

A scenic view of a snowy mountain range overlooking a body of water. The foreground shows a shoreline littered with debris, including wooden planks, metal barrels, and other industrial waste. The water is calm, reflecting the sky. The mountains in the background are covered in snow and have a rugged appearance.

Case Study of the Remediation of Padloping Island and FOX-E, Durban Island Sites in Nunavut

Presentation Overview

- **Project Location**
- **Project Background**
- **Scope of Work**
- **Demolition**
- **Surface and Buried Debris**
- **Contaminated Soil**
- **Ground Conditions**
- **Roads**
- **Heritage Resources**
- **Access and Transportation**
- **Wildlife**
- **Climate**
- **Aboriginal/Inuit Opportunities Considerations**
- **Acknowledgements**
- **Questions**



Presenters



Rebecca Morley, E.I.T.

Environmental Inspector, Padloping Island, 2013

Resident Engineer, Padloping Island, 2014

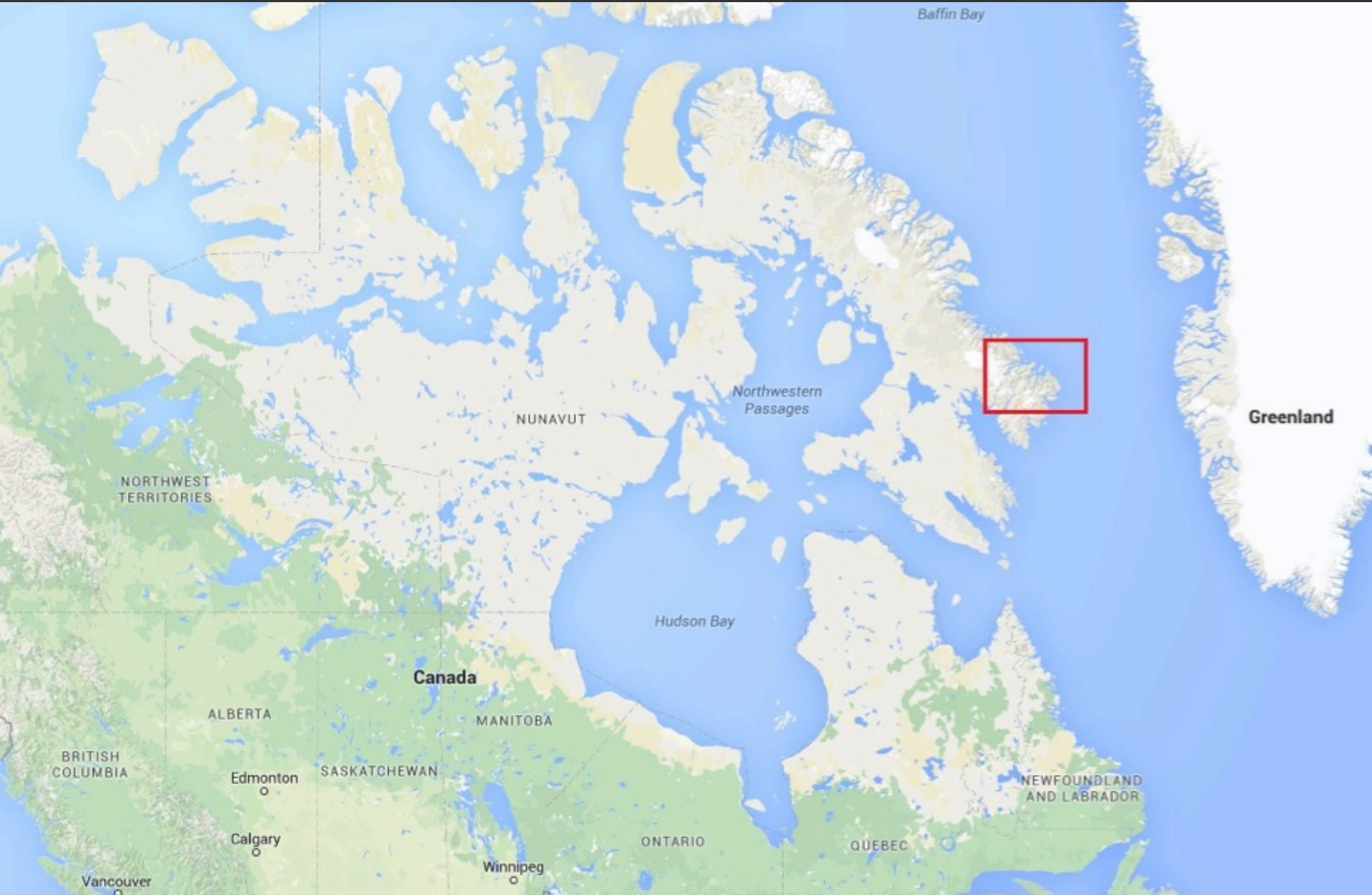


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Resident Engineer, Padloping Island, 2013

Resident Engineer, Durban Island, 2014

Project Location





Qikiqtarjuaq

Padloping
Island

Durban
Island

FOX-E Durban Island

- 24 km southwest of Padloping Island
- 95 km southeast of Qikiqtarjuaq
- 475 km northeast of Iqaluit
- 60 km northwest of DYE-M Cape Dyer

Padloping Island – Former Weather Station

- United States Air Force weather station
- Constructed in 1943
- Abandoned in 1956



