Hamlet of Resolute Bay Airport Sewage Lagoon

Quality Assurance/Quality Control Plan

APRIL 2016

ECONOMIC DEVELOPMENT AND TRANSPORTATION

GOVERNMENT OF NUNAVUT

Table of Contents

Appendices

Appendix A: Site Plan

Appendix B: Environmental Monitoring Program: Sample Bottle Requirements and Laboratory Accreditation

Appendix-C: A Chain of Custody Sheet

Appendix-D: Capacity of Sample bottles: Monitoring Program

1.0 Introduction

The purpose of the QA/QC Plan of the Resolute Airport Sewage Lagoon water licence is to ensure that samples taken in the field as part of the Monitoring Program will maintain a high quality, so as to accurately represent the physical and chemical nature of the samples being taken. It should also be noted that while minimum sampling requirements have been imposed, additional sampling may be requested by an inspector.

1.1 Background

Resolute Airport maintains Municipal Type B license # 3BM-YRB 0308 issued on November 30, 2003 and expired on November 30, 2008. A renewal application was submitted on November 28, 2008. Additional information was requested by NWB on July 20, 2010 to ED&T but was not provided on the due date August 20, 2010. September 24, 2012, NWB was informed about the change of licensee from GN-ED&T to GN-CGS in a letter signed by Art Stewart, Acting Director, Transportation and Planning, ED&T. Due to delays of the WWTP construction, the lagoons are required to keep active and at the same time GN-ED&T remains as the licensee.

The drinking water supply system was changed from the conditions and criteria established in the initial licence. Initially fresh water was supposed to be extracted from the Strip Lake. They stopped this process long time ago due to contamination of the source. Currently treated water is collected from the Water Treatment Plant located at Signal Hill and trucked to the Airport facilities. And wastewater is collected from the Airport facilities and truck discharged to the Airport Sewage Lagoon located in an area adjacent to the Airport Terminal

The Sewage Lagoon can only be decommissioned once Mechanical wastewater Treatment plant for Utilidor system is built and commissioned. This facility might not be ready before 2022. Therefore the Airport water licence is required to be renewed in order to use sewage lagoon.

1.2 Monitoring and Regulatory Requirement

Item 3 of Part H water licence requires that the Licensee shall conform to the Quality Assurance/Quality Control (QA/QC) Plan, which shall be provided to the licensee by the NWB within 6 months of the issuance of this licence.

1.3 Objectives

The objectives of this QA/QC plan are to (i) to ensure the reliability of the data collected during monitoring activities at the locations specified in the Hamlet's water licence , and (ii) satisfy the requirement of the water licence.

1.4 Scope of work

The QA/QC Plan covers the environmental monitoring undertaken at the Water treatment plant of the Utilidor system at Signal Hill and the Airport Sewage Lagoon disposal facility as shown in the Site Plan.

1.6 Definitions

The following definitions that are relevant to this plan include:

Quality Assurance is a system that ensures that quality control procedures are correctly performed and documented.

Quality control refers to the established procedures observed both in the field and in the laboratory, designed to ensure that the resulting end data meet intended quality objectives.

Trip Blank is a sample of clean water that was prepared by the analytical laboratory and shipped to the sample site in the cooler along with the empty sample bottles. This trip blank sample remains unopened and is transported back to the laboratory with the monitoring program samples. The trip blank is analyzed by the Laboratory along with the monitoring program samples. The purpose of the trip blank is to assess contamination introduced during shipping and field handling procedures.

CALA refers to the Canadian Association for Laboratory Accreditation, formally known as the Canadian Association of Environmental Analytical laboratories (CAEAL).

Chain of Custody Documentation refers to the documentation that accompanies samples set to an analytical laboratory. It is a legal document which ensures that the sample taken at a specific site is the sample received in the laboratory. It also provides information on the sample condition and integrity as received by the laboratory.

2.0 Field Sampling

2.1 Sampling procedures

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 Waste water, or by such other methods approved by the Board. All analyses shall be performed in a Laboratory certified by the Canadian Association of Environmental Analytical Laboratories (CAEAL) or as otherwise approved by NWB..

To obtain meaningful results from the analyses, the following six factors are of particular importance:

- Sample collection as per schedule and location
- Correct usage of container/sample bottle for parameter being tested.
- Correct labeling of sample bottles and filling out record/field sheet

- Correct procedure for field sampling
- Proper and timely shipment of samples to the laboratory
- Timely delivery of samples to the laboratory from the air cargo facility.

