EKALUGAD FJORD PROJECT

HEALTH AND SAFETY PLAN

APPENDIX 6

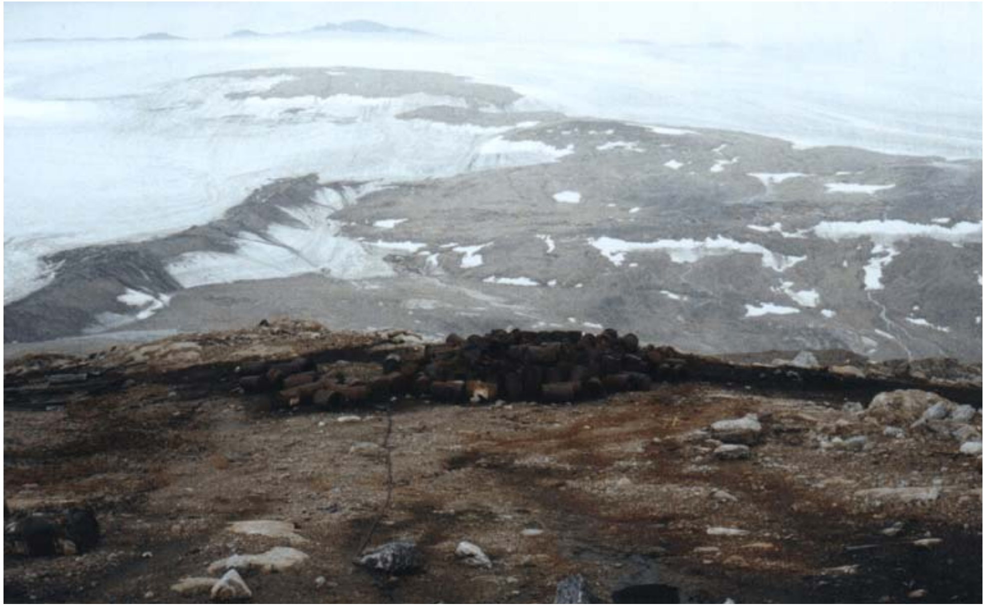
Spill Contingency Plan

SPILL CONTINGENCY PLAN

Clean Up and Camp Service

FOX-C Dew Line Site

EKALUGAD FJORD PROJECT



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QIKIQTAALUK CORPORATION

July 2005 (revision 1: December 2005)

EXECUTIVE SUMMARY

The clean up activities at Ekalugad Fjord shall be conducted over a period of three years starting in August 2005. Investigations performed at this abandoned former Intermediate Dew Line station (FOX-C) located in the Canadian Arctic have demonstrated the extent of environmental problems from past occupation.

This document describes requirements for fuel spill emergency planning to be implemented during the clean up and camp service works. It includes:

a– Duties and Responsibilities
b– Fuel and Lube Requirements and Storage Capacity
c- Training and Drills
d- Material and Equipment
e- Emergency Procedures
f– Reporting Requirements

The Ekalugad Fjord Clean Up project mainly consists in the management of immediate health and environmental risk problems such as contaminated soils, PCB amended paint, asbestos, and barrel contents (POL products). It also involves the decommissioning of abandoned facilities including landfill closure. For the camp service project, a remote construction camp will be operated and managed to accommodate the working crew. Approximately 40 persons will occupy the camp over a 75 day period from July 1 to September 15.

This project is administered by Public Works and Government Services Canada (PWGSC), acting on behalf of the owner, Indian and Northern Affairs Canada (INAC). Following competitive tenders, the clean up and camp services projects were granted to Qikiqtaaluk Corporation, a company owned by the Qikiqtani Inuit Association (QIA), the Inuit birthright organization representing the Baffin region of Nunavut.

The Ekalugad Fjord Clean Up project shall provide employment and training benefits for Inuit. It shall also attenuate local inputs from pollution to the nearby communities, thereby protecting health and future of the Inuit.

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PREAMBLE

The Spill Contingency Plan shall be effective from August 2005 until October 2008, date to which the Ekalugad Fjord Clean Up and Camp Service Projects (61˚ 35' N and 60˚ 40' W) shall be completed.

The following formal distribution has been made of this Plan.

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Brad Thompson, PWGSC, Alberta
Robert Martin, INAC, Contaminated Sites Program, Iqaluit
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1-GENERAL

The spill emergency plan was developed to assist the Contractor in implementing measures to protect the environment and minimize impacts from spill events. It provides precise instructions to which all personnel shall be familiarized with during emergency situations. The Plan outlines procedures for responding to spills in a way to minimize potential health and safety hazards, environmental damage, and clean up costs.

The map presented on the following page shows the existing layout of the site. Ekalugad Fjord is located on the east coast of Baffin Island, Nunavut (68˚ 42' N, 68˚ 33' W), approximately 195 km south of Clyde River. The site (FOX-C) is about 1.5 km inland from the coast, on the south shore of Ekalugad Fjord. The operations station (upper site) is situated 770 m above sea level, overlooking the Fjord which discharges into Home Bay. The upper site contains areas of environmental concern such as patches of PCB and metal contaminated soil, four dumps, building materials contaminated with PCB amended paint and Asbestos (Module train), a POL drum storage area, and some 3,400 drums scattered on and around the site (some of which still contain POL products). Three buildings, two POL tanks and a collapsed antenna, which will have to be demolished, are also present on site.

The beaching area (lower site) is located in Qarmaralik Cove, about 3 km northwest of the upper site. From the beach, a gravel road leads to the fresh water lake area (lower site), located some 2.5 km away. The main environmental concern associated with the lower site are the 6,600 or so drums located in several caches and scattered along the road, the lake shore as well as in the river valley between the lake and the ocean. Some of these drums still contain POL products. The lower site also has potentially large volumes of hydrocarbon contaminated soils. Furthermore, there are 2 POL tanks and a refuelling pipeline to be demolished.

The upper site is located some 6.5 km from the beaching area by gravel road. The road which links the beach to the lake and to the upper site has been badly damaged by erosion throughout the years. In many places the road is impassable and will need repair.

The spill emergency plan insures that the Contractor will respect all applicable laws, regulations and requirements of federal and/or territorial authorities. The owner is acquiring all required permits, approvals and authorizations required for the project. The Contractor will comply with those permits and approvals obtained by the owner (INAC) to conduct this work. The Contractor will work in close collaboration with PWGSC and DIAND, and with all regulatory authorities to ensure full compliance

according to applicable federal or territorial laws, regulations and/or guidelines. The following documents shall be used as guidelines for spill containment:

– The *Canadian Environmental Protection Act* controls hazardous substances from their production and/or import, their consumption, storage and/or disposal. Furthermore, this act also includes procedures to handle specified levels of PCB contaminated materials, and requirements for PCB storage facilities.

– The *Fisheries Act* protects fish and their habitat from pollution, disturbance, or fish movement disturbances. Fisheries and Oceans Canada is responsible to review permit applications or restoration plans submitted by other agencies.

– The *Transportation of Dangerous Goods Act* and *Regulations* describe safety measures in the transportation of dangerous goods. The act applies to all handling of dangerous goods by any means of transport whether or not the goods originate from or are destined for any place(s) in Canada.

– The *Territorial Land Use Regulations* define regulatory measures to maintain appropriate environmental practices for any land use activities on territorial lands. These regulations require that land use permits be issued for such operations as the clean up work to be conducted at Ekalugad Fjord (use of heavy machinery, camp operation, use of explosives, construction of access roads, etc.).

– The *Guidelines for Preparation of Hazardous Material Spill Contingency Plans* describe parameters that should be considered in the development of hazardous material spill emergency plans. It also defines the information that should be incorporated into a comprehensive contingency plan.

– The *Code of Practice for Used Oil Management* defines appropriate environmental options for handling, storage, collection, recycling, transportation, reuse and/or disposal of used oils in Canada. It gives standard procedures to handle used oil generators. It also helps regulatory authorities to formulate provincial and/or regional strategies for used oil management.

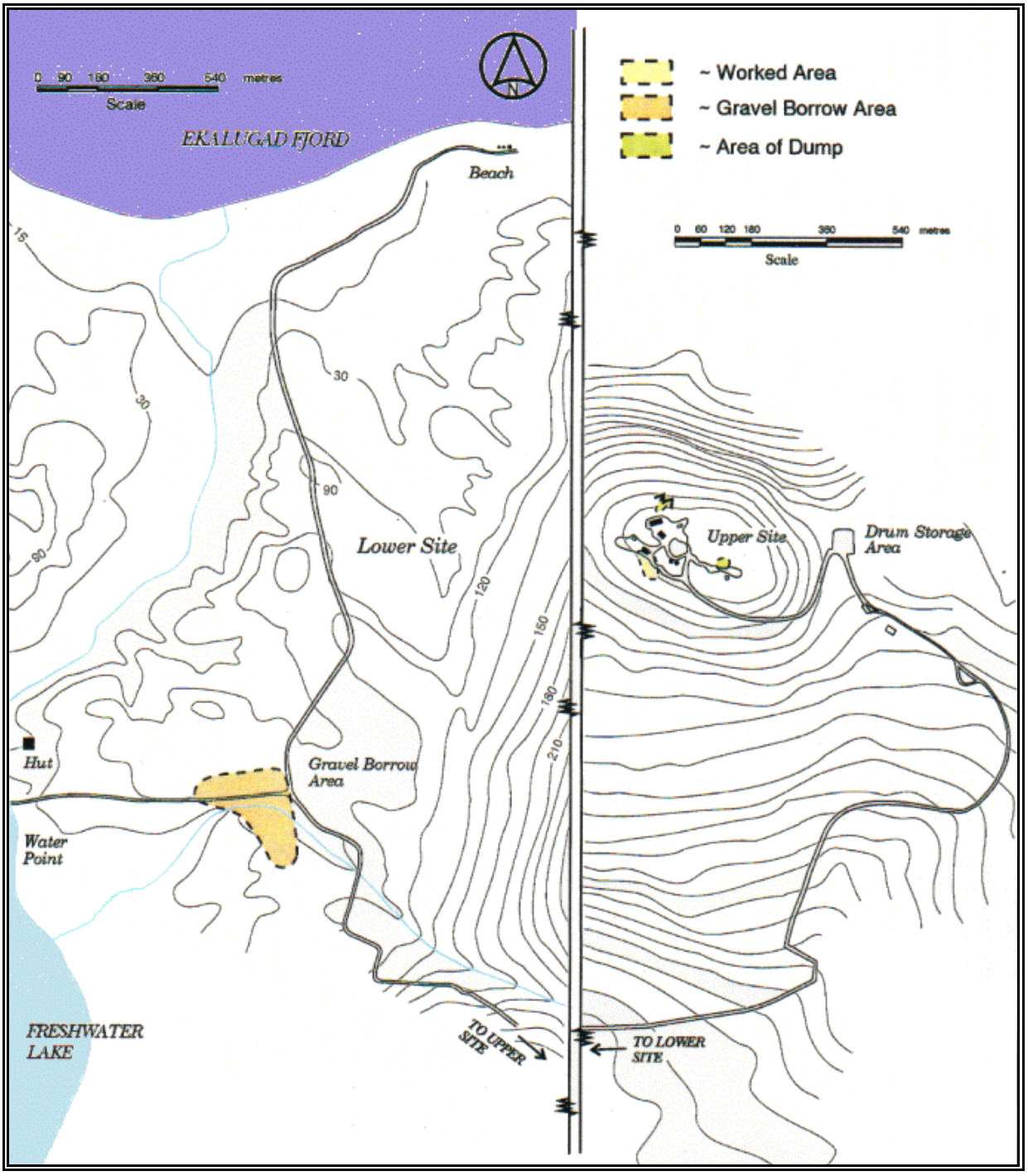


Figure-1: Ekalugad Fjord Project Site Layout
(courtesy of ESG)

– The *NWT Environmental Protection Act* governs the protection of the environment from contaminants. The act defines offenses and penalties as well as the powers of environmental inspectors.

– The *Code of Practice for Used Oil Management* defines appropriate environmental options for handling, storage, collection, recycling, transportation, reuse and/or disposal of used oils in Canada. It gives standard procedures to handle used oil generators. It also helps regulatory authorities to formulate provincial and/or regional strategies for used oil management.

– The *NWT Environmental Protection Act* governs the protection of the environment from contaminants. The act defines offenses and penalties as well as the powers of environmental inspectors.

– The *NWT Spill Contingency Planning and Reporting Regulations* describe requirements for spill reporting and emergency planning.

– The *Field Guide for Oil Spill Response in Arctic Waters* developed by the Emergency Prevention Preparedness and Response, a program of the Arctic Council, describes response methods and strategies for operations and provides technical support documentation.

2-FUEL AND LUBE REQUIREMENTS AND STORAGE CAPACITY

A variety of fuels, oils and other hazardous materials will be used during clean up activities at the Ekalugad Fjord site. The greatest volumes involved consist in diesel fuel. Other substances such as aviation fuel, lubricant oils, hydraulic fluid, antifreeze, fuel additives, gasoline, engine coolants, cleaning solvent (DIPSOL and SUPREX) are used but their volumes are small compared with diesel fuels. All these products are to be considered as potential environmental and safety hazards.

The following table summarizes the estimated quantities mobilized on site.

Table-1: Quantities of Petroleum Products stored on site

Liquids to be used	Estimated Volumes (Litres)
diesel fuel	356,640
Aviation Fuel (Jet A1)	41,000
Gasoline	10,250
Engine oil	4000
Transmission oil	1000
Differential oil	600
Hydraulic oil	1000
Coolant	600
DIPSOL	205
SUPREX	205

The MSDS of all these products are found in appendix 1. All petroleum products were delivered to the site (by marine shipment) in 205-Litre drums strapped on pallets. Once used, all these UN approved drums will be either sent back down south by marine shipping during site demobilization to the supplier to recover the deposit, or crushed and landfilled on site, if damaged. A variety of intermediate fuel tanks will also be used to:

– Supply the camp generator: 2 above ground fuel tanks having a capacity of 1360 litres each (i.e. 300 gal) located within the seacans in which gensets are installed. These fuel tanks will be filled from drums using a 12-Volt fuel pump (20gpm).

– Supply the different heavy equipments on the field: One 683 litre tank (150 gal) and two 1140 litres (250 gal) installed in the back of Ford F250 pick up trucks. These fuel tanks will be filled from drums using a 12-Volt fuel pump (20gpm). A 12-Volt fuel pump will also be used to transfer the fuel from these tanks for equipment reservoirs.

For all petroleum products stored in drums, the following storage facility is to be used:
The drum storage will be installed about mid way between the beach area and the water lake area, near borrow are #4, at distance away from highwater mark and traffic to comply with all conditions of permits (see figure 3 for location). Small berms will be constructed around the storage area (to contain spills from accidents), spill kits (see below) will be installed in the vicinity and restricted area/no smoking area placards will be posted. The area will be graded to have a smooth gravel pad prior to haul pallets from the beach (sealift unloading) to the storage area.

Hand operated pumps are to be used for fuel transfer operations with drums of gasoline, oils and lubricants.

3-DUTIES AND RESPONSIBILITIES

As part of the spill emergency response, the Contractor is responsible of implementing, through its site superintendent or its authorized representative, the following procedures:

a- To communicate immediately the spill event to the PWGSC official (immediately shall mean upon discovery).
b- To authorize the use of personnel and applicable equipment to contain the spill using the most reliable method.
c- To eliminate all fire hazards and potential ignition sources near the spill area.
d- To implement all required safety and security procedures at the site of the spill.
e- To eliminate the source of the spill or reduce the rate of discharge, if such procedures can be implemented with respect to health and safety requirements.
f- To contain the spill using the most appropriate methods for the situation (dykes, ditches, sorbent materials, containment booms and other barriers).
g- To evaluate the possibilities of recovering spilled chemicals.
h- To mobilize all available personnel, equipment and tools, as required.
i- To obtain assistance from PWGSC (through its official), from DIAND (the owner) and/or from Environment Canada, if required. To consult and, if required, request assistance from the Canadian Coast Guard and/or and Fisheries and Oceans

Canada if the spill affects water.

j- To obtain additional assistance by hiring northern residents from local communities and/or specialized spill response firms, if required.

k- To comply with all applicable guidelines and regulations.

l- To assess on a preliminary basis, environmental impacts on marine, freshwater and terrestrial wildlife and on the general ecosystem and then to communicate with relevant authorities.

m- To provide documentation for all events and actions.

n- To report the event to the GN Spill Report Line and to prepare and submit a written spill report using the appropriate form (see below for the list of information required for such submittals).

As part of the spill emergency response, the Site Superintendent is responsible for the implementation of the following procedures:

a- To ensure that appropriate resources required to respond and clean up the spill are made available.

b- To supervise containment, clean up and restoration operations.

c- To provide documentation for all events and actions.

d- To notify relevant government authorities.

The site superintendent, acting as the incident commander, will have authority over the following department/unit, each having a specific role for the spill response operations:

Table-2: Roles of Key personnel under the site superintendent for spill response

Department/Unit	Responsibility
Fire Chief	Ensure existing conditions do not present a fire/explosion hazard
Health & Safety Officer	Ensure spill response workers are not exposed to health and safety risks
Contractor's Site Engineer	Coordinate spill response methods and procedures
Medical / Rescue Unit	Provide assistance to victims (if required)
Spill Response Team Leader	Implement the containment and clean up activities
Containment Unit	Perform spill response
Clean up Unit	Conduct remediation

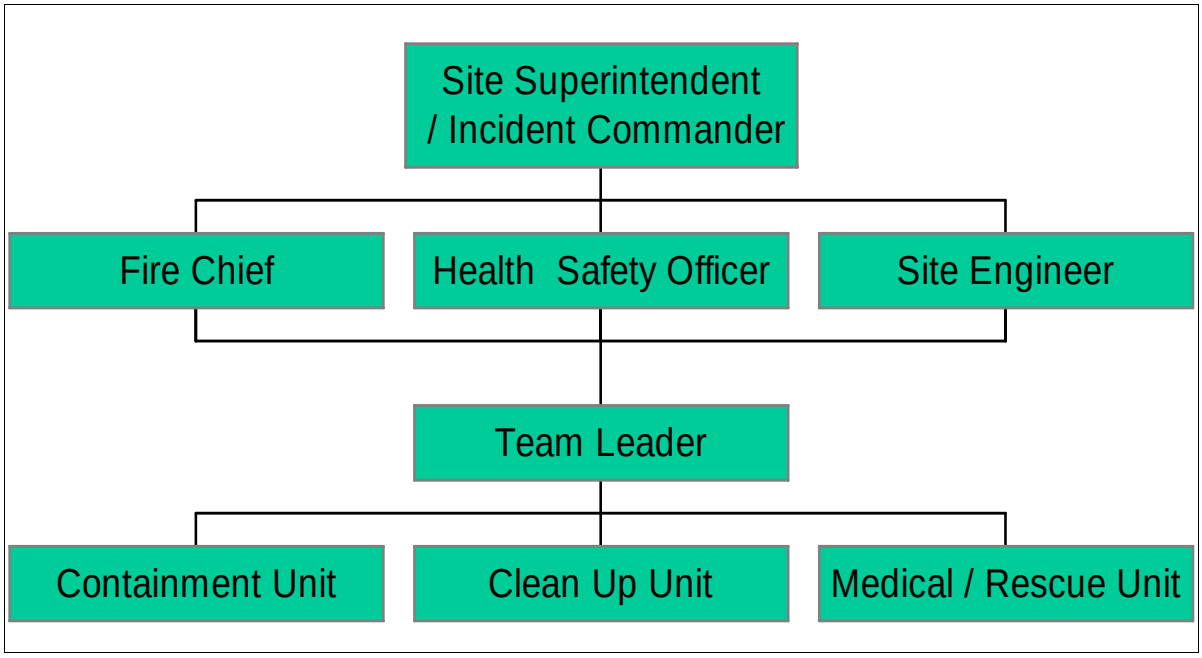


Figure-2: Emergency Response Team

Once a spill event is reported, the site superintendent, fire chief, health & safety officer and site engineer shall meet to establish a specific strategy for containing and controlling the spill and to initiate the clean up activities. They shall delegate a person - the Spill Response Team Leader - to oversee the implementation of the strategy. Members of the Ekalugad Fjord Fire / Rescue Team, under the direction of the Spill Response Team Leader shall then coordinate the activities of the Containment and Clean up Units. Figure-2 shows a graphic representation of the emergency team and chain of command.

Otherwise, the Contractor will ensure that any selected shipment company have prepared the contingency plans (emergency response plans {ERP}) required to face spill events, and that they can comply with all applicable regulations. The shipment company will be responsible to register their ERP, if required, with the Director General of the Transport of Dangerous Goods Directorate if materials identified for transport are exceeding volumes listed on schedule XII of the TDG regulations. The ERP shall contain information on the nature of risks from dangerous goods and contact names and numbers for emergency assistance.

If during transport, a spill of hazardous materials exceeds the volumes listed in Part 9, Table I of the TDG regulations, the shipment company authorities will have to immediately notify the relevant authorities using the contact lists defined in Table II of the same regulations. The shipment authority will also have to inform his/her employer, the owner of the transport vehicle, and the dangerous goods owner. The shipment authority's employer will then be required to submit a written report to the TDG Director General within 30 days following the spill event.

The Contractor will ensure that the selected shipment company reports the spill events, if those occur, using the appropriate spill response line. Quantities of substances which represent "a spill" are listed in schedule B of the NWT Spill Contingency and Reporting Regulation.

If a spills occurs on water during shipment of material, the shipment company will be responsible to deploy containment booms and recover as much fuel as possible with required and available equipment.

4-TRAINING AND DRILLS

All personnel on site shall be informed that any spill of fuel and/or hazardous liquids or solids, whatever the extent, has to be reported immediately to the site superintendent or his authorized representative.

The site superintendent and the health and safety officer shall select a group of 4 to 6 on-site workers to be assigned to spill containment in case of emergency. These persons shall be aware of available spill containment equipment, protective clothing and containers and shall be responsible to implement procedures and coordinate other workers if required. These persons shall also be aware that defensive actions and techniques employed will depend on a variety of factors. These include, but are not limited to:

a- type of pollutant;
b- degree of loss;
c- topography of the nearby area; and
d- proximity to water.

Also, they should know that the most common pollution incident potentially occurring at the Ekalugad Fjord site will probably be caused by fuel, oil or other hazardous fluid spills onto land or water resulting from:

a- human error during transfer operations of fuel from storage drums to day tanks;
b- rupture of lines, tanks or valves from accidental damage, deterioration or equipment

failure; and

c- leaks from fittings or valves.

Finally, the spill containment team shall be aware that, if a spill occurs, the protection of human health and safety shall be a priority. Even if emergency procedures are attempted to rapidly clean, contain and dispose released contaminants to minimize further environmental impact, human exposure during spill event is to be considered as a real concern and be prevented.

The Contractor site superintendent shall organize a drill with each rotating spill containment team near the beginning of each season. These drills shall mainly be used to determine the time required to mobilize equipment at the drum storage area.

5-MATERIAL AND EQUIPMENT

In order to prevent spills and provide an appropriate response in case of spill events, the Contractor maintains on-site appropriate equipment and material required. These equipment and materials are present on site. A list of spill prevention and spill containment equipment including protective clothing is presented below. Figure-3 presents the locations of hazardous material and spill kits on site.

