

E. HAZARDOUS MATERIALS AND SPILL CONTINGENCY

39. Does the project include the Handling or Storage of Petroleum Products or Hazardous Materials?

Yes (X) No ()

If YES, provide the following information:

a) a plan for the safe handling, storage, and disposal of petroleum products or hazardous materials.

This project will include the handling and storage of a range of petroleum products and hazardous wastes. Table 39.1 provides a summary of the petroleum products and chemicals/reagents that are likely to be used and stored on site. As site plans and details become finalized the information regarding the type and quantity of the substances may change. However, this gives a reasonable expectation as to the nature of the site and the planned chemical handling and storage facilities.

As a result of the types and quantities of substances expected to be handled and stored on site, there are multiple legislative acts and regulatory requirements that will or may apply to the Wolverine Project. Table 39.2 provides a short list of *Acts* and regulations relevant to petroleum products and other substances to be kept on site. It is not considered an exhaustive list of all possible regulations that may apply over the full duration of mine construction and operations, however. Certain regulations come into force depending on the presence of specified substances if present in quantities greater than those specified in the regulations (e.g., E2 Regulations list 174 substances and minimum quantities and the Yukon Spills Regulation also provides the types of substances and quantities that if released will constitute a spill). As the Site plans develop and details are finalized, chemical inventories will be maintained and checked against the relevant regulations and YZC will ensure compliance.

Table 39.1: Preliminary List of Hazardous Materials to be Stored On Site

Substance	Expected Quantity Stored	Location
Diesel Fuel	Up to 720,000 L in storage tanks	tank farm
Low Sulfur Diesel Fuel	85,000 L in storage tanks	tank farm
Gasoline Fuel	5,000 L in storage tanks	tank farm
Jet B Aviation Fuel	~ 4,500 L in 45 G drums	airport
Antifreeze (propylene glycol)	500 G tank	truckshop
Lubricating Oil	200 G tank	truckshop
Lubricating Oil (engine)	200 G tank	truckshop
Final Drive Oil	200 G tank	truckshop
Hydraulic Fluid	200 G tank	truckshop
Waste Oil	500 G tank	truckshop
Transmission Oil	200 G tank	truckshop
Explosives		
Geldyne	260 cases	explosive magazines
Exactex	200 cases	explosive magazines
Amex	1400 x 25 kg bags	explosive magazines
Magnafrac	400 cases	explosive magazines
Propane	3 x 30,000 G 1 x 10,000 G	above mine at raises at camp
Acetylene Propane	25 x 100 lb cylinders	truckshop
Oxygen	25 x 100 lb compressed gas cylinders	truckshop
Mill Regents: Lime	50 t in silo storage - made into 20% solution	mill
SMBS (sodium metabisulphide)	Solid (made into ~ 10% solution)	mill
TNC312	bulk container	mill

Table 39.1: Preliminary List of Hazardous Materials to be Stored On Site

Substance	Expected Quantity Stored	Location
MIBC (methyl isobutyl carbinol)	bulk container	mill
Acro3477 (isobutly dithiophosphate)	bulk container	mill
A343 (sodium isopropyl xanthate)	200 kg drums or kg bags	mill
Sodium cyanide	Solid (made into ~ 10% solution)	mill
Zn sulphate & Cu sulphate	Solid (made into ~ 10% solution)	mill/water treatment plant
Flocculant	Drums	mill/water treatment plant
Ferro - silicon	bulk container	mill

Table 39.2 Examples of Regulatory Requirements

Legislation and Regulations	Governing Body
<i>Canadian Environmental Protection Act</i> (1999) Environmental Emergency Regulations (E2 Regulations)	Environment Canada
<i>Explosives Act</i> (1985) and Regulations	Natural Resources Canada
<i>Yukon Environment Act</i> (revised 2002) Special Waste Regulation Solid Waste Regulation Contaminated Sites Regulation Spills Regulation Storage Tank Regulation	Yukon Government
<i>Occupational Health and Safety Act</i> (revised 2002) and Regulations	Yukon Government
<i>Transportation of Dangerous Goods Act</i> (1992) and Regulations	Transport Canada
National Fire Code (2005) adopted by the Yukon Government	Yukon Government

i) Handling and Storage

General Approach

Infrastructure at the industrial area of the mine site includes: a mine portal and three ventilation raises, local roads and laydown areas, crusher, industrial complex buildings, power generation plant, laboratory, fuel storage farm, water supply, sewage treatment, surface settling and collection ponds, waste disposal facilities, and explosives storage (magazines) to the west.

Prevention is better than a cure. The first priority is to avoid any incidental release of hazardous substances. Prevention is an important part of best management practices for the protection of the environment, and to prevent injury to personnel and damage to the property. It also helps to avoid expensive clean-up costs. Spill prevention is maximized through good house keeping, regular maintenance, and routine inspections of equipment, process units, storage facilities, solid waste incinerators, and a sewage treatment plant, as well as, by good record keeping. Regular training of operating personnel improves the performance in preventive measures, which in turn minimizes potential negative impacts. Training of emergency response personnel, including simulating mock drill exercises will be conducted to ensure spill response preparedness and to provide practical approaches to handling spills in a most efficient and safe way.

Careful consideration of sensitive ecological areas and the locations that pose risks for spills (*e.g.*, through the use of maps and site plans), along with the knowledge acquired through training and simulation exercises will be effective in preventive and response measures. Avoiding sensitive areas has been an important consideration in the design and location of storage facilities, incinerators, sewage treatment plant, loading zones, and pipelines and roads. For example, all these infrastructures has been sited as far away from water bodies as is practical. Site drainage will be collected in ditches around the industrial area and diverted to the surface sumps for subsequent treatment. Clean surface runoff will be diverted away from the industrial area, and allowed to naturally drain downslope. Furthermore, proper protective measures will be taken to minimize the risk of problems arising from adverse weather conditions and difficult terrain. This will be an important mitigative and proactive strategy that will be taken by YZC to prevent adverse environmental impacts.

