

Quality Assurance / Quality Control Plan

(QA & QC PLAN)

September 2014

**Hamlet of Grise Fiord
Baffin Region
Community and Government Services
Government of Nunavut**

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Hamlet of Grise Fiord Quality Assurance / Quality Control Plan, September 2014

1.0 Introduction

The Hamlet of Grise Fiord is located on the North end of Flaherty Island, a large central island off the Belcher Islands in Hudson Bay and located at 56°32'N and 79°14'W within the Qikiqtani Region of Nunavut. The population of the Community in 2014 is 160. Currently they have three facilities under the Water Licence # 3BM-GRI 0911. The current licensed three facilities are:

1. Water Supply
2. Sewage Lagoon
3. Municipal Dump sites;
 - a. Domestic waste
 - b. Metal waste

Item 3 is a non-engineered facility. No design and drawings is available. The O&M manual did not exist at the past. Therefore, Hamlet is not following any regulatory protocol managing the community waste. The existing waste sites have no fencing.

The area of 3(a) is 43,560 m² and 3 (b) 3,422 m².

The average waste generation rate is considered 0.015 m³/person / day and for population of 160 in 2014, total about 876 cubic meters waste annually is expected, which is equivalent to un compacted volume for 78,840 kg (considering uncompacted density=99 kg/m³ of waste annually (Following Arktis design study for Hamlet of Resolute Bay Solid waste Management in 2010).

Both sites 3(a) and 3 (b) are full. Community is expecting a new engineered facility to accommodate all the waste satisfying the regulatory requirements.

They have been doing extensive sampling program following GN-CGS sampling guidelines.

Hamlet has started segregation of hazardous waste and they like to continue each year following the guidelines of GN-DOE.

Nunavut Water Board (NWB) issued a Class B Water Licence 3BM- GRI 0911 to the Hamlet on July 29,2009 and this expired on July 31, 2011. The water licence governs water use and waste disposal within the Hamlet.

