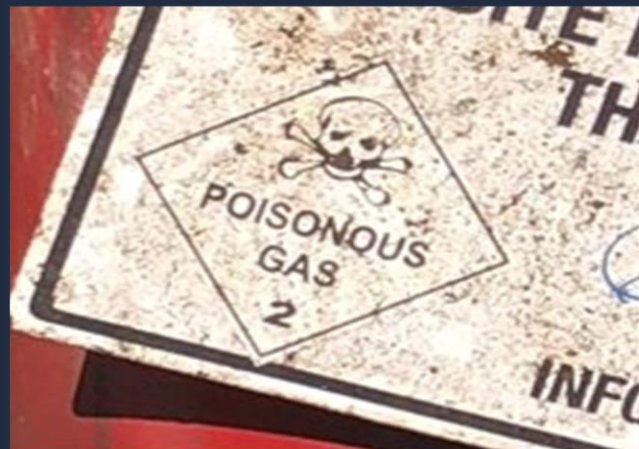
HELI PAD/ABANDONED

Many of the sites inspected had significant production infrastructure still in place

ISSUES (LEAKS, SCVF, GAS MIGRATION)



High H₂S wells pose a significant risk factor



REGULATORY APPROVALS

CAMP (200 person camp)

- Location, placement
- Regulator Temporary Field Authorizations (RTFs - issued by AER)
- Wildlife sweep
- Municipal approvals (open for occupancy December 15, 2022)

ROADS

- RTFs
- Seismic line usage
- Proximity/crossing approvals

HAY RIVER CROSSING

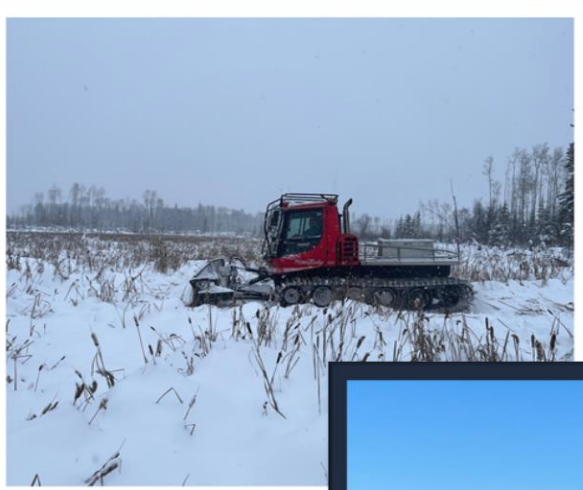
- Regulatory approvals
- Ice survey; ground penetrating radar (GPR)
- Ice engineering
- Fisheries and Oceans Canada approval

CARIBOU PLANNING

- Yates herd
- Bistcho herd



START OF FIELD ACTIVITY



SNOW CAT



FLOATER TRUCK



D3 CAT

- Contractor mobilization to the area
- Track packing
 - Skidoos
 - Tracked argos
 - Snowcats/floater trucks
 - D3-D5 Cats, graders
 - Snow making machine (river, creeks)

(Maximum 120 day operating period)

