



- **Hamlet of Hall Beach**

Quality Assurance / Quality Control Plan

Project Name

Water Licence Compliance – Hamlet of Hall Beach

Type of Document

Final

Project Number

OTT-00209248-A0

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Date Submitted

August 15, 2013

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1 Introduction

The purpose of this document is to provide guidance to ensure that environmental monitoring program samples collected in the field are done so with a high degree of quality, in order to ensure that they accurately reflect the physical and chemical nature of the matrix being tested.

1.1 Background

The Hamlet of Hall Beach (Hamlet) is located on the east shore of the Melville Peninsula, on the western shore of Foxe Basin (Figure 1, Appendix A). The population was estimated to be approximately 727 in 2012.

The water supply for the Hamlet is Water Supply Lake located approximately 2.5 km south of the Hamlet. A man-made water reservoir, filled from Water Supply Lake on a yearly basis, provides sufficient water supply to meet the Hamlet's needs over the winter. Water is taken from the reservoir via an inclined shaft intake which is equipped with a submersible pump located below the water level in the reservoir. The truck fill station provides water treatment through chlorination.

Wastewater generated in the community is disposed of at the Sewage Disposal Facility. The Sewage Disposal Facility is comprised of a two-celled sewage lagoon system located approximately 1.2 km to the north of the community. The two cells are unlined cells which are decanted seasonally to a natural wetland to the north of the site. The wetland provides additional treatment prior to the release of the effluent to the environment. Due to ongoing operational issues with Cell #1, the Hamlet primarily utilizes Cell #2 with more frequent decanting.

The current solid waste disposal site is located approximately 1.2 km to the north of the Hamlet adjacent to the sewage disposal facility. A separate area along the access road from the Hamlet is used as a disposal site for wood waste.

The Nunavut Water Board (NWB) issued a Class B Water Licence (3BM-HAL0810) to the Hamlet on May 16, 2008. The water licence governs water use and waste disposal within the Hamlet. A copy of the Water Licence is provided in Appendix B.

1.2 Monitoring and Regulatory Requirement Program

Condition 1 of Part F of the water licence issued to the Hamlet requires that the Hamlet submit to the NWB for approval, an Operations and Maintenance Manual, which contains, among other requirements, a Monitoring Program Quality Assurance / Quality Control (QA/QC) Plan. This QA/QC Plan was prepared in accordance with "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), herein referred to as "The Guidelines".

1.3 Objectives

The objectives of this QA/QC plan are to: i) 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

This QA/QC Plan covers the environmental monitoring undertaken at the Hamlet's truck fill station, Solid Waste Disposal Facility, and, Sewage Disposal Facility (Figures 2 and 3).

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 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.

2 Field Sampling

2.1 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 labelling 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 specific details on the sampling locations, equipment and sampling methods.

2.2.1 Locations

The water licence issued to the Hamlet (3BM-HAL0810) by the NWB specifies five monitoring stations (Figures 2 and 3) across the licensed facilities.

- Station HAL-1 is a raw water supply (from Water Supply Lake) volume monitoring location.
- Station HAL-2 is a run-off sampling location from the Solid Waste Disposal Facility.
- Station HAL-3 is a wastewater influent (raw sewage) volume monitoring location at the discharge point into the Sewage Disposal Facility.
- Station HAL-4 is an effluent discharge sampling location from the Sewage Disposal Facility.
- Station HAL-5 is a final effluent discharge sampling location prior to entering Foxe Basin.

The following table includes the geographic coordinates for the five monitoring stations described above.

Table 1 –Geographic Coordinates for the Monitoring Stations for NWB Licence 3BM-HAL0810

| Monitoring Station | Latitude | Longitude |
|--------------------|------------------|------------------|
| HAL-1 | N 68° 45' 46.40" | W 81° 14' 05.47" |
| HAL-2 | N 68° 48' 28.53" | W 81° 16' 22.88" |
| HAL-3 (cell #1) | N 68° 48' 15.96" | W 81° 15' 48.96" |
| HAL-3 (cell #2) | N 68° 48' 18.24" | W 81° 15' 52.98" |
| HAL-4 | N 68° 48' 23.88" | W 81° 15' 46.20" |
| HAL-5 | N 68° 49' 01.32" | W 81° 15' 50.40" |

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 repellent, disinfection hand gel or other chemical products before and during sample collection. Also, please refrain from smoking during sample collection.

2.2.3.1 Landfill Runoff Sampling

Landfill runoff is to be collected (at Station HAL-2) at the beginning, middle, and near the end of the season when flow is observed. Runoff samples are to be 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 to be filled with runoff and the sample bottle is raised neck first to prevent sample spillage.

2.2.3.2 Wastewater Effluent Sampling

Effluent samples from the Sewage Disposal Facility (Station HAL-4) are collected from the receiving water body by immersing the sample bottle into the effluent stream neck first to a depth of 5 to 10 cm (if possible). The sampling container is filled with effluent and the sample bottle is raised neck first to prevent sample spillage. Effluent samples from the Final Effluent Discharge Point (Station HAL-5) are collected from the receiving water body in the same manner described above (i.e., for Station HAL-4).

2.3 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 C.

All sample containers are to be tightly sealed and properly labelled 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 ziplock 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.

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, **exp** recommends 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.

3 Laboratory Analysis

3.1 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-HAL0810. Appendix F includes a copy of the laboratory's CALA accreditation certificate and a list of the parameters for which they are certified.

3.2 Method Detection Limits

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

4 Reporting Requirements

4.1 General Submissions

As a condition of NWB Licence 3BM-HAL0810 (Appendix 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. 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-HAL0810 – where applicable).

5 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.

*Hamlet of Hall Beach
Quality Assurance / Quality Control Plan
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August 15, 2013*

Appendix A: Figures

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| scale NTS | CLIENT: HALL BEACH, NUNAVUT | project no. OTT-00209248-A0 |
| date 27/05/13 | TITLE: LOCATION PLAN | FIG 01 |
| drawn by M.KELLEY | | |



WATER SUPPLY
LAKE

TRUCK-FILL
STATION

HAL-1



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| scale NTS | CLIENT: HALL BEACH | project no. OTT-00209248-A0 |
| date 27/05/13 | TITLE: MONITORING STATION LOCATIONS | FIG 02 |
| drawn by M.KELLEY | | |



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| scale NTS | CLIENT: HALL BEACH | project no. OTT-00209248-A0 |
| date 27/05/13 | TITLE: MONITORING STATION LOCATIONS | FIG 03 |
| drawn by M.KELLEY | | |

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Hamlet of Hall Beach
Quality Assurance / Quality Control Plan
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August 15, 2013

Appendix B: Hamlet of Hall Beach's Water Licence

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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

File No.: 3BM-HAL0810

May 29, 2008

Mr. John Mabberi-Mudonyi
Acting SAO
Hamlet of Hall Beach
Box 3
Hall Beach, NU X0A 0K0
E-mail: sao_hbhamlet@qiniq.com

RE: NWB Licence No. 3BM-HAL0810

Dear Mr. Mabberi-Mudonyi;

Please find attached Licence No. 3BM-HAL0810 issued to the Hamlet of Hall Beach by the Nunavut Water Board (NWB) pursuant to its authority under Article 13 of the *Agreement between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*. The terms and conditions of the attached Licence related to water use and waste disposal are an integral part of this approval.

If the Licensee contemplates the renewal of this Licence, it is the responsibility of the Licensee to apply to the NWB for its renewal. The past performance of the Licensee, new documentation and information, and issues raised during a public hearing, if the NWB is required to hold one, will be used to determine the terms and conditions of the Licence renewal. Note that if the Licence expires before the NWB issues a new one, then water use and waste disposal must cease, or the Licensee will be in contravention of the *Nunavut Land Claims Agreement (NLCA)* and the *Nunavut Waters and Nunavut Surface Rights Tribunal Act (NWNSTRTA)*. However, the expiry or cancellation of a licence does not relieve the holder from any obligations imposed by the licence. The NWB recommends that an application for the renewal of this Licence be filed at least three months prior to the Licence expiry date.

If the Licensee contemplates or requires an amendment to this licence, the NWB may decide, in the public interest, to hold a public hearing. The Licensee should submit applications for amendment as soon as possible to give the NWB sufficient time to go through the amendment process. The process and timing may vary depending on the scope of the amendment, however a minimum of thirty (30) days is required from time of acceptance by the NWB. It is the responsibility of the Licensee to ensure that all application materials have been

received and acknowledged by the Manager of Licensing.

