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**Groundwater Baseline Drilling
Waste Management Plan
Slater River Project
Norman Wells, NT**

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1. Introduction

Husky Oil Operations Limited (Husky) is planning to conduct a groundwater drilling program within Exploration Licences EL462 and EL463 to:

- establish baseline groundwater conditions prior to further exploration activity; and,
- determine whether there are prospective productive bedrock aquifers that may be used as a source of water for future activities.

The information collected will be used to assist Husky in monitoring local groundwater conditions and provide potential sources of water to support exploration and development programs within both ELs. A “Type A” Land Use Permit is required since the weight of the drilling rig will exceed 2.5 Tonnes. All activity will be conducted under an Aurora Research Institute research licence application currently awaiting approval. The proposed survey area is located approximately 40 kilometres south to southeast of the Town of Norman Wells on a low lying plateau within the Mackenzie River valley.

Four groundwater wells that will test bedrock aquifers, and up to twenty shallow groundwater monitoring wells will test the surficial formations are proposed for the 2012-2013 winter drilling season. This program will assist Husky to properly assess the baseline parameters of this exploration area.

The effects that this drilling program may have on the environment, and on the social, economic, and cultural well-being of the residents of nearby communities has been addressed in accordance with the Mackenzie Valley Resource Management Act (MVRMA) and the requirements of the Sahtu Land and Water Board (SLWB) in a separate Environmental Protection Plan.

a. COMPANY INFORMATION AND SITE LOCATION

The program has been named the Slater River Project and is located approximately 40 km south, southeast of the Town of Norman Wells in the Sahtu Region.

The project is owned and operated by:

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b. EFFECTIVE DATE

The Groundwater Drilling program will be scheduled to start in January of 2013 and completed by March of 2013 and will be operating in conjunction with the construction project for the Slater River project. This specific program will have approximately 6 – 8 personnel at the project site and will utilize the camps / waste management infrastructure put in place for the larger construction / completions projects.

c. ENVIRONMENTAL POLICY OF THE PROPONENT

This waste management plan incorporates the basic principles of waste management, source reduction, reuse, recycle/recover, treatment and disposal. Husky Energy is committed to conducting operations within the accepted environmental standards of the oil and gas industry. These methods are important to the oil and gas industry in reducing the environmental footprint of operations.

- Source reduction is the elimination or decrease of the volume or toxicity of waste by adopting practical methods such as using alternative materials or processes. This can be achieved by material elimination, inventory control and management, material substitution, process modification and improved housekeeping, maintenance and training.
- Reuse is achieved by using a product more than once for the same application or for different purposes. Reusing material such as drilling fluids is an industry expectation and can reduce the amount of waste generated.
- Recycling of products that typically have one use is an excellent method of reducing the volume of waste generated at a worksite. Sorting the products so that they can be managed in bulk eliminates the need for additional handling and allows for different products to be managed by efficient recycling processes.

- Waste treatment is used to reduce the volume, mass and/or toxicity of the material prior to disposal due to contaminants contained within the waste. There are a number of treatment options including thermal, chemical, biological and physical processing which may be used separately or combined to be the most effective and efficient.

Disposal of waste is the final option for waste management. When disposing of waste, the type of waste, volume, location and final containment must be considered. The waste disposal options available to the oil and gas industry include deep well injection, landfills, and on-site burial or land farming. The physical and chemical characteristics as well as the regulatory requirements and liability associated with disposal may limit which options are available for waste disposal.

d. SCOPE OF PROJECT

The drilling program will be used to validate a geophysical survey that will be conducted to identify the presence of permafrost and gravel on Husky's exploration licenses.

The program consists of the following components:

- Mobilization of a wheeled air/water/mud-rotary drilling rig by winter road to the project area;
- Mobilization of a tracked auger rig by winter road to the project area
- Use of existing clearings, helipads and recently cleared access to spot the drilling rigs;
- Drilling of up to 15 wells at 5 locations (3 wells per location) to evaluate bedrock aquifers to a maximum depth of 150 metres each;
- Drilling of 20 holes to evaluate surficial groundwater to a maximum depth of 30 metres each;
- Collection of cuttings and groundwater samples for further analysis;
- Logging of boreholes using electro-mechanical downhole logging tools;
- Flow testing freshwater bedrock aquifers;
- Installation of steel well casing and wellheads in bedrock wells;
- Installation of PVC monitoring wells in surficial boreholes;
- Installation of thermistors to monitor ground temperature in selected boreholes;
- The storage of minimal amounts of fuel and motor and hydraulic fluids on site; and
- Demobilization of the drilling rig and related equipment using the winter road.

Drilling locations will utilize existing clearings, cut lines or natural open areas wherever possible. Maximum planned site size for the bedrock wells is 50 x 50 metres and 25 metres x 25 metres for the surficial locations but will be constructed to minimize disturbance while maintaining space for safe operations. If necessary, additional clearing will be bulldozed or mulched. Boreholes will be drilled using a track-mounted auger drill using hollow-stem augers to bring material to the surface.

i. **Environmental Factors**

Included in the submitted Environmental Protection Plan is a description of the biological environment including vegetation, wildlife, fish, and how potential effects of the reclamation program and mitigation measures will be managed. If a sensitive or potentially sensitive receptor is encountered or affected, the primary mitigation measure will be avoidance, if practical. Husky and its contractors will make the best effort to avoid contact with or disturbance to, each species, its habitat and/or its residence.

ii. **Social Factors**

Husky has presented and discussed its proposed program with community members of Norman Wells, Tulita, and Fort Good Hope at public meetings. Prior to travel to the North and the community consultation meetings, Husky initiated numerous phone calls to the community Land Corporations, the Tulita District Land Corporation, Town offices, etc., informing them that Husky would be in the communities, and to coordinate schedules that would provide the greatest exposure to Husky's plans for the proposed program to the communities. A detailed summary of socio-cultural and interacting environment information can be found in the submitted Environmental Protection Plan.

iii. **Regulatory Factors**

Aurora Research Institute

A multiyear scientific research license has been submitted to the Manager of Scientific Services with the Aurora Research Institute (ARI) in Inuvik NT for this phase of the project titled 'Application 2099: EL 462 and EL 463 – Regional Hydrology and Surface Water Quality Sampling' (<https://polar.nwtresearch.com/>).

National Energy Board (NEB)

This body regulates development on frontier lands including the Northwest Territories. Their mandate is to promote safety and security, environmental protection, efficient energy infrastructure and markets within the Canadian public interest, the regulation of pipelines, energy development and trade. Their regulatory authority derives from the Canadian Oil and Gas Operations Act (COGOA) and the National Energy Board (NEB) Act. NEB authority includes:

- Approval to Drill a Well (ADW)
- Geophysical Operation Authorization (GOA)
- Approval of use of drilling fluids.

- Does not regulate waste disposal on shore (unless it is downhole disposal in their area of jurisdiction).
- Regulation of offshore drilling waste management - “Offshore Waste Treatment Guidelines.”
- Inspections - compliance of drilling and seismic operations and waste handling.

The NEB works with northern agencies to oversee appropriate oil and gas waste management. In the Northwest Territories, the deposit of waste from industrial operations, including oil and gas operations, is regulated under the Northwest Territories Waters Regulations. The Northwest Territories Waters Act and Regulations are administered by the various land and water boards including the Sahtu Land and Water Board

The following regulations are brief summaries of the legislation that affects the handling, transport and disposal of waste. Further details can be found in the CAPP Draft Guide *“Oil and Natural Gas Waste Management – Northwest Territories”* April 2008.

Federal

Canadian Environmental Protection Act 1999 (CEPA 1999) distinguishes between hazardous waste and hazardous recyclables in order to provide flexibility for dealing with materials that can be recycled. It also is based on a number of principles which includes the polluter-pay principle where producers and users of harmful substances, pollutants and wastes have a responsibility for bearing the costs associated with the safe use and disposal of these substances and wastes.

Particular regulations have been developed under the authority of CEPA 1999 that impact waste management. These include the Inter-provincial Movement of Hazardous Waste Regulations.

This regulation came into effect in August 2002 and replaced the provisions for movement of waste that were formerly regulated by the federal Transportation of Dangerous Goods Act (TDGA). Under this regulation duties for the waste generator of hazardous waste include:

- During transport, the Movement Document shall be kept in the location required for shipping documents under the Transportation of Dangerous Goods Regulations.
- The waste generator or the waste consignor shall send the required copies of the Movement Document with the waste transporter, and sends the required copy to the appropriate authority of the territory.
- The consignee shall complete Part C of the Movement Document and shall ensure that the appropriate copies of the completed document are distributed to the appropriate authority of the territory.
- The consignor, each authorized carrier and the consignee shall retain a copy of the Movement Document for a period of two years after the hazardous waste is received by the consignee at their principal place of business in Canada.

The latest version of the federal Transportation of Dangerous Goods Act (TDGA) and regulations came into force in August 2002 and is informally called the Plain Language version. TDGA regulates the transportation of dangerous goods in Canada. The hazard classifications were the basis of current hazard definitions for wastes. The 2002 Plain Language version of TDGA removed references to waste manifesting, used to track waste movements. The revision also removed several distinct waste classes from the TDGA. Wastes must still be classified under TDGA for shipment.

Canada Oil and Gas Operations Act (COGOA) COGOA enables regulations that govern oil and gas drilling in frontier areas managed by the federal government, including on and off shore in the Northwest Territories.

Canada Oil and Gas Drilling Regulations (SOR/79-82) The regulations define waste (Section 2) as any refuse or garbage, or any other useless material generated during a drilling program and ancillary operations, but does not include drilling fluid and drill cuttings (referred to as drilling waste in this Guide). The regulations provide general guidance on waste management including the following points:

- Drilling rigs must be equipped with drip trays, curbs and gutters and such other facilities, as are necessary to prevent pollution of the water by fuel or chemicals, that have been spilled or leaked aboard the drilling unit.
- All waste material, drilling fluid and drill cuttings generated at a drill site are handled and disposed of in a manner that (a) does not create a hazard to safety, health or to the environment; and (b) is approved by the Chief Conservation Officer or Chief Safety Officer.
- Rigs must be equipped with a means for burning, venting, storing, transporting or otherwise disposing of waste.
- All working areas including walkways, decks, stairs, rig floors and enclosed areas on a drilling rig are kept clean and tidy and free of waste material, oil and ice.

Northwest Territories

The Environmental Protection Act, in force since 1998, prohibits discharges of contaminants into the environment. It also enables officials to create regulations, guidelines and permits and enforce regulations. There are several regulations promulgated under the Environmental Protection Act. Otherwise, many guidelines have been issued to cover various components of waste management. Most of the guidelines have not been updated since 1998. They are administrated by the Environmental Protection Service (EPS) of the Department of Environment and Natural Resources (GNWT – ENR).

The regulations and guidelines are intended to provide guidance to all industries, other

than those who have a Northwest Territories Water Board water license, on Commissioners Land, municipalities or GNWT undertakings. The guidelines provide guidance to municipal facilities that might take wastes from those industrial facilities, including oil and gas operations.

Guideline for Industrial Waste Discharges in the Northwest Territories: This was developed for the disposal of residual waste, both solid and liquid, from industrial operations in the NWT. It was authored by the Environmental Protection Service (EPS). This guideline sets the standards for industrial wastes that are suitable for landfills in the NWT.

Municipal Solid Wastes Suitable for Open Burning: The NWT has prohibited the open burning of wastes including Municipal Solid Waste (MSW) and used oil in the development of waste management guidelines. However, the NWT allows burning of paper products, paperboard packaging and untreated wood waste where alternative methods of disposal or recycling are not feasible.

Northwest Territories Water Act: The Act became effective in 1992 and regulates the water in the Northwest Territories in designated areas. It does not cover waters in designated federal parks. The act enables regulations and the Northwest Territories Water Board to support the Act. The Act defines waste (section 2) as:

- a) Any substance that, if added to water, would degrade or alter or form part of a process of degradation or alteration of the quality of the water to an extent that is detrimental to its use by people or by any animal, fish or plant, or
 - b) Water that contains a substance in such a quantity or concentration, or that has been so treated, processed or changed, by heat or other means, that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water to the extent described in paragraph (a).
- Any substance or water that, for the purposes of the Canada Water Act, is deemed to be a waste.
 - Any substance or class of substances prescribed by regulations.
 - Water that contains any substance in a quantity or concentration that is equal to or greater than a quantity or concentration prescribed by regulations.
 - Water that has been subjected to a treatment, process or change prescribed by regulations.

Except in accordance with the conditions of a license or as authorized by regulations, no one shall deposit or permit the deposit of waste (Section 9):

- In any waters in a water management area.

- In any other place under conditions in which the waste, or any other waste that results from the deposit of that waste, may enter any waters in a water management area.

The Northwest Territories Waters Regulations is enabled by the Northwest Territories Water Act and provides the details for management of wastes. Any industrial activity other than mining and milling, including hydrostatic testing, the exploration for, and production and transportation of oil and gas and cooling systems, are covered by this regulation.

Discussions with the Department of Fisheries and Ocean (DFO), the Sahtu Land and Water Board (SLWB) and the Sahtu Renewable Resources Board (SRRB) have confirmed that no other licenses or permits are required for this phase of the project.

e. **DESCRIPTION OF PROJECT**

Husky has been granted a Type A Land Use Permit (S11T-002) and a Type B Water License (S11L3-002) from the Sahtu Land and Water Board. These permits regulate the use of land and water resources as well as the deposit of waste as they pertain to this project. In 2011/2012 Husky drilled two vertical test wells to obtain core samples and petro-physical information at sites Little Bear N-09 and Little Bear H-64; these wells were then temporarily suspended. Additional phases of this project are to include surface construction for operations support, groundwater drilling for monitoring program implementation and well completions.

f. **PROPOSED LOCATION**



Figure 1. Location of Slater River Project

Access to the area will utilize 30 km of the Government of Northwest Territories (GNWT) winter road from Norman Wells to Tulita. A constructed ice bridge will be used for transport over the MacKenzie River and existing cut lines will be used for access roads. A staging area was constructed on the west side of the MacKenzie River 1.7 km north of the ice bridge and will be used to offload barge supplies and store equipment. Fixed and rotary-winged aircraft will assist ground transportation when required.

Table 1. List of Water Wells and Monitoring Wells Locations (EPP Map Reference)

Well	Lat./Long (NAD 83)	Target
MW-01	65.098419N, 126.267940W	Surficial Groundwater
MW-02	65.067182N, 126.280939W	Surficial Groundwater
MW-03	65.051550N, 126.326047W	Surficial Groundwater
MW-04S	65.049189N, 126.333221W	Surficial Groundwater
MW-04D		Bedrock Aquifers
MW-05	65.022213N, 126.408529W	Surficial Groundwater
MW-06S	65.009585N, 126.434233W	Surficial Groundwater
MW-06D		Bedrock Aquifers
MW-07	65.002435N, 126.466789W	Surficial Groundwater
MW-08	65.005967N, 126.489097W	Surficial Groundwater
MW-09S	64.985556N, 126.513987W	Surficial Groundwater
MW-09D		Bedrock Aquifers
MW-10S	64.997265N, 126.537855W	Surficial Groundwater
MW-10D		Bedrock Aquifers
MW-11	64.968019N, 126.543921W	Surficial Groundwater
MW-12	64.963540N, 126.509614W	Surficial Groundwater
MW-13	64.932539N, 126.466166W	Surficial Groundwater
MW-14	64.942099N, 126.421970W	Surficial Groundwater
MW-15	64.921813N, 126.373554W	Surficial Groundwater
MW-16	64.901931N, 126.325088W	Surficial Groundwater
MW-17	64.879687N, 126.272149W	Surficial Groundwater
MW-18	64.853761N, 126.273792W	Surficial Groundwater
MW-19S	64.889132N, 126.194355W	Surficial Groundwater
MW-19D		Bedrock Aquifers
MW-20	64.874840N, 126.147876W	Surficial Groundwater

g. DESCRIPTION OF SITE CHARACTERISTICS

The majority of the drilling program is situated within the Taiga Plains ecological region, with the western most portions just within the Taiga Cordillera ecological region. In the submitted Environmental Protection Plan there is additional information that specifically

describes the climate, ecological and chemical characteristics of the region.

2. Waste Types

a. WASTE SOURCE, GENERATION AND CHARACTERISTICS

Drilling waste for bedrock aquifer wells is anticipated to consist of native rock cuttings, clay, organics, fresh water and freshwater drilling fluid. Compressed air drilling will be used whenever possible to clear rock cuttings from the wellbore. Depending on the groundwater conditions encountered, this may be switched to fresh water or a clay-based drilling fluid. Waste generated specifically from the groundwater drilling program includes:

- **Drilling Solids:** rock cuttings and organics where fluid is not required to drill;
- **Drilling Water / Mud:** rock cuttings, organics, bentonite clay and fresh water;
- **Groundwater:** clear water pumped from completed wells.

Domestic and food waste will be packed and carried to the work location(s) on a daily basis. These same wastes will be collected and packaged from the site and transported to camp each day for incineration as described in the Construction / Completions Waste Management Plans. It is noteworthy that food waste will be stored in an “airtight” container representing an “odour-proof” means of containment to ensure wildlife is not attracted. All field crews, regardless of container size, will have access and utilize supplied odour-proof airtight containers.

Waste characterization is used in assessing the appropriate handling, treatment, transportation and disposal of the waste. Characterization is the assessment of the physical, chemical and toxicological properties of the product. These properties are used to determine the dangers relating to handling, storage, and transportation of the waste on public roads, and also to determine the environmental consequences of the waste so that an appropriate disposal option can be determined. This allows the determination of hazardous or non-hazardous waste as well as dangerous oilfield waste classification as required in Alberta. Waste transportation and disposal is regulated by the NWT, NEB or Environment Canada and receiving jurisdiction (AB). Regulated waste includes any waste material which is specifically regulated as hazardous (in CEPA or through the various guidelines issued by EPS of GNWT-ENR), and dangerous for transport (in CEPA and TDGA). The NEB through COGOA and CODGR controls all wastes associated with a drilling activity except for the drilling wastes (drilling fluids and drill cuttings) which are managed by Aboriginal Affairs and Northern Development Canada (AANDC) and the Sahtu Land and Water Board. If doubt exists whether a material is a “hazardous waste” or a “dangerous good” consult with the onsite environmental representative.

b. ESTIMATED VOLUME PRODUCED

Table 2. Estimated volumes of wastes generated

Waste	Estimated Volume
Drilling Solids (dirt/rock)	180 m ³
Drilling Mud (water/bentonite)	100 m ³
Groundwater	150 m ³

c. POTENTIAL ENVIRONMENTAL IMPACTS

There is potential that environmental impact from waste related to these activities could occur based on the following circumstances:

- Release of drilling mud to the native environment
- Presence of saline water in groundwater without detection prior to release

d. APPLICABLE WASTE TREATMENT METHODS

Physical Methods: Physical methods such as gravity separation, filtration and centrifugation are means of reducing solids and ease of handling of both liquid and solid wastes in the drilling process.

Evaporation: is used to reduce the quantity of a waste containing a fluid that can be readily evaporated at low temperatures [100°C or less] such as water. The resultant solids can be collected for alternative reuse such as road base construction. If residual material is contaminated it can be transferred and transported by small or large means of containment to an authorized waste receiver.

3. Waste Management Planning

a. DRILLING SOLIDS MANAGEMENT

Native rock cuttings consist of unconsolidated surficial material and bedrock. The inert cuttings brought to surface with compressed air are anticipated to be dry or damp and will be stored in a metal shale bin or bermed in a lined area within the proposed construction project staging area. These cuttings will be incorporated as fill into road construction planned for the 2012/13 winter season.

If aquifers are encountered, and water enters the well bore, water will be used to circulate the cuttings. Waste in this case will consist of inert rock cuttings and fresh water. Cuttings and water will be produced to a heated tank for settling. After field testing, the water will be discharged to the surface using proper dispersion hoses if TDS levels are less than 4000 mg/L (Alberta Environment Definition of Freshwater), and pH is between 6.0 and 9.0. Residual solids will be dried or solidified using dry cuttings, and stored in a lined and bermed area at the proposed staging area and incorporated as fill into road construction, or quarry construction.

If artesian aquifers are encountered, an inert bentonite clay drilling additive will be used to control the flow of water in the well while drilling. Waste will consist of inert mixture rock cuttings, fresh water and bentonite clay. This mixture will be removed and managed as a drilling mud described hereinafter.

b. DRILLING WATER / MUD MANAGEMENT

This section discusses the proper waste handling and management procedures required when dealing with the drilling mud associated with groundwater well drilling. Cuttings are ground up rock and dirt from the drilling process that are returned to surface with the drilling mud. The drilling mud in this application consists only of bentonite clay, sand, grout and water. As this drilling mud is being generated from hydrological testing, there will be no contamination present in the solids. It is estimated that this activity will produce approximately 100 cubic meters of drilling water / mud that will need to be contained, sampled, classified and managed. Although it is anticipated that the material is non-hazardous, Husky will be due diligent in sampling batches of the drilling mud to confirm the waste is inert. Proper characterization is required to determine if disposal is necessary and, if so, the appropriate disposal options.

As the drilling mud is generated, it will be collected in available surface bins. When one bin is full, they will begin filling another bin. Depending on the number of bins available, an alternate bermed and lined area located at the proposed construction staging area, may also be used. Husky may fill multiple bins or the bermed area before collecting representative samples for analysis. Waste will be allowed to settle so that solids and liquids can separate by means of gravity separation to form two distinct waste matrixes. Both the solid and liquid portions in the bins will be sampled and analyzed to confirm the appropriate waste management.

When sufficient waste has accumulated, solids will be sampled as per the steps below.

1. Using a clean sampling shovel / pick, collect grab samples from various surface tanks / lined and bermed area containing the drill cuttings and consolidate the samples into a 20 L pail.

2. Mix the contents of the pail using the sampling tool or another clean tool to create one composite sample of all the samples collected.
3. Collect composite mixtures ensuring there is no head space in the jar. The easiest way to ensure there is no air in the sample is to slightly overfill the jar with material and compress the sample lid onto the jar.
4. Seal and label the sample accordingly and place in a cooler for transportation to an accredited third party lab.
5. Sample will be sent to an accredited lab for analysis of pH, Salinity and Electrical Conductivity, the results will be compared against the Canadian Council of Ministers of Environment (CCME) standards.

The separated solid and liquid waste will then be stored temporarily until the samples have been analyzed and determined to be non-hazardous. If the solid portions of the waste meet the CCME criteria, the solids will be incorporated as fill for road or quarry construction. The liquid portion will be subject to tests as described in the following groundwater management section hereinafter.

c. GROUNDWATER MANAGEMENT

Liquid wastes (groundwater) generated during field investigation activities include fluids produced during well installation, development, purging and sampling, aquifer testing, surface water sampling, and decontamination of equipment. Water produced during pump testing will be stored in a 400bbl tank. It is anticipated that only freshwater will be produced (<4000mg/L Total Dissolved Solids (TDS), Alberta Environment Freshwater Definition). Electrical Conductivity (derives TDS), and pH can both be field screened, and any water exceeding 4000mg/L, pH below 6 and above 9, will be stored until transportation to an offsite disposal facility can be coordinated. If TDS or the electrical conductivity is greater than this, water will be contained in heated above ground 400bbl storage tanks for offsite disposal to an approved third party facility.

After confirming that water is clean through field sampling / screening, the water will be pumped and released to the land through diffuser hoses which will periodically be moved to disperse the water more evenly. The water sampling / screening, and release areas will be recorded for auditing purposes, and will be available upon request to the SLWB / Water Licence Inspector. Well purging will be conducted with a bailer and/or a portable downhole pump. Shallow monitoring wells will be sampled using a reel-mounted submersible sampling pump with variable flow control. Six-inch bedrock monitor in wells will be sampled using dedicated submersible pumps and purge water will be discharged to the ground.

Water quality samples will be taken from each well and Husky will use this information to confirm the non-hazardous properties of the purge water. Alternatively, Husky has a backup plan consisting of temporarily storing the generated purge water in heated above

ground 400bbl storage tanks in the event an unforeseen circumstance or contamination issue arise. When the analytical results confirm that the water meets all applicable standards, Husky will release the water to the environment or keep the water for snow making applications during the construction phase.

d. ALTERNATIVE DISPOSAL OPTIONS

In the rare event that a contaminant is discovered, the waste will be classified according to the contaminant of concern and an offsite disposal option will be arranged. The offsite disposal option would include acceptance and transport to an oilfield processing facility and / or landfill in Northern Alberta or British Columbia. If the contaminant designates the material as a hazardous waste then all Transportation of Dangerous Goods Regulations apply including the requirement for a movement document or manifest.

Downhole Injection: Downhole disposal of waste muds, both oil and water based, from onshore wells may be a suitable disposal option. The liquid or slurried mud waste is pumped downhole. At present, there are no commercially operated downhole injection facilities in the Northwest Territories. In B.C., Tervita Secure and Newalta operate disposal wells in conjunction with their waste treatment facilities. These are located North of Fort Nelson and in Fort St. John. In Alberta, Newalta operates a disposal well as part of its treatment, recovery and disposal (TRD) plant near Zama. It operates under EUB Approval No. WM 063 for surface facilities associated with the Class 1b disposal well located at LSD 08-21-116-06W5M. This facility is permitted to accept fluid for disposal that meets Class 1b disposal well requirements and is also permitted to accept sour fluids [EUB Approval No. 8702]. Tervita operates a Class 1b well in conjunction with the waste treatment facility at Rainbow Lake.

Landfill: Landfills are generally specially constructed and monitored facilities designed to accommodate burial of large volumes of wastes. A key consideration in the operation of a landfill site is the need to ensure long-term containment. Husky will be using Tervita's Class II Oilfield Waste Landfill Facility located in Rainbow Lake, Alberta (Alberta Environmental Approval # 193262-00-00). Design features of this landfill include:

- A high-density polyethylene (HDPE) liner providing primary containment.
- An engineered clay liner providing secondary containment
- A drainage layer that leachate flows through to a collection trench
- A collection sump where leachate is removed
- Surface storage for leachate before its disposal into a deep well
- Continuous landfill capping, grading, and seeding to prevent run-off
- Continuous groundwater monitoring by wells surrounding the cell

e. TRACKING AND RECORDING

All waste records must be tracked through their cycle by the generator and kept on record for a period of two (2) years. The waste generator of the waste (supervisor or his delegate associated with the activity – construction, seismic or drilling) will be responsible for completing part A of the Federal Movement Document (FMD).

Husky has received a hazardous waste generator registration number NTG000277 from the Northwest Territories Environmental Protection Division of Environment and Natural Resources.

Hazardous Waste: The Transportation of Dangerous (TDG) Regulations require that a completed waste manifest form accompany shipments of hazardous waste. In the NWT, a Movement Document supplied by the Department of Environment and Natural Resources qualifies as a hazardous waste manifest form and is recognized by other provincial agencies. All parties involved in the disposal of hazardous wastes, the generator, the carrier and the receiver must be registered and provided with the appropriate registration number. These numbers are required to meet compliance with the TDG Regulations. The form contains the following information.

- detailed information on the types and amounts of hazardous waste shipped;
- a record of the firms or individuals involved in the shipment; and
- information on the storage, treatment or disposal of the waste and confirmation that they reached their intended final destination

The Generator (Consignor), Carrier and Receiver (Consignee) must each complete their portion of the FMD. The information provided on the FMD as well as other TDGR requirements (i.e.: labeling and placarding) are also intended to assist first responders (police, ambulance, fire fighters) with hazard information should a transportation accident occur. The FMD completion instructions are provided on the reverse side of each movement document.

Non Hazardous Waste: The Movement Document supplied by the Department of Environment and Natural Resources will be used to track all non hazardous waste.

f. CONTRACTOR AND ENVIRONMENTAL SERVICES

Husky will have dedicated environmental consultants and waste contractor personnel both in the field and in the Calgary office during the project operations. Waste contractor selection will be conducted through the company's internal selection process to ensure that the contractor is qualified according to company requirements. The prime contractor at the worksite will provide oversight and manage all wastes with a dedicated waste management provider as deemed necessary. The contractor will comply with the following:

- Contracts with waste contractors contain appropriate provisions on health, safety and environmental protection
- Equipment provided for the storage and transport of wastes such as waste bins or containers and trucks are in good working order prior to being accepted by Husky
- Waste materials transferred to contractors are packaged and labeled appropriately, and shipping notification and documentation completed in accordance with approved procedures and that documentation rests with Husky at the end of the winter program
- Waste consignments reach the specified final disposal site and are disposed of at an approved facility
- Transportation costs are closely monitored. These costs are a major cost component of the waste management program and require close control.

Environmental services will include a senior environmental advisor who will provide direction and guidance to the program through the field environmental advisor. The field environmental advisor will be knowledgeable in the handling of wastes as well as requiring the following.

- knows intimately the waste regulations for the NWT, B.C. and Alberta
- can characterize the wastes prior to generation or when it is generated
- have influence in managing water volumes in the drilling operation
- ensure that cross contamination of waste does not occur on the drilling lease or any other Husky operated property
- coordinate the handling and disposition of wastes
- track the waste material and volumes being generated, transported and manifested
- monitor the performance of waste containing equipment being supplied by outside contractors and the authority to reject faulty equipment
- work with the selected contractor and Husky's logistics personnel.

4. Summary of Waste Planning

Each class of waste generated in Husky's operation is identified in the attached Waste Management Table which contains the following:

- Waste Stream
- Description
- Handling Method
- Disposal Method (Handling Code)
- AB Code
- Shipping Name
- PIN
- Class
- PG
- Comments

Husky has created a Waste Management Table that will be posted at the operations site to help field staff determine how wastes are to be managed. A copy of this table is included in this document as Appendix I. The On-site Environmental Technician is responsible, in conjunction with the Husky Supervisor, to ensure that all wastes are managed accordingly.

Appendices

Appendix I Husky Waste Management Table

Appendix I

Husky Waste Management Table

Waste Management Summary Table

Waste Generator Number: NTG 000277

Waste Stream	Description	Handling Method	Disposal Method	AB Code	Shipping Name	PIN	CLASS	PG	Est. Volume	Comments
Drilling Solids	Drilling solids generated during the groundwater monitoring phase of the project	Waste will be stored in designated tanks or in a bermed, lined area.	Waste will be stored onsite until sufficient waste has accumulated to merit analytical testing. Sample will not likely contain contamination. If sample meets criteria, waste solids will be incorporated into roads / quarry	No Provincial Code	Not expected to contain any contaminants	N/A	N/A	N/A	180m3	Haul to approved facility if contamination is present
Drilling Mud/ water	Drilling water/muds generated during the groundwater monitoring phase of the project	Waste will be stored in designated tanks or in a bermed, lined area.	Waste will be stored onsite until sufficient waste has accumulated to merit analytical testing. Sample will not likely contain contamination, and will be clear water pumped off in a controlled manner	WATER	Not expected to contain any contaminants	N/A	N/A	N/A	100m3	Haul to approved facility if contamination is present
Groundwater	Groundwater generated during the groundwater monitoring phase of the project	Waste will be stored in designated tanks or in a bermed, lined area.	Groundwater will be stored onsite until sufficient volumes have accumulated to merit analytical testing. Sample will not likely contain contamination and if freshwater criteria is met, water will be pumped off in a controlled manner to the environment.	WATER	Not expected to contain any contaminants	N/A	N/A	N/A	150 m3	Haul to approved facility if contamination is present

Notes:

1. Use a Federal Movement Document for the transport all Hazardous waste types.
2. Use a Bill of Lading Movement Document for the transport of all Non-hazardous waste types.
3. DOW = Dangerous Oilfield Waste