REPORT

Tuk Base Spill Contingency Plan

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1.0 INTRODUCTION AND PROJECT DETAILS

Golder Associates Ltd. (Golder) has prepared this Spill Contingency Plan (the Plan) on behalf of Imperial Oil Environmental & Property Solutions (Imperial) for the former Tuktoyaktuk Exploration Logistics Base Camp (Tuk Base or the Site). The purpose of this Plan is to describe the proper responses to several types of spills that may occur during the planned remediation of Tuk Base (the Project).

The Plan will be effective upon its approval and will be implemented at the beginning of the 2019 phase of the Project (i.e., at the end of June 2019). It includes the Spill Response Contact List for relevant organizations and agencies in the Northwest Territories (NT), and the reporting requirements in the event of a chemical, fuel, or waste spill. Paper copies of this Plan will be available on Site (through the Site Supervisor) and will be posted at several accessible locations. All personnel will have access to paper and digital copies of the Plan. Prior to commencement of the work, the Plan will be distributed to personnel from Imperial, Golder, E. Grubens Transport Ltd. (EGT) and their subcontractors. It will be discussed with the entire crew in daily Health and Safety meetings. Additional copies can be requested through Imperial (Tyler Horton, tyler.d.horton@esso.ca).

Project details are provided in the following sections. Additional details are provided in the Remediation Action Plan (RAP) and the Waste Management Plan, submitted to the Inuvialuit Water Board (IWB) in March and April 2019.

1.1 Site Location

The Site is located at 69°25'35''N latitude and 132°57'20''W longitude on the Beaufort Sea coast approximately 1.5 km southeast of the Hamlet of Tuktoyaktuk, NT (Figures 1and 2). The Site is located in the Inuvialuit Settlement Region (ISR), on a lease (ILA 8500107) held by Imperial from the Inuvialuit Land Administration (ILA).

1.2 Site Description

The Site covers a land area of approximately 54 hectares (133 acres) and is generally comprised of the former Tuk Base on the Upper Terrace, transitioning down to a Lower Terrace (created by infilling the low lying natural topography with dredged ocean sediments) and the surrounding natural tundra as shown on Figure 3.

The Site is bordered by tundra to the north and south, with the Mayogiak Inlet and Tuktoyaktuk Harbour bordering the Site to the east and west, respectively (Figure 3). The former Northern Transportation Company Limited (NTCL) tank farm/lease is also located to the north of the Imperial lease on Saviktok Point.

Tuk Base began operations in 1970 and operated as a staging and storage area for oil and gas exploration in the Arctic. In 1980, decommissioning of the Site began. Between 2001 and 2013 almost all major infrastructure on-site was decommissioned and removed (Advisian 2019). As of 2018, the only notable features remaining on-site include two historic landfills, a sewage lagoon, north and south docks, and concrete pads.

1.2.1 North and South Landfills

The South Landfill (estimated to contain 36,000 cubic metres [m³] of debris/soil) was the main historic disposal area for camp-generated debris, which included drums, domestic debris, rig mats, heavy tangled cables, and possible metal decking materials. The North Landfill (estimated to contain 2,000 m³ of debris/soil) was used as a historic construction camp dump and contains construction/demolition debris, and general camp debris.

1.2.2 Sewage Lagoon

The former camp sewage lagoon contains solid waste covered by approximately 2,000 m³ water.
1.2.3 Contaminated Soil

Contaminated soil areas that will need to be excavated include the north and south landfills, and multiple locations throughout the former operations area at the Upper Terrace as defined in the RAP (Advisian 2019). Each area will be excavated and where possible, soil will be treated on site and used as backfill to promote positive drainage. Alternatively, soil that cannot be treated will be disposed of off-site at an approved and licenced facility.

1.2.4 Hazardous Material

Based on the hazardous material survey completed by WorleyParsons (WorleyParsons 2012) most of the hazardous material associated with historic Tuk Base operations was located in the historical buildings on-site and has since been removed from Site. Similar to the materials encountered during the 2011 demolition program (WorleyParsons 2013), potential hazardous waste found within the landfills may include asbestos containing materials (ACMs), PCBs, items painted with PCB amended paint (PAP), items painted with lead-based paint, batteries and waste fuel/oil.

1.2.5 Barrels

As summarized in the RAP (Advisian 2019), previous investigations have identified buried barrels possibly containing product at the south landfill. The barrel contents were not classified during previous Environmental Site Assessments (ESAs) and will be identified and appropriately disposed of during the Project.

1.2.6 Equipment

Local construction equipment will be utilized to execute this Project. All machinery will be equipped with a first response spill kit readily available to the operator in the event of a glycol, fuel or hydraulic leak etc. Drip trays will be placed under all potential drip points on equipment at the end of the work shift or when equipment is parked for several hours. Drip trays and spill kits will be utilized during refueling. All stationary powered equipment including generators and pumps will also be placed in a drip tray.

1.3 Project Summary

The RAP was submitted to and approved by the ILA in October 2018. It was updated in March 2019 to conform with the NT Archaeological Site Regulations and will guide the following Project tasks:

- Surface debris (including the wood piles from the former wooden wharf) will be collected, removed, and disposed of off-site at an Imperial-approved, licenced disposal facility.
- Hazardous material encountered on-site will be removed, transported off-site and disposed of at an appropriate, licenced disposal facility.
- Soil impacted with light-end petroleum hydrocarbons (PHCs) will be treated onsite and used as backfill.
- Soil impacted with heavy-end PHCs will be treated onsite and/or disposed of off-site at an Imperial approved, licensed disposal facility.
- Soils impacted with metals or PCBs will be excavated and transported to an off-site Imperial approved, licensed facility.
- The sewage lagoon will be dewatered, backfilled and regraded.
- The North Dock will be utilized for the Project and then will either be repurposed (pending negotiations with the ILA) or demolished.
■ The South Dock will be demolished.
■ The concrete pads may be used as treatment cells for soil remediation, repurposed or used as backfill on-site.

2.0 POTENTIAL SPILLS AND THEIR ENVIRONMENTAL IMPACTS

2.1 Gasoline
Gasoline may be harmful to human health, wildlife and aquatic life. Gasoline is not readily biodegradable and has the potential to bioaccumulate in the environment. Runoff into water bodies will be avoided. Gasoline is highly flammable and quick to volatize.

There will be up to four full fuel drums (at 205 L each) at the Site. In a worst-case scenario, all tanks or drums were punctured or opened, and contents would overflow and seep through secondary containment into the surrounding terrestrial and aquatic environment. This would involve up to 820 L. Such an event could cause illness or death to aquatic life and could indirectly affect wildlife feeding from the land and water.

2.2 Diesel Fuel, Lube Oils and Grease
Diesel (and potentially large quantities of lube oils and grease) may be harmful to human health, wildlife and aquatic life. Like gasoline, diesel fuel is not readily biodegradable and has the potential to bioaccumulate in the environment. Runoff into bodies of water bodies will be avoided. Unlike gasoline, diesel burns slowly which reduces the risk to the environment during recovery because a burn can be easier contained.

There will be one 100,000 double hulled envirotank with diesel at the Site. In a worst-case scenario, the tank was punctured or opened, and contents seeped through and overflowed secondary containment into the surrounding soil and water bodies. This would involve up to 100,000 L of diesel. This scenario could cause illness or death to aquatic life and could indirectly affect wildlife feeding from the land and water.

2.3 Propane
Propane may be harmful to human health, wildlife and to the surrounding environment. Propane is extremely volatile and flammable and will impact to human health and the surrounding environment if leaks are not prevented, recognized or stopped.

There will be up to six 20 L tanks at the Site at any given time. In a worst-case scenario, all cylinders were punctured or failed, and contents leaked into the surrounding environment and ignited, possibly leading to an explosion. This would involve up to 120 L of propane. The site workers would be at immediate risk and serious environmental impacts could result from this scenario. Emergency response drills and daily safety meetings will address this scenario.

2.4 Sewage
Sewage may be harmful to wildlife and humans as it may cause illness. Sewage is biodegradable and will not bioaccumulate in the environment. Sewage will have a minimal effect on marine environment and aquatic life.

There is one 60,000 L sewage tank on the barge servicing the camp. It will be emptied regularly and replaced during that process with a 38,000 L tank.

In a worst-case scenario, sewage from the barge camp would enter the ocean. This would involve up to 60,000 L. This scenario would cause environmental impacts but not result in the endangerment of humans or aquatic life.
Water from the historic lagoon (to be removed and backfilled) will be tested to ensure it meets release criteria before dewatering. During dewatering, measures will be taken to ensure the release does not create soil erosion or enter any existing water body.

2.5 Hazardous Waste Management

There may be a variety of hazardous waste materials at Tuk Base. As outlined in the Waste Management Plan (submitted to the IWB in March 2019), hazardous waste will be stored in a safe and secure manner, including the following principles:

- Hazardous waste shall be stored and shipped in certified containers for the material type.
- Only properly trained individuals with current Transportation of Dangerous Good (TDG) certification will be collecting and preparing potential hazardous waste samples for shipment to third-party laboratories off-site, for analysis and classification.
- Hazardous waste will be stored in a secure area with controlled access. Only persons authorized to enter and trained in waste handling procedures will have access to the storage site.
- Drainage into and from the Site will be controlled to prevent spills or leaks from leaving the Site and to prevent runoff from entering the Site. Any surface water collected within excavations will be sampled to confirm it meets accepted release criteria before release to the environment. While dewatering an excavation measures will be taken to ensure the release does not create soil erosion or enter any existing water body. Volumes of released surface water will be tracked and reported in the seasonal execution summary report.
- 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 will be removed, and their contents transferred to a sound container for transportation and off-site disposal.
- Storage sites will use secondary containment and meet the regulatory requirements.

Disposal of all hazardous waste encountered will be off-site at a licensed disposal facility.

2.6 Classification of Dangerous Goods

The shipper (consignor) is responsible for classifying all dangerous goods that are shipped. Goods classified by the manufacturer will be verified by the contractor onsite. 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 will have proper placarding on vehicles. Containers will also be labelled according to the requirements laid out by the Transportation of Dangerous Goods (TDG) Act and Regulations. The site contractor is responsible for completing the shipping document. 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.
3.0 SPILL RESPONSE ORGANIZATION

3.1 Regulatory Agencies

The Government of the Northwest Territory’s (GNWT’s) Departments of Environment and Natural Resources (ENR) and Lands, and the Office of the Regulator of Oil and Gas Operations (OROGO) are responsible for coordinating regulatory oversight and investigation of hazardous material spills in the NWT. Federal agencies (Crown Indigenous Relations and Northern Affairs Canada [CIRNAC], Environment and Climate Change Canada [ECCC] and Transport Canada) are responsible in accordance to their jurisdiction for spill investigations and cleanup monitoring in the NWT. The ILA is responsible for spills on land in the ISR and is the lead regulatory agency for the Tuk Base. The IWB is responsible for discharges to inland waters and the Canadian Coast Guard is the lead response agency overseeing spills from ships and barges.

3.2 Spill Reporting Procedures

The spill response thresholds for a wide variety of materials, compounds, and liquids are provided in the Spill Contingency Planning and Reporting Regulations under the NWT Environmental Protection Act (1988) and are provided in Appendix B. Additional details are included in Section 9.0.

All spills, regardless of quantity, will be reported to the Golder Site Supervisor, the Golder Safety and Environment Officer, the Imperial Project Manager, the IWB Representative, the ILA and the Northwest Territories/Nunavut (NT/NU) Spill Line where the accidental release:

- is near or into a water body;
- is near or into a designated sensitive environment or sensitive wildlife habitat;
- poses an imminent threat to human health or safety; or
- poses an imminent threat to a listed species at risk or its critical habitat.

If applicable, a detailed report including GPS location(s) will be submitted to the applicable regulatory agency no later than 30 days after the initial report of any spill occurrence.

Spill response and reporting procedures will also apply to the accidental release of any untested impounded waters from excavations even if found to be acceptable for release when tested after the incident.