The NWB strongly recommends that the Licensee consult the comments received from interested persons on issues identified. This information is attached for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read 'T. Kabloona', with a long horizontal flourish extending to the right.

Thomas Kabloona
A/Chief Executive Officer

TK/tla/dh

Enclosure: Licence No. 3BM-HAL0810
Comments from GN DoE and INAC

cc: Qikiqtani Distribution List



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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN KATIMAYINGI
OFFICE DES EAUX DU NUNAVUT

DECISION

LICENCE NUMBER: 3BM-HAL0810

This is the decision of the Nunavut Water Board (NWB) with respect to an application for a Licence renewal received on February 25, 2008, made by:

Hamlet of Hall Beach

to allow for the use of water and disposal of waste for the Hamlet of Hall Beach, located within the Qikiqtani region of Nunavut. With respect to this application, the NWB gave notice to the public on March 14, 2008 that the Hamlet had filed an application for a water licence renewal.

DECISION

After having been satisfied that the application was exempt from the requirement for screening by the Nunavut Impact Review Board in accordance with S. 12.3.2 of the *Nunavut Land Claims Agreement* (NLCA), the NWB decided that the application could proceed through the regulatory process. After reviewing the full submission of the Applicant and written comments expressed by interested parties, the NWB, having given due regard to the facts and circumstances, the merits of the submissions made to it and to the purpose, scope and intent of the *NLCA* and of the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* (NWNSRTA), decided to waive the requirement to hold a public hearing and determined that:

Licence Number 3BM-HAL0810 be issued subject to the terms and conditions contained therein. (Motion #: 2008-06)

SIGNED this 16th day of May, 2008 at Gjoa Haven, NU.

Thomas Kabloona
Acting Chief Executive Officer

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I. BACKGROUND

The Hamlet of Hall Beach has a population of approximately 700 people and is located at the coordinates of 68°46' north latitude and 81°13' west longitude on western shore of Foxe Basin within the Qikiqtani region of Nunavut. Hall Beach is located within a zone of continuous permafrost and is located on sand and gravel raised beaches with flat and gently rolling terrain containing numerous lakes and ponds.

Existing water use and waste disposal facilities include a freshwater intake pump and reservoir, sewage lagoon, solid waste disposal and hazardous waste storage.

II. PROCEDURAL HISTORY

The NWB issued a municipal water licence to the Hamlet of Hall Beach on January 9, 2003, to allow for the use of water and disposal of waste. Following an application by the Hamlet, the NWB issued an amendment to the Licence on April 24, 2007 approving the decommissioning of an abandoned sewage lagoon.

The Municipal Water Licence expired on March 31, 2008. The Government of Nunavut Department of Community and Government Services, on behalf of the Hamlet, submitted an application for water licence renewal to the NWB, which was received on February 25, 2008. Following a preliminary review of the application, the NWB concluded that it met the requirements of section 48(1) of the *Nunavut Waters and Surface Rights Tribunal Act* (the Act) and advised the Applicant and distribution list accordingly on March 14, 2008.

Information contained in the February 25, 2008 submission and distributed for review was as follows:

- Application cover letter
- Application summary;
- NWB Licence renewal application form;

The scope of the renewal application included ongoing operation of the existing Sewage Disposal Facility and Solid Waste Disposal Facility. No other information was presented to the NWB.

The Nunavut Water Board publicly posted notice of this application, in accordance with Section 55.1 of the Act and Article 13 of the *Nunavut Land Claims Agreement* (NLCA), on March 14, 2008. The assessment process included the referral of the application to a variety of Federal, Territorial and local organizations for their review and comment.

As no public concern was expressed, the NWB waived the requirement to hold a public hearing and proceeded with the application process.

The NWB received comments on the application from Indian and Northern Affairs Canada (INAC) and the Government of Nunavut Department of Environment (GN-DOE) on or prior to April 25, 2008.

Based upon the results of the detailed assessment, including consideration of any potential accidents, malfunctions, or impacts to water that the overall project might have in the area, the Board approved the application and has issued Licence 3BM-HAL0810.

III. ISSUES

Term of Licence

In accordance with Section 45 of the Act, the NWB may issue a licence for a term not exceeding twenty-five years. In determining an appropriate term of a water licence, the Board considers a number of factors, including, but not limited to, the results of INAC site inspections and the compliance record of the Applicant. In review of the previous water licence NWB3HAL0308 inspection reports, the NWB has noted that there were several issues of non-compliance and other related problems identified by the inspector, which include:

- i. The Solid Waste Facility is unfenced and waste is not segregated;
- ii. The Sewage Disposal Facility lacks sufficient holding time to treat sewage;
- iii. Uncontrolled seepage from the lagoon;
- iv. Improperly stored hazardous waste;
- v. Uncontrolled runoff from the Solid Waste Disposal Facility; and
- vi. Lack of annual reporting to the NWB.

In review of the application and the comments received from interested parties, there were no specific comments with respect to the Hamlet's request for a term of five (5) years for the Licence renewal. However, INAC recommended the following:

INAC recommends that an extension of the current water license, retaining the current terms and conditions, if the Hamlet and Community and Government Services agree to bring the Hamlet into compliance with the current terms and conditions of the license for the current wastewater disposal facilities and water use in the community. This extension should be provided in order for the community and its technical support group to provide to the Board an amendment, a revised license application and/or a report dealing with compliance issues.

Having considered INAC's comments, the NWB has decided on a two (2) year term for the renewed Licence. The decision for a short duration was based on issues with non-compliance and is intended to send a clear message to the Hamlet and regulatory authorities that the Board will not passively encourage the Hamlet's failure to comply with the Licence conditions and

associated legal requirements. The Board fully expects the Hamlet to take immediate steps to come into full compliance with the Licence requirements for its existing facilities and to operate the Sewage Disposal Facility in accordance with the Licence. When the Hamlet submits an application to renew the Licence in approximately 20 months, the Board expects the Hamlet to be in full compliance with the licence. This short duration also permits the Board to increase its level of confidence that the facility is operating as it should. As per Part B, Item 10 of the Licence, the Licensee must submit a Plan for Compliance that clearly demonstrates how the Hamlet will achieve full compliance with the Licence conditions.

Annual Report

The NWB has imposed on the Licensee, the requirement to produce an Annual Report. These Reports are for the purpose of ensuring that the NWB has an accurate annual update of municipal activities during a calendar year. This information is maintained on the public registry and is available to interested parties upon request. A “*Standardized Form for Annual Reporting*” is to be used by the Licensee and is available from the NWB file transfer protocol (FTP) site under the Public Registry link at the NWB Website. Additional information may be submitted as required.

[\(ftp://nunavutwaterboard.org/ADMINISTRATION/Standardized%20Forms/\)](ftp://nunavutwaterboard.org/ADMINISTRATION/Standardized%20Forms/).

Operational Plans

Appropriate Plans need to be developed to the satisfaction of the NWB for the operation and maintenance of the facilities, the protection of the environment with regard to potential spills through day-to-day operations, and abandonment and restoration of the sites.

It is noted that the Licensee has not submitted an Operations and Maintenance (O&M) Plan to the NWB as required under the previous licence. The renewed Licence has therefore, included the requirement to provide O&M Manual to the NWB. The O&M Manual is to include the following in accordance with Part F, Item 1 of the Licence:

- i. *Water Storage and Distribution Facility Operation and Maintenance (O&M) Plan;*
- ii. *Sewage Disposal Facility Operation and Maintenance (O&M) Plan;*
- iii. *Sewage Sludge Management Plan;*
- iv. *Solid Waste Disposal Facility Operation and Maintenance (O&M) Plan;*
- v. *Spill Contingency Plan; and*
- vi. *Monitoring Program Quality Assurance/Quality Control Plan.*

The purpose of the O&M Manual noted above is to assist Hamlet staff in carrying out the procedures relating to their water distribution and waste disposal facilities. The O&M Manual should demonstrate to the NWB that the Hamlet is capable of operating and maintaining the infrastructure related to water use and waste disposal to meet the requirements of the Licence. The O&M Manual should be based, at a minimum on the various NWB-approved guidelines

available (i.e. *Guidelines for the Preparation of an Operations and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories*, Duong and Kent, 1996) and other regulatory guidelines as deemed appropriate.

