11. INUIT WATER RIGHTS

Will the project or activity substantially affect the quality, quantity, or flow of water flowing through Inuit Owned Lands and the rights of Inuit under Article 20 of the Nunavut Land Claims Agreement?

No.

If yes, has the applicant entered into an agreement with the Designated Inuit organization to pay compensation for any loss or damage that may be caused by the alteration. If no compensation agreement has been made, how will compensation be determined?_____

12. CONTRACTORS AND SUB-CONTRACTORS (name, address and functions)

UMA Engineering Limited (Consultant hired to conduct long-term monitoring)
17007 107 Avenue
Edmonton, AB
T5S 1G3

13. STUDIES UNDERTAKEN TO DATE (list and attach copies of studies, reports, research, etc.)

A comprehensive list of the studies, reports, research, etc. that have been conducted to date is provided in Appendix 6. Copies of many of these have already been provoded to the Nunavut Water Board. If you require copies of any of these reports please let us know.

14. THE FOLLOWING DOCUMENTS MUST BE INCLUDED WITH THE APPLICATION FOR THE REGULATORY PROCESS TO BEGIN

Supplementary Questionnaire (where applicable: see section 5) ☐ Yes ☒ No If no, date expected ____

Inuktitut and/or Inuinnaqtun/English Summary of Project ☒ Yes ☐ No If no, date expected _____

Application fee of $30.00 (Payee Receiver General for Canada) ☐ Yes ☒ No If no, date expected n/a

Water Use fee of $30.00 (unless otherwise indicated in Section 9 of the *NWT Waters Regulations;* Payee Receiver General for Canada)

☐ Yes ☒ No If no, date expected n/a

15. PROPOSED TIME SCHEDULE (unless otherwise indicated, the NWB will consider the application for a five (5) year term)

☐ one year or less (or) ☒ Multi Year

Start Date: August 1, 2008 Completion Date: September 30, 2032

Natalie Plato	Director, Cont. Sites		Aug 11/08
Name (Print)	**Title (Print)**	**Signature**	**Date**

For Nunavut Water Board office use only

APPLICATION FEE **Amount: $_____** **Pay ID No.: _____**

WATER USE DEPOSIT **Amount: $_____** **Pay ID No.: _____**

Appendix 2: Executive Summary (English)

EXECUTIVE SUMMARY

1. PROJECT BACKGROUND

The former CAM-F DEW Line site was constructed in 1957 and subsequently closed and abandoned in 1963. In 1977 the site was converted to a scientific research station and in 1985, a hazardous materials removal program was implemented in which visible hazardous wastes and liquids from abandoned equipment were removed. Assessments completed in 1987/88 and 1994 confirmed the presence of contaminated soil and additional hazardous materials. In 1989, a partial clean up of the walls and floors, containing PCB amended paints, was carried out to limit the exposure of workers to PCBs. An asbestos abatement program and the clean up of Dump A were carried out in 1997.

Indian and Northern Affairs Canada (INAC) augmented the work carried out in previous years with a detailed site investigation in the summer of 2004. At the same time, a geotechnical investigation was completed to identify suitable borrow source material and potential locations for non-hazardous landfills. A site specific human health and ecological risk assessment was also completed to assist in determining suitable remediation criteria for the site. Previously containerized PCB soil wastes were also removed from the site and transported south for disposal. Based on the results of these investigations, as well as information gathered during the public consultation process, INAC finalized the CAM-F Remedial Action Plan.

Implementation of the Remedial Action Plan began in 2005 with the mobilization of equipment and materials to Hall Beach. In March-April of 2006 the equipment was moved from Hall Beach to CAM-F via CAT-Train. The on site remediation work took place over two field seasons (June -September 2006 and June-September 2007) and included the construction of a Non-Hazardous Waste Landfill and a Secure Soil Disposal Facility, the cleaning and disposal of over 9,000 drums, debris collection, contaminated soil excavation, hazardous waste removal, and building and structure demolition. The equipment and materials were demobilized from the site in April-May 2008.

2. PROJECT LOCATION

The former CAM-F DEW Line site is located at 68°33' N, 83°19' W on the Melville Peninsula, between Foxe Basin and Committee Bay in Nunavut. The site is situated exclusively on Crown land. The main station was situated at an elevation of 260 m above sea level on a hill approximately 2 km north of the west arm of Sarcpa Lake. Terrain around the site consists of rolling tundra highland with gravel deposits, several lakes and numerous rivers. The site, which is approximately 85 km west of Hall Beach and 100 km southwest of Igloolik, is landlocked and inaccessible by sea-lift. It can be reached by canoe or overland

winter route by way of Hall Lake and the Kingora River. As well, there is an airstrip suitable for landing small aircraft such as a Twin Otter.

3. PROJECT ACTIVITIES & SCHEDULE

During the summer of 2008 INAC will implement the CAM-F Sarcpa Lake Long-Term Monitoring Plan (See Appendix 4). Monitoring of the site will continue for 25 years (every year for the first 5 years, then in year 7, 10, 15, 20 and 25) at which time a review will be conducted and the need for continued monitoring assessed.

The monitoring plan for CAM-F includes monitoring of the Non-Hazardous Waste Landfill and the Secure Soil Disposal Facility. The parameters that will be measured consist of visual characteristics, water, soil, and temperature.