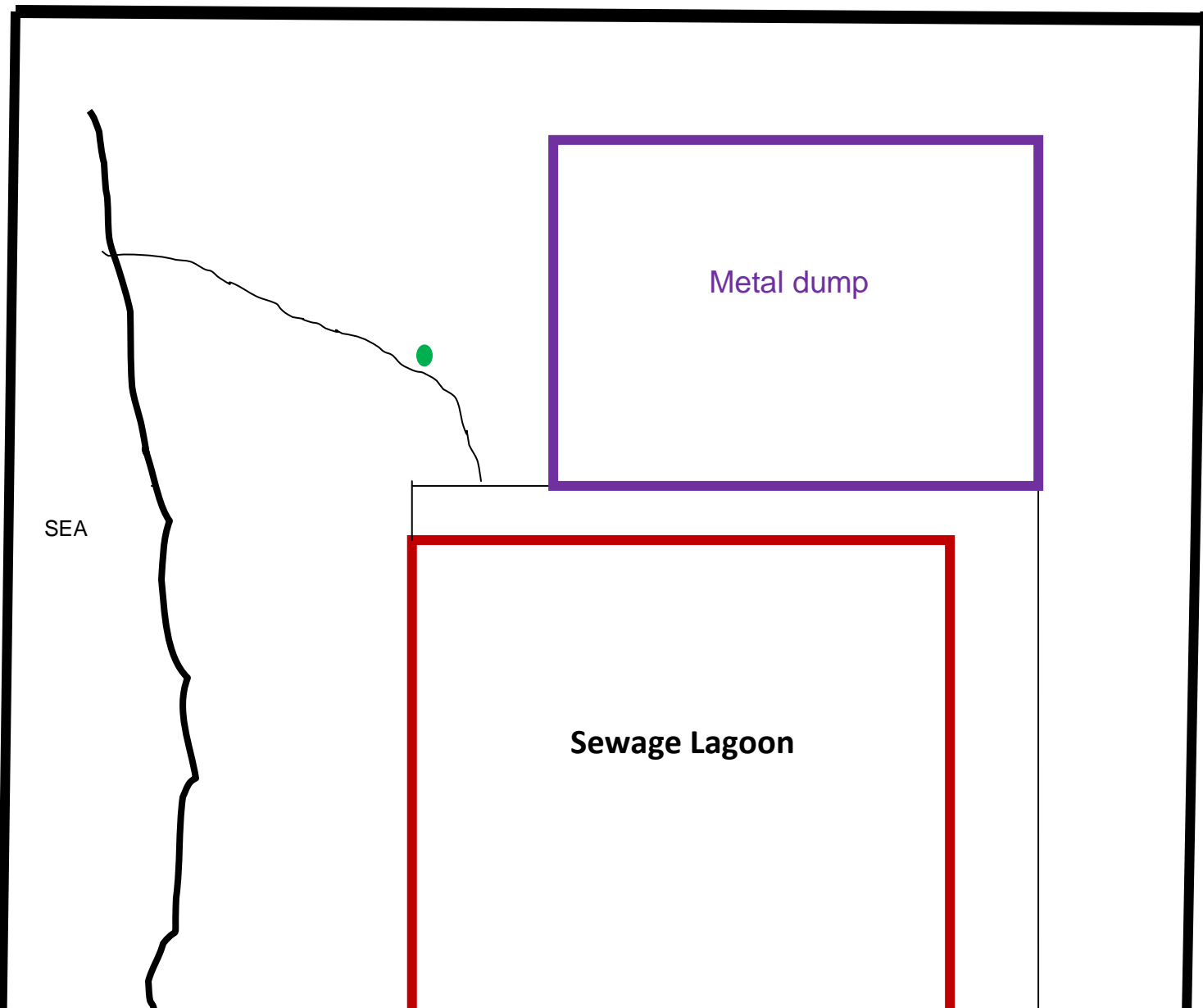




Fig-1: Grise Fiord Water Licensed facilities

2.0 Monitoring and Regulatory Requirement Program

Item 2(f) of Part F of the water licence issued to the Hamlet requires that the Hamlet submits to the NWB for approval, a Quality Assurance / Quality Control (QA/QC) Plan prepared in accordance with "**Guidelines for the preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal facilities in the Northwest Territories; 1996**".

2.1 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.

2.2 Scope of Work

This QA/QC Plan covers the environmental monitoring undertaken at the Hamlet's truck fill station, solid waste disposal site, and Sewage Disposal Facility.

2.3 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 blanks is analyzed by the laboratory along with the monitoring program samples. The purpose of the trip blank is the assess contamination introduced during shipping and field handling procedures.

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

Chain of Custody Documentation refers to the documentation that accompanies samples sent to an analytical

laboratory. It is a legal document which ensures that the sample taken at a specific site is the same sample received in the laboratory. It also provides information on the sample condition and integrity as received by the laboratory.

3.0 Field Sampling

3.1 Sampling Procedures

All sampling, sample preservation and analyses is to be conducted in accordance with methods described in the current edition of Standard Methods for the Examination of Water and Wastewater (American Public Health Association, American Water Works Association, and Water Environment Federation, most current edition).

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.

3.2 Sampling Collection

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

3.2.1 Monitoring and Sampling

Table-1: Monitoring Stations

Monitoring Station	description	GPS locations
GRISE-1	Raw Water Supply intake at Grise Fiord Lake (Volume)	Only Volume, GPS not required
GRISE-2	Runoff from the Solid waste disposal Facilities	
GRISE-3	Raw Sewage at truck offload point	Only Volume
GRISE-4	Final Sewage effluent discharge point next to the sewage lagoon	

3.2.2 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.

3.2.3 Sampling Methods

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

3.2.3.1 Wastewater Sampling

Sewage Lagoon and Wetland:

- Collect raw sewage sample directly from the truck once in summer every year to establish the base line data.
- Collect effluent samples from GRIS-4 two times; at the beginning and at the ending of decanting period.
- Collect leachate sample from the GRIS-2 on monthly as the flow is observed.

3.2.3.2 Landfill Runoff (Leachate) Sampling

Landfill runoff is collected once monthly during periods of observed flow from Station GRIS-2. Runoff samples are collected from the receiving water body by immersing the sample bottle into the runoff stream neck first to a depth of 5 to 10 cm (if possible). The sampling container is filled with runoff and the sample bottle is raised neck first to prevent sample spillage.

3.3 Sample Handling

All water samples are to be collected in laboratory-supplied containers with the proper preservative, where applicable. A complete list of parameter handling and preservatives can be found in Appendix -B.

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 odour, 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.

4.0 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, we recommend the use of trip blanks. **It is essential to request a trip blank sample to be prepared when placing the bottle order with the contract Laboratory.**

4.1 Laboratory Accreditation As indicated in the Guidelines, the Hamlet 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-GRI 0911**. Appendix F includes a copy of the laboratory's CALA accreditation certificate and a list of the parameters for which they are certified.

4.2 Method Detection Limits: The method detection limits (MDLs) are provided on the contract laboratory's Certificates of Analysis. Hamlet of Grise Fiord is using ALS Lab in Winnipeg, Manitoba and following their lab procedure.

5.0 Annual Reporting: As a condition of Part B: General conditions of Hamlet of Grise Fiord Water Licence # 3BM-GRI 0911 , 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. Among other requirements, the annual report is required to include tabular summaries of all analytical data generated under the Monitoring Program (compared to the Maximum Average Concentrations – provided in Part D of the 3BM-GRI 0911 Licence (where applicable).

