

SPILL CONTINGENCY PLAN 1

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Spill Contingency Plan

Introduction

This Spill Contingency Plan Core covers the fundamental principles of the spill response process required of operators in the Northwest Territories. This core is intended as an adjunct to supplement the specific project details situated in Section 4.0 of this plan. Please reference the project site tabs located in Section 4.0 for further spill response equipment and location details.

Purpose and Scope

The purpose of this Spill Response plan is to outline response actions and mitigation procedures for potential spills of any size. This plan will identify key response personnel and their roles and responsibilities in the event of a spill as well as the equipment and other resources available to respond to a spill. It details spill response procedures that will minimize potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to a spill.



Environmental Policy



Husky Oil

EXPLORATION AND PRODUCTION SERVICES



Husky Energy

HEALTH, SAFETY AND ENVIRONMENT POLICY

Husky is committed to ensuring that its activities are conducted safely, reliably and with integrity; the health and well-being of employees, contractors, customers and the public will be protected; impact to the environment will be mitigated; and physical assets (such as facilities and equipment) will be protected from damage or loss.

In particular, Husky will:

- Demonstrate leadership and commitment to HSE by providing support to meet this HSE policy, as well as providing recognition for positive performance and applying disciplinary action, where appropriate, for breaches of this policy.
- Require every member of staff, and those who work on our behalf: to be a leader in health and safety; to exercise personal responsibility in preventing harm to themselves, to others, to the environment and to physical assets; to stop any work that is or becomes unsafe; and to report all incidents regardless of severity. Husky aims to sustain an incident free workplace.
- Identify and mitigate risk to as low as reasonably practicable during design, engineering, construction and operation.
- Prepare for emergencies and security threats.
- Maintain operations stability and integrity. Seek improvements in process/equipment dependability by systematically eliminating defects and sources of loss.
- Comply with relevant laws, regulations and industry standards and take any additional measures considered necessary to meet the intent of this policy. Everyone is responsible for knowing and following the laws, regulations and standards applicable to their work.
- Monitor and/or audit regularly to ensure all activities are conducted in a manner consistent with this HSE policy, and report on the progress of our performance. Establish leading and lagging key performance indicators and measurable goals to demonstrate continuous improvement in health, safety, environmental performance, reliability, integrity, compliance and security.
- Provide training and encourage the sharing of lessons learned to foster a culture of continuous learning and improvement. Provide knowledge of best available technologies where appropriate to improving Husky's HSE performance.
- Seek sustainable solutions by balancing economic, environmental and social considerations.

Asim Ghosh
President & C.E.O., Husky Energy
June 16, 2010

Al Pate
GM, Exploration Production Services
June 16, 2010

List of Hazardous Materials On-Site:**Process for Staff Response to Media inquiries**

Depending on the severity of an emergency, the media may attempt to contact company representatives in person at the incident site or in close proximity to the site. These representatives could include rovers, roadblock personnel, on-site personnel or other people the media deem credible to represent the company.

If you are approached by media:

- Be polite.
- Never use the phrase "No comment."
- If a more senior person is immediately available at your location, redirect the inquiry to that person.
- If you are the most senior person at your location, advise the media that you are not the Corporate Spokesperson.
- Gather the information on the Media Inquiry Form, if possible.
- Advise the media that the Corporate Spokesperson will be in contact with them.

An example of the script you may use is:

My name is (*your name*).
I am not the Corporate Spokesperson. However, (*name of Corporate Spokesperson*) could help you with your questions. May I have your name and the name of your organization?
I will have (*name of Corporate Spokesperson*) call you back as soon as possible.

- Forward the Media Inquiry Form or any call back commitments to your supervisor as soon as possible. The media will be working to a deadline.
- The supervisor will pass the Media Inquiry Form or call back commitments to the Corporate Spokesperson for response.
- Be careful not to deny information or facts. Again, simply state that you are not the Corporate Spokesperson.
- Although a press release may indicate information about the number of people injured, NEVER disclose any information about the names of those injured or the extent of their injuries. Next-of-kin notification must be completed before this information is released.

In cases where it is not possible to pass along the information to a more senior company representative, the following statement may be released: Media Statement

"We are in the early stages of gathering information on this situation to determine our involvement and response. Of utmost priority is the safety and protection of the public and all responders. Company information will be available to you when we know more. Feel free to leave your contact number with me or call our Corporate Communications department in Calgary at 403-370-0488 for information".

Response Organization

Initial Spill Response Actions

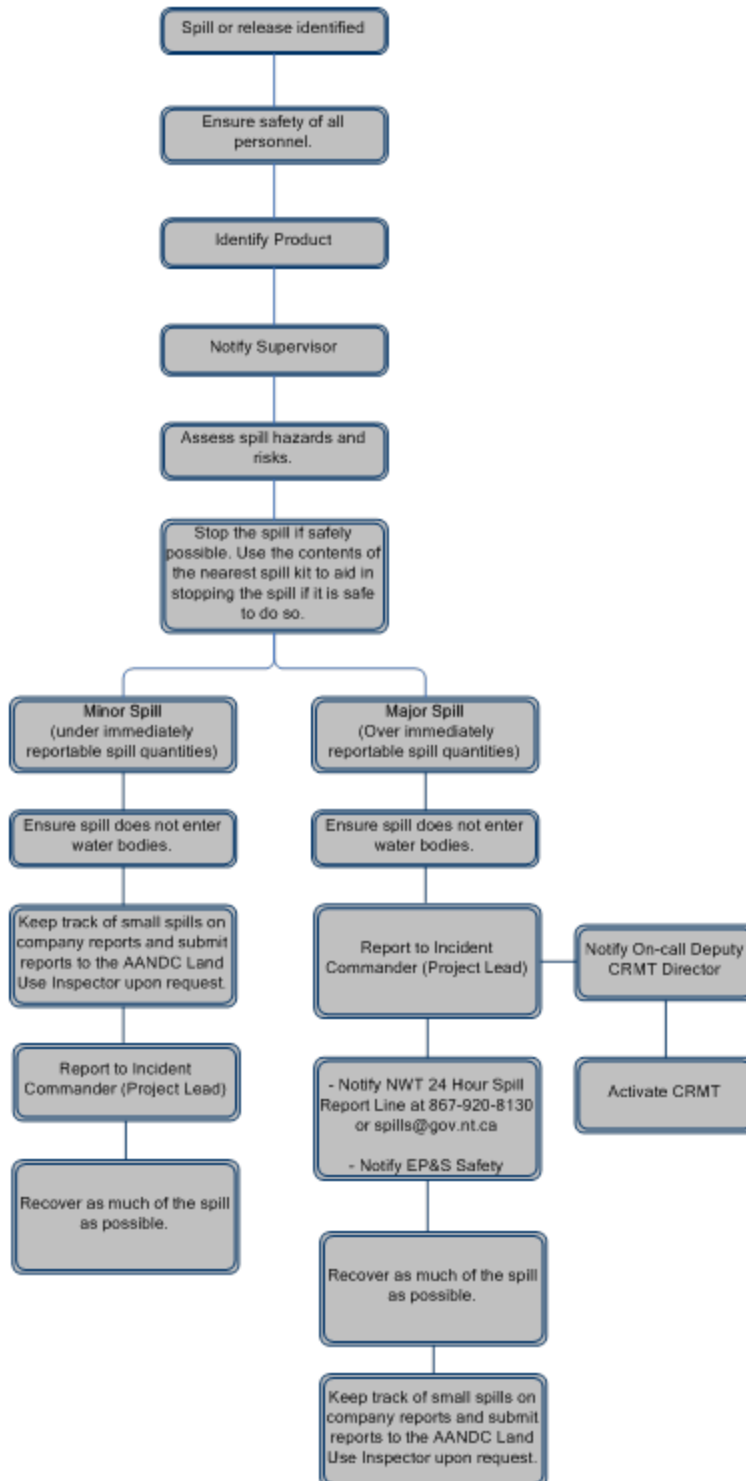
Procedures for Initial Actions:

- Ensure safety of all personnel.
- Assess spill hazards and risks.
- Remove all sources of ignition.
- Stop the spill if safely possible (e.g. shut off pump, replace cap, tip drum upward, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so.
- No matter what the volume is, notify camp manager.
- Contain the spill – use contents of spill kits to place sorbent materials on the spill, or use shovel to dig to contain spill. Methods may vary depending on the nature of the spill.
- Relay information to internal company contacts, government agencies and, if required, landowner, spill response contractors and the designated Information Officer.

Size up considerations for a spill site:

- Are there any nearby public (workers, traffic, residents) that would need to be evacuated or diverted from the spill area?
- Is there a fire or explosion hazard? What is the ignition source?
- Is there H₂S or other toxin present? Are concentrations safe or is additional PPE needed?
- Are there any areas deemed hazardous? (Mark with flags)
- What are the ground and weather conditions? (Snow, gravel, sand etc.)
- Where is the location of the leak, the type of release and the volume released? Is it reportable? Has it been reported to the regulator?
- How long has the spill been taking place?
- Are air monitoring trailers required?
- Is the spill into a watercourse or a water body?
- Is the spill contained or migrating? Which direction? How far can it go?
- If the spill is not contained, determine and prioritize the containment points and methods to be used.
- What lands or water bodies may be affected? (Farm, livestock, brush, drinking water, etc.)
- How is it going to be contained and cleaned up?
- How to access the spill site, the source of the spill and recovery points?
- What equipment is required? Is oil spill equipment (oil spill co-op) required?
- Where can spill responders park so as not to interfere with spill equipment? (Minimize vehicular traffic as much as possible at the spill site.)
- Are there any residences in the area? Do they have water wells that could be affected?
- Should the spill site be cordoned off to prevent wildlife / livestock from entering?
- Will a media response be required?

Flowchart of Response Organization



Control and Containment

- If possible, immediately shut off the source of the spill ensuring your own safety.
- Determine what will be affected by the spill.
- Assess speed and direction of spill and cause of movement (water, wind and slope)
- Prioritize and set up containment points.
- Where possible, prevent a spill from entering a watercourse.
- Have a contingency plan ready in case spill worsens beyond control or if the weather or topography impedes containment.
- Use safest and simplest method to get job done within resource and safety capabilities.
- Isolate and depressurize (ESDs, manual block valves, manual valve isolation).
- Plug and patch (e.g. fix faulty valve or hole in drum).
- Absorb or adsorb (e.g. applying adsorbent pads to oil spill).
- Transfer (e.g. removing product to waste truck or new container).
- Containerize (e.g. put leaking drum into over-pack drum).
- Reposition (e.g. upright or roll and chock leaking container).
- Others (e.g. hot-tap, vent and burn, flaring).
- Contain the spill – containment is a priority for limiting environmental damage.
- Contain as close to source as safe and practical.
- Avoid excessive walking or driving on the spill area.
- Consider ground disturbance guidelines.
- Determine where bell holes or trenches would be most effective.
- Keep trenches as shallow and narrow as possible, to prevent additional clean-up and minimize groundwater impact. Supplement with berms where possible.
- Use practical containment tools and equipment including shovels, dump trucks, sand bags, plastic bags, heavy earth moving equipment, "Plug and Patch", foam, salvage covers, adsorbents, booms, hose, redwood plugs, etc.
- If weirs are installed, they should be able to handle large flow rates and surges.
- Surface run off may have to be diverted from the spill site if wet conditions are present.
- Ensure the health and safety of the persons responding to the spill.
- Once containment has been achieved, recovery and clean-up operations begin immediately.
- Recover as much product and saturated debris as possible.
- Keep environmental disturbance to a minimum.

Spills of hazardous materials in the NWT present a potential threat to the public interest and the environment. Agencies responsible for conducting spill investigations and monitoring clean up of spills have signed an agreement to promote a well-coordinated state of preparedness for these activities.

Designation of Lead Investigating Agency for Spills on Land in the NWT:

- The Government of the NWT (GNWT) is the lead agency in dealing with spills on Commissioner's Land, Territorial highways and in communities.
- Indian and Northern Affairs Canada (INAC) is the lead agency in dealing with spills at facilities authorized under federal legislation and sections of Territorial highways on ice surfaces and for spills on Territorial (Crown) lands in the NWT.
- Environment Canada is responsible for dealing with spills at federal facilities, other than those authorized under federal legislation, and spills in National Parks.
- The National Energy Board (NEB) is responsible for spills at oil and gas exploration and production facilities.
- The Inuvialuit Land Administration is responsible for spills on land in the NWT set aside under the Inuvialuit Land Claim Agreement.