5.1 Spill Prevention

The materials and equipment used for spill prevention are essentially related to waste oil incineration, temporary fuel tank inspection, and temporary containment basin construction:

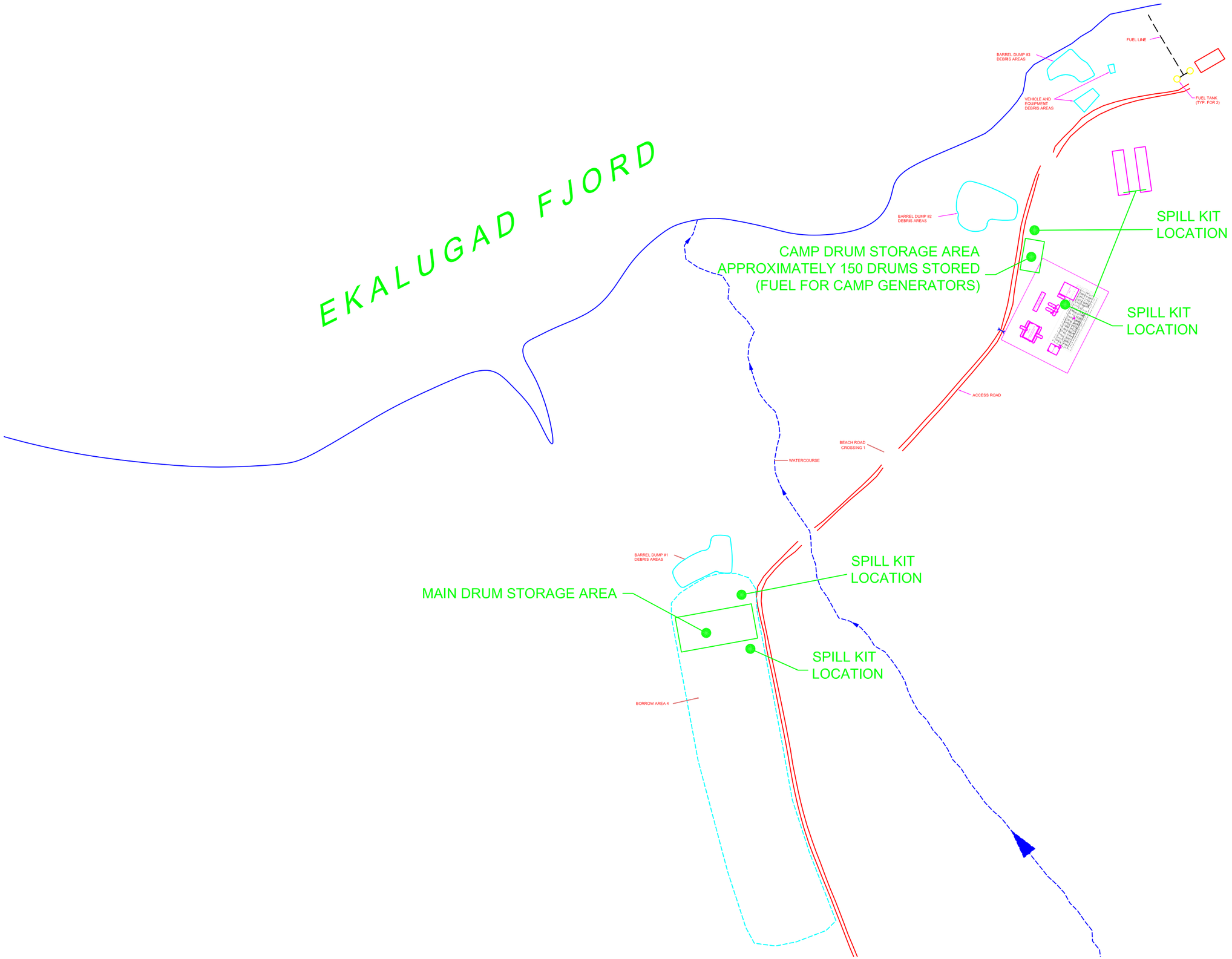
Qtt	*Description*
1	roll of HDPE geomembrane
2	Westland waste oil burner

5.2 Spill Containment

The material and equipment to be used for spill containment and emergency response including protective clothing are:

Qtt	*Description*
5	Containerized spill kits having 10 sorbent booms, 2 safety glasses. 2 Nitrile gloves, 100 sorbent sheets
10	Rolls of (38" x 144') sorbent sheets

5	100 metre long/8 inch diameter oil sorbent booms
1	Vacuum suction hose/tank installed on a trailer
2	1 ½" and 2" x 25 ft oil hose c/w kamlock fittings
10	Emergency eye wash station c/w saline solution
10	First aid kit
2	Case of disposable coveralls (50 per case)
2	Cat bulldozer (D6)
2	Cat excavators (320L and 322BL)
2	Cat integrated tool carriers (950 and IT38) c/w snow/gravel bucket, 4 ft forks, material handling arm
1	Cat dump trucks (D250)
3	Dump trucks (Mack and GMC)
1	Bobcat 763 skid loader
25	Fire extinguishers
4	Fire extinguishers, class ABC, 20 lbs dry chemical
1	high pressure air compressor c/w moisture separator, low pressure regulator, adaptor to recharge fire extinguishers and Scott paks
4	Scott air pak (Draeger)
8	spade nose shovels
1	Electric fuel pump - stationary 115 V, approx. 15 USGAL/min , explosion proof switch, water sediment filter
200	Leather work gloves
100	Rubber gloves
20	Nitrile gloves
15	Cartridge half mask respirator
1	Cartridge full face respirator
40	Organic vapour cartridges
120	Pre-filters and filter clips
500	Disposable dust masks
40	Rubber boots steel toe and shank
40	Safety goggles
100	Saranek & Tyvek suits


EKALUGAD FJORD
BARREL DUMP #3
DEBRIS AREAS
FUEL LINE
VEHICLE AND
EQUIPMENT
DEBRIS AREAS
FUEL TANK
(TYP. FOR 2)
BARREL DUMP #2
DEBRIS AREAS
SPILL KIT
LOCATION
CAMP DRUM STORAGE AREA
APPROXIMATELY 150 DRUMS STORED
(FUEL FOR CAMP GENERATORS)
SPILL KIT
LOCATION
ACCESS ROAD
BEACH ROAD
CROSSING 1
WATERCOURSE
BARREL DUMP #1
DEBRIS AREAS
SPILL KIT
LOCATION
MAIN DRUM STORAGE AREA
SPILL KIT
LOCATION
BORROW AREA 4

6-SPILL RESPONSE PROCEDURES

Following a spill event, specific procedures shall be implemented by the person who first noticed the emergency situation. These procedures are as follows:

a- Immediately warn other personnel working near the spill area.

b- Evacuate the area if health and safety are judged to be threatened.

c- If not, take appropriate measures to stop, contain and identify the nature of the spill.

d- Report to the PWGSC site representative and the Contractor's site superintendent all relevant information concerning the spill event such as the type and volume of contaminant, the location and approximate size of the spill, the actions already taken to stop and contain the spill and all other observations including the presence of wildlife and meteorological conditions.

The spill clean up approaches shall be discussed with PWGSC and INAC. INAC will communicate with Environment Canada. The selected methods shall be based on criteria where the impacts on human health and safety, wildlife, land, water and other environmental parameters are minimized.

To manage a spill incident, some emergency clean up guidelines shall be followed by the Contractor when applicable. These incorporate some of the material previously described and include:

e- Sorbent materials will be used to contain the spill and/or to minimize its movement.

f- Appropriate protective clothing and other safety devices will be used to handle spilled materials.

g- When the spill occurs on land, dykes may be constructed to limit the spill movement providing granular material is sufficiently available. Snow dikes covered with an impermeable liner may also be used if snow still remains. Otherwise, containment booms will be installed in front of the plume and secured to make sure these sorbent barriers do not get saturated.

h- Any free product settled in ditches, trenches or any other ground cavities will be removed using equipment such as pumps, buckets or skimmers. Recovered fluids will be temporarily stored in appropriate containers.

i- Any spill areas will be cleaned up to an extent where land, water and other disturbed environmental systems are restored and the site is left as close as possible to its original state.

7-POTENTIAL SPILL ANALYSIS

As part of the analysis of potential spills, their fates and effects, three potential sources of spills have been identified for the Ekalugad Fjord clean up and camp service projects. The first is the drum storage area located at the middle site. The second is related to the management of scattered waste drums (to be cleaned up) located everywhere on-site. The third consists in the fuel delivery using fuel tanks on pick-up trucks. Each of these three sources are analysed in detail in the following pages.

7.1- Scenario #1: Drum Storage Area

The drum storage area will consist of a levelled pad where pallets will be staged/stockpiled. All pallets of drums will be somewhat independent and, therefore the spillage of one drum should not affect the others.

Two potential situations could occur that would cause a spill:
1) the accidental spillage of fuel during transfer into temporary tanks;
2) the rupture of drums, possibly from a violent impact caused by the collision of a vehicle or piece of heavy equipment.

In the first case, the spilled volume would be, at worst, 45 gallons, which represents the entire volume of one drum. In the other case, we can assume that the impact would occur at mid-height on two stacked pallets and, at worst, sixteen drums would be affected. Therefore the spilled volume should not exceed a total volume of 720 gallons.

In either case the spillage flowrate would be moderate to high and we can assume that the entire volume would be spilled within 15 to 20 minutes.

The general direction of migration would be along the natural drainage pathway. The high water mark is to be located minimum 100 metres down-gradient from the drum storage area. It is unlikely that the spilled fuel would reach the lake because the porous sandy soil along the way would soak up part of fuel, and also because the low slope will not allow for rapid flow of fuel, thereby providing enough time for the spill response procedures to take effect.

The spill would be communicated by the witness of the scene to the site superintendent, or in his absence, the assistant site superintendent. The latter would then go down the chain of command

and advise the appropriate persons of the immediate actions to be taken. Radio communication is to be used at all times on the site and key team members will carry a radio with them at all times.

The personnel responsibilities are outlined in previous sections of this document. The witness of the spill would be advised to try to stop the source of the spill, while waiting for backup help to arrive; his actions would be immediate. The Contractor site engineer would coordinate the spill response activities carried out by the containment unit. Members of this unit would be mobilized to the spill site. The drum storage area can be reached from any other area of the site within a maximum of 25 minutes.

Mobilization of containment equipment to the spill site can be carried out rapidly. A bulldozer and bucket loader will be present in close proximity and can reach the site of the spill within a matter of minutes. A sand and gravel pit is also located in the vicinity, if required for berm construction. Spill response kits containing sorbent material will be kept next to the drum storage location. Containment would be carried out by the construction of soil berms and the installation of sorbent booms. After containment, clean up equipment can be mobilized to the site. A list of equipment is presented in previous sections of this document.

Safety hazards associated with the spill event includes the risk of fire. This can be minimized by preventing personnel from smoking near the spill scene. Risks to personnel (from inhalation and dermal contact) can be prevented by the proper use of personnel protective equipment.

Measures and procedures to prevent such events from occurring include regular inspection of the drum storage area and containment system, and safety rules concerning the use of vehicles and heavy equipment on site, especially in close proximity of this area (*e.g.,* speed limits, training of heavy equipment operators, restricted area posting, safety orientation of workers, etc.).

7.2- Scenario #2: Management of Waste in Scattered Drums

Various abandoned fuel caches, waste drums and dumps potentially containing contaminated petroleum products and/or solvent are to be managed/remediated. During operations, the likelihood of spillage exists.

Two potential situations could occur that would cause a spill:
1) the sudden breakage of tank piping or fittings containing POL product during clean up;

2) the rupture of a drum/tank found in dumps, possibly from a violent impact caused by the collision of a vehicle or piece of heavy equipment.

Any incident causing the spillage of one drum or a remaining unknown small tanks, would bring the fuel to flow onto the surrounding area.

The rupture of unknown tanks during clean up operations might cause the loss of most significant volume, but based on previous investigations, this is unlikely. In this case, the spilled fluid would probably flow towards the natural cavity formed by the waste landfill which would serve as natural containment

In either case, it is most unlikely that any sensitive receptor would be impacted from the spills because of the fuel infiltrating into the soil and bedrock, as well as the rapidity of response measures.

The spill would be communicated by the witness of the scene to the site superintendent, or in his absence, the assistant site superintendent. The latter would then go down the chain of command and advise the appropriate persons of the immediate actions to be taken. Radio communication will be used at all times on the site and key team members will carry a radio with them at all times.

The personnel responsibilities are outlined in previous sections of this document. The witness of the spill would be advised to try to stop the source of the spill, while waiting for backup help to arrive; his actions would be immediate. The Contractor site engineer would coordinate the spill response activities carried out by the containment unit. Members of this unit would be mobilized to the impacted site. All impacted site can be reached from any other area of the site within a maximum of 25 minutes. Response to a spill at any clean up site would probably be more rapid when compared with potential impacts knowing that mitigating measures are to be implemented.

Mobilization of containment equipment to the spill site can be carried out rapidly. Bucket loaders and other heavy equipment shall be present in close proximity and can reach the site of the spill within a matter of minutes. Sand and gravel pits/stockpiles are also located in the vicinity, if required for berm construction. Spill response kits, sorbent material, pumps, hose and many other equipment are located in the storage warehouse nearby. Containment would be carried out by the construction of soil berms and the installation of sorbent booms. After containment, clean up equipment can be mobilized to the site. A list of equipment is presented in previous sections of this

document.

Safety hazards associated with the spill event includes the risk of fire. This can be minimized by preventing personnel from smoking near the spill scene. Risks to personnel (from inhalation and dermal contact) can be prevented by the proper use of personnel protective equipment.

Measures and procedures to prevent such events from occurring include training of staff (Hazwoper) and safety rules concerning the use of vehicles and heavy equipment on site, especially while in operations with waste/scattered drum handling, and landfill excavation (*e.g.,* speed limits, training of heavy equipment operators, etc.).

7.3- Scenario #3: Fuel Delivery

The fuel delivery operations (small tanks - 250-350 gal - installed on pick-up trucks) to supply fuel to heavy equipment and to carry fuel from the drum storage area to the upper site operations are carrying some risks of spillage.

Any accident involving the fuel delivery pick-up trucks could result in the loss of its entire volume of fuel. Such an accident could occur almost anywhere on site, any place the pick-up trucks have access to.

Heavy equipment works at least 30 metres away from any body of water. Therefore the fuel delivery should not ever get closer than 30 metres from bodies of water. Any fuel spill at that distance would not rapidly reach the receptor.

Any spills would be communicated by the witness of the scene to the site superintendent, or in his absence, the assistant site superintendent. The latter would then go down the chain of command and advise the appropriate persons of the immediate actions to be taken. Radio communication will be used at all times on the site and key team members will carry a radio with them at all times.

The personnel responsibilities are outlined in previous sections of this document. The witness of the spill would be advised to try to stop the source of the spill, while waiting for backup help to arrive; his actions would be immediate. The Contractor site engineer would coordinate the spill response activities carried out by the containment unit. Members of this unit would be mobilized to the spill area. All areas at Ekalugad Fjord can be reached from any other area of the site within a maximum of 15-25 minutes (once roads will all be repaired/maintained).

Mobilization of containment equipment to the spill site can be carried out rapidly. Sorbent booms may be required to contain the oil slick and prevent further spreading or migration to any discharge stream; those are present at the middle site and the lower site. If the construction of an oil-water separator in the discharge stream is necessary, the following equipment and materials would be required: heavy equipment (loader or excavator), sand and gravel, piping, and tarp/geomembrane. All these equipment and materials could be mobilized within 20 to 30 minutes. If the fuel reaches the discharge stream, spill response measures may have to be implemented further down stream. After containment, clean up equipment will be mobilized to the area. A list of equipment is presented in previous sections of this document. However, due to the size of temporary fuel tanks used for delivery/supply, potential impact from spill are likely to be rapidly contained.

Safety hazards associated with the spill event includes the risk of fire. This can be minimized by preventing personnel from smoking near the spill scene. Risks to personnel (from inhalation and dermal contact) can be prevented by the proper use of personnel protective equipment.

Measures and procedures to prevent such events from occurring include regular safety rules concerning the use of vehicles site, especially in close proximity to sensitive areas (*e.g.,* speed limits, training of truck drivers, etc.).

8-REPORTING REQUIREMENTS

Spills will be immediately reported using the **24 Hour Spill Report Line (867) 920-8130 (NWT)**. Immediately shall mean upon discovery. Failure to report can lead to fines. A written spill report will then be prepared by the Contractor with the assistance of the Engineer and submitted to the PWGSC site representative and the Spill Report Line supervisor (see Appendix 2). This report will include:

a- date and time of the incident;
b- location or map coordinates and direction of spill movement if not at steady-state;
c- party responsible for the spill;
d- type and estimated quantities of spilled contaminant(s);
e- specific cause of the incident;
f- status of the spill indicating if spilled materials are still moving or now at steady-state;
g- approximate surface of contaminated area;
i- factors affecting spill or recovery such as temperature, wind, etc.;
j- status on containment actions indicating whether a) naturally, b) booms, dykes or

other, c) no containment has been implemented;

k- corrective action taken or proposed to clean, contain or dispose spilled material;

l- whether assistance is required and in what form;

m- whether the spill poses a hazard to persons or property (*i.e.,* fire, drinking water);

n- comments and recommendations;

o- name, position and employer of the person reporting the spill; and

p- name, position department of the person to whom the spill is reported.

Apart from reporting requirements, the Contractor, through its site superintendent, may require special assistance. These could be implemented for the following reasons:

.1 If assistance and coordination are required for spill response, Environment Canada (Nunavut Office) and the Environmental Protection Service of the Government of Nunavut can be contacted at:

Environment Canada	**(867) 979-6808**
GN Environmental Protection Service	**(867) 975-5910 or 975-5907**

.2 If medical assistance and coordination are required when injuries occurred during spill incident/spill response and/or critical incident stress is observed after an event, the Baffin Regional Hospital (general enquiries) shall be contacted at:

Baffin Regional Hospital	**(867) 979-7300**

Other emergency assistance numbers are found in the Ekalugad Project Clean Up and Camp Service Health and Safety Plan.

APPENDIX -1-

MSDS of pretroleum products and chemicals stored on site

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2005-11-07
Supersedes: 2002-11-05

Class B3 Combustible Liquid

Class D2B Other Toxic Effects - Skin Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**LOW SULPHUR DIESEL CP-43**
SYNONYMS:	Diesel Automotive Gas Oil
PRODUCT USE:	Fuel Solvent
MSDS Number:	320-043

MANUFACTURER
Shell Canada Limited
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS	
Shell Emergency Number	1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER	613-996-6666
For general information:	1-800-661-1600
For MSDS information:	403-691-3982
(From 7:30 to 4:30 Mountain Time)	403-691-2220

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Fuels, Diesel, No. 2	68476-34-6	100	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Clear To Yellow Hydrocarbon Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.
Hazards:

Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Combustible Liquid.
Irritating to skin.
Vapours are moderately irritating to the eyes.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
Vapours are moderately irritating to the respiratory passages.

Handling: Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs. Do not give anything by mouth to an unconscious person.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions: Caution - Combustible. Do not use a direct stream of water as it may spread fire. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Avoid inhalation of smoke. Product will float and can be reignited on surface of water. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.

Hazardous Combustion Products: A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Try to work upwind of spill. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain water spills by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

Handling: Combustible. Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene.

Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Diesel fuel, as total hydrocarbons: 100 mg/m3
Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation: Concentrations in air should be maintained below the recommended threshold limit value if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.

Skin Protection: Impervious gloves (viton, nitrile) should be worn at all times when handling this material. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.

Respiratory Protection: If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Clear To Yellow
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Cloud Point-43 °C
Boiling Point:	150 - 330 °C
Density:	< 850 kg/m3 @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	Not available
pH:	Not available
Flash Point:	Pensky-Martens CC > 40 °C
Lower Explosion Limit:	1 % (vol.)
Upper Explosion Limit:	6 % (vol.)
Autoignition Temperature:	250 °C
Viscosity:	1.3 - 2.1 cSt @ 40 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{OW}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes

Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	**Toxicological Data**
Fuels, Diesel, No. 2	LD50 Dermal Rabbit > 5000 mg/kg LD50 Oral Rat = 9000 mg/kg

Routes of Exposure:	Exposure will most likely occur through skin contact or inhalation.
Irritancy:	This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.
Acute Toxicity:	Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.
Carcinogenicity and Mutagenicity:	The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk. The American Conference of Governmental Industrial Hygienists (ACGIH) has classified this product as A3 - confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.

Biodegradability:	Not readily biodegradable.
Bioaccumulation:	Potential for bioaccumulation.
Partition Coefficient (log K_{ow}):	Not available

Aquatic Toxicity

May be harmful to aquatic life.

Ingredient:	**Toxicological Data**
Fuels, Diesel, No. 2	EL50 - growth rate Algae (72hr) 10 - 100 mg/L EL50 Daphnia Magna (48hr) 10 - 100 mg/L LL50 (WAF method) Rainbow Trout (96hr) 10 - 100 mg/L

Definition(s):

LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances.
WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery (cement kilns, thermal power generation), 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1202
Proper Shipping Name	DIESEL FUEL
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Additional Information	Not Regulated in Containers Less Than or Equal to 450 Litres.
Shipping Description	DIESEL FUEL Class 3 UN1202 PG III Not Regulated in Containers Less Than or Equal to 450 Litres.

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Class:	Class B3 Combustible Liquid Class D2B Other Toxic Effects - Skin Irritant
DSL/NDSL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Combustible Liquid. Irritating to skin.
Handling Statement:	Eliminate all ignition sources. Avoid prolonged exposure to vapours. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. Changes have been made to: Section 1 Section 3 Section 5 Section 8 Section 9 Section 12

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2005-08-15
Supersedes: 2002-08-14

Class B3 Combustible Liquid

Class D2B Other Toxic Effects - Skin Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**SHELL JET A-1 WITH AIA**
SYNONYMS:	Aviation Turbine Fuel (Kerosene Type) May contain anti-icing additive (Diethylene Glycol Monomethyl Ether)
PRODUCT USE:	Fuel Solvent
MSDS Number:	142-017

MANUFACTURER
Shell Canada Limited
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS	
Shell Emergency Number	1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER	613-996-6666
For general information:	1-800-661-1600
For MSDS information:	403-691-3982
(From 7:30 to 4:30 Mountain Time)	403-691-2220

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade-mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Kerosene (Petroleum), Hydrodesulfurized	64742-81-0	60 - 100	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Bright Clear Hydrocarbon Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.
Hazards:

Combustible Liquid.
Irritating to skin.
Vapours are moderately irritating to the eyes.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
Vapours are moderately irritating to the respiratory passages.

Handling: Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Carbon Dioxide
Foam
Dry Chemical
Water Fog

Firefighting Instructions: Caution - Combustible. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Product will float and can be reignited on surface of water. Do not use a direct stream of water as it may spread fire. Containers exposed to intense heat from fires should be cooled with water to prevent vapour pressure buildup which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus.

Hazardous Combustion Products:	A complex mixture of airborne solid, liquid, particulates and gases will evolve when this material undergoes pyrolysis or combustion. Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Try to work upwind of spill. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain water spills by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

Handling:	Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not pressurize drum containers to empty them. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene. Combustible.
Storage:	Store in a cool, dry, well ventilated area, away from heat and ignition sources. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Kerosene/Jet fuels, as total hydrocarbon vapour (skin) : 200 mg/m3 (Application restricted to conditions in which there are negligible aerosol exposures.)
Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation:	Use explosion-proof ventilation as required to control vapour concentrations. Concentrations in air should be maintained below the recommended threshold limit value if unprotected personnel are involved. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection:	Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
Skin Protection:	Avoid contact with skin. Use protective clothing and gloves manufactured from nitrile. Safety showers should be available for emergency use.
Respiratory Protection:	Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Bright Clear
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Freeze Point < -47 °C
Boiling Point:	145 - 300 °C
Density:	775 - 840 kg/m3 @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	1 - 1.4 kPa @ 37.8 °C
pH:	Not available
Flash Point:	Tag Closed Cup > 43 °C
Lower Explosion Limit:	0.7 % (vol.)
Upper Explosion Limit:	5 % (vol.)
Autoignition Temperature:	210 °C
Viscosity:	< 8 cSt @ -20 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	3.3 - 6
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.