2.2 Sampling Collection

Refer to the Environmental Monitoring Program Checklist, found in **Appendix C** for the specific details on the sampling locations, equipment and sampling methods.

2.2.1

The water License issued to the Resolute Airport Authority represented by GN-ED&T by the NWB specifies three monitoring stations across the licensed facilities:

YRB- 1: Raw water supply prior to Treatment. (Currently the Contractor ATCO is getting treated water only from the Utilidor water treatment plant and volume recorded daily); The YRB-1 was ceased and abandoned permanently. The station YRB-1 is now proposed to be installed at the lower end of the wetland in between the YRB-3 and the sea to monitor the waste water effluent quality in order to assess the efficiency of the wetland.

YRB-2: Raw Sewage at Truck offloads point: Volume is recoded daily. The daily wastewater volume is considered equal volume to the treated water consumption volume.

YRB- 3: Effluent discharge from the Final discharge point of the sewage disposal facilities. This is the Compliance Point.
The following table includes the geographic coordinates for the three monitoring stations described above:

Monitoring Station	**Latitude**	**Longitude**
YRB-1 (to be established)		
YRB-2	**$74^0$40.408'N**	**$94^0$55.256'W**
YRB-3	**$72^0$41.973'N**	**$77^0$55.902'W**

2.2.2 Sampling Equipment

Dedicated latex or nitrile gloves (i.e., one pair per sample) are to be used during sample handling. Dedicated sampling equipment such as sampling poles (see photo below for an example) are to be cleaned with soap and water after each sample is collected to prevent cross-contamination. Environmental monitoring samples collected for analysis of selected chemical parameters are to be placed directly into new pre-cleaned, laboratory-supplied sample bottles. All monitoring samples are to be placed in clean coolers for transportation to the subcontract laboratory. The samples are transported/submitted under Chain of Custody documentation. Included on a Chain of Custody form is the client information, the sample information, the analyses requested, the relevant regulations, the turnaround time for the analytical results, comments, and temperature of the samples at the time they arrived in the laboratory. An example of a completed Chain of Custody form is included in **Appendix D.**

2.2.3 Sampling Methods

Please see Appendix E for the Environmental Monitoring Program Schedule. As a general recommendation, please refrain from using insect repellant, disinfection hand gel or other chemical products before and during sample collection. Also, please refrain from smoking during sample collection.

2.2.3.1 Wastewater Sampling

Wastewater influent samples are collected from the active sewage disposal facility at station YRB-2. Wastewater influent samples are collected from the lagoon by immersing the sample bottle into the lagoon neck first to a depth of 0.20 to 0.50 m if possible). The sampling container is filled with influent wastewater and the sample bottle is raised neck first to prevent sample spillage.

The Licensee shall advise an inspector at least ten (ten) days prior to initiating any decant of the Sewage Lagoon.

On monthly basis, from May to August, samples will be collected from the stations at YRB-1 , YRB-2 and YRB-3 as long as the flow is observed. Preference sampling at the beginning, at the middle and at the end of the decanting period if possible..

2.3 Sample Handling

All water samples are to be collected in laboratory-supplied containers with the proper preservative where applicable. All sample containers are to be tightly sealed and properly labeled with the sample ID, date and time of sample collection, location of sample collection and parameters to be analyzed. The outside of the bottles are to be cleaned with soap and water after sampling and dried off prior to placing the samples in the cooler. The samples are to be stored on ice in a cooler until delivery to the laboratory. A chain of custody form is to be filled out completely and is used to track the samples and placed in the cooler with the samples, in a zip lock bag. Keep the last page of the Chain of Custody and give it to the Hamlet Foreman for their records.

The following checks are generally performed by the laboratory upon receipt:

- Verification of the integrity and condition of all sample coolers.
- Verification of the integrity and condition of all sample containers.
- Checks for leakage, cracked or broken closures or containers, evidence of grossly contaminated container exteriors or shipping cooler interiors, and obvious odors, etc.
- Verification of receipt of complete documentation for each container.
- Verification that sample identification numbers on sample transmittal forms corresponds to sample identification numbers on the sample containers.
- Verifications that holding times were met and samples were kept cool during transit.

2.4 Quality Assurance and Quality Control Program

Cross contamination is a common source of error in sampling procedures. QC samples help identify when and how contamination might occur. There are various types of QC samples. For the purposes of the Hamlet's environmental monitoring, CGS recommends the use of trip blanks if and where applicable.

