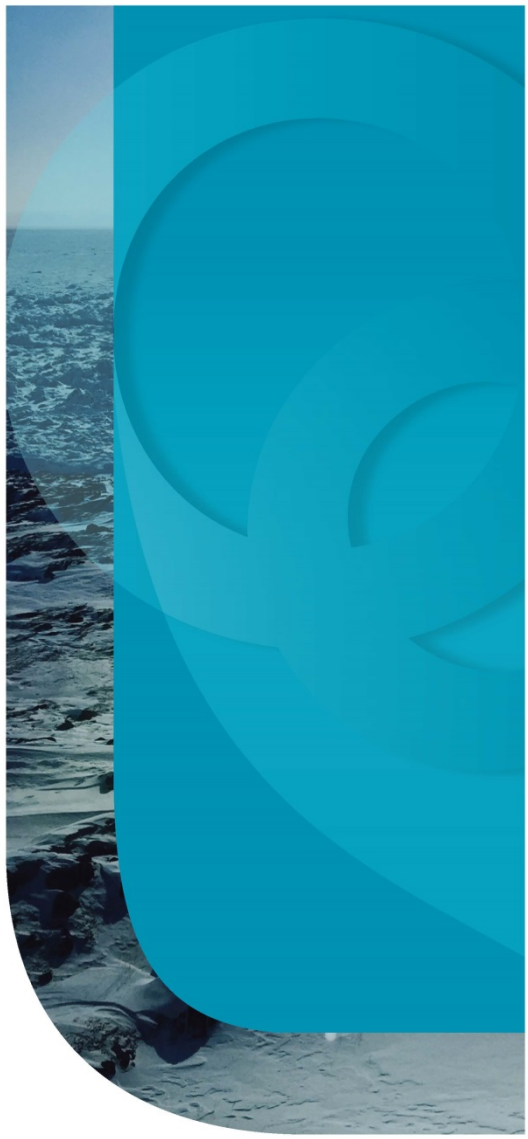
OPERATIONS AND MANAGEMENT PLAN

ENVIRONMENTAL WASTE PROCESSING FACILITY

Qikqtaaluk Environmental Inc.
PO Box 2110
2027 Iqaluit Lane
Iqaluit, Nunavut X0A 0H0



September 27, 2019
O/Ref.: QE19-100-8

Qikiqtaaluk environmental
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

1. OPERATIONS AND MANAGEMENT PLAN

1.1 General

The Environmental Waste Processing Facility (EWPF) was developed due to a rising need for an environmental services provider in the City of Iqaluit and Nunavut in general. The EWPF is part of a business model to provide Qikiqtaaluk Environmental Inc. (QE)'s clients with a turnkey solution for the safe management of their environmental liabilities. For this Operations and Management Plan, the EWPF's activities are divided into 3 general categories, which are complementary in the proper management of waste and pollutants.

The first category includes various hazardous waste streams generated by clients who require QE's services to comply with regulations regarding proper packaging, storage, transportation and final disposal of hazardous waste. This waste is either transported to the EWPF by the clients, or picked-up by QE for temporary storage before consolidation and maritime transport to authorized disposal facilities in southern Canada. The waste will be properly packaged, labelled and stored by QE's qualified personnel before being shipped to its final disposal facility. Depending on its physical state, waste is stored in 20-feet intermodal containers, or at an HDPE[1]-lined and bermed designated area on the site. The quantity of hazardous waste stored at the EWPF at a given time depends on how much is generated by QE's clients, as well as the maritime transport companies sealift schedules for the previous year.

The second category of activities at the EWPF involves the treatment of **Hydrocarbon-Impacted Soils**, mainly originating from spill remediation activities that have either been carried out by QE or directly by its clients. Once the contaminated soils arrive at the EWPF, they are placed on an HDPE-lined and bermed containment area, where they will undergo the various steps of the treatment process. Once it has been confirmed by laboratory analysis that a batch of treated soils is below the Government of Nunavut Department of Environment (GN DoE)'s PHC[2] concentrations, the treated soils may then be reused according to classification, which ranges from residential, to commercial or industrial. The volume of contaminated soils stored on the EWPF each year is dependent upon remediation activities and treatment rates.

The third type of activity that takes place at the EWPF involves the treatment of **Hydrocarbon-Impacted Water,** which primarily originates from spill remediation operations undertaken by QE for its clients, or by the clients themselves. Some contaminated water may also be generated by snowmelt or rain coming in contact with hydrocarbon-impacted soils stored on the EWPF's HDPE-lined and bermed containment cells. The contaminated water is treated through QE's Water Treatment Unit (WTU). Treated water is stored in batches, and analyzed for comparison to QE's Nunavut Water Board (NWB)'s Licence No. 1BR-THI1722 discharge criteria. If the analyzed batch meets the criteria, the treated water is discharged at an approved location. Such treatment activities are possible when the outdoor temperatures allow for water to be in a liquid state, which is roughly between May and October in Nunavut. The volume of water treated each year is dependent upon QE's and its client's remediation activities, as well as yearly precipitation events.

1 High-density polyethylene
2 Petroleum hydrocarbon

1.2 Location

The EWPF measures 19,160 m² and is located in Iqaluit. The approximate coordinates of the centre of the property are:

Latitude: 63°44’38.22” N
Longitude: 68°32’58.59” W

The legal description of the EWPF is:

Lot 1673 Plan 666 REM Parcels Q & O

The civic address of the EWPF is:

2027 Iqaluit Lane
PO Box 2110
Iqaluit, Nunavut X0A 0H0

2. HAZARDOUS WASTE MANAGEMENT

2.1 Hazardous Waste Types and Descriptions

The main waste streams and anticipated quantities generated by QE's clients and managed at the EWPF are presented in Table 1, below.

Hazardous Waste Managed at the EWPF

TABLE 1

Shipping Name	Description	TDG[1] Class	Maximum Storage Capacity	Container Type and Quantity
Waste lubricating oil	Used oil	N/A[2]	32,000 L	160 drums or 32 tote tanks or any combination of both
Waste glycol	Waste antifreeze	N/A	19,200 L	96 drums or 19 tote tanks or any combination of both
Oily water	Water and oil mixture	N/A	500,000 L	Steel tanks and storage basin
Batteries, wet, filled with acid	Vehicle batteries	8	32,500 kg	50 battery waste wranglers
Batteries, dry, containing potassium hydroxide, solid	Small batteries	8	800 kg	4 drums
Paint and paint related materials	Paints, thinner	3	16,000 kg	15 waste wranglers
Flammable liquids, not otherwise specified (gasoline)	Various petroleum products mixtures	3	32,000 L	160 drums
Oily contaminated solids (rags, absorbents, filters)	Oily solids	N/A	7,200 kg	32 waste wranglers
Hydrocarbon-contaminated soil	Oily soils	N/A	10,000 m^3	Containment cells
Environmentally hazardous substances, solids, not otherwise specified (mercury)	Crushed fluorescent tubes and light bulbs	9	2,400 kg	11 drums
Propane	Propane tanks	2.1	800 kg	Bulk storage
Butane	Butane tanks	2.1	400 kg	4 waste wranglers
Acetylene	Gas cylinders	2.1	800 kg	Bulk storage
Oxygen	Gas cylinders	2.2 (5.1)	800 kg	Bulk storage
Helium	Gas cylinders	2.2	800 kg	Bulk storage
Argon	Gas cylinders	2.2	800 kg	Bulk storage
Aerosols	Aerosol cans, paint/solvents	2.1	2,000 kg	10 waste wranglers
Organic solids, toxins, N.O.S.[3] (medication)	Spent medication	6.1	200 kg	1 drum or 10 pails
Sodium persulfate	Soil treatment oxidizing agent (solid)	5.1	2,000 kg	25 kg bags stacked on pallets
Biomedical waste	Medical Sharps	6.2	30,000 kg	UN-approved sharps containers (5 L each) in UN-approved cardboard overpack boxes

1 Transportation of Dangerous Goods, 2 Not applicable, 3 Not otherwise specified

In the future, other types of waste materials may be generated within the community. These materials will be assessed and analyzed to determine whether they are hazardous, and how they should be managed.

2.2 Hazardous Waste Management Procedures

Hazardous Waste management begins at the source when it is generated. Waste is then managed through the following steps until it is finally safely disposed of, recycled or eliminated:

- Collection;
- Consolidation;
- Storage;
- Maritime transport; and,
- Final disposal.

The following sections describe these 5 steps in further detail.

2.2.1 Collection

2.2.1.1 Delivery to the EWPF

Hazardous Waste is collected at the EWPF, which is a voluntary drop-off site for QE's clients. The waste is received by QE personnel, inspected, identified (with client code and product ID), classified, segregated, and temporarily stored according to its physical state. Liquid waste is stored in the Unconsolidated Liquid Waste Storage Area, which is part of the Multi-purpose HDPE-Lined and Bermed Containment Cell. All other unconsolidated solid waste is temporarily stored in intermodal containers or on the ground in the Unconsolidated Solid Waste Storage Area.

The Transfer Station maintains flexible operating hours to allow clients to drop off waste outside of regular business hours (9 a.m. to 5 p.m.). Qualified waste management personnel will be available on-site to provide guidance and assistance to clients.

2.2.1.2 Pick-up Services

QE will also offer waste pick-up services. Transport of waste materials from client locations to the EWPF will be done by TDG[1]-certified drivers trained in the operation of vehicles equipped for the transport of such materials.

Once the waste has been delivered to the EWPF, a Certificate of Storage, Transfer and Disposal is issued by QE and countersigned by the client. This document indicates the quantities and types of waste received, and serves as a receipt confirming that the waste has become QE's responsibility.

1 Transportation of Dangerous Goods

2.2.2 Consolidation

Collected Hazardous Waste will be packaged in appropriate containers to help prevent leaks and spills that may result in human exposure or environmental release during handling, storage and transport. Therefore, containers must be:

- Made of materials compatible with the given waste stream;
- Filled to, or below, the maximum capacity specified by the manufacturer;
- In good condition (i.e. no excessive denting, corrosion, or wear);
- Able to withstand normal handling (i.e. to prevent spills); and,
- Approved for maritime and ground transport.

Examples of appropriate containers for the storage and transport of various waste streams are listed in Table 2, below.

Hazardous Waste Containers

TABLE 2

Waste Type	Container
Small propane and butane tanks	• Open top steel or plastic drums (45 or 75 Imp. gal.) with ventilation • Waste wrangler (1 yd^3)
Aerosol cans	• Open top steel or plastic drums (45 or 75 Imp. gal.) with ventilation • Waste wrangler (1 yd^3).
Small batteries	• Open top plastic pail with lid (5 Imp. gal.)
Paint cans	• Open top steel or plastic drums (45 or 75 Imp. gal.) • Waste wrangler (1 yd^3)
Fluorescent light tubes and bulbs	• Intact tubes: ▪ Cardboard drum ▪ Original cardboard box • Crushed tubes and bulbs: ▪ Open top plastic pail with lid (5 Imp. gal.) ▪ Open top steel or plastic drums (45 or 75 Imp. gal.)
Cooking oil	• Closed top steel drums (45 Imp. gal.) • Open top plastic pail with lid and gasket (5 Imp. gal.)
Waste oil, waste antifreeze, oily water	• Closed top steel drums (45 Imp. gal.) • HDPE tote tanks on steel pallets (1,000 L)
Flammable liquids	• Closed top steel drums (45 Imp. gal.)
Petroleum hydrocarbon impacted soils	• Waste wrangler (1 yd^3)
Vehicle batteries	• Waste battery wrangler (0.5 yd^3)
Oil filters, other oily solids	• Open top steel drums (45 or 75 Imp. gal.) • Waste wrangler (1 yd^3)

Waste Type	Container
Gas cylinders	• No additional container required; however, all cylinders must be equipped with protective caps over the valves and must be secured in such a way as to remain upright and ventilated at all times

Upon receipt, waste containers will be identified with a waste tracking code that includes the client ID, product type, date received, and a sequential number. If Hazardous Waste is received in inappropriate containers, it will be repackaged in compliance with the TDGR[1]. Containers will then be properly marked and labelled in accordance with the TDGR (i.e. proper shipping name, hazard class, label and UN[2] number, etc.).

Specialized equipment will be used to reduce the volume of certain waste received at the EWPF. For example, fluorescent lamp crushers will be used to reduce the volume of tubes by breaking the tubes into fine glass particles inside a steel drum (ready for transport) while recovering the mercury vapour.

Waste will be handled manually or with the help of heavy equipment for heavier items.

2.2.3 Storage

Proper waste storage is critical to ensure the safety of users and EWPF personnel, as well as regulatory compliance. Storage is a temporary operation that serves to accumulate waste until sufficient quantities are available for off-site shipment, and until ships are available to transport them (i.e. summer season). The EWPF is used for commercial purposes to store hazardous waste for periods that may exceed 180 days. Furthermore, the quantity of waste to be stored on-site will exceed the criteria set out in Appendix 8 of the *Environmental Guideline for the General Management of Hazardous Waste*[3], namely for Class 3 materials, and possibly for Class 8 materials. Therefore, QE is registered with the GN DoE as a hazardous waste management facility.

As stated in the *Environmental Guideline for the General Management of Hazardous Waste*, the EWPF meets the following requirements:

- The facility meets local and territorial siting and construction requirements and is readily accessible for firefighting and other emergency response requirements. The local Fire Chief is advised of the storage facility and its contents for emergency planning and response purposes;
- The facility is secure. Access is limited to employees who have been trained in safety and emergency procedures. These procedures are documented, and a copy is available to employees having access to the facility;
- Containers are placed so that each can readily and easily be inspected for signs of leaks, corrosion or deterioration. Leaking, corroded or deteriorated containers will be immediately removed, and their contents transferred to a sound container;

1 Transportation of Dangerous Goods Regulations (SOR/2008-34)
2 United Nations
3. Department of Environment, Government of Nunavut, Original: April 1999, Revised: January 2002, April 2010, October 2010

- Drainage into and from the EWPF is controlled to prevent spills or leaks from leaving the site and to prevent run-off from entering the site;
- Waste is stored on a firm working surface, impervious to leaks;
- Incompatible waste is stored in a manner rendering impossible contact in the event of a spill or accidental release;
- Emergency response plans have been developed in cooperation with local emergency response personnel, and emergency response equipment is locally available in the event of a spill, fire or other emergency.

Hazardous waste is stored in sound containers approved for the type of material being stored. The containers are stored at a location on the EWPF where there is minimal traffic. The EWPF is fenced, and access is restricted to authorized personnel at all times. The entrance to the EWPF, as well as each container, bears placards indicating the presence of hazardous waste within the facility.

During the winter months, the EWPF is cleared of snow to maintain access to the storage containers.

2.2.4 Transport

The next step in the hazardous waste management process is transport. The transport of hazardous waste from the storage site to the southern disposal facilities is carried out in accordance with TDG and IMDG[1] Regulations, as well as the Interprovincial Movement of Hazardous Waste Regulations[2]. Compliance with these regulations reduces potential hazards to humans and the environment during the handling and transport of hazardous waste.

It should be noted that not all waste streams are regulated for transport. As transport is done within Canadian Territorial Waters and only within Canada, once on land, the federal TDGR define materials that are regulated for transport and how they are packaged and labelled.

The main transportat requirements of the TDGR are:

1 Packaging;

2 Labelling and marking of containers and road vehicles; and,

3 Shipping documents.

Containers and packaging used for transport will be the same as those used for storage, as described in Table 1, above.

The requirements for the labelling and marking of waste regulated for transport are:

- Proper shipping name is written on the container or label;
- UN number written on the container or label;
- Hazard class label(s) affixed to the container;
- Hazard class placards affixed to the road vehicle.

1 International Maritime Dangerous Goods
2 Interprovincial Movement of Hazardous Waste Regulations (SOR/2002-301)

Waste items identified as non-TDG regulated do not have a UN number or hazard class.

The "Shipper's Declaration for Dangerous Goods" document must be completed for regulated waste being shipped to its final disposal facility in southern Canada and includes the following information:

- Proper shipping name;
- UN number;
- Hazard class(es);
- Packing group (PG);
- Flashpoint (for Class 3 products);
- Marine pollutant (when applicable).

Other information required on shipping documents includes:

- Name and address of the shipper;
- Date of the shipment;
- Number of containers, and total quantity (weight or volume);
- A 24-hour emergency telephone number where the shipper can be reached.

A movement document/manifest must also be completed for all waste being shipped interprovincially, regardless of whether it is regulated.

2.2.5 Final Disposal

Hazardous waste shipped out of Iqaluit will be unloaded at ports near Montréal, Quebec, where it will be transported by ground to authorized final disposal facilities.

At that point, a bill of lading, listing types and quantities of regulated and non-regulated waste, is completed and given to the drivers to accompany each shipment.

2.3 Monitoring

Waste generators are required to create, provide and maintain records that track waste from the time it is generated to ultimate disposal. The purpose of obtaining, maintaining and preserving these documents is to ensure that waste is properly managed and regulatory requirements are met. The information and documentation are also useful in determining and avoiding potential liability issues with the transporter or disposal facility. Contrary to minimum regulatory requirements, permanently maintaining the required records and documentation is a prudent management practice. Registers are required to maintain an inventory of the waste to be disposed of and who had access to it, and who was responsible for handling it at each step.

Records will be maintained and indicate the types and quantities of hazardous waste being stored along with the date, type and quantity brought into or removed from the facility.

2.4 Training

Appropriate training will be provided to ensure that workers involved in waste handling, storage, and transport understand regulatory requirements and methods to minimize the hazards and risks associated with waste management.

This training may include:

- WHMIS[1] - GHS[2];
- Transportation of Dangerous Goods (TDG and IMDG);
- Handling, packaging, and storage of hazardous waste;
- Emergency response procedures;
- Instruction in the use of fire extinguishers;
- HAZWOPER[3].

Federal and territorial legislation requires employers to provide WHMIS training to employees who work with controlled products (i.e. hazardous products and waste).

The TDGR (Part 6 - Training) state that:

> "*A person who handles, offers for transport or transports dangerous goods must:*
>
> *a) be adequately trained and hold a training certificate in accordance with this Part; or*
>
> *b) perform those activities in the presence and under the direct supervision of a person who is adequately trained and who holds a training certificate in accordance with this Part.*"

Dangerous goods include hazardous waste. This training is required for workers responsible for the pre-transport packaging and labelling, road transport, and completion of regulatory documentation. TDG training must be updated every 3 years.

Operations and site-specific training may be developed and delivered to employees to ensure that hazardous waste is effectively and safely managed. Employees who have not received appropriate training will not work in unsupervised positions until they have completed the training requirements to do so.

1 Workplace Hazardous Material Information System
2 Globally Harmonized System
3 Hazardous Waste Operations and Emergency Response

3. SOIL TREATMENT

3.1 General

This facility was developed based on a rising need from clients with hydrocarbon impacted soils to manage, resulting mainly from heating oil spills (e.g., from storage tanks and furnaces). The impacted soils may now be transported to the EWPF for treatment.

This plan describes the operation of a treatment facility designed to serve Iqaluit primarily, with the potential of eventually serving other smaller communities in Nunavut. The treatment facilities are designed to provide an economical solution for the management of soils impacted by petroleum hydrocarbons.

QE's treatment process brings about a permanent solution to contamination issues. The contaminants are destroyed primarily through biological mineralization, but may also be treated by chemical oxidation. Physical treatment steps (e.g., screening and rock washing) are also used to prepare the soils for biotreatment.

The treatment facility uses biopiles and landfarming techniques for the elimination of contaminants, and to improve the overall quality of soils for reuse.

The soils to be treated arrive by truck. Upon arrival, the soils are directed to the processing area.

If a weight scale is available for the trucks, empty trucks will be weighed at the beginning and end of each workday (or at the beginning and end of the work) to determine an average empty weight. All trucks carrying soils/waste will be weighed before entering the Site to document the weight of the materials received and processed at the treatment facility for reporting to regulatory authorities and invoicing purposes. If a weight scale is unavailable, the volume of the truck box will be measured, and invoicing will be based on the percentage of the filled truck box.

The treatment facility was designed by QE's partner, Sanexen Environmental Services Inc. (Sanexen), based on their expertise. With more than 20 years' experience in the execution of biotreatment projects, as well as the combined experience of its shareholders and senior employees, Sanexen has performed on-site biotreatment projects for many clients over this period, and manages and operates a permanent biotreatment facility in Quebec (Sol+).

The target contaminants are mostly PHCs, including BTEX[1], MAHs[2] and PAHs[3].

The treatment facility is organized for optimal production, effectiveness, and simplicity. The selection of durable, long-life materials, involving greater capital costs, is a design choice that confers many operational advantages over the mid- and long-term. Such design choices translate to assets for effective operations.

1 Benzene, toluene, ethylbenzene and xylenes
2 Monocyclic aromatic hydrocarbons
3 Polycyclic aromatic hydrocarbons

The original scenario was based on a treatment capacity of 1,000 m.t.[1] per year, depending on the quality of the soils in treatment. The facility includes a treatment area and a processing area. The latter will also be used for pre-treatment (i.e. screening, rock washing, separation of metals and debris, etc.), if necessary.

The system is designed to be operational during the summer and early fall seasons.

3.2 System Components

Air (heated or no) is pushed into the biopiles using a piping network connected to a circulation system. Air may also be withdrawn from the biopiles. Air circulation is thereby established through the soils with blowers and the piping network. The piping network is composed of secondary aeration pipes (slotted or perforated) beneath the biopiles, and of main plain pipes that direct the air toward the secondary pipes.

If air is withdrawn from the biopiles, it is directed to an air/water separator. The collected water is transferred to a collection pond, which is used to collect water from the biopiles. A submersible pump in this collection pond directs the water to the WTU storage basin.

Below is a list of the system's main components:

- Containment Cells
  - Treatment Pad; and,
  - Processing Area;
- Water Collection Ponds;
- Aeration System;
  - Secondary Piping System;
  - Air/Water Separator (optional);
- Covering Liners (optional).

A description is presented in the following sections.

3.2.1 Containment Cells

The containment cells are lined and bermed areas designed to isolate the contaminated soils and/or water and prevent contaminants from leaching into the environment. They are constructed with a watertight minimum 40 mil thick HDPE liner or similar, covered and underlain by a protective geotextile liner and further protected by a 0.3 m thick layer of fine gravel.

3.2.1.1 Treatment Pad

On the treatment pad, the typical height for a biopile is 2 to 3 m. Piling soils higher than 3 m will cause the soils to become compacted and less permeable to air and moisture, requiring more frequent turning/tilling.

1 Metric tonne

The perimeter of the treatment pad is surrounded by a berm, which is 6 inches higher than the interior grade to prevent soil or water loss. The base of the treatment pad is built with a slight slope toward a leachate/water collection pond. The water can then be reused for moisturizing the piles or redirected to the WTU for treatment.

3.2.1.2 Processing Area

The processing area is used for the temporary storage and screening (mechanical treatment) of soils as well as rock washing. This processing area, which measures roughly 4,500 m², may also be used for containerization of untreatable soils before being packaged for off-site shipment and disposal at authorized facilities.

The processing area is also watertight and constructed of a minimum 40 mil thick HDPE liner, or similar, covered and underlain by a protective geotextile liner, and further protected by a 0.3 m thick layer of clean gravel.

The outer edge will be composed of an elevated berm (4' above the exterior grade) around the perimeter to prevent soil or water loss. There is a slight slope to allow leachate and run-off water to flow by gravity toward the water collection pond.

3.2.2 Water Collection Ponds

Water collection ponds are installed at the low points of both containment cells, namely the treatment pad and processing area. The ponds are equipped with a submersible pump to direct water back onto the soil piles, or direct excess water to the WTU. The water collection ponds are part of the containment cells, as such they are watertight and constructed of the same minimum 40 mil thick HDPE liner, or similar, covered and underlain by a protective geotextile liner. The water collection ponds have the extra capacity necessary to store water during major precipitation events. The leachate from the contaminated soil piles and water from the air/water separators are discharged into those ponds.

The biopiles normally operate with a deficit of water because of the moisture entrainment by the air that is circulated through the soils. However, sufficient buffer capacity is needed for water because:

- Soils received may occasionally be wet;
- Soils are exposed to rain when the covers are removed; and,
- A sufficient volume of water is required to condition the soils.

It should be noted that the mixing of soils with amendments and the additive solution is normally delayed in the event of rain. In the event of excess water in the pond, water is sprayed on the drier soils during the following days. Excess water may also be directed to the WTU.

3.2.3 Aeration System

The treatment of soils in biopiles requires an air circulation system that is sufficiently powerful to force the air through the semipermeable liner, the soils and piping. Calibration of the flowrate provided by the blower is necessary to obtain the desired treatment performance; valves will help to adjust this flowrate according to the needs.

3.2.3.1 Secondary Air Piping

Secondary air pipes are positioned at the base of the biopiles. The 2" diameter perforated pipes have a predetermined profile and are made of PVC[1] approved for temperatures up to 60°C. The sections are joined with synthetic rubber couplings. These couplings allow the desired flexibility and resilience for the assembly, particularly for contraction and expansion due to temperature fluctuations. The perforation profile is designed to equalize the air flowrates across the width of the biopile.

The secondary pipes are covered with ¾" to 2" stone that allows for better air distribution.

3.2.3.2 Air/Water Separator (Optional)

Some water will drain from the soils undergoing treatment and be collected with the air withdrawn from the biopiles. More water is collected at the beginning of the treatment. A cylindrical steel catchment basin (a sewer-type steel cylindrical manhole) is adapted to complete this task. Water is collected by gravity at the bottom, whereas air is drawn from an outlet at the top. A submersible pump, activated by a float with a check valve at the discharge, periodically transfers the water to the collection pond, where the water will be reused to condition the soils or redirected to the WTU. The air/water separator is positioned in the collection pond to allow gravity flow, and to prevent freezing during cold weather operations.

3.2.4 Covering Liners (Optional)

Semipermeable liners are used to cover soils undergoing treatment. One reason for using a cover is to ensure the confinement of contaminants that could be carried away by the wind. The liner also acts as a vapour barrier for volatile contaminants. The pressure gradient across the liner, with the air moving downward through the interstices, prevents the loss of volatiles. Another important reason is to allow even and appropriate diffusion, to the top of the biopiles, of air, to properly oxygenate the soils, and water, to maintain the desired moisture content in the soils.

The liners are woven to allow air to penetrate and, as needed, a limited quantity of water into the biopiles.

The black colour helps to absorb heat from sunlight and maintain ideal soil temperatures. The liners are also instrumental in preventing the soils from becoming too wet, which may slow or completely halt the treatment process.

1 Polyvinyl chloride

3.3 Description of Treatment Operations

The soil treatment facility operation requires the coordination of several aspects to optimize efficiency and throughput. Soils received by road would have a transport manifest (or hauling sheet) completed in compliance with the regulatory and commercial requirements for the facility. An authorization number must be issued by the site manager or their delegate before transport, and before receipt of the soils at the centre. This number allows for the tracking of the origin, anticipated quantities, type(s) of contamination and other relevant information concerning the soils. The shipper should notify the treatment centre a minimum of 24 hours before site work. This delay is important to avoid the double handling of soils upon arrival. Without authorization, the load of soils cannot be accepted and must be held over until it is accepted or returned. The person responsible for issuing the authorization should make the necessary arrangements with the shipment supervisor to adequately plan the receipt and acceptance of future soil shipments.

Once the truck has entered the treatment facility and the vehicle has been assessed, the truck driver remits the manifest to the foreman, or his designated alternate, so that the soils can be directed to the proper location according to nature and contaminants. The truck unloads the soils; alternately a loader transfers the load of soils. If insufficient information is known about the soils, the load is placed in the processing area. The processing area may also be used if the treatment pad is full. In all instances, the soils are inspected upon discharge to confirm the nature of the soils, verify the extent of the contamination, the presence of mixed waste and/or debris, and any anomalies. Representative soil samples are collected and analyzed.

If enough information is known about the soils, they are immediately conditioned with the appropriate amendments and nutrient solution. The site supervisor will log the location where the soils are unloaded and create space allotments for soils of a similar nature to monitor large batches.

During piling, composite samples are collected for each batch[1] of soils received. This composite sample is analyzed for internal purposes to obtain an average initial concentration for the soils undergoing treatment. A duplicate is refrigerated and stored, and may be further analyzed for quality control purposes.

The conditioned soils are covered with a semi-permeable cover and, if there is a sufficient quantity of soils (more than ≈ 500 m^3), the blower is started to establish the desired air circulation through the soils.

After a treatment period determined by the contaminant concentrations and other soil characteristics, the batches are again turned or tilled, sampled and analyzed. Depending on the results, the soils will either be sampled according to the official protocol for declassification that denotes the end of treatment, or subjected to further treatment.

The system has been designed to operate 24 hours per day, 7 days per week during the warmer season.

3.3.1 Physical Treatment

Soils are screened to reduce the volume to be treated, and allow for optimal biological activity.

1 A batch normally represents a volume of soils of the same origin and nature; a batch can be 10 truckloads, for example.

3.3.2 Biological Treatment

Treatment begins when the soils are conditioned, and forced aeration is initiated in the biopile. Excess water is withdrawn from the soils during the first days of biotreatment. The collection pond should not be completely emptied, as water may be needed during dry periods. However, water levels are monitored because if they are too high, there is a risk of overflow. It is possible to schedule the soil conditioning events to receive as much water as possible from the biopiles, taking into consideration weather forecasts and the water inventory.

The soil temperature should increase significantly during the first week after conditioning. Amendments are used to increase microbial activity, associated with the growth and internal metabolism of the bacteria, so they use as many organic contaminants as possible as a source of carbon and food.

The following conditions must be met to obtain optimal treatment:

- A constant supply of oxygen;
- Optimal moisture content;
- Ideal temperature;
- A sufficient initial population of microorganisms; and
- A sufficient amount of nutrients (nitrate and phosphate).

The bacteria will consume the oxygen, nutrients (nitrate will also be used as an alternate oxidizer in parts of the soils that may not be sufficiently aerated) and hydrocarbons or other contaminants to be biodegraded. The biological reaction will, in turn, generate additional biomass, heat and CO_2[1].

The presence of CO_2 is a positive sign of biological activity. A 4-gas detector is used to read O_2[2] and CO_2 concentrations at each of the valve connections in a secondary conduit.

Soil treatment by chemical oxidation consists of adding and mixing an oxidizing agent (i.e. sodium persulfate) into the contaminated soil pile. The soil pile is then covered and left for a few weeks to treat passively. No air circulation is required for this process.

3.4 Treatment Procedure

The installation of the various structures and equipment is fairly straightforward. The treatment pad and processing area, as well as the water collection ponds, are first constructed with proper slopes and peripheral berms. The air/water separator is positioned partially below the biopiles, with the inlet positioned to respect the slope and orientation of the treatment pad's main air pipe.

The blower container is positioned and connected by 8" diameter PVC piping to process the air. It is important to install drains at low points to prevent water accumulation and problems due to freezing. The piping is connected by screwing the threaded extremities, or the use of a coupling or flange with a gasket.

1 Carbon dioxide
2 Oxygen

The pumps and associated piping and valves are installed to direct the water to the collection pond and to circulate/pump out the water from the pond. Drains are installed at the low points of the circuit, and vents at the high points, again to empty the lines and prevent freezing. A small air compressor may also be used to displace water from the lines, when necessary, with an air connection just downstream of the check valves.

The isolation valves, drain and vent valves, pressure and temperature gauges, as well as tracing and insulation, are installed where required.

Before system start-up, each of the components is individually verified, for each mode. A training period is also necessary for personnel to become familiar with site-specific health and safety rules, as well as the system and the operating procedures, including spill response and other emergency response procedures. A HAZOP[1] study may also be conducted as part of the preparation (e.g., understanding what happens under conditions of low-flow/high-flow/no-flow at various locations under various conditions and what problems/hazards may follow. The same can be performed for pressures, levels, concentrations, etc.).

3.4.1 Reception of Soils

Regardless of the origin and the mode of transport (truck, loader, etc.) of incoming soils, the transporter should have a manifest approved by the treatment facility. The manifest specifies the authorization number for the soils, the origin of the soils, the types of contaminants, the expected levels of contamination (according to the classification corresponding to the invoicing unit rates), the approximate volume, the nature of the soils and waste/debris that may be present, the sample numbers corresponding to laboratory analyses, and the transporter's (and/or consultant's, if applicable) identification.

The project manager or client notifies the treatment facility supervisor 24 hours in advance of the shipment(s) to be received. Proper planning minimizes double handling and standby expenditures.

The employee at the gate records the volume of the loaded trucks upon entry and signs the manifests. Once notified, the supervisor confirms the area to which the truck driver should proceed, according to the nature of the soils. The supervisor meets the truck driver, checks and confirms the information, documents on the manifest where the soils were unloaded and signs once unloading is complete.

The supervisor defines batches according to the origin and nature of the soils and the contaminants and level of contamination. For example, sand contaminated by VOCs will be segregated in a different batch from clay with heavy hydrocarbons, even if the soils originate from the same site.

At the end of the day personnel will compile all manifests, verify the conformity of the information in the reception log, and complete/update the log used to follow soil batches.

3.4.2 Screening

Soils are screened upon reception of the soils to reduce the volume to be treated, and to facilitate biological growth within the pile.

1. Hazard and operability

3.4.3 Pile Preparation

Piling consists of placing soils on the treatment pad, regardless of the origin of the soils. The soils are placed on a section of the pad, using the excavator, one load at a time. This step is crucial for treatment and should be performed with care. The success of the treatment is largely due to the quality of piling. Taking the time to adequately place/position the contaminated soils in a pile decreases the possible requirement to repeatedly remix the soils.

Piling is performed by section, between 2 secondary conduits. The excavator starts in one corner, on the side of the first section at the back of the treatment pad (where the 6" berm is located). The excavator fills the section to the front of the treatment pad and continues to place another row of soils by starting at the back.

The steps to properly set up a pile are the following:

- Prepare nutrients (powder or solution) in advance and the pump and hose system to spray the liquid suspension on the soils;
- Place the organic amendment within reach of the excavator on a section of the pad to facilitate mixing the amendment with the soils;
- Take a composite sample of the soils before conditioning;
- Add the nutrients. If the soils are too wet for spraying, place the solid fertilizer alongside the organic amendment for mixing into the soils; the fertilizer may be mixed beforehand with part of the organic amendment;
- Remove any large debris (metal, concrete, wood, etc.);
- Using the excavator, pick up the contaminated soils, with amendment laid on its surface, and place it in the designated area or section;
- Drop the contaminated soils from a height of approximately 3 m to break up lumps and distribute/mix additives (amendments, nutrients);
- Pile soils to a maximum height of 3 m and flatten the top of the pile (3.2 m high, as 0.2 m serves to fill depressions);
- Open the 2" valves on the secondary conduits when each 450 m^3 pile of contaminated soils has been placed in position in a section;
- Repeat these operations until all soils have been placed, or until all spaces on the treatment pads are occupied.

Once the soils are in place, heavy machinery must not roll over the soils to maintain good bulking and to prevent soil compaction (thus reducing air circulation and oxygen transfer).

3.4.4 Soil Mixing

There are several methods of soil mixing, but the following basic rules include:

- Mix each m^3 of the pile, but do not mix the same m^3 twice (unless it is very clayey and contaminated, in which case double handling is warranted);

- The excavator should not sit on mixed conditioned soils; if this occurs, the compacted soils should be bulked/mixed to a depth of 1 m;
- Remove significant sized debris or boulders;
- Do not mix soils from separate soil batches;
- Do not mix soils from different sections;
- Do not mix clean soils into the contaminated soils to dilute the contaminants.

The most appropriate method for mixing and bulking the soils is for the excavator to back away from the mixed soils and onto soils that have yet to be mixed.

3.4.5 Sampling

After the anticipated treatment period, a batch of soils is subjected to sampling for internal monitoring. The covering liner(s) are removed. Each section is sampled by collecting 5 subsamples at varying locations and depths to create a composite sample. The composite sample is homogenized in a metal pan. For volatiles, samples are collected directly from the piles to avoid loss of volatiles during handling. Coarse materials should be removed as per the regulatory agency's sampling requirements. A minimum of 10% duplicate samples are collected during final sampling. Washing/cleaning of the sampling tools is performed as per the regulatory agency's requirements. Surgical-type nitrile gloves are used and, if they have touched the soils, are changed before proceeding to the next sample.

Organoleptic indications are documented (noting the appearance and odour of the soils in terms of contamination) and a portable instrument, such as a UV[1] photo-ionization detector, or PID, is used to check for the presence of contaminants. The samples are brought to a table where an experienced technician (ideally the same technician for any given sampling campaign), within the hour, documents the observations and the PID readings.

This interim internal sampling and testing help determine which sections must be mixed and conditioned again, and which sections can be subjected to the final certified sampling.

When results indicate that all sections should be remixed/reconditioned, it is carried out as soon as possible.

When the final results indicate that the soils have met the characterization criteria, the liners are again withdrawn to remove the treated soils.

Typically, 8 representative composite sample per 450 m^3 of treated soils, composed of 5 subsamples, are collected for testing at a certified laboratory to quantify the concentrations of the target contaminants, with 10% duplicates for quality control, for acceptance of a batch of soils.

Daily or weekly sampling and testing may be performed on soils using on-site detectors, testing kits and other analytical instruments.

1 Ultraviolet

3.4.6 Assessment of the Results

A proper assessment of the results is the key to making good treatment decisions. Biological indicators (CO_2, T°[1], bacterial count, pH[2], nutrients, and moisture) should be monitored to ensure operating conditions are optimal. Interim measurements of contaminant concentrations will help to plan if and where an additional treatment effort, such as the remixing of some soils with or without amendments, is warranted and plan final sampling for acceptance and removal of treated soils.

For monitoring and treatment management, 2 important tools are the *Treatment Schedule* and the *Batch Description* forms.

The *Treatment Schedule* shows a top view of the treatment pads. Each rectangle in a treatment pad represents a section between 2 aeration conduits. In each section, the batch number, level of contamination and the colour denoting the current step in the treatment process are indicated (*undergoing treatment*, *to be sampled*, *to be conditioned*, *accepted* and *to be removed*).

Each rectangle is linked to the *Batch Description* form. This form is used to show previous and current information for a given batch. Analytical results (contaminant concentrations, moisture, pH, nutrients in leachate) are given, as well as pertinent data (amendments used, nutrients and biomass added, organoleptic indications, T° and CO_2). This information facilitates decision-making for the treatment strategy.

3.4.7 Soil Reuse or Disposal

When the soils meet the treatment objectives, analytical results are provided to the GN DoE for approval. Following written approval from the GN DoE, the treated soils are directed to their reuse site (site of origin or other) or disposal (as daily cover for sanitary landfill sites, for example). While the soils are loaded on trucks, a visual inspection of the soils is nevertheless performed. Undesirable materials, debris or lumps of soils with leftover contamination may be segregated at that point. Debris may be disposed of separately, whereas soils that may require further treatment are returned to the biopile.

Waste materials separated from the soils (segregated through screening or otherwise, when it is possible or practicable to do so) should be characterized according to the applicable regulations and should be handled and disposed of accordingly.

Hazardous and non-hazardous waste that cannot be cost-effectively dealt with through biodegradation is transported off-site for disposal at an authorized facility.

When it is time to remove soils that have met the desired criteria, the supervisor issues a manifest to the transporter and completes a disposal log for each outgoing shipment.

1 Temperature
2 Measure of acidity or alkalinity

The manifest is the form that documents the return of the soils to the site of origin or the designated reuse site. Alternatively, it is the form used by the disposal site (for example, the sanitary landfill site that uses treated soils for daily cover over domestic waste). The batch number and sample identification (indicating soil acceptability) are provided on the form. Data is entered in the disposal log upon each shipment. The compilation of the data at the end of each workday allows for close monitoring of a given batch and invoicing. The *Treatment Schedule* and *Batch Description* are updated daily, establishing a good line of communication between the treatment facility and the office. Monitoring of a given batch ends when all corresponding soils have been treated, accepted and transported to the reuse or disposal site.

3.5 Maintenance and Calibration

The system components require very little maintenance. The instruments and control devices, such as the gauges (pressure, T°, level), the gas detector, PID and anemometer should be checked and/or calibrated every year (by the supplier or by a competent technician), or according to the supplier's recommendations. Spare equipment should be available (in stock or leased) to compare readings and verify the precision of measurements.

3.5.1 Equipment Maintenance

All equipment must be inspected regularly to confirm it is in good operating condition to maintain the efficiency and safety of the biopile treatment system.

The specifications, drawings and manuals for the various equipment, pumps, blowers, instruments and controls, valves, filters and so on, should be kept at the facility and the office. Relationships must be established with critical suppliers (blowers) and subcontractors (electrician, for example) to allow for rapid troubleshooting, repairs and replacement.

3.5.2 Instrument Calibration

Pressure gauges, for example, are checked against a similar instrument (the standard) whose precision and accuracy have been verified and certified by the supplier. For example, if a reading between 38 and 42 psig[1] is obtained when the standard instrument indicates 40 psig, the pressure gauge is accepted for a tolerance of ± 2 psi[2]. The zero is also verified (with the gauge disconnected). The readings obtained are recorded in the calibration log with the date and the initials or signature of the technician. An instrument is normally verified against a value that corresponds to a normal operating condition.

1 Pounds per square in gauge
2 Pounds per square inch

4. WATER TREATMENT

4.1 General

The facility was also developed to be able to treat contaminated water and/or snow and ice resulting from spills from petroleum storage tanks, soil excavation, and through leachate from the soil treatment pads. This water is accumulated in the 490 m^3 raw water collection pond.

The raw water is then pumped to a pretreatment unit. The unit consists of a dosing system for pH adjustment, coagulant, and flocculant. The pH adjustment and coagulant are injected into the line before a static mixer to promote faster mixing conditions. After the mixing stage, the flocculant is added to the line to coagulate and flocculate the suspended particles. The water is then routed to the settling unit, which is composed of 3 different tanks to improve treatment efficiency. The first tank is an open top 30 m^3 roll-off container used to retain the majority of the sludge. Then, the water passes through a second polishing tank (17 m^3) and a third buffer tank (15 m^3) before being transferred to the filtration system.

The filtration system contains a multi-step filtration system to treat the impacted water. Water is initially passed through a bag filter to remove the sediments. Following the initial filtration, water is then circulated through Sanexen's patented ULTRASORPTION™ and activated carbon filters to remove organic chemicals. Technical details regarding the water treatment system are presented in Figures 2 and 3 of Appendix A. The treated water is then stored in a clean 122 m^3 capacity tank for sampling and analysis by a Canadian Association for Laboratory Accreditation Inc. (CALA) certified laboratory to ensure it complies with the Nunavut Water Board (NWB) criteria prior to discharge.

The system will treat oily waste, hydrocarbon-impacted water, hydrocarbon-impacted snow and ice, as well as metals. The unit can treat up to a maximum of 43.2 m^3 of water per day. The total storage capacity of impacted water before treatment, as well as for treated water awaiting analysis and discharge, is 674 m^3. The pretreatment and settling unit will be installed on a lined and bermed area to provide a secondary containment in the event of a spill. The filtration unit and treated water storage tank both have built-in secondary containment systems.

4.2 System Components

No fuel or other hazardous liquids are used during the operation of the PHC-impacted water treatment system. Hydrocarbons may be recovered from the buffer tank as they are separated from the water exiting through the bottom of the tank. Absorbents will be used in this case. The volume of waste oil to be managed from the treated system varies and is difficult to predict as it is depends on the degree of impacted snow/water.

The facility is located in an industrial area of Iqaluit and holds a permit issued by the Government of Nunavut to operate as an authorized hazardous waste transfer station. As such, QE already has spill response materials, additional containers, including tote tanks and overpack drums, in stock and can thus easily manage any waste oil generated by the treatment system.

4.3 Secondary Spill Containment Systems

4.3.1 Water Storage Tanks

A secondary spill containment system will be constructed around the water storage tanks and the WTU to capture hazardous liquids in the event of a spill. As shown in Figure 1 of Appendix A, a containment berm will be constructed around the ASTs[1]. The treated water storage tank and filtration system both have built-in secondary spill containment systems.

4.3.2 Recovered Petroleum Hydrocarbons, Liquid Sludges and Waste Filter Media

Petroleum hydrocarbons and free product recovered during water treatment operations will be containerized in closed 205 L drums for off-site shipment and disposal. Waste filter media is packaged in waste wranglers for off-site shipment and disposal.

Before being loaded on the sealift, waste liquids and filter media will be stored on-site in a secondary containment structure, as shown in Figure 1 of Appendix A.

4.4 Treated Water Discharge Location

Treated water is discharged at a location on the EWPF property, as shown in Figure 1 of Appendix A. Should transport eventually be required, based on a change in the discharge location, the water will be pumped into a tank located on a roll-off platform. The water will then be transported using a roll-off truck to the discharge location. The truck will be equipped with a spill kit, and the operator will be trained in spill response procedures.

4.5 Treated Effluent Quality Monitoring

Based on the conditions of the NWB Water Licence (No. 1BR-THI1722), a monitoring station with ID THI-1 (Water) was established to monitor the effluent from the WTU to be discharged at the Final Discharge Point.

One sample is collected at Monitoring Station THI-1 per batch of treated effluent from the tank. The storage tank can retain the treated water for the duration of the sample analyses (1 week) and until receipt of the discharge authorization. Before each discharge event, the sample analytical results must be forwarded to the Water Resources Officer from Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC). There is a maximum 10-day wait to receive authorization. The sample is to be analyzed for the parameters included in the following table.

1 Aboveground storage tank

Analytical Parameters

pH[1]	Total Zinc	Total Nickel
Total Suspended Solids	Conductivity	Total Phosphorous
Nitrate – Nitrite	Ammonia Nitrogen	Total Aluminum
Total Phenols	Oil and Grease (visual)	Total Cobalt
Total Hardness	Sulphate	Total Manganese
Sodium	Total Alkalinity	Total Arsenic
Magnesium	Potassium	PAH[2]
Chloride	Calcium	BTEX[3]
Total Copper	Total Cadmium	TPH[4]
Total Iron	Total Chromium	
Total Mercury	Total Lead	

TABLE 3

1 Measure of acidity or alkalinity
2 Polycyclic aromatic hydrocarbons
3 Total petroleum hydrocarbons
4 Benzene, toluene, ethylbenzene, xylenes

The Final discharge point is located more than 31 m from the highest water mark of the closest waterbody, which is the drainage ditch surrounding the EWPF. Measures were taken to minimize erosion from effluent discharge, such as the placement of large clean rocks to act as a French drain and trickle the water toward the low end of the site. A photograph of this erosion control measure is presented in Appendix B.

Among the parameters to be monitored, the maximum allowable concentrations for any grab sample are to be met for the discharge are presented in Table 4.

TABLE 4

Maximum Allowable Concentrations

Parameter	**Maximum Allowable Concentration of any Grab Sample**
pH	6.0 to 9.0 (pH units)
Total Suspended Solids	50 mg/L
Oil and Grease	15 mg/L and no visible sheen
Benzene	0.370 mg/L
Toluene	0.002 mg/L
Ethylbenzene	0.090 mg/L
Total Lead	0.050 mg/L
Total Arsenic	0.050 mg/L
Total Cadmium	0.010 mg/L
Total Copper	0.025 mg/L

Parameter	Maximum Allowable Concentration of any Grab Sample
Total Mercury	0.0006 mg/L
Total Silver	0.005 mg/L
Total Zinc	0.20 mg/L

4.6 Soil Quality Monitoring

In addition to effluent quality monitoring, yearly confirmatory soil sampling will be carried out at the final discharge point to ensure the water treatment activities are not impacting the surrounding environment.

4.7 Operation of the Water Treatment Unit

The water treatment unit is operated as follows:

1 Water is collected in the 490 m³ holding pond to allow continuous flow in the pretreatment unit;

2 The raw water is pumped to the pretreatment unit at a flowrate of 30 LPM[1] to inject the lime, alum, and polymer;

3 The water is routed to the settling unit to remove the suspended particles. The settling time for the 3 tanks is 34.4 hours to prevent the filtration unit of clogging;

4 An air compressor is started, and the water is pumped into the filtration system;

5 The water is pumped through the different filters to remove the contamination and accumulate in the treated water storage tank. The treated water storage tank has a capacity of 122 m³ and a retention time of 67.8 hours to allow for the analytical results to be obtained;

6 At no time should the pressure in the system rise above 10 psi;

7 The system must be monitored at all times during operation until the automated shut-off system is connected and fully tested to ensure it is operating properly;

8 Treated water is then sampled and sent to a CALA accredited laboratory for analysis. If results meet discharge criteria, then they are submitted to CIRNAC and permission is requested for discharge. Once permission is obtained, the water is discharged to the authorized discharge location;

9 Should water not meet the discharge criteria, it is treated until the discharge criteria are met.

4.8 Water Monitoring

To ensure the EWPF activities do not have a negative impact on the surface waters near the EWPF area, a water monitoring program will be conducted:

- Groundwater monitoring wells are installed around the site, one upgradient and 3 downgradient of the operations. Water samples are collected once per year, at the end of August, and analyzed at a certified laboratory;

1 Litres per minute

- Coordinates of the monitoring wells are as follows (see Figure 1 of Operations and Maintenance Manual) for a plan showing monitoring well locations):
  - monitoring well 1 (THI-4): 63°44’38” N, 68°33’00” W,
  - monitoring well 2 (THI-5): 63°44’35” N, 68°32’58” W,
  - monitoring well 3 (THI-6): 63°44’37” N, 68°32’55” W,
  - monitoring well 4 (THI-7): 63°44’39” N, 68°32’53” W;

- Surface water from the ditches will be sampled at 2 locations annually, at the end of August. One surface water sample upgradient of the EWPF and one sample downgradient will be collected and analyzed at a certified laboratory;
  - Coordinates of the water quality sampling locations are as follows:
    - upgradient of the EWPF (THI-2): 63°44’38.82”N, 68°33’2.45”W,
    - downgradient of the EWPF (THI-3): 63°44’39.27”N, 68°32’52.00”W;
- The water samples collected as part of the water monitoring program will be analyzed for the parameters included in the licence.

5. EMERGENCY RESPONSE AND SPILL REPORTING

Risks associated with the handling of hazardous waste include accidental release (i.e. spills and leaks) and fire (or explosion) and are referred to as events. A spill contingency plan will be filed with the GN DoE, as required by the *Spill Contingency Planning and Reporting Regulations*[1].

The spill contingency plan specific to the EWPF facilities and operations is designed to establish methods to prevent/mitigate hazardous waste events and to safely and effectively respond to such events. For example, keeping a minimal quantity of hazardous waste in storage for a shorter length of time will reduce the likelihood and magnitude of events.

The maximum volume of liquid in a single container will be 1,000 L (tote tank) for non-regulated waste (used oil and antifreeze) and 205 L for regulated waste (flammable liquids). A spill of such volumes of liquid would be relatively easy to manage. Releases of solid hazardous waste are not usually problematic and are easily recovered.

Hazardous waste spills will be managed internally by trained EWPF personnel. In the event of fire or explosion involving hazardous waste, the fire department will be immediately called to intervene. Emergency telephone numbers are listed in Table 5, below.

TABLE 5 Emergency Telephone Numbers

Department	Contact	E-mail	Telephone
GN DOE	Tim Cater	TCater@gov.nu.ca	867 975-7726
Fire Department (General) Fire Department (Emergency)	-	-	867 979-5655 867 979-4422
RCMP - Iqaluit	-	-	867 979-0123
Ambulance	-	-	867 979-4422

These emergency telephone numbers are posted in prominent locations at the EWPF.

The EWPF is equipped with:

- Telephones and mobile telephones capable of summoning emergency assistance;
- Portable fire extinguishers; and,
- Spill control equipment (i.e. spill kit).

This equipment will be kept at fixed locations to ensure availability in case of an emergency. All personnel are informed of the exact locations and the appropriate use of this emergency equipment.

1 Spill Contingency Planning and Reporting Regulations (NWT Reg. (Nu) 068-93)

The Regulation states that:

> "The owner or person in charge of management or control of contaminants at the time a spill occurs shall immediately report the spill where the spill is of an amount equal to or greater than the amount set out in Schedule B."

In the event of a hazardous waste spill, the site supervisor will immediately report the event to the NWT/Nunavut Spill Report Line at 867 920-8130.

APPENDIX A

Figures

THI-2 (Monitoring Station 2, Surface water upgradient)

Monitoring Station 4, Monitoring well upgradient

THI-4

Cold storage & HW, supplies & equipment storage and consolidated solid waste storage area (mostly with Sakoonie)

Offices (3.25 x 15.8)

Heated Storage

Heated Storage

Parking lot

TBM On Utility Pole Elev.: 10.68 metres

Culvert (ø 600 mm)

HDPE lined & bermed area

Access ramp

Soil treatment area, Pile B

Soil treatment area, water collection pond

Soil treatment area, Pile A

Soil treatment area, topsoil stockpile

WTU, THI-1 treated water holding tank

WTU, Filtration system

Treated water discharge location

WTU, Pre-treatment

WTU, Decantation tank

WTU, Polishing tank

WTU, Tampon tank

Consolidated waste storage area

Access ramp

HCS, Multi-purpose HDPE lined & bermed area water collection pond

WTU, HCW storage holding basin

WTU, HCW steel holding tanks

HW, Unconsolidated liquid waste storage area

HCS, Multi-purpose HDPE lined & bermed area water collection pond

Slope 1 %

HCS, Processing area

Slope 0.5 %

Access ramp

Snow Piling Area

THI-5

Monitoring Station 5, Monitoring well downgradient of treatment area

HDPE lined & bermed area

THI-6

Monitoring Station 6, Monitoring well downgradient of multi-purposed containment cell

Monitoring Station 7, Monitoring well downgradient of multi-purposed containment cell

THI-7

Culvert (ø 600 mm)

THI-3

THI-3 (Monitoring Station 3, Surface water downgradient)

Iqaluit Lane

Area rented to neighbour

Security Fence

LOT 861
PLAN 2102 LTO

Legend

- Monitoring well (QE, 2018) (approximate location)
- Water quality monitoring point (approximate location)
- Fence (metal mesh, 1,8 m of height, 3 rows of barbwires)
- Ditch
- Overhead electrical line
- Utility pole and guy wire
- Boundary of lease (approximate location)
- HDPE lined and bermed area
- Cross-section location

Source:
- *QE; land survey data; October 2017;*
- *SubArctic Surveys Ltd.; File no. 15-306-QE-JL14-TOPO; July 16, 2015;*
- *Iqaluit - Survey Sketch 001-2015.dwg; 2015.*

0 3 6 9 12 15m

CONFIDENTIAL

Seal:

Sequence:	Description:	
B	*FOR PERMIT*	
Prepared by:		Date:
J.-S. B. Dicaire, *jr Eng* J.-F. Larose, *P. Eng*	No OIQ : 111779	2019-09-24
Approved by:		Date:
O. Simard		2019-09-24
Sequence:	Description:	
A	*FOR PERMIT*	
Prepared by:		Date:
J.-S. B. Dicaire, *jr Eng* J.-F. Larose, *P. Eng*	No OIQ : 111779	2019-06-27
Approved by:		Date:
O. Simard		2019-06-27

Figure 1

Environmental Waste Processing Facility

NIRB AND NWB LICENCE APPLICATIONS

Presented to:

Property located at:

Lease parcels O and Q.
Airport lands in Iqaluit, NU

Drawn by:	Prepared by:	Approved by:
H. Longval	J.-S. B. Dicaire, *jr Eng* / J.-F. Larose, *P. Eng.*	J. Godin
Date:	Revision:	Project no.:	Contract no.:
2019-09-24	1	QE19-100-8-04	

Qikiqtaaluk environmental

QE19-100-8-04.dwg

Figure 1

APPENDIX B

Photograph

IQALUIT OFFICE

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Iqaluit, Nunavut X0A 0H0

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