Conditions of Reactivity: Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Kerosene (Petroleum), Hydrodesulfurized	LD50 Dermal Rabbit > 2000 mg/kg LD50 Oral Rat > 5000 mg/kg

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Irritancy: This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.

Chronic Effects: Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.

Pre-existing Conditions: Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

Carcinogenicity and Mutagenicity: The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms.

Biodegradability: Not readily biodegradable.
Rapid volatilization.

Bioaccumulation: Potential for bioaccumulation.

Partition Coefficient (log K_{ow}): 3.3 - 6

Aquatic Toxicity

Product is expected to be toxic to aquatic organisms.

Ingredient:	Toxicological Data
Kerosene (Petroleum), Hydrodesulfurized	EL50 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L.

Definition(s): LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances.
WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery (cement kilns, thermal power generation), 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1863
Proper Shipping Name	FUEL, AVIATION, TURBINE ENGINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Additional Information	Not Regulated in Containers Less Than or Equal to 450 Litres.
Shipping Description	FUEL, AVIATION, TURBINE ENGINE Class 3 UN1863 PG III Not Regulated in Containers Less Than or Equal to 450 Litres.

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Class:	Class B3 Combustible Liquid Class D2B Other Toxic Effects - Skin Irritant
DSL/NDSL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION

LABEL STATEMENTS
Hazard Statement : Combustible Liquid.
Irritating to skin.

Handling Statement:

Eliminate all ignition sources.
Avoid prolonged exposure to vapours.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

First Aid Statement :

Wash contaminated skin with soap and water.
Flush eyes with water.
If overcome by vapours remove to fresh air.
Do not induce vomiting.
Obtain medical attention.

Revisions:

This MSDS has been reviewed and updated.
Changes have been made to:
Section 3
Section 4
Section 5
Section 7
Section 8
Section 9
Section 12
Section 14

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2005-07-26
Supersedes: 2002-06-14

Class B2 Flammable Liquid

Class D2A Other Toxic Effects - Carcinogen

Class D2B Other Toxic Effects - Eye Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: **REGULAR UNLEADED GASOLINE**
SYNONYMS: Automotive Fuel
Petrol
PRODUCT USE: Fuel
MSDS Number: 211-001

MANUFACTURER
Shell Canada Limited
P.O. Box 100, Station M
400-4th Ave. S.W.
Calgary, AB Canada
T2P 2H5

TELEPHONE NUMBERS

Shell Emergency Number	1-800-661-7378
CANUTEC 24 HOUR EMERGENCY NUMBER	613-996-6666
For general information:	1-800-661-1600
For MSDS information:	403-691-3982
(From 7:30 to 4:30 Mountain Time)	403-691-2220

This MSDS was prepared by the Toxicology and Product Stewardship Section of Shell Canada Limited.

*An asterisk in the product name designates a trade-mark(s) of Shell Canada Limited, used under license by Shell Canada Products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Gasoline	86290-81-5	> 90	Yes
Ethyl Alcohol	64-17-5	0 - 10	Yes
Benzene	71-43-2	< 1.5	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Clear Typical Gasoline Odour

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Hazards:

Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Flammable Liquid.
Irritating to eyes.
May cause cancer.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
May be absorbed by skin contact. Prolonged immersion in liquid may lead to chemical burns.

Handling:

Eliminate all ignition sources.
Wear suitable gloves and eye protection.
Bond and ground transfer containers and equipment to avoid static accumulation.
Avoid prolonged exposure to vapours.
Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

Eyes: Flush eyes with water for at least 15 minutes while holding eyelids open. If irritation occurs and persists, obtain medical attention.

Skin: Wash contaminated skin with mild soap and water for 15 minutes. If irritation occurs and persists, obtain medical attention.

Ingestion: DO NOT INDUCE VOMITING! OBTAIN MEDICAL ATTENTION IMMEDIATELY. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs.

Inhalation: Remove victim from further exposure and restore breathing, if required. Obtain medical attention.

Notes to Physician: The main hazard following accidental ingestion is aspiration of the liquid into the lungs producing chemical pneumonitis. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision. If symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered.

5. FIRE FIGHTING MEASURES

Extinguishing Media:

Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions: Extremely flammable. Do not use water except as a fog. Product will float and can be reignited on surface of water. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Avoid breathing vapours. Avoid inhalation of smoke. Vapours may travel along ground and flashback along vapour trail may occur. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus.

Hazardous Combustion Products: Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Flammable". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Try to work upwind of spill. Avoid direct contact with material. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain water spills by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations

7. HANDLING AND STORAGE

Handling: Extremely flammable. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Avoid breathing vapours and prolonged or repeated contact with skin. Vapours may accumulate and travel to distant ignition sources and flashback. Do not use as a cleaning solvent. Never siphon by mouth. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers. Provide adequate ventilation. Launder contaminated clothing prior to reuse. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities.

Storage: Store in a cool, dry, well ventilated area, away from heat and ignition sources. Protect against physical damage to containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

THE FOLLOWING INFORMATION, WHILE APPROPRIATE FOR THIS PRODUCT, IS GENERAL IN NATURE. THE SELECTION OF PERSONAL PROTECTIVE EQUIPMENT WILL VARY DEPENDING ON THE CONDITIONS OF USE.

OCCUPATIONAL EXPOSURE LIMITS (Current ACGIH TLV/TWA unless otherwise noted):

Gasoline: 300 ppm (STEL: 500 ppm)
Ethanol: 1000 ppm
Benzene (skin) : 0.5 ppm (STEL: 2.5 ppm)
Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation: Concentrations in air should be maintained below lower explosive limit at all times or below the recommended threshold limit value if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. Make up air should always be supplied to balance air exhausted (either generally or locally). For personnel entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed including ventilation and testing of tank atmosphere.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection:	Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
Skin Protection:	Avoid contact with skin. Use protective clothing and gloves manufactured from nitrile.
Respiratory Protection:	Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved respirator. For limited time exposures (< 1 hour) exceeding the OEL, use an organic vapour cartridge. For longer exposures or high concentrations, use a NIOSH-approved supplied-air respirator.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Clear
Odour:	Typical Gasoline Odour
Odour Threshold:	< 0.25 ppm
Freezing/Pour Point:	Not available
Boiling Point:	35 - 220 °C
Density:	720 - 760 kg/m3 @ 15 °C
Vapour Density (Air = 1):	3.5
Vapour Pressure (absolute):	< 107 kPa @ 38 °C
Specific Gravity (Water = 1):	0.74
pH:	Not applicable
Flash Point:	Tag Closed Cup -30 °C
Lower Explosion Limit:	1.4 % (vol.)
Upper Explosion Limit:	7.6 % (vol.)
Autoignition Temperature:	280 °C
Viscosity:	< 1 cSt @ 38 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{OW}):	2.3
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents
Formula:	C4 - C11

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Incompatible Materials:	Avoid contact with strong oxidizing agents and acids.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	**Toxicological Data**
Gasoline	LD50 Dermal Rabbit > 5 mL/kg LD50 Oral Rat > 18 mL/kg

Ethyl Alcohol	LD60 Dermal Rabbit = 20000 mg/kg LD50 Oral Mouse = 3450 mg/kg LC50 Inhalation Rat = 20000 ppm for 10 hours LD50 Oral Rat = 7060 mg/kg
Benzene	LC50 Inhalation Rat = 13700 ppm for 4 hours LD50 Oral Rat = 930 - 5600 mg/kg

Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.

Irritancy: Based on the ingredients, this product would be expected to be irritating to the eyes.

Acute Toxicity: Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.

Chronic Effects: Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression. Prolonged and repeated exposure may cause serious injury to blood forming organs, resulting in anemia and similar conditions.

Carcinogenicity and Mutagenicity: According to the International Agency for Research on Cancer (IARC) this product is considered to be possibly carcinogenic to humans. Epidemiological studies indicate that long term inhalation of benzene vapour can cause leukaemia in man. Benzene has also produced chromosomal aberrations in peripheral blood lymphocytes.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities.

Biodegradability: Not readily biodegradable.
Rapid volatilization.

Bioaccumulation: Potential for bioaccumulation.

Partition Coefficient (log K_{ow}): 2.3

Aquatic Toxicity

May be harmful to aquatic life.

Ingredient:	Toxicological Data
Gasoline	EL60 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L.
Ethyl Alcohol Benzene	EL50 - growth rate Algae (72hr) 10 - 100 mg/L. EL50 Daphnia Magna (48hr) 10 - 100 mg/L. LL60 Rainbow Trout (96hr) 1 - 10 mg/L.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery (cement kilns, thermal power generation), 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site. Incinerate at a licenced waste disposal site with approval of environmental authority.

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1203
Proper Shipping Name	GASOLINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG II
Additional Information	Marine Pollutant
Shipping Description	GASOLINE Class 3 UN1203 PG II Marine Pollutant

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the *Controlled Products Regulations* (CPR) and the MSDS contains all the information required by the CPR.

WHMIS Class:	Class B2 Flammable Liquid Class D2A Other Toxic Effects - Carcinogen Class D2B Other Toxic Effects - Eye Irritant
DSL/NDSL Status:	This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act. This product and/or all components are listed on the U.S. EPA TSCA Inventory.
Other Regulatory Status:	No Canadian federal standards.

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Flammable Liquid. Irritating to eyes. May cause cancer.
Handling Statement:	Eliminate all ignition sources. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Avoid prolonged exposure to vapours. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. A WHMIS class has been added to this MSDS. The ingredients have changed. Other information may also be affected by that change.

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

Product Name: HDH (All)
Synthetic HDH (All)
Synthetic IDO 50 (All)
Product Class: Lubricant
WHMIS Classification: Not Controlled.

Supplier Name and Address: Irving Oil Limited
P.O. Box 1421
Saint John, N.B.
E2L 4K1

Phone: (506) 632-2000
Emergency: (506) 648-3060

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIALS

Hazardous Ingredients	CAS#	wt%	ACGIH-TLV	LC_{50}	LD_{50}
None			5 mg/m^3 (oil mist)		

SECTION 3 - PHYSICAL DATA AND CHEMICAL PROPERTIES

Form: Liquid
Colour: Brown
Odour: Pungent
Specific Gravity @ 15°C: 0.88 - 0.92
Solubility: Negligible
Vapour Pressure (mm @ 20°C): < 0.10

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability: ☒Yes ☐ No **Conditions:** Open flame above flash point.
Flash Point : > 200°C (COC)

Upper Flammable Limit: Not established.
Auto Ignition Temperature: Not determined.
Sensitivity to Impact: None.
Lower Flammable Limit: Not established.
TDG Flammability Classification: Not classified.
Sensitivity to Static Discharge: None.

Means of Extinction: Dry chemical, water spray (fog), foam or carbon dioxide.
Hazardous Combustion Products: Hydrogen sulphide and oxides of carbon, nitrogen, sulphur and phosphorus.
Special Procedures: Water foam may cause frothing. Use water to cool exposed containers. Use self-contained breathing apparatus for fire fighting.

SECTION 5 - REACTIVITY DATA

Stability: This product is stable.
Hazardous Polymerisation: Will not occur.
Conditions to avoid: Extremely high temperatures.
Incompatibility with other substances: Strong oxidising agents.
Hazardous decomposition products: Thermal decomposition from high temperature or combustion will produce hydrogen sulphide and oxides of carbon, nitrogen, sulphur and phosphorus.

SECTION 6 - TOXICOLOGICAL PROPERTIES

Route of Entry: ☐Eye ☒ Skin Contact ☐ Skin Absorption ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure: Irritation to skin and eyes. Inhalation of hot oil mist or vapours may irritate the upper respiratory tract.
Effects of Chronic Exposure: Repeated or prolonged exposure may cause dermatitis and/or oil acne. Long-term intensive exposure to oil mist may cause benign lung fibrosis. No specific toxicity data but extrapolation from similar materials indicates that this product has low oral toxicity.

Exposure Limits: 5 mg/m^3 (oil mist)
Reproductive Toxicity: Not determined.
Irritancy of Product: Slight.
Carcinogenicity: Not determined.
Teratogenicity: Not determined.
Mutagenicity: Not determined.

SECTION 7 – PREVENTATIVE AND CORRECTIVE MEASURES

Personal Protective Equipment:	*Gloves:*	Oil/Chemical resistant.
	Eye:	Chemical safety glasses or full face shield.
	Respiratory:	NOISH respirator if mist levels are high.
	Footwear:	Oil/Chemical resistant.
	Clothing:	Oil/Chemical resistant if repeated exposure to skin and clothing occurs.
	Other:	

Engineering Controls: Local exhaust at source of heated vapours.
Leak and Spill Procedure: Contain spills with dikes or absorbent material. Eliminate fire hazards. Prevent from entering sewers or water courses. Vacuum liquid or transfer absorbed material into containers. Advise authorities.
Waste Disposal: Follow local and governmental regulations. Not regulated as a hazardous waste.
Storage Requirements Cool, dry location. Keep containers closed.
Special Shipping Information: No special requirements.

SECTION 8 - FIRST AID MEASURES

Inhalation: Remove to fresh air or give artificial respiration. If breathing is difficult, give oxygen and seek medical attention.
Ingestion: Do not induce vomiting, give two glasses of water and seek medical attention.
Eye: Flush with water for 15 minutes.
Skin: Wash contaminated area with soap and water. Clean contaminated clothing before wearing again.
General Advice: High pressure injection under skin can be serious and requires urgent medical attention.

SECTION 9 - PREPARATION DATE OF MSDS

MSDS Prepared by: Irving Lubricants **Phone:** (506) 632-7000
MSDS Date: Feb 17/05

Revision 01

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

Product Name: Lubex EP (All grades)
AF-WB
Product Class: Lubricating Grease
WHMIS Classification: Not Controlled

Supplier Name and Address: Irving Oil Limited
P.O. Box 1421
Saint John, N.B.
E2L 4K1

Phone: (506) 632-2000
Emergency: (506) 648-3060

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIALS

Hazardous Ingredients	CAS#	wt%	ACGIH-TLV	LC_{50}	LD_{50}
None					

SECTION 3 - PHYSICAL DATA AND CHEMICAL PROPERTIES

Form: Semi-Solid
Colour: Green
Odour: Petroleum
Specific Gravity @ 15°C: 0.96 - 0.98
Volatiles (wt%): 0
Solubility in Water: Insoluble

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability: ☒Yes ☐ No **Conditions:** Open flame above flash point.
Flash Point : 175°C (COC)

Upper Flammable Limit: Not applicable.
Lower Flammable Limit: Not applicable.
Auto Ignition Temperature: Not applicable.
TDG Flammability Classification: Not classified.
Sensitivity to Impact: Not applicable.
Sensitivity to Static Discharge: Not applicable.

Means of Extinction: Water fog, Carbon dioxide, dry chemical, foam, earth or sand. Water may cause frothing.
Hazardous Combustion Products: Carbon monoxide, carbon dioxide and oxides of sulphur.
Special Procedures: Wear self-contained breathing apparatus when fighting fire. Use water to cool fire-exposed containers.

SECTION 5 - REACTIVITY DATA

Stability: This product is stable.
Hazardous Polymerisation: Will not occur.
Conditions to avoid: Excessive heat or open flame.
Incompatibility with other substances: Strong oxidising agents.
Hazardous decomposition products: Not determined.

SECTION 6 - TOXICOLOGICAL PROPERTIES

Route of Entry: ☐Eye ☒Skin Contact ☐ Skin Absorption ☐ Inhalation ☐ Ingestion

Effects of Acute Exposure: Irritation to skin and eyes.
Effects of Chronic Exposure: Not determined.

Exposure Limits: Not determined.
Carcinogenicity: Not determined.
Reproductive Toxicity: Not determined.
Teratogenicity: Not determined.
Irritancy of Product: Slight.
Mutagenicity: Not determined.

MATERIAL SAFETY DATA SHEET

SECTION 7 - PREVENTATIVE AND CORRECTIVE MEASURES

Personal Protective Equipment:	*Gloves:*	Oil/Chemical resistant.
	Eye:	Chemical safety glasses or full face shield.
	Respiratory:	None normally required.
	Footwear:	None normally required.
	Clothing:	None normally required.
	Other:	

Engineering Controls: None normally required.
Leak and Spill Procedure: Absorb with sand or inert material. Sweep or scoop to remove.
Waste Disposal: Consult local authorities.
Storage Requirements Keep container closed, in a cool, dry area.
Special Shipping Information: None.

SECTION 8 - FIRST AID MEASURES

Inhalation: Not applicable.
Ingestion: Do not induce vomiting, seek medical attention.
Eye: Flush with water for 15 minutes.
Skin: Clean area exposed with soap and water.
General Advice:

SECTION 9 - PREPARATION DATE OF MSDS

MSDS Prepared by: Irving Lubricants **Phone:** (506) 632-7000
MSDS Date: February 16,2005
Revision 01

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

Product Name: Transflo
Product Class: Lubricant
WHMIS Classification: Not Controlled.

Supplier Name and Address:
Irving Oil Limited
P.O. Box 1421
Saint John, N.B.
E2L 4K1

Phone: (506) 632-2000
Emergency: (506) 648-3060

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIALS

Hazardous Ingredients	CAS#	wt%	ACGIH-TLV	LC_{50}	LD_{50}
None			5 mg/m^3 (oil mist)		

SECTION 3 - PHYSICAL DATA AND CHEMICAL PROPERTIES

Form: Liquid
Colour: Red
Odour: Petroleum
Specific Gravity @ 15°C: 0.85
Solubility: Negligible

Vapour Pressure (mm @ 20°C): < 0.10

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability: ☒Yes ☐ No
Flash Point : > 160°C (COC)
Conditions: Open flame above flash point.

Upper Flammable Limit: Not established.
Auto Ignition Temperature: Not determined.
Sensitivity to Impact: None.
Lower Flammable Limit: Not established.
TDG Flammability Classification: Not classified.
Sensitivity to Static Discharge: None.

Means of Extinction: Dry chemical, water spray (fog), foam or carbon dioxide.
Hazardous Combustion Products: Hydrogen sulphide and oxides of carbon, nitrogen, sulphur and phosphorus.
Special Procedures: Water foam may cause frothing. Use water to cool exposed containers. Use self-contained breathing apparatus for fire fighting.

SECTION 5 - REACTIVITY DATA

Stability: This product is stable.
Hazardous Polymerisation: Will not occur.
Conditions to avoid: Extremely high temperatures.
Incompatibility with other substances: Strong oxidising agents.
Hazardous decomposition products: Thermal decomposition from high temperature or combustion will produce hydrogen sulphide and oxides of carbon, nitrogen, sulphur and phosphorus.

SECTION 6 - TOXICOLOGICAL PROPERTIES

Route of Entry: ☐Eye ☒ Skin Contact ☐ Skin Absorption ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure: Irritation to skin and eyes. Inhalation of hot oil mist or vapours may irritate the upper respiratory tract.
Effects of Chronic Exposure: Repeated or prolonged exposure may cause dermatitis and/or oil acne. Long-term intensive exposure to oil mist may cause benign lung fibrosis. No specific toxicity data but extrapolation from similar materials indicates that this product has low oral toxicity.

Exposure Limits: 5 mg/m^3 (oil mist)
Reproductive Toxicity: Not determined.
Irritancy of Product: Slight.
Carcinogenicity: Not determined.
Teratogenicity: Not determined.
Mutagenicity: Not determined.

MATERIAL SAFETY DATA SHEET

SECTION 7 - PREVENTATIVE AND CORRECTIVE MEASURES

Personal Protective Equipment:	*Gloves:*	Oil/Chemical resistant.
	Eye:	Chemical safety glasses or full face shield.
	Respiratory:	NOISH respirator if mist levels are high.
	Footwear:	Oil/Chemical resistant.
	Clothing:	Oil/Chemical resistant if repeated exposure to skin and clothing occurs.
	Other:	

Engineering Controls:	Local exhaust at source of heated vapours.
Leak and Spill Procedure:	Contain spills with dikes or absorbent material. Eliminate fire hazards. Prevent from entering sewers or water courses. Vacuum liquid or transfer absorbed material into containers. Advise authorities.
Waste Disposal:	Follow local and governmental regulations. Not regulated as a hazardous waste.
Storage Requirements	Cool, dry location. Keep containers closed.
Special Shipping Information:	No special requirements.

SECTION 8 - FIRST AID MEASURES

Inhalation:	Remove to fresh air or give artificial respiration. If breathing is difficult, give oxygen and seek medical attention.
Ingestion:	Do not induce vomiting, give two glasses of water and seek medical attention.
Eye:	Flush with water for 15 minutes.
Skin:	Wash contaminated area with soap and water. Clean contaminated clothing before wearing again.
General Advice:	High pressure injection under skin can be serious and requires urgent medical attention.

SECTION 9 - PREPARATION DATE OF MSDS

MSDS Prepared by: Irving Lubricants **Phone:** (506) 632-7000
MSDS Date: Feb 17/ 05

Revision 01

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

Product Name: Transflo TO-4 (All)
Product Class: Lubricant
WHMIS Classification: Not Controlled.

Supplier Name and Address:
Irving Oil Limited
P.O. Box 1421
Saint John, N.B.
E2L 4K1

Phone: (506) 632-2000
Emergency: (506) 648-3060

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIALS

Hazardous Ingredients	CAS#	wt%	ACGIH-TLV	LC_{50}	LD_{50}
None			5 mg/m^3 (oil mist)		

SECTION 3 - PHYSICAL DATA AND CHEMICAL PROPERTIES

Form: Liquid
Colour: Brown
Odour: Petroleum
Specific Gravity @ 15°C: 0.88 - 0.90
Solubility: Negligible
Vapour Pressure (mm @ 20°C): < 0.10

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability: ☒Yes ☐ No **Conditions:** Open flame above flash point.
Flash Point : > 220°C (COC)

Upper Flammable Limit: Not established.
Auto Ignition Temperature: Not determined.
Sensitivity to Impact: None.
Lower Flammable Limit: Not established.
TDG Flammability Classification: Not classified.
Sensitivity to Static Discharge: None.

Means of Extinction: Dry chemical, water spray (fog), foam or carbon dioxide.
Hazardous Combustion Products: Hydrogen sulphide and oxides of carbon, nitrogen, sulphur and phosphorus.
Special Procedures: Water foam may cause frothing. Use water to cool exposed containers. Use self-contained breathing apparatus for fire fighting.

SECTION 5 - REACTIVITY DATA

Stability: This product is stable.
Hazardous Polymerisation: Will not occur.
Conditions to avoid: Extremely high temperatures.
Incompatibility with other substances: Strong oxidising agents.
Hazardous decomposition products: Thermal decomposition from high temperature or combustion will produce hydrogen sulphide and oxides of carbon, nitrogen, sulphur and phosphorus.

SECTION 6 - TOXICOLOGICAL PROPERTIES

Route of Entry: ☐Eye ☒ Skin Contact ☐ Skin Absorption ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure: Irritation to skin and eyes. Inhalation of hot oil mist or vapours may irritate the upper respiratory tract.
Effects of Chronic Exposure: Repeated or prolonged exposure may cause dermatitis and/or oil acne. Long-term intensive exposure to oil mist may cause benign lung fibrosis. No specific toxicity data but extrapolation from similar materials indicates that this product has low oral toxicity.

Exposure Limits: 5 mg/m^3 (oil mist)
Reproductive Toxicity: Not determined.
Irritancy of Product: Slight.
Carcinogenicity: Not determined.
Teratogenicity: Not determined.
Mutagenicity: Not determined.