FOX-E, Durban Island – Intermediate DEW Line Site

- Intermediate DEW Line site
- Constructed in 1957
- Abandoned in 1963



Major Work Items

- Mobilization
- Provision of Camp
- Upgrading Site Roads
- Hazardous Materials Abatement
- Demolition
- Surface Debris
- Buried Debris
- Barrel Collection, Cleaning and Disposal
- Contaminated Soil Excavation and Treatment
- Regrades
- Borrow Source Development and Reclamation
- Demobilization





Demolition – FOX-E Durban Island



Hazardous Materials Abatement

- PCB Amended Paint (PAP)
- Leachable Lead Amended Paint
- Asbestos in doors, wall panels, pipe wrap
- Fuel tanks and POL lines containing fuel
- Compressed gas cylinders



Unique Challenge – Unknown Hazardous Waste

Lessons Learned

- Recognize structures that have the potential for additional hazardous material
- Complete comprehensive sampling during assessment
- Supplemental sampling should occur early in the construction season

Building Materials

- Additional sampling of building materials in 2014
- Total increase of PAP material: 580 m³
- 24 additional marine containers required





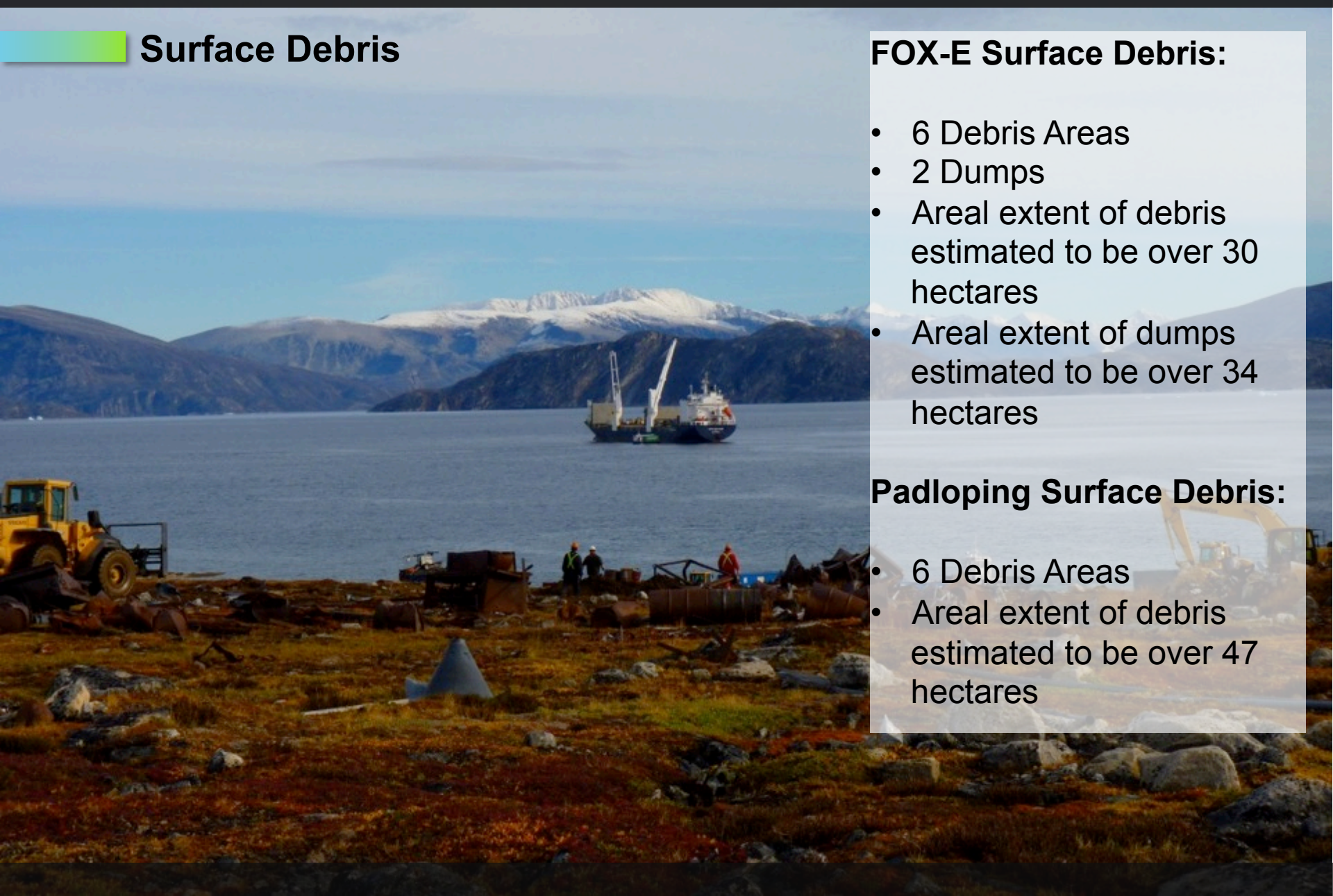
Surface Debris

FOX-E Surface Debris:

- 6 Debris Areas
- 2 Dumps
- Areal extent of debris estimated to be over 30 hectares
- Areal extent of dumps estimated to be over 34 hectares

Padloping Surface Debris:

- 6 Debris Areas
- Areal extent of debris estimated to be over 47 hectares





Barrel Processing

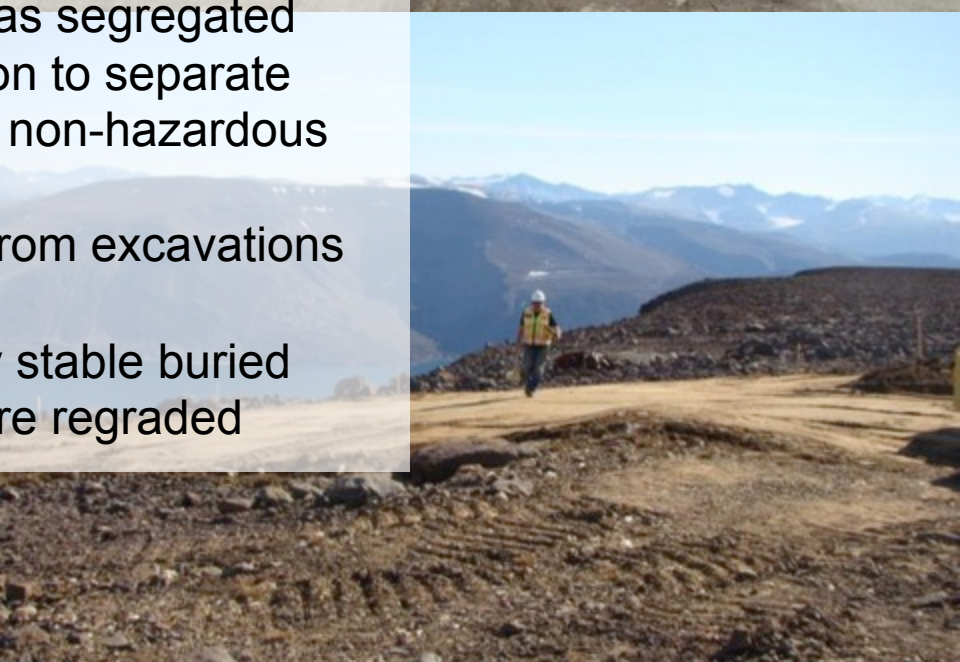


- Collection of barrels and consolidation of like products
- Sampling of contents to determine disposal requirements
- Washing and crushing barrels for disposal

Buried Debris



- Environmentally unstable buried debris lobes were excavated to the design extents
- Buried debris was segregated during excavation to separate hazardous from non-hazardous debris
- Stockpiled soil from excavations was sampled
- Environmentally stable buried debris lobes were regraded



Unique Challenge – Widespread Surface Debris
Padloping Island



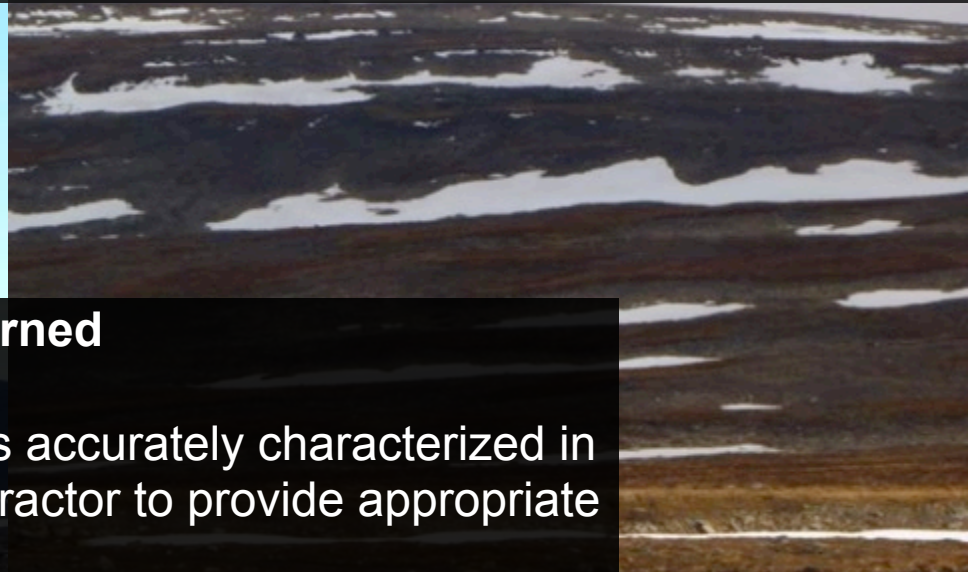
Unique Challenge – Widespread Surface Debris
Padloping Island



Unique Challenge – Widespread Surface Debris Padloping Island

Lessons Learned

- The concentration of the debris was accurately characterized in the Specifications allowing the contractor to provide appropriate manpower for the task
- Having an enthusiastic team is invaluable



Unique Challenge – Dump A Durban Island



Unique Challenge – Dump A Durban Island



Debris Removal

- All debris removed by slinging loads with a helicopter
- Debris removal required three separate teams: debris collection and packaging team, sling foreman at Dump A and sling foreman at Temporary Storage Area
- An estimated 450 m³ of debris was removed
- Removal of debris was completed over 8 weeks

Unique Challenge – Dump A Durban Island

Safety

- On site safety training:
 - Slinging procedures
 - Working around helicopters
 - Emergency evacuation
- Removal of debris from Dump A was identified as the work item with the highest risk of injury or incident
- All precautions paid off as the work was completed with only one minor incident in 8 weeks of work
- Boat from local community on call in the event the helicopter was unable to fly

