Defence Construction Canada

CAM-4, Pelly Bay DEW Line Site

Monitoring Plan

Prepared by:
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November 2005

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November 15, 2005 File Name: CAM-4 (3.6)

Phyllis Beaulieu
Manager of Licensing
Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Dear Ms. Beaulieu:

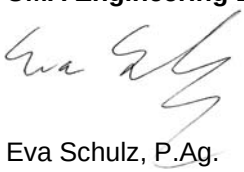
Re: Monitoring Plan for Water Use License NWB5PEL0510

UMA Engineering Ltd. is submitting the attached monitoring plan as per the requirements of Part J.1 of the above-noted water use license. The monitoring plan is being submitted on behalf of Defence Construction Canada and the Department of National Defence.

Please feel free to contact the undersigned if you have any questions or comments regarding the submission.

Sincerely,

UMA Engineering Ltd.



Eva Schulz, P.Ag.
Environmental Scientist
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EMS:mm

Encl. Monitoring Plan

cc: Phil Warren, DCC

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1.0 Construction Monitoring Program

The program during the construction phase of the project addresses the requirement for effluent monitoring of the sewage lagoon. Currently, sewage from the CAM-4 site is being collected and treated by the Hamlet. This monitoring plan was submitted to the Nunavut Water Board for approval in 2003.

Table 1: Monitoring Requirements During the Construction Phase

Location	Sample Type	Frequency	Parameters
C4-1	Water	Twice. Once at 30 days after establishment and once prior to discharge.	Mineral Oil & Grease
			Total Suspended Solids
			Biological Oxygen Demand
			Faecal Coliforms
			pH

Note: Coordinates of have not been collected.

2.0 Post-Construction Monitoring Program

2.1 Introduction

The following summary is being provided for the post-construction landfill monitoring program as described in the DND-NTI Environmental Cooperation Agreement for the former CAM-4, Pelly Bay DEW Line site. Information on both the development and review process for the program, as well as the specific components of the program are included.

2.2 Background

The Department of National Defence (DND), in cooperation with Nunavut Tunngavik Incorporated (NTI), developed a landfill monitoring plan to address post closure monitoring requirements for the landfills at the DEW Line Sites. Defence Construction Canada (DCC) is managing the cleanup and monitoring programs on behalf of DND.

The objective of the landfill monitoring program is to collect sufficient information to assess the performance of the landfills from a geotechnical and environmental perspective. The landfill monitoring plan specifies the requirements for visual inspection, and chemical and thermal monitoring of landfills at the DEW Line sites under DND's jurisdiction.

2.3 Program Components

The post-construction landfill monitoring program consists of four main components to measure the performance of the landfills, depending on the remediation plan for each landfill. These components are visual, soil, groundwater water and thermal monitoring. Details on each of the monitoring components are provided below.

Visual Monitoring: The physical integrity of the landfill is inspected and reported using hand-drawn sketches. Documented observations include:

- Evidence of settlement, ponding, frost action, erosion, and lateral movement.
- Sloughing of berms/covering layers, thermal contraction cracks, etc.

Photographic records are to be provided to document the general condition of the landfill and to substantiate all recorded observations. The location of all photographic viewpoints will be referenced to existing monuments.

Soil and Groundwater Monitoring: The soil and groundwater monitoring program consists of baseline/background assessment and contaminant evaluation. Background conditions represent soil and water quality from an area not impacted by the landfill. Background (naturally occurring) values are obtained from samples collected from areas that were not directly influenced by activities at the DEW Line site, but are indicative of the prevailing geochemistry. These samples are taken hydraulically upgradient and at some distance from the landfill. Baseline conditions refer to existing soil and water quality at the landfill area, prior to any remediation and/or construction work being carried out. These samples are generally collected from areas both up and downgradient of the landfill.

Soil and groundwater samples (where required) are collected prior to construction/closure of a landfill, to represent background as well as baseline conditions. The results of subsequent landfill monitoring events are compared to these baseline and background values to evaluate any potential changes in environmental conditions.

In general, one monitoring well is installed upgradient and two to three wells are installed downgradient of the landfill during the construction phase. Using water elevation data from a minimum of three wells allows assessment of the hydraulic gradient and flow velocities. Review of analytical data from water samples collected from wells up and down gradient allows evaluation of potential impacts associated with the landfill. Soil samples are collected from the toe of the landfill, generally from the same locations as the monitoring wells. Contamination in soil samples at the toe of the landfill reflects chronic input from water that may have infiltrated the landfill, and is an important factor of contaminated leachate.

Prior to collection of samples from a monitoring well, the well is purged and allowed to reach equilibrium. Physical measurements are collected prior to and after purging and are referenced to the top of the monitoring well pipe. The measured physical parameters include:

- Water elevation;
- Total depth of water;
- Presence of hydrocarbons;
- Hydrocarbon layer thickness (if appropriate);
- Colour, odour;
- pH;
- Conductivity; and
- Temperature.

Thermal Monitoring: Geothermal analysis were carried out as part of the design to predict the length of time required for permafrost aggradation through landfills requiring leachate containment, including the Tier II Soil Disposal Facility. These analyses also provided information on the long and short term thermal regime in the ground, and the depth of the active layer in the cover material.

A thermal monitoring system provides measurement of sub-surface ground temperatures, which allows comparison to and verification of the predicted ground temperatures. The thermal monitoring system consists of installation of thermistor strings, with thermistor beads at selected intervals to provide ground temperature profiles at various locations within the landfill. The thermistor strings are attached to automated data-loggers that allow for remote data collection. In general, a minimum of three thermistors are installed at each landfill where permafrost aggradation through the landfill contents is an integral part of the design.

2.4 Frequency

The landfill monitoring program consists of three phases, as described in detail below.

2.4.1 Phase I

Phase I involves monitoring of conditions to confirm that equilibrium is achieved. The frequency of monitoring events during Phase I monitoring is dependent on the closure or remediation design at specific landfills. The Tier II Soil Disposal Facility, Upper Site Landfill – Central Lobe and Lower Site Landfill - Main Lobe will be monitored on an annual basis for the first five years. The five-year term was selected on the basis that ground-temperature thermal regimes at this specific landfill will require three to five years to reach equilibrium.

The Upper Site Landfill – South Lobe, and Lower Site Landfill – South and East Lobes will be regraded, and the Phase I monitoring will be carried out over a reduced frequency in the first, third and fifth years following construction. All other landfills have been or will be excavated and therefore do not require any monitoring.

An evaluation of all Phase I data will be carried out at the end of five years to confirm that thermal and chemical equilibrium is achieved, and that no stability issues are identified. The Phase I monitoring program may be extended, if required, to provide sufficient data to establish equilibrium conditions.

The first year of the Phase I post-construction monitoring is completed by the Environmental Sciences Group (ESG) of the Royal Military College of Canada, who are part of the DEW Line Clean Up Project Team. Subsequent landfill monitoring events are carried out by independent contractors, who successfully win the competitive tender.

2.4.2 Phase II

Phase II monitoring is the verification of equilibrium conditions established in Phase I. The monitoring frequency in Phase II is downgraded from Phase I and will be carried out according to the following schedule, years 7, 10, 15 and 25. Year 25 marks the end of Phase II monitoring.

2.4.3 Phase III

Phase III involves the monitoring for long-term issues such as liner integrity, permafrost stability, and significant storm events. At the end of the Phase II program, 25 years after construction, a re-evaluation of the landfill monitoring program will be carried out prior to initiating any Phase III program. The scope of the Phase III monitoring program is not included here, but is anticipated to be based on a 10 year monitoring interval.

2.5 Review and Evaluation Process

An Environmental Working Group (EWG) was established to provide a technical report and to support to the DLCU Steering Committee. This working group is comprised of qualified engineers and environmental scientists with expertise in environmental remediation and clean up in northern climates. The EWG has four designated representatives, two from each of the Owner (DND) and the Inuit (through the NTI), respectively.

During the monitoring program, the EWG reviews the results of the monitoring program in accordance with the methodology as described previously. The results of the review and any recommendations regarding changes to the monitoring plan and/or remediation requirements are reported to the DND/NTI Steering Committee.

The requirement for further monitoring after 25 years is evaluated. Monitoring may be terminated if the performance of the landfill was satisfactory over the period of monitoring from an environmental, geotechnical and thermal perspective, as appropriate. The assessment of satisfactory performance is carried out jointly by the NTI and DND.

3.0 Detailed Landfill Monitoring Requirements

The following sections provide a summary and the detailed monitoring requirement for each landfill at CAM-4.

3.1 Tier II Soil Disposal Facility

A DCC Tier II Soil Disposal Facility was constructed at the CAM-4 site for the disposal of Tier II soil excavated during the clean up. The facility is located west of the former warehouse, upgradient of the Upper Site Landfill. The design of this landfill includes a double-containment system consisting of a liner system and the placement of sufficient fill to promote freezing of landfill contents. The liner was placed along the bottom of the landfill, along the berms, and over the top of the landfill contents. Monitoring of the Tier II Soil Disposal Facility consists of visual monitoring, collection of soil and groundwater, and monitoring of subsurface ground temperatures in the berms and in the main body of the facility. Table 2 provides the monitoring station coordinates and Table 3 provides the detailed monitoring requirements at the West Landfill. See Figures CAM-4.1 and 41 and 4.3 for details.

Table 2: Monitoring Station Coordinates at the Tier II Soil Disposal Facility

Landfill Monitoring Station	Coordinates		Elevation (masl)
	North (m)	East (m)	
MW-5 (soil & groundwater)	10039	10137	310.3
MW-8 (soil & groundwater)	10144	10099	-
MW-9 (soil & groundwater)	10102	10146	-
MW-14B (soil & groundwater)	10025	10022	317.8
MW-15 (soil & groundwater)	10079	10005	-
VT-1 (temperature)	N/A	N/A	N/A
VT-2 (temperature)	N/A	N/A	N/A
VT-3 (temperature)	N/A	N/A	N/A
VT-4 (temperature)	N/A	N/A	N/A

NOTE: Coordinates for the monitoring locations are as provided by the contractor. Thermistors have not been installed and therefore the coordinates are not yet available.

Table 3: Detailed Monitoring Requirements at the Tier II Soil Disposal Facility

Location	Sample Type	Frequency	Parameters
Determined on site	Visual	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	N/A
MW-5, MW-8, MW-9, MW-14B, MW15	Groundwater	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	Total Arsenic
			Total Cadmium
			Total Chromium
			Total Cobalt
			Total Copper
			Total Lead
			Total Nickel
			Total Zinc
			Total Mercury
			PCBs
			Total Petroleum Hydrocarbons (C_{6}-$_{32}$)
MW-5, MW-8, MW-9, MW-14B, MW15	Soil	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	PCBs
			TPH as F1 (C_6-C_{10})
			TPH as F2 (C_{10}-C_{16})
			TPH as F3 (C_{16}-C_{34})
			Arsenic
			Cadmium
			Chromium
			Cobalt
			Copper
			Lead
			Nickel
			Zinc
			Mercury
VT-1 → VT-4	Thermal	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	Temperature

3.2 Station Area Non-Hazardous Waste Landfill

The Station Area Non-Hazardous Waste Landfill is a new landfill constructed for the disposal of non-hazardous wastes and debris generated and collected during the clean up. The landfill site is located approximately 200 metres northeast of the module train. The design of this landfill includes perimeter berms, and placement of a compacted granular fill cover over the landfilled material. Eight groundwater monitoring wells were installed at the landfill perimeter, three of which are multi-level wells (two screened intervals). The long term monitoring plan will consist of visual monitoring and periodic collection of soil and groundwater samples. Table 4 provides the coordinates of the monitoring stations and Table 5 provides the detailed monitoring requirements at the Non-Hazardous Waste Landfill. See Figures CAM-4.1 and 4.2 for details.

Table 4: Monitoring Station Coordinates at the Station Area Non-Hazardous Waste Landfill

Landfill Monitoring Station	Coordinates		Elevation (masl)
	North (m)	East (m)	
BMW-1 (soil & groundwater)	10161	10021	-
MW-1 (soil & groundwater)	10279	10081	-
MW-2 (soil & groundwater)	10257	10087	302.3
MW-3 (soil & groundwater)	10217	10133	303.4
MW-4 (groundwater)	10235	10120	-
MW-6 (groundwater)	10270	10067	-
MW-7 (groundwater)	10248	10008	-
MW-16 (soil & groundwater)	10171	9993	-

NOTE: Coordinates are as provided by the cleanup contractor's survey.

Table 5: Detailed Monitoring Requirements at the Station Area Non-Hazardous Waste Landfill

Location	Sample Type	Frequency	Parameters
Determined on site	Visual	Once per year in years 1, 3, 5, 7, 10, 15, 25 post-construction	N/A
BMW-1, MW-1 → MW-4, MW-6, MW-7, MW-16	Groundwater	Once per year in years 1, 3, 5, 7, 10, 15, 25 post-construction	Total Arsenic
			Total Cadmium
			Total Chromium
			Total Cobalt
			Total Copper
			Total Lead
			Total Nickel
			Total Zinc
			Total Mercury
			PCBs
			Total Petroleum Hydrocarbons (C_{6}-$_{32}$)
BMW-1, MW-1 → MW-4, MW-6, MW-7, MW-16	Soil	Once per year in years 1, 3, 5, 7, 10, 15, 25 post-construction	PCBs
			TPH as F1 (C_6-C_{10})
			TPH as F2 (C_{10}-C_{16})
			TPH as F3 (C_{16}-C_{34})
			Arsenic
			Cadmium
			Chromium
			Cobalt
			Copper
			Lead
			Nickel
			Zinc
			Mercury

3.3 Lower Site Non-Hazardous Waste Landfill

The Lower Site Non-Hazardous Waste Landfill is a new landfill constructed for the disposal of non-hazardous wastes and debris generated and collected during the clean up. The landfill site is located

approximately 1.5 km west of the west end of the airstrip. The design of this landfill includes perimeter berms and placement of a compacted granular fill cover over the landfilled material. Three groundwater monitoring wells were installed at the landfill perimeter. The long term monitoring plan will consist of visual monitoring and periodic collection of soil and groundwater samples. Table 6 provides the coordinates of the monitoring stations and Table 7 provides the detailed monitoring requirements at the Non-Hazardous Waste Landfill. See Figures CAM-4.1 and 4.5 for details.

Table 6: Monitoring Station Coordinates at the Lower Site Non-Hazardous Waste Landfill

Landfill Monitoring Station	Coordinates		Elevation (masl)
	North (m)	East (m)	
MW-21 (soil & groundwater)	20415	18807	138.0
MW-22 (soil & groundwater)	20364	18861	-
MW-23 (soil & groundwater)	20464	18877	135.6

NOTE: Coordinates are as provided by the cleanup contractor's survey.

Table 7: Detailed Monitoring Requirements at the Lower Site Non-Hazardous Waste Landfill

Location	Sample Type	Frequency	Parameters
Determined on site	Visual	Once per year in years 1, 3, 5, 7, 10, 15, 25 post-construction	N/A
MW-21 → MW-23	Groundwater	Once per year in years 1, 3, 5, 7, 10, 15, 25 post-construction	Total Arsenic
			Total Cadmium
			Total Chromium
			Total Cobalt
			Total Copper
			Total Lead
			Total Nickel
			Total Zinc
			Total Mercury
			PCBs
			Total Petroleum Hydrocarbons (C_{6}-$_{32}$)
MW-21 → MW-23	Soil	Once per year in years 1, 3, 5, 7, 10, 15, 25 post-construction	PCBs
			TPH as F1 (C_6-C_{10})
			TPH as F2 (C_{10}-C_{16})
			TPH as F3 (C_{16}-C_{34})
			Arsenic
			Cadmium
			Chromium
			Cobalt
			Copper
			Lead
			Nickel
			Zinc
			Mercury

3.4 Upper Site Landfill

The Upper Site Landfill is located approximately 200 metres east of the module train. The landfill consists of three lobes: the south, central and north lobes. The geophysical survey conducted on the landfill area indicated that debris is fairly continuous between the north and central lobes, but the south lobe in more isolated. Together, the three lobes encompass an area of approximately 4500 square metres. No contaminated soil or evidence of leachate was detected at the south lobe, however, Tier I and Tier II contaminated soils were found downgradient of the central lobe indicating contaminant migration from the landfill.

Based on the evaluation of the landfill as a source of contamination, potential pathways and receptors, the Upper Site Landfill was classified as a high potential environmental risk. The remediation for this landfill includes complete excavation of the north lobe, partial excavation and installation of a leachate containment system at the central lobe, and regrading of the south lobe. Thermistors will be installed within the central lobe, and groundwater monitoring wells will be installed at the landfill perimeter.

The long term monitoring plan consists of visual monitoring, collection of soil samples, collection of groundwater samples and downloading of ground temperature data. Table 8 provides the coordinates of the monitoring stations and Table 9 provides the detailed monitoring requirements at the Upper Site Landfill. See Figures CAM-4.1 and 4.4 for details.

Table 8: Monitoring Station Coordinates at the Upper Site Landfill

Landfill Monitoring Station	Coordinates		Elevation (masl)
	North (m)	East (m)	
MW-10 (soil & groundwater)	10061	10234	301.4
MW-11 (soil & groundwater)	9999	10114	312.5
MW-12 (soil & groundwater)	10013	10247	295.9
MW-13 (soil & groundwater)	9950	10221	-
VT-1 (temperature)	TBD	TBD	TBD
VT-2 (temperature)	TBD	TBD	TBD
VT-3 (temperature)	TBD	TBD	TBD
VT-4 (temperature)	TBD	TBD	TBD

NOTE: Coordinates are as provided by the cleanup contractor's survey.

Table 9: Detailed Monitoring Requirements at the Upper Site Landfill

Location	Sample Type	Frequency	Parameters
Determined on site	Visual	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	N/A
MW-10 → MW-13	Groundwater	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	Total Arsenic
			Total Cadmium
			Total Chromium
			Total Cobalt
			Total Copper
			Total Lead
			Total Nickel
			Total Zinc
			Total Mercury
			PCBs

Location	Sample Type	Frequency	Parameters
			Total Petroleum Hydrocarbons (C_{6-32})
MW-10 → MW-13	Soil	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	PCBs
			TPH as F1 (C_6-C_{10})
			TPH as F2 (C_{10}-C_{16})
			TPH as F3 (C_{16}-C_{34})
			Arsenic
			Cadmium
			Chromium
			Cobalt
			Copper
			Lead
			Nickel
			Zinc
			Mercury
VT-1 → VT-4	Thermal	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	Temperature

3.5 Lower Site Landfill

The Lower Site Landfill is located approximately 1.5 kilometres west of the west end of the airstrip. The landfill is divided into four main lobes of buried material; encompassing an aggregate area of approximately 10,000 square metres. No contaminated soil was identified downgradient or within the landfill; however, a localized stain of Tier I concentration was identified south of the landfill perimeter. Evidence of contaminant migration was present at the main and north lobes.

Based on the elevation of the landfill as a source of contamination, potential pathways, and receptors, the Lower Site Landfill was classified as moderate potential environmental risk. The remediation for the main lobe of the landfill included installation of a double synthetic liner system anchored into the permafrost along the toe, and regrading with placement of additional granular fill sufficient to cause permafrost aggradation through the landfill contents. The remediation of the other three lobes included complete excavation of the north lobe, and regrading of the south and east lobes. Thermistors will be installed within the main landfill lobe, and groundwater monitoring wells are installed at the landfill perimeter.

The long-term monitoring plan consists of visual monitoring, collection of soil and groundwater samples, and thermal monitoring. Table 10 provides the coordinates of the monitoring stations and Table 11 provides the detailed monitoring requirements at the Lower Site Landfill. See Figures CAM-4.1 and 4.6 for details.

Table 10: Monitoring Station Coordinates at the Lower Site Landfill

Landfill Monitoring Station	Coordinates		Elevation (masl)
	North (m)	East (m)	
MW-17 (soil & groundwater)	20591	18795	120.5
MW-18 (soil & groundwater)	20523	18728	125.4
MW-19 (soil & groundwater)	20441	18700	129.1
MW-20 (soil & groundwater)	20489	18810	-
VT-9 (temperature)	TBD	TBD	TBD
VT-10 (temperature)	TBD	TBD	TBD
VT-11 (temperature)	TBD	TBD	TBD
VT-12 (temperature)	TBD	TBD	TBD
C4-1 (soil)	TBD	TBD	TBD
C4-2 (soil)	TBD	TBD	TBD
C4-3 (soil)	TBD	TBD	TBD

NOTE: Coordinates are as provided by the cleanup contractor's survey.

Table 11: Detailed Monitoring Requirements at the Lower Site Landfill

Location	Sample Type	Frequency	Parameters
Determined on site	Visual	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	N/A
MW-17 → MW-20	Groundwater	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	Total Arsenic
			Total Cadmium
			Total Chromium
			Total Cobalt
			Total Copper
			Total Lead
			Total Nickel
			Total Zinc
			Total Mercury
			PCBs
			Total Petroleum Hydrocarbons (C_{6}-$_{32}$)
MW-17 → MW-20	Soil	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	PCBs
			TPH as F1 (C_6-C_{10})
			TPH as F2 (C_{10}-C_{16})
			TPH as F3 (C_{16}-C_{34})
			Arsenic
			Cadmium
			Chromium
			Cobalt
			Copper
			Lead
			Nickel
			Zinc
			Mercury

Location	Sample Type	Frequency	Parameters
VT-9 → VT-12	Thermal	Once per year in years 1, 2, 3, 4, 5, 7, 10, 15, 25 post-construction	Temperature

Appendix A

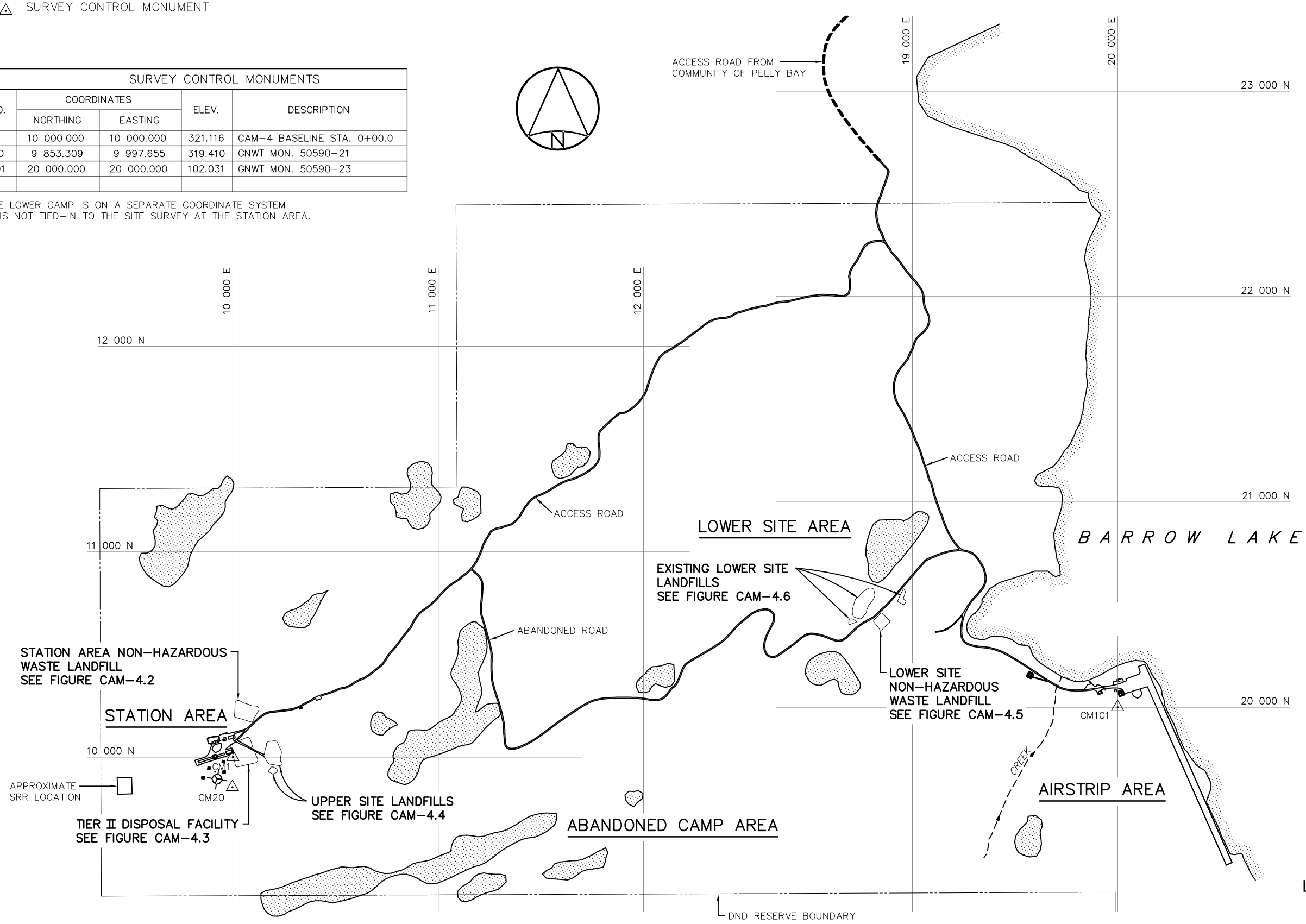
Drawings

LEGEND:

CM1 △ SURVEY CONTROL MONUMENT

SURVEY CONTROL MONUMENTS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
1	10 000.000	10 000.000	321.116	CAM–4 BASELINE STA. 0+00.0
20	9 853.309	9 997.655	319.410	GNWT MON. 50590–21
* 101	20 000.000	20 000.000	102.031	GNWT MON. 50590–23

* THE LOWER CAMP IS ON A SEPARATE COORDINATE SYSTEM.
IT IS NOT TIED–IN TO THE SITE SURVEY AT THE STATION AREA.