Water Use

The Hamlet of Hall Beach currently utilizes “Water Supply Lake” as a source of potable water with a maximum quantity of 35,000 cubic metres annually. No concerns were raised by the parties in their written submissions as to the amount of water required by the Hamlet, the manner in which it is obtained or in the manner in which this water will be used. The NWB has renewed the terms and conditions associated with water use by the Hamlet accordingly.

Sewage

The Hamlet of Hall Beach currently provides trucked sewage services for the Community’s residents, businesses and institutions. Specific comments relevant to sewage disposal operations in the Hamlet were provided by GN-DOE and INAC.

As a standard condition for most water licenses involving municipal effluents the NWB has included acute toxicity testing as a Licence requirement under Part D, Item 6 prior to entering the receiving environment in Foxe Basin.

The NWB has added a requirement for a geotechnical inspection of the facilities to be carried out on an annual basis by a qualified engineer. This condition is consistent with other water licences issued in Nunavut.

INAC noted that a Spill Contingency Plan should be submitted to the NWB by the Licensee. The NWB concurs with this recommendation, and has imposed this requirement as part of the O&M Manual in the Licence.

Finally, as part of the Sewage Disposal Facility O&M Plan, the NWB requires that the Licensee include procedures and frequencies of inspections to be carried out to verify when there is flow from the Sewage Disposal Facility. Visual inspections to verify flow from the Sewage Disposal Facility are required to ensure that the monitoring program under Part D, Item 2 of the Licence is initiated at the appropriate time and that the Inspector is notified upon its commencement.

Solid Waste

The development of an O&M Plan for the Solid Waste Disposal Facility is required as part of the overall O&M Manual discussed above. The O&M Plan for the Solid Waste Disposal Facility should set out procedures for the segregation, storage and eventual removal for disposal of hazardous wastes, including waste oil, and should also address procedures for the incineration of solid waste.

The NWB notes the concern raised by INAC regarding leachate and/or runoff from the Solid Waste Disposal Facility and Sewage Disposal Facility entering the stream that runs along the length of both facilities. INAC provided a summary of water quality sample results taken in 2007 by the Inspector. Results indicate that runoff and/or leachate from the waste areas has entered the stream. The Licensee is reminded of its obligation to contain waste and dispose of waste in accordance with the terms and conditions of this Licence. Any issues of non-compliance are subject to the direction provided by the Inspector. The Licensee must contain runoff and leachate from the Solid Waste Disposal Facility so that it does not enter water. This requirement is also supported by the GN-DoE.

Abandonment and Restoration

To ensure that all existing end-of-life facilities are reclaimed in an appropriate manner, the NWB requires Licensees to submit an *Abandonment and Restoration Plan*. This Plan is to be submitted at least six (6) months prior to final closure of any licensed facility or upon submission of the final design drawings for the construction of new facilities to replace existing ones. The requirements for the Plan are outlined in Part G, Item 1 of this Licence.

IV. LICENCE 3BM-HAL0810

Pursuant to the *Nunavut Waters and Nunavut Surface Rights Tribunal Act* and the *Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada*, the Nunavut Water Board, hereinafter referred to as the Board, hereby grants to

HAMLET OF HALL BEACH
(Licensee)

of P.O. Box 3 HALL BEACH, NUNAVUT X0A 0K0
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water for a period subject to restrictions and conditions contained within this Licence:

Licence Number 3BM-HAL0810

Water Management Area NUNAVUT 06

Location HALL BEACH, NU (Latitude 68°46'N and Longitude 81°13'W)

Purpose: WATER USE AND WASTE DISPOSAL

Description MUNICIPAL UNDERTAKINGS

Quantity of Water Not to Exceed 35,000 CUBIC METRES ANNUALLY

Date of Licence May 16, 2008

Expiry Date of Licence May 30, 2010

Dated this 16th of May, 2008 at Gjoa Haven, NU.


Thomas Kabloona
Acting Chief Executive Officer

PART A: SCOPE AND DEFINITIONS

1. Scope

- a. This Licence allows for the use of water and the disposal of waste for municipal undertakings at the Hamlet of Hall Beach, Qikiqtani Region, Nunavut (68°46' N; 81°13'W);
- b. This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the Nunavut Waters and Nunavut Surface Rights Tribunal Act, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited, this Licence shall be deemed, upon promulgation of such Regulations, to be subject to such requirements; and
- c. Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

In this Licence: **3BM-HAL0810**

“**Act**” means the *Nunavut Waters and Nunavut Surface Rights Tribunal Act*;

“**Amendment**” means a change to original terms and conditions of this Licence requiring correction, addition or deletion of specific terms and conditions of the Licence; modifications inconsistent with the terms of the set terms and conditions of the Licence;

“**Analyst**” means an Analyst designated by the Minister under Section 85 (1) of the *Act*;

“**Appurtenant undertaking**” means an undertaking in relation to which a use of waters or a deposit of waste is permitted by a licence issued by the Board;

“**Average Concentration**” means the arithmetic mean of the last four consecutive analytical results for composite or grab samples collected from the monitoring stations identified in Part H;

“**Board**” means the Nunavut Water Board established under the *Nunavut Land Claims Agreement*;

“Composite Sample” means a water or wastewater sample made up of four (4) samples taken at regular periods over a 24 hour period;

“Effluent” means treated or untreated liquid waste material that is discharged into the environment from a structure such as a settling pond or a treatment plant;

“Engineer” means a professional engineer registered to practice in Nunavut in accordance with the *Engineering, Geological and Geophysical Act (Nunavut)* S.N.W.T. 1998, c.38, s.5;

“Final Discharge Point” in respect of an effluent means an identifiable discharge point of a facility beyond which the operator of the facility no longer exercises control over the quality of the effluent;

“Freeboard” means the vertical distance between water line and the designed maximum operating height on the crest of a dam or dyke’s upstream slope;

“Geotechnical Engineer” means a professional engineer registered with the Association of Professional Engineers, Geologist and Geophysicists of Nunavut and whose principal field of specialization with the engineering properties of earth materials in dealing with man-made structures and earthworks that will be built on a site. These can include shallow and deep foundations, retaining walls, dams, and embankments;

“Grab Sample” means a single water or wastewater sample taken at a time and place representative of the total discharge;

“Greywater” means all liquid wastes from showers, baths, sinks, kitchens and domestic washing facilities, but does not include toilet wastes;

“Inspector” means an Inspector designated by the Minister under Section 85 (1) of the Act;

“Licensee” means the holder of this Licence;

“Modification” means an alteration to a physical work that introduces new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion, and changes to the operating system that are consistent with the terms of this Licence and do not require amendment;

“Monitoring Program” means a monitoring program established to collect data on surface water and groundwater quality to assess impacts to the freshwater aquatic environment of an appurtenant undertaking;

“Nunavut Land Claims Agreement” (NLCA) means the *“Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in right of Canada”*, including its preamble and schedules, and any amendments to that agreement made pursuant to it;

“Sewage” means all toilet wastes and greywater;

“Sewage Disposal Facilities” comprises the area and engineered lagoon and decant structures designed to contain sewage as described in the Application for Water Licence filed by the Applicant on January 9, 2003, and as modified pursuant to the amendment request granted by the NWB on April 24, 2007.

“Solid Waste Disposal Facilities” comprises the area and associated structures designed to contain solid waste (landfill site) as described in the Application for Water Licence filed by the Applicant on January 9, 2003;

“Toilet Wastes” means all human excreta and associated products, but does not include greywater;

“Waste” means, as defined in S.4 of the Act, any substance that, by itself or in combination with other substances found in water, would have the effect of altering the quality of any water to which the substance is added to an extent that is detrimental to its use by people or by any animal, fish or plant, or any water that would have that effect because of the quantity or concentration of the substances contained in it or because it has been treated or changed, by heat or other means;

“Water Supply Facilities” comprises the area and associated intake infrastructure at Water Supply Lake, as described in the Application for Water Licence filed by the Applicant on January 9, 2003.

3. Enforcement

- a. Failure to comply with this Licence will be a violation of the *Act*, subjecting the Licensee to the enforcement measures and the penalties provided for in the *Act*;
- b. All inspection and enforcement services regarding this Licence will be provided by Inspectors appointed under the *Act*;
- c. For the purpose of enforcing this Licence and with respect to the use of water and deposit or discharge of waste by the Licensee, Inspectors appointed under the *Act*, hold all powers, privileges and protections that are conferred upon them by the *Act* or by other applicable law; and

- d. The Licensee shall, in relation to any application to renew or amend the Licence, provide an updated Plan for Compliance as submitted pursuant to Part B, Item 10. The updated Plan for Compliance must be submitted at the time of Application, in order for the Application to be deemed complete.