All hazardous materials and petroleum products will be handled and stored according to the appropriate regulations under the *Yukon Environment Act*, Contaminated Site Regulation, Special Waste Regulation, Solid Waste Regulation, and Storage Tank Regulation. In addition, explosives will be handled and stored in a manner that complies with the *Explosives Act* (Natural Resources Canada). The following are examples of standard operating procedures related to the storage of chemicals that YZC is developing:

- An up-to-date chemical inventory and the relevant Material Safety Data Sheets (MSDS) will be kept in all locations that a substance is either stored, handled or used.
- Chemical storage areas will be located far from food preparation and food storage areas and will be designated as non-smoking zones.
- Incompatible chemicals will be stored separately to prevent cross-contamination and chemical reactions.

- Where appropriate, chemicals stored indoors will be kept in fire-proof storage cabinets.
- All on-site storage of hazardous materials will be provided with secondary containment, utilizing well maintained equipment and containers to be handled only by trained personnel.
- Storage tanks with a capacity of more than 4000 L, or more than twenty-four 45-gallon drums stored in one group will have secondary containment. Tanks will have a clay or plastic liner or a curbed concrete pad surrounding the container, and a spill containment device attached to the intake valve. When containing 45-gallon drums, a drip pan or similar container or two containers (with one placed inside the other) will be used.
- Materials will be kept dry and protected from the weather. Containers stored outside will be covered to protect them.
- Containers will be stored in piles, with 1.5 m between the piles.

Wherever practical, site transfer and transportation will also be performed under secondary containment. Accessories such as transfer hoses with camlock mechanisms, drip pans, and pumps will require routine inspection by personnel using the equipment or materials on a regular basis. In addition, weekly documented inspections with more comprehensive monthly inspections are planned. The Environmental Coordinator or Safety Supervisor will document the existing condition of the equipment/storage facilities and any problems encountered, and will make recommendations for repairs if necessary. The Environmental Coordinator will record the amount of materials stored, compatibility of materials stored, levels of fluids (risk of overfilling), and used/unused protective equipment list. He or she will also recommend and implement changes and improvements in procedures by reviewing any previous releases or spills.

Mill Reagents

For general reagents, each reagent will be stored in an area specifically designed for spill containment. There will be both a mix tank and holding tank for the various reagents. Generally, the reagents will either be received or diluted to 10% concentration. The tanks will have secondary containment facilities to both contain spills and facilitate spilled reagent re-use. The storage and handling facilities will have vents to the atmosphere to remove dust.

Lime

Lime will be delivered in bulk in 40t trucks. It will be off-loaded pneumatically into a silo equipped with a dust collector unit. The lime will be slurried with water to a 20% concentration. The lime slurry will then be pumped to the points of addition using a closed loop system. Valves will be controlled by pH monitors.

Sodium Cyanide

Sodium cyanide will be prepared using a mix tank and holding tank. Special safety conditions will apply for the cyanide preparation area including; fencing to prevent general access, dedicated safety showers, cyanide monitors, cyanide antidote kits (amyl

nitrate, sodium nitrate and sodium thiosulphate) and special staff training will be mandatory.

Petroleum Hydrocarbon Products

The primary fuels that will be used on site include diesel and gasoline. Gasoline and other hydrocarbons are combustible; therefore, no smoking or ignition sources will be allowed within 15m of all hydrocarbon storage. Spills from overflowing fuel tanks, leaking pipelines, and breaking hydraulic hoses are the most common ones. The worst potential spill will be due to a major leak from any of the petroleum products storage tanks or the overturning of a fuel delivery truck. These risks will be minimized through best management practices and actions that will be taken in the result of any spill are outlined in the Spill Contingency Plan (Section 39, Part c).

The fuel farm will be located in the industrial area and will include storage tanks for diesel fuel, propane and a small amount of gasoline. The largest consumption of diesel fuel will be for power generation. Propane will be used to heat the mine ventilation air. Most project vehicles will be diesel powered. Gasoline will be reserved for light duty vehicles and small tools used on the surface such as chain saws.

The diesel storage tanks will provide approximately two weeks supply when demand is at its peak in midwinter. The diesel fuel containment area and the storage tanks will be designed and constructed to meet codes and regulations. The tanks will be either double walled tanks or a conventional single walled tank arranged in a sealed containment having a capacity of 110% of the tank. One or more tanks will be located in a lined containment to prevent contamination of soil in case of accidental discharge of the fuel. The fuel will be automatically pumped via underground pipes to day tanks of the power plant. The tanks will also be equipped with metering dispenser pumps for fuelling vehicles. When a truck is delivering fuel or a vehicle is being fueled, it will stand on a concrete platform over a sump equipped with an oil water separator. All electrical equipment will be flame proof. A lined storage facility will be constructed within the fuel farm area to store hazardous waste that is held in segregation pending periodic off-site shipment.

Explosives

The existing explosives and detonator magazines (70,000 kg explosive supply) will be relocated to approximately 1.5 to the south east of the portal, a safe distance away from both the main site and any main structures or roads (See Figure 21.1-2). The explosives storage magazines conform to standards set by Natural Resources Canada. This includes each magazine being bullet-proof, fire resistant, theft-resistant, weather proof, and well ventilated.