PLAN TO BE UPDATED WITH
RECORD INFORMATION
FOLLOWING CONSTRUCTION (2007)

DRAFT

0 200 400 600m
200 100 1: 20000

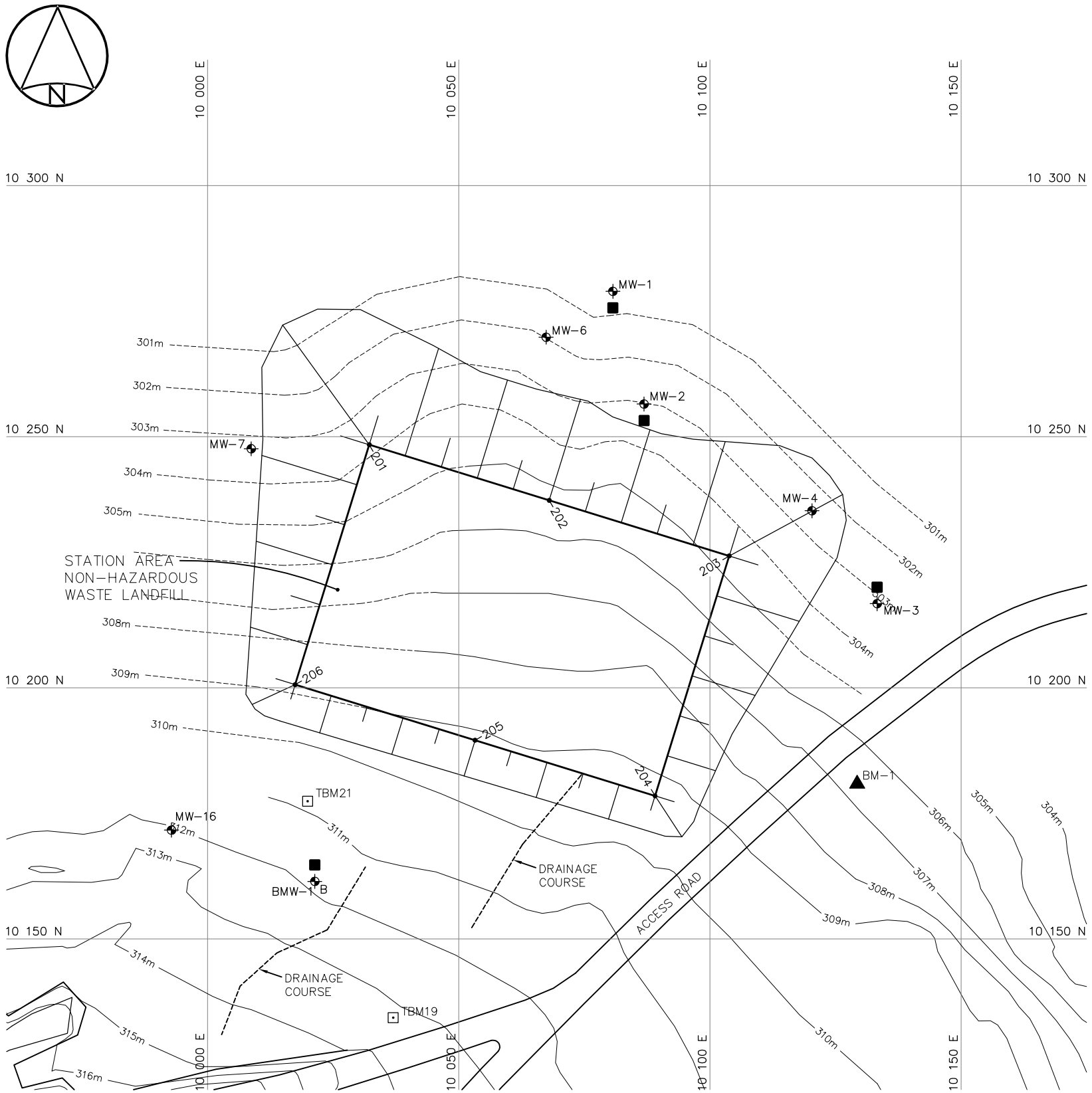
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

CAM-4 - PELLY BAY

OVERALL SITE PLAN

FIGURE CAM-4.1

DGS NAME: C4-R001.DWG CC - 05/02/10



LEGEND:

- TBM19 — TEMPORARY BENCHMARK
- BM-1 — PROPOSED PERMANENT BENCHMARK
- MW-1 — MONITORING WELL LOCATION
- 201 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION

COORDINATE POINTS			
NO.	NORTHING	EASTING	ELEV.
201	10 248.4	10 032.2	310.00
202	10 237.3	10 068.0	310.00
203	10 226.3	10 103.9	310.00
204	10 178.5	10 089.1	312.00
205	10 189.6	10 053.3	312.00
206	10 200.6	10 017.4	312.00

TEMPORARY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
19	10 134.323	10 036.965	313.428	
21	10 177.412	10 019.938	311.096	

PLAN TO BE UPDATED WITH RECORD INFORMATION FOLLOWING CONSTRUCTION (2007)

DRAFT

0 10 20 30m
10 5 1:1000

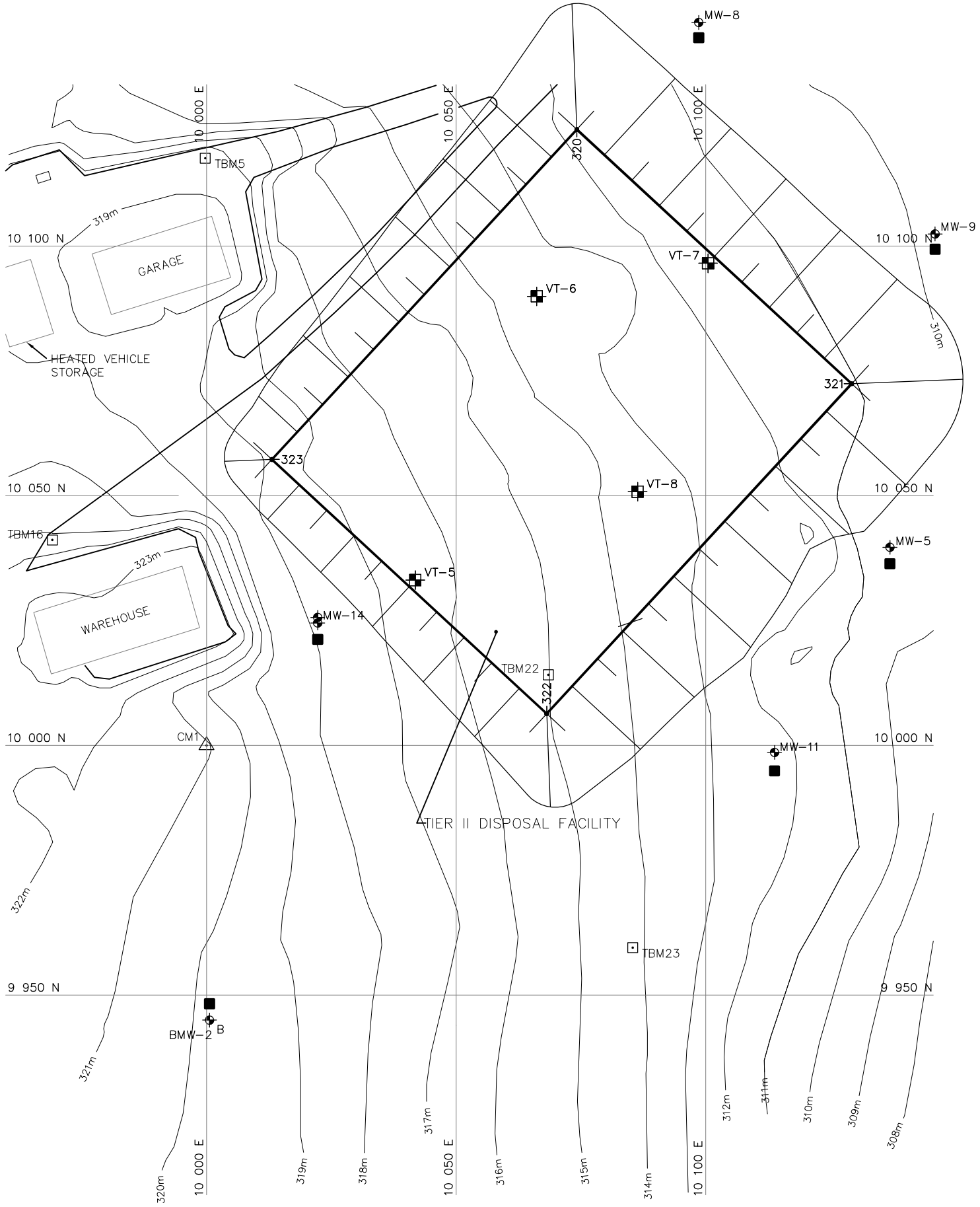
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

CAM-4 - PELLY BAY

STATION AREA NON - HAZARDOUS WASTE LANDFILL

FIGURE CAM-4.2

DOS NAME: C4-RD02.DWG CC - 05/02/10



PLAN TO BE UPDATED WITH RECORD INFORMATION FOLLOWING CONSTRUCTION (2007)

LEGEND:

- CM1 — SURVEY CONTROL MONUMENT
- TBM5 — TEMPORARY BENCHMARK
- MW-9 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR
- 320 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION

COORDINATE POINTS FINAL LANDFILL SURFACE			
NO.	NORTHING	EASTING	ELEV.
320	10 123.3	10 074.2	318.00
321	10 072.4	10 129.3	317.25
322	10 006.3	10 068.2	320.40
323	10 057.3	10 013.1	321.15

SURVEY CONTROL MONUMENTS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
1	10 000.000	10 000.000	321.116	CAM-4 BASELINE STA. 0+00.0

TEMPORARY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
5	10 117.578	9 999.749	318.515	13mm DIA. REBAR
16	10 041.136	9 969.113	321.393	SPIKE
22	10 014.140	10 068.484	315.374	
23	9 959.507	10 085.386	314.493	

DRAFT

0 10 20 30m
10 5 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

CAM-4 - PELLY BAY

TIER II DISPOSAL FACILITY

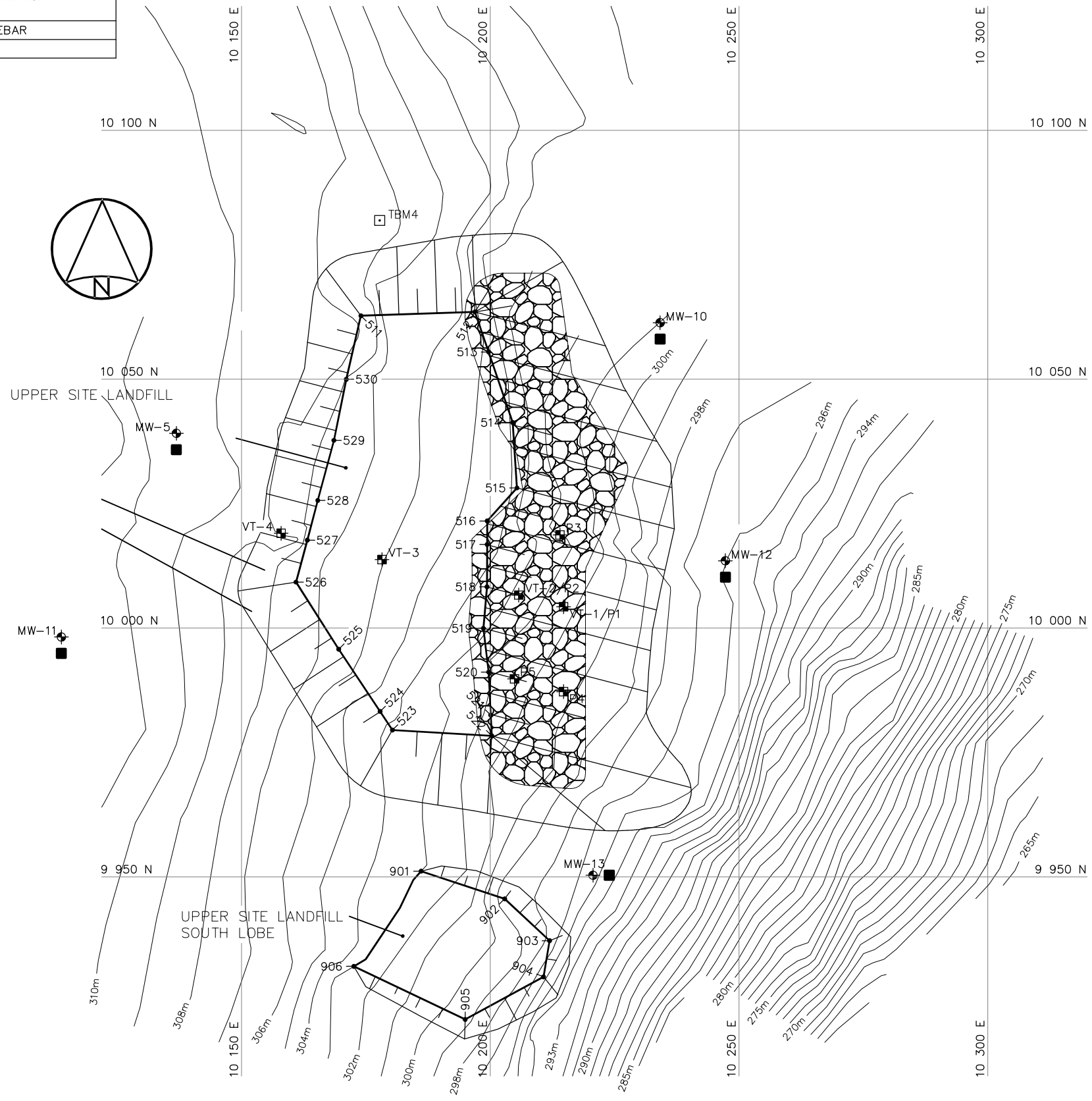
FIGURE CAM-4.3

DOS NAME: C4-R003.DWG CC - 05/02/10

TEMPORARY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
4	10 081.880	10 177.784	308.712	13mm DIA. REBAR

COORDINATE POINTS UPPER SITE LANDFILL			
NO.	NORTHING	EASTING	ELEV.
511	10 062.7	10 174.0	311.80
512	10 063.5	10 196.9	309.67
513	10 055.5	10 199.7	309.14
514	10 041.3	10 204.5	308.35
515	10 028.1	10 205.4	307.80
516	10 021.5	10 199.4	308.26
517	10 016.8	10 199.4	308.18
518	10 008.3	10 199.4	307.77
519	9 999.9	10 198.6	307.52
520	9 991.1	10 199.7	306.72
521	9 982.5	10 200.1	306.32
522	9 978.3	10 200.3	306.16
523	9 979.5	10 180.3	308.16
524	9 983.2	10 177.9	308.70
525	9 995.7	10 169.6	310.50
526	10 009.2	10 161.0	311.40
527	10 017.7	10 163.2	311.50
528	10 025.6	10 165.3	311.70
529	10 037.7	10 168.6	311.60
530	10 050.0	10 171.1	311.80

COORDINATE POINTS UPPER SITE LANDFILL – SOUTH LOBE		
NO.	NORTHING	EASTING
901	9 951.1	10 186.1
902	9 945.6	10 202.9
903	9 937.2	10 211.9
904	9 929.9	10 210.7
905	9 921.4	10 195.0
906	9 932.0	10 172.6



LEGEND:

- TBM4 — TEMPORARY BENCHMARK
- MW–10 — MONITORING WELL LOCATION
- VT — VERTICAL THERMISTOR PIEZOMETER INSTALLATION
- 511 — COORDINATE POINT
- MONITORING SOIL SAMPLE LOCATION
- RIPRAP

PLAN TO BE UPDATED WITH RECORD INFORMATION FOLLOWING CONSTRUCTION (2007)

DRAFT

0 10 20 30m

10 5 1:1000

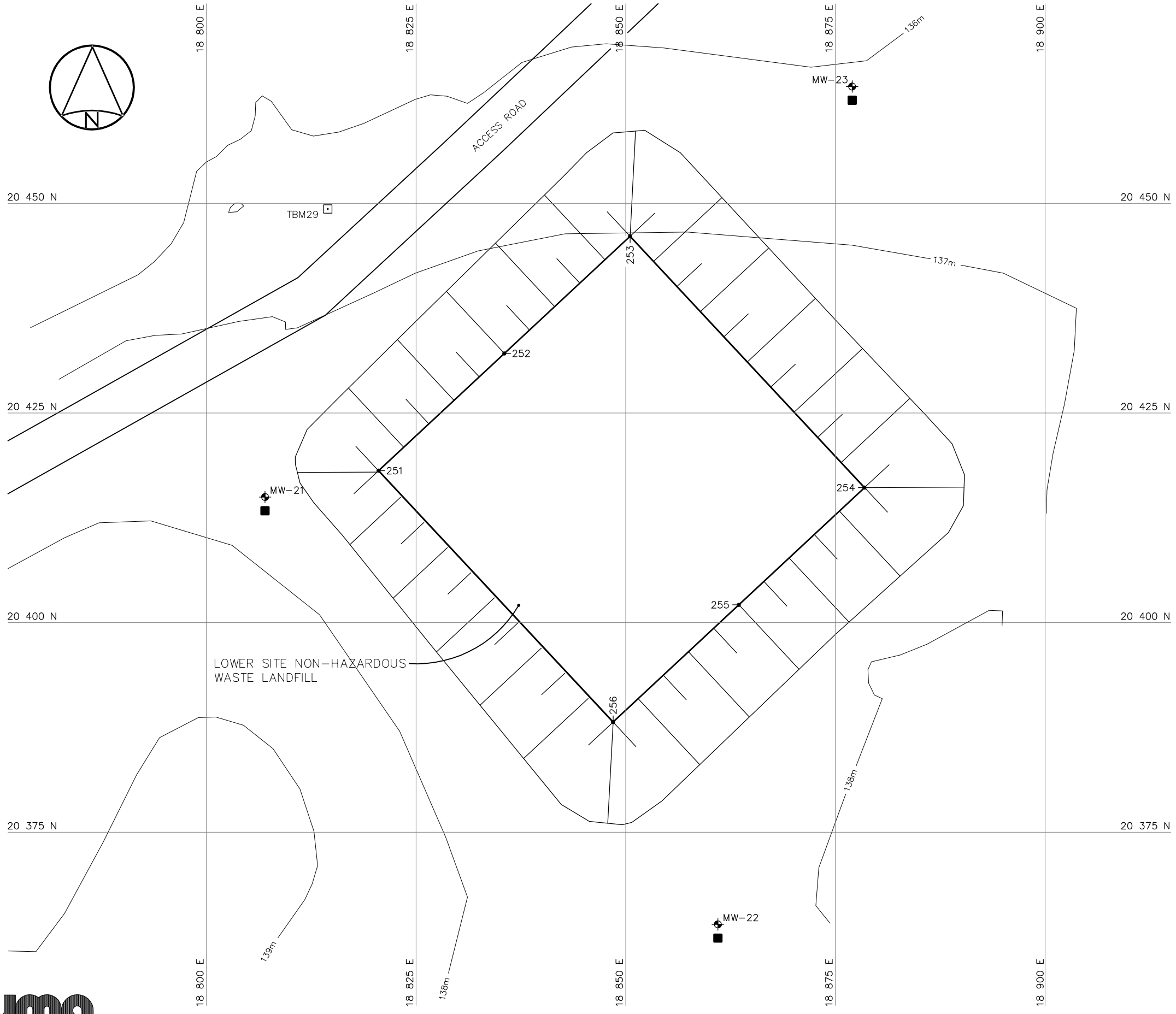
DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

CAM-4 - PELLY BAY

UPPER SITE LANDFILLS

FIGURE CAM-4.4

DOS NAME: C4-R004.DWG CC – 05/02/10



LEGEND:

- TBM29 ⊡ TEMPORARY BENCHMARK
- MW-23 ⌖ MONITORING WELL LOCATION
- 251 • COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION

TEMPORARY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
29	20 449.339	18 814.476	136.940	

COORDINATE POINTS			
NO.	NORTHING	EASTING	ELEV.
251	20 418.1	18 820.5	140.43
252	20 432.1	18 835.5	140.43
253	20 446.1	18 850.5	140.43
254	20 416.1	18 878.5	141.25
255	20 402.1	18 863.5	141.25
256	20 388.1	18 848.5	141.25

PLAN TO BE UPDATED WITH
RECORD INFORMATION
FOLLOWING CONSTRUCTION (2007)

DRAFT

0 5 10 15m
5 2.5 1:500

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

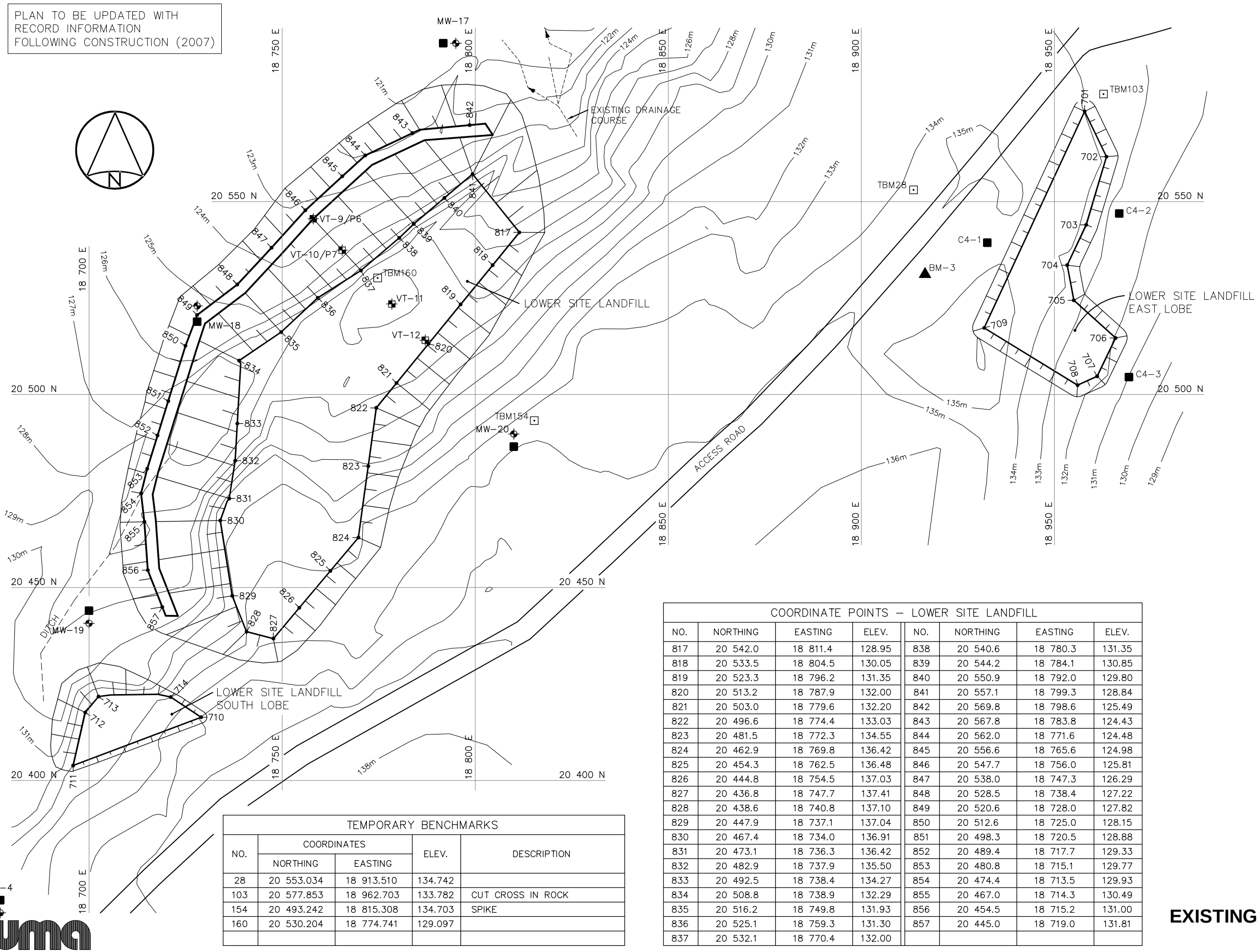
CAM-4 - PELLY BAY

LOWER SITE NON - HAZARDOUS WASTE LANDFILL

FIGURE CAM-4.5

DGS NAME: 04-R005.DWG CC - 05/02/10

PLAN TO BE UPDATED WITH
RECORD INFORMATION
FOLLOWING CONSTRUCTION (2007)