4. SOCIAL IMPACT OF THE PROJECT

Wherever possible, the project has adopted solutions tailored to the northern environment and its inhabitants by using local knowledge and including the unique needs of northerners and their environments.

Consultations were held in Hall Beach and Igloolik throughout the CAM-F Sarcpa Lake remediation project. The community presentations were used to complete the following objectives:

- To share information on the project with the community;
- To hear site-specific concerns from local people who are familiar with current conditions at the site or were familiar with on-site activities during facility operation;
- To identify the issues and concerns the communities had with the site and the proposed work; and
- To identify resources (labour and equipment) in the community that would be able to assist in the execution of the project

Appendix 3: Executive Summary (Inuktitut)

ᓇᐃᖏᑕᑭᐊᖅᓴᒪᔨᖅ ᐅᓂᒃᑲᖅ

1. ᐱᑎᐊᖅᖃᓕᐅᑭᓴᐊ

ᑎᐅᑕᐃᓐᓄᑦ CAM-F-ᒥ ᐃᓕᑕᐅᑎᖅᑲᖃᑕᐅᑕᐅᖅᓴᒪᖏᓕᑕ 1957-ᒥ ᖁᑭᖏᓂᐊᖅᓱᓂᕐᒪᖅ 1963-ᒥ; ᑕᐃᒪᖏᔪᓂ ᑕᖏᖅ ᐅᑎᖅᐃᐅᑕᐅᖅᓴᒪᖏᑎᑕᖅ 1963-ᒥᓂ. 1977-ᒥ, ᓇᓇᕋᓯᖏᓐᓄᑦ ᖃᐅᐅᓴᖅᑎᒃᓄᑯᓐᓇᓂ ᐊᑐᖅᑕᐅᖅᑲᑕᑕᐅᖅᑐᖅ ᐊᒻᒪ 1985-ᒥ, ᐊᑕᕐᓇᖅᑐᑦ ᐄᕐᖅᑕᐅᓂᖅᑭᓐᓇᓂ ᐱᓕᕆᐊᒃᓴᖅ ᐊᑐᓕᖅᑎᑕᐅᑕᐅᖅᑐᖅ ᑕᑯᕐᐅᔪᓐᓇᖅᑐᑦ ᐃᒪᐃᓕᓐᓂ ᐊᑕᕐᓇᖅᑐᑦ ᐃᑲᖅᑕᐅᓕᖅᑐᑦ ᐊᐅᓚᑲᒪᔨᖅ. ᖃᓄᓂᒋ ᐊᖏᑎᕐᑎᓐᓇᓂ ᐃᒃᐱᖅᓇᕐᓂᖃᖅᑐᑦ ᖃᐅᐅᓴᖅᑎᑕᐅᔭᓂᒃᑎᓕᓂ 1987/88-ᒥ ᐊᒻᒪ 1994-ᒥ ᐱᑕᖃᖅᓂᕐᕆᐃᓕᐅᖅᑐᑦ ᓇᓇᒥᒃ ᐊᓯᖏᓐᓄᓕᒫᖅ ᐃᒃᐱᖅᑕᐅᖅᑐᑦ. 1989-ᒥ, ᐃᓕᐃᓇᖏᓐᓄᒃ ᓴᓇᒪᖅᓴᐃᓕᐅᖅᑐᑦ ᐊᑭᓇᕐᓂᒃ ᐃᓇᐃᓐᓇᖅᑐᒥᒃ ᐊᒥᐊᖅᑕᐅᔪᕆᐊᓗᓂ, ᐃᓇᐃᓐᓇᖅᑐᑦ ᐊᓇᓴᓂ ᐊᑕᕐᓇᖅᑐᑦ. ᐃᑭᓴᕐᕕᐃᓐᓇᕐᓂᐊᕐᓂᖅᑐᑦ ᐃᒃᐱᖅᑕᐅᓕᕐᒥᔪᓂ ᐊᖅᑕᕐᑕᕐᒥᒃ ᐊᒥᐊᖅᑕᐅᓕᕐᒥᔪᓂ ᑕᒪᓐᓇ ᓇᓇ ᖃᐅᐅᓴᖅᑎᑕᐅᑕᐅᖅᑐᑦ ᑕᒪᓐᓇ ᓇᓇᖃᖅᑐᑦ 2004 ᐊᐅᓚᖅᓱᓂ. ᒪᑐᒥᓂᕆᐊᓐᓇᖅ ᓇᓇᖅᓱᓂ ᐊᒃᑕᕐᕕᖅᓴᒪᖏᑎᑕᖅ ᖃᐃᓕᖅᑐᑦ ᐃᓇᐃᓐᓇᖅᑐᑦ ᓇᓇᖅᓱᓂᓂ ᐊᑕᕐᓇᖅᓯᑕᐅᑐᓂ. ᑕᒪᓐᓇ ᓇᓇᖅ ᖃᐅᐅᓴᖅᑎᑕᐅᓕᕐᒥᔪᖅ ᐅᒪᔪᓂ ᐊᑕᕐᓇᑭᐅᑐᐃᓐᓇᕆᔨᖃᖅᓴᖅᓱᓂᓱᓂᒃ ᐊᐅᑎᖅᓱᓂᓂᒃ ᐊᑐᐃᖅᑕᐅᑎᓂᒃ ᐊᑐᐃᓇᑭᐅᖅᑕᐅᑕᐅᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ. ᑕᐃᔨᓕᓂ ᐅᖅᖃᖅᑕᐅᓕᕐᒥᔪᖅ ᐃᓇᐃᓐᓇᑭᐅᖅᑐᑦ ᐃᑲᖅᑕᐅᓕᖅᑐᒃ ᖃᐅᓐᓇᑭᐅᖅᑐᑦ ᐃᓕᓴᕐᓂᖅ ᐊᑕᕐᓇᑭᐅᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᐊᑐᐃᓐᓇᖅᑕᐅᑕᐅᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ. ᑕᐃᔨᓕᓂ ᐅᖅᖃᖅᑕᐅᓕᕐᒥᔪᖅ ᐃᓇᐃᓐᓇᑭᐅᖅᑐᑦ ᖃᐅᓐᓇᑭᐅᖅᑐᑦ ᓇᓇᒪᓂ ᐊᑕᕐᓇᑭᐅᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᐊᑐᐃᓐᓇᖅᑕᐅᑕᐅᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ. ᑕᐃᔨᓕᓂ ᐅᖅᖃᖅᑕᐅᓕᕐᒥᔪᖅ ᐃᓇᐃᓐᓇᑭᐅᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᐊᑐᐃᓐᓇᖅᑕᐅᑕᐅᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ.

