Compliance Plan

Kugaaruk Soil Remediation Landfarm

January 18, 2019

Prepared and submitted by

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Kugaaruk Landfarm Licence: 1BR-KRK 1318 — Plan of Compliance

January 18, 2019

Nunavut Water Board
P.O. Box 119
Gjoa Haven, NU X0B 1L0

Attention: Dave Baines**,** Technical Advisor, Nunavut Water Board

RE: 1BR-KRK 1318 – Plan of Compliance. (Ref. NWB letter Dec 20, 2018)

Dear Dave,

The Community and Government Services (CGS) is pleased to submit to Nunavut Water Board the enclosed “**Plan of Compliance**” of Soil remediation under the Licence 1BR-KRK1318.

The Department of Community and Government services (CGS), as Licensee has undertaken for soil remediation and waste management since 2016 which has led improvement to hydrocarbon compounds F2-F4 fractions in Petroleum hydrocarbons (PHC) in soils transferred to the landfarm.

Facilities monitoring program is mostly effective during July-September and as convenient. We have summarized the Plan of Compliance in respond to those conditions and requirements outlined in the Licence**.**

We hope that Nunavut Water Board will find this Plan of Compliance valuable in operating the Soil remediation Landfarm of Kugaaruk.

Best Regards,

Shah Alam, P. Eng. E.P.
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Enclosure: AANDC Annual Report 2018
Executive Summary (Inuktitut) of the Amendment Application
Cc: Manger, Licensing, Nunavut Water Board.
Baba Pedersen, Resource Management/Water Resource Officer, AANDC

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EXECUTIVE SUMMARY:

This Compliance Plan is prepared for Kugaaruk Landfarm operation and monitoring as required in the Licence 1BR-KRK 1318 to submit to Nunavut Water Board to meet Conditions.

The facility has been in operation since 2007 (after built in 2006) to treat about 2,172 m3 of Petroleum Hydrocarbon contaminated (PHC) soil from the previous fuel storage tank farm site. Soils were collected from the affected area in the old tank farm site and hauled to the Landfarm site about 1.5 km southeast of the Hamlet of Kugaaruk and laid on the soil treatment cell. The facility consists of a soil treatment cell (upper cell) and run-off water collection pond (lower cell) with HDPE liner on base and berm sides. The Phase III ESA required contaminated soils be treated for PHC concentration F_1-F_4 fractions to values that exceeded the CCME Environmental Quality Guidelines.

In 2007, a series of composite samples were collected from the soil pile after placement in the cell.in 2008, soil pile was turned over once to improve aeration and allowed soil washed water collection at the run-off cell from where about 800 m3 of water was discharged out. In 2009, 5 monitoring wells were installed at the down gradient of the facility to collect sub-ground flow water of PHC washed from the facility. Water samples were collected and tested by Tetra Tech for analysis. About 900 m3 of run-off water discharged from the retention cell. In 2010, another monitoring well MW6 was installed at the up-gradient of the landfarm and about 885 m3 of run-off water discharged from the retention pond.

The review of sample results of previous years have shown decreasing in HC fraction in soil while 2011 results shown increase in some parameters (phenol, total Cadmium) and some metals concentration at samples from monitoring station NM_1. The analysis explained such increase value in 2011 is due to the samples taken from 60 cm below grade. Normal layer thickness considered 30 cm from top where aeration and oxygen ingress be suitable for soil remediation naturally. Also, due to soil turning, lower layer retained the higher concentration of PHC from top layer through water precipitation. Test results of 2012-17 shows decreasing trend of HC fraction in soil. The plan of compliance is therefore, limits the layer thickness for 30 cm to be maintained for turning, sampling and removal (once treated).

As mandated for natural remediation process, no other alternatives adopted or planned, but to continue the operation and monitoring for existing and current new candidate soils. Once the remediation passes, the soil will be repurposed for community -mostly for solid waste site cover and access road construction. The licensee will continue follow the Plan of Compliance.

BACKGROUND:

In 2006, Tetra Tech WEI Inc. carried out a phase III ESA on the site of the former fuel storage tank compound. The ESA revealed several areas where soil had been contaminated by PHC which needed remediation before repurposing to meet CCME Guidelines. Considering the scope, construction of a soil landfarm was cost effective and less operational constraints. In anticipation of the requirement to remove the HC impacted soil, CGS undertook the design and construction of the soil treatment land farm outside of the Hamlet of Kugaaruk.

WATER USES ACTIVITIES

No external water intake or supplied water uses for the facility operation. The only water uses from the run-off retention pond to extract HC from the landfarm cell, which originally comes from rain or snow melts through the soil landfarm upper cell. Quantity of water spray depends on the soil volume and weather condition.

Water discharge from the run-off retention lower cell only requires when the cell becomes full or water level marks close near to the Free Board (1.0 m mark from top of the berm). Water discharge usually happened during summer- fall from the decanting point SW_2 of the lower cell to the down gradient grassy open land. Quantity of water discharged varied from 800 m3 (2008) to 1227 m3 (2012), but not necessarily in each year. However, the Plan of Compliance is noting a requirement of water discharge in each year for the remaining years of operation.

CHARACTERISTICS OF SOIL IN LANDFARM

Characteristics of soils deposited (2172 m3) in landfarm in 2007 were described in Report of 2006-2008, which were determined to be coarse-grained and contaminated with Petroleum Hydrocarbon (PHC) fractions. To meet the re-uses of this contaminated soil, remediation of concentration classified F_1- F_4 fraction HC, in accordance to the CCME Guideline is imposed in the Licence.

The new candidate soils (2000 m3) placed in Mega Bags inside the facility, are similar type and from the same compound of previous Fuel storage tank farm of PPD. This new soil will be sprayed on soil pad after the previous soil treated and removed.

RATE OF DEGRADATION

The degradation rate is based on reduction in average concentration of F_2 petroleum hydrocarbon (PHC) in the soil. The F_2 fraction (PHC) is being monitored as this parameter exceeded the guidelines limits. The 2011 monitoring data shows an overall reduction of 33% in average F_2 concentration with the exception of phenol and Cadmium which were results from surrounding environment and some noted open drums of fuel mixed soils/gravels on site by unauthorized dumps. Annual samples results shown reduction in F2 concentration in the soil, indicating the active remediation process.

SITE ACTIVITIES:

Soil cell aeration:

Turning of soil pile helps the aeration (air/O2 ingress) for the soil bacteria that degrade petroleum HC. Turning of soil mostly takes place during the month of July-August using small excavator, bobcat or even hand-held tools. Also, turning helps the sunlight ingress into the soil layer and evaporates HC.

Additionally, spray water washes the HC from soil/gravel surface towards the run-off cell. The plan for soil turning twice a year is helpful for the soil layer upper and lower part simultaneously in each year which expedites the remediation process.

Soil sample collection

A total of 4-6 composite samples collection from the monitoring stations LF_1-LF_6 inside the soil landfarm cell. Soil samples are collected twice a year followed by turning and water spray (if possible) of the soil. Location of soil sampling also can be changed (arbitrarily) based on best presentation of samples. Sampling locations are determined using GPS locators. To ensure the best representative of location and material, the Landfarm is divided in 6 longitudinal segments when collecting samples. The northwest berm is divided into 6 equal lengths, and then perpendicular lines are extended to the opposite side of the cell.

Ground Water monitoring

Ground water monitoring includes technic for measuring of static ground water depth in the well using a duel phase water level indicator, measurement of headspace vapor concentration in the well using a Gastech by checking the presence of light Non-aqueous Phase Liquids (LNAPL), and physical observation of ground water in the well. It noted from field observation, ground water be seen in the monitoring well mostly during summer and mostly at down gradient wells.

Water sampling

PHC impacted water run-off into the lower cell. Two monitoring stations marked for water sampling:

SW_1: at the sump location where run-off stores temporarily before entering into the lower cell

SW_2: location at the decanting point from where water discharge from lower cell to outside land.

Water sampling are carried mostly at the same time of soil sampling, but it can be in separate scope depending on flow and plan for discharging water from the cell. In average, two times per year water sampling from stations SW_1 (as available) and SW_2. Water samples tests for Trace Metals, Routine parameters, BTEX and CCME Fractions.

General conditions of Compliance (Ref. Appendix A):

- Soil samples collection from stations LF_1-LF_6 (as convenient) during July – Sep each year
- Water samples collection from SW_1 and SW_2 from run-off sump and lower retention cell.
- Turning of top layer soil (30 cm plus thick) to facilitate aeration and sunlight ingress
- Water spray from lower cell using mechanical pump on top layer and normal wash out of rain water
- Soil and water samples test at Taiga Laboratory, Yellowknife, twice a year (or as needed)
- Original about 2172 m3 soils sprayed in 2006 within an area 60 m x 60 m in the facility
- About 2000 m3 new soils in Mega bags are moved in the facility from new Hamlet Office building site
- No modification to the facility but small improvement on lower cell berm to secure water containment
- No abandoned or restoration work and, therefore, no application submitted to the Board for this
- Monitoring stations remains unchanged. Facility signage and warning signs are reinstalled as needed.
- Water intake, supply or waste disposal activities are not part of this license or facility. The only uses of water to spray on contaminated soil layer (if needed) for natural remediation purposes.
- Revised O&M manual will be updated with the Board by Summer- Fall 2019. .

Appendix A:

Compliance Plan Summary

Kugaaruk Landfarm Licence 1BR-KRK 1318

Plan for Compliance Kugaaruk Landfarm Licence (1BR-KRK 1318, Type B)

Licence Condition		Status of Compliance	Plan for Compliance
Part B	**General Conditions**		
B1	Annual Reports	All Annual Reports updated with NWB	Continue Annual Report submission each year by March 31st
B2	Monitoring program	CGS carried Annual monitoring program during spring & summer (Jul – Sep)	Continue annual monitoring program. Soil and run-off water sampling, testing, reporting and documenting each year.
B3	Modification of Monitoring program	Transfer of Licence from PPD project to CGS in 2016 and therefore, changes of annual monitoring by CGS projects.	CGS will continue Land farm facility monitoring by own resources. Process include turning of top layer first, allow natural remediation until removal of treated soil and then underlain soil layer in the same process. Each layer may take 2 years (seasons) or more.
B4, B5	Signage	GPS recorded 6 locations LF_1 – LF_6 soil sampling and SW_1- SW_2 run-off water sampling. Monitoring wells MW_1-MW_6 for ground water collection as available. Installed facility signage to deter dumping and showing facility is active.	CGS will continue maintaining sings and monitoring stations of soil landfarm, run-off water cell, ground water collection wells, and water decanting point. Ground water collection wells are outside the perimeter berm and samples be taken as flow available. Maintain signage to deter the public from unauthorized dumping.
B7	Plan of operation	The facility is operating by CGS as the owner. Not much changes on operation procedure, and limited to water spray, turning of soil layers and sampling.	CGS will continue turning soil top layer using hand tools, excavator or bobcat keeping underneath layer un-disturb during June-August to allow PHC evaporate and wash out naturally. Soil samples will be collected twice in year (as available) and tested for parameters.
B11	Reports and studies	No other study or reports since the first operation 2007 other than AANDC annual inspection reports. Signs are installed at locations as reported in AANDC report.	Facility signage and any missing signs will be maintained until the decommissioning of the facility. Soil sampling location signs may be carried on berm with projections to the facility soil, turning, water wash and sampling activities.
Part C	**Water uses and management**		
C1	Water uses	No water uses from any approved source since the License issued to CGS.	Mostly will depend on natural rain water for HC wash out. Run-off cell water can be sprayed on soil layer during summer time when needed and no rain water to speed up the remediation process.
C3	Erosion control	No activities carried outside the berm or nearby that may cause erosion on the berm. AANDC inspection reported area on the lower cell berm near to decanting point has been repaired.	The Licensee will maintain the facility perimeter berm, HDPE liner, run-off cell berm, monitoring well and outside area free from erosion or any digging/dumping activities. Annual inspection procedure will be maintained and as needed follow up.

Part D	**Waste management**		
D1	Soil treatment	Existing 2172 m3 soils were sprayed on an approximate area 60 m x 60 m inside the facility. Remediation of the top layer (30 cm) continued and soil water samples test results shown decreasing of PHC level in soil (Sep 2011 –Aug 2017). Some 2000 m3 new soils in bags are stored inside the facility from the same source the previous PPD tank farm.	Existing soils will be removed from the facility in layers once remediate the HC F1-F4 (in two layers), new candidate soils will be sprayed within the area in the facility and continue the natural remediation process. Expected time for full remediation within next 5 years. To expedite the remediation process, water spray, turning soil layer and may use of other materials that can absorb HC from soil/gravel surfaces, but it will depend on scope and costs. Annual sampling will be continued at least twice /year as feasible.
D3	Water discharge	Water level in the run-off retention cell was near to the Free Board, which required water discharge from the cell. Water samples tested from stations SW1 and SW2 before decanting from the cell.	The licensee will continue run-off water decanting annually or as needed from the cell to allow new run-off deposition in the cell. Primary uses of the run-off water to spray on turned soil to wash PHC in soils and will return to run-off cell. Discharge of water will be only when water level in the cell rises near the Free Board.
D4	Effluent discharge	No other effluent storage inside the facility, but PHC contaminated soils only.	Any effluent will be deterred from the facility other than contaminated soils from the designated source.
D5, D8	Effluent storage	Soils of treatment objectives are only stored within the facility.	No effluent or soils in excess of the PHC treatment objectives will be stored within or outside the facility.
D9	treated soil removal	No soils were removed from the facility. Top layer soils of 0.6 m thick, are now treating to desired level of HC.	Any soils removal will be carried once treated to accepted parameters F1-F4 approved. Treated soil will be used as cover materials to solid waste reduced or burn substance and/or access road base materials to any waste facility.
Part E	**Construction operation**		
E1, E2	Revised O&M	The Landfarm facility and the scope of work remain unchanged, and therefore, no major changes of the O&M manual which was submitted in 2011. A revised O&M is in the plan to be completed.	The Licensee will submit a revised O&M manual, which will include scope, process of treatment, sampling, monitoring, soil removal and commissioning of the facility. Expected submission of the revised O&M by the summer 2019 and will follow up to any changes.

Appendix B:

AANDC Inspection Report 2018

Kugaaruk Landfarm Licence 1BR-KRK 1318

WATER LICENCE INSPECTION FORM

☒ Original
☐ Follow-Up Report

Licensee	Licensee Representative
Gov't of Nunavut CG&S	Shah Alam
Licence No. / Expiry	**Representative's Title**
1BR-KRK1318	Municipal Planning Engineer
Land / Other Authorizations	**Land / Other Authorizations**
Date of Inspection	**Inspector**
11 July 2018	Baba Pedersen

Activities Inspected

☐ Camp ☐ Drilling ☐ Mining ☐ Construction ☐ Reclamation ☐ Fuel Storage
☐ Roads/Hauling ☐ Other: ☒ Other: Land Farm

Conditions: **A - Acceptable** **C - Concern** **U - Unacceptable** **NA – Not Applicable** **NI – Not Inspected**

Water Use	Condition	Comment	Site Conditions	Condition	Comment	Haz/Mat Management	Condition	Comment
Intake/Screen			Water Management Structures	C	5	Storage	C	2
Flow Measure. Device			Culverts / Bridges			Spills	C	5
Source:			Drainage			Spill Plan		
Water Use:			Erosion / Sediment	C	5			
Recirculation (y /n)			Mitigation Measures			**Administrative**		
			Reclamation Activities	C	2	Records		
			Materials Storage	C	2	Reports	A	7
Waste Disposal			Signage	U	1&6	Plans		
Waste Water	C	4				Notifications	C	8
Solid Waste			**Monitoring**			**Other**		
Hazardous Waste			Sample Collection / Analysis	C	4	Decanting	C	4

**The number in the comments field will correspond with specific comments provided below.*

Samples taken by Inspector:	Location(s): No Samples taken during this visit
☐ Yes ☒ No	

SECTION 1 ☒ **Comments** (s.__) ☐ **Non-Compliance with Act or Licence** (s.__) ☐ **Action Required** (s.__)

On July 11, 2018 I Inspected the Gov't of Nunavut, CG&S Kugaaruk Land Farm Water License 1BR-KRK1318. I was accompanied by Shah Alam from the GN CGS.

SECTION 2 ☒ **Comments** ☐ **Non-Compliance with Act or Licence** ☐ **Action Required**

At the Land Farm location I saw the following; 1. There was No Signage at the Entrance (Photo 1) to Identify the Site and Warn the Public of its contents, 2. The top half of the Upper Cell (Photo 2) contained Mega Bags of Contaminated Soils, 3. The bottom half of the Upper Cell (Photo 3) was Clean and Dry, 4. The lower Cell (Photo 4) was full of clear Water, 5. A portion of the Lower Cell Berm (Photo 5) has visible Damage from Overflow Run-Off, 6. There was No Signage at the bottom of the Lower Cell (Photo 6) to identify where the Sample Location and Decant Areas are. 7. Annual Reports have been submitted to the Nunavut Water Board. 8. The Water License is Expiring in 2018.

SECTION 3 ☐ **Comments** ☐ **Non-Compliance with Act or Licence** ☒ **Action Required**

1. Appropriate Signage, in both languages, must be installed at the Entrance to Identify the Site and warn the Public of its Contents. 2. The Contaminated Soils need to be removed from the Mega Bags and spread out in order for the natural process of biodegrading to start. 4. The Lower Cell must be Sampled and then Decanted prior to Freeze-up. 5. The Damaged area of the Lower Cell Berm must be repaired prior to Freeze-up. 6. Appropriate Signage must be installed to identify the Sample Locations as well as the Decant Area. 8. The Renewal Process must be started in order to get a new License prior to Expiry.

Licensee or Representative	Inspector's Name
	Baba Pedersen
Signature	**Signature**
	Signed Original on File
Date	**Date**
	19 October 2018

Office Use Only: Follow-up report to be issued by Inspector ☐ Yes ☒ No

cc. CIRNAC, Manager Field Operations, Iqaluit, justin.hack@canada.ca

Nunavut Water Board, Manager of Licensing, Gjoa Haven, licensing@nwb-oen.ca

PHOTO LOG

Date	Camera	Inspector	Authorization
11 July 2018	Sony DSC-HX50V	Baba Pedersen	1BR-KRK1318

Photo Log # DSC02723 **Kugaaruk Land Farm**

Photo 1

Description: Entrance to Land Farm – No Signage

Photo Log # DSC02724 **Kugaaruk Land Farm**

Photo 2

Description: Top half of Upper Cell containing Mega Bags of Contaminated Soil

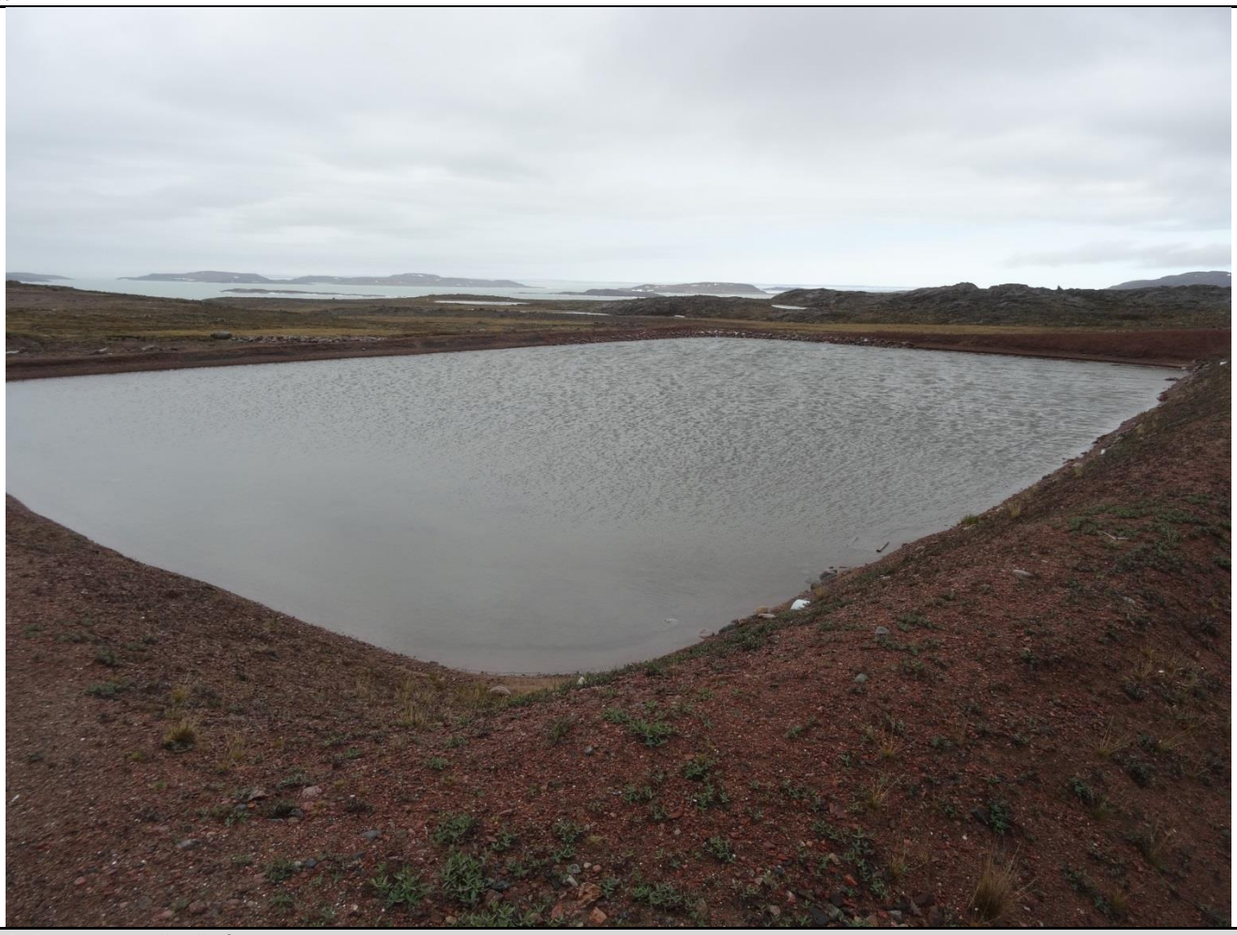
Photo Log # DSC02725	Kugaaruk Land Farm

Photo 3

Description: Bottom Half of Upper Cell – Clean and Dry

Photo Log # DSC02726	Kugaaruk Land Farm

Photo 4



Description: Lower Cell Full of Water

Photo Log # DSC02730	Kugaaruk Land Farm

Photo 5

Description: Lower Cell Berm Damaged from Overflow Run Off

Photo Log # DSC02733	Kugaaruk Land Farm

Photo 6

Description: Bottom edge of Lower Berm – No Signage for Sample Location and Decant Area

Appendix C:

Pages from Licence: Conditions of Compliance

Kugaaruk Landfarm Licence 1BR-KRK 1318

PART B: GENERAL CONDITIONS

1. The Licensee shall file an Annual Report with the Board for review, no later than March 31st of the year following the calendar year being reported, which shall contain the following information collected during that period:

    a. A summary of all waste disposal activities including;
        i. Quantity and quality of effluent discharged from the Landfarm;
        ii. Characterization of soils placed in the Landfarm for treatment; and
        iii. Quantity of soils placed in the Landfarm for treatment;
    b. Tabular summaries of all data generated under the Monitoring Program, an analysis and interpretation of the results, and any follow-up measures that may be required;
    c. The monthly and annual quantities in cubic metres of all Effluent discharged;
    d. A summary of modifications and/or major maintenance work carried out on the Landfarm, including all associated structures and facilities;
    e. An analysis of progress achieved in remediating the contaminated soil in the Landfarm;
    f. The final destination of treated soil and intended use;
    g. Any modifications to the Monitoring Program in accordance with Part J, Item 21;
    h. A list of unauthorized discharges and summary of follow-up action taken;
    i. A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year;
    j. Any revisions to approved plans and manuals as required by Part B, Item 9 submitted in the form of an Addendum;
    k. A public consultation/participation report describing any consultation with local organizations and the residents of the nearby communities;
    l. A summary of any studies or reports requested by the Board that relate to Waste disposal or restoration, and a brief description of any future studies planned; and
    m. Any other details on 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.

1. The Licensee shall install flow meters or other such devices, or implement suitable methods required for measuring of volumes of water discharged as required under Part J, Item 5.

4. 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.

5. The Licensee shall post signs in the appropriate areas to inform the public of the location of the Landfarm. All signage postings shall be in the Official Languages of Nunavut.

6. 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.

7. The Licensee shall, for all Plans submitted under this Licence, implement the Plan as approved by the Board in writing.

8. 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.

9. The Licensee shall review the Plans referred to in this Licence as required by changes in operation and/or technology and modify the Plans or Manuals accordingly. Revisions to the Plans or Manuals are to be submitted in the form of an addendum to be included with the Annual Report required by Part B, Item 1(j), complete with a revisions list detailing where significant content changes are made.

10. The Licensee shall ensure a copy of this Licence is maintained onsite at all times. Any communication with respect to this Licence shall be made in writing to the attention of:

(a) 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

(b) Inspector Contact:
Manager of Field Operations, AANDC
Nunavut District, Nunavut Region
P.O. Box 100
Iqaluit, NU X0A 0H0
Telephone: (867) 975-4295
Fax: (867) 979-6445

11. The Licensee shall submit one (1) paper copy and one (1) electronic copy of all reports, studies, and plans to the Board or as otherwise requested by the Board. Reports or studies submitted to the Board by the Licensee shall include an executive summary in English and Inuktitut, and Inuinnaqtun.

12. The Licensee shall ensure that any document(s) or correspondence submitted by the Licensee to the Board, is received by the Board and maintain on file a copy of the acknowledgment of receipt issued by the Manager of Licensing.

13. This Licence is assignable as provided in Section 44 of the Act.

PART C: CONDITIONS APPLYING TO WATER USE AND MANAGEMENT

1. The use of Water is not authorized under the terms and conditions of this Licence.

2. The Licensee shall not remove any material from below the ordinary High Water Mark of any water body.

3. The Licensee shall not conduct any activity that will cause erosion to the banks of any body of water and shall provide necessary controls to prevent such erosion.

4. The Licensee shall implement and maintain sediment and erosion control measures prior to and during the operations to prevent entry of sediment and/or dust into Water.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL AND MANAGEMENT

1. The Licensee shall treat, to the appropriate Treatment Objective, Type B Soil in the Landfarm Facility, or as otherwise approved by the Board.

2. The Licensee shall maintain the Landfarm Facility to the satisfaction of the Inspector.

3. The Licensee shall provide at least fifteen (15) days written notice to the Inspector prior to any planned discharges from the Landfarm Facility. The notice shall include an estimated discharge volume, Effluent quality or results of monitoring under Part J, Item 7, and the proposed location for the discharge.

4. All Effluent discharged from the Landfarm at Monitoring Program Station SW2 shall not exceed the following Effluent quality limits:

Parameter	Maximum Concentration of any Grab Sample (mg/L)
pH	6.5 to 9
TSS	50
Oil and grease	15 and no visible sheen
Total Lead	0.001
Benzene	0.37
Toluene	0.002
Ethylbenzene	0.090

5. Effluent that exceeds Effluent quality limits in Part D Item 4 shall be treated until it meets the

above limits or it shall be considered Hazardous Waste and disposed off-site at an approved facility or as otherwise authorized by the Board in writing.

6. The Licensee shall direct all Effluent from the Landfarm that meets the Effluent quality limits of Part D, Item 4 to the Splash Pad, unless otherwise approved by the Board in writing.

7. The discharge point for all Effluent described in Part D, Item 4 shall be located at a minimum of thirty-one (31) metres from the ordinary High Water Mark from any Water body and where direct or indirect flow into a Water body is not possible and no additional impacts are created.

8. The Licensee shall dispose of soils containing contaminants in excess of the Treatment Objectives off site at an approved treatment facility or as otherwise approved by the Board in writing.

9. The Licensee shall, prior to the removal of any treated soil from the Landfarm Facility confirm with the Government of Nunavut, Environmental Protection Service that the soils have been treated to meet all legislatively-required treatment objectives.

PART E: CONDITIONS APPLYING TO CONSTRUCTION AND OPERATIONS

1. The Licensee shall submit to the Board for approval within thirty (30) days following the date of issuance of this Licence, a revised Operations and Maintenance Manual for the Landfarm Facility. The revised Plan shall address the issues identified in the NWB's December 8, 2011 correspondence as well as take into consideration the *Federal Guidelines for Landfarming Petroleum Hydrocarbon Contaminated Soils* (2005).

2. The Licensee shall not mix or blend petroleum hydrocarbon contaminated soils with non-contaminated soils for the expressed purpose of achieving the Treatment Objective.

3. The Licensee shall use clean material for construction, operation, and maintenance activities obtained from an approved source which has been demonstrated not to produce acid rock drainage and to be non-metal leaching.

PART F: CONDITIONS APPLYING TO DRILLING OPERATIONS

1. The Licensee is not authorized to drill except for the purposes of installing monitoring stations.

2. The Licensee shall not conduct any land-based drilling within thirty-one (31) metres of the ordinary High Water Mark of any Water body, unless otherwise approved by the Board in writing.

3. The Licensee shall ensure that all drill waste, including chips, muds and salts (CaCl2) in any quantity or concentration, from land-based drilling, shall be disposed of in a properly constructed sump or an appropriate natural depression located at a distance of at least thirty one (31) metres from the ordinary high water mark of any adjacent water body, where direct flow into a water body is not possible and no additional impacts are created.

4. If artesian flow is encountered, drill holes shall be immediately sealed and permanently capped to prevent induced contamination of groundwater or salinization of surface waters. The Licensee shall report all artesian flow occurrences within the Annual Report, including the location (GPS coordinates) and dates.

PART G: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee shall submit to the Board for approval in writing, construction drawings stamped and signed by an Engineer, 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 Landfarm Facility 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. the proposed 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 G, Item 1, have not been met, may only be carried out upon approval from the Board in writing.

4. 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.

5. 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.

PART H: CONDITIONS APPLYING TO SPILL CONTINGENCY PLANNING

1. The Licensee shall submit to the Board for review, within thirty (30) days of issuance of this Licence, an addendum to the Plan entitled “Kugaaruk Landfarm Spill Contingency Plan” dated April 2011, in the format set out by the *Consolidation of Spill Contingency Planning and Reporting Regulations R-068-93*. The revision shall include:

    a. A site plan or topographical map of a suitable scale showing the facility location and surrounding sensitive environmental components including water bodies;

b. An interactive fillable copy of the NT-NU Spill Report Form should be appended to the Plan as well as the guide to spill reporting; and
c. Additional contact information for the following agencies or organizations: the Nunavut Water Board, Government of Nunavut –Department of Environment (GN-DoE), Environment Canada (EC), Fisheries and Oceans Canada (DFO), and the Hamlet of Kugaaruk.

2. If, during the period of this Licence, an unauthorized discharge of Waste and/or Effluent occurs, or if such a discharge is foreseeable, the Licensee shall:

a. Employ the Spill Contingency Plan;
b. Report the incident immediately via the 24-Hour Spill Reporting Line at (867) 920-8130 and to the Inspector at (867) 975-4295;
c. For each spill occurrence, submit a detailed report to the Inspector, no later than thirty (30) days after initially reporting the event, which includes the amount and type of spilled product, the GPS location of the spill, and the measures taken to contain, clean up and restore the spill site; and
d. Response measures for addressing spills in water on land or ice.

3. The Licensee shall prevent any chemicals, petroleum products or wastes associated with the project from entering water. All sumps and fuel caches shall be located at a distance of at least thirty one (31) metres from the ordinary high water mark of any adjacent water body and inspected on a regular basis.

4. The Licensee shall ensure that any equipment maintenance and servicing be conducted only in designated areas and shall implement special procedures (such as the use of drip pans) to manage motor fluids and other waste and contain potential spills.

PART I: CONDITIONS APPLYING TO ABANDONMENT, RESTORATION AND CLOSURE

1. The Board has accepted the revisions to the approved plan entitled "Interim Abandonment and Reclamation Plan for the Kugaaruk Landfarm Facility," dated December 2012 that has been approved by the Board under the previous licence.

2. The Licensee shall, at least six (6) months prior to abandoning any facilities or upon submission of final design drawings for the construction of new facilities to replace existing ones, submit to the Board for approval in writing, a Final Abandonment and Restoration Plan for the facilities being decommissioned. The Plan shall incorporate, where applicable, information on the following:

a. Waste disposal and treatment facilities;
b. Petroleum and chemical storage areas;
c. Any site affected by waste spills;
d. Leachate prevention;
e. An implementation schedule;

f. Maps delineating all disturbed areas, and site facilities;
g. Consideration of altered drainage patterns;
h. Type and source of cover materials;
i. Future area use;
j. Hazardous wastes; and
k. A proposal identifying measures by which restoration costs will be financed by the Licensee upon abandonment.

3. The Licensee shall carry out progressive reclamation of any components of the project no longer required for the Licensee's operations.

4. In order to promote growth of vegetation and the needed microclimate for seed deposition, all disturbed surfaces shall be prepared by ripping, grading, or scarifying the surface to conform to the natural topography.

5. Areas that have been contaminated by hydrocarbons shall be reclaimed to meet objectives as outlined in the Government of Nunavut's Environmental Guideline for Site Remediation, January 2009. The use of reclaimed soils for the purpose of back fill or general site grading may be carried out only upon consultation and approval by the Government of Nunavut, Department of Environment and an Inspector.

6. The Licensee shall complete the restoration work within the time schedule specified in the approved Abandonment and Restoration Plan in Part I, Item 2, or as subsequently revised and approved by the Board.

7. The Licensee shall complete all restoration work prior to the expiry of this Licence.

PART J: CONDITIONS APPLYING TO THE MONITORING PROGRAM

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

Monitoring Station Label	Description	Frequency	Parameters
SW1	Monitoring station located within the run-off water retention cell	Prior to discharge	Quality in accordance with Part J Item 6 and Part J, Item 7
SW2	Effluent discharged point for the Landfarm Facility	At least once during discharge	Volume in accordance with Part J Item 5 Quality in accordance with Part J, Item 10

MW1	Groundwater monitoring station located approximately 3 m outside landfarm berm to west of the southwest corner and to north of stream	Twice per year (Once during spring freshet and once during mid-summer)	Quality in accordance with Part J, Item 8 Static groundwater level in accordance with Part J, Item 9
MW2	Groundwater monitoring station located approximately 3 m outside landfarm berm at approximately centre of the west-southwest wall and to northwest of MW1	Twice per year (Once during spring freshet and once during mid-summer)	Quality in accordance with Part J, Item 8 Static groundwater level in accordance with Part J, Item 9
MW3	Groundwater monitoring station located approximately 3 m outside landfarm berm to south of the west corner and to northwest of MW2	Twice per year (Once during spring freshet and once during mid-summer)	Quality in accordance with Part J, Item 8 Static groundwater level in accordance with Part J, Item 9
MW4	Groundwater monitoring station located approximately 3 m outside landfarm berm to north of the west corner and to north of MW3	Twice per year (Once during spring freshet and once during mid-summer)	Quality in accordance with Part J, Item 8 Static groundwater level in accordance with Part J, Item 9
MW5	Groundwater monitoring station located approximately 3 m outside landfarm berm to the northeast of the west corner and to northeast of MW4	Twice per year (Once during spring freshet and once during mid-summer)	Quality in accordance with Part J, Item 8 Static groundwater level in accordance with Part J, Item 9
MW6	Groundwater monitoring station located approximately 10 m outside landfarm to east of the east Corner	Twice per year (Once during spring freshet and once during mid-summer)	Quality in accordance with Part J, Item 8 Static groundwater level in accordance with Part J, Item 9

2. The Licensee shall confirm the locations and GPS coordinates for all Monitoring Program Stations referred to in Part J, Item 1 with an Inspector.

3. The Licensee shall measure and record the volume of all soil from all locations entering the Landfarm Facility.

4. The Licensee shall assess and record the concentration of F1 – F4 fractions in petroleum hydrocarbon contaminated soil entering the Landfarm Facility from all sources, as per the CCME *Canada-Wide Standard for Petroleum Hydrocarbons in (PHC) in Soil*.

5. The Licensee shall record the volume of all Effluent discharged from the Landfarm Facility at Monitoring Program Station SW2.

6. The Licensee shall sample prior to discharge at Monitoring Program Station SW1, to verify compliance with the Effluent quality limits under Part D, Item 4.

7. The Licensee shall sample prior to discharge at Monitoring Program Station SW1 and analyze for the following parameters:

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

Total Petroleum Hydrocarbons (TPH)
Polycyclic Aromatic Hydrocarbons (PAH)
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)

8. The Licensee shall sample twice per year, once during spring freshet and once during mid-summer, at Monitoring Program Stations MW1, MW2, MW3, MW4, MW5, and MW6 and analyze for the parameters listed under Part J, Item 7.

9. During sampling events conducted under Part J, Item 8, the Licensee shall monitor the static depth to the groundwater level at Monitoring Program Stations MW1, MW2, MW3, MW4, MW5, and MW6.

10. The Licensee shall sample the Effluent discharged from Monitoring Program Station SW2 at least once during a particular discharge event to verify compliance with the Effluent quality limits under Part D, Item 4 and to analyze for the parameters listed under Part J, Item 7.

11. The Licensee shall maintain at least two groundwater monitoring wells down-gradient of the Landfarm Facility.

12. The Licensee shall maintain at least one groundwater monitoring well up-gradient of the Landfarm Facility for background data collection.

13. The Licensee shall sample soil at being treated in the Landfarm Facility no less