LEGEND:

- TBM28 ⊡ TEMPORARY BENCHMARK
- BM-3 ▲ PROPOSED PERMANENT BENCHMARK
- ⌖ MONITORING WELL LOCATION
- VT ⌖ VERTICAL THERMISTOR PIEZOMETER INSTALLATION
- 701 • COORDINATE POINT
- ■ MONITORING SOIL SAMPLE LOCATION

COORDINATE POINTS LOWER SITE LANDFILL EAST AND SOUTH LOBE		
NO.	NORTHING	EASTING
701	20 573.4	18 957.8
702	20 561.6	18 963.5
703	20 544.0	18 958.2
704	20 533.5	18 953.3
705	20 524.4	18 955.0
706	20 514.7	18 965.8
707	20 504.7	18 961.0
708	20 502.4	18 956.0
709	20 517.3	18 931.8
710	20 416.4	18 729.0
711	20 403.9	18 695.9
712	20 417.6	18 699.0
713	20 421.8	18 702.5
714	20 421.6	18 721.1

TEMPORARY BENCHMARKS				
NO.	COORDINATES		ELEV.	DESCRIPTION
	NORTHING	EASTING		
28	20 553.034	18 913.510	134.742	
103	20 577.853	18 962.703	133.782	CUT CROSS IN ROCK
154	20 493.242	18 815.308	134.703	SPIKE
160	20 530.204	18 774.741	129.097	

COORDINATE POINTS – LOWER SITE LANDFILL							
NO.	NORTHING	EASTING	ELEV.	NO.	NORTHING	EASTING	ELEV.
817	20 542.0	18 811.4	128.95	838	20 540.6	18 780.3	131.35
818	20 533.5	18 804.5	130.05	839	20 544.2	18 784.1	130.85
819	20 523.3	18 796.2	131.35	840	20 550.9	18 792.0	129.80
820	20 513.2	18 787.9	132.00	841	20 557.1	18 799.3	128.84
821	20 503.0	18 779.6	132.20	842	20 569.8	18 798.6	125.49
822	20 496.6	18 774.4	133.03	843	20 567.8	18 783.8	124.43
823	20 481.5	18 772.3	134.55	844	20 562.0	18 771.6	124.48
824	20 462.9	18 769.8	136.42	845	20 556.6	18 765.6	124.98
825	20 454.3	18 762.5	136.48	846	20 547.7	18 756.0	125.81
826	20 444.8	18 754.5	137.03	847	20 538.0	18 747.3	126.29
827	20 436.8	18 747.7	137.41	848	20 528.5	18 738.4	127.22
828	20 438.6	18 740.8	137.10	849	20 520.6	18 728.0	127.82
829	20 447.9	18 737.1	137.04	850	20 512.6	18 725.0	128.15
830	20 467.4	18 734.0	136.91	851	20 498.3	18 720.5	128.88
831	20 473.1	18 736.3	136.42	852	20 489.4	18 717.7	129.33
832	20 482.9	18 737.9	135.50	853	20 480.8	18 715.1	129.77
833	20 492.5	18 738.4	134.27	854	20 474.4	18 713.5	129.93
834	20 508.8	18 738.9	132.29	855	20 467.0	18 714.3	130.49
835	20 516.2	18 749.8	131.93	856	20 454.5	18 715.2	131.00
836	20 525.1	18 759.3	131.30	857	20 445.0	18 719.0	131.81
837	20 532.1	18 770.4	132.00				

DRAFT

0 10 20 30m
10 5 1:1000

DEW LINE CLEAN UP
LANDFILL MONITORING PLAN

CAM-4 - PELLY BAY

EXISTING LOWER SITE LANDFILLS

FIGURE CAM-4.6

DGS NAME: C4-R006.DWG CC - 05/02/10

Appendix B

DND/NTI Cooperation Agreement

AGREEMENT

BETWEEN

NUNAVUT TUNNGAVIK INCORPORATED

AND

HER MAJESTY IN THE RIGHT OF CANADA

AS REPRESENTED BY

THE MINISTER OF NATIONAL DEFENCE

FOR THE CLEAN-UP AND RESTORATION OF

DISTANT EARLY WARNING SITES

WITHIN THE NUNAVUT SETTLEMENT AREA

(Environmental Provisions)

Arthur C. Eggleton
Minister of National Defence

Dated 1 Sep 98

James Eetoolok
1st Vice President
Nunavut Tunngavik Incorporated

Dated 1 Sep 98

AGIKATIGEGUTAOYOK

UGUNAGA

NUNAVUT TUNNGAVITKUN TIMIKUTIGIYANIN

UVALO

KOENMIN IHUMAKHUTIVLOGIN KANATAMI

GIVGAKTOKTIGIVLOGO UNA

MINISTAOYOK AGUYAKTULIKIYINI

HALUMAKHIVALEATILOGIN IHOAKHAKHUGILO

TULAEGUYUN IGLUKAKVEN

UGUNANI NUNAVUTMI NUNATAKNIKMI NUNAOYUN

(AVATILIKINIGUN PIVIKHAKAKVEOYUN)

ARTHUR C. EGGLETON
MINISTAOYOK AGUYAKTILIKIYINI

KANATAOM GAVAMAENI

UVLOANI _____

JAMES EETOOLOOK
HIVULIK TUKLEATA
IKHIVAOTALEOM
NUNAVUT TUNNGAVITKUN
TIMIKUTIGIYANI
UVLOANI _____

AGIKATIGEGUTAOYOK

UGUNAGA

NUNAVUT TUNNGAVITKUN TIMIKUTIGIYANIN

UVALO

KOENMIN IHUMAKHUTIVLOGIN KANATAMI

GIVGAKTOKTIGIVLOGO UNA

MINISTAOYOK AGUYAKTULIKIYINI

HALUMAKHIVALEATILOGIN IHOAKHAKHUGILO

TULAEGUYUN IGLUKAKVEN

UGUNANI NUNAVUTMI NUNATAKNIKMI NUNAOYUN

(AVATILIKINIGUN PIVIKHAKAKVEOYUN)

ARTHUR C. EGGLETON
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UVLOANI _____

JAMES EETOOLOOK
HIVULIK TUKLEATA
IKHIVAOTALEOM
NUNAVUT TUNNGAVITKUN
TIMIKUTIGIYANI
UVLOANI _____

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ᐊᒻᒪ
ᑯᐃᓐ ᑭᓱᖃᑎᒋᔭᖏᓐᓄᑦ ᑲᓇᑕᒥ
ᑭᓱᖃᑎᒋᔭᐅᓂᖏᑦᑐᑦ ᑐᓴᕐᓂᐊᖅᑎᓪᓗᒍ
ᑲᓇᑕᒥᑦ ᐅᓇᓕᖃᑎᒋᓕᕆᔨᒪᔭᖏᓪᓗᓕᕐᓂᖅ ᒪᓂᕐᓂᖓᓂ

ᓄᓇᕗᑦ ᑎᑎᕋᐅᓯᖏᓐᓄᑦ ᓴᓇᒪᓕᖃᑎᒌᖃᑎᒌᒍᓐᓇᓚᖏᓪᓗᓂᑦ
ᐊᒻᒪᓗ ᓄᓇᕗᑦ ᖃᐅᔨᓴᖃᑎᒌᒍᓐᓇᓚᖏᓪᓗᓂᑦ
ᓄᓇᕗᖑᓚᐅᖏᓐᓄᑦ ᐃᓗᐊᓂ

(ᐊᐃᑎᓕᓴᐅᓪᓚᒃ ᒪᓕᒐᐃᓕ)

ᐊᖏᓪᓗ ᒫ. ᐃᓅᔪᓕᖅ
ᒪᓂᓕ ᑲᓇᑕᒥᑦ ᐅᐊᓕᖏᑐᑎᓴᓕᖅᑐᓂ

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ᐊᖏᓪᓚᕆᐊᖃᖅᑐᑦ ᓴᓇᓕᓕᖏᓐ ᑐᓵᓕᐊ
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ᐅᓴᐃᓕ

PREAMBLE

WHEREAS the Government of Canada (Canada) has modernized the air defences of Canada through a joint USA/Canada project referred to as the North American Air Defence Modernization Project (NAADM);

AND WHEREAS NAADM includes the decommissioning of some of the Distant Early Warning (DEW Line) radar sites and the conversion of others to North Warning System (NWS) radar sites;

AND WHEREAS fifteen DEW Line sites are located on Department of National Defence (DND) reserves within the Nunavut Settlement Area (NSA);

AND WHEREAS DND wishes to undertake an environmental clean-up of the DEW Line sites, facilities and associated areas;

AND WHEREAS the Inuit and the Federal Government have an interest in all activities that occur within the NSA, including, but not limited to, protecting the ecosystem integrity and the existing and future well-being of the residents and communities of the NSA and increasing the participation of Inuit and Inuit Firms in business and employment opportunities in the NSA;

AND WHEREAS DND and NTI are voluntarily entering into this Agreement to establish a framework for the decommissioning, remediation and restoration of the DEW Line sites in the NSA;

NOW THEREFORE, in consideration of the premises and mutual covenants contained herein, the Parties agree as follows:

1.0 DEFINITIONS

Debris means hazardous and non-hazardous materials of non-natural origin existing on the surface, or visible and partially embedded within one metre of the surface or within two metres of the surface of any water body at low tide and any structures scheduled for demolition

DEW Line sites means the Distant Early Warning Sites listed in paragraph 3.1 below;

DCL means Defence Construction (1951) Limited the designated contracting agent for contracting for the Department of National Defence for the Dew Line Clean-up;

DND means the Crown in the right of Canada represented by the Minister of National Defence or his delegate

Engineered Landfill means a landfill professionally designed to permanently isolate the contents of the landfill from contact with the environment.

Hazardous materials or substances means all materials or substances designated as hazardous under territorial or federal legislation at the time of the clean-up of a particular landfill.

Inuit has the same meaning as in the NLCA;

Inuit Owned Lands has the same meaning as in the NLCA;

Landfill means any area where a concentration of non-hazardous and/or hazardous substances or materials or Debris have been buried;

Minister of National Defence means the Minister of National Defence or his designate

Nunavut Settlement Area has the same meaning as in the NLCA;

Rules means the *Rules and Procedures for the Management of Inuit Owned Lands* adopted by NTI, as amended from time to time,;

Parties means NTI and DND;

Regional Inuit Associations (RIA) means the Qikiqtani Inuit Association, the Kivalliq Inuit Association and the Kitikmeot Inuit Association;

Relevant RIA means the RIA in the region in which a DEW Line site is located;

Work means all the materials, equipment, goods, services, labour, matters and things done or furnished or required to be done or furnished to perform any DEW Line site decommissioning, remediation or restoration activity.

2.0 OBJECTIVES

2.1 The objectives of this Agreement are to establish a broad environmental framework for participation of the Inuit in the clean-up of the DEW Line Sites in the NSA and to achieve cost effective and an environmentally sound DEW Line clean-up as described herein.

2.2 DND and NTI will enter into a corollary agreement with respect to economic benefits for the Inuit and Inuit firms including provisions for training (this agreement may or may not involve regional negotiations).

3.0 GENERAL

3.1 **Scope.** This Agreement relates to the decommissioning, remediation, restoration and related activities of the following DEW Line sites:

PIN 2 - Cape Young
PIN 3 - Lady Franklin Point
PIN 4 - Byron Bay
CAM M - Cambridge Bay
CAM 1 - Jenny Lind Island
CAM 2 - Gladman Point
CAM 3 - Shepherd Bay
CAM 4 - Pelly Bay
CAM 5 - Mackar Inlet
FOX M - Hall Beach
FOX 2 - Longstaff Bluff
FOX 3 - Dewar Lakes
FOX 4 - Cape Hooper*
FOX 5 - Broughton Island
DYE M - Cape Dyer

* Prior to the signing of this Agreement the clean-up of Cape Hooper (FOX 4) had already begun under a separate set of understandings. Therefore only the post clean-up provisions of this Agreement will apply to this site

3.2 **Precedent.** This Agreement is not to be construed as a precedent for any other activities of DND, Canada or any third party. Nothing in this Agreement shall be interpreted or used to define the rights of the Parties, Canada or any third party in relation to any matter under the NLCA or to interpret any Article of the NLCA except for the purpose of this Agreement.;

3.3 **Urgency.** The Parties mutually agree to recognize the urgency of the matters dealt with in this Agreement and to perform all required actions as expeditiously as possible.

3.4 **Nunavut Land Claims Agreement.** The Parties recognize and acknowledge their respective obligations to comply with the NLCA in connection with all Work.

3.5 **Inuit Owned Lands.** All use of and access to Inuit Owned lands by DND, Contractors and subcontractors for the purposes of the Work is subject to the NLCA and the Rules, to the extent that the Rules are not inconsistent with the NCLA.

3.6 **Clean-up Schedule.** The commencement and completion of the Work will take place in accordance with the attached Appendix A. The Parties will use their best efforts to adhere to Appendix A.

4.0 Steering Committee

4.1 There shall, during the duration of this Agreement, be a Steering Committee to monitor progress, develop recommendations and suggest alternative solutions for achieving the commitments set forth in this Agreement by:

(a) reviewing progress in achieving the commitments set out in this Agreement;

(b) ensuring that any perceived deficiencies with respect to the Work or to commitments under this Agreement discussed and, where agreed, are expeditiously acted upon;

(c) considering other items of mutual concern, as appropriate;

(d) requesting the Environmental Working Group (EWG), established in accordance with section 7 of this Agreement, to undertake additional study and formulate recommendations to the Steering Committee.

4.2 The Steering Committee shall consist of four members, two to be named by DND and two to be named by NTI. It shall meet at least twice a year and at the request of any Party at mutually agreed upon times and locations. In order to place an item in the agenda, a Party shall provide that item to the other Party not less than ten working days before each scheduled meeting. The Steering Committee shall operate on the basis of unanimous agreement.

4.3 Recommendations agreed to by a majority of the members of the EWG will be incorporated into the site specific plan referred to in section 23 of this Agreement or into the post-clean-up methodology as the case may be. Where either DND or NTI disagree with the EWG recommendations, it will raise the issue at the Steering Committee for discussion in accordance with clause 4.4. If the Environmental Working Group is deadlocked (ie 2-2) on any issue, including scoring of the risk assessment matrix and landfill remediation, the Steering Committee will discuss the situation and attempt, in good faith, to arrive at a consensus. The Parties pursuant to clause 4.5 may, where appropriate, seek independent advice.

4.4 Should unanimous agreement not be reached at the Steering Committee the following approach will be used:

(a) Prior to Clean-up Commencing - the clean-up will not commence until the issue is resolved to the satisfaction of both Parties.

(b) Clean-up has commenced - the clean-up will continue in accordance with the site specific clean-up plan. If the issue is not included in the site specific plan then DND will proceed based on the advice provided by its consultants. DND and NTI will continue to attempt to arrive at a consensus.

In either event, both Parties continue to have the option of involving the provisions of section 5 of this Agreement if unanimous agreement cannot be reached. If unanimous agreement is reached at a later date or there is an arbitration decision which differs from the actions taken by DND, the new decision will be implemented.

4.5 The Steering Committee shall, with the agreement of the members, acting reasonably, invite representatives of Government departments, Inuit organizations, non-governmental organizations, Contractors, Subcontractors and others to provide advice or information as required. If requested by the other Party, DND and NTI agree to provide each other with all relevant scientific and technical information, with the exception of:

- advice to Ministers or Inuit Boards of Directors
- negotiating strategies
- commercially confidential third Party information
- personal information

4.6 The Parties each shall be responsible for their respective costs associated with participating in Steering Committee meetings.

5.0 ARBITRATION

5.1 If DND and NTI disagree on any question of fact or mixed question of law and fact related to the interpretation, implementation or operation of this Agreement, with the exception of any matter within the jurisdiction of the Arbitration Board under the NLCA, either party may by written demand refer the dispute to arbitration in accordance with the following provisions.

5.2 An arbitration Panel consisting of a single arbitrator who both Parties agree is qualified to arbitrate the question in dispute will render a decision on the dispute. If DND and NTI cannot agree on a single arbitrator then a decision will be render by an Arbitration Panel consisting of three similarly qualified arbitrators, one of whom shall be chosen by NTI, one by DND and the third by the two so chosen, which third arbitrator shall be the chairperson. If within fifteen days of having received a written demand, or such extended time as the parties agree, a party fails to either agree to a single arbitrator or to appoint an arbitrator, or if the two arbitrators appointed by the parties do not agree upon the third arbitrator, then upon written application by either party such third arbitrator shall be appointed by the superior court having jurisdiction in the NSA.

5.3 The arbitration proceedings shall be held within thirty days following the appointment of the Arbitration Panel in a location agreed upon by the Parties or, if the Parties are unable to agree, as determined by the arbitration panel. The timing for the panel hearing may be extended by mutual consent of the Parties, not unreasonably being withheld.

5.4 The arbitration panel shall have jurisdiction to determine all questions of fact, questions of mixed law and fact and to make an award, including interim relief, payment of interest, and costs. If an arbitration panel makes no decision as to costs, each party shall bear its own costs and an equal share of the other costs of the arbitration, including the remuneration and expenses of the arbitration panel.

5.5 The Arbitration Panel shall render a decision, in writing, within thirty days of the completion of the arbitration hearing and state the reasons on which it is based. The decision is final and binding and is not subject to appeal. Pursuant to section 17(3)(b) of the *Federal Court Act*, the Parties agree that the Federal Court Trial Division shall have jurisdiction to review the decision of an arbitration panel on any grounds set out in section 18.1(4) of the *Federal Court Act.*

5.6 Where a party to an arbitration fails to comply with any of the terms of the decision of the arbitration panel, any party to the arbitration may file in the office of the Registrar of the superior court having jurisdiction in the NSA, a copy of the decision in the prescribed form, whereupon the decision shall be entered in the same way as a judgement or order of that court, and is enforceable as such.

5.7 The territorial *Arbitration Act* shall apply in any arbitration under this Agreement to the extent that it is not inconsistent with this Agreement, unless otherwise agreed by the parties.

5.8 The arbitration panel may, on application, allow any to participate in an arbitration as an intervenor, if in the arbitration panel's opinion the interest of that person may be directly affected by the arbitration, and on such terms as the arbitration panel in its discretion may order.

5.9 Unless the parties otherwise agree, the proceedings and Board's decision shall be made public.

6.0 Environmental Risk Assessment Matrix

6.1 All landfills will be scored by the EWG in accordance with the Environmental Risk Assessment Matrix as set out in Appendix B of this Agreement. The construction of this matrix takes into account two conservative assumptions:

- The contents of the landfills are unknown and all potential contaminants (ie substances typically used at DEW Line sites) may be present in the landfill
- If a contaminant comes into contact with receptors, it could have an adverse impact on those receptors regardless of the exposure duration or concentration

6.2 Landfills scoring 105 points or more are classified as potentially high environmental risk (Class A) and will be excavated. Landfills with a score of 100-104 points will be considered on a case by case basis to determine whether they should be excavated or considered as Class B landfills.

6.3 Landfills with a score in the range 75 to 99 points are classified as moderate environmental risk (Class B). An engineered leachate containment system will be provided for these landfills to mitigate against potential environmental risks. The landfill engineers under contract to DCL will take into consideration any suggestion of the EWG regarding the design of the leachate containment facility. In specific cases where an engineered leachate containment system cannot be constructed, the EWG will recommend whether complete excavation or partial excavation with a leachate containment system is required.

6.4 Landfills with scores of 75 or less are classified as low environmental risk (Class C). The remediation approach for these landfills will be the placement of an engineered cover following collecting, sorting, and appropriate disposal of debris where it may impact on the integrity of the landfill. Hazardous debris will be removed and disposed of in accordance with federal regulations. Generally, the final thickness of cover material will be approximately 0.75 metres, but may vary depending on site specific conditions.

6.5 Scores that fall within plus or minus five points of 75 points will be considered on a case by case basis.

6.6 The scoring of Category C: Receptors of the matrix will take into account local/traditional knowledge in accordance with the procedures set out in Section 8 of this Agreement. The primary focus for the collection of local/traditional knowledge will be on the local community and an Inuit representative who is familiar with the DEW site under assessment.

6.7 The scoring of the landfills will take place before the clean-up at that DEW site commences and the site specific clean-up plan is finalized.

7.0 Environmental Working Group

7.1 An Environmental Working Group (EWG) will be established. The EWG will consist of four members, two chosen by each of the Parties. The members will be qualified engineers and/or scientists with expertise in environmental remediation and clean-up in northern climates.

7.2 The EWG will, for each of the landfills prior to the clean-up of that site, be responsible for the scoring of the risk assessment matrix, interpreting the results and recommending a remediation solution in accordance with this Agreement. If a majority of the members of the EWG are in agreement with the EWG recommendations then DND will include these recommendations in its site specific plans which are referred to in section 23 of this Agreement. If the EWG is deadlocked then the issue will be referred to the Steering Committee as per section 4.3 of this Agreement.

7.3 During the monitoring period, the EWG will also examine the results of the monitoring program in accordance with the methodology set out in section 20 of this Agreement and report to the Steering Committee on the results of their investigation. Should changes to the monitoring plan and/or additional remediation be required, the EWG will make recommendations to the Steering Committee on what action should be taken as per section 4.3 of this Agreement.

7.4 The EWG will go on-site during the pre-cleanup delineation phase of the project to assemble information required, including local/traditional knowledge as per section 8 of this Agreement, to score the risk assessment matrix. DND will contribute $10,000 per site to NTI to defray the cost incurred by its EWG members and a community representative selected by the relevant RIA (NTI Representative). DND will also provide the NTI representative transportation

costs whenever the NTI representatives are travelling to a site or to a community with the DND representatives on a DND charter. DND will also provide meals and accommodation for the NTI representative while at the site.

7.5 The EWG will also act as a resource to the Steering Committee and will upon request from the Steering Committee investigate certain matters and produce reports or studies for consideration by the Steering Committee. Both Parties agree to cover the costs of their members of the EWG to undertake such work.

8.0 Local/Traditional Knowledge

8.1 Traditional and local knowledge for use in the scoring of the risk assessment matrix will be collected during the Pre-Cleanup Delineation phase of the DEW Line clean-up project.

8.2 An Inuit representative familiar with the DEW site and traditional use of the area around the site will be chosen by the relevant Regional Inuit Association to be on site during the pre-construction delineation phase of a site clean-up. The Inuit representative will work closely with the EWG to identify Inuit use of the area, wildlife patterns, and past events and occurrences that may have impacted on landfills (i.e. dumping, hazardous waste storage, natural occurrences) in order to assist in the scoring of the matrix.

8.3 DND and NTI will attempt to establish a community DEW Line Clean-up Committee which would facilitate the flow of local knowledge to the EWG prior to, and during, the site visit.

8.4 The EWG will visit the local community (ies) most affected by the DEW site. The EWG will conduct one-on-one interviews with a number of residents and will also meet with the Hamlet Administration Officer and/or the Hamlet Mayor, the local Hunters and Trappers Association, and relevant community organizations to obtain information concerning the traditional use of the area by the community. The Community Land and Resource Committee (CLARC) will be consulted if Inuit Owned Land is affected in any way.

8.5 In anticipation of these community consultations, DND, in consultation with NTI will prepare an information package in English and the relevant Inuit language for

use in the community consultations. The package will include maps of the site and the surrounding area along with sample questions (see Appendix D) that would facilitate discussion.

8.6 DND will provide NTI with at least six months notice regarding the site visit in a given season. Six weeks notice will be provided regarding the dates for the community visit. DND will attempt to arrange the timing for the community consultation to avoid harvest time when members of the community might be on the land. NTI in conjunction with the EWG will arrange the interviews with the various community associations and individuals.

8.7 The EWG will document all information collected during the community consultations. This information will be provided to DND, NTI, the relevant RIA and the host community.

8.8 All information collected from the interviews will be considered during the matrix scoring and will be given equal consideration with conventional scientific knowledge collected during the site visits.

8.9 Prior to the actual clean-up, DND will conduct a community information session to inform the residents of the scope of the Work and other relevant facts. In the case of CAM 4, there will be a community information session during the summer of 1998 at the option of the RIA. For Fox 5, in addition to this community information session, the EWG will be consulting the community of Broughton Island on FOX-5 as part of its work on scoring landfill evaluation matrices, during the summer of 1998 and DND will provide a limited public information session at that time.

9.0 CEPA Soils

9.1 Soils at concentrations exceeding federal regulations (referred to herein as "CEPA" soils) will be removed from the site and disposed of in a licenced facility in accordance with those federal regulations.