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board not later than March 31st of the year following the calendar year reported which shall contain the following information:
 - a. tabular summaries of all data generated under the “Monitoring Program”;
 - b. the monthly and annual quantities in cubic metres of fresh water obtained at the Water Supply Facilities;
 - c. the monthly and annual quantities in cubic metres of each and all waste discharged;
 - d. a summary of modifications and/or major maintenance work carried out on the Water Supply Facilities and Sewage Disposal Facility and Solid Waste Facility, including all associated structures and facilities;
 - e. a list of unauthorized discharges and summary of follow-up action taken;
 - f. a summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
 - g. Any updates or revisions for manuals and plans (i.e., *Operations and Maintenance Manual*) as required by changes in operation and/or technology;
 - h. a summary of any studies or reports requested by the Board that relate to water use and waste disposal or restoration, and a brief description of any future studies planned; and
 - i. any other details on water use or waste disposal requested by the Board by November 1st of the year being reported.
2. The Licensee shall comply with the “Monitoring Program” described in this Licence, and any amendments to the “Monitoring Program” as may be made from time to time, pursuant to the conditions of this Licence.
3. The “Monitoring Program” and compliance dates specified in the Licence may be modified at the discretion of the Board.

4. Meters, devices or other such methods used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee.
5. The Licensee shall, within ninety (90) days after the first visit by the Inspector following issuance of this Licence, post the necessary signs to identify the stations of the “Monitoring Program.” All signage postings shall be in the Official Languages of Nunavut.
6. The Licensee shall immediately report to the 24-Hour Spill Report Line (867-920-8130) any spills of Waste, which are reported to, or observed by the Licensee, within the municipal boundaries or in the areas of the Water Supply or Waste Disposal Facilities.
7. The Licensee shall ensure a copy of this Licence is maintained at the Municipal Office at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

Manager of Licensing:

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1J0
Telephone: (867) 360-6338
Fax: (867) 360-6369
Email: licensing@nunavutwaterboard.org

Inspector Contact:

Water Resources Officer
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

Analyst Contact:

Taiga Laboratories
Department of Indian and Northern Affairs
4601 – 52 Avenue, P.O. Box 1500
Yellowknife, NT X1A 2R3
Telephone: (867) 669-2781
Fax: (867) 669-2718

8. The Licensee shall submit one paper copy and one electronic copy of all reports, studies, and plans to the Board. Reports or studies submitted to the Board by the Licensee shall include a detailed executive summary in Inuktitut.

9. The Licensee shall ensure that all document(s) and correspondence submitted by the Licensee to the Board are received and acknowledged by the Manager of Licensing.
10. The Licensee shall submit to the Board for approval within the lesser of ninety (90) days or upon the filing of any application in relation to the Licence, a Plan for Compliance that clearly demonstrates the ways and means the Licensee will undertake to achieve full compliance with the conditions of this Licence. The Plan for Compliance must also address the potential for minimally treated sewage to enter the environment during periods when the wetland area may be frozen or otherwise not fully capable of treating sewage.
11. The Licensee shall, for all Plans submitted under this Licence, include a proposed timetable for implementation. Plans submitted, cannot be undertaken without subsequent written Board approval and direction. The Board may alter or modify a Plan if necessary to achieve the legislative objectives and will notify the Licensee in writing of acceptance, rejection or alteration of the Plan.
12. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.
13. Every Plan to be carried out pursuant to the terms and conditions of this Licence shall become a part of this Licence, and any additional terms and condition imposed upon approval of a Plan by the Board become part of this Licence. All terms and conditions of the Licence should be contemplated in the development of a Plan where appropriate.
14. This Licence is not assignable except as provided in Section 44 of the Act.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water from Water Supply Lake using the Water Supply Facilities or as otherwise approved by the Board in writing.
2. The annual quantity of water used for all purposes shall not exceed 35,000 cubic metres.
3. The Licensee shall equip all water intake hoses with a screen of an appropriate mesh size to ensure that fish are not entrained and shall withdraw water at a rate such that fish do not become impinged on the screen.
4. The Licensee shall not remove any material from below the ordinary high water mark of any water body unless otherwise approved by the Board in writing.
5. The Licensee shall not cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion.

6. Sediment and erosion control measures shall be implemented prior to and maintained during the operation to prevent entry of sediment into water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. The Licensee shall direct all Sewage to the Sewage Disposal Facility or as otherwise approved by the Board in writing.
2. The Licensee shall provide notice to an Inspector annually when flow is observed from the sewage disposal facility and upon commencing the monitoring program at Monitoring Program Station HAL-4.
3. All Effluent discharged from the Sewage Disposal Facility at Monitoring Program Station HAL-4 shall meet the following Effluent quality standards:

| <u>Parameter</u> | <u>Maximum Average Concentration</u> |
|------------------------|--------------------------------------|
| BOD ₅ | 120 mg/L |
| Total Suspended Solids | 180 mg/L |
| Fecal Coliforms | 1 x 10 ⁶ CFU/100mL |
| Oil and Grease | No visible sheen |
| pH | between 6 and 9 |

4. The Licensee shall maintain at all times, a freeboard of at least 1.0 metre, or as recommended by a qualified geotechnical engineer and as approved by the Board in writing, for all dams, dykes or other structures intended to contain, withhold, divert or retain water or wastes.
5. The Sewage Disposal Facility shall be maintained and operated in such a manner as to prevent structural failure.
6. All Effluent discharged from the Sewage Disposal Facility (HAL-4), shall be demonstrated to be Not Acutely Toxic at Monitoring Program Station HAL-5 prior to entering Foxe Basin, under the following tests to be conducted once annually approximately mid-way through discharge:
 - a. Acute lethality to Rainbow Trout, *Oncorhynchus mykiss* (as per Environment Canada’s Environmental Protection Series Biological Test Method EPS/1/RM/13); and
 - b. Acute lethality to the crustacean, *Daphnia magna* (as per Environment Canada’s Environmental Protection Series Biological Test Method EPS/1/RM/14).

7. The Licensee shall dispose of and contain all solid wastes at the Solid Waste Disposal Facility or as otherwise approved by the Board in writing.
8. The Licensee shall segregate and store all hazardous materials and/or hazardous waste within the Solid Waste Disposal Facility in a manner as to prevent the deposit of deleterious substances into any water until such a time as proper disposal arrangements are made.
9. The Licensee shall implement measures to control wind-blown litter at the Solid Waste Disposal Facility.

PART E: CONDITIONS APPLYING TO MODIFICATION AND CONSTRUCTION

1. The Licensee shall submit to the Board for written approval, construction design drawings stamped by a qualified engineer registered in Nunavut, prior to the construction of any dams, dykes or structures intended to contain, withhold, divert or retain water or wastes.
2. The Licensee may, without written approval from the Board, carry out modifications to the Water Supply and Waste Disposal Facilities provided that such modifications are consistent with the terms of this Licence and the following requirements are met:
 - a. the Licensee has notified the Board in writing of such proposed modifications at least sixty (60) days prior to beginning the modifications;
 - b. these modifications do not place the Licensee in contravention of the Licence or the Act;
 - c. the Board has not, during the sixty (60) days following notification of the proposed modifications, informed the Licensee that review of the proposal will require more than sixty (60) days; and
 - d. the Board has not rejected the proposed modifications.
3. Modifications for which all of the conditions referred to in Part E, Item 2, have not been met may be carried out only with written approval from the Board. The Licensee shall provide as-built plans and drawings of the Modifications referred to in this Licence within ninety (90) days of completion of the Modification. These plans and drawings shall be stamped by an Engineer.

4. All activities shall be conducted in such a way as to minimize impacts on surface drainage and the Licensee shall immediately undertake any corrective measures in the event of any impacts on surface drainage
5. The Licensee shall implement sediment and erosion control measures prior to and during all activities carried out under this Part to prevent the release of sediment and minimize erosion.

