

Hamlet of Cambridge Bay Quality Assurance Control Plan

Prepared for:

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0

Prepared by:

Earth Tech (Canada) Inc.
17203-103rd Avenue
Edmonton, AB T5S 1J4

Introduction

This Quality Assurance/Quality Control Plan is intended to provide operating principles for the activities involved in the Hamlet of Cambridge Bay's Surveillance Network Program (SNP). These operating principles will ensure that the samples collected for the SNP are reliable and of high quality.

Sampling Plan

The SNP, as part of the Hamlet's Water License, requires that the Hamlet maintain sampling stations at four locations:

- CAM-1 (Raw water supply prior to treatment),
- CAM-2 (Runoff from Solid Waste Disposal Facilities),
- CAM-3 (Effluent discharge from Sewage Disposal Facilities) and
- CAM-4 (Effluent discharge from Hydrocarbon-Impacted Landfarm Treatment Facility).

At CAM-1, only water quantities are monitored for the Water License. Refer to the current Water License for sampling parameters and frequency at CAM-2, CAM-3 and CAM-4.

Sampling Methods

The Water License says that sampling and analyses "shall be conducted in accordance with methods prescribed in the current edition of *Standard Methods for the Examination of Water and Wastewater*, or by such other methods approved by the Board".

In addition, the laboratory that will analyze the samples may have handling and field requirements, including the type of container, type and amount of preservative, and holding times, which will vary depending on the parameters being analyzed for. A summary of Bodycote Testing Group (Bodycote)'s sample taking and handling requirements for analyses required for the Hamlet's SNP is included in Appendix 1.

To ensure that samples arriving at the laboratory accurately reflect the site conditions, these general precautions must be taken:

- Wear gloves when taking samples
- Use clean, appropriate containers: for example, a container for metals sampling may need to be acid-rinsed before a sample is taken
- Avoid contaminating clean containers
- Determine the allowable headspace (air) in the sample container: most samples should fill the bottle, but some analyses (such as for volatile organic parameters) require absolutely no headspace, whereas a sample for coliform counts should have two (2) centimeters of headspace. To check for the presence or absence of headspace, tilt the closed sample container upside-down and check for bubbles or large airspaces.
- Keep samples cool, but do not allow them to freeze. 4°C is recommended for most samples; if the temperature of the water is allowed to drop below zero, a sample may

freeze and break the container (if glass). Thus, keep the samples in a cooler with ice, but do not leave the cooler outside for a long period of time during cold weather.

- If ice is used in the sample cooler, use additional packaging such as bubble wrap for glass containers, so that when the ice melts, the containers are still supported and cannot damage each other.
- Send samples to the laboratory as soon as possible. Some analyses have an allowable hold time as short as 24-48 hours. While samples can be analyzed past the hold time, the results are less reliable.

Sample Handling

Samples may need to be chemically preserved or kept at a certain temperature during storage and transportation to the laboratory. Samples must also arrive at the laboratory and be tested within a certain time frame (hold time), the length of which depends on the type of analysis to be performed. These requirements depend on the type of analysis that will be done; refer to *Standard Methods* and the laboratory guidelines. Bodycote's requirements are included in Appendix 1. These handling techniques ensure that when the analysis is performed, the samples correctly represent the site conditions.

In addition, samples should be properly labeled to avoid confusion and inaccurate SNP reporting. The label on each sample needs to include:

- Sampling date and time;
- SNP station or other location;
- Name of the sample collector;
- Any preservative used;
- Any identifying label required by the laboratory (for example "Metals" if intended for metals analysis); and
- Any other information that is important for identifying the sample.

Quality Control

As required by the Water License, samples will be sent to a Canadian Association of Environmental Analytical Laboratories (CAEAL) Certified Laboratory (or another laboratory approved by an Analyst) for analysis. This ensures that the analytical methods and procedures are reliable. Analytical quality control is handled by the laboratory.

The Hamlet may wish to occasionally send a duplicate sample (taken at the same time, from the same location as the first sample) to the laboratory to check that consistent sampling is being done. To ensure sampling integrity, a duplicate sample should be taken once every ten (10) samples.

Instruments and Supplies

The following instruments used in the SNP must be inspected and calibrated regularly as per manufacturer's guidelines:

- Flow meter at CAM-1

Training and Certification

Operations personnel do not require any certification or special training to take grab samples. Personnel should familiarize themselves with the proper sampling methods and preservation techniques.

The laboratory performing analyses for the Hamlet as part of the SNP must be certified by the Canadian Association of Environmental Analytical Laboratories (CAEAL), or else approved by an Analyst (consult the Nunavut Water Board if laboratory is not CAEAL certified).

Documentation and Records

Results from the Surveillance Network Program must be included in the Annual Water License Report prepared by the Hamlet. Therefore, organized records should be kept of all laboratory analysis results, INAC inspection reports, and field observations (for instance the presence of oil and grease on the lagoon surface, or lagoon colour).

References

USEPA: Guidance for Quality Assurance Project Plans (EPA QA/G-5), 2002.

Bodycote Testing Group: Sample Requirements, 2008.

Appendix 1: Bodycote Sample Requirements for Selected Parameters

Parameter	Volume	Container	Collection Procedure	Preservation	Hold Time
Ammonia N	125 mL	Amber Glass Bottle	Fill bottle with sample.	4°C	48 hours
BOD	1 L	Plastic Bottle	Fill bottle with sample.	4°C	48 hours
Coliforms	250 mL	Sterile Clear Plastic Bottle	Fill bottle leaving 2cm on top. DO NOT rinse or touch inside of bottle or cap. Maintain temperature at 0-10 °C.	3 mg sodium thiosulfate in bottle, 4°C	24 – 48 hours
Extractable Petroleum Hydrocarbons (EPH)	1 L	Amber Glass Bottle with Teflon-lined Lid	Fill bottle to the top with sample.	4°C	7 days
Nitrate-Nitrite	125 mL	Amber Glass Bottle	Fill bottle with sample.	4°C	24 hours
Oil and Grease		None	Visual Observation		
Phenols	125 mL	Amber Glass Bottle	Fill bottle with sample and add preservative.	1 mL 1: 1 sulfuric acid	28 days
Routine (pH, EC, SO ₄ , dissolved Ca, Mg, Na, K, Fe, Cl, Mn, TDS, TSS)	500 mL	Plastic Bottle	Fill bottle with sample.	4°C	7 days
Total Metals	100-500 mL	Plastic Bottle	Fill bottle with sample and add preservative.	2 mL 1:1 nitric acid, 4°C	6 months (30days Hg)
Volatile Petroleum Hydrocarbons (VPH)	3 x 40 mL	3 Glass Vials with Teflon-lined Lids	Fill vials to the top with no headspace or air bubbles.	0.12g sodium bisulfate (+ 2 drops sodium thiosulfate if chlorinated), 4°C	14 days ¹

1: 14 days with sodium bisulfate, or 7 days if sample is not preserved