10.0 Tier II Soils

10.1 Tier II soils are defined in Appendix E of this Agreement.

10.2 Tier II soils will be excavated and placed in an engineered, lined, containment facility (Tier II Disposal Facility). After excavation, the area will be backfilled with sufficient clean fill to provide an effective layer over any remaining Tier I soils and to meet the requirement of clause 22 of this Agreement . A schematic of a Tier II Disposal facility is presented in Appendix K. Tier II soils may also be placed in a similarly engineered cell of a larger landfill. The location of the Tier II Disposal Facility will be selected in order to minimize potential environmental impact in a cost-effective manner. In some cases Tier II soils may be transported from one DEW site to another depending on soil volumes and project economics.

10.3 Confirmatory testing will be conducted in accordance with the methodology outlined in section 13 of this Agreement.

11.0 Tier I Soils

11.1 Tier I Soils are defined in Appendix E of this Agreement.

11.2 Tier I soils will be excavated to a depth of to 30 cm if the soil is located on a flat or gently sloping area such as a gravel pad unless delineation testing indicates a lessor depth of contamination. In such a case, a suitable safety margin will be excavated. Where Tier I soils are located on slopes greater than 3:1 (horizontal:vertical), the contaminated soils will be excavated to a depth of up to 60 cm. After excavation, the area will be backfilled with sufficient clean fill to provide an effective layer over any remaining Tier I soils and to meet the requirement of clause 22 of this Agreement .

11.3 Tier I soils will be placed in a professionally engineered landfill where they may be used as intermediate fill.

11.4 During the pre clean-up delineation phase prior to going to tender for the clean-up, testing to determine the presence or absence of Tier II contaminated soil below the Tier I soils will be conducted.

12.0 Hydrocarbon Soils

12.1 Hydrocarbon contamination will be based initially on the measurement of Total

will investigate areas of concern identified by NTI and/or its representatives who will be on-site during the delineation work. Risk assessment consideration will be given to soils that act as sources of contaminants to nearby aquatic environments even if the contaminants are below the relevant DCC criteria. The method of delineation will follow the grid as set out in Appendix F of this Agreement.

13.2 Confirmatory testing of contaminated areas, other than Tier I soils, will be conducted after contaminated soils have been excavated. Confirmatory testing will be conducted in accordance with the protocol outlined in Appendix F of this Agreement.

13.3 Should there be evidence to suggest that some contaminated areas were missed during the pre clean-up delineation work, these areas will be investigated in accordance with the pre clean-up delineation methodology.

13.4 During the confirmatory testing phase, NTI may assign a qualified observer to the site.

13.5 Appropriate quality assurance measures acceptable to the EWG will be taken to ensure the accuracy of all analytical work in the field or in laboratories.

14.0 Debris

14.1 Debris will be collected and sorted into hazardous and non-hazardous components. Hazardous debris will be disposed of in accordance with Federal regulations. Non-hazardous debris will be buried in a professionally engineered landfill, provided there is a suitable location and sufficient gravel is available. Appendix C contains additional details concerning the destination of collected debris.

14.2 All debris which is attributable to the operation of any DEW site and is within two metres of the surface at low tide or within two metres of the surface of an inland water body will be removed by DND.

15.0 Off Site Contamination and Debris

15.1 Where there is reasonable evidence of additional off site contamination or debris

Petroleum Hydrocarbons (TPH) where the TPH value is greater than or equal to 2500 ppm. Should the soils contain Tier I or Tier II contamination, they will be treated in accordance with the relevant sections of this Agreement. These hydrocarbon areas will be identified on site as part of the pre-construction delineation testing.

12.2 Each contaminated area will be evaluated qualitatively by the EWG using the checklist outlined in Appendix J of this Agreement.

12.3 Where remediation is required, one of the following options will be used:

- aerating the hydrocarbon contaminated soil in place to reduce hydrocarbon contaminant concentrations
- use of hydrocarbon contaminated soil as intermediate fill within an engineered landfill
- landfilling in a Tier II Disposal facility
- bioremediation using a landfarming or bio-pile processes
- soil washing
- other equivalent technologies recommended by the EWG

12.4 Based on site specific conditions, the EWG will recommend the most appropriate of the remediation options outlined in clause 12.3 in accordance with section 4.3 of this Agreement. The appropriateness of the options will take into consideration the environmental sensitivity of the area. Factors which will be considered in the selection of the method are:

- type of contaminant (ie fuel or lubricating oil)
- total volume of hydrocarbon contaminated soils on site (mobilization costs, ability to treat the soil)
- concentration of hydrocarbons within the soil (effectiveness of treatment process)
- type of soil

13.0 Pre Clean-up Delineation and Confirmatory Soil Testing

13.1 A comprehensive pre clean-up delineation program will be designed to ensure that all contaminated soil and contaminated building material will be identified . DND

which, subject to clause 15.2, is attributable to the operation of a nearby DEW site, DND will undertake testing to determine the extent of the contamination in consultation with NTI and remediate the site in accordance with the relevant sections of this Agreement.

15.2 Should the evidence clearly demonstrate that other individuals or organizations have contributed significantly to the contamination or debris, then NTI and DND will endeavour to obtain the third Party (ies) agreement to contribute its pro-rated share of the investigation and clean-up costs before the investigation and clean-up commences. If the third party does not agree to pay their share of the costs, DND has the option, where practical, to clean up its share of the contamination, or in the alternative, waiting until there is third party agreement regarding payment of the investigation and clean-up costs. The investigation and clean-up will be in accordance with the clean-up protocol outlined in this Agreement.

15.3 NTI will endeavour to identify areas of concern prior to the delineation phase of the clean-up.

16.0 PCBs in Paint

16.1 PCBs in paint will be treated in accordance with applicable federal regulations. Changes to these regulations will be dealt with in accordance with section 25.1 of this Agreement.

17.0 Materials Containing Lead-based Paints

17.1 Materials containing lead-based paints will be placed in a professionally engineered landfill. Should regulations or guidelines be issued which direct otherwise, the implementation of this change will be dealt with in accordance section 25.1 of this Agreement.

18.0 Barrels

18.1 The testing and disposal of POL tank sludge, waste oil, petroleum products, antifreezing agents, solvents and barrels will be handled in accordance with the criteria as set out in Appendix G.

19.0 Borrow Material

19.1 DND will attempt to minimize new excavation of borrow materials required for the clean-up activities. Where possible, existing sources of borrow material will be used. All borrow areas will be regraded to match the surrounding topography.

20.0 Monitoring Program

20.1 The monitoring program will identify an actual or potential landfill failure. Remedial action will be undertaken if leachate is present at levels greater than the site specific baseline concentrations at the time of the landfill completion. Action taken as result of the monitoring program will ensure the integrity of the landfills and thereby the health of the Inuit is protected on a continuing basis.

20.2 Following the completion of the clean-up for a site, DND will commence a monitoring program in accordance with Appendix H of this Agreement.

20.3 The monitoring program will have three phases. The objective of each phase are identified in Appendix H.

20.4 Monitoring results will be communicated to both Parties in the form of a comprehensive report.

21.0 Research Proposals

21.1 NTI, on behalf of communities, may raise at the Steering Committee, items, including the need for hydrographic mapping, which could involve the requirement for research and investigation. These proposals will be discussed and evaluated at the Steering Committee. If the Steering Committee decides that the proposals are consistent with the objective of the clean-up which is to protect the environment from contaminants entering the food chain or involve direct DEW site related impacts which could cause significant economic impact, DND will fund the agreed upon research activities.

21.2 Where the proposals are broader in nature and not solely restricted to DND DEW

site activities, DND will support NTI in seeking funding under other Government programs and/or initiatives and may contribute funding to the approved proposals.

21.3 Involvement of the Inuit in the research activities including training and technology transfer will be dealt with in an agreement dealing with economic provisions.

22.0 Site Restoration

22.1 All sites will be regraded to the extent possible to conform to the natural contours. The regrading will pay particular attention to hydrocarbon stained areas and wherever feasible these areas will be regraded so as to improve the aesthetics of the stained area.

23.0 Site Specific Clean-up Plan

23.1 DND will provide NTI with a site specific clean-up plan six months in advance of the clean-up of a particular site. NTI will review the plan to satisfy itself that the plan is in accordance with the requirements as set out in this Agreement. Any items of concern to NTI will be referred to the Steering Committee for resolution in accordance with section 4.3 of the Agreement prior to the issuance of any requests for bids by DCL. DCL, as the representative of the project proponent (DND), will be responsible for preparing all necessary submissions to obtain regulatory approval to proceed with the clean-up activity.

24.0 Liability and Indemnification

24.1 DND acknowledges and agrees that it has continuing responsibility and liability for the integrity of all landfills remaining on site. DND agrees that should there be evidence of potential or actual failure of a landfill, it will investigate the situation pursuant to the monitoring provisions of this Agreement.

24.2 Should there be evidence of contamination at the DEW Line site which exceeds the protocol as set out in this Agreement at the time of the signing of this Agreement and which cannot be attributed to a third Party then DND will undertake the clean-up.

24.3 DND agrees that nothing in this Agreement shall relieve the Crown or its agents either at present or in the future from complying with all applicable federal laws of general application. Changes to territorial law will be referred to the EWG which will make recommendations to the Steering Committee concerning the relevance of these changes to the clean-up.

24.4 DND agrees that it will be a condition of any sale or transfer of any of the lands comprising the DEW Line sites that the purchaser must assume DND's obligations under this Agreement with respect to the lands sold or transferred. It will also be a further condition of any such sale or transfer that the purchaser or transferee shall provide security for the performance of the assumed obligation and shall provide and maintain a letter of credit, surety bond, or other security in a form and amount mutually agreeable to the Parties.

25.0 Amendments

25.1 Should existing federal regulations or guidelines be amended, the EWG will examine the implementation of these changes or amendments taking account the special characteriztics of the Arctic environment and make appropriate recommendations to the Steering Committee in accordance with section 4.3 of this Agreement.

25.2 The Protocol for confirmatory testing may be reviewed and adjusted on a site by site basis provided that a majority of the EWG are in agreement with the changes. Permanent or major changes will require the prior approval of the Steering Committee.

25.3 In the event that either Party wishes to amend the schedule as set out in Appendix A, it will provide the other Party with thirty (30) months written notice. If unforeseen event(s) or a decision by a regulatory body occurs which has a material impact on this schedule, the Parties will review these events and attempt to arrive at a mutually acceptable alternative.

25.4 Both Parties agree to review changes in technology and research studies which may have a bearing on this Agreement and discuss the need for changes resulting from these developments. The Steering Committee may task the EWG to investigate a particular technology pursuant to clause 4.1 (d) of this Agreement.

Recommendations of the EWG will be implemented in accordance with section 4.3.

25.5 If either Party wishes to make other changes to this Agreement, it will provide, in writing, six months notice of proposed changes. Any agreed upon amendments will be executed and attached as an appendix to this Agreement.

25.6 DND and NTI agree to consider amendments in an expeditious manner, particularly where the proposed amendments directly affects the conduct of a clean-up in progress or one which is scheduled to commence in the near term.

26.0 EWG Reports

26.1 All reports of the EWG will be available to provide additional information and guidance in the implementation of this Agreement. In the event of any conflicts or differences in interpretation of the EWG reports and this Agreement, this Agreement will prevail.

27.0 Notices

27.1 Where any Party is obliged or entitled to give any notice, request, approval, demand, consent, direction or other communication (ie Notice) to the other Party, such party shall first communicate the substance thereof personally or by telephone. However, such Notice shall not be sufficiently given until sent in writing to the addressees at the address below. Any Notice may be personally delivered or sent by registered mail or telefacimile and will be effective upon receipt by the addressee.

27.2 Notices to DND will be sent to:

Director General Environment
National Defence Headquarters
101 Colonel By Drive
Ottawa, Ontario
K1A 0K2

27.3 Notices to NTI will be sent to:

1st Vice President
Nunavut Tunngavik Incorporated
Box 1041
Cambridge Bay
Northwest Territories
X0E 0C0

28.0 **Termination of the Agreement**

28.1 This Agreement will terminate on the later of December 31st, 2008 or when the clean-up work as set out in this Agreement for the sites listed in Appendix A is completed or on such a date agreed to by the Parties in accordance with clause 25.3 of this Agreement.

28.2 Notwithstanding clause 28.1 of this Agreement, monitoring and any necessary remediation in accordance with section 20 of this Agreement will continue for twenty five (25) years after the termination of this Agreement.

28.3 At the end of twenty five years of monitoring following the termination of this Agreement, DND and NTI will negotiate a new agreement to specify the terms of any further monitoring (if required).

Annexes to the Agreement

Appendix A

Clean-up Schedule

Site*		Start Date	Completion Date
CAM M	Cambridge Bay	1998	1999
FOX 5**	Broughton Island	2001	2003
CAM 4**	Pelly Bay	2001	2003
FOX M/CAM 5	Hall Beach/Maclar Inlet	2002	2006
CAM 3	Shepard Bay	2002	2003
DYE M	Cape Dyer	2003	2006
CAM 2	Gladman Point	2003	2004
FOX 2/FOX 3	Longstaff Bluff/Dewar Lakes	2004	2008
CAM 1	Jenny Lind Island	2004	2005
PIN 4	Byron Bay	2005	2006
PIN 3	Lady Franklin Point	2006	2007
PIN 2	Cape Young	2007	2008

* Dates for the Baffin Sites are tentative pending resolution of economic and business issues

** The starting dates for CAM 4 and Fox 5 and the subsequent starting dates could be moved up pending the timing of the PCBs in paint decision by Environment Canada

Appendix B

Environmental Risk Assessment Matrix

Introduction

The matrix has been based on the CCME National Classification System for Contaminated Sites, and adapted to address the particular concerns of the Arctic environment. The matrix is divided into three categories of equal weight: contaminated source, pathways, and receptors. The interaction of these three elements results in environmental risk. Each category is assigned 50 points, which are distributed among several factors. Each of these factors has been made as specific as possible in order to reduce the subjectivity of the matrix to a minimum. In addition, each of the three main categories is assigned a highly subjective "special considerations" factor according to the method described in the CCME Classification System. As it is unlikely that any classification system could address all possible factors, a special considerations factor allows the user to increase or decrease the score "to emphasize important concerns about a site and should be used as an **exception rather than as a rule**" (CCME 1992, p.6-7).

The purpose of the matrix is to evaluate the environmental risk posed by landfills in their current condition and location. It is not suitable for determining the risk posed by a landfill post-closure, as most of the elements in the matrix would not change by the application of a remedial solution. It should also be recognized that monitoring is an integral part of the closure.

The next sections provide guidance to the EWG on the methodology and items to be considered when scoring the matrix. This section is followed by the actual matrix which is to be used in the scoring.

A. Contaminant Source

Five factors were considered under Contaminant Source to describe specific landfills, as follows:

- A.1 Landfill Extent
- A.2 Estimated Depth of Landfill
- A.3 Presence of Leachate
- A.4 Presence of Surface Contaminated Soil
- A.5 Presence of Surface Debris

A.1 Landfill Extent

Landfill areas will be based on the results of geotechnical/geophysical site surveys and visual observations. Those landfills with an area greater than 10,000 square metres will score 10 and those smaller landfills will be scored in proportion to their size relative to 10,000 square metres.

A.2 Estimated Depth

The estimated depth of a landfill is determined by visual inspection of surrounding topographic features. The average depth of the active layer will be used as a qualifier for the description of landfill depth, as this is generally the maximum depth of investigation. The depth of the active layer may range from one to two meters at these sites, depending on material type; therefore an average depth of 1.5 meters was used in the rating. Landfills with estimated depths of greater than 1.5 meters will score 5 and those with estimated depths of less than 1.5 meters will score less.

A.3 Presence of Leachate

Leachate provides evidence of contamination within landfill. Leachate can be defined as the presence of contaminants in water emanating from the landfill, but concentrations may be so low as to be difficult to detect. The presence of leachate can be better determined by the presence of contaminated soil at the toe of the landfill, indicating

chronic low levels of contaminants leaching from the landfill. All types of contaminants in leachate (PCBs, (Polychlorinated Biphenyls) TPH (Total Petroleum Hydrocarbons) or inorganics) are considered to be of equal concern, as indicators of contamination within the landfill.

In the scoring, leachate is considered to be either present or not; no interpolation of the score is used in this category.

A.4 Surface contaminated soil

Within each landfill, there is potentially a source of contamination. The presence of surface contaminated soil, like the presence of leachate, is an indication that the landfill contains contamination. The volume of contaminated soil is not taken into consideration; this provides a conservative approach in that a small amount of contaminated soil can trigger a high score. The presence of Tier II soils will trigger the highest score (15). Based on the hypothesis that each landfill potentially contains contaminants, 5 points are given to this subsection, even if no surface contaminated soils were identified.

A.5 Presence of surface debris

At some landfills surface debris is very extensive, while at others there is almost no debris. Scoring needs to be quantitative; therefore the percentage of the surface area of the landfill that is covered with debris is used as the basis for scoring. A landfill that has surface debris covering more than 50% of its surface receives a full score.

B. Pathways

The primary transport mechanisms for contaminants from the DEW Line landfills are considered to be:

- aerial transport of fine particles; and
- water transport, both as surface water run-off or subsurface water flow.

B.1 Aerial Transport of Contaminants

All contaminants can be transported as particles; windblown debris is not considered in this category, as debris pickup is inherent in any cleanup. Surface contamination or surface expressions of leachate imply the potential for aerial transport. This factor is given a low weight because the quantity of contaminated soil on the surface of a landfill is generally low relative to the quantity of contaminated soil at the site as a whole. In addition, it is anticipated that relative to the effect of water movement, aerial transport contributes less to the transport of contaminants away from a landfill.

B.2 Water Movement

Water movement includes the movement of surface water and subsurface water within the active layer. "Groundwater" is not addressed as an issue separate from surface water as the movement of water within the active layer is subject to the same driving forces as surface water. The intent of this sub-category is to examine factors that affect migration away from the landfill – slope, runoff, extent and type of cover on the landfill, annual precipitation and distance to surface water. Among these factors, topography, runoff potential and proximity to surface water are given the highest weight.

B.2.1 Topography

The degree of the slope on which the landfill is located is one of the major factors contributing to transport of contaminants; the scoring is carried out on a sliding scale. In cases where there are different slopes across the landfill, a weighted average is used.

B.2.2 Cover Material – Depth

The extent to which potential contaminants are available to transport is also dependent on the depth and type of cover material. The potential for leachate generation and correspondingly, leachate migration, is related to the infiltration of water into the landfill. Cover over the landfill helps mitigate infiltration of water into the landfill contents. As the thickness of the landfill cover increases, the likelihood that potential contaminants will be released from the landfill decreases. If the active layer is contained in the cover material above the debris, then the potential for surface water infiltration into the landfill is small; this circumstance is assigned the lowest score.

B.2.3 Cover Material – Type

The erosion potential of a landfill is partly based on the type of cover material. Erosion can eventually lead to the exposure of the landfill contents. Some cover materials are more susceptible to erosion than others; well graded gravels are the least susceptible, and silty materials are the most susceptible. In cases where there is no cover, this factor is assigned the highest score. Where the cover materials consist of a combination of soil types, the scoring should reflect the more conservative or higher score.

B.2.4 Surface Water/Run-Off Potential

This factor aims to describe the destructive potential of water action on the landfill, which could take the form of waves; streams, rivers or lakes; or seasonal drainage. Where there is significant seasonal drainage, the run-off potential is high. "Significant seasonal drainage" is defined as run-off that has the potential to transport large quantities and concentrations of contaminants to surface water courses over a short period of time (CCME 1992, p.23). Significant seasonal drainage also includes consideration of major snow drifting on a landfill.

B.2.5 Precipitation

The amount of precipitation received, either as rain or snow fall, affects the amount of surface water infiltration or run-off. The majority of the DEW Line sites receive less than 500 mm of precipitation annually, with the exception of Cape Dyer. Typically, the amount of precipitation at any site is relatively low; therefore it is unlikely that any single precipitation event would cause significant runoff. This factor is therefore given a relatively low weight.

B.2.6 Distance to Downgradient Perennial Surface Water/Seasonal Drainage Channel

The distance to surface water will affect the probability of contaminants reaching the watercourse. This factor can include streams, seasonal or perennial, running directly through the landfill, or streams and lakes downgradient from the landfill, but it is intended to exclude small ponds with no outflow. On very steep slopes this distance should consider the horizontal distance to the water body rather than the vertical drop. The impact of drainage with respect to contaminant exposure is not considered in this category (it is considered under Receptors); this factor determines whether there is a drainage pathway from the landfill.

C. Receptors

This section addresses the potential for impact on receptors, specifically, aquatic and terrestrial habitats, as well as human exposure. Impact on humans is the primary consideration; however, it should be recognized that impact on humans is implicit in the scoring of factors addressing ecosystem impact. The scoring within each category is to be based on recorded data, as well as local knowledge of the land use in the area, and therefore requires local input.

C.1 Potential Impact on Receiving Freshwater/Marine Habitat

The water body should be selected based on the potential effects on the receiving habitat. In the selection of the receiving water body to be used in the landfill evaluation matrix, consideration must be given to the regional drainage patterns. For example, where the drainage from a landfill is overland (i.e. there is no direct connection between the landfill and the downgradient water body), water bodies beyond 2 kilometers should not be used in the evaluation. This is based on the premise that natural attenuation of any potential contamination will occur with overland flow. Where a direct connection between a landfill and a downgradient water body exists, via a stream or interconnected ponds, the two-kilometre limit should not be used.

C.1.1 Proximity to Receiving Freshwater/Marine Habitat

"Receiving habitat" is considered to be the most potentially impacted significant body of water near the toe of the landfill. The water body may support freshwater or marine life and/or may be used by avifauna and/or terrestrial mammals as a water source. It is not necessarily the seasonal drainage course or perennial water body closest to the landfill toe: This section's objective is to select a habitat which support receptors rather than identify the closest body of water. It is assumed that only habitat downgradient from the landfill is to be considered (given that aerial transport of contaminants to habitat upgradient from the landfill will be addressed by the remediation of contaminated soil).

C.1.2 Estimated Habitat Usage – Freshwater/Marine

This section is scored based on the frequency of usage within the selected receiving water body: the level of biodiversity and the occurrence of calving/spawning should be considered in scoring. It is recognized that freshwater and/or marine wildlife is potentially more at risk compared with terrestrial wildlife or avifauna, which should only be exposed through water ingestion. Thus, when terrestrial wildlife or avifauna is the primary receptor, the score for this factor should fall into the moderate or low category based on the potential frequency of usage. Otherwise, when the selected water body sustains freshwater and/or marine wildlife, the level of biodiversity should be used to evaluate the score. It should be noted that the most conservative approach - in the selection of the receiving water body - must be used when scores from section C.1.1 and C.1.2 are combined. Finally, "Biologically sensitive" areas such as bird sanctuaries and/or endangered, threatened or vulnerable populations should be considered as "special considerations".

C.2 Potential Impact on Receiving Terrestrial Habitat

C.2.1 Extent of Vegetation

Typically the area in which to consider vegetation would include an area 300 m downgradient from the toe of the landfill. The area within this distance is expected to be most susceptible to uptake of contaminants if they are leaching from the landfill, but a larger or smaller area could be considered if site specific conditions warrant it.

C.2.2 Estimated Habitat Usage – Terrestrial/Avifauna

The same criteria as for usage of aquatic habitat are to be applied.

C.3 Potential Human Exposure Through Land Use

C.3.1 Presence/Occupation

This factor addresses strictly dermal exposure and inhalation; consumption of food and water from the area is dealt with in subsequent factors. The risk of dermal exposure or inhalation is much lower when soil is frozen; therefore winter occupation of the site is assigned a low risk. "Summer" in this factor is intended to include the spring, summer and fall periods when the ground is not frozen. Within this factor, the scoring takes into account the likelihood and the duration of contact. In such way, proximity to a community is considered (high likelihood of contact), although proximity to a community does not necessarily trigger a high score if visits are infrequent (low duration of contact).

The likelihood of contact considers proximity to community or to a camp, as well as proximity to "travel routes". The duration of contact considers full time residences (i.e. permanent community for high, summer camp for moderate, winter camp or travel routes as low). Scores may be interpolated between the allocated points, according to the table below.

Table 1-1: Scoring Guide for Section C.3.1

	High Likelihood of Contact	Moderate Likelihood of Contact	Low Likelihood of Contact
High Duration of Contact	8	6	4
Moderate Duration of Contact	6	4	2
Low Duration of Contact	4	2	1

For large DEW Line sites, different parts of the site need to be considered individually, as some areas of the site could be quite far (more than a few kilometres) from the landfill under consideration.

C.3.2 Proximity to Drinking Water Source

Regardless of whether the source is seasonal or perennial, an established community or a summer camp water source located downgradient of the landfill is to be considered in this factor.

C.3.3 Food Consumption

Sedentary organisms are more susceptible to local inputs as their exposure is large if they are downgradient from the landfill. These organisms can include bottom-dwellers such as sculpins, mussels, sea urchins etc., as well as terrestrial vegetation, which can be used for medicinal purposes. This kind of contamination "is quite localized when considered on a broad regional scale" (DIAND 1997, pg. 5). Migratory marine animals may have body burdens of contaminants; these are not directly attributable to local contaminant sources, as the vast majority of organochlorines, for instance, arrive in the Arctic via long range transport.

