ENVIRONMENTAL MONITORING PLAN

SARCPA LAKE DEWLINE SITE
CAM - F

1.0 INTRODUCTION

Indian and Northern Affairs Canada (INAC) have retained Public Works and Government Services Canada (PWGSC) to complete the remediation program at the abandoned Intermediate DEW Line site at Sarcpa Lake, Nunavut.

The following tasks will be completed in order to achieve site remediation objectives:

- Existing site infrastructure will be demolished and the demolition wastes will be segregated into hazardous and non-hazardous materials and disposed of appropriately;
- Contaminated soil areas, identified during the previous field investigations, will be remediated;
- All hazardous materials and soil will be disposed of at an off-site licensed disposal facility;
- Scattered surface debris and partially buried debris at the site is to be collected and disposed of;
- New landfills will be constructed to contain the non-hazardous contaminated soil and demolition waste generated during the clean up;
- Existing landfills, on this site, will be remediated, as required; and
- Disturbed areas will be physically restored to and shaped to match the existing terrain.

This document will present a brief description of environmental monitoring that is to be carried out at the site as part of the remediation project as well as the long term monitoring program that will be completed following this project.

2.0 MONITORING DUTIES

Site monitoring will be split between the site engineer, an environmental monitor and the site contractor. Duties of the site engineer will include making sure the contractor adheres to the contract specifications that contain all site remedial activities and to make decisions that may not be addressed within the contract or that require an on-site decision. The site engineer will consult with INAC on non-routine issues not adequately addressed in agreements.

The site contractor is bound by the contract specifications and is responsible for providing the camp, equipment and contract work as is indicated by the specifications unless otherwise indicated by the engineer or the environmental monitor.

3.0 PROJECT TASKS

3.1 Excavation of Impacted Soils

The total volume of soils impacted by hydrocarbon, metals and PCBs are estimated at 3133 m^3. Metals and PCB impacted soils with concentrations registering above Tier II will be transported off site to a registered facility for disposal. Ongoing monitoring of these activities will be carried out under the direction of the site Engineer.

Soil excavations will remain free of standing water during soil removal, confirmatory sampling and backfilling activities. Transportation of the Tier I and II contaminated soils from excavation to landfill and secure soil facility will be carried out in such a manner that no soils or liquid will be spilled during transport.

Excavation will not be permitted within 2m of any watercourse or within 2m of the high water mark of the intertidal zone. The Engineer will co-operate with the Environmental Monitor if any excavation is required within the watercourse.

Excavating equipment will be cleaned prior to mobilization to the next impacted area. Special precautions will be made to ensure the bucket and tracks of the equipment are devoid of soil lumps and particles to avoid tracking of impacted soils through the site. Decontamination of the equipment which comes in direct contact with the contaminated soils will be steam cleaned or cleaned by other means acceptable to the engineer and on site environmental monitor. This will be completed in a secure area capable of containing the waste generated by the washing operation. Any waste soils resulting form the decontamination procedure will be treated as Tier II or hydrocarbon contaminated soil.

Excavated material will be replaced with granular fill, compacted and graded to match the existing ground surface. Backfilling operations will not commence until confirmatory sampling and testing has been completed by the engineer to ensure that the excavation no longer contains impacted soils.

3.2 Erosion Sediment and Drainage Plan

For all excavations at site, the contractor will be submitting a drainage control plan for approval prior to commencing excavation that will specifically address the protection of bodies of water adjacent to the excavation and the following:

- Details of grading work to prevent surface drainage into or out of the excavation areas;
- Details of erosion control works and materials to be used, including the deployment of silt fencing and containment booms during construction and excavation activities;
- Work schedule including the sequence and duration of all related work activities;
- The treatment of site runoff to prevent siltation of the water courses;
- Dewatering procedures for excavated materials including silt removal procedures prior to discharge;
- Stabilizing procedures during excavation; and
- Maintenance of filters and sedimentation traps.

3.3 Confirmatory Sampling

Confirmatory sampling will be carried out on contaminated soil areas. The locations, frequency and method of testing will be determined by the Engineer at site. Soil sampling will be carried out within the perimeter of each contaminated soil excavation and at a depth within the completed excavation area, immediately upon completion of excavation. Criteria used for soils will be the DCC DEW Line Cleanup Criteria for metals and PCBs, and the CCME Canadian Wide Standards for PHCs. Any metals, PHCs, or PAHs not covered under DCC or CCME criteria will be dealt with using a site specific risk assessment (SSRA) where required.