Designation of Lead Agency for Spills on Water in NWT:

- Indian and Northern Affairs Canada is responsible for spills on water in the NWT.
- Transport Canada is the Lead Investigating Agency for all ship source spills.
- The Canadian Coast Guard is the Lead Response Agency ensuring spills from ships and barges (including Oil Handling Facility re-supply) and mystery spills on water are addressed.
- The National Energy Board is responsible for spills on water at oil and gas exploration and production facilities.

Action Plan

Potential Environmental Impacts of Spill

Overall for all hazardous materials discussed below, impacts are lower during winter as snow is a natural sorbent and ice forms a barrier limiting or eliminating soil or water contamination, thus spills can be more readily recovered when identified and reported.

Gasoline

Environmental impacts: Gasoline may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Gasoline is quick to volatilize. Runoff into water bodies must be avoided.

Worst case scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Diesel Fuel

Environmental impacts: Diesel may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Diesel burns slowly and thus risk to the environment is reduced during recovery as burn can be more readily contained compared with volatile fuels. Runoff into water bodies must be avoided.

Worst case scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Aviation Fuel

Environmental impacts: Aviation fuel may be harmful to wildlife and aquatic life. It is not readily biodegradable and has the potential for bioaccumulation in the environment. Aviation fuel volatilizes relatively quickly. Runoff into water bodies must be avoided.

Worst case scenario: All fuel drums were punctured or open simultaneously and contents seeped into surrounding soil and water bodies. This could cause illness or death to aquatic life and indirectly affect wildlife feeding from the land and water.

Propane

Environmental impacts: Propane may be harmful to wildlife and the surrounding environment. It has the potential to accumulate in the environment. Propane is extremely volatile and is the most flammable material stored on site, thus immediate impacts to the surrounding environment are a concern.

Worst case scenario: All cylinders were punctured or failed simultaneously and contents leaked into the surrounding environment and ignited leading to an explosion. This could cause

serious environmental impacts in the immediate surroundings. Safety during emergency response to a propane spill is of the utmost concern.

Specific Spill Containment Methods

Spill Assessment (Land)

Following the initial hazard assessment and development of a site safety plan, gather detailed information on the location and effects of the spill on the land base.

Identify and document the spill boundary with the appropriate equipment, including:

- PPE
- Gas detection monitors
- Compass
- Measuring device (ie GPS)
- Shovel
- Quantabs or conductivity meter for produced water or emulsion spills
- Hoe, drill or sampling equipment if sub-surface contamination is suspected
- Camera

First ensure that there are no flammable vapours in the area. Produce a sketch of the spill and take appropriate photographs. Next, identify land uses in areas affected by the spill. Look at whether the spill affects private land owners (farm, acreage, residential, etc.), public land (green areas, parks), dispositions (pipelines, utilities, roads, facilities, trappers, etc.), or sensitive areas (protected areas, wildlife habitat, archaeological resources etc.).

Based on the land use in the spill area, determine the possible public that could be directly impacted; evaluate site for wildlife and livestock, and determine the approval requirements for accessing the spill site.

It is important to note the terrain, soil types, characteristics and conditions, as well as the vegetation types on site. Surface run-off patterns, erosion potential, moisture levels and movement of the water table can all impact the severity of the spill and the way in which it can be contained, so it is imperative to take note of all these things before proceeding with cleanup.

When the previous considerations have been addressed, the next course of action is to determine the equipment resources that are required to control the spill. The initial assessment will impact what equipment will be used, how it will be transported to the spill site and how it will improve or create access to the spill.

Land Spills

Land spills will spread outward from the initial spill point toward lower-lying areas. Penetration downward into the soil will also occur at a rate that is dependent on the soil type and the nature of the product spilled. During spills in winter, petroleum will spread under the snow making definition of the extent of the spill area difficult.

The Incident Commander and ICS Operations personnel should:

- Attempt to restrict spills on land to as small an area as possible based on site conditions.
- Prevent the spill from entering water bodies or flowing watercourses or flowing into manholes or culverts, within the bounds of safety and practicality.

The method chosen for land containment and recovery is dependent on site conditions and the equipment available. A summary of common options is presented in the following table:

Land Containment Options		
Containment Method	Technique Description	Comments
Earth or Sand Dike (All seasons)	<p>Earth or sand at or near the site is used to contain spilled material on flat or sloped surfaces.</p> <p>Sandbags filled with soil or sand are used to contain spill. Augment with poly-sheeting if available.</p>	<p>Sufficient dry earth, gravel or sand needs to be available to contain spill. Earth may be frozen.</p> <p>Surface disturbance to remove earth or sand may result in erosion, especially on steep slopes.</p> <p>Work crews and/or earth-moving equipment are required to build dike.</p>
Snow or Ice Dike (Winter only)	<p>Snow or ice at or near the site is used to contain spilled material on flat or sloped surfaces.</p> <p>Augment with poly-sheeting if available.</p>	<p>Sufficient snow or water needs to be available to contain spill. Snow or ice dike will melt quickly in warm weather.</p> <p>Contaminated snow or ice may need to be removed or stored for treatment.</p> <p>Work crews and/or earth-moving equipment are required to build snow dike. Water spraying equipment may be required to construct ice dike.</p>
Sorbent Dike (All seasons)	<p>Sorbent material is used to contain spill.</p>	<p>Useful only in small spills, as purchase of large quantities of sorbent is expensive and impractical.</p> <p>Contaminated sorbent may need to be replaced or squeezed out during incident. Contaminated sorbents need to be disposed in compliance with government legislation.</p> <p>Sufficient sorbent or sorbent boom, work crews and storage containers or a lined storage area for contaminated sorbents needs to be available to build sorbent dike.</p>

<p>Trench or Sump (All seasons)</p>	<p>A trench or sump is excavated downslope on sloping terrain to limit surface or subsurface spill movement. Work crews and/or earth-moving equipment are required to build trench or sump, as well as plastic or other impermeable sheeting for a trench liner.</p>	<p>It is recommended that the trench be dug to the bedrock or permafrost, which will then provide containment layer for the spilled fuel. Clean topsoil should be removed before trench construction. Frozen soil, bedrock close to the surface or soil type (e.g. sand) may make this option impractical. Surface disturbance to remove earth or sand may result in erosion or further penetration in sandy soil. Ensure no other pipelines or underground utilities are in the excavation area.</p>
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<p>Land Recovery Options</p>		
<p>Recovery Method</p>	<p>Technique Description</p>	<p>Comments</p>
<p>Vacuum Truck</p>	<p>A vacuum truck is used to recover spilled material from a dike or trench in areas accessible by trucks or heavy equipment.</p>	<p>The method depends on site access. Surface disturbance and soil damage may result from movement of the vacuum truck to and from the site. Topsoil may need to be stripped from the site before starting recovery activities.</p>
<p>Pumping Spilled Material into Storage</p>	<p>A pump is used to recover spilled material from a dike or trench in areas not accessible by vacuum trucks.</p>	<p>Pumps need to be safe for use at the spill site and compatible with the product to be pumped. Surface disturbance and soil damage may result from movement of the pump and storage equipment to the site. Skid tanks, tanker trucks, port-a-tanks, fuel bladders, permanent tanks, or a lined excavated area need to be available to provide storage for the recovered material. A work crew and power supply for the pump needs to also be available.</p>

Spill Assessment (Water)

Begin by assessing the characteristics of the affected watercourse including width, depth and velocity. Shoreline characteristics and sensitivities also need to be taken into consideration. The degree of oil impact, degree of sensitivity (ecological, cultural, human use, etc.) and the physical limitations can all affect the way in which a spill will be contained.

Preventing potential impacts on stakeholders can be done by advising downstream water users that contaminated water may pass their intakes. Their reserve water supplies (if any) may permit them to close the intakes until the spilled product passes. Examples of users include area residents, cities and towns.

A control point can be calculated to determine how much time is necessary to contain the spill after all considerations have been taken into account. To calculate the distance to a control point, one takes the current velocity of the stream (km/hr) times the total hours of time to deliver equipment to the site plus total hours to deploy equipment. If a river has a current velocity of 4 km/hr, and it takes 3 hours to deliver and 2 hours to deploy equipment the distance to the leading edge of the spill to the control point = $4 \times (3+2) = 20$ km.

Water Spills

Spills into a Watercourse

Petroleum products will spread outward from the origin of the spill, eventually achieving a stable thickness on the water. Spills on rivers, creeks or streams will flow downstream, contaminating riverbanks and vegetation, affecting wildlife, fish and water users in the area of the spill.

The rate of spill movement will depend on the current speed of the water and the time of year. Current may flow faster in the deepest channels in the river and slower in shallower areas, due to varying volumes of water. Flow in a watercourse will also be faster in the spring, because of snowmelt entering the watercourse from the surrounding area. River currents in summer and fall will be generally slower than in the spring. Wind and wave action will also affect the rate and direction of spill travel.

Spill velocity on a watercourse may be estimated quickly by using a current velocity meter or by timing the movement of a floating object on the watercourse over a set distance.

The following table is used for estimating spill velocity based on a 30 metre (100 foot) distance:

Time Required For Object to Travel 30 metres (100 feet) (seconds)	Surface Current Speed			Boom Angle (degrees)
	(km/hr)	(m/s)	(miles/hour)	
216	0.5	0.14	0.3	60°
108	1.0	0.28	0.6	60°
72	1.5	0.42	0.9	60°
54	2.0	0.56	1.2	45°
43	2.5	0.69	1.5	45°
36	3.0	0.83	1.9	45°
31	3.5	0.97	2.1	15°
27	4.0	1.11	2.5	15°
24	4.5	1.25	2.8	15°
22	5.0	1.39	3.1	15°
18	6.0	1.67	3.7	15°

Note: In currents faster than 6.0 km/h (3.7 mph), or in excessively turbulent waters, the use of containment booms may be impractical and other containment or protection methods such as the use of diversion or exclusion booms may be required.

The velocity calculated will be an approximation only, as the watercourse velocity varies at different points across the river, due to changes in river depth and at various points upstream and downstream on the river. In the initial stages of the spill on a watercourse, lighter-end materials will tend to evaporate, especially in warm weather. Other processes that might affect spill behaviour include dispersion of the petroleum into the water, formation of stable oil/water emulsions and stranding or oil along the shoreline.

Containment of a spill on a watercourse should be completed as quickly as possible as the spilled material has the potential to travel a much greater distance and contaminate a larger area than spills on land. The Incident Commander and ICS Operations personnel will implement appropriate containment actions based on the size of the watercourse and current velocity.

Watercourse Containment Options		
Containment Method	Technique Description	Comments
Containment Boom (Spring to Fall)	A containment boom is placed in the watercourse to prevent migration of the spilled material down-stream of the containment point.	The watercourse needs to be accessible to allow containment activities. If water is too shallow, or current is too fast, the containment boom may not be effective in containing the oil. Oil spill containment equipment, work and safety boats, and a work crew need to be available to conduct this method.
Diversion Boom (Spring to Fall)	Diversion booms are used in large or swift rivers to divert spilled material to calmer water for containment and recovery. May be used in combination with containment boom.	The watercourse needs to be accessible to allow boom to be deployed. High current speeds or turbulence may make deployment impossible, or may cause deployed boom to fail, releasing spilled material downstream. Oil spill containment equipment, work and safety boats, and a work crew need to be available to conduct this method.