Caribou living in the general area of DEW Line sites do not have elevated levels of contaminants, since they feed over a very wide area. The Canadian Arctic Contaminant Assessment Report (DIAND, 1997) describes these results in more detail.

It is recognized, however, that sources such as DEW Line sites do contribute contaminants to the Arctic ecosystem. For the purpose of scoring the matrix, therefore, a high consumption of animals from the area surrounding the DEW Line sites has the potential to pose a higher risk than a low consumption, **although in general the risk remains low.**

This factor is divided into two sub-sections, and the score is the sum of the score for each of the two sub-sections.

1.3 Special Considerations

As indicated in the introduction to the matrix (section 1.1), each of the three main categories includes a "*special considerations*" factor. The proposed value of the special considerations factor is a maximum of ten percent of the overall score for each category. It is intended that no circumstance will allow a user to assign a special considerations score that will cause the score for that category to exceed the maximum allotted. To avoid undue bias, it is also suggested that the user should complete the entire evaluation form and score a site before addressing special considerations in the total score.

The Environmental Working Group (EWG) based the landfill risk evaluation matrix on the CCME model which defines three categories: contaminant source, pathways and receptors. Within those three categories, the EWG tried to address all of the possible factors contributing to risk. Recognizing that even a thorough matrix could never address all possible risk factors, special considerations were included to address specific risk factors, which are not general to all of the DEW Line sites.

As noted in the CCME document, the special considerations factor is not intended to be applied on a regular basis, as it addresses very site-specific risk factors. In fact, if the special consideration factor was being consistently applied in the scoring of landfills, it would indicate that the matrix itself was incomplete. Special considerations should be site-specific characteristics that can be documented.

Three examples of how special considerations could be applied are provided to clarify the use of such a classification:

Example 1. Wildlife on site

At Byron Bay, the caribou belong to the Peary herd, an endangered species. It may be that "special considerations" points would be assigned to the Receptors category when endangered, threatened and/or vulnerable species (COSEWIC, 1997) are known to visit the DEW Line landfill.

Example 2. Drinking water

The risk associated with landfill impact on a drinking water source is addressed in section C.3.2. In that section, the distance from a landfill to a known drinking water source, permanent or seasonal, is used as an indicator of the risk that the contaminants in the landfill could have an impact on the drinking water source. If a landfill is close to a drinking water source, then section C.3.2 would be assigned the maximum score (8 points). In the case of Pelly Bay, however, where the landfills are far from the drinking water source and therefore receive a relatively low score in section C.3.2, "special considerations" points may be added to address concerns that the landfills are located in the watershed for the community drinking water supply.

Example 3. Proximity to a community

In the landfill risk evaluation matrix, human exposure to a landfill is measured in the following way: people can spend time at the landfill (potential dermal exposure), they can drink water from an area near the landfill (potential ingestion), they could live very close to landfills (potential exposure through aerial transport) or they could eat animals that feed near the landfill (potential ingestion). These three considerations form section C.3 of the risk evaluation matrix. If a landfill is located near a community, there is a greater likelihood that people will spend time at the landfill than there is for landfills far from a community. It is not necessarily the case, however, that landfills near communities receive frequent visits; therefore, instead of creating a special section addressing proximity to a community, the risk of human exposure (section C.3.1) is more accurately evaluated by measuring time spent at a landfill. In these cases, however, "special considerations" points may be added to the Receptors category to address a community's specific concerns.

PROPOSED ENVIRONMENTAL RISK EVALUATION MATRIX FOR LANDFILLS IN THE NUNAVUT REGION			
A.	CONTAMINANT SOURCE		Maximum Score
A.1	LANDFILL EXTENT		
	>10 000 m2	10	
	For areas less than 10,000 = Area of Landfill X 10 / 10 000	2-9	
	Minimum Score	1	10
A.2	ESTIMATED DEPTH OF LANDFILL		
	greater than 1.5 m	5	
	less than 1.5 m	2-4	5
A.3	PRESENCE OF LEACHATE		
	Evidence of Leachate	10	
	No Evidence of Leachate	0	10
A.4	PRESENCE OF SURFACE CONTAMINATED SOIL		
	> DCC Tier II Stains	15	
	> DCC Tier I < DCC Tier II. Stains	10	
	Contaminated suspected, no surface contamination noted	5	15
A.5	PRESENCE OF SURFACE DEBRIS AT LANDFILL		
	>50% of surface area	10	
	<50% of surface area, pro-rated	1-9	
	No debris observed	0	10
	SPECIAL CONSIDERATIONS		
		+/- 5	
	TOTAL SCORE - CONTAMINANT SOURCE		*50*

PROPOSED ENVIRONMENTAL RISK EVALUATION MATRIX FOR LANDFILLS IN THE NUNAVUT REGION			
B.	**PATHWAY/TRANSPORT MECHANISMS**		**Maximum Score**
B.1	AERIAL TRANSPORT OF CONTAMINANTS		
	All Landfills Scored as 2 If Surface Soil Contamination (A.4) or leachate (A.3) has been identified		2
B.2	WATER MOVEMENT		
B.2.1	TOPOGRAPHY		
	Steeply Slope (>40 % Grade)	12	
	Sloping (10% to 40% Grade)	4-11	
	Subdued to 10% Slope	2-3	
	Flat (< 3%)	1	12
B.2.2	COVER MATERIALS -DEPTH		
	No to little existing cover	4	
	Greater than 50% exposed/surface debris	3	
	Occasional exposed/surface debris	2	
	Existing cover, minimal debris.	1	
	Cover thickness > average active layer thickness	0	4
B.2.3	COVER MATERIAL - TYPE		
	No cover	5	
	Silty/Sandy Material	4	
	Sandy/Gravel Material	3	
	Gravel Material	1-2	5
B.2.4	SURFACE WATER/RUN-OFF POTENTIAL		
	Very High - evidence of erosion, continuing run-off, or wave action	12	
	High - evidence of erosion, seasonal, widespread, storm waves	10	
	Moderate - % area affected by erosion	3-9	
	Low - no evidence of erosion, slight slopes	1-2	12
B.2.5	PRECIPITATION		
	> 500 mm annual precipitation	5	
	< 500 mm annual precipitation (pro-rated)	1-4	5
B.2.6	DISTANCE TO DOWNGRADIENT PERENNIAL SURFACE/L SEASONAL DRAINAGE CHANNEL		
	0 to 100 m	10	
	100 to 300 m	7-9	
	300 to 1 km	2-6	
	greater than 1 km	1	10
	SPECIAL CONSIDERATIONS		
		+/- 5	
	TOTAL SCORE - PATHWAYS		***50***

PROPOSED ENVIRONMENTAL RISK EVALUATION MATRIX
FOR LANDFILLS IN THE NUNAVUT REGION

C.	RECEPTORS				Maximum Score
C.1	POTENTIAL IMPACT ON RECEIVING FRESHWATER/MARINE HABITAT				
C.1.1	PROXIMITY TO RECEIVING FRESHWATER/MARINE HABITAT				
	0 to 100 m			6	
	100 to 300 m			4-5	
	300 to 1 km			2-3	
	greater than 1 km			1	6
C.1.2	ESTIMATED HABITAT USAGE - FRESHWATER/MARINE				
	High: High Biodiversity/ High Occurrence/Calving or Spawning Area			5-6	
	Moderate: Moderate Biodiversity, Migratory			3-4	
	Low: Low biodiversity: rare sightings			1-2	6
C.2	POTENTIAL IMPACT ON RECEIVING TERRESTRIAL HABITAT				
C.2.1	Extent of Vegetation				
	Extensive vegetation growth, (80 to 100 % ground cover)			6	
	Moderate vegetation growth (40 to 80% ground cover)			4-5	
	Low vegetation growth (20 to 40% ground cover)			2-3	
	Sparse vegetation (<20% ground cover)			1	6
C.2.2	ESTIMATED HABITAT USAGE - TERRESTRIAL/AVIFAUNA				
	High: High Biodiversity/ High Occurrence/Calving, Denning or Nesting Area			5-6	
	Moderate: Moderate Biodiversity, Migratory			3-4	
	Low: Low biodiversity: rare sightings			1-2	6
C.3	POTENTIAL HUMAN EXPOSURE THROUGH LAND USE				
C.3.1	Presence/Occupation	*likehood of contact*			
	Duration of contact	high	moderate	low	
	High - Numerous visits, summer camp	6	6	4	
	Moderate - occasional summer camp	6	4	2	8
	Low - Infrequent visits or winter camp	4	2	1	
C.3.2	Proximity to Drinking Water Source				
	0 to 100 m			8	
	100 to 300 m			5-7	
	300 to 1 km			2-4	
	greater than 1 km			1	8
C.3.3	Food Consumption				
	High quantity of sedentary organisms - marine & plant life			8	
	Moderate quantity of sedentary organisms - marine & plant life			6	
	Low quantity of sedentary organisms - marine & plant life			4	
	No consumption			0	8
	High quantity of migratory organisms			2	
	Moderate quantity of migratory organisms			1	
	Low quantity of migratory organisms			0.5	
	No consumption			0	2
	SPECIAL CONSIDERATIONS				
				+/-5	
	TOTAL SCORE - RECEPTORS				***50***
	TOTAL SCORE				150

Appendix C
Disposal Requirements For Items Potentially Found At Dew Line Sites

Hazardous materials (as defined by federal or territorial legislation) will not be landfilled at the DEW sites.

The following table includes items that could be found at DEW sites and provides the treatment of these items as part of the clean-up.

Item	Disposal
Waste oil	Treat as per the DLCU Barrel Protocol/GNWT criteria
PCB-containing equipment (e.g. transformers/capacitors)	Treat as per federal regulations
Asbestos	Bag and bury according to GNWT regulations
Sewage-liquid	Treat as per wastewater discharge criteria
Sewage-solid	Treat as soil
Lead and PCB based paints	Treat as per federal regulations
Radioactive tubes	Not suitable for landfill
Scrap metal	Bury in engineered landfill on site
Radar components	Bury in engineered landfill on site
Fuel barrels	Treat as per the DLCU Barrel Protocol/GNWT criteria
Lime	Not suitable for landfill
Antifreeze	Treat as per the DLCU Barrel Protocol/GNWT criteria
Wood	Bury in engineered landfill on site
AVGAS (aviation fuel)	Treat as per the DLCU Barrel Protocol/GNWT criteria
Sulfamic acid	Not suitable for landfill.
Cathode-ray tubes and screens	Bury in engineered landfill on site
Filtron tubes	Not suitable for landfill
Oscillators	Bury in engineered landfill on site
Meters	Not suitable for landfill if PCB- or mercury-containing
Copper wire	Bury in engineered landfill on site
Transmission fluid	Treat as per the DLCU Barrel Protocol/GNWT criteria
1,1,1-trichloroethane	Not suitable for landfill
PBX telephone equipment	Bury in engineered landfill on site
Mercury vapour rectifier tubes	Not suitable for landfill
Paint thinners	Treat as per the DLCU Barrel Protocol/GNWT criteria
Batteries	Not suitable for landfill
Chlorinated hydrocarbons	Treat as per the DLCU Barrel Protocol/GNWT criteria
Corrosion inhibitors	Not suitable for landfill
Lye	Not suitable for landfill
Corrosives	Not suitable for landfill

Item	Disposal
Plastic	Bury in engineered landfill on site
Solvent	Treat as per DLCU Barrel Protocol/GNWT criteria
Dynamite	Not suitable for landfill
RF Interference filters	Bury in engineered landfill on site
Generators	Clean and bury in engineered landfill on site
Scopes	Bury in engineered landfill on site
Vehicles	Clean and bury in engineered landfill
Rubber fuel bladders	Clean and bury in engineered landfill on site
Creosote-treated poles	Bag and bury in engineered landfill on site
Compressed gas cylinders	Vent, puncture and bury in engineered landfill on site
Refrigeration equipment	Recover freon and bury in engineered landfill on site
Paper	Bury in engineered landfill on site

Appendix D

Sample Questions For Community Consultations

Habitat Considerations

- Are there fish/birds/clams in the pond/lake/bay immediately down hill of the landfill?
- Are there many different types of fish/birds/clams in the pond/lake/bay? What species have you observed in that water body?
- Does spawning or nesting occur in the pond/lake/bay?
- Do the animals in the pond/lake/bay stay all year round or are they migratory?
- Have you observed any land animals such as caribou, fox or bear at the DEW Line site? How many? Was the wildlife feeding/calving/nesting/burrowing on site or near a landfill?

Exposure Considerations

- Does the community fish in the pond/lake/bay down hill of the landfill? Where does the community fish?
- Does the community collect clams/sculpins/urchins from the lake/bay?
- Does the community hunt seal, walrus or whales from the bay?
- Does the community pick berries or use the vegetation down gradient of the landfill?
- Does the community hunt at the DEW Line site? What do they hunt?
- How often do the community residents visit the site? Do you camp there seasonally? Where is the camp located?
- Where is drinking water taken from on-site?

Special Considerations

- Is the community aware of this landfill? Are there any special considerations?

Appendix E

Tier I and Tier II
DEW Line Clean-up Criteria

Substance	Units	DCC Tier I	DCC Tier II*
Arsenic	ppm	-	30
Cadmium	ppm	-	5.0
Chromium	ppm	-	250
Cobalt	ppm	-	50
Copper	ppm	-	100
Lead	ppm	200**	500
Mercury	ppm	-	2.0
Nickel	ppm	-	100
Zinc	ppm	-	500
PCB's	ppm	1.0***	5.0

* concentrations exceeding this limits are classified as Tier II Soils except where the concentrations exceed federal regulations (referred to herein as "CEPA" soils)

** concentrations between 200 and 500 ppm are classified as Tier I Soils

*** concentrations between 1.0 and 5.0 ppm are classified as Tier I Soils

Appendix F

Confirmatory Testing Protocol

Confirmatory Testing Grid Sizes

Size of area	Grid size	# Perimeter samples analyzed	# Interior grid samples analyzed
<100 m^2	3x3 m	all	all
>100 m^2, <2500 m^2	6x6 m	50%	40%
>2500 m^2	12x12 m	50%	40%

Where the excavation has an irregular shape, samples from the perimeter of the excavated area are to be collected following the shape of the excavation, rather than the grid if the grid points do not fall on the edge of the excavation.

Samples at the grid intersections will be point samples (as opposed to composite samples from each cell on the grid),to ensure simplicity of sampling and clarity of the result.

Appendix G

Barrel Contents Criteria and Disposal

Introduction

In order to determine the correct disposal method for barrels and their contents, the contents must first be identified. All barrel contents will be sampled and analyzed. Analytical data obtained for the samples collected from barrels located at the site will be compared to the criteria included in Table 1, below. Barrel contents are identified as organic or aqueous and the concentrations of glycols, alcohols, PCBs, chlorine, cadmium, chromium and lead are determined. Uncontaminated aqueous phases can be disposed of on the land; uncontaminated organic phases can be incinerated; contaminated aqueous material should be scrubbed free of organic material; and contaminated organic material should be disposed of as hazardous material.

Table 1: Barrel Protocol Criteria and Disposal Summary

Phase	% glycols or alcohols	PCB	Cl	Cd	Cr	Pb	Disposal
Organic	-	<2	<1000	<2	<10	<100	Incineration
Organic	-	>2	>1000	>2	>10	>100	Ship south
Aqueous	>2 %	>2	>1000	>2	>10	>100	Ship south
Aqueous	>2 %	<2	<1000	<2	<10	<100	Incineration
Aqueous	<2%						Scrub and discard

A. Inspection

1. All barrels are to be inspected to address the following items which shall be recorded and used as a guide prior to opening barrels.

2. Symbols, words, or other marks on the barrel that identify its contents, and/or that its contents are hazardous: e.g. radioactive, explosive, corrosive, toxic, flammable.
3. Symbols, words, or other marks on the barrel that indicate that it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume containers.
4. Signs of deterioration or damage such as corrosion, rust, or leaks at seams, rims, and V grooves.
5. Spillage or discoloration on the top and sides of the barrel.
6. Signs that the barrel is under pressure such as bulging and swelling.

B. Sampling

1. Barrels shall not be transported until it has been determined that they are not under pressure, do not leak, and are sufficiently sound for transport.
2. Barrels to be sampled should be set in an upright position, provided that this does not cause them to leak and that it is physically possible.
3. Barrels should only be opened using heavy equipment, according to accepted procedures and under qualified supervision.
4. Once open, barrels will be sampled by personnel wearing proper personal protective gear. Samples of the contents of all barrels shall be extracted using a drum thief.
5. In instances where there are a large number of barrels with obviously similar contents, these can be grouped together and 30 to 40% of the barrels in the group sampled. Barrels containing less than 50 mm of liquid may be combined with compatible material prior to sampling; samples inferred to contain only water on a visual examination shall be tested prior to this consolidation. Barrel contents, which consist of black oil, shall not be consolidated.
6. All barrels shall be clearly numbered using spray paint or other suitable marker. The number on this label should be the only sample coding provided to the laboratory.
7. The barrel locations and barrel sample descriptions should be recorded.
8. Samples should be kept at ambient temperatures and shipped by guaranteed freight to laboratories where they should be kept cold pending analysis.

C. Testing

1. Liquid samples shall be inspected and classified as either containing water or organic materials. Samples thought to contain water shall be analyzed to confirm that they are indeed water, and contain less than 2% glycols or alcohols.
2. The contents of barrels containing organic materials, including aqueous samples which contain more than 2% glycols or alcohols, shall be tested for PCBs, total

chlorine, cadmium, chromium and lead, in addition to identification of the major components e.g. fuel oil, lubricating oil.

3. Contents of barrels which contain two or more phases shall have all phases analyzed; the organic phases as described above and the aqueous phase to ascertain whether it contains less than 2% organic substances. In addition, the aqueous phase shall be tested for any components found in the organic phases above the criteria described below.

D. Disposal of Barrel Contents

1. Barrels containing only rust and sediment shall be treated as empty barrels.
2. Barrel contents comprising water only (less than 2% glycols or alcohols) shall be transferred to an open vessel such as a utility tub or half-barrel and any organic material removed by agitation with a pillow or segment of oil absorbent material. The water may then be discarded on to the ground that is a minimum of 30 meters distance from natural drainage courses. Used oil absorbent material shall be treated as described in below (D.5.).
3. Barrel contents which are composed of water with glycols and/or alcohols or organic phases, and which contain less than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium, and 100 ppm lead, may be disposed of by incineration. Alternatively these contents may be disposed of off-site at a licensed disposal facility. The solid residual material resulting from incineration shall be subjected to a leachate extraction test. Material found to be not leachate toxic shall be disposed of as DCC Tier II contaminated soil. Leachate toxic material shall be treated as hazardous waste and disposed of off-site at a licensed disposal facility.
4. Barrel contents, which contain greater than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium or 100 ppm lead shall be disposed of off-site at a licensed disposal facility. Contents may be combined with compatible materials for shipping purposes. Flash points may be required to be determined if they cannot be inferred from the product identification.
5. Used oil absorbent material should be treated as hazardous waste and disposed of off-site at a licensed disposal facility. If it is shown to be uncontaminated with PCBs (< 2 ppm), chlorine (< 1000 ppm), cadmium (< 2 ppm), chromium (< 10 ppm) and lead (< 100 ppm), it may be incinerated on-site.

E. Disposal of Barrels

1. Empty barrels may be crushed or shredded and landfilled on-site as non-hazardous waste after they have been cleaned in an appropriate manner. The barrels shall be

crushed in such a manner so as to reduce their volume by a minimum of 75%. Shredded barrels may be disposed of off-site as recycled metals.

Appendix H

Post Construction Landfill Monitoring Regime

1.0 Types of Landfills

There are four types of landfills that require monitoring:

- New landfills for non-hazardous materials and Tier I soil;
- Landfills to be closed by the addition of granular fill and regraded;
- Landfills to be closed with leachate containment; and
- Tier II soil disposal facilities.

2.0 Monitoring

New landfills are to be constructed for the disposal of non-hazardous demolition wastes, site debris and Tier I soil. These landfills, constructed according to specifications, are considered to pose low potential environmental risks as the contents and placement of the materials in the landfill are known. The monitoring of these landfills will be limited to a visual inspection program to evaluate the stability of the landfill.

Existing landfills that are to be regraded will be monitored for leachate periodically by the collection of soil and/or water samples from test pits at the toe of the landfill, in addition to visual inspection.

For existing landfills that have been classified as moderate potential environmental risk, and proposed Tier II soil disposal areas, the design in both cases is to incorporate a leachate containment system, consisting of synthetic liners (geocomposite clay liners, and/or geomembrane liners) and promotion of permafrost aggradation through the landfill contents. The monitoring program for these landfills will include thermal monitoring of the ground temperatures in and around the landfill, collection and analysis of soil samples, collection and analysis of water from wells around the landfill, and visual inspection.

3.0 Description of Monitoring Components

3.1 Visual Inspection

The physical integrity of the landfill will be inspected and reported using photographs (from the air as well as ground level) and hand drawn sketches. Documented observations should include:

- Signs of damage from settlement, ponding, frost action, erosion, and lateral movement.
- Sloughing of berms, thermal contraction cracks etc.

3.2 Soil and Water Sampling

Soil and water samples, representing background as well as baseline conditions, will be collected. Results of analyses of samples from landfills will be compared to these baseline and background samples as this is indicative of changing environmental conditions at the site.

In general, one monitoring well will be placed upgradient and three will be placed downgradient. This allows the assessment of hydraulic gradient and evaluation of potential impacts. Soil samples will be collected from the toe of the landfill, and will generally be taken from the same locations as the wells. Soil samples at the toe of the landfill reflect chronic input from water and are a very important indicator of leachate.

Soil and water samples will be tested for:

- PCBs (polychlorinated biphenyls);
- TPH (total petroleum hydrocarbons),; and;
- Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel and zinc.

If the landfill is close to a drinking water source and has the potential to have an impact on it, the water samples will be analyzed for the following parameters in addition to the compounds and elements listed above:

- inorganic elements by ICP scan;

- major ions, hardness, and total dissolved solids,; and;
- pH and conductivity.;

The intent of the additional analyses is to provide added information to evaluate the potential impacts related to the landfill, and not necessarily to provide an assessment of the potability of the water source. In this latter case, the results of the analyses of these drinking water samples will be compared to the most current version of Canadian and/or Territorial standards for drinking water for the parameters analysed, in addition to comparison with background and baseline data.

3.3 Thermal Monitoring

As indicated previously, one component of the leachate containment system incorporates aggradation of the permafrost through the landfill contents such that the active layer does not penetrate the waste materials. Geothermal analyses were carried out to predict the length of time for freezeback of the landfill; long-term and short-term thermal regime in the ground; and the depth of the active layer in the cover material. The analyses have shown that it takes several years for the landfill temperatures to equilibrate and stabilize.

A thermal monitoring system provides measurement of sub-surface ground temperatures, which allows comparison to and verification of the predicted ground temperatures. The thermal monitoring system consists of installation of thermistor strings, with "thermistor beads" at select intervals to provide ground temperature profiles at various locations within the landfill. The thermistor strings are attached to automated data-loggers which allow for remote data collection. In general, a minimum of three thermistors will be placed; the actual number will be evaluated on a landfill-specific basis. Thermistor installation will be in accordance with standard engineering practice.

Checklists for the collection of monitoring data are presented in Appendix I.

4.0 Monitoring Frequency

Generally, the post-construction monitoring program would have three phases, each with a different objective.

4.1 Phase I: Monitoring of conditions to confirm that equilibrium is achieved.

During Phase I, sites where leachate containment and/or Tier II soil facilities have been constructed, monitoring will take place on an annual basis, for an estimated period of five years following construction. The five-year term was selected on the basis that ground-temperature thermal regimes at these specific landfills would require three to five years to reach equilibrium.

At other locations, where existing landfills have been regraded and new landfills have been constructed, Phase I monitoring will be carried out on in the first, third and fifth years following construction.

An evaluation of the Phase I data will be carried out at the end of five years to confirm that thermal and chemical equilibrium had been achieved, and that no stability issues have been identified. The Phase I monitoring program may be extended, if required.

4.2 Phase II: Verification of equilibrium conditions established during Phase I.

The monitoring frequency in Phase II be downgraded from Phase I, and be carried out according to the following schedule: year 7, year 10, year 15 and year 25. Year 25 would mark the end of Phase II monitoring.

4.3 Phase III: Monitoring for long term issues such as liner integrity, permafrost stability, and significant storm events.