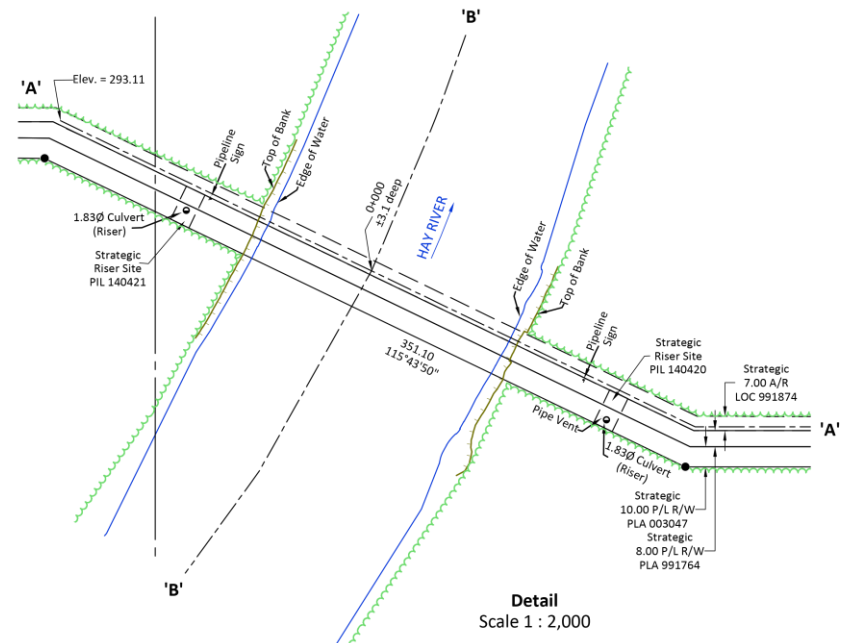
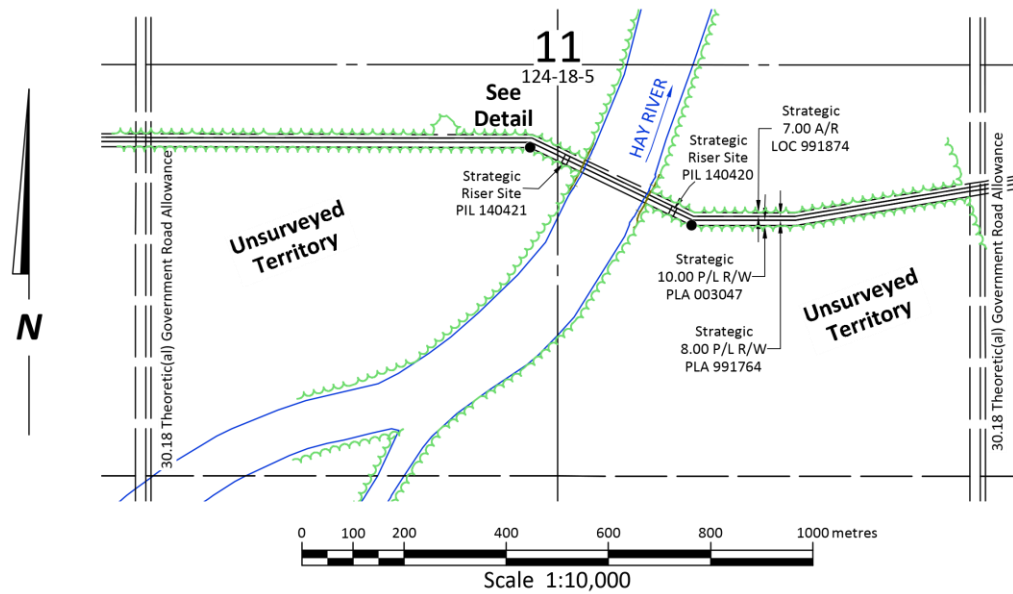


HAY RIVER CROSSING

BEFORE – AUGUST 2021



AFTER – AUGUST 2022



HAY RIVER INSTALLATION



PROCESS TO WORK ON ICE

- Walk on ice
 - Flood ice
 - Drive on ice
 - Flood ice
 - Engineering/inspection
- Minimum 25 cm of ice to commence operations (December 23, 2021)
 - Require 1.1 metres for 50,000 kg loads (February 5, 2022)
 - Three GPR inspections



HAY RIVER INSTALLATION



HAY RIVER CROSSING





Initial Phase II

Analytical interpretation and next phase of work proposal (supplement or remediation) was completed within 4-5 days of sample arrival at the lab

Supplementary Phase II

- a. Field drilling with remote access drill
- b. Sample preparation and shipping
- c. Laboratory analysis (Bureau Veritas, Calgary)

Results/Interpretation

Remediation Plan and Cost Estimate

DECOMMISSIONING/ABANDONMENT

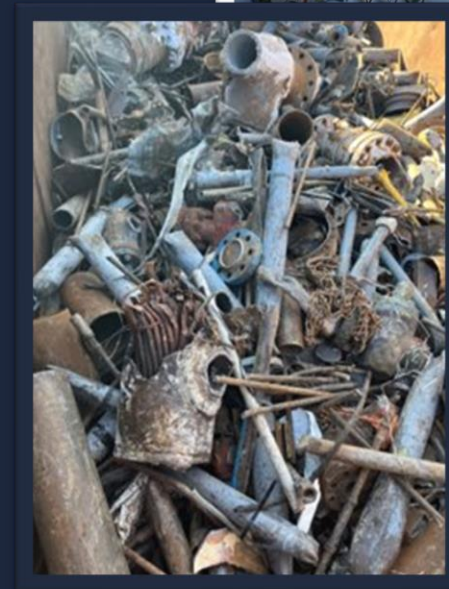
FACILITY DECOMMISSIONING REMOVAL

a. Fluid removal

- Oil/water emulsion
- Propane
- Corrosion inhibitor
- Methanol

b. Onsite flowlines and pilings

c. Pipeline and risers



DECOMMISSIONING/ABANDONMENT



SERVICE RIG



WATER JET CUT & CAP



WELL ABANDONMENT

- Removing downhole pipe
- Cementing
- Repair SCVF/gas migration
- Upon successful abandonment
 - cut and cap wellhead

