

1. INTRODUCTION AND BACKGROUND

This report summarizes the cleanup activities that were accomplished at FOX-MAIN, Nunavut during the months of August and September of 2002. FOX-MAIN is a former Distant Early Warning (DEW) Line site situated near the community of Hall Beach, Nunavut and is currently operated by the Department of National Defence (DND) as a North Warning System Logistical Support Site. The beach refuel area at FOX-MAIN was classified as a due diligence issue in need of immediate attention due to the potential for a release of hydrocarbons into the marine environment.

The following report summarizes the work accomplished at FOX-Main in 2002 that was contracted to Mosher Engineering Ltd. of Halifax, Nova Scotia. The goal of the work was to remediate the beach refuel area of FOX-MAIN in accordance with the plans and specifications. The goal was successfully achieved and the details of this work are presented below.

2. WORK ACCOMPLISHED

Specifications titled "Specifications for the Remediation of the Beach Refuel Area, FOX-M, Hall Beach, DEW Line Site" were prepared in July 2002 by UMA Engineering Ltd. in association with the SGE Group Inc. to remediate the beach refuel area. These specifications detailed the completion of the work that is described in the following sections.

2.1 Hydrocarbon Contaminated Secure Soil Storage Area

A 21 642 m² area of land north of the communications area was leveled off to provide a uniform surface for use as a secure storage area for the Hydrocarbon Type B contaminated soil. It is approximately square in shape and is enclosed on all sides by a 0.6m deep ditch with a slope of 1:3 and is surrounded by a one meter high perimeter berm with 1:3 side slopes and a 2 meter width at the top.

Four monitoring wells were installed around the secure storage area, one on each side. They were installed to a depth of 1.5 m and have been purged and locked by the Environmental Services Group (ESG) of the Royal Military College of Canada. The purpose of the wells is for long term monitoring of the area.

Four signs have been posted on each side of the secure storage area informing personnel of the material stored.

2.2 Environmental Protection

During the work at the beach refuel area, sixty five meters of absorbent booms and sixty five meters of a two meter high silt curtain were installed in the water north east of the work area, stretching from the pier across to the beach. A temporary 0.5 m high berm was constructed above the high tide

mark along the shoreline and following the shoreline's contour. See Photos 3 and 4 in Appendix B.

Sixty meters of silt fencing is stored in the Air terminal building for future use.

Tank W22G was cleaned and was used to store the water that resulted from the dewatering of ponded contaminated areas during the excavation. The sludge removed from Tank W22G due to the cleaning has been stored in tank W22F.

2.3 Demolition, Removal and Storage of Debris in Existing Retrograde Storage Area

Three abandoned power poles, and various pieces of surface debris, ranging from random pieces of wood and plastic to a metal barge, metal pallets and metal storage bins were removed and stored in the existing retrograde storage area. The concrete pads and the existing beachmaster's shed were demolished and the material stored in the retrograde storage area.

There were two locations within the original specified excavation area that had buried debris. The specified buried debris at the northwest consisted of crushed empty metal barrels. The previously unknown buried debris located at the southwest area, which was discovered during the excavation, consisted of pieces of wood, piping, bottles and metal. All of the debris was sorted and removed to the retrograde storage area for temporary storage as no hazardous materials were found.

2.4 Tier I, Tier II and Hydrocarbon Type A Contaminated Soil

Refer to Appendix A for definitions of Contaminated Soil.

All of the specified Tier I contaminated soil was excavated and transported to the abandoned sewage lagoon for temporary storage as per the plans and specifications.

All of the specified Tier II contaminated soil was excavated and transported to the abandoned sewage lagoon for temporary storage as per the plans and specifications. Additional Tier II soil was discovered on the beachmaster's mound after the demolition of the beachmaster's shed. The top 0.3 m of soil on the mound was excavated and taken to the abandoned sewage lagoon for temporary storage. Two additional Tier II locations were also discovered at the northwest edge and the southwest edge of the specified buried debris area. The northwest location was fully excavated and taken to the abandoned sewage lagoon. The southwest location was excavated up to the temporary berm and the material was taken to the abandoned sewage lagoon. Additional delineation of this location is required.