It is essential to request a trip blank sample to be prepared when placing the bottle order with the contract laboratory.

3.0 **Laboratory Analyses**

3.1 **Laboratory Accreditation**

As indicated in the Guidelines, the GN-ED&T should use an analytical laboratory accredited by the Canadian Association for Laboratory Accreditation (CALA); formally known as the Canadian Association for Environmental Analytical Laboratories (CAEAL) for the monitoring program for NWB Licence NWB YRB 0308. Appendix B includes a copy of the laboratory's CALA accreditation certificate.

3.2 **Method Detection Limits**

The method detection limits (MDLs) are provided on the contract laboratory's Certificates of Analysis.

4.0 **Reporting Requirements**

4.1 **General Submissions**

As a condition of NWB Licence # 3BM-YRB 0308, the GN-ED&T is required to submit an Annual Report to the NWB, no later than March 31st of the year following the calendar year reported which shall contain the information of item 1 of Part B of the Water Licence. The annual lab results are attached with the Annual Report.

References

Quality Assurance (QA) and Quality Control (QC) Guidelines for use by Class "B" Licensees in Collecting Representative Water Samples in the Field and for Submission of a QA/QC Plan, Department of Indian and Northern Affairs Canada, July 1996.

Standard Methods for the Examination of Water and Wastewater, American Public Health Association, American Water Works Association, and Water Environment Federation, 22nd Edition, 2012.

exp Services Inc. (2013); QA/QC Plan for Cape Dorset, Kimmirut and Hall Beach

Appendices:

Appendix-A: Site Plan

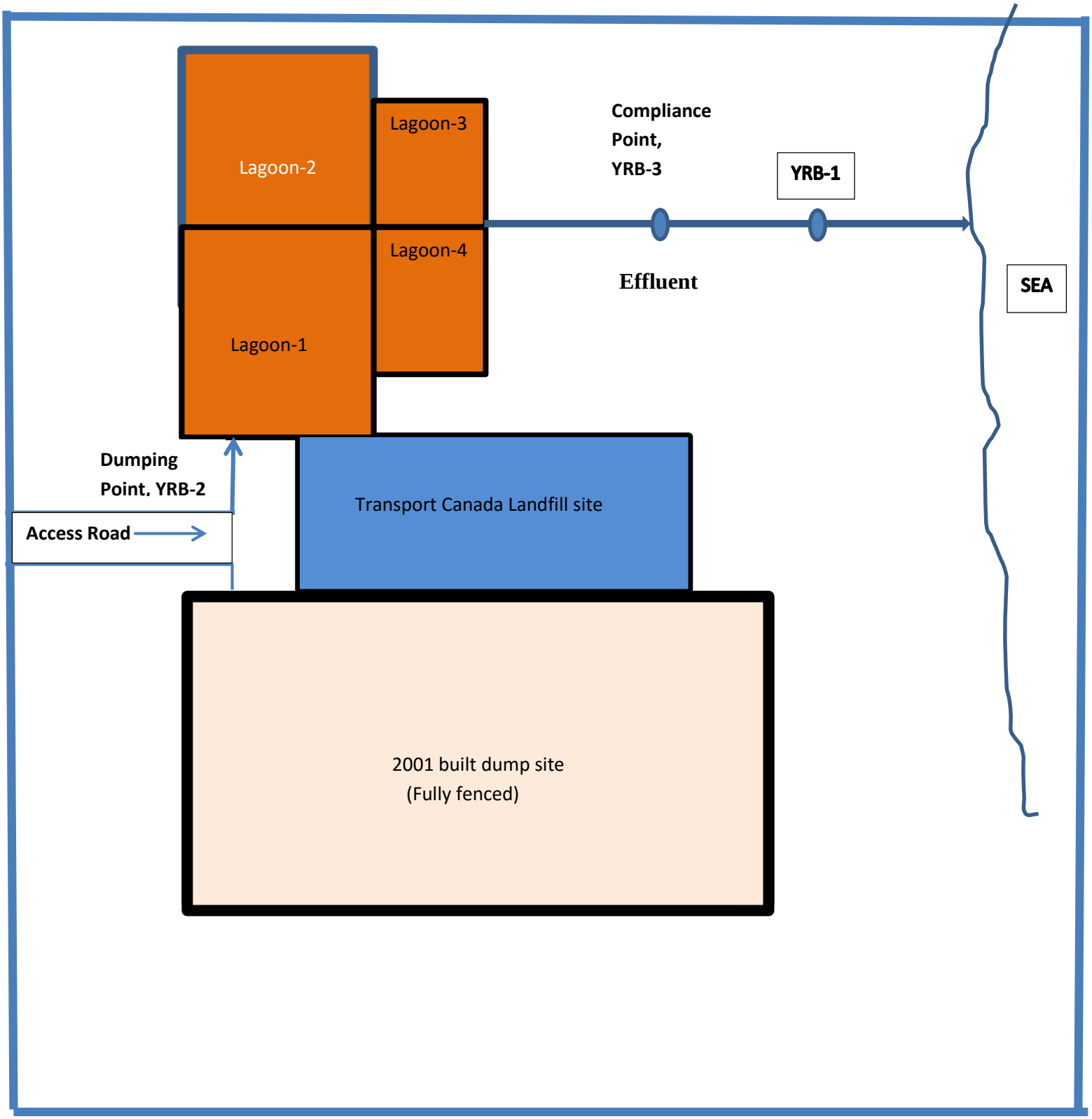
Appendix-B: Environmental Monitoring Program Checklist, Summary of Sample Bottles requirements and Subcontract Laboratory Accreditation

