REPORT

Environmental Screening
Of The Proposed Site Remediation
At The Former CAM-F DEW Line Site
At Sarcpa Lake, Nunavut

PUBLIC WORKS AND GOVERNMENT
SERVICES CANADA, WESTERN REGION

PROJECT NO. ABC50625

Jacques Whitford

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REPORT TO **Public Works and Government Services Canada Western Region**

FOR **Environment Screening of The Proposed Site Remediation at the Former CAM-F DEW Line Site at Sarcpa Lake, Nunavut**

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EXECUTIVE SUMMARY

Public Works and Government Services Canada (PWGSC), on behalf of Indian and Northern Affairs Canada (INAC) is planning to complete the clean up and remediation of the former CAM-F Intermediate DEW Line Site on Melville Peninsula. Various stages of clean up of the site have been ongoing since 1985. The first phase of PWGSC's clean up and remediation consisted of a detailed site assessment and preliminary consideration of existing wastes at the site. The second phase involves the remediation of the site. As required under the *Nunavut Land Claim Agreement* (*NLCA*) and the *Canadian Environmental Assessment Act* (*CEAA*), the remediation activities proposed for CAM-F must undergo an environmental screening.

The remediation program at CAM-F is proposed to commence with mobilization in fall 2005 with completion of remediation in 2007 and demobilization continuing into 2008. Activities will consist of contaminated soil excavation/remediation, dump-area remediation, collection and disposal of hazardous and non-hazardous debris and demolition and disposal of site facilities.

The remediation activities at CAM-F will interact with the environment through vehicle and machinery emissions, waste disposal, surface disturbance and the provision of employment to local inhabitants. There is also the potential for spills of fuel or hazardous materials. The activities will be carried out following standard good operating practices for northern Canada, with spill prevention practices and contingency plans in place. The objectives of the activities are to clean up and return sites to as close to natural conditions as is possible. Specifically, the remediation will mitigate and/or control the release of contaminants into the environment. The environmental effects of the activities are assessed as being of low magnitude and not significant. The activities will benefit the area through the short-term employment of local individuals and through the clean up of the site.

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1.0 INTRODUCTION

The former CAM-F Intermediate DEW Line Site has been undergoing various stages of clean up since 1985. Indian and Northern Affairs Canada (INAC) has requested Public Works and Government Services Canada (PWGSC) Western Region to complete the remediation of the site over the next several years. In 2004, PWGSC conducted a detailed site assessment and preliminary waste consolidation at the site. This is to be followed by the implementation of a remediation plan. This Environmental Screening assesses the potential impacts of the proposed remediation of the CAM-F DEW Line Site.

2.0 REGULATORY CONTEXT

2.1 Permits, Licences, and Authorizations - Current Regulatory Regime

Development of the Project will involve a number of distinct undertakings and activities, requiring authorizations from a variety of federal, territorial, Inuit, and resource co-management agencies. Table 2-1 provides a preliminary listing of permits, licences, and authorizations that may be required to develop the Project. The specific permits, licences, and authorizations that will be required will depend on the final configuration of the Project and all related activities, and may include others not listed here. Regulatory procedures that must be followed differ for each permitting, licencing, or authorizing agency. The application for a permit, licence, or authorization will usually initiate a review of the Project under one or more environmental assessment processes, unless the proposed activity has been explicitly exempted from assessment.

Within Nunavut, Indian and Northern Affairs Canada (INAC) regulates land use on Crown (or federal) lands, whereas Nunavut Tungavik Incorporated (NTI) and the regional Inuit associations regulate subsurface and surface land use on Inuit Owned Lands. All site activities will be carried out on Crown lands with the exception of a short portion of the cat train route (to access the site). The Nunavut Water Board regulates water use in Nunavut. Environmental screening and assessment is the responsibility of the Nunavut Impact Review Board (NIRB). The *Nunavut Land Claim Agreement* (*NLCA*) establishes these new boards and regulatory processes, with the *Nunavut Land Claim Settlement Act* and the *Nunavut Act* being the federal legislation enabling the implementation of the provisions of the *NLCA*. Depending on the activity, environmental screening and assessment may also have to accommodate the requirements of the federal *Canadian Environmental Assessment Act (CEAA)*, in addition to the requirements of NIRB.