Annual Report for Hamlet of Grise Fiord

YEAR BEING REPORTED:

The following information is compiled pursuant to the requirements of **Part B, Item 1** of Water Licence # 3BM- GRI 0911 issued to the Hamlet of Grise Fiord.

- i) - iii) tabular summaries of all data generated under the “Monitoring Program”; monthly and annual quantities in cubic metres of freshwater obtained from all sources; monthly and annual quantities in cubic metres of each and all wastes discharged;

Attached are quantities of water used as reported in our On Tap Water Delivery System and the estimated discharge of sewage waste based on quantities used.

Month Reported	Quantity of Water Obtained from all sources (litres)	Quantity of Sewage Waste Discharged (Estimated)
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
ANNUAL TOTAL		

Note: Consumption volume of water is considered as equal to discharge volume.

References:

exp's QA/QC Plan for the Hamlet of Cape Dorset, 2011

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.

Appendix A: Summary of Sample Bottle Requirements

Sample Bottle Requirements for Parameters Listed in Conditions 6 of Part H of Nunavut Water Board Licence No. 3BM-SAN 1214 and as advised by ALS Lab, Winnipeg, Manitoba.

	Recommended Sample Container	Preservative	Hold Time, days
Alkalinity	250 mL Plastic	None	14
Anions (Br, Cl, F, NO ₃ , NO ₂ , PO ₄ , SO ₄)	250 mL plastic	None	5/28
Biochemical Oxygen Demand (BOD ₅)	250 mL plastic	None	4
Carbonaceous Biochemical Oxygen Demand (CBOD ₅)	500 mL plastic	None	4
Carbon, Total Organic (TOC)	500 mL plastic	H ₂ SO ₄ (pH<2)	10
Conductivity	250 mL plastic	None	28
Dissolved ICPMS, ICP Metals	250 mL plastic	None-if not field filtering	60
Total ICPMS, ICP Metals - NOT FILTERED	250 mL plastic	HNO ₃) (pH<2)	30
Nitrogen - Ammonia (NH ₃ - N) / Total Kjeldahl Nitrogen (TKN)	250 mL plastic	H ₂ SO ₄ (pH<2)	10
Solids - (TS, TSS, TDS)	250 mL plastic	None	7
Microbiological (incl. faecal coliforms)	250 mL plastic	Na ₂ S ₂ O ₃	48
Total Hardness	250 mL plastic		28
Phenols-Total	120 mL amber glass	H ₂ SO ₄ (PH<2)	30

APPENDIX-B: Environmental Monitoring program Checklist

Environmental Monitoring program Checklist
Hamlet of Grise Fiord

Pre-sampling Activities		
Bottle order	At least two weeks before upcoming environmental sampling, send a request to the contact laboratory for the appropriate sample sets for the required sampling test groups.	○
Personnel protective equipment	Ensure that the required personal protective equipment (PPE), such a latex gloves, is on hand before commencing the environmental monitoring program,	○
Bottle shipment	Ensure that the bottle shipment has arrived from the contract laboratory in time for the sampling program and verify the integrity of all sampling containers.	○
Sampling location Inspection	Perform an initial inspection of all routinely-monitored sampling locations before the commencement of the monitoring program. Make note of any equipment damage or conditions that may prevent the collection of the environmental monitoring program samples.	○
General sampling instruction		
Prevention Case Contamination	Ensure that any laboratory provided sampling instructions as strictly followed. Latex or nitrite gloves should be worn during sampling and should be replaced with fresh gloves after all sample containers are filled at each sampling location. Dedicated sampling equipment such as sampling poles should be cleaned with	○

	<p>soap and water after each sample is collected to prevent cross-contamination. As a general recommendation, please refrain from using insect repellent, disinfection hand gel or other chemical products before and during sample collection. Also, please refrain from smoking during sample collection.</p>	
Sample care(including packing of cooler)	<p>All sample containers should 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 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 samples, in a Ziploc bag. Keep the last page of the chain of custody and give it to the Hamlet Foreman for their records.</p>	○
RAW Water Supply		
Sampling Station GRIS-1	<p>Volume is being calculated daily, monthly and annually.</p>	○
Solid waste Disposal facilities		
GRIS-2	<p>Land fill runoff (leachate) is collected once monthly during periods of observed flow .Runoff samples are collected from the receiving water body by immersing the sample bottle into the runoff stream neck first to a depth of 5 to 10cm if possible. The sample container is filled with runoff and the sample bottle is raised neck first to prevent sample spillage.</p>	○
Sewage Effluent		
GRIS-4	<p>Sewage effluent will be collected at the beginning of June, at the beginning of July, at the beginning of August and at the beginning of September as the flow is observed following instruction of the Caduecon Lab in Ottawa, Ontario.</p>	○