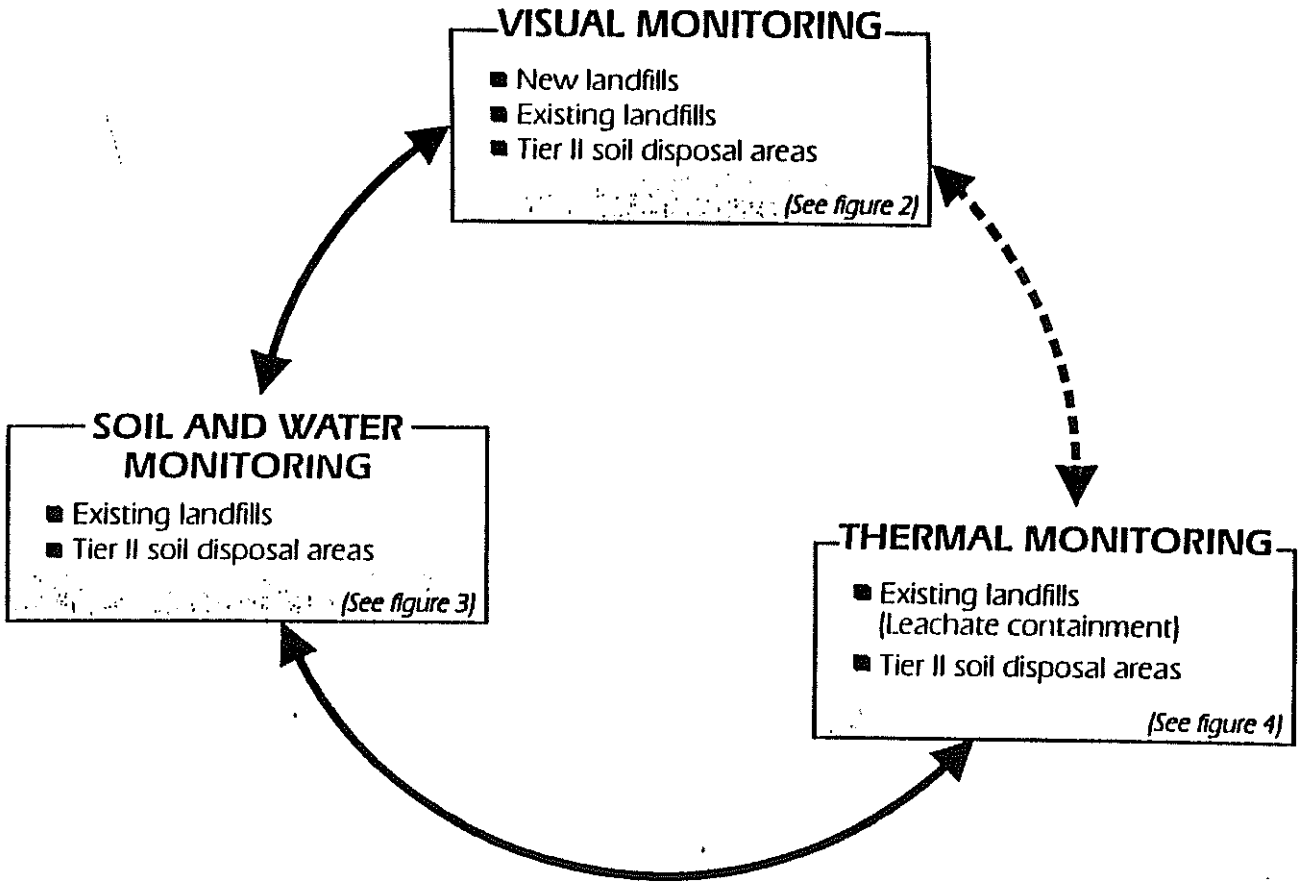
At the end of Phase II, 25 years after implementation of the remedial actions for a given landfill, a major re-evaluation of the monitoring program will be carried out prior to initiating Phase III. It is difficult to predict beyond 25 years how world events and improvements in technology may impact on monitoring requirements. Based on current technology and knowledge, a Phase III program should be implemented at 10 year intervals. The duration of the Phase III program will be estimated at the outset of the program and be subject to re-evaluation as new technologies are developed and new information becomes available.

5.0 Interpreting Monitoring Results

Monitoring results (thermal, chemical and visual) have to be interpreted in concert with one another. An increase in chemical concentrations, for instance, from one year to the next does not necessarily trigger action if there are no other signs of landfill instability. Stability problems would have to be established by a geotechnical engineer with northern experience. Action will be taken based on trends in chemical data rather than isolated results.

Normally, the first step to be taken when a potential problem is identified is to intensify the monitoring program. If a problem has been confirmed, then remedial action will be undertaken.

The flowcharts in Figures 1 to 4 illustrates the decision-making process to be applied to monitoring data. The following section outlines actions to be taken if the monitoring program indicates a deficiency in a landfill.



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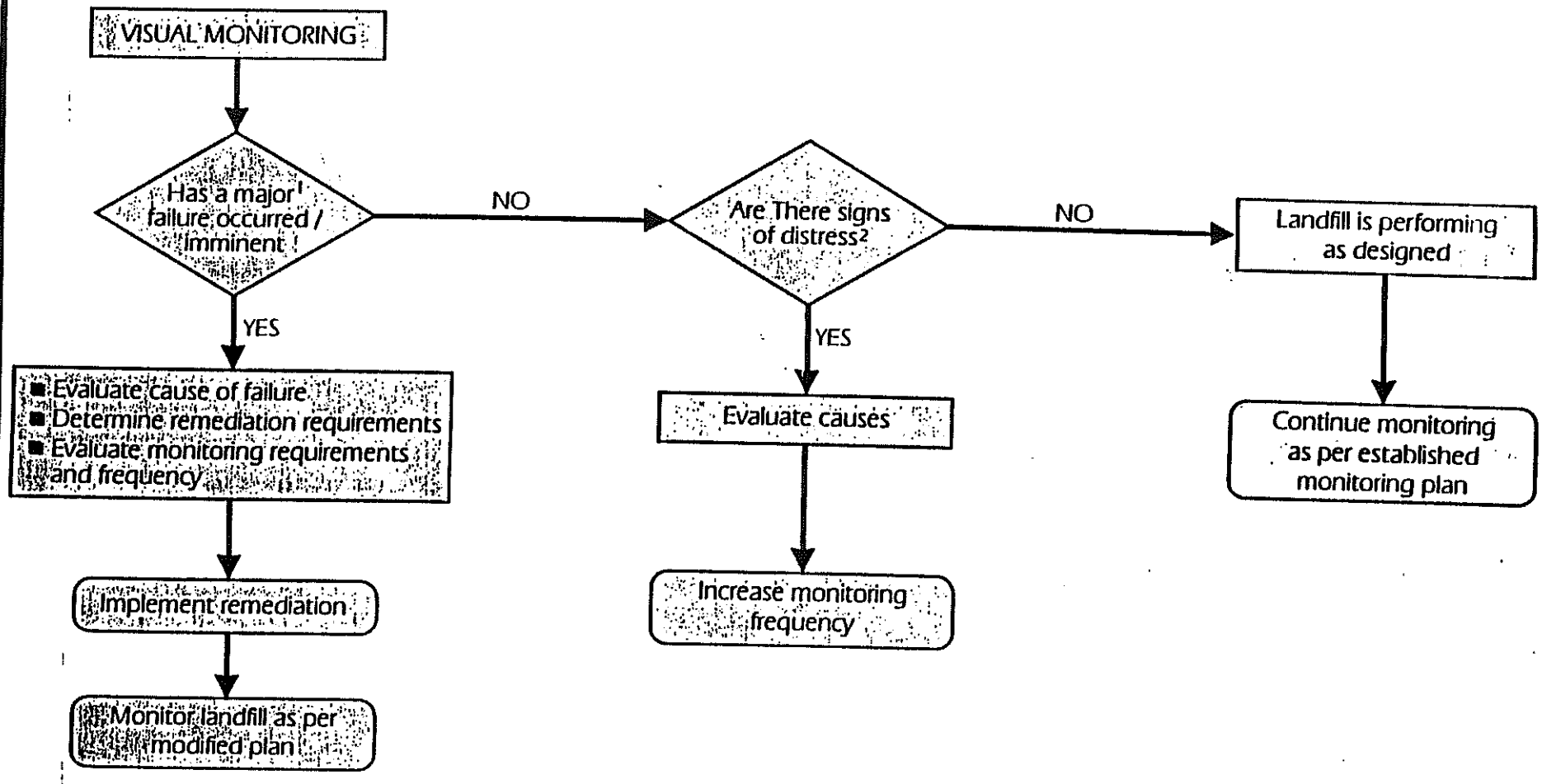
SUMMARY FLOW CHART

Figure



Notes:

1 Major Failure: significant exposed debris (>25% of surface area) due to erosion, settlement, frost action; berm failure (slope stability)

2 Signs of Distress: Voids due to settlement, ponding on surface, and\or tension cracks, and/or erosion.

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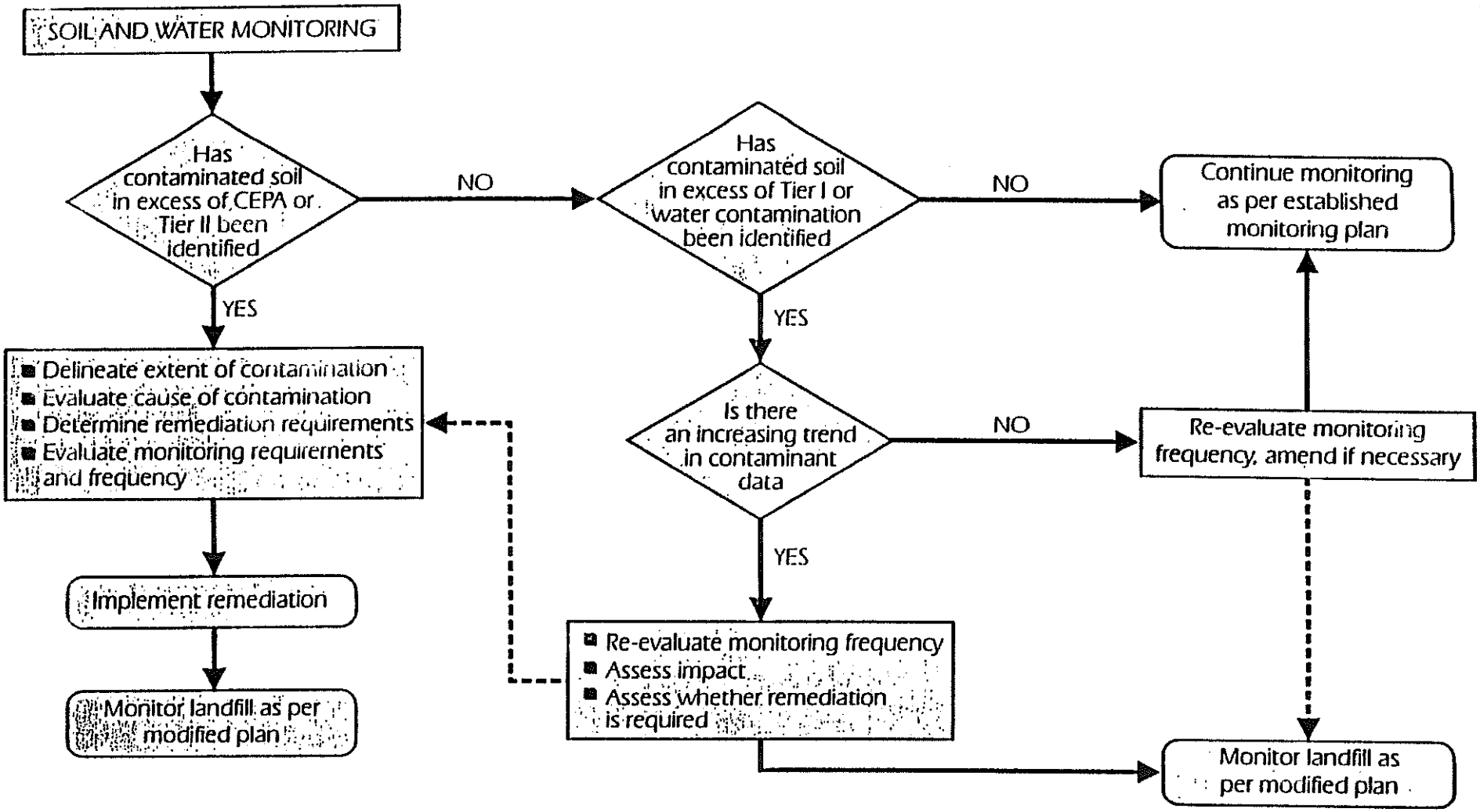
VISUAL MONITORING FLOW CHART

Figure



Note:
Water contamination to be evaluated relative to baseline and background concentrations.

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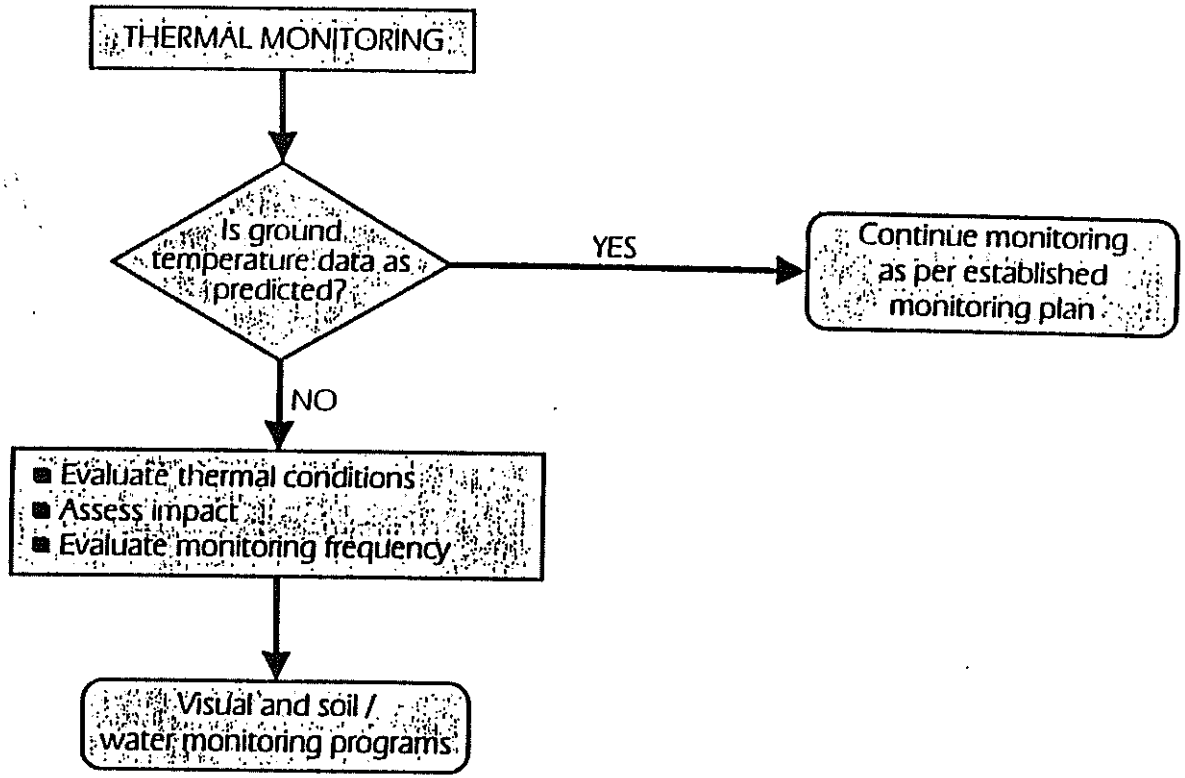
SOIL AND WATER MONITORING FLOW CHAR

Figure



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THERMAL MONITORING FLOW CHART

Figure

6.0 Impact of Monitoring Results

The possible results and the associated potential mitigation requirements for the landfill monitoring components are described in the following subsections. For all instances, the mitigation requirements are dependent on the severity of the deficiency, and will be assessed by a professional geotechnical engineer with northern engineering design and construction experience. In addition, the assessment and implementation of resulting remediation requirements will be carried out in a staged approach to ensure that the proposed solutions address the specific requirements in a logical and cost effective manner.

6.1 Visual Inspection

If the results of the visual inspection program indicate evidence of significant settlement, ponding, or frost jacking, it may be necessary to implement one or more of the following mitigative measures:

- increase the frequency of the visual monitoring program
- place erosion protection material such as riprap, vegetation mats, etc.
- recompact existing debris material and existing granular material
- place additional granular fill
- regrade, as required, to promote positive drainage away from the deficient landfill area.

It should be noted that settlement of the landfill surface may not necessarily result in failure of the landfill. Settlement (typically differential settlement) that results in ponding and infiltration of surface water could lead to erosion and frost jacking problems.

If the visual monitoring program results indicate evidence of sloughing of landfill perimeter berms and thermal contraction cracks, it may be necessary to implement one or more of the following mitigative measures:

- flatten granular berm slopes
- compact existing granular slopes
- place and compact additional granular fill material

6.2 Soil and Groundwater Monitoring

The results of the soil and groundwater monitoring program will be compared against baseline data established prior to the initial landfill development or remediation program. Results of the analysis of soil and groundwater samples that show decreasing trends of contamination at the perimeter of landfills typically indicate that the implemented landfill remediation has been effective. Conversely, if the results indicate increasing levels of contamination, then it may be necessary to implement one or all of the following:

- Increase the frequency of the monitoring program.
- Carry out a review and evaluation of the nature and extent of the contamination, including the incorporation of the results of the visual monitoring program. The major objective of this evaluation will be to determine the cause of the contaminant migration problem, and in particular to determine if it is the result of ineffective design, material (e.g. liner) failure, improper compaction, selection and use of inadequate granular material, poor grading, etc. This evaluation may require intrusive investigation into and around the landfill.
- Depending on the results of the above, it may be necessary to remove and replace liner material, reconstruct containment berms, etc.
- Assess the requirement to excavate and dispose of the contaminated soil; this would include the delineation of the vertical and areal extent of the contamination.
- Excavate and dispose of contaminated soil and/or excavate all or part(s) of the landfill, as required.

The requirement for the specific scope and extent of remediation, as outlined above, will also incorporate an risk evaluation of the potential impacts of the contamination based on the principles defined in the Landfill Risk Evaluation Matrix. The need for the risk evaluation is predicated on the understanding that not all affected sites pose the same risk to the environment, and consequently remediation requirements will vary.

6.3 Thermal Monitoring

The results of the thermal monitoring program will be compared against the parameters for freezeback that were incorporated into the geothermal design of the landfills. It is important that the overall assessment of these results consider the results of both the visual and soil/groundwater monitoring programs. If the thermal monitoring results indicate ground temperatures that are significantly higher (greater than 2° C) than

predicted during the geothermal analyses carried out as part of the design, then it may be necessary to implement one or more of the following:

- Increase the frequency of the recording and assessment of results from the thermal monitors.
- Establish, based on the results of the soil and groundwater monitoring programs, if groundwater and/or soil contaminant levels beyond the perimeter of the landfill have increased. Incorporate the results of a risk assessment. Assess the impacts, as outlined above, to determine the appropriate remediation requirements.
- If it established that a slower than expected freezeback period has resulted in the migration of contamination beyond the landfill and depending on the results of the above risk assessment, then it may be necessary to implement one or more of the following:

    - determine if the rate of the freezeback progress is continuing, or if freezeback within the landfill has terminated; is at steady-state;
    - excavate and dispose of contaminated soil and/or excavate all or part of the landfill, as required;
    - place additional granular cover material or other insulating material (styrofoam insulation, vegetation) over the landfill to provide an increased insulation barrier over the landfill;
    - reconstruct and/or re-saturate the perimeter berms of the landfill.

Appendix I

Landfill Monitoring Checklist

DEW LINE CLEANUP
LANDFILL MONITORING CHECKLIST

MONITORING PROGRAM

LANDFILL TYPE	Visual	Soil and Water	Thermal
New Landfill (Non-Hazardous Wastes)	X		
Landfill requiring Regrading	X	X	
Landfill requiring Leachate Containment	X	X	X
Tier II Soil Disposal Facilities	X	X	X

SITE: _____

LANDFILL DESIGNATION: _____

LANDFILL TYPE: _____

DATE: _____

MONITORING EVENT NO.: _____

NAME: _____

WEATHER CONDITIONS: _____

VISUAL INSPECTION CHECKLIST

Carry out a visual inspection of the landfill surface, berms, toe of berms and identify potential areas of distress as follows:

1. Settlement:
   a) Is there differential settlement occurring on the surface?
      i) low areas or depressions;
      ii) voids forming

   b) What is the extent of settlement?
      i) percent of surface area affected;
      ii) localized areas or continuous;
      iii) how deep;

   c) Where is the settlement occurring?
      i) near berms, center of facility, etc.

   d) Explain?
      i) evidence of significant surface infiltration,
      ii) water ponding on surface
      iii) snow drifting

32. Erosion
   a) Is there erosion occurring on the surface or berms of the landfill?
      i) preferred drainage channels;
      ii) sloughing of material;

   b) What is the extent of erosion?
      i) percent of surface area affected;
      ii) localized areas or continuous;

   c) Where is the erosion occurring?
      i) along the toe, on the surface, through the berms;

   d) Explain?
      i) evidence of significant surface water run-off ;
      ii) poor material type;

34. Frost Action

a) Is there frost action/damage to the landfill?
   i) exposure of debris due to uplift;
   ii) tension cracking along berms;
   iii) sorting of granular fill;

b) What is the extent of frost action?
   i) percent of surface area affected;
   ii) localized areas or continuous;

c) Where is the cracking, frost heaving occurring?
   i) along the toe, on the surface, through the berms;

d) Explain?
   i) poor material gradation;
   ii) poor compaction;
   iii) high water content, silt content in cover material;

45. Condition of Other Monitoring Instruments:

56. Provide detailed sketch and photographic record of landfill.

PRELIMINARY STABILITY ASSESSMENT

SOIL AND GROUNDWATER MONITORING FIELD CHECKLIST

1. Soil Samples:

Sample No:	
Field Measurements: VOC	
Soil Description:	
Analyses Requested	

2. Water Samples

Sample No: Well No.:	
Field Measurements :	pH Conductivity Temperature
Well Processing	Water level
	Purged well or standing water sampled
	Recovery Rates
Analyses Requested	

Comments:

Additional surface water samples: where, why, describe areas of stressed vegetation

THERMAL MONITORING CHECKLIST

Thermistor Number:
Location:

1. Download data
2. Replace battery pack
3. Check condition of connections and instrumentation
4. Save data to hard-drive and disk,.
5. Relock cap

Appendix J

Hydrocarbon Contamination Checklist

General

Date:

Name of Assessor:

Site Name:

Hydrocarbon Spill/Stain Location:

Hydrocarbon Source

What type of hydrocarbon is present in this stain? Consider the following:

Toxicity (Lubrication Oil, Diesel, Gasoline/Avgas)
Fluidity
Solubility
Volatility

What is the concentration of total petroleum hydrocarbons in parts per million (ppm)? Is it above 2500 ppm?

What is the approximate volume of contaminated soil in cubic metres?

Pathways

1. Is the contaminated soil in a stable location or on a slope?

2. What is the estimated organic matter in the contaminated soil? (ie. <0.1%, <5%, >5%)

3. What is the estimated grain size of the contaminated soil? Consider the following:

   Coarse (D_{50} > 75 micron)
   Fine (D_{50} < 75 micron)

4. What is the distance from the contaminated soil to a marine or freshwater environment?

5. What is the annual precipitation of the site?

6. What is the mean summer temperature?

Potential Impacts on Receptors

1. What is the distance to the nearest down gradient marine or freshwater habitat?

2. Is this a potential or known drinking water source for terrestrial animals or humans?

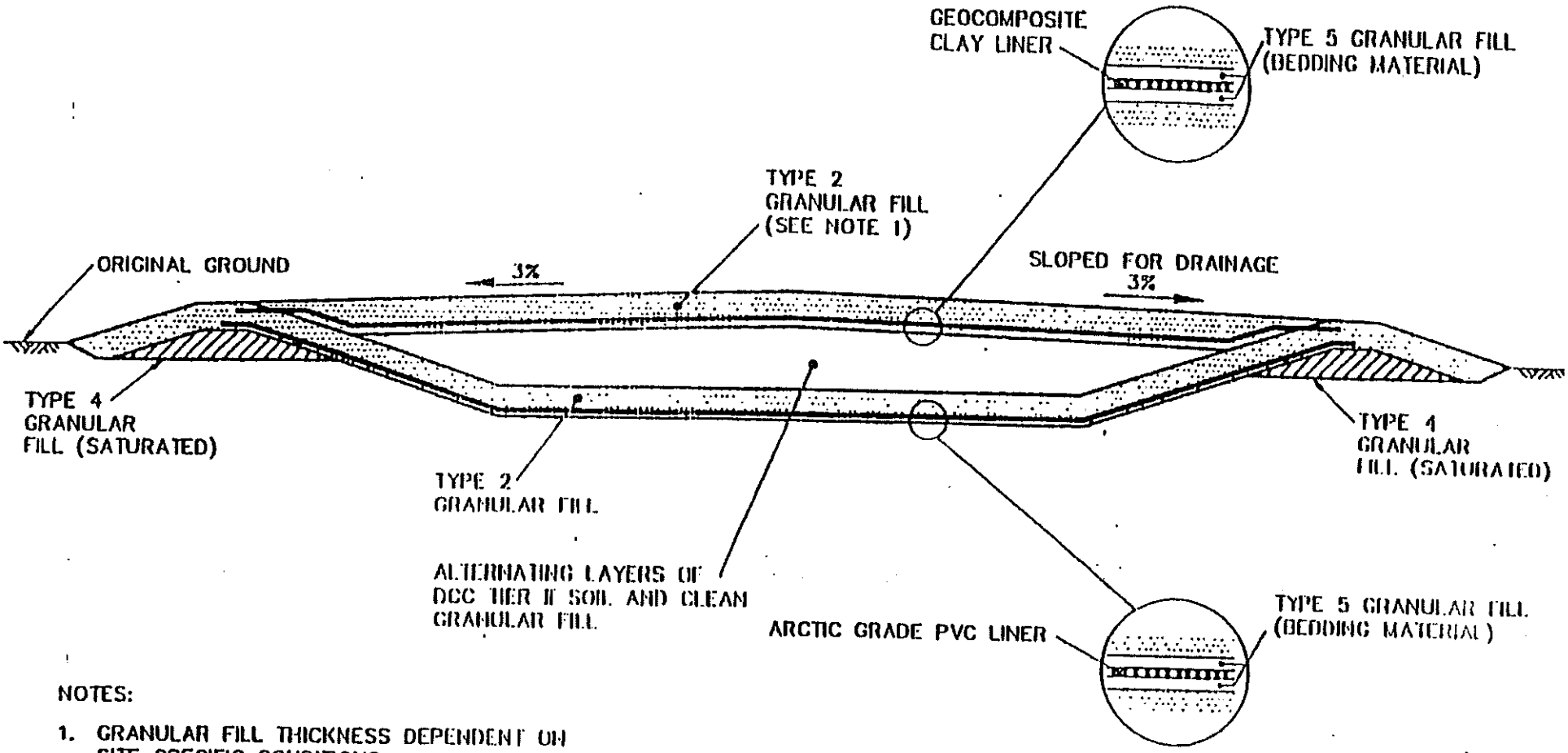
3. What is the down gradient habitat usage? Consider the following:

   Grazing, nesting, denning, spawning, calving
   High, medium, or low number of sitings.
   High, medium or low biodiversity.

