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# **PROPOSAL FOR REVISION AND UPDATE OF THE SURVEILLANCE NETWORK MONITORING PROGRAM**

## **— Eureka High Arctic Weather Station —**

In support of the  
Nunavut Water Board License  
**No. 3BC-EUR0611**

Prepared by Environment Canada  
Assets, Contracting and Environmental Management Directorate (ACEMD)

**November, 2007**

**Canada**

## Control Page

On receipt of revisions and/or amendments, the Assets, Contracting and Environmental Management Directorate (ACEMD) shall complete this control page to ensure that the Proposal for Revision and Update of the Surveillance Network Monitoring Program at Eureka High Arctic Weather Station (HAWS) is always current and consistently reflects the operations and activities taking place on site.

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## Acronyms and Symbols

ACEMD	Assets, Contracting and Environmental Management Directorate
BOD	Biochemical oxygen demand
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
<i>E. coli</i>	<i>Escherichia coli</i>
EMS	Electromagnetic survey
HAWS	High Arctic Weather Station
Hg	Mercury
Mg	Magnesium
PEARL	Polar Environment Atmospheric Research Lab
pH	Measure of acidity or alkalinity
ppb	Parts per billion
SS	Suspended solids
TKN	Total Kjeldahl Nitrogen
TSS	Total suspended solids

## 1. Introduction

This proposal is in reply to a request made by the Nunavut Water Board to Environment Canada with respect to License No. 3BC-EUR0611. A letter from the Board, dated November 6, 2006, requested that Environment Canada submit to the Board:

*Part J, Item 12 – “...shall submit to the Board within ninety (90) days of issuance of the License, a proposal for revisions to the monitoring program outlined in Table 1. The proposal shall address additional monitoring requirements for any on-site facilities, active or remediate, not listed in Table 1. This proposal shall include verification of land farming of hydrocarbon contaminated materials at the facility. “*

This proposal shall also address Part I, Item 7 which states:

*“The Licensee shall submit, within nine (9) months of the issuance of this License, a Final Report on the Reclamation of the West Airstrip Landfill. This report shall detail the activities that have been completed, an overview of current monitoring, a summary analysis of the results to date and an outline of long term monitoring needs.”*

The requests from the Nunavut Water Board specifically target Environment Canada's Eureka High Arctic Weather Station (HAWS) which is located on the north side of Slidre Fjord, at the north-western tip of Fosheim Peninsula on Ellesmere Island at 80° 0' N and 85°56' W.

Eureka HAWS is a weather monitoring facility that has been in operation since 1947. The Eureka HAWS is a centre of activity for Environment Canada, the Department of National Defence, the Polar Continental Shelf Project, and the Polar Environment Atmospheric Research Lab (PEARL). Most of the work is carried out in the short Arctic summer – June, July and August. The number of people located on-site varies between 8 and 40 (this includes the members of the Department of National Defence).

The requirements of the Surveillance Network Monitoring Program at Eureka HAWS are listed in Table 1.

**Table 1.** Monitoring Program and Stations Requirements (from license No. 3BC-EUR0611).

Station	Description	Required Analysis	Frequency	Flow Measurements
EUR-1	Raw water supply prior to treatment	n/a	Monthly	Yes
EUR-2	Runoff from the solid waste disposal facilities	SS, pH and conductivity, major cations, nutrients, sulphate, oil and grease, total phenols, total metals, total Hg	During periods of flow	No
EUR-3	Discharge from sewage lagoon, prior to entering the ocean	pH, TSS, BOD, major cations, nutrients, sulphate, oil and grease, total phenols	During periods of flow near the beginning and end of discharge	Yes
		Quantity in cubic meters of sewage solids removed from the sewage disposal facility		

n/a = not available

Major cations: calcium, magnesium, potassium and sodium

Nutrients: ammonia-N, nitrates and nitrites, phosphorus

Total metals: As, Cd, Cr, Cu, Fe, Pb, Ni, Zn.

Total Hg (mercury): minimum detection limit of 0.2 ppb

## **2. Monitoring Program for Drinking Water and Wastewater**

The following section describes the monitoring that took place at Eureka HAWS in relation to drinking water and wastewater.