ᐃᓇᓕᓗᐊᔪᖅᑲᒃᑯᑦ ᐃᓕᐃᓕᐅᖅᑐᑦ ᐱᑕᖃᓗᓴᕐᔪᐊᓘᓂᖅᓂᒃ ᐅᑭᐅᖓᒍᓕᐅᖅᑐᑦ ᑕᒪᓐᓇ ᓇᓇ ᖃᐅᐅᓴᖅᑎᑕᐅᑕᐅᖅᓴᒪᖏᑎᑕᖅᑐᑦ 2004 ᐊᐅᓚᖓᓂᓂ. ᒪᑐᒪᓂᑕᐃᓐᓇᖅ ᓇᓇᖅᓱᓂ ᐊᒃᑕᕐᕕᒃᓴᖅ ᖃᐅᐅᓴᖅᑎᑕᐅᓂᒃᑐᑦ ᓇᓇᖅᓱᓂᓂ ᐊᑕᕐᓇᖅᓯᑕᐅᑐᓂ. ᑕᒪᓐᓇ ᓇᓇᖅ ᖃᐅᐅᓴᖅᑎᑕᐅᓕᕐᒥᔪᖅ ᐅᒪᔨᓂ ᐊᑕᕐᓇᑭᐅᑐᐃᓐᓇᕆᔨᖃᖅᓴᖅᓱᓂᓱᓂᒃ ᐊᒥᐊᖅᑕᐅᑎᓂᒃᑐᑦ ᖃᐅᐅᓴᖅᑎᑕᐅᑕᐅᖅᑐᖅ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ. ᑕᐃᔨᓕᓂ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᖃᐅᐅᓴᖅᑎᑕᐅᑕᐅᖅᑐᖅ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ.

ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃᑐᑦ ᓴᓇᒪᖅᓴᐃᓕᐅᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑕᐅᑕᐅᖅᓴᒪᖏᑎᑕᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ ᑕᒪᑐᒪᖅᓯ ᓇᓇᒪᓂ 2005-ᒥ ᐃᓅᑕᐅᓂᒃ ᐊᓇᖅᑐᓂ ᐊᓯᖏᓐᓄᓕᒫᖅ ᐊᓂᕆᐊᖓᓂᒃ. ᐃᓕᓴᐃᐊᓗᓕᒥ-ᒥ 2006-ᒥ ᐊᓇᖅᑐᓂ ᐃᓅᑕᐅᓂᒃ ᐊᓂᕆᐊᖓᒥᓂ CAM-F-ᓗᑦ CAT ᖃᐅᔨᑎᐊᓕᕐᒥᔪᓂ. ᐃᓂᓂᕆᐊᖓᒥ ᓴᓇᒪᖅᓴᐃᓂᖅᑐᑦ ᓯᖁᐊᑎᖅᑐᑦ ᐊᑕᐃᒪᖅᑐᑦ ᐊᑕᐃᓕᖅᑐᑦ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃᑐᑦ (ᔨᓂ - ᓄᑎᐱᓗ 2006 ᐊᒻᒪ ᔨᓂ - ᓄᑎᐱᓗ 2007) ᐊᓇᓕᐅᖅᓯᑎᓐᓄᓕ ᐊᑕᕐᓇᓴᕐᓯᑕᐅᓂᒃ ᐊᒥᐊᖅᑕᐅᑎᓂᒃ ᓇᓇᒥᒃ ᓯᑭᖅᓄᒪᔨᖅ ᐊᒥᐊᖅᑕᐅᑎᓂᒃᓱᓕᕐᓂᐊᕐᓂᐊᖅᑎᓂᒃᓗᓕ, ᓴᓇᒪᖅᓴᓕᐅᖅᑐᓂᒃ ᐊᒥᐊᖅᑕᐅᑕᒃᓴᓕᐊᕐᑎᖅᑎᕐᕕᓕᕐᓂᓕ 9,000 ᐅᖃᓕᒋᐅᔪᓂᑦ ᐅᖅᑭᓄᑕᐅᑎᓯᓚᐅᖅᑐᑦ, ᐊᒥᐊᓯᐅᖅ ᒪᑎᖅᓄᑲᓕᑕᐅᓂᒃ, ᓇᓇ ᓄᕐᐅᔨᖅ ᓴᓇᒪᖅᓴᖅᑭᖅᑐᖅᓱᓂᒃ, ᐊᑕᕐᓇᖅᑐᑦ ᐊᒥᐊᓯ ᓅᑕᐅᓂᒃ, ᐊᒻᒪ ᐃᓗᓇᔨᐊᓯ ᓴᓇᒪᖅᓴᐅᓄᑲᓕᕐᓂᓗ ᓄᕐᐅᖅᑎᑕᐅᓂᒃᓇᐃᓕᐅᓄᑲᓕᕐᓂᓗ ᓄᕐᐅᖅᑎᑕᐅᓂᒃ. ᓴᓇᒪᖅᓴᓂ ᐊᓯᖏᓐᓄᓗ ᓴᖅᑭᑕᐅᓂᒃ ᐃᓕᓴᕐᓂᖅ ᐊᑐᐃᓐᓇᖅᑕᐅᑎᓂᒃ 2008-ᒥ.