All of the specified Hydrocarbon Type A contaminated soil was excavated and transported to the abandoned sewage lagoon for temporary storage as per the plans and specifications. Additional Type A was discovered southwest of the overall excavation and this area was excavated and taken to the abandoned sewage lagoon for temporary storage.

In total, approximately 747 m³ of Tier 1, Tier II and Hydrocarbon Type A Contaminated Soil was transported to the abandoned sewage lagoon.

2.5 Hydrocarbon Type B Contaminated Soil

Refer to Appendix A for definitions of Contaminated Soil.

The Hydrocarbon Type B Contaminated soil was excavated to the depths noted in the plans and specifications. The Hydrocarbon Type B was excavated to the limits noted in the drawings and specifications except for the area on the eastern edge, which is below the high tide mark. This section was excavated up to the temporary berm. It was also decided with SGE Acres that the Hydrocarbon Type B would only be excavated to within one meter on all sides of the existing refuel lines to ensure no damage to the lines.

Additional Hydrocarbon Type B Contaminated soil was discovered on the western edge of the specified limits of the excavation, south of the fuel lines. Additional delineation is required to determine the western edge of the contamination.

Additional Hydrocarbon Type B Contaminated soil was discovered on the southeast side of the specified limits of the excavation, west of the pier. This location was fully excavated and taken to the hydrocarbon secure storage area.

In total, approximately 6 897 m³ of Hydrocarbon Type B Contaminated Soil was transported to the hydrocarbon secure storage area. Within the secure storage area it was then spread out in a single layer to a thickness of approximately 0.4 m.

2.6 Confirmatory Testing

Confirmatory testing of the limits of all excavated areas was completed by the ESG prior to backfilling with borrow material to confirm that the contaminated soil has been removed. Additional areas discovered at the site that were not excavated this season will be delineated by the ESG. This work will be performed during the full site cleanup of the FOX-M Site.

2.7 Geomembrane Installation and Backfilling

Before backfilling, the PVC Arctic Liner Geomembrane was installed on both sides of the refuel lines to separate the hydrocarbon contaminated soil that was not excavated from the clean backfill material.

The PVC Arctic Liner Geomembrane was also installed along the eastern limits of the excavation before backfilling as per the onsite agreement between Wade Cumins, Enforcement Officer, Northern Division, Environmental Protection Branch, Environment Canada, and Nick Monteiro, Associate Project Manager, DEW Line Cleanup, Defence Construction Canada, on September 10, 2002. Refer to the attached as-built and Photo 9 and 10 for the locations of the geomembrane installation.

The entire excavation was backfilled with borrow material taken from the areas shown on the plans and specifications. The area was regraded to match the original elevations.

3. SITE INSPECTIONS

Wade Cumins, Enforcement Officer, Environment Canada and Nick Monteiro, Associate Project Manager, DCC visited the site on September 10, 2002.

Randy Wheeler, P.Eng., of SGE Acres carried out a final inspection of the site on October 4, 2002.

Members of the Public Works department of the Hamlet of Hall Beach would occasionally visit the site throughout the project. As noted in the weekly reports, DCC maintained lines of communication with the Hamlet of Hall Beach.

4. SUMMARY

The following lists the additional issues that arose out of this contract. The work will be dealt with during the full site cleanup of the FOX-M Site.

- Delineation of Tier II on the southeast edge of the original buried debris area and excavation of the eastern edge that is below the high tide mark.
- Delineation of the western edge of the contamination.

APPENDIX A: CRITERIA FOR AND DEFINITIONS OF CONTAMINATED SOIL

Table A.1 Criteria for Tier I and Tier II Contaminated Soil

Substance	Criteria	
	DCC Tier I (ppm)	DCC Tier II (ppm)
Arsenic (As)	--	30
Cadmium (Cd)	--	5
Chromium (Cr)	--	250
Cobalt (Co)	--	50
Copper (Cu)	--	100
Lead (Pb)	200	500
Mercury (Hg)	--	2
Nickel (Ni)	--	100
Zinc (Zn)	--	500
Polychlorinated Biphenyls (PCBs)	1	5

