DESIGN AND COST ESTIMATING OF THE CLEAN UP OF 21 DEW LINE SITES

95% DESIGN SUBMISSION
ENVIRONMENTAL PROTECTION PLAN

Prepared by:

Jacques Whitford Environment Limited

In association with:

UMA Engineering Ltd.
Sheppard Green Engineering and Associates Ltd.

December 1994
1484-015-3000-3.9

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1994 12 07

File No. 1484-015-3147-3.9

DIAND/NAP
200 Range Road
Whitehorse, Yukon Y1A 3V1

Attention: Mark Zrum

Dear Sir:

RE: DEW LINE CLEAN UP PROJECT
95% DESIGN SUBMISSION - ENVIRONMENTAL PROTECTION PLAN (EPP)

We are pleased to enclose one copy of our 95% Design Submission - Environmental Protection Plan dated December, 1994 as prepared in association with Jacques Whitford Environment Ltd. This final update to the EPP incorporates information from the latest Environmental Screening Reports prepared by the Environmental Sciences Group and considers various comments received from the project team over the past few weeks.

Please note that this report is subject to further revision as the following issues are resolved:

- Cooperation Agreements with aboriginal groups.
- Heritage Resource requirements after further discussion with Territorial and Regional officials.
- Coordination of NWSO POL dyke lining projects.
- Detailed planning and design of sewage lagoons at the Cambridge Bay and Hall Beach NWS sites.
- Additional information gathering during pre-tender site visits prior to implementation.
- Contract Management Organization with respect to environmental inspection requirements.
- Further design development and implementation planning.

A number of action items have been suggested for consideration under Environmental Protection Procedures in Section 8.0

Please forward your comments regarding this EPP to Major Scott Munn by January 9, 1995. It is anticipated that this document will be discussed at our next Project Review Meeting. Thank you for your cooperation.

Yours truly,

UMA Engineering Ltd.

for A. S. Washuta, P.Eng.
Project Manager

ASW/blm
Enclosure

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LIST OF ACRONYMS

CMO	Contract Management Organization
CPS	Canadian Parks Service
CWS	Canadian Wildlife Service (Parks Canada)
DCC	DEW Line Clean Up Criteria
DCL	Defence Construction (1951) Ltd.
DEW Line	Distant Early Warning Line
DFO	Department of Fisheries and Oceans
DGE	Director General Environment
DIAND	Department of Indian Affairs and Northern Development
DND	Department of National Defence
DNWSO	Director North Warning System Office
EARP	Environmental Assessment and Review Process
EISC	Environmental Impact Screening Committee
EPP	Environmental Protection Plan
ESG	Environmental Sciences Group
ESR	Environmental Screening Report
GNWT	Government of Northwest Territories
IATA	International Air Transport Association
IBP	International Biological Program
IFA	Inuvialuit Final Agreement
ILA	Inuvialuit Land Administration
IMDGC	International Marine Dangerous Goods Code
INAC	Indian and Northern Affairs Canada
JWEL	Jacques Whitford Environment Limited
LRR	Long Range Radar
LSS	Logistic Support Site or Station
MOU	Memorandum of Understanding
NIRB	Nunavut Impact Review Board
NPC	Nunavut Planning Commission
NTI	Nunavut Tunngavik Incorporated
NWS	North Warning System
NWT	Northwest Territories
PCB	Polychlorinated biphenyl
PCO	Plan of Construction Operations
PMO	Project Management Office
POL	Petroleum, oils and lubricants
RMA	Resource Management Area
RRMC	Royal Roads Military College
SRR	Short Range Radar
TDGA	Transportation of Dangerous Goods Act
TFN	Tungavik Federation of Nunavut
UMA	UMA Engineering Ltd. (in association with Jacques Whitford Environment Limited and Sheppard Green Engineering & Associates Ltd.)
WHMIS	Workplace Hazardous Materials Information System

1.0 INTRODUCTION

1.1 SCOPE AND OBJECTIVES

This Environmental Protection Plan (EPP) has been developed to serve several functions related to the clean up of 21 DEW Line sites in the Canadian Arctic. This EPP provides a practical reference field document for the effective implementation of mitigation and environmental protection measures developed during the Environmental Screening process. Environmental Screenings are a formal part of the Federal Environmental Assessment and Review Process (EARP). These screenings and all available environmental and engineering information were used to prepare the Environmental Protection Plan. The EPP is to be implemented by the Contractor through appropriate actions and the application of contingency plans. The EPP is designed to be used during clean up activities in conjunction with the Contract Drawings and Specifications. It forms part of the Contract Documents and reference to it can be found throughout the Contract Specifications.

The EPP provides:

- an overview of the activities involved in construction of a work camp (where applicable), clean up and demolition activities, and closure of those parts of the DEW Line site which will not be required as part of the NWS (Section 2.0);
- an overview of the regulatory environment which includes legislation and regulations from federal and territorial authorities. It also describes the requirements of Inuvialuit and other groups related to permit requirements (Section 3.0);
- a description of the general environmental protection measures to minimize or avoid potential adverse effects (Section 4.0);
- a description of protection measures for specific valued environmental components (Section 5.0);
- details related to environmental inspection responsibilities and procedures (Section 6.0);
- contingency plans describing emergency actions and reporting requirements (Section 7.0); and
- site specific environmental protection procedures for each of the 21 sites (Section 8.0).

The protection measures described herein are designed to be implemented by the Contractor to minimize or avoid potential adverse environmental impacts. These procedures are considered to be appropriate for known and anticipated situations and conditions. However, should certain procedures or protection measures prove impractical, imprudent or insufficient in field situations, appropriate modifications or substitutions will be proposed by field personnel, reviewed and approved by the Engineer in consultation with regulatory officials.

2.0 PROJECT DESCRIPTION OVERVIEW

2.1 PROJECT RATIONALE

In March 1985, Canada and the United States signed a Memorandum of Understanding (MOU) agreeing to modernize the North American Air Defence System. The memorandum sets out the requirements for replacement of the Distant Early Warning (DEW) Line with an upgraded system called the North Warning System (NWS). Of the original 42 DEW Line sites, 21 sites were closed in 1963 and are currently under the administration of the Department of Indian Affairs and Northern Development (DIAND). The remaining 21 DEW Line sites located in Canada's Arctic are listed in Table 2.1. Eight of the DEW Line sites have been down-sized to NWS Long Range Radar (LRR) sites. In accordance with the DNWSO Cost Reduction Initiative, it is anticipated that by the end of 1996 only CAM-M and FOX-M, the logistic support sites (LSS), will have permanent staff. The remaining six LRRs will be remotely operated and treated in a similar manner to the SRRs. Eight NWS Short Range Radar (SRR) sites have been built at existing DEW Line sites. The SRR sites are remotely operated and personnel will only be on site for short periods for maintenance and inspection. The other five sites have been decommissioned and closed.

As part of the environmental screening process, ten of the 21 sites underwent investigations in 1990 and 1992 to document the environmental implications and potential effects of the clean up work. The need for mitigation, monitoring and/or actual project activity modifications was also identified. Ten of the remaining eleven sites underwent a similar study in 1992 and 1993. FOX-4 Cape Hooper was surveyed in 1994.

2.2 PROJECT ACTIVITIES

The clean up activities will be similar for each of the 21 sites, because the clean up plan is based on a common protocol which targets contaminated soil, landfills, and demolition and surficial debris for cleanup. Variations in the extent and degree of clean up are related to the size and condition of each site. The following sections describe the major activities to be performed in the clean up of the DEW Line stations. Detailed requirements are described in the Contract Specifications and Drawings. It is intended that the EPP be read in conjunction with these documents to determine all project requirements.

The major clean up activities include the following:

- establishment of a construction camp, including:
  - access and supply routes (Section 2.2.1.1),
  - water supply (Section 2.2.1.2),
  - waste management (Section 2.2.1.3),
  - fuel handling and storage (Section 2.2.1.4),
  - equipment and vehicle use, storage and maintenance (Section 2.2.1.4);

- excavation of contaminated soil and disposal of hazardous material (Section 2.2.2);
- disposal of non-hazardous materials (Section 2.2.3);
- construction of Northern Disposal Facilities (Section 2.2.4);
- demolition of existing facilities (Section 2.2.5);
- excavation and closure of landfills (Section 2.2.6);
- closure of existing sewage facilities (Section 2.2.7);
- development of granular borrow areas (Section 2.2.8);
- site grading (Section 2.2.9);
- air strips and roads (Section 2.2.10);
- demobilization (Section 2.2.11).

TABLE 2.1
21 DEW LINE SITES IN ARCTIC CANADA

Site Name	Facility Designation	NWS Designation
Komakuk Beach	BAR-1	SRR
Shingle Point	BAR-2	LRR
Tuktoyaktuk	BAR-3	SRR
Nicholson Peninsula	BAR-4	SRR
Cape Parry	PIN-M	LRR
Clinton Point	PIN-1	closed
Cape Young	PIN-2	closed
Lady Franklin Point	PIN-3	LRR
Byron Bay	PIN-4	closed
Cambridge Bay	CAM-M	LRR/LSS
Jenny Lind Island	CAM-1	closed
Gladman Point	CAM-2	SRR
Shepherd Bay	CAM-3	LRR
Pelly Bay	CAM-4	SRR
Mackar Inlet	CAM-5	closed
Hall Beach	FOX-M	LRR/LSS
Longstaff Bluff	FOX-2	SRR
Dewar Lakes	FOX-3	LRR
Cape Hooper	FOX-4	SRR
Broughton Island	FOX-5	SRR
Cape Dyer	DYE-M	LRR

SRR - Short Range Radar LSS - Logistic Support Station
LRR - Long Range Radar

2.2.1 CONSTRUCTION CAMPS

Construction camps are to be located in areas of previous disturbance such as granular borrow areas or storage areas near the sealift beach or as proposed on site drawings. This will prevent or at least minimize disturbance to previously undisturbed areas. Alternatively, commercial facilities may be used, where they exist.

2.2.1.1 Access and Supply

Each of the sites, with the exception of CAM-4, CAM-5 and FOX-3, can be accessed by water. CAM-4 and FOX-3 can not be accessed by water because of their interior locations while the coast of CAM-5 is almost always iced-in. It is expected that, with the exception of these three sites, the primary means of site access will be by ship or barge. The secondary means of transport, used for movement of most personnel, will be by aircraft. For CAM-4, CAM-5 and FOX-3, site access can be by air or cat train.

Local access to construction, demolition, clean up and other work areas generally will be via existing road networks. Graded areas, typically located near the beach landing area and/or airstrip at each site, are to be used for temporary storage of materials.

2.2.1.2 Water Supply and Use

Existing drinking water supply locations may be used by the Contractor as drinking water supplies, with the exception of CAM-5, as long as such use does not adversely affect fish habitats. The CAM-5 water supply should not be used since barrels and debris have been found there. An alternative supply should be located, tested and approved in accordance with the Land Use Permit. Water supplies at all sites should be tested prior to use to ensure that water quality meets Canadian Drinking Water Quality Guidelines. Water is also required for barrel washing and other clean-up activities. Depending on the volume of water needed, alternative supplies may be required.

2.2.1.3 Waste Management

Sewage is to be collected and disposed of in a portable septic system. The material shall then be properly disposed of as per the Contract Specifications, Section 02090, in accordance with the Land Use Permit. Domestic refuse is to be disposed of in a proposed or existing landfill at each site. Alternatively, domestic refuse can be incinerated and disposed of in a proposed or existing landfill provided it does not violate the Land Use Permit.

2.2.1.4 Fuel Handling and Storage

Fuel is to be transported to the site by the Contractor and stored in approved facilities described further in Section 4.7 at the construction camp, storage compound or existing fuel storage facilities, if available.

2.2.1.5 Equipment and Vehicle Use, Storage and Maintenance

Equipment and vehicles are to be transported to the site by the Contractor; stored in approved locations; used only for contracted work; and maintained by the Contractor. The number and type of vehicles and heavy equipment will vary for each site, depending on the site work requirements.

2.2.2 EXCAVATION OF CONTAMINATED SOIL AND DISPOSAL OF HAZARDOUS MATERIALS

2.2.2.1 Contaminated Soil

For this project, the definition of contaminated soil has been established in accordance with the DEW Line Clean Up Criteria as shown in Table 2.2. Soils contaminated at levels above Tier I but less than DCC Tier II criteria are to be landfilled on site. Soils containing contaminants equal to or exceeding Tier II criteria are to be transported to and placed in a Northern Disposal Facility. These criteria are designed to be protective of the Arctic ecosystem.

TABLE 2.2
DEW LINE CLEAN UP CRITERIA (DCC)
FOR 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
Polychlorinated Biphenyls (PCBs)	1	5
Zinc (Zn)	--	500

Due to the potential for spills and/or exposure to contaminated soils, activities such as collection, on-site handling, containerization, storage, loading onto and off transport craft, shipment and delivery to the disposal facility all pose some risk to the environment, human health and safety. Although Tier II soil is not classified as hazardous, offsite transportation of Tier II soil shall conform with the Transportation of Dangerous Goods Regulations, as applicable.

2.2.2.2 Hazardous Materials

For this project, "hazardous" materials are defined as follows:

Hazardous materials are wastes or materials that are designated as "hazardous" under Northwest Territorial, Yukon Territorial or Federal legislation; or as "dangerous goods" under the *Transportation of Dangerous Goods Act* (TDGA). The *Canadian Environmental Protection Act* (CEPA) also regulates material containing PCBs at greater than fifty parts per million (ppm). Specifically identified hazardous materials include: batteries; asbestos; fuel tank bottom sludges; solvents; PCB-containing liquids; fuels and lubricating oils; alcohols and glycols; and heavy metal-contaminated liquids. All or some of these materials may be found at DEW Line sites. Disposal requirements of these hazardous materials are presented in Table 2.3. Other hazardous materials including explosives and radioactive materials are much less likely to be found at DEW Line sites.

TABLE 2.3
HAZARDOUS MATERIAL DISPOSAL REQUIREMENTS

Hazardous Material	Disposal Requirement
batteries	licensed treatment/disposal facility
asbestos	double bag and dispose of in on-site landfill
fuel tank bottom sludges	licensed treatment/disposal facility or on-site incineration
fuels and lubricating oils, alcohols, glycols	on-site incineration or southern disposal
heavy metal-contaminated organic liquids	licensed treatment/disposal facility
liquids containing organic compounds with chlorine concentrations > 1000 ppm	licensed treatment/disposal facility
liquids containing organic compounds with PCB concentrations > 2 ppm and < 50 ppm	licensed treatment/disposal facility
liquids and solids containing organic compounds with PCB concentration > 50 ppm	licensed storage, or disposal at the Alberta Special Waste Management System Facility - Swan Hills, Alberta
liquids containing organic compounds other than those described above	licensed treatment/disposal facility

If a substance is discovered that is suspected to be explosive, all ignition sources in the area shall be immediately eliminated (including no smoking, flares or flames in the immediate area). The material shall be cleaned up and disposed of only under the supervision of a permitted explosives expert. If fire or heat threatens the area of the potentially explosive material, all personnel will move to a distance of at least 1000 m from the material. The procedure outlined in the Contractor's Contingency Plan for dealing with such substances shall then be implemented.

Any suspected radioactive material will be tested and all confirmed radioactive materials shall be handled, packaged and disposed of as outlined under the TDGA and the Atomic Energy Control Act.

Hazardous materials may be encountered during landfill excavation and the sorting of site debris or demolition debris. Hazardous materials are to be collected and sorted using equipment suitable for the task.

Transportation of hazardous materials is to be in accordance with the Transportation of Dangerous Goods Regulations, as applicable.

2.2.3 DISPOSAL OF NON-HAZARDOUS MATERIALS

Non-hazardous materials expected to be encountered at DEW Line sites include wood, metal, empty barrels, creosote treated timbers, and concrete. Consistent with the clean up protocol, these materials are to be disposed of on site either in existing or proposed landfills.

2.2.4 CONSTRUCTION OF NORTHERN DISPOSAL FACILITIES

Based on the volume of contaminated soil estimated at each of the 21 DEW Line sites, the development of Northern Disposal Facilities is being considered for Cape Parry (PIN-M), Lady Franklin Point (PIN-3), Cambridge Bay (CAM-M), Shepherd Bay (CAM-3), Hall Beach (FOX-M), and Cape Dyer (DYE-M). The facilities will be designed to accept only DCC Tier II contaminated soils.

The proposed Northern Disposal Facilities (NDFs) design feature a double containment system to prevent contents from leaking and migrating into the surrounding environment.

The Northern Disposal Facilities (NDFs) will be developed entirely within permafrost, which will provide the primary containment barrier. This differs from southern landfills because the entire subsoil, and not just a thin liner, is effectively impervious. Moreover, the contents of the NDF will eventually be frozen. The length of time required for freezeback will be predicted as part of the design. This will effectively immobilize non-frozen liquid contaminants that may be in the soil pores, and eliminate the possibility of leachate migration.

Synthetic liners will provide secondary containment. A PVC (polyvinyl chloride) liner will be placed at the base and sides of the facility to prevent the potential movement of moisture during permafrost aggradation. The second liner, a geocomposite clay liner, will be installed in the cover of the facility to prevent drainage from percolating down through the cover fill.