Table 2-1: Permits, Licences, and Authorizations That May Be Required			
Activity	**Permit/Approval**	**Legislation**	**Agency**
Remediation			
Route and site clearing, laydown and staging areas, borrow sources	Land Use Permit / Quarry Permit / Permit to Access Inuit Owned Land	*Nunavut Land Claims Settlement Act Territorial Lands Act and Regulations** *Federal Real Property Act & Regulations*	Nunavut Tungavik Incorporated, Kivalliq Inuit Association, Lands Division INAC
Construction of watercourse crossings affecting fish habitat	Authorization or Letter of Advice for Works or Undertakings Affecting Fish Habitat	*Fisheries Act**	Fisheries and Oceans Canada
Water use and waste water disposal at bridge crossings	Water Licence	*Nunavut Waters Act*	Nunavut Water Board
Transportation, use of heavy equipment	Vehicle Registration or Permit	*Motor Vehicles Act (Nunavut)*	Nunavut Department of Community Government and Transportation
Transportation of dangerous goods	Certificate / Permit	*Transportation of Dangerous Goods Act*	Transport Canada Nunavut Department of Sustainable Development
Sewage disposal, food premises, sanitation at camps	Permit / Criteria	*Public health Act (Nunavut)*	Nunavut Department of Health and Social Services

2.2 Existing Environmental Assessment and Review Process

This section provides a summary of the typical regulatory provisions for environmental assessment pursuant to the *NLCA* and the *CEAA*, as outlined in the agreement, enabling legislation, guidelines, and operational procedures that may apply to any project within Nunavut.

Article 12 of the *NLCA* establishes processes for the screening and review of project proposals on land and marine areas within the Nunavut Settlement Area (including Inuit Owned Lands, Commissioners lands, and Crown lands) and to the Outer Land Fast Ice Zone. The NIRB was established in 1996, under Article 12.2.1 of the *NLCA*, as an institution of public government with responsibilities for environmental assessment. The NIRB's primary functions are to screen and review the ecosystemic and socio-economic effects of project proposals, and to make recommendations to the federal or territorial Minister(s) responsible for authorizing such projects to proceed. The NIRB also can issue recommendations for monitoring of project effects, but the responsibility for enforcement of such provisions lies with the agency issuing a permit, licence, or authorization. The NIRB's objectives are to protect the ecosystemic integrity of Nunavut, and to protect and promote the existing and future well-being of the residents and communities of Nunavut, and of Canada.

The CAM-F DEW Line Site is located on federal lands that are regulated by INAC. As the Responsible Authority, INAC requires that an environmental screening be conducted in accordance with the *CEAA*. Where a proposed project in Nunavut involves a *CEAA* trigger, federal and territorial governments and the NIRB work together to harmonize the environmental screening process. This process is intended to provide information for the federal authorities to support the screening of the project pursuant to the requirements of *CEAA*. As such, the study has been conducted in a manner that is consistent with the

NLCA and *CEAA* and the guidance documentation of the NIRB, the Canadian Environmental Assessment Agency and INAC.

The initial step in obtaining approval for a project proposal within the Nunavut Settlement Area is the submission of an application for a permit, licence, lease, or approval to an authorizing agency (*i.e.*, government department, Designated Inuit Organization, regulatory board). It is important to note that more than one authorization may be required for undertakings and activities on land or water.

The authorizing agency is responsible for initial processing of the application. Where regional land use plans are in place, the application is forwarded to the Nunavut Planning Commission (NPC) for review of conformity with the land use plan. Where a project proposal conforms to an approved land use plan, or if a variance has been approved, the NPC forwards the project proposal application to the NIRB for screening. If no approved land use plans exist, project proposal applications are referred directly by the authorizing agency to the NIRB for screening.

The initial steps of the screening involve notification of the proponent and authorizing agencies, establishment of a timeline for a screening determination (where not specified by regulation), and distribution of the project proposal application to appropriate stakeholders. Taking into account all comments received from stakeholders regarding the project proposal, existing scientific information, Inuit traditional knowledge, and the information provided by the proponent, the NIRB then reviews the potential effects of the project and the level of public concern about and/or in support of the project proposal. Once the screening has been completed, the NIRB will produce a Screening Decision Report that documents its determination as to whether the project proposal should be approved without further review, abandoned or modified by the proponent, or subject to review under Part 5 or 6 of the NLCA.