Lessons Learned



Padloping Island

- 12 m³ of Tier I Contaminated Soil
- 380 m³ of Tier II Contaminated Soil
- 45 m³ of Hazardous Contaminated Soil
- 3,200 m³ of Petroleum Hydrocarbon Contaminated Soil

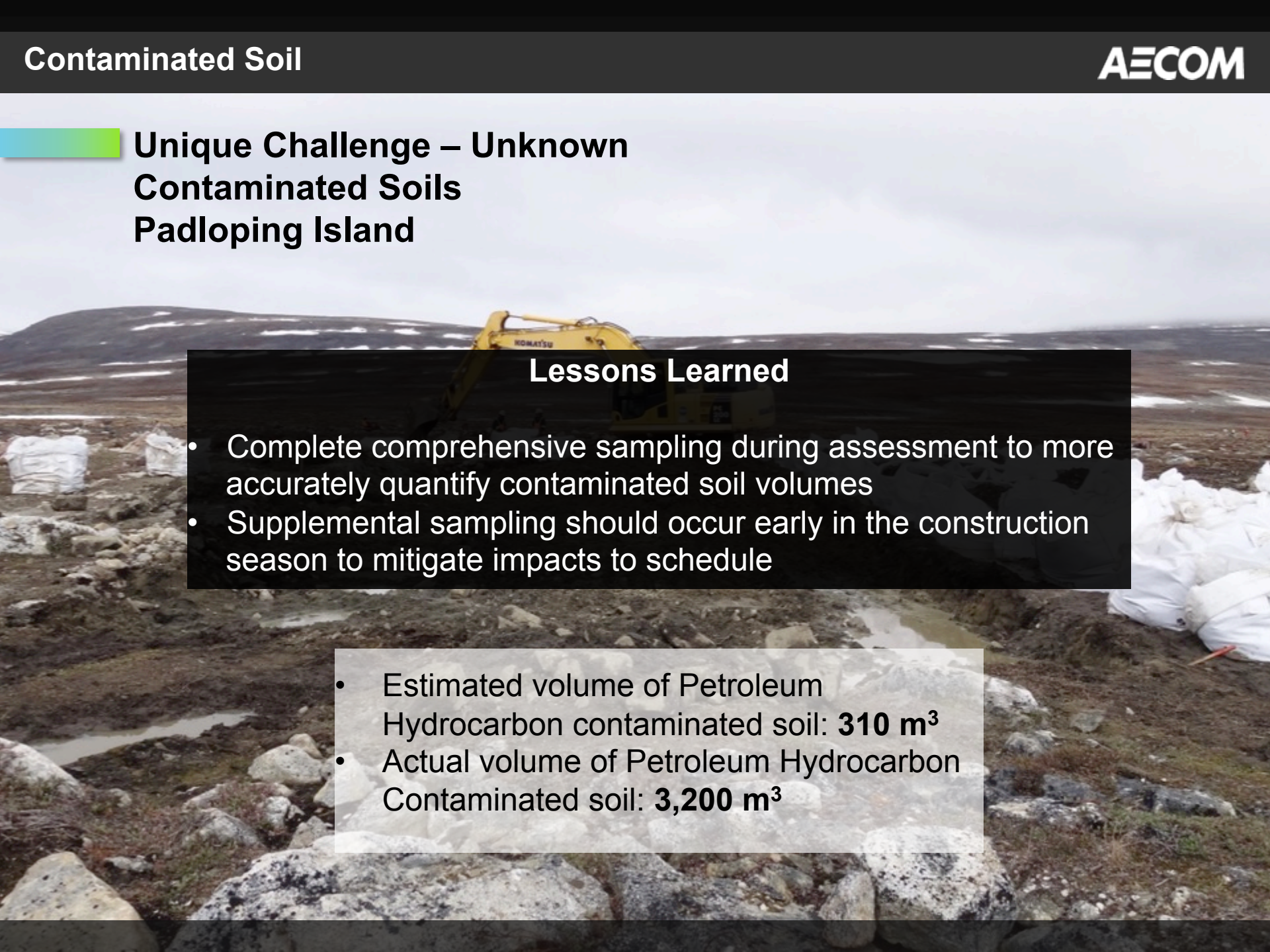
FOX-E Durban Island

- 38 m³ of Tier I Contaminated Soil
- 33 m³ of Tier II Contaminated Soil
- 9,500 m³ of Petroleum Hydrocarbon Contaminated Soil





Unique Challenge – Unknown Contaminated Soils Padloping Island



Lessons Learned

- Complete comprehensive sampling during assessment to more accurately quantify contaminated soil volumes
- Supplemental sampling should occur early in the construction season to mitigate impacts to schedule


- Estimated volume of Petroleum Hydrocarbon contaminated soil: **310 m³**
- Actual volume of Petroleum Hydrocarbon Contaminated soil: **3,200 m³**

Unique Challenge – Unknown Contaminated Soils Durban Island



Soil Disposal and Treatment

- 5% of soil was treated in on-site landfarm
- 50% of soil was placed in the Soil Disposal Area
- 46% of soil was used as cover for the Soil Disposal Area