2.2.5 DEMOLITION OF EXISTING FACILITIES

Facilities such as buildings, antennae, communication dishes, communication billboards and fuel storage tanks not required as part of the NWS operations are to be dismantled and disposed of appropriately. Hazardous materials are to be removed from the structures prior to demolition and disposed of as described in Section 2.2.2.2. Non-hazardous materials and asbestos are to be buried in a suitable on-site landfill. Materials are to be placed and compacted as described in the Contract Specifications and Drawings, to minimize landfill settlement.

Salvaging of scrap metal and/or other site debris will not be allowed due to the potential liability associated with the reuse of these materials **[to be confirmed]**.

2.2.6 LANDFILLS

Each of the 21 sites, with the exception of BAR-3, has at least one landfill where domestic waste, abandoned machinery and equipment, structural remains, barrels and other material have been buried. Surficial debris piles are also found at each site. Generally, existing landfills are covered with gravel, except as discussed below.

New landfills are to be developed in approved areas only where there is insufficient capacity in existing landfills to contain all non-hazardous material, DCC Tier I soil and asbestos. New landfills will be sited adjacent to existing landfills and/or demolition areas.

Clean up requirements for existing landfills are determined by the presence of contaminated leachate, extent of surface debris, and their susceptibility to erosion. These options are discussed below.

2.2.6.1 Closure of Non-Leachate Producing Landfills

Landfills that have been designated as non-leachate producing are to be covered with compacted granular fill, and graded to restore natural drainage across the area as detailed in the Contract Specifications and Drawings. Exposed debris will also be compacted and covered with granular fill.

2.2.6.2 Closure of Leachate Producing Landfills

A leachate containment system will be constructed at landfills that have been designated as leachate producing. The design incorporates a manufactured liner as well as a freezeback technique used in permafrost conditions. Sufficient fill material is to be placed over the landfill to promote permafrost aggradation into the landfill. This effectively freezes the landfill in an artificially raised permafrost layer. As detailed in the Contract Specification and Drawings, the components of the design include: a bedding layer; a geocomposite clay liner keyed into permafrost; granular material; a layer of insulating fill material; surface fill material to prevent surface infiltration and to limit leachate production; and a toe berm to protect the liner key from thermal degradation.

2.2.6.3 Excavation of Landfills

Landfills at three sites - BAR-1, BAR-4 and DYE-M, have been identified as requiring excavation.

The excavated landfill material will consist of debris and soil. The debris is to be classified as hazardous, non-hazardous, or potentially hazardous by visual assessment. Potentially hazardous material is to be tested and then classified as hazardous or non-hazardous. Potentially contaminated soil (stained) is to be transported to a secure sorting area, tested and classified as clean, DCC Tier I, or DCC Tier II contaminated soil.

2.2.7 CLOSURE OF EXISTING SEWAGE LAGOONS

Existing sewage lagoons and abandoned outfalls at all sites are to be closed as detailed in the Contract Specifications Section 02060, 02066, 02209 and 02223. Removal of abandoned outfall areas is to follow the same protocol as for contaminated soil with areas being regraded and covered with granular fill.

2.2.8 DEVELOPMENT OF GRANULAR BORROW AREAS

Each site typically has several sources of granular borrow material as identified on the site drawings. Where possible, existing sources of borrow material are to be used during clean up. After site clean up, all borrow areas are to be graded and blended to match surrounding contours.

2.2.9 SITE GRADING

Site grading operations are to focus on shaping and grading disturbed areas to blend in with natural contours. Disturbed areas include:

- contaminated soil excavation areas, including sewage outfalls and discontinued sewage lagoons;
- existing and proposed landfill areas;
- debris areas;
- areas disturbed during demolition operations;
- granular borrow areas; and
- any area disturbed during the establishment and operation of the construction camp, equipment storage and maintenance facilities.

During grading operations, natural drainage is to be restored where feasible. This will apply to areas which can be restored by excavation or placement of common site material. Reshaping during the period of maximum thaw will require the Contractor's careful supervision.

Areas which should not be disturbed include the operating LRR and SRR sites including grounding grids, satellite ground terminals, beach fuel tanks, helipads, etc., as described in the Contract Specifications and Drawings.

2.2.10 AIRSTRIPS AND ROADS

If required, certain existing or former abandoned airstrips may be used as sources of borrow material. Exceptions are:

- Airstrips controlled by Transport Canada or Arctic Airports at Tuktoyaktuk (BAR-3), Cambridge Bay (CAM-M), Hall Beach (FOX-M) and Broughton Island (FOX 5).

- The possible use of LRR airstrips at Shingle Point (BAR-2), Cape Parry (PIN-M), Lady Franklin Point (PIN-3), Shepherd Bay (CAM-3), Dewar Lakes (FOX-3) and Cape Dyer (DYE-M) is subject to negotiation with DNSWO prior to commencement.

The airstrips from which granular material is acquired are to be left in a level condition with culverts in place. Existing access roads will remain as is except that culverts will be removed and trenches excavated across the road to maintain drainage. The access roads at CAM-M and FOX-M, or at other sites where roads are required for specific purposes following clean up shall remain in place.

2.2.11 DEMOBILIZATION

Following the completion of clean up activities, all equipment, remaining fuel, supplies, and the construction camp are to be removed from the site by the Contractor.

3.0 REGULATORY OVERVIEW

3.1 INTRODUCTION

The Contractor will comply with all applicable environmental laws, regulations and requirements of Federal, Territorial, Inuvialuit Land Administration and other regional authorities, and will acquire and comply with such permits, approvals and authorizations as may be required (a partial list is presented in Table 3.1). The Contractor will be subject to and must comply with those permits and approvals obtained on behalf of and by DND to conduct this work. The Contractor, through all project phases, will work in close cooperation with regulatory authorities and DND to ensure compliance.

3.2 CANADA

Several federal Acts, regulations, and guidelines affect project activities across all Canadian jurisdictions. The most relevant to the DEW Line Clean Up EPP are outlined below:

- *The Canadian Environmental Protection Act* is a comprehensive piece of environmental legislation that regulates toxic substances from their production or import, to consumption, storage and disposal. This Act also incorporates the former Ocean Dumping Regulations and PCB Storage Regulations.

- *The Transportation of Dangerous Goods Act* and Regulations promote public safety in the transportation of dangerous goods. The Act applies to all handling, offering for transport and transporting of dangerous goods by any means of transport whether or not the goods originate from or are destined for any place or places in Canada.

- *The Fisheries Act* protects fish and fish habitat from pollution, negative alteration or disturbance, or impediments to fish movement. Fisheries and Oceans Canada will be given the opportunity to review permit applications or restoration plans submitted by other agencies.

- *The Arctic Waters Pollution Prevention Act and Regulations* govern development and shipping activity in Arctic waters adjacent to the mainland and islands of the Canadian Arctic, to ensure the continuing welfare of the residents of the areas, and to protect the ecological balance in water, ice and land areas.

- *The Migratory Birds Convention Act* provides for the protection of designated migratory species, including birds of prey, their habitats, and the regulated harvest of certain species.

- *The Canada Wildlife Act* provides for the involvement of the Government of Canada in cooperative research and management programs involving wildlife species normally the responsibility of provinces or territories. This is particularly relevant to rare and endangered species or species such as caribou which seasonally move across various regulatory boundaries.

- *The Canada Shipping Act* regulates shipping activities under the jurisdiction of Canada. Regulations cover technical standards of operation safety and pollution aspects related to shipping activities in Canadian waters.

- *The Constitution Act* is the enabling legislation for the Inuvialuit Final Agreement (IFA). The IFA in turn details the terms and conditions for developments and other uses of lands within the Inuvialuit Settlement Region. The IFA also provides for the creation of the Northern Yukon (Ivvavik) National Park and the terms and conditions under which any developments may take place there.

- *The Navigable Waters Protection Act* pertains to the erection of structures or facilities used to support or impede navigation in waters under the jurisdiction of Canada.

- *The Territorial Lands Act* provides the authority for administering and protecting lands under the direct control of the Minister of Department of Indian Affairs and Northern Development (DIAND) (Territorial Lands). The following regulations are pursuant to this act:

  - The Territorial Land Use Regulations provide regulatory control for maintaining sound environmental practices for any land use activities on Territorial lands. These regulations require that land use permits be issued for such operations as work involving the use of heavy equipment, establishment of camps, use of explosives, and clearing of lines, trails and rights-of-way, including construction of access roads.
  - The Territorial Quarrying Regulations establish the fee schedule and procedures for extracting Crown-owned limestone, granite, slate, marble, gypsum, loam, marl, gravel, sand, clay or stone from Territorial Lands. The regulations specify permits, applications, staking and dimensions of quarries.

- *The Yukon Waters Act* and Regulations provide for the conservation, development and use of the water resources of the Yukon and for the establishment of a Water Board to license all such water usage and waste disposal activities.

- *The Northwest Territories Waters Act* and Regulations provide for the conservation, development and use of the water resources of the Northwest Territories and for the establishment of a Water Board to license all such water usage and waste disposal activities.

- *Canada Labour Act* and Regulations under the Act is the Labour code for all Federal Employees or activities on Federally owned or controlled land. Private Provincial or Territory employees are governed by the Provincial/Territorial Labour Acts, even when working on Federal lands or facilities. The labour acts control such things as statutory holidays, maximum work hours and minimum wages.

- *Atomic Energy Control Act* and Regulations describe the packaging requirements and approvals needed for the transportation of radioactive materials.

- *Explosives Act* and Regulations define explosives, the permitting requirements needed to use explosive substances, packaging, handling and transporting requirements, and safety requirements.

- National Fire Code (NFC) establishes the standard for fire prevention, fire fighting and life safety in buildings in use, including standards for the conduct of activities causing fire hazards, maintenance of fire safety equipment and egress facilities, standards for fire extinguishers, etc. In addition, the NFC establishes the standard for prevention, containment and fighting of fires originating outside buildings which may present a hazard to a nearby community and sets the standards for the storage and handling of dangerous goods, flammable liquids and combustible liquids.

- Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments indicate the degree of treatment and effluent quality that will be applicable to all wastewater discharged from existing and proposed Federal installations.

- National Guidelines for the Landfilling of Hazardous Waste (CCME Report, April 1991) are to be used by regulators, designers, owners, and operators of hazardous waste facilities. They cover site selection, design, construction, closure and post-closure care, monitoring, and operation. They are intended for new, not existing facilities.

- Guidelines for Preparation of Hazardous Material Spill Contingency Plans identify factors that should be considered in the development of hazardous material spill contingency plans and the information that should be incorporated into a comprehensive contingency plan.

- Code of Good Practice on Dump Closing or Conversion to Sanitary Landfill at Federal Establishments (1977) outlines the guidelines to improve operation and properly close existing dumps. It is intended to promote a consistent approach to the clean up of existing dumps to prevent contamination of water, air and land and to ensure that the best particular control technology is used.

- Code of Practice for Used Oil Management in Canada describes environmentally sound options for the handling, storage, collection, transportation, recycling, reuse and disposal of used oils in Canada. It is intended to provide guidance for used oil generators and to regulatory authorities in the formulation of provincial or regional used oil management strategies.

- Canadian Environmental Quality Criteria for Contaminated Sites compiled by the Canadian Council of Ministers of the Environment (CCME) provide numerical limits for contaminants in soil and water intended to maintain, improve, or protect environmental quality and human health at contaminated sites. The criteria are intended to provide general technical and scientific guidance to provincial, federal, territorial, and non-governmental agencies in the assessment and remediation of contaminated sites across Canada. They serve as bench marks against which to assess the degree of contamination at a site.

- Canadian Drinking Water Guidelines are also compiled by CCME for Canadian Drinking Water Quality for specified uses of water likely of concern at contaminated sites.

3.3 YUKON TERRITORY AND NORTHWEST TERRITORIES

Of the 21 DEW Line sites included in this project, only the BAR-1 (Komakuk Beach) and BAR-2 (Shingle Point) sites are located in the Yukon Territory. The remaining 19 sites are in the NWT.

3.3.1 YUKON TERRITORY

The Yukon is administered by the Yukon Territorial Government, the Inuvialuit Land Administration (ILA) and DIAND. DIAND administers ten Resource Management Areas (RMAs) in the Yukon. BAR-1 and BAR-2 are in RMA 10, with headquarters at Dawson City.

In addition to the Federal and Territorial Acts and Regulations identified in Section 3.2, the following ordinances apply in the Yukon:

- The Yukon Archaeological Sites Regulations, pursuant to the *Yukon Territory Act*, protects archaeological sites in the Yukon from disturbance and prohibits the removal of archaeological specimens, except under permit.

- *Gasoline Handling Act* regulates the storage and handling of POL in the Yukon.

- *Environment Act* provides for the maintenance of essential ecological processes, the preservation of biological diversity and the management of the environment of the Yukon. The *Act* promotes sustainable development in the Yukon and ensures comprehensive and integrated consideration of environmental and socioeconomic effects in public policy making. It also facilitates effective participation by Yukon residents in the making of decisions that will affect the environment.

  Draft Special Waste Regulations provide for intended procedures for disposal of special wastes including oil, antifreeze, other petroleum products, cleaners, solvents, and biohazardous waste.

- *Occupational Health and Safety Act* outlines the health and safety standards and regulations to be maintained at workplaces to ensure the health and safety of all persons.

- *Fire Prevention Act* outlines the responsibilities of all personnel responsible for fire fighting activities; fire inspection requirements; and, penalties given out for offenses.

3.3.2 NORTHWEST TERRITORIES

The Territorial Government, the Inuvialuit Land Administration (ILA) and DIAND jointly administer the part of the NWT which contains DEW Line sites. The Territorial seat of government and the DIAND regional office are in Yellowknife, while the ILA offices are based in Inuvik. DIAND local offices are also present in Inuvik, Yellowknife and Iqaluit. In addition to the Federal and Territorial Acts and Regulations identified in Sections 3.2 and 3.3.1, the clean up of the DEW Line sites in the NWT is also governed by the following:

- *The Explosive Use Act* provides controls for surface blasting other than for mining purposes.

- *The NWT Wildlife Act* provides for the protection of wildlife and wildlife habitats as well as regulated harvest of selected species.

- *The NWT Environmental Protection Act* provides for protection of the environment from the discharge of contaminants, clean up of contaminants and unsightly premises. In addition, the powers of inspectors as well as offenses and penalties are defined. The Act applies only to situations not authorized by other Canadian Acts in the NWT.

- The Spill Contingency Planning and Reporting Regulations outline requirements for filing of a contingency plan and for reporting of spills.

- The Northwest Territories Archaeological Sites Regulations, pursuant to the *Northwest Territories Act*, protects archaeological sites in the Northwest Territories from disturbance and prohibits the removal of archaeological specimens, except under permit.

- *Safety Act*
  Occupational Health Regulations outline the health and safety standards to be maintained at workplaces to ensure the health and safety of persons.

- Guidelines for Removal of Materials Containing Friable Asbestos outline guidelines to be used to remove friable asbestos.

- Guidelines for Municipal Type Wastewater Discharges outline requirements for water quality effluent from these facilities.

- Guidelines for Discharge of Treated Municipal Wastewater outline requirements for water quality effluent from these facilities.

In addition to the above noted Acts and Regulations, both the Yukon and NWT have *Land Titles Acts* and Regulations which govern the procedures for the registration, recording and transfer of documents relating to titled lands in their respective areas. The Federal Real Property Act provides for the disposition of Crown lands not covered under the Territorial Lands Act or other legislation.

3.4 INUVIALUIT LAND ADMINISTRATION

Activities associated with clean up of DEW Line sites in the Inuvialuit Settlement Region will require the provision of Land Use Permits and Quarry Licenses. Under the terms of the permits and licenses, a variety of user fees are specified. Requirements governing access and use of ILA land are provided in the document **"Inuvialuit Land Administration Rules and Procedures"**. The appropriate administrative body shall be contacted directly to confirm permitting, licensing and fee details for any undertaking. The following DEW Line sites are within the Inuvialuit Settlement Region:

- BAR-1 Komakuk Beach
- BAR-2 Shingle Point
- BAR-3 Tuktoyaktuk
- BAR-4 Nicholson Peninsula
- PIN-M Cape Parry
- PIN-1 Clinton Point.

3.5 NUNAVUT

In 1990, leaders of the federal and territorial governments and the president of the Tungavik Federation of Nunavut (TFN) signed an Agreement-in-Principle establishing Nunavut, a land claim settlement area incorporating almost two million square kilometres of the present NWT. Inuit ratification of the document was achieved in November 1992, and the Land Claim Agreement was signed by the Federal government, GNWT and TFN in May 1993. Nunavut will become the Nunavut Territory, with its own government, legislation and powers by April 1999. Nunavut Tunngavik Incorporated (NTI), established on April 1, 1993, is an Inuit corporation in charge of implementing the Nunavut Land Claims Agreement. One of the public institutions created from this agreement will be the Nunavut Impact Review Board (NIRB), which will screen project proposals to determine the need for review of environmental, social or economic impacts. The legislation required for the establishment of the NIRB is scheduled for completion by July 1995, and must be in place by no later than 1996. The board will be operational following completion of the legislation and appointment of members; however, since the DEW Line Clean Up environmental screenings are expected to be submitted before July 1995, the clean up of the fifteen DEW Line sites (those not identified in Section 3.4) that are located in the Nunavut Settlement Area, will not be subject to review by NIRB. Another institution created from the agreement will be the Nunavut Planning Commission (NPC). The timetable for establishment of this commission is the same as for the NIRB. The NPC will be responsible for land use planning and ensuring that projects are in conformity with land use plans. It is thus probable that the commission will have requirements for permitting and licensing of land use, quarrying and right-of-way access.

