present a hazard to a nearby community and sets the standards for the storage and handling of dangerous goods, flammable liquids and combustible liquids.

Nunavut Regulatory Overview

The Territorial Government and DIAND jointly administer the Nunavut Territory that contains DEW Line sites. The DIAND regional office is in Yellowknife. DIAND district offices within the Nunavut Settlement Area and the Territorial seat of government are located in Iqaluit.

In addition to the Federal and Territorial Acts and Regulations above, the clean up of the DEW Line sites in Nunavut is also governed by:

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

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

- The *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 offences and penalties are defined. The Act applies only to situations not authorised by other Canadian Acts in Nunavut.

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

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

- The *Public Health Act* and *Regulations*, particularly the *General Sanitation Regulations* and the *Camp Sanitation Regulations*, outline the health standards to be maintained at workplaces and any camp facilities.

- The *Historical Resources Act* protects archaeological sites from disturbance and prohibits the removal of speciments, except under permit.

Environmental Guidelines

- *National Guidelines for Decommissioning Industrial Sites* provides the recommended process for undertaking site assessment studies.

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

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

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

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

F. Community Consultations - Public Participation

1. Purpose

A Public Consultation Program was carried out in communities across the north in August of 1992, in May and June of 1993, and again in 1994 to inform the public of the status of the DEW Line Cleanup project at each of the 21 sites and to obtain input regarding specific concerns of the people.

2. Process

Meetings were held in communities across the north in the vicinity of DEW Line sites and information sessions were held with government officials in Cambridge Bay, Iqaluit and Inuvik. The action plan was prepared by UMA with the consultation team comprised of representatives from DND, DIAND, Environmental Sciences Group/RRMC, UMA and SGE.

Information packages were provided to the communities in English as well as Inuktitut, Inuinaktun and Inuvialuktun where applicable. Minutes were recorded at each of the meetings and a number of action items were identified and passed on to the responsible agencies.

3. 1992 Community Consultations

Sixteen communities were visited in 1992; the locations and dates are listed in Table I-3. The objectives of the initial meetings included the following:

- Inform the community of the status and schedule for the project.
- Provide information regarding the process for closure and cleanup of the sites as well as overall objectives for maximizing northern benefits.

- Present environmental information regarding the DEW Line Clean Up (DLCU) project.
- Provide general information regarding the demolition/disposal of facilities.
- Obtain information regarding public concerns through discussions at the meetings and through questionnaires.
- Obtain information regarding local labour and contracting capabilities to assist in developing implementation strategies.

A report prepared by UMA and its associates outlines the information provided to the public and summarizes questions and concerns which arose during the meetings. Three of the meetings scheduled in the Western Arctic were either canceled at the request of the Hamlet (Tuktoyaktuk and Paulatuk) or simply boycotted due to instructions to the communities from the Inuvialuit Regional Corporation (IRC). Their position was based on their interpretation of certain aspects of the Inuvialuit Final Agreement and land claim settlements. One western meeting, held in Inuvik in 1992, was well attended.

Many questions and concerns were raised regarding various aspects of the project and almost half of these dealt with two main areas: employment opportunities and environmental protection. There is a serious desire among the people in the communities to obtain training and to be involved in the cleanup of the sites. The second major issue of environmental impact and protection was expressed as concern about the short and long-term impact on the food chain. Perhaps the most serious concerns expressed centered on previous disposal practices, particularly ocean dumping.

The appearance of the sites, particularly those adjacent to communities, was a concern. The proposed cleanup protocol was generally accepted to be the most practical especially after assurances that the Federal Government would assume long term responsibility.

In general, the meetings were well attended, the project team was well received and discussions were wide ranging and lively. People seemed to appreciate the initiative taken by DND to inform the communities regarding DLCU and the public provided valuable insights into the project.

4. 1993 Community Consultations

Thirteen communities were visited in May and June 1993. The locations, dates, and attendance figures are listed in Table I-4. The objectives for this second round of meetings were as follows:

- Report to the community on the current status of the project.
- Present information on the site investigations and the 80% Design Submission for the ten sites studied in 1992.
- Provide information on the 11 DND sites to be studied in 1993.
- Present information on the plans for the 21 DIAND sites.
- Obtain information regarding community concerns with the cleanup plans.