Appendix-C: Chain of Custody Sheet

Appendix-D: Designated sample bottles and their capacities: Monitoring Program

APPENDIX- A

SITE PLAN


Lagoon-2
Lagoon-3
Lagoon-4
Lagoon-1
Compliance
Point,
YRB-3
YRB-1
Effluent
SEA
Dumping
Point, YRB-2
Access Road
Transport Canada Landfill site
2001 built dump site
(Fully fenced)

APPENDIX-B

ENVIRONMENTAL MONITORING PROGRAM

AND

SAMPLE BOTTLE REQUIREMENTS

Bottle Order	At least two weeks before upcoming environmental sampling, send a request to the contract laboratory for the appropriate sample sets (bottles) for the required sampling test groups (see conditions 2 of Part H of Nunavut Water Board Licence #NWB3YRB0308).	
Personal Procedure Equipment	Ensure that the required personal protective equipment (PPE), such as latex gloves, is on hand before commencing the environmental monitoring program.	
Bottle shipment	Ensure that bottles shipment has arrived from the laboratory in time for the sampling program and verify the integrity of all sampling containers. Report any missing bottles or broken bottles to the lab as soon as possible so that the replacement bottles may be shipped.	
Sampling Location Inspections	Perform an initial inspection of all the monitoring sampling program stations before the commencement of the monitoring program. Make sure of any equipment damage or conditions that may prevent the collection of the Environmental monitoring program samples.	
	General sampling Instructions	
Prevention of cross Contamination	Ensure that any laboratory provided sampling instructions are strictly followed. Latex or nitrite gloves should be worn during sampling and should be replaced with fresh gloves after all sampling containers are filled at each location. Dedicated sampling equipment such as sampling poles should be cleaned with soap and water after each sample is collected to prevent cross-contamination. As a general recommendation, please refrain from using insect repellant, disinfection hand gel or other chemical products before and during sample collection. Also refrain from smoking during sampling.	
Sample Care(including packing of Cooler)	All the sample containers should be tightly sealed and properly labeled with sample ID, date and time of sample collection, location of sample collection and parameters to be analyzed. The outside of the bottles should be cleaned with soap and water and dried prior to placing the samples in the cooler. The samples should be stored on ice in a cooler until delivery to the laboratory. A chain of Custody form should be filled out completely and be used to track the samples and placed in the cooler with the samples, in a Zip lock bag. Keep the last page of the chain of Custody and retain in the Hamlet garage for their records.	
	Raw Water Supply	
Sampling station YRB-1	This station has been changed to Signal Hill Water Treatment Plant. Raw water prior to chlorination can be collected from the intake pipe coming from the Pump station located at Char Lake.	
	Sewage Disposal Facility.	
Sampling Station YRB-2	The Licensee shall measure and record in cubic meters the monthly and annual quantities of sewage discharged at Monitoring Program Station YRB-2 for all purposes.	
Sampling Station YRB-3	Effluent discharge is collected from the Final effluent discharge point of the Sewage Disposal Facilities upon providing notice to the INAC inspector, at the beginning, at the middle and at the end of decanting the lagoon.	

Name: Signature: Date:

Laboratory Accreditation & Supporting Documentation

CALA Directory of Laboratories

Canadian Association for

Laboratory Accreditation Inc.

Membership Number: 2644

Laboratory Name: **Caduceon Environmental Laboratories {Ottawa)**
Parent Institution: Caduceon Enterprises Inc.

Address: 2378 Holly Lane Ottawa ON K1V 7P1
Contact: Mr. Greg Clarkin

Phone: {613) 526-0123;Fax: {613) 526-1244;Email: gclarkin@caduceonlabs.com

Standard: Conforms with requirements of ISO/IEC

17025 Clients Served: Revised On: May 9, 2013

Valid To: October 25, 2015

Note:

1.The Licensee shall sample monthly at Monitoring Station YRB-3 during the months of May to August , inclusive and analyze samples for the following parameters:

BOD, pH, Total Suspended Solids, Nitrate-Nitrite, Total Phenols, Sodium, Magnesium, Total Arsenic, Total Copper, Total Iron, Total Mercury, Total Zinc, Faecal Coliform, Conductivity, Ammonia Nitrogen, Oil and Grease (Visual), Sulphate, Potassium, Calcium, Total Cadmium, Total Chromium, Total Lead and Total Nickel.

2. The Licensee shall conform to the Quality Assurance and Quality Control (QA/QC) Plan attached.

APPENDIX-C

A CHAIN OF CUSTODY SHEET

Resolute Bay Airport Sewage Lagoon Environment Monitoring Program

(QA/QC Plan)

CADUCEON™ ENVIRONMENTAL LABORATORIES
Client committed. Quality assured.

TESTING REQUIREMENTS

- ☐ O.Reg 153 — Table _____
- ☐ Surface Soil ☐ Sub Surface Soil
- ☐ Yes ☐ No — Record of Site Condition
- ☐ Provincial Water Quality Objectives
- ☐ Sewer Use By-Law: _____

REPORT NUMBER (Lab Use)

Indicate Laboratory Samples are submitted to: Kingston ☐ Ottawa Ric☐ond Hill Windsor

Organization:	Address and Invoicing Address (if different)	
Contact:		
Tel:		
Fax:	Quote No.:	Project Name:
Email:	P.O. No.:	Additional Info:

LYSES REQUESTED (Print Test in B

Suspected Highly Contaminated

TURNAROUND SERVICE REQUESTED (see back page)

- ☐ Platinum 200% Surcharge**
- ☐ Gold 100% Surcharge
- ☐ Silver 50% Surcharge
- ☐ Bronze 25% Surcharge
- ☐ Standard 5-7 days
- ■ Specific Date: _____

Are any samples to be submitted intended for Human Consumption under any Drinking Water Regulations? (If yes, submit all drinking water samples on a drinking water Chain of Custo

* Sample Matrix Legend: WW=Waste Water SW=Surface Water GW=Groundwater LS=Liquid Sludge SS=Solid Sludge S=Soil Sed=Sediment PC=Paint Chips F=Filter Oil = Oil

Lab No:	Sample Identification	S.P.L.	Sample Matrix *	Date Collected (yy-mm-dd)	Time Collected	Indicate Test For Each Sample ing A Check Mark In The Box Pro	✓	Field pH	Field Temp.	# Bottles/ Sample	Field Filtered(Y/N)
1											
2											
3											

SAMPLE SUBMISSION INFORMATION

	Sampled by:	Submitted by:
Print:		
Sign:		
	Date (yy-mm-dd)/Time:	Date (yy-mm-dd)/Time:

SHIPPING INFORMATION

- Client's Courier ■
- Caduceon's Courier ☐
- Drop Off ☐
- Caduceon (Pick-up) ☐

Invoice ☐

# of Pieces

SAMPLE RECEIVING INFORMATION (LABORATORY USE ONLY)

Signature:

Time Received:

Laboratory Prepared Bo ☐ Yes ☐ No

Labeled by:

Laboratory Locations/Shipping Addresses

ston Lab - 285 Dalton Ave., Kingston, ON K7K 6Z1, Tel: (613) 544-2001 Fax: (613) 544-2770 Email: contactkingston@caduceonlabs
ttawa Lab - 2378 Holly Lane, Ottawa, ON K1V 7P1, Tel: (613) 526-0123 Fax: (613) 526-1244 Email: contactottawa@caduceonlabs.co
ill Lab - #14-110 West Beaver Creek Rd., ON L4B 1J9, Tel: (289) 475-5442 Fax: (866) 562-1963 Email: contactrichmondhill@caduce
r Lab - #5-3201 Marentette Ave., Windsor, ON N8X 4G3, Tel: (519) 966-9541 Fax: (519) 966-9567 Email: contactwindsor@caduceonla

APPENDIX-D

Guide Lines for Water, Wastewater and Leachate sampling Baffin Communities

Drinking water:

Monthly Sampling: (Bacteria analysis)

1. Collect five samples (**200 ml each**) from five different locations and send to Iqaluit Health Lab though your local health center. One of the five samples should be raw water sample.
   Once in a month for Resolute Bay.

Annual Sampling: (Microbiological and Chemical Analysis)

2. Send samples to Caducean Environmental Lab, Ottawa, Ontario.
   Caducean Environmental Lab
   Gord Murphy/Rebecca Marshall, Lab Supervisor
   2378 Holly Lane
   Ottawa, ON, K1V 7V1
   Ph-613-526-0123
   Fax-613-526-1244

Precautions of Sampling:

1. Be careful not to let the mouth of the bottle or lid touch anything including sampler's fingers.
2. Do not overfill the bottle or rinse out
3. Fill the bottle to the 200ml line from water tap, valve or water truck delivery hose nozzle. When sampling from a water tap, remove screen, aerator or other attachment from tap and allow the cold water to run for 2-3 minutes before collecting. Do not dip into the filled water truck tank to take a sample.
4. Ensure each bottle label information is filled for:
   - Date and time sample was taken
   - Sample point location
   - Sampler's name
5. Persons' name and contact address where to send sample Test results and invoice.
6. Samples must arrive at the Labs either Iqaluit or Ottawa within 24 hrs. from the time of sampling.

Wastewater:

1. Collect five treated samples from the first point of discharge of Sewage (YRB-3).
2. Collect Five raw samples directly from the truck discharge (YRB-2)

Sample bottles specifications for Wastewater and leachate:

All the wastewater and Leachate samples will be sent to Caducean Lab, Ottawa, ON.

Waste water you get 8 bottles / sample with 3 samples / cooler.
2 Pet 500 ml
1 O& G 1000 ml
1Metals red Cap 125 ml
1 TKN/TP Yellow 125 ml
1 Phenol Glass 125 ml
1 300 ml Bacteria
2 TOC 40 ml x 2

Raw Drinking Water 7 Bottles per sample
1 L amber 1000 ml for surfactants
1Metals red Cap 125 ml
1 Phenol Glass 125 ml
1 GWC clear 500 ml
2 x 250 ml TSS Raw and Treated
1 Green cap CN 125 ml

Precautions of sampling:

1. Use hand gloves
2. Ensure each bottle level information is filled:
1. Date and time sample taken
2. Location with GPS coordinates
3. Sampler's name
4. Person's name and contact information where to send sample Test Results and invoice.

5. Samples must be arrived Ottawa Lab within 24 hours from the time of sampling.

CADUCEON™
ENVIRONMENTAL LABORATORIES
Client *committed. Quality assured.*

April 7, 2016

Bhabesh Roy
Government of Nunavut
PO BOX 379
Pond Inlet, NU
XOAOSO

Dear Bhabesh Roy,

Caduceon Environmental Laboratories looks forward to aiding Hamlet of Resolute Bay in their environmental analysis. The Caduceon staff has reviewed the PDF document entitled "QA/QC *for the Wastewater Treatment Facility of Resolute Bay"* that was provided to our Ottawa Laboratory.

Our staff has read and understands the requirements found within this document and see no issues with providing you quality service and analysis. In addition, it has been noted that it is necessary all testing be completed under GALA accreditation. Caduceon Environmental Laboratories are accredited for all of the parameters listed within the document.

I believe you have already been provided with our GALA Scopes of Accreditation for your records. Should you require any further information please call either Gord Murphy (Lab Supervisor) or myself (Greg Clarkin, Lab Manager) at the Ottawa office and we will be more than happy to help you out.

Again, thanks for the opportunity to work with the Hamlet of Resolute Bay.

Regards,

Greg Clarkin, Lab Manager- Ottawa District
Caduceon Environmental Laboratories
Tel: (613) 526-0123
Fax: (613) 526-1244
E-mail: gclarkin@caduceonlabs.com

cc: Gord Murphy, Lab Supervisor
Damien Gilbert, CEO

Resolute Bay Airport Sewage Lagoon Environment Monitoring Program
(QA/QC Plan)