REMEDIATION



REMEDIATION PLAN – MAJOR

- a. Excavation
- b. Class II landfill approvals
- c. Excavation closure sampling
- d. Analytical interpretation
- e. Excavate and haul to landfill
- f. Backfill
- g. Large excavation where material was hauled to landfill required backfill material from regulatory approved borrow pit



REMEDIATION PLAN – MINOR

- a. Surface stain cleanup and analytical closure
- b. Numerous sites were identified to have small cumulative releases from around existing facilities:
 - Salt water
 - Petroleum hydrocarbons
 - Methanol



REMEDIATION



REMEDIATION - EXCAVATION

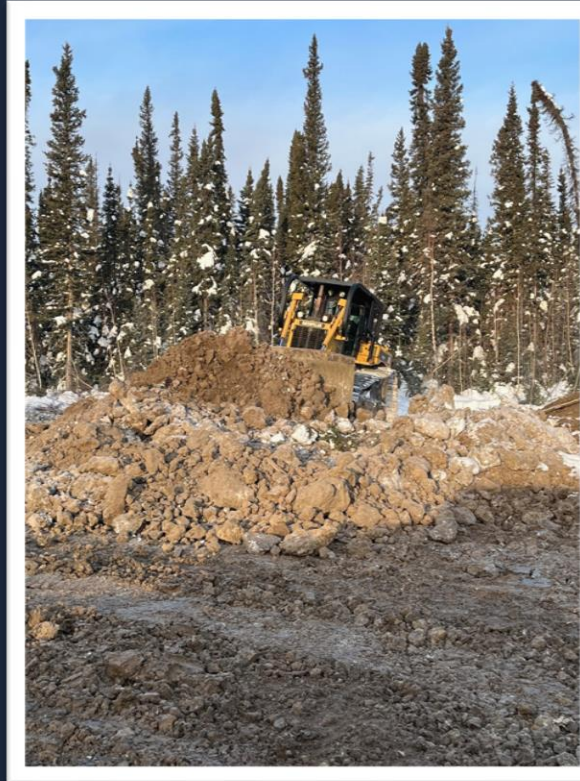


LOADING CLEAN BACKFILL



TRUCKING CONTAMINATED
SOIL TO LANDFILL

RECLAMATION



MAJOR RECLAMATION

Cut/fill with grade road format:

- Cut and fill construction
- Pad sites
- High grade roads
- Stripped sites requiring surface soil re-distribution

MINOR RECLAMATION

- Woody material rollback to prevent windrows
- Contour minor settlement

ROLLBACK



Rollback woody vegetation on designated sites to enhance the re-establishment of native forested species and to minimize weed encroachment



PROJECT LIMITATIONS

REMOTENESS TO SERVICES

- Sample shipment logistics and coordination with shippers and Bureau Veritas laboratory

DURATION OF EXTREME COLD

- 90 of the 120 days spent on the project were -25 to -42 C, causing significant issues with equipment operability

MANPOWER CHALLENGES

- ↑ Rising oil and gas prices
- ↑ Rising oil and gas activity
- ↓ Manpower and available equipment shortages

COVID-19

- During the peak of the Omicron variant, experiencing multiple waves
- Rapid testing before and after arrival at camp (3 negative tests) required to remain at camp
- 10-day quarantine to 5-day quarantine

PROJECT SUCCESS

SAFETY

- 77,979 total person hours (abandonment, decommissioning & environment), 3 incidents
- Everybody went home safe at the end of the day
- Due to the COVID-19 protocols in place, there were very few pandemic issues in the camp

LARGE VOLUME OF WORK

- 350 km winter access/ ~\$7 to \$10/km freeze-in. Tackle and complete closure on the most remote sites as a priority
- 988 boreholes drilled (Phase II)
- 4,105 soil samples analyzed in a 48 hour turnaround
- 3,839 tonnes contaminated soil hauled to landfill

ALBERTA BIODIVERSITY

- Less future disturbance to Caribou herds
- Sour wells removed from Alberta inventory
- Significant decommissioning and equipment removal to aid in future site restoration and reduce permafrost damage, cleaning up our backyard



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THANK YOU TO PARTICIPATING CONTRACTORS

PRIME CONTRACTORS



SUBCONTRACTORS