Table 1 indicates the current spill response contact list and Figure A depicts a flow chart for spill response. The Golder Site Supervisor (and Alternate) will be responsible for activating the Plan.

### Table 1: Spill Response Contact List

<table>
<thead>
<tr>
<th>Organization</th>
<th>Contact</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Northwest Territories 24-Hour Spill Report Line</td>
<td>N/A</td>
<td>867-920-8130</td>
</tr>
<tr>
<td>Inuvialuit Water Board</td>
<td>N/A</td>
<td>867-678-2942</td>
</tr>
<tr>
<td>Government of the Northwest Territories Environment Protection Officer, Inuvik</td>
<td>Alicia McRae</td>
<td>867-678-6653</td>
</tr>
<tr>
<td>Government of the Northwest Territories Environment and Natural Resources, Inuvik (Water Resources Officer)</td>
<td>Lloyd Gruben</td>
<td>867-678-6676</td>
</tr>
<tr>
<td>Inuvialuit Land Administration</td>
<td>Charles Klengenberg</td>
<td>867-777-7057</td>
</tr>
<tr>
<td>Canadian Coast Guard 24-hour Spill Reporting Line for Arctic Waters</td>
<td>N/A</td>
<td>1-800-265-0237</td>
</tr>
<tr>
<td>Golder Site Supervisor</td>
<td>Dave Bennett</td>
<td>778-951-0715</td>
</tr>
<tr>
<td>Golder Site Supervisor (Alternate)</td>
<td>Todd Bonin</td>
<td>587-439-5244</td>
</tr>
<tr>
<td>Organization</td>
<td>Contact</td>
<td>Phone Number</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>----------------</td>
<td>--------------</td>
</tr>
<tr>
<td>Golder Project Manager</td>
<td>Brian Suen</td>
<td>604-358-6348</td>
</tr>
<tr>
<td>Golder Safety and Environment Officer</td>
<td>Nick Vettorazzo</td>
<td>613-329-7863</td>
</tr>
<tr>
<td>Imperial Media and Public Enquiries</td>
<td>N/A</td>
<td>587-476-7010</td>
</tr>
</tbody>
</table>

A variety of communications equipment will be available at the site for use during the Project. Table 2 summarizes the communications equipment for both summer and winter components of the Project.

**Table 2: Communications Equipment for the Project**

<table>
<thead>
<tr>
<th>Project Component</th>
<th>Company</th>
<th>Equipment (Number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer Field Work</td>
<td>Golder</td>
<td>Satellite phone (1) / cell phones (3) / handheld radios (3)</td>
</tr>
<tr>
<td></td>
<td>EGT and Subcontractors</td>
<td>Cab-mounted radios (3) / cell phones (6) / handheld radios (9)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>Satellite phone (1) / cab-mounted radios (3) cell phones (9) / handheld radios (12)</td>
</tr>
<tr>
<td>Winter Site Access / Removal of Waste</td>
<td>Golder</td>
<td>Satellite phone (1) / cell phones (1) / handheld radios (1)</td>
</tr>
<tr>
<td></td>
<td>EGT and Subcontractors</td>
<td>Cab-mounted radios (2) / cell phones (2) / handheld radios (2)</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>Satellite phone (1) / cab-mounted radios (2) cell phones (3) / handheld radios (3)</td>
</tr>
</tbody>
</table>
Figure A: Spill Response Flow Chart

1. Accidental spill or release identified
2. Ensure safety of all personnel
3. Identify spilled substance
4. Notify Supervisor: Dave Bennett (778-951-0715) or Todd Bonin (587-439-5244)
5. Assess spill hazard and risk
6. Stop the spill if safely possible. Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so

- Minor spill (under reportable spill quantities)
  1. Ensure spill does not enter water bodies
  2. Report to Site Supervisor Dave Bennett (778-951-0715) or Todd Bonin (587-439-5244)
  3. Record small spills in company reports and submit reports to regulators upon request
  4. Recover as much of the spill as possible

- Major spill (over reportable spill quantities)
  1. Ensure spill does not enter water bodies
  2. Report to Site Supervisor Dave Bennett (778-951-0715) or Todd Bonin (587-439-5244)
  3. Notify NWT 24-hour spill report line at 867-920-8130 or spills@gov.nt.ca
  4. Recover as much of the spill as possible
  5. Submit reports to ILA, ENR Water Resources Officer and the IWB
4.0 PREVENTATIVE MEASURES

The following section provides details of the existing preventative measures that are in place for the Project regarding fuel storage, secondary containment, fuel handling procedures, and related activities that have the potential to result in a spill event.

Barrels that may contain product are expected to be uncovered during the excavation of the south landfill. Intact barrels will be placed in overpacks and damaged barrels will have their contents drained into new barrels. The barrel contents will be tested, and the barrels will be stored in a secure location using secondary containment and at least 30 m away from the nearest water body.

Spill kits will be located wherever fuel is stored or used. Refer further to Section 7.1.1 for details on spill kit contents. Portable drip trays and appropriately sized fuel transfer hoses will be used when refueling motorized equipment, to avoid any leaks/drips onto the land. Vehicles will be refueled by filling a fuel truck at the barge and transporting it to the equipment at the work sites. Established procedures and drip trays will be used during refueling operations to prevent any spills.

The Golder Site Supervisor or designated fuel monitor will conduct daily visual inspections to check for leaks or damage to any fuel storage facilities. Regular maintenance and oil checks of all motorized equipment will also be undertaken to avoid preventable leaks.

5.0 SPILL RESPONSE ACTIONS

5.1 Initial Spill Response Actions

- ensure safety of all personnel;
- if needed, evacuate or divert workers from the spill area;
- minimize vehicular traffic as much as possible at the spill site;
- mark, flag and ribbon-off any area that is deemed hazardous to humans or wildlife;
- monitor the air at the perimeter of the flagged off area, as necessary;
- use personal protective equipment (PPE) until concentrations are determined to be within acceptable levels;
- fence off the spill site to prevent wildlife from entering.
- assess spill hazards and risks;
- identify the leak location along with the type of product/material spilled, the duration and the volume released;
- evaluate ground and weather conditions to assess the risk to environment (i.e. rain, gravel, sand, water body, muskeg, etc.);
- remove all sources of ignition;
- stop the spill if safely possible (e.g. shut off pump, replace cap, tip drum upwards, patch leaking hole). Use the contents of the nearest spill kit to aid in stopping the spill if it is safe to do so;
- contain the spill by using contents of spill kits. Place sorbent materials on the spill or dig a berm/bell hole to contain the spill; and
- relay information to internal company contacts, government agencies and, if required, the designated communications representative.
5.2 Spill Assessment (Land)

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.

Following the initial hazard assessment and development of a Site safety plan, detailed information on the location and effects of the spill on the land will be collected. The spill boundary will be identified with the appropriate equipment, including:

- PPE;
- gas detection monitors;
- compass;
- measuring device (i.e. GPS);
- shovel;
- Quantabs or conductivity meter for produced water or emulsion spills;
- hoe, drill or sampling equipment if sub-surface contamination is suspected; and
- camera.

Use a handheld air monitor to assess the potential of flammable vapors 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, 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 spilled area, determine the possible public that could be directly impacted; evaluate site for wildlife, and determine the approval requirements for accessing the spill site. Reporting details are provided in Section 9. 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 of these observations before proceeding with cleanup. Details on Site topography are provided in Appendix E. 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.

5.3 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 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. Note that there are very limited water bodies at the Site: the former sewage lagoon within the lease area and two small likely man-made ponds (without connection to any watercourse) north of the lease area (Figure 3). Therefore, this section focuses on a spill potentially reaching the harbor.

In the absence of any current or wind, a spill on water bodies or the ocean 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 recover and cleanup efforts more difficult.

The Site Supervisor will attempt to contain the spill to as small an area as possible and 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 (i.e., the ocean) may include the 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 measure may be implemented as recommended by the Project's Environmental Specialists.

Spills on ice (for example the iceroad between the Site and Tuktoyaktuk) will be contained as follows: For small spills, sorbent materials will be used to soak up spilled fuel and shovels will be used to remove soils and other solid waste materials that may have spilled. After the initial cleaning, the remaining contaminated ice and slush will be scraped and shoveled into a soil bags or drums. Trucks travelling on the iceroad will use tarps to cover their loads to prevent materials from spilling onto the ice.

5.4 First Aid

First aid measures will vary based on the type of materials involved in the spill. It is recommended that personnel follow all chemical-specific instructions or call the Northwest Territories 24-hour Spill Reporting Line for assistance. Refer to the chemical-specific Safety Data Sheets (SDSs) if skin contact, eye contact, inhalation, or ingestion should occur and follow the first aid procedure on the MSDS. Information on poison control hazardous chemicals ingested can be obtained by calling the Inuvik Regional Hospital at 867-777-8000 or Tuktoyaktuk Regional Health Services at 867-977-2321.

6.0 RESPONSE ACTIONS BY SPILL TYPE

6.1 Chemical Spills

The action plan laid out here is generally applicable to any chemical spill that the Project may encounter, but some chemicals may have special handling and disposal requirements. Refer to WHMIS labels and SDSs for chemical-specific information.

6.2 Initial Action

In the event of a chemical spill, the following measures will be taken immediately:

- evacuate unnecessary personnel;
- ventilate area of leak or spill (opening all doors and windows);
- wear PPE (gloves, safety glasses, impervious material long-sleeved shirt/coat);
- if available, wear respirator/self-contained breathing apparatus (SCBA);
- remove all other chemicals from the area if safe to do so;
- for small spills, dilute with water, mop or wipe up and place in proper container;
for large spills, contain by diking (soil/dry sand/kitty litter), absorb with inert material (soil/dry sand/kitty litter) and place in chemical waste container;

- after mopping up chemical, wash area well with soap and water, mopping into spill container and not to the ground;
- do not use combustible materials (i.e. sawdust or cardboard);
- contain runoff from spill clean-up; and
- notify the Northwest Territories 24-hour Spill Report Line at (867) 920-8130 to receive disposal information.

6.2.1 Follow-Up Action

After the spill has been cleaned up, other reporting, disposal, and follow-up activities may be required. The following measures will be taken if applicable:

- dispose of chemical, inert absorbent material, and mop-up water as directed by Spill Report Line personnel and applicable regulators;

- arrange for repair or replacement of chemical containers, pipelines and equipment, if damaged or leaking; and

- submit a detailed report on the occurrence to the applicable regulatory agency within thirty (30) days of reporting the spill event.

6.3 Petroleum Product and Antifreeze Product Spills

Petroleum products have many operational uses and used petroleum product drums or other containers may be present at Site. Petroleum product spills may range from minor spills during operations such refueling, to constant leakage from pipelines in need of repair, to major spills causing large contaminated soil/water issues.

Depending on the location of the spill, a petroleum product spill may result in contaminated soil or water. The contaminated material must be cleaned up and removed for disposal along with the spilled petroleum product.

Antifreeze or engine coolant products are used in automotive engines and generally consist of ethylene glycol or propylene glycol mixed with distilled water; of the two, propylene glycol is significantly less toxic. Used antifreeze product drums or other containers may cause minor spills to large spills from punctured containers.

Petroleum and antifreeze product spills can be handled in the same manner. Refer to WHMIS labels and MSDSs for chemical-specific information.

6.3.1 Initial Action

In the event of a petroleum or antifreeze product spill, the following measures will be taken immediately:

- shut off ignition sources, if safe to do so;
- identify the spilled material and locate the source;
- stop the spill at the source, if safe to do so;
- take actions to contain/clean up spilled material;
record relevant information for reporting including the quantity of material spilled, product type, location, date, weather, and other relevant information; and

notify the Northwest Territories 24-Hour Spill Report Line at (867) 920-8130.

6.3.2 Follow-Up Action
After the initial clean-up and reporting procedures, other activities may be required such as reporting and disposal. The following measures will be taken if applicable:

- collect soil samples for laboratory analysis to determine that spill has been cleaned up;
- dispose of soil in the onsite PHC contaminated soil treatment facility if appropriate or offsite with the excavated heavy-end PHC contaminated soil and metals contaminated soils;
- arrange for repair or replacement of petroleum product containers, pipelines and equipment, if damaged or leaking;
- submit a detailed report on the occurrence to the relevant regulatory agency within thirty (30) days of reporting the event; and
- for large spills, install wells to monitor groundwater for signs of contamination. Determine the level of final clean-up in consultation with an AANDC inspector.