Watercourse Containment Options

Containment Method	Technique Description	Comments
<p>Sorbent boom (Spring to Fall)</p>	<p>Sorbent booms may be used in narrow, low flow streams or rivers to remove small amounts of surface oil. Chicken wire or containment boom may be used to back up sorbent boom.</p>	<p>The watercourse needs to be accessible to allow boom to be deployed. Sorbent boom use is only viable in low flow watercourses, as boom is not very sturdy and breaks easily. (Chicken wire or containment boom may be used behind sorbent boom to reinforce sorbent boom and prevent breakage). Sorbent boom also has no skirt allowing large amounts of oil to easily flow under it. Sorbent boom will pick up sheen but not large amounts of oil. Sorbent boom is not very effective in cold weather. Large amounts of sorbent boom are expensive, and needs to be replaced in the watercourse when saturated. Used sorbent needs to be stored and disposed of in compliance with government legislation. Sorbent boom, work crew and possibly boats may be required.</p>
<p>Earth or Sand Dike (Spring to Fall)</p>	<p>Dikes are used across very shallow streams and intermittent creeks to contain flowing oil. Dikes can also be used to contain spilled materials along a shoreline.</p>	<p>Sufficient earth or sand is needed to construct the dike. Flowing may be caused if stream or creek is dammed (a containment weir may be used to alleviate this problem – see below) Damage may be caused by evacuation and construction in the watercourse and along the banks. A work crew with shovels, earth-moving equipment, earth or sand, sandbags and/or sheets of metal or wood may be required.</p>
<p>Containment Weir (Spring to Fall)</p>	<p>Containment weirs are physical dams with culverts or pipes constructed in the dam to allow free water movement from a site while containing surface oil.</p>	<p>Containment weirs are used in shallow streams and creeks and are suitable for maintaining a constant water level at the site and preventing flooding. Damage may be caused by excavation and construction in the watercourse and along the banks. A work crew with shovels, earthmoving equipment, earth or sand and piping or culvert material is required.</p>

Watercourse Recovery Options

Recovery Method	Technique Description	Comments
Vacuum Truck	A vacuum truck is used to recover free petroleum from water in areas accessible by trucks or heavy equipment.	A vacuum truck and operator are required. Use of this method is subject to site access. Surface disturbance and soil damage may result from movement of the vacuum truck to and from the site. Topsoil may need to be stripped from the site before conducting recovery activities.
Pumping of Spilled Material into Storage	A pump is used to recover free oil from the watercourse in areas not accessible by vacuum trucks.	Pumps need to be safe for use at the spill site and be compatible with the product to be pumped. Surface disturbance and soil damage may result from movement of the pump and storage equipment to the site. Technique will generate large volumes of contaminated water that will require storage. Skid tanks, tankers, port-a-tanks, fuel bladders, permanent tanks or a lined excavated area need to be available to provide storage for the recovered material. A work crew and power supply for the pump need to also be available.
Skimmers	Mechanical devices are used to skim oil from water surface or remove oil/water mixture for storage.	Skimmer will need sufficient water depth to float. Weir skimmers work best on thicker layers of oil in flowing water. Will generate large quantities of water/oil mixture. Drum or disc skimmers will pick up thinner layers of oil on slow moving water. Debris and vegetation may clog skimmer making oil pickup difficult. A suction, floating weir, disc or drum skimmer, pump and work crew are required. A secure storage facility (tanker, portable tanks, fuel bladders or excavated, lined storage site) is also required.

Spills into Waterbodies

In the absence of any current or wind, spills on water bodies such as lakes will spread out in all directions from the site of the spill until a uniform stable thickness is reached. If a wind and/or current are present, the spill will move with the wind or current until it reaches the shoreline.

Wave action in the water body may also affect the spill causing oil-in-water or water-in-oil emulsions to form, making recovery and clean-up efforts more difficult.

The Incident Commander and ICS Operations personnel should attempt to contain the spill to as small an area as possible on the water body near the spill source. Dispersion of the spill over a large area on the water body could cause widespread impacts when the spill reaches the shore. If the spill can be contained on the water body, the spilled material is moved toward shore for recovery.

Containment options for spills on water bodies use a containment boom to surround the spill. If the area that may be impinged by the spilled materials is environmentally sensitive, appropriate shoreline protection measures may be implemented as recommended by Husky Environmental Specialists.

Spills into Wetlands or Muskeg

Wetlands are areas with high organic content, which contain large amounts of water in the soil. Wetlands may be continuously covered in water or water levels may fluctuate throughout the year. Muskeg is a land area that contains high moisture content and is boggy in the summer because of large quantities of peat, moss, or other vegetative material in the soil. In winter, muskeg will freeze making excavation extremely difficult.

Spills in wetlands or muskeg can be some of the most difficult spills to contain, recover and clean up because of limited site access for both manpower and equipment. Because of the sensitive nature of these ecosystems, more damage may be caused by emergency response operations than was caused by the original spill. The Incident Commander may consult with government officials or environmental specialists before conducting emergency response operations in wetlands or muskegs. This will ensure that containment, recovery, and clean-up operations represent the most viable option for the spill, based on the type of product, size of spill and site specific safety, operational or environmental concerns.

If all other options are considered unviable, natural recovery may be approved by environmental protection agencies. Natural recovery uses micro-organisms already present in the ecosystem to degrade the oil. Degradation of the oil may be enhanced by addition of other nutrients required by the micro-organisms, to ensure sufficient levels of these nutrients are present to allow degradation to continue.

Natural recovery may be preferable to recovery and clean-up depending on:

- the amount, type and persistence of the oil
- the location of the site
- the nature and uses of the area
- whether the impacts of various clean-up methods are greater than damage related to the actual spill

Natural recovery should be considered if:

- clean-up activities will cause more harm than leaving the site to recover naturally
- leaving the area to recover naturally will not cause further harm to environmentally sensitive areas

Containment operations for wetland or muskeg spills in winter are similar to those for spills on land or ice. If containment operations are conducted at the site in the summer, a combination of land containment and water containment options will be used as appropriate.

A summary of available options is provided in the following table:

Wetland or Muskeg Containment Options		
Containment Method	Technique Description	Comments
Containment Boom	A containment boom is placed in wetland to prevent migration of oil into non-contaminated areas.	If water is too shallow, or the current is too fast, the containment boom may not be effective in containing the oil. Oil spill containment equipment, work and safety boats and a work crew need to be available to use this method.
Containment Weirs	Containment weirs are physical dams with culverts constructed in the dam to allow free water movement from a site while containing surface oil. Containment weirs are used to maintain a constant water level at spill site for easy oil recovery.	Access to the site by manpower and equipment may be limited. Building of containment weirs may be labour-intensive and time-consuming if done manually. Damage may be caused by excavation and construction in the watercourse and along the banks. A work crew with shovels, earthmoving equipment, earth or sand and piping or culvert material is required to use this method.
Vacuum Truck	Muskeg or wetland areas need to be accessible. A vacuum truck can recover from a trench or water surface.	Surface disturbance and soil damage may result from movement of the vacuum truck to and from the site. Topsoil may need to be stripped from the site before undertaking recovery activities.

Wetland or Muskeg Containment Options

Containment Method	Technique Description	Comments
Pumping of Spilled Material into Storage	A pump is used to recover free oil from wetlands or muskeg.	<p>The wetland or muskeg area needs to be accessible for equipment.</p> <p>Pumps need to be safe for use at the spill site and be compatible with the product to be pumped.</p> <p>The technique will generate large volumes of contaminated water that will require storage.</p> <p>Skid tanks, tanker trucks, port-a-tanks, fuel bladders, permanent tanks or a lined excavated area need to be available.</p> <p>A work crew and power supply for the pump need to also be available.</p>
Skimmers	<p>Used to skim oil from water surface or remove oil/water mixture for storage.</p> <p>Drum or disc skimmers will pick up thinner layers of oil on slow moving water.</p>	<p>The wetland or muskeg area needs to be accessible.</p> <p>Skimmer will need sufficient water depth to float.</p> <p>Debris and aquatic vegetation may clog skimmer, making oil pickup difficult.</p> <p>A suction, floating weir, disc or drum skimmer, pump and work crew are required to undertake method. A secure storage facility is also required.</p>
Fresh Water Flushing	<p>Water is flushed through an area to push oil that is in vegetation or on the water surface toward a collection point for recovery.</p> <p>The method can be used in conjunction with trenches.</p>	<p>The wetland or muskeg area needs to be accessible for equipment to allow recovery activities to be conducted. The method is not suitable for areas with extensive vegetation or obstructions.</p> <p>Physical damage may be caused to sensitive environmental areas.</p> <p>Pumps, a power supply, hoses, hot or cold water, and a work crew are required. A lined, excavated area or storage tanks may be required to hold water for treatment or testing.</p>

Spill Assessment (Ice-Covered Water)

The first step in an ice-covered water assessment is to identify the On-Site Supervisor, Safety Supervisor, Ice Rescue Team and Ice Assessment Team. The applicable equipment will then be identified to ensure that all resources necessary are available to contain the spill. Before beginning an assessment, ensure workers are protected against exposure to cold, warm-up facilities and food have been provided, and designate a rest area off the ice.

Ice assessment team will proceed from the shore and drill one test hole in the ice to determine, ice thickness, current velocity, water depth below ice and current direction of water flow. If the ice is safe to continue, the ice assessment team can proceed across the watercourse. As the assessment team moves away from the shore, it may be necessary to reposition anchors from shore to on-ice with the use of ice anchors.

Following the initial assessment of the ice across the watercourse, the team may move downstream (approximately 9 metres) and drill test holes across the watercourse. At this point, it is important to stagger the holes in order to obtain a more accurate assessment. The On-Site Safety Supervisor will then declare whether or not the weight bearing capacity is sufficient to continue work without the use of safety lines and anchors.

Ice Spills

Spills on Ice

Spills on ice will tend to spread out from the spill source toward lower-lying areas. Surface depressions, cracks and pockets in the ice will cause the spilled material to pool. A significant volume of some oils can be absorbed into ice.

The presence of oil on or in ice increases solar heating and the rate of melting. Subsequent freezing and melting may eventually cause the oil to migrate throughout the surface of the ice. Openings in the ice may allow the spilled material to migrate into open water or allow the spill to be swept under ice, making response operations more difficult.

The information presented should be used as a guideline only in determining typical load-bearing capacity of ice. The Incident Commander and ICS Operations personnel need to determine whether it is safe to work on ice based on actual site conditions.

The ability for ice on a river, stream or lake to support the weight of workers and equipment is determined by effective ice thickness which is based on the thickness of clear ice and presence of white ice.

Clear ice (sometimes called blue ice) is translucent and well compressed with few air pockets. This ice is very strong and has a high load-bearing capacity.

White ice (or snow ice) is very porous, with many air pockets and is much weaker. White ice has approximately half the load-bearing capacity of clear ice. White ice is formed by constant melting and freezing of the top layer of ice due to solar heating or mild temperatures and is normally found on top of clear ice.

Holes should be drilled in the ice at the work site, before starting any on ice operations, to determine the average thickness of white and clear ice.

Effective ice thickness then can be calculated, using the formula in the following table:

Effective Ice Thickness = clear ice thickness + ½ white ice thickness
Example: The spill site has 20 inches of clear ice and 10 inches of white ice 20 inches clear ice + ½ x 10 inches white ice = 25 Effective Ice Thickness
Note: If water lies between layers, use the depth of only the top layer of white ice

Based on the effective ice thickness, a determination can be made as to the stationary and moving loads that may be supported by the ice. Normally less ice is required for continuous movement on the ice than for stationary loads as less pressure is exerted on any one point on the ice during movement.

The following table will assist the Incident Commander and ICS Operations personnel determine the permissible loads on ice based on the effective ice thickness:

LOAD-BEARING CAPACITY OF ICE THICKNESS FOR CONTINUOUS TRAVEL ¹		
Permissible Load	Effective Ice Thickness - Inches (Centimetres)	
	Lake	River
One person on foot	2.0 (5.0)	2.5 (6.3)
Group, in single file	3.2 (8.0)	3.5 (8.8)
Passenger car 4,400lbs (2000kg)	7.1 (17.8)	8.3 (20.8)
Light Truck 5,500lbs (2500kg)	7.9 (19.8)	9.1 (22.8)
Medium Truck 7,700lbs (3500kg)	10.2 (25.5)	11.8 (29.5)
Heavy Truck 15,000 – 17,500lbs (6800 – 8000kg)	13.8 (34.5)	16.1 (40.3)
20,000lbs (9000kg)	15.0 (37.5)	17.3 (43.3)
50,000lbs (23,000kg)	24.8 (62.0)	28.7 (71.8)
99,000lbs (45,000kg)	31.5 (78.8)	36.2 (90.5)
150,000lbs (68,000kg)	39.4 (98.5)	45.3 (113.3)
240,000lbs (109,000kg)	49.2 (123.0)	56.7 (141.8)
WEIGHT-BEARING CAPACITY FOR STATIONARY LOADS AND WORKING ON ICE		
Permissible Load	Effective Ice Thickness - Inches (Centimetres)	
	Lake	River
2,200lbs (1000kg)	8.0 (20.0)	9.1 (22.8)
4,400lbs (2000kg)	12.0 (30.0)	14.0 (35.0)
8,800lbs (4000kg)	18.0 (45.0)	21.0 (52.5)
17,600lbs (8000kg)	24.0 (60.0)	27.0 (67.5)
50,000lbs (23,000kg)	44.0 (110.0)	50.0 (125.0)
99,000lbs (45,000kg)	59.0 (147.5)	68.0 (170.0)
150,000 lbs (68,000 kg)	71.0 (177.5)	82.90 (205.0)
240,000 lbs (109,000 kg)	91.0 (227.5)	105.0 (262.5)

Note: These tables are guidelines only for determining the typical load-bearing capacity of ice.