The communities were generally pleased to host the meetings and assisted with pre-meeting preparations. This was not the case in Tuktoyaktuk, where the Hamlet refused to assist with advertisement or preparation. This, again, was due to direction from the IRC, which was involved with ongoing negotiations with DND. The meeting in Tuktoyaktuk was eventually canceled due to lack of participation. The other Western Arctic meetings were much more successful than those of the previous year. Residents from two communities chose to attend the meetings despite a request from the IRC to boycott. These meetings were relatively well attended and appeared to have re-opened the lines of communication.

Other community meetings were generally well attended. Overall, the residents were pleased that the meetings were held and were usually satisfied with the cleanup

plans. The exception to this was Broughton Island, where several local residents did not like the northern landfill concept and were skeptical about the realization of local benefits due to previous experiences with government projects.

The main issues of concern continue to be potential local benefits; with respect to employment as well as training opportunities, and environmental issues. The environmental questions were addressed through discussions during the meetings and most residents' fears were alleviated with the exception of Broughton Island again. DEW Line buildings were also of considerable interest to local residents. The residents of most communities were also generally interested in being kept informed on the status of the cleanup.

5. 1994 – 1998 Community Consultations

The topic of the meetings held during 1994 – 1998 were general project presentations, a review of the scientific investigations, engineered landfill, employment opportunities and site prioritization methodology. Table I-5 provides a summary of the public consultation program.

Table I-3: 1992 Community Consultations

Location	Date	Type of Meeting	Attendance
Iqaluit	4 August	Technical	4
Broughton Island	4 August	Public	50+
Clyde River	5 August	Public	55+
Igloolik	6 August	Public	35+
Hall Beach	6 August	Public	50+
Taloyoak	10 August	Public	35+
Pelly Bay	10 August	Public	-
Gjoa Haven	11 August	Public	35+
Coppermine	12 August	Public	60+
Cambridge Bay	13 August	Public	18+
Aklavik	17 August	Public	-
Inuvik	18 and 19 August	Technical	3
Inuvik	18 August	Public	27+
Paulatuk	19 August	Public	-
Tuktoyaktuk	19 August	Public	-
Yellowknife	20 August	Technical	23

Table I-4: 1993 Community Consultations

Location	Date	Type of Meeting	Attendance
Iqaluit	9 May	Media	2
Iqaluit	10 May	Technical	7
Broughton Island	10 May	Public	35+
Clyde River	11 May	Public	30+
Igloolik	12 May	Public	10
Hall Beach	13 May	Public	30+
Pelly Bay	17 May	Public	30+
Taloyoak	18 May	Public	-
Gjoa Haven	19 May	Public	30+
Cambridge Bay	20 May	Public	5
Paulatuk	8 June	Public	19
Coppermine	8 June	Public	60+
Aklavik	9 June	Public	20+
Tuktoyaktuk	9 June	Public	-
Inuvik	10 June	Technical	4
Inuvik	10 June	Public	7

Table I-5: 1994 - 1998 Community Consultations

Location	Date	Type of Meeting	Attendance
Broughton Island	August 10, 1998	Public	15
Broughton Island	1997	Public	not available
Clyde River	1997	Public	not available
Broughton Island	Jan. 29, 1996	Council	18
		Public	50+
Clyde River	Jan. 30, 1996	Public	30+
Cambridge Bay	July, 1994	Public	15
Nunavut Planning Comm.	Oct. 19, 1994	Public	25
Kitikmeot Inuit Assn. AGM	Nov. 9, 1994	Public	---
Site Prioritization Methodology	July, 1995	Technical	20
	May 6, 1998	Council/Public	70 +
Tuktoyaktuk	May 4,1998	Public	14

G. Tier II Disposal Facility

1. Background/Rationale

Based on engineering field surveys conducted at the sites in 1992 and 1993, it became apparent that a potentially large volume of Tier II contaminated soil (estimated at 30,200 m^3 for known contaminated soil and an undetermined quantity of PAH and chlorinated hydrocarbon contaminated soils for the 15 sites in Nunavut). These soils would require removal in a manner which precludes their continued contact with (and thereby protecting) the Arctic ecosystem. The costs of disposing (including transport) of these soils was also determined to contribute significantly to the total cost of DEW Line Cleanup. A number of disposal options were considered by the DEW Line Cleanup Project team; of these, the most viable (both economically and logistically) was determined to be the development of engineered Tier II Disposal Facilities (TDF) at each site. In some cases Tier II soils may be transported from one DEW site to another depending on soil volumes and project economics. These facilities utilize a leachate containment system, consisting of permafrost and synthetic liners which limit leachate generation and prevent contaminant migration.