6.4 Sewage
The transfer of the sewage from the barge to the Tuktoyaktuk sewage lagoon at the end of the season will be undertaken so as to prevent spills. In the event of a spill the area of impact will be minimized and then cleaned up.

6.4.1 Preventative Action
- personnel undertaking sewage transfers will be properly trained and aware of the potential concerns with this activity;
- all hoses and connections will be checked for condition and presence of potential leaks;
- the pump operator will remain at the pump for the duration of the transfer;
- the pump operator will have direct visual contact with the line and the receiving tank or will have constant radio contract with a spotter;
- a spotter will walk the line during the transfer looking for any leaks or signs of potential failure (bulges, etc);
- if the spotter identifies any concerns the pump will be shut down and the issue addressed;
- drip trays or secondary containment will be used to prevent drips from entering the environment;
- once transfer is completed the hoses will be emptied as much as possible. Then they will be carefully removed and handled to keep any remaining contents in the hose; and
- All connections, lids and caps will be made secure.

6.4.2 Initial Action
In the event of a sewage spill, the following measures will be taken immediately:
shut off ignition sources if methane gas is present (when safe to do so);
identify the spilled material and locate the source;
stop the spill at the source, if safe to do so;
take actions to contain/clean up spilled material;
record relevant information for reporting including the quantity of material spilled, product type, location, date, weather, and other relevant information; and
if spill volume is above the recordable quantity (as per Appendix B; Other Contaminants), notify the Northwest Territories 24-hour Spill Report Line at (867) 920-8130.

6.4.3 Follow-Up Action
After the initial clean-up and reporting procedures, other activities may be required such as reporting and disposal. The following measures will be taken if applicable:
dispose of sewage off-site in an appropriate manner; and
submit a detailed report (if required) on the occurrence to the applicable regulatory agency within thirty (30) days of reporting the event.

7.0 RESOURCE INVENTORY
The following section provides the details of the resources that will be available on Site to aid in spill response. The procedures for handling, transporting and disposal of spill-related wastes is outlined in Section 6.1 of the Waste Management Plan (submitted to the IWB in April 2019). The Waste Management Plan will be implemented during all Project activities and its contents will be included in daily Health and Safety meetings with all staff and contractors.

7.1 On-site Resources
Spill kits will be located throughout the Site with contents described below. In addition, earth moving and other equipment is located at the Site at all times to assist with spill response (as listed below). Spill response equipment will be located inside all heavy equipment and vehicles used at the Site. Additional spill response equipment will be located at a lay down area next to the temporary fuel storage location (depicted on Figure 3).

7.1.1 Spill Kit Contents
- four (4) Tyvek splash suits;
- four (4) pairs of chemical master gloves;
- ten (10) large bags with ties for temporary use;
- two (2) oil only booms (5” x 10’);
- fifty (50) oil only mats (16” x 20”);
- five (5) sorbent socks;
- ten (10) sorbent pads;
- two (2) large tarps;
- one (1) roll duct tape;
- one (1) utility knife;
- one (1) field notebook and pencil;
- one (1) rake;
- one (1) pick axe;
- three (3) aluminum scoop shovels; and
- one (1) instruction binder.

7.1.2 Equipment Specific to Chemical Spills

A spill kit will be available at the Site to aid in the event of a chemical spill. The kit will include:

- heavy-duty gloves;
- safety glasses;
- mop/wringer/spill squeegee;
- shovel/broom/dustpan;
- chemical spill container with sealable lid; and
- sand/kitty litter (absorbent, non-flammable material).

Alternatively, a 50 Gallon Universal Sorbent Spill Kit can be provided, which includes:

- ten (10) - 3” x 48” socks;
- four (4) - 3” x 10’ socks;
- fifty (50) - 15” x 17” pads;
- four (4) pillows;
- fifty (50) wipers;
- five (5) disposal bags and ties;
- five (5) tamperproof seals;
- two (2) pair nitrile gloves; and
- one (1) emergency response guidebook.

7.1.3 Equipment Specific to Fuel Spills

One spill kit will be on-hand at each of the fuel storage areas and in every pick-up truck onsite. The kit will include:

- heavy-duty gloves;
- safety glasses;
- mop/wringer/spill squeegee;
shovel/broom/dustpan;
chemical spill container with sealable lid; and
sand/kitty litter (absorbent, non-flammable material).

Alternatively, a 50 Gallon Universal Sorbent Spill Kit can be provided with contents described in Section 7.1.2, above.

7.1.4 Equipment Specific to Sewage Transfer Spills

Two spill kits will be on-hand in the vicinity of the sewage transfer with one kit near each end of the transfer. The kits will include:

heavy-duty gloves;
safety glasses;
mop/wringer/spill squeegee;
shovel/broom/dustpan; and
sand/kitty litter (absorbent, non-flammable material).

Alternatively, a 50 Gallon Universal Sorbent Spill Kit can be provided with contents described in Section 7.1.2, above.

7.1.5 Earth Moving and Other Equipment

It is anticipated that the following equipment will be available on Site:

one (1) small loader;
three (3) excavators;
two (2) dozers;
two (2) rock trucks;
two (2) all-terrain vehicles;
five (5) pick-up trucks;
one (1) zodiac boat;
three (3) fuel transfer hoses with pumps; and
tool kit including hack saw, hammer, screwdrivers, etc.

7.2 Off-Site Resources

Spill response contact numbers are provided in Table A above. The Project may align itself with the Mackenzie Delta Spill Response Corporation - MDSRC. The MDSRC is a non-profit, co-operatively funded organization consisting of oil and gas companies operating within the Mackenzie River Delta and the Mackenzie Valley of the NT.
The MDSRC was formed in 2002. Its geographic area of responsibility is the Mackenzie River Delta of the NT - from lands north of Inuvik and Aklavik extending to the shores of the Beaufort Sea. If registered, the Project would be assigned a ‘login’ and would have direct access to all available on-site and off-site equipment held by the organization.

8.0 SPILL RESPONSE TRAINING

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

8.1 Orientation
- provide all site personnel with an orientation of the Project's Spill Contingency Plan and its applicable elements;
- discuss and clarify bridging between the Golder’s emergency response procedures and this Project Spill Contingency Plan where applicable;
- utilize summary wall charts outlining key responsibilities and lines of communication for quick reference purposes; and
- devote a portion of scheduled safety and/or staff meetings to discussion of spill response issues on an ongoing basis.

8.2 Specialized Spill Response Training
- make available (through Golder’s Safety and Environment Officer) all required training;
- ensure all personnel comply with the Project's safety training requirements (e.g. First Aid/CPR, Workplace Hazardous Materials Information System [WHMIS], Transportation of Dangerous Goods, Firefighting, etc).

8.3 Spill Response Drills
Golder will conduct drills on an as needed basis to ensure readiness. If any drills are undertaken, the IWB will be notified and a summary included in the Annual Report.

8.4 External Orientation
As appropriate, brief and familiarize all external groups or agencies having a role in this Plan and define their specific responsibilities under the Plan.

8.5 Training Records
The Golder Safety and Environment Officer will be tracking all training requirements and compliance utilizing a spreadsheet.
9.0 REPORTING REQUIREMENTS

As outlined in Section 3.2, all spills, regardless of quantity, will be reported to the Site Supervisor, the Safety and Environment Officer and the Imperial Project Manager. Spills to be reported include spills that have already occurred, or potential spills that are about to occur. Spills must be reported if the amount is greater than or equal to the amount listed in the spill response thresholds (Appendix B). The spill response thresholds for a wide variety of materials, compounds, and liquids are provided by the Spill Contingency Planning and Reporting Regulations under the Environmental Protection Act (1988) are provided in Appendix B.

In accordance with the Spill Contingency Planning and Reporting Regulations, any reportable spill will be reported immediately to the 24 Hour Spill Report Line at (867) 920-8130. The following detail will be provided (if possible):

- date and time of spill;
- location of spill;
- direction spill is moving;
- name and phone number of a contact person close to the location of spill;
- type and quantity of contaminant spilled and cause of spill;
- whether spill is continuing or has been stopped;
- description of existing containment;
- actions taken to contain, recover, clean-up and dispose of the contaminant; and
- name and phone number of the person reporting the spill and the person in charge or control of contaminants at time of spill

A detailed report on the occurrence must also be submitted within thirty (30) days of the event. An NT/NU Spill Report Form is included at the back of this Plan (Appendix C).

In the very unlikely event that the public may be affected by a spill, the Golder Site Supervisor (or Alternate) will inform Imperial and the Hamlet of Tuktoyaktuk will be informed of the nature and size of the spill. The Hamlet will be notified of the clean-up progress and all measure taken to mitigate potential impacts.

10.0 SAFETY DATA SHEETS (SDSS)

SDSs have been provided in Appendix D for the materials outlined in Sections 1 and 2. It should be noted that the documents in Appendix D still use the previous name "Material Safety Data Sheets" (MSDS) but are referred to by their current official name (Safety Data Sheets [SDSs]). These SDSs are presented for informational purposes only and should not be used for WHMIS purposes. SDSs from the actual vendors will be acquired and maintained for WHMIS compliance and, if applicable, will replace the sheets in this Plan.

The list of contaminants presented above is not intended to be a comprehensive list of potential contaminants the Project might face but is merely to present the common contaminants that may be encountered on a regular basis.
11.0 REFERENCES


APPENDIX A

Environment Policy
Environment Policy

It is the policy of Imperial Oil and the ExxonMobil companies in Canada to conduct their business in a manner that is compatible with the balanced environmental and economic needs of the communities in which they operate. The companies are committed to continuous efforts to improve environmental performance throughout their operations.

Accordingly, the companies’ policy is to:

- comply with all applicable environmental laws and regulations and apply responsible standards where laws and regulations do not exist
- encourage respect for the environment, emphasize every employee’s responsibility in environmental performance, and foster appropriate operating practices and training
- work with government and industry groups to foster timely development of effective environmental laws and regulations based on sound science and considering risks, costs and benefits, including effects on energy and product supply
- manage their business with the goal of preventing incidents and of controlling emissions and wastes to below harmful levels; design, operate, and maintain facilities to this end
- respond quickly and effectively to incidents resulting from their operations, in cooperation with industry organizations and authorized government agencies
- conduct and support research to improve understanding of the impact of their business on the environment, to improve methods of environmental protection, and to enhance their capability to make operations and products compatible with the environment
- communicate with the public on environmental matters and share their experience with others to facilitate improvements in industry performance
• undertake appropriate reviews and evaluations of their operations to measure progress and to foster compliance with this policy.
APPENDIX B

Spill Response Thresholds
## Appendix B:
### Immediately Reportable Spill Quantities

<table>
<thead>
<tr>
<th>TDG Class</th>
<th>Substance for NWT 24 Hour Spill Line</th>
<th>Immediately Reportable Quantities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Explosives</td>
<td>Any Amount</td>
</tr>
<tr>
<td>2.3</td>
<td>Compressed Gas (Toxic)</td>
<td></td>
</tr>
<tr>
<td>2.4</td>
<td>Compressed Gas (Corrosive)</td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Infectious Substances</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Radioactive</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>Unknown Substance</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>Compressed gas (flammable)</td>
<td>Any amount of gas from containers with a capacity greater than 100 L</td>
</tr>
<tr>
<td>2.2</td>
<td>Compressed gas (non-corrosive, non-flammable)</td>
<td></td>
</tr>
<tr>
<td>3.1</td>
<td>Flammable liquids</td>
<td>&gt;100 L</td>
</tr>
<tr>
<td>3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>Flammable solids</td>
<td></td>
</tr>
<tr>
<td>4.2</td>
<td>Spontaneously combustible solids</td>
<td>&gt;25 kg</td>
</tr>
<tr>
<td>4.3</td>
<td>Water reactant</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Oxidizing substances</td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>Miscellaneous products or substances excluding PCB mixtures</td>
<td>&gt;50 L or 50 kg</td>
</tr>
<tr>
<td>5.2</td>
<td>Organic peroxides</td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Environmentally hazardous</td>
<td>&gt;1 L of 1 kg</td>
</tr>
<tr>
<td>6.1</td>
<td>Poisonous substances</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Corrosive substances</td>
<td>&gt;5 L or 5 kg</td>
</tr>
<tr>
<td>9.3</td>
<td>Dangerous wastes</td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>PCB mixtures of 5 or more ppm</td>
<td>&gt;0.5 L or 0.5 kg</td>
</tr>
<tr>
<td>None</td>
<td>Other contaminants (e.g. crude oil, drilling fluid, produced water, waste or spent chemicals, used or waste oil, vehicle fluids, waste water, etc.)</td>
<td>&gt;100 L or 100 kg</td>
</tr>
<tr>
<td>None</td>
<td>Sour natural gas (i.e. contains H2S)</td>
<td>Uncontrolled release or sustained flow of 10 minutes or more</td>
</tr>
</tbody>
</table>