2. ᐱᓕᕆᐊᒃᓴᐅᑉ ᓇᓃᓐᓂᖓ

ᑎᐅᓚᐃᓐᑯᑦ CAM-F-ᒥ ᓈᓚᐅᑎᖃᕐᕕᕕᓂᖓ ᓄᓇᙳᐊᑎᒍᑦ 68°33' ᐅᐊᖕᓇᖅ, 83°19' W ᒥᐊᕕᐊᓪ ᐃᑭᕋᓴᖓᓂ, ᓯᑰᕐᒥᐅᑦ ᐊᒥᖓᑕ ᐊᑯᓕᐅᓪᓗ ᐊᑯᓐᓂᖓᓂ ᓄᓇᕗᒻᒥ. ᓄᓇ ᑕᒪᓐᓇ ᑯᐃᑉ ᓄᓇᖓᓃᑦᑐᖅ. ᐃᒡᓗᕐᔪᐊᖃᕐᕕᖓ ᖁᑦᑎᖕᓂᕐᒦᕐᒐᓂ 260-ᒦᑦᑐᒥᒃ ᖁᑦᑎᖕᓂᓕᒃ ᓯᒡᔭᖓᓂᑦ ᐊᕙᓗᐊᓂ 2 ᑭᓛᒥᑐᒥᒃ ᐅᐊᖕᓇᖕᓘᖓᓃᕐᒐᓂ ᓴᖅᐸᐅᑉ ᑕᓯᖓᑕ. ᓄᓇᖓ ᓇᖅᓴᖃᐅᒪᓛᒃᑐᖅ ᖁᑦᑎᒃᑑᓪᓗᓂ ᑐᐊᐸᔫᑦ, ᐊᒥᓱᓂᒃ ᑕᓯᓕᒃ ᐊᒥᓱᓗᖕᓂᓗ ᑰᒐᓛᓕᒃ. ᓄᓇ ᑕᒪᓐᓇ ᐃᒻᒪᖄ 85 ᑭᓛᒥᑐᒥᒃ ᐊᐅᖕᓇᖕᓘᖓᓃᑦᑐᖅ ᓴᓂᕋᔭᐅᑉ ᐊᒻᒪᓗ 100 ᑭᓛᒥᑐᒥᒃ ᐅᖓᓯᖕᓂᖃᖅᒐᓂ ᐃᒡᓗᓕᖕᒥᑦ, ᓄᓇᑐᐃᓐᓇᕐᒦᑦᑐᖅ ᐅᒥᐊᕐᔪᐊᒃᑯᑦ ᑎᑭᑕᒃᓴᐅᙱᑦᑐᒥ. ᑲᓅᒃᑯᑦ ᑎᑭᑕᒃᓴᖅ ᓄᓇᒃᑯᓪᓗ ᓴᓂᕋᔭᐅᑉ ᑕᓯᖓᒍᑦ ᑭᖑᕋᐅᓪᓗ ᑰᖓᒍᑦ. ᐊᒻᒪᐃᓛᒃ, ᒥᕝᕕᒃᑕᓕᒃ ᓈᒻᒪᒃᑐᒥᒃ ᒥᑭᑦᑐᓂᒃ ᑎᖕᒥᓲᓂᒃ ᓲᕐᓗ ᒪᕿᓕᕋᓛᕐ.