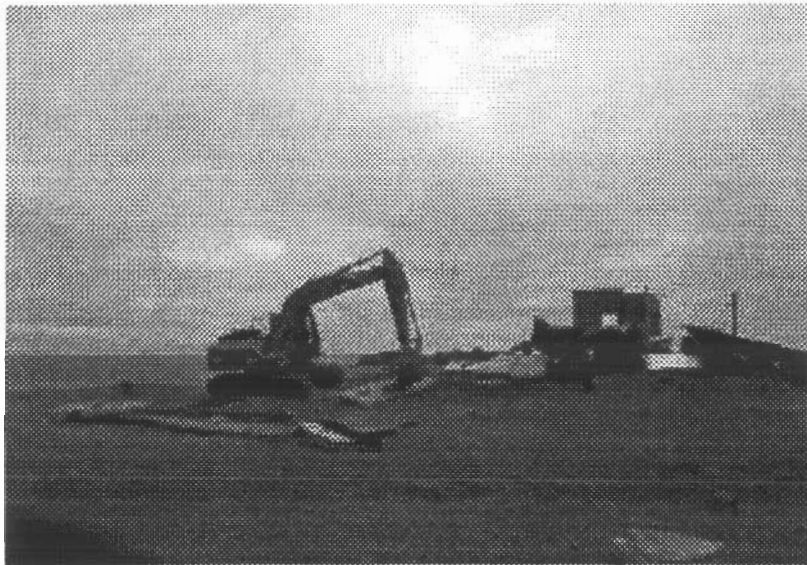
DEFINITIONS:

Hydrocarbon Type A: Hydrocarbon contaminated soil in which the primary hydrocarbon product consists of lubricating oil and grease as determined by laboratory analysis.

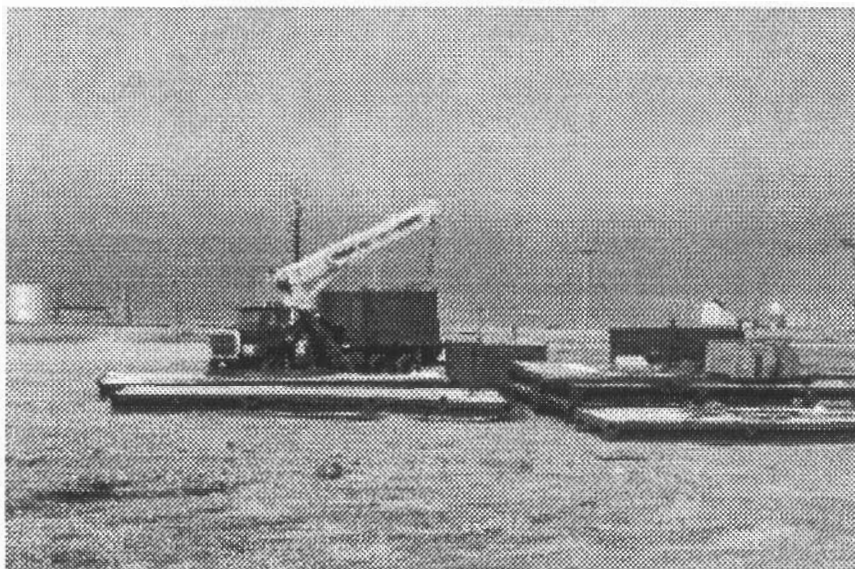
Hydrocarbon Type B: Hydrocarbon contaminated soil in which the primary hydrocarbon product consists of diesel, fuel oil, and/or gasoline as determined by laboratory analyses.

SOURCE: *Specifications for the Remediation of the Beach Refuel Area at the FOX-M Hall Beach DEW Line Site Environmental Protection Plan, UMA Engineering Ltd., July 2002*