MATERIAL SAFETY DATA SHEET

SECTION 7 - PREVENTATIVE AND CORRECTIVE MEASURES

Personal Protective Equipment:	*Gloves:*	Oil/Chemical resistant.
	Eye:	Chemical safety glasses or full face shield.
	Respiratory:	NOISH respirator if mist levels are high.
	Footwear:	Oil/Chemical resistant.
	Clothing:	Oil/Chemical resistant if repeated exposure to skin and clothing occurs.
	Other:	

Engineering Controls:	Local exhaust at source of heated vapours.
Leak and Spill Procedure:	Contain spills with dikes or absorbent material. Eliminate fire hazards. Prevent from entering sewers or water courses. Vacuum liquid or transfer absorbed material into containers. Advise authorities.
Waste Disposal:	Follow local and governmental regulations. Not regulated as a hazardous waste.
Storage Requirements	Cool, dry location. Keep containers closed.
Special Shipping Information:	No special requirements.

SECTION 8 - FIRST AID MEASURES

Inhalation:	Remove to fresh air or give artificial respiration. If breathing is difficult, give oxygen and seek medical attention.
Ingestion:	Do not induce vomiting, give two glasses of water and seek medical attention.
Eye:	Flush with water for 15 minutes.
Skin:	Wash contaminated area with soap and water. Clean contaminated clothing before wearing again.
General Advice:	High pressure injection under skin can be serious and requires urgent medical attention.

SECTION 9 - PREPARATION DATE OF MSDS

MSDS Prepared by: Irving Lubricants **Phone:** (506) 632-7000
MSDS Date: Feb 17/ 05

Revision 01

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

Product Name: IDO Premium; Premium VDS
IDO Universal (All)
IDO Series 1 (All)
IDO Series 3 (All)

Product Class: Lubricant

WHMIS Classification: Not Controlled.

Supplier Name and Address: Irving Oil Limited
P.O. Box 1421
Saint John, N.B.
E2L 4K1

Phone: (506) 632-2000
Emergency: (506) 648-3060

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIALS

Hazardous Ingredients	CAS#	wt%	ACGIH-TLV	LC_{50}	LD_{50}
None			5 mg/m^3 (oil mist)		

SECTION 3 - PHYSICAL DATA AND CHEMICAL PROPERTIES

Form: Liquid
Color: Brown
Odor: Petroleum
Specific Gravity @ 60°F: 0.86 - 0.90
Solubility: Negligible

Vapor Pressure (mm @ 68°F): < 0.10
Volatile (wt%): 0

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability: ☒Yes ☐ No
Flash Point : > 424°F (COC)

Conditions: Open flame above flash point.

Upper Flammable Limit: Not established.
Auto Ignition Temperature: Not determined.
Sensitivity to Impact: None.

Lower Flammable Limit: Not established.
TDG Flammability Classification: Not classified.
Sensitivity to Static Discharge: None.

Means of Extinction: Dry chemical, water spray (fog), foam or carbon dioxide.
Hazardous Combustion Products: Hydrogen sulfide and oxides of carbon, nitrogen, sulfur and phosphorus.
Special Procedures: Water foam may cause frothing. Use water to cool exposed containers. Use self-contained breathing apparatus for fire fighting.

SECTION 5 - REACTIVITY DATA

Stability: This product is stable.
Hazardous Polymerization: Will not occur.
Conditions to avoid: Extremely high temperatures.
Incompatibility with other substances: Strong oxidizing agents.
Hazardous decomposition products: Thermal decomposition from high temperature or combustion will produce hydrogen sulfide and oxides of carbon, nitrogen, sulfur and phosphorus.

MATERIAL SAFETY DATA SHEET

SECTION 6 - TOXICOLOGICAL PROPERTIES

Route of Entry: ☐Eye ☒ Skin Contact ☐ Skin Absorption ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure: Irritation to skin and eyes. Inhalation of hot oil mist or vapors may irritate the upper respiratory tract.
Effects of Chronic Exposure: Repeated or prolonged exposure may cause dermatitis and/or oil acne. Long-term intensive exposure to oil mist may cause benign lung fibrosis. No specific toxicity data but extrapolation from similar materials indicates that this product has low oral toxicity.

Exposure Limits:	5 mg/m^3 (oil mist)	**Carcinogenicity:**	Not determined.
Reproductive Toxicity:	Not determined.	**Teratogenicity:**	Not determined.
Irritancy of Product:	Slight.	**Mutagenicity:**	Not determined.

SECTION 7 - PREVENTATIVE AND CORRECTIVE MEASURES

Personal Protective Equipment:	*Gloves:*	Oil/Chemical resistant.
	Eye:	Chemical safety glasses or full face shield.
	Respiratory:	NOISH respirator if mist levels are high.
	Footwear:	Oil/Chemical resistant.
	Clothing:	Oil/Chemical resistant if repeated exposure to skin and clothing occurs.
	Other:	

Engineering Controls: Local exhaust at source of heated vapors.
Leak and Spill Procedure: Contain spills with dikes or absorbent material. Eliminate fire hazards. Prevent from entering sewers or water courses. Vacuum liquid or transfer absorbed material into containers. Advise authorities.
Waste Disposal: Follow local and governmental regulations. Not regulated as a hazardous waste.
Storage Requirements Cool, dry location. Keep containers closed.
Special Shipping Information: No special requirements.

SECTION 8 - FIRST AID MEASURES

Inhalation: Remove to fresh air or give artificial respiration. If breathing is difficult, give oxygen and seek medical attention.
Ingestion: Do not induce vomiting, give two glasses of water and seek medical attention.
Eye: Flush with water for 15 minutes.
Skin: Wash contaminated area with soap and water. Clean contaminated clothing before wearing again.
General Advice: High pressure injection under skin can be serious and requires urgent medical attention.

SECTION 9 - PREPARATION DATE OF MSDS

MSDS Prepared by: Irving Lubricants **Phone:** (506) 632-7000
MSDS Date: February 16, 2005
Revision 01

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION AND USE

Product Name: Universal Antifreeze
Product Class: Permanent antifreeze/Summer Coolant.
WHMIS Classification: Class D2B - Toxic Material

Supplier Name and Address:
Irving Oil Limited
P.O. Box 1421
Saint John, N.B.
E2L 4K1

Phone: (506) 632-2000
Emergency: (506) 648-3060

SECTION 2 - HAZARDOUS INGREDIENTS OF MATERIALS

Hazardous Ingredients	CAS#	wt%	ACGIH-TLV	LC_{50}	LD_{50}
Ethylene Glycol	107-21-1	90-95	50 ppm(vapour)		Oral: 4700 mg/kg (Rat) Skin: 9530 mg/kg (Rabbit)
Diethylene Glycol	111-46-6	≤ 5			

SECTION 3 - PHYSICAL DATA AND CHEMICAL PROPERTIES

Form: Liquid.
Colour: Fluorescent Green.
Odour: Mild odour.
Specific Gravity @ 15°C: 1.12
Solubility in Water: Complete
Volatile content (%vol): > 95

Vapour Pressure(@20°C): 0.1
Vapour Density (Air = 1): 2.1
Freezing Point (°C): -20
Boiling Point (°C @760 mm Hg): 163
Evaporation Rate: < 1

SECTION 4 - FIRE AND EXPLOSION HAZARD

Flammability: ☒Yes ☐ No
Flash Point : 121°C (TOC)
Conditions: Open flame above flash point.

Upper Flammable Limit: 16.0% (calculated)
Auto Ignition Temperature: Not applicable.
Sensitivity to Impact: Not established.

Lower Flammable Limit: 3.0%
TDG Flammability Classification: Not classified.
Sensitivity to Static Discharge: Not established.

Means of Extinction: Water, fog, Carbon dioxide, dry chemical, or alcohol foam.
Hazardous Combustion Products: Oxides of carbon.
Special Procedures: Wear self-contained breathing apparatus when fighting fire. Use water to cool fire-exposed containers. A solid stream of water directed into hot burning liquid can cause frothing.

SECTION 5 - REACTIVITY DATA

Stability: This product is stable.
Hazardous Polymerisation: Will not occur.
Conditions to avoid: Excessive heat.
Incompatibility with other substances: Strong oxidising agents.
Hazardous decomposition products: Thermal decomposition; oxides of carbon.

MATERIAL SAFETY DATA SHEET

SECTION 6 - TOXICOLOGICAL PROPERTIES

Route of Entry: ☒Eye ☒Skin Contact ☒ Skin Absorption ☒ Inhalation ☒ Ingestion

Effects of Acute Exposure:	Irritating to eyes and skin. Inhalation irritates nose and throat. High vapour concentration causes nausea, vomiting and headaches. Exposure to high concentration from heated antifreeze coolant or exposure to mists may produce nausea, vomiting, headache, dizziness and irregular eye movements. Ingestion causes abdominal discomfort or pain, dizziness, lumbar pain, oliguria, uraemia and central nervous system depression. Ingestion of large volumes cause kidney damage and can be fatal.		
Effects of Chronic Exposure:	Slightly toxic on prolonged or repeated skin contact.		
Exposure Limits:	50 ppm (vapour or mist)	**Carcinogenicity:**	Not determined.
Reproductive Toxicity:	Not determined.	**Teratogenicity:**	Not determined.
Irritancy of Product:	Irritation to eyes and skin may occur.	**Mutagenicity:**	Not determined.

SECTION 7 - PREVENTATIVE AND CORRECTIVE MEASURES

Personal Protective Equipment:	*Gloves:*	Chemical resistant.
	Eye:	Chemical safety glasses or full face shield.
	Respiratory:	NOISH respirator if mist levels are above exposure limits.
	Footwear:	No special requirements under normal conditions.
	Clothing:	No special requirements under normal conditions. Wear chemical resistant pants and jacket if in risk of skin exposure.
	Other:	
Engineering Controls:	Provide adequate ventilation, mechanical or other.	
Leak and Spill Procedure:	Contain spills with dikes or absorbent material. Prevent from entering sewers or water courses. Clean up or absorb for salvage or disposal.	
Waste Disposal:	Consult local authorities.	
Storage Requirements	Keep containers closed.	
Special Shipping Information:	None.	

SECTION 8 - FIRST AID MEASURES

Inhalation:	Remove to fresh air or give artificial respiration. If breathing is difficult, give oxygen and seek medical attention.
Ingestion:	Give two glasses of water or milk if conscious, then induce vomiting. Seek medical attention immediately.
Eye:	Flush with water for 15 minutes.
Skin:	Wash contaminated area with soap and water. Clean contaminated clothing before wearing again.
General Advice:	Follow good work/hygiene practices.

SECTION 9 - PREPARATION DATE OF MSDS

MSDS Prepared by: Irving Lubricants **Phone:** (506) 632-7000
MSDS Date: January 12,2005
Revision 02

MATERIAL SAFETY DATA SHEET

Product: DIPSOL

MAGNUS CHEMICALS LIMITED
1271 AMPERE
BOUCHERVILLE, QUEBEC, J4B 5Z5

EMERGENCY PHONE: 450-655-1344 FAX: 450-655-5428 (8:30 to 16:30)
(613) 996-6666 (CANUTEC)

1- PRODUCT INFORMATION:

Product Manufacturer: ..... MAGNUS CHEMICALS LIMITED
Product Identifier: ..... Dipsol
Product Use: ..... General use solvent for light paint-brush degreasing.

2- HAZARDOUS INGREDIENTS:

MATERIAL or COMPOUND:	C.A.S. No.:	PERCENT: W/W	THRESHOLD LIMIT VALUE (TLV) PPM:	mg/m3	LD50 oral, rat
Aliphatic naphtha	NAV	60-100	200	1250	NAV
Aromatic hydrocarbon	64742-94-5	15-40	100	550	> 500 mg/kg

NAP: Not Applicable, NAV: Not Available

3- PHYSICAL DATA:

Physical State: ..... Liquid.
Appearance and Odor: ..... Clear colorless liquid, citrus odor.
Odour Threshold: ..... Not available.
Specific Gravity: 0.813
Vapor Pressure: ..... 0.5 kpa at 38oC
Vapor Density: ..... 4.7-5.4 (air=1)
Evaporation Rate: ..... 0.04 (butyl acetate= 1)
Boiling Point: ..... 182 to 210oC
Freezing Point: ..... Not applicable.
pH: ..... Not applicable.
Coefficient of Water/Oil Distribution: .. Not available.
Percent Volatile: 100%
Solubility in Water: ..... Negligible.

4- FIRE AND EXPLOSION HAZARD DATA

Conditions of Flammability: ..... Temperature above flash point.
Extinguishing Media: ..... CO2, dry chemical, foam.
Flash Point and Method: ..... 60oC TCC
Flammable Limits - UEL: 6.0
Flammable Limits - LEL: 0.9
Auto-Ignition Temperature: ..... Not available.
Hazardous Combustion Product: ..... Carbon monoxide.
Sensitivity to Mechanical Impact / Static Discharge: Ground the container.
Unusual Fire And Explosion Hazards: ..... None known.

5- REACTIVITY DATA

Stability, If Not, Under Which Condition:	Stable.
Incompatibility - Materials to Avoid: ...	Oxidizer.
Hazardous Polymerization:	Will not occur.
Corrosion:	None known.
Hazardous Decomposition Products:	Not available.

6- PREVENTIVE MEASURES

Environmental Data:	Not available.
Handling:	Practice good industrial hygiene when handling this product.
Personal Protective Equipment:	
Eye Protection:	Safety glasses.
Hand Protection:	Neoprene, gauntlet type.
Respiratory Protective Equipment: ..	When TLV is exceeded, an approuved respirator is advised.
Other Protective Equipment:	Determined by the application.
Recommended Disposal:	Disposal should be in accordance with applicable regulations.
Spill Response:	Extinguish all ignition sources, Absorb with a commercial absorbent, Ventilate the area.
Storage Requirements:	Store in a well ventilated area, away from ignition source.
Ventilation Requirements:	Provide ventilation capable of maintaining emissions below the TLV.

7- TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY: ..... Eyes and skin contact. Inhalation.

7.1 - EFFECTS OF ACUTE EXPOSURE:

Eye Contact:	Possibility of a light irritation.
Skin Contact:	Possibility of a light irritation.
Inhalation:	In higk concentration, may cause irritation.
Ingestion:	Low toxicity.

7.2 - EFFECTS OF CHRONIC EXPOSURE:

Carcinogenicity:	Not applicable.
Reproductive Toxicity:	Not applicable.
Teratogenicity:	Not applicable.
Mutagenicity:	Not applicable.
Synergistic Product:	Not available.
Sensitization:	Not available.

8- SUGGESTED FIRST AID

Eye Contact:	Rinse with plenty of water during at least 15 minutes.
Skin Contact:	Wash with soap and water.
Inhalation:	Remove victim to fresh air.
If Swallowed:	Do not induce vomiting.
Other First Aid:	Contact a physician.

9- ADDITIONAL INFORMATION

TDG Classification: ..... Not-regulated.
WHMIS Classification: B3

10- PREPARATION INFORMATION

Preparation: MAGNUS Industrial Hygiene Department TEL: 450-655-1344
FAX: 450-655-5428

Code. : 018294

Date of Preparation: 11/06/2004

MATERIAL SAFETY DATA SHEET

Product: SUPREX

MAGNUS CHEMICALS LIMITED
1271 AMPERE
BOUCHERVILLE, QUEBEC, J4B 5Z5

EMERGENCY PHONE: 450-655-1344 FAX: 450-655-5428 (8:30 to 16:30)
(613) 996-6666 (CANUTEC)

1- PRODUCT INFORMATION:

Product Manufacturer: ..... MAGNUS CHEMICALS LIMITED
Product Identifier: ..... Suprex
Product Use: ..... General purpose degreaser.

2- HAZARDOUS INGREDIENTS:

MATERIAL or COMPOUND:	C.A.S. No.:	PERCENT: W/W	THRESHOLD LIMIT VALUE (TLV) PPM:	mg/m3	LD50/LC50
Not applicable.					

NAP: Not Applicable, NAV: Not Available

3- PHYSICAL DATA:

Physical State: ..... Liquid.
Appearance and Odor: ..... Clear yellow liquid with a light pine odor.
Odour Threshold: ..... Not available.
Specific Gravity: 1.02
Vapor Pressure: ..... Not available.
Vapor Density: ..... Not available.
Evaporation Rate: ..... < 1 (butyl acetate = 1).
Boiling Point: ..... Near 100oC
Freezing Point: ..... Near 0oC
pH: ..... 11.7 (10% solution)
Coefficient of Water/Oil Distribution: .. Not available.
Percent Volatile: 84%
Solubility in Water: 100%

4- FIRE AND EXPLOSION HAZARD DATA

Conditions of Flammability: ..... None known.
Extinguishing Media: ..... Not applicable.
Flash Point and Method: ..... Not applicable.
Flammable Limits - UEL: ..... Not applicable.
Flammable Limits - LEL: ..... Not applicable.
Auto-Ignition Temperature: ..... Not applicable.
Hazardous Combustion Product: ..... Oxide of carbon.
Sensitivity to Mechanical Impact / Static Discharge: Not applicable.
Unusual Fire And Explosion Hazards: ..... None known.

5- REACTIVITY DATA

Stability, If Not, Under Which Condition: Stable.
Incompatibility - Materials to Avoid: ... Acid.
Hazardous Polymerization: ..... Will not occur.
Corrosion: ..... None known.
Hazardous Decomposition Products: ..... Not available.

6- PREVENTIVE MEASURES

Environmental Data: ..... Not available.
Handling: ..... Handle and open container with care.
Personal Protective Equipment:
- Eye Protection: ..... Safety glasses.
- Hand Protection: ..... Gloves if necessary.
- Respiratory Protective Equipment: .. Not normally necessary.
- Other Protective Equipment: ..... Not normally necessary.

Recommended Disposal: ..... Disposal should be in accordance with applicable regulations.
Spill Response: ..... Wash the area with water.
Storage Requirements: ..... Avoid freezing.
Ventilation Requirements: ..... Mechanical (general).

7- TOXICOLOGICAL PROPERTIES

ROUTE OF ENTRY: ..... Skin contact. Eye contact.

7.1 - EFFECTS OF ACUTE EXPOSURE:

Eye Contact: ..... Irritation.
Skin Contact: ..... Possibility of a light irritation.
Inhalation: ..... Negligible effects.
Ingestion: ..... Gastric discomfort.

7.2 - EFFECTS OF CHRONIC EXPOSURE:

Carcinogenicity: ..... Not applicable.
Reproductive Toxicity: ..... Not applicable.
Teratogenicity: ..... Not applicable.
Mutagenicity: ..... Not applicable.
Synergistic Product: ..... Not available.
Sensitization: ..... Not available.

8- SUGGESTED FIRST AID

Eye Contact: ..... Rinse with plenty of water.
Skin Contact: ..... Wash with plenty of water during at least 15 minutes.
Inhalation: ..... Remove victim to fresh air.
If Swallowed: ..... Drink plenty of water.
Other First Aid: ..... Contact a physician.

9- ADDITIONAL INFORMATION

TDG Classification: ..... Not regulated.
WHMIS Classification: ..... Not regulated.

10- PREPARATION INFORMATION

Preparation: MAGNUS Industrial Hygiene Department TEL: 450-655-1344
FAX: 450-655-5428

Code. : 030044

Date of Preparation: 05/31/2004

The opinions expressed herein are those of qualified experts within MAGNUS CHEMICALS LIMITED. We believe that the information contained herein is current as of the date of this Material Safety Data Sheet. Since the use of this information and of these opinions and the conditions of use of the product are not within the control of MAGNUS CHEMICALS LIMITED, it is the user's obligation to determine the conditions of safe use of the product.

LS07 / suprexa

APPENDIX -2-

Spill Contingency report

Spill Contingency Report

Information of Incident
Section A

Date of Incident _____ Time _____

Location _____

Coordinates: ☐° ☐' ☐" W
☐° ☐' ☐" N

Check the Direction of Spill Movement: N ☐ NW ☐ W ☐ SW ☐ S ☐ SE ☐ E ☐ NE ☐
(State the bearing if possible)

Bearing: _____ Rate of Movement: _____

Party Responsible for Spill _____

Type of Substance that Spilled _____

Estimated Quantity of Substance _____

Specific Cause of Incident
Section B

Please state the causes of the incident above in the following space provided

Status of Incident
Section C

Approximate surface area of contamination _____

Containmant Actions Taken:

- ☐ Occurred Naturally
- ☐ Booms used
- ☐ Dyke used
- ☐ No containment implemented
- ☐ Other (specify)

_____

_____

List any factors affecting the spill such as: wind, temperature, etc.

Action Proposed to Clean, Contain or Dispose of Spilled Substance

Spills should be immediately reported using the 24 Hour Spill Report Line: (867) 920-8130 (NWT)

Section D

Hazards of Spill

Section E

- ☐ Flammable
- ☐ Combustible
- ☐ Health hazard (specify)

_____

_____

- ☐ Corrosive
- ☐ Explosive
- ☐ Radioactive
- ☐ Other (specify)

_____

_____

Information if Assistance is Required

Section F

Organization

Contact Person

Contact Number Alternate Number

Hours of Operation:

Comments and Recommendations

Section G

Information on Person Making Report

Section H

( ) -

Full Name *Contact Number* *Position & Department*

Employer

Submitted to

Reporter's Signature Date

Spills should be immediately reported using the 24 Hour Spill Report Line: (867) 920-8130 (NWT)

EKALUGAD FJORD PROJECT

HEALTH AND SAFETY PLAN

APPENDIX 7

Work Methodology Plan

Barrel Processing and Hazardous Waste Material
Demolition
Contaminated Soil Excavation
Debris Excavation and Removal
Landfill Waste Excavation
Grading
Asbestos Abatement

1. HAZARDOUS WASTE MATERIAL PROCESSING AREA

1.1. A Hazardous Waste Material Processing Area will be established for the purposes of sorting, packaging, sampling, and processing hazardous waste materials. It will also be used for the consolidation of compatible liquids and sediments, packaging for shipment, and cleaning of barrels.

1.2. The hazardous waste material processing area will be of sufficient size and capacity to accommodate the volume of material and number of barrels to be processed at any one time. It will be leak-proof and made to contain all runoff water, spills, and leaks so as not to contaminate the environment. It will be used to conduct the sampling, testing and packaging of hazardous waste materials, barrel contents and wash water. It will be designed to minimize the handling of hazardous waste materials, and to isolate hazardous materials, barrel contents and wash water from other work operations.

1.3. Any spills, leaks, or other releases of liquid or sediment from this area will be immediately cleaned up using appropriate techniques, equipment and materials.

1.4. All details concerning the Hazardous Waste Material Processing Area will be submitted to the Engineer for review and approval prior to commencing clean up activities.

1.5. Access for consolidation, packaging, cleaning of barrels, and transporting containers to the Temporary Storage Area will be provided.

2. TEMPORARY STORAGE AREA

2.1. The location and size of the Temporary Storage Area will be established so as to minimize the handling of materials, isolate materials from other work operations and to provide for the collection and removal of these materials from the site. Materials within the Temporary Storage Area will be segregated as follows:

- Containerized PCB-amended demolition material
- Tier II containerized contaminated soil
- Other hazardous contaminated soil
- Containerized barrel contents
- Other containerized hazardous waste materials

2.2. Hazardous waste materials will be stored in their appropriate packaging containers in accordance with the TDGR requirements. Hazardous waste containers will not be stacked. A detailed inventory of the Temporary Storage Area indicating the location and contents of each container and assigned Environment Canada Registration numbers (for PCB waste) and packaging configuration will be submitted to the Engineer.