If the NIRB determines that the project proposal should proceed without further review, the NIRB may include in its Screening Decision Report terms and conditions to be attached to the authorizations to be issued. The authorizing agency will include the NIRB terms and conditions in the final authorization. However, where the authorizing agency disagrees with the recommended terms and conditions, the agency must provide the NIRB with a rationale for omissions from the final authorization. Monitoring of adherence to terms and conditions is the responsibility of the authorizing agency. The NIRB will complete its screening and issue its Screening Decision Report to the authorizing agency (or agencies) within applicable legislated timelines to allow the agencies to meet their legislative requirements. However, should an agency have no legislated time limits regarding the issuance of permits, NIRB will provide its Screening Decision Report within "an acceptable time period".

When the Screening Decision Report indicates that a review is required, the Minister may:

- refer the proposal to the Minister of Environment for review by a federal environmental assessment panel;
- refer the proposal back to the NIRB for a review of ecosystemic and socio-economic impacts; or
- inform the proponent that the proposal should be abandoned or modified and resubmitted to NIRB.

The scope of the project has been determined pursuant to Section 15.1 of *CEAA*. Discussions with PWGSC were undertaken to establish the scope of the project, the scope of the environmental screening and the establishment of Valued Environmental Components (VECs). Factors considered in the environmental screening include those prescribed in Section 16.1 (a) to (e) of *CEAA*, listed below:

(a) the environmental effects of the project, including the environmental effects of malfunctions or accidents that may occur in connection with the project and any cumulative environmental effects that are likely to result from the project in combination with other projects or activities that have been or will be carried out;

(b) the significance of the effects referred to in paragraph (a);

(c) comments from the public that are received in accordance with this Act and the regulations;

(d) measures that are technically and economically feasible and that would mitigate any significant adverse environmental effects of the project; and

(e) any other matter relevant to the screening, comprehensive study, mediation or assessment by a review panel, such as the need for the project and alternatives to project, that the responsible authority or, in the case of a screening, the Minister after consulting with the responsible authority may require to be considered.

Cumulative environmental effects have been considered pursuant to Section 16.1(a) of *CEAA* for likely future projects. No additional factors have been prescribed under Section 16.1(e) by INAC for inclusion in the potential cumulative environmental effects assessment analysis.

The existing conditions of the project area environment, with respect to the identified VECs, are characterized in this report. Potential interactions of specific project activities with the environment are identified and the environmental effects are evaluated in consideration of appropriate mitigation measures.

3.0 ENVIRONMENTAL ASSESSMENT CONTACTS

Responsible Authority Contact: Robert Martin Contaminated Sites, Project Officer Nunavut Regional Office P.O. Box 2200 Iqaluit, NU X0A 0H0 Phone: (867) 979-7931 Fax: (867) 979-7939	***CEAA Contact:*** Brian Torrie Project Assessment Group Canadian Environmental Assessment Agency 160 Elgin Street, 22nd Floor, Ottawa, ON K1A 0H3 Phone: (613) 957-0791
Proponent Contact: Robert Martin Contaminated Sites, Project Officer Nunavut Regional Office P.O. Box 2200 Iqaluit, NU X0A 0H0 Phone: (867) 979-7931 Fax: (867) 979-7939	***Nunavut Impact Review Board:*** Jorgen Komak Environmental Assessment Officer P.O. Box 2379 Cambridge Bay, NU X0B 0C0 Phone: (867) 983-2593 Fax:(867) 983-2594 e-mail: jkomak@nirb.nunavut.ca
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4.0 PROJECT DESCRIPTION

The Department of Indian Affairs and Northern Development (DIAND) wishes to implement a remedial action plan at the abandoned intermediate DEW Line site CAM-F, located at Sarcpa Lake, Nunavut. Remediation assessment activities at the site were carried out in the summer of 2004 to quantify the volume of contaminated soil and hazardous materials at the site and to conduct a waste audit on all non-hazardous materials. Potential gravel and rock borrow sources and suitable locations for an engineered landfill were also identified.

DIAND has requested PWGSC to assume responsibility for cleaning and remediating the site. PWGSC developed a work plan for a detailed site assessment in 2004 which was carried out to address this responsibility. The results from the detailed site assessment were used to develop a remediation work plan which is proposed to be carried out in 2006/2007, with initial site preparation commencing in September 2005.

The full Project consists of two components:

1. a detailed site assessment and preliminary waste consolidation at the CAM-F DEW Line Site (conducted in summer 2004); and
2. the implementation of a remedial action plan for the site (scheduled to commence in 2005).

This environmental screening focuses on the second component, the implementation of a remedial action plan.