4. Is this area visited frequently by humans for hunting, fishing, gathering or camping purposes? What is consumed and from where is it obtained?

Appendix K

Tier II Disposal Facility



NOTES:

1. GRANULAR FILL THICKNESS DEPENDENT ON SITE SPECIFIC CONDITIONS.
2. GRANULAR FILL GRADATIONS ARE SITE SPECIFIC.

UMA

TIER II DISPOSAL FACILITY

TYPICAL CROSS SECTION

AGREEMENT BETWEEN

Nunavut Tunngavik Incorporated

And

Her Majesty In The Right Of Canada,

Represented By

The Minister Of National Defence

With Respect To Economic Benefits For Inuit

In The Clean-Up And Restoration Of

Distant Early Warning Sites

Within The Nunavut Settlement Area

(NTI-DND Economic Agreement)

CONTENTS

PREAMBLE

WHEREAS fifteen Distant Early Warning (DEW) Line Sites are located on Department of National Defence (DND) reserves within the Nunavut Settlement Area (NSA);

AND WHEREAS DND is undertaking an environmental clean-up of the DEW Line sites, facilities and associated areas;

AND WHEREAS the Inuit and the Federal Government have an interest in protecting the ecosystem integrity and the existing and future well-being of the residents and communities of the NSA and increasing the participation of Inuit and Inuit firms in business and employment opportunities in the NSA;

AND WHEREAS on September 1, 1998 DND and NTI have entered into an agreement to establish a framework for the remediation and restoration of the DEW Line Sites in the NSA;

AND WHEREAS the Parties wish to enter into an agreement addressing the participation of Inuit in the clean-up of DEW Line sites in the Nunavut Settlement Area, in order to achieve a cost-effective and environmentally sound clean up and restoration of DEW Line Sites, which optimises economic benefits and opportunities for Inuit in employment, the provision of goods and services, training and the transfer of technology, in accordance with the *Nunavut Land Claims Agreement* (NLCA), and specifically Article 24 of the NLCA;

NOW THEREFORE, in consideration of the premises and mutual covenants contained herein, the Parties agree as follows:

1.0 DEFINITIONS

Clean-up Contract means a contract entered into by DND's contracting agent and a Contractor for a Site clean-up;

Contractor means the party who has contracted with DND's contracting agent to carry out a Site clean-up;

Contracting Working Group means the working group established under Section 4.2 of the Agreement;

DEW Line Site means one of the Distant Early Warning Sites listed in Section 3.1 below;

DIAND DEW Line Sites means the Distant Early Warning Sites in Nunavut not listed in Sections 3.1 and 3.2;

DND means the Crown in right of Canada represented by the Minister of National Defence or his delegate;

Inuit firm has the same meaning as in the *Nunavut Land Claims Agreement*;

Inuit Firm Registry is the comprehensive list of Inuit firms maintained in accordance with Paragraph 24.7.1 of the *Nunavut Land Claims Agreement;*

MIEC means the Minimum Inuit Employment Content set in accordance with Section 5.0 of this Agreement;

MICC means the Minimum Inuit Content for Contracting set in accordance with Section 6.0 of this Agreement;

NLCA means *Nunavut Land Claims Agreement;*

NTI has the same meaning as "Tungavik" under Section 1.1.1 of the NLCA;

NTI-DND Environmental Agreement means "The Agreement Between Nunavut Tunngavik Incorporated and the Department of National Defence for the Clean-up and Restoration of DEW Sites Within the Nunavut Settlement Area" dated September 1, 1998;

Nunavut Settlement Area has the same meaning as in the *NLCA*;

Parties means Nunavut Tunngavik Incorporated and the Department of National Defence;

Regional Inuit Association means the Kivalliq Inuit Association, the Qikiqtani Inuit Association or the Kitikmeot Inuit Association or their successors;

Representative Occupational Grouping means a category of personnel required for a Site clean-up classified by occupation or type of work to be performed;

Registry has the same meaning as "Inuit Firm Registry";

RIA means "Regional Inuit Association";

Site means a "DEW Line Site" that is, or is projected to be, remediated and restored, as provided for in the NTI-DND Environmental Agreement;

Steering Committee means the Committee established under Section 4.1 of the Agreement;

Subcontractor means a party who contracts with a Contractor or Subcontractor to perform any part of the Contractor's obligations on a Site;

Work means materials and services furnished or provided to perform a clean-up or restoration of a Site.

2.0 OBJECTIVES

2.1 The objectives of this Agreement are as follows:

a) to complement the NTI/DND environmental provisions as set out in the NTI-DND Agreement for the Clean-up and Restoration of DEW Sites Within the Nunavut Settlement Area, 1 Sept. 1998;

b) to further the objectives of Article 24 of the NLCA in relation to the DEW Line Clean-up in the NSA;

c) to achieve an efficient and cost-effective clean-up and restoration of the DEW Line Sites in the NSA;

d) to achieve:

i) increased participation by Inuit firms in business opportunities generated by the clean-up;
ii) improved capacity of Inuit firms to compete for government contracts;
iii) increased employment of Inuit up to a representative level;
iv) increased access by Inuit to career training, on-the-job training, apprenticeship, and other job-related programs, in order to develop a skilled and professional pool of labour available for work on the DEW Line Clean Up in the NSA; and
v) increased opportunities for Inuit to receive training and experience to successfully create, operate and manage businesses in Nunavut;

e) to establish a mechanism whereby successful Contractors fulfill agreed-upon commitments to levels of Inuit participation.

3.0 GENERAL

3.1 **Scope.** This Agreement applies to the Site clean-up at the following DEW Line Sites:

PIN 2 - Cape Young
PIN 3 - Lady Franklin Point
PIN 4 - Byron Bay
CAM 1 - Jenny Lind Island
CAM 2 - Gladman Point
CAM 3 - Shepherd Bay
CAM 4 - Pelly Bay (near Kugaaruk)
CAM 5 - Mackar Inlet
FOX M - Hall Beach
FOX 2 - Longstaff Bluff
FOX 3 - Dewar Lakes
FOX 5 - Broughton Island (near Qikiqtarjuaq)
DYE M - Cape Dyer

3.2 The Parties acknowledge that prior to the signing of this Agreement, the clean-up of Cape Hooper (FOX 4) and Cambridge Bay (CAM M) had been completed. Note that the process for awarding the contracts for the clean-up of Pelly Bay (CAM 4) and Broughton Island (FOX 5) will have started prior to the timelines contemplated in this Agreement.

3.3 **No Precedent.** This Agreement is not to be construed as a precedent for any other activities of DND, Canada or any third party. Nothing in this Agreement shall be interpreted or used to define the rights of the Parties, Canada or any third party in relation to any matter under the NLCA or to interpret any Article of the NLCA except for the purpose of this Agreement.

3.4 **Urgency.** The Parties recognize the urgency of the matters dealt with in this Agreement and agree to perform all required actions as expeditiously as possible.

3.5 **Nunavut Land Claims Agreement.** The Parties recognize and acknowledge their respective obligations to comply with the NLCA in connection with all Work.

3.6 **No Retrospectivity.** This Agreement binds the Parties only with respect to Site clean-ups, including selection of Contractors for Site clean-ups, that have not commenced as of the date of the signing of this Agreement, unless the Parties agree otherwise.

4.0 STEERING COMMITTEE AND CONTRACTING WORKING GROUP

4.1 Steering Committee

4.1.1 The Steering Committee established under Article 4.0 of the NTI-DND Environmental Agreement shall perform the following functions in connection with this Agreement:

a) establish Minimum Inuit Employment Content, under Section 5.10;

b) establish Minimum Inuit Content for Contracting, under Section 6.10;

c) review contract award issues, under Sections 8.3.1, 8.3.3, and 8.3.5 through 8.3.11; and

d) review Contractor's deviation from MIEC and MICC pursuant to Section 12.2;

e) consider other items of mutual concern related to the implementation of this Agreement, raised by either Party.

4.1.2 The Steering Committee may meet either in person or by teleconference.

4.1.3 The Steering Committee shall operate on the basis of consensus.

4.1.4 The Parties each shall be responsible for their respective costs associated with participating in Steering Committee meetings.

4.1.5 The Steering Committee shall establish and make publicly available procedures governing its operations and those of the Contracting Working Group, including, without limitation, conflict of interest, release of information provided to either Party, and procedures for decision-making that ensure fairness and due process to Contractors.

4.2 Contracting Working Group

4.2.1 A Contracting Working Group shall be established, composed of two members appointed by NTI and two members appointed by DND. The working group shall perform the following functions in connection this Agreement:

a) make a recommendation to the Steering Committee on the Minimum Inuit Employment Content (MIEC), under Section 5.8; and

b) make a recommendation to the Steering Committee on the Minimum Inuit Content for Contracting (MICC), under Section 6.8.

4.2.2 The Contracting Working Group shall operate on the basis of consensus.

4.2.3 The Parties each shall be responsible for their respective costs associated with participating in Contracting Working Group meetings.

5.0 MINIMUM INUIT EMPLOYMENT CONTENT

5.1 A Minimum Inuit Employment Content (MIEC) shall be set for each Site.

5.2 The MIEC for a Site is the minimum level of Inuit employment that DND shall require the Contractor to achieve for the clean-up of that Site.

5.3 The MIEC shall be expressed as a percentage, and shall be calculated by dividing the total number of Inuit employed, in person-days, by the total number of persons employed, in person days, for the term of the contract of a Site clean-up. The calculation shall include all on-site and off-site personnel employed by Contractors and Subcontractors. Off-site personnel shall include without limitation:

a) management and support personnel dedicated to the Site clean-up;

b) project management personnel employed by the Contractor;

c) technical or drafting personnel; and

d) expediting, shipping, payroll or accounting personnel.

5.4 The calculation of the MIEC shall not include:

a) project management staff at DND's contracting agent;

b) DND employees; and

c) any consultants contracted by DND or DND's contracting agent for the provision of advice concerning the specifications of the clean-up, contract management or other advice.

5.5 The MIEC shall be within a range of 65-85%.

5.6 Eight months prior to the scheduled commencement of a Site clean-up, DND shall provide NTI with DND's estimates of the types and level of positions that will be required for the conduct of the Site clean-up, in person-days, and broken out by Representative Occupational Grouping. The estimate shall be

provided in the form attached as Annex A.1. Education and skills profiles for Representative Occupational Groupings are listed in Annex B.

5.7 Within two months of the receipt of the information described in Section 5.6, NTI, in consultation with the RIAs, shall provide DND with a projection of the level of Inuit employment for the Site clean-up. The projection will be provided in the form attached as Annex A.2 to this Agreement. NTI's projection will be based on an analysis, for each Representative Occupational Grouping, of the number of Inuit qualified for work on the Site clean-up in relation to the employment opportunities using, to the extent possible, relevant available information on Inuit qualifications and employment.

5.8 Within one month of receipt by DND of the projection under Section 5.7, the Contracting Working Group shall recommend a MIEC for the Site clean-up. In making the recommendation to the Steering Committee for the MIEC, the Contracting Working Group shall take into account, for each Representative Occupational Grouping, the following factors:

a) NTI's projection of Inuit employment;

b) Inuit employment achieved on other DND DEW Line Site clean-ups to date, compared to the MIEC established for the Sites, and on DIAND DEW Line Sites;

c) the results achieved by training and apprenticeship programs for Inuit labour, to date; and

d) the projected impact on the availability of Inuit labour of other projects being undertaken in Nunavut.

5.9 Where the Contracting Working Group, after a reasonable effort, is unable to reach agreement on the MIEC for a Site clean-up, either Party may refer the MIEC to the Steering Committee for resolution.

5.10 The Steering Committee shall meet as soon as practicable following a recommendation under Section 5.8 or a referral under Section 5.9 to decide on a MIEC. In the event that the Steering Committee does not reach agreement on a MIEC within two weeks, either Party may refer the matter to Expedited Arbitration, as provided under Section 14.0.

5.11 The MIEC resulting from a decision of the Steering Committee or arbitrator shall be the MIEC required under Section 5.1.

5.12 The forms used to provide the information required under Section 5.6 and 5.7 may be modified for a Site clean-up upon the agreement of all members of the Contracting Working Group.

6.0 MINIMUM INUIT CONTENT FOR CONTRACTING (MICC)

6.1 A Minimum Inuit Content for Contracting (MICC) shall be set for each Site.

6.2 The MICC for a Site is the minimum level of Inuit business participation that DND shall require the Contractor to achieve for the clean-up of that Site.

6.3 The Minimum Inuit Content for Contracting (MICC) for a Site clean-up shall be expressed as a percentage, and shall be calculated by dividing the total dollar value of Inuit contracting content by the total dollar value of the Clean-up Contract. The total dollar value of Inuit contracting content shall be calculated by adding the dollar value of all subcontracts for goods or services to be obtained through, or awarded to Inuit firms, including all labour costs. Where the Contractor is an Inuit firm, the total dollar value of Inuit contracting shall also include the Contractor's share of the Clean-up Contract, which is the total dollar value of the contract minus the dollar value of all subcontracts.

6.4 The MICC shall be within a range of 60-75%.

6.5 Eight months prior to the start of a Site clean-up, DND shall provide NTI with an analysis of categories of contracting opportunities and an estimate of each category's percentage of total value of the Clean-up Contract for the Site clean-up. The analysis shall be in the form provided in Annex A.3.

6.6 Within two months of the receipt of the analysis required under Section 6.5, NTI, in consultation with the RIAs, shall provide to DND a list of Inuit firms that have declared themselves able to perform work on a Site clean-up, listed according to the categories of contracting opportunities identified under Section 6.5.

6.7 NTI shall request Inuit firms to provide corporate resumes to their RIAs that shall include information on relevant capacity and work experience. NTI shall deal with all information provided to it under this section as strictly confidential. DND shall treat all information provided to it by NTI under this section as commercial confidential information. DND shall not release such information unless prior approval is received from the Inuit firm, or DND is required to release such information under the provisions of the *Access to Information Act* and/or the *Privacy Act*.

6.8 The Contracting Working Group shall recommend the MICC for a Site to the Steering Committee within one month of receipt of the list of Inuit firms required under Section 6.6. This recommendation shall take into account the following factors:

a) Inuit firms' capacities;

b) historical data from prior Site clean-ups in Nunavut and the Western Arctic;

c) Site-specific characteristics; and

d) impact of other projects on the availability of Inuit firms.

6.9 In the event that the Contracting Working Group is unable to reach agreement on the MICC, as provided in Section 6.8, either Party may refer the matter to the Steering Committee.

6.10 The Steering Committee shall meet as soon as practicable following a recommendation under Section 6.8 or a referral under Section 6.9 to decide the MICC. In the event that the Steering Committee does not reach agreement on the matter within two weeks of a referral, either Party may refer the matter to Expedited Arbitration, as provided under Section 14.0.

6.11 The MICC resulting from a decision of the Steering Committee or arbitrator shall be the MICC required under Section 6.1 for a Site.

6.12 The form used to provide the information required under Section 6.5 may be modified for a Site clean-up upon the agreement of all members of the Contracting Working Group.

7.0 CONTRACTOR'S INUIT PARTICIPATION PLAN

7.1 DND shall require all companies that either submit a bid on a Clean-up Contract or enter into negotiations for a Clean-up Contract to provide a preliminary Contractor's Inuit Participation Plan (CIPP) that shall include:

a) a description of how the company intends to achieve the MIEC, including, where possible and without limitation:

i) the number, percentage and types of positions, including training positions, that the company proposes to fill with Inuit, in relation to the total number of positions, and the number and percentage of person-days proposed for these positions in relation to total person-days;

ii) the steps the company will take to recruit potential Inuit employees; and

iii) any measures the company has taken or proposes to take to increase Inuit employment, including such things as the details of any Inuit recruitment programs, training or apprenticeship programs, and equivalencies for formal qualifications;

b) where the MIEC is lower than the NTI projection provided to DND under Section 5.7, a description of how the Contractor could achieve the NTI projection for Inuit employment;

c) any other measures for optimizing Inuit employment and training; and

d) a description of how the company intends to achieve the MICC, including, where possible and without limitation the names, address and particulars of any actual or proposed Subcontractors; and the specifics of any actual or proposed contracting arrangements.

7.2 DND shall require all companies that submit a bid on a Clean-up Contract to submit their preliminary Contractor's Inuit Participation Plans in a separate envelope from their tender bid, to DND's contracting agent prior to the closing of bids.

7.3 For all bids for contracts for a Site clean-up, DND or its contracting agent shall:

a) advise bidders that the envelope containing the CIPP shall be opened first; and

b) advise bidders that bids shall be opened only if the CIPP complies fully with the requirements contained in Section 7.1.

7.4 Within three (3) months of DND having provided NTI with the estimates required under Section 5.6 above, NTI, through the Regional Inuit Associations, shall ensure that information regarding Inuit who have indicated their interest in employment in Site clean-ups, including information regarding their work experience and qualifications, is provided to DND's contracting agent.

7.5 DND's contracting agent shall make the information provided to it under Section 7.4 available to bidders for use by them in the preparation of bids and in finding suitable Inuit labour.

7.6 Upon the written request of the Contractor, DND's contracting agent may approve revisions to the CIPP during the course of a Site clean-up, provided that the Contractor demonstrates to DND's contracting agent that the MIEC and MICC for the Site clean-up will still be achieved.

7.7 In the event that DND's contracting agent approves a revised CIPP under Section 7.6, it shall provide the Steering Committee with the revised CIPP within five (5) working days of its approval. DND's contracting agent shall not release commercial confidential information to the Steering Committee without written permission from the Contractor.

8.0 SELECTION PROCESS FOR CONTRACTOR

8.1 Tender and Contract Documents

8.1.1 In all tender documents issued to companies that submit a bid on a Clean-up Contract or enter into negotiations for a Clean-up Contract , DND's contracting agent shall identify the following as criteria that a Contractor must comply with in a bid:

a) Minimum Inuit Employment Content (MIEC) established in accordance with Section 5.11;

b) Minimum Inuit Content for Contracting (MICC) established in accordance with Section 6.11; and

c) Submission of a Contractor's Inuit Participation Plan (CIPP) that fully complies with Section 7.1.

8.1.2 DND's contracting agent shall provide a copy of this Agreement in all tender documents issued to companies that submit a bid on a Clean-up Contract or enter into negotiations for a Clean-up Contract, and shall advise such companies in the tender documents that compliance with the provisions of the Agreement by the Contractor and its Subcontractors is mandatory.

8.1.3 DND's contracting agent shall include as a term in all Clean-up Contracts that the Contractor will comply with this Agreement and a term that the Contractor will ensure that any Subcontractors will be bound by and comply with the Agreement, where applicable.

8.2 Solicitation of Interest

8.2.1 DND's contracting agent shall prepare a Solicitation of Interest (SOI) for a Site clean-up. The SOI shall be in English and Inuktitut and shall request Letters of Interest (LOI) to identify firms that are both interested in and capable of performing as the prime Contractor for clean-up of the Site. The SOI shall be distributed Canada-wide through MERX and by mail or by fax to firms on the Registry.

8.2.2 The Solicitation of Interest under subsection 8.2.1 shall have the following characteristics:

a) The type of opportunity will be a *Letter of Interest (LOI);*

b) The region of delivery will be *Nunavut*;

c) The region of opportunity will be *Canada Wide;*

d) The agreement type is *Comprehensive Land Claim Agreement (CLCA).*

8.2.3 DND's contracting agent shall include the following in the SOI:

a) A description of the background, objectives and nature of the clean-up of DND DEW Line Sites;

b) A description of the services to be provided by a Contractor for clean-up of the Site and of the specific capabilities required for a Contractor;

c) A statement that the Site is located in a region where a Comprehensive Land Claim Agreement has been signed;

d) Instructions for the preparation of a response to the Solicitation of Interest;

e) A description of the employment and contracting environment in Nunavut, within the context of the NCLA and the requirements of the NTI-DND Economic Agreement (as per Annex D of this Agreement);

f) A definition of Minimum Inuit Employment Content (MIEC) and the Minimum Inuit Content for Contracting (MICC) and identification of the range for the MIEC and MICC that must be achieved by the Contractor in the Site clean-up;

g) All available values for the MICC and MIEC for previous Clean-up Contracts in Nunavut.

8.2.4 DND's contracting agent shall require that firms responding to the Solicitation of Interest adhere to the following process:

a) Firms shall provide a complete and fully documented LOI in the format prescribed in the SOI.

b) Firms shall provide in a LOI any information or documentation necessary to demonstrate capability to:

i) Provide the services of a Contractor for clean-up of the Site;
ii) Manage and finance a contract as Contractor for clean-up of the Site;
iii) Obtain liability insurance;

c) Each firm's LOI shall contain a statement that the firm understands the requirements to meet the levels for MIEC and MICC for the clean-up of the Site provided for under Sections 5.5 and 6.4 of the Agreement, and is capable of meeting those requirements

8.2.5 DND's contracting agent shall assess the Letters of Interest to determine those firms that have demonstrated their capability to be a Contractor for clean-up of a given Site and based on that assessment shall establish a list of qualified Contractors for that Site.

8.3 Selection Process for a Site Clean-up

8.3.1 Where DND's contracting agent determines under Section 8.2.5 that only one firm is capable of performing the contract for the Site clean-up, the following procedure shall be followed:

(a) DND's contracting agent shall issue an Advance Contract Award Notice (ACAN) indicating its intent to negotiate the contract with the firm;

b) if no valid challenge to the ACAN is received within the time frame provided for in the Treasury Board of Canada Contracting Policy, DND's contracting agent shall negotiate with the firm for the purpose of arriving at a price for the Site clean-up and shall require the firm to submit a CIPP in accordance with the requirements of Section 7.1 above;

c) if negotiations have been successfully completed under Subsection b), above, DND shall make a determination as to whether the price is acceptable, and whether the criteria set forth in Subsections 8.1.1 (a) to (c) have been met;

d) in the event that DND determines under Subsection c) above that the price is acceptable and that the criteria set forth in Subsections 8.1.1 (a) to (c) have been met, DND's contracting agent shall issue a letter of intent to award the contract to the firm;

e) in the event that DND determines under Subsection c) above that the firm has not fully met the criteria set forth in Subsections 8.1.1 (a) to (c), DND shall refer the matter to the Steering Committee and Sections 8.3.7 through 8.3.10 shall apply; and

f) in the event that negotiations under Subsection b) above are not successfully completed, or the price is not acceptable to DND, DND's contracting agent may decline to award the contract to the firm.

8.3.2 Where DND's contracting agent determines under Section 8.2.5 that more than one firm is capable of performing the Clean-up Contract, it may invite bids from the list of firms determined in 8.2.5 in accordance with Section 8.3.3. Where there is a valid challenge to the Advance Contract Award Notice issued in accordance with Section 8.3.1, DND's contracting agent may

invite bids from the sole firm considered capable in Section 8.2.5 plus the firms which have put forward a valid challenge to the ACAN, in accordance with Section 8.3.3.