Compressed gases

Compressed gases (propane, oxygen and acetylene) can ignite with explosive power. Furthermore, if valves of cylinders are severely damaged, the resultant uncontrolled venting of a pressurize cylinder can represent a significant risk for injury and equipment damage. Therefore, the cylinders will be stored in accordance with the guidelines set out

by the Canadian Centre for Occupational Health and Safety (or other relevant regulatory body) to minimize the risk of such occurrences.

Other

Substances such as antifreeze, lubricating oils, solvents, assasy laboratory chemicals and reagents, etc., will be handled and stored in a manner consistent with best management practices and manufacturer's directions.

ii) Disposal

Special or hazardous wastes are dangerous goods that are no longer used for their original purpose as defined in the federal *Transportation of Dangerous Goods Act* and Regulations. Special waste is regulated by the Special Waste Regulations under the Yukon *Environment Act*, and a Special Waste Permit is required to generate, handle or dispose of a special waste. Special wastes generated, handled and stored on site will likely include used anti-freeze, used batteries, leftover solvents, cleaners, paints, and petroleum products. Details pertaining to the source and management of these substances are provided in the following sections.

Hazardous waste will be segregated at the point of generation, placed into appropriate storage containers and then shipped off site to an acceptable disposal or recycling facility in either Whitehorse or Watson Lake. When convenient, YZC will also participate in Environment Yukon's annual commercial special waste collection.

Two facilities in Whitehorse that are permitted to collect and dispose of hazardous wastes such as used oil, waste oil filters, used batteries, antifreeze, waste solvents and lubricants are as follows:

- Sun Set Septic - current trucking costs are \$1.60/km and \$105/hr while onsite.
- Corvus Industries - current trucking costs are \$125/hr and 205L drums are supplied at \$80 ea.

Watson Lake is revising its Solid Waste Management Plan and is looking to build local businesses and facilities that have the capacity to support future industrial sites for all types of non-hazardous and hazardous wastes.

All wastes will be handled, stored and disposed of according to the appropriate regulations under the Yukon *Environment Act*, Contaminated Site Regulation, Special Waste Regulation, Solid Waste Regulation, and Storage Tank Regulation. In addition, unused or damaged explosives will be disposed of in a manner that complies with the *Explosives Act* (Natural Resources Canada).

The following general storage procedures will be followed to prevent special waste from endangering public health and the environment:

- Liquid special wastes will be stored in a tank if the volume is more than 205 L or in containers for smaller amounts. For transportation, flammable and combustible liquids will be stored in containers or tanks that meet the requirements of the federal Transportation of Dangerous Goods Regulations.

- When storing waste in tanks and containers, the National Fire Code guidelines will be followed with regards to distance from buildings and property lines, distance between tanks, dikes and drainage, and emergency access.
- Storage tanks with a capacity of more than 4000 L, or more than twenty-four 45-gallon drums stored in one group will have secondary containment. Tanks will have a clay or plastic liner or a curbed concrete pad surrounding the container, and a spill containment device attached to the intake valve. When containing 45-gallon drums, a drip pan or similar container or two containers (with one placed inside the other) will be used.
- Records of the wastes being stored, including type, volume, origin and storage location will be kept and will be readily accessible to assist response teams if a spill or fire occurs. Copies of waste manifests will be submitted to the Environmental Programs Branch.
- Containers stored outside will be covered to protect them from the weather. Containers will be stored in piles, with 1.5 m between the piles.
- Containers will be closed, except when waste is added or removed.
- The volume of waste will not exceed the limits set out in the National Fire Code for flammable and combustible liquids.
- If wastes with different flash points are stored together, the storage requirements for the liquid with the lowest flash point will be used.
- Containers will be labeled with the waste's identity, PIN no., class, and packing group as per the requirements of the Special Waste Permit, and in accordance with the federal Transportation of Dangerous Goods Regulations.
- Wastes will not be mixed or diluted with other wastes or water, as mixed products often cannot be recycled.

In the event of a temporary closure, all unused chemicals or reagents, with the exception of those required for the water treatment plant and other incidental uses, that are deemed to have short shelf life will be returned to suppliers/manufacturers. Those chemicals that cannot be returned will be disposed of in a proper manner as per manufacture instructions. Fuel supplies for equipment will remain on site and diesel fuel tanks will remain in service during a temporary closure. YZC will comply with the requirements under the Yukon *Environment Act* pertaining to storage and handling of petroleum products.

Used Oil

The major sources of waste oil will be from mobile equipment and power plant generators. The most common types of used oil are crank case oil, gear oil, transmission fluid, and hydraulic oil. Under the Special Waste Regulations, a special waste permit is required if more than 20 L of used oil is generated per month or stored. For tanks with capacities greater than 4000 L, a permit will be required under the Storage Tank Regulations.

Used oil will be collected in designated waste oil tanks located in the mobile equipment maintenance area and near the diesel gensets. The oil will be periodically shipped off site

by authorized carriers and taken to permitted facilities for shipping, treatment or recycling.

Waste Oil Filters

Before disposing of waste oil filters, as much oil as possible will be eliminated from them. Steps required to ensure proper disposal include puncturing the top of the filter, setting the filter in a tray and allowing the oil to drain for approximately 24 hours, and crushing the filter to increase waste oil recovery. Once the oil is drained, the filter will be disposed of by recycling through a company interested in the filter's metal value, or through a disposal operator, or at a landfill site.