2.3. The Temporary Storage Area shall be located:

2.3.1. More than 100 m away from any water body or drainage course
2.3.2. On stable ground not subject to flooding or seasonal saturation
2.3.3. In an area not routinely accessed or essential to the workforce, or site personnel
2.3.4. More than 30 m away from flammable materials

2.4. Signage will be erected at all access points to the Temporary Storage Area used for the storage of containerized PCB-painted materials. Signage will be visible all side of the area. The English version of the sign shall read:

CAUTION
PCB STORAGE AREA
TRESPASSING IS PROHIBITED

2.5. Signage will be posted in English, Inuktitut (local dialect) and French. All conform to CAN3-Z321-77, or latest edition thereof. All lettering shall be black, not less than 100 mm high, with a 25 mm wide stroke, on a white background.

2.6. PCB storage containers will be kept locked or equivalently secured to prevent unauthorized access to stored materials.

2.6.1. Only authorised personnel to enter the PCB storage.

2.6.2. PCB storage containers accessible to authorised inspectors as required by the Engineer.

2.7. Rows of storage containers will be placed at a minimum of 1 m offset so that container and Environment Canada Registration numbers remain visible.

Sufficient sorbent materials, or an approved spill kit will be stored near the Temporary Storage Area for an emergency clean up.

3 GENERAL

.1 All barrels will be processed following the general protocol set out in section 02090 - Hazardous Waste Material of the Specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site as outlined and referenced below.

4 GENERAL METHODOLOGY

.1 All barrels shall be inspected by QC employees prior to their being moved. This inspection will include signs of barrel deterioration, contamination due to leakage and signs that the barrel may be under pressure.

.2 Barrels that are open and empty will be moved to one of selected areas where barrel shredding is to take place.

.4 If the barrels contain liquid, the engineer will be informed. The engineer will then test the contents of the barrel and recommend appropriate action. Barrels that are easily opened will be opened slowly so as to relieve any internal pressure. These barrels may be moved to a central barrel processing/sorting location, if it is safe to do so. Otherwise, barrels with holes in them will be sampled and their contents analyzed and the contents will be transferred to a sound container prior to their being moved.

.5 Barrels that cannot be readily opened will be examined by the Engineer's representative and will be opened with a remote opening device as required.

.6 Once barrels are emptied and cleaned, they will be shredded and residual materials will be later placed into non-hazardous landfills.

5 METHODOLOGY

.1 Clean up Protocol for Barrels

1. Initial proposals for the methodology for dealing with barrels and their contents at the DEW Line sites were put forward at a meeting in Victoria in March 1993. The general approaches were discussed by representatives of the government agencies present which included Indian and Northern Affairs, Department of National Defence, Environment Canada and the Government of the Northwest Territories. At a follow up meeting in April 1994, the group endorsed the protocol. The protocol was employed during the decommissioning of the Horton River site and in further field investigations at Resolution Island during the summer of 1994 and has since been used at other DEW Line cleanup sites.

2. The following, outlines procedures for the cleanup of barrels to be used for the FOX-C Dew Line Clean Up. This follows the procedures in the specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site.

3. Figure 02090-1 from the specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site that summarizes the barrel processing protocol is presented in Annex A.

.2 INSPECTION:

1. The area around the barrels should be tested with a VOC meter to prior to the start of any works ensure safe working conditions if any barrels show evidence of holes, rust points, or openings. If the VOC meter shows VOC levels exceeding 20% of the Lower Explosive Limit (LEL), then all work shall be conducted in accordance with appropriate sections of the NIOSH Guidelines, the National Fire Code of Canada and the TDGA for flammable and combustible materials.

2. All barrels are to be inspected by QC and the Engineer to address the following items, which shall be recorded and used as a guide when opening barrels (section 02090 – Hazardous Waste Material, clauses 3.5.2.1.1 to 3.5.3.1.5 of the specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site)

   .1 Symbols, words, or other markings on the barrel that identify its contents, and/or that its contents are hazardous: e.g. radioactive, explosive, corrosive, toxic, flammable.

   .2 Symbols, words, or other marks on the barrel that indicate that it contains discarded laboratory chemicals, reagents, or other potentially dangerous materials in small-volume containers.

   .3 Signs of deterioration or damage such as corrosion, rust, or leaks at seams, rims, and V grooves.

   .4 Evidence of spillage, discoloration, or other contamination on the top and sides of

the barrel.
.5 Signs that the barrel is under pressure such as bulging and swelling.

.3 OPENING AND SAMPLING:

1. Pressurized barrels are extremely hazardous and shall be opened with extreme caution. Only non-sparking equipment shall be used to open barrels. All personnel responsible for opening barrels shall be provided with appropriate safety equipment and clothing. Barrels shall be opened in accordance with appropriate sections of the OSHA Code of Federal Regulations Title 29, Part 1910, Section 120 (29 CFR 1910.120) Hazardous Waste Operations and Emergency Response (HAZWOPER).

2. If the bungs can readily be moved, then the barrels shall be opened slowly allowing time for any pressure in the barrel to be released before the bungs are fully removed.

3. If the bungs cannot be readily moved, or inspection suggests that opening of the barrel presents a special hazard, then the barrels shall be vented remotely to relieve any internal pressure that may be present prior to opening. Remote venting shall be conducted using a suitable device. Such devices include a sharp spear weighted and dropped from an appropriate height or released from a tube housing a spring to penetrate the barrel, a sharp spear operated from within an excavator, or a remote drum opening device that uses an explosion proof drill with a brass drill bit operated at a safe distance from the drum behind a protective barrier. The remote venting operation shall be conducted at a safe distance from other site operations and from behind suitable walls or barricades. After sampling, the any openings shall be plugged if the barrel is not to be processed within a few days.

4. Samples of the contents of all barrels shall be extracted using a drum thief by the engineer. All barrels shall be clearly numbered using spray paint or other suitable marker by the engineer and cross referenced to the sample numbers.

5. Barrels shall not be transported until it has been determined that they are not under pressure, do not leak, and are sufficiently sound for transport by the engineer.

6. Barrels containing less than 50 mm depth of liquid may be combined with compatible materials (judged by similar colour and viscosity) from other barrels prior to sampling; samples inferred to contain only water on a visual examination may be tested prior to this consolidation. Barrel contents which consist of black oil shall not be consolidated.

7. Consolidation of barrel contents shall take place in the Hazardous Waste Material Processing Area. Barrels scattered on the tundra may be vented, then closed, and then transported to a barrel

sorting area for sampling and possible consolidation. This will be done to reduce the risk of leakage if the barrel is damaged during transport. One method of consolidation is to use a barrel containment tray and empty the barrels into the tray. Barrels that contain water or fuel can be piled on their sides with the bungs out and then shredded after a few days. Barrels that contain black oils will not be consolidated.

.4 TESTING:

1. Liquid samples shall be inspected and classified as either containing water or organic materials by the Engineer. Samples thought to contain water shall be analyzed to confirm that they are indeed water, and contain less than 2% glycols or alcohols.

2. The contents of barrels containing organic materials, including aqueous samples which contain more than 2% glycols or alcohols, shall be tested for PCBs, total chlorine, cadmium, chromium and lead, in addition to identification of the major components e.g. fuel oil, lubricating oil. Samples containing greater than 1000 ppm chlorine shall be further tested to identify the chlorinated compounds present.

3. Contents of barrels which contain two or more phases shall have all phases analyzed; the organic phases as described above and the aqueous phases to ascertain whether it contains less than 2% organics. In addition, the aqueous phases shall be tested for any components found in the organic phases above the criteria described below.

.5 DISPOSAL OF BARREL CONTENTS:

1. Barrels containing only rust and sediment shall be treated as empty non-contaminated barrels. Barrels containing unknown solids will be handled with caution.

2. Barrel contents comprising water only (less than 2% glycols or alcohols) shall be transferred to an open vessel such as a utility tub or half-barrel and any organic material removal by agitation with oil absorbent material, or oil water separator discharged to ground that is a minimum of 30 meters distance from natural drainage courses and 100 meters from fish bearing waters.

3. The contents of barrels comprising water and a trace of hydrocarbon shall be transferred to an oil/water separator, and any organic contamination that floats to the top shall be transferred by pump to a sound vessel and dealt with according to the test results of the original barrel contents. The remaining water will then be treated using the same method outlined in clause 3.5.2 of this work methodology plan.

4. All used oil absorbent material shall be treated according to its contamination levels. If PCBs,

cadmium, chromium and lead are at Tier I or Tier II or (for PCBs) CEPA levels they should be treated as soil contaminated at similar levels. If test results, and permits allow these materials shall be incinerated as outlined in clause 3.5.2 of this work methodology plan.

5. Barrel contents which are composed of water with glycols and/or alcohols or organics phases, and all oil absorbent material both of which contain less than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium, and 100 ppm lead, may be disposed of by incineration. Alternatively these contents may be disposed of off-site at a licensed disposal facility. The solid residual material resulting from incineration shall be subjected to a leachate extraction test by the Engineer. Material found to be not leaching toxic shall be treated of as DCC Tier II contaminated soil as per section 02190 – Contaminated Soil Remediation of the Specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site. Leachate toxic material shall be treated as hazardous waste, packaged in accordance with TDGA and/or IATA regulations as required, and eventually disposed of off-site at a licensed disposal facility.

6. Barrel contents which contain greater than 2 ppm PCBs, 1000 ppm chlorine, 2 ppm cadmium, 10 ppm chromium or 100 ppm lead shall be disposed of off-site at a licensed disposal facility. Contents may be combined with compatible materials for shipping purposes (note clause 3.6.1 of this work methodology plan). Flash point may be required to be determined if they cannot be inferred from the product identification.

.6 CLEANING AND DISPOSAL OF BARRELS:

1. Empty barrels resulting from consolidation of contaminated material (section 3.5.4) shall be triple rinsed with solvent (varsol, diesel etc.) prior to steam cleaning. Solvent washings shall tested by the engineer and will be incinerated if contamination levels allow, or shall be treated as hazardous waste, packaged in accordance with TDGA and/or IATA regulations as required, and disposed of off-site at a licensed disposal facility.

2. Only empty barrels resulting from consolidation of small volumes (clause 3.3.6 of this work methodology plan), from incineration (clause 3.5.5 of this work methodology plan) and from solvent washing (clause 3.6.1 of this work methodology plan) require steam cleaning; after cleaning they shall be treated as described in clause 3.6.3 of this work methodology plan. Recycling of rinsate is permitted. Steam cleaning will be carried out in a unit which is designed to reduce the contact between the operator and the steam and fuel vapors generated in the operation. The resulting wash water shall have any organic material removed by agitation with oil absorbent material or be separated with an oil/water separator. The water shall then be analyzed for cadmium, chromium and lead. If these metals are present at less than 2, 10 and 100 ppm respectively, then the water may be discarded on land that is a minimum of 30 meters from natural drainage courses and 100 meters from fish bearing waters, but if not then it shall be

disposed of off-site at a licensed disposal facility or subjected to a decontamination procedure. Alternatively, the wash water may be shipped off-site without testing for disposal at a licensed disposal facility. Used absorbent material shall be disposed of as described in section 3.5.4.

3. Empty and cleaned barrels may be crushed or shredded and be landfilled on-site as non-hazardous wastes. The barrels shall be crushed in such a manner so as to reduce their volume by a minimum of 75%. Shredded barrels may be disposed of off-site as recycled metals. Empty barrels that contained fuel shall be tested with a VOC meter to ensure that LEL inside the drum is below 20% of the LEL before they can be shredded. Experience may show that after a number of days, barrels with bungs removed have low LELs in which case measurement may not be necessary.

6 ALTERNATIVES

1. Any modifications to the work methodology plan proposed by QC shall be approved by the Engineer before implementation.

7 REFERENCES

2. The following page present the barrel processing flow chart from section 02090 – Hazardous Waste Material of the Specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site.

END OF WORK METHODOLOGY PLAN

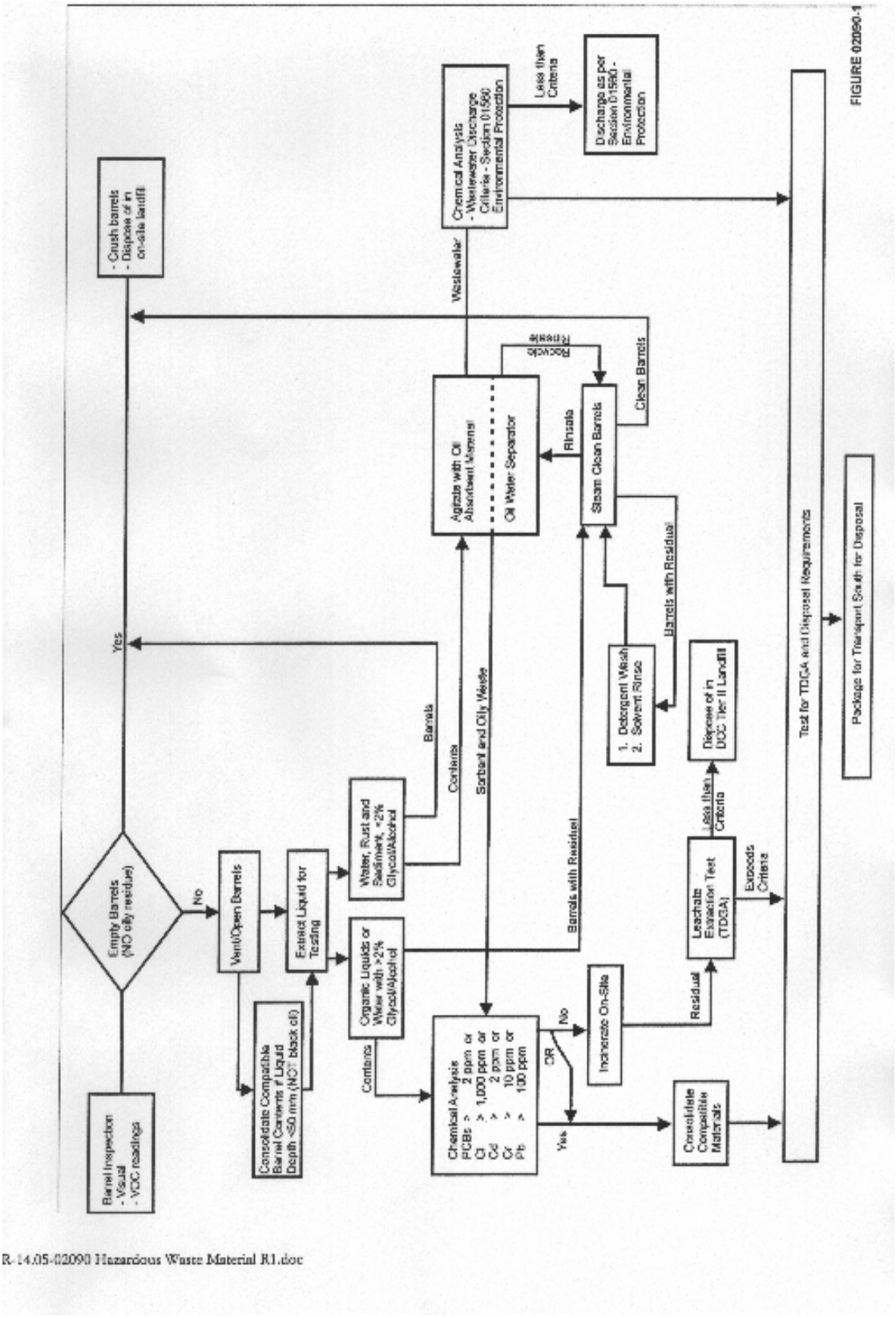


FIGURE 02090-1
Barrel Inspection
- Visual
- VOC readings
Empty Barrels
(NO oily residue)
Yes
- Crush barrels
- Dispose of in
on-site landfill
No
Vent/Open Barrels
Consolidate Compatible
Barrel Contents if Liquid
Depth <50 mm (NOT black oil)
Extract Liquid for
Testing
Water, Rust and
Sediment, <2%
Glycol/Alcohol
Barrels
Contents
Organic Liquids or
Water with >2%
Glycol/Alcohol
Contents
Sorbent and Oily Waste
Barrels with Residual
Chemical Analysis
PCBs > 2 ppm or
Cd > 1,000 ppm or
Cd > 2 ppm or
Cr > 10 ppm or
Pb > 130 ppm
OR
No
Yes
Incinerate On-Site
Residual
Consolidate
Compatible
Materials
Leachate
Extraction Test
(TDGA)
Less than
Criteria
Exceeds
Criteria
Dispose of in
DOC Tier II Landfill
1. Detergent Wash
2. Solvent Rinse
Barrels with Residual
Agitate with Oil
Absorbent Material
Oil Water Separator
Rinsate
Steam Clean Barrels
Reusable
Clean Barrels
Wastewater
Chemical Analysis
- Wastewater Discharge
Criteria - Section 01560 -
Environmental Protection
Less than
Criteria
Discharge as per
Section 01560 -
Environmental
Protection
Test for TDGA and Disposal Requirements
Package for Transport South for Disposal

1 Methods and Equipment for Demolition

1. The locations of all buildings, structures, and materials to be demolished (including any hazardous materials present) as presented in appendix A – Demolition Inventory, of the Specifications for the Cleanup of FOX-C, Ekalugad Fjord DEW Line Site.

2. Movement, settlement, or damage of adjacent structures, services, roadways, and parking areas is to be prevented and they will remain in their original place. Bracing, shoring, and underpinning will be provided where required.

3. All personnel engaged in demolition activities will wear and use protective equipment and clothing. The environment will be protected from fugitive waste materials resulting from demolition activities.

4. Demolition work, including asbestos abatement, will not start until:
   .1 Written approval of the Work Methodology Plan has been received from the Engineer and the Government of Nunavut Health and Safety; and
   .2 The Contractor has demonstrated to the Engineer that all required permits to be acquired by the Contractor for the work have been obtained.

5. If required by authorities having jurisdiction, drawings, diagrams or details showing sequence of disassembly work or supporting structures and underpinning will be submitted for approval. Submissions will bear a stamp of a qualified professional engineer registered in the NWT/Nunavut.

6. All saw dust, if cutting is required, will be collected and disposed as per specifications for Hazardous Waste Material.

7. Safe passage of persons around areas of demolition will be ensured.

8. Prevailing weather conditions and weather forecast will be considered. Demolition work will not proceed when weather conditions constitute a hazard to the workers and site.

9. Dry materials and rubbish will be covered and wet down to prevent blowing dust and debris. Dust control for existing and temporary roads will be provided.

10. Fires and burning of demolition materials on site will not be permitted unless specifically indicated in the Specifications, or as authorized in writing by the Engineer.

11. Burning of any painted materials will be strictly prohibited.

12. Where fires or burning are permitted, staining or smoke damage to structures, materials or vegetation which is to be preserved will be prevented. Any stained or damaged work will be restored, cleaned and returned to its original condition.

13. Supervision, attendance and fire protection measures in accordance with Section 01546 – Fire Safety Requirements will be provided.

14. Details will be submitted to the Engineer for review prior to starting of work. These details should include written confirmation from Transport Canada that the Contractor's proposed containers satisfy TDGA regulatory requirements for marine transport.

15. Before commencing demolition, all hazardous materials, asbestos containing products and hazardous building contents will be removed as where identified in the Table in the Appendix A of the contract specifications (Demolition Survey Table). Hazardous materials and asbestos removal work will be completed and accepted by the Engineer prior to the start of demolition.

16. Before starting demolition of fuel storage tanks, there will be removal and disposal of the remaining contents and tank sludge. Remaining petroleum products and sludge will be managed as per the Hazardous Waste Material Work Methodology Plan and tanks will be cleaned, in accordance with Section 02090 – Hazardous Waste Materials. VOC testing results of the LEL will be provided to the Engineer on request when tank cutting will be required following flammable vapor purging.

17. Existing water and sewage tanks will be pumped out prior to demolition. Water and sewage tank lines will be cleaned in accordance with Section 02090 – Hazardous Material.

18. Fiberglass insulation material will be placed inside polyethylene bags prior to disposal. Creosote-treated timber will be cut to 300 mm below ground level and wrapped in polyethylene sheeting bond with tape prior to disposal.

19. Any gas cylinders will be vented and/or exploded in a remote location prior to disposal. Any gas cylinders that potentially contain ozone depleting substances (Freon or halon) will be hauled to the Hazardous Waste Processing Area for packaging in compliance with TDGA.

20. Any transformers found prior to demolition will be drained and packaged in accordance with Section 02090 – Hazardous Waste Material.

21. Once all asbestos, hazardous material including PCB amended, existing equipment and furniture have been removed from the facility to be demolished, the remaining structure will be removed using cutting tools and heavy equipment to the top of the concrete foundation level.

22. Demolition debris will be removed and containerized/disposed of as specified in Section 02315 – Grading. Demolition will minimize dusting and concrete walls and masonry will be removed in small sections. At the end of each day, the structure will be left in safe conditions, the interiors protected from the outdoor element at all times.

23. Work will be performed in an environmentally acceptable manner. Requirements of Section 01561 – Environmental Protection, the Land Use Permit and the Water Use License will be complied with.

24. Unless otherwise specified, demolition work will be carried out in accordance with Section 01005 – General Instructions and Section 01545 – Safety, Medical, Security Requirements.

25. Fluorescent lamp ballasts will be handled and general safety precautions will be followed as follows:
    .1 Some ballasts in the buildings to be demolished may contain PCB-filled capacitors
    .2 Gloves will be worn while handling ballasts and those will be disposed with ballasts. Damaging ballast cases will be avoided.

26. Site will be inspected and items designated for demolition will be verified with the Engineer.

27. All utility and service lines to remain will be located and protected. They will be preserved in operating condition.

28. Electrical and telephone service lines entering buildings to be demolished will be disconnected in accordance with rules and regulations of authorities having jurisdiction. Warning signs on electrical/ communication lines and equipment that must remain energized to serve other properties during the period of demolition will be posted with warning signs.

29. Underground services outside of buildings scheduled for demolition will be disconnected and capped.

30. Electrical equipment containing PCBs will require confirmation of removal.

31. Upon completion of the demolition activities, remaining debris will be removed, all voids and/or holes on concrete surfaces will be filled, the area surrounding concrete pads and timber foundations will be reshaped. Type 3 Granular fill will be used to backfill any excavated area during demolition activities.

32. Dispose of all non-hazardous demolition material as per the methods described in the Work Methodology Plan – Grading.

2 Methods and Equipment for Handling PCB-Amended

1. All loose paint will be removed prior to dismantling structures and placed in a polyethylene bag. Loose paint chips will be removed by hand by workers wearing the appropriate PPE (see section 18 of the health and safety plan). The use of heat to remove loose paint will not be permitted. Bags of loose paint will be placed in the Hazardous Waste Containers specified in Clause Section 02222.

2. All paint particles will be contained prior to facility dismantling operation by the use of polyethylene sheets or other measures to seal facilities. Drop sheets will be used as required to collect paint particles that become removed from surfaces during dismantling operations. A control area will be established around these activities to ensure unprotected personnel are not exposed to airborne paint particles. A control area will be constructed to ensure no paint chips can escape.

3. The use of heat (eg. Cutting torches) to cut or dismantle facilities containing paint materials will not be used unless the paint was been removed from the areas to be cut.

4. For concrete surfaces coated with PCB – Amended Paint (PAP) at PCB concentrations in excess of 50 ppm, concrete will be removed to a depth of 25 mm by chipping or other measures.

5. Intermediate Containers for the storage of PAP materials (> 50 ppm PCBs) and PCB contaminated concrete will be as follows:
    - .1 Wooden Containers, with dimensions of 1.2 m (4 ft) by 1.2 m (4 ft) by 1.83 m (6 ft), Sea-Can Containers, or approved TDG equivalent.
    - .2 The containers will be in NEW condition.
    - .3 Approvals from Transport Canada will be provided for the use of containers for the transportation of PCB-Amended Painted Materials.

6. ISO Barge Containers for the Storage of PAP materials (>50 ppm PCBs) and the consolidation of Intermediate Containers will be as follows:
    - .1 Containers will be of steel plate construction, with sufficient support to withstand the vertical and lateral pressures exerted by the materials placed in them. The containers will be leak-proof, of sufficient durability to prevent the PCB materials from being affected by the weather and suitable for transport by sea barge, ship, semi-trailer roadway vehicles, and rail, and for international shipment requirements.
    - .2 Containers will be in new condition, with dimensions of 8 feet by 8 feet by 20 feet (2.44 x 2.44 x 6.10 meters).
    - .3 Containers will include sufficient lashing fittings, attached to the frame members or panels, in order to secure cargo.
    - .4 Containers will have drip trays composed of metal or polyethylene with plywood protection as described in Clause 2.7 Section 02222.
    - .5 Prior to shipment to site, documentation will be provided indicating the steel barge containers were inspected and certified by Transport Canada.
    - .6 Containers will be designed to support full gross weight for bottom lift by forklift or equivalent.
    - .7 Containers will be end-loading type. Opening will be sealed to prevent the escape of paint chips, flakes, and/or dust upon opening of container.

.8 Details of the containers will be submitted to the Engineer for review, including all required approvals, as well as a description of the type, volume and number of containers, prior to commencement of work.

.9 The barge containers will maintain a current Transport Canada inspection certification.

.10 A black and white weather proof logo measuring 150 mm by 150 mm in the form illustrated in Figure 1 and translated into the local dialect will be securely affixed to the entrance of the barge container.

.11 A black and white weatherproof label measuring 76 mm by 76 mm will be securely affixed to the side of the barge container, bearing the unique Environment Canada Registration number. There will be no obstruction to the view of the barge container number or Environment Canada number. Environment Canada PCB labels will be provided to the Engineer. The label will be in the form illustrated in Figure 2 Section 02222.

.12 The containers will remain the property of the owner.

7. Drip material will be provided for all onsite ISO barge containers consisting of 60 mil high-density polyethylene (HDPE) or 6 mil (0.15 mm) polyethylene with 12.5 mm thick plywood for protection.

8. Dunnage, locks, and bracing for securing PAP material placed in steel containers will be provided.

9. During the removal of PCB-amended paint, the Personnel Protection Requirements specified for the removal of Type 2 asbestos materials will be followed. Respirators with organic vapour – HEPA combination filters will be used. Appropriate eye protection (goggles, face shields, safety glasses) will be worn during paint scraping operations.

10. When working with PCB-containing materials, and other contaminants, workers will wear protective clothing and equipment acceptable to Labour Canada or Territorial Labour Department as suitable for exposure in the work area. National Institute for Occupational Safety and Health (NIOSH) guidelines will be followed in providing protection for on-site personnel including contract employees, subcontractors, the Engineer, Engineer's staff, and other authorized personnel.

11. When transporting containers of PCB-amended paint to the designated PCB Storage area, the release of any material will be avoided. Any spill will immediately be addressed as per the emergency response plan.

3 Methods and Equipment to Segregate/Containerize PCB-Amended

1. Dismantled PCB-amended painted materials will be placed in the containers, in a manner to minimize voids within the container. Separate containers will be sorted and provided for the various components coated with PCB amended as follows:

.1 Segregation and placement of PCB amended painted materials into Intermediate containers:

.1 All PCB-amended materials will be segregated and placed into separate Intermediate Containers, designated for that type of hazardous waste.

.2 All material that is sized or that can easily be sized to fit within the lined Intermediate Containers will be placed into Intermediate Containers.

.3 The material will be placed in the intermediate container such that no movement of the material will occur during normal conditions of transport.

.4 Loaded and closed Intermediate Containers will be placed into barge containers.

.2 Placement of PCB-Amended Painted Materials into Barge Containers:

.1 Prior to loading materials into barge containers, a layer of 60 mil (1.5 mm) HDPE or 6 mil polyethylene with plywood will be placed into the bottom of the container to serve as a drip tray. The drip tray will extend to a distance of at least 400 mm up the sides of the container.

.2 All filled Intermediate containers and larger demolition materials that cannot fit within the intermediate containers will be placed neatly into the barge containers.

.3 The weight of the material will be distributed evenly over the floor of the container. Where cargo items of a varying weight are to be packaged into a container or where a container will not be full, the material will be arranged so that the centre of gravity of the cargo is close to the mid-length of the container. Heavy loads are NOT to be concentrated on small areas of the container floor.

.4 Materials will be positioned in the container so that the centre of gravity is below half-height of the container.

.5 Materials within the container will be positioned so that lateral bracing for the load is not provided by the sidewalls of the container. Wood bracing materials or strapping will be provided and used so that the material does not move during transport. The strapping material will be anchored to the fastening loops built into the frame of the container,

.6 No gaps will be left between intermediate containers, larger demolition materials and the front or side walls of the barge that would allow cargo shifting.

.7 A wooden frame at the rear of the container will be constructed to prevent the movement of materials within the container and to prevent pressure on the door. The bracing material will be anchored to the structural frame of the container.

.2 A photographic record of the interior of all completed containers will be provided prior to closing. The photographic record will be supplied to the Engineer together with the corresponding inventory of each container upon completion of work. Trained and certified Contractor personnel are required to complete all Transportation of Dangerous Goods Act (TDGA) and regulations documentation and

recording requirements. The Engineer will serve as the Owner's representative as the generator of the waste and will sign all documentation as required.

.3 The contents of all the containers will be clearly marked in accordance with the requirements of the Canadian Environmental Protection Act for the storage of PCB Materials (SOR/92-507), and with the Transportation of Dangerous Goods Regulations.

.4 At the entrance of the barge container, securely affixed will be a black and white weatherproof label measuring 150 mm x 150 mm in the form illustrated in Figure 1 in section 02222 (specific to the type of material containerized), and it will be translated into the local dialect.

.5 To a visible side of the barge container will be affixed a black and white weatherproof label measuring 76 mm x 76 mm bearing the unique Environment Canada Registration number and Environment Canada PCB will be provided by the Engineer. The label will be in the form illustrated in Figure 02222-2 (specific to the type of material containerized).

.6 Barge containers will be locked or placed within the Temporary Storage Area that prevents access to the contents by unauthorized personnel.

.7 Gross contamination from clothing will be removed before leaving work areas containing PCB-amended materials, and will be placed in polyethylene bags. Outer clothing will be removed before leaving work area and placed in double polyethylene bags. Bags will be placed in Hazardous Waste Material Containers.

.8 All equipment that comes into direct contact with PCB-amended will be decontaminated. All rags or cloth used during the equipment decontamination will be placed in polyethylene bags. The bags will be placed in the Hazardous Waste Material Containers.

.9 All drop cloths placed to collect paint particles that become removed during dismantling operations will be sprayed or dampened with water prior to their removal from the facilities. The drop cloths will be placed in polyeythelyne bags, and the bags will be placed in the Hazardous Waste Material Containers.

4 Handling and Disposal of Wash Water

.1 Wash water that might have to be used for cleaning fuel tanks, wetting asbestos or other purposes will be tested prior to discharge. Once results indicate that wash water parameters are below discharge criteria, hoses and pumps will be used to discharge the water on land in an area at least 30 meters from any watercourses and down-gradient from areas of concerns. Otherwise, water will be treated using a

method to be developed based on the exceeding parameter(s). The required method will be proposed to the Engineer for approval prior to implementation. Treatment method might include carbon adsorption, oxidation, settling and/or filtering.

5 Alternatives

.1 Any modifications to the work methodology plan proposed by QC shall be approved by the Engineer before implementation.

END OF WORK METHODOLOGY PLAN

1. GENERAL

1.1. Contaminated soils shall be treated in various ways depending on the level of contamination. It is important to keep soils contaminated at different classification levels, and different contaminates separate. Care will be taken to minimize equipment contamination.

1.2. Soils with extremely high contamination levels will be placed directly in storage containers at the discretion of the Engineer.

1.3. Soils will be excavated by the Contractor from areas delineated and marked for removal by the Contractor and approved by the Engineer. The depths of the proposed excavation are either specified on the drawings or will be determined following testing.

1.4. The Engineer will conduct confirmatory testing after excavation As a result, further excavation may be required. Final decisions regarding excavations will be made by the Engineer.

2. PRODUCTS – MATERIALS

2.1. Hazardous Contaminated Soil Containers:

2.1.1. Containers will satisfy requirements of the latest Transportation of Dangerous Goods Act and Regulation and in particular the requirements for Intermediate Bulk Containers for marine transport of hazardous materials.

2.1.2. Details of the containers will be submitted to the Engineer for review prior to starting the work. Written confirmation from Transport Canada that the proposed containers satisfy TGDA regulatory requirements for marine transport will be included.

2.1.3. All necessary liners for the containers will be included, as per TGDA requirements.

2.2. Type 3 Granular Fill, which will be used for regrading as indicated on the Drawings, will be in accordance with Section 02300 - Granular Materials.

2.3. Environmental protection supplies will be used and will be as per section 01561 – Environmental Protection.

3. PROTECTION

3.1. Damage will be prevented to benchmarks, existing buildings, surfaces and underground service and utility lines not designated for demolition, as well as to instrumentation

installations. Any damage to the above will be repaired or replaced immediately, at no cost to the owner.

3.2. Environmental protection measures will be in accordance with the requirements specified in Section 01561 – Environmental Protection. The accepted Erosion, Sediment and Drainage Control Plan will be followed.

3.3. All water release resulting from the dewatering of ponded contaminated soil areas and the decontamination of excavation equipment will conform to the Wastewater Discharge Criteria outlined in Section 01561 – Environmental Protection.

4. METHODOLOGY

4.1. All areas containing contaminated or hazardous soils shall be deemed hazardous waste sites.

4.2. Machinery entering the hazardous waste area shall remain within the area until the cleanup work is completed and/or they have been submitted to decontamination procedures. Only equipment that is absolutely required will enter a hazardous waste area.

4.3. A transfer area will be set up for each hazardous waste site area. These transfer areas will be used to transfer materials, such as containers for Tier II soil, from within the hazardous waste areas to uncontaminated locations. Machinery within the hazardous waste site area will transport the containers to the transfer areas. Machinery from outside the hazardous site areas will then take the containers to the Hazardous waste storage facility.

4.4. Machinery leaving a hazardous waste site will be cleaned in a transfer area. Equipment will be washed with a pressure washer and/or a steamer depending on what conditions require. All wash water will be collected and treated. Waste Water Discharge Criteria, as indicated in Section 01561 – Environmental Protection, will be followed. A vacuum truck shall be used when practical to clean equipment.

4.5. Excavation Procedure

4.5.1. All hazardous waste sites will be divided into grids.

4.5.2. Each grid will be excavated as shown on the plans, or as directed by the Engineer. When excavation is completed the grid will have confirmatory testing done.

4.5.3. If the grid still shows contamination then 4.5.2 will be repeated.

4.5.4. When a grid is below the clean up criteria, the grid will be signed off by QC, and

the Engineer. Measures will be taken to ensure that the grid does not become recontaminated.

4.5.5. Where possible excavation will be done using an excavator. For soils unreachable by excavator, hand excavation may be necessary.

4.5.6. Any hazardous waste or contaminated materials other than soils will be dealt with as per the Hazardous Waste Material Work Methodology Plan.

4.5.7. Any saturated soils encountered during excavation will be stockpiled and allowed to drain prior to shipment or containerization. Drained water will be collected and treated as per the Wastewater Discharge Criteria outlined in Section 01561 – Environmental Protection. Any ponded water will be pumped out of the Hazardous Waste Site and treated prior to discharge.

4.6. Removal And Disposal Of Contaminated Soil (Excluding Hazardous Contaminated Soil)

4.6.1. Layout and excavation of contaminated soils will follow the limits defined on the Drawings. In contaminated soil areas containing boulders, all organic materials and fine grained materials will be removed from boulders. Hand excavation tools may be necessary for this work. All layouts will be field verified by the Engineer prior to excavation.

4.6.2. Silt fences, floating silt curtains and/or containment berms will be erected when excavating in the vicinity of a drainage source or a body of water to prevent the release of sediment and deleterious materials into the water.

4.6.3. Dust generated during excavation will be suppressed using water spray. Surface water will be prevented from entering the excavated area.

4.6.4. Ponded hazardous waste sites will be dewatered, as required. Soil excavations will be maintained free of standing water during soil removal, confirmatory sampling and backfilling activities. Waste Water Discharge Criteria, as indicated in Section 01561 – Environmental Protection, will be followed.

4.6.5. No Tier I and/or F3/F4 contaminated soil or liquid will be spilled during transport to designated on-site Non-Hazardous Waste Landfill.

4.6.6. Tier I and/ or F3/F4 contaminated soil will be placed as intermediate landfill (Type 6) in the Non-Hazardous Waste Landfill as per section 023159 – Grading.

4.6.7. Tier II contaminated soil will be containerized in a manner that non soil or liquid will be spilled during operation. Containers will be transported to the temporary

storage area.

4.6.8. F1/F2 contaminated soil will be transported to the Hydrocarbon Contaminated Soil Treatment Area

4.6.9. Excavation equipment including bucket, tracks, etc. will be cleaned of soil lumps and particles prior to mobilizing to the next hazardous waste site. Removed material will be collected and disposed in accordance with the contaminated soil designation. Special precautions will be taken to mitigate the tracking of contaminated soil over the site area.

4.6.10. The equipment used for decontaminating of Tier II contaminated soil will be decontaminated in accordance with section 3.3 of Section 02190 before commencing contaminated soil excavation at another hazardous waste site.

4.6.11. Excavated material will be replaced with granular fill (as indicated on Drawings), compacted, and graded to match existing ground surface. Backfilling or regrading of the excavated surface area will not commence until confirmatory testing has been completed by the Engineer, and the requirement for possible additional contaminated soil excavation is determined.

4.6.12. Uncontaminated equipment will not be operated in hazardous waste sites that have been excavated until the Engineer has confirmed, based on confirmatory testing results, that no further excavation of contaminated soil in that area is required.

4.7. Excavation Of Hazardous Contaminated Soil

4.7.1. Hazardous contaminated soil areas will be laid out and excavated following the limits defined on the Drawings. All organic materials will be removed from boulders in the contaminated soils containing boulders. Hand excavation tools will be used for this work if necessary. All layouts will be verified by the Engineer prior to excavation.

4.7.2. All boulders and rocks greater than 200 mm in maximum dimension will be removed from contaminated soil prior to placing in containers. Hazardous soil will be removed from these boulders and rocks. The boulders and rocks will be used as backfill for these excavations.

4.7.3. Dust generated during excavations will be suppressed using water spray. Surface water will be prevented from entering the excavated area.

4.7.4. Ponded contaminated soil areas will be dewatered, as required. Soil excavations will be maintained free of standing water during soil removal, confirmatory

sampling and backfilling work activities. Requirements of the Wastewater Discharge Criteria will be complied with, as indicated in Section 01560 – Environmental Protection.

4.7.5. Contaminated soil will be placed in containers as described in Clause 2.1 of section 02190. Hazardous contaminated soil containing hydrocarbons will be placed in containers lined with hydrocarbon resistant layers.

4.7.6. Soil will be transported in its containers to the designated on-site Temporary Storage Area. The hazardous contaminated soil containers will be ensured to be leak-proof prior to transport of materials. If contents show any evidence of leakage, the contents will be removed from the container and re-containerized in a leak-proof container, as required.

4.7.7. A numbering system will be developed for the identification of each hazardous contaminated soil container. Based on this numbering system, the number and contents of the container will be marked on the containers. A listing of the numbered containers, their contents, and the Hazardous Contaminated Soil Area designation from where the soil was excavated will be submitted to the Engineer.

4.7.8. Excavating equipment, including buckets, tracks, etc., will be cleaned of soil lumps and particles prior to mobilizing to the next contaminated soil area. Removed material will be collected and disposed of in the contaminated soil containers. Special precautions will be taken to mitigate the tracking of contaminated soil over the site area.

4.7.9. Equipment used for the excavation of hazardous contaminated soils will be decontaminated in accordance with Clause 3.3 of Section 02190 before commencing contaminated soil excavation at another location.

4.7.10. Excavated material will be replaced with granular fill (as indicated on Drawings), compacted, and graded to match existing ground surface. Backfilling or regrading of the excavated surface area will not commence until confirmatory testing has been completed by the Engineer, and the requirement for possible additional contaminated soil excavation is determined.

4.7.11. Uncontaminated equipment will not be operated in contaminated soil areas that have been excavated until the Engineer has confirmed, based on confirmatory testing results, that no further excavation of contaminated soil in that area is required.

4.8. Transport of Contaminated and Hazardous Soils

4.8.1. Contaminated soils will be transported to the proper disposal facility using dump

trucks. These trucks will have leak proof boxes to prevent water leakage during transport. The trucks will not enter the hazardous waste site so decontamination will not be necessary.

4.8.2. Hazardous soils will be stockpiled within the hazardous waste site. The soils will be excavated to fill the soil containers. The containers will located in a non-contaminated area, or if one cannot be found, they will be placed on a membrane to prevent them from coming into contact with the contaminated soil. The containers will be transported to temporary storage area. Short hauls for the containers will be done using a loader. Long hauls will be done using a flat bed trailer and heavy duty truck.

5. EQUIPMENT DECONTAMINATION

5.1. Equipment which comes into direct contact with contaminated soils will be decontaminated by steam cleaning or other means acceptable to the Engineer in a secure area capable of containing the waste generated by the washing operation.

5.2. Any contaminated soil that leaks, spills or otherwise leaves the piece of equipment during transport from the area of work to the decontamination area will be collected and properly disposed of.

5.3. Liquid waste resulting from the decontamination operations will be filtered through an oil-absorbent material. The disposal requirements for the oil-absorbent material are dependent on the results of testing to be carried out by QC. If test results indicate:

5.3.1. PCBs < 2 ppm
5.3.2. Chlorine < 1,000 ppm
5.3.3. Cadmium < 2 ppm
5.3.4. Chromium < 10 ppm; and
5.3.5. Lead < 100 ppm

Then the oil absorbent material will be incinerated on-site. Oil-absorbent material containing contaminants in excess of above criteria will be packaged in accordance with the TDGA and disposed off-site at a licensed disposal facility.

5.4. Waste liquid will be disposed of in accordance with the Wastewater Discharge Criteria outlined in section 01561 – Environmental Protection.

5.5. Any waste resulting from the decontamination procedure will be treated as Tier II or hydrocarbon contaminated soil, depending on the source of the material, and handled accordingly.

6. TEMPORARY STORAGE AREA

6.1. Hazardous contaminated soil containers will be stored in a single designated area, approved by the Engineer, to facilitate loading of the containers onto off-site transport equipment. Requirements for the Temporary Storage Area are described in section 02315 – Grading.

6.2. Hazardous contaminated soil containers will be stored within the Temporary Storage Area separately from all other shipping containers.

6.3. Stacking of containers is NOT allowed for hazardous waste materials.

6.4. Signage will be provided and erected as described in Section 02090 – Hazardous Waste Materials.

6.5. Various types of containerized materials will be segregated according to Section 02090 – Hazardous Waste Materials of the Specifications.

6.6. Engineer will be provided with a detailed inventory of the Temporary Storage Area indicating the location and contents of each container, the container and assigned Environment Canada Registration numbers and packaging configuration, as required.

6.7. Only authorized personnel will be allowed to enter the Temporary Storage Area.

7. PERSONNEL PROTECTION:

7.1. Cleanup areas under this contract contain soils and hazardous materials containing PCBs, inorganic elements, hydrocarbons, and other contaminants which are considered hazardous to human health.

7.2. PCBs in concentrations higher than 50 ppm are considered dangerous substances. Storage, handling, and disposal of PCBs are regulated by the Canadian Environmental Protection Act and the Federal Transportation of Dangerous Goods Act. Compliance will be maintained for all applicable regulations.

7.3. Workers will wear protective clothing and equipment acceptable to Labour Canada or Territorial Labour Department standards when working with inorganic elements, PCB containing materials, hydrocarbons, and other contaminants. Guidelines established by the National Institute for Occupational Safety and Health will be followed in providing protection for on-site personnel including contract employees and subcontractors, the Engineer and other authorized site personnel. Details of protective clothing and equipment required will be provided for each work area in the Health and Safety Plan as required by Section 01351 – Site Specific Health and Safety for Contaminated Sites.

7.4. Sufficient quantities of designated protection equipment will be supplied to fit all site personnel, including the Engineer and authorized visitors. Workers will be educated on

regards to risk and safe work practices.

7.5. No separate pay item will apply to the work practice requirements, including personnel protection, of this Section. Costs will be included in the applicable payment items to which this Section applies.

8. ALTERNATIVES

8.1. Any modifications to the work methodology plan proposed by QC shall be approved by the Engineer before implementation.

END OF WORK METHODOLOGY PLAN

1. GENERAL

1.1. This section describes the requirements for the removal, sorting, handling, and transport of partially buried and scattered debris over the site area, including excavation of buried non-hazardous debris at the Middle Site Area.

2. PROTECTION

2.1. When excavating in the vicinity of a drainage course or a body of water, silt fences, floating silt curtains and/or containment berms will be installed to prevent the release of sediment or deleterious materials into the water. The environmental protection measures specified in Section 01561 – Environmental Protection of the specifications will carefully followed during work.

3. REMOVAL AND SORTING

3.1. Prior to removal of debris the areas will be examined to assess the material type and nature of the debris. The debris will be then removed if, based on visual assessment, it is determined to be non-hazardous. Continual monitoring will be carried out to identify potentially hazardous material. Operations will be suspended if suspected hazardous material or debris is identified to allow for visual confirmation of the nature of the material or debris to be established. Partially buried debris will also be removed unless otherwise indicated by the Engineer. Debris removal will be carried out using an excavator with bucket and thumb attachment or grapple attachment. Barrels containing liquids will be carefully removed using a barrel clamp. If stained soils are encountered during debris removal operations the Engineer will be advised. Buried debris excavation will be completed to the limits indicated on the Drawings or directed by the Engineer, or to the depth where debris within the excavation area is not visible. Excavated debris will be sorted and containerized as appropriate. Sorting of small items will be carried out manually and for large items lifting equipment (*e.g.*, loader, forklift, crane truck) will be used.

4. DISPOSAL

4.1. The non-hazardous debris will be transported using dump trucks and disposed at the designated on-site landfill. Any hazardous and suspected hazardous waste, including barrels and barrel contents, will be containerized in UN standardized containers (as per TDG Regulations) and disposed in accordance with Section 02090 of the specifications.

5. ALTERNATIVES

5.1. Any modifications to the work methodology plan proposed by QC shall be approved by the Engineer before implementation.

END OF WORK METHODOLOGY PLAN

1. Equipment and Method for Landfill Excavation

1. The excavation of landfills will be conducted using excavators equipped with grapple and/or thumb attachments (Cat 320 or equivalent)

2. The hauling of excavated debris to the Material Processing Area will be conducted using conventional dump trucks.

3. The landfill excavation will include the physical removal of all buried debris and material to a limit indicated on the Drawings and/or to an extent where solid bedrock is reached and/or debris are not visible.

4. Two weeks prior to the excavation of landfills, a specific methodology that will include set-back distances, precise location and description of the Material Processing Area, excavation sequence sampling and testing method for water entering in contact with waste will be provided to the Engineer.

5. The excavation of landfill will be supervised at all time by a hazardous waste specialist that has more than five-year experience in hazardous waste management. A visual contact between the excavator(s) operator(s) and the hazardous waste specialist will be maintained at all time during excavation work to minimize spillage.

6. Sorbent material, empty containers, shovels, pumps, liners and fire extinguishers class A-B-C will be kept at all times close to the excavation area in case of spill.

7. Personal protection equipment such as steel toe cap rubber boots, respirators, tyvek, nitrile gloves and safety goggles will be provided to all work personnel involved in the excavation of landfills and sorting of debris and soil at the Material Processing Area.

8. Silt fence such as geogrid landlock will be installed to prevent sediment, soil and/or waste from entering water body when excavation of landfills will need to be conducted in the vicinity of a drainage course or a body of water.

9. Before excavation, all ice and/or snow will be removed and all pounded water will be tested prior to processing (see section 2 below).

10. Stakes will be installed and placed outside the landfill perimeter at a 20 meter spacing to record the source locations of excavated materials (see section 3 below).

11. A Volatile Organic Compound (VOC) monitor such as a miniRae PID will be used to monitor organic vapors when excavation of buried drums is conducted. In events when VOC measurements indicate that levels are exceeding 20% of the Lower Explosion Level (LEL), work will be temporarily halted and the excavated area will be ventilated using either natural or induced means to reduce the organic vapors at a safe level.

12. Excavator(s) and dump truck(s) will be kept on clean ground progressing on cleaned areas to minimize the decontamination of equipment.

13. Excavation will be done using a wide valleys methodology, to ensure good ventilation and to enhance thawing.

14. If asbestos is encountered during the landfill excavation, the material will be immediately transported to the asbestos landfill location for burying and covering with gravel. That is if the material is wet or frozen. If the material is friable, thawed and dry, excavation will be temporarily halted and the asbestos will then be double bagged prior to hauling to the disposal area. All workers handling any asbestos during landfill excavation will wear adequate personnel protection equipment as described in the Asbestos Abatement Work Methodology Plan.

15. Should the landfill excavation not be completed within a season, Type 3 granular fill will be used to cover the open area as per specifications. As such, a minimum of 200 mm thickness of Type 3 granular fill will be used to provide positive drainage. The granular fill will be removed the following season and temporarily stockpiled for grading throughout the project.

16. Once the limits indicated on the drawing or as directed by the Engineer have been reached, or the depth of debris is not visible anymore, the Engineer will be asked to provide instruction for test pits and confirmatory sampling.

17. At completion, based on the Engineer approval, clean soil will be placed in 250 mm lifts and compacted to 95 percent of Maximum Dry Density to promote positive drainage.

2. Equipment and Method for Snow Removal and Dewatering

1. Snow will be removed using dozers and excavators (Cat D6, 320 or equivalent). Snow will be pushed beside the landfill in an area down-gradient of the buried waste and not up-gradient of the Material Processing Area (to be decided on site) to prevent runoff, erosion and water treatment. All snow covering the areas of landfill excavation will be treated as low potential for water contamination except the top layer (approximately 1-foot) sitting directly on waste.

2. The top first foot of snow lying on buried waste will be stockpiled separately. Melt water from these piles may need to be tested to verify it complies with water discharge parameters described in section 01561 of the specifications.

3. Any standing water will be tested prior to discharge whether it is melting water, groundwater and/or leachate. Once results indicate that standing water parameters are below discharge criteria, hoses and pumps will be used to discharge the water on land in an area at least 30 meters from any watercourses and down-gradient from areas of concerns. Otherwise, water will be treated using a method to be developed based on the exceeding parameter(s). The required method will be proposed to the Engineer for

approval prior to implementation. Treatment method might include carbon adsorption, oxidation, settling and/or filtering.

4. Erosion and drainage control methods such as silt fences will be installed/implemented to collect any sediment from running water escaping and/or flowing through the landfill excavation areas.

3. Material Processing Area

1. For each landfill and buried debris excavation areas, a Material Processing Area will be established to sort, inspect, test and classify materials hauled from the excavation.

2. Proposed locations for Material Processing Area will be submitted to the Engineer for approval.

3. The proposed locations will be selected outside of any landfills or areas of concerns to:
   - minimize hauling; provide enough space for materials handling, sorting, testing and packaging
   - minimize potential impacts to the environment
   - be sufficiently large to support operations including access roads from excavation and to disposal/temporary storage areas, and safe work conditions to the workers.

4. The surface of each Material Processing Area will be at least 800 m^2 to support daily hauling/stockpiling and processing/disposal and the 10-day turn around time for testing results. The above mentioned surface is minimal. The selected Material Processing Areas will potentially be much larger in surface. Granular material will likely be required to set up the areas and construct access roads.

5. Once the proposed Material Processing Areas are approved by the Engineer, containment systems that shall include berm, liners, and/or sumps will be prepared to avoid any impacts from spills, runoff, leachate and/or melting water to the surrounding environment. Therefore, the area might need to be prepared using available Heavy Equipment (dozers, excavators).

6. The Material Processing Area will be used to sort Tier I, Tier II and CEPA (if any found) contaminated soil and F3/F4 and F1/F2 hydrocarbon contaminated soils. In addition, creosote-treated wood, barrels, asbestos-containing materials, potentially hazardous debris such as transformers, electrical parts, paint cans and others, with non-hazardous debris will need to be sorted and managed/hauled/containerized as per specifications.

7. Materials (soils/debris) hauled from the excavation areas will be stockpiled onto the Material Processing Areas, each truckload forming a separate stockpile to facilitate sorting (<20 m^3). Soils that are stained or potentially contaminated will not be placed onto potentially non-hazardous debris and/or clean soil.

8. A daily written record will be provided to the Engineer and will include:
   - date of excavation and stockpiling.
   - location from where the material was excavated *vs* surveyed grid.
   - measured volume of stockpiled material.
   - type of material.

9. At all Material Processing Areas, debris will be separated from soils. As such:
   - Soils will be disposed based on results of analysis.
   - Intact excavated barrels will be placed in overpacks, hauled to the hazardous Material Processing Area for further testing.
   - Hazardous debris/soil will be containerized as per specifications (once testing results are available).
   - Non-hazardous debris will be transported to the closest non-hazardous landfill, as per specifications.
   - All non-contaminated soil, following Engineer approval will be used for grading as per specifications (Section 02315).

10. All soil contamination resulting from the operations of Material Processing Areas, if any, shall be addressed and remediated based on a plan to be submitted to the Engineer for approval.

11. Once landfill excavations are completed, all Material Processing Areas will be reshaped to promote drainage.

4. Maintenance of Filters and Traps

1. Erosion control and drainage systems will be inspected daily to ensure efficiency. Filtering material used to collect sediments will be replaced when clogging is observed.

2. All erosion and drainage control systems will be placed within the nearest non-hazardous waste landfill, once the landfill and/or buried debris excavation operations are completed.

5. Alternatives

1. Any modifications to the work methodology plan proposed by the Contractor shall be approved by the Engineer before implementation.

END OF WORK METHODOLOGY PLAN

PRESEASON WORK:

1. Obtain Quarrying Permits

2. Find Surveying Subcontractor

   2.1. Name(s) and qualification(s) of the surveying subcontractor(s) will be provided upon request

ON SITE WORK:

1. START OF WORK SEASON:

1.1. All snow and ice will be removed from any areas where granular fill is to be placed using heavy equipment at the beginning of the season, prior to construction, and any standing water will be removed or pumped out starting one week prior to construction of the berms.

1.2. Set up of soil testing lab prior to start of work:

1.2.1. The soil testing lab will be set up on a site designated by the Engineer, and will be ready for use three days prior to the first day where testing is required.

1.2.2. The lab will be constructed to respect Section 01592 of the camp service specifications – Testing Laboratory Services of the specifications and plans will be submitted prior to construction. Keys to the locks will be provided.

1.2.3. The lab will be equipped as per the specifications

1.2.4. The lab will be cleaned and maintained as per the specifications

1.2.5. Power will be supplied to the lab as per clause 4.13 of Section 01410 – Testing Laboratory Services of the specifications

2. GRANULAR FILL PRODUCTS

2.1. All borrow sources are to be approved by the Engineer

2.2. All borrow sources will respect clauses 1.2.2, 1.2.3, 1.2.4, 1.2.5, 1.2.6, 1.2.7, 1.2.8, and 1.2.9 of Section 02300 – Granular Materials of the specifications.

2.3. All aggregate will be made available for continual sampling by the Engineer.

2.4. All granular fill will meet clauses 2.1.1, 2.1.2, 2.1.3, and 2.1.4 of Section 02300 – Granular Materials of the specifications.

2.5. All Granular fill will be tested and approved for use by the engineer prior to placement.

2.6. Type 2 granular fill will meet clause 2.1.5 of Section 02300 – Granular Materials of the specifications.

2.7. Type 3 granular fill will meet clauses 2.1.6 of Section 02300 – Granular Materials of the specifications.

2.8. Type 4 granular fill will meet clauses 2.1.7 of Section 02300 – Granular Materials of the specifications.

2.9. Type 6 granular fill will meet the amended clause 2.1.8 of Section 02300 – Granular Materials of the specifications.

2.10. Unsuitable granular fill as defined in clause 2.9 of this Work Methodology Plan will be immediately rejected and placed in a known area so as not to be used elsewhere.

3. DEVELOPMENT OF AGGREGATE SOURCE

3.1. The Engineer will be advised seven days prior to the start of excavation operations in selected borrow areas. The Engineer will be advised should any unsuitable granular fill be encountered in the borrow area.

3.2. Prior to excavation of granular fill, any debris will be removed; all organic and surface materials will be stripped far enough ahead of excavation to ensure granular fill is not contaminated by deleterious materials. If a significant deposit of organic material is encountered, then the area will be left undisturbed. Replacement or placement to a new location of organic materials will be done as directed by the Engineer.

3.3. Slopes of waste material piles will be trimmed off and dressed, and the site will be left in neat condition.

3.4. When excavation is complete the sides of the excavation will be dressed to achieve gentle slopes, swales or ditches will be provided to prevent surface standing water in the excavation area, and excavation areas will be left in a condition acceptable to the Engineer.

4. PROCESSING & HANDLING

4.1. The aggregate will be processed uniformly using methods that prevent contamination, segregation and degradation.

4.2. Blending will be used to obtain gradation requirements, and to decrease percentage of flat and elongated particles. Only approved methods and equipment will be used.

4.3. In stratified deposits, only excavation equipment and methods will be used that will produce uniform, homogeneous aggregate.

4.4. Aggregate will be moisture conditioned or dried, depending on conditions, as required, and directed by the Engineer.

4.5. Aggregate will be handled to avoid segregation, contamination, and degradation.

5. STOCKPILES

5.1. Stockpiles will be developed as needed.

5.2. Stockpile sites will not be on undisturbed tundra, and will be level, well drained and of adequate bearing capacity and stability to support stockpiles and equipment.

5.3. A compacted sand base of 300 mm thickness will be used as directed by the Engineer. In the case where a sand base is not used, the bottom 300 mm of the stockpile will not be used as granular fill.

5.4. Stockpiles will be separated to ensure no intermixing. All intermixed granular fill types will be rejected, and removed within 48 hours.

5.5. Stockpiled granular fills will be placed in layers of 1 m thickness. The entire area will be covered before another layer is started. Aggregates will be uniformly spot dumped using dump trucks or wheeled loaders and built up as specified.

5.6. Stockpiles will not be coned, and granular fill will not be dumped over the edges of the stockpiles.

5.7. Snow and ice will not be mixed into the stockpiles.

5.8. Stockpile areas will be left in a condition acceptable to the Engineer. Any unused aggregate stockpiles will be left to the satisfaction of the Engineer.

5.9. Fill will be produced throughout the entire season by excavation from borrow pits using excavators and a bull dozer, and transported to raw material stockpiles near a grizzly, using dump trucks and/or wheel loaders. The raw materials will be fed into the grizzly using a wheel loader or excavator. The grizzlies will have sufficient spacing to remove

any undesired materials prior to screening if necessary. Processed materials will then be transported to stockpiles using dump trucks. All stockpile locations are subject to the approval of the Engineer.

6. REGRADING

6.1. Type 2 and Type 3 granular fill will be placed, bladed and trimmed to the elevations, grades, and cross-section dimensions indicated, or as directed by the Engineer.

6.2. Where regrading is required witness stakes will be used to monitor the depth of granular fill. Grade stakes will be placed on a grid system approved by the Engineer for each area where regrading is required. All damaged and displaced stakes will be immediately replaced.

6.3. Type 2, and Type 3 granular fill will be compacted to specified density. Granular fill will be dried or moisture conditioned as necessary to obtain the specified density.

7. RESHAPING

7.1. Granular fill will be bladed and trimmed to the elevations, grades, and cross-section dimensions indicated, or as directed by the Engineer.

7.2. Granular fill from within the area to be reshaped will be used to provide a surface that is smooth and compact with firm slopes. Extra granular fill will only be used should the existing granular fill not be sufficient for reshaping.

7.3. Any debris exposed during reshaping will be removed or covered with a minimum depth of Type 2 granular fill as directed by the Engineer.

7.4. The final reshaped surface will be blended with the existing terrain to provide positive drainage.

8. EXCAVATING

8.1. Grades and layout will be set in detail from control points in areas of excavation. The Engineer will be advised in advance of any placement to allow for surveying of the original ground cross-sections.

8.2. Excavation will be done to the lines, grades, elevations, and dimensions indicated on the drawings, or agreed to with the engineer. Excavations will not be done until snow and/or ice has melted or been removed from the area to be excavated.

8.3. All excavations will be kept free of water while work is in progress. Open excavations will be protected from flooding and damage due to surface run-off. Water will be discharged so as not to affect continuing, or completed work. All water discharge will conform to the Waste Water discharge Criteria of Section 01561 – Environmental Protection.

8.4. Excavated materials will be disposed of in approved locations. Flow of surface drainage or natural water courses will not be obstructed. Suitable excavated materials from key trench excavations will be used as granular fill.

8.5. Earth bottoms of excavations will be undisturbed soil, level, free from loose, soft, soil or organic mater.

8.6. Engineer's approval will be sought for the completion of excavation, and when the bottom of an excavation is reached.

8.7. The final depth of trench excavation shall be determined in the field by the Engineer based on acceptable soil, groundwater, and bedrock conditions, if encountered.

8.8. Where an unauthorized over excavation has occurred, under areas will be filled with Type 2 or Type 4 granular fill, as directed by the Engineer. The granular fill will be compacted to a minimum of 95% of maximum dry density in accordance with ASTM D698.

8.9. All loose material and debris will be removed, and excavations will be hand trimmed, and made firm. When material at the bottom of the excavation is disturbed, the foundation soil will be compacted to a density at least equal to the undisturbed soil.

9. BACKFILLING

9.1. Only compaction equipment capable of obtaining specified densities will be used for compaction of backfilled materials.

9.2. Backfilling will not start until approval of the excavation is obtained from the Engineer.

9.3. Backfilling will start within 1 day of receipt of confirmatory testing indicating no further excavation is required.

9.4. An area will not be backfilled if snow and/or ice and/or water are present.

9.5. No trenches or excavations will be left open over the winter season.

10. LANDFILLING

10.1. Grades and layout will be set in detail from control points in areas of excavation. The Engineer will be advised in advance of any placement to allow for surveying of the original ground cross-sections.

10.2. Perimeter berms of Type 2 and/or Type 4 granular fill will be constructed to the dimensions shown on the drawings. The granular fill will be placed as per clause 3.3 of Section 02209 – Grading.

10.3. Landfilling Non-Hazardous Waste

10.3.1. Non-hazardous waste will be placed in the designated area(s) in uniform, horizontal lifts between and against the berms as shown on the drawings. The thickness of each waste lift will be not greater than 0.5 metres, and small enough that all voids can be filled with intermediate cover.

10.3.2. Waste will be compacted during placement and spreading with a double drum vibratory roller soil compactor. If the compactor is not heavy enough to crush all debris, a bulldozer will be used in the worst case the materials will be cut.

10.3.3. Prior to placement in the landfills, all non-hazardous waste that requires it will be cut to minimize displacement and lifting of landfilled materials resulting from landfill compaction operations; so that the maximum depth of any one material component within the landfill does not exceed 0.5 m; and to satisfy the overall landfill dimension requirements as indicated on the drawings.

10.3.4. All structural steel non-hazardous waste will be cut into separate members prior to placement in the landfill. Large materials will be placed on the base of the landfill or the base of an intermediate cover layer so that the materials lay on a flat, compacted surface. Hollow materials such as tanks that cannot be shredded will be cut to allow for nesting. At a minimum any hollow non-hazardous waste will be cut in half parallel to the longest axis and will not exceed 0.5 m in height. Within the landfill underside of nested materials will be supported with intermediate cover, or other non-hazardous waste to minimize the displacement and lifting of the waste.

10.3.5. All metal non-hazardous waste will be segregated from other wastes in the landfill. Approval of location will be obtained from the Engineer prior to placement of metal non-hazardous waste. The location and depth of metal non-hazardous waste will be recorded.

10.3.6. Barrels will be cut, crushed, or shredded onsite, prior to placement in the landfill to reduce the volume of the barrel by 75%.

10.3.7. All asbestos waste will be segregated from other wastes in the landfill. Approval of location will be obtained from the Engineer prior to placement of asbestos waste. The location and depth of asbestos waste will be recorded.

10.3.8. Double bagged asbestos waste will be hand placed in the landfill. A daily cover of minimum 150 mm Type 6 granular fill will be placed over the asbestos waste. Equipment will not operate directly on the asbestos waste containers. Ripped and/or torn asbestos bags will be replaced.

10.3.9. Tier I and F3/F4 contaminated soil or Type 6 granular fill will be used if required as intermediate cover to a maximum loose thickness of 150 mm over each layer of non-hazardous waste or as required to infill voids within the waste layer, and compacted with the random action of tracked equipment. Sufficient passes will be made with the tracked equipment to subject every point on the surface to a minimum of three separate passes.

10.3.10. Type 6 granular fill will only be used after all Tier I contaminated soil has been used, and after approval from the Engineer.

10.3.11. The number of layers of 150 mm thick intermediate fill to be placed within a landfill will be done as per the Specifications.

10.3.12. Additional Type 6 granular fill will be placed on the final lift to a level that all debris are covered with Type 6 prior to placement of Type 2 cover.

10.3.13. A stockpile of intermediate fill will be continuously maintained adjacent to each landfill.

10.3.14. Additional intermediate cover granular fill will be placed and compacted to a minimum of 95% of maximum dry density, when required to completely infill voids within the waste layer prior to proceeding with the placement of the next overlying layer and prior to placement of the final cover.

10.3.15. Special care will be taken to place and compact intermediate fill cover granular fill against exposed rock faces and areas inaccessible to large compaction equipment to specified requirements.

10.3.16. Approval will be sought from the Engineer prior to the placement of Type 2 fill over the landfill.

10.3.17. The final cover will be constructed to the specified thicknesses and grades indicate on the drawings.

11. TESTING

11.1. Testing of granular fill, materials and compaction testing will be carried out and paid for by the Engineer. The frequency of the testing will be determined by the Engineer.

12. FINISHING AND TOLERANCES

12.1. All areas to be covered with granular fill shall be uniform without projections or depressions exceeding 100 mm in 3 m.

12.2. Granular fill surfaces will be within 100mm of design elevations but will not be uniformly high or low.

13. MAINTENANCE

13.1. A finished surface will be maintained in a condition in accordance with the specifications until succeeding granular fill is applied or until acceptance by the Engineer.

14. ON-SITE DOCUMENTATION

14.1. The following documents will be maintained onsite:

14.1.1. ASTM 698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

14.1.2. ASTM C127-01 Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate

14.1.3. ASTM C136-01 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

14.1.4. ASTM C117-95 Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing

14.1.5. ASTM D4542-95(2001) Standard Test Method for Pore Water Extraction and Determination of the Soluble Salt Content of Soils by Refractometer

14.1.6. ASTM D2487-00 Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

15. ALTERNATIVES

15.1. Any modifications to the work methodology plan proposed by QC shall be approved by the Engineer before implementation.

END OF WORK METHODOLOGY PLAN

1.0 PROJECT PREPARATION

1.1 Regulations

All asbestos abatement activities will be in accordance with existing Territorial and Federal government guidelines and regulations. In particular the most stringent of the following regulations will be followed:

- Northwest Territories Safety Act - Asbestos Safety Regulations, March 6, 1992;
- Northwest Territories Guidelines for the Removal of Materials Containing Friable Asbestos, February 1, 1992;
- Northwest Territories Department of Renewable Resources Asbestos Disposal Guidelines, July 24, 1992; and
- Transportation of Dangerous Goods Act.

1.2 Environmental Protection

The environmental protection taken will comply with the Environmental Protection Plan and as specified in section 1561- Environmental Protection (Specifications for the Cleanup of FOX-C, Ekalugad Fjord).

Procedures will also comply with the Environmental Guideline for Waste Asbestos (NWT Resources, Wildlife & Economic Development, September 1997) and Guidelines for Removal of Materials Containing Friable Asbestos.

2.0 SAFETY TRAINING AND INSTRUCTION

2.1 Supervisor Qualifications

The Asbestos Abatement Training and Removal will be supervised by a certified professions Asbestos Specialist with extensive training and experience in all types of removal techniques as well as safety instruction. The qualifications of the Asbestos Specialist will be provided before the asbestos abatement start up. Local labor will be used. It is proposed that laborers who have assisted in DEW line asbestos program in the past and have received prior training will be used wherever feasible. The hierarchy of the abatement team consists of a foreman/supervisor, lead hand and laborers, respectively.

2.2 Safety Training

The Asbestos Specialist will provide health and safety training prior to commencement of the work to all workers. An outline of the asbestos training program is attached to this WMP. These instructions will be provided to all asbestos workers prior to project commencement. The instructions include materials describing the hazards of asbestos exposure and all safety requirements and personal protective measures. Special attention will be given to the following items:

- proper use of respirators (including limitations, inspection, maintenance, fitting and decontamination);

- protective clothing requirements;
- decontamination procedures;
- safe handling and proper disposal;
- work execution procedures; and
- general safety requirements for a demolition site

Ongoing safety training throughout the project will include weekly safety meetings, daily tailgate meetings, individual instruction and periodic review of specific potential safety problems.

2.3 Respirator Fit Testing

Asbestos crew personnel will be instructed and fitted with respiratory protection using qualitative fit testing methods. An irritant smoke test will be used at the beginning of the job, when a new mask is issued, when a problem is identified or every two weeks at a minimum. Workers will perform positive and negative fit test every time the mask is donned. Workers will be provided with non-powered half-face respirators with HEPA cartridge filters.

3.0 PREPARATION OF WORK AREAS AND DECONTAMINATION FACILITY

3.1 Preparation of Permits and Equipment

No work will begin until all necessary preparatory steps have been taken and permits obtained. Further, all necessary equipment, such as tools and waste receptors, will be readily available before removal begins.

3.2 Building Preparation

Prior to commencement of the asbestos abatement program, all buildings will be prepared for the asbestos work crew. All furnishings, walls, doors, carpets, suspended ceilings and unfastened equipment and/or stored materials, which can be removed without disturbing asbestos-containing material, will be removed from the building. Personnel will be provided with Tyvek coveralls and fitted half-face respirators with HEPA filters for these activities, where deemed necessary by the Asbestos Specialist. Any liquids remaining in piping etc. will be drained and collected for proper disposal. All air handling and ventilation systems will be shut off and remain shut for the duration of the work.

3.3 Signage

Warning signs will be mounted as per the specifications at all possible work access locations.

3.4 Air Monitoring

A fibrous aerosol monitor (FAM) will be used to monitor air both inside and outside of asbestos work area enclosures for areas to be re-occupied.

4.0 ASBESTOS REMOVAL

4.1 Building Occupation

No buildings will be used as temporary accommodations during the cleanup. No buildings will be occupied by personnel other than the asbestos crew during removal activities (i.e. there will be no partially occupied buildings). In the case of the buildings that will be demolished, any attached "modules" will be pulled away from the rest of the buildings to facilitate demolition activities and to ensure that only properly trained and protected personnel occupy any spaces where asbestos removal activities are ongoing.

4.2 Building Closure

All openings such as corridors, doorways, windows, ducts, grills, etc., will be sealed off with poly and sealed with tape or supported with wood framing.

4.3 Dusting

Dust on surfaces likely to be disturbed will be removed with a HEPA vacuum. The top of the ceiling systems, light fixtures etc., in proximity of ceiling entry will also be vacuumed.

4.4 Piping and Tanks

Asbestos from piping, elbows and tanks in the buildings will be removed using a technique as follows:

- Delineate the buildings into distinct work areas.
- Seal each work area as per 4.2 of this WMP with an access/egress at one end and an equipment decontamination/bagging room at an exit at the other end.
- Locate a one-stage decontamination station near the access/egress of each work area. Demarcate the area between the one-stage decontamination unit and the work area as an Asbestos Hazard Area.
- Perform background PAM monitoring prior to commencing work in each work area. Perform the removal progressively in each work area starting from the furthest point away from the one-stage decontamination unit.
- Use traditional glovebag or Type 2 techniques detailed in the Clean-up Specification, Section 13282 Asbestos Abatement. Place asbestos waste in receptacles and seal once half full. If the pipe removal option is to be exercised, the exposed ends of the pipe will be sealed with duct tape and the pipe will be wrapped with 6 mm polyethylene.
- After removal the asbestos will be taken to the bagging room where it will be cleaned, double bagged and taken to the disposal transfer area. PCB amended painted asbestos material will also be double bagged and taken to the Hazardous Waste Material Processing Area.
- FAM testing will be done upon completion of the work.

4.5 Personnel Decontamination

When leaving a work area, the following rules will be followed:

- The disposable coveralls will be removed and left at the entrance to the work area if they are to be re-used or will be treated as asbestos waste and disposed of.
- Rubber boots will be left at the entrance to the work area, but will be washed and dried if they are to be removed from the work area.
- While wearing the respirator, the outside surface will be wiped using wet towels. The respirator will then be moved and the open ends of the HEPA filter will be covered with duct tape to prevent any fibers from escaping.
- Upon leaving the asbestos work area, workers will wash their faces and hands using the water, soap and towels provided in the decontamination site.
- It will be everyone's responsibility to keep the decontamination site clean. Personal belongings, protective equipment tools and materials in the decontamination area will be neatly stored, and waste will be placed in the appropriate disposal bags.

4.6 Completion

After the complete removal and post cleaning of the buildings, FAM clearance will be obtained. Once an air clearance has been obtained the entire work area will be sealed with a post-removal sealer. A final air sample will be drawn using the FAM. No building or module will be entered until air monitoring shows the area to be safe. If safe, asbestos signage will be, removed and demolition procedures will continue. If unsafe, additional abatement will be undertaken by the asbestos crew.

5.0 TRANSPORT, STORAGE AND DISPOSAL

5.1 Packaging

All asbestos material removed will be placed in pre-labeled polyethylene bags or wrapped in polyethylene sheeting of a minimum 6-mil thickness. Friable asbestos will be sprayed with a wetting agent prior to bagging.

5.2 Containerization

All asbestos contaminated with PCB-amended paint will be disposed as per specifications.

All asbestos material, with the exception of intact wall panels and doors, will be doubled bagged prior to transport to the landfill site.

Intact wall panels and doors will be double-wrapped in polyethylene, taped with duct tape and transported to the landfill site.

6.0 RECORD KEEPING

A daily tog will be kept of all asbestos abatement activities, particularly those related to workers, shifts, safety issues and breaches of safety protocols and confirmation of asbestos removal. A daily record of enclosure inspection will be kept as well as a record of volume. The estimates and storage information, including location, depth and description of specific demolition materials, including asbestos-containing materials, disposed in landfills.

7.0 ALTERNATIVES

Any modifications to the work methodology plan proposed by QC shall be approved by the Engineer before implementation.

END OF WORK METHODOLOGY PLAN

ATTACHMENT- Asbestos Removal Training Outline

Day 1

1.0 Project Orientation
2.0 Asbestos Awareness
3.0 Personal protection
4.0 Asbestos Removal procedures
  4.1 Pipe insulation

Day 2

1.0 Asbestos Removal Examples
2.0 Hands-on Training
  2.1 Pipe Insulation Removal
  2.2 Type 2 (moderate risk) and Glove bag procedures

ATTACHMENT - Project Orientation

1.0 Asbestos Abatement Scope of Work

The scope of the job is the removal of asbestos containing materials from the buildings at Ekalugad Fjord, including asbestos pipe insulation and asbestos PCB-amended paint material.

1.1 Project Schedule

The asbestos removal project schedule was provided with the bid. The asbestos removal team will work in safe and orderly manner to finish the job on schedule

1.2 Day Schedule

The asbestos removal team is expected to work 10 hours per day, 7 days per week. An average day may proceed as follows:

Breakfast	6:00 a.m.
Work	7:00 am.
Lunch Break	12:00 a.m.
Work	1: 00 P.M.
Work Day End	6:00 p.m.

As it is difficult to take coffee break during the day when taking asbestos removal, we will take longer lunch breaks, or stop early at the end of the day. This will be decided by the asbestos removal team members.

1.3 Asbestos Awareness

Asbestos is a naturally occurring metal that is strong and is an excellent insulator. It was used in many products such as pipe insulation and floor tiles. Asbestos was used for pipe insulation because it was the best to keep the water in the pipes hot. Asbestos is no longer used due to the associated health risk- Asbestos is dangerous when it is disturbed and the fibers (dust) are inhaled. In such an instance, the asbestos can cause lung diseases. The substance is not dangerous to touch and is therefore safe to work with and around when using the right personal protection.

1.4 Personal Protection

1.4.1 Half-mask Respirators

The asbestos removal team will use half-face, dual HEPA cartridge respirators, also known as half-masks. The respirators are made up of 4 parts:

1. The rubber face-piece: Different people will wear different sizes of - respirators. The respirator face piece The respirators face piece should fit over the nose and chin

2. The straps: The respirator straps should be adjusted to make sure the face-piece is snug and fairly comfortable.
3. The HEPA filter: HEPA filter clean the air and stop the asbestos fibers from being breathed in.
4. The valves: The respirator valves make sure that the air being breathed comes through the HEPA filters and prevents the exhaled air from going through the HEPA filters.

It is important that the respirator fits correctly. For this to happen, all workers must be clean shaven. Any facial hair will not allow the respirator to fit snugly against the skin. Also, scars, wrinkles and dentures may affect the respirator fit. There are three tests that will tell if the respirator fits right and is working:

1. Positive Pressure Test: Place the palm of the hand over the exhalation valve and breathe out gently. No air should escape from the edges of the face-piece.
2. Negative Pressure Test: Place the palm of each hand over the respirator filter opening and breathe in gently. The face-piece should collapse and there should be no air.
3. Irritant Smoke Test: Once the respirator has passed the Positive and Negative Pressure Tests, the Smoke Test may be done. An irritant smoke is released around the edges of the respirator while it is being worn. If the worker detects the chemical, the respirator should be checked and adjusted. This test should be repeated until the respirator fits well.

Respirators will be checked before work every day. If the interior of the respirator is visibly dirty, it should be wiped. The valves should also be checked and cleaned if dirty or sticky. The positive and negative pressure tests should be done regularly. During breaks and at the end of the work day, respirators will be covered with duct tape. HEPA filters work better the more they are used. The HEPA filters should be inspected regularly and changed when necessary.

1.4.2 Disposable Coveralls

Disposable coveralls must be worn when in an asbestos area. They should fit loosely and may be worn over clothing. The hoods on the coveralls should always be used.

1.4.3 Rubber Boots

Steel-toed rubber boots will be provided and must be worn in the asbestos work area. Rubber boots should be washed and dried before they are removed from the asbestos work area.

1.4.4 Hard Hats

Hard hats will be provided and will be required to be worn at certain times when doing asbestos work. They may also be required to be worn in other work areas in the camp

1.4.5 Safety Glasses

Safety glasses will be provided and should be worn at all times in the asbestos work area to protect from flying debris. Workers may also be required to wear safety glasses in other work in the camp.

1.4.6 Face Shields

Face shields will be provided and must be worn when operating the pipe cutting saw to protect the eyes and fare from flying debris.

1.4.7 Hearing Protection

Hearing protection will be provided and must be worn during pipe cutting activities.

1.4.8 Gloves

Leather and rubber gloves provided and should be worn when needed.

EKALUGAD FJORD PROJECT

HEALTH AND SAFETY PLAN

APPENDIX 8

Vehicle Preventive Maintenance

Heavy Equipment -PM Checklist
Light Equipment - PM Checklist
All Terrain Vehicles
Power Unit Daily Inspection
Field Inspection Sheet
Activity Descriptions - Repairs, Adjustments or Replacements

PREVENTIVE MAINTENANCE CHECKLIST
HEAVY EQUIPMENT

Equipment Description: _____
Model: _____ Make: _____
Serial Number: _____
Type: _____ Year: _____

Maintenance Interval Schedule

PM 1 – 250 Hours or Monthly
PM 2 – 500 Hours or 3 Months
PM 3 - 1000 Hours or 6 Months
PM 4 – 2000 or 1 year
PM 5 – 3000 or 2 years

PM - 1	PM -2	PM -3	PM -4	PM -5	TASK
#					Change final drive oil
#					Replace hydraulic oil filter
#					Change swing drive oil
#					Clean air conditioner condenser
#					Inspect/replace/adjust – belts
#					Add – cooling system coolant additive
#					Inspect cooling system hoses
#					Obtain engine oil sample
#					Change oil and filter
#					Check final drive oil
#					Obtain final drive oil sample
#					Clean/inspect/replace fuel system primary filter
#					Inspect fuel system priming pump
#					Replace fuel system water separator element
#					Obtain hydraulic system oil sample
#					Lubricate swing bearing
	#				Clean engine crankcase breather
	#				Replace fuel system secondary filter
	#				Clean fuel tank cap and strainer
	#				Replace hydraulic system oil filter
		#			Check Battery electrolyte level
			#		Clean engine governor oil supply screen
			#		Check engine valve lash
				#	Change cooling system coolant

PREVENTIVE MAINTENANCE CHECKLIST
LIGHT EQUIPMENT

Make of Vehicle: _____ Type: _____
Year: _____ Model: _____ Capacity: _____
Type of Engine: _____ Serial #: _____
Body Serial #: _____

PM – 1 Every 200 hours
PM – 2 Every 1200 hours

PM 1	PM 2	TASK
		ENGINE LUBRICATION CHECK
	#	Wash and clean engine
#	#	Drain engine, refill crankcase with recommended grade oil
#	#	Replace oil filter/cartridge
		CHASSIS LUBRICATION CHECK
#	#	Complete lubrication; check all fluid levels as per manufacturer's recommendation, steering gear, and rear axle, transmission and brakes/clutch master cylinder reservoir. Check battery and tire pressure.
		ENGINE CHECK
#	#	Check drive belt
#	#	Inspect air cleaner piping for signs of leakage or loose mounting. Clean/replace air cleaner element
#	#	Replace fuel filter, inspect for leaks
	#	Test compression: 1 2 3 4 5 6 7 8
#	#	Service crankcase ventilation system
	#	Check ignition system and adjust/replace spark plugs
	#	Check injectors
	#	Record engine oil pressure at high idle, using oil gauge; PSI
#	#	Check radiator and fan shroud for damage or obstruction
#	#	Check coolant with anti-freeze tester/coolant level
	#	Inspect water pump bearing for looseness
	#	Inspect motor mounts
	#	Run computer diagnostic check (F.R.E.D.)
#	#	Visually inspect fuel system pump and injectors for leakage
	#	Check turbo-charger condition, check for excessive smoke – diesel engines only
		ELECTRICAL CHECK
#	#	Clean and inspect battery terminals, cables, hold down bracket
	#	Inspect electrical wiring for proper routing, clamping, deterioration
#	#	Check lights, signals, reflectors, back-up alarm
	#	Perform cranking motor test

	#	Check charging rate, record output volts
#	#	Check block heater, battery heater
		BRAKE SYSTEM
#	#	Inspect brake lines, fitting for signs of kinking and leakage
	#	Inspect disc brake cables and levers and adjust operations
	#	Remove all wheels, inspect linings, brake drum and wheel cylinders. Clean, inspect and re-pack bearings.
		STEERING SYSTEM
	#	Inspect ball-joints for wear, check adjustment of steering stop
#	#	Inspect drag-link, pitman arm, tie rod ends, steering box for looseness
#	#	Inspect steering column U-joint, splines for wear and looseness
	#	Check toe-in and front end alignment
#	#	Inspect front wheel bearing for looseness, rear wheel bearing on front end drive
		TRANSMISSION/DIFFERENTIAL
#	#	Clean breather on 4x4 models, check extension tubes
	#	Check transmission modulator valve for internal leaks
#	#	Inspect transmission and differential mounting for looseness and deterioration
#	#	Inspect transmission and differential pinion flange for looseness
#	#	Inspect drive shaft, U-joints, spline section, center bearing for looseness and wear
	#	Change automatic transmission oil and filter
#	#	Check front wheel drive axle boots and constant velocity joints
		CHASSIS SECTION CHECK
#	#	Inspect exhaust system for leakage, looseness and proper wear
#	#	Inspect fuel tanks, mounting and straps
	#	Inspect cab mount
#	#	Check front/rear springs, shacklers, shocks and frame for looseness and wear
	#	Inspect cross member, stabilizer brackets, torque arm and equalizers for looseness and wear
	#	Check front and rear U-bolts
		WHEEL, AXLE, HUB AND TIRES
#	#	Check tires for cuts, wear and matching
#	#	Check front steering seals and locking hubs
		BODY AND CAB
#	#	Inspect interior/exterior condition of vehicle for damage/seatbelt
#	#	Check operation of instruments, gauges, in- board computers, shift quadrant indicators
#	#	Inspect windshield wiper arm, blades, washer
#	#	Inspect glass and mirror mounting, check window regulators, door striker plates
#	#	Lubricate hood and door latches, hinges, and door locks
#	#	Check operation of air conditioner, heater and defroster

		EMERGENCY EQUIPMENT
#	#	Check first aid kit and fire extinguisher, report if missing or damage
#	#	Complete PM sticker, record meter reading for next PM inspection
		ROAD TEST INSPECTION
#	#	Check steering for effort, shimmy or pulling
#	#	Check braking action and operation
#	#	Check clutch, brake and transmission controls for proper operation
#	#	Check for unusual noise or vibration
#	#	Check speedometer and hour meter operation
#	#	Check operating temperature
		ADDITIONAL WORK IDENTIFIED DURING INSPECTION

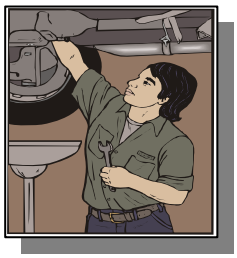
Preventive Maintenance Checklist

Equipment Description: _____

Model: _____ Make: _____

Serial Number: _____

Type: _____ Year: _____



Maintenance and Lubrication Schedule *Every 6 months of service*	Good Condition	Needs Attention	Not Applicable
Check clutch operation: adjust if necessary	☐	☐	☐
Check for wheel damage and runout	☐	☐	☐
Check wheel bearings for loosness or damage	☐	☐	☐
Check steering system operation	☐	☐	☐
Check front wheel toe-in	☐	☐	☐
Check rear suspension operation	☐	☐	☐
Check all chassis bolts and nuts for tightness	☐	☐	☐

Maintenance and Lubrication Schedule (cont'd) *Every 1 year of service*	Good Condition	Needs Attention	Not Applicable
Perform all items under *Every 6months of serivice*	☐	☐	☐
Replace oil filter	☐	☐	☐
Remove and clean carbon from muffler baffle	☐	☐	☐
Clean engine oil strainer at crankcase drain plug	☐	☐	☐
Change final drive unit gear oil	☐	☐	☐
Change transfer case gear oil (4-wheel drive)	☐	☐	☐
Check constant velocity rubber boots for damage	☐	☐	☐

Maintenance and Lubrication Schedule (cont'd) *Every 2 years of service*	Good Condition	Needs Attention	Not Applicable
Change brake fluid	☐	☐	☐

Maintenance and Lubrication Schedule (cont'd) *Every 4 years of service*	Good Condition	Needs Attention	Not Applicable
Replace all brake hoses	☐	☐	☐
Replace all fuel hoses	☐	☐	☐

Date:_____

Checked by: _____

Power Unit Daily Inspection

Ekalugad Fjord Project

Unit #:	

x	Needs Attention
√	Performs to Standard
–	Not Applicable

Name of Personnel: _____

ID #	Componant Code	Componant Description	Date:				Comments
			Check 1	Check 2	Check 3	Check 4	
A		***Engines***	*Time:*	*Time:*	*Time:*	*Time:*	
1	1350	Coolant Temperature					
2	N/A	Oil Temperature					
3	N/A	Hour Meter					
4	N/A	Oil Level					
5	N/A	Coolant Level					
6	N/A	R.P.M.					
7	1318	Oil Pressure					
8	N/A	Fuel Pressure					
9	1000	Engine Operation					
10	N/A	Belt Tension					
11	N/A	Leaks (Oil, Coolant)					

C		Panel					Comments
1	7468	Voltmeter					
2	7471	Frequency Meter (Hz)					
3	7467	Phase A (Amps)					
4	7467	Phase B (Amps)					
5	7467	Phase C (Amps)					
6	7467	Phase N (Amps)					

Date:_____

Checked by:_____

Ekalugad Fjord

Field Inspection Report on Vehicles

Make of Vehicle:_____
Type:_____
Year:_____ Model:_____
Capacity:_____
Type of Engine:_____ Serial #:_____
Body Serial #:_____
Accessories:_____
_____

Cab, Body - Condition:

a) Cab:_____
b) Doors:_____
c) Hood or Trunk:_____
d) Fenders:_____
e) Grills:_____
f) Bumpers:_____
g) Box or Deck:_____
h) Seats, Floor Mats:_____
i) Instrument Panel:_____
j) Mirrors:_____
k) Paint:_____
l) Decals and Dept. Numbers_____
m) Problems Occurred:_____
_____
_____
_____

Chassis, Suspension – Condition:

a) Frame:_____
b) Springs, Shackles, Pins_____
c) Front Axle:_____
d) Shocks:_____
e) Wheels:_____
f) Tires:_____
g) Tire Inflation:_____
h) Steering Gear Box:_____
i) Tie Rod Ends, Drag Links:_____

j) Problems Occurred:_____
_____
_____

Brake Systems – Hydraulic or Air – Condition

a) Adjustment:_____
b) Fluid Levels:_____
c) Breathers or Filters:_____
d) Operations:_____

Hand or Emergency Brake – Condition

a) Adjustment:_____
b) Operation:_____
c) Problems Occurred:_____
_____
_____

Electrical Systems – Condition

a) Battery:_____
b) Starter System:_____
c) Charging System:_____
d) Lights:_____
e) Horn, Wipers, Etc.:_____
f) Problems Occurred:_____
_____
_____

Fuel and Exhaust System – Condition

a) Radiator:_____
b) Shutters:_____
c) Exhaust System:_____
d) Problems Occurred:_____
_____
_____

Cooling System – Condition

a) Radiator:_____
b) Shutters:_____
c) Fan:_____
d) Belts, Hoses:_____
e) Heater;_____

f) Problems
Occurred:_____
_____
_____
_____

Power Train – Condition

a) Engine and Components:_____
b) Compression Test:_____
c) Noises:_____
d) Operation:_____
e) Mileage or Hours:_____
f) Problems
Occurred:_____

2

a) Clutch Linkage:_____
b) Adjustment:_____
c) Operation:_____
d) Problems
Occurred:_____

3

a) Transmission or Transfer Cases:_____
b) Noises:_____
c) Operation:_____
d) Problems
Occurred:_____

4

a) Drive Line:_____
b) U-Joints, Phased:_____
c) Centre Bearing:_____
d) Problems
Occurred:_____

5

a) Transfer Case-
i) Back Lash:_____
ii) Noises:_____
iii) Operations:_____
iv) Problems
Occurred:_____

b) Differential – Rear
i) Back lash:_____
ii) Noises:_____

iii) Seals:_____
iv) Operations:_____
v) Problems Occurred:_____

d) Differential - Front
   i) Back Lash:_____
   ii) Noises:_____
   iii) Seals:_____
   iv) Operation:_____
   v) Problems Occurred:_____

Accessories or Attachments:

a) PTO, Hydraulic Pumps:_____
b) Hoist:_____
c) Crane:_____
d) Other Equipment mounted on vehicle:_____
   _____
   _____
e) Parts Books:_____
f) Repair Manual:_____
g) Operations Manual:_____
h) Special Tools required for repair or servicing:_____
   _____
   _____

Other Comments:_____
_____
_____
_____
_____
_____
_____
_____

Inspected by: _____ Date: _____

Activity Description

General guide in performing a repair and replacement or adjustment of a component identified through PM Checklist.

Frame – Structural members, bumpers, engine and body mounts and necessary mounts for attaching components.

Suspension – Suspension brackets and bushing necessary for attaching the suspension to the frame, shock absorbers, springs and non-drive axles.

Steering – Steering wheel assembly, steering gear assembly, idler arm, pitman arm, tie rod end, tie rod adjusters, king pin assembly, ball joint assembly.

Brakes – Brake shoes, pads, drums, rotors, wheel cylinders, calipers, brake chambers, master cylinders, lines, compressor, brake control valve systems, slack adjuster and dryer.

Differential – Drive axle, axle housing, axle shaft, differential flange, electric two- speed shift.

Transmission – Case, cover, all internal parts and controls, drive shafts, universal joints, support bearing, auxiliary transmission or transfer case, internal parts and controls, power take-off.

Engine – Air intake system, intake manifold, air cleaners, turbochargers, blowers and superchargers.

Fuel System – Fuel tanks, lines, pumps, filters, carburetor or fuel injectors and controls.

Engine Block – V-belts, emission controls, PCV valves, air pump and thermal reactors.

Cooling System – Radiators, surge tank, shutters, shutter controls, fan and shroud, thermostat and housing, hoses, and water pump.

Exhaust System –Exhaust manifold, heat riser, exhaust pipe, muffler, tail pipe, gaskets, clamps, supports and catalytic converters.

Electrical – Generator/Alternator, voltage regulator, related wiring harness, starter motor, wires, cables, battery, ignition switch, coil, condenser, rotor, selector, spark plug, all wiring, transistor ignition system, bulbs, switches and wiring harnesses.

Hydraulic System – Hydraulic controls, control valves on backhoes, front-end loaders etc. pump cylinder, piston, fluid reservoirs, tank, hydraulic lines, fittings, hoses.

(Reservoir to the pump and to the components), hydraulic motors, circle drivers, winches, hydraulic system on attachment, brush cutters, snow blower, dump box system, plow & wing system, cranes, hoisting devices, sanders, power tail gate assemblies, outrigger systems. Hydraulic system on specialized equipment, pavement burners, centerline markers, hydroseeders, garbage packers, self-propelled brooms and chill spreaders.

Attachments – Vehicle coupling system, fifth wheel, fifth wheel plate, pintle hooks, Clevis connection, tow hooks, draw bars, power tail gate, platform, mounting hardware, winch, wiring, mounting hardware, winch assembly, hoisting devices, mounting hardware, all cables including crane cables, boom, links, pins.
Snow equipment – wings, blades, plows, blowers, mounting hardware, sanders, mower blades, trenchers, augers, backhoe assembly, cutting edges and teeth.
Outrigger/stabilizer; structural frame, supporting components.
Radio- equipment, VHF and two – way communication.
Bulldozer blades front – end loader buckets and cherry picker buckets.

Cab/Body – Exterior, sheet metal, wiper blades, wiper arms, mirrors, reflectors, glass, seats, interior equipment, instrument gauge, warning device, heater core, hoses, ductwork, fire extinguisher, flares, moldboard, blades, brackets.