PART F: CONDITIONS APPLYING TO OPERATION AND MAINTENANCE

1. The Licensee shall submit to the Board for approval, within ninety (90) days of issuance of the Licence, an Operations and Maintenance Manual prepared where appropriate, in accordance with the “*Guidelines for the Preparation of an Operation and Maintenance Manual for Sewage and Solid Waste Disposal Facilities in the Northwest Territories; 1996*”. The Manual shall take into consideration the comments received during the application review process and shall contain the following plans:
 - a. *Water Distribution Facility Operation and Maintenance (O&M) Plan;*
 - b. *Sewage Disposal Facility Operation and Maintenance (O&M) Plan;*
 - c. *Sewage Sludge Management Plan;*
 - d. *Solid Waste Disposal Facility Operation and Maintenance (O&M) Plan;*
 - e. *Spill Contingency Plan; and*
 - f. *Monitoring Program Quality Assurance/Quality Control Plan (QA/QC Plan).*
2. The Licensee shall review the O&M Manual referred to in Part F, Item 1 as required by changes in operation and/or technology and modify accordingly. Revisions are to be submitted in the form of an Addendum to be included with the Annual Report.
3. An inspection of all engineered facilities related to the management of water and waste shall be carried out annually in July or August by a Geotechnical Engineer. The engineer’s report shall be submitted to the Board within sixty (60) days of the inspection, including a covering letter from the Licensee outlining an implementation plan addressing each of the Engineer’s recommendations.
4. The Licensee shall perform more frequent inspections of the engineered facilities at the request of an Inspector.
5. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:
 - a. employ the appropriate contingency measures as approved under the Operation and Maintenance Manual for the Hamlet of Hall Beach;

- b. report the incident immediately via the 24-Hour Spill Reporting Line at (867) 920-8130 and to the Inspector at (867) 975-4295; and
- c. submit to the Inspector, a detailed report on each occurrence, not later than thirty (30) days after initially reporting the event, that provides the necessary information on the location (including the GPS coordinates), initial response action, remediation/clean-up, status of response (ongoing, complete), proposed disposal options for dealing with contaminated materials and preventative measures to be implemented.

PART G: CONDITIONS APPLYING TO ABANDONMENT AND RESTORATION

- 1. The Licensee shall submit to the Board for approval an *Abandonment and Restoration Plan* at least six (6) months prior to abandoning any facilities or upon submission of the final design drawings for the construction of new facilities to replace existing ones. Where applicable, the Plan shall include information on the following:
 - a. water intake facilities;
 - b. the water treatment and waste disposal sites and facilities;
 - c. petroleum and chemical storage areas;
 - d. any site affected by waste spills;
 - e. leachate prevention;
 - f. an implementation schedule;
 - g. maps delineating all disturbed areas, and site facilities;
 - h. consideration of altered drainage patterns;
 - i. type and source of cover materials;
 - j. future area use;
 - k. hazardous wastes; and
 - l. a proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

PART H: CONDITIONS APPLYING TO THE MONITORING PROGRAM

- 1. The Licensee shall maintain Monitoring Program Stations at the following locations:

| Monitoring Program Station Number | Description | Status |
|--|---|-----------------|
| HAL-1 | Raw water supply intake at Water Supply Lake | Active (Volume) |
| HAL-2 | Runoff from Solid Waste Disposal Facility | Active |
| HAL-3 | Raw Sewage at discharge point into the Sewage Disposal Facility | Active (Volume) |
| HAL-4 | Effluent discharged from Sewage Disposal Facility | Active |

| | | |
|-------|--|-----|
| HAL-5 | Final Effluent Discharge Point prior entering Foxe Basin | New |
|-------|--|-----|

2. The Licensee shall sample at Monitoring Program Stations HAL-4 and HAL-5 upon providing notice to the inspector and every four weeks thereafter when flow is observed. Samples shall be analyzed for the following parameters:

| | |
|---------------------------------|----------------------------|
| Biochemical Oxygen Demand - BOD | Fecal Coliforms |
| Total Suspended Solids | pH |
| Conductivity | Nitrate-Nitrite |
| Oil and Grease (visual) | Total Phenols |
| Magnesium | Calcium |
| Sodium | Potassium |
| Chloride | Sulphate |
| Total Hardness | Total Alkalinity |
| Ammonia Nitrogen | Total Zinc |
| Total Cadmium | Total Iron |
| Total Cobalt | Total Manganese |
| Total Chromium | Total Nickel |
| Total Copper | Total Lead |
| Total Aluminum | Total Arsenic |
| Total Mercury | Total Organic Carbon (TOC) |

3. The Licensee shall sample at Monitoring Program Station HAL-2 once annually during periods of runoff or seepage. Samples shall be analyzed for the following parameters:

| | |
|---|------------------|
| TPH (Total Petroleum Hydrocarbons) | |
| PAH (Polycyclic Aromatic Hydrocarbons) | |
| BTEX (Benzene, Toluene, Ethylbenzene, Xylene) | |
| BOD | Fecal Coliforms |
| pH | Conductivity |
| Total Suspended Solids | Oil and Grease |
| Nitrate-Nitrite | Ammonia Nitrogen |
| Total Phenols | Total Alkalinity |
| Total Hardness | Calcium |
| Magnesium | Potassium |
| Sodium | Sulphate |
| Total Arsenic | Total Cadmium |
| Total Copper | Total Chromium |
| Total Iron | Total Lead |
| Total Mercury | Total Nickel |

4. The Licensee shall report all results of acute toxicity testing as required under Part D,

Item 6 within the Annual Report as per Part B, Item 1.

5. The Licensee shall measure and record, in cubic metres, the monthly and annual quantities of water pumped at Monitoring Program Station HAL-1, for all purposes.
6. The Licensee shall measure and record, in cubic metres, the monthly and annual quantities of raw sewage offloaded from trucks at Monitoring Program Station HAL-3, for all purposes.
7. The Licensee shall measure and record the annual quantities of sewage solids removed from the Sewage Disposal Facility. Details of the protocol for monitoring quantities of sewage sludge removed from the Sewage Disposal Facility shall be provided in the *Sewage Sludge Management Plan*, as part of the O&M Manual.
8. The Licensee shall include all of the data and information required by the “Monitoring Program” in the Licensee's Annual Report, as required *per* Part B, Item 1, or as requested by an Inspector.
9. Modifications to the Monitoring Program may be made only upon written approval from the NWB.
10. If, during the term of this Licence, additional Final Discharge Points are identified, the Licensee shall submit a report to include:
 - a. Plans, specifications, geographic coordinates and a general description of each Final Discharge Point; and
 - b. A description of how each Final Discharge Point is designed and maintained, if required.
11. 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.
12. All analyses shall be performed by a laboratory certified by the Canadian Association of Environmental Analytical Laboratories (CAEAL), or as otherwise approved by an Analyst.

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**Appendix C:
Environmental Monitoring Program Checklist,
Summary of Sample Bottle Requirements**

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HAMLET OF HALL BEACH ENVIRONMENTAL MONITORING PROGRAM CHECKLIST

PRE-SAMPLING ACTIVITIES

| | | |
|--------------------------------------|--|--------------------------|
| Bottle Order | At least two weeks before upcoming environmental sampling (see Environmental Monitoring Program Schedule in Appendix E), send a request to the contract laboratory for the appropriate sample sets (bottles) for the required sampling test groups (see Conditions 2 and 3 of Part H of Nunavut Water Board Licence 3BM-HAL0810) | <input type="checkbox"/> |
| Personal Protective Equipment | Ensure that the required personal protective equipment (PPE), such as latex gloves, is on hand before commencing the environmental monitoring program. | <input type="checkbox"/> |
| 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. Report any missing or broken bottles to the contract laboratory as soon as possible, so that replacement bottles may be shipped. | <input type="checkbox"/> |
| Sampling Location Inspections | 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. | <input type="checkbox"/> |

GENERAL SAMPLING INSTRUCTIONS

| | | |
|--|--|--------------------------|
| Prevention of Cross-Contamination | Ensure that any laboratory provided sampling instructions are 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. | <input type="checkbox"/> |
| Sample Care (including Packing of Cooler) | All sample containers should be tightly sealed and properly labelled 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 the samples, in a ziplock bag. Keep the last page of the Chain of Custody and give it to the Hamlet Foreman for their records. | <input type="checkbox"/> |