3. ᐱᓕᕆᐊᒃᓴᕐᒥ ᖃᓄᐃᓕᐅᕐᓃᑦ ᖃᖓᒃᑰᕐᓂᖏᓪᓗ

ᐊᐅᔭᖓᓂ 2008 ᐃᓄᓕᕆᔨᑐᒃᑯᑦ ᐊᑐᓕᖅᑎᓛᖅᑖ CAM-F ᓴᖅᐸᐅᑉ ᑕᓯᐊᑕ ᐅᖓᓯᒃᑐᒧᑦ ᓇᐅᑦᑎᖅᓱᕐᓂᕐᒧᑦ ᐸᕐᓇᒍᑎ (ᑕᑯᓗᒍ ᐅᐃᒍ C). ᐃᓂᖃᕐᕕᒃ ᓇᐅᑦᑎᖅᓱᖅᑕᐅᖏᓐᓇᓛᖅᑐᖅ ᐊᒡᒋᖅᑐᓂ ᐊᕐᕌᒍᓂ 25-ᓂ (ᐊᕐᕌᒍᑕᓖᑦ ᓯᕗᓪᓕᖅᐹᓂ ᑕᓪᓕᒪᓂ, ᐊᕐᕌᒍᒋᓕᖅᑕᖏᓐᓂᒡᓗ 7, 10, 15, 20 ᐊᒻᒪ 25) ᐱᐊᓂᒃᐸᓪᓗ ᕿᒥᕐᕈᐊᓛᖅᑕᐅᓛᖅᒐᓂ ᓇᓗᓇᐃᔭᖅᑕᐅᓛᖅᒐᓂᓗ ᓇᐅᑦᑎᖅᓱᖅᑕᐅᔭᕆᐊᖃᒃᑲᓐᓂᕐᓂᖓ.

ᓇᐅᑦᑎᖅᓱᖅᑕᐅᓂᖓᓄᑦ ᐸᕐᓇᐅᑎ CAM-F-ᒧᑦ ᐃᓚᐅᓂᖃᖅᐳᖅ ᓇᐅᑦᑎᖅᓱᖅᑕᐅᓂᖓᓂᒃ ᐊᑦᑕᕐᓇᙱᑦᑐᓄᑦ ᐊᒃᑕᕐᕕᒃ ᓄᓇᒧᓪᓗ ᓱᕈᖅᓯᒪᔪᒧᑦ ᐊᒃᑕᕐᕕᖕᒧᐊᑦᑎᐊᕐᕕᒃ. ᐆᒃᑐᖅᑕᐅᔪᑦ ᑕᑯᔭᒃᓴᐅᔪᓐᓇᓛᖅᐳᑦ ᑕᖏᖃᕐᓗᑎᒡᓗ ᓲᕐᓗ, ᐃᒪᖅ, ᓄᓇ, ᐅᖅᑰᓂᕆᔭᖓᓗ ᓂᒡᓚᓱᖕᓂᕆᔭᖓᓗ.

4. ᐱᓕᕆᐊᒃᓴᐅᑉ ᐃᓅᖃᑎᒌᖕᓂᕐᒧᑦ ᐊᒃᑐᐊᓂᖓ

ᓇᐅᒃᑯᑐᐃᓐᓇᖅ ᐊᔪᙱᑦᑕᕌᖓᑦ, ᐱᓕᕆᐊᒃᓴᖅ ᐋᖅᑭᒃᓯᒋᐊᕈᑎᖃᓲᖑᒪᑦ ᐅᑭᐅᖅᑕᖅᑑᑉ ᐊᕙᑎᖓᓄᓪᓗᐊᑕᖅ ᑐᕌᖓᔪᓂᒃ ᐅᑭᐅᖅᑕᖅᑐᕐᒥᐅᓄᓪᓗ ᐊᑐᖅᒐᑎᒃ ᓄᓇᓕᖕᓂ ᖃᐅᔨᒪᔭᐅᔪᓂᒃ ᐊᑐᖅᑎᑦᑎᓪᓗᑎᒡᓗ ᐊᔾᔨᐅᙱᑦᑐᓂᒃ ᐊᑐᓇᐊᖃᖅᑕᖏᓐᓂᒃ ᐅᑭᐅᖅᑕᖅᑐᕐᒥᐅᑕᐃᑦ ᐊᕙᑎᖏᓪᓗ.

ᓴᓂᕋᔭᖕᒥ ᐃᒡᓗᓕᖕᒥᓗ ᖃᐅᔨᒋᐊᕐᕕᒋᔭᖃᖃᑦᑕᓚᐅᖅᑐᑦ CAM-F ᓴᖅᐸᐅᑉ ᑕᓯᖓ ᓴᓗᒻᒪᖅᓴᖅᑕᐅᑎᓪᓗᒍ. ᓄᓇᓕᖕᓄᑦ ᓴᖅᑭᑎᑕᐅᔪᑦ ᐅᑯᓂᖓ ᑐᕌᕐᕕᖃᓚᐅᖅᑐᑦ:

- ᖃᐅᐸᐃᖅᐃᓴᓯᕆᑦ ᐱᓕᕆᐊᒃᓴᐅᑦ ᒥᐦᓴᓄᑦ ᓄᓇᓕᖅᑎᐅᑕᓄᑦ ᑐᓴᖅᑎᑕᐅᓂᖅᓯᒪᑦ;
- ᐃᓂᖅᑲᕕᖅᓯᒪᓕᕆᑕᖅ ᐃᓕᒧᒐᑎᑎᕐᐅᓪᓚᑦ ᑐᐊᓴᐅᓂᐊᕐᓴᒪᑕ ᓄᓇᓕᖅᑎᐅᑕᓂᑦ ᖃᐅᐸᒪᓂᖅᑐᓂᑦ ᐊᓂᖅᓚᖅᑕᖅ ᐃᓂᖅᑕᕐᓚᖅᑕᐅᓂᖅᑐᑦ ᐃᓕᓴᐅᓂᖅᑐᑦ ᑕᐃᔨᓕᒪᓂ ᖃᐅᓄᐃᑕᐅᓂᕕᖅᑐᓂᖅᑐᑦ ᐊᑐᖅᑕᐅᑎᓪᓗᑐᒍ;
- ᓇᓗᓇᐃᖅᑕᐅᓂᖅᓯᒪᑦ ᓄᓇᓕᖅᓱᓄᑦ ᐱᔨᕆᐅᐊᕐᓴᑦ ᐃᓕᓐᓂᑎᑎᕐᐅᓪᓚᑦᓗ ᐃᓂᖅᑲᕕᖅᓯᒪᑦ ᖃᒪᓕᕆᐅᓕᖅᓴᓕᕆᓂᖅ; ᐊᒻᒪᓗ
- ᐃᖃᓗᐹᑎᖅᓴᐃᑦ ᓇᓗᓇᐃᖅᑕᐅᓂᖅᓯᒪᑦ (ᐃᖅᑲᖃᓇᐃᔨᖅᑲᓂᑦ ᓴᓇᖅᑭᑦᓗ) ᓄᓇᓕᖅᑎᒥ ᐃᖃᓗᐹᓇᕆᔨᖅᑕᒥ ᖃᐅᓕᑎᑕᐅᓂᖅᓱᓇᓄᑦ ᐱᓕᕆᐊᒃᓴᖅ.

