Executive Summary
Application to Renew/Amend Existing Water Use Licenses in Support of
Long-Term Monitoring of Landfills at Remediated DND DEW Line Sites in Nunavut

INTRODUCTION

The former Distant Early Warning (DEW) Line sites in Nunavut under the jurisdiction of the Department of National Defence (DND) were remediated between the 1990s and the 2010s. Following remediation, DND began a long-term monitoring program of landfills remaining at these sites, according to the following timeline:

Site ID	Site Name	Monitoring Year 1
PIN-2	Cape Young	2012
PIN-3	Lady Franklin Point	2005
PIN-4	Byron Bay	2013
CAM-M	Cambridge Bay	2001
CAM-1	Jenny Lind Island	2010
CAM-2	Gladman Point	2006
CAM-3	Shepherd Bay	2008
CAM-4	Pelly Bay	2007
CAM-5	Mackar Inlet	2011
FOX-M	Hall Beach	2008
FOX-2	Longstaff Bluff	2012
FOX-3	Dewar Lakes	2012
FOX-4	Cape Hooper	1999
FOX-5	Broughton Island	2007
DYE-M	Cape Dyer	2014

Each site is monitored over a period of 25 years; monitoring requirements beyond this period have not yet been determined. DND is applying to renew/amend an existing Water Use License at one or more of the above-mentioned sites in support of the DEW Line long-term landfill monitoring program.

BACKGROUND

As part of the DEW Line Clean-Up (DLCU) project, DND and Nunavut Tunngavik Incorporated (NTI) developed agreements to determine the approach for long-term monitoring of the landfills at the remediated DEW Line Sites under DND's jurisdiction. The objective of the long-term monitoring plan is to collect sufficient information to assess the geotechnical and environmental performance of the landfills.

LONG-TERM MONITORING PROGRAM

DND hires independent contractors to conduct the long-term landfill monitoring. The components of the monitoring program are described below.

Visual Inspection: The physical integrity of each landfill is inspected for observations such as settlement, erosion, lateral movement, frost action, sloughing, cracking, animal burrows, staining, vegetative stress, seepage points, ponded water, exposed debris and vegetation re-establishment. Detailed photographs and figures are provided to document the condition of each landfill and to substantiate all recorded observations.

Soil and Groundwater Monitoring: Prior to the remediation of each DEW Line site, background soil samples were collected from areas that were not influenced by site activities; these background samples represent naturally occurring soil conditions at each site. During the remediation program, soil samples (and sometimes groundwater samples, depending on the characteristics of the landfill) were collected closer to each landfill to determine landfill-specific baseline soil and groundwater conditions.

The long-term monitoring plan specifies the locations and quantities of soil and groundwater samples to be collected at the landfills during each monitoring event. The soil and groundwater samples are analyzed for total petroleum hydrocarbons (PHCs), arsenic, cadmium, chromium, cobalt, copper, lead, nickel and zinc. Soil samples are also analyzed for polychlorinated biphenyls (PCBs). The results of these long-term monitoring samples are then compared to the background and baseline concentrations to evaluate any potential changes in environmental conditions.

All samples are collected by hand using manual tools or small pumps. No heavy equipment or machinery is involved in the regular long-term monitoring events.

Thermal Monitoring: The design of certain landfills incorporated the natural re-establishment of permafrost after landfill construction. A thermal monitoring system was established at these landfills to monitor the temperature of the landfill contents and the ground over time. During the monitoring events, the data from the thermal monitoring system is collected.

The long-term landfill monitoring program consists of three phases, as described below.

Phase I: Phase I represents the first five years after remediation is completed at each DEW Line site. Typically, the landfills are monitored annually during this phase (Years 1, 2, 3, 4 and 5 after remediation).

Phase II: Phase II represents the next twenty years of long-term monitoring. Typically, the landfills are monitored at a reduced frequency during this phase (Years 7, 10, 15 and 25 after remediation).

Phase III: Phase III will involve monitoring for long-term issues such as the impacts of climate change (such as permafrost stability and significant storm events) and the long-term performance of the landfill design components (such as geosynthetic liners used in landfill construction). At the end of the Phase II program, a re-evaluation of the landfill monitoring program will be carried out prior to initiating Phase III. Phase III monitoring events are anticipated to be scheduled on a 10-year monitoring interval.

REVIEW AND EVALUATION PROCESS

As per the NTI-DND Agreements, an Environmental Working Group (EWG) was established to provide technical review and support during the remediation and long-term monitoring aspects of the DEW Line Clean-Up. The EWG is comprised of engineers and environmental scientists with expertise in environmental remediation and geotechnical engineering in northern climates. The EWG is composed of four members; two represent the NTI and two represent DND. The EWG reviews the results of the long-term landfill monitoring program. The results of the review and any recommendations regarding changes to the long-term monitoring plan and/or remediation requirements are reported to the NTI-DND DEW Line Steering Committee.

SITE ACCESS AND WATER USE DURING MONITORING EVENTS

The monitoring contractors access the remote DEW Line sites by charter aircraft; sites that are within driving distance of communities are accessed by pick-up truck and ATV. Typically, teams of five to ten people conduct the monitoring over a period of two to ten days, depending on the size of the site and the number of landfills to be monitored. Teams travel across the sites by foot, ATV and/or pick-up truck.

At sites accessed by charter aircraft, the monitoring teams typically set up a temporary camp at the site's airstrip to provide accommodations during the work program. The camp would consist of several tents and power would be supplied by one or two generators. In some cases, the team stays inside the North Warning System facilities instead of setting up a camp. In both situations, all drinking water would be brought in bottles from the staging community.

Water use typically only consists of the collection of small volumes of groundwater for submission to laboratories for chemical analysis as part of the long-term environmental evaluation of the landfills.