4.1 Project Location

CAM-F DEW Line Site (Figure 4-1) is located at 68°33' N, 83°19' W on Melville Peninsula, between Foxe Basin and Committee Bay in Nunavut Territory. The main station is situated at an elevation of 260 m above sea level on a hill approximately 2 km north of the west arm of Sarcpa Lake (Figure 4-2). Terrain around the site consists of rolling tundra highland with gravel deposits, several lakes and numerous rivers (Indian and Northern Affairs, 2003). The site, which is approximately 85 km west of Hall Beach and 100 km southwest of Igloolik, is landlocked and inaccessible by sea-lift. It can be reached by canoe or an overland winter route by way of Hall Lake and Kingora River (Royal Roads Military College 1994). As well, there is an airstrip accessible for most of the year and airplanes equipped with skis may land on Sarcpa Lake during the short summer.

The CAM-F site is situated entirely on Federal (Crown) Land. A short portion of the cat-train route to access the site will cross Inuit Owned Land.

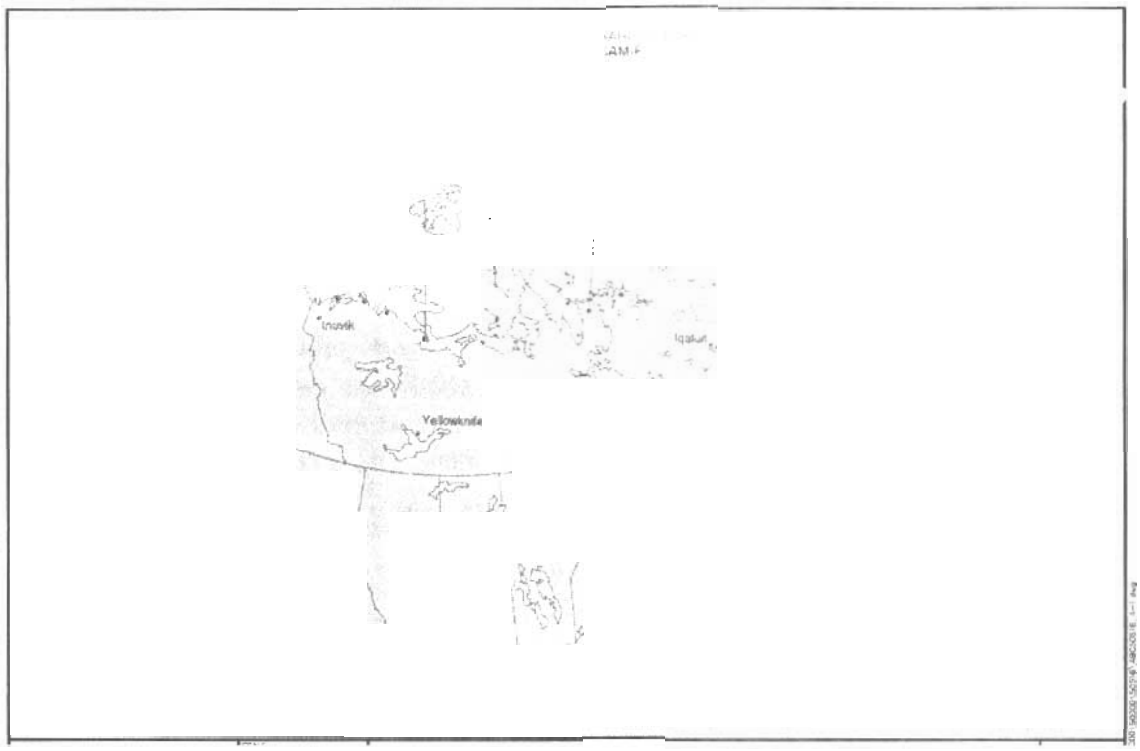

Figure 4-1: CAM-F DEW Line Site Location Map

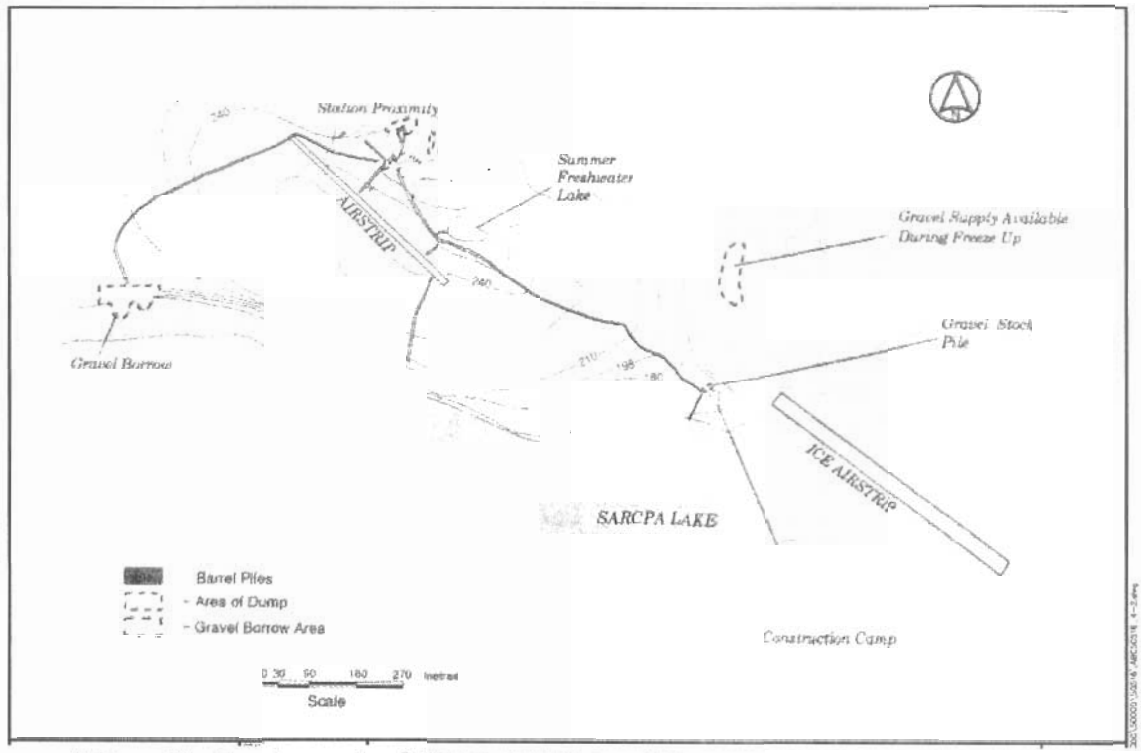

Figure 4-2: Station Layout - CAM-F DEW Line Site

4.2 History

Sarcpa Lake (CAM-F) was reserved for use as an intermediate DEW Line site form 1956 to 1963. The station was constructed in 1957 and the site was closed and abandoned in 1963. The site was converted to a scientific research station in 1977 under the auspices of the Science Institute of the Northwest Territories and Indian and Northern Affairs (DIAND). In 1985, a hazardous materials removal program was implemented with the removal of hazmat found in equipment and surface contaminants. Assessments completed in 1987/88 and 1994 have confirmed the presence of various hazardous materials and contaminated soil

Infrastructure at the site included a module building train; warehouse and garage; Inuit house (dormitory); petroleum, oil, lubricant (POL) pumphouse; quonset hut; communications antenna; POL tanks; drum storage pads, sewage outfall; vehicle pile, generator site, former construction camp, shop site and two dump sites.