3.6 OTHER

Disposal of contaminated wastes is to be conducted by licensed waste handlers, in compliance with the appropriate legislation.

3.7 PERMITS

The Owner (DND) and the Contractor involved in the site clean up process will be required to acquire all necessary permits, approvals and authorizations. A partial list of these requirements is presented in Table 3.1 with an approximate minimum turnaround time. **[Responsibility for obtaining permits to be determined.]**

TABLE 3.1
LIST OF APPLICABLE AUTHORIZATIONS FOR CLEAN UP ACTIVITIES

Authorization	Authority	Activity to Which Authorization Applies	Contact Person	Minimum Turnaround Time
Land Use Permit	Territorial Lands Act, Territorial Land Use Regulations (Yukon)	Camps, heavy equipment, explosives, new roads, fuel storage and use, landfill, terrain protection, waste disposal.	Mark Zrum (403) 667-3173	42 days
	Inuvialuit Land Administration Rules and Regulations	Activities on ILA lands.	Jane Bicknell (403) 979-2737	6-8 weeks
	Territorial Land Use Regulations (NWT)	Camps, heavy equipment, explosives, new roads, fuel storage and use, landfill, terrain protection, waste disposal.	Jim Umpherson (403) 920-8171	42 days
Quarrying Permit/ License	Territorial Quarry Regulations (Yukon)	Extraction, staking, dimensions.	Mark Zrum (403) 667-3173	42 days
	Inuvialuit Land Administration	Extraction, staking, dimensions.	Jane Bicknell (403) 979-2737	6-8 weeks
	Territorial Quarry Regulations (NWT)	Extraction, staking, dimensions.	Jim Umpherson (403) 920-8171	42 days
Archaeological Research Permit	Yukon Territory Act, Yukon Archaeological Sites Regulations (must be applied for by qualified archaeologist)	Investigation of archaeological sites, mitigation, monitoring.	Jeff Hunston (403) 667-5983	3 weeks
	Northwest Territories Act, Northwest Territories Archaeological Sites Regulations (must be applied for by qualified archaeologist)	Investigation of archaeological sites, mitigation, monitoring.	Charles Arnold (403) 920-8084	3 weeks
Authorization for Works or Undertakings Affecting Fish Habitat	Fisheries and Oceans Canada (Yukon)	Stream crossing, culverts, drainage, siltation and erosion control, effluent discharge.	Burt Hunt (403) 667-2235	1 week
	Fisheries and Oceans Canada (NWT)	Stream crossing, culverts, drainage, siltation and erosion control, effluent discharge.	Ken Chang-Kue (403) 920-6640	1 week

TABLE 3.1
LIST OF APPLICABLE AUTHORIZATIONS FOR CLEAN UP ACTIVITIES

Authorization	Authority	Activity to Which Authorization Applies	Contact Person	Minimum Turnaround Time
Transportation Permits	Transportation of Dangerous Goods Act	Shipping.		Advance notification 30 days
Transportation Permits	International Air Transport Association Dangerous Goods Regulations	Air transport.		Advance notification 30 days
Fishing Licenses	Department of Renewable Resources	Recreational fishing.		
Firearms Acquisition Certificates	RCMP	Use and storage of firearms.	Any RCMP detachment	6 weeks
Water Use and Waste Disposal Licenses	Yukon Waters Act	Water use and waste disposal.	Judi Doering (403) 667-3980	4 months
	Northwest Territories Water Act	Water use and waste disposal.	Pam Lemouel NWT Water Board (403) 920-8191	8 weeks

4.0 GENERAL ENVIRONMENTAL PROTECTION MEASURES

4.1 CONSTRUCTION CAMP

Due to the sparseness and fragile nature of Arctic vegetation, camp sites are to be situated in areas with minimal ground cover. Potential construction camp sites have been identified on Contract Drawings. Construction, use, and abandonment is to conform to Land Use Permit conditions.

The construction camp at each site is to be located in an area that does not impede surface drainage and is at least 30 metres from the nearest water body. Ice-rich substrates are to be avoided. The camp is to be located as close as practicable to the main area(s) of clean up activity to minimize traffic over the site. Where possible, the construction camp is to be located on an existing gravel pad or in a former borrow area. Permafrost is to be protected by construction of gravel pads and/or elevation of heated buildings on wooden supports. Areas containing archaeological resources are to be avoided during construction. Siting shall also avoid interference with LRR and SRR activities.

4.2 EQUIPMENT AND VEHICLE USE AND MAINTENANCE

Vehicles and equipment operated off established roads and trails have the potential to disturb vegetative cover, leading to rutting, permafrost degradation and erosion in areas of fine-grained, permafrost-sensitive terrain. Off-road use of vehicles can also lead to the illegal harassment of wildlife and disturbance of archaeological sites.

Terrain protection shall be accomplished by restricting all vehicles to established roads, stream crossings and work pads unless specifically exempted by terms of the Land Use Permit and with the concurrence of the Land Use Inspector. Following heavy rains, vehicle and heavy equipment use outside of road and work pad areas is not permitted until the soil has drained sufficiently to prevent excessive rutting and until authorized by the Engineer. Vehicles shall not be used to harass any species of wildlife.

Environmental concerns related to vehicle maintenance include ground and water contamination from spills while refuelling and improper disposal of waste crankcase oil and other petroleum- or glycol-based products.

Fuelling and lubrication of equipment shall be conducted in a manner that avoids spillage of fuels, oils, greases and coolants. When refuelling equipment, operators are to use leak-free containers and reinforced rip- and puncture-proof hoses and nozzles. Operators are to be in attendance for the duration of the refuelling operation and are to ensure that all storage container outlets are properly sealed after use.

4.3 STORAGE AND HANDLING OF FUEL AND OTHER HAZARDOUS SUBSTANCES

Spilled fuel is a health and safety hazard, and can contaminate nearby water sources, damage aquatic habitat, kill fish and other aquatic life, and render soil infertile for plant growth. During clean up activities, the Contractor is to store fuel in approved storage facilities at a location designated in the Land Use Permit that does not interfere with LRR and SRR activities. Fuel is to be stored in self-dyking containers, or shall be positioned over an impervious liner and surrounded by an impervious dyke of sufficient height to contain not less than 110% of the capacity of the tank. The location is to avoid sites that slope towards waterways or other environmentally sensitive areas; exhibit ponding or flooding; or have high groundwater tables, excessive seepage, or ice-rich (thaw-sensitive) soils. Archaeological resources shall also be avoided as described in Section 5.9. All barrels and associated materials and equipment shall be removed from the work site at the conclusion of the work. Smoking is prohibited within 10 metres of the fuel storage facility. Fuel storage shall be inspected at least once each week for the duration of the project. Fire-fighting equipment is to be made available for immediate access at each fuel storage facility.

All waste petroleum products including used oil filters shall be treated as hazardous material and handled and disposed of following the requirements detailed in Section 02090 of the Contract Specifications. Waste oil shall not be used for dust suppression. All fuel spills shall be reported to the Engineer and, as provided by legislation, to the applicable government authorities, as indicated in Section 7.4.

The Contractor shall conduct regular inspections of all machinery hydraulic, fuel, and cooling systems. Leaks shall be repaired immediately. Emergency spill equipment including at least two fuel pumps, empty 200 litre barrels and absorbent material sufficient to clean up a 1,000 litre spill shall be preassembled and maintained at all permanent fuel storage sites and work camps (see Contingency Plans, Section 7.0).

4.4 WATER MANAGEMENT

The extraction of water from water bodies has the potential to adversely affect fish and fish habitat where the water level or flow rate is decreased excessively. With the exception of the water supply at CAM-5, existing water sources at the DEW Line stations may be used by the Contractor as long as such use does not adversely affect fish habitats.

Potable water must be treated where required to protect human health. The camp water supply shall be remote from sources of contamination. The camp water supply equipment shall include a standard chlorination or iodisation unit for treating potable water, and the potable water shall be tested for bacteria as required by the appropriate public health ordinances.

Water is also required for barrel washing and other clean-up activities. Depending on the volume of water, alternate supplies may be required. This will require a water use licence from a Water Board and the Contractor shall adhere to all conditions of the license.

Water withdrawals must not endanger fish or draw down the water level so as to adversely affect fish habitat. For this reason, water withdrawal rates are not to exceed 10% of existing stream flow or 10% of the total volume of a water body, whichever is appropriate. Water intake hoses are to be equipped with screens with a mesh size of 2.5 millimetres or less to prevent the intake of fish.

4.5 DOMESTIC WASTE MANAGEMENT

Improper garbage disposal results in wind-blown litter and potential for problems with wildlife. Improper disposal of kitchen refuse attracts scavengers, particularly foxes and bears. Occasionally wolves, other mammals and a variety of birds may be attracted to the camp dump. Foxes are easily habituated to human presence and food, and represent a potential source of diseases, especially rabies. Bears are a safety hazard to site personnel at all times and can seriously damage buildings and equipment while attempting to obtain food.

All kitchen wastes and other non-hazardous wastes are to be buried in an on-site landfill unless otherwise specified. If more than one landfill exists on a site, the landfill selection is to be determined jointly by the Contractor and Engineer. The location will meet all Land Use Permit regulations, and will not interfere with NWS Operations. Kitchen wastes shall be temporarily stored in metal, animal-proof containers. Burning of garbage will be permitted provided it is in compliance with the Land Use Permit.

The Contractor, in consultation with the Engineer, will determine acceptable options for sewage disposal. Each construction camp shall provide primary sewage treatment, using a portable septic tank system or equivalent, prior to discharge. Any further treatment requirements will be specified in the conditions of the Land Use Permits.

4.6 ROAD CONSTRUCTION AND MAINTENANCE

As approved on each site's Land Use Permit, some roads will provide access to sources of aggregate, potable water and/or landfill locations. All sites are located in permafrost zones. Permafrost influences road construction in areas of fine-textured and ice-rich soils. The major environmental concerns related to new site access roads are the potential to disrupt vegetation and, with it, the permafrost regime which in turn can disrupt surface drainage, cause erosion and result in erosion scars on the landscape. Such disruptions persist for decades in the Arctic and there are no practical reclamation procedures for such terrain disturbance. The 1984 DIAND report "Land Use Guidelines: Access Roads and Trails" shall be followed so that road and trail maintenance shall emphasize preservation of the permafrost regime, vegetation patterns, existing surface drainage patterns, water quality and stream flows The latter concern is particularly important if fish make seasonal migrations past the road.

Prior to and pending a decision by territorial archaeological officials, all planned new road rights-of-way are required to be surveyed by a qualified permitted archaeologist to identify archaeological resources along the right-of-way. Archaeological resources are to be avoided

during construction as described in Section 5.9. Roads are not to be sited within 30 metres of other ecologically sensitive areas. Ice-rich soils, especially peatlands, are also to be avoided during road construction.

The road bed is to be prepared with a sufficient thickness of fill to prevent terrain damage. Culverts are to be installed to maintain natural cross drainage and prevent ponding. These culverts shall be removed from such roads and drainage restored at the end of the clean up operation. Access roads shall be monitored for signs of erosion and remedial action taken where necessary. Oil is not to be used for dust control. Dust suppression, if required, is to be effected with water only.

4.7 STREAM CROSSING AND DIVERSION

Construction activities associated with bridging, channelizing and culverting streams have the potential to degrade the quality of streams when executed improperly. Siltation, erosion and degradation of water quality can result. The environmental protection of streams, lakes, rivers and coastal waters is therefore a priority to maintain fish habitat and population viability.

All government regulations, licensing requirements/procedures and inspections regarding the protection of water quality and stream integrity to prevent destruction of spawning areas are to be adhered to by the Contractor. An authorization from Fisheries and Oceans Canada for alterations or crossings of any water body constituting fish habitat and a water license for watercourse crossing and diversions are required and must be obtained by the Contractor.

To prevent siltation of waterways and disruption of streambeds, the following procedures will apply:

- siltation of waterways shall be prevented through the use of cofferdams, silt barriers, and by minimizing activities adjacent to watercourses;
- equipment shall not be operated in waterways;
- streambeds are not to be used for borrow material;
- excavated fill, waste material or debris shall not be disposed of in waterways;
- concentrations of fish shall be avoided during activities adjacent to waterways; and
- streams shall not be forded at or immediately above locations containing concentrations of fish.

When removing culverts, the following procedures are to be followed to minimize disruption to stream beds and potential fish habitat:

- the removal of culverts should be timed to avoid concentrations of fish if such concentrations exist;
- cofferdams of non-erodible material, silt barriers, or other suitable methods shall be used to control siltation downstream of the work area;

- the site shall be resloped to conform to grade of adjacent stream bank following removal of the culvert;
- riprap or other suitable methods shall be used, if required, to stabilize the bank at the worksite; and
- all silt controls shall be removed following completion of work and ensure grade of the streambed is restored.

4.8 BORROW PIT AND QUARRY DEVELOPMENT AND OPERATION

Both the Yukon and the Northwest Territories have specific permit requirements for opening and operating gravel pits and quarries. Each Quarry Permit can be expected to have site-specific provisions for environmental protection. DIAND issues permits under the Territorial Quarrying regulations. Permit environmental protection conditions are for the purpose of minimizing the impact of development and extraction activities on surface drainage patterns, water quality, soil erosion, vegetation and, in some cases, wildlife or fish. The Contractor shall comply with all terms and conditions of the quarry permits, including recontouring/reclaiming and site clean up prior to site abandonment.

The number of borrow pits opened shall be minimized by using existing borrow pits and aggregate stockpiles where feasible. Archaeological resources are to be avoided during the siting of borrow areas. Borrow areas are to be located at least 30 metres from the nearest water body providing potential fish habitat, and other sensitive resources.

If organic overburden exists, it is to be stripped and stockpiled separately for use in restoring the borrow area. Following excavation, the area is to be recontoured to restore natural drainage patterns and the overburden worked into the recontoured borrow area to prevent erosion. Drainage and run-off control using diversion ditches and sediment filters shall be used as required to prevent sediment-laden run-off from reaching water bodies.

During aggregate extraction, vehicle and equipment operations in areas adjacent to the borrow pit are to be controlled to minimize the extent of disturbance. Aggregate is to be stockpiled on ice-poor, well drained ground such that surface drainage is not impeded. The site is to be located at least 30 metres from archaeological resources, water bodies, and other sensitive resources.

Development of additional borrow areas that are not identified on site plans will be at the discretion of the Engineer and shall meet all siting criteria and permit requirements as discussed above.

4.9 SECURE SORTING AREAS

Improper site selection and preparation of sorting areas can result in soil erosion, permafrost degradation, disturbance of archaeological resources, contamination of surrounding areas, and disruption of vegetation and wildlife.

The Contractor is to develop a secure area(s) for the sorting and processing of suspected or known contaminated soils and hazardous materials. The site shall be at least 30 metres from the nearest water body, on ice-poor, well drained soil. The site shall be as close to the location of work as is practicable and shall be protected with an impermeable liner as directed in Section 02090 of the Contract Specifications. Movement of vehicles and equipment between the sorting area and work site shall be controlled to prevent the spread of potentially hazardous material and contaminated soils along roadways.

Leachate, meltwater and runoff from the secure sorting area (and landfill excavation) are to be collected, handled, tested and disposed of in accordance with the requirements identified in the Contract Specifications.

4.10 CONTAMINATED SOILS

Improper excavation of contaminated soils can result in soil erosion, permafrost degradation, contamination of surrounding areas, and disruption of vegetation and wildlife.

DEW Line Clean Up Criteria (DCC) have been established as remediation criteria for soil. All soils containing substances classified as DCC Tier II are to be removed from contact with the Arctic ecosystem and placed in Northern Disposal Facilities. Soils classified as Tier I are to be landfilled on-site.

Locations of contaminated soil are delineated on site drawings, and the respective levels of contamination are detailed in the Contract Specifications. These locations are typically associated with spill/stained areas and sewage outfalls. Soils exceeding the DCC criteria are to be removed following the protocol detailed in the Contract Specifications and Drawings. Disruption to adjacent areas is to be minimized during excavation. Spillage of material during transportation between the excavation site and the disposal location is to be avoided. Following excavation of Tier II contaminated soil, excavation equipment is to be steam cleaned in a secure area capable of collecting all wash water and waste. The wash water and waste is to be collected, containerized, transported and disposed of as detailed in the Contract Specifications. The excavated area is to be filled with granular material promptly following completion of work, and the surface regraded to match adjacent areas.

At BAR-1 a fuel spill area is to be encapsulated and regraded to prevent hydrocarbon migration.

A program of sampling and confirmatory testing of outfalls, catchment areas, and potentially contaminated soil from landfill excavations will be undertaken by the Contractor in conjunction with the Engineer as outlined in the Contract Specifications.

4.11 LANDFILL MODIFICATION, CLOSURE AND DEVELOPMENT

Clean up activities at landfills and landfill construction can result in improper site selection and preparation of sorting areas can result in soil erosion, permafrost degradation, disturbance of archaeological resources, contamination of surrounding areas, and disruption of vegetation and wildlife.

Landfills located in areas that are not subject to erosion and are not a source of contaminated leachate are to be capped with fill material to provide a minimum cover thickness as indicated on the Contract Drawings. The site is to be regraded to restore natural drainage patterns and topography.