RAW WATER SUPPLY

| | | |
|-------------------------------|--|--------------------------|
| Sampling Station HAL-1 | Station HAL-1 (see Figure 2) is a raw water supply (from Water Supply Lake) volume monitoring location. The water licence does not require the collection of any water samples from this location. Measure and record (in m ³) the monthly and annual quantities of water pumped from Station HAL-1. | <input type="checkbox"/> |
|-------------------------------|--|--------------------------|

SOLID WASTE DISPOSAL FACILITY

| | | |
|-------------------------------|---|--------------------------|
| Sampling Station HAL-2 | Landfill runoff is collected once annually during periods of runoff or seepage (see Schedule in Appendix E for timing and list of parameters to be sampled). Runoff samples are collected from the receiving water body (see Figure 3) 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. | <input type="checkbox"/> |
|-------------------------------|---|--------------------------|

SEWAGE DISPOSAL FACILITY

| | | |
|-------------------------------|---|--------------------------|
| Sampling Station HAL-4 | Effluent discharge is collected from the Sewage Disposal Facility upon providing notice to the inspector and every four weeks thereafter when flow is observed (see Schedule in Appendix E for timing and list of parameters to be sampled). Effluent samples are collected from the receiving water body (see Figure 3) by immersing the sample bottle into the effluent stream neck first to a depth of 5 to 10 cm (if possible). The sampling container is filled with effluent and the sample bottle is raised neck first to prevent sample spillage. | <input type="checkbox"/> |
| Sampling Station HAL-5 | Effluent discharge is collected from the Final Effluent Discharge Point upon providing notice to the inspector and every four weeks thereafter when flow is observed (see Schedule in Appendix E for | <input type="checkbox"/> |

| | | |
|---------------------------------|---|--------------------------|
| | timing and list of parameters to be sampled). Effluent samples are collected from the receiving water body (see Figure 3) by immersing the sample bottle into the effluent stream neck first to a depth of 5 to 10 cm (if possible). The sampling container is filled with effluent and the sample bottle is raised neck first to prevent sample spillage. | |
| POST-SAMPLING ACTIVITIES | | |
| Sample Shipment | See Sample Care section for sampling handling and cooler packing instructions. Ensure all samples are shipped to the contract laboratory immediately after the completion of the environmental monitoring event to ensure that the hold times are respected for the various parameters. Follow-up with the contract laboratory on the day after the samples were shipped to ensure that the samples were collected from the air cargo facility and received by the contract laboratory for analysis. | <input type="checkbox"/> |
| Analytical Results | Ensure that the analytical results for the environmental monitoring program samples are received within the specified turn-around time. Follow-up with the contract laboratory if the results are not provided as expected to ensure timely reporting to the Nunavut Water Board (as required by Water Licence 3BM-HAL0810). | <input type="checkbox"/> |

Checklist Performed By:

_____ Name

_____ Signature

_____ Date

**Sample Bottle Requirements for Parameters Listed in Conditions 2 & 3 of Part H of
Nunavut Water Board Licence No. 3BM-HAL0810**

| Parameter | Recommended Sample Container | Preservative | Hold Time |
|--|-------------------------------------|---|------------------|
| Alkalinity | 250 mL plastic | None | 14 days |
| Anions (Br, Cl, F, NO ₃ , NO ₂ , PO ₄ , SO ₄) | 250 mL plastic | None | 5/28 Days |
| Biochemical Oxygen Demand (BOD ₅) | 500 mL plastic | None | 4 days |
| Carbon, Total Organic (TOC) | 250 mL plastic | H ₂ SO ₄ (pH < 2) | 10 days |
| Conductivity | 250 mL plastic | None | 28 days |
| Dissolved ICPMS, ICP Metals | 250 mL plastic | None - if not field filtering | 60 days |
| Total ICPMS, ICP Metals - NOT FILTERED | 250 mL plastic | HNO ₃ (pH < 2) | 30 days |
| Nitrogen - Ammonia (NH ₃ - N) / Total Kjeldahl Nitrogen (TKN) | 250 mL plastic | H ₂ SO ₄ (pH < 2) | 10 days |
| Phenolics - Total | 120 mL amber glass | H ₂ SO ₄ (pH < 2) | 30 days |
| Solids - (TS, TSS, TDS) | 500 mL plastic | None | 7 days |
| Microbiological (incl. faecal coliforms) | 300 mL plastic - Sterilized | Na ₂ S ₂ O ₃ | 48 hours |
| Total Hardness | 500 mL plastic | None | 28 days |
| Total Petroleum Hydrocarbons (TPH) | 2 x 500 mL amber glass | NaHSO ₄ (pH < 2) | 40 days |
| BTEX (benzene, toluene, ethylbenzene, xylenes) | 3 x 40 mL clear glass septum vial | NaHSO ₄ (pH < 2) | 14 days |
| Polycyclic Aromatic Hydrocarbons (PAH) | 3 x 40 mL clear glass septum vial | NaHSO ₄ (pH < 2) | 14 days |
| | 2 x 500 mL amber glass | None | 14 days |

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**Appendix D:
Completed Example of Chain of Custody
Documentation**

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exp Services Inc.

Hamlet of Hall Beach
Quality Assurance / Quality Control Plan
OTT-00209248-A0
August 15, 2013

Appendix E: Environmental Monitoring Program Schedule

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Hall Beach Monitoring Program Schedule
 Nunavut Water Board Licence No. 3BM-HAL0810

| Monitoring Station ID | Location Description | Month | | | | | | | | | | | | Annual | |
|-----------------------|---|---------|----------|-------|-------|-----|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | January | February | March | April | May | June | July | August | September | October | November | December | | |
| HAL-1 | Raw water supply intake at Water Supply Lake | V | V | V | V | V | V | V | V | V | V | V | V | V | V |
| HAL-2 | Runoff from Solid Waste Disposal Facility | | | | | | LR ¹ | LR ¹ | LR ¹ | | | | | | |
| HAL-3 | Raw sewage at discharge point into Sewage Disposal Facility | V | V | V | V | V | V | V | V | V | V | V | V | V | V |
| HAL-4 | Effluent discharged from Sewage Disposal Facility | | | | | | WW ² |
| HAL-5 | Final Effluent Discharge Point prior to entering Foxe Basin | | | | | | WW ² |

| Test Groups | |
|-------------|---|
| V | Volume (m ³) |
| LR | Landfill Runoff (Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH), benzene, toluene, ethylbenzene, xylenes (BTEX), Biochemical Oxygen Demand (BOD ₅), pH, Total Suspended Solids (TSS), nitrate-nitrite, total phenols, total hardness, magnesium, sodium, total arsenic, total copper, total iron, total mercury, faecal coliforms, conductivity, oil & grease (visual), ammonia nitrogen, total alkalinity, calcium, potassium, sulphate, total cadmium, total chromium, total lead, total nickel) |
| WW | Wastewater Effluent (Biochemical Oxygen Demand (BOD ₅), Total Suspended Solids (TSS), conductivity, oil & grease (visual), magnesium, sodium, chloride, total hardness, ammonia nitrogen, total cadmium, total cobalt, total chromium, total copper, total aluminum, total mercury, faecal coliforms, pH, nitrate-nitrite, total phenols, calcium, potassium, sulphate, total alkalinity, total zinc, total iron, total manganese, total nickel, total lead, total arsenic, total organic carbon (TOC)) |

¹ Sample only once annually during periods of runoff or seepage.

² Upon providing notice to the inspector and every four weeks thereafter when flow is observed.

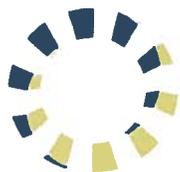
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exp Services Inc.

Hamlet of Hall Beach
Quality Assurance / Quality Control Plan
OTT-00209248-A0
August 15, 2013

Appendix F: Subcontract Laboratory Accreditation & Supporting Documentation

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CALA

Canadian Association for
Laboratory Accreditation Inc.