Environmental assessment of the CAM-F DEW Line site was initiated in 1986 when DND and Environment Canada visited the site to remove contaminants such as PCBs and POLs and identify areas of buried materials that could pose environmental risks in the future. Their findings identified a number of drum caches with many of the drums still containing product. These were left in-place. Removal of PCB containing equipment was conducted and elevated PCB concentrations were noted in soil samples at several areas. Various sampling and clean up activities have been conducted at the site during the late 1980s and 1990s, including a partial clean up of PCB contaminated walls and floors at the station in 1989 and an asbestos abatement program and clean up of Dump A in 1997.

The site was revisited in 1994 by the Environmental Sciences Group of Royal Roads Military College at which time a detailed surface soil sampling program was completed. Their investigations identified soil contamination exceeding Tier I and Tier II DCC criteria near the module train, garage, warehouse, dumps, crashed aircraft and construction camp. However, these investigations did not include assessment of hydrocarbon contamination that has the potential to be a significant source of contamination at the site. Analysis of paint, barrel contents and asbestos has also been conducted.

A detailed site assessment and preliminary waste consolidation was conducted in 2004. The detailed site assessment involved:

- assessment of the existing landfills including delineation of landfill boundaries, identification and quantification of hazardous materials in the landfills, and determination of whether the landfill is releasing deleterious substances into the surrounding environment;
- contaminated soil delineation including areal and vertical limits of the contamination on-site;
- hazardous materials inventory including identification and quantification of materials that will require specialized disposal and a sampling of barrels containing liquid;
- assessment of new landfill location and borrow sources including a survey of the site to tie in all site structures, borrow sources, landfill areas and assessed locations;
- site-specific risk assessment to quantify the risk to human and ecological receptors;
- site assessment of the lake to determine if debris has been dumped in the lake or contamination has occurred; and
- a waste consolidation of barrels in the area

Based on the results and reports generated from the assessment activities, the remediation plan was developed.

