

Quality Assurance / Quality Control Plan

(QA & QC PLAN)

September 2014

**Hamlet of Sanikiluaq
Baffin Region
Community and Government Services
Government of Nunavut**

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1.0 Introduction

The Hamlet of Sanikiluaq 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 856. Currently they have three facilities under the Water Licence # 3BM-SAN1214. 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 partial 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 856 in 2014, total about 4,687 cubic meters waste is expected, which is equivalent to un compacted volume for 463,973 kg (considering uncompacted density=99 kg/m³ of waste (Following Arktis design study for Hamlet of Sanikiluaq 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- SAN 1214 to the Hamlet on February 28, 2012 and this expired on March 01, 2014. The water licence governs water use and waste disposal within the Hamlet.

SEA

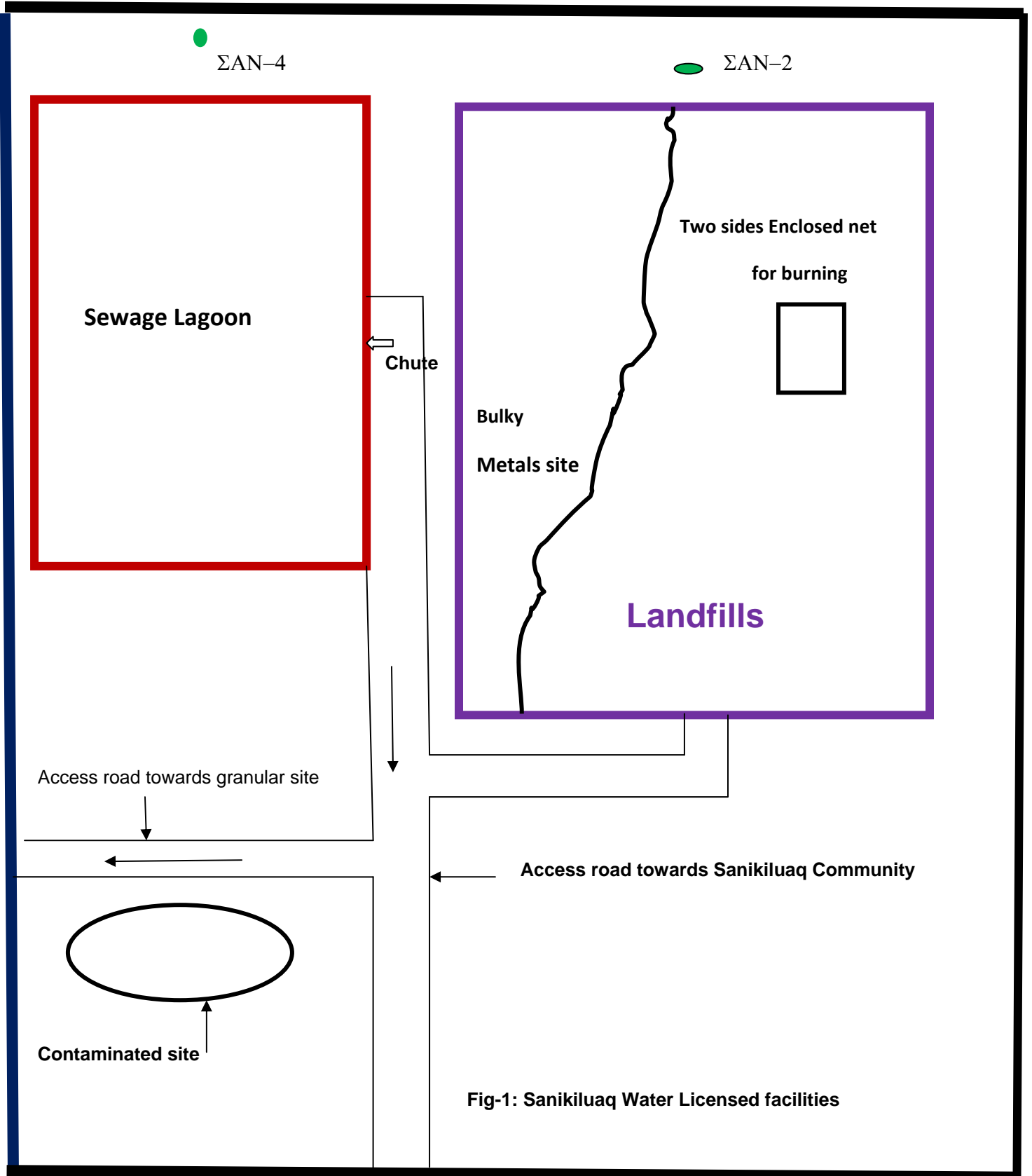


Fig-1: Sanikiluaq Water Licensed facilities

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 submit 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 and Land farm.

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
SAN-1	Raw Water Supply intake at Sanikiluaq Lake (Volume)	Only Volume, GPS not required
SAN-2	Runoff from the Solid waste disposal Facilities	
SAN-3	Raw Sewage at truck offload point	Volume, inactive
SAN-4	Final Sewage effluent discharge point next to the sewage lagoon	



Sanikiluaq water Source Intake



Leachate sampling Point



Wastewater effluent sampling Point

Figure 2: Monitoring Stations

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 SAN-4 four times, 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. SAN-4 is the compliance point.
- Collect leachate sample from the SAN-2 at the same frequency of SAN-4 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 SAN-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 odours, 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-SAN1214. 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 Sanikiluaq 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 Sanikiluaq Water Licence # 3BM-SAN 1214 , 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 NWB Licence 3BM-SAN 1214 where applicable).

Annual Report for Hamlet of Sanikiluaq

YEAR BEING REPORTED:

The following information is compiled pursuant to the requirements of **Part B, Item 1** of Water Licence # 3BM-PAN-1214 issued to the Hamlet of Sanikiluaq.

- 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	H2SO4 (pH<2)	10
Conductivity	250 mL plastic	None	28
Dissolved ICPMS, ICP Metals	250 mL plastic	Nine-if not field filtering	60
Total ICPMS, ICP Metals - NOT FILTERED	250 mL plastic	HNO3) (pH<2)	30
Nitrogen - Ammonia (NH ₃ - N) / Total Kjeldahl Nitrogen (TKN)	250 mL plastic	H2SO4 (pH<2)	10
Solids - (TS, TSS, TDS)	250 mL plastic	None	7
Microbiological (incl. faecal coliforms)	250 mL plastic	Na2S2O3	48
Total Hardness	250 mL plastic		28
Phenols-Total	120 mL amber glass	H2SO4 (PH<2)	30

APPENDIX-B: Environmental Monitoring program Checklist

**Environmental Monitoring program Checklist
Hamlet of Sanikiluaq**

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 as 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 nitrile 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 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.	○
Sample care(including packing of cooler)	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.	○
RAW Water Supply		
Sampling Station SAN-1	Volume is being calculated daily, monthly and annually.	○
Solid waste Disposal facilities		
SAN-2	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.	○
Sewage Effluent		
SAN-4	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 ALS Lab in Winnipeg, MB.	○

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

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

Guide Lines for Water, Wastewater and Leachate Sampling for Hamlet of Sanikiluaq 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 Sanikiluaq since population is less than 1000.

Unless otherwise differently instructed by CMO.

Monthly and Annual Sampling: (Bacteria and Chemical Analysis)

2. Send samples to ALS Lab in Winnipeg Lab, Manitoba for Analysis.

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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 ALS Lab Winnipeg 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 ALS Lab, Winnipeg, Manitoba.

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 Winnipeg Lab, Manitoba within 24 hours from the time of sampling.

Appendix E: MONITORING SIGNS





Subcontract Laboratory Accreditation & Supporting Documentation