8.3.3 The process for the tender shall follow the Treasury Board of Canada Contracting Policy, along with the following specific procedures, whereby DND's contracting agent shall:

a) open the envelopes containing the Bidder's CIPP before opening any other part of any bid;

b) with respect to each bidder's CIPP, make a determination as to whether the CIPP meets the criteria set forth in Subsections 8.1.1 (a) to (c) , and open only those bids that in DND's contracting agent's determination meet those criteria;

c) if DND's contracting agent determines that none of the bids meets the criteria set forth in Subsections 8.1.1 (a) to (c), refer the matter to the Steering Committee, which shall determine if the work should be retendered with a revised MIEC and/or MICC;

d) identify the lowest priced of the bids opened under Subsection b) and determine whether the price is acceptable to DND; and

e) if the bid meets the criteria set forth in Subsections 8.1.1 (a) to (c) and the price is acceptable, issue a letter of intent to award the contract, otherwise the contract shall not be awarded.

8.3.4 DND's contracting agent shall require that, within twenty-eight (28) calendar days of a company receiving a letter of intent pursuant to Sections 8.3.1 or 8.3.3, the company shall provide to DND's contracting agent a final CIPP confirming that it is capable of achieving the MICC and MIEC for the Site, and that this final CIPP shall meet the criteria set forth in Subsections 8.1.1 (a) to (c), and shall include, without limitation:

a) documentation evidencing the signing of agreements with Inuit Subcontractors, or the intention to enter into subcontracts with Inuit Subcontractors, if applicable; and

b) a schedule showing a monthly projection of Inuit labour and Subcontractors to be utilized throughout the life of the contract.

8.3.5 DND's contracting agent shall review the final CIPP, including the documentation and schedule provided by the company under Section 8.3.4. In the event that DND's contracting agent determines that the documentation and schedule is adequate to confirm that the bidder can meet the criteria set forth in Subsections 8.1.1 (a) to (c), the contracting agent, acting in good

faith, shall approve the CIPP and may award the Contract to the company. In all other events DND's contracting agent shall either:

a) withdraw the letter of intent; or

b) request a review by the Steering Committee.

8.3.6 DND's contracting agent shall provide the Steering Committee with a copy of the approved CIPP within fifteen (15) days of contract award. DND's contracting agent shall not release commercial confidential information to the Steering Committee without written permission from the Contractor.

8.3.7 In the event that DND's contracting agent requests a review of a contract award under Section 8.3.1, 8.3.3 or 8.3.5, the Steering Committee shall meet to determine whether the company has made best efforts to meet the criteria set forth in Subsections 8.1.1 (a) to (c), and, whether fault for any failure to do so cannot reasonably be placed on that company. The determination of best efforts shall take into account, without limitation:

a) the specific activities of the firm to achieve the elements contained in its preliminary CIPP; and

b) adherence by the firm with the requirements of Section 9.0.

8.3.8 In the event that the Steering Committee fails, within 3 weeks of a matter being referred to it under Section 8.3.1, 8.3.3 or 8.3.5, to agree on whether the company has made best efforts to meet the criteria set forth in Subsections 8.1.1 (a) to (c), the Steering Committee shall refer the matter for decision under the Expedited Arbitration provisions in Section 14.0.

8.3.9 In the event that the Steering Committee, or arbitrator appointed under Section 14.0, determines that the company failed to make best efforts to meet the criteria set forth in Subsections 8.1.1 (a) to (c) and that fault for the failure can reasonably be placed on the company, DND's contracting agent shall withdraw the letter of intent to award the contract.

8.3.10 In the event that the Steering Committee, or arbitrator appointed under Section 14.0, determines that the company has made best efforts to meet the criteria set forth in Subsections 8.1.1 (a) to (c) and that fault cannot reasonably be placed on the company for its failure, the MICC shall be adjusted at the discretion of the Steering Committee or arbitrator in order to allow for the awarding of the contract.

8.3.11 The specific contracting process to be utilized in issuing contracts for monitoring of Sites will be determined by the Steering Committee prior to the preparation of any future contract documents for monitoring of Sites.

9.0 SELECTION PROCESS FOR INUIT SUBCONTRACTORS

9.1 Inuit Firm Registry

9.1.1 NTI shall provide to DND the most current Inuit Firm Registry ("the Registry"). The Registry shall contain a brief description of the equipment, goods or services provided by each Inuit firm, the firm's experience, address and contact name.

9.1.2 The Registry shall be included in all contract solicitation documents.

9.2 Bid Invitations for Subcontracts

9.2.1 DND's contracting agent shall require Contractors who have a letter of intent or who have been awarded the contract, or any Subcontractors, in subcontracting work on a Site clean-up, to invite Inuit firms listed in the Registry that may be capable of performing the proposed subcontracting work, to bid on the proposed subcontracting work.

9.2.2 DND and its contracting agent and Contractors shall be held blameless if Inuit firms that do not appear in the Registry are not solicited under Section 9.2.1.

9.2.3 Nothing in Section 9.2.1 shall prevent a Contractor or Subcontractor from seeking bids from firms not listed in the Registry.

9.2.4 All contract documents issued by DND's contracting agent shall require Contractors and Subcontractors, in subcontracting work on a Site clean-up, to:

a) include in bid invitations only employment and skills requirements that are essential to the Site clean-up;

b) provide Inuit firms with a minimum of 15 days to respond to a bid invitation, but that in no event shall an Inuit firm have less time to respond than firms not listed in the Registry; and

c) enter into a contract with an Inuit firm if that Inuit firm's bid meets the Contractor's or Subcontractor's requirements, including such criteria as technical compliance and price, if the Contractor or Subcontractor enters into a subcontract for the Work.

9.2.5 All contract documents issued by DND's contracting agent shall require Contractors and Subcontractors, in subcontracting Work on a Site clean-up, to take the following steps in the event that they reject a bid from an Inuit firm

on grounds that it contains minor variances which cause it to be considered not technically compliant or not competitive:

a) provide the Inuit firm that submitted the bid with a written statement of the variances and the grounds for rejection;

b) provide the Inuit firm that submitted the bid the opportunity to revise its bid to address the stated variances and submit another bid within 7 calendar days of the date on which it was notified that the bid was rejected; and

c) enter into a subcontract with the Inuit firm if the new bid meets the Contractor's or Subcontractor's requirements and is less than or equal to the lowest priced bid from non Inuit firms which meet the Contractor's or Subcontractor's requirements; otherwise the contract may be awarded to a firm not listed in the Registry.

9.2.6 DND's contracting agent shall, where a bid has been rejected under Section 9.2.5, require the Contractor or Subcontractor, upon receiving a request in writing, to provide the Inuit firm within thirty (30) calendar days with written reasons why the bid was rejected. Subject to the approval of the Inuit firm, a copy of the reasons shall also be provided to NTI.

10.0 TRAINING

10.1 DND shall provide NTI with $50,000 per Site to assist in meeting the overall objective of achieving a representative level of Inuit employment on DEW Line Site clean-ups through the training of Inuit for clean-up related jobs, for a total of $750,000 for all Sites in Nunavut.

10.2 DND and NTI agree to work jointly to identify additional funding sources for training activities envisioned in Section 10.1.

10.3 Of the $750,000 DND has agreed to provide under Section 10.1, NTI acknowledges that DND has already provided $100,000 in connection with the clean-up of the FOX 4 and CAM M Sites. Of the $650,000 remaining, DND shall make an initial payment of $75,000 to NTI as soon as practical after the signing of this Agreement to fund the development of a comprehensive training plan, schedule and budget.

10.4 The cost of any training positions identified in the plan developed by NTI for on-the-job training at a Site shall be funded from sources other than DND's budget for the Site Clean-up Contract. Cost for such training shall also include administrative costs that may be borne as result of the presence of trainees.

10.5 The training plan, which shall be completed within one year after receipt of funding for the plan, shall set out a schedule for further payments to NTI from DND up to the full amount of $650,000.

10.6 Subject to DND's agreement to the schedule which may be based on reasonable budget considerations, DND shall make payments to NTI in accordance with the schedule completed under Section 10.5. NTI shall provide DND with an updated training plan and budget, outlining the proposed use of funds, prior to each payment.

10.7 The training plan referred to in Section 10.3 shall incorporate both common and site specific elements. The training plan shall include, without limitation, the following elements:

a) an analysis of skills and knowledge requirements for all positions;

b) learning objectives derived from the skills analysis identified in Subsection (a);

c) identification of training resources, including existing and required training programs;

d) development of a detailed plan and schedule for design, delivery and evaluation of orientation and training courses necessary to achieve representative levels of Inuit employment; and

e) development of milestones and performance indicators that will be considered in setting MIEC and MICC under Sections 5.8 and 6.8.

11.0 REPORTING

11.1 DND shall provide to NTI, by December 1 of each year that this Agreement is in effect, a report covering annual and cumulative results by type and level of employment, for each Site clean-up, including:

a) the total number of person days worked by all employees by Representative Occupational Grouping;

b) the total number of person days worked by Inuit, by Representative Occupational Grouping;

c) the percentage of total person days worked by Inuit, by Representative Occupational Grouping; and

d) a list of all contracts for goods, services and labour awarded to Inuit firms and to non-Inuit firms during the year and the dollar value of each of those contracts.

11.2 NTI shall provide DND with a report, by December 1 of each year that this Agreement is in effect, outlining the progress of the training program, the number of Inuit trained as well as the success rate of the program, including:

a) a list of training programs provided under the NTI training plan;

b) the number of hours of training received by Inuit in these programs;

b) the percentage of Inuit who successfully completed the training; and

c) the number of graduates who were subsequently hired by Contractors and Subcontractors.

11.3 DND shall include as a term in all Clean-up Contracts between DND and the Contractor a requirement for the Contractor to submit monthly reports on the Contractor's compliance with the final CIPP or the revised CIPP. DND shall advise NTI within five (5) business days of any deviations below the currently approved CIPP. Either Party may request a meeting of the Steering Committee following such a report. Where DND advises NTI of such a deviation below the CIPP in any two consecutive months, a meeting of the Steering Committee is required to be held pursuant to Section 12.2.

12.0 ENFORCEMENT

12.1 Where, during a Site clean-up, deviation from the approved CIPP or from the CIPP as amended pursuant to Section 7.6 indicate that the MIEC or MICC may not be achieved by the Contractor over the remainder of the Site clean-up, DND or its contracting agent shall advise the Steering Committee within ten (10) working days.

12.2 The Steering Committee, within one week of receiving notice under Section 12.1, shall convene to make a determination as to whether the Contractor is using its best efforts to comply with the MIEC or MICC. The Contractor shall then be required to demonstrate to the satisfaction of the Steering Committee that it has made best efforts to comply with the MIEC or MICC, and that fault for the failure to comply with the MIEC or MICC cannot reasonably be placed on the Contractor.

12.3 Where the Steering Committee does not make the determination required under Section 12.2 within 3 weeks, either Party may refer the matter to arbitration under the Expedited Arbitration provisions in Section 14.0.

12.4 Where the Steering Committee in a determination made under Section 12.2, or arbitrator to which a matter is referred under Section 12.3, determines that the Contractor failed to make best efforts to comply with the MIEC or MICC, and that fault can reasonably be placed on the Contractor for this failure, the

Steering Committee shall so advise DND's contracting agent of their determination or of that of the arbitrator. The Steering Committee or arbitrator may make recommendations on remedial measures to be applied, and DND's contracting agent may, after considering any recommendations by the Steering Committee or arbitrator, apply remedial measures at its sole discretion. DND's contracting agent shall report to the Steering Committee as soon as practicable on the results of the remedial measures applied. Remedial measures shall, to the extent possible, be designed to correct the Contractor's failure to achieve the MICC and/or MIEC, and to provide a disincentive for future failures. DND's contracting agent shall consider the following measures and inform NTI of the actions taken. Measures may include:

a) requiring the Contractor to undertake additional measures to achieve the MIEC or MICC;

b) providing the Contractor with information about specific Inuit or Inuit firms who are known to be available and qualified for employment by the Contractor, and advising the Contractor that further enforcement steps may be taken if the MIEC or MICC are not met;

c) withholding progress payments;

d) issuing a stop work order;

e) charging the Contractor for damages related to a stop work order; or

f) terminating the contract.

12.5 Where the Steering Committee, or arbitrator appointed under Section 14.0 determines that the Contractor made best efforts to achieve the MIEC and MICC through its currently approved CIPP, and that fault cannot reasonably be placed on the Contractor for failing to meet the MIEC or MICC, the Steering Committee, or arbitrator, shall adjust the MIEC or MICC.

12.6 Following an adjustment to the MIEC or MICC under Section 12.5, DND's contracting agent shall thereafter continue to monitor and report on the Contractor's performance as provided for in Section 11.3.

13.0 ARBITRATION

13.1 If DND and NTI disagree on any question of fact or mixed question of law and fact related to the interpretation, implementation or operation of this Agreement, with the exception of any matter within the jurisdiction of the Arbitration Board under the NLCA and of any matter related to provisions of this Agreement mentioned in Section 14.1, either Party may by written demand refer the dispute to arbitration in accordance with the following

14.6 The arbitration proceedings shall be held within two weeks of the appointment of an arbitrator. The arbitration proceedings shall be in a location agreed upon by the Parties, or if the Parties are unable to agree, as determined by the arbitrator. The timing for the hearing may be extended only by the mutual consent of the Parties, acting reasonably.

14.7 The arbitrator shall have all of the powers granted under the Commercial Arbitration Act (Canada) to conduct the arbitration, may compel the attendance of the Parties and any required witnesses and the tendering of any documents or things and dispose of any further matters that arise out of the arbitration decision (if raised by the Parties within five (5) days of the completion of the arbitrator's written decision).

14.8 With respect to any such arbitration:

a) each Party shall bear its own costs and an equal share of the other costs of the arbitration, including remuneration and expenses of the arbitrator;

b) the arbitrator shall have jurisdiction to determine all questions of fact, law, and questions of mixed fact and law and make a determination;

c) all witnesses called to give evidence at the hearing shall be sworn under oath and shall be subject to such examination as the arbitrator determines to be appropriate, and there shall be a court reporter and a formal record of the hearing.

14.9 The arbitrator shall, on application, allow a Contractor or a Subcontractor directly affected by a decision requested of the arbitrator to participate in the expedited arbitration as an intervenor, on such terms as the arbitrator in his or her discretion may order.

14.10 The arbitrator shall render a decision in writing and provide such decision to the Steering Committee within one week of the conclusion of the hearing. The decision shall state the reasons on which it is based. The decision is final and binding, and is not subject to appeal.

14.11 Where a Party to the arbitration fails to comply with any of the terms of the decision of the arbitrator, any Party to the arbitration may file in the office of the Registrar of the Nunavut Court of Justice, a copy of the decision in the prescribed form, whereupon the decision shall be entered in the same way as a judgment or order of the court, and is enforceable as such.

14.12 Unless the Parties otherwise agree, the proceedings and arbitrator's decision shall be made public.

15.0 ENTIRE AGREEMENT

This Agreement and the Annexes hereto shall constitute the entire and sole agreement between the Parties and shall supersede all other communications, negotiations, arrangements and agreements of any nature among them in relation to this Agreement prior to the date of the Agreement.

16.0 SEVERABILITY

If any provision of this Agreement or its application to any person or circumstance shall, to any extent, be invalid and unenforceable, the remainder of this Agreement, or the application of such provisions to persons or circumstances other than those as to which it is held invalid or unenforceable, shall be valid and enforced to the fullest extent permitted by law and be independent of every other provision of this Agreement.

17.0 ENUREMENT

This Agreement shall enure to the benefit of and be binding upon each of the Parties hereto, their respective heirs, legal representatives, successors and permitted assigns.

18.0 APPLICABLE LAW

This Agreement shall be governed by and construed in accordance with the applicable laws of Canada and Nunavut.

19.0 TIME IS OF THE ESSENCE

The Parties acknowledge that time is of the essence of this Agreement.

20.0 PARLIAMENTARY APPROPRIATION

The implementation of the Agreement is subject to there being an appropriation for the contracts for the fiscal year in which any commitment would come in course of payment.

21.0 HOUSE OF COMMONS

No member of the House of Commons shall be admitted to any share or part of this Agreement, or to any benefit arising thereof.

22.0 AMENDMENTS

22.1 If either Party wishes to make changes to this Agreement, it shall provide notice of proposed changes in writing to the other Party. Amendments must be agreed upon by both Parties. Any agreed-upon amendments will be executed and attached as an appendix to this Agreement.

22.2 DND and NTI agree to consider amendments in an expeditious manner, particularly where the proposed amendments directly affect the conduct of a Site clean-up that is in progress or one which is scheduled to commence in the near term.

23.0 NOTICES

23.1 Where any Party is obliged or entitled to give any notice, request, approval, demand, consent, direction or other communication (i.e. Notice) to the other Party, such Party shall first communicate the substance thereof personally or by telephone. However, such Notice shall not be sufficiently given until sent in writing to the addressees at the address below. Any Notice may be personally delivered or sent by registered mail or telefacsimile and will be effective upon receipt by the addressee.

23.2 Notices to DND will be sent to:

Director General Environment
National Defence Headquarters
101 Colonel By Drive
Ottawa, Ontario
K1A 0K2

23.3 Notices to NTI will be sent to:

1st Vice President
Nunavut Tunngavik Incorporated
Box 1041
Cambridge Bay
Nunavut
X0E 0C0

24.0 OFFICIAL LANGUAGES

24.1 The official languages of this Agreement shall be English and Inuktitut. In the case of incompatibility between the two texts, the text of the English version shall prevail.

25.0 TERMINATION OF THE AGREEMENT

25.1 This Agreement will terminate on the later of December 31st , 2008 or when the Clean-Up Work as set out in this Agreement for the Sites listed in Section 3.1 is completed or on such a date agreed to by the Parties in accordance with Section 22.3 of this Agreement.

IN WITNESS HEREOF, the Parties have executed this Agreement.

Nunavut Tunngavik Incorporated

_____
Acting President

_____

_____

Department of National Defence

_____
Minister of National Defence

this _____ day of _____ 2001

ANNEXES TO THE AGREEMENT

ANNEX A: REPORTS

A.1 Format for DND Work Force Estimate (Section 5.6)

Site: Region:

Occupational Group	Projected Manpower Requirements							
	Year 1		Year 2		Year 3		Overall	
	Positions	Persondays	Positions	Persondays	Positions	Persondays	Positions	Persondays
Project Manager/General Superintendent (Off-site)								
Site Superintendent								
Site Clerk								
Expediter (Off-Site)								
Surveyor								
Surveyor's Assistant								
Service Truck Driver								
Camp Setup Carpenter/ Electrician/Plumber								
Foreman								
Heavy Equipment Operator								
Heavy Equipment Mechanic								
Truck Driver								
Labourer/Scaleperson/Cutter								
Asbestos Labourer								
Hazardous Material Handler								
Cook/Cook's Helper								
Bear Monitor								
Nurse/First Aid								
Other								
Other								
Total:								

Note: The specific Representative Occupational Groupings included in this form may be changed, under Section 5.12, by mutual consent of the Contracting Working Group to reflect variations among Sites. DND's work force estimate may include additional categories of work not listed, as required.

A.2 Format for NTI Inuit Labour Projection (Section 5.7)

Site:
Region:

Positions Identified	Projected Manpower Requirements (person days)							Projected Inuit Employment (person days)						
	Year 1		Year 2		Year 3		Overall	Year 1		Year 2		Year 3		Overall
	Pos.	Person Days	Pos.	Person Days	Pos.	Person Days	Person Days	Pos.	Person Days	Pos.	Person Days	Pos.	Person Days	Person Days
Project Management														
Site Superintendent														
Site Clerk														
Expediter														
Surveyor														
Surveyor's Assistant														
Service Truck Driver														
Camp Setup														
Carpenter/Electrician/ Plumber														
Foreman														
Heavy Equipment Operator														
Heavy Equipment Mechanic														
Truck Driver														
Labourer/Scaleperson/Cutter														
Asbestos Labourer														
Hazardous Material Handler														
Cook/Cook's Helper														
Bear Monitor														
Nurse/First Aid														
Other														
Other														
Total Positions														
Projected Inuit Employment									%		%		%	%

Note: The specific Representative Occupational Groupings included in this form may be changed, under Section 5.12, by mutual consent of the Contracting Working Group to reflect variations among Sites.

A.3 DND: Analysis of Contracting Opportunities (Section 6.5)

Site: Region:	
Description	*% of Total Contract Value*
1 Marine Transportation	
2 Commercial Airlines	
3 Local Aircraft Charter	
4 Catering	
5 Small Tools	
6 Camp Supply	
7 Bonds & Insurance	
8 Office Supplies	
9 Communications Equipment	
10 Bear Monitor	
11 Geotextile - Supply & Install	
12 Geomembrane - Supply & Install	
13 Drilling for Instrumentation	
14 Instrumentation	
15 Public Consultation/Translation	
16 Excavate Hazardous/Contaminated Soil	
17 Landfarming	
18 Gravel - Excavate & Place	
19 Excavation	
20 Demolition & Debris	
21 Landfill Excavation	
22 Asbestos Abatement	
23 Project Management and Overhead	
24 Other	
Total	**100%**

Note: The specific Contracting Opportunities included in this form may be changed, under Section 6.12, by mutual consent of the Contracting Working Group to reflect variations among Sites. DND's analysis of contracting opportunities may include other contracting opportunities not listed, as required.

ANNEX B: EDUCATION AND SKILLS PROFILES

Position	Essential Qualifications
Superintendent/Construction Manager	3-5 years directly related project management experience, and substantial (minimum 10 years) construction supervision experience, normally combined with trade certification in one or more relevant trades and/or relevant post-secondary education
Clerk	Previous clerical experience
Expediter	2-3 years experience as expediter for a northern construction company, ideally combined with 2-3 years trade experience in an applicable construction trade
Surveyor Technologists Surveying Assistants	2-3 year college program and trade certification Some related training and/or experience
Service Truck Driver	On–the-job training Driver's license appropriate to class of vehicle
Foreman	3 years supervising similar construction activities
Electrician	Trade certification
Carpenter	Trade certification or 3-5 years on the job experience
Welder	Trade certification
Plumber	Trade certification
Heavy Equipment Operator	5 week certification program Valid driver's license
Heavy Equipment Mechanic	Trade certification or 5 years experience
Small Equipment Mechanic	Trade certification or 3-5 years experience
Truck Driver	Valid driver's license Approved medical certificate 3-4 weeks training
Labourer	On-the-job training; physically fit for the proposed work
Asbestos Labourer	12 hours classroom instruction 12 hours practical instruction
Asbestos Foreman	18 hour training course (following minimum of 2 years of experience as asbestos labourer)

Position	Essential Qualifications
	Certificate from Occupational Health and Safety
Hazardous Materials Handler	5 years + TDG certification through employer
Cooks Cooks Helper	Trade certification or 2 years experience Some related experience
First Aid	Training in appropriate first aid courses
Bear Monitor	Experienced polar bear hunter

Note: This list of qualifications is for the use of the Contracting Working Group in establishing the MIEC This list is not intended for any other use by any third party for any purpose, and DND and NTI are not liable for any use of this list by any third party. Bidders or Contractors are required to establish their own criteria for hiring project staff.

ANNEX C: LIST OF ARBITRATORS

Honourable Roger P. Kerans

Roger F. X. Marentette

Daniel Ish Q.C.

Harvey J. Kirsh

Honourable Lorne O. Clarke

Paul-Emile Chiasson

ANNEX D BUSINESS ENVIRONMENT STATEMENT

The following language shall be included in all Solicitations of Interest prepared and distributed by DND's contracting agent, as described in Section 8.2 of this Agreement:

> One of the principal objectives of The Nunavut Land Claims Agreement is to provide Inuit with means of participating in economic opportunities through government contracting. Article 24 of the NLCA ("Government Contracting") provides full details of the Government of Canada's obligations to fulfill this objective. In the case of DEW Line Clean Up for which the Department of National Defence (DND) has responsibility, NTI and the Government of Canada, as represented by DND, have entered into an Agreement (see Annex XX of the SOI).
>
> The principal mechanism to which NTI and DND have agreed for provision of economic benefit for Inuit is the use of a Minimum Inuit Employment Content (MIEC) and a Minimum Inuit Content for Contracting (MICC). Companies that are invited to submit tenders for the work following this SOI will be informed of the site specific MIEC and MICC. These levels will be set within the following ranges – MIEC (65-85%); MICC (60-75%). Contractors will be required to achieve the MIEC and MICC in the contract, and DND's contracting agent will monitor levels of MIEC and MICC based on a monthly plan submitted by the Contractor.
>
> In the case of the MIEC the Inuit workforce must be made up of Inuit enrolled under the NLCA. Contractors must understand that they may need to recruit a workforce from a number of communities in Nunavut, and that a significant number of the workers have Inuktitut as their first language. DND's contracting agent will provide bidders with a list of Inuit who have indicated their interest in employment in Site clean-ups, including information regarding their work experience and qualifications. This list will be prepared by NTI approximately six months prior to the commencement of the clean-up of a given Site.
>
> In the case of the MICC, Inuit firms used as Subcontractors must be drawn from the Inuit Firm Registry maintained by NTI.