4.3 Objectives of the Remediation Program

The objectives of the remediation program are to remediate the site to an acceptable level of environmental risk by:

- removing contaminated soils;
- stabilizing existing dumps;
- developing engineered landfill facilities;
- collecting and disposing surface debris;
- demolishing and removing exiting site facilities; and
- physically restoring the site.

4.4 Existing Infrastructure

UMA Engineering (2005) provides several drawings and photographs describing the CAM-F DEW Line Site. These are presented in Appendix A of this report. Figure 4-3 is a site layout of CAM-F DEW Line Site. Site infrastructure consists of the following:

- main building train;
- warehouse and garage;
- Inuit house (dormitory);
- POL (Petroleum, Oil, Lubricants) and drum storage pads;
- quonset hut;
- two dump sites;
- a vehicle dump;
- a radar tower;
- a land airstrip;
- a lake airstrip; and
- an 85-km winter route from Hall Beach to the site.

The winter route will require no clearing and will use only existing points of land as references. The route passes from Hall Beach to Sarcpa Lake. Hall Beach is located on the east side of Melville Peninsula near the coast. There are three major sections of the route from Hall Beach to the site. The first (east) section, is approximately 30 km long, basically heading due west-to-northwest from the Hamlet. The middle section crosses Hall Lake, the largest lake on Melville Peninsula, heading west-southwest along the lake until reaching the west shore of the lake where it follows the lakeshore south for approximately 4 km. The third, most westerly section of the route, leaves the lake and twists up through higher elevations along the Kingora River route, before leaving the river ravine near the site and following high points of land the remainder of the way to Sarcpa Lake. The route enters the DEW Line site from the south.