2. Environmental Considerations in TDF Design

The TDFs are designed to provide a contained facility for the disposal of Tier II contaminated soil. One of the major concerns with respect to the facilities is the possible leakage of contaminants from soils placed in the facility and the potential impact on the surrounding ecosystem and nearby communities.

The leachate containment system developed for each TDF is designed to prevent contents from leaking and migrating into the surrounding environment. The design has been based on the characterization of the contaminants in the soils and the geothermal properties of the permafrost. Permafrost will provide the primary containment barrier in

which the frozen substrate will advance (freezeback) and encapsulate the contents in the facility. Extensive geothermal analysis on the time required for freezeback, thermal regime in the ground surrounding the facilities and the depth of the active layer in the cover material, has been used to determine the thickness of the cover and the time required to provide adequate permafrost encapsulation. Synthetic liners provide secondary containment. A PVC (polyvinylchloride) liner will be placed at the base and sides of the facility; this liner is chemically compatible with the contaminated soils, and will prevent the potential movement of moisture during the period required for permafrost aggradation. The second liner, a low permeability geocomposite clay liner (GCL), is incorporated into the cover of the facility to maximize run-off. The GCL also serves to reduce infiltration of surface water if thermal contraction cracks develop in the frozen soil. The GLC liner provides the required flexibility for accommodating settlement or disturbance. The location of a TDF at any site would result in an increase in total amount of gravel required at this site for capping of the facility.

Careful consideration has also been given to the characterization of waste soils being placed in the TDFs. Contaminated soils which contain levels of contaminants in violation of the *Canadian Environmental Protection Act* (CEPA) are considered hazardous material and will not be placed in the TDFs; these are to be removed from the site to a licenced hazardous material disposal facility along with other hazardous wastes. Some of the soils may also contain petroleum hydrocarbons - often where lead and PCB contamination has occurred as a result of waste oil and/or fuel spills. These hydrocarbons should be contained within the soil matrix and should not exist as free liquids which could potentially leach. Leachate testing has also been conducted on most of the more highly contaminated soil samples as set forth in Ontario *Regulation 347*. None of these have leached levels of contaminants which correspond to the definitions for hazardous wastes.

Selection of the areas for TDF development at each site are also based on a number of technical factors including:

- Topography, drainage and geology;
- Minimization of disturbance to natural drainage patterns;
- Appropriate distances from marine and freshwater systems and communities, as well as other biologically-sensitive areas;
- Drainage away from ocean and domestic water supplies;
- Distances from beaching areas and locations of contaminated soil; and
- Accessibility.

H. Cumulative Effects

For the purposes of the DEW Line Clean Up Project, cumulative effects have been defined as changes to the biophysical, social, cultural or economic environments caused by a project component in combination with any on-going, past or future activities. In undertaking environmental assessments, the project management office has included an evaluation of possible cumulative effects, including:

- Impacts over a larger (regional) area including the crossing of jurisdictional boundaries;

- Temporal boundaries beyond the time frame required to complete the clean up work;

- Interactions with Valued Ecosystem Components (both biophysical and socio-economic); and/or

- With other past, ongoing (i.e., operation of the North Warning System, mining activities, existing hamlet operations) or known future (i.e., construction related to the build up of the Nunavut government infrastructure) activities.

This evaluation also included an evaluation of levels of significance.

Cumulative effects arising from the DEW Line Clean Up Project can occur as interactions between project components (either from the same or more than one site) and/or between environmental components. Effects can occur in one of four ways:

- Physical or chemical transport mechanisms;

- "Nibbling loss" (i.e., gradual disturbance);

- Spatial or temporal crowding;

- Growth induction initiated by the project.

An analysis of cumulative environmental effects has been undertaken for this project. In doing so, four steps have been undertaken to date:

1. Scoping, including identifying issues of potential concern, VEC;s that could be affected and boundary setting;

2. Analysis of effects, including an evaluation of baseline data and possible effects on VEC's. Methods could include the use of overlays to identify where the geographic and temporal extent of various projects' effects may interact;

3. Identification of mitigation options and recommending measures to be undertaken; and

4. Evaluating significance of these effects, after mitigation actions have been applied.

Other activities that may affect the cleanup project include the following:

- Cleanup activities that may be taking place at the Intermediate DEW Line sites for which DIAND is responsible - these activities may occur at the same time as for the 14 DND DEW Line sites.