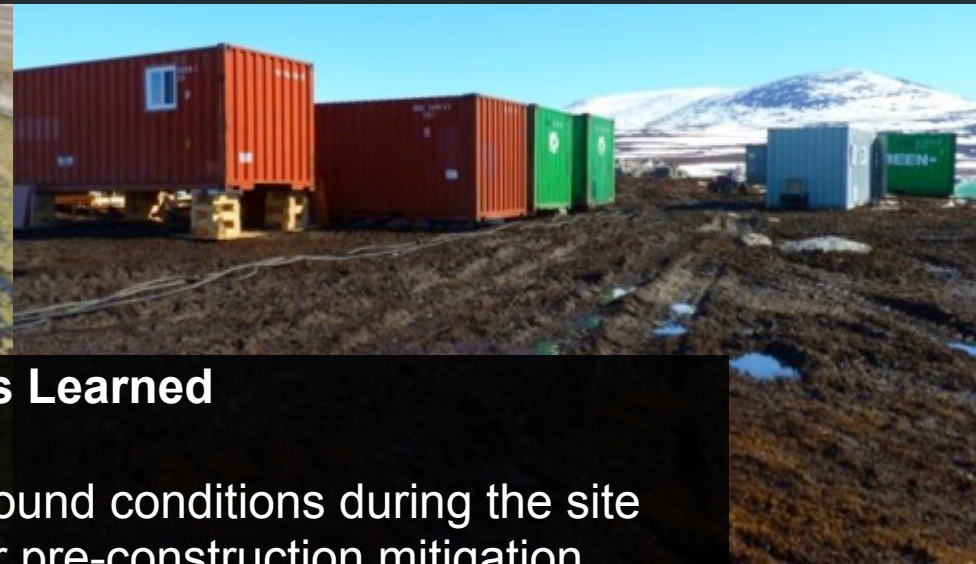


Unique Challenge – Unknown Contaminated Soils Durban Island

Lessons Learned

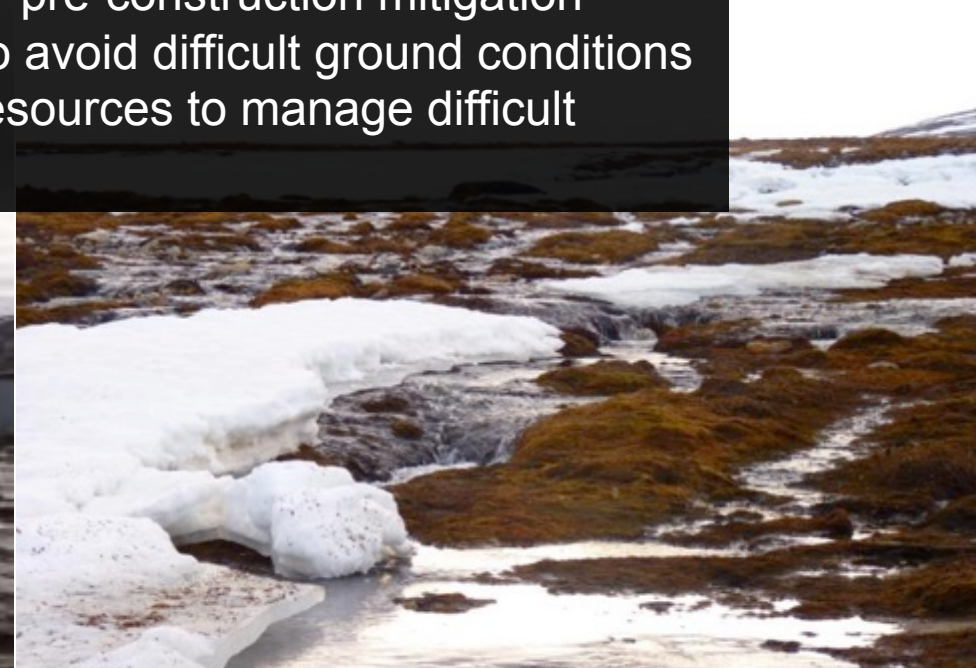
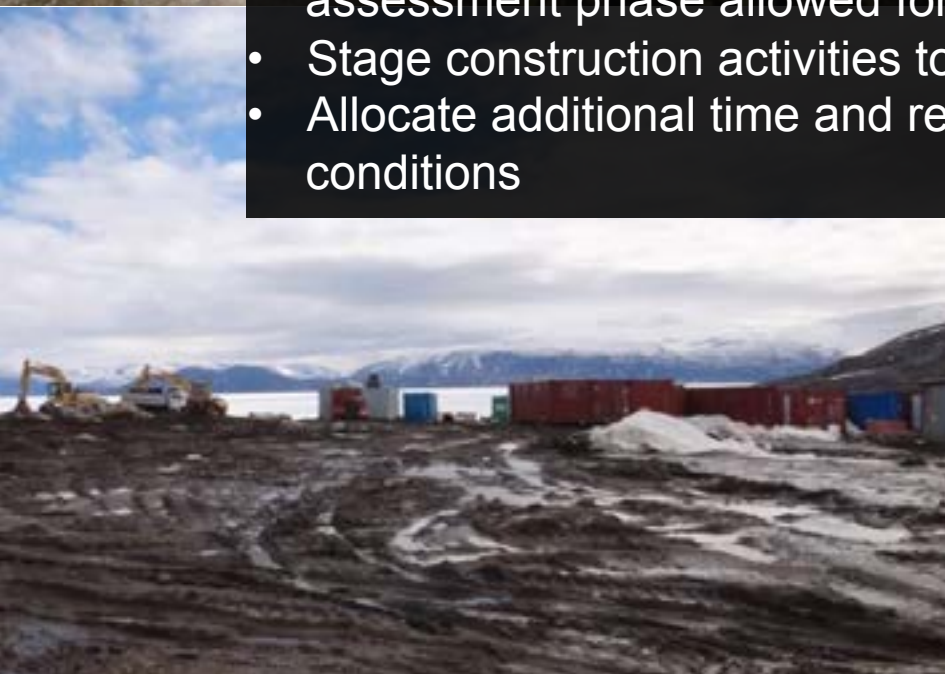
- Complete comprehensive sampling during assessment to more accurately quantify contaminated soil volumes
- Supplemental sampling should occur early in the construction season to mitigate impacts to schedule
- Creative solutions can help reduce costs and keep projects on schedule