Appendix 4: CAM-F Sarcpa Lake Long-Term Monitoring Plan

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

CAM-F SARCPA LAKE LONG-TERM MONITORING PLAN

January 23, 2007

Table of Contents

Appendices

1.0 Introduction

CAM-F Sarcpa Lake was an Intermediate Distant Early Warning (DEW) Line site, a remediation project was conducted at the site between 2005 and 2008. The remediation involved the demolition and disposal of buildings, structures and other debris, as well as the clean up of hazardous materials. . The remediation included the excavation and disposal of contaminated soil, which was either shipped off site or placed in a secure soil disposal facility on site.

1.1 Location

CAM-F Sarcpa Lake is located on the Melville Peninsula within the Baffin Region of Nunavut. The two nearest communities are Hall Beach, located approximately 85 kilometres to the East, and Igloolik, which is located approximately 100 kilometres to the Northeast. The GPS Coordinates of the site are 68°33'0"N - 83°19'0"E (see Figure 1).

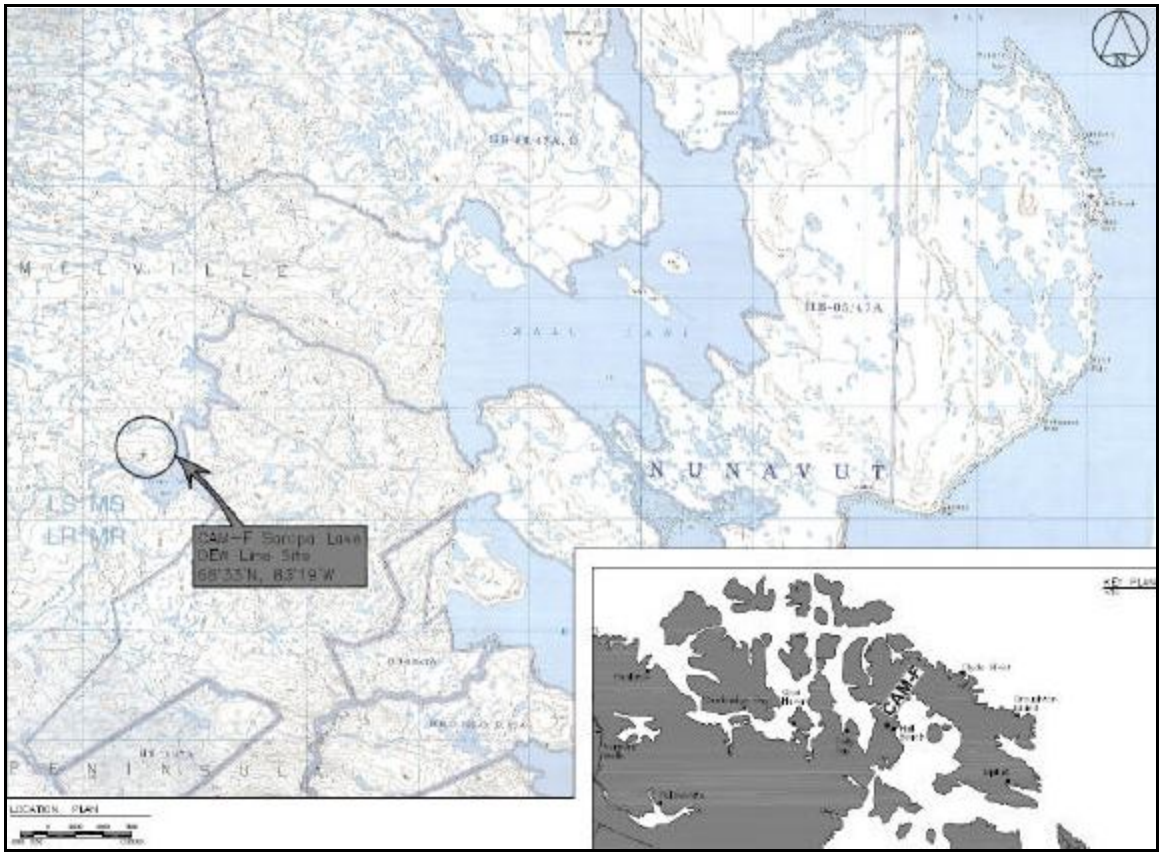

Figure 1: CAM-F Sarcpa Lake Location

1.2 Site Characteristics

The CAM-F Intermediate DEW Line Site was constructed in 1957 and subsequently abandoned in 1963. It was converted to a scientific research station in 1977 under the Science Institute of the Northwest Territories and Canada, Department of Indian and Northern Affairs and operated seasonally until 1988.