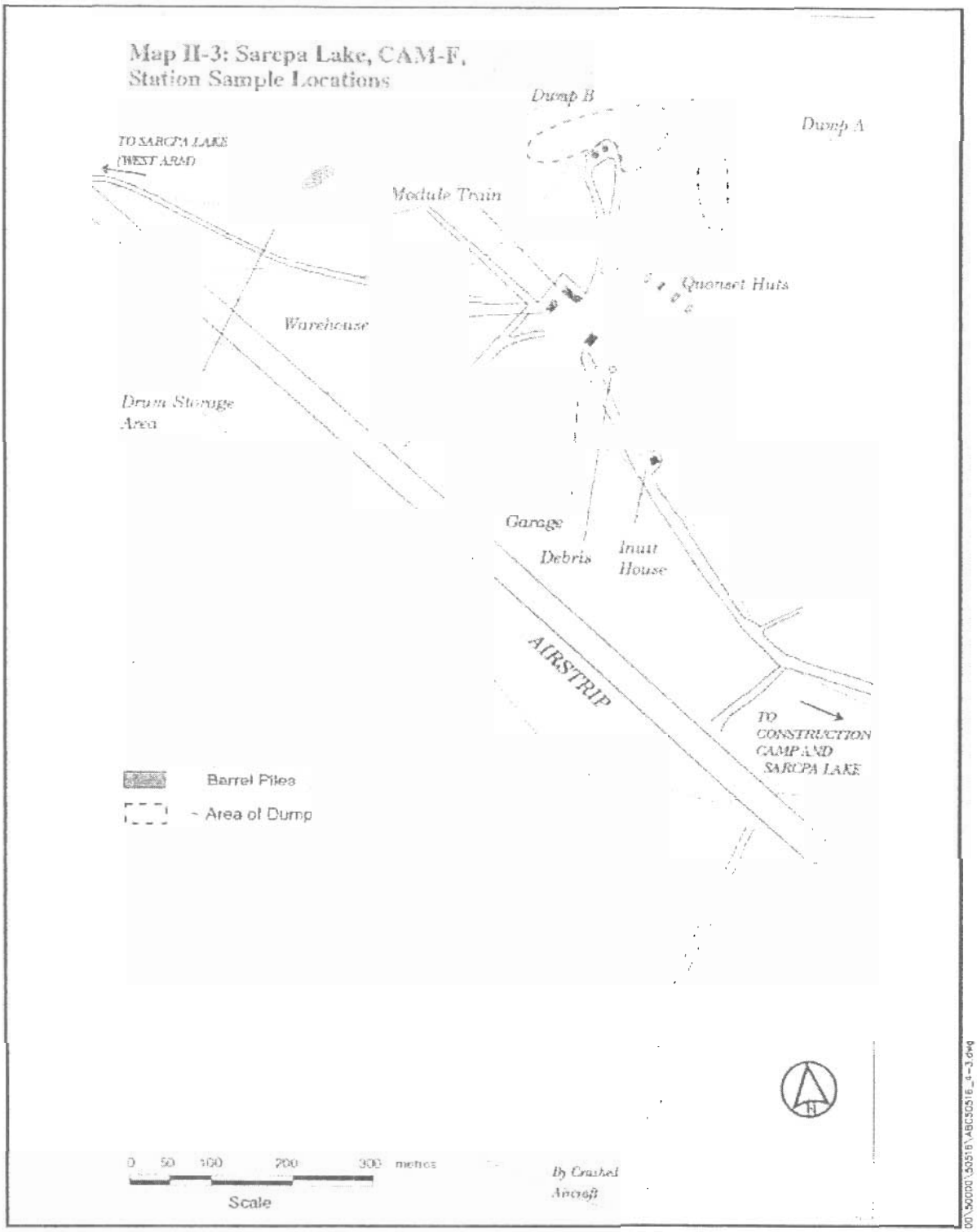

Figure 4-3: Site Layout of CAM-F DEW Line Site

As the route will be only be crossed during winter when both the lake and river are frozen, no Fisheries and Oceans Canada approvals will likely be required to access the site.

4.5 Project Activities

The remediation activities at CAM-F are described below. The work plan has been developed by UMA Engineering (2005). Their drawings showing the remediation sites described below are presented in Appendix A.

4.5.1 Contaminated Soil Remediation

There is a total of approximately 312 m^3 of Tier I contaminated soils and 2525 m^3 of Tier II contaminated soils on the CAM-F site.

Table 4-1 details the locations of the soils, their contaminants of concern and the proposed remediation options for each area. In general, Tier I, petroleum hydrocarbons (PHC) and metals-contaminated soils can be covered with fill and regraded. Tier II and CCME contaminated soils must be excavated and disposed of in the on-site Secure Disposal Facility. CEPA contaminated soils must be excavated and disposed of at an off-site approved facility.

Table 4-1: Contaminated Soils at CAM-F

Location	Contaminant of Concern[1]	Tier I Volume m^3	Tier II Volume m^3	Notes[1]	Remediation Option[1]
Module Station	PCBs (Tier I & II), PHCs (BTEX, F1, F2), PAHs, metals	0	500	Tier I & Tier II Soil.	Regrade Tier I soils or dispose in the NWH facility. Excavate and dispose Tier II and CCME soils in the secure disposal facility.
Stain NW of Module Station	PCBs, PHCs (F3, F4), metals	0	5	Three small discrete pockets of contamination were grouped together near sewage outfall pipe.	Regrade PHC soils. Excavate and dispose Tier II soils in the secure disposal facility.
Sewage Outfall	PCBs (Tier II), metals (Tier II)	0	30	Contamination at end of sewage outfall pipe. More delineation required.	Excavate and dispose Tier II soils in the secure disposal facility.
Warehouse	PCBs, PHCs (F2), metals	20	20	20 m^3 contamination near loading dock.	PHC below 0.5 m, Regrade area. Excavate and dispose Tier II and CCME soils in on-site Secure Disposal Facility.
Garage	PCBs, PHCs (F2, F3), metals (Tier I)	9	20	20 m^3 contamination at north end of garage.	Cover with fill and Regrade Tier I metals contamination. Excavate and dispose Tier II and CCME soils in on-site Secure Disposal Facility.
Vehicle Pile	PCBs, PHCs (F2, F3), metals (Tier II)	10	100	Contaminated soil beneath old vehicle pile; south of garage.	Excavate and dispose Tier II and CCME soils in on-site Secure Disposal Facility
West Barrel Cache	PHCs (BTEX, F1, F2, F3), PAHs	0	450	Contaminated soil between 0.8 m and 1.0 m below grade. Some surface stains.	Cover with fill and regrade area.