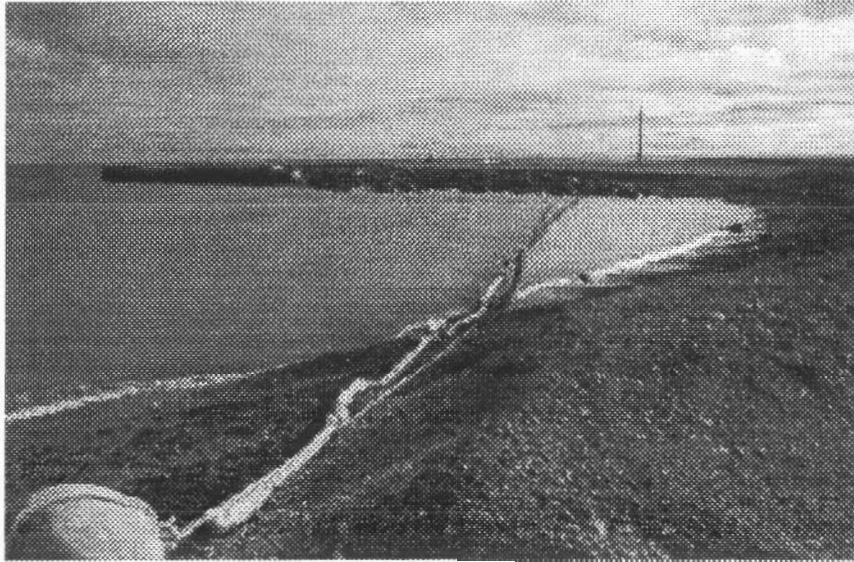
APPENDIX B: PHOTOGRAPHS



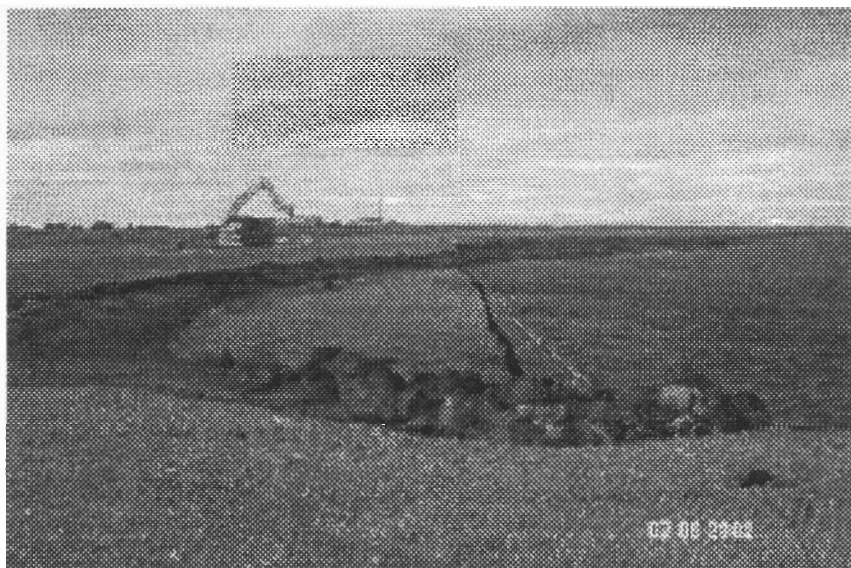
Photograph 1: Beachmaster's shed demolition