¹ Does not apply to parked loads, or where ice faults are evident.

Temperature may affect the load-bearing capacity of ice on a water body. Air temperatures need to remain below the freezing point of water (0°C) for a sufficient period to allow the ice to adequately support a stationary or moving load. Temperature effects are dependent on ice thickness, as follows:

- less than 50 centimetres (20 inches) of ice: temperature need to be constant for 3 days
- between 50 and 100 centimetres (20 and 40 inches) of ice: temperature need to be constant for 4 days
- over 100 centimetres (40 inches) of ice: temperature need to be constant for 5 days

Sudden drops or increases in temperature can also cause thermal stressing or cracking of ice requiring temporary load restrictions for 3 to 5 days following the change. Thawing due to warm temperatures may also significantly affect ice conditions. On-Site personnel should take extreme care when evaluating ice conditions during a thaw and limit work on or near ice under these conditions.

Containment and clean-up options for spills on ice are similar to those on land and are summarized in the following tables:

On Ice Containment Options		
Containment Method	Technique Description	Comments
Earth or Sand Dike (All seasons)	Earth or sand at or near the site is used to contain spilled material on flat or sloped surfaces. Sandbags filled with earth or sand are used to contain spill. Augment with impermeable or poly-sheeting if available.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required to build dike. Sufficient dry earth, gravel or sand needs to be available to contain spill. Earth may be frozen. Surface disturbance to remove earth or sand may result in erosion, especially on steep slopes. Earth or sand placed on ice needs to be removed before spring break-up. Work crews and/or earth-moving equipment are required to build dike.
Snow or Ice Dike (Winter only)	Snow or ice at or near the site is used to contain spilled material on flat or sloped surfaces. Augment with impermeable or poly-sheeting if available.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required to build dike. Sufficient snow or water needs to be available to contain spill. Snow or ice dike may melt quickly in warm weather. Contaminated snow or ice may need to be removed or stored for treatment. Work crews and/or earth-moving equipment are required to build snow dike. Water spraying equipment may be required to construct and maintain an ice dike.

On Ice Containment Options

Containment Method	Technique Description	Comments
Sorbent Dike (All seasons)	Sorbent material is used to contain spill.	Useful only in small spills, as purchase of large quantities of sorbent is expensive and impractical. Contaminated sorbent may need to be replaced or squeezed out during incident. Contaminated sorbents needs to be disposed of properly to comply with government regulations. Sufficient sorbent or sorbent boom, work crews and storage containers or a lined storage area for contaminated sorbents needs to be available to build sorbent dike.

On Ice Clean-Up Options

Clean-up Method	Technique Description	Comments
Manual Removal by Work Crew and/or Equipment (Winter)	A work crew or earth-moving equipment are used to remove thick oil or contaminated snow and ice.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required. All necessary safety precautions should be undertaken for personnel who work near any open water. Manual removal may be a difficult and time-consuming process. A work crew with hand tools or earth-moving equipment (e.g. backhoe) and operators, as well as ice cutting equipment, may be required. Lined storage area or storage drums are required to store contaminated material before treatment or disposal. Oil present in snow may be skimmed off during spring thaw.
Steaming of Ice Surface	Steam is used to melt ice surface to aid in spill clean-up. The technique may be used in association with other clean-up and recovery techniques.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required. All necessary safety precautions should be undertaken for personnel who work near any open water. A work crew with steaming equipment is required to undertake this method.

On Ice Clean-Up Options		
Clean-up Method	Technique Description	Comments
Sorbents (Spring to Fall)	The method is used in isolated areas to clean up small amounts of oil.	<p>Clean-up is labour-intensive and time-consuming. Limited access to site may make this method difficult or impossible.</p> <p>Sorbents are not very effective on weathered oil or in cold weather. Sorbents may freeze to the surface.</p> <p>Sorbents needs to be disposed of properly to comply with government regulations.</p> <p>Sufficient sorbent, work crews and storage containers or a lined storage area for contaminated sorbents needs to be available.</p>
Snow or ice melting	<p>Snow or ice is removed from the clean-up site and melted in heated tanks to allow spilled material to be skimmed off the surface of the melt water.</p> <p>The technique may be used in association with other clean-up and recovery techniques.</p>	<p>Contaminated snow or ice needs to be removed from clean-up site and placed in melting tanks.</p> <p>The method may be labour-intensive and time-consuming, as melting is not be very efficient for clean-up of large volumes of petroleum-contaminated ice. In very cold temperatures, sufficient heat may not be available in the tanks to melt ice.</p> <p>A work crew, heating tanks, skimming equipment, transfer vehicles and operators are required.</p> <p>A lined storage facility for storage of contaminated ice or snow before melting may also be required, as well as storage tanks for storing recovered petroleum.</p>

Spills Under Ice

Spills of petroleum under ice will spread and will travel under the ice at a velocity that is less than the current speed of the watercourse. The spill will tend to follow the path of the main current flow. The spill product may become trapped in crevices, cracks, pockets, and other irregularities under the ice and may freeze from the underside of the ice anywhere downstream or outward from the original spill. This will make recovery and clean-up operations extremely difficult.

Before conducting any response operations to contain, remove and clean up oil under ice, the Incident Commander should ensure that the ICS Operations personnel have calculated the effective ice thickness to ensure it will support the weight of personnel and equipment.

For spills under ice, the Incident Commander and ICS Operations personnel should attempt to determine the location of the spilled material and bring the spill to the surface of the water for containment and recovery. Spill movement under the ice is normally located by drilling holes through the ice using an ice auger downstream of the spill source on a flowing watercourse or outward from the spill source on a non-flowing water body. Alternately, aerial reconnaissance may be used to attempt to locate spilled material in cracks at the surface or under thin ice. Once the spill has been located, containment operations can be conducted to bring the spilled product to the surface.

Containment operations are normally accomplished by constructing slots in the ice. Ice slots allow petroleum products trapped under the ice to rise to the surface for recovery.

The slot is normally constructed at an angle in relation to the shore toward the area of strongest current flow in the river. If the slot is constructed correctly, the spilled material will rise into the slot and flow along it toward the shore for recovery.

The angle of slot construction in relation to the shore depends on the current velocity, similar to a containment boom placed in a flowing river. For higher currents in the river, a shallower angle is used for the ice slot, while a larger angle may be used for lower current flows.

If a slot is constructed at too great an angle to the current, turbulence may occur, sweeping the spilled material under the ice on the downstream side. Plywood or other types of sheeting may be placed on the downstream side of the slot and frozen in place to facilitate containment of the spilled material. The ice slot should be 0.5 to 1.0 metre (1.6 to 3.3 feet) wide, to aid in containment. Ice blocks may be cut using a ditch witch or backhoe if the effective ice thickness is sufficient to allow stationary equipment on the ice. [If ice is too thin for equipment but safe for personnel, crews equipped with chainsaws and proper safety gear can cut the ice.] Ice blocks can be removed to clear the slot or pushed under the ice downstream of the slot if sufficient water depth is available.

Ice blocks are extremely heavy (one cubic foot of ice weighs 24 kilograms (53 pounds)). Blocks should be cut to a size that will allow the crews or equipment to remove them easily. To aid in block removal, the ones nearest the shore should be removed first and remaining blocks should be floated toward shore for removal. Plywood or other sheeting can be used upstream of the slot to divert oil into the slot for recovery. Narrow slots may be cut into the ice with a chain saw and sheeting may be wedged into the slots to channel the main current toward the ice slot in a manner similar to a diversion boom in open water.

Under Ice Containment Options		
Containment Method	Technique Description	Comments
Ice Slotting	Ice slots are cut into ice on rivers to collect oil moving under the ice. The technique is best used for rivers with current, as oil will be moved toward slot by current.	Effective ice thickness needs to be sufficient to support the weight of manpower and equipment required to build slot. All personnel working near any open water need to take all required safety precautions. The location of the spill needs to be confirmed by drilling holes downstream of the spill source before constructing the ice slot. Total containment of spilled petroleum in an ice slot is unlikely, due to material trapped under ice. Snowmobiles, communications gear, and ice augers may be required to determine the location of the spill. Work crews, chain saws and/or a backhoe or ditch witch are required to construct an ice slot. A recovery device such as a heat-traced ice skimmer is required to recover spilled material. Storage tanks or a lined excavated storage area may be required to store recovered oil/water mixture.

Spills in Broken Ice

The risk to Life Safety of the personnel attempting spill response in broken ice conditions using existing technology is extreme. Emergency operations in broken ice conditions during spring thaw or winter freeze-up are extremely difficult. When oil is mixed with floating ice or covered by a very thin ice cover, ice interferes with the collection of the oil and could damage containment and recovery equipment. The presence of ice also makes the use of boats difficult.

Before authorizing any spill response operations in broken ice conditions, the Incident Commander and ICS Operations personnel, along with the appropriate regulatory agencies, will evaluate whether it is safe or feasible to undertake containment and recovery operations and what methods should be used.

Containment options for spills during freeze-up or break-up are similar to those for spills on a river and on ice. If containment operations are determined to be feasible based on site conditions, the Incident Commander and ICS Operations personnel will attempt to deflect ice away from the containment site.

Deflection of ice may be achieved using log booms or ice dams. A log boom consists of logs cabled together with chain, anchored upstream of a conventional containment boom. An ice dam is constructed upstream of the oil spill site and containment site, to attempt to divert upstream ice away from a containment site.

Log booms are deployed at an angle away from the containment site. Logs are spaced to allow spilled materials and water to move directly toward the containment site, while diverting the ice toward the opposite shore, allowing the ice to pass around the containment site.

Snow Spills

Snow is a natural sorbent, thus as with spills on soil, spilled fuel can be more easily recovered. Generally, small spills on snow can be easily cleaned up by raking and shovelling the contaminated snow into plastic bags or empty barrels, and storing these at an approved location.

Dykes can be used to contain fuel spills on snow. By compacting snow down slope from the spill and mounding it to form a dyke, a barrier or berm is created thus helping to contain the spill. If the quantity of spill is fairly large, a plastic tarp can be placed over the dyke such that the spill pools at the base of the dyke. The collected fuel/snow mixture can then be shovelled into barrels or bags, or collected with sorbent materials.

Leaks

Leak During Fuel Transfer

To minimize the likelihood of a fuel release, use dedicated fuel and fluid transfer personnel, and follow the barge contractor's written procedures. Ensure that tank trucks have absorbents, drip trays and a scoop shovel. Also, ensure that drip trays and absorbent pads are always used under connections and fuel transfer operations. Maintain constant dedicated attention during fuel transfer operation and avoid the tendency to top up a tank when refuelling. When the fuel is being transferred from barges to tankage use the barge contractor's fuel transfer procedures. This includes having personnel positioned along the load-out or transfer line during pumping operations.

Leak During Fuel Transfer from Barge

When a leak in a pipeline or hose is discovered during a fuel transfer from a barge, the first course of action is to stop all transfer operations immediately and close all manifold valves. It is then necessary to inform the loading master and locate the source of the leakage.

If it is possible to transfer spilled oil into an empty tank, such as the slop tank or another oil tank, prepare the transfer pump and drain the affected section of the pipeline into an empty tank. If the source of the leakage is located in the engine room at the suction manifold, take the necessary measures to relieve the pressure from the relevant section of the pipeline. Use absorbents and permissible solvents to clean up the spill if the spilled oil is contained onboard and can be handled by the vessel crew. Ensure that any residue collected in the cleanup operation is stored carefully then dispose of the residue properly.

In the event that oil is noticed on the water near the barge during cargo transfer operations and cannot be accounted for, the possibility of hull leakage should be investigated immediately. When the source of the leak has been identified reduce the head of cargo oil by transferring it into an empty or slack tank. Consider pumping water into the leaking tank to create a water cushion to prevent further oil loss (loading a water cushion will displace the fuel above the hull breach). Initiate an event report, including details of spilled product, spill size, location, status and injuries. Report any releases to the NWT 24-hour spill reporting line.