Unique Challenge – Difficult Ground Conditions Padloping Island



Lessons Learned

- Accurate documentation of ground conditions during the site assessment phase allowed for pre-construction mitigation
- Stage construction activities to avoid difficult ground conditions
- Allocate additional time and resources to manage difficult conditions



Unique Challenge – Road to Upper Site Durban Island

- Road to upper site was 6.5 km long with an elevation change of 600 m
- Two wood bridges with concrete supports
- Enforced speed limit of 10 km/h
- Five turn outs were constructed and a radio protocol was established for vehicle traffic



Unique Challenge – Road to Upper Site Durban Island

Lessons Learned

- Professional truck drivers brought to site
- Establishment of the radio protocol reduced traffic congestion
- Radio protocol was designed to be simple to eliminate language barriers (English, French, Inuktitut)
- No incidents occurred on the road to the Upper Site



Rock Falls



Low Visibility



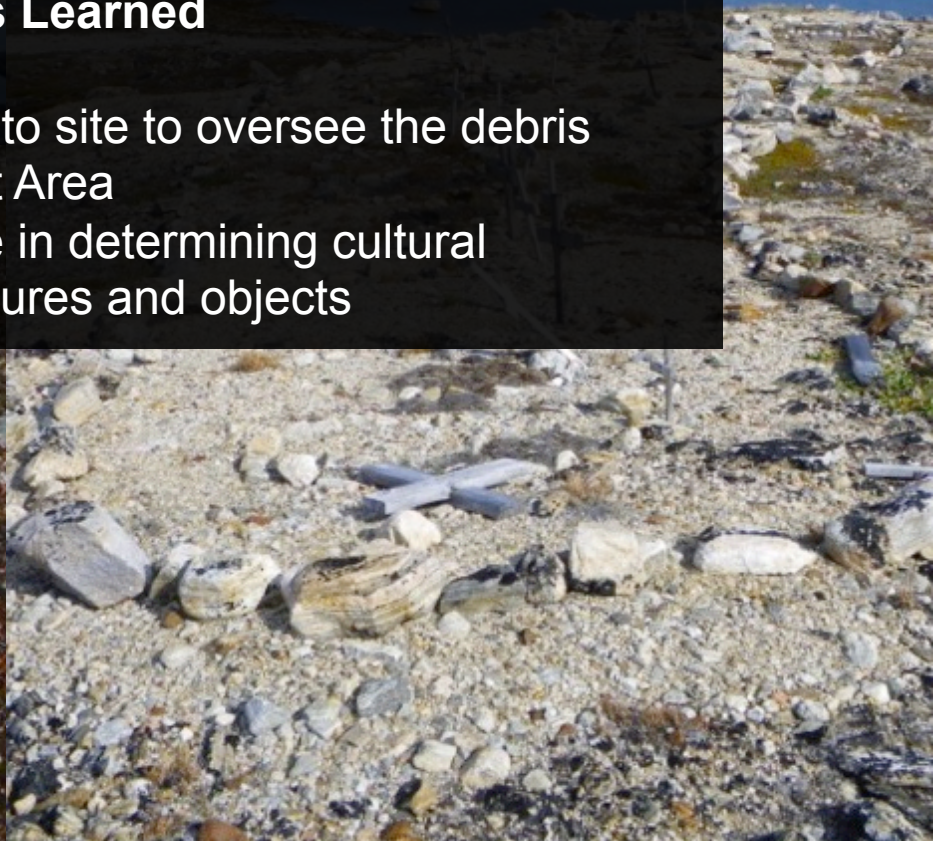
Unique Challenge – Protection of Heritage Resources Padloping Island

- Archaeological assessment recommendations:
 - Cemetery located west of the project area be avoided
 - Debris in the former Inuit settlement within the project area be hand picked to avoid removal of heritage objects

Unique Challenge – Protection of Heritage Resources Padloping Island

Lessons Learned

- An archaeologist was brought to site to oversee the debris removal in the Inuit Settlement Area
- Local knowledge was valuable in determining cultural importance of remaining structures and objects





