

**MUNICIPALITY OF ARCTIC BAY**

**Environmental Monitoring Program and  
Quality Assurance/Quality Control Plan for  
Municipal Water Licence**

**March 2025**

## Document Control

Date	Document Title	Author	Details
Unknown	QA/QC of Water Supply to the Hamlet of Arctic Bay	Unknown	Initial document
November 2024	Municipality of Arctic Bay Environmental Monitoring Program and Quality Assurance/Quality Control Plan for Municipal Water Licence	GN-CGS and Dillon Consulting Ltd.	Consolidation of information and update of previous manuals into standard template
March 2025	Municipality of Arctic Bay Environmental Monitoring Program and Quality Assurance/Quality Control Plan for Municipal Water Licence	GN-CGS	Added laboratory letter of approval Added GPS coordinates of monitoring stations Removed references to interpretation of laboratory results

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## 1.0 Introduction

This quality assurance/quality control (QA/QC) plan for sampling and monitoring describes the procedures and protocols to be followed when conducting environmental sampling under the Nunavut Water Board (NWB) Water Licence monitoring program.

Although the QA/QC Plan is submitted to the NWB as a condition of the water license, it is primarily intended to be read, understood, and implemented by Municipality personnel responsible for environmental quality monitoring.

The water licence requires Hamlet personnel to adhere to these procedures, which should be applied to all water quality samples taken by the Hamlet. This document applies to the currently used infrastructure and environmental laboratory, and any changes will require this document to be updated.

**Date this plan was prepared:** 2024-Nov-15

**Community:** Municipality of Arctic Bay  
**Latitude:** 73°02'15"N  
**Longitude:** 85°08'53"W

This quality assurance/quality control (QA/QC) plan for sampling and monitoring was created to meet the requirements of the community's water licence:

**Water licence number:** 3BM-ARC1924  
**Issue date:** August 29, 2019  
**Expiry date:** August 28, 2024

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**Figure 1: Arctic Bay Monitoring Locations Google Earth, 2024**

## 2.0 Environmental Monitoring and Reporting

Part I of the NWB licence provides specific requirements for the monitoring program. **Table 1** summarises the sampling locations, while **Table 2** details the water quality sampling parameters.

**Table 1: Water License Sampling Locations**

Monitoring Program Station	Description	Sample Type	Frequency	Status	Coordinates
ARC-1	Raw Water intake at Marcil Lake	Water	Daily, monthly, and annually	Active (Volume)	Lat: 72°59'35.49"N Lon: 85° 0'47.29"W
ARC-3	Raw Wastewater Discharge (South Berm)	Wastewater	<u>Volume</u> Monthly and Annually <u>Water Quality</u> Once prior to Licence renewal	Active (Volume, Water Quality)	Lat: 73° 2'33.97"N Lon: 85° 5'49.58"W
ARC-4	Lagoon Pump Discharge (North Berm)	Wastewater	Once prior to decant	Active (Volume, Water Quality)	Lat: 73° 2'27.23"N Lon: 85° 5'21.76"W
ARC-6b	Surface Water at the end of Wetland area	Wastewater	Three (3) times annually (once at the onset of decant; once during	Active (Water Quality)	Lat: 73° 2'54.19"N Lon: 85° 6'57.21"W

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Monitoring Program Station	Description	Sample Type	Frequency	Status	Coordinates
			decant; and once at the end of decant)		
ARC-7b	Runoff from the Quarry Site	Surface Water	Annually during periods of runoff or seepage	Active (Water Quality)	Lat: 73° 1'37.13"N Lon: 85°10'22.18"W
ARC-8	Sewage Sludge	Wastewater/ Sludge	Prior to removal from Lagoon	Active (Volume, Water Quality)	Lat: 73° 2'29.75"N Lon: 85° 5'33.23"W
ARC-9	Runoff from the Solid Waste Disposal Facility	Leachate	Annually during periods of runoff or seepage	Active (Water Quality)	Lat: 73° 2'6.80"N Lon: 85° 4'57.19"W
ARC-10	Thermistors in accordance with approved Instrumentation Monitoring and Surveillance Plan	Temperature		Inactive	Lat: 73° 2'26.34"N Lon: 85° 5'21.58"W
ARC-11	Standpipes in accordance with approved Instrumentation Monitoring and	Seepage		Active	Lat: 73° 2'26.34"N Lon: 85° 5'21.58"W



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Monitoring Program Station	Description	Sample Type	Frequency	Status	Coordinates
	Surveillance Plan				
ARC-12	Settlement stations In accordance with approved Instrumentation Monitoring and Surveillance Plan	Location/Elevation		Inactive	Lat: 73° 2'26.34"N Lon: 85° 5'21.58"W

Standpipe and monitoring location information is available in **Appendix A** on As-Built drawing L1; however, the monitoring stations are inactive. For monitoring program locations that are used to collect chemical data for surface water or groundwater, the parameters that will be analyzed are as follows:

**Table 2: Water License Sampling Parameters ARC-3, ARC-4, and ARC-6b**

MONITORING LOCATIONS	PARAMETERS
ARC-3, ARC-4, ARC-6B	<ul style="list-style-type: none"> <li>• BOD<sub>5</sub></li> <li>• TSS</li> <li>• Conductivity</li> <li>• Oil and Grease (Visual)</li> <li>• Magnesium</li> <li>• Sodium</li> <li>• Chloride</li> <li>• Total Hardness</li> <li>• Ammonia Nitrogen</li> <li>• Total Cadmium</li> <li>• Total Cobalt</li> <li>• Total Chromium</li> <li>• Total Copper</li> <li>• Total Aluminum</li> <li>• Total Mercury</li> <li>• Faecal Coliforms</li> <li>• pH</li> <li>• Nitrate-Nitrite</li> <li>• Total Phenols</li> <li>• Calcium</li> <li>• Potassium</li> <li>• Sulphate</li> <li>• Total Alkalinity</li> <li>• Total Zinc</li> <li>• Total Iron</li> <li>• Total Manganese</li> <li>• Total Nickel</li> <li>• Total lead</li> <li>• Total Arsenic</li> <li>• TOC</li> </ul>

**Table 3: Water License Sampling Parameters ARC-7b and ARC-9**

MONITORING LOCATIONS	PARAMETERS
ARC-7B, ARC-9	<ul style="list-style-type: none"> <li>• BOD<sub>5</sub></li> <li>• TSS</li> <li>• Conductivity</li> <li>• Oil and Grease (Visual)</li> <li>• Magnesium</li> <li>• Sodium</li> <li>• Total Hardness</li> <li>• Ammonia Nitrogen</li> <li>• Total Cadmium</li> <li>• Total Chromium</li> <li>• Total Copper</li> <li>• Total Mercury</li> <li>• Faecal Coliforms</li> <li>• pH</li> <li>• Nitrate-Nitrite</li> <li>• Total Phenols</li> <li>• Calcium</li> <li>• Potassium</li> <li>• Sulphate</li> <li>• Total Alkalinity</li> <li>• Total Iron</li> <li>• Total Lead</li> <li>• Total Arsenic</li> <li>• TPH</li> <li>• PAH</li> <li>• BTEX</li> </ul>

The environmental lab used to analyze the samples collected for the monitoring program must meet the accreditation requirements outlined in the community's water licence.

Proof of environmental lab's accreditation and approval letter of the QA/QC Plan is provided in **Appendix B.**

**The address and contact information for the environmental laboratory used for analysis by Arctic Bay is:**

Caduceon Labs Ottawa  
2387 Holly Ln  
Ottawa, ON  
K1V 7P1  
(613) 526-1023

**Laboratory analyses shall meet the following standards:**

- All sampling, sample preservation 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 writing.
- All analyses shall be performed in a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing.

Reports will be distributed to the municipality, Government of Nunavut, Department of Community and Government Services (GN-CGS), and the Nunavut Water Board.

**Additional special conditions or requirements that have been noted in Arctic Bay's water license are as follows:**

1. The Licensee shall submit to the Board, as part of the Annual Report required under Part B, Item 1, monitoring results for thermistor, standpipe, and settlement stations at Monitoring Program Stations ARC-10, ARC-11, and ARC-12. An annual assessment of the geotechnical and geothermal performance of the Wastewater Treatment Facility shall be provided as an Addendum to the Annual Report required as per Part B Item 1. This assessment shall include:
  - interpretation of unexpected monitoring results;
  - analyses of settlement station results on liner integrity; and
  - analyses of thermistor and seepage results on berm stability.

2. The detailed Instrumentation Monitoring and Surveillance Plans shall be incorporated into the Manuals referred to in Part F, Item 2, and Part F, Item 3, and shall include the following information where applicable:
  - details of the proposed instrumentation plan, the frequency of measurements and trigger values or observations for remedial action;
  - review of geothermal monitoring plans including the number of thermistors to be installed, the location of thermistor installations, the installation of thermistors within the key trench, the depth of thermistor strings in subgrade soils, justification for the final chosen depth of thermistor strings, and the final detailed design of thermistor strings, taking into consideration reviewer comments; and
  - details of settlement monitoring at the upstream and downstream toes of the berms.

## 3.0 Sampling Procedures and Protocols

To ensure quality of the monitoring program, the following procedures and protocols shall be used for field sampling. These methods are consistent with the Standard Methods for the Examination of Water and Wastewater (Eaton et al., 2005) and have been approved by the Nunavut Water Board.

### 3.1 Sampling Location and Frequency

The monitoring program included in the water license includes specific requirements regarding sampling locations, sampling frequency and parameters to be analyzed. These are provided in **Table 1** and **Table 2**. Monitoring locations are shown in **Figure 1**.

### 3.2 Sample Container Selection

Sample containers vary in size and material of construction depending on the specific type of analysis to be conducted. Containers to be used shall be obtained directly from the laboratory. The laboratory will provide the correct sizes and types of bottles based on the parameters required. The sample containers for specific analysis are provided in **Appendix C**. The laboratory shall be contacted at least one (1) month prior to the sampling event to ensure that containers are available for sampling.

### 3.3 Field Sample Log

The individual collecting the samples shall record the following at each location at the time of sampling:

- Date of sampling;
- Time of sampling;
- Weather conditions;
- Monitoring Station Number (i.e., ARC-1, ARC-2, etc.);
- Results of any field measurements;
- Sampler shall also indicate if sample used preservatives;
- Any unusual conditions; and
- Any deviation from standard procedures.

An example Sampling Log is included in **Appendix D**.

### **3.4 General Procedures for Sample Collection**

General procedures for sample collection are outlined below. Different laboratories have slightly different bottle requirements and sample handling protocols. Sampling technicians must receive site specific training and laboratory procedures must take precedence over other protocols.

- Sample Locations and Sampling Frequency – The location and frequency of each sampling option has been carefully selected, and is part of site design and layout, as well as the Water Board License. Sampling will follow their requirements. Diversions must be recorded and submitted to the Water Board for approval;
- Preparation – Approximately one (1) month prior to the sampling event the laboratory will be notified, and the required bottles, blanks, and materials assembled. Plans for rapid return of the samples prepared;
- Field Collection – At each sampling station the specified samples will be collected, and field data recorded;
- Handling Storage and Transportation –Appropriate personal protective equipment (gloves, safety glasses, etc.) will be used when handling samples. Samples will be stored at 4°C and protected from freezing until delivered to the laboratory. Chain of custody for sampling, storage, and delivery must be maintained. Laboratory sample sheets will be filled in as per laboratory protocols; and
- Delivery to Laboratory – Samples will be delivered to the laboratory in the laboratory dictated method and within the hold times specified, as much as possible.

### **3.5 Surface Water Sampling Procedures**

All the samples taken will be grab samples. Samples will normally be taken from natural lakes, streams, treatment ponds, or process streams. Where possible, samples shall be taken from just below the surface to avoid floating debris, which may contaminate the sample.

#### **3.5.1 Freshwater Streams, Surface Drainage, and Wetlands**

Guidelines for collecting samples from streams, surface drainage, and wetlands are as follows:

- The samples shall be collected as close to the middle of the stream where water flows freely and is free of debris.
- Samples shall be collected upstream of the sampler.
- After getting into position, the sampler shall wait to allow any stirred sediment that occurred from entering the stream to settle or wash away.
- The sample bottle shall be partially filled with the water to be sampled and rinsed with the lid in place.

- Rinse water shall be emptied downstream of the sampling point, so that stream sediments remain undisturbed.
- Prior to sampling for oil/grease, bacteria, and for any bottles containing preservative, the bottles shall not be rinsed.
- If possible, bottles shall be plunged into the stream to a depth of approximately half the total stream depth and allow it to fill with the mouth of the bottle facing upstream.
- If the stream is too shallow to allow for sample bottle to be filled completely, without disturbing bottom sediment of the streambed, the sampler may use a smaller container that has been properly rinsed to transfer sample to the larger bottle.
- Do not use a smaller sample bottle containing preservatives.
- When taking the sample, sufficient room shall be left to allow for the addition of preservatives, if required.

### **3.5.2 Lakes or Ponds**

When collecting samples from lakes or ponds, the below procedures should be followed:

- Surface sampling shall be collected using the same procedures as streams.
- Sample bottles shall be plunged to approximately 150 mm (6 inches) below the water surface.

## **3.6 Sample Identification**

All samples collected are to be labelled according to standard identification procedures (Name of sampler, time and date of sampling, sample identifier, sampling method and type of sample). Sample labels shall be water-resistant and prepared prior to going into the field. The individual samples will be labelled with the following information:

- Sample ID #;
- Monitoring Station Name (e.g., ARC-3);
- Date and time of collection;
- Parameter to be analyzed;
- Preservatives;
- Project number identifier; and
- Bottle number 1 of \_\_\_\_.

## **3.7 Sample Preservation**

To obtain good results from a sampling program, timing is critical. All samples are to be shipped to the Laboratory that has been contracted to carry out the analysis the same day as they are collected. Samples must be protected from breakage and shall be shipped in an insulated cooler

that can be provided by the Laboratory. If samples cannot be shipped until the next day, due to unavoidable events such as weather or mechanical problems with transport aircraft, all samples must be stored in a refrigerator at 4°C. Samples must not be frozen.

In all cases where samples cannot be delivered to the lab on the same day, specific preservatives must be added to the samples to prevent chemical changes that may alter the concentration of the parameters of interest. The samples must be preserved within two hours of sampling. Usually, samples can be preserved away from the field at the end of the site visit. In most cases, the laboratory can fill the bottles with preservative, and then ship them to the Municipality to be filled and sent back for analysis.

### **3.8 Sample Transportation**

The main objective of the sampler is to minimize any chemical changes to the sample between the time it is collected and delivery to the laboratory. Heat, light, and agitation can all impact the water chemistry, and the samples shall be protected from these effects.

Effluent and surface water samples shall be stored and transported at a temperature of 4°C. Coolers and ice packs need to be available and are usually provided by the laboratory. Upon arrival at the laboratory, samples shall be refrigerated as soon as possible.

### **3.9 Water Volume and Water Level Measurements**

The NWB license includes measuring the monthly and annual volume of water pumped from ARC-1. This can be accomplished by installing a flow meter on the intake pipe.



## **4.0 Quality Assurance and Quality Control**

Quality Assurance (QA) and Quality Control (QC) are vitally important components of environmental management.

### **4.1 Quality Assurance**

Quality Assurance (QA) is a set of operating principles that, if strictly followed during sample collection and analysis, will produce data of known and defensible quality. As such the accuracy of the analytical results can be stated with a high level of confidence. A high level of quality assurance can be achieved by applying the following principles:

- Personnel involved in water sampling and analysis are well trained;
- Facilities and equipment required for sampling are suitable, well maintained, and always kept clean;
- Standard procedures are developed and implemented for the collection, transportation, and analysis of samples, based on recognized best management practices (BMP);
- Laboratory and field instruments are calibrated according to manufacturers recommendations or recognized as good operating practice; and
- Supplies used in sampling and analysis are of consistent high quality and are not expired.

### **4.2 Quality Control**

Quality Control (QC) is a set of specific procedures used to measure the quality of the data produced and correct deficiencies in the sampling or analyses, as they occur. Quality control is used by the analyst and sampler to achieve standards of measurement for the three principles components of quality: precision, accuracy, and reliability.

Most commercial laboratories undertake QA/QC procedures with the volume of sample sent for analysis. Reports are usually provided with the Certificates of Analysis. It is recommended that the suggested QA/QC protocols by the laboratory be followed.

To ensure that the monitoring program maintains accepted quality control, field blanks and duplicate samples should be collected. These samples are collected and analyzed for the sample parameters listed in the monitoring program in the license as part of a quality control check on monitoring activities.

#### **4.2.1 Field Blanks**

Field Blanks are samples that the lab uses to identify any environmental impacts caused during sample collection or sample transportation. Field Blanks shall accompany the sampler into the field, labelled as field blanks, preserved in the field, and submitted to the laboratory with the field samples.

#### **4.2.2 Replicate or Duplicate Samples**

Replicate or duplicate samples involves collecting more than one sample for a given sampling station subject to specific analysis. Standard procedures used for the routine sampling shall be applied. The replicate or duplicate samples are useful in identifying problems with accuracy and sampling methods.

### **4.3 Lab Accreditation**

Analytical methods and accreditation are usually dictated by the guideline criteria being followed. In most cases, the guideline criteria are the Canadian Environmental Quality Guidelines (CCME, 2007). These guidelines specify bottles, hold times, preservatives, sampling protocols, as well as lab accreditation, and analytical methodologies. These guidelines or equivalent standard will be used. Prior to any sampling, this information should be reviewed to ensure consistency with regulation and standards. Laboratory accreditation is included in **Appendix B.**

## **5.0 Laboratory Analysis and Reporting**

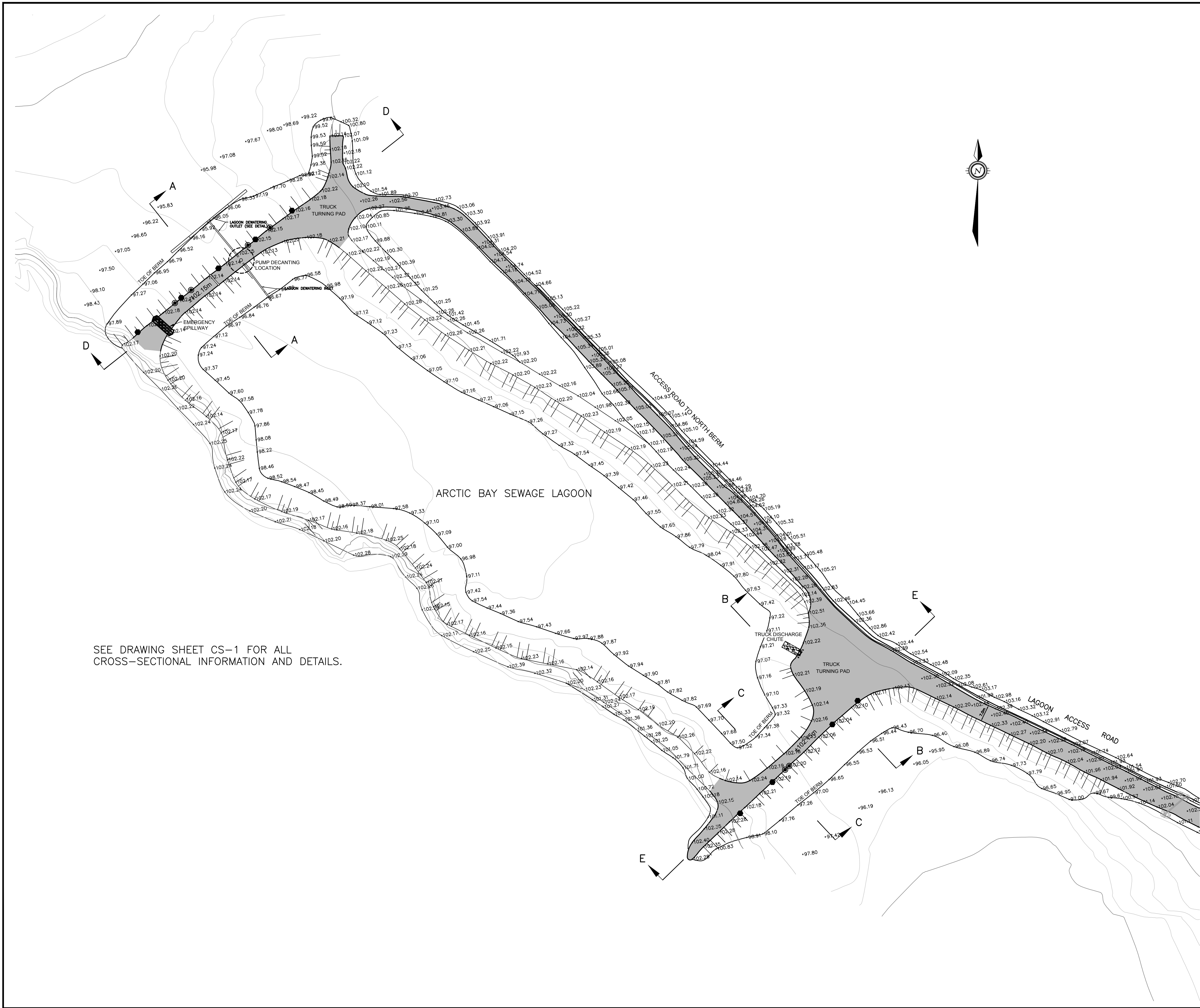
The laboratory will perform the analysis of all samples as outlined herein. The results shall be received by the Municipality within the time frame agreed to with the laboratory. The results shall contain the limits of detection used for analysis of each parameter as supplied by the laboratory. The Municipality may request clarification of the analysis by contacting the NWB Technical Advisor and a review of the analysis will be provided upon request. The laboratory results are compared to the limits of the Water Licence for each parameter, and/or to other comparative criteria such as the Canadian Environment Water Quality Guidelines. Results of the monitoring program are reported in the Annual Report as required in the water license. The Annual Report must be submitted by March 31 of the year following the calendar year for which the report has been submitted. The content of the Annual Report and Guideline Criteria is outlined in the following documents:

- Solid Waste Management Facility Operations and Maintenance Plan;
- Sewage Treatment Facility Operations and Maintenance Plan; and
- Water Supply Facility Operations and Maintenance Plan.

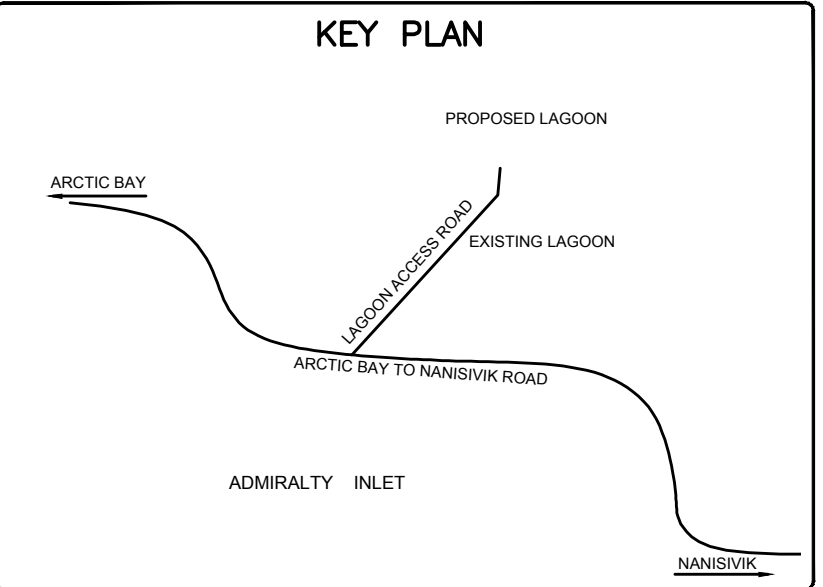
These reports will need to be updated upon NWB approval of this plan.

# Appendix A

## *Site Drawings*



SEE DRAWING SHEET CS-1 FOR ALL  
CROSS-SECTIONAL INFORMATION AND DETAILS.



LEGEND

- BERM CORE DETECTION - THERMISTOR CASING GW THERMISTOR STRING AND DATA LOGGER CONNECTION
- SAMPLING POINT

# AS-BUILT

DATE: NOVEMBER 30, 2011

BENCH MARK

BM 1 ELEV. = 59.12  
CONTOUR ELEVATIONS WERE DREINED FROM NAD 83 CONTROL MONUMENT 7038914 LOCATED NORTH OF THE ARCTIC BAY AIRPORT UNDER CONSTRUCTION.

R E V I S I O N S				
4	AS-BUILT	30/11/11	SAB	SLB
3	AS-CONSTRUCTED	17/11/11	MEB	SLB
2	TENDER SET	27/04/09	MMR	SLB
1	ISSUED FOR APPROVAL	24/04/08	MMR	SLB
No.	DESCRIPTION	DATE	BY	APP'D

DRAWINGS ORIGINALLY SEALED BY  
S.L.BURDEN, P.eng. OF  
exp. SERVICES Inc.  
APRIL 27TH, 2009

**Trow Associates Inc.**  
154 Colonnade Road South  
Ottawa, Ont. K2E 7J5  
Tel: (613) 225-9940  
Fax: (613) 225-7337

CLIENT

GOVERNMENT OF NUNAVUT

PROJECT

ARCTIC BAY WASTEWATER LAGOON

TITLE			
PROPOSED LAGOON			
design by	SAD	project no.	OTCD000190544
drawn by	MEB	drawing no.	L-1
checked by	SLB		
date	15/01/2008		
scale	HORIZ 1:750		

## Appendix B

### *Laboratory **Accreditation and Approval Letter***

# Canadian Association for Laboratory Accreditation Inc.

## Certificate of Accreditation

Caduceon Environmental Laboratories (Ottawa)  
Caduceon Enterprises Inc.  
2378 Holly Lane  
Ottawa, Ontario



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).



Accreditation No.: 1002644  
Issued On: 11/22/2024  
Accreditation Date: 1/3/2005  
Expiry Date: 5/22/2027

A handwritten signature in black ink, appearing to read "K. McKinley".

President and CEO



This certificate is the property of the Canadian Association for Laboratory Accreditation Inc. and must be returned on request; reproduction must follow policy in place at date of issue.  
For the specific tests to which this accreditation applies, please refer to the laboratory's scope of accreditation at [www.cala.ca](http://www.cala.ca).

March 7, 2025

Attention: Mr. Ryan Kum  
Municipal Engineering Officer  
Community & Government Services  
Government of Nunavut

Dear Mr. Kum,

Thanks for sending along the QA/QC Plan for the Arctic Bay Municipal Water Licence Water Monitoring Program. Regarding your request that CADUCEON verify we can abide by both Part I, Item 9, and Part I, Item 10 as outlined below, provided to you as an attachment is CADUCEON's Statement of Qualifications.

**Part I, Item 9: "All sampling, sample preservation 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 writing."**

**Part I, Item 10: "All analyses shall be performed by a laboratory accredited according to ISO/IEC Standard 17025. The accreditation shall be current and in good standing."**

We trust the Statement of Qualification document will meet your approval. If you have any further questions or concerns, please do not hesitate to contact me.

Thanks again for your patronage and we look forward to providing analytical work to you and your team.

Sincerely,



Damien John Gilbert  
Chief Executive Officer  
CADUCEON Environmental Laboratories  
Office: 613-544-2001



# Appendix C

## *Wastewater and Leachate Sampling Guide*

# Instructions

1. Label all bottles prior to going to sampling site.
2. Wear gloves when sampling/handling preservatives.
3. Plunge bottle to about 15 cm below surface, avoid floating debris.
4. Fill bottles partially with water and rinse with lid in place, empty water away from sampling hole, repeat 3 times.
5. **Do not rinse bottles when sampling if bottles contain preservatives.**
6. If preservative is already in the bottle, fill slowly so not to wash out preservative (can use rinsed General Chemistry bottle to fill bottles with preservatives).
7. Put bottles in cooler with icepacks.
8. Place Chain of Custody (COC) form in plastic bag and put in cooler.
9. Wash hands when done handling samples.
10. Send samples to lab as soon as possible (take samples on day there is a flight). Sample should be kept in cargo cooler – **do not freeze**.
11. Notify the lab that the sample was shipped, waybill #, and when it is expected to arrive (Sabina Islam [sislam@caduceonlabs.com](mailto:sislam@caduceonlabs.com)).

# Nunavut Wastewater Package

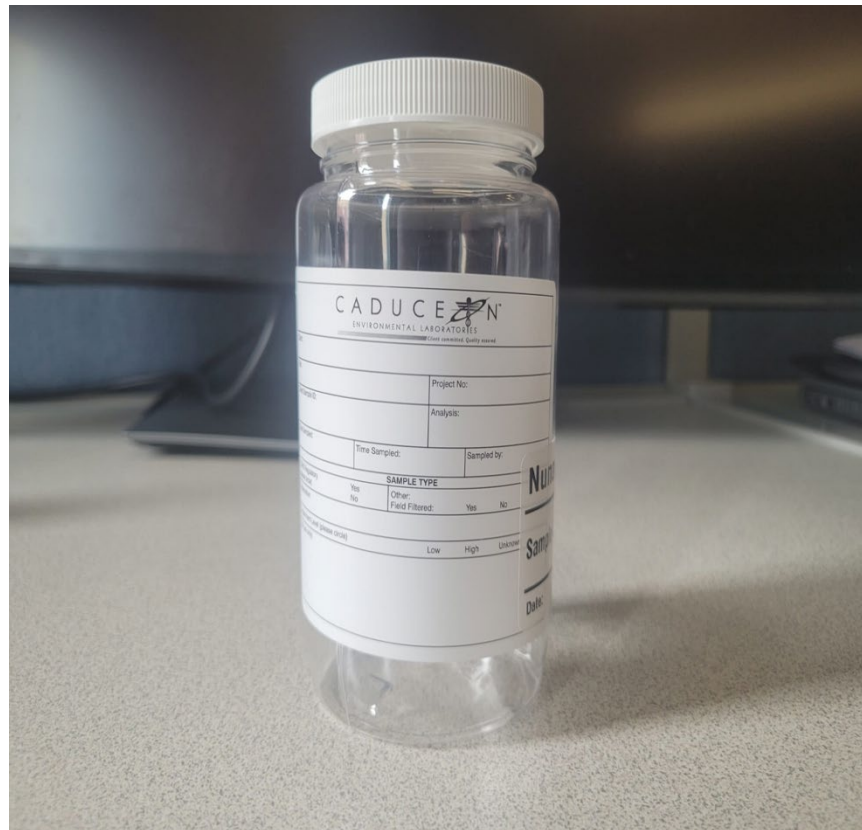


# The wastewater package includes:

Test	Bottle Amounts
General Chemistry	1
Nutrients/TOC	2
Metals	1
Mercury	1
Phenols	1
Fecal Coliforms	1
Oil & Grease	1
Routine	1

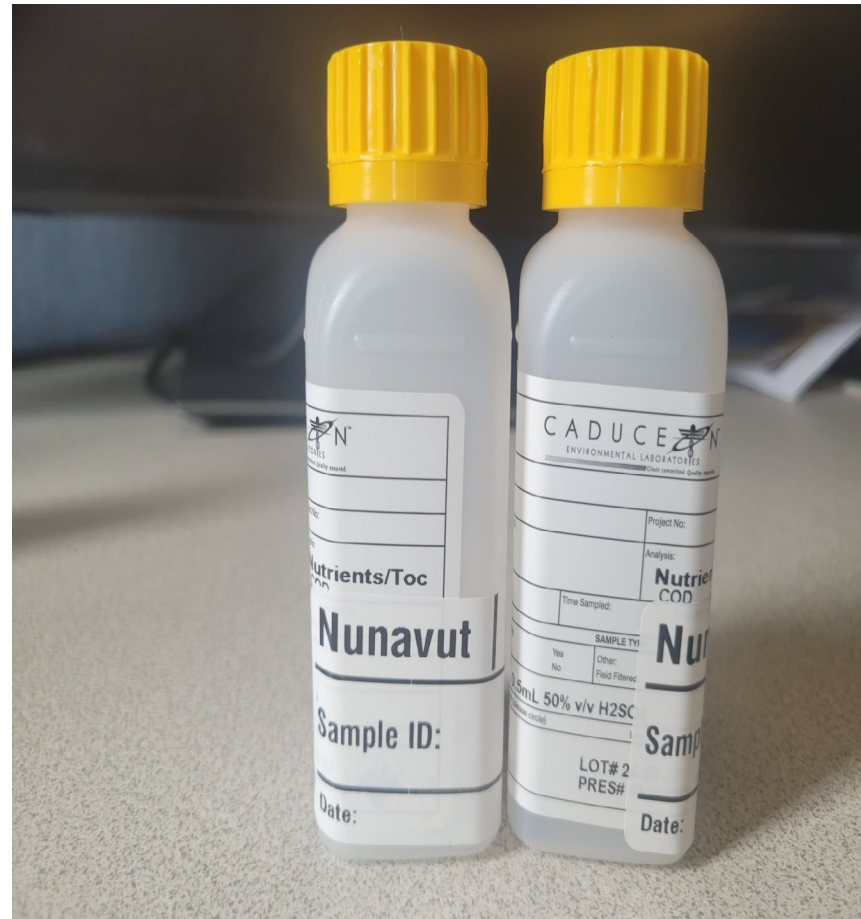
## General Chemistry

- Rinse 3 times
- Fill to 95% capacity
- Cap tightly
- Store at 4°C



## Nutrients/TOC (x2)

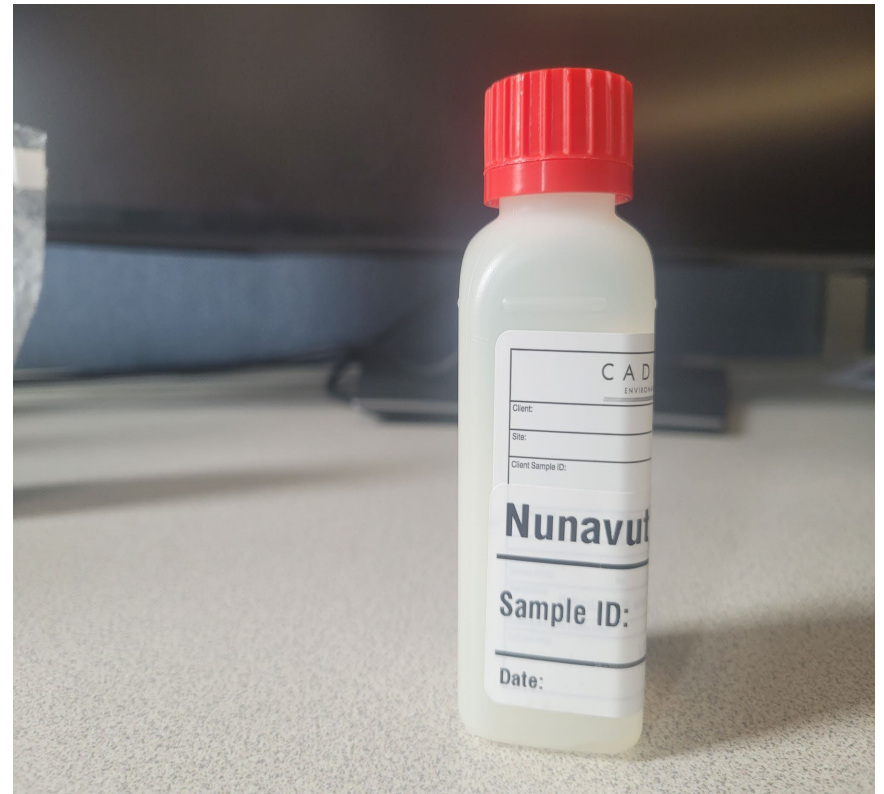
- Pre-charged with H<sub>2</sub>SO<sub>4</sub>. **Do not rinse.**
- Fill both bottles to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Store at 4°C





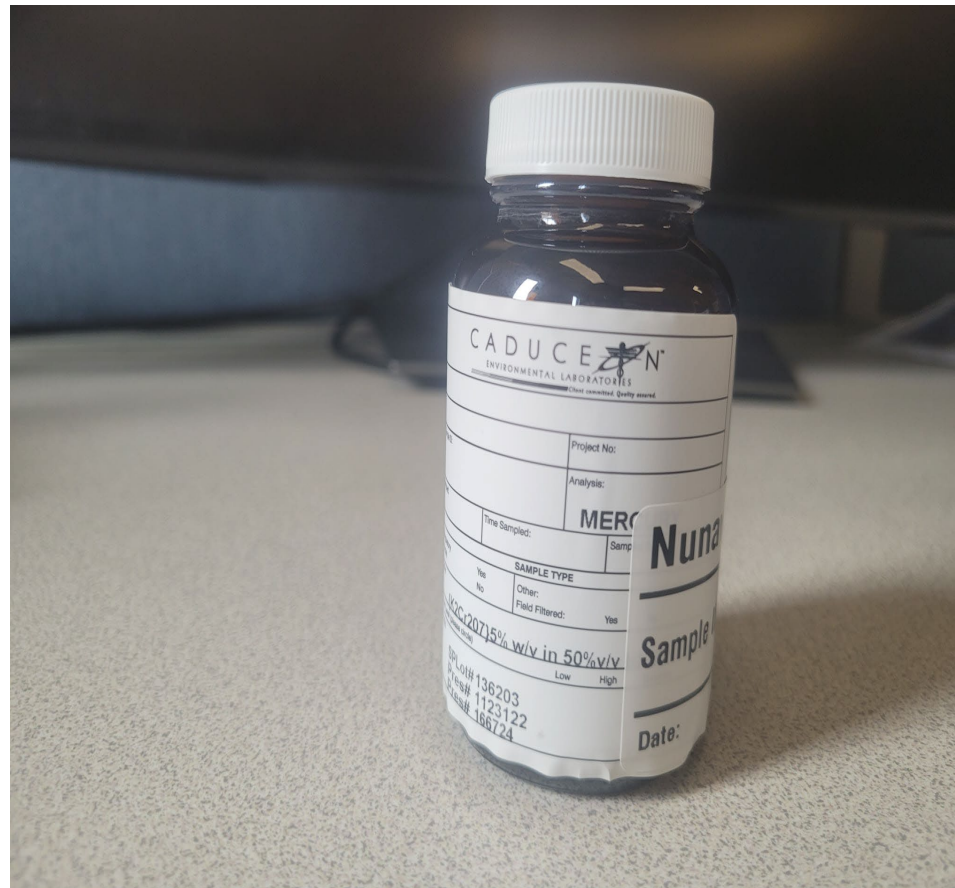
## Metals

- Pre-charged with  $\text{HNO}_3$ . **Do not rinse.**
- Fill bottle to where bottle neck begins to taper.
- Dissolved Metals analysis requires field filtration, therefore, samples from the general chemistry bottle will be filtered at the lab and then analysed for Dissolved Metals.
- Cap tightly and invert to mix.
- Store at 4°C



## Mercury

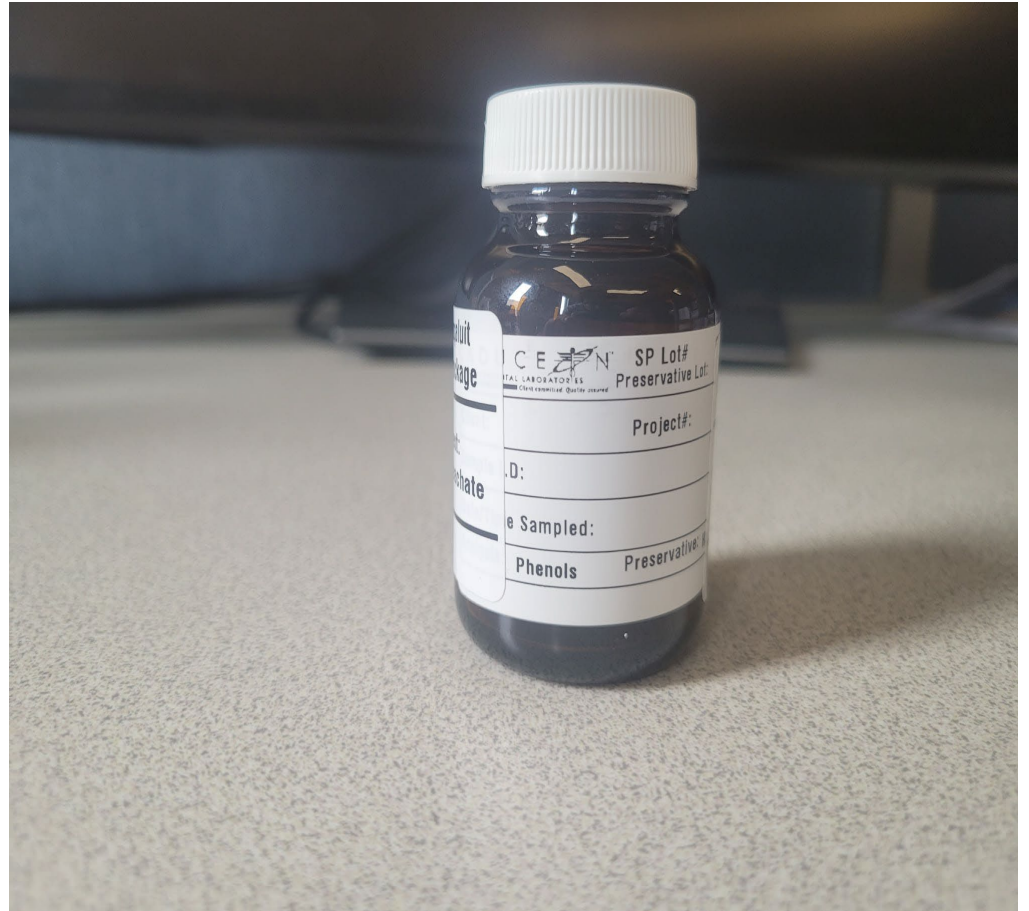
- Pre-charged with  $\text{K}_2\text{Cr}_2\text{O}_7/\text{HNO}_3$ . **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C





## Phenols

- Pre-charged with  $\text{H}_2\text{SO}_4$ . **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at  $4^\circ\text{C}$ .



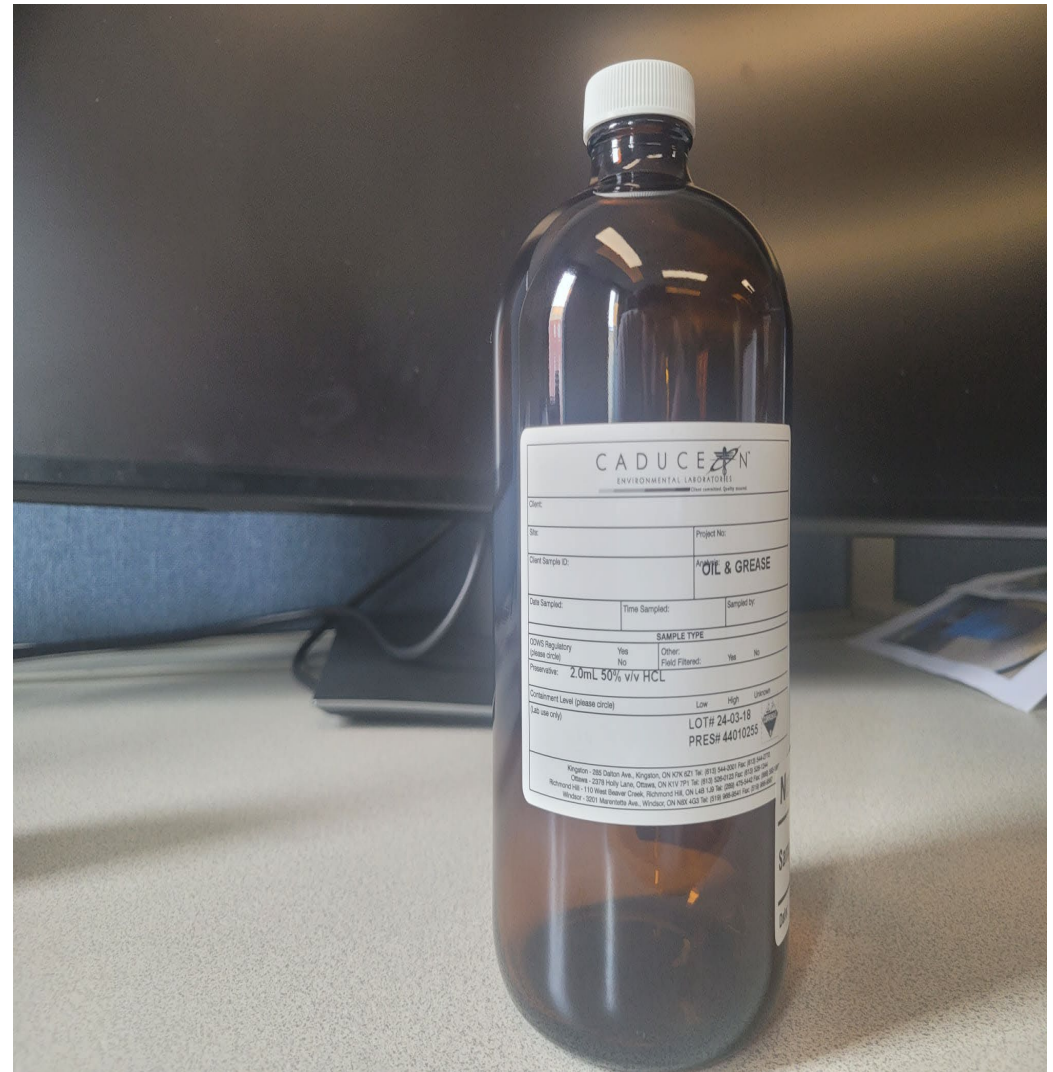
## Fecal coliforms

- Pre-charged with Sodium Thiosulfate. **Do not rinse.**
- To prevent contamination, refrain from inserting your hands into the bottle, please wear gloves.
- Fill up to the 200 ml mark on the bottle.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C.



## Oil & Grease

- Pre-charged with HCL. **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C



## Routine

- Rinse 3 times
- Fill to 95% capacity
- Cap tightly
- Store at 4°C





# Leachate Package

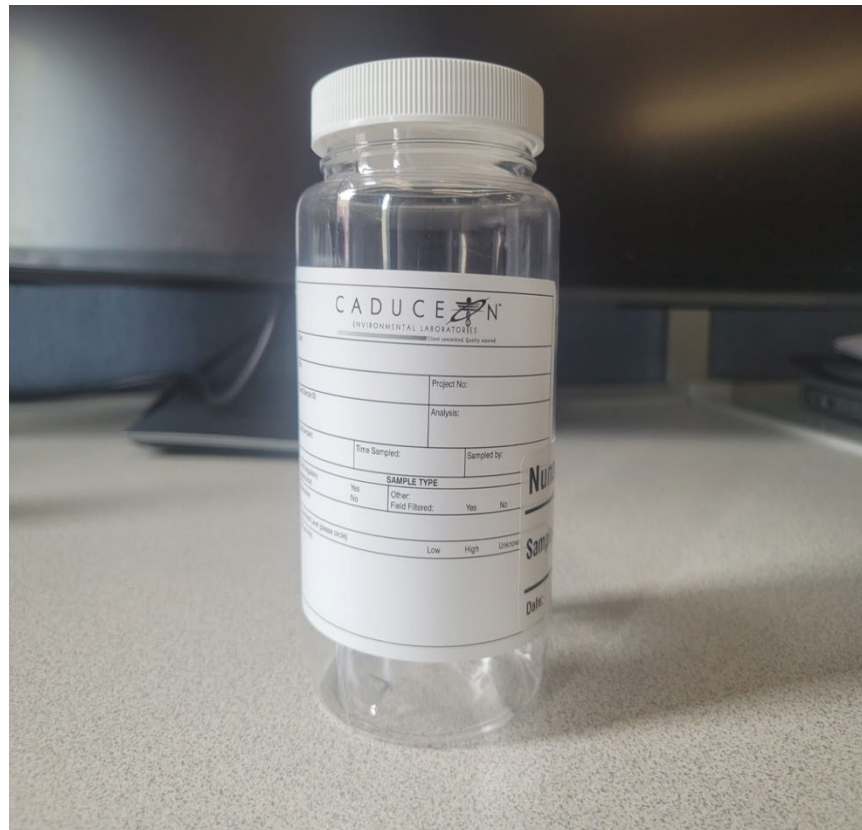


# The Leachate package includes:

Test	Bottle Amounts
General Chemistry	1
Nutrients/TOC	2
Metals	1
Mercury	1
Phenols	1
Fecal Coliforms	1
Oil & Grease	1
BTEX/PHC (F1)	2
PHC F2-F4	1
PAHs	2
Routine	1

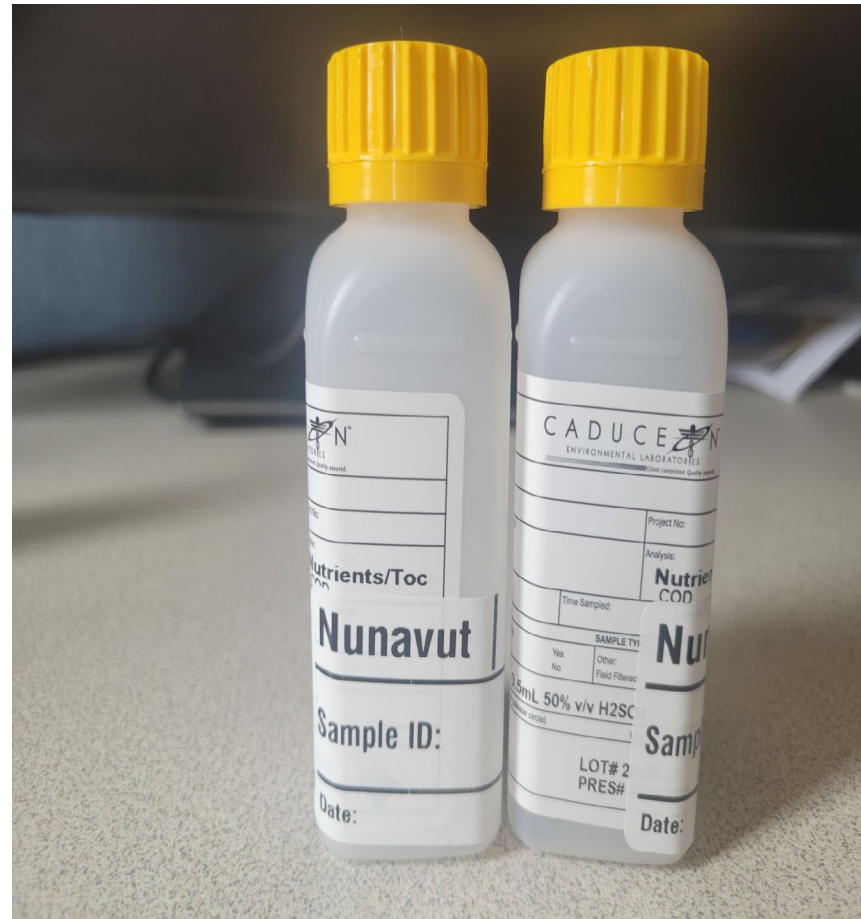
## General Chemistry

- Rinse 3 times
- Fill to 95% capacity
- Cap tightly
- Store at 4°C



## Nutrients/TOC (x2)

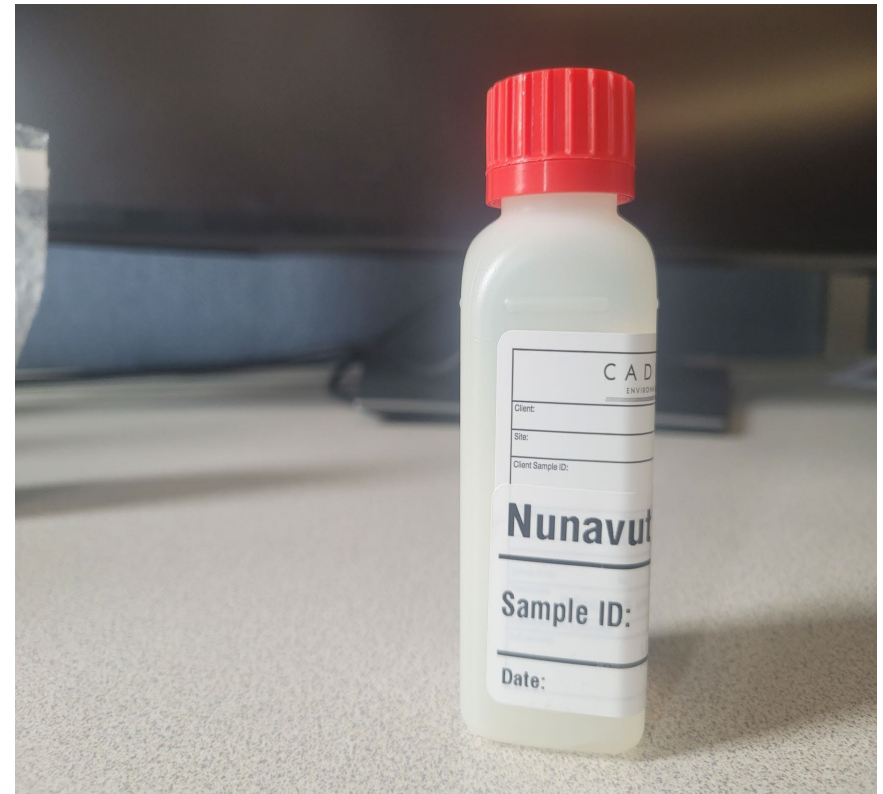
- Pre-charged with  $\text{H}_2\text{SO}_4$ . **Do not rinse.**
- Fill both bottles to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Store at  $4^\circ\text{C}$





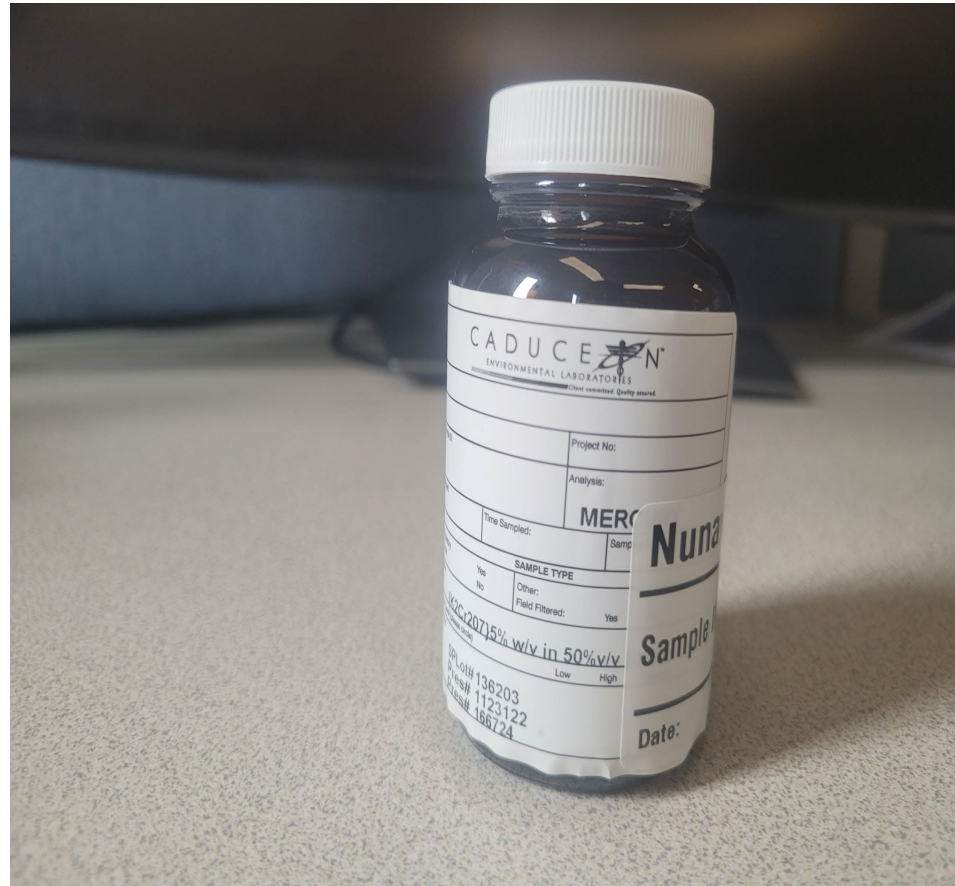
## Metals

- Pre-charged with  $\text{HNO}_3$ . **Do not rinse.**
- Fill bottle to where bottle neck begins to taper.
- Dissolved Metals analysis requires field filtration, therefore, samples from the general chemistry bottle will be filtered at the lab and then analysed for Dissolved Metals.
- Cap tightly and invert to mix.
- Store at 4°C



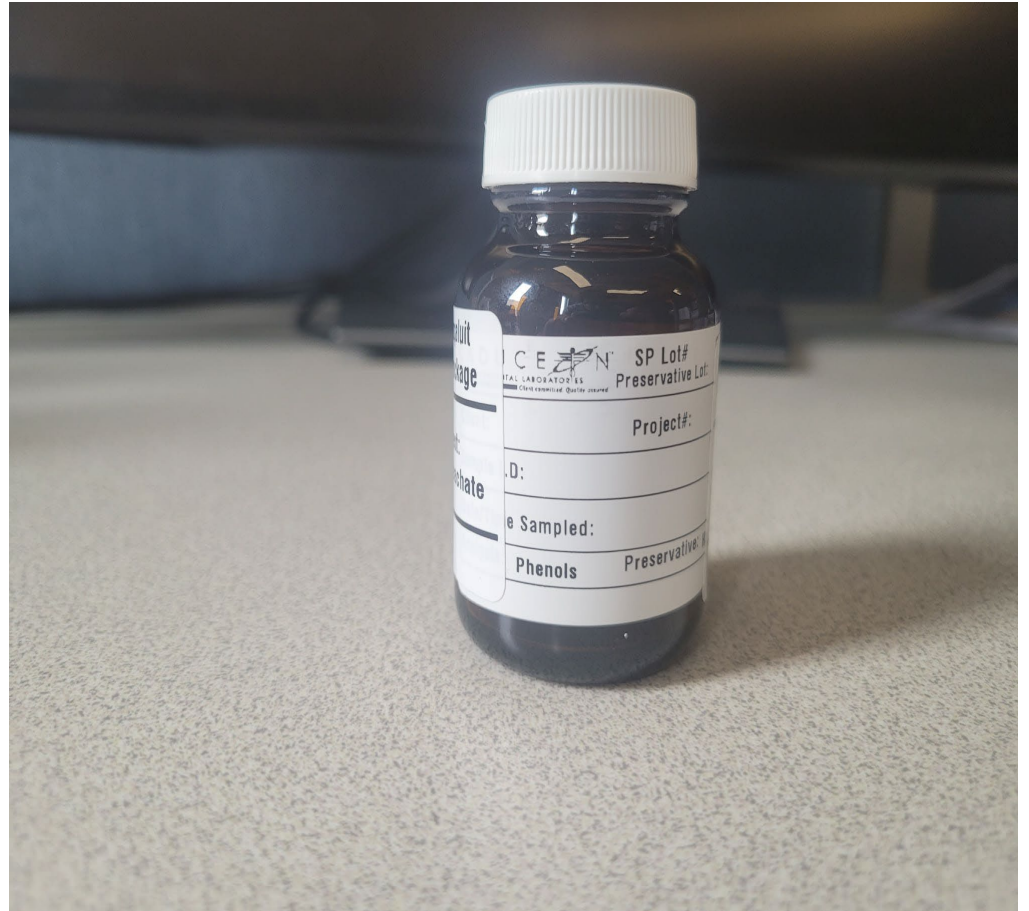
## Mercury

- Pre-charged with  $\text{K}_2\text{Cr}_2\text{O}_7/\text{HNO}_3$ . **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C



## Phenols

- Pre-charged with  $\text{H}_2\text{SO}_4$ . **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at  $4^\circ\text{C}$ .



## Fecal coliforms

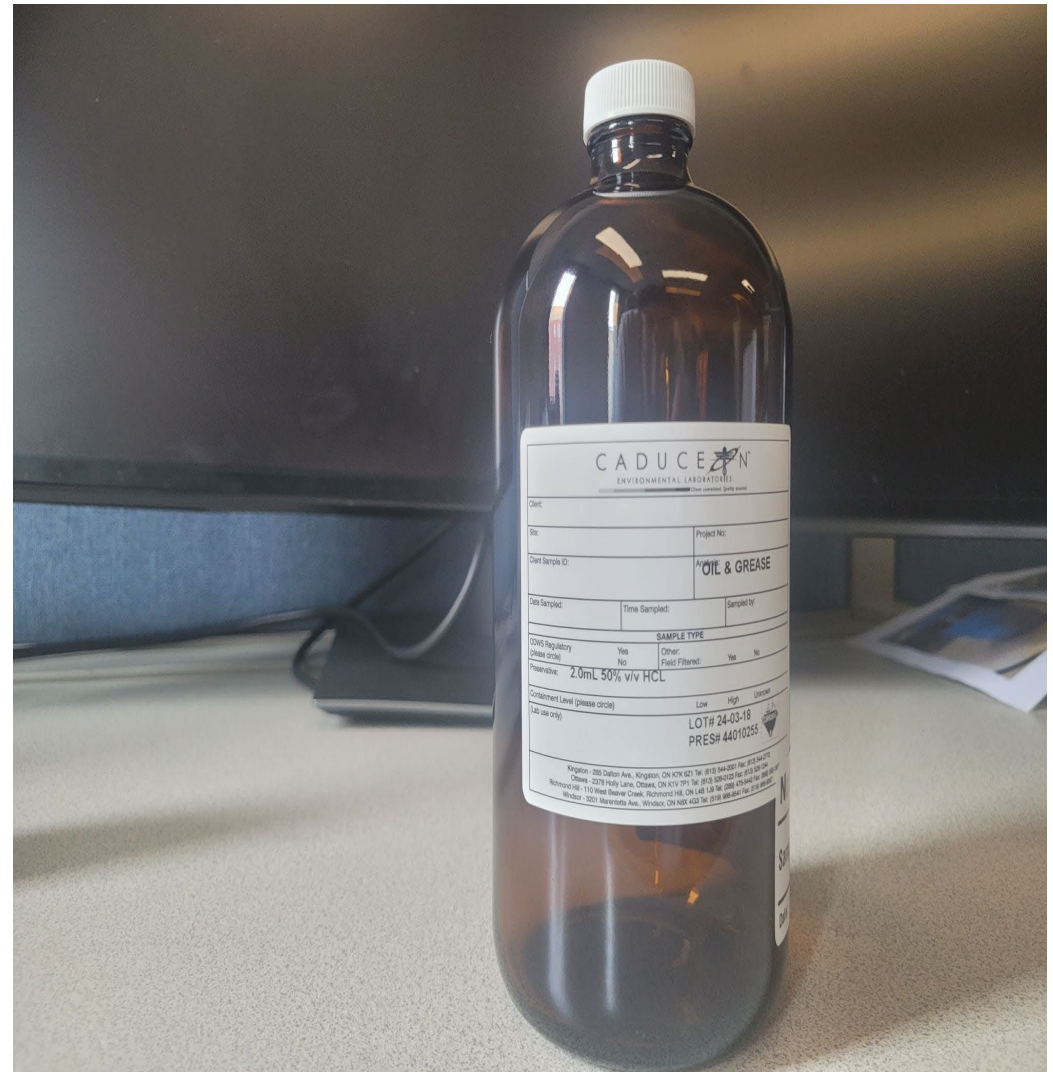
- Pre-charged with Sodium Thiosulfate. **Do not rinse.**
- To prevent contamination, refrain from inserting your hands into the bottle, please wear gloves.
- Fill up to the 200 ml mark on the bottle.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C.





## Oil & Grease

- Pre-charged with HCL. **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C



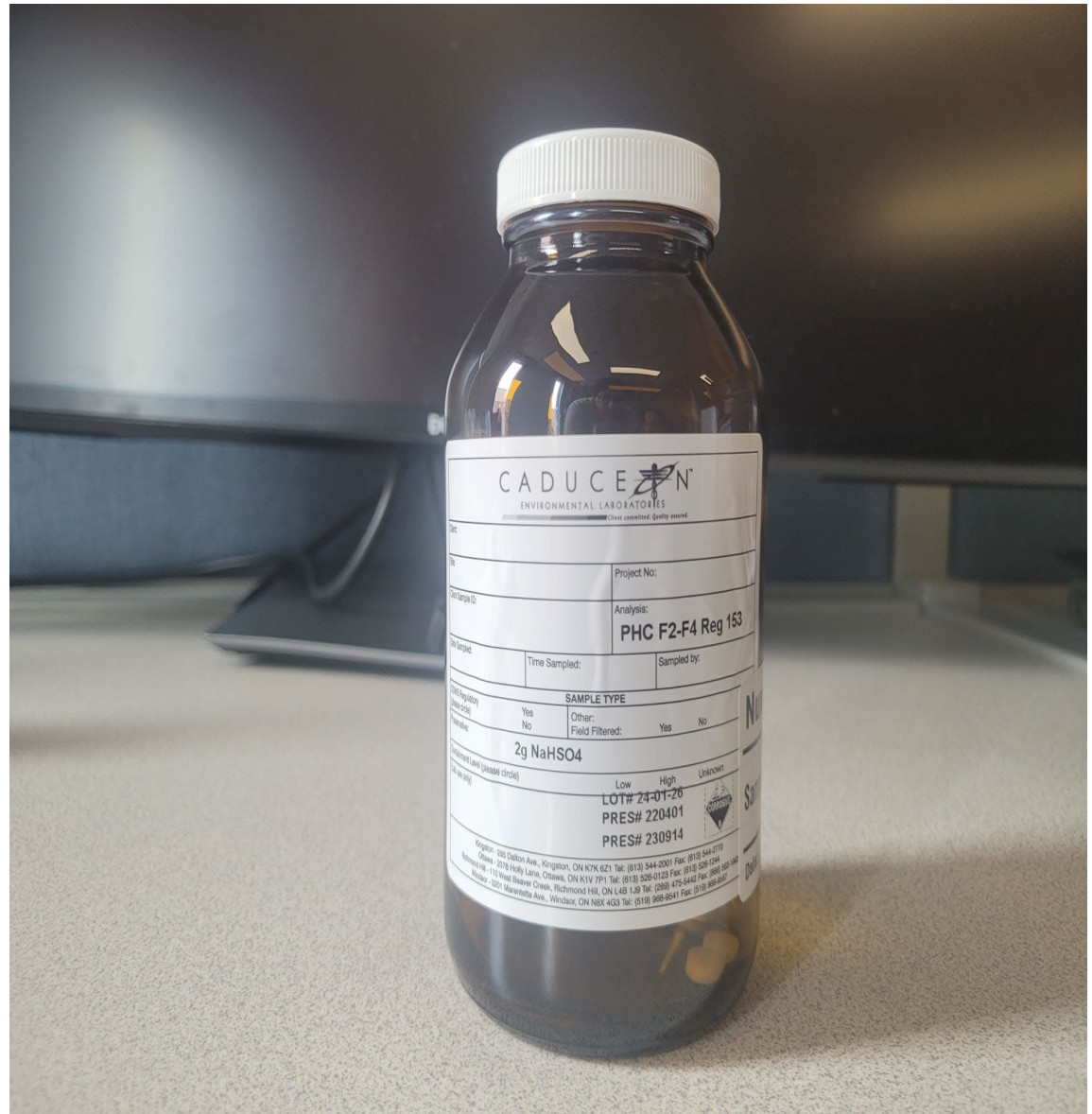
## BTEX/PHC (F1)

- Pre-charged with  $\text{NaHSO}_4$ . **Do not rinse.**
- Fill vial until just prior to overflowing.
- There should be minimal to no headspace.
- Cap and invert the vial to verify no air space.
- If air space is present, uncap the vial and add more sample water.
- Cap tightly.
- Place in bubble wrap and seal.
- Store at  $4^\circ\text{C}$



## PHC (F2-F4)

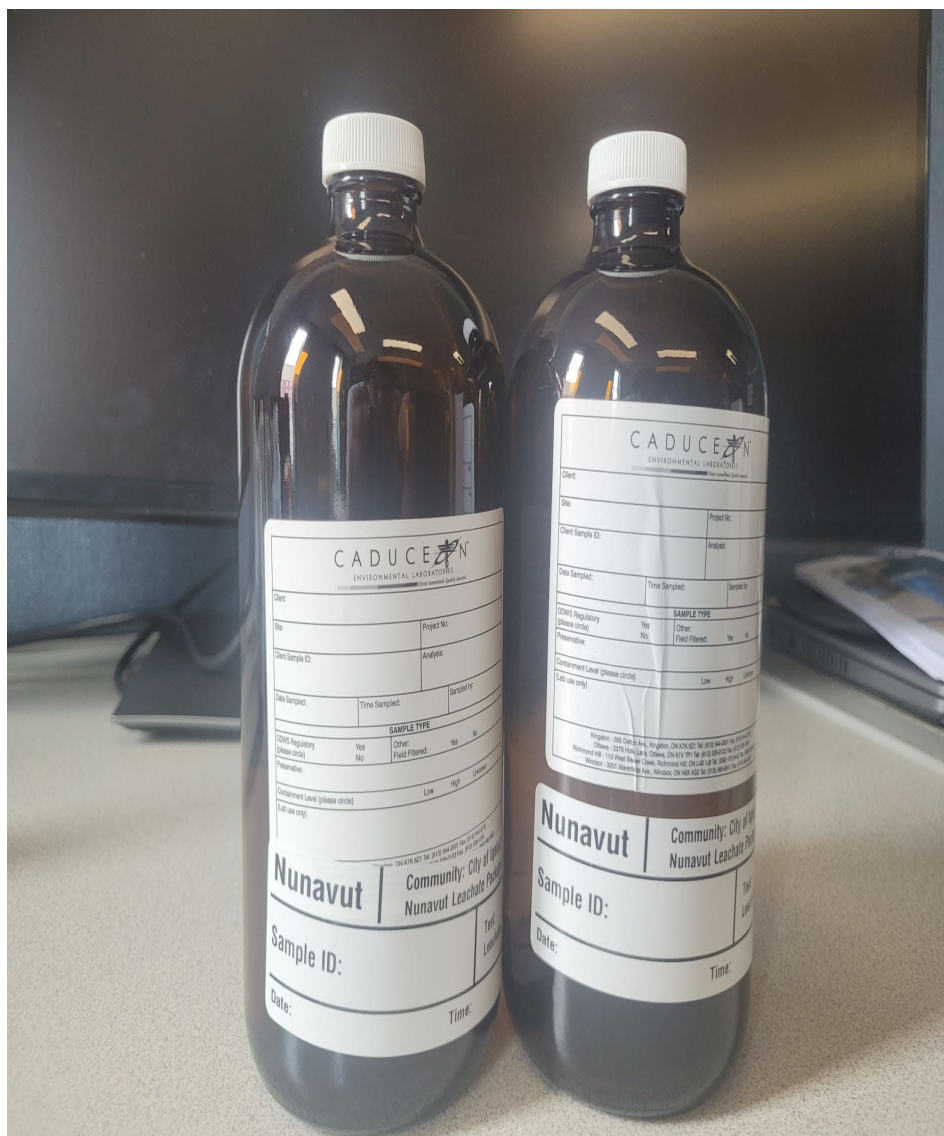
- Pre-charged with NaHSO<sub>4</sub>. **Do not rinse.**
- Fill to where bottle neck begins to taper.
- Cap tightly and invert to mix.
- Place in bubble wrap and seal.
- Store at 4°C





## PAHs (x2)

- Rinse 3 times
- Fill to 95% capacity
- Cap tightly
- Place in bubble wrap and seal
- Store at 4°C





## Routine

- Rinse 3 times
- Fill to 95% capacity
- Cap tightly
- Store at 4°C



# Appendix D

## *Field Forms*

# Field Log

Name of Sampler(s): \_\_\_\_\_

Date of Sampling: \_\_\_\_\_

Time of Sampling: \_\_\_\_\_

Monitoring Station Number: \_\_\_\_\_

GPS Coordinates: N \_\_\_\_\_ ° \_\_\_\_\_ ' \_\_\_\_\_ "      W \_\_\_\_\_ ° \_\_\_\_\_ ' \_\_\_\_\_ "

Weather Conditions: \_\_\_\_\_

## Samples:

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

500 mL BOD  
500 mL Routine  
500 mL CBOD  
40 mL Glass Mercury Vial + Pres  
100 mL Amber Nutrients + Pres  
100 mL Amber Phenols + Pres  
250 mL Sterile Bacteria Bottle  
**2 x** 250 mL Amber Oil & Grease + Pres

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

60 mL Metals + Pres  
**3 x** 40 mL BTEX, F1 Vials + Pres  
**2 x** 100 mL Amber F2-F4 Vials + Pres  
**2 x** 250 mL Amber PAH + Pres

## Other:

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Other Notes: (any unusual conditions, any deviation from standard procedures, reason sample was not taken, etc.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_