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.
APPENDIX C

NT/NU Spill Report Form
# 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

### A. Report Date
- MM | DD | YY

### B. Occurrence Date
- MM | DD | YY

### C. Land Use Permit Number (if applicable):

### D. Geographic Place Name or Distance and Direction from the Named Location:

### E. Latitude:
- Degrees | Minutes | Seconds
- Degrees | Minutes | Seconds

### F. Responsible Party or Vessel Name:

### G. Any Contractor Involved:

### H. Product Spilled:
- Potential Spill

### I. Spill Source:

### J. Factors Affecting Spill or Recovery:

### 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:

### N. Received at Spill Line by:
- Position:
- Employer:
- Location Called:
- Report Line Number:

### Lead Agency:
- EC
- CCG/TCMSS
- GNWT
- GN
- ILA
- AANDC
- NEB
- Other:

### Significance:
- Minor
- Major
- Unknown

### File Status:
- Open
- Closed

---

### Agency:
- Contact Name:
- Contact Time:
- Remarks:

**Lead Agency:**

**First Support Agency:**

**Second Support Agency:**

**Third Support Agency:**
1. Product and company identification

Product name: GASOLINE, UNLEADED
Code: W102E, SAP: 112 to 117
Material uses: Unleaded gasoline is used in spark ignition engines including motor vehicles, inboard and outboard boat engines, small engines such as chain saws and lawn mowers, and recreational vehicles.
Manufacturer: PETRO-CANADA
P.O. Box 2644
550 – 8th Avenue South-West
Calgary, Alberta
Canada
T2P 3E3
In case of emergency: Petro-Canada: 432-296-3000
Canulac Transportation: 613-995-6666
Police Control Centre: Consult local telephone directory for emergency number(s).

2. Hazards identification

Physical state: Clear liquid.
Odor: No change.
WHMIS (Canada): Class B-2, Flammable liquid.
Class D-2A, Material causing other toxic effects (Very toxic).
Class D-2B, Material causing other toxic effects (Toxic).
OSHA/HCS status: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview: WARNING!
FLAMMABLE LIQUID AND VAPOR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CANCER. HAZARD CAN CONTAIN MATERIAL WHICH CAN CAUSE CANCER. CONTAINS MATERIAL WHICH MAY CAUSE HEREDITARY GENETIC EFFECTS.
Inhalation: Flammable liquid, irritating to eyes, respiratory system and skin. Keep away from heat, sparks and flame. Avoid exposure. Consult special instructions before use. Do not breathe vapor or mist. Avoid contact with eyes, skin, and clothing. Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure. Inhalation of this product may cause respiratory tract irritation. Inhalation of this product may cause respiratory tract irritation and Central Nervous System (CNS) depression, symptoms of which may include: weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure, coma and death.
Ingestion: Ingestion of this product may cause gastro-intestinal irritation. Ingestion of this product may cause severe irritation or burns to the respiratory tract. Ingestion of this product may cause Central Nervous System (CNS) depression, symptoms of which may include: weakness, dizziness, slurred speech, drowsiness, unconsciousness and in cases of severe overexposure, coma and death.

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>R6290-81-5</td>
<td>85-100</td>
</tr>
<tr>
<td>Toluene</td>
<td>108-88-3</td>
<td>15-40</td>
</tr>
<tr>
<td>Benzene</td>
<td>71-43-2</td>
<td>0.5-1.5</td>
</tr>
<tr>
<td>Ethanol</td>
<td>64-17-5</td>
<td>0.1-0.3</td>
</tr>
</tbody>
</table>

*Montreal: may vary from 3-40%
*Edmonton: may vary from 1-5%

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

Eye contact: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes. Occasionally lifting the upper and lower eyelids. Get medical attention immediately.
Skin contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
Inhalation: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loose light clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
Ingestion: Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Protection of first-aiders: No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it or, wear gloves.

Notes to physician: No specific treatment. Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Date of issue: 10/10/2012. Internet: www.petro-canada.ca/msds
5. Fire-fighting measures

Flammability of the product: Flammable liquid (NFPA).
Extinguishing media: Use dry chemical, CO₂, water spray (tg) or foam.
Suitable: Use dry chemical, CO₂, water spray (tg) or foam.
Not suitable: Do not use water jet.
Special exposure hazards: Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.
Products of combustion: Carbon oxides (CO, CO₂), nitrogen oxides (NOₓ), polymeric aromatic hydrocarbons, phenols, aldehydes, ketones, smoke and irritant vapours as products of incomplete combustion.
Special protective equipment for fire-fighters: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full-face-piece operated in positive pressure mode.
Special remarks on fire hazards: Extremely flammable in presence of open flames, sparks, shocks, and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. Rapid escape of vapour may generate static charge causing ignition. May accumulate in confined spaces.
Special remarks on explosion hazards: Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Containers may explode in heat of fire. Vapours may form explosive mixtures with air.

6. Accidental release measures

Personal precautions: No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flames, smoking or fires in hazard area. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).
Environmental precautions: Avoid dispersal of spilled material and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
Methods for cleaning up
Small spill: Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.
Large spill: Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Collect and contain spillage with non-corrosive, absorbent materials e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal in accordance with local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor.

7. Handling and storage

Handling: Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Avoid exposure - obtain special instructions before use. Do not get in eyes or on skin or clothing. Do not inhale. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not work in storage areas and confined spaces unless adequately ventilated. Keep in the original container or a approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not re-use container.

Storage: Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. Ensure the storage containers are grounded/bonded.

8. Exposure controls/personal protection

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Exposure limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>ACGIH TLV (United States), TWA: 300 ppm 8 hour(s).</td>
</tr>
<tr>
<td>Toluene</td>
<td>ACGIH TLV (United States), TWA: 200 ppm 8 hour(s).</td>
</tr>
<tr>
<td>Benzene</td>
<td>ACGIH TLV (United States), Absorbed through skin, TWA: 6.5 ppm 8 hour(s).</td>
</tr>
<tr>
<td>Ethanol</td>
<td>ACGIH TLV (United States), STEL: 2.5 ppm 15 minute(s).</td>
</tr>
</tbody>
</table>

Consult local authorities for acceptable exposure limits.
Recommended monitoring procedures: If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
Engineering measures: Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.
Hygiene measures: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
Personal protection: Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard or a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels. The hazards of the product and the safe working limits of the selected respirator. Recommended: A NIOSH-approved air-purifying respirator with active charcoal cartridge or canister may be permitted for certain circumstances where airborne concentrations are to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive-pressure, air-supplied respirator if there is any potential for uncontrolled release. Exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.
8. Exposure controls/personal protection

Hands: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Recommended: polyvinyl alcohol (PVA), Viton®. Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of their imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

Eyes: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Environmental exposure controls: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

Physical state: Clear liquid.
Flash point: Closed cup: -50 to -38°C (-58 to -66.4°F) [Tag alabue.]
Auto-ignition temperature: 257°C (496°F) (NFPA)
Flammable limits: Lower: 1.3% (NFPA)
Upper: 7.9% (NFPA)
Color: Clear to slightly yellow or green, undyed liquid. May be dyed red for taxation purposes.
Odor: Gasoline
Odor threshold: Not available.
PH: Not available.
Boiling/congealation point: 25 to 220°C (77 to 428°F) (ASTM D66)
Melting/freezing point: Not available.
Relative density: 0.885 to 0.9 kg/l, @ 15°C (59°F)
Vapor pressure: <170 kPa (<802.5 mm Hg) @ 37.8°C (100°F)
Vapor density: 3 to 4 [Air = 1] (NFPA)
Volatility: Not available.
Evaporation rate: Not available.
Viscosity: Not available.
Pour point: Not available.
Solubility: Hydrocarbon components virtually insoluble in water. Soluble in alcohol, ether, chloroform and benzene. Dissolves fats, oils and natural resins.

10. Stability and reactivity

Chemical stability: The product is stable.
Hazardous polymerization: Under normal conditions of storage and use, hazardous polymerization will not occur.
Materials to avoid: Reactive with oxidizing agents, acids and internal oils.
Hazardous decomposition products: May release CO, NOx, phenols, polycyclic aromatic hydrocarbons, aldehydes, ketones, smoke and irritating vapours when heated to decomposition.

11. Toxicological information

Acute toxicity
Product/ingredient name: Gasoline
Result: LD50 Dermal Rabbit >5000 mg/kg
Species: Rabbit
Dosage: >5000 mg/kg
Exposure: 4 hours

Benzene
LD50 Dermal Rabbit >8240 mg/kg
LD50 Oral Rat 930 mg/kg
LD50 Oral Rat 13700 ppm
LC50 Inhalation Vapor Rat 7590 ppm

Ethanol
LD50 Oral Rat 7050 mg/kg
LC50 Inhalation Vapor Rat >32380 ppm

Conclusion/Summary: Not available.
Chronic toxicity: Not available.
Irritation/Corrosion: Not available.
Sensitizer: Not available.
Carcinogenicity: Not available.
Genotoxicity: Not available.

12. Ecological information

Environmental effects: No known significant effects or critical hazards.
Aquatic ecotoxicity: Not available.
Bioavailability: Not available.

Conclusion/Summary: Not available.
13. Disposal considerations

Waste disposal: The generation of waste should be avoided or minimized wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions, and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling spilled containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

<table>
<thead>
<tr>
<th>Regulatory information</th>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Classes</th>
<th>PO* Label</th>
<th>Additional information</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDG Classification</td>
<td>UN1203</td>
<td>GASOLINE</td>
<td>3</td>
<td>II</td>
<td>-</td>
</tr>
<tr>
<td>DOT Classification</td>
<td>Not available</td>
<td>Not available</td>
<td>Not available</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

PO*: Packing group

15. Regulatory information

United States

<table>
<thead>
<tr>
<th>Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCS Classification</td>
<td>Flammable liquid</td>
</tr>
<tr>
<td></td>
<td>Irritating material</td>
</tr>
<tr>
<td></td>
<td>Carcinogen</td>
</tr>
</tbody>
</table>

Canada

<table>
<thead>
<tr>
<th>WHMIS (Canada)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class B-2: Flammable liquid</td>
</tr>
<tr>
<td></td>
<td>Class D-2A: Material causing other toxic effects (Very toxic)</td>
</tr>
<tr>
<td></td>
<td>Class D-2B: Material causing other toxic effects (Toxic)</td>
</tr>
</tbody>
</table>

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

International regulations

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada inventory</td>
<td>All components are listed or exempted</td>
</tr>
<tr>
<td>United States inventory (TSCA 18)</td>
<td>All components are listed or exempted</td>
</tr>
<tr>
<td>Europe inventory</td>
<td>All components are listed or exempted</td>
</tr>
</tbody>
</table>

16. Other information

Label requirements: FLAMMABLE LIQUID AND VAPOR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. CANCER HAZARD. CONTAINS MATERIAL WHICH CAN CAUSE CANCER. CONTAINS MATERIAL WHICH MAY CAUSE HERITABLE GENETIC EFFECTS.