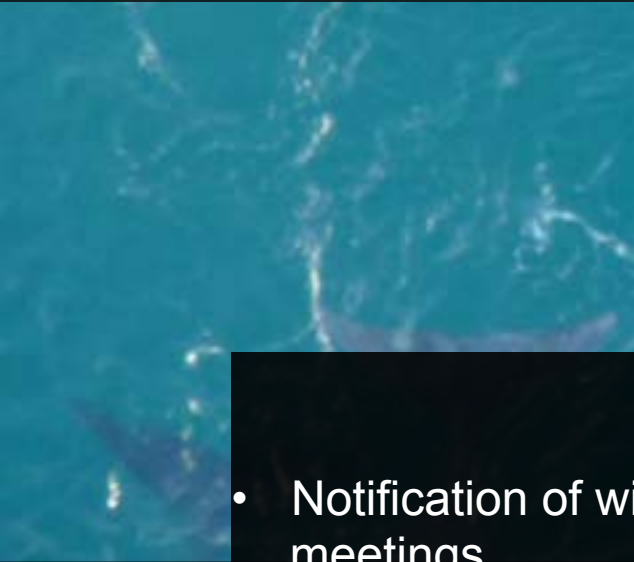
Lessons Learned

- Good planning, flexibility and multiple modes of transport allowed for smooth transportation to, from and between sites



Lessons Learned

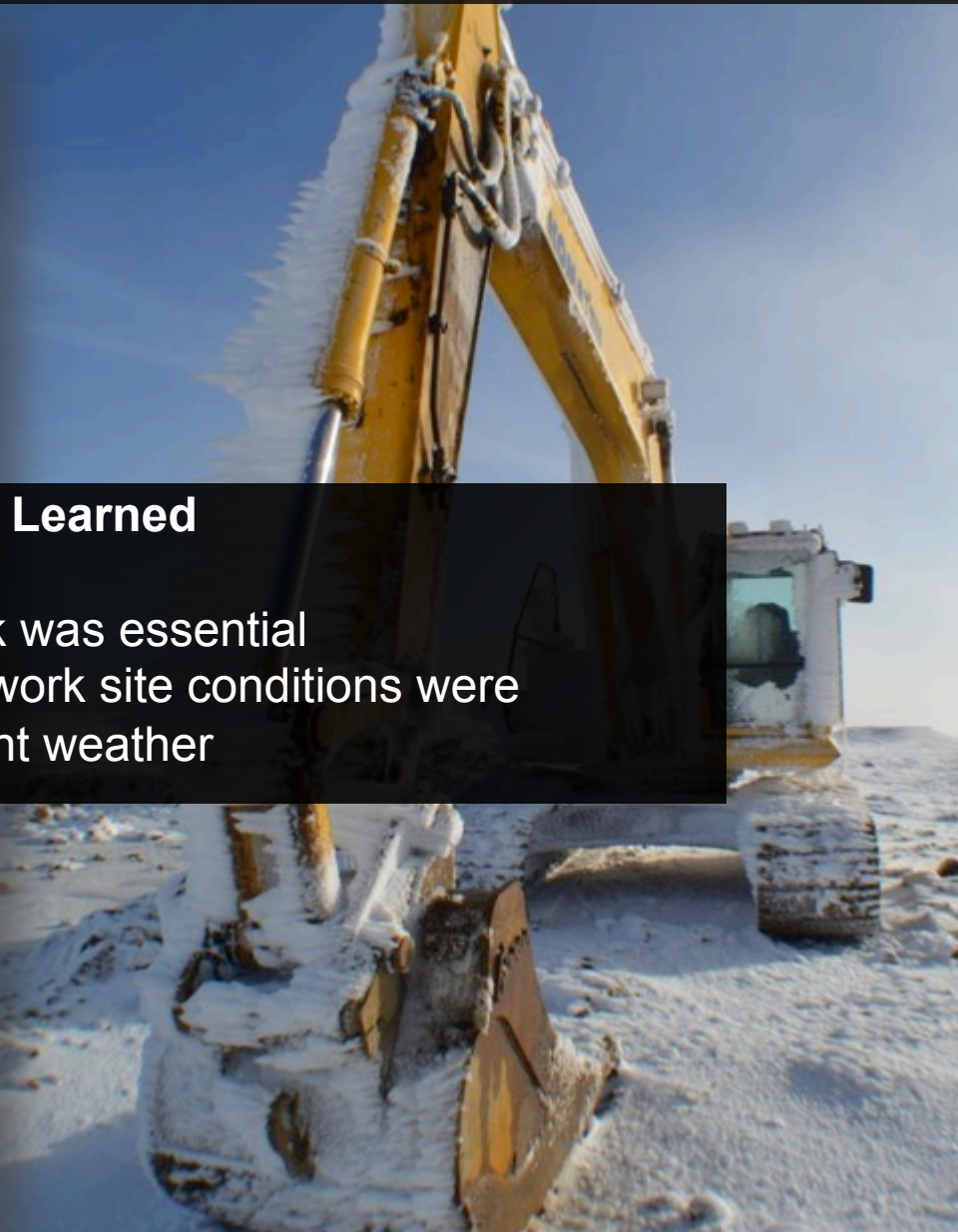
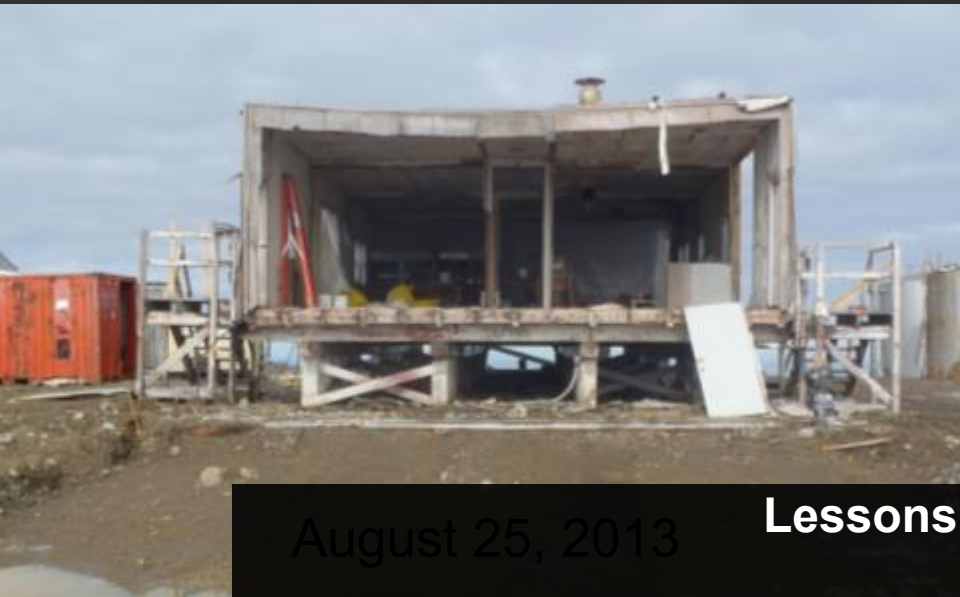
- Combining the contracts represented a substantial cost savings
 - Specialized staff could be shared between sites
 - Staff could be based out of FOX-E during start up and shut down of Padloping Island
- Remediation of the Padloping Island and FOX-E Sites were combined into a single project with one shared contract
 - Staff and resources were shared between sites
 - Remediation of both sites was managed by a single project management team