**Appendix C: Completed Example of Chain of Custody
Documentation from a Typical Accredited lab.**

☐ O.Reg 153/04 (1 2 3 4 5 6)
☐ MISA Guidelines
☐ Provincial Water Quality Objectives
☐ Sewer Use By-Law:

☐ ODWS (Non Regulatory)
☐ O.Reg 558 Leachate Analysis
Disposal Site: CCME
☒ Other: CCME

Turnaround Time Requested
☐ Rush 24 Hr
☐ Rush 48 Hr
☐ Rush 72 Hr
☒ 5-7 Day
☐ 100% Surcharge
☐ 50% Surcharge
☐ 25% Surcharge
☒ Standard

Specific Date:

Organization: **EXP SERVICES INC**

Contact: **Robert Renaud**

Tel: **613-698-1899**

Fax: **613-225-7337**

Email: **Robert.renaud@exp.com**

Quote No.:

Project Name: **OT-00209248-AO**

P.O. No.:

Additional Info: **Waybill # 245-45556615**

Lab No. **KIM-8**

Sample Identification

Matrix *

Date Collected

(yy-mm-dd)

Time Collected

13-07-23

11:00

ANALYSES REQUESTED (Print Test in Boxes)

Alkalinity, pH
Ammonia-N, TOC
BOD
Anions - Cl, NO₂/NO₃
Fecal Coliforms
Phenols
Total Metals, Hg
TSS, Conductivity
Hardness (CaCO₃)

Indicate Test For Each Sample
By Using A Check Mark In The Box Provided

Field pH

Temp.

Bottles Sample

Field Filtered(Y/N)

REPORT NUMBER:



Sample Submission Information

Sampled By (print): **Bob Renaud**

Submitted By (print): **Bob Renaud**

Signature: **Bob Renaud**

Date(yy-mm-dd): **13-07-23**

Time: **12:00**

Shipping Information

Courier (Client account) ☒

Courier (Caducean account) ☐

Drop Off ☐

Caducean (Pick-up) ☐

Reporting and Invoicing

Invoice for Shipping

Fax Results ☐

Email Results ☒

Invoice by Email ☒

Invoice by Mail ☐

LABORATORY USE ONLY

Received By (print):

Signature:

Time Received:

Laboratory Prepared Bottles: ☐ YES ☐ NO

Comments:

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* 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

Laboratory Locations/Shipping Addresses

Kingston Lab - 285 Dalton Ave., Kingston, ON K7K 6Z1, Tel: (613) 544-2001 Fax: (613) 544-2770 Email: contactkingston@caduceonlabs.com

Ottawa Lab - 2378 Holly Lane, Ottawa, ON K1V 7P1, Tel: (613) 526-1123 Fax: (613) 526-1244 Email: contactottawa@caduceonlabs.com

Peterborough Lab - #206-160 Charlotte St., Peterborough, ON K9J 2T8, Tel: (705) 748-1506 Fax: (705) 748-6514 Email: contactpeterborough@caduceonlabs.com

C 15189

Appendix D: Environmental Monitoring Program guidelines and Schedule for the Hamlet of Grise Fiord

Guide Lines for Water, Wastewater and Leachate Sampling for Hamlet of Grise Fiord of 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 through your local health center. One of the five samples should be raw water sample.

Once in month for the Hamlet of Grise Fiord since population is less than 1000.

Unless otherwise differently instructed by CMO.

Monthly and Annual Sampling: (Bacteria and Chemical Analysis)

2. Send samples to Caduceon Environmental Lab in Ottawa Lab, Ontario for Analysis.

Caduceon Environmental Lab

Gord Murphy

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 Caduecon Lab, Ottawa, Ontario within 24 hrs. from the time of sampling.

Wastewater:

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

Leachate:

1. Collect five leachate samples from the land fill site

Sample bottles specifications for Wastewater and leachate:

Five samples should be taken from a point in five different bottles:

Bottle 1: **500 ml**

Bottle 2: **100 ml**

Bottle3: **1000 ml**

Bottle 4: **250 ml**

All the wastewater and Leachate samples will be sent to Caduecon Lab, Ottawa, Ontario.

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
3. Person's name and contact information where to send sample Test Results and invoice.
4. Samples must be arrived Caduceon Lab, Ottawa, Ontario within 24 hours from the time of sampling.

Appendix E: MONITORING SIGNS

Subcontract Laboratory Accreditation & Supporting Documentation