Diesel Leak from an Iced-in Barge

Barges will be used to transport fuel to support construction, drilling, seismic and testing operations. Barges will be staged with fuel stored in the centre cells. No fuel will be placed in the outer storage cells. Each spill will require a varied response depending on the specific situation. The response might range from no action to attempting to recover whatever amount of spilled diesel can be found.

To contain a leak from an iced-in barge, drill auger holes in the ice at intervals downstream of the source of the leak to determine the areal extent and quantity of diesel spilled. Look for a hydrocarbon sheen on the water. To locate the source of the leak, cut the ice on the river side of the barge using an ice saw sleigh, starting at the downstream end of the barge. Cut the ice 0.3 m from the barge hull along the entire length of the barge. When the source of the leak has been found, transfer the remaining diesel in the leaking tank to a secure tank. Initiate an event report, including details of spilled product, spill size, location, status and injuries. Report any releases to the NWT 24-hour spill reporting line. To recover spilled diesel trapped under the ice, follow the response steps outlined in the Spills Under Ice procedure.

Spill Control Point Descriptions

Control points are pre-identified locations on watercourses that allow for the staging and deployment of oil spill containment and recovery equipment in response to oil spills that have occurred upstream of the control point. Control point selection is critical to an effective oil spill response and part of your risk assessment and development of site-specific emergency response plan information.

Husky may decide to provide additional Husky control points in the site-specific sections of this Emergency Response Plan.

An ideal control point should have:

- quick access to the watercourse in all seasons, using clear ground, a road or a trail
- adequate work space to conduct operations and to store required equipment with minimal need for clearing of brush and vegetation
- sufficient space to deploy containment and recovery equipment quickly with minimal effort or obstructions (i.e. trees, rocks, steep banks, etc.) and minimal environmental impact
- boat launch location(s) for boats assisting in containment and recovery operations.

Selection of control points with public access is preferred.

Disposal and Remedial Operations

The proper disposal of contaminated materials as well as site remediation options is outside the scope of this Emergency Response Plan. Site restoration will be determined by consultation among the Incident Commander, Husky Environmental staff, environmental protection agency personnel and any external environmental consultants that are contracted by the company.

Procedure for Reporting Spills

An immediately reportable spill is defined as: “release of a substance that is likely to be an imminent environmental or human health hazard”. (Refer to Appendix A for classifications of immediately reportable spills). These spills must be reported to the NWT 24-hour spill reporting line immediately after being discovered.

For reportable spills, Husky’s on-site representative needs ensure that the external notification and reports are made to the National Energy Board and Government of NWT Department of Environment and Natural Resources. (See Appendix B - NT-NU Spill Report form and refer to instructions on back).

In addition, all releases of harmful substances, regardless of quantity, are immediately reportable to the NWT spill line and National Energy Board, where the release is near or in a waterbody; is near or in a designated sensitive environment or sensitive wildlife habitat; poses an imminent threat to human health or safety; poses an imminent threat to a listed species at risk or its critical habitat and is uncontrollable.

If a high-traffic work area starts to show signs of contamination as a result of frequent minor spills from equipment operating at a site, timely cleanup will be performed regularly to the satisfaction of Husky’s on-site representative.

Preventive measures include: removing leaky equipment from the site, using drip trays, using belly tarps, maintaining an internal log of spills from each piece of equipment, using the internal log to identify equipment needing repair.

If Husky’s on-site representative determines that an area has become contaminated enough to potentially cause damage to the environment, the spill will be reported immediately to the 24-hour spill reporting line. The affected area will also be cleaned up immediately.

Hazardous Waste Management

Hazardous waste must be stored in a safe and secure manner. In general, hazardous waste should be stored according to the following:

- Hazardous waste is to be stored in a secure area with controlled access. Only persons authorized to enter and trained in waste handling procedures should have access to the storage site.
- Drainage into and from the site is controlled to prevent spills or leaks from leaving the site and to prevent run off from entering the site.
- Incompatible wastes are segregated by chemical compatibility to ensure safety of the public, workers and facility.
- Regular Inspections are performed and recorded. Containers are placed so that each container can be inspected for signs of leaks or deterioration. Leaking or deteriorated containers should be removed and their contents transferred to a sound container.
- Maintain a record of the type and amount of waste in storage.
- Storage sites have emergency response equipment appropriate for the hazardous waste stored on site.
- Storage sites are expected to meet all local bylaw and zoning requirements.

Waste management is intended to reduce or eliminate the effects of waste on the environment, to provide for public and worker safety and to maximize the efficient use of resources. Once hazardous waste has been created the proper treatment and disposal can be expensive. While it is the responsibility of the waste generator to pay for all disposal costs, various waste management options are available to reduce the cost and volume of waste requiring treatment. A more effective and proactive management practice is to eliminate or reduce the generation of the waste. This is referred to as pollution prevention. Minimizing or avoiding the creation of pollutants and waste can be more effective in protecting the environment than treating them, or cleaning them up after they have been created.

It is not acceptable for hazardous waste to be abandoned, poured down sewers, dumped on land or discarded at a landfill.

Treating hazardous waste to reduce or eliminate their hazard is the final option after implementing appropriate pollution prevention options. It is the responsibility of the generator to treat or dispose of their hazardous waste properly. Although a discussion of treatment and disposal methods is beyond the scope of this guideline, the following are general points for consideration:

- The generator is required to determine and follow the proper management method for their waste. Sources of assistance include:
 - the manufacturer's Material Safety Data Sheet (MSDS) provided with the raw materials
 - the manufacturer
 - complying with this guideline and other relevant legislation
 - waste management consultants and associations
- Open burning of hazardous waste is not acceptable.
- Different types of hazardous wastes should not be mixed together in the same container. It is important to control the quality of any waste to ensure it can be recycled or disposed of properly. Contaminating wastes with other wastes may prevent reuse/recycling options and increase disposal costs.
- Hazardous waste containers must be properly managed. Containers should be emptied, to the greatest extent possible, using regular handling procedures, or by triple rinsing with an appropriate cleaning agent. They should be rendered unusable by puncturing or crushing prior to disposal. This is especially of concern for containers which could eventually be used for water or food storage.

Classification of Dangerous Goods

The shipper (consignor) is responsible for classifying all dangerous goods that are shipped. Goods classified by the manufacturer should be verified by the shipper. Where the composition of the products has been changed (e.g., mixtures of hazardous waste), the products may need to be reclassified. The carrier is responsible to ensure that the documentation matches the package. All vehicles transporting dangerous goods into, or out of the site should have proper placarding on vehicles. Containers should also be labelled according to the requirements laid out by the TDG Act and Regulations. The shipper (consignor) is responsible for completing the shipping document. The carrier shall ensure that the documents match the package. Persons ordering and receiving dangerous goods shall ensure that shipping documents are sent by the suppliers where required by the TDG Act and Regulations and shall refuse shipments if not in compliance. Documents must be retained for at least two years.

A person that handles, offers for transport or transports dangerous goods must be adequately trained and have a training certificate or work under the direct supervision of an adequately trained person. Within each area or department that ships or receives dangerous goods, management shall identify individuals who require transportation of dangerous goods training. Retraining is required every three years. A training certificate must be requested for inspection.

Training Program

Husky is committed to ensure all personnel involved in an emergency response fully understand their roles and the roles of others with whom they may interact during an incident. To meet this commitment and to ensure personnel respond effectively, training activities will include:

Orientation

- Provide employees and contractor management with an orientation to Husky's Emergency Response Plan and its applicable elements.
- Discuss and clarify bridging between contractors' emergency response procedures and this Husky ERP where applicable.
- Utilize summary wall charts outlining key responsibilities and lines of communication for quick reference purposes.
- Devote a portion of scheduled safety and/or staff meetings to the discussion of emergency response issues on an on-going basis.

Specialized Emergency Response Training

- Make available (through the Husky Safety Advisor) all required training.
- Ensure employees and contractor personnel comply with Husky's safety training requirements (e.g. First Aid/CPR, WHMIS, Transportation of Dangerous Goods, firefighting, etc).

Emergency Drills

- Employees and contractors should conduct drills on an on-going basis to ensure readiness, including, but not restricted to:
 - fire fighting
 - spill response
 - first aid
 - confined space entry
 - man down

External Orientation

- As appropriate, brief and familiarize all external groups or agencies having a role in this Emergency Response Plan with the overall plan and their specific responsibilities under the plan.



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Appendix



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Spill Report Form



Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130

FAX: (867) 873-6924

EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH - DAY - YEAR	REPORT TIME	<input type="checkbox"/> ORIGINAL SPILL REPORT, OR		REPORT NUMBER
	B	OCCURRENCE DATE: MONTH - DAY - YEAR	OCCURRENCE TIME	<input type="checkbox"/> UPDATE # TO THE ORIGINAL SPILL REPORT	
C	LAND USE PERMIT NUMBER (IF APPLICABLE)		WATER LICENCE NUMBER (IF APPLICABLE)		
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM THE NAMED LOCATION			REGION <input type="checkbox"/> NWT <input type="checkbox"/> NUNAVUT <input type="checkbox"/> ADJACENT JURISDICTION OR	
E	LATITUDE DEGREES MINUTES SECONDS		LONGITUDE DEGREES MINUTES SECONDS		
F	RESPONSIBLE PARTY OR VESSEL NAME		RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION		
G	ANY CONTRACTOR INVOLVED		CONTRACTOR ADDRESS OR OFFICE LOCATION		
H	PRODUCT SPILLED		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER	
I	SPILL SOURCE		SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES	
J	FACTORS AFFECTING SPILL OR RECOVERY		DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR EQUIPMENT	
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS				
L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE
REPORT LINE USE ONLY					
N	RECEIVED AT SPILL LINE BY	POSITION Station operator	EMPLOYER	LOCATION CALLED Yellowknife, NT	REPORT LINE NUMBER (867) 920-8130
LEAD AGENCY <input type="checkbox"/> EC <input type="checkbox"/> CCG <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> ILA <input type="checkbox"/> AANDC <input type="checkbox"/> NEB <input type="checkbox"/> TC			SIGNIFICANCE <input type="checkbox"/> MINOR <input type="checkbox"/> MAJOR <input type="checkbox"/> UNKNOWN		FILE STATUS <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSED
AGENCY	CONTACT NAME	CONTACT TIME	REMARKS		
LEAD AGENCY					
FIRST SUPPORT AGENCY					
SECOND SUPPORT AGENCY					
THIRD SUPPORT AGENCY					

Instructions for Completing the NT-NU Spill Report Form

This form can be filled out electronically and faxed to the spill line at 867-873-6924. Commencing on January 2, 2007, the form can also be e-mailed as an attachment to spills@gov.nt.ca. Until further notice, please verify receipt of e-mail transmissions with a follow-up telephone call. Spills can still be phoned in by calling collect at 867-920-8130.