Table 4-1: Contaminated Soils at CAM-F					
Location	Contaminant of Concern[1]	Tier I Volume m^3	Tier II Volume m^3	Notes[1]	Remediation Option[1]
POL Tanks	PHCs (BTEX, F1, F2, F3), PAHs, metals	0	700	Most PHC contaminated soil between 0.8 m and 1.2 m below grade. Limited volume of BTEX, F1, F2 in shallow soils.	Cover will fill and regrade metals contamination. Excavate and dispose Tier II and CCME soils in on-site Secure Disposal Facility.
Dump A	PCBs (Tier I and II, possible CEPA), metals	133	510	Including estimated 430 m^3 remaining after 1997 clean-up.	Cover Tier I soils with fill and regrade. Excavate and dispose Tier II and CCME soils in on-site Secure Disposal Facility. If necessary, excavate and dispose CEPA soils off-site.
Dump B	PCBs, PHCs (F3, F4), metals (Tier II)	140	120	Further delineation required once debris is removed.	Excavate and dispose Tier II in on-site Secure Disposal Facility. Cover Tier I souls with fill and regrade.
Construction Camp	PHCs (F2, F3), PAHs, metals (Tier II)	0	71	11 m^3 former generator site 60 m^3 former machine shop – assume contamination limited to area of former shop.	Cover and regrade Tier I PHCs and metals. Excavate and dispose Tier II and CCME soils in on-site Secure Disposal Facility.

1. CCME = Canadian Council of Ministers of the Environment
2. CEPA = Canadian Environmental Protection Act
3. NHW = Non-hazardous Wastes
4. PAHs = Polycyclic Aromatic Hydrocarbons
5. PCBs = Polychlorinated Biphenyls
6. PHCs = Petroleum Hydrocarbons
   BTEX=Benzene, toluene, ethylbenzene, and xylene
   F1 = C6 – C10
   F2 = C11 – C16
   F3 = C17 – C34
   F4 = C35 +

4.5.2 Dump Area Remediation

4.5.2.1 Dump A

Dump A is located 200 m northeast of the station area. It contains some loose debris including 550 barrels and 53 wrangler bags of Tier II soil. There is also the possibility of some remnant CEPA soils from the 1996/97 clean up.

Surface debris at this site will be removed and contaminated soil and buried debris will be excavated. Excavated areas will be backfilled and regraded using clean fill. The Tier I and II contaminated soils will be removed to the on-site Secure Disposal Facility.

4.5.2.2 Dump B

Dump B is located 170 m north of the module train. It consists of an area of equipment and building materials that have been tipped over a small bedrock ledge. A small area of contaminated soil was found on the surface (UMA 2004).

Surface debris at this site will be removed and contaminated soil and buried debris will be excavated. The excavated areas will be backfilled and regraded with clean fill. The small area of contaminated soil will be removed to a secure soil storage facility.

4.5.3 Construction of New Landfills

4.5.3.1 Non-hazardous Waste Landfill

A non-hazardous waste landfill can be used for soils that are classified as Tier I contaminated as they are not at risk of leaching into the surrounding soil. One non-hazardous waste landfill is proposed for the area around the station for disposal of site demolition debris and Tier I contaminated soil. Construction of the landfill will include construction of exterior gravel berms, Tier I and PHC soil placement along with non-hazardous demolition waste and site debris. This debris will then be compacted and an intermediate granular cover will be placed over the debris and compacted. A final granular cover will then be placed over the landfill and will be graded to promote drainage away from the landfill.

4.5.3.2 Secure Soil Disposal Facility

An on-site Secure Soil Disposal Facility will be used for all Tier II contaminated soils. These facilities have been used at DEW Line sites in the past for disposal of Tier II contaminated soils. This facility was designed by UMA Engineering Ltd. based on the characteristics of the contaminants in the soils and local characteristics. The design of the landfill uses the existing permafrost as the main method of containment, designing the facility such that both the contaminated soil and berms will remain continuously frozen. Secondary containment is provided by a high-density polyethylene liner, which is placed at the base and side slopes of the facility. To prevent precipitation from entering and percolating through the contaminated soils a second high-density polyethylene liner is placed over the top of the contaminated soils and sealed to the base liner.

Construction of the facility will include the following (UMA 2004):

- preparation of subgrade;
- construction of exterior berms with saturated silty gravel;
- supply and installation of geotextile and high-density polyethylene liners;
- placement of Tier II and PHC contaminated soils;
- placement and compaction of final granular cover on the landfill;
- grading to promote drainage away from the landfill; and
- supply and installation of thermister strings and groundwater monitoring wells in and around the landfill.