The site and buildings were within a favoured hunting area and the buildings had been used as temporary hunting shelters.

The CAM-F site consists of two main parts - the station area and the former construction camp area at Sarcpa Lake (See Appendix A).

The station is accessed via 3 km of road from the shores of Sarcpa Lake. Site facilities consisted of an airstrip, small module train, warehouse, garage, Quonset, Inuit house, two former landfill areas, and oil and lubricants (POL) storage facilities. The site contained approximately 10,000 barrels, a radar tower that had been knocked down, other site debris and contaminated soil. There were also some miscellaneous wastes and chemicals from the years as a research site.

The beach area at Sarcpa Lake included a former construction camp that consisted primarily of scattered barrels (in and around the lake), abandoned construction equipment, and a small machine shop and generator pad.

1.3 Climate

Climatic data information was obtained from the closest weather stations at Hall Beach (elevation 8 m, 85 km east of Sarcpa Lake) and Mackar Inlet (elevation 395 m, 100 km west of Sarcpa Lake) as no weather station was available at Sarcpa Lake. In total, approximately 215 mm and 189 mm of precipitation occur per year at Hall Beach and Mackar Inlet respectively, of which 60% is rainfall and 40% is snowfall. Generally, the wettest months are July through September.

The mean annual air temperature at Hall Beach is -14.7 °C, and at Mackar Inlet -14.4 °C. Daily temperature ranges from 6.0°C in July to -32.7°C in February. Winds are primarily from the northwest, with an average wind speed of 21 km/hr.

1.4 Geology

Regionally, the terrain is undulating to hilly with numerous bedrock outcrops. The landscape is characterized by a surficial veneer or blanket of glacial drift. Occasional small water ponds or thaw lakes occur throughout the area. The ponds are generally small and irregular in shape and follow valleys in the bedrock terrain. Drainage channels and patterns are generally well developed

throughout the area, with drainage directed toward the Kingaroo River and Sarcpa Lake.

Sarcpa Lake is within the zone of continuous permafrost. No ground temperature measurements were made at the site; however, ground temperatures have been measured at Hall beach. The mean annual ground temperatures at Hall Beach varied from -9°C to -10° C.

The CAM-F site sits on a ridge approximately 1,000 m north of Sarcpa Lake. Surface drainage around the station flows off the ridge outward to the southwest and north. Surface water drains either overland or in short drainages which follow the bedrock valleys towards Sarcpa Lake.

Elevation at the main site is 260 m above sea level and the shoreline of Sarcpa Lake is approximately 165 m above sea level.

2.0 Monitoring Areas

During the remediation of CAM-F two structures were constructed and remain on the site, the Non-Hazardous Waste Landfill (NHWL) and the Secure Soil Disposal Facility (SSDF).

2.1 Non-Hazardous Waste Landfill

Construction of the NHWL at CAM-F started in July 2006 and was completed in September 2007. A site map detailing the location of the NHWL can be found in Appendix B.

2.1.1 Design

The NHWL was designed to contain non-hazardous materials only. It was constructed on native ground with the organic matter stripped and consists of four perimeter berms constructed of granular material. The non-hazardous waste was placed in the landfill in layers consisting of 0.5 metre lifts of waste covered by 0.15 metres of granular fill. Once all the layers were completed a final cover consisting of a minimum of 1.0 metres of granular fill was used to cap the landfill. See Appendix C for a detailed schematic of the design.

2.1.2 Contents

The NHWL at CAM-F contains the following:

- Tier I contaminated soil (see Table 1)
- F3 and F4 fraction hydrocarbon contaminated soil
- Non-hazardous demolition debris, such as timbers, plywood, and sheet metal
- Non-hazardous site debris, such as scrap metal and wood
- Non-hazardous debris/soil excavated from landfills
- Creosote timbers
- Double-bagged asbestos

Table #1: DEW Line Cleanup Criteria Tier I Contaminant Criteria

Parameter	Criteria
Lead	200 to 500 ppm
PCBs	1 to <5 ppm

2.1.3 Monitoring Requirements

The NHWL will be monitored by:

- Visual Monitoring
    - This will check the physical integrity of the NHWL and look for evidence of erosion, ponding, frost action, settlement and lateral movement (Appendix D contains a Visual Monitoring Checklist).

- Photographs will be taken to document the condition of the NHWL and substantiate the recorded observations.

2.2 Secure Soil Disposal Facility (SSDF)

Construction of the SSDF at CAM-F started in July 2006 and was completed in September 2007. A site map detailing the location of the SSDF can be found in Appendix E.

2.2.1 Design

The SSDF was designed to contain non-hazardous, contaminated soils. The design was based on the characteristics of the contaminants in the soil and the local geothermal and permafrost properties. The design uses permafrost as the primary containment barrier with both the contents and perimeter berms remaining in a frozen state (the SSDF should reach a frozen state within 3-4 years of construction). The thickness of the cover material was calculated to prevent the thaw of the contaminated soil even after 10 consecutive 1 in 100 warm years. The initial design was modified in 2007 and an additional metre of cover was added increasing the total cover material from 2.3 to 3.3 metres. The additional cover material was added after data from an international project called the Arctic Climate Impact Assessment was assessed and it was determined that the long term recommendations for climate change had increased.

Secondary containment is achieved by using High-Density Polyethylene (HDPE) liners welded together to cover the base, sides, and top of the facility. The HDPE liners are chemically compatible with the contaminated soil and prevent precipitation percolation as well as the movement of contaminants during permafrost aggradation.

The SSDF was constructed by first preparing the subgrade and installing the key trench and four exterior berms using saturated silty gravel. The HDPE liner on the base and sides was then installed and contaminated soils were placed inside the facility. Following this an intermediate granular cover was placed on top followed by the top HDPE liner and the final granular cover. The final construction steps are to grading to promote drainage and the installation of thermistors and monitoring wells. See Appendix F for a detailed schematic of the design.

2.2.2 Contents

The SSDF at CAM-F contains the following:

- Tier II contaminated soil (see Table 2)
- PHC (petroleum hydrocarbon) contaminated soils (BTEX, F1 and F2)

Table #2: DEW Line Cleanup Criteria Tier I Contaminant Criteria

Parameter	Criteria
Arsenic	30 ppm
Cadmium	5 ppm
Chromium	250 ppm
Cobalt	50 ppm
Copper	100 ppm
Lead	500 ppm
Mercury	2 ppm
Nickel	100 ppm
Zinc	500 ppm
PCBs	>5 to <50 ppm

2.2.3 Monitoring Parameters

The SSDF will be monitored by:

- Visual Monitoring
  - This will check the physical integrity of the SSDF and look for evidence of erosion, ponding, frost action, settlement and lateral movement (Appendix D contains a Visual Monitoring Checklist).
  - Photographs will be taken to document the condition of the SSDF and substantiate the recorded observations.
- Active Layer Water Monitoring
  - Samples will be taken from the 2 monitoring wells installed down-gradient from the SSDF. These samples will be analysed and the results will be compared to those from background samples. The parameters that will be analysed include:
    - Colour
    - Odour
    - pH
    - Conductivity
    - Temperature
    - Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel, and zinc
    - Polychlorinated biphenyls (PCBs)
    - Total Petroleum Hydrocarbons (TPH)
- Soil Monitoring
  - Soil samples will be taken at the toe of the SSDF in the vicinity of the monitoring wells. These samples will be analysed and the results will be compared to baseline/background samples. The parameters that will be analysed include:
    - Inorganic elements: arsenic, cadmium, chromium, cobalt, copper, lead, nickel, and zinc
    - Polychlorinated biphenyls (PCBs)
    - Total Petroleum Hydrocarbons (TPH)

- Thermal Monitoring
  - The thermal monitoring system consists of 4 thermistor strings with beads at selected intervals to provide ground temperature profiles at various locations within the SSDF (See Appendix G for the Thermistor Installation Reports). Automatic data loggers attached to the thermistors allow remote data collection. The data from this system will be collected and analysed to determine the permafrost aggradation in the facility.

2.3 Monitoring Schedule

Monitoring at the CAM-F Sarcpa Lake site will begin in 2008 and continue for 25 years until 2032. Monitoring will occur every year for the first 5 years, then in year 7, 10, 15, 20 and 25. At the completion of the 25 year monitoring program a review will take place and the need for continued monitoring will be assessed. The table below outlines the schedule:

Table #3: Monitoring Schedule

Year	Site Monitoring Scheduled (X)
2008	X
2009	X
2010	X
2011	X
2012	X
2013	
2014	X
2015	
2016	
2017	X
2018	
2019	
2020	
2021	
2022	X
2023	
2024	
2025	
2026	
2027	X
2028	
2029	
2030	
2031	
2032	X

2.4 Monitoring Plan Summary

The monitoring plan at CAM-F Sarcpa Lake will begin in 2008 and continue for 25 years. The areas to be monitored are the NHWL and the SSDF; the parameters that will be monitored include visual characteristics, water, soil, and temperature. The monitoring requirements for the NHWL and the SSDF are summarized in the tables below:

Table #4: General Monitoring Requirements

Area	Monitoring Parameter			
	Visual	Water	Soil	Temperature
NHWL	X			
SSDF	X	X	X	X

Table #5: Specific Monitoring Requirements

Area	Water & Soil				Temperature		
	ID	Notes	Distance	Install Date	ID	Depth	Install Date
SSDF	BM-1	Up-gradient	~ 60 m	2006	VT-1	4.8 m	2007
	BM-2	Up-gradient	~ 57 m	2006	VT-2	4.8 m	2007
	MW-5	Down-gradient	~ 18 m	2006	VT-3	6.9 m	2007
	MW-6	Down-gradient	~ 19 m	2006	VT-4	6.9 m	2007

3.0 Quality Assurance/Quality Control

All sampling, sample preservation and analyses will be conducted in accordance with methods prescribed in the current edition of “Standard Methods for the Examination of Water and Wastewater”. All analysis will be performed in a Canadian Association of Environmental Analytical Laboratories (CAEAL) Accredited Laboratory.

Quality Assurance/Quality Control (QA/QC) will be consistent with CAEAL regulations and guidelines. At least 20% of samples will be taken and analyzed in duplicate and all appropriate QA/QC data will be generated and reported.

Appendix A: CAM-F Sarcpa Lake Site Map