A. Report Date/Time	The actual date and time that the spill was reported to the spill line. If the spill is phoned in, the Spill Line will fill this out. Please do not fill in the Report Number: the spill line will assign a number after the spill is reported.
B. Occurrence Date/Time	Indicate, to the best of your knowledge, the exact date and time that the spill occurred. Not to be confused with the report date and time (see above).
C. Land Use Permit Number /Water Licence Number	This only needs to be filled in if the activity has been licenced by the Nunavut Water Board and/or if a Land Use Permit has been issued. Applies primarily to mines and mineral exploration sites.
D. Geographic Place Name	In most cases, this will be the name of the city or town in which the spill occurred. For remote locations – outside of human habitations – identify the most prominent geographic feature, such as a lake or mountain and/or the distance and direction from the nearest population center. You must include the geographic coordinates (Refer to Section E).
E. Geographic Coordinates	This only needs to be filled out if the spill occurred outside of an established community such as a mine site. Please note that the location should be stated in degrees, minutes and seconds of Latitude and Longitude.
F. Responsible Party Or Vessel Name	This is the person who was in management/control/ownership of the substance at the time that it was spilled. In the case of a spill from a ship/vessel, include the name of the ship/vessel. Please include full address, telephone number and e-mail. Use box K if there is insufficient space. Please note that, the owner of the spilled substance is ultimately responsible for any spills of that substance, regardless of who may have actually caused the spill.
G. Contractor involved?	Were there any other parties/contractors involved? An example would be a construction company who is undertaking work on behalf of the owner of the spilled substance and who may have contributed to, or directly caused the spill and/or is responding to the spill.
H. Product Spilled	Identify the product spilled; most commonly, it is gasoline, diesel fuel or sewage. For other substances, avoid trade names. Wherever possible, use the chemical name of the substance and further, identify the product using the four digit UN number (eg: UN1203 for gasoline; UN1202 for diesel fuel; UN1863 for Jet A & B)
I. Spill Source	Identify the source of the spill: truck, ship, home heating fuel tank and, if known, the cause (eg: fuel tank overflow, leaking tank; ship ran aground; traffic accident, vandalism, storm, etc.). Provide an estimate of the extent of the contaminated/impacted area (eg: 10 m ²)
J. Factors Affecting Spill	Any factors which might make it difficult to clean up the spill: rough terrain, bad weather, remote location, lack of equipment. Do you require advice and/or assistance with the cleanup operation? Identify any hazards to persons, property or equipment; for example, a gasoline spill beside a daycare centre would pose a safety hazard to children. Use box K if there is insufficient space.
K. Additional Information	Provide any additional, pertinent details about the spill, such as any peculiar/unique hazards associated with the spilled material. State what action is being taken towards cleaning up the spill; disposal of spilled material; notification of affected parties. If necessary, append additional sheets to the spill report. Number the pages in the same format found in the lower right hand corner of the spill forms: eg. "Page 1 of 2", "Page 2 of 2" etc. Please number the pages to ensure that recipients can be certain that they received all pertinent documents. If only the spill report form was filled out, number the form as "Page 1 of 1".
L. Reported to Spill Line by	Include your full name, employer, contact number and the location from which you are reporting the spill. Use box K if there is insufficient space.
M. Alternate Contact	Identify any alternate contacts. This information assists regulatory agencies to obtain additional information if they cannot reach the individual who reported the spill.
N. Report Line Use Only	Leave Blank. This box is for the Spill Line's use only.

Immediately Reportable Spill Quantities

TDG Class	Substance for NWT 24 Hour Spill Line	Immediately Reportable Quantities
1 2.3 2.4 6.2 7 None	Explosives Compressed gas (toxic) Compressed gas (corrosive) Infectious substances Radioactive Unknown substance	Any amount
2.1 2.2	Compressed gas (flammable) Compressed gas (non-corrosive, non-flammable)	Any amount of gas from containers with a capacity greater than 100 L
3.1 3.2 3.3	Flammable liquids	> 100 L
4.1 4.2 4.3	Flammable solids Spontaneously combustible solids Water reactant	> 25 kg
5.1 9.1	Oxidizing substances Miscellaneous products or substances excluding PCB mixtures	> 50 L or 50 kg
5.2 9.2	Organic peroxides Environmentally hazardous	> 1 L or 1 kg
6.1 8 9.3	Poisonous substances Corrosive substances Dangerous wastes	> 5 L or 5 kg
9.1	PCB mixtures of 5 or more ppm	> 0.5 L or 0.5 kg
None	Other contaminants (e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, waste water, etc.)	> 100 L or 100 kg
None	Sour natural gas (i.e. contains H ₂ S) Sweet natural gas	Uncontrolled release or sustained flow of 10 minutes or more

In addition, all releases of harmful substances, regardless of quantity, are to be reported to the NWT spill line if the release is near or into a water body, is near or into a designated sensitive environment or sensitive wildlife habitat, poses imminent threat to human health or safety, poses imminent threat to a listed species at risk or its critical habitat, or is uncontrollable.



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Material Safety Data Sheets (MSDS)

MSDS will be provided by the product supplier and made available on-site for reference.



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Ward Chemicals - Heavy Brine Plus - MSDS W1 32.txt
WARD CHEMICAL INC. CALCIUM CHLORIDE SOLUTION
MATERIAL SAFETY DATA SHEET
Trade Name: Grade W 1.32 CALCIUM CHLORIDE Brine

=====
General Information
=====

Company's Name: WARD CHEMICAL INC.
Company's Street: 9915-65 Ave.
Company's City: EDMONTON
Company's Province: Alberta
Company's Country: Canada
Company's Postal Code: T6E 0L1
Company's Emerg Ph #: 780-940-1133
Company's Info Ph #: 780-436-4832
Date MSDS Prepared: 04MAR98
Safety Data Review Date: 15JUL2011

=====
Ingredients/Identify Information
=====

Ingredient: CALCIUM CHLORIDE
Percent: 27-28
NIOSH (RTECS) Number: EV9800000
CAS Number: 10043-52-4
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE
Other Recommended Limit: 10 MG/M3 (MFR)

Ingredient: Magnesium Chloride
Percent: 4%
NIOSH (RTECS) Number: TS8050000
CAS Number: 7447-40-7
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Ingredients: Sodium Chloride/ Potassium Chloride
Percent: 3-4
NIOSH (RTECS) Number: VZ4725000
CAS Number: 7647-14-5
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

Ingredient: WATER
Percent: 64-66
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: NOT APPLICABLE
ACGIH TLV: NOT APPLICABLE

=====
Physical/Chemical Characteristics
=====

Appearance And Odor: CLEAR TO STRAW LIQUID SOLUTION
Boiling Point: 230F, 160C
Vapor Pressure (MM Hg/70 F): SAME/H2*0
Vapor Density (Air=1): 7-15@25C
Specific Gravity: 1.32(20 C)
Solubility In Water: COMPLETELY MISCI BLE

=====
Fire and Explosion Hazard Data
=====

Flash Point: NOT APPLICABLE
Lower Explosive Limit: N/A
Upper Explosive Limit: N/A
Extinguishing Media: NON-COMBUSTIBLE

Ward Chemicals - Heavy Brine Plus - MSDS W1 32.txt
Special Fire Fighting Proc: WEAR NIOSH/MSHA APPROVED POSITIVE PRESSURE SCBA.

Unusual Fire And Expl Hazrds: NONE SPECIFIED BY MANUFACTURER.

=====
Reactivity Data
=====

Stability: YES

Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.

Materials To Avoid: METALS WILL SLOWLY CORR IN AQU SOLN. ALUMINUM(AND ITS ALLOYS) AND YELLOW BRASS WILL BE ATTACKED BY CALCIUM CHLORIDE.

Hazardous Decomp Products: NOT APPLICABLE

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

=====
Health Hazard Data
=====

LD50-LC50 Mixture: ORAL(RAT)900-2100MG/KG 100% CACL

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: NO

Route Of Entry - Ingestion: NO

Health Haz Acute And Chronic: EYE:MOD/SEVERE EYE IRRIT W/CORNEAL INJURY MAY BE SLOW TO HEAL AT HIGH TEMPS, MATERIAL HAS MORE INTENSE EFTS AND THERMAL BURNS POSSIBLE. SKIN:RPTD EXPOSURE MAY CAUSE SKIN IRRIT, EVEN BURNS.MORE SEVERE RESPONSE IF CONFINED TO SKIN OR SKIN IS SCRATCHED/CUT. INGEST: MAY CAUSE GI IRRIT OR ULCERATION. (SEE EFTS OF OVEREXP)

Carcinogenicity - NTP: NO

Carcinogenicity - IARC: NO

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: NOT RELEVANT

Signs/Symptoms Of Overexp: HEALTH HAZARDS: INHAL: MISTS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT.

Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.

Emergency/First Aid Proc: EYES:IRRIGATE W/FLOWING WATER IMMED. AND CONT FOR 15 MIN. CONSULT MD. SKIN:WASH OFF IN FLOWING WATER OR SHOWER.

INGEST: INDUCE VOMIT IMMED, BY GIVING 2 GLASSES OF WATER AND STICKING FINGER DOWN THROAT. CALL MD. INHAL: REMOVE TO FRESH AIR. CONSULT MD. NOTE TO MD: IF BURN IS PRESENT, TREAT AS ANY THERMAL BURN. AFTER DECONTAM. NO SPECIFIC ANTIDOTE. SUPPORTIVE CARE. TREATMENT BASED ON JUDMENT (SUPP DATA)

=====
Precautions for Safe Handling and Use
=====

Steps If Matl Released/Spill: FLUSH AREA W/PLENTY OF WATER. WALKING SURFACES MAY REMAIN WET LONGER DUE TO MOISTURE BEING HELD BY SPILLED MATERIAL.

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Method: WASH AWAY WITH LARGE EXCESS OF WATER. KEEP OUT OF DRINKING WATER SOURCES. COMPLY WITH LOCAL, STATE, AND FEDERAL REGULATIONS

Precautions-Handling/Storing: MAY SOMETIMES BE SHIPPED HOT, WHICH MAY CAUSE THERMAL BURNS & INTENSE CHEM IRRIT OR BURN. AVOID EYE & PROLONGED SKIN CONTACT.

Other Precautions: ALWAYS USE COOL WATER (TEMP <80F) WHEN DILUTING CALCIUM CHLORIDE SOLUTION. HEAT DEVELOPED BY SOLUTIONS IS VERY HIGH DURING MIXING. LEATHER CLOTHING & SHOES WILL BE DAMAGED BY CALCIUM CHLORIDE.

=====
Control Measures
=====

Respiratory Protection: CONSULT LOCAL/SAFETY HEALTH AUTHORITIES IF ADDITIONAL GUIDANCE IS NECESSARY. THERE IS NO OSHA PEL OR ACGIH TLV FOR CALCIUM CHLORIDE.

Ventilation: GENERAL AND/OR LOCAL EXHAUST TO CONTROL AIRBORNE LEVELS BELOW EXPOSURE GUIDELINES.

Protective Gloves: IMPERVIOUS GLOVES AS REQUIRED (FP N).

Eye Protection: CHEM GOGGLES/EYE WASH FOUNT IN IMMED AREA

Ward Chemicals - Heavy Brine Plus - MSDS W1 32.txt

Other Protective Equipment: USE PROTECTIVE CLOTHING IMPERVIUOUS TO THIS MATERIAL, GLOVES, BOOTS, APRON OR FULL-BODY SUIT WILL DEPEND ON OPERATION.
Work Hygienic Practices: IF SKIN COMES IN CONTACT W/CONTAIN CLOTHING REMOVE COTHING IMMED, WASH SKIN AREA W/SOAP & WATER, LAUNDER CLOTHING.
Suppl. Safety & Health Data: FIRST AID PROC: NOTE TO PHYSICIAN: SUPPORTIVE CARE. TREATMENT BASED ON JUDGMENT OF THE PHYSICIAN IN RESPONSE TO REACTIONS OF THE PATIENT.