- The periodic maintenance visits to the short range radar stations.

- The continued operation of the long range radar stations.

- The periodic use of the sites by local hunters and trappers.

As a result of this analysis, it can be concluded that, for the most part, both the clean up of each site and the individual components will not lead to significantly adverse cumulative impacts. As a result of initial overlay studies, the clean up of each site can be considered as a short term, distinct individual event that will not have any form of additive effect with past, existing or known future activities. All of the activities listed above will affect the 15 site cleanup project to some extent. An Environmental Protection Plan (EPP) will be developed to ensure that each of the on-site activities will be carried out in a manner that will preclude further damage to the Arctic environment. All on-site activities will be monitored and carried out in accordance with the EPP and the overall effect of the cleanup will be a positive impact, i.e., the site will be restored as much as possible to a natural state.

I. Site Specific Summaries

At each of the 14 Nunavut sites, there is the possibility that some of the proposed cleanup activities have the potential to impact adversely on the environment - particularly heritage resources, Arctic habitat, flora, fauna, and human and ecosystem health. Nevertheless, with the integration of proper mitigation procedures that will be established in the Environmental Protection Plan (EPP) and the positive impacts such as the overall improvement in the physical condition and environmental health of the site, the restoration of ecosystem components lost during cleanup and previous site activities, as well as Northern economic benefits, will more than outweigh the potential negative effects in the long term.

1. Cape Young, PIN-2

Three landfills at the site - beach and two south (east and west) - are to be cleared of visible surface debris and regraded to match existing contours and drainage patterns. A new landfill will be developed by the station to accommodate non-hazardous visible and building demolition debris removed from the station proximity, existing landfills, three pallet storage areas and the beach. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Soils contaminated with PCBs and inorganic elements will be excavated from the station proximity and sewage outfall, in addition to an isolated stained location at the beach fuel tanks. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All buildings and facilities in the Station and Beach Areas will be removed and/or demolished. Specified locations of the site will also be recontoured to natural drainage patterns. A cleanup camp will be set up in the vicinity of the station area and subsequently demobilized or demolished at the end of the project. The total area affected by cleanup operations is approximately 26 hectares.

2. Lady Franklin Point, PIN-3

The existing landfill at the station, the Main Landfill, will be used for disposing of site debris, demolished structures and Tier I soils. In addition to the Main Landfill, two other landfills will be regraded. Contaminated soil will be excavated from several locations around the main station and from the sewage lagoon. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. A cleanup camp and equipment storage areas will be established and then demobilized or demolished when cleanup activities have been completed. The total area affected by cleanup activities is approximately 18 hectares.

3. Byron Bay, PIN-4

Six landfill areas have been identified at this site, one which requires leachate containment. One new landfill is to be developed in the station area to accommodate non-hazardous site and demolition debris as well as all Tier I soils. Surface debris is to be removed from all the landfill areas prior to being covered with granular fill material and regraded to match the natural contours of the surrounding terrain. Contaminated soils will be excavated from the station proximity, the sewage outfall, the airstrip area and the beaching area. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. All structures and facilities will be demolished. A contractor camp to accommodate personnel for these cleanup activities is to be set up in proximity to the former station; this camp will be demobilized or demolished when the project is completed. The total area affected by cleanup activities is approximately 82 hectares.

4. Cambridge Bay, CAM-M

Two existing landfills at the site - south shore and west - are to be cleared of visible surface debris (as required), and regraded according to natural contours and drainage patterns. The third, referred to as the Main Landfill (including north and south lobes), will require a leachate containment system to prevent further leakage from the facility. This facility will be used to accommodate additional non-hazardous surface and building demolition debris removed from the Station and South Shore Areas, and will be subsequently regraded, during closure, to redirect surface drainage from the area. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. Soils contaminated with PCBs and inorganic elements will be excavated from the station proximity and sewage outfall. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. All buildings and facilities in the Station and South Shore Areas which are not required for the operation of the LRR/LSS will be removed and/or demolished and specified locations of the site will also be recontoured to natural drainage patterns. A cleanup camp will be set up in the vicinity of the Station Area for the above purpose and subsequently demobilized at the end of the project, or the contractor may use community facilities as required. The total area affected by clean up operations is approximately 19 hectares.