CALA Directory of Laboratories

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

Scope of Accreditation

Air (Inorganic)

Metals - Air Filter (012)

D-ICP-02; modified from APHA 3120 B

ICP - DIGESTION

Cadmium

Chromium

Cobalt

Copper

Iron

Lead

Manganese

Molybdenum

Nickel

Zinc

Air (Inorganic)

Total Suspended Particulates - Air Filter (018)

A-TSP-01; modified from MOEE E3288A

GRAVIMETRIC

Total Suspended Particulates

Dustfall

Total/Insoluble Dustfall - Dustfall (020)

A-DF-01; modified from MOEE DF-E3043A

FILTRATION - GRAVIMETRIC

Insoluble Dustfall

Total Dustfall

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Fluoride Candles

Fluoride - Candles (019)

A-FISE-01; modified from MOEE FSIE-1983D

DIGESTION - ISE

Fluoride

Oil (Organic)

Polychlorinated Biphenyls (PCB) - Oil (040)

C-PCB-01; modified from EPA 8081

GC/ECD - EXTRACTION

Aroclor 1242

Aroclor 1248

Aroclor 1254

Aroclor 1260

Solids (Inorganic)

Anions - Soils, Biosolids (069)

A-IC-01; modified from APHA 4110 C

ION CHROMATOGRAPHY - EXTRACTION

Chloride

Nitrate

Nitrite

Sulphate

Solids (Inorganic)

Boron (Hot Water Soluble) - Soil (098)

D-ICP-02; MOE-LaSB E3470

ICP/AES - EXTRACTION

Boron

Solids (Inorganic)

Conductivity - Soil, Sediments (099)

A-CONDO-03; SM 2510 B & MOE-LaSB E 3138

CONDUCTIVITY METER - EXTRACTION

Conductivity

Solids (Inorganic)

Extractable Anions - Leachate (090)

A-IC-01; modified from EPA 1311, APHA 4110-C

ION CHROMATOGRAPHY - TCLP

Nitrate

Nitrite

Solids (Inorganic)

Extractable Metals - Leachate (091)

D-ICP-01; modified from EPA 1311/APHA 3120 B

ICP/AES - TCLP

Arsenic

Barium

Beryllium

Boron

Cadmium

Chromium

Lead

Nickel

Silver

Zinc

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Solids (Inorganic)

Extractable Metals - Leachate (092)
D-ICPMS-01; modified from EPA 1311/EPA 200.8
ICP/MS - TCLP
Antimony
Arsenic
Selenium
Uranium

Solids (Inorganic)

Extractable Metals - Leachate (093)
D-HG-02; modified from EPA 1311/SM 3112 B
COLD VAPOUR AA - TCLP
Mercury

Solids (Inorganic)

Flash Point - Soil, Solid Waste (096)
C-FPCC-01; modified FROM ASTM D93-10
CLOSED CUP FLASH POINT TESTER
Flashpoint

Solids (Inorganic)

Hexavalent Chromium - Soil (094)
D-CRVI-02; modified from EPA 3060A EPA 7196 A
COLORIMETRIC - MANUAL
Chromium (VI)

Solids (Inorganic)

Mercury - Soil, Solid Biosolids (017)
D-HG-01; modified from EPA 7471A
COLD VAPOUR AA - DIGESTION
Mercury

Solids (Inorganic)

Metals - Soil, Solid Biosolids (015)
D-ICP-02; modified from EPA 6010
ICP/OES - DIGESTION
Aluminum
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Iron
Lead
Magnesium
Manganese
Molybdenum
Nickel
Potassium
Silver
Sodium
Strontium

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Tin
Titanium
Tungsten
Vanadium
Zinc

Solids (Inorganic)

pH - Soil, Sediment, Solid Sludge (100)
A-pH-03; SM 4500 H & MOE-LaSB E3137
pH METER - EXTRACTION
pH

Solids (Inorganic)

Total Metals - Soils, Biosolids (070)
D-ICPMS-01; modified from EPA 6020
ICP/MS - DIGESTION
Antimony
Arsenic
Selenium
Silver
Thallium
Uranium

Solids (Organic)

Extractable Volatile Organic Compounds (VOC) - Leachate (089)
C-VOC-01; modified from EPA SW-846 METHOD 1311, 5030/8260
GC/MS - PURGE AND TRAP - TCLP
1,1-Dichloroethylene
1,2-Dichlorobenzene
1,2-Dichloroethane
1,4-Dichlorobenzene
Benzene
Carbon tetrachloride
Chlorobenzene
Chloroform
Dichloromethane
Methyl ethyl ketone
Tetrachloroethylene
Trichloroethylene
Vinyl chloride

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Soil (075)
C-PHCS-01; modified from CCME CWS REF. METHOD & MOE E3398
GC/FID - EXTRACTION
F2: C10-C16
F3: C16-C34
F4: C34-C50

Solids (Organic)

Petroleum Hydrocarbons (PHC) - Soil (097)
C-PHCS-01; modified from CCME CWS REF. METHOD & MOE E3398
GRAVIMETRIC
F4: Gravimetric

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Solids (Organic)

Polychlorinated Biphenyls (PCB) - Soil (053)

C-PCB-02; modified from EPA 8000/8081

GC/ECD - EXTRACTION

Aroclor 1242

Aroclor 1248

Aroclor 1254

Aroclor 1260

Solids (Organic)

Volatile Organic Compounds (VOC) - Soil (063)

C-VOC-02; modified from EPA 8260

GC/MS - PURGE AND TRAP

1,1 - Dichloropropene

1,1-Dichloroethane

1,1-dichloroethylene

1,1,1-Trichloroethane

1,1,1,2 - Tetrachloroethane

1,1,2-Trichloroethane

1,1,2,2-Tetrachloroethane

1,2 - Dibromo - 3 - chloropropane

1,2-dichlorobenzene

1,2-dichloroethane

1,2-Dichloropropane

1,2,3 - Trichlorobenzene

1,2,3 - Trichloropropane

1,2,4 - Trichlorobenzene

1,2,4 - Trimethylbenzene

1,3 - Dichloropropane

1,3-Dichlorobenzene

1,3,5 -Trimethylbenzene

1,4-dichlorobenzene

2 - Chlorotoluene

2 - Hexanone (MBK)

2,2 - Dichloropropane

4 - Chlorotoluene

Acetone (2-Propanone)

Benzene

Bromobenzene

Bromodichloromethane

Bromoform

Bromomethane

Carbon Tetrachloride

Chlorobenzene

Chlorodibromomethane

Chloroethane

Chloroform

Chloromethane

cis-1,2-Dichloroethylene

cis-1,3-Dichloropropene

Dibromomethane

Dichlorodifluoromethane

Dichloromethane

Ethylbenzene

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Ethylene Dibromide
 Hexachlorobutadiene
 Hexane
 Isopropylbenzene
 Isopropyltoluene
 m/p-xylene
 Methyl Ethyl Ketone
 Methyl isobutyl Ketone
 Methyl t-butyl ether
 n - Butylbenzene
 Naphthalene
 o-xylene
 Propylbenzene
 sec - Butylbenzene
 Styrene
 tert - Butylbenzene
 Tetrachloroethylene
 Toluene
 trans-1,2-Dichloroethylene
 trans-1,3-Dichloropropene
 Trichloroethylene
 Trichlorofluoromethane
 Vinyl Chloride

Solids (Organic)

Volatile Petroleum Hydrocarbons (VPH) - Soil (073)
 C-GRO-01; modified from CCME CWS REF. METHOD & MOE E3398
 GC/FID - PURGE AND TRAP
 F1: C6-C10

Water (Inorganic)

Alkalinity - Water (088)
 A-ALK-03; modified from APHA 2320 B
 AUTO TITRIMETRIC
 Alkalinity (pH 4.5)

OSDWA †

Water (Inorganic)

Ammonia - Water, Wastewater, Liquid Biosolids (055)
 A-NH3-01; modified from MOEE RNDNP-E3364, SDNP-E3366
 AUTO COLOR
 Ammonia
 Ammonia - Nitrogen

OSDWA †

Water (Inorganic)

Ammonia - Water, Wastewater, Liquid Biosolids (103)
 A-NH3-01; modified from MOEE RNDNP-E3364, SDNP-E3366
 COLORIMETRIC - DISCRETE
 Ammonia

Water (Inorganic)

Anions - Water, Wastewater, Liquid Biosolids (002)
 A-IC-01; modified from APHA 4110 C
 ION CHROMATOGRAPHY
 Bromide
 Chloride
 Fluoride
 Nitrate
 Nitrite