Used Batteries

Waste vehicle batteries will be collected for regular shipment to a licenced recycle or disposal facility. A Special Waste Permit is required for handling more than 5 kg of lead-acid batteries per month. The steps outlined below for storing batteries will be followed to help prevent acid leaks and spills and to avoid contamination of the storage site:

- Batteries will be placed on wooden pallets in secondary containment (i.e., on a liner or berm) to prevent the escape of acid.
- Before putting waste batteries on the pallet, plastic sheeting will be placed on it to completely enclose all of the batteries in a continuous sheet of plastic. All sides will be wrapped to protect the batteries from the weather and to prevent any acid from being discharged into the environment.
- Batteries will not be stacked more than three layers thick and each layer will be separated with a sheet of plywood or other suitable material.

Antifreeze

A permit under the Special Waste Regulations is required if more than 5 L of waste antifreeze is generated within a 30 day period. Used antifreeze will be stored in good quality containers that are leak-free and have tight closures to prevent spills, then shipped to a licenced recycle or disposal facility.

Waste Solvents and Lubricants

Miscellaneous, small quantities of waste solvents and lubricants will be generated through routine maintenance and repair of equipment. Solvents are liquid substances that can dissolve other substances and can be recycled. Paint thinners and strippers, varsols, degreasing fluids, mineral spirits and petroleum distillates are common solvents. Most of these liquids are flammable and toxic. A Special Waste Permit must be obtained from the Environmental Programs Branch if more than 5 L of solvents per month, or more than 5 kg of solvent sludge per month is handled or stored.

Solvents and lubricants will be collected and stored in appropriate drums for regular shipment to a licenced recycle or disposal facility. Containers will be covered to protect them from precipitation and will be kept apart from other waste products. When

transporting solvents, the container will be labeled according to the Transportation of Dangerous Goods Act.

Contaminated Sites

For wastes contaminated with petroleum hydrocarbons (with <3% hydrocarbon content), such as in the event of a spill, bioremediation will be used. A Land Treatment Facility permitted under the Contaminated Sites Regulations (#24-022) is located near the airstrip, and any additional contaminated soil generated and treated during the life of the project will require an amendment to this permit. Remediated soils will be sampled to determine when hydrocarbon contamination has been reduced to acceptable standards, and subsequently stockpiled for use in reclamation projects. Water collected in the land farm will run through an oil-water separator and the water will subsequently be discharged into the tailings facility and the sludge will be disposed of according to Special Waste Regulations.

Medical Wastes

A small amount of hazardous waste (such as syringes, bandages etc.) will be generated at the first aid room. This waste will be collected in designated purpose-built containers and disposed of appropriately at an offsite facility.

b) a description of equipment to be kept available for spill response or other emergency and it's location, and a description of proposed training programs for workers.

The following sections describe equipment and training directly related to spill response. More detail regarding general emergency response training is provided in Section 40 (Emergency Response).

i) Spill Response and Emergency Equipment

Emergency Response Station

The emergency response station will be equipped for first aid, environmental response and mine rescue activities. The first aid room will be separate from the environmental response and mine rescue room where specialized equipment must be stored and maintained. The first aid room will be fully serviced with hot and cold water, toilets and communications. A subsidiary first aid room will be located in the camp. The existing helipad at the southwest corner of the industrial complex area, will be retained as part of the emergency response facilities.

Spill Response

Spill kits will be located at the portal, camp and airstrip, as well as in heavy equipment. Spill kit contents generally contain oil sorbent pads, pillows and socks, granular sorbent, plug patties for instant leak stop, shovels, and protective equipment including gloves, goggles, and protective suits. All heavy equipment will be equipped with sorbent pads, granular sorbent and gloves, at a minimum.

Shovels, rakes and pitchforks will be kept in easily accessible locations to aid with spill containment. Heavy equipment such as front-end loaders and haul trucks will also be available for larger spill situations. Pumps and suction hoses, along with portable storage tanks or drums will be available for spill recovery.

Emergency Equipment

Dry chemical fire extinguishers will be located near the fueling stations. The water truck can also be used in fire suppression activities and pumps are onsite at the upper portal for spill pumping and fire suppression activities.

ii) Spill Response Training

Training and preparedness will be conducted in accordance with both Occupational Health and Safety Regulations and regional legislation. At a minimum, a first responder awareness level training program will be implemented with all key staff and contractors.

All personnel will receive training that includes instruction in spill recognition and assessment, spill hazards, spill reporting, communication procedures, clean-up measures and general emergency response.

Where contract fuel suppliers will be shipping fuels as outlined under the *Transportation of Dangerous Goods Act* and received by an employee of YZC, these personnel must hold a valid Canadian Certificate of Training in the form of a wallet card. This person will be responsible for ensuring that the appropriate records are maintained and any incidents involving the shipper and/or receiver are reported to the appropriate authorities.

c) a contingency plan for the containment and clean-up in the event of a spill.

The measures outlined in the following sections intend to minimize the potential impact to the environment following a fuel or chemical spill. The immediate priority is to ensure human safety and limit environmental damage, followed by action plans to effectively implement procedures/methods for spill containment and clean up and site remediation measures. The priority sequence is as follows:

- Ensure safety - protect life and prevent injury;
- Protect the environment;
- Protect infrastructure; and,
- Minimize business activity disruption.

The following subsections provide details pertaining to spill response, containment and reporting.

i) General Approach for Spill Containment

The responsibilities for spill response are summarized in Table 39.3, and the general steps required to be taken in the event of a spill are as follows:

- First responder/observer must ensure their safety and the safety of others;
- Shut off ignition sources (including electrical sources) and ensure no smoking;
- Identify and assess the spilled material (including approximate quantity);

- If safe, stop the source of the spill, contain the spill, and proceed with clean-up activities;
- Report all spills immediately to Site Supervisor;
- The Environmental Coordinator will notify senior management immediately and contact the Yukon 24-hour Spill Report Hotline and Client Services and Inspections shortly thereafter once details are determined; and,
- The Environmental Coordinator will complete the Spill Report Form.

Certain substances will require specific spill containment and handling measures. Spill response procedures for those substances will be developed and kept readily accessible in the appropriate locations.

Table 39.3 Roles and Responsibilities for Spill Response

Position	Responsibilities
All Employees (First Observer)	<ul style="list-style-type: none"> • Assess the initial severity of the spill and safety concerns • Identify the source of the spill • Report all spills to Supervisor and Environmental Coordinator as soon as possible • Determine the size of the spill and stop or contain it, if possible • Participate in spill response as member of cleanup crew
Work Supervisors	<ul style="list-style-type: none"> • Contact the Mine Manager • Gather facts of the spill • Assist as required in spill response measures
Emergency Response Team	<ul style="list-style-type: none"> • Conduct cleanup of spills under direction of Mine Manager or Env. Coordinator • Take appropriate response measures- deploy booms, absorbents and other equipment and materials as required • Continue cleanup as directed by Mine Manager or Env. Coordinator
Mine Manager	<ul style="list-style-type: none"> • Assist in initial and ongoing response efforts • Supervise Spill Response Team • Ensure source of the spill has stopped and contain spill • Record spill information • Ensure co-ordination of equipment and manpower as needed • Oversee the cleanup operation until it is satisfactorily completed • Continue actions until relieved or supplemented by other supervisors • Decide with Environmental Coordinator if mobilization of additional equipment or a contractor is warranted
Environmental Coordinator	<ul style="list-style-type: none"> • Ensure expeditious response and clean up of spill site and impacted areas • Report the spill to the Yukon 24-Hour Spill Report Line and Client Services and Inspections • Together with the Mine Manager, decide if additional equipment is required for containment and remedial activities • Notify senior management

Table 39.3 Roles and Responsibilities for Spill Response

Position	Responsibilities
	<ul style="list-style-type: none"> • Oversee completion and distribution of Spill Report • Ensure investigation identifies measures to prevent similar spills
VP Environment and Community Affairs	<ul style="list-style-type: none"> • Communicate with the media. Ensures that all press releases are accurate and in accordance with company policy • Make financial decisions on major expenses during large spill response
YZC Board of Directors	<ul style="list-style-type: none"> • Establish a corporate environmental policy based on the recommendations of the Environmental Management Committee

ii) Spill Containment, Clean-up and Disposal

The potential exists for spills of petroleum products and/or various chemicals used at the Wolverine Mine. Various proven practical methods of containment and recovery are well documented for use in northern climates and are summarized below for each of the following areas: on land, snow, ice or in water.

Containment

For spills that occur on land, three methods of containment are summarized in Table 39.4 and action plans for the clean up of fuels, oils and antifreeze in various environments are provided in Table 39.5.

Containment on snow is readily achieved and is very effective due to snow’s absorbent quality. Liquid spills (petroleum) will become immobile within the snow pack and easily removed for transport for recovery or disposal. Use the snow to its advantage in construction of snow dykes/dams. Whenever possible, the snow pack should be left in place to avoid contaminating the underlying substrate.

Spills that occur on ice, from either direct spillage or migration to the ice, are greatly affected by the strength of the ice. If the spill does not penetrate the ice, and the ice is safe to work on, then the methods of containment are similar to that on land. Where the spill has penetrated the ice, the situation should be handled similar to that on open water.

A spill occurring on or into open water is very difficult to contain and every effort should be made to prevent the material from entering the water. If in the case of petroleum products, the material floats, then surface booms should be deployed immediately to control the spread of material.

Table 39.4 Spill Containment Option for Land-based Spills

Containment Method	Details Pertaining to Method Application
Snow Dykes	Petroleum products spilling onto frozen snow covered ground may be contained by the construction of snow dykes. For smaller spills, the dykes can be built with shovels while larger dykes will typically require the use of heavy equipment. In freezing temperatures, water may be sprayed or poured over the dykes to further enhance the barrier. Synthetically lined dykes are more effective than just snow or snow and ice-lined dykes. The impermeability of dykes may be ensured by lining with a polyethylene plastic liner, plastic tarpaulin or similar synthetic material.
Sand or Gravel Dykes	During warmer months, containment dykes may be constructed from sand or gravel if these materials are available. For smaller spills, the dykes can be fashioned manually with shovels where as for larger spills; trucks or other heavy equipment (front-end loaders) will normally be required to handle sand and gravel.
Trenching or ditching	Used for containing and/or intercepting the flow of liquid spills on land. Ice, snow, loose sand, gravel and surface layers of organic material can usually be scraped or dug away until the underlying frozen substrate is reached. They are effective in re-directing flow or simple containment prior to pumping or absorbing the spilled material. Trenching in solid frozen ground or rocky substrate is normally neither practical nor possible.

Table 39.5 Action Plans for Fuels, Oils and Antifreeze

Location of Spill	Spill Substance Type		
	Diesel, Hydraulic, Lube and Waste Oil	Gasoline and Jet B Aviation Fuel	Ethylene Glycol (Antifreeze)
On Land	Do not flush into ditches or drainage systems. Prevent entry into waterways and contain with berm or other barrier. Remove small spills with sorbent pads.	Block entry into waterways with berms or other barrier. Do not flush into ditches or drainage systems. Do not contain spill if there is any chance of igniting vapours. On shop floors and in work yards, apply particulate sorbents.	Block entry into waterways with berms or other barrier. Do not flush into ditches or drainage systems. Contain spill by dyking with earth or other barriers. Remove minor spills with universal sorbent. Remove large spills with pumps or vacuum equipment.

Table 39.5 Action Plans for Fuels, Oils and Antifreeze

Location of Spill	Spill Substance Type		
	Diesel, Hydraulic, Lube and Waste Oil	Gasoline and Jet B Aviation Fuel	Ethylene Glycol (Antifreeze)
On Snow and Ice	Block entry into waterways and contain with berm or other barrier. Remove minor spills with sorbent pads or snow. Use ice augers and pump when feasible to recover diesel under ice. Burn using Tiger Torches if unrecoverable by other methods, feasible and safe to do so.	Block entry into waterways with snow or other barrier. Do not contain spill if there is any chance of igniting vapours. In work yards, apply particulate sorbents.	Block entry into waterways with berms or other barrier. Do not flush into ditches or drainage systems. Contain spill by dyking with snow or other barrier. Remove minor spills with universal sorbent. Remove contaminated snow with shovels and mechanical equipment.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled oil with sorbent pads and/or skimmer. Flush with low-pressure water to herd oil to collection point. Burn only in localized areas, e.g., trenches, piles or windrows. Do not burn if root systems can be damaged (low water table). Minimize damage caused by equipment and excavation.	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled gasoline or Jet B with pumps. Low pressure flushing can be tried to disperse small spills. Burn carefully only in localized areas, e.g., trenches, piles or windrows. Do not burn if root systems can be damaged (low water table). Minimize damage caused by equipment and excavation.	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled gasoline or Jet B with pumps. Burning is not feasible. Minimize damage caused by equipment and excavation.
On Water	Contain spill as close to release point as possible. Use spill containment boom to concentrate slicks for recovery. On small spills, use sorbent pads to pick up contained oil. On larger spills, obtain and use skimmer on	Do not attempt to contain or remove spills. Use booms to protect water intakes and sensitive areas.	Ethylene glycol sinks and mixes with water. Isolate/confine spill by damming or diversion.

Table 39.5 Action Plans for Fuels, Oils and Antifreeze

Location of Spill	Spill Substance Type		
	Diesel, Hydraulic, Lube and Waste Oil	Gasoline and Jet B Aviation Fuel	Ethylene Glycol (Antifreeze)
	contained slicks. Do not use sorbent booms/pads in fast currents and turbulent water. Intercept moving slicks in quiet areas using sorbent booms.		

Recovery

Spilled petroleum products contained within a dyked, trenched or boomed area should be recovered by pumping into a portable storage tank or drum. Pump and suction hoses should be screened to prevent snow, ice or debris from clogging the line or pump. Any remaining material may be absorbed by use of a variety of products, such as 3M brand Conweb and Phase III brand Oil Sponge.

The availability of shovels, rakes and pitchforks are invaluable in any spill clean-up and recovery operation. The use of heavy equipment for larger spill situations such as front-end loaders and haul trucks, make the removal of material easier.

Disposal

Petroleum products such as oil that have been recovered by pumping into a tank or drum, can often be reused. Currently, hydrocarbon contaminated materials are removed to either the burn area for ignition or to the land farm.

The licenced land treatment farm is located adjacent to the airstrip as previously described. Soil is reclaimed through the process of bioremediation through tilling and the breakdown of hydrocarbons by naturally occurring bacteria. The process is most effective when soil temperatures range from 5 to 45°C. Bioremediation in soil will work so long as the ground is not frozen.

Other Concerns

In the event that the accident/incident is in combination with a fire, extinguishing the fire may be required prior to initiating efforts to stop the spillage. In order to control the resulting runoff (in cases where water is used), and the subsequent spread of the spilled material, the site should be contained as soon as practical. Note that petroleum and chemical spills and fires have the potential to generate toxic fumes. Approaching and dealing with any spill or fire from upwind is recommended as well as caution with regard to breathing the vapours. A Self-Contained Breathing Apparatus (SCBA) should be used when situations warrant.

Reporting

The sequence of reporting (provided in Figure 39.1) that must be strictly followed to ensure that:

- An efficient and effective response occurs;
- An accurate spill report is completed; and
- Notifications to both YZC management, government agencies and First Nations are done in a timely fashion.

Most major suppliers in the Yukon are members of the Transportation Emergency Assistance Plan (TEAP). One of the responsibilities of this organization is the sharing of resources, consumables, equipment and personnel in the event of a spill. The transporter of the fuel is responsible for contacting TEAP in the event of a spill.

The person who discovers the spill is considered the First Observer. That person identifies the source of the spill and reports to his or her direct supervisor who gathers the facts of the spill and contacts the Site Manager. The Site Manager records the spill information and passes it onto the Environmental Coordinator who will oversee its completion and distribution. Table 39.6 provides a list of substances and quantities that currently constitutes a spill with the Yukon Government. Any spill matching these criteria must be reported to the 24-hour Spill Report Line and Client Services and Inspections. However, if in doubt as to whether the reporting criteria were met, the call should be placed as a precautionary measure.

Table 39.6 What constitutes a spill according to the Yukon Government

Substance Spilled	Specified Amount
1. Explosives of Class 1 as defined in section 3.9 of the Federal Regulations	any amount
2. Flammable gases, of Division 1 of Class 2 as defined in section 3.11(a) of the Federal Regulations	any amount of gas from a container larger than 100L, or where the spill results from equipment failure, error or deliberate action or inaction
3. Non-flammable gases of Division 2 of Class 2 as defined in section 3.11(d) of the Federal Regulations	Any amount of gas from a container larger than 100L, or where the spill results from equipment failure, error or deliberate action or inaction
4. Poisonous gases of Division 3 of Class 2 as defined in section 3.11(b) of the Federal Regulations	any amount
5. Corrosive gases of Division 4 of Class 2 as defined in section 3.11(c) of the Federal Regulations	any amount
6. Flammable liquids of Class 3 as defined in section 3.12 of the Federal Regulations	200L
7. Flammable solids of Class 4 as defined in section 3.15 of the Federal Regulations	25 kg
8. Products or substances that are oxidizing substances of Division 1 of Class 5 as defined in sections 3.17(a) and 3.18(a) of the Federal Regulations	50 kg or 50 L
9. Products or substances that are organic compounds that contain the bivalent "-0-0-" structure of Division 2 of Class 5 as defined in sections 3.17(b) and 3.18(b) of the Federal Regulations	1 kg or 1L
10. Products or substances that are poisons of Division 1 of Class 6 as defined in sections 3.19(a) to (e) and 3.20(a) of the Federal Regulations	5 kg or 5 L
11. Organisms that are infectious or that are reasonable believed to be infectious and the toxins of these organisms as defined in sections 3.19(f) and 3.20(b) of the Federal Regulations	any amount
12. Radioactive materials of Class 7 as defined by section 3.24 of the Federal Regulations	any discharge or a radiation level exceeding 10mSv/h at the package surface and 200 mSv/h at 1 m from the package surface
13. Products or substances of Class 8 as	5 kg or 5 L

Table 39.6 What constitutes a spill according to the Yukon Government

Substance Spilled	Specified Amount
defined by section 3.24 of the Federal Regulations	
14. Miscellaneous products or substances of Division 1 of Class 9 as defined by sections 3.27(1) and 2(a) of the Federal Regulations	50 kg or 50 L
15. Miscellaneous products or substances of Division 2 of Class 9 as defined in section 3.27(1) and 2(b) of the Federal Regulations	1 kg or 1 L
16. Miscellaneous products or substances of Division 3 of Class 9 as defined in section 3.27(1) and 2(c) of the Federal Regulations	5 kg or 5 L
17. Special waste as defined in section 1 of the Special Waste Regulations	amounts specified in s. 3(1)(b) of the Special Waste Regulations
18. A pesticide as defined in section 2 of the Environment Act, but not including those pesticides and fertilizers listed in Schedule 4 of the Pesticide Regulations	5 kg or 5 L
19. Pesticides and fertilizers listed in Schedule 4 of the Pesticide Regulations	any amount

Source: Yukon Government Department of Renewable Resources: Spills Regulations, updated 1999

The Environmental Coordinator reports the spill to YZC senior management and the 24-hour Spill Report Line and Client Services and Inspections. A verbal notification is to be made by telephone as soon as possible given the circumstances. A list of contact numbers will be readily available and kept up-to-date (Table 39.7).

The following information shall be conveyed to the affected agencies through the 24-hour emergency Yukon Spill Response Line and Client Services and Inspections. This information will constitute verbal notification of the spill and should be documented on the Spill Reporting Form. The verbal report should include as much of the following information as is known at the time of the report (excerpt from the Implementation Guidelines for Part 8 of the *Canadian Environmental Protection Act, 1999* – Environmental Emergency Plans: Appendix 6: Notification and Reporting of Environmental Emergencies).

- The reporting person's name and telephone number at which the person can be immediately contacted;
- The name of the person who owns or has the charge, management or control of the substance immediately before the environmental emergency;
- The date and time of the release;
- The location of the release;
- The name/UN number of the substance released;

- The estimated quantity of the substance released;
- The means of containment (from which the substance was released) and a description of its condition;
- The number of deaths and injuries resulting from the environmental emergency;
- The surrounding area/environment affected and potential impact of the release (mobility of release and weather or geographic conditions at the site);
- A brief description of the circumstances leading to the release;
- The cause of the release (if known);
- Details of the actions taken or further actions contemplated (to contain, recover, clean up and dispose of the substance involved);
- The names of agencies notified or on-scene; and other pertinent information.

The Canadian Transport Emergency Center (CANUTEC), a branch of Transport Canada, can also be contacted for 24 hr technical advice on Dangerous Goods. Other stakeholders such as the Ross River Dena Council and Liard First Nation will be notified.

A written report should be made to the Director, Environmental Protection, Pacific and Yukon Region, Environment Canada within 30 days of the spill occurrence. The following information should be included in the written report (excerpt from the Implementation Guidelines for Part 8 of the *Canadian Environmental Protection Act, 1999* – Environmental Emergency Plans: Appendix 6: Notification and Reporting of Environmental Emergencies):

- The name and address of the person who owns or has the charge, management or control of the substance involved in the environmental emergency and the telephone number, including the area code, at which the person may be contacted;
- The date, time and exact location of the release;
- The name/UN number of the substance released;
- The composition of the substance released showing, with respect to each substance involved, its concentration and total weight;
- The estimated quantity of the substance released and the total quantity of substance in the means of containment before the release;
- The duration of the release of the substance and its release rate;
- The means of containment (from which the substance was released) and a description of its condition;
- The number of deaths and injuries resulting from the environmental emergency;
- The surrounding area/environment affected and potential impact of release (mobility of release, weather or geographic conditions at the site, long-term environmental impacts);
- A complete sequence of events before and after the environmental emergency (including the cause of the release, if known);

- The names of agencies notified or on-scene at the time of the release;
- All measures taken pursuant to CEPA 1999 paragraph 201(1)(b) and (c) (regarding protection of the environment and public safety and notification to any member of the public adversely affected by the environmental emergency); and
- All measures to be taken to prevent similar releases.

Figure 39.1 Spill Reporting and Response Procedure

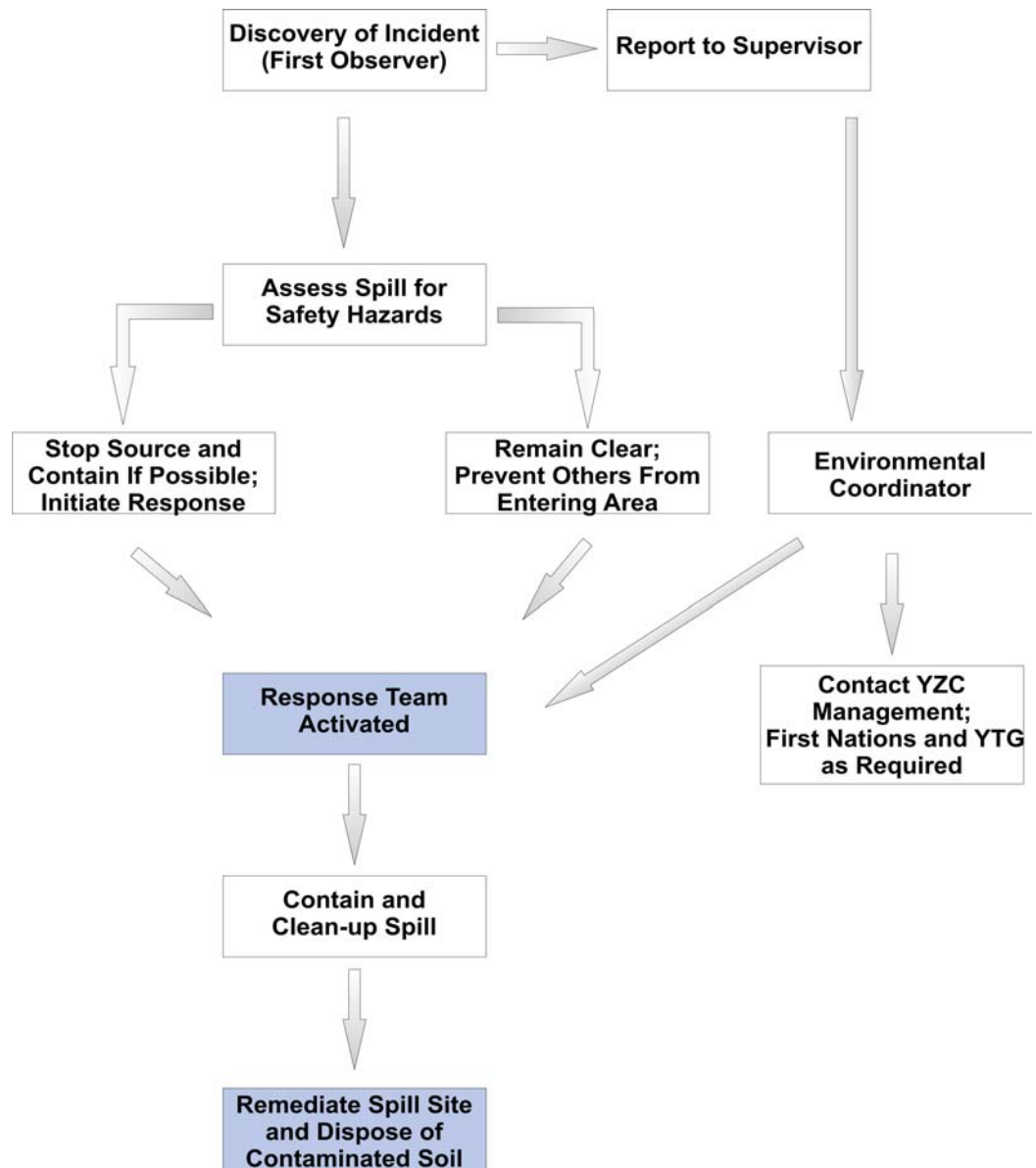


Table 39.7 Wolverine Project Emergency Contact Numbers

Yukon Zinc Corporation Contacts:	
President and CEO, Harlan Meade	(604) 682-5474 ext 228
Chief Operating Officer, Ray Mah	(604) 682-5474 ext 313
VP Environment & Community Affairs, Pamela Ladyman	(604) 682-5474 ext 246
Spill Reporting Yukon Government Contacts:	
24-hour Yukon Spill Line	(867) 667-7244
Client Services and Inspections	(867) 456-3882
Watson Lake District Conservation Officer	(867) 536-7363
Whitehorse District Conservation Officer	(867) 667-5221
Environmental Inspections Branch	(867) 667-3436
Mine Rescue Station	(867) 667-5450
First Nation Contacts:	
Ross River Dena Council, Testloa Smith	(867) 969-2097
Liard First Nation, Laurie Allen	(867) 536-2912
Federal Government Contacts:	
Department of Fisheries and Oceans	(867) 393-6722
Environment Canada (Whitehorse)	(867) 667-3400
Transport Canada (CANUTEC 24-hour Service)	(613) 996-6666
Regional Emergency Numbers	
Hospital:	
Watson Lake	(867) 536-4444
Whitehorse	(867) 393-8700
Watson Lake Health Unit	(867) 536-7834
Ambulance:	
Watson Lake	(867) 536-4444
Fire Department:	
Watson Lake	(867) 536-2222
Whitehorse	(867) 668-8699 or 668-2462
Police:	
Watson Lake	(867) 536-5555
Whitehorse	(867) 667-5555
Laboratories (Vancouver) :	
ASL Chemex	(604) 984-0221
ALS Environmental	(604) 253-4188
Maxxam Analytics Inc	(604) 444-4808