Landfills identified as a source of contaminated leachate as per the clean up protocol will require additional protection to minimize leachate generation and contain leachate. The design incorporates a geocomposite clay liner and permafrost to provide double containment of landfill contents.

If sufficient capacity is available in existing landfills, non-hazardous waste is to be placed, compacted and covered with granular fill material.

New landfills are to be developed only if sufficient capacity is not available within existing landfills. Landfills are to be sited in well-drained areas that do not impede surface drainage and are at least 30 metres from the nearest water body. Archaeological resources are to be avoided during construction. Landfills are not to be constructed within 30 metres of peatlands or other sensitive resources.

Organic material, if present, is to be stripped and stockpiled for reuse. Waste material is to be added to the landfill following the procedures detailed in Section 02239 of the Contract Specifications. The size of the landfill is to be minimized. Drainage controls such as diversion ditches and sediment filters are to be provided as required to prevent runoff from reaching water bodies during construction of the landfill.

Upon closure of the landfill, the site is to be capped with fill as specified on the Drawings. The site is to be regraded to match the surrounding topography, and any original organic material reincorporated.

4.12 CONSTRUCTION OF NORTHERN DISPOSAL FACILITIES

The design of the NDFs is expected to mitigate potential impacts associated with water quality and permafrost degradation. The proposed locations are all immediately adjacent to existing station facilities with the exception of CAM-M. This minimizes potential impacts of disturbance to vegetation, wildlife, and habitat components. The proposed location at CAM-M is 2 km northwest of station Area, in a comparatively undisturbed area. Borrow extraction occurred in the general area of the proposed NDF site at CAM-M. A survey of the environment at this site was conducted in 1994, in conjunction with geotechnical drilling activities, and no significant

terrestrial resources were noted. Potential archaeological resources should be confirmed with Territorial archaeological officials to determine if a survey is required prior to development. Additional protection procedures to mitigate potential impacts may therefore be required.

4.13 REMOVAL OF LANDFILLS

Removal of landfills can result in soil erosion, permafrost degradation, disturbance of archaeological resources, contamination of surrounding areas, and disruption of vegetation and wildlife.

At three sites (BAR-1, BAR-4, and DYE-M), removal and/or stabilization and partial removal of landfills in areas of high erosion potential is required. Little information exists on the types of waste materials present in these landfills, but it is expected that they contain contaminated soils and a mixture of hazardous and non-hazardous materials.

The contents of the landfills to be excavated are to be sorted into hazardous and non-hazardous material in a secure sorting area, sampled and tested as required, and the material disposed of in accordance with the Contract Specifications. If material can be identified as non-hazardous or hazardous at the point of excavation it can be taken directly to the landfill or temporary storage areas, as appropriate. The secure sorting area is to be sited and operated according to the protection procedures detailed in Section 4.9. Appropriate personnel protective equipment should be used during handling of contaminated soil and hazardous materials.

Disturbance to areas adjacent to the landfills to be excavated is to be minimized by restricting vehicle and equipment traffic outside of designated work areas. Adequate drainage control is to be provided using diversion channels and sediment filters to control run-off across the site. To minimize runoff, excavation work is to be curtailed during periods of heavy rainfall.

During landfill excavation, it is necessary to avoid releasing contaminants into the environment. The following protocol for separating hazardous and non-hazardous materials from within landfills is to be used in association with the Contingency Plan (Section 7 of this EPP):

Sorting and Classification of Material

- The excavation is to take place under the supervision of the Contractor's qualified and trained hazardous waste specialists.
- Site personnel are required to wear environmental protection equipment as detailed in Section 02240 of the Contract Specifications.
- A secure sorting area is to be established near the working face of the excavation, if possible, for the identification, classification and packaging of hazardous materials.
- Prior to excavation, the working face of the area to be excavated shall be visually examined to assess the type of materials present.
- If, based on the visual inspection, the material appears to be non-hazardous, the excavation can proceed using standard excavation methods.

- The excavation will be monitored continuously to identify potentially hazardous material.
- If suspected hazardous material is identified, confirmation of the hazardous nature of the material is to be carried out.
- Samples of stained soil are to be taken and tested to determine the type and concentration of contaminants. Contaminated soil is to be classified using the DEW Line Clean Up Criteria (DCC).
- All contaminated and potentially contaminated soil is to be removed to a secure sorting area prior to continuing with the excavation.

Excavation of Barrels

- If intact barrels are encountered during the excavation, the area is to be examined immediately to determine the best means for excavating the barrels. Excavated intact barrels are to be placed in overpacks at the excavation site and then moved to the secure sorting area for inspection and classification. Barrel contents are to be classified according to media (solid, liquid or mixed) and contents (water, organics, mixtures, other) and then tested to determine the nature and concentration of contaminants. Disposal of barrel contents is to be in accordance with Section 02090 of the Contract Specifications.
- Those barrels whose contents are sent for southern disposal or incineration are to be steam rinsed, and wash water collected and analyzed as described in Section 02090 of the Contract Specifications. Wash water is to be disposed of on-site if it is not contaminated. If contaminated, it is to be treated as hazardous material and shipped off-site for disposal. Washed barrels are to be crushed and buried in the on-site landfill.

Disposal of Excavated Material

- All other hazardous and suspected hazardous materials are to be disposed of according to the criteria and methods identified in this EPP and in the Contract Specifications.
- All non-hazardous materials and asbestos are to be placed in an on-site landfill.

Spills During Excavation

- An emergency response plan for response to spills and other emergencies during excavation is to be developed by the Contractor and reviewed by relevant authorities for compliance with emergency response requirements prior to commencement of work.
- In the event of a spill, the spill contingency plan shall be invoked and appropriate action taken.

- A full range of clean up equipment is to be available at the site of the excavation to contain and clean up spills, as required. The equipment is to include booms (sorbent and containment), sorbents for clean up, fire extinguishers for A-B-C fires, overpacks (large barrels which can hold standard 205 litre barrels) for barrels and contaminated soils, pumps, hand shovels, picks and containment barriers such as plastic sheeting.

After landfill excavation, the area is to be promptly regraded to restore natural drainage patterns and to match adjacent topography. In the event that excavation is only partially completed by the end of the construction season, fill shall be placed against the excavated face and disposed of at the start of the next excavation season in accordance with Section 02240 of the Contract Specifications.

4.13.1 Excavation of Landfills and Recovery of Barrels Under Water

The Contractor shall perform a preliminary inspection and assessment of the barrels under water to determine their condition prior to removal. Intact barrels with minimal corrosion shall be assumed to contain hazardous material until recovered and tested. Appropriate measures (e.g. silt fences) must be taken to minimize contaminant release into the water body. Other requirements for the recovery and disposal of barrels under water are described in the Contract Specification Section 02090.

4.14 DISPOSAL OF SITE DEBRIS

Improper disposal of site debris can result in human health hazards, contamination of surrounding areas, disruption of vegetation and wildlife, and continued aesthetic impacts.

Visible site debris is to be sorted into hazardous and non-hazardous components. Hazardous material with the exception of asbestos is to be containerized and stored in a secure location for appropriate disposal. Non-hazardous material and asbestos are to be buried in a suitable landfill location. Crushed and empty barrels are to be landfilled. Contents of intact barrels are to be tested and disposed of as described in the Contract Specifications Section 02090. Asbestos is to be handled and disposed of according to the methods described in the Contract Specifications Section 02081.

Workers are to wear appropriate protective clothing when handling potentially hazardous material as directed in Section 02090 of the Contract Specifications. Off-road activity is to be kept to a minimum during collection of site debris.

4.15 DEMOLITION OF BUILDINGS AND STRUCTURES

Improper demolition of buildings and structures can result in human health hazards and impacts on wildlife, particularly nesting raptors.

Debris from the demolition of facilities is to be dealt with in the same manner as visible site debris. Prior to the demolition of structures all hazardous materials are to be removed, properly stored, and eventually disposed of as per the Contract Specifications. Residual fuel and sludge in fuel storage tanks is to be removed and disposed of in accordance with Section 02060 and Section 02090 of the Contract Specifications.

All residual debris from the site is to be removed down to grade. Structures are to be demolished to the top of concrete foundation level. Non-hazardous demolition debris shall be disposed of as directed in the Contract Specifications and Drawings. Gravel pads and other foundations are to be regraded to restore natural drainage patterns and to match adjacent topography.

Structures containing nests actively occupied by birds of prey are not to be dismantled or disturbed during the nesting season (see Section 5.8).

4.16 CLOSURE OF SEWAGE FACILITIES

Improper closure of sewage facilities can result in soil erosion, permafrost degradation, contamination of surrounding areas, and disruption of vegetation and wildlife.

Existing lagoons and abandoned outfalls containing contaminated soil are to be cleaned up, and the residue removed and disposed of in accordance with Section 02066 of the Contract Specifications. Disturbance in adjacent areas is to be minimized by restricting vehicle and equipment traffic to designated work areas. Excavated material is to be replaced with granular fill, and the area regraded to restore natural drainage patterns and topography. At CAM-M and FOX-M, DNWSO will be constructing new sewage lagoons. These activities shall be coordinated as described in the Plan of Construction Operations.

4.17 MARINE VESSEL MOVEMENTS

Marine vessel movements have the potential to disrupt marine mammals and seabirds, and to interfere with local resource use.

It is anticipated that marine vessels will be used for the transport of materials at all DEW Line sites except CAM-4, CAM-5 and FOX-3. Under certain circumstances, marine vessels can adversely affect wildlife. Sea mammals and flocks of waterfowl must be avoided by all shipping. To minimize disruption to hunting and fishing activities, vessel traffic will be restricted to traditional shipping lanes, where they exist. Vessel operators are to avoid marked fishing gear that may be encountered near shore. It is the Contractor's responsibility to inform all marine vessel operators of all applicable EPP requirements when scheduling arrangements are made or at other appropriate periods prior to the arrival of the vessel at the site.

4.18 AIRCRAFT MOVEMENTS

Aircraft movements can disrupt wildlife and avifauna since many animals are sensitive to the sight and sound of nearby aircraft.

It is anticipated that fixed wing and/or helicopter support will be used at all DEW Line construction sites to transport personnel, perishable supplies and various construction materials and equipment.

Under certain circumstances, low-flying aircraft, particularly helicopters, can disturb wildlife. Nesting birds may desert their nests, break eggs or leave eggs exposed to predators. Waterfowl and birds of prey are particularly sensitive. Large mammals such as caribou and muskoxen can stampede, resulting in calves being separated from their mothers, spontaneous abortion by pregnant cows and/or a variety of physical injuries which can lead directly or indirectly to increased mortality. Bird strikes may cause damage to aircraft.

Where concentrations of birds or mammals are known to be near construction sites, pilots shall be advised to maintain an altitude of at least 500 metres and preferably 1,000 metres, above ground or water, when passing over these areas. Low-level flights to observe or photograph wildlife shall not be permitted. It is the Contractor's responsibility to inform all pilots of all applicable EPP requirements when scheduling arrangements are made or at other appropriate periods prior to the arrival of the aircraft at the site.

4.19 TRANSPORTATION OF CONTAMINATED SOIL AND HAZARDOUS MATERIALS

Inadequate procedures for transporting contaminated soil and hazardous materials can result in human health hazards and additional contamination of the environment.

Storage

DCC Tier II contaminated soil and hazardous materials other than asbestos may be stored on site pending off-site transport. Each storage area should be separated from the nearest water body by a 30 metre buffer zone; at beach storage areas consideration must be given to the reach of sea ice and storm tides.

Shipping

The *Transportation of Dangerous Goods Act* (TDGA) and the *International Air Transport Association* (IATA) Dangerous Goods Regulations govern the shipment of hazardous goods within Canada. If shipping out of Canada, Canadian regulations and regulations of the destination country both apply. Requirements of the International Marine Dangerous Goods Code (IMDGC) must be addressed in international waters (e.g., near Greenland).

Any material classified as hazardous by the TDGA must be accompanied by the appropriate TDG shipping documents. The documents state the shipper, the receiver and all carriers involved in the transport of the shipment. Non-hazardous materials are also to be accompanied by a document indicating ownership and responsibility of the receiver. The hazardous material must also be packaged in accordance with the Transportation of Dangerous Goods Regulations.

For TDG classification 9.3, dangerous goods in quantities larger than 5 kilograms or 5 litres, and for wastes that contain more than 500 grams of PCB mixture (a mixture with PCB concentration > 50 ppm), the TDGA requires that the shipper complete and sign a waste manifest complete with reference number unique to each shipment. The manifest accompanies the shipping document providing further notification of the origin and destination of the shipment. The manifest must be delivered to the initial carrier and sent to the relevant government agencies by the shipper within two days of sending the shipment.

On receipt of the dangerous goods, the receiver must send a copy of the manifest to the sender, the carrier of the shipment, and the relevant government agencies within two working days. The shipper (Contractor) is responsible for submitting the signed TDG shipping documents and waste manifests to the relevant parties as detailed in the TDG Regulations. The Contractor is to provide DND's waste generator number on all waste manifests. These manifests are to be reviewed and signed by the Engineer before being submitted since DND is responsible for the accuracy of the information. Provincial and territorial governments must be notified of any shipments of PCB mixtures which pass through their borders.

In the Yukon, the generation, handling and disposal of special wastes (eg. Waste Oils) will be regulated under the Special Waste Regulations. Currently these are in draft form, but the final version is expected by early 1995. Special waste permits may be required to generate, store or handle special wastes.

Any waste of unknown TDGA hazard should be tested to determine whether any transport hazard exists according to the regulations. Any substance which is considered hazardous under the TDGA must be packaged in accordance with the regulations and the national standard Performance Packaging for Transportation of Dangerous Goods. For shipment off-site by air, the IATA Dangerous Goods Regulations and its standards will apply. Both the TDGA and the IATA regulations specify the packaging requirements for dangerous or hazardous goods according to risk. Table 4.1 provides packaging requirements for contaminated soil and expected hazardous materials. Most packaging will be the same except for any hazardous waste containing PCB mixtures. PCB mixtures must be contained in a combination of an inner leak-proof packaging and outer leak-proof packaging (with absorbent in between if the material is in liquid form). Differences between the TDG and IATA are identified in Table 4.1 and consist mainly of volume controls for air transport of dangerous goods. Packaging must be conducted according to the specifications in the regulations.

Labelling

Labelling and placarding of packages is according to class and division of the hazardous item and may differ between the IATA and TDGA regulations. A label or placard design is unique to each classification. All packages must be labelled on at least two sides and the name of the hazardous substance must be written beside the label. Large containers must have a placard as defined by the class and division with the TDG product identification number clearly displayed. The product identification number is indicated by the substance name in the regulations. The classification and shipping name of the wastes may differ from TDG to IATA regulations and the differences are listed in Table 4.1. ***[Possible update requirements]***

TABLE 4.1
TDGA AND IATA CLASSIFICATION AND PACKAGING REQUIREMENTS

Substance	Class/Packing Group	Packaging/Shipping Criteria
Petroleum Distillates, N.O.S. These types of petroleum hydrocarbons will include the majority of the liquid hydrocarbons to be removed from the site. (TDG)	3 III (3.3 III for Marine Vessels) - flammable liquids with a flashpoint between 23°C and 61°C, and a boiling point greater than 35°C (e.g., diesel, kerosene, lube oil). Packing Group III is the lowest risk for this class.	- by cargo vehicle or vessel, can be transported in standard large containers/barrels on land. - by air, maximum quantity per package is 200 L. Substance may be packed in drums according to IATA regulations.
Hydrocarbons in soils Flammable Solids N.O.S. (TDG)	4.1 III/II - flammable low (III) or medium (II) risk as tested. Criterion is how readily ignited the substance is. Assume most hydrocarbon contaminated soils are low risk.	- as above for cargo vehicles or vessels - by air, maximum quantity per package is 50 kg for II, 100 kg for III. Packaging may be "single" or "combination" as in the IATA regs.
Tank bottoms sludges Waste Type 78 (TDG)	6.1, 4.1 II - A TDG defined waste type which is more poisonous (6.1) than flammable (4.1) but both risks must be labelled. The risk is medium (Packing Group II) for this substance.	- cargo vehicle or vessel only, shipment must be registered - should be packaged in sealed, leak proof containers.
Poisonous Solids, Flammable, N.O.S. (IATA)	6.1, 4.1 II - as above	- by air, maximum quantity per package is 50 kg. Packaging may be "single" or "combination" as per the IATA regs.

TABLE 4.1
TDGA AND IATA CLASSIFICATION AND PACKAGING REQUIREMENTS

Substance	Class/Packing Group	Packaging/Shipping Criteria
Polychlorinated Biphenyls (TDG)	9.3 I - hazardous waste with a high risk to human health (Packing Group I). This is for anything containing PCB mixtures (any item containing PCBs in concentrations greater than 50 ppm)	- cargo vehicle or vessel only, shipment must be registered. - Any item containing PCB mixtures and intended for disposal must be contained in a combination packaging where the inner package is made of earthenware, plastic or metal and is leak-proof, and the outer packaging is a drum or box made of steel, aluminum, plywood, fibre or plastic. There must also be sufficient absorbent between the inner and outer packagings to prevent any liquid from escaping (if liquid is present) from the outer packaging.
Polychlorinated Biphenyls (IATA)	9 II - any item with PCB mixtures is considered medium risk for aircraft.	- by air, maximum quantity per package is 220 L. Packaging as per IATA regs, see TDG package description.
Miscellaneous degreasing solvents Waste Type 1 (TDG)	6.1 II - A poisonous liquid waste with a medium risk for this class.	- cargo vehicle or vessel only - should be packaged in sealed, leak-proof containers for ground transport.
Poisonous Liquids, N.O.S. (IATA)	6.1 II - as above	- by air, maximum quantity per package is 60 L. Packaging may be "single" or "combination" as per the IATA regs.
Batteries, wet, acid filled[6] (TDG, IATA)	8 III - corrosive substances contained in equipment or part of an item are considered low risk (Packing Group III)	- should be packaged in sealed, leak-proof containers for ground transport, or air transport. - by air, there is no quantity limit per package. Batteries must be packed upright, be incapable of short circuiting, and be securely cushioned in plastic or wooden drums or boxes. Package orientation and "This End Up" labels are required.