3.4 Soil Disposal Requirements

The analytical results for inorganic elements and PCBs can be interpreted using the established DEW Line Cleanup Criteria (DCC). The DCC protocol defines two concentration tiers of soil contamination for metals and polychlorinated biphenyls (PCBs), including Tier I Contaminated Soils, which is either placed in a on-site landfill or buried beneath a minimum of 0.3m of clean fill and Tier II Contaminated Soil, which requires disposal in a manner that provides additional measures to permanently segregate these contaminants from the Arctic ecosystem. Soils exceeding federal legislative limits (i.e., Canadian Environmental Protection Act and Chlorobiphenyl Regulations) require disposal off-site at a licensed disposal or destruction facility.

For soils contaminated with hydrocarbons, the Canada Wide Standards (CWS) for Petroleum Hydrocarbons (PHC) defines criteria for a residential/parkland application for fine grained soil. The generic Tier 1 values were assumed for the residential/parkland uses using the default set of exposure assumptions. Although the Tier I guidelines were developed for a more typical “southern

exposure and land uses", the use of these generic guidelines for the DIAND Intermediate DEW Line Sites is considered suitable.

Only soils exceeding CEPA standards (hazardous) will be disposed of off site.

The contaminated soils at Sarcpa Lake CAM-F have been divided into several categories depending on the type and severity of the contamination. Generally, non-hazardous surface contaminants are covered or excavated. [1]

3.5 Secure Soil Disposal Facility

A secure disposal facility will be constructed at the site to contain contaminated soil exceeding the DCC Tier II Criteria. These facilities utilize a double containment system, consisting of permafrost to limit leachate generation and synthetic liners to prevent migration of contaminants into the surrounding environment.

The design of this facility is based on the characteristics of contaminates in the soils, the geothermal properties of the area and the local permafrost regime. The design also utilizes permafrost as a primary containment barrier as both the Tier II contaminated soil and the perimeter berms are designed to be continuously frozen. Geothermal analysis will be conducted at the site to determine the time required for freeze-back of the facility and the long-term thermal regime of the facility. The thickness of the cover material is calculated to prevent thaw of the contaminated soil even after 10 consecutive 1 in 100 warm years.

Secondary containment is provided by a high-density polyethylene liner along the base and the side slopes of the facility. This liner will be chemically compatible with the contaminated soils and will prevent the potential movement of contaminants during the period required for permafrost aggradation. A second liner will be placed over the contaminated soils and seamed to the base liner to prevent precipitation from percolating down through the cover fill and into the contaminated soils.

During construction of the facility, the gradation, moisture content and compaction are monitored to verify the facility is constructed in accordance with the design.

[1] UMA 2004, Draft Remediation Work Plan

3.6 Hazardous Waste

3.6.1 Fuel Drums

These items include empty barrels and equipment that have been abandoned on site. A total count of 9160 empty drums were identified at site. The areas beneath the drums will have further sampling conducted once removal has been completed.

All drums are to be inspected by the on site engineer to identify the process for potential opening, sampling, testing and handling of the drums. The inspection will determine signs of deterioration and evidence of spill or other contamination on the tip and sides of the drum as well as the surrounding soils.

Areas around the drums will be tested using a Volatile Organic Compound (VOC) instrucment prior to movement. If levels exceed 20 per cent Lower Explosive Limit (LEL) as measured by the VOC, all handling will be conducted in accordance with the appropriate sections of the NIOSH guidelines, Nation Fire Code of Canada and the TDGA for flammable and combustible materials.

Disposal of the drum content will be in accordance with the wastewater discharge criteria in Section 4.2 of this report. All contents in excess of the applicable criteria will be packaged in accordance with TDGA regulations and shipped off site for disposal in a registered facility.

All drums will be steamed cleaned to remove any residual products. The drums will then be crushed and shredded prior to disposal in the onsite landfill. The rinsate from the stream cleaning will be tested by the engineer. If concentrations exceed the criteria, the rinsate will be packaged according to TDG regulations and shipped off site for disposal in a registered facility.

3.6.2 Fuel Tanks and Pipelines

The pipelines will be drained and flushed of all potential product prior to dismantling. These pipelines will be cut and disposed of in the landfill. All liquids within the fuel tanks and pipelines will be incinerated at site. Degassing of the tanks will commence under the Petroleum Association for Conservation of the Canadian Environment (PACE). The area will be monitored for vapour build up during degassing. Wastewater will be tested by the engineer and if concentrations exceed the recommended criteria, the wastewater will be packaged according to TDG regulations and shipped off site for disposal in a registered facility.

3.7 Non Hazardous Waste

Approximately 3619m³ of non-hazardous materials are located at the site. These materials will be consolidated into two engineered landfills that are to be constructed at the site.

3.8 Demolition of Structures

Some of the structures to be demolished have lead and PCB containing materials. The contractor and all other personnel on site will be required to abide by all regulations under Labour Canada, NIOSH and the Territorial government.