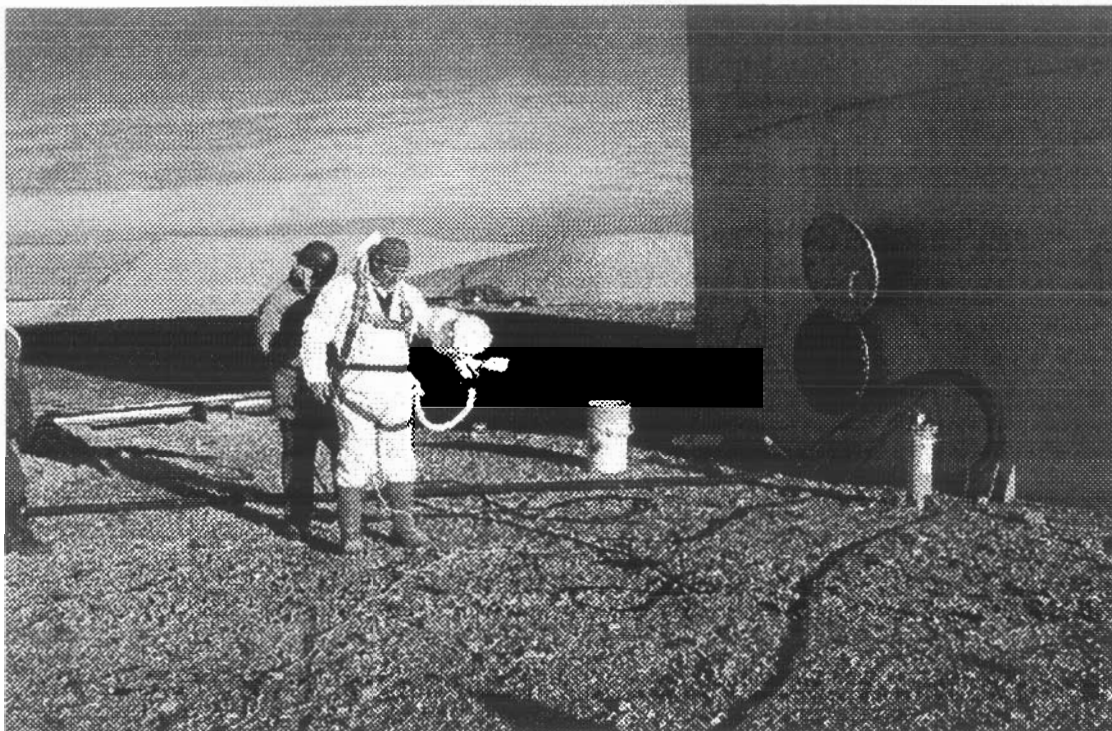
Photograph 2: Debris Removal



Picture 3: Sorbent Booms and Silt Curtain



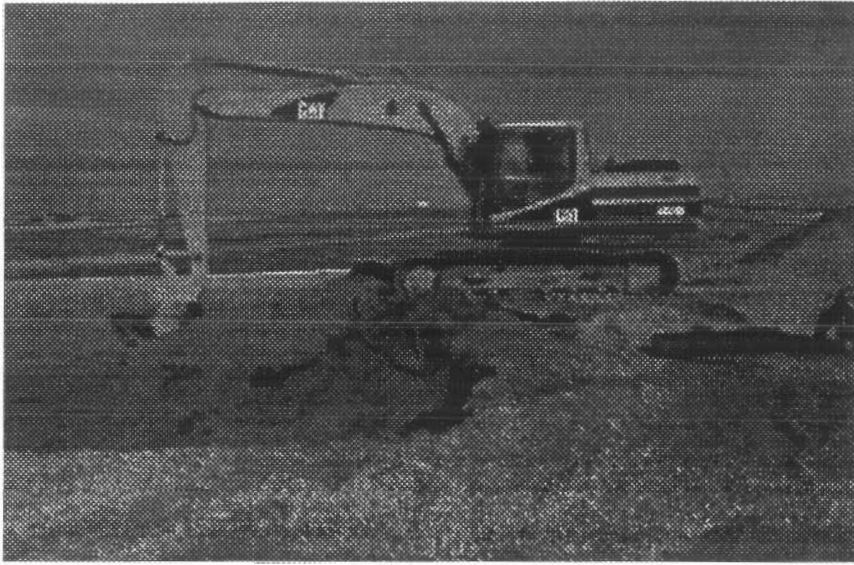
Photograph 4: Sorbent Booms and Silt Curtain