TABLE 4.1
TDGA AND IATA CLASSIFICATION AND PACKAGING REQUIREMENTS

Substance	Class/Packing Group	Packaging/Shipping Criteria
Compressed Gases:		
i) Flammable Gases (TDG, IATA)	2.1 X - any pressurized or liquified gas which is ignitable at normal atmospheric pressure when in a mixture of 13% or less in air by volume.	- any compressed gas should be contained in cylinders according to the standards in the CSA document Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods
ii) Non-Flammable, Non-Poisonous, Non-Corrosive Gases (TDG, IATA)	2.2 X - any pressurized or liquified gas which does not meet the criteria of divisions 2.1, 2.2 or 2.4	
iii) Poison Gas (TDG, IATA)	2.3 X - any pressurized or liquified gas that has an LC50 value less than 5,000 mL/m^3 at normal atmospheric pressure by reason of toxicity.	
iv) Corrosive Gases (TDG, IATA)	2.4 X - any pressurized or liquified gas that has an LC50 value less than 5,000 mL/m^3 at normal atmospheric pressure by reason of corrosion effects on the tissues of the respiratory tract.	
Radioactive Material, N.O.S. (TDG, IATA)	7 X - any product, substance or article with activity greater than 74 kBq/kg	- must be packaged and handled according to the Transport Packaging of Radioactive Materials Regulations

Note:

1. Standard documentation applies for all of the above, except any item with "waste" in the name must have a waste manifest as well as a standard shipping document. (Ground and sea transport only.)
2. Special notification is needed for any PCB mixture transport.
3. "Waste" is not a commodity according to the IATA regulations; alternate classifications are shown.
4. These items may be shipped by a licensed TDG shipper only.
5. Packing Group X indicates special packaging required.
6. Wet acid filled batteries can be transported as described or alternatively they can be neutralized. Neutralization would make the batteries a "waste" under TDG and would require them to be manifested.

4.20 EXPLOSIVES

Improper handling and use of explosives can result in human health hazards and impacts on wildlife and fish.

Explosives may be required for use in some excavation activities. Since explosives are potentially dangerous to human and animal health:

- all necessary permits and licenses shall be obtained;
- the handling, transportation, storage and use of explosives and all other related hazardous material shall be accomplished in accordance with all applicable laws, regulations and orders of regulating authorities;
- electronic detonation methods shall be used for all blasting operations;
- use of explosives shall be restricted to authorized and certified/licensed personnel who have been trained in their use;
- explosives shall be used in a manner which will minimize damage and defacement of landscape features and other surrounding objects by controlling the scatter of blasted material beyond the cleared working area;
- blasting procedures which minimize shock or instantaneous peak noise levels shall be used;
- scatter from blasting shall not reach fuel or hazardous substance storage locations;
- blasting shall not be conducted in the vicinity of concentrations of wildlife; and
- blasting shall be restricted to above water and a minimum of 100 metres from concentrations of fish.

4.21 WORK SITE CLEAN UP AND ABANDONMENT

Improper site cleanup and abandonment can cause continued health hazards, soil erosion, permafrost degradation, and impacts to fish and wildlife.

Land use regulations will require the Contractor to clean up the construction site prior to leaving the site and prior to Land Use Permit expiry. All buildings, fuel barrels, vehicles, equipment and surplus materials shall be removed from the sites following completion of work. All large earth works shall be left with stable slopes. Gravel access roads required for operation and maintenance may remain. All culverts under roads shall be removed and the road embankments breached then stabilized at culvert locations so the overland flow of surface runoff and the passage of fish are not impeded. All disturbed areas are to be regraded to restore natural drainage patterns. All airstrip culverts are to remain in place. At CAM-M and FOX-M all culverts are to be left in place.

5.0 PROTECTION MEASURES FOR VALUED ENVIRONMENTAL COMPONENTS

5.1 HUMAN HEALTH AND SAFETY

Hazards to human health and safety are present at each of the DEW Line sites in the form of hazardous materials, hazardous local terrain and unpredictable weather conditions. Hazardous material and contaminated soil have the potential to enter water bodies and the food chain and thereby affect vegetation, fish, wildlife and the health of people who travel, hunt and fish in these areas. Site debris may present a physical hazard to people travelling through these locations. All surface debris scattered throughout the site is to be collected and disposed of in accordance with Section 02219 of the Contract Specifications and Drawings.

All necessary precautions are to be taken when handling and transporting hazardous materials to ensure that the materials do not come into contact with site personnel or local residents. Site workers shall wear protective clothing as directed in Section 02090 of the Contract Specifications when handling hazardous materials. All site personnel working on or in the vicinity of clean up operations must be trained in, made aware of, and adhere to the requirements of the Workplace Hazardous Materials Information System (WHMIS) program.

Outdoor recreation activities of clean up staff have the potential to adversely affect nearby fish, wildlife and heritage resources. Although recreational time will be limited, some staff will undoubtedly wish to leave camp for recreational purposes. Subject to the Contractor's camp rules, terms of the Land Use Permit and the requirements of territorial fishing licenses and regulations, staff may be permitted to leave the site for recreational purposes. Normal precautions for Arctic travel include: provision for rapidly changing weather conditions; possible bear encounters; filing a trip plan; first aid kit, survival kit and insect repellant.

Personal firearms shall not be permitted in the construction camp. However, each camp superintendent shall keep two weapons (one for backup or replacement) for defence in the event of a bear encounter which threatens human safety.

5.2 LOCAL RESOURCE USE

The coastal marine waters at some DEW Line sites are used for fishing and hunting, including traditional hunts of sea mammals. A potential concern involves physical conflicts between ship traffic and fishing nets, near shore pollution incidents during ship-to-shore transfer of fuel and equipment, shore-to-ship transfer of DCC Tier II contaminated soil and hazardous materials, and shoreline terrain damage during beach landing area preparation.

Clean up activities and related shipping shall not interfere with local resource use in excess of levels normally encountered by established local activities and shipping. To minimize disruption to hunting and fishing activities, vessel traffic will be restricted to traditional shipping lanes where they exist. Vessel operators are to avoid marked fishing gear that may be encountered near shore.

The Contractor must attend annual meetings with local committees to discuss these issues and to minimize any potential problems. This will include consultation to confirm the scheduling and locations of hunting and fishing activities. A contact person shall be assigned to answer questions and address concerns of local residents or resource users.

5.3 LOCAL ECONOMY AND CONTACT WITH LOCAL RESIDENTS

Impacts and potential impacts of the clean up activities on the local economy are for the most part predicted to be positive. Benefits may accrue to northern residents from employment prospects and training opportunities.

The Contractor is to maximize employment and business opportunities in the north and provide communication with the local communities to keep them informed of contracts and significant project developments for which local businesses and individuals may be qualified to work.

The Contractor must attend regular meetings with local communities to discuss ongoing work and to address any community concerns. Briefing meetings with all camp personnel will be required to discuss and explain Camp rules which must be established to minimize conflict with local residents.

5.4 AESTHETIC VALUE

It is anticipated that the clean up activities will have an overall positive effect on the aesthetic value of the DEW Line sites in that obsolete buildings and structures will be demolished and all disturbed areas (landfills, debris piles, sewage outfalls and lagoons and borrow pits) will be restored as closely as possible to their original appearance. Construction personnel are to ensure that their activities do not contribute to any additional degradation of the local environment.

5.5 SURFACE WATER AND FISH HABITAT

Activities required at some sites may involve stream crossings, culvert removal and general drainage maintenance. These activities have the potential to degrade the quality of surface water if executed improperly. Siltation, erosion and a decrease in water quality can result.

Species such as Arctic char, Arctic cisco, least cisco, lake whitefish, Arctic grayling, and lake trout may appear in large numbers in rivers and lakes during spawning and migration. The timing of spawning and migrations is dependent upon the species, however in rivers and streams, concentrations may be observed at any time during the ice-free period.

The following will apply to work adjacent to waterways:

- siltation of waterways supporting fish shall be prevented by the use of cofferdams or silt fences as required, and by minimizing activities adjacent to watercourses;
- equipment shall not be operated in waterways;
- streambeds are not to be used for borrow material;
- excavated fill, waste material or debris shall not be disposed of in waterways;
- areas immediately upstream and for 100 m downstream of proposed work areas shall be surveyed to determine presence of concentrations of fish;
- concentrations of fish shall be avoided during culvert removals and work adjacent to waterways;
- streams shall not be forded at or immediately above locations containing concentrations of fish;
- blasting shall be restricted to above water and more than 100 m from concentrations of fish;
- where possible, in-stream work shall be conducted during low flow periods.

When removing culverts, the procedures as outlined in Section 4.7 are to be followed to minimize disruption to stream beds and potential fish habitat.

An authorization from Fisheries and Oceans Canada alterations or crossings of any water body constituting fish habitat and a water license for watercourse alterations or crossings are required and must be obtained by the Contractor.

5.6 PERMAFROST SOILS

Poorly drained soils are typically ice-rich, and thus susceptible to permafrost degradation. The top layer of soil provides a protective thermal barrier that prevents permafrost degradation. The often poorly developed organic layer and typically sparse vegetation cover results in soils that are easily eroded. Erosion removes the thermal protection and causes permafrost degradation. Vehicle and equipment traffic and soil excavation can disturb the surface layer and degrade the permafrost.

To minimize disturbance to permafrost soils, vehicle and heavy equipment traffic and use are to be restricted to roads and work areas unless approved by the Engineer. Activity in areas adjacent to work areas is to be minimized. Vehicles or heavy equipment are not to be operated off-road following heavy rain or melting snow until the soil has dried sufficiently to prevent excess rutting. Appropriate drainage and erosion control structures are to be installed along access roads, where required.

In addition, the following procedures are to be implemented to minimize disruption of permafrost during facility siting and excavations:

- facilities such as work camps and storage areas are to be sited such that they do not impede surface drainage or result in ponding. Construction of gravel pads or other appropriate methods are to be used to protect ice-rich soil from thermal or physical damage;
- during excavations, the extent of disturbance is to be minimized;
- following excavations, the area is to be promptly backfilled with granular fill, or as detailed on contract drawings;
- the number of new borrow areas developed is to be minimized;
- materials are not to be stored directly on unprotected ground; and
- disturbed areas are to be regraded to restore natural drainage patterns.

Rutting that impedes local drainage or exposes permafrost in ice rich soils shall be repaired to the satisfaction of the Engineer.

5.7 COASTAL MARINE RESOURCES

The coastline adjacent to many DEW Line stations is used by marine mammals and seabirds for feeding, migration and breeding. These species are particulary vulnerable to oil spills since they spend a significant amount of time on the surface; some of these species may occur in large concentrations.

Seabirds are also vulnerable to disturbance during the nesting period. Species such as fulmars, murres, and terns nest in colonies that may be disrupted by low-flying aircraft and close approaches by ships.

Where concentrations of birds and mammals are known to be near construction sites, pilots shall be advised to maintain an altitude of at least 500 metres and preferably 1000 metres above ground or water when passing over these areas. Low-level flights to observe or photograph wildlife shall not be permitted. It is the Contractor's responsibility to inform and require all pilots to adhere to all applicable EPP requirements.

Marine mammals and flocks of seabirds must be avoided by all shipping. Where feasible, ships shall maintain a minimum distance of 1 km from known seabird colonies.

During transfer of fuel to land-based storage tanks, the hoses or pipes are to be equipped with properly functioning and approved check valves to prevent backflow of fuel in the case of failure. Fuel transfer shall be attended at all times. In the event of a spill of fuel, the Contractor is to implement the appropriate contingency plan as detailed in Section 7 of this EPP.

The murre colony at PIN-M can be expected to be occupied as soon as open water appears. This species is susceptible to impacts due to the high numbers that congregate in one area, and the precarious location of the egg and young. Activities adjacent to the colony shall only proceed prior to the arrival or after the nesting period of these birds.

5.8 TERRESTRIAL RESOURCES

Caribou, muskoxen, polar bear, arctic fox, raptors (birds of prey), waterfowl and other wildlife have been reported seasonally or year round at many of the DEW Line sites. There is concern over human/wildlife contact which could include harassment by project personnel causing disruption of activities such as calving, breeding, nesting and rearing. In order to protect wildlife from avoidable impacts:

- all on-site personnel are required to be familiar with the contents of "Safety in Bear Country";
- project personnel shall not feed, injure or harass wildlife;
- clean up activities shall not interfere with wildlife movement through the area;
- raptors nesting on site shall not be disturbed. Structures containing active raptor nests are not to be dismantled or demolished during the nesting season;
- vehicle, vessel and aircraft movements shall conscientiously avoid all known concentrations of wildlife or areas known to be frequented by important species or concentrations of wildlife;
- no attempt shall be made by any person to chase, catch, divert, follow or otherwise harass wildlife by aircraft, vehicle, boat or on foot;
- refuse shall be controlled and made inaccessible to bears and other scavengers;
- in the event of unanticipated or unavoidable contact with mammals, particularly polar bears, individuals shall act in accordance with the contingency plan (Section 7.0). All individuals working at or visiting the site shall be familiarized with this plan as part of their orientation to the work site;
- equipment and vehicles shall yield to wildlife;
- except in the vicinity of the airfield, aircraft shall be advised not to fly at elevations lower than 500 metres above ground or water;
- in the event that wildlife are spotted from the air, aircraft shall not make descents for observation or photography;
- domestic or wild pets are not allowed in camps with the exception of controlled watch dogs;
- project personnel shall not be permitted to possess personal firearms. The only firearms allowed on site shall be for protection from bears and shooting of animals exhibiting aberrant behaviour. The firearms shall be controlled by the camp superintendent; and
- vehicle collisions with wildlife, encounters with troublesome animals, and/or the presence of potentially troublesome animals will be reported to the Engineer and to the district wildlife officer.

Disruption of avifauna during the nesting period can result in reproductive failure. For this reason, concentrations of nesting birds such as the murre colony at PIN-M and the shorebirds in the vicinity of the sewage outfall at CAM-M should be avoided during this period. Raptors

should also be avoided because of their comparatively low abundance and their position at the top of the food web. Impacts on these species can be minimized by scheduling disruptive activities outside of the nesting period and by discouraging nesting at work areas.

The arrival of avifauna at specific locations in the Arctic is influenced by weather conditions and other factors. Inclement weather or a delayed spring melt may delay arrival by several weeks. In general however, the chronology of arrival, nesting, and departure is relatively consistent between years.

Typically within two weeks of arrival, nesting commences and continues for one to two months until the young leave the nest. Following this, the birds feed in preparation for the fall migration and depart by mid to late September.

The migration and breeding chronology of major groups of birds is shown in Table 5.1. At work sites containing raptor or concentrations of other birds, work shall be scheduled to minimize impacts on these species. For structures containing nest sites for peregrine falcons, the nest shall be removed between the time the falcons migrate in the fall and before their arrival the following year. Since peregrine falcons only prepare a rudimentary nest site themselves, they occupy nests constructed by species such as ravens or rough legged hawks. Removal of nest material from structures will prevent them from nesting at these sites. If the nest is occupied upon arrival at the site for commencement of cleanup activities, then demolition of structures containing active nests shall proceed only after the young have left the nest.

Table 5.1 Approximate nesting and breeding chronology for birds observed near DEW LINE stations

Group or Species	Arrival	Nesting Period		Length of Breeding Season	Departure
		From	To		
Peregrine falcon (central)	Mid-May	Early June	Late August	65-75 days	Late September
Peregrine falcon (Baffin)	Early May	Mid June	Late August	65-75 days	Late September
Rough-legged Hawk	Late May to Early June	Early June	Late August	65-75 days	Late September
Waterfowl	Late May to Early June	Early to Mid-June	Mid to late July	25-38 days	Early September
Shorebirds	Late May to Early June	Early June	Early to late July	20-25 days	Late August
Murres	Mid June or first appearance of open water	Late June	Late August	50-55 days	September

For the rough-legged hawks and other raptors, removal of nest material may not be effective in discouraging nesting on DEW Line structures. However, the population of rough-legged hawks was low in 1994 and it is possible that nests will not be active during the clean-up period. If removal of nest material is not effective in discouraging nesting, then demolition activities for structures containing active nests shall proceed only after the young have left the nest. Alternatively the structure can be removed prior to the arrival of these species.

Shorebirds are expected to begin arriving in early June. They commence nesting during early June and the young leave the nest soon after hatching. The young develop over the remainder of the summer and the birds begin to congregate for the migration south. The preferred mitigation for nesting shorebirds at CAM-M is to conduct excavation activities after the young have left the nest. If this is not feasible, then excavation should begin before nesting is initiated to prevent birds from nesting in areas to be excavated. Concentration of nesting shorebirds shall not be disrupted after commencement of nesting until young have left the nest (mid June - late July).