5. Jenny Lind Island, CAM-1

Two landfills have been identified at this site. The main landfill, located 300 m east of the station, will be extended to accommodate non-hazardous site and demolition debris, as well as Tier I soils. Surface debris is to be removed from the other landfill. Both landfills will be covered with granular fill and regraded to match the surrounding terrain. Contaminated soils (TCC-II) will be excavated from the station proximity and the sewage outfall area. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All hazardous materials (with the exception of asbestos and creosote-

treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. All structures will be demolished. A contractor camp to accommodate personnel for the cleanup activities will be established near the former station; this camp will be dismantled when the project has been completed. The total area affected by cleanup activities is approximately 45 hectares.

6. Gladman Point, CAM-2

Three existing landfills at the site - airstrip and two west (north and south portions) - are to be cleared of visible surface debris and subsequently covered and reshaped according to natural contours and drainage patterns. A new landfill will be developed at the station to accommodate non-hazardous visible and building demolition debris removed from the station proximity, existing landfills, three pallet storage areas and the beach. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Soils contaminated with PCBs and inorganic elements will be excavated from the station proximity, and isolated stained locations at the airstrip hangar and beach fuel tanks; Tier I soils will be disposed of in the engineered landfill on-site; Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All buildings and facilities in the Station, Airstrip and Beach Areas will be removed and/or demolished. Specified locations of the site will also be recontoured to natural drainage patterns. A cleanup camp will be set up in the vicinity of the station area for the above purposes and subsequently demobilized or demolished at the end of the project. The total area affected by cleanup activities is approximately 13 hectares.

7. Shepherd Bay, CAM-3

Cleanup at this site will involve the demolition of several structures; the excavation of the sewage outfall, which is contaminated with PCBs and inorganic elements in excess of Tier II; the closure of four existing landfills in the station area

(these are stable and require proper burial only); and the excavation of other contaminated soil, either for placement in an extension of the Northeast Landfill (Tier I) or in a new Tier II Disposal Facility constructed on-site. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. A cleanup camp will be established in the Station Area and demobilized or demolished when the cleanup has been completed. The total area affected by cleanup activities is approximately 55 hectares.

8. Pelly Bay, CAM-4

Five landfills at the site - station, construction camp (abandoned), lower site, Barrow Lake and airstrip - are to be remediated. Remediation may include clearing of visible surface debris, partial or complete excavation and installation of a leachage containment system. The areas will be reshaped according to natural contours and drainage patterns. A new landfill will be developed near the station will be developed to accommodate non-hazardous visible and building demolition debris removed from the station, existing landfills, lower site, three pallet storage areas, lake near the construction camp, and the airstrip. Underwater debris will also be removed from the bottom of Barrow Lake along the west shore. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal.

Soils contaminated with PCBs and/or inorganic elements will be excavated from locations in the station proximity, sewage outfall, existing station landfill, lower site landfill and airstrip. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All buildings and facilities in the Station and Airstrip Areas will be removed and/or demolished. Specified locations of the site will also be recontoured to natural drainage patterns. A landfill for the disposal of materials painted with PCB amended paint has been proposed for this site, pending a decision from Environment Canada.

A cleanup camp will be set up just northwest of the station area for the above purposes and subsequently demobilized at the end of the project. The total area affected by cleanup operations is approximately 12 hectares.

9. Mackar Inlet, CAM-5

A new landfill will be developed to accommodate Tier I soils, demolition debris and general site debris. The existing station landfill requires leachate containment. There are three landfills to be closed at the lower site, one of which requires erosion control. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Soils contaminated with PCBs and inorganic elements will be excavated, primarily from areas within the station proximity, the sewage outfall and the Upper Site Landfill. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. A cleanup camp will be established in the station proximity and demobilized or demolished when the cleanup is complete. The total area affected by cleanup activities is approximately 39 hectares.

10. Hall Beach, FOX-M

Two landfills have been identified at this site. Surface debris is to be removed from these landfill locations prior to being covered with granular fill material and regraded to the natural contours of the surrounding terrain. The West Beach Landfill is proposed for the engineered landfill to accommodate non-hazardous site and demolition debris as well as all Tier I soils. Contaminated soils will be excavated from the station proximity, the sewage outfall and the beaching area. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. All structures that are not associated with the LRR/LSS facilities will be demolished. A contractor camp to accommodate personnel for

these cleanup activities is to be set up in proximity to the former station; this camp will be demobilized when the project is completed. The total area affected by cleanup activities is approximately 19 hectares.