=====
Transportati on Data
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DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Prop. Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
Additional Trans Data: NOT REGULATED FOR TRANSPORTATION

=====
Di sposal Data
=====

Di sposal mustcomply wi th l ocal envi ronmental regul ati ons.
=====

=====
Label Data
=====

Label Required: NO
Technical Review Date: 15JUL2011
Common Name: CALCIUM CHLORIDE BRINE SOLUTION
Acute Health Hazard-Slight: X
Contact Hazard-Severe: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: AVOID EYE AND PROLONGED SKIN CONTACT. CAUSES SKIN BURNS. DO NOT GET ON SKIN AND CLOTHING. AVOID BREATHING MIST. KEEP CONTIANER CLOSED. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. MAY CAUSE RESPIRATORY TRACT IRRITATION. DO NOT INGEST. MAY CAUSE IRRITATION/ULERATION. CHRONIC: HAZARDS NOT DETERMINED.
Protect Eye: Y
Protect Skin: Y
=====



MATERIAL SAFETY DATA SHEET

I. PRODUCT INFORMATION AND USE

TRADE NAME	SF-800™	Supplier's Name and Address: SynOil Energy Services Suite 2000, 300- 5 th Avenue SW Calgary, Alberta T2P 3C4 Ph (403) 261-2713
Synonyms:	Product: Naphtha, mid run distillate	24hr Emergency # 613-996-6666
Product Use:	A hydrocarbon liquid to be gelled for hydraulic fracturing	
TDG:	Shipping Name – Petroleum Distillates, N.O.S. , Class 3, P.I.N. – UN 1268 Packing Group - III	

WHMIS Classification: B2, D2B

Version 03-01-2011

II. HAZARDOUS INGREDIENTS

Hazardous Ingredients	CAS #	%	Alberta OEL 8 hr.
SynFrac™-800		100	Not established N/E
Made up of a complex mixture of petroleum hydrocarbons (C ₇ -C ₁₆) which include the following:		<u>Approx.</u>	
Alkanes	N/E	78.1	N/E
Olefins	N/E	0.7	N/E
Naphthenes	N/E	0.0	N/E
Aromatics	N/E	21.2	N/E
Ethyl Benzene	100-41-4	0.52	100 ppm
Total Xylenes	1330-20-7 95-47-6 108-38-3 106-42-3	0.24	100 ppm
Toluene		0.09	
Benzene		<0.02	

III. HEALTH HAZARD INFORMATION

ROUTE OF ENTRY	<p>Ingestion: Yes</p> <p>Inhalation: Yes</p> <p>Skin Yes</p> <p>Contact:</p> <p>Eye Contact: Yes</p> <p style="text-align: center;">Skin Absorption: Yes</p> <p>Inhalation: <u>Acute:</u> May cause irritation of the respiratory tract, dizziness, burning sensation in the chest, headache, nausea and drowsiness; and may cause other central nervous system effects.</p> <p>Eye: May cause eye irritation but will not injure eye tissue.</p> <p>Skin: <u>Acute:</u> Removes skin oils which may lead to drying and irritation. Can be absorbed through the skin in toxic amounts resulting in vomiting, diarrhea, pneumonia and kidney failure.</p> <p>Ingestion: <u>Chronic:</u> May cause inflammation of the skin, vesicles may appear which weep and form crusts. Reported cases of anaemia resulting from destruction of bone marrow cells and death following chronic skin application in animals. May cause burning sensation in mouth, throat and stomach; vomiting and diarrhea, drowsiness. If SynFrac™-800 is aspirated into the lungs, severe lung damage or death may result.</p> <p>Teratogenic: Insufficient data.</p> <p>Carcinogenic: Skin painting tests indicate that materials of similar composition have produced skin cancer in experimental animals. The relationship of these results to humans has not been fully established.</p> <p>Mutagenic: Insufficient data.</p> <p>Sensitizer: No data.</p> <p>Reproductive Toxin: Insufficient data.</p> <p>Synergistic Products: Unknown, but the possibility of synergistic or additive toxic effects of the components should not be overlooked.</p>
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IV. EMERGENCY AND FIRST AID PROCEDURES

Inhalation:	Remove victim to fresh air, apply artificial respiration and CPR if needed. Immediately contact physician.
Eye Contact:	Flush with water for a minimum of 15 minutes. Hold eyelids open to ensure effective cleansing. Contact physician.
Skin Contact:	Remove contaminated clothing. Flush area with water and soap for at least 20 minutes. Contact physician.
Ingestion:	Contact physician. Do not induce vomiting. If vomiting occurs have victim lean forward to reduce risk of aspiration.

Special Procedures: Consult physician and/or Poison Control Centre for all exposures except minor instances of inhalation or skin contact.

V. PROTECTIVE MEASURES

Respiratory Protection: Depends on airborne concentration; should all be NIOSH approved, half-face or full face organic vapor cartridge respirator or self-contained breathing apparatus.

Protective Equipment / Clothing: Neoprene or nitrile gloves should be worn if contact likely. Long sleeved clothing should be worn to minimize skin contact. A neoprene or nitrile rain suit may be needed in certain situations (ie: tank cleaning).

Eye Protection: Monogoggles and/or full face shield if splashing is likely.

Engineering Controls: Adequate ventilation to ensure that atmospheric concentrations do not exceed the Occupational Exposure Limits.

VI. LEAK AND SPILL PROCEDURE

Leak and Spill Procedure: Use full protective equipment. Eliminate ignition sources. Contain spill with inert absorbent (dry clay, sand). **DO NOT** use combustible material such as sawdust. Place used absorbent in closed metal container.

Waste Disposal: Comply with Provincial and Federal regulations.

Storage: Small quantities should be stored in an approved safety solvent container which is stored in a fire-resistant grounded cabinet vented to the atmosphere. Storage tanks should be electrically grounded and vented to the atmosphere. A containment dike should be build around tank.

Special Shipping Instructions: None known.

TDG Classification: PETROLEUM PRODUCTS, N.O.S., UN 1268, Class 3, Packing Group III.

VII. PHYSICAL DATA

Physical State:	Liquid, clear amber	Odour and Appearance:	Clear liquid with hydrocarbon odour.
Specific Gravity:	0.8	Vapour Pressure(RVP) :	<1.0 kpa @ 37.8°C
Vapour Density (Air = 1):	4.5.	pH:	N.A.
Odour Threshold:	0.552 mg/m3	Evaporation Rate:	1.7 (Butyl Acetate = 1)
Coefficient of Water /	<1	Density:	0.812

Oil Distribution:		Boiling Point(°C):	N.A.
Water Solubility:	Negligible	Freezing Point (°C)	-48°C
Viscosity	1.766 cSt at 20oC 1.259 cSt at 40oC 0.9785 cSt at 60oC		

VIII. FIRE AND EXPLOSION DATA

Flammable:	Yes	Lower Explosive Limit (% by Volume):	0.7
Flash Point (°C and method):	40°C (TCC)	Upper Explosive Limit (% by Volume):	5.0
Auto Ignition Temp. (°C):	210oC.		
Hazardous Combustion Products:	Carbon monoxide, carbon dioxide, nitrogen oxides and other toxic gases.		
Extinguishing Media:	Wear self-contained breathing apparatus and full protective equipment. Carbon dioxide, dry chemical, F-500 and foam.		
Unusual Fire / Explosion Hazards:	Do not extinguish with water unless flow can be stopped. The use of water may spread fire. Do not use water jet. Do not cut, drill or weld empty containers.		
Sensitivity to Impact:	Not known	Sensitivity to Static Discharge:	Yes

IX. REACTIVITY DATA

Chemical Stability:	Normally stable.
Incompatibility:	Strong oxidizing agent.
Hazardous Decomposition Products:	Carbon monoxide, carbon dioxide, nitrogen oxides and other toxic gases.

Conditions to Avoid: Excessive heat, static discharge and oxidizing agents.

Hazardous Polymerization: Will not occur.

X. PREPARATION DATA

Prepared by: SynOil Energy Services **Date:** 03-01-2011

Telephone #: (403) 261-2713

- References:**
- KeySpan., MSDS For Frac Oil, 2001.
 - SynOil Fluids Inc MSDS for FracMax, 2002.
 - Canadian Centre for Occupational Health and Safety Cheminfo database for, Ethylbenzene and Xylene.
 - Canadian Centre for Occupational Health and Safety RTECS database.
 - Workers' Compensation Board of British Columbia, WHMIS Core Material - A Resource Manual for the Application and Implementation of WHMIS, 1988.
 - Dangerous Goods Guide to Initial Emergency Response (1986) Canutec.
 - Dangerous Properties of Industrial Materials, Fifth Edition.
 - Core Laboratories Canada, Ltd., Crude Assay for SynOil Fluids 2003.
 - Core laboratory and Maxxam laboratory analysis 1999.

DISCLAIMER ... The information presented in this Material Safety Data Sheet is based on tests, research and reports from the above-mentioned sources, which are believed to be accurate and reliable. The data and information are presented without warranty, guarantee or liability on the part of SynOil Energy Services. Warning. SF-800™ is not suitable for use in internal combustion engines.

WHMIS Classification based on: Combustible Liquid – B2
Carcinogenic tests - Experimental Results - D2A
Skin Irritation - D2B

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name	SCA-Oil (Shale Clean-up Acid for Oil Wells)	Code
Supplier	Trican Well Service Ltd. 2900, 645 – 7 th Ave S.W. Calgary, Alberta, T2P 4G8 For Product Information/MSDS Call: 403-266-0202 or 403-723-3688 (8:00 AM – 5:00 PM MST, Monday – Friday)	Revision Date
Product Uses	Acid Stimulation Blend	Supersedes Date New issue
24 Hour Emergency Numbers	CANUTEC 613-996-6666 (Canada 24 hours)	Original Creation April 29, 2010
WHMIS (Pictograms)		WHMIS (Classification) D1A Very Toxic material causing immediate & serious toxic effects D2A Very Toxic material causing other toxic effects E Corrosive Material

SECTION 2. HAZARDS IDENTIFICATION

Hazard Summary	CORROSIVE. Causes severe burns to eyes, skin and respiratory tract. Harmful by all routes of exposure. Avoid breathing vapours or mists. In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Immediately remove all contaminated clothing and flush thoroughly with plenty of water. Wear suitable protective clothing, gloves and eye/face protection. Provide safety shower and eyewash in immediate work area.
Routes of Exposure	Eyes, skin, inhalation and ingestion.
Potential Acute Health Effects	<p>Eyes Contact Direct liquid contact with eyes may cause severe eye irritation or burns to eyes. Vapours or mists may cause eye irritation.</p> <p>Skin Contact/Absorption Direct liquid contact with skin may cause severe skin irritation or burns to skin. Vapours or mists may cause skin irritation.</p> <p>Inhalation Direct liquid contact with nose, mouth or throat may cause severe irritation or burns to tissue. Vapours or mists may cause irritation of upper respiratory tract. May cause fluid accumulation in lungs (pulmonary edema).</p> <p>Ingestion Direct liquid contact with mouth or throat may cause severe irritation or burns to tissue. Ingestion may cause gastrointestinal irritation or ulceration.</p>
Medical Conditions Aggravated by Exposure	Not available
<i>See also Toxicological Information (Section 11)</i>	
Additional Remarks	Not available

SECTION 3. COMPOSITION AND INFORMATION ON INGREDIENTS

Name	CAS #	% (wt)
Hydrochloric acid	7647-01-0	5 - 10
Acetic acid	64-19-7	5 - 10
Sodium nitrilo-triacetate	18662-53-8	0.1 - 1

SECTION 4. FIRST AID MEASURES

Eye Contact	Immediately flush eyes with plenty of water for at least 15 minutes while holding eyelids open. Seek medical attention immediately after flushing.
Skin Contact	Flush with water for at least 15 minutes. For large splash, flood body under a shower. Remove contaminated clothing immediately and launder before reuse. If symptoms develop or persist, seek medical attention.
Inhalation	Remove person to fresh air. If not breathing, provide artificial respiration. If

	breathing is difficult or symptoms develop, seek prompt medical attention.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of material into lungs. Seek medical attention immediately.
Notes to Physician	Treat symptomatically.
Additional Remarks	Not available

SECTION 5. FIRE FIGHTING MEASURES

Conditions of Flammability	Not considered flammable but may release flammable vapours when heated to high temperatures (> 100°C).
Extinguishing Media	Use alcohol resistant foam, dry chemical, or carbon dioxide.
Protection of Firefighters	As in any fire, wear full fire fighting gear including NIOSH-approved positive pressure self-contained breathing apparatus.
Hazardous Combustion Products	Carbon monoxide, carbon dioxide and other toxic vapours.
Sensitivity to Mechanical Impact	Not expected
Sensitivity to Static Discharge	Not available
Additional Remarks	Use water spray to cool fire-exposed containers or structures. Use water spray to disperse vapours.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Eliminate all ignition sources. Isolate hazard area and restrict access. Try to work upwind of spill. Do not touch or walk through spilled material. Spilled material may be slippery. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
Environmental Precautions	Prevent substance from entering natural bodies of water and sewer systems. Spilled product may pose a risk to the aquatic ecosystem if released.
Clean Up Methods	SMALL SPILLS: Stop leak if without risk. Move containers from spill area. Absorb with an inert material. Place residues in a suitable, covered, properly labeled container. Dispose of via a licensed waste disposal contractor. LARGE SPILLS: Stop leak if without risk. Move containers from spill area. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Contain and collect spillage with noncombustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Contaminated absorbent material may pose the same hazard as the spilled product.
Additional Remarks	Waste must be disposed of in accordance with federal, provincial and local environmental control regulations.

