Hamlet of Resolute Bay Metal Waste Site
(Next to Resolute Bay Airport Sewage Lagoon)
Quality Assurance/Quality Control Plan

May 2016

Hamlet of Resolute Bay

NUNAVUT

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1.0 Introduction

The purpose of the QA/QC Plan of the Resolute Bay Water Licence # 3BM-RES 1520-Type B for Waste (Metal Waste) Management facility is to ensure that samples (Leachate) 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**

The Hamlet of Resolute Bay has a new Water licence #3BM-RES 1520; Type B, which covers existing Landfills site (Municipal Dump site) and the existing metal dump site (MDS). Both sites are almost full and have near capacity. The Municipality is planning to build a new waste management site within a few years. Currently the buried pipes of the Utilidor system are being replaced. At the same time Federal Governmental agencies especially NAV Canada has started demolishing their old and unused buildings. It may be cost effective to retain these metals and non- hazardous materials in the Community rather than shipping them out to the South following Hamlet new waste collection bylaws. The Hamlet of Resolute Bay is planning to amend their exiting WL licence # 3BM-RES1520-Type B to accommodate the 2000/2001 built waste site situated at N $74^0$44'29.2"and W $095^0$00'24.9",which is located next to the Resolute Bay Airport Sewage Lagoon. Since this facility was constructed in 2000/2001, this was never licensed and used.

The site has a perimeter fence with an entrance gate located on the south face, east side of the enclosure. A gravel road with ditch provides access through the entrance gates into the enclosed site. The site has an area of approximately 50,000 m^2.

Generally, the site consists of a higher topographic zone (in the east half of the site; "the eastern zone") in the vicinity of the entrance gate with a slope of about 1H: 22V, and a zone of steeper grade (in the west half of the site; "the western zone") with a slope of about 1H: 10V. The dimensions of the site are approximately 285 m x 175 m with an overall elevation change of about 15 m. An outcrop ridge of highly fractured bedrock is located at a topographic elevation of about 60 m; and separates the two zones noted above. The lowest point within the proposed MDS, located along the west side of the fence is at a topographic elevation of 52 m, while the highest point at the east side of the enclosure is 67m. Typical ground cover in the eastern zone ranges from about 1 to 2 m of overburden sandy-gravel material to highly fractured bedrock and boulder size materials. The western zone of the site consists mainly of highly fractured bedrock to 1 to 2 m of boulder size materials.

The galvanized steel chain link fence making up the enclosure for the proposed new MDS consists of twenty-eight (28) 88.9 mm dia. hollow post sections at various spacing, with smaller 66 mm dia. posts between, spaced at approximately 2 m. All posts appear to be drilled and backfilled into the surrounding soils. The top rail and bracing members located adjacent to doors, and in changes of direction along the length of the fence, were found to be 42.9 mm dia. as per drawings. The height of the fence is approximately 1.8 m. The gates providing access to the enclosure consist of two (2) 88.9 mm posts spaced at 1.8 m complete with gate hinges, drop latch and latch catch. Adjacent to the gates there is a pedestrian door between two (2) 88.9 mm posts complete with gate hinges and door latch. The fence installation appeared to be true

and was found to be stable.

The Engineering design and as built drawings of the fence are not available. The Hamlet of Resolute Bay feels that this is a suitable site for metal waste storage until the new waste management facility is built and commissioned. Hamlet also feels that this site has no Environmental and Ecological concerns.

Hamlet will monitor the leachate quality and provide the test results in their annual report to NWB. Hamlet will be taking full responsibility to operate and maintain this site to the acceptable standard.

1.2 Monitoring and Regulatory Requirement

This Quality Assurance/Quality Control (QA/QC) Plan will be used to satisfy the item 3 of Part H of the proposed amended Water Licence to satisfy the monitoring and regulatory requirements of the metal waste site which is being added under the existing Water 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 metal waste

disposal facility as shown in the Site Plan: Fig.-1: **Appendix-A.**

1.5 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 B** for the specific details on the sampling locations, equipment and sampling methods.

2.2.1 Only two Leachate sampling stations are recommended to include at the downstream of the Metal waste site in the proposed amendment #1 Water Licence which should be issued to the Hamlet of Resolute Bay.

RES- 1M: Leachate discharge station at the downstream of the waste site about 10m from the fence of the Metal disposal facility as shown in the site plan in Fig.-1:**Appendix-A.**

RES-2M: Second leachate sampling station at the downstream of the Metal Waste facility about 100m from the fence as shown in the site plan in Fig.-1: **Appendix-A.**
The following table includes the geographic coordinates for the three monitoring stations described above:

Table -1

Monitoring Stations	Latitude	Longitude
RES-1 M	**To be determined this summer**	**To be determined this summer**
RES-2M	**To be determined this summer**	**To be determined this summer**

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 C.**

2.2.3 Sampling Methods

Please see **Appendix B** 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 Leachate Sampling

Leachate samples are collected from the active disposal facility at stations RES-1M and RES-2M as shown in the site Plan. The leachate influent samples are collected from the wetland by immersing the sample bottle into the Leachate stream first to a depth of 0.10 to 0.20 m if possible or use a different clean device to collect from the ground to fill the sample bottles.

On monthly basis, from May to August, samples will be collected from the stations at RES-1M and RES-2M as long as the flow is observed. Preference sampling will be given at the beginning of each month.

