6.0 Environmental mapping

Figure 3 (attachment 3) illustrates a large-scale map of the area where impacts could theoretically occur from spills. NES's landfarm is located within an industrial area (North 40 industrial park). The most sensitive areas are as follows:

To the North: Natural ponds and small lakes eventually leading to Koojeesse Inlet. The distance between the landfarm and the closest pond is approximately 50 meters.

To the East, West and South: Municipal ditches eventually leading to Koojeesse Inlet. The distance between these ditches and the landfarm property limit range from 5 to 100 meters.

The access to these ditches and ponds is rapid as the landfarm has roads contouring the property. For potential spills flowing outside of the fenced area, field staff would access the impacted area by walking. The spill response equipment depot (described in the 'Resource Inventory' section) is located within the landfarm area on a permanent basis. This equipment is protected from the rain and snow.

The main water supply for the City of Iqaluit is located 2 km from the landfarm. The fresh water lake used as water supply is 45 meters above the landfarm's level. A potential spill from the landfarm directly impacting the fresh water lake is therefore absolutely impossible.

7.0 Resource Inventory

This section describes and lists the manpower, specific types of equipment, machinery and tools available to respond to a possible spill. All the equipment, machinery and manpower needed to address a spill are available on site. It is not anticipated that resources and equipment from other sources be required.

7.1 Manpower

Field staff usually attends the landfarm during business hours from late June to early September. Up to 5 people work at the landfarm. Landfarming is only efficient during the warmer months (end of June to early September), Consequently, the landfarm closes in September and reopens in June. During the fall and spring, the landfarm is inspected on a weekly basis whereas inspections are done on a monthly basis during the winter months. There are no activities at the landfarm during the winter months. The individuals involved in the landfarm operation include Alain Carrière, a foreman and seasonal workers.

7.2 Machinery

The heavy equipment list needed to address a spill is listed below:

- Backhoe or hydraulic excavator or loader
- Service vehicle
- Manual tools such as shovels and wheel barrels

7.3 Equipment

Equipment needed to address a potential spill associated with NES's activities includes the following:

- Hydrophobic sorbent pads: these pads have dimensions varying from 17"x19", 12 oz sheet to 38"x 144' rolls can absorb 1.7 liters per sheet to 347 liters per roll. All hydrophobic pad dimensions are kept on site, as Nunatta Environmental Services Inc. is also a contractor addressing fuel spills in Iqaluit and in Nunavut. Pads are mainly used for surface spills on the ground.

- Hydrophobic sorbent booms: these booms have dimensions varying from 5"x10' to 8"x10' and can absorb from 144 to 216 liters per bale. These booms are mainly used to recuperate petroleum products floating on water bodies.

- All purpose granular oil sorbent : this granular absorbent will recover up to 8 times its own weight in fuel products. Granular sorbent is usually used on floors but can also be used for difficult access areas such as between rocks, on slopes, etc.

- Over pack drums: Once spoiled absorbent pads and booms are placed in a waterproof over pack drum as intermediate storage vessel. The content is either incinerated or shipped to a southern approved facility.

MSDS sheets for such products are found in attachment 2.

8.0 Training and exercise

Nunatta Environmental Services is an environmental contractor. Its main field of activities is summarized below:

- Landfarm operation
- Addressing fuel and other contaminant spills (on soil or on water)
- Asbestos and other waste management
- Project management for environmentally sensitive issues such as phase 1 and 2 investigations and terrain remediation.

NES staff is exposed to environmental situations on a daily basis and have addressed several minor and important spills in Iqaluit and elsewhere in Nunavut. The interventions range from addressing fuel spills in basements or in water bodies to designing a phenol contaminated water treatment plant. NES members are concerned about environmental issues and new employees receive constant training through discussions with more experienced workers. Formally, training and exercises offered to NES employees consists of the following:

For individuals without an environmental background, each new employee spends 2 complete days as observers with an established employee to learn and understand the types of intervention that NES specializes in. Each employee must read and understand the company's Health and Safety Plan and the Spill Contingency Plant.

'Tool box' type of briefing explaining various environmental situations is offered seasonally on a weekly basis. During these sessions, the foreman explains how spills are addressed (for NES's clients) and often recalls that accidental spills do not only happen at Client's property but also on the landfarm area. Directives are given to the employees how to react if a spill was to occur within the property.

A fuel spill and a water containing spill are simulated twice during the summer season. The first exercise is planned while employees are watching the preparations. The second exercise is planned without the field employees knowing that a spill will occur. Each employee addresses the spill (knowing and not knowing that a spill will occur) while the foreman notes the efficiency of the operation. A debriefing is offered to the workers after the event. Training session and exercises are documented (individuals involved, type of training, type of exercise). Reports are annexed to the Spill Contingency Plan.

Mr. Alain Carrière is responsible for preparing the spill exercises, for documenting it and for keeping the Spill Contingency Plan updated. Mr. Carrière has been in charge of NES since NES's inception in 1999 and has been involved in Nunavut on a full time basis since the mid 1970's in earthwork and construction projects. He has been training and supporting local staff projects such as residential, commercial and industrial construction, heavy equipment operation, landfarm construction, emergency spill response, phase 1 and 2 investigations, environmental and geotechnical monitoring, asbestos removal. Mr. Carrière used to sit on the Board of Directors of the Workmen Compensation Board until June 2004. Safety and environmental issues are part of the everyday training offered to staff employed by Nunatta Environmental Services Inc.

Attachment 1

Hazardous Material Information

This section provides information on all potentially hazardous materials stored, handled, or transported by NES. These material include fuel, lubricants, fuel contaminated water and fertilizers.

Arctic Diesel fuel – supplier: Baffin Gas Bar

1- Chemical composition: a mixture of hydrocarbons containing C9-C16 paraffins (53%), cycloparaffins (31%), aromatics (16%), and olefins (0.5%). The aromatic content of Diesel might vary from less than 2.5% to greater than 22% by volume. The benzene content of Diesel is typically less than 0.02%, and a small amount of polycyclic aromatic hydrocarbons might be present in Diesel. Some compounds contain sulfur (up to 50 parts per million)

2- Physical and chemical properties: Flammable liquids having low solubility in water. The lighter fraction of Diesel fuel is readily volatile under normal conditions whereas the heavier fraction will only volatilize after long periods. Diesel density is less than water: approx. 850kg per cubic meter. Diesel has a characteristic hydrocarbon odor and has a light brown color. Boiling point: 170°Celsius.

3- Potential hazards: Diesel is a flammable liquid that will not explode. Diesel is known to be toxic to humans if ingested in relatively large quantities. This type of fuel is non-toxic to microorganisms given that the concentration is less than 10% by weight. It will because toxic to some microorganisms if these concentrations are exceeded. Diesel is not a carcinogenic compound.

4- Emergency response action: In case of fire the following extinguishing media can be used: water and water fog, carbon dioxide, foam and dry chemical. To prevent a fire, avoid high temperatures, sparks and open flame. If spilled in eyes or skin, rinse with water. If ingested, do not induce vomiting. Get medical attention readily. For environmental protection, have absorbent material available during transfer operations.

5- Fuel is delivered to the landfarm on a daily basis for small quantities (using 5 gallon Jerry cans). A fuel truck goes to the landfarm on as required basis. No fuel is stored within the landfarm facility except for 5 gallons of fuel kept on the landfarm for emergency purposes.

6- The fuel consumption will range from 10 to 200 litres per day, depending on the operations undertaken. Fuel is delivered to the site. There is no Diesel storage tank within the landfarm area.

Gasoline – supplier: Baffin Gas Bar

1- Chemical composition: Gasoline is a complex mixture of hydrocarbons containing lightweight alkanes, alkenes and aromatic compounds. Gasoline is more volatile than Diesel fuel. One of the main components is MTBE (Methyl Tert Butyl Ether) and can account for up to 15% of gasoline.

2- Physical and chemical properties: Appearance and Odor: Clear, pink, or blue tinted liquid with characteristic, pungent odor: odor threshold is 0.25 ppm. Boiling Range @ 760 mm Hg: 80-437 degrees F. Specific Gravity (H_2O=1): 0.68-0.76 @60 degrees F. Gasoline is only soluble in water at trace levels.

3- Potential hazards: Fire - the auto ignition temperature is gasoline is 480°F. Explosion: Vapors may travel extended distances and flashback with explosive force if ignition sources are present. Clothing, rags, or similar organic material contaminated with the product and stored in a closed space may undergo spontaneous combustion. Human health: Work in well ventilated areas using good engineering practices to process, transfer and store. Explosion-proof equipment is required. Vapor recovery systems may be required in some areas. Mechanical ventilation is required for confined spaces such as tanks and vessels. Environment: Gasoline is non-toxic to microorganisms given that the concentration is less than 10% by weight. It will because toxic to some microorganisms if these concentrations are exceeded. Gasoline contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm. These chemicals are: Benzene (cancer), toluene (reproductive effects).

4- Emergency response action: Fire - In case of fire the following extinguishing media can be used: water and water fog, carbon dioxide, foam and dry chemical. To prevent a fire, avoid high temperatures, sparks and open flame. If spilled in eyes or skin, rinse with water. If ingested, do not induce vomiting. Get medical attention readily. For environmental protection, have absorbent material available during transfer operations.

5- Gasoline is delivered to the landfarm on a as required basis (using 5 gallon Jerry cans). No gasoline is stored within the landfarm facility.

6- Gasoline consumption will range from 1 to 20 liters per day, depending on the operations undertaken. Gasoline is delivered to the site. There is no gasoline storage tank within the landfarm area.

20:20:20 Fertilizer – Supplier – Cooperative St-Clet, Quebec

1- Chemical formula: 20:20:20 fertilizer contains urea (ammonium nitrate), monobasic and dibasic ammonium phosphate, and potassium nitrate.

2- Physical and chemical properties: water soluble granules used as plant food.

3- Potential hazards: fire – non-flammable. Explosion: non applicable. Human health - Exposure can occur by eye or skin contact, ingestion, or inhalation of dusts or mists. Eye contact may cause slight, temporary irritation. Skin contact may cause mild irritation. Ingestion may cause nausea, vomiting along with mild irritation to the mouth, throat, esophagus and stomach. High dust concentrations may cause mild respiratory tract

irritation with coughing and nasal discharge. Environment: this fertilizer is water-soluble. Excess products will enter water systems and cause eutrophication.

4- Emergency response action: Fire – not considered as flammable. Explosion: – non applicable. Human health, first aid: EYES: If in eyes, hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for treatment advice. SKIN: If on skin or clothing, take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice. INGESTION: If swallowed, call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to by a poison control center or doctor. Do not give anything by mouth to an unconscious person. INHALATION: Move person to fresh air. Call a poison control center or doctor for further treatment advice. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth. Call a poison control center or doctor for further treatment advice. Environmental protection: proper dosage in the soil system is essential to prevent water soluble fertilizers to enter water bodies. If spilled, remove granular fertilizer and dispose adequately. If excess fertilizer enters a water body, pump water (if possible) and treat.

5- Outline of transportation: Fertilizers are transported to the landfarm in sealed steel 45 gallon drums on wooden pallets. The drums will be stored adjacent to the site in a heated building. There is no by-products or secondary products upon use of the fertilizers.

6- Rate of usage: Fertilization is required on a monthly basis in June, July, August and September. Fertilizers are applied to the land's surface with a conventional granular spreader. Approximately 500 kg per application is anticipated. The storage area will contain 2 years worth of fertilizer application, approximately 2,000 kg or 10 sealed barrels.

Hydraulic fluid – Supplier: Ultramar Canada

1- Chemical composition: Hydraulic fluid is composed of petroleum hydrocarbons having moderate to high molecular weight compounds. Hydraulic oil is a red colored fluid. According to WHMIS regulations, hydraulic fluid is not considered as a hazardous product.

2- Physical and chemical properties: Hydraulic fluid is a liquid with a boiling point reported to be 212 ^{o}F., with a specific gravity higher than water: 1.089 kg per liter. It has no reported vapor pressure.

3- Potential hazards: Fire – Hydraulic fluid is not a flammable product. Explosion – Does not explode. Human health: routes of entry (Skin contact; Eye contact; Ingestion). Preventive measures reported in the MSDS sheets. Environment: can be toxic to microorganisms if found in concentrations greater than 10% by weight.

4- Emergency response action: Fire: If hydraulic fluid sets on fire, Apply alcohol-type or foam for large fires. Apply water spray, carbon dioxide or dry chemical for small fires. Explosion: Hydraulic fluid will not explode. Avoid strong oxidizing agents. Human health and first aid – Eyes: wash with water, consult a doctor. Skin: wash with soap and water.

Ingestion: drink water and induce vomiting. Inhalation: breathe fresh air. Environmental protection – recuperate if spilled on soil; hydraulic oil is heavier than water. Pump deposited hydraulic fluid if spilled in a water body.

5- Outline of transportation: Hydraulic fluid is already present in heavy equipment. In the event that an hydraulic hose would rupture, it would be fixed and a small quantity of hydraulic fluid would be delivered to the landfarm. Soil spoiled with hydraulic fluid is placed in the landfarm for treatment. Hydraulic fluid is not stored within the landfarm zone.

6- Rate of usage: on an as-required basis but is anticipated not to exceed 50 liters per field season. Hydraulic fluid is stored at the supplier's installations.

Motor oil – supplier: Pennzoil – Quaker State

1- Chemical composition: petroleum distillates, dewaxed solvents, Dialkyl(C1-C14)dithiophosphoric acid, zinc salt

2- Physical and chemical properties: Motor oil is a liquid with a boiling point reported to be 220 °F, with a specific gravity higher than water: 1.11 kg per liter. It has no reported vapor pressure.

3- Potential hazards – Motor oil is not a flammable product. Explosion – Does not explode. Human health: routes of entry (Skin contact; Eye contact; Ingestion). Preventive measures reported in the MSDS sheets. Environment: can be toxic to microorganisms if found in concentrations greater than 10% by weight.

4- Emergency response action: Fire - If motor oil sets on fire, apply alcohol-type or foam for large fires. Apply water spray, carbon dioxide or dry chemical for small fires. Explosion – motor oil will not explode. Human health and first aid - Inhalation: Negligible hazard at room temperature (up to 95 degrees F). High temperatures or mechanical action may form mists or fumes. Inhalation of oil mists or fumes can cause irritation of the nose, throat and upper respiratory tract. Eye Contact: May cause irritation to the eyes. Skin Contact: Prolonged or repeated contact with skin may cause mild irritation and possibly dermatitis. Symptoms may include redness, edema, drying, defatting and cracking of the skin. Ingestion: Low toxicity. Pulmonary aspiration hazard if swallowed. Swallowing may cause stomach cramps and diarrhea. Environmental protection - recuperate if spilled on soil; motor oil is heavier than water. Pump deposited motor oil if spilled in a water body.

5- Outline of transportation – Oil change on heavy equipment is not done at the landfarm. Equipment is sent to a local garage for maintenance. A small quantity of motor oil and grease tube will be stored on site in a rain and snow shelter. A maximum of 20 liters of motor oil will be stored on site.

6- Rate of usage: motor oil changes are done in a local garage. During the daily heavy equipment inspection, motor oil levels are checked. Motor oil will occasionally be used to fill up crankcases to the required levels. The bulk of the motor oil used by the equipment is based at a local garage.

Material Safety Data Sheets for the above listed products are found in Attachment 2.