Hazardous Material

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>2</td>
</tr>
<tr>
<td>Flammability</td>
<td>3</td>
</tr>
<tr>
<td>Physical hazards</td>
<td>0</td>
</tr>
<tr>
<td>Personal protection</td>
<td>1</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Fire Risk Group</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>Special</td>
</tr>
</tbody>
</table>

References: Available upon request. *TM Trademark of Suncor Energy Inc. Used under licence.

Date of printing: 10/10/2012.

Date of previous issue: 4/20/2010.

For Copy of (M)SDS: Internet: www.petro-canada.ca/msds

For Product Safety information: (905) 804-4752

Notice to reader:

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Date of issue: 10/10/2012. Internet: www.petro-canada.ca/msds

Petro-Canada is a Suncor Energy business *TM Trademark of Suncor Energy Inc. Used under licence.
**Material Safety Data Sheet**

**DIESEL FUEL**

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

**Product name:** DIESEL FUEL

**Synonyms:** Seasonal Diesel, #1 Diesel, #2 Heating Oil, #1 Heating Oil, D50, Arctic Diesel, Farm Diesel, Marine Diesel, Low Sulphur Diesel, L50, Ultra Low Sulphur Diesel, ULSD. Mining Diesel, Naval Distillate, Dyed Diesel, Marked Diesel, Coloured Diesel, Furnace special, Biodiesel blend, B1, B2, BS, Diesel Low Cloud (LC), Marine Gas Oil

**Product code:** 101002, 101007, 100669, 100668, 100911, 100663, 100663, 100460, 100065, 101766, 101769, 101765, 101792, 101794, 101791, 100768, 100643, 100642, 100103, 101768, 101900, 101797, 101768, 101780, 101787, 102531, 100734, 100733, 100640, 100997, 100065, 100732, 100731, 100994

**Manufacturer or supplier's details:**
- Petro-Canada
  - P.O. Box 2944, 150 - 5th Avenue South-West
  - Calgary Alberta T2P 3E3
  - Canada

**Emergency telephone number:**
- Suncor Energy: 1-800-296-3000
- Poison Control Centre: Consult local telephone directory for emergency number(s).

**Recommended use of the chemical and restrictions on use:**
- **Recommended use:** Diesel fuels are distillate fuels suitable for use in high and medium speed internal combustion engines of the compression ignition type. Mining diesels, marine diesels, MDO and naval distillates may have a higher flash point requirement.

**Prepared by:** Product Safety: 1-905-804-4752

**SECTION 2. HAZARDS IDENTIFICATION**

**Emergency Overview**

| Appearance | Bright oily liquid. |
| Colour | Clear to yellow (This product may be dyed red for taxation purposes). |
| Odour | Mild petroleum oil-like. |
| Hazard Summary | Combustible liquid. May cause cancer. Irritating to eyes and skin. |

**Potential Health Effects**

- **Primary Routes of Entry:**
  - Eye contact
  - Ingestion
  - Inhalation
  - Skin contact
  - Skin Absorption

- **Inhalation:** May cause respiratory tract irritation. Inhalation may cause central nervous system effects. Symptoms and signs include headache, dizziness, fatigue, muscular weakness, drowsiness and in extreme cases, loss of consciousness.

- **Skin:** Causes skin irritation.

- **Eyes:** Causes eye irritation.

- **Ingestion:** Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. Aspiration hazard if swallowed - can enter lungs and cause damage.

- **Aggravated Medical Condition:** None known.

- **Carcinogenicity:**
  - IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
  - ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

**Substance / Mixture:** Mixture

**Hazardous components**

- **Chemical Name:**
  - Kerosene (petroleum), hydrodesulfurized
  - Kerosene (petroleum)
  - Fuels, diesel
  - Diesel fuel
  - Fuels, diesel
  - Fuel oil n. 2
  - Alkanes, C10-20-branched and linear
  - Soybean oil, Methyl ester
  - Rape oil, Methyl ester

- **CAS-No.:**
  - 84742-81-0
  - 110-21-8
  - 68314-30-5
  - 68477-70-2
  - 920771-01-1
  - 67794-80-9
  - 72891-99-3

- **Concentration (%):**
  - 70 - 100%
  - 0 - 25%
  - 0 - 5%
SECTION 4. FIRST AID MEASURES

If inhaled: Move to fresh air; Artificial respiratory and/or oxygen may be necessary. Seek medical advice.

In case of skin contact: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Wash clothing before reuse. Seek medical advice.

In case of eye contact: Remove contact lenses. Rinse immediately with plenty of water; also under the eyelids, for at least 15 minutes. Obtain medical attention.

If swallowed: Rinse mouth with water. DO NOT induce vomiting unless directed to do so by a physician or poison control center. Never give anything by mouth to an unconscious person. Seek medical advice.

Most important symptoms and effects, both acute and delayed: First aid needs to protect himself.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media: Dry chemical Carbon dioxide (CO2) Water fog Foam

Unsuitable extinguishing media: Do NOT use water jet.

Specific hazards during firefighting: Cool closed containers exposed to fire with water spray.

Hazardous combustion products: Carbon oxides (CO, CO2), nitrogen oxides (NOx), sulphur oxides (SOx), sulphur compounds (H2S), smoke and irritating vapours as products of incomplete combustion.

Further information: Prevent fire extinguishing water from contaminating surface water or ground water system.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures: Use personal protective equipment. Ensure adequate ventilation. Evacuate personnel to safe areas. Material can create slippery conditions.

Environmental precautions: If the product contaminates rivers and lakes or drains inform respective authorities.

Methods and materials for containment and cleaning up: Prevent further leakage or spillage if safe to do so. Remove all sources of ignition. Soak up with inert absorbent material. Non-sparking tools should be used. Ensure adequate ventilation. Contact the proper local authorities.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling: For personal protection see section 8. Smoking, eating and drinking should be prohibited in the application area. Use only with adequate ventilation. In case of insufficient ventilation; wear suitable respiratory equipment. Avoid spark, static, and electrical hazards. Use non-sparking tools. Do not ingest. Keep away from heat and sources of ignition. Keep container closed when not in use.

Conditions for safe storage: Store in original container. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Keep in a cool, dry and well-ventilated place. Keep in properly labelled containers. To maintain product quality, do not store in heat or direct sunlight.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

Components | CAS-No. | Value type (Form of exposure) | Control parameters / Permissible concentration | Basis
--- | --- | --- | --- | ---
Kerosene (petroleum) | 64742-81-0 | TWA | 200 mg/m3 | ACGIH
## Material Safety Data Sheet

### DIESEL FUEL

**000003000395**

**Version 1.0**  
**Revision Date 2015/05/14**  
**Print Date 2015/05/14**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydrodesulfurized</td>
<td>8008-20-6</td>
</tr>
<tr>
<td>TWA</td>
<td>200 mg/m3 (As total hydrogen cyanide)</td>
</tr>
<tr>
<td>ACGIH</td>
<td></td>
</tr>
<tr>
<td>kerosine (petroleum)</td>
<td>8008-20-6</td>
</tr>
<tr>
<td>TWA</td>
<td>200 mg/m3 (As total hydrogen cyanide)</td>
</tr>
<tr>
<td>ACGIH</td>
<td></td>
</tr>
</tbody>
</table>

**Engineering measures**: Use only in well-ventilated areas. Ensure that eyewash station and safety shower are proximal to the work-station location.

**Personal protective equipment**

**Respiratory protection**: Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

**Filter type**: Organic vapour cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstances where air-purifying respirators may not provide adequate protection.

**Hand protection**

**Material**: Neoprene, nitrile, polyvinyl alcohol (PVA), Viton(R). Consult your PPE provider for breakthrough times and the specific glove that is best for you based on your use patterns. It should be realized that eventually any material regardless of its imperviousness, will get permeated by chemicals. Therefore, protective gloves should be regularly checked for wear and tear. At the first signs of hardening and cracks, they should be changed.

**Remarks**: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

**Eye protection**: Wear face-shield and protective suit for abnormal processing problems.

**Skin and body protection**: Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place.

**Protective measures**: Wash contaminated clothing before re-use.

**Hygiene measures**: Remove and wash contaminated clothing and gloves, including the inside, before re-use. Wash face, hands and any exposed skin thoroughly after handling.

### SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Bright oily liquid,</td>
</tr>
<tr>
<td>Colour</td>
<td>Clear to yellow (This product may be dyed red for taxation purposes),</td>
</tr>
<tr>
<td>Odour</td>
<td>Mild petroleum-like,</td>
</tr>
<tr>
<td>Odour Threshold</td>
<td>No data available</td>
</tr>
<tr>
<td>pH</td>
<td>No data available</td>
</tr>
<tr>
<td>Pour point</td>
<td>No data available</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>150 - 371 °C (302 - 700 °F)</td>
</tr>
<tr>
<td>Flash point</td>
<td>&gt; 40 °C (104 °F)</td>
</tr>
<tr>
<td>Method: closed cup</td>
<td></td>
</tr>
<tr>
<td>Auto-Ignition Temperature</td>
<td>225 °C (437 °F)</td>
</tr>
<tr>
<td>Evaporation rate</td>
<td>No data available</td>
</tr>
<tr>
<td>Flammability</td>
<td>Flammable in presence of open flames, sparks and heat. Vapours are heavier than air and may travel considerable distance to sources of ignition and flash back. This product can accumulate static charge and ignite.</td>
</tr>
<tr>
<td>Upper explosion limit</td>
<td>5 °C (V)</td>
</tr>
<tr>
<td>Lower explosion limit</td>
<td>0.7 °C (V)</td>
</tr>
<tr>
<td>Vapour pressure</td>
<td>7.5 mmHg (20 °C / 68 °F)</td>
</tr>
<tr>
<td>Relative vapour density</td>
<td>4.5</td>
</tr>
<tr>
<td>Relative density</td>
<td>0.8 - 0.88</td>
</tr>
<tr>
<td>Solubility (es)</td>
<td>Insoluble</td>
</tr>
<tr>
<td>Water solubility</td>
<td>No data available</td>
</tr>
<tr>
<td>Partition coefficient: n-octanol/water</td>
<td>1.3 - 4.1 cSt (40 °C / 104 °F)</td>
</tr>
<tr>
<td>Viscosity</td>
<td></td>
</tr>
<tr>
<td>Viscosity, kinematic</td>
<td></td>
</tr>
</tbody>
</table>
Explosive properties: Do not pressurise, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Runoff to sewer may create fire or explosion hazard.

SECTION 10. STABILITY AND REACTIVITY

Possibility of hazardous reactions: Hazardous polymerisation does not occur. Stable under normal conditions.

Conditions to avoid: Extremes of temperature and direct sunlight.

Incompatible materials: Reactive with oxidising agents and acids.

Hazardous decomposition products: May release CO, NO, SO, H2S, smoke and irritating vapours when heated to decomposition.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure:
- Eye contact
- Ingestion
- Inhalation
- Skin contact
- Skin absorption

Acute toxicity:
- Product:
- Acute oral toxicity: Remarks: No data available
- Acute inhalation toxicity: Remarks: No data available
- Acute dermal toxicity: Remarks: No data available

Components:
- Kerosine (petroleum), hydrosulfurized:
  - Acute oral toxicity: LD50 Rat: > 5,000 mg/kg.
  - Acute inhalation toxicity: LC50 Rat: > 5 mg/l Exposure time: 4 hrs Test atmosphere: dust/mist
  - Acute dermal toxicity: LD50 Rabbit: > 2,000 mg/kg.

- Kerosine (petroleum):
  - Acute oral toxicity: LD50 Rat: > 5,000 mg/kg.
  - Acute inhalation toxicity: LC50 Rat: > 5 mg/l
SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
Product: Remarks: No data available
Toxicity to fish
Toxicity to daphnia and other aquatic invertebrates Remarks: No data available
Toxicity to algae Remarks: No data available
Toxicity to bacteria Remarks: No data available
Persistence and degradability
Product: Remarks: No data available
Biodegradability
Bioaccumulative potential Remarks: No data available
No data available
Mobility in soil Remarks: No data available
No data available
Other adverse effects Remarks: No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods
Waste from residues The product should not be allowed to enter drains, water courses or the soil. Offer surplus and non-recyclable solutions to a licensed disposal company. Waste must be classified and labelled prior to recycling or disposal. Send to a licensed waste management company. Dispose of hazardous waste in compliance with local and national regulations. Dispose of product residue in accordance with the instructions of the person responsible for waste disposal.