OSDWA †

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Sulfate

| | |
|--|---------|
| Water (Inorganic) Biochemical Oxygen Demand (BOD) - Water (008) C-BOD-01; modified from APHA 5210 B D.O. METER BOD (5 day) CBOD (5 day) | OSDWA † |
| Water (Inorganic) Carbon - Water (054) C-OC-01; modified from APHA 5310C, EPA 415.1 IR-UV-PERSULFATE Organic Carbon | OSDWA † |
| Water (Inorganic) Chemical Oxygen Demand (COD) - Water (083) C-COD-01; modified from APHA 5220 D COLORIMETRIC COD | OSDWA † |
| Water (Inorganic) Colour - Water (027) A-COL-01; modified from APHA 2120 C SPECTROPHOTOMETRIC True Colour | OSDWA † |
| Water (Inorganic) Conductivity - Water (003) A-COND-01; modified from APHA 2510 B CONDUCTIVITY METER Conductivity (25°C) | OSDWA † |
| Water (Inorganic) Conductivity - Water (087) A-COND-02; modified from APHA 2510 B AUTO CONDUCTIVITY METER Conductivity (25°C) | OSDWA † |
| Water (Inorganic) Dissolved and Extractable Metals - Water (004) D-ICP-01; modified from APHA 3120 B ICP Aluminum Barium Beryllium Bismuth Boron Cadmium Calcium Chromium Cobalt Copper Iron Lead Lithium Magnesium Manganese Molybdenum | OSDWA † |

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Nickel
Potassium
Silicon
Silver
Sodium
Strontium
Tin
Titanium
Tungsten
Vanadium
Yttrium
Zinc
Zirconium

Water (Inorganic)

Dissolved Metals - Water (049)
D-ICPMS-01; modified from EPA 200.8

ICP/MS

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Lead
Molybdenum
Selenium
Silver
Thallium
Uranium
Vanadium

OSDWA †

Water (Inorganic)

Hexavalent Chromium - Water (095)
D-CRVI-01; modified from MOE - HEXCR-E3056
COLORIMETRIC - MANUAL

Chromium (VI)

Water (Inorganic)

Mercury - Water, Wastewater (025)
D-HG-02; modified from APHA 3112 B
COLD VAPOUR AA - DIGESTION

Mercury

OSDWA †

Water (Inorganic)

Nitrate + Nitrite - Water (102)
A-NO23-01; modified from SM 4500-NO3-F
COLORIMETRIC - DISCRETE ANALYZER

Nitrate plus Nitrite

Water (Inorganic)

Nitrite - Water (101)
A-NO2-01; modified from SM 4500-NO2-B
COLORIMETRIC - DISCRETE ANALYZER

Nitrite

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| | |
|---|---------|
| Water (Inorganic) Nitrogen - Water, Wastewater, Liquid Biosolids (033) A-TKN-01; modified from MOEE RTNP-E3367 AUTO COLOR - DIGESTION Total Kjeldahl Nitrogen | OSDWA † |
| Water (Inorganic) Orthophosphate - Water (104) A-PO4-01; modified from MOEE RNDNP-E3364, SDNP-E3366 COLORIMETRIC - DISCRETE Phosphate | |
| Water (Inorganic) pH - Water (005) A-pH-01; modified from APHA 4500 H pH METER pH | OSDWA † |
| Water (Inorganic) pH - Water (086) A-pH-02; modified from APHA 4500H+ B AUTO - pH METER pH | OSDWA † |
| Water (Inorganic) Phenols - Water (056) C-PHEN-01; modified from MOE ROPHEN-E3179 AUTO, 4-AAP Total Phenolics | OSDWA † |
| Water (Inorganic) Phosphate - Water (058) A-PO4-01; modified from MOEE RNDNP-E3364, SDNP-E3366 AUTO COLOR Phosphate | OSDWA † |
| Water (Inorganic) Total Metals - Water, Wastewater, Liquid Biosolids (067) D-ICP-01; modified from APHA 3120 B ICP/AES - DIGESTION Aluminum Antimony Arsenic Barium Beryllium Bismuth Boron Cadmium Calcium Chromium Cobalt Copper Iron Lead Lithium Magnesium Manganese Molybdenum | |

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Nickel
Potassium
Silver
Sodium
Strontium
Tin
Titanium
Tungsten
Vanadium
Yttrium
Zinc
Zirconium

Water (Inorganic)

Total Metals - Water, Wastewater, Liquid Biosolids (071)

D-ICPMS-01; modified from EPA 6020

ICP/MS - DIGESTION

Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Lead
Molybdenum
Selenium
Silver
Vanadium

Water (Inorganic)

Total Phosphorus - Water, Wastewater, Liquid Biosolids (057)

A-TP-01; modified from MOEE RTNP-E3367

AUTO COLOR - DIGESTION

Total Phosphorus

OSDWA †

Water (Inorganic)

Total Suspended Solids (TSS) - Water (009)

A-TSS-01; modified from APHA 2540 D

GRAVIMETRIC

Total Suspended Solids

OSDWA †

Water (Inorganic)

Turbidity - Water (026)

A-TURB-01; modified from APHA 2130 B

NEPHELOMETRY

Turbidity

OSDWA †

Water (Microbiology)

Coliforms - Water (050)

B-ECTC-01; modified from MICROMFDC-E3407

MEMBRANE FILTRATION (DC)

Background Bacteria
Escherichia coli (E. coli)
Total Coliforms

OSDWA †

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| | |
|---|---------|
| Water (Microbiology) Escherichia coli (E. coli) - Water (010) B-MFEC-01; modified from MFMICRO-E3371 MEMBRANE FILTRATION (EC) Escherichia coli (E. coli) | OSDWA † |
| Water (Microbiology) Fecal (Thermotolerant) Coliforms - Water (065) B-MFFC-01; modified from MFMICRO-E3371 MEMBRANE FILTRATION (mFC) Fecal (Thermotolerant) Coliforms | OSDWA † |
| Water (Microbiology) Heterotrophic Plate Count (HPC) - Water (021) B-HPC-01; modified from APHA 9215 C SPREAD PLATE Heterotrophic Plate Count (HPC) | OSDWA † |
| Water (Microbiology) Total Coliforms - Water (066) B-MFTC-01; modified from MFMICRO-E3371 MEMBRANE FILTRATION (mENDO) Background Counts Total Coliforms | OSDWA † |
| Water (Organic) Glycols - Water (085) C-GLYCOL-01; modified from EPA 8015 B DIRECT INJECTION GC-FID Diethylene Glycol Ethylene Glycol Propylene Glycol | OSDWA † |
| Water (Organic) Petroleum Hydrocarbons (PHC) - Water (072) C-GRO-01; modified from MOE E3421 GC/FID - PURGE AND TRAP F1: C6-C10 | OSDWA † |
| Water (Organic) Petroleum Hydrocarbons (PHC) - Water (074) C-PHCW-02; modified from MOE E3421 GC/FID - EXTRACTION F2: C10-C16 F3: C16-C34 F4: C34-C50 | OSDWA † |
| Water (Organic) Volatile Organic Compounds (VOC) - Water (041) C-VOC-01; modified from EPA 8260 and 5030 GC/MS - PURGE AND TRAP 1,1-Dichloroethane 1,1-dichloroethylene 1,1-Dichloropropene 1,1,1-Trichloroethane 1,1,1,2-Tetrachloroethane 1,1,2-Trichloroethane 1,1,2,2-Tetrachloroethane 1,2-Dibromo-3-chloropropane | OSDWA † |

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1,2-dichlorobenzene
1,2-dichloroethane
1,2-Dichloropropane
1,2,3-Trichlorobenzene
1,2,3-Trichloropropane
1,2,4-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3-Dichlorobenzene
1,3-Dichloropropane
1,3,5-Trimethylbenzene
1,4-dichlorobenzene
2-Chlorotoluene
2-Hexanone (MBK)
2,2-Dichloropropane
4-Chlorotoluene
4-Isopropyl Toluene
Acetone (2-Propanone)
Benzene
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane
Carbon Tetrachloride
Chlorobenzene
Chlorodibromomethane
Chloroform
Chloromethane
cis-1,2-Dichloroethylene
cis-1,3-Dichloropropene
Dibromomethane
Dichlorodifluoromethane
Dichloromethane
Ethylbenzene
Ethylene Dibromide
Hexachlorobutadiene
Hexane
Isopropyl Benzene
m/p-xylene
Methyl Ethyl Ketone
Methyl isobutyl Ketone
Methyl t-butyl ether
n-Butylbenzene
n-Propylbenzene
Naphthalene
o-xylene
Sec-Butylbenzene
Styrene
tert-Butylbenzene
Tetrachloroethylene
Toluene
trans-1,2-Dichloroethylene
trans-1,3-Dichloropropene
Trichloroethylene

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Trichlorofluoromethane
Vinyl Chloride

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