3.8.1 Asbestos Abatement

There is a very limited amount of asbestos containing materials at site. These materials have already been removed and bagged. The asbestos will be inspected and double bagged and disposed of within the NWH landfill at site.

3.8.2 PCB Abatement

Prior to the dismantling of the structures and facilities, any loose paint will be removed and placed in polyethylene bags. During dismantling activities, all loose paint and paint particles will be collected by the use of drop clothes and contained within the facility by the use of polyethylene sheets. A control area will be constructed around the area to ensure no paint chips escape into the environment. A visual inspection will be conducted after removal to ensure that all particles and chips were retained within the control area. If there is uncertainty that the PCB materials were not contained, soil sampling will be conducted in the area for confirmation purposes.

PCB materials will be placed in containers registered under the TDGA for transportation and disposal at a licensed facility. All containers will be clearly marked in accordance with the requirements of CEPA and TDGA.

3.9 Engineered Landfill

One non-hazardous waste (NHW) landfill sites will be designed on the premise that it will contain non-hazardous materials only and will not generate leachate. The NHW design will not be constructed to maintain the contents in a perennially frozen state. An NHW landfill consists of a perimeter berm and granular cover to minimize erosion and infiltration in order to provide long-term stability. A NHW landfill is generally established on native ground (stripped of organic matter). No base cover or liner is required.

The materials that are to be disposed of in the NHW landfill include:

- Tier I contaminated soils;
- Hydrocarbon contaminated soil, where applicable;
- Non-hazardous demolition debris;
- Non-hazardous site debris;
- Non-hazardous debris/soils excavated from landfills;
- Creosote timbers wrapped in polyethylene sheeting; and
- Double-bagged asbestos

3.10 Camp Operations

3.10.1 Site Maintenance

The site will be kept free of the accumulation of waste material and debris. Upon completion of the remedial work, the camp will clean and dispose of all surplus materials, supplies, rubbish and temporary works leaving the site neat and tidy to the requirements of the site engineer and the land use permit.

3.10.2 Waste Water Discharge

Wash water, meltwater collection, rinse water resulting from the cleaning of fuel tanks and pipelines, water from dewatering contaminated soil areas, and/or any other liquid effluent stream shall be released onto the ground at a location that is a minimum of 30 metres from natural drainage courses and 100 metres from fish bearing waters and shall conform the following applicable guidelines:

Parameter	**Maximum Allowable Concentration**
pH	6 to 9
Oil and Grease	5 mg/L and none visible
Arsenic (total)	100ug/L
Cadmium (dissolved	10 ug/L
Chromium (total)	100 ug/L
Cobalt (dissolved)	50 ug/L
Copper (dissolved)	200 ug/L
Lead (dissolved)	50 ug/L
Mercury (total)	0.6 ug/L
Nickel (dissolved)	200 ug/L
PCB: discharge to barren area	50 ug/L
PCB: discharge to vegetated area	5 ug/L
Phenols	20 ug/L
Zinc (total)	1000 ug/L

Any liquids not conforming to these guidelines will be treated as hazardous waste materials and disposed of in accordance within the hazardous waste regulations.

3.10.3 Sewage Disposal Requirements

Sewage disposal will comply with the requirements of the Land Use Permit, the Water Licence and the Public Health Act (Nunavut). The temporary lagoon will be located away from the following locations:

- A minimum of 100 m from the construction camp;
- A minimum of 100 m from drainage paths;
- A minimum of 450 m from water bodies supporting aquatic life; and
- Downwind of the construction camp based on the prevailing wind direction.

3.10.4 Spill Contingency Plan

A spill contingency plan will be completed for the site to include all the anticipated volumes of fuel that will be stored at the site for the remedial activities, the method of dispensation and possible maximum volume that could be spilled. Response capabilities will be identified detailing response time, and types and volumes of spills to which the contractor and site engineer can respond. Spills will be reported immediately to the site engineer and a written report will be submitted within 24 hours of the incident.

3.10.5 Health and Safety Plan

A site specific health and safety plan will be submitted to the PWGSC engineer by the contractor. The HASP must ensure that all requirements under the Nunavut Safety Act, OSHA Regulations, other Authorities with jurisdiction and the Contract Specifications have been addressed.

4.0 POST REMEDIATION LONG TERM MONITORING

The expected duration of remedial activities on site will generally be from July to October. During the winter months, work will cease and equipment and facilities on site will be winterized. Completion of the site remediation and demobilization of the contractors' facilities and equipment is anticipated for 2008. Long term monitoring of the landfills will begin upon completion of the clean up (2008) and will continue for a 25-year period. After 25 years, the monitoring requirements will be re-evaluated.