Contaminated packaging Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION

International Regulation

IATA-DGR
UN No. 1202

SECTION 15. REGULATORY INFORMATION

WHMIS Classification B3: Combustible Liquid
D2A: Very Toxic Material Causing Other Toxic Effects
D2B: Toxic Material Causing Other Toxic Effects

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

The components of this product are reported in the following inventories:

DSL On the inventory, or in compliance with the inventory
TSCA All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.
EINECS On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

For Copy of (MSDS) Internet: www.petro-canada.ca/msds
Canada-wide: telephone: 1-800-666-0220, fax: 1-800-837-
Prepared by: Product Safety: +1 905-804-4752

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guideline for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.
MATERIAL SAFETY DATA SHEET PACKET

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: 1866b
SRM Name: Common Commercial Asbestos

Date of Issue: 09 January 2007

Emergency Telephone Chem Trec:
1-800-424-9300 (North America)
+1-703-527-3887 (International)

MSDS Coordinator: Mario Cellarosi
Telephone: 301-975-6776
FAX: 301-926-4751
E-mail: SRMMSDS@nist.gov

Description: Standard Reference Material (SRM) 1866b is comprised of three commercial-grade asbestos materials that were, or are, commonly used in commerce. These asbestos materials are typical of the asbestos found in bulk samples during routine asbestos inspections of building materials. The optical properties serve as a primary calibration standard in the identification of asbestos with polarized light microscopy (PLM). A unit of SRM 1866b consists of a set of three bottles: one bottle containing chrysotile, one bottle containing asbestiform grunerite (amosite), and one bottle containing asbestiform riebeckite (crocidolite). Each bottle contains between 1 gram and 3 grams of material.

Chrysotile

Asbestiform Grunerite (Amosite)
Asbestiform Riebeckite (Crocidolite)

An MSDS is provided for each of the three asbestos materials listed above, which contain hazardous components 1% or greater and/or carcinogens 0.1% or greater, in compliance with OSHA 29 CFR 1910.1200.

MSDS 1866b
MATERIAL SAFETY DATA SHEET

1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300

SRM Number: 1866b
MSDS Number: 1866b
SRM Name: Common Commercial Asbestos

Date of Issue: 09 January 2007

MSDS Coordinator: Mario Cellarosi
Telephone: 301-975-6776
FAX: 301-926-4751
E-mail: SRMMSDS@nist.gov

Emergency Telephone ChemTrec:
1-800-424-9300 (North America)
+1-703-527-3887 (International)

Description: Standard Reference Material (SRM) 1866b is a set of three individual commercial-grade asbestos materials: chrysotile, asbestiform grunerite (amosite), and asbestiform riebeckite (crocidolite). A unit of SRM 1866b consists of three bottles, each containing between 1 gram and 3 grams of individual material.

Substance: Chrysotile

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS(*)

Component: Chrysotile
Other Designations: Chrysotile (metasite; serpentine chrysotile; asbestos; chrysotile asbestos)
CAS Number: 12001-29-5
EC Number (EINECS): Not assigned.
SRM Nominal Concentration (% by weight or volume): > 90

Component: Magnetite (as an impurity)
Other Designation: Magnetite (magnetic iron oxide; black iron oxide; magnetic iron ore; lodestone; black ferric oxide)
CAS Number: 1309-38-2
EC Number (EINECS): 215-169-8
SRM Nominal Concentration (% by weight): < 5
EC Classification: T
Carcinogen Category: 1
EC Risk (R No.): 23, 45, 48
EC Safety (S No.): 45, 53

(*) Hazardous components 1% or greater; carcinogens 0.1% or greater are listed in compliance with OSHA 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4):
Health = 1
Fire = 0
Reactivity = 0

Major Health Hazards: Cancer hazard (in humans)

Potential Health Effects
Inhalation: Inhalation of chrysotile asbestos dust may be irritating. Symptoms include a cough and chest pain. Chronic exposure may cause asbestosis, interstitial fibrosis of the lung tissue, which may develop within 4 years to 9 years, but onset may be typically delayed 20 years to 40 years after first exposure. Death from asbestosis may be due to respiratory or cardiac failure. Secondary lung infections may also occur. Chronic exposure of asbestos to workers may also cause pleural effusion as early as 3 years to 4 years after initial exposure. Chronic exposure of asbestos to workers also increases the chance of pleural and peritoneal mesotheliomas, bronchogenic carcinoma, lung cancer, and cancers of the gastrointestinal tract and larynx. The latent period for mesothelioma is 3 years to 40 years; for lung cancer, 15 years to 30 years.

MSDS 1866b
Skin Contact: Direct contact may cause irritation. Asbestos fibers may penetrate the skin and result in “asbestos corns”, due to thickening of the skin around the implanted fiber. These corns usually occur on the hands and forearms, and they disappear on removal of the fibers.

Eye Contact: Direct contact may cause irritation with redness due to mechanical action.

Ingestion: Acute exposure by cause gastrointestinal irritation. Chronic exposure of asbestos fibers may be involved in cancers of the buccal cavity and pharynx, esophagus, stomach, colon, and rectum.

Listed as a Carcinogen/Potential Carcinogen: Yes No
X In the National Toxicology Program (NTP) Report on Carcinogens.
X In the International Agency for Research on Cancer (IARC) Monographs.
X By the Occupational Safety and Health Administration (OSHA).

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Get immediate medical attention.

Skin Contact: Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Get immediate medical attention.

Eye Contact: Flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion: If a large amount is swallowed, get immediate medical attention.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Chrysotile is a negligible fire hazard.


Fire Fighting: If material is involved in a fire, extinguish fire with a medium appropriate for the surrounding fire. Material itself does NOT burn or burns with difficulty. Keep run-off water out of sewers and water sources. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Component: Chrysotile
Flash Point: Not applicable.
Method Used: Not applicable.
Autoignition Temp.: Not applicable.

Flammability Limits in Air
UPPER (Volume %): Not applicable.
LOWER (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Do NOT touch or walk through spilled material. Avoid inhalation of asbestos dust (see Section 8, “Exposure Controls and Personal Protection”). Collect small dry spills with a shovel and place material into an appropriate container for disposal. Prevent entry into waterways and sewers. Clean up residue with a HEPA filter vacuum.

Disposal: Refer to Section 13, “Disposal Considerations”.

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards.

Safe Handling Precautions: See Section 8, “Exposure Controls and Personal Protection”.

MSDS 1866b
8. Exposure Controls and Personal Protection

Exposure Limits: Chrysotile
OSHA (PEL): 0.1 fibers/cc TWA
ACGIH (TLV): 0.1 fibers/cc TWA
NIOSH: 0.1 fibers/cc recommended TWA (10 h)

Ventilation: Provide local exhaust ventilation system equipped with a HEPA-filter dust collection system.

Respirator: If workplace conditions warrant a respirator’s use, a NIOSH/MSHA approved respirator should be used under an implemented respiratory protection program in accordance with OSHA Standard 29 CFR 1910.134 (General Industry, Use of Respirators) and 29 CFR 1910.1001 for occupational exposure to asbestos.

Eye Protection: Wear safety goggles. An eye wash station should be readily available near areas of use.


9. Physical and Chemical Properties

Component: Chrysotile
Appearance: Fibrous solid to dust-like powder. White to grey-brown. Odorless.
Relative Molecular Mass: Not applicable.
Molecular Formula: Mg₃(Si₂O₅)(OH)₄
Water Solubility: Insoluble.
Solvent Solubility: Insoluble in organic solvents.

10. Stability and Reactivity

Stability: X Stable _____ Unstable
Stable at normal temperatures and pressure.

Conditions to Avoid: Avoid generating dust. Keep out of water supplies and sewers.

Incompatible Materials: May be attacked by strong acids.

Fire/Explosion Information: See Section 5, “Fire Fighting Measures”.

Hazardous Decomposition: Completely decomposes at temperatures of 1000 °C.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. Toxicological Information

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data: Chrysotile
Human, Inhalation TCL₂: 2.8 fibers/cc (5 years)
Rat, Inhalation-Intermittent TCL₂: 8 210 µg/m³ (6 h to 20 d)
Rat, Oral-Continuous TDLo: 10 867 mg/kg (78 weeks)

Tumorigenic, Reproductive, Mutagenic Data: Chrysotile has been investigated as a tumorigenic and mutagenic effector.

Health Effects (Acute and Chronic): See Section 3: “Hazards Identification” for potential health effects.

12. Ecological Information

Ecotoxicity Data: Not available.
13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Asbestos; UN2212; Hazard Class 9
NOTE: This material, as packaged for SRM 1866b, is not subject to the regulations per DOT Special Provision 156 and IATA special Provision A61.

15. REGULATORY INFORMATION

U.S. Regulations: CERCLA Sections 102a/103 (40 CFR 302.4); Asbestos: 1 lbs RQ
SARA Title III Section 302 (40 CFR 355.30): Not regulated.
SARA Title III Section 304 (40 CFR 355.40): Not regulated.
SARA Title III Section 313 (40 CFR 372.65): Asbestos.
SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):
  ACUTE: No.
  CHRONIC: Yes.
  FIRE: No.
  REACTIVE: No.
  SUDDEN RELEASE: No.

State Regulations: California Proposition 65: Asbestos is known to the state of California to cause cancer (Feb. 17, 1987).

CANADIAN Regulations
WHMIS Classification: Not determined for this material.

EUROPEAN Regulations
EC Classification (assigned): T Toxic.
  Carcinogen Category 1.

EC Risk Phrases: R45 May cause cancer.
  R23/48 Toxic: danger of serious damage to health by prolonged exposure through inhalation.

EC Safety Phrases: S45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
  S53 Avoid exposure.

National Inventory Status
U.S. Inventory (TSCA): Asbestos: Not listed on inventory.

TSCA 12(b) Export Notification: Asbestos: CAS No.: 1332-21-4
  Section 6

16. OTHER INFORMATION


Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.
1. SUBSTANCE AND SOURCE IDENTIFICATION

National Institute of Standards and Technology  
Standard Reference Materials Program  
100 Bureau Drive, Stop 2300  
Gaithersburg, Maryland 20899-2300  

MSDS Coordinator: Mario Cellarosi  
Telephone: 301-975-6776  
FAX: 301-926-4751  
E-mail: SRMMSDS@nist.gov

SRM Number: 1866b  
MSDS Number: 1866b  
SRM Name: Common Commercial Asbestos

Date of Issue: 09 January 2007  
Emergency Telephone ChemTrec:  
1-800-424-9300 (North America)  
+1-703-527-3887 (International)

Description: Standard Reference Material (SRM) 1866b is a set of three individual commercial-grade asbestos materials: chrysotile, asbestiform grunerite (amosite), and asbestiform riebeckite (crocidolite). A unit of SRM 1866b consists of three bottles, each containing between 1 gram and 3 grams of individual material.

Substance: Asbestiform Grunerite

2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS(a)

<table>
<thead>
<tr>
<th>Component</th>
<th>Other Designations</th>
<th>CAS Number</th>
<th>EC Number (EINECS)</th>
<th>SRM Nominal Concentration (% by weight or volume)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asbestiform Grunerite</td>
<td>Asbestiform Grunerite (grunerite; amosite; brown asbestos; amosite asbestos)</td>
<td>12172-73-5</td>
<td>Not assigned.</td>
<td>&gt; 90</td>
</tr>
<tr>
<td>Magnetite (as an impurity)</td>
<td>Magnetite (magnetic iron oxide; black iron oxide; magnetic iron ore; lodestone; black ferric oxide)</td>
<td>1309-38-2</td>
<td>215-169-8</td>
<td>&lt; 5</td>
</tr>
<tr>
<td>Quartz</td>
<td>Quartz (alpha quartz; silicon dioxide; silica; silicic anhydride; agate)</td>
<td>14808-60-7</td>
<td>238-878-4</td>
<td>&lt; 5</td>
</tr>
</tbody>
</table>

EC Classification: T  
Carcinogen Category 1  
EC Risk (R No.): 23, 45, 48  
EC Safety (S No.): 45, 53

(a) Hazardous components 1% or greater; carcinogens 0.1% or greater are listed in compliance with OSHA 29 CFR 1910.1200.