Lessons Learned

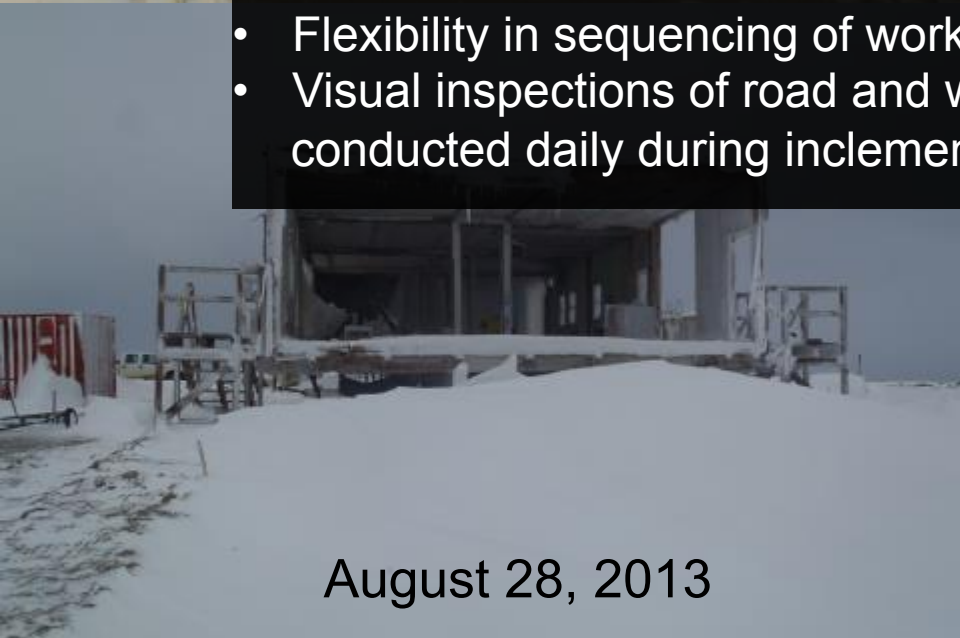
- Notification of wildlife sightings was made part of daily tailgate meetings
- All staff on site respected areas identified as containing sensitive wildlife, such as bird nests
- Requirements for wildlife monitors were revised based on season and polar bear activity, local knowledge was crucial





August 25, 2013 **Lessons Learned**

- Flexibility in sequencing of work was essential
- Visual inspections of road and work site conditions were conducted daily during inclement weather



August 28, 2013

- Remediation projects in Nunavut are often required to include an Aboriginal/Inuit Opportunities Considerations package
- Contractors include a target percentage of Inuit employment on the project and a percentage of materials and service costs that will be spent with Inuit owned businesses in their bids
- Provides socioeconomic benefits to local communities



Aboriginal/Inuit Opportunities Considerations

On this project:

- Recruitment done through community meetings social media, radio ads and newspaper ads
- A bilingual local recruitment officer was hired and based in Qikiqtarjuaq
- Training opportunities included asbestos, PAP and lead-based paint abatement, heavy equipment operation, basic first aid and many safety procedures
- Cultural events were celebrated on site
- Country food was brought to site such as seal, arctic char and narwhal



Acknowledgements



Aboriginal Affairs and
Northern Development Canada

Affaires autochtones et
Développement du Nord Canada



Public Works and
Government Services
Canada

Travaux publics et
Services gouvernementaux
Canada



Questions

