OPERATION AND MANAGEMENT PLAN

CONTAMINATED WATER TREATMENT UNIT

Privileged and confidential document presented to

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

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NUNAVUT WATER BOARD

AND

NUNAVUT IMPACT REVIEW BOARD

Prepared and verified by:

Olivier Simard, B.Sc.
Project Manager

Approved by:

Greg Johnson, P.Eng., M.Sc.A.
Project Director

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS

AST:	Aboveground storage tank
CALA:	Canadian Association for Laboratory Accreditation Inc.
INAC:	Indigenous and Northern Affairs Canada
NWB:	Nunavut Water Board
PHC:	Petroleum hydrocarbons
WTU:	Water treatment unit

1. OPERATION AND MANAGEMENT PLAN

1.1 General

The facility was developed based on a need arising from clients with impacted water and/or snow and ice resulting from spills from storage tanks or water from tank washing. The impacted water is transported to the facility for treatment.

The facility contains a multi-step filtration system to treat the impacted water. Water is initially passed through an oil/water separator and particulate filter to remove free product and suspended solids. Following the initial filtration, water is then circulated through Sanexen's patented ULTRASORPTION™ filters and activated carbon filters to remove organic chemicals. Inorganic contamination may be removed through precipitation or filtration through various media (e.g., ion-exchange resin). The treated water is then stored in clean tanks for sampling and analysis in a CALA certified laboratory to ensure it respects the NWB criteria prior to discharge.

The system will treat hydrocarbon impacted water (including water originating from impacted snow and ice) as well as water impacted by various inorganic (i.e., metals, pH, etc.) and organic (i.e., solvents, glycol, etc.) contaminants. The facility can treat up to a maximum of 15 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 30 m^3. Berms will be constructed around the tanks storing the contaminated and treated water.

1.1.1 Location

The facility is located on a property in the western part of Iqaluit, in an area referred to as the West 40. The approximate coordinates of the centre of the property are:

Latitude: 63°44'38.22″ N
Longitude: 68°32'58.59″ W

1.2 Hazardous Liquids Found On-Site and Storage Capacity

No fuel or other hazardous liquids are used during the operation of the water treatment system. Hydrocarbons may be recovered from the oil/water separator, and such waste oil will either be used in a waste oil furnace, or containerized for off-site disposal. The volume of waste oil to be managed from the treatment system varies and is difficult to predict, as it is dependent on the degree of impacted snow/water.

The facility is located in an industrial area of Iqaluit and has a permit from the Government of Nunavut to operate as an authorized hazardous waste transfer station. As such,

Qikiqtaaluk Environmental Inc. (QE) already has spill response materials, additional containers, including tote tanks and overpack drums, in stock and can therefore easily manage any waste oil generated by the treatment system.

All fuel storage containers will be situated in a manner that allows easy access and removal of containers in the event of leaks or spills. Fuel caches in excess of 20 drums will be inspected daily.

For fuel transfer operations with drums of waste oil, 12-volt fuel pumps, gear pumps, diaphragm pumps and hand pumps shall be used.

1.3 Secondary Containment Systems

1.3.1 Water Storage Tanks (Impacted and Treated Water)

A secondary containment system will be constructed around both the treated and impacted water storage tanks to prevent any potential spills of contaminated water. A containment berm will be constructed around the ASTs to serve as a secondary means of containment in the event of a spill.

1.3.2 Recovered Petroleum Hydrocarbons, Liquid Sludge and Waste Filter Media

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

Prior to loading on the sealift, waste liquids and filter media will be stored on-site.

1.4 PHC Impacted Soils

During remediation work following a spill, impacted soils are often excavated from affected snow/ice/water source areas. Impacted soils will either be containerized and shipped for off-site disposal at authorized facilities, or treated in the newly-constructed QE soil treatment facility.

1.5 Transport and Disposal of Contaminated Materials

Contaminated materials from treatment operations (filter media, sludge, petroleum hydrocarbons, etc.) are packaged in accordance with applicable regulations and transported by truck to the barging area for shipment and off-site disposal. The truck will be equipped with a spill kit and fire extinguisher and the operator trained in spill response.

To minimize storage time at the beach, materials will be transported to the beach barging area a maximum of one week prior to the arrival of the sealift. Whenever possible, the

fenced Coast Guard Compound will be used to temporarily store the waste prior to loading the ship.

1.6 Transport of Treated Water to Discharge Location

It is not necessary to transport treated water, as water will be discharged at an approved location on the facility property. Should transport eventually be required, based on a change in 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 trained in spill response.

1.7 Treated Effluent Quality Monitoring

Based on the conditions of the water licence (No. 1BR-THI1419), 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 prior to each batch discharge event and prior to completion of discharge. The sample shall be analyzed for the parameters included in Table 1, below.

TABLE 1: Discharge Water Analysis Parameters

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

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

The monitoring of the water quality in the drainage ditch located at the perimeter of the property will be carried out in accordance with the water quality monitoring program presented in the Environmental Protection Plan.

Among the parameters to be monitored, Table 2 presents the maximum allowable concentrations of any grab sample to be met before discharge.

TABLE 2: Maximum Allowable Concentrations

Parameter	Maximum Allowable Concentration of any Grab Sample (mg/L)
pH[1]	6.5 to 9 (pH units)
TSS[2]	50
Oil and Grease	15 and no visible sheen
Total Lead	0.001
Benzene	0.370
Toluene	0.002
Ethyl benzene	0.090

1. Measure of acidity of basicity
2. Total suspended solids

1.8 Soil Quality Monitoring

In addition to effluent quality monitoring, yearly soil sampling will be carried out at the Final Point of Discharge to ensure that the water treatment activities are not causing a negative impact on the surrounding environment.

1.9 Operation of the Water Treatment Unit

The water treatment unit is operated as follows:

1. Water is collected in the holding tank and allowed to settle for a minimum of 24 hours;
2. Any free product floating on the surface of the tank will be pumped off into sound drums for disposal;
3. If the water has known metal contamination, then the appropriate treatment for the metal contamination is done in the holding tank, either by precipitation through pH adjustment or using an ion resin;
4. A flocculant is added to the water to remove any suspended particles;
5. An air compressor is started and the water is pumped into the oil/water separator;
6. Once the oil/water separator is filled, water is pumped into the intermediate holding tank;
7. Should the water not show any signs of free product, it is then pumped through the filters to remove the contamination, and into the treated water holding tank;
8. The water is checked for clarity and if it appears to have been properly treated, it is pumped into a clean holding tank to be tested prior to discharge;

9. At no time should the pressure in the system rise above 10 psi;
10. The system must be monitored at all times during operation until the automated shut-off system is connected and fully tested to ensure that it is operating properly;
11. Treated water is then sampled and sent to a CALA accredited laboratory for analysis. If results meet discharge criteria, then they are submitted to an INAC Water Resource Officer and permission is requested for discharge. Once permission is obtained, the water is discharged at the authorized discharge location;
12. Should water not meet the discharge criteria, it is treated until the discharge criteria are met.