SECTION 7. HANDLING AND STORAGE

Equipment	Locate safety shower and eyewash station in immediate use area.
Procedures	Wear appropriate personal protective equipment. Avoid contact with eyes, skin, and clothing. Avoid breathing vapours or spray mists. Use only with adequate ventilation. Maintain good personal hygiene. Do not smoke, eat or drink when handling this product. Wash thoroughly after handling product and before eating, drinking or smoking.
Storage Requirements	Store in a cool, well-ventilated area, away from incompatible materials. Keep container tightly closed when not in use.
Additional Remarks	Not available

SECTION 8. EXPOSURE CONTROL/PERSONAL PROTECTION

Exposure Guidelines / Limits	Not established for product.
Exposure Guideline / Limits for Components	
Hydrochloric acid	ACGIH TLV: Ceiling 2 ppm.
Acetic acid	ACGIH TLV: TWA 10 ppm ; STEL 15 ppm.
Please consult with local authorities for acceptable provincial exposure limits since values can vary from jurisdiction to jurisdiction.	
Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapours or mists below their respective threshold limit value. Ensure that eyewash stations and safety showers are near the work location.

Personal Protection

Personal Protective Equipment recommendations are based on anticipated known manufacturing and use conditions. These conditions are expected to result in only incidental exposure. A thorough review of the job tasks and conditions by a safety professional is recommended, however, to determine the level of person protective equipment appropriate for these job tasks and conditions.

Respirator	A respirator should be worn if there is potential for inhalation of vapour or mist. A NIOSH approved air-purifying mask equipped with organic vapour / acid gas cartridges with N95 prefilters is recommended. In poorly ventilated areas or emergency situations use a NIOSH/MSHA approved atmosphere-supplying respirator.
Hands	Butyl rubber or neoprene gloves.
Eyes	Chemical safety goggles and face shield.
Body	Wear long sleeves and pants of an impervious material to prevent skin contact. Acid-resistant apron or suit recommended.
Feet	Steed toed, chemical resistant boots.
Other	Emergency eyewash fountains and safety showers should be in the immediate vicinity of any potential exposure. Remove contaminated clothing and launder before reuse.

Protective Clothing (Pictograms)**Additional Remarks**

Not available

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State	Liquid
Odour and Appearance	Rotten sour odour; clear, light amber in colour
Odour Threshold	Not available
Specific Gravity	1.050 – 1.052 approx.
Flashpoint	>93.3°C
Upper Flammable Limit (% by volume)	Not available
Lower Flammable Limit (% by volume)	Not available
Autoignition Temperature	Not available
Vapour Density (air=1)	Not available
Vapour Pressure	Not available
Evaporation Rate	Not available
Boiling Point	Not available
Freezing Point	Not available
pH	<1
Viscosity	Not available
Solubility in Water	Completely soluble in water
Coefficient of Water/Oil	Not available
Additional Remarks	Not available

SECTION 10. STABILITY AND REACTIVITY DATA

Chemical Stability	Stable
Conditions of Instability	Not available
Incompatible Material	Bases, reducing agents and metals.
Conditions of Reactivity	May form toxic gases is contact with cyanides or sulfides. Flammable hydrogen gas may be released on contact with some metals. Contact with bases or reducing agents may generate extreme heat.
Hazardous Decomposition Products	At high temperatures, toxic and corrosive hydrogen chloride gases may be evolved.
Hazardous Polymerization	Will not occur
Additional Remarks	Not available

SECTION 11. TOXICOLOGICAL INFORMATION

Acute Toxicity	No data for product.
Acute Toxicity for Components	
Hydrochloric acid	Acute LD50 (rat, oral): 900 mg/kg

Acetic acid	Acute LC50 (rat, inhalation): 3124 ppm/1 hr Acute LD50 (rat, oral): 3310 mg/kg Acute LD50 (rabbit, dermal): 1060 mg/kg
Sodium nitrilo-triacetate	Acute LC50 (rat, inhalation): 11.4 mg/L/4hr Acute LD50 (rat, oral): 1100 mg/kg and 1450 mg/kg Acute LD50 (rabbit, dermal): >10 000 mg/kg
Effects of Acute Exposure	<i>See Hazards Identification (Section 2)</i>
Effects of Chronic Exposure	Hydrochloric acid: Chronic exposure may result in malaise, headache, sleeping disturbances and irritability. changes in pulmonary function, chronic bronchitis, dermatitis, decay and erosion of dental enamel, bleeding of nose and gums, nasal and oral mucosal ulceration, conjunctivitis, and overt upper respiratory tract abnormalities. Destructive to the mucous membranes and upper respiratory tract eyes and skin. May cause inflammation and edema of the larynx, bronchi and pulmonary tract. Repeated or prolonged exposure may cause erosion of the teeth. Acetic acid: Repeated or prolonged overexposure to acetic acid may cause injury to the eyes, or damage to the digestive tract, respiratory tract or skin.
Irritancy of Product	<i>See Hazards Identification (Section 2)</i>
Skin Sensitization	Not expected
Respiratory Sensitization	Not expected
Carcinogenicity	This product contains sodium nitrilo-triacetate which is listed as a substance that "may reasonably be anticipated to be" carcinogenic by the National Toxicological Program (NTP) and is classified as "possibly carcinogenic to humans" by the International Agency for Research on Cancer (IARC).
Reproductive Toxicity	Not expected
Teratogenicity	Not expected
Embryotoxicity	Not expected
Mutagenicity	Not expected
Synergistic Products/Effects	None expected
Additional Remarks	Not available

SECTION 12. ECOLOGICAL INFORMATION

Aquatic Toxicity	Not available for product.
Degradability	Not available
Bioaccumulation	Not available
Mobility	Not available
Additional Remarks	Do not allow product or run-off from fire control to enter storm or sanitary sewers, lakes, rivers, streams or public waterways. Block off drains and ditches. May be harmful to aquatic life.

SECTION 13. DISPOSAL CONSIDERATIONS

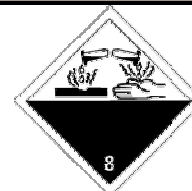
Responsibility for proper waste disposal rests with the generator of the waste. Dispose of any waste material in accordance with all applicable federal, provincial and local regulations.

Additional Remarks	Note that these regulations may also apply to empty containers, liners and rinsate. Processing, use, dilution or contamination of this product may cause its physical and chemical properties to change.
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SECTION 14. TRANSPORT INFORMATION

TDG Classification

CORROSIVE LIQUID, N.O.S.
(contains Hydrochloric acid, Acetic acid)
Class 8, UN1760, PG III



Marine Pollutant	Not available
Additional Transport Information	Not available
Emergency Response Guide	Guide 154

SECTION 15. REGULATORY INFORMATION**Canadian Regulations**

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

Environmental Regulations

DSL Inventory All components of this product are either on the Domestic Substances List (DSL), the Non-Domestic Substances List (NDSL) or exempt.

TSCA Inventory Status All components are included or are exempted from listing on the US Toxic Substances Control Act Inventory.

Other Regulatory Information No further regulatory information is available.

SECTION 16. OTHER INFORMATION

Other Special Considerations New Issue

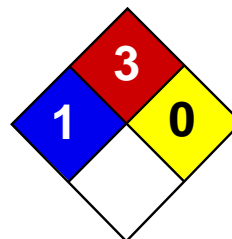
Trican Well Service Ltd. Disclaimer

NOTE: The information on this MSDS is based on data which is considered to be accurate. Trican Well Service Ltd., however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.

END OF MATERIAL SAFETY DATA



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Methyl alcohol MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl alcohol

Catalog Codes: SLM3064, SLM3952

CAS#: 67-56-1

RTECS: PC1400000

TSCA: TSCA 8(b) inventory: Methyl alcohol

CI#: Not applicable.

Synonym: Wood alcohol, Methanol; Methylol; Wood Spirit; Carbinol

Chemical Name: Methanol

Chemical Formula: CH₃OH

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl alcohol	67-56-1	100

Toxicological Data on Ingredients: Methyl alcohol: ORAL (LD50): Acute: 5628 mg/kg [Rat]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 64000 ppm 4 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (sensitizer). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to eyes. The substance may be toxic to blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 12°C (53.6°F). OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 6% UPPER: 36.5%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. **SMALL FIRE:** Use DRY chemical powder. **LARGE FIRE:** Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Explosive in the form of vapor when exposed to heat or flame. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition, it emits acrid smoke and irritating fumes. **CAUTION: MAY BURN WITH NEAR INVISIBLE FLAME**

Special Remarks on Explosion Hazards:

Forms an explosive mixture with air due to its low flash point. Explosive when mixed with Chloroform + sodium methoxide and diethyl zinc. It boils violently and explodes.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Poisonous liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, metals, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 200 from OSHA (PEL) [United States] TWA: 200 STEL: 250 (ppm) from ACGIH (TLV) [United States] [1999] STEL: 250 from NIOSH [United States] TWA: 200 STEL: 250 (ppm) from NIOSH SKIN TWA: 200 STEL: 250 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Alcohol like. Pungent when crude.

Taste: Not available.

Molecular Weight: 32.04 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 64.5°C (148.1°F)

Melting Point: -97.8°C (-144°F)

Critical Temperature: 240°C (464°F)

Specific Gravity: 0.7915 (Water = 1)

Vapor Pressure: 12.3 kPa (@ 20°C)

Vapor Density: 1.11 (Air = 1)

Volatility: Not available.

Odor Threshold: 100 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; $\log(\text{oil/water}) = -0.8$

Ionicity (in Water): Non-ionic.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizers. Violent reaction with alkyl aluminum salts, acetyl bromide, chloroform + sodium methoxide, chromic anhydride, cyanuric chloride, lead perchlorate, phosphorous trioxide, nitric acid. Exothermic reaction with sodium hydroxide + chloroform. Incompatible with beryllium dihydride, metals (potassium and magnesium), oxidants (barium perchlorate, bromine, sodium hypochlorite, chlorine, hydrogen peroxide), potassium tert-butoxide, carbon tetrachloride, alkali metals, metals (aluminum, potassium magnesium, zinc), and dichloromethane. Rapid autocatalytic dissolution of aluminum, magnesium or zinc in 9:1 methanol + carbon tetrachloride - sufficiently vigorous to be rated as potentially hazardous. May attack some plastics, rubber, and coatings.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 5628 mg/kg [Rat]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 64000 4 hours [Rat].

Chronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. Causes damage to the following organs: eyes. May cause damage to the following organs: blood, kidneys, liver, brain, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS), optic nerve.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

Passes through the placental barrier. May affect genetic material. May cause birth defects and adverse reproductive effects(paternal and maternal effects and fetotoxicity) based on animal studies.

Special Remarks on other Toxic Effects on Humans:

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 29400 mg/l 96 hours [Fathead Minnow].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation:

Methanol in water is rapidly biodegraded and volatilized. Aquatic hydrolysis, oxidation, photolysis, adsorption to sediment, and bioconcentration are not significant fate processes. The half-life of methanol in surfact water ranges from 24 hrs. to 168 hrs. Based on its vapor pressure, methanol exists almost entirely in the vapor phase in the ambient atmosphere. It is degraded by reaction with photochemically produced hydroxyl radicals and has an estimated half-life of 17.8 days. Methanol is physically removed from air by rain due to its solubility. Methanol can react with NO₂ in polluted to form methyl nitrate. The half-life of methanol in air ranges from 71 hrs. (3 days) to 713 hrs. (29.7 days) based on photooxidation half-life in air.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Methyl alcohol UNNA: 1230 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Methyl alcohol Illinois toxic substances disclosure to employee act: Methyl alcohol Illinois chemical safety act: Methyl alcohol New York release reporting list: Methyl alcohol Rhode Island RTK hazardous substances: Methyl alcohol Pennsylvania RTK: Methyl alcohol Minnesota: Methyl alcohol Massachusetts RTK: Methyl alcohol Massachusetts spill list: Methyl alcohol New Jersey: Methyl alcohol New Jersey spill list: Methyl alcohol Louisiana spill reporting: Methyl alcohol California Directors List of Hazardous Substances (8CCR 339): Methyl alcohol Tennessee Hazardous Right to Know : Methyl alcohol TSCA 8(b) inventory: Methyl alcohol SARA 313 toxic chemical notification and release reporting: Methyl alcohol CERCLA: Hazardous substances.: Methyl alcohol: 5000 lbs. (2268 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). Class D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable. R23/24/25- Toxic by inhalation, in contact with skin and if swallowed. R39- Danger of very serious irreversible effects. R39/23/24/25- Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed. S7- Keep container tightly closed. S16- Keep away from sources of ignition - No smoking. S36/37- Wear suitable protective clothing and gloves. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information**References:**

-SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. LOLI, HSDB, RTECS, HAZARDTEXT, REPROTOX databases

Other Special Considerations: Not available.

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