Photograph 5: Tank Cleaning



Photograph 6: Hydrocarbon Secure Storage Area ditch digging



Photograph 7: Soil Excavation



Photograph 8: Confirmatory testing



Photograph 9: Installation of Geomembrane around refuel lines



Photograph 10: Installation of geomembrane, east side of excavation

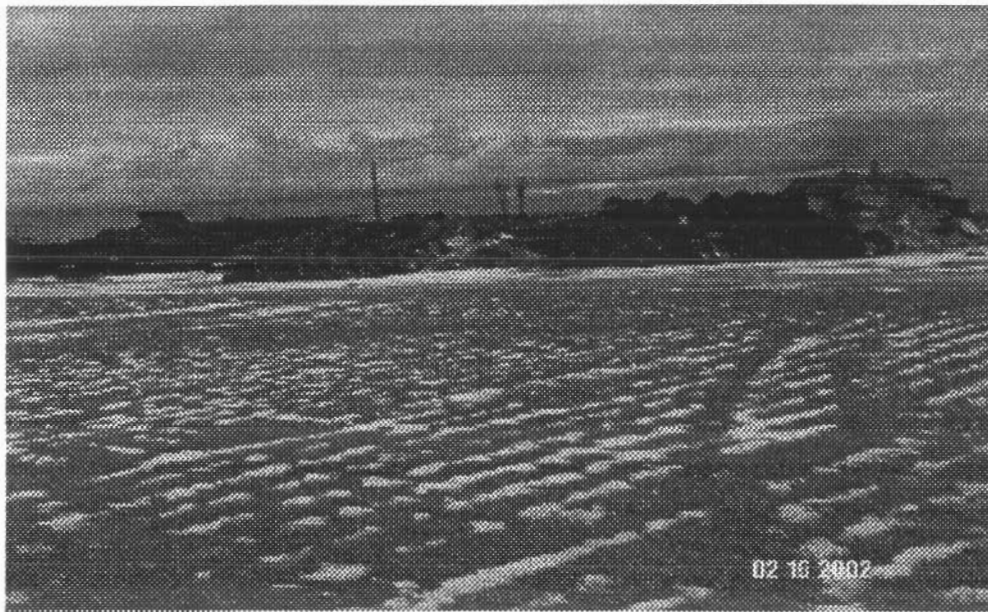
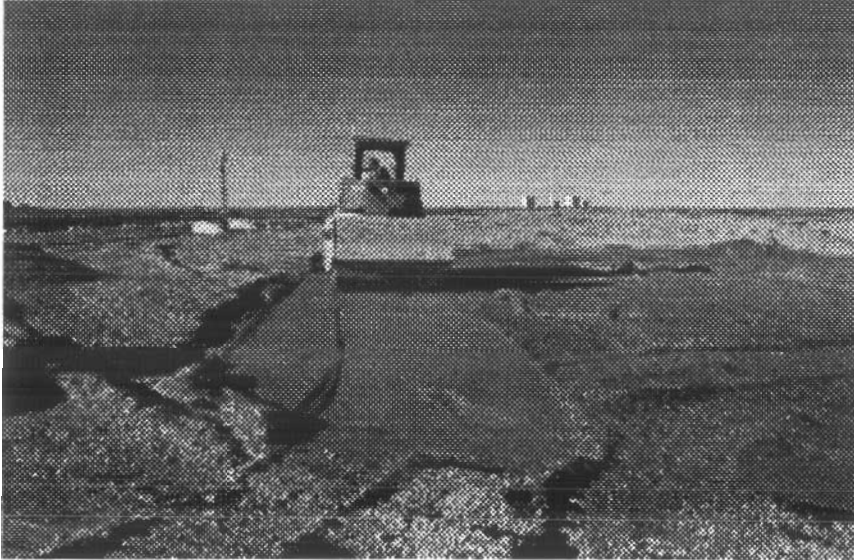


Photo 11: Debris



Photo 12: Hydrocarbon Secure Storage Area, aerial view



Picture 13: Compaction



Picture 14: Final grade

APPENDIX C
AS-BUILT DRAWING OVERLAIN ON AERIAL PHOTOGRAPH



APPENDIX D - FINAL QUANTITIES

**QUANTITIES
ADJUSTMENT
SHEET**

DCL FILE NO. DLCFOX MAIN			
NO.	(1) ITEMS AS SHOWN IN CONTRACT	(2) QUANTITY ORIGINALLY AUTH. UNDER CONTRACT	(3) FINAL
2066.1	Contaminated Soil (Tier 1 and II, Type A) - Beach Refuel	560	747
2066.2	Hydrocarbon Contaminated Soil - Beach Refuel	8000	6897
2209.1	Unclassified Excavation	3000	1270
2209.2	Type 3 Granular fill	3500	5894
2209.3	Test Pits	5	5
2209.4	Monitoring Well Supply	4	4
2209-5	Reshaping (Landfarm etc.)	25000	21643
2219.1	Buried Debris Removal	400	347
2499.1	Geomembrane Installation	400	500