3. HAZARDS IDENTIFICATION

NFPA Ratings (Scale 0–4):  
Health = 1  
Fire = 0  
Reactivity = 0

Major Health Hazards: Cancer hazard (in humans)
**Potential Health Effects**

**Inhalation:** Inhalation of grunerite asbestos dust may be irritating. Symptoms include a cough and chest pain. Chronic exposure may cause asbestosis, interstitial fibrosis of the lung tissue, which may develop within 4 years to 9 years, but onset may be typically delayed 20 years to 40 years after first exposure. Death from asbestosis may be due to respiratory or cardiac failure. Secondary lung infections may also occur. Chronic exposure of asbestos to workers may also cause pleural effusion as early as 3 years to 4 years after initial exposure. Chronic exposure of asbestos to workers also increases the chance of pleural and peritoneal mesotheliomas, bronchogenic carcinoma, lung cancer, and cancers of the gastrointestinal tract and larynx. The latent period for mesothelioma is 3 years to 40 years; for lung cancer, 15 years to 30 years.

**Skin Contact:** Direct contact may cause irritation. Asbestos fibers may penetrate the skin and result in “asbestos corns”, due to thickening of the skin around the implanted fiber. These corns usually occur on the hands and forearms, and they disappear on removal of the fibers.

**Eye Contact:** Direct contact may cause irritation with redness due to mechanical action.

**Ingestion:** Acute exposure by cause gastrointestinal irritation. Chronic exposure of asbestos fibers may be involved in cancers of the buccal cavity and pharynx, esophagus, stomach, colon, and rectum.

**Listed as a Carcinogen/Potential Carcinogen:**

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

In the National Toxicology Program (NTP) Report on Carcinogens. In the International Agency for Research on Cancer (IARC) Monographs. By the Occupational Safety and Health Administration (OSHA).

---

### 4. First Aid Measures

**Inhalation:** If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Get immediate medical attention.

**Skin Contact:** Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Get medical attention, if needed.

**Eye Contact:** Flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Get immediate medical attention.

**Ingestion:** If a large amount is swallowed, get immediate medical attention.

---

### 5. Fire Fighting Measures

**Fire and Explosion Hazards:** Asbestiform grunerite is a negligible fire hazard.

**Extinguishing Media:** Regular dry chemical. Carbon dioxide. Water. Regular foam.

**Fire Fighting:** If material is involved in a fire, extinguish fire with a medium appropriate for the surrounding fire. Material itself does NOT burn or burns with difficulty. Keep run-off water out of sewers and water sources. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

**Component:** Asbestiform Grunerite

**Flash Point:** Not applicable.

**Method Used:** Not applicable.

**Autoignition Temp.:** Not applicable.

**Flammability Limits in Air**

**UPPER (Volume %):** Not applicable.

**LOWER (Volume %):** Not applicable.
6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Do NOT touch or walk through spilled material. Avoid inhalation of asbestos dust (see Section 8, “Exposure Controls and Personal Protection”). Collect small dry spills with a shovel and place material into an appropriate container for disposal. Prevent entry into waterways and sewers. Clean up residue with a HEPA filter vacuum.

Disposal: Refer to Section 13, “Disposal Considerations”.

7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards.

Safe Handling Precautions: See Section 8, “Exposure Controls and Personal Protection”.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Asbestiform Grunerite
OSHA (PEL): 0.1 fibers/cc TWA
ACGIH (TLV): 0.1 fibers/cc TWA
NIOSH: 0.1 fibers/cc recommended TWA (10 h)

Quartz
OSHA (PEL): 0.3 mg/m³ TWA (total dust) 30 mg/m³% SiO₂ + 2, based on size/aerodynamic characteristics
OSHA (PEL): 0.1 mg/m³ TWA (respirable dust) 10 mg/m³% SiO₂ + 2, based on size/aerodynamic characteristics
ACGIH (TLV): 0.025 mg m⁻³ TWA (respirable dust)
NIOSH: 0.05 mg/m⁻³ recommended TWA (10 h) (respirable dust)
UK WEL: 0.3 mg/m⁻³ TWA (respirable particulate) (Chemical Hazard Alert Notice issued).

Ventilation: Provide local exhaust ventilation system equipped with a HEPA-filter dust collection system.

Respirator: If workplace conditions warrant a respirator’s use, a NIOSH/MSHA approved respirator should be used under an implemented respiratory protection program in accordance with OSHA Standard 29 CFR 1910.134 (General Industry, Use of Respirators) and 29 CFR 1910.1001 for occupational exposure to asbestos.

Eye Protection: Wear safety goggles. An eye wash station should be readily available near areas of use.


9. PHYSICAL AND CHEMICAL PROPERTIES

Component: Asbestiform Grunerite
Relative Molecular Mass: Not applicable.
Molecular Formula: Fe²⁺₇(Si₆O₂₂)(OH)₂
Water Solubility: Insoluble

10. STABILITY AND REACTIVITY

Stability: X Stable Unstable
Stable at normal temperatures and pressure.

Conditions to Avoid: Avoid generating dust. Keep out of water supplies and sewers.

Incompatible Materials: May be attacked by strong acids.

Fire/Explosion Information: See Section 5, “Fire Fighting Measures”.

MSDS 1866b
Hazardous Decomposition: Completely decomposes at temperatures of 1,000 °C.
Hazardous Polymerization:  

<table>
<thead>
<tr>
<th>Will Occur</th>
<th>Will Not Occur</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
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</tr>
</tbody>
</table>

11. TOXICOLOGICAL INFORMATION

<table>
<thead>
<tr>
<th>Route of Entry:</th>
<th>Inhalation</th>
<th>Skin</th>
<th>Ingestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toxicity Data:</td>
<td>Asbestiform Grunerite</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rat, Intrapleural TD_{50}: 150 mg/kg</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

Tumorigenic, Reproductive, Mutagenic Data: Asbestiform grunerite has been investigated as a tumorigenic and mutagenic effector.

Health Effects (Acute and Chronic): See Section 3: “Hazards Identification” for potential health effects.

12. ECOLOGICAL INFORMATION

Ecotoxicity Data: Not available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. TRANSPORTATION INFORMATION

U.S. DOT and IATA: Asbestos; UN2212; Hazard Class 9

NOTE: This material, as packaged for SRM 1866b, is not subject to the regulations per DOT Special Provision 156 and IATA special Provision A61.

15. REGULATORY INFORMATION

U.S. Regulations: CERCLA Sections 102a/103 (40 CFR 302.4): Asbestos: 1 lbs RQ.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Asbestos.


SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

<table>
<thead>
<tr>
<th>ACUTE</th>
<th>CHRONIC</th>
<th>FIRE</th>
<th>REACTIVE</th>
<th>SUDDEN RELEASE</th>
</tr>
</thead>
</table>

State Regulations: California Proposition 65: Asbestos is known to the state of California to cause cancer (Feb. 27, 1987).

CANADIAN Regulations

WHMIS Classification: Not determined for this material.

EUROPEAN Regulations

EC Classification (assigned): T  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Toxic.</td>
</tr>
<tr>
<td>Carcinogen Category 1</td>
<td></td>
</tr>
</tbody>
</table>

EC Risk Phrases: R45

<table>
<thead>
<tr>
<th>R23/48</th>
</tr>
</thead>
<tbody>
<tr>
<td>May cause cancer.</td>
</tr>
</tbody>
</table>

| Toxic: danger of serious damage to health by prolonged exposure through inhalation. |

EC Safety Phrases: S45

<table>
<thead>
<tr>
<th>S53</th>
</tr>
</thead>
<tbody>
<tr>
<td>In case of accident of if you feel unwell, seek medical advice immediately (show the label where possible).</td>
</tr>
</tbody>
</table>

| Avoid exposure. |

MSDS 1866b  
Page 9 of 14
National Inventory Status

U.S. Inventory (TSCA):
Asbestos: Not listed on inventory.

TSCA 12(b)
Export Notification:
Asbestos: CAS No.: 1332-21-4
          Section 6

16. OTHER INFORMATION


Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.
1. Substance and Source Identification

National Institute of Standards and Technology
Standard Reference Materials Program
100 Bureau Drive, Stop 2300
Gaithersburg, Maryland 20899-2300
SRM Number: 1866b
MSDS Number: 1866b
SRM Name: Common Commercial Asbestos
Date of Issue: 09 January 2007

MSDS Coordinator: Mario Cellarosi
Telephone: 301-975-6776
FAX: 301-926-4751
E-mail: SRMMSDS@nist.gov

Standard Reference Material (SRM) 1866b is a set of three individual commercial-grade asbestos materials: chrysotile, asbestosiform grunerite (amosite), and asbestosiform riebeckite (crocidolite). A unit of SRM 1866b consists of three bottles, each containing between 1 gram and 3 grams of individual material.

Substance: Asbestosiform Riebeckite

2. Composition and Information on Hazardous Ingredients

| Component: | Asbestosiform Riebeckite |
| Other Designations: | Asbestosiform Riebeckite (blue asbestos; crocidolite; asbestos; crocidolite asbestos) |
| CAS Number: | 12001-28-4 |
| EC Number (EINECS): | Not assigned. |
| SRM Nominal Concentration (% by weight or volume): | > 90 |
| Component: | Magnetite (as an impurity) |
| Other Designation: | Magnetite (magnetic iron oxide; black iron oxide; magnetic iron ore; lodestone; black ferric oxide) |
| CAS Number: | 1309-38-2 |
| EC Number (EINECS): | 215-169-8 |
| SRM Nominal Concentration (% by weight): | < 5 |
| EC Classification: | T |
| Carcinogen Category: | 1 |
| EC Risk (R No.): | 23, 45, 48 |
| EC Safety (S No.): | 45, 53 |

Hazardous components 1% or greater; carcinogens 0.1% or greater are listed in compliance with OSHA 29 CFR 1910.1200.

3. Hazards Identification

NFPA Ratings (Scale 0–4):
Health = 1  Fire = 0  Reactivity = 0

Major Health Hazards: Inhalation hazard (in humans)

Potential Health Effects

Inhalation: Inhalation of riebeckite asbestos dust may be irritating. Symptoms include a cough and chest pain. Chronic exposure may cause asbestosis, interstitial fibrosis of the lung tissue, which may develop within 4 years to 9 years, but onset may be typically delayed 20 years to 40 years after first exposure. Death from asbestosis may be due to respiratory or cardiac failure. Secondary lung infections may also occur. Chronic exposure of asbestos to workers may also cause pleural effusion as early as 3 years to 4 years after initial exposure. Chronic exposure of asbestos to workers also increases the chance of pleural and peritoneal mesotheliomas, bronchogenic carcinoma, lung cancer, and cancers of the gastrointestinal tract and larynx. The latent period for mesothelioma is 3 years to 40 years; for lung cancer, 15 years to 30 years.

MSDS 1866b
Skin Contact: Direct contact may cause irritation. Asbestos fibers may penetrate the skin and result in “asbestos corns”, due to thickening of the skin around the implanted fiber. These corns usually occur on the hands and forearms, and they disappear on removal of the fibers.

Eye Contact: Direct contact may cause irritation with redness due to mechanical action.

Ingestion: Acute exposure by cause gastrointestinal irritation. Chronic exposure of asbestos fibers may be involved in cancers of the buccal cavity and pharynx, esophagus, stomach, colon, and rectum.

Listed as a Carcinogen/Potential Carcinogen: Yes

X In the National Toxicology Program (NTP) Report on Carcinogens.
X In the International Agency for Research on Cancer (IARC) Monographs.
X By the Occupational Safety and Health Administration (OSHA).

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. If not breathing, give artificial respiration by qualified personnel. Get immediate medical attention.

Skin Contact: Rinse affected area with copious amounts of water followed by washing with soap and water for at least 15 minutes while removing contaminated clothing. Get medical attention, if needed.

Eye Contact: Flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Get immediate medical attention.

Ingestion: Get immediate medical attention. If vomiting occurs, keep head lower than hips to prevent aspiration. Give artificial respiration, if not breathing, by qualified personnel.

5. FIRE FIGHTING MEASURES

Fire and Explosion Hazards: Asbestiform Riebeckite


Fire Fighting: If material is involved in a fire, extinguish fire with a medium appropriate for the surrounding fire. Material itself does NOT burn or burns with difficulty. Keep run-off water out of sewers and water sources. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Component: Asbestiform Riebeckite

Flash Point: Not applicable.

Method Used: Not applicable.

Autoignition Temp.: Not applicable.

Flammability Limits in Air
UPPER (Volume %): Not applicable.
LOWER (Volume %): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Occupational Release: Do NOT touch or walk through spilled material. Avoid inhalation of asbestos dust (see Section 8, “Exposure Controls and Personal Protection”). Collect small dry spills with a shovel and place material into an appropriate container for disposal. Prevent entry into waterways and sewers. Clean up residue with a HEPA filter vacuum.

Disposal: Refer to Section 13, “Disposal Considerations”.

MSDS 1866b
7. HANDLING AND STORAGE

Storage: Store and handle in accordance with all current regulations and standards. Store in a cool, dry place.

Safe Handling Precautions: See Section 8, “Exposure Controls and Personal Protection”.

8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits: Asbestiform Riebeckite
OSHA (PEL): 0.1 fibers/cc TWA
ACGIH (TLV): 0.1 fibers/cc TWA
NIOSH: 0.1 fibers/cc recommended TWA (10 h)

Ventilation: Provide local exhaust ventilation system equipped with HEPA-filter dust collection system.

Respirator: If workplace conditions warrant a respirator’s use, a NIOSH/MSHA approved respirator should be used under an implemented respiratory protection program in accordance with OSHA Standard 29 CFR 1910.134 (General Industry, Use of Respirators) and 29 CFR 1910.1001 for occupational exposure to asbestos.

Eye Protection: Wear safety goggles. An eye wash station should be readily available near areas of use.


9. PHYSICAL AND CHEMICAL PROPERTIES

Component: Asbestiform Riebeckite
Appearance: Fibrous solid to dust-like powder. Blue to purple color. Odorless.
Molecular Formula: Na₂(Fe²⁺₃Fe³⁺₂)(Si₆O₂₂)(OH)₂
Water Solubility: Insoluble.

10. STABILITY AND REACTIVITY

Stability: X Stable _____ Unstable
Stable at normal temperatures and pressure.

Conditions to Avoid: Avoid generating dust. Keep out of water supplies and sewers.

Incompatible Materials: May be attacked by strong acids.

Fire/Explosion Information: See Section 5, “Fire Fighting Measures”.

Hazardous Decomposition: Completely decomposes at temperatures of 1 000 °C.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

11. TOXICOLOGICAL INFORMATION

Route of Entry: X Inhalation X Skin X Ingestion

Toxicity Data: Asbestiform Riebeckite
Rat, Intraperitoneal LD₁₀: 300 mg/kg
Rat, Inhalation-Intermittent TC₁₀: 7 200 µg/m³ (6 h – 20 days)
Rat, Inhalation-Intermittent TC₁₀: 13 600 µg/m³ (6 h – 5 days)

Tumorigenic, Reproductive, Mutagenic Data: Riebeckite asbestos has been investigated as a tumorigenic and mutagenic effector.

Health Effects (Acute and Chronic): See Section 3: “Hazards Identification” for potential health effects.
12. **ECOLOGICAL INFORMATION**

Ecotoxicity Data: Not available.

13. **DISPOSAL CONSIDERATIONS**

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

14. **TRANSPORTATION INFORMATION**

U.S. DOT and IATA: Asbestos; UN2212; Hazard Class 9

NOTE: This material, as packaged for SRM 1866b, is not subject to the regulations per DOT Special Provision 156 and IATA special Provision A61.

15. **REGULATORY INFORMATION**

U.S. Regulations: CERCLA Sections 102a/103 (40 CFR 302.4): Asbestos: 1 lbs RQ.

SARA Title III Section 302 (40 CFR 355.30): Not regulated.

SARA Title III Section 304 (40 CFR 355.40): Not regulated.

SARA Title III Section 313 (40 CFR 372.65): Asbestos.


SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21):

- **ACUTE:** No.
- **CHRONIC:** Yes.
- **FIRE:** No.
- **REACTIVE:** No.
- **SUDDEN RELEASE:** No.

State Regulations: California Proposition 65: Asbestos is known to the state of California to cause cancer (Feb. 27, 1987)

CANADIAN Regulations
WHMIS Classification: Not determined.

EUROPEAN Regulations
EC Classification (assigned): T  
Toxicity.
Carcinogen Category 1.

EC Risk Phrases: R45  
May cause cancer.
R23/48  
Toxic: danger of serious damage to health by prolonged exposure through inhalation.

EC Safety Phrases: S45  
In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S53  
Avoid exposure.

National Inventory Status
U.S. Inventory (TSCA): Asbestos: Not listed on inventory.

TSCA 12(b) Export Notification: Asbestos: CAS No. 1332-21-4  
Section 6

16. **OTHER INFORMATION**


Disclaimer: Physical and chemical data contained in this MSDS are provided only for use as a guide in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.
MATERIAL SAFETY DATA SHEET
(POLYCHLORINATED BIPHENYLS)

COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients Name: polychlorinated biphenyls (PCBs)

HAZARD IDENTIFICATION

Reports of Carcinogenicity: YES

HEALTH HAZARDS ACUTE AND CHRONIC

- **Eyes**: Moderately irritating to eye tissues.
- **Skin**: Can be absorbed through intact skin, may cause de-fatting, potential for chloracne.
- **Inhalation**: Possible liver injury.
- **Ingestion**: Slightly toxic; reasonably anticipated to be carcinogenic.

EFFECTS OF OVER-EXPOSURE

Can cause dermatological symptoms; however, these are reversible upon removal of exposure source.

FIRST AID MEASURES

- **Eyes**: Irrigate immediately with copious quantities of running water for at least 15 minutes if liquid or solid PCBs get into them.
- **Skin**: Contaminated clothing should be removed and the skin washed thoroughly with soap and water. Hot PCBs may cause thermal burns.
- **Inhalation**: Remove to fresh air; if skin rash or respiratory irritation persists, consult a physician (if electrical equipment arcs over, PCBs may decompose to produce hydrochloric acid).
- **Ingestion**: Consult a physician. Do not induce vomiting or give any oily laxatives. (If large amounts are ingested, gastric lavage is suggested).

FIRE FIGHTING MEASURES: Flash Point: >141 °C (285.8 °F)

EXTINGUISHING MEDIA: PCBs are fire-resistant compounds.
FIRE-FIGHTING PROCEDURES

Standard fire-fighting wearing apparel and self-contained breathing apparatus should be worn when fighting fires that involve possible exposure to chemical combustion products. Fire fighting equipment should be thoroughly cleaned and decontaminated after use.

UNUSUAL FIRE/EXPLOSION HAZARD

If a PCB transformer is involved in a fire-related incident, the owner of the transformer is required to report the incident. Consult and follow appropriate federal, provincial and local regulations.

Note: When askarel liquid becomes involved in a fire, toxic by-products of combustion are typically produced including polychlorinated dibenzofurans and polychlorinated dibenzodioxins, both known carcinogens. The structures of these chemical species are as follows:

\[
\text{TCDF} \quad C_{12}H_{8-n}Cl_nO \quad n = 4 - 8
\]

\[2,3,7,8\text{-tetrachlorodibenzo-furan}\]

\[
\text{TCDD} \quad C_{12}H_{8-n}Cl_nO_2 \quad n = 4 - 8
\]

\[2,3,7,8\text{-tetrachloro-dibenzo-p-dioxin}\]

Note: 2,3,7,8-tetrachloro-dibenzo-p-dioxin is one of the most potent teratogenic, mutagenic and carcinogenic agents known to man.

SPILL RELEASE PROCEDURES

Cleanup & disposal of liquid PCBs are strictly regulated by the federal government. Ventilate area. Contain spill/leak. Remove spill by means of absorptive material. Spill clean-up personnel should use proper protective clothing. All wastes and residues containing PCBs should be collected, containerized, marked and disposed of in the manner prescribed by applicable federal, provincial and local laws.

HANDLING AND STORAGE PRECAUTIONS

Care should be taken to prevent entry into the environment through spills, leakage, use, vaporization, or disposal of liquid. Avoid prolonged breathing of vapours or mists. Avoid contact with eyes or prolonged contact with skin. Comply with all federal, provincial and local regulations.
**OTHER PRECAUTIONS**

Federal regulations require PCBs, PCB items, storage areas, transformer vaults, and transport vehicles to be appropriately labelled.

**RESPIRATORY PROTECTION**

Use OHSA approved equipment when airborne exposure limits are exceeded. Full facepiece equipment is recommended and, if used, replaces need for face shield and/or chemical splash goggles. The respirator use limitations specified by the manufacturer must be observed.

**VENTILATION**

Provide natural or mechanical ventilation to control exposure levels below airborne exposure levels.

**PROTECTIVE GLOVES:** Wear appropriate chemical resistant gloves to prevent skin contact.

**EYE PROTECTION:** Wear chemical splash goggles and have eye baths available.

**OTHER PROTECTIVE EQUIPMENT**

Wear appropriate protective clothing. Provide a safety shower at any location where skin contact can occur.

**WORK HYGIENIC PRACTICES**

Wash thoroughly after handling. Supplemental safety and health: none

**PHYSICAL/CHEMICAL PROPERTIES**

- **Vapour pressure:** (mm Hg @100 °F) 0.005 - 0.00006
- **Viscosity:** (CENTISTOKES) 3.6 - 540
- **Stability indicator/materials to avoid:** Yes
- **Stability Condition to Avoid:** PCBs are very stable, fire-resistant compounds.

**HAZARDOUS DECOMPOSITION PRODUCTS**

Carbon monoxide, carbon dioxide, hydrogen chloride, phenolics, aldehydes, furans, dioxins

**WASTE DISPOSAL METHODS**

Consult the applicable PCB regulations prior to any disposal of PCBs or PCB-contaminated items.
SITE SURVEY PLAN
LEGEND & NOTES:

- LEAF, BOUNDARY, SHOWN TIMES
- OWN SHOWN TIMES
- CLS PERIOD TIMES
- Contour Interval: 5 m

Distances are in metres and decimals thereof.

Bearings are in the pole NAD 83 Zone K and are referenced to the central meridian 135°W.

Elevations are referenced to AGL T.D.1988 (+313) and are orthometric.

"GPM" Lordtøys 10" +169 Highwater High


Surveyed: April 25-29, 2009
This drawing is prepared for the use of the contractual customer of WorleyParsons Canada Services Ltd. and WorleyParsons Canada Services Ltd. assumes no liability to any other party for any representations contained in this drawing.
FIGURE B3

IMPERIAL OIL RESOURCES VENTURES LTD.
GEOTECHNICAL DESKTOP STUDY
TUKTOYAKTUK BASE, NT

SITE SURVEY
CROSS SECTION C & D

WEST (TOWARDS TUKTOYAKTUK HARBOUR)

EAST (TOWARDS MAYOGIAK INLET)

SECTION
H 251 V 128

SECTION
H 251 V 128

EROSION

LOWER TERRACE

APPROX LOCATION
NORTHERN EROSION
NORTH

APPROX LOCATION
SOUTHERN EROSION
SOUTH

LOWER TERRACE

NORTH SOUTH

EAST (TOWARDS MAYOGIAK INLET)

WEST (TOWARDS TUKTOYAKTUK HARBOