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NUNAVUT WATER BOARD
NUNAVUT IMALIRIYIN
KATIMAYINGI

Water License Application

Supplementary Information Requirements For Hydrocarbon-Impacted Soil Storage and Landfarm Treatment Facilities

Adopted March 2005

Preamble

This supplementary questionnaire has been provided by the Nunavut Water Board ("NWB") for the purpose of assisting Applicants in the development of water licence applications ("Applications") for the construction and operation of landfarm treatment facilities. By following this questionnaire, Applicants should be able to produce an Application that contains all the relevant information that the NWB deems necessary for a comprehensive review of a landfarm undertaking. However, according to the specific circumstances of a particular Application, the NWB may request additional information from an Applicant that goes beyond the scope of this questionnaire.

The information provided here is intended to apply to "one-off" storage or landfarm facilities and not for permanent or commercial storage or landfarm facilities. The latter will require further management and monitoring procedures to ensure the medium- to long-term landfarming activities do not impact on the environment.

Under suitable conditions, landfarming is an effective bioremediation technology for reducing concentrations of nearly all of the constituents of petroleum products typically found at petroleum storage sites. In some cases, an Applicant may decide that off-site soil storage and disposal is a better option.

Landfarming is an above ground remediation technology for hydrocarbon-contaminated soil that reduces hydrocarbon concentrations through biodegradation. This technology usually involves spreading excavated contaminated soil in a thin layer on the ground surface and stimulating aerobic microbial activity within the soils through aeration and/or the addition of minerals, nutrients and moisture. The optimal rate of application of each of these parameters to achieve efficient biodegradation will depend on a number of factors, including but not limited to: the type of petroleum hydrocarbons to be remediated; the level of hydrocarbon contamination; the hydrocarbon-degrading bacteria present; and the soil matrix.

When environmental and other conditions will not be suitable for landfarming, an Applicant may apply for on-site storage licence. Information to be submitted in support of the Application is the same as for a landfarm.

I. GENERAL INFORMATION

The following general information should be included in the Application.

1. Date of Application.
2. Name and mailing address of the Applicant.
3. Contact information including phone number(s), fax number(s) and email address(es).
4. Name(s) of Facility operator(s) and alternate management personnel.

5. Number of years the Applicant is requesting for a water license.

Applicants may be required, under various legislation, to obtain land tenure approvals or other permits from local, territorial or federal regulators.

II. TECHNICAL INFORMATION REQUIRED TO PROCESS THE APPLICATION

Current Engineered Drawings, Facility Design Plans, a Facility Operations and Maintenance Plan (including, but not limited, to a Spill Contingency Plan developed in accordance with the Board's "*Guidelines for Contingency Planning*" (1987)) and a Site Monitoring Plan will be required to process the Application. All Engineered Drawings shall be stamped by a qualified Professional Engineer registered to practice in Nunavut.

Site Assessment Considerations

The Applicant shall provide details of the site topography, hydrology and permafrost regime, including the following**:**

1. Current detailed topographical site survey diagrams, map(s) and/or aerial photos, of sufficient scale to clearly show all pertinent drainage features, and which clearly illustrate the location of the following:

    a. Soil, fuel and chemical storage locations;
    b. Soil landfarm active treatment locations;
    c. Site drainage patterns;
    d. Adjacent surface water bodies that could be affected by the proposed undertaking, particularly fish-bearing waters;
    e. Facility site access routes;
    f. Surface and subsurface environmental monitoring sites; and
    g. Traditional land use areas used for recreation, camping, fishing, etc.

Note: Maps, diagrams and aerial photos submitted with the Application must include an accurate scale that allows the determination of distances between the objects depicted.

2. The slope of land underlying the Facility.

3. A hydrological/climatic assessment of the site that includes the following:

a. Precipitation and temperature profiles for the area;
b. Details concerning the local drainage basin;
c. Information regarding direction, path of water flow and potential seepage in area of the undertaking;
d. A discussion concerning the likelihood of flood events that could disrupt operations or threaten water quality, and whether the local landforms may encourage or discourage such events (i.e. a Facility situated in an active flood plain).

4. A description of the soil underlying the site that includes:

   a. The physical and chemical characteristics of the material underlying Facility;
   b. The depth of the permafrost active layer; and
   c. A discussion of any permafrost characteristics that may impact on the construction and operation of the Facility (i.e. frost heaving, presence of ice lenses, evidence of permafrost degradation).

5. Information regarding the conformity of the undertaking with any applicable Municipal zoning or land use planning ordinances.

Soil Storage and Landfarm Treatment Design Considerations

The Applicant shall provide details of design and construction of all components of the Soil Storage and Landfarm Treatment Facility prior to its construction, including the following**:**

1. Comprehensive design details, including the dimensions, materials of construction and installation/construction procedures of all Facility components are required as part of the Application. Drawings of the design, stamped by an engineer licensed to practice in Nunavut, are also required. The design details should depict and describe the following components:

   a. Retaining structures (dimensions, materials of construction, etc.);
   b. Geo-synthetic liners (properties, installation details, etc);
   c. Sumps, pumps, storage ponds/tanks and any other devices used to manage excess runoff water and/or leachate;
   d. Existing and any proposed drainage modifications, such as berms (natural or constructed) and diversion ditches; and
   e. Water quality and environmental monitoring stations and associated equipment (design, placement, etc).

2. Information regarding the installation of barriers to prevent access to the site.
3. A discussion considering the placement of the Facility in relation to water bodies.

4. A discussion considering flood risks/maximum probably precipitation events in regards to the Facility placement and design.

5. The consideration of alternative methods of soil storage or remediation, in the event that circumstances are not suitable, for example because of environmental constraints, available human resources, etc.

Operations and Maintenance Considerations

The Applicant shall provide details of the Operations and Maintenance Plan to be implemented at the Facility regarding the acceptance of material at the Facility, the procedures to be utilized in the treatment, or storage, of the hydrocarbon-impacted soil, the criteria to be attained prior to soil being deemed remediated, and the ultimate deposition of any treated soils. This shall include the following**:**

1. The procedures to determine if soils may be accepted at the Facility, including but not limited to:

    a. Chemical, physical and biological characterization of the soils and the associated hydrocarbon and metal contaminant concentrations;
    b. Treatability studies, to determine the viability of landfarm treatment; and
    c. Sampling frequency and number of samples *per* volume of soil accepted

2. The procedures to be utilized during active landfarming operations in the active treatment cells, including but not limited to:

    a. Treatment cell development and material placement therein;
    b. Contaminated soil thickness in treatment cells;
    c. Method of mechanical aeration in treatment cells;
    d. Oversize material management;
    e. Surface water management, leachate containment and/or treatment, and site grade planning;
    f. Process water management, and treatment prior to discharge;
    g. Site volume and operational monitoring programs;
    h. Dust control programs; and
    i. Staff operational training programs.

3. The Applicant must provide a soil quality remedial objective, as defined by the Canadian Council of Ministers of the Environment ("CCME") or by other applicable agency, to which the Applicant is intending to achieve.
4. A conceptual decommissioning and reclamation plan is required with the Application, which should contain the following information:

a. Details regarding the ultimate deposition of any treated soils; and
b. A disposal plan for soils contaminated with bioremediation-unsuitable compounds, or for soils that do not respond well to the proposed landfarming treatment.

Surface and Groundwater Monitoring Programs

A comprehensive Surface and Groundwater Monitoring Plan to be implemented at the Facility is required with the Application. This Plan shall include the following**:**

1) Locations (including GPS coordinates) of all proposed Monitoring Stations;
2) Chemical, physical and biological parameters to be monitored;
3) Sampling frequency;
4) Baseline monitoring programs currently in progress, or contemplated during the term of the license under consideration; and
5) QA/QC Programs to be implemented as part of the Monitoring Program.

Table VII: Summary Information on Monitoring Program Sites

Monitoring Location	GPS Coordinates	Type of Monitoring Carried Out	Monitoring Frequency
		□ Surface □ Subsurface	□ Monthly □ Annually
		□ Surface □ Subsurface	□ Monthly □ Annually
		□ Surface □ Subsurface	□ Monthly □ Annually
		□ Surface □ Subsurface	□ Monthly □ Annually
		□ Surface □ Subsurface	□ Monthly □ Annually
		□ Surface □ Subsurface	□ Monthly □ Annually