### ***2.1 Drinking Water***

In 2007, Eureka HAWS carried out the collection and analysis of one sample from the raw water supply and one sample following the reverse osmosis purification system. The concentrations of a large number of organic substances, along with total organic carbon, hardness and selected trace and major elements, have been determined. In addition to these analyses, Eureka HAWS continues to carry out a monthly analysis of the drinking water, which provides assurance to the staff that the water is potable. The samples for these analyses are collected at four locations:

1. Tank room before filtration;
2. Tap in the weather office;
3. Reverse osmosis in the weather office; and
4. Kitchen tap.

These samples have been and shall continue to be analyzed for free and total chlorine, pH, total coliforms and *E. coli*.

Eureka also monitors the volume of water that has been pumped into the retaining pond, and also the volume of water that is used monthly by the station (all operations).

Eureka shall continue this sampling regime in 2008.

### ***2.2 Wastewater and Effluents***

Three samples are usually collected at the time that the sewage treatment lagoon is being emptied.

The first sample is collected from the discharge pipe when the lagoon is 2/3 full. The second sample is collected when the lagoon is 1/2 full. And the third sample is collected when the lagoon is 1/3 full. The method for collecting, storing and transporting the samples is described in the Quality Control and Assurance Program for Eureka HAWS.

The two samples, which were labelled EUWW#1 and EUWW#2 were analyzed for TSS, BOD, nitrates and nitrites, total phosphorus, TKN, Mg, Na, fecal and total coliforms and total phenols.

Eureka HAWS calculates the amount of effluents that are discharged from the lagoon each year.

This sampling regime shall be continued in 2008.

### **3. Monitoring Program for Solid Waste Disposal Areas and Areas Being Remediated**

The following section describes the monitoring program for solid waste disposal areas and areas being remediated at Eureka HAWS.

#### **3.1 Active Landfill**

Soil and water samples shall continue to be collected from the active refuse area located on the east end of the runway. Since Eureka HAWS is located in a rather arid geographical location, it may not be possible to collect any water samples representing runoff from the refuse area every year. All attempts shall be made to collect a sample representative of the runoff or pooled surface at the bottom edge of the refuse area. Soil samples shall also be collected from a similar location which shall be representative of the substrate at that area.

Additional samples, of both water and soil, shall be collected if any special conditions arise such as larger than normal runoff, extended period of runoff, large slumping of soil cover due to changes in the stability of the permafrost. All samples shall be analyzed for BTEX, total volatile and total extractable hydrocarbons, pH, major ions and selected metals.

### **3.2 Abandoned Landfill**

This landfill located on the west end of the runway has been decommissioned and closed in 2001. An electromagnetic survey was carried out in 2007 to investigate the stability and thickness of the cover. The final report and data were not yet available at the time that this document was written and therefore, the following steps of the action plan shall be followed to assess the presence of any residual contamination on the receiving environment:

1. Evaluate results of electromagnetic survey (EMS). If the survey does not show any contamination, then plan to repeat the EMS in 4-6 year period to assess integrity of landfill cap.
2. Determine drainage pattern from abandoned landfill and areas in the landfill that shall be evaluated and assessed to determine if leaching of contaminants is taking place.
3. Identify contaminants of concern.
4. Design multi-year surveillance program.
5. Carry out sampling for the surveillance program.
6. Report data and evaluate effectiveness and extent of surveillance program and adjust both to reflect existing situation.
7. Continue as necessary with the surveillance program for this site.

Once the results of the EMS are available and the assessment of the data is completed (as per above outline) the results shall be submitted to the Board in a separate submission.

## **4. Surveillance Program for Any Area Undergoing Remediation or Remediated (post-care)**

A surveillance program has been carried out in the past, in the vicinity of the hydrocarbon treatment cell. Water samples have been collected in 2006 to assess the movement of any hydrocarbons from the treatment cell into the surrounding environment.

Again, due to the arid nature of this area, no runoff samples can be collected. Samples were collected from the standing water located at the toe of the treatment cell and from a creek that originated in this standing water. The samples were analyzed for BTEX, total volatile and total extractable hydrocarbons, selected metals and any other parameters that would aide in identifying the nature, extent and severity of the runoff onto the surrounding environment. The results of this part of the surveillance program shall be assessed upon the completion of 3 years of sampling. The assessment shall provide recommendations with respect to the analysis that are being undertaken, the timing of sample collection and any other factors that may arise from the generated data.

In the meantime, Eureka HAWS shall continue to carry out the practice of collecting and analyzing water samples from the runoff of this treatment cell.

In the event that any other remediation activities should take place at any site that is operated by Environment Canada's Eureka HAWS, a plan for a surveillance monitoring program shall be submitted to the Nunavut Water Board for their consideration and approval.