Removal of raptor nests and clean up activities at the sewage outfall at Cambridge Bay should be conducted in consultation with the Territorial Departments of Renewable Resources.

5.9 HERITAGE RESOURCES

DEW Line sites are often located in areas which have been seasonally settled or visited by Inuit over the past 1000 years; by their Palaeo-Eskimo predecessors for as many as three thousand years before the Inuit; and by Europeans and Eurocanadians over the past four centuries. Archaeological sites and recent camps and cemeteries exhibiting evidence of the presence of former occupants have been found on or adjacent to all of the DEW Line stations. Many of the sites have been disturbed by previous DEW Line activities. The traditional and scientific value of heritage resources is greatly diminished if they are disturbed or moved. Archaeological sites in the Yukon and Northwest Territories are protected by law. Disturbance of archaeological sites and collection of archaeological specimens is prohibited except under the terms of an archaeological research permit officials and in order to protect heritage sites from any further disturbance the following procedures shall be adhered to:

- qualified archaeologists conducting mitigative work for the project must apply to the appropriate authorities for a research permit well in advance of any proposed archaeological activities;
- an on-site archaeological survey is to be conducted by a qualified permitted archaeologist in specified new project areas (see Section 8) prior to clean up activities. The Construction Supervisor and environmental monitors at each site will be trained by a qualified archaeologist in artifact and archaeological site recognition and awareness of legislation and procedures to follow when an archaeological site is encountered;
- wherever possible, archaeological sites, human burial sites and other significant heritage sites are to be protected by flagging, barriers, signs or other means;

- if disturbance is unavoidable, the archaeological site is to be fully documented by a qualified permitted archaeologist and, if necessary, subjected to sampling or a full excavation program approved by the regulatory authority prior to disturbance;
- all personnel are to be discouraged from visiting archaeological and other heritage sites;
- if unanticipated archaeological resources are encountered during project activities, work is to cease in that area pending contact with the appropriate authority; and
- a generic pamphlet from the regulatory authorities for use at all sites, illustrating typical site and artifact types, and describing procedures to follow in the event of encountering an archaeological site shall be obtained and followed.

6.0 ENVIRONMENTAL INSPECTION

As part of its overall commitment to a strategy of environmental protection, DND intends to employ a dedicated environmental inspection staff to monitor its own compliance with the EPP and all applicable laws, regulations, permits, guidelines and standards.

The environmental inspection staff will comprise a component of the Contract Management Organization (CMO) to be formed for the project. The CMO will be formed in consultation with DND as per the Terms of Reference of the Memorandum of Understanding between the Director General Environment (DGE) and Defence Construction Canada Limited (DCL). The CMO will function under the direction of an appointed Contract Manager who will be a DCL official. The CMO will be responsible for administration, performance quality, construction supervision and monitoring of the DEW Line Clean Up Contracts.

The CMO will be represented at the site by the Engineer who will report to the DCL Contract Manager. Environmental inspection staff at each site will report to the Engineer.

Further details on reporting requirements and responsibilities within the CMO are under review. As related to the requirements and responsibilities of the environmental inspection staff, this review will include:

- the requirements for an environmental orientation and education program;
- the identification of the roles and responsibilities of the environmental inspection staff; and
- the development of reporting relationships that provide for effective communication between the CMO and relevant regulatory authorities.

7.0 CONTINGENCY PLANS

The following generic contingency plans present the prescribed course of action to be followed in the case of unanticipated events during clean up such as fuel or chemical spills, potentially dangerous wildlife encounters, and the discovery of heritage resources. The plans will enable persons in a particular contingency situation to maximize the effectiveness of the environmental protection response and meet all regulatory requirements for reporting to the appropriate authorities. The Contractor is required to submit to the Engineer for approval detailed spill contingency plans for each site. The Contractor must also identify its response capabilities by detailing response times, and types and volumes of spills to which it can respond to. The following information is required as a minimum:

- a description of pre-emergency planning:
- personnel roles, lines of authority and communication;
- emergency alerting and response procedures;
- evacuation routes and procedures, safe distances and places of refuge;
- emergency phone numbers;
- directions/methods of getting to nearest medical facility;
- emergency decontamination procedure;
- emergency medical treatment and first aid;
- emergency equipment and materials;
- emergency protective equipment;
- procedures for reporting incidents; and
- spill response and containment plans for all materials which could potentially be spilled.

7.1 FUEL AND HAZARDOUS MATERIAL SPILLS

The objective of the fuel-related contingency plan is to protect the environment by minimizing the impacts of spill events through clear and concise instructions to all personnel.

A variety of fuels and liquid and dry chemicals will be in use at the DEW Line sites during clean up. The greatest volumes will likely involve Arctic diesel fuel. Other substances such as acids, solvents, lubricants, hydraulic fluid, antifreeze, fuel additives and engine coolants also pose potential environmental and safety hazards. For simplicity, POL and minor chemical spills will be considered together. Since chemicals are usually stored and transferred in barrels of 205 litres or smaller capacity, any spill quantity is likely to be small.

Based on the hazardous materials identified for disposal, Emergency Response Plans are not required during transport under the TDG regulations. If materials identified for disposal are listed on Schedule XII of the TDG regulations and are in volumes exceeding those specified in that schedule, an ERP must be registered with the Director General of the Transport of Dangerous Goods Directorate. The ERP will contain information such as the nature and risks of the particular dangerous good and contact names and numbers for emergency assistance.

If a spill or a dangerous occurrence is discovered during transport in excess of those volumes listed in Part 9, Table 1 of the TDG regulations, the person who has management or control of the goods at that time must immediately notify the Emergency Authority in the province where the occurrence took place. The appropriate authorities are listed in Part 9, Table 2 of the TDG regulations. The person must also notify his/her employer, the owner of the vehicle on which the goods were carried, and the owner of (consigner) the dangerous goods. The person's employer is then required to issue a written report to the Director General within 30 days of the occurrence in the form detailed by the TDG regulations.

7.1.1 Potential Spill Sources

The most common pollution incidents will probably involve spills of arctic diesel or aircraft fuel onto land or water resulting from:

- human error during transfer operations between holding tanks;
- rupture of lines, tanks, valves, dykes or barrels from deterioration or damage;
- seepage from fittings or valves;
- accidental spills during POL transport via vehicle or aircraft; and
- equipment failure.

A person in control of a substance at the time of a spill shall report the spill via the appropriate spill response line (see Section 7.4). Quantities of substances which represent "a spill" are listed in Schedule B of the NWT Spill Contingency and Reporting Regulation NWT Reg R-068-93. Yukon legislation is currently being drafted. The Engineer must also be advised of all spills.

7.1.2 Action Plan

In the event of a spill, protection of human health and safety is paramount. Contamination of personnel involved in clean up is a real possibility as is contamination of the surrounding workplace and environment.

7.1.2.1 Detection

The individual discovering a spill shall:

- warn people in the immediate vicinity and evacuate area if necessary;
- identify the spilled material if possible and take all safety precautions before approaching it;
- attempt to immediately stop the leakage and contain the spill, if safe to do so;
- report to the Engineer the spill location, type of material, volume and extent, status of spill (direction of movement), and prevailing meteorological conditions; and

- in the event of a shoreline spill, provide information about beach location, contaminated area, beach characteristics, presence of wildlife and archaeological sites which might be threatened.

7.1.2.2 Spill Response

Both the Contractor and the Engineer have specific responsibilities in responding to a spill event. These are described below.

Contractor

The Contractor shall:

- ensure response crew members are appropriately trained;
- establish communications and verbally report all spills to the Engineer as soon as practical;
- isolate and eliminate all ignition sources;
- ensure safety and security at the spill site;
- stop or reduce discharge, if safe to do so;
- make every effort to contain the spill by dyking with earth or other barriers on land and containment booms on water;
- assess potential for fuel/chemical recovery;
- deploy on-site crews to mobilize pumps, empty 200 L drums, hand tools and absorbents to the spill site;
- follow all guidelines and regulations for disposal of spilled materials, associated debris, contaminated soil and water as established by appropriate government agencies;
- assess potential terrain and wildlife disturbance, erosion and archaeological site disturbance in any areas to be affected by clean up operations and contact relevant authorities;
- document all events/actions; and
- report the spill to the Spill Report Line and follow up with a written spill report (Section 7.4).

For spills on water the Contractor shall:

- immediately mobilize additional containment and clean up equipment in consultation with the Coast Guard, Environment Canada and Fisheries and Oceans Canada if on-site equipment is inadequate; and
- protect all beaches by deployment of floating booms.

Engineer

The Engineer has the authority to commit resources required to respond to and clean up a spill. The Engineer will:

- supervise containment, clean up and restoration operations;
- document all events/actions; and
- notify appropriate government agencies using the contact list.

7.1.2.3 Spill Clean Up

The final decision on clean up methods will be made by Environment Canada at the time of the notification of the spill.

The selected clean up methods should:

- minimize danger to persons and wildlife;
- minimize danger to property;
- minimize water pollution;
- minimize the area and degree of disturbance to land and water surrounding the spill during clean up; and
- minimize environmental impacts of the spill.

7.1.2.4 General Clean Up Procedures

These include the following:

- Wear protective clothing as required for handling spills.

- Contain spills on soil or rock by constructing earthen dykes using available material. If soil is not available, place sorbent material or boom in path of spill. As the sorbent barrier becomes saturated, continually replace it. Fuel or liquids lying in pools, trenches or in specially constructed troughs can be removed with pumps, buckets or skimmers.

- If ground is snow covered, create snow dykes and line with polyethylene liner for containment and recovery of ponded fuel.

- For spills on water, deploy containment booms and recover as much fuel as possible with a work boat and skimmer if the area has less than 1/10 ice cover. If the area is ice infested, burn any fuel spills using igniters.

- Apply sorbents, if necessary.

- Assess potential for disturbance of wildlife, fish, and archaeological sites by spill or clean up operations and notify the relevant authorities.

- Notify environmental authorities to discuss disposal and clean up options.
- Conduct required clean up operations.
- Assess and appropriately treat any areas disturbed by clean up activities.
- Ensure the site has been completely restored and leave the site only when all work is finalized.

7.1.2.5 Reporting

Spills are to be reported immediately on the 24 Hour Spill Report Line (403) 920-8130 (NWT) or (403) 667-7244 (Yukon). The Contractor shall prepare a written spill report and submit it to the supervisor of the Spill Report Line (Arctic Alarm and Communications) who shall forward copies to DIAND and Environment Canada.

The specific information needed when reporting a spill includes:

- report date and time of spill;
- location and map coordinates (if known) and direction of spill movement;
- party responsible;
- product identification and quantity spilled;
- cause of spill;
- whether the spill has terminated or is continuing;
- extent of contaminated area;
- factors affecting spill recovery;
- containment measures;
- response actions to date;
- request for assistance;
- hazards and dangers;
- comments and recommendations;
- name of the person reporting the spill; and
- name of the person to whom the spill is reported.

7.2 WILDLIFE ENCOUNTER

Polar bears are potentially present year-round at all DEW Line sites. Barren ground grizzlies and black bears may also be present at some of the western sites. Bears are a potential hazard to workers at all times and the situation can be aggravated by the presence of any substance that a bear perceives to be food. The Contractor shall be familiar with bear deterrent procedures and at least one designated staff member shall be competent with the camp firearms. The Contractor shall be familiar with the GNWT "Safety in Bear Country" manual. A reference copy shall be kept at the Contractor's office.

Collisions with large mammals such as caribou, bears and muskoxen may occur. Operators of vehicles and equipment shall make every effort to avoid such encounters. Congregations of animals near food or garbage are a potential problem which can be overcome by proper disposal of food wastes. Concentrations of scavenging animals such as wolves, foxes and bears increase the risk of diseases, particularly rabies, and danger to personnel. The following precautions and actions must be taken at each site:

- It shall be noted that the killing of wildlife for any reasons at variance with the Wildlife Act and regulations is an offence. Personnel shall coordinate procedures for handling wildlife problems and incidents with the regional wildlife office.

- All personnel shall watch for bears and immediately report any sighting to the Contractor's construction supervisor and the Engineer. The Contractor shall immediately notify all personnel of the sighting. If the threat of attack is considered significant, the Contractor shall assign a full time bear monitor to the site.

- Personnel designated by the Contractor's construction supervisor shall use vehicles, noisemakers and, if necessary, a firearm to frighten the bear away from the site.

- Only if the bear returns repeatedly, refuses to leave or directly threatens human safety shall it be shot. Killing shall be considered a last resort and, if at all possible, the appropriate wildlife officer shall be contacted by the Contractor and alerted to the problem (see Key Contact List, Section 7.4). If a bear is to be shot, only a person familiar with and competent with the camp firearm shall be assigned the task. Wounded or otherwise aggravated bears can be extremely dangerous.

- The death of a bear at any DEW Line site shall be reported by the Contractor to the appropriate wildlife officer (see Key Contact List, Section 7.4) who will issue instructions as to disposal of the carcass and the formal reporting procedures to be followed. The Contractor shall also report the incident to the Engineer.

- Due to the possibility of rabies, any animal which bites a human shall be shot and the carcass retained intact pending instructions from the appropriate wildlife officer. If possible, the wildlife officer shall be notified before any drastic action is taken. Medical advice for treatment of animal-inflicted wounds shall be sought from the appropriate medical facility.

7.3 HERITAGE RESOURCES

All known archaeological sites at DEW Line stations are to be avoided during clean up activities unless expressly stipulated in the EPP and by the appropriate Territorial agency (see Key Contact List, Section 7.4).

Unrecorded archaeological sites containing such remains as habitation structures, hunting blinds, food caches and graves, and objects such as tools, utensils and butchered animal bone may be inadvertently discovered and disturbed during clean up activities. All site personnel are prohibited from knowingly disturbing any archaeological or other heritage site or collecting any artifacts. Removing artifacts is a criminal offence.

In the event of finding heritage resources:

- site work shall cease immediately in the area; personnel shall not remove any artifacts or other associated objects from the site unless their integrity is threatened in any way;
- the Contractor shall mark the site's visible boundaries which are to be avoided by clean up activities;
- the discovery of the site shall be reported immediately to the Engineer;
- the Contractor shall immediately report the finding to the respective Territorial authority (see Key Contact List, Section 7.4) by phone or fax and comply with any instructions provided; and
- reports of any discovery shall be prepared by the Contractor for the respective regulatory authority and DND indicating:
  - the identity of the person making the discovery;
  - the nature of the material;
  - the nature of the activity resulting in its discovery;
  - the location of the find;
  - protection measures instituted;
  - the present location of any heritage material removed for safekeeping; and
  - extenuating circumstances.

7.4 KEY CONTACT LIST

7.4.1 24 Hour Spill Report Line

In the event of a spill, the Contractor is required to call the following number and provide all the relevant details (see Section 7.1):

- Telephone: (403) 920-8130 Fax: (403) 873-6924 - NWT
- Telephone: (403) 667-7244 Fax: (403) 667-7962 - Yukon

The relevant lead agencies shall then be contacted by officials to ensure the appropriate response. In the case of the DEW Line, the lead agency is Environment Canada. The lines are staffed 24 hours a day and can also be used to coordinate a response in the event of occurrence of a non-spill emergency outside of normal working hours.

7.4.2 Other Contacts

In the event of a non-spill emergency (e.g. related to wildlife, fisheries, heritage resources, etc.) contacts are provided in Table 7.1 and Sections 7.2 and 7.3. The Plan of Construction Operations (PCO) outlines non-interference requirements with other operations on site. If any clean up or associated operations adversely affect the North Warning System Operations, Major R. Allie (613) 996-4093 or Mr. J. Boissonneault (613) 992-9743 should be contacted.

TABLE 7.1
CONTACTS FOR RESOURCE INTERESTS

Resource	Location	Agency	Phone No.	Fax No.
Land Use	Western Arctic	Inuvialuit Land Administration	(403) 977-2466	(403) 977-2467
	Yukon	Land Use	(403) 667-3173	(403) 667-3214
	NWT	Land Administration	(403) 920-8171	(403) 920-4669
Fisheries, Marine Mammals	Yukon	Fisheries and Oceans Canada	(403) 667-2235	(403) 668-6829
	NWT	Fisheries and Oceans Canada	(403) 920-6640	(403) 873-8871
Wildlife	Yukon	Department of Renewable Resources	(403) 667-5715	(403) 668-4363
	NWT	Department of Renewable Resources	(403) 873-7654	(403) 873-0221
	Inuvik Region	Department of Renewable Resources	(403) 979-2938	(403) 979-2418
	Kitikmeot Region	Department of Renewable Resources	(403) 982-7240	(403) 982-3701
	Iqaluit Region	Department of Renewable Resources	(813) 979-5012	(819) 979-6791
Migratory Birds	Yukon	Canadian Wildlife Service	(403) 668-2285	(403) 667-7962
	NWT	Canadian Wildlife Service	(403) 920-8531	(403) 873-8185
Heritage Resources	Yukon	Heritage Branch	(403) 667-5983	(403) 667-2634
	NWT	Prince of Wales Northern Heritage Centre	(403) 920-8084	(403) 873-0205

8.0 SITE SPECIFIC ENVIRONMENTAL PROTECTION PROCEDURES

Sections 4.0 and 5.0 define the general Environmental Protection Procedures related to project activities and valued environmental components for the clean up of all of the DEW Line sites. Since the list of components includes both ecosystem and socio-economic issues, the term "valued environmental components" is used rather than "valued ecosystem components". Section 8 identifies valued environmental components specific to individual DEW Line sites that require special consideration, and provides reference to the applicable environmental protection measures as detailed in Section 5.0.

The excavation of landfills will occur at several sites including BAR-1, BAR-4 and DYE-M. The specific requirements outlined in Section 4.12 are to be followed to protect workers and the environment when conducting this work.

Northern Disposal Facilities will be constructed at specific DEW Line sites for the disposal of DCC Tier II contaminated soil from nearby sites. As a result, there will generally be more vehicle traffic and storage and handling of contaminated soil at these sites. The anticipated disposal destinations for DCC Tier II contaminated soils are shown in Table 8.1.

TABLE 8.1
NDF DESTINATIONS FOR DCC TIER II CONTAMINATED SOIL

Source of DCC Tier II Contaminated Soil	Proposed NDF Location
BAR-1, BAR-2, BAR-3, BAR-4, PIN-M, PIN-1	PIN-M
PIN-2, PIN-3, PIN-4	PIN-3
CAM-M	CAM-M
CAM-1, CAM-2, CAM-3, CAM-4	CAM-3
CAM-5, FOX-M, FOX-2, FOX-3	FOX-M
FOX-5, DYE-M, FOX-4	DYE-M

It should be noted that the information presented in this section is supplementary to the information presented in Sections 4.0 and 5.0. The Contractor is responsible for the mitigation of all environmental impacts on valued environmental components resulting from the clean up operations at all of the sites. The site specific mitigation procedures are summarized by site in the following tables.

8.1 BAR-1 - KOMAKUK BEACH

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Komakuk Beach is within Firth River IBP site; Ivvavik National Park surrounds BAR-1 site.	- As per Section 5.2.
Fish Habitat - Fish Creek borders east side of station	- As per Section 5.5.
Permafrost Soils - Abundant wetlands on and around site.	- As per Section 5.6.
Coastal Marine Resources - Belugas and Bowhead whales occasionally seen in large concentrations; fur seal rare visitor; ringed seal common.	- As per Section 5.7. - Landfill excavation on coast to proceed such that no debris is introduced into marine environment. Stabilize slopes of excavation to prevent erosion. (As per Section 4.12.)
Terrestrial Resources - Raptors, waterfowl, and shorebirds may occur commonly in area. Calving grounds of Porcupine caribou herd west of site; caribou may occur on site year-round but predominantly between May and August. Muskoxen, grizzly bears and polar bears have been observed near the site. Near-continuous cover of low-Arctic tundra vegetation.	- As per Section 5.8. - Minimize disturbance of vegetation - A fuel spill around the helipad area may impact the local environment.The fuel spill is to be encapsulated and the area regraded to prevent hydrocarbon migration.
Heritage Resources - Specific elements of the site valued for historical significance. Inuit graves formerly recorded on site. Minimal potential for additional archaeological or historic resources.	- Request by CPS for specified DEW Line artifacts and structures to be preserved (identified in Annex B, Section IV, Part 1, Volume 1 of Environmental Study of Eleven DEW Line Sites prepared by RRMC (1993)) - As per Section 5.9.

8.2 BAR-2 - SHINGLE POINT

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Seasonal hunting, whaling and fishing camp on the Running River delta at Shingle Point is occupied throughout the ice free period.	- As per Section 5.2.
Fish Habitat - High concentration of marine fish in vicinity.	- As per Section 5.7.
Permafrost Soils - Numerous small ponds and kettle lakes, ice rich peatlands.	- As per Section 5.6.
Coastal Marine Resources - Variety of marine species in coastal waters including Bowhead whales in Aug/Sept, and Belugas and ringed seals.	- As per Section 5.7.
Terrestrial Resources - Important staging and nesting area for swans, ducks and geese. Raptors, including Golden Eagle, Snowy Owl, Gyrfalcon and Rough-legged Hawk sighted in area. Grizzly bear and black bear rare visitors. Arctic fox, wolverine and ground squirrels frequent site; caribou migrate through area. Near-continuous cover of low-Arctic vegetation.	- As per Sections 5.5 and 5.8. - Minimize disturbance to vegetation.
Heritage Resources - High archaeological potential. Historic camp consisting of tent platform and various artifacts located on main terrace east of USAF Landfill ravine. Chert flake and wooden pylons (recent origin) located on raised ridge west of water supply lake near access road. Remnants of old shacks on ridge along shore of fishing lake. Small cluster of marked bricks, stove parts and asbestos shingles southeast of station communication domes. Two boxes (one within other) buried in low earth mound, wooden step ladder, remains of partially-charred wooden building and other buried artifacts located west of station (possibly native houses).	- Pending the results of discussions with Territorial/Regional archaeological officials, an archaeological survey may have to be conducted by a qualified permitted archaeologist in the vicinity of the Beach Landing Area, USAF landfill areas prior to excavation or grading. - As per Section 5.9.

8.3 BAR-3 - TUKTOYAKTUK

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Hunting and fishing in the general area by the residents of Tuktoyaktuk. Shipping traffic and general activity common due to proximity to community.	- As per Section 5.2.
Local Economy - Hamlet of Tuktoyaktuk immediately adjacent to the station.	- As per Section 5.3.
Fish Habitat - Nursery, feeding and wintering habitat for freshwater, coastal marine and Anadromous fish. Large resident populations of white fish and cisco in summer. Important domestic and recreational fishery.	- As per Sections 5.2, 5.5 and 5.7.
Permafrost Soils - Station constructed on old pingo.	- As per Section 5.6
Coastal Marine Resources - Variety of marine species including Belugas in June-August, Bowhead whales and ringed seals in coastal waters off Tuktoyaktuk.	- As per Section 5.7.
Terrestrial Resources - Important staging and nesting area for waterfowl and sea ducks in general area.	- As per Section 5.7.
Heritage Resources - Old boat, the *Reindeer*, pulled up on beach west of station.	- As per Section 5.9

8.4 BAR-4 - NICHOLSON PENINSULA

Valued Environmental Component	Environmental Protection Procedures
Fish Habitat - BAR-4 adjacent to outer Mackenzie Delta, an essential habitat for large number of freshwater, coastal marine and Anadromous fish.	- As per Sections 5.5 and 5.7.
Permafrost Soils - Ice-rich soils common in area that are maintained by extensive vegetation cover. These soils are susceptible to erosion due to their fine texture and hilly topography.	- As per Section 5.6 All excavated areas are to be stabilized to prevent erosion.
Coastal Marine Resources - Bowhead whales, occasionally in large concentrations, observed west of Nicholson Peninsula. Beluga whales and ringed seals observed near site.	- As per Section 5.7 - Airstrip landfill excavation to proceed such that no debris is introduced into the marine environment. Stabilize slope of excavation to prevent erosion. (As per Section 4.12).
Terrestrial Resources - Snowy Owl common on-site; Peregrine Falcon nest southwest of station. South end of Peninsula within Anderson River Migratory Bird Sanctuary, an IBP site. Variety of waterfowl, shorebirds and terrestrial avifauna present on site. Caribou of the Bluenose Herd noted throughout the area, occasionally in large concentrations. Station also within the Mackenzie Reindeer Grazing Preserve. Both species may be present year round. Grizzly bear and wolf occasionally seen on site. Ground squirrels abundant. Site is generally well vegetated. Extensive vegetation cover in undisturbed areas.	- As per Section 5.8. - Disturbance to vegetation should be minimized.
Heritage Resources - A recent Inuit burial site was noted at the station. Worked mammal bone found on surface. High potential for additional archaeological resources in access routes to beach; some disturbance and potential disturbance noted. A fur trading post was reported to have existed in the area. No evidence of this has been found, but a number of buildings, their historical use unknown, are located along the south coast. An unidentified historic camp was recorded southeast of the station. Tin cans, weathered boards and a rusted sign were noted in the area.	- Avoidance or reinterment, if human remains present at burial site and if so directed following discussion with Territorial/Regional archaeological officials. Otherwise, consideration of commemoration. Fence or mark site. - Archaeological investigation to be completed by a qualified permitted archaeologist in two valley areas and in vicinity of worked bone artifact if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.5 PIN-M - CAPE PARRY

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Hunting and fishing in the general area by the residents of Paulatuk.	- As per Section 5.2.
Coastal Marine Resources - Ringed seals commonly observed in this area during September. The Cape Parry Migratory Bird Sanctuary contains the only known nesting colony of Thick-billed Murre. This species nests on cliff ledges during the ice free period. Other coastal marine avifauna include both King Eider and Common Eider.	- As per Sections 5.7 and 5.8. - All clean up activity on Bird Sanctuary is to be scheduled for late fall after murres have left or early spring prior to arrival. - No access to the Bird Sanctuary during the breeding period.
Terrestrial Resources - Caribou from Bluenose Herd regularly observed on site in small numbers. Black bear and Polar bear are rare visitors, Arctic fox have been observed in area.	- As per Section 5.8.
Heritage Resources - High archaeological potential. Many known heritage sites; highly disturbed by past station activities. One site in the bird sanctuary area is reported to contain a large two-roomed house mound with an associated midden and a second, indistinct house ruin. Two slate ulu blade fragments have been observed here, as well as numerous animal bones. Another site near the bird sanctuary is reported to contain two house ruin remains part of what probably had been a small Thule winter village. Two possible cache features have been observed along the first main terrace above the present beach near the bird sanctuary. A mound feature, use unknown, has been observed on the first main terrace above the present beach, southwest of the main station compound. The abandoned village of Cape Parry is located to the southeast of the main station compound. Miscellaneous debris is present at this site as well as several standing buildings. Several grave sites have also been noted in this area. A small cairn is located northeast of the main station compound; a large stone cairn is located on the first main ridge north of the abandoned village.	- An archaeological investigation is to be completed by a qualified permitted archaeologist in all new work areas, if required by Territorial/Regional archaeological officials. - The two known Thule sites, already vandalized, are to be excavated and documented by a qualified permitted archaeologist, if required by Territorial/ Regional archaeological officials. - Discussions should be held with GNWT and Inuit families at Paulatuk regarding clean up of DEW Line debris at the abandoned village of Cape Parry. Possible need for fencing or signage. - As per Section 5.9.

8.6 PIN-1 - CLINTON POINT

Valued Environmental Component	Environmental Protection Procedures
Coastal Marine Resources - Bowhead and Beluga whales and seals occasionally seen.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Waterfowl common on water supply lake. Nesting pair of Peregrine Falcons and nesting pair of Rough-legged Hawks on knoll 500 m northwest of airstrip access road. Caribou from Bluenose Herd and grizzly bear (with young) noted in area; muskoxen (commonly seen), wolverine, foxes, hare and ground squirrels also reported or seen. Polar bears observed during winter and spring.	- As per Section 5.8. - Nesting sites of peregrine falcon and hawks are immediately adjacent to work areas, and workers are to be instructed to avoid nesting sites.
Heritage Resources - High archaeological potential. Many known heritage sites; some highly disturbed by past station activities. Surveys in 1990 did not cover all areas of potential or all previously recorded site areas. A Thule village has been bulldozed and looted; it is located next to the landfill site near the airstrip; a grave, which has also been looted, is located next to a gravel source. Eight sites in vicinity of main station; these have likely been destroyed by recent disturbance and bulldozing. Three caches identified near the Roscoe River.	- An archaeological investigation is to be completed by a qualified permitted archaeologist in all new work areas, if required by Territorial/Regional archaeological officials. - The known Thule village site, already vandalized, is to be excavated and documented by a qualified permitted archaeologist, if required by Territorial/Regional archaeological officials. - Human remains associated with burial site to be reinterred, if required by Territorial/Regional archaeological officials. - All sites in activity areas to be marked for avoidance. - As per Section 5.9.

8.7 PIN-2 - CAPE YOUNG

Valued Environmental Component	Environmental Protection Procedures
Permafrost Soils - Abundant ponds and lakes surrounding site.	- As per Section 5.6.
Coastal Marine Resources - Belugas and narwhals sited. Seals seen in early spring.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Some caribou from Bluenose Herd seen on station and muskoxen occasionally seen south of the station. Grizzly bears and polar bear rarely seen. Arctic ground squirrels and fox in tundra southwest of site, fox den east of site near water supply lake, lemming burrows on site. Nesting pair of Peregrine Falcons 8 km south of station, 500 m east of winter water supply lake. Barren-ground caribou observed to frequent station hangar area.	- As per Section 5.8. - Keep hangar doors closed when possible to discourage caribou from frequenting area. Workers are not to harass wildlife as detailed in Section 5.8.
Heritage Resources - Moderate archaeological potential. Several known heritage sites, some previously disturbed, others at risk during clean up. Four clusters of caches containing 100 individual features including circular pits and rock caches interspersed with several tent rings - near north end of point along beach terraces. Seven cache and pit features, and number of small rock cairns - front of narrow terrace southeast of beach area. More recent trappers shack with unmarked wooden cross and possible tent ring and currently undisturbed tent ring site. Archaeological sites along road to water supply point at Harding River include a wooden structure (end of water supply road), stone alignment (possible foundation) and burned remains of another structure (halfway between station and water point).	- Additional site recording and other mitigation, including fencing, at previously disturbed sites may be required prior to clean up, especially in vicinity of runway and access roads, if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.8 PIN-3 - LADY FRANKLIN POINT

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Arctic char fished commercially by communities on Victoria Island.	- As per Section 5.2.
Coastal Marine Resources - Ringed seals commonly observed in Coronation Gulf and Dolphin and Union Strait.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Occasional presence of Peary caribou and muskoxen. Snowy Owl, Rough-legged Hawk, Gyrfalcon, Peregrine Falcon and Golden Eagle nests in area.	- As per Section 5.8.
Heritage Resources - High archaeological potential. Many known heritage sites; highly disturbed by past station activities. Several sites were identified including a Thule village which was looted and a grave site close to the beach road. Many sites are located on beach ridges and in close proximity to proposed site earth works.	- An archaeological investigation to be completed by a qualified permitted archaeologist in all new work areas, if required by Territorial/Regional archaeological officials. - The known Thule site, already vandalized, to be excavated and documented by a qualified permitted archaeologist, if required by Territorial/Regional archaeological officials. - Sites adjacent to proposed areas of disturbance, including the Inuit burial site, to be marked for avoidance. - As per Section 5.9.

8.9 PIN-4 - BYRON BAY

Valued Environmental Component	Environmental Protection Procedures
Fish Habitat - Arctic char observed in Sinclair Creek and along shore. Lake trout common.	- As per Sections 5.5 and 5.7.
Permafrost Soils - Abundant ponds and lakes surrounding site and generally poor drainage indicates extensive ice-rich soils.	- As per Section 5.6.
Coastal Marine Resources - Ringed seals in area.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Arctic fox and hares present near station; frequent sightings of Peary caribou; muskoxen with young noted in groups of 15-30, polar bears known to frequent the area. Peregrine Falcon and Rough-legged Hawks observed near the station. Vegetation on site relatively lush.	- As per Section 5.8. - Minimize disturbance of vegetation.
Heritage Resources - Two marked historic graves are located between 200 and 300 m northwest of the station, adjacent to the Chisolm Trail. One site, about 5 km east of the station, contains a small cache. Approximately 7.5 km east of the station is a cache associated with two bone elements. A tent ring and rock alignment, as well as caribou bones, shotgun shells, and tin cans have been observed about 7.2 km east of the station.	- Marking and avoidance of grave sites. Possible need for reinterment, if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.10 CAM-M - CAMBRIDGE BAY

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Residents of Cambridge Bay hunt and fish in general vicinity of site.	- As per Section 5.2.
Local Economy - Cambridge Bay, 3 km from the site, has a wide range of commercial and public services.	- As per Section 5.3.
Fish Habitat and Surface Water Quality - Abundant ponds and lakes surrounding site and presence of arctic char in water supply lake. Excavation of soil at sewage outfall extends into adjacent waterbody.	- As per Section 5.5. - Prevent siltation and further release of contaminants to waterbody at outfall site through the use of silt fences, cofferdams or other suitable methods.
Terrestrial Resources - Peary caribou, muskoxen, arctic fox, arctic hare and lemmings all present in vicinity of site. Rough-legged Hawk nesting on station dish antenna. Waterfowl and shorebirds common in area. Snow Buntings, eiders, ptarmigan, plovers and turnstones nesting in site vicinity. Shorebirds nesting in high concentration in vicinity of sewage outfall. No significant terrestrial resources were noted at the NDF site during 1994 surveys. Near-continuous cover of low-Arctic tundra vegetation.	- As per Sections 5.5 and 5.8. - Confirm presence of hawk nest on communication dish. Schedule demolition of dish before arrival of hawks or after young have fledged. - Schedule excavation at sewage outfall to minimize impacts to shorebirds as per section 5.8. Commence work at sewage outfall area prior to arrival of nesting shorebirds or after departure. - Survey site to determine proximity of other nest sites to work areas. - Monitor nest sites to determine extent of disturbance and schedule activities as required and where feasible to minimize disruption. - Minimize disturbance of vegetation.
Heritage Resources - Much of the area in the vicinity of CAM-M has been extensively disturbed and most of the archaeological sites in this area probably have been destroyed or buried. Two recent sites identified including small cairn located 600 m north of station, and 1 m long waterfowl hunting blind (composed of rock) east of small lake southeast of station. Some potential for future finds in undisturbed areas given nature of environment in region.	- Archaeological survey to be conducted by qualified permitted archaeologist in new areas scheduled for disturbance, if required by Territorial/Regional archaeological officials. - As per Section 5.9. - Survey proposed NDF site prior to development, if required by Territorial/ Regional archaeological officials.

8.11 CAM-1 - JENNY LIND ISLAND

Valued Environmental Component	Environmental Protection Procedures
Coastal Marine Resources - Bearded seal summer in area; ringed seal probably year round. Large concentration of seals observed on pack ice near island.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Small herd of breeding muskoxen recorded. Peary caribou also present. Foxes and hares observed. Wide variety of birds noted on site. Station 75 km north of Queen Maud Gulf Migratory Bird Sanctuary. Raptors nesting in communication dish adjacent to outfall in 1993. Snow Buntings nesting under module train, and other species nest nearby. Occasional large concentrations of Canada Geese and extremely significant colony of Lesser Snow Geese on island, including near station.	- As per Section 5.8. - Confirm presence of raptor nest on communication dish. Schedule demolition of dish before arrival of raptor or after young have fledged. - Survey site to determine proximity of other nest sites to work areas. - Monitor nest sites to determine extent of disturbance and schedule activities as required and where feasible to minimize disruption. - Avoid clean up activities during breeding/rearing season in vicinity of geese.
Heritage Resources - Several sites, one of which has been disturbed by vehicles: Inuit village, grave site, four prehistoric camps (containing tent rings and caches), and a house ruin. The sites at Jenny Lind Island span the entire period of Arctic occupation and are therefore considered significant.	- Marking and avoidance of Inuit site west of runway and graves on north side of station. Possible need for reinterment, if required by Territorial/ Regional archaeological officials. - Mitigative recording of sites previously disturbed by station activities, if required by Territorial/Regional archaeological officials. - Archaeological survey to be conducted by a qualified permitted archaeologist in new areas scheduled to be disturbed, if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.12 CAM-2 - GLADMAN POINT

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Inuit from Gjoa Haven net fish and trap fox in Gladman Point area.	- As per Section 5.2.
Fish Habitat - Mostly domestic Arctic char fishery between March and December used by residents of Gjoa Haven; Cisco and cod fished in area; rivers in region fished commercially.	- As per Sections 5.5 and 5.7.
Permafrost Soils - Abundant ponds and lakes surrounding site and extensive vegetation cover indicates extensive ice-rich soils.	- As per Section 5.6.
Coastal Marine Resources - Bearded seal and ringed seal noted on pack ice.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Arctic fox, ground squirrel, lemmings and caribou observed in vicinity of station. Arctic fox observed denning in vicinity of West Landfill South (1993). Peregrine Falcon nesting in hangar and communication billboard adjacent to outfall in 1993 and in previous years. Snowy Owls regular visitors to site. Rock Ptarmigan nests found on site. Snow Bunting nest in airstrip hangar.	- As per Section 5.8. - Monitor fox denning site. Minimize disturbance adjacent to fox denning site, where feasible. - Remove raptor nesting structures between nesting seasons. - Confirm locations and presence of nesting peregrine falcons and schedule demolition of nesting structures for before arrival of birds or after young have fledged. - Survey site to determine proximity of other nest sites to work areas. - Monitor nest sites to determine extent of disturbance and schedule activities as required and where feasible to minimize disruption.
Near continuous cover of low-Arctic tundra vegetation.	- Minimize disturbance of vegetation.

Heritage Resources - Inuit village with associated graves and campsite on Gladman point in direct association with beach area for site - already disturbed by previous station activities (graves adjacent to road of particular concern). Inuit sealing and hunting camp consisting of three tent rings and seal skin stretching rings, and cache complex; located along mouth of river on far side of M'Clintock Bay, 3.3 km southeast of station. Previously unidentified Inuit camp containing tent ring, eight seal skin stretching rings and other artifacts; located 500 m southwest of airstrip.	- Known sites to be fenced and provided with signage for avoidance. - Qualified, permitted archaeologist to be present when clean up activities take place at Gladman Point, if required by Territorial/Regional archaeological officials. - Archaeological survey to be conducted by a qualified permitted archaeologist in all new areas to be disturbed, especially near landing beach, POL area, and Gladman Point, if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.13 CAM-3 - SHEPHERD BAY

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Waters adjacent to this site are major seal and bird hunting and fishing areas for residents of Gjoa Haven and Taoyoak. Arctic fox also trapped.	- As per Section 5.2.
Fish Habitat - Char, cod and cisco in nearby waters.	- As per Sections 5.5 and 5.7.
Permafrost Soils - Abundant ponds and lakes surrounding site and extensive vegetation cover indicates ice-rich soils.	- As per Section 5.6.
Coastal Marine Resources - Ringed and bearded seals in area; whales/walrus uncommon.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Caribou from Wager Herd common on site. Arctic foxes, hares, ground squirrels and lemmings in area. Shepherd Bay important staging area for Canada Geese. Oldsquaw and White-fronted Geese noted on site. Snow Bunting nest under module train. Near continuous cover of low-Arctic tundra vegetation in undisturbed areas.	- As per Section 5.8. - Survey site to determine proximity of other nest sites to work areas. - Monitor nest sites to determine extent of disturbance and schedule activities as required and where feasible to minimize disruption. - Minimize disturbance of vegetation.
Heritage Resources - The area of Shepherd Bay contains significant archaeological remains and is considered to be of high archaeological potential. Three prehistoric sites (of Thule age) have been identified in the vicinity of the CAM-3 beaching area; all have been impacted by past station activities, one of them severely.	- Avoid regrading in area 50 m east and west of road south of abandoned airstrip and the beach POL tanks unless qualified, permitted archaeologist in attendance, if required by Territorial archaeological officials. - If required by Territorial/Regional archaeological officials, full recording of 3 existing sites to be undertaken by qualified, permitted archaeologist; sites to be flagged for avoidance. - Archaeological survey to be conducted by a qualified permitted archaeologist in new areas scheduled to be disturbed, if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.14 CAM-4 - PELLY BAY

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Residents of the community of Pelly Bay hunt and fish in the general vicinity, including ice-fishing at Barrow Lake.	- As per Section 5.2.
Local Economy - Community of Pelly Bay is located 14 km northwest of the site.	- As per Section 5.3.
Fish Habitat - Arctic char in Kugajuk River and Barrow Lake. Domestic fishery for Arctic Char and lake trout used by Inuit.	- As per Section 5.5.
Coastal Marine Resources - Occasional migration of whales and walruses through Gulf of Boothia. Bearded and ringed seals extend into Pelly Bay.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Barren Ground caribou from Wager Herd common on site and near Barrow Lake. Arctic hare, fox and ground squirrel in area. Large colony of Thayer's Gulls located 4 km north of station, near Barrow Lake. Snow Bunting, nesting under module train; other species nest nearby.	- As per Section 5.8. - Survey site to determine proximity of other nest sites to work areas. - Monitor nest sites to determine extent of disturbance and schedule activities as required and where feasible to minimize disruption. - Particular attention is required due to the number of caribou that can occur in close proximity to the station.
Heritage Resources - One prehistoric archaeological site identified (out of six previously reported in area) consisting of tent rings, caches, stone alignments, foundation of large structure and other artifacts; located at north end of Barrow Lake near mouth of the Alliarusiq River, 5 km northeast of station and 600 m beyond north service road.	- Marking and avoidance of the site at the north end of Barrow Lake. - As per Section 5.9.

8.15 CAM-5 - MACKAR INLET

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Polar bear and possibly narwhal hunted by Inuit from the region. Arctic char commercially fished in Committee Bay.	- As per Section 5.2.
Fish Habitat - Arctic char present in Bagnall Lake and adjacent bay.	- As per Sections 5.5 and 5.7.
Terrestrial Resources - Abundant caribou from Melville Herd. Polar bears - occasional visitors. Wolves and arctic ground squirrels seen; swans observed.	- As per Section 5.8.
Heritage Resources - West end of Bagnall lake: hunting blind, caches, shelters, tent rings, a possible grave and other unidentified structures, potentially several centuries old, but considerably disturbed due to gravel borrowing and erosion. South shore of Bagnall Lake: two tent rings which predate the station; inukshuk (stone person), cache and tent ring which appear prehistoric; subject to erosion. West of runway - tent rings, caches and hearths; subject to erosion.	- Full recording of sites between river and runway, and sites at west end of runway, if required by Territorial/ Regional archaeological officials. - Avoidance of sites. Monitoring during clean up work in these areas. - As per Section 5.9.

8.16 FOX-M - HALL BEACH

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Residents of community of Hall Beach hunt and fish in general vicinity of site, including walrus and seal hunting along the coast of the Melville Peninsula during fall.	- As per Section 5.2.
Local Economy - Hall Beach has a wide range of commercial and public services.	- As per Section 5.3.
Fish Habitat - Arctic char common in Hall Lake.	- As per Section 5.5.
Coastal Marine Resources - Walrus, seal, whales known to frequent area.	- As per Sections 5.7 and 5.8. Refer to section 4.12.1 during excavation of underwater debris.
Terrestrial Resources - Smaller ponds found throughout the site provide habitat for waterfowl including king eiders, snow geese, tundra swans, brant, common eiders, oldsquaw. Arctic loons, sandpipers, plovers, terns, and jaegers also observed in area. Arctic fox denning near the station. Polar bear reported at station.	- As per Section 5.8. - Monitor fox denning site. - Avoid activities adjacent to fox denning site where feasible.
Heritage Resources - Major Thule archaeological site previously disturbed by station activities; several other archaeological sites in the region. Potential for additional sites to be present throughout area. A site located near the southern end of the present LRR station, about 700 m west of the shore of Foxe Basin, contains the remains of 12 Thule sod houses. Many artifacts have been recovered at this site including a harpoon head, several handle parts, cut or drilled cores, drilled slate end blade fragments, a slate drill bit, and a sandstone whetstone fragment. A site located at Tern Beach, 1.4 km south of the mouth of the river that forms the southwestern boundary of the station, contains four inuksuit, three meat caches, fragments of a soapstone vessel, broken bottles and ceramic sherds. Some of these artifacts may be recent, however, some may be from Thule period. Reported archaeological find in the Kingmitokvik Point area has not been verified. A site located on a beach ridge about 500 m west of the south edge of the Hall Beach townsite in an area of small ponds contains such items as sea mammal and other animal bones, structural stones and a Dorset tool support piece made of bone.	- Known sites to be fenced and provided with signage for avoidance. - Additional testing to delimit boundaries of major vandalized Thule village and establish period of occupation to be conducted by qualified permitted archaeologist, if required by Territorial/ Regional archaeological officials. - Archaeological survey to be conducted by a qualified permitted archaeologist in all new areas to be disturbed, if required by Territorial/Regional archaeological officials. - As per Section 5.9.

8.17 FOX-2 - LONGSTAFF BLUFF

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Arctic fox trapping and a commercial char fishery occur in this general area.	- As per Section 5.2
Fish Habitat - Arctic char present along shore and in lakes near station. A commercial harvest of char occurs in this region.	- As per Sections 5.5 and 5.7.
Coastal Marine Resources - Colonies of Sabine gulls and arctic terns occur along the coast.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Many caribou from South-Baffin Herd noted at upper and lower sites. Polar bears frequent the site. A variety of avifauna including Greater and Lesser Snow Geese breed in the general vicinity.	- As per Section 5.8. Particular attention is required due to the numbers of caribou that occur in close proximity to the station. The area provides important grazing and calving habitat.
Heritage Resources - numerous archaeological sites in coastal areas. Some already disturbed by station activities. Additional sites probably present on coast between old and new landing beaches. Five rock slab features (up to 1 m in length), serving as hunting blinds or shelters; lichen covering suggests features are several centuries old; area partly truncated by service road - 200 m north of old site storage area (northeast of station). Tent ring, three caches, shelter, large inukshuk (stone person) and other artifacts - on upper ridge above beach north of access road to old storage site. Eleven caches, two shelters, four tent rings and blinds, and large inukshuk (stone person); site at least a century old - on point of land further to northeast overlooking Piling Bay. Thule muskox horn sheath artifact found previously on hillside near airstrip; area has now been disturbed by Geological Survey of Canada Camp. Three loci consisting of tent rings, caches, exterior hearth, and fox trap; some a century old or more, one disturbed by gravel extraction - within 1 km of airstrip to northwest. Thirteen tent rings, two caches, blind, kayak rest and fox trap; some features either disturbed or destroyed by gravel excavation - on beach terraces between shore and access road to airstrip. Twenty-three tent rings, four caches, two hearths and other artifacts; some features disturbed/destroyed by gravel extraction and marine erosion - on beach terraces between shore and access road, east of West Beach Area.	- Archaeological survey to be conducted by permitted qualified archaeologist in all new areas proposed for disturbance, if required by Territorial/Regional archaeological officials. - Full recording by qualified, permitted archaeologist of archaeological sites in proximity to activity areas, if required by Territorial/Regional archaeological officials. - Sites in proximity of disturbance areas to be fenced and provided with signage. - As per Section 5.9.

8.18 FOX-3 - DEWAR LAKES

Valued Environmental Component	Environmental Protection Procedures
Fish Habitat - Arctic char in river near airstrip.	- As per Section 5.5.
Terrestrial Resources - Calving area for South-Baffin Herd. Caribou common on site; polar bears occasionally seen. A variety of waterfowl and other avifauna occur in this area including loons, tundra swans, brant, larks, buntings, and plovers.	- As per Section 5.8. Particular attention is required at this site due to the numbers of caribou that may occur in close proximity to the station.
Heritage Resources - Two possibly prehistoric sites and one recent Inuit burial site located in areas close to station activities. One area on the northwest end of Dewar Lakes near the mouth of the river entering the lake, approximately 1.5 km south of the airstrip, contains evidence of tent rings, caches and hearths that probably date to the Thule period. A site located 750 m north of the north end of the airstrip contains one inukshuk (stone person) and several boulders that may have formed a caribou fence system. A grave marker and associated cache are located approximately 1.5 km west of the airstrip adjacent to the access road. There may be other areas of high archaeological potential round the Dewar Lakes site.	- Burial site and other known features to be fenced and provided with signage for avoidance. - As per Section 5.9.

8.19 FOX-4 - CAPE HOOPER

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - Native land use, hunting and fishing activities.	- As per Section 5.2
Coastal Marine Resources - Very large colony of Northern Fulmars located south of station at Cape Searle. Additional seabird colonies located at Exeter Sound and Scott Inlet. Potential presence of seals and whales.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Polar bears frequently reported in vicinity of station. Cape Hooper is within an important denning area for polar bears. Potential presence of raptors.	- As per Section 5.8.
Heritage Resources - Burial site and tent rings have been located north of the airstrip. Tent rings, caches, and hearths were observed around Tanner Bay and east of the POL facilities.	- Mark and avoid Inuit burial site north of west end of runway. - Avoid archaeological sites at Tanner Bay. - As per Section 5.9.

8.20 FOX-5 - BROUGHTON ISLAND

Valued Environmental Component	Environmental Protection Procedures
Local Resource Use - residents of the Village of Broughton Island hunt and fish in the general vicinity.	- As per Section 5.2.
Local Economy - Broughton Island has a limited range of public and commercial services.	- As per Section 5.3.
Coastal Marine Resources - polar bear common on station and near community. Site in close proximity to major colonies of Northern Fulmar at Cape Searle, Exeter Sound, and Scott Inlet. Large numbers of fulmars may occur in the marine environment adjacent to the station and may travel past Cape Dyer during feeding forays from the colonies.	- As per Sections 5.7 and 5.8.
Heritage Resources - no known sites in areas of clean up activities. Minor potential in beach area adjacent to runway. One site was recorded on the west side of Broughton Island southeast of the summit station in 1990; it is Inuit and, possibly, late Thule in affiliation. The archaeological site is well removed from the station and is not expected to be impacted by clean up activities. Several other historical sites have previously been recorded on Broughton Channel; there remains some potential for the presence of new sites in the area of the village, the lower part of the station and the coastline north from the village.	- As per Section 5.9.

8.21 DYE-M - CAPE DYER

Valued Environmental Component	Environmental Protection Procedures
Fish Habitat - Arctic char are fished commercially in the rivers flowing into Merchants Bay northeast of the station. Arctic char may occur in river at northern edge of beach landing area.	- As per Sections 5.5 and 5.7. Prior to debris removal and earthworks at the Lower Camp Landfills, conduct survey to determine presence of concentrations of fish. Use coffer dams and silt fences to intercept run-off and prevent siltation of the watercourse.
Coastal Marine Resources - variety of marine species in coastal waters, including Sunneshine Fiord. Major colonies of Northern Fulmar in region at Cape Searle, and south shore of Reid Bay. CWS identifies area as key migratory bird habitat. Large numbers of fulmars may occur in the marine environment adjacent to the station and may travel past Cape Dyer during feeding forays from the colonies.	- As per Sections 5.7 and 5.8.
Terrestrial Resources - Polar bear common in area.	- As per Section 5.8. - Landfill excavations (As per Section 4.12).
Heritage Resources - numerous archaeological sites in coastal areas. Six historic and prehistoric sites were found on the shore of Sunneshine Fjiord, west of the runway signifying Thule and later habitation. Other sites are likely present.	- Burial site and Thule village to be fenced and provided with signage. Thule village to be completely tested prior to loss of one structure to marine erosion and to confirm nature and age of one structure partially covered by road construction, if required by Territorial/Regional archaeological officials. - As per Section 5.9.