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 Blank if and where applicable.

3.0 **Laboratory Analyses**

3.1 **Laboratory Accreditation**

As indicated in the Guidelines, the Hamlet of Resolute Bay 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 # 3BM-RES 1520-Type B. **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-RES 1520-Type B, the Hamlet 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: Fig.-1

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

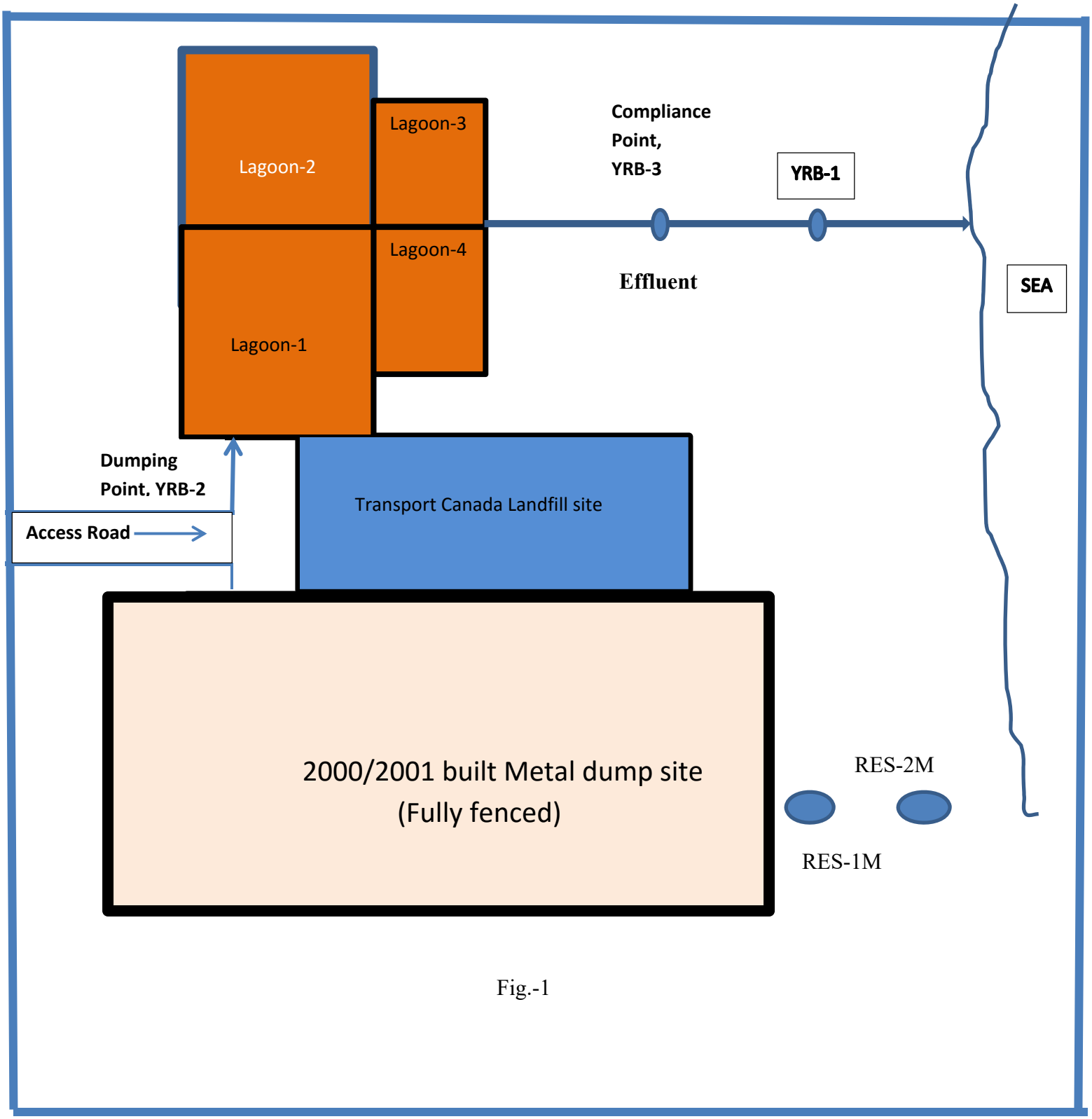
Lagoon-2
Lagoon-3
Lagoon-4
Lagoon-1
Compliance
Point,
YRB-3
YRB-1
Effluent
SEA
Dumping
Point, YRB-2
Access Road
Transport Canada Landfill site
2000/2001 built Metal dump site
(Fully fenced)
RES-2M
RES-1M

Fig.-1

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.	
	Leachate Sampling	
RES-1M	Sampling is restricted at Station RES-1M	
RES-2M	**Sampling is restricted at Station RES-2M**	

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 RES-1M and RES-2M 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

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 ■ — Invoice ☐
- Caduceon's Courier ☐
- Drop Off ☐ — # of Pieces
- Caduceon (Pick-up) ☐

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
Hill 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 Waste water and Leachate sampling
Baffin Communities

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

Wastewater and Leachate:

1. Collect Four (4) Leachate samples from the station RES-1M from Aug. to Sep.
2. Collect Four (4) Leachate samples from the station RES-2M from Aug. to Sep.

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

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.

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ENVIRONMENTAL LABORATORIES

Client *committed. Quality assured.*

April 7,

2016

Bhabes

h 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