11. Longstaff Bluff, FOX-2

Three landfills at the site - beach, west beach and airstrip - are to be cleared of visible surface debris (if present) and subsequently covered and reshaped according to natural contours and drainage patterns. The fourth existing landfill near the station (upper site) will also be cleared of visible surface debris and a leachate containment system will be put in place to prevent further leakage from this facility; portions will be regraded to redirect surface drainage. Two new engineered landfills - one in the station proximity and the other by the airstrip hangar - will be developed to accommodate non-hazardous visible and demolition debris removed from the upper (Station Landfill) and lower (Hangar Landfill) areas of the site. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Soils contaminated with PCBs and inorganic elements will be excavated from locations in the Station Area and sewage outfall, Beach Area, Upper Site Landfill drainage, (West) Beach Area, and old storage area northeast of the station. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. All buildings and facilities at the Station, Airstrip and Beach Areas will be removed and/or demolished. Specified locations of the site will also be recontoured to natural drainage patterns. A cleanup camp will be set up in the vicinity of the Station Area for the above purpose and subsequently demobilized or demolished at the end of the project. The total area affected by cleanup operations is approximately 15 hectares.

12. Dewar Lakes, FOX-3

Four landfill areas requiring closure have been identified at this site; three areas in the station proximity and one area adjacent to the airstrip. The Main Landfill, which requires leachate containment, will be used to accommodate site and demolition debris, as well as Tier I soils. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Contaminated soils will be excavated from the station proximity, sewage outfall and isolated areas near the airstrip. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. A contractor camp to accommodate personnel for these cleanup activities is to be established in the station proximity; this camp will be demobilized or demolished when the project is completed. The total area affected by cleanup activities is approximately 12 hectares.

13. Broughton Island, FOX-5

A new landfill will be developed for the disposal of site debris, demolished buildings and Tier I contaminated soil. A landfill for the disposal of materials painted with PCB amended paint has been proposed for the station area. In addition, two landfills must be properly closed and regraded, one requiring leachate containment. Cleanup and restoration activities are confined primarily to the Main Station Area, the Airstrip Area and locally disturbed areas which were used historically for waste disposal and borrow extraction. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. A cleanup camp and equipment storage area will be established and then demobilized or demolished once cleanup activities have been completed. The total area affected by cleanup activities is approximately 12 hectares.

14. Cape Dyer, DYE-M

Two landfills will be developed at DYE-M at the lower camp, for the disposal of non-hazardous demolition and site debris, and Tier I contaminated soil. One landfill at the lower site will also receive non-hazardous waste materials from landfill excavations. The Pallet Line Landfill at the upper site will be extended to accommodate non-hazardous site and demolition debris, as well as Tier I soil, from the upper camp.Two landfills require leachate containment. All hazardous materials (with the exception of asbestos and creosote-treated wood) will be shipped off-site to a licensed hazardous material facility for disposal. Contaminated soils will be excavated - Tier I soils to the engineered landfill on-site, Tier II soils will be contained in a new Tier II Disposal Facility constructed on-site. A contractor camp to accommodate personnel for these cleanup activities is to be established in the station proximity; this camp will be demobilized or demolished when the project is completed. The total area affected by cleanup activities is approximately 36 hectares.

Table I-6: Summary of Cleanup Activities at 14 DEW Line Sites in the Nunavut Settlement Region

Activity	PIN-2	PIN-3	PIN-4	CAM-M	CAM-1	CAM-2	CAM-3
Landfill Closure/Remediation							
Regrading/Reshaping	3	3	9	2	1	3	4
Leachate Containment	-	-	1	2	-	-	-
Excavation	-	-	-	-	-	-	-
Landfill Development							
New Landfill Development	1	-	1	-	-	1	-
Existing Landfill Extension	-	1	-	1	1	-	1
New Tier II Disposal Facility	1	1	1	1	1	1	1
Contaminated Soil Excavation							
Tier I (m^3)	140	110	110	350	1450	310	710
Tier II(m^3)	120	2200	50	14010	1780	1450	2180
CEPA Soils [3]	✓	✓	✓	✓	✓	✓	✓
Demolition							
All DEW Line Facilities (m^3)[1]	3800	-	4400	-	3200	4400	-
Partial Demolition (m^3)[1] (LRR Sites)	-	1430	-	2900	-	-	2400
Borrow Excavation Volume (m^3)[1]	18,700	55,000	36,700	191,100	13,700	29,900	86,700
Debris Volume (m^3)[1]	25	600	2	50	5	29	170
HazMat[2] Shipment Off-Site	✓	✓	✓	✓	✓	✓	✓
Contractor Camp Development	✓	✓	✓	✓	✓	✓	✓
Area Affected by Cleanup Activities (ha)[1]	26	18	82	19	45	13	55

1. Values are approximate; 2. Hazardous Materials; 3. These are soils which exceed the Chlorobiphenyl Regulations (i.e., 50 ppm)

Table I-6: Summary of Cleanup Activities at 14 DEW Line Sites in the Nunavut Settlement Region (Cont.)

Activity	CAM-4	CAM-5	FOX-M	FOX-2	FOX-3	FOX-5	DYE-M
Landfill Closure/Remediation							
Regrading/Reshaping	5	2	3	2	3	-	7
Leachate Containment	-	1	-	1	1	1	2
Excavation	-	-	-	-	-	-	2
Landfill Development							
New Landfill Development	2 (1 proposed)	1	1	2	-	2 (1 proposed)	2
Existing Landfill Extension	-	-	-	-	1	-	-
New Tier II Disposal Facility	1	1	1	1	1	1	1
Contaminated Soil Excavation							
Hydrocarbon Type A	-					235	
Hydrocarbon Type B	6000					1800	
Tier I (m^3)	1920	530	730	640	600	190	800
Tier II(m^3)	3700	430	5870	410	720	50	440
Tier I/Type A	480					1900	
Tier I/Type B	55					-	
Tier II/Type A	500					205	
Tier II/Type B	270					800	
CEPA Soils [3]	140	✓	✓	✓	✓	✓	✓
Demolition							
All DEW Line Facilities (m^3)[1]	3400	4100	-	4000	-	5100	-
Partial Demolition (m^3)[1] (LRR Sites)	-	-	7300	-	1400	-	17950
Borrow Excavation Volume (m^3)[1]	225,000	60,300	74,000	43,200	34,000	170,000	220,000
Debris Volume (m^3)[1]	680	80	1890	387	870	200	14,600
HazMat[2] Shipment Off-Site	✓	✓	✓	✓	✓	✓	✓
Contractor Camp Development	✓	✓	✓	✓	✓	✓	✓
Area Affected by Cleanup Activities (ha)[1]	12	39	19	15	12	12	36

1. Values are approximate; 2. Hazardous Materials; 3. These are soils which exceed the Chlorobiphenyl Regulations (i.e., 50 ppm)

J. Project Summary

The purpose of the proposed cleanup activities is to improve existing environmental conditions at the 14 DEW Line sites located within the NSA by restoring those areas that have been adversely affected from activities and facilities associated with the past operation of the stations. The proposed cleanup activities are anticipated to have an overall positive effect on the biophysical environment, as well as improving the general appearance of the site. Northern residents stand to benefit from opportunities provided by the cleanup project. The use of local services and the hiring of Northern residents, as well as the opportunities for education and retraining are anticipated to have a beneficial effect on the socio-economic environment. It is recognized, however, that the activities involved in the actual cleanup may, if not properly mitigated, have potential adverse environmental effects primarily related to the sensitivity of the Arctic environment to disturbance from cleanup activity.

Potential risks to soils, surface water, terrestrial and aquatic habitat and species, as well as human safety from accidental events such as fuel and hazardous materials spills can be mitigated or eliminated by the development of control procedures, contingency plans and proper response procedures. The risk of creating hazards to human health and safety are minimized by implementing correct procedures for the handling of hazardous materials encountered during cleanup. Hazardous materials will be removed from site and transported in accordance with the requirements of the *Transportation of Dangerous Goods Act*.

Disturbance to terrestrial, aquatic and marine wildlife species can be avoided through the implementation of Contractor education programs, engineering controls and the scheduling of activities to avoid ecologically sensitive areas and times (for example nesting or calving areas). Terrestrial habitat and vegetation are very sensitive components of the Arctic ecosystem. Damage to habitat is to be avoided or minimized by confining cleanup operations to areas that have been previously disturbed. Some sites are

considered to have high archaeological potential, based on the number and variety of known historic and prehistoric features. Archaeological monitoring measures are expected to prevent disturbance to heritage features in the area.

An Environmental Protection Plan (EPP) will be developed to facilitate the implementation of specific mitigative measures. The EPP will form part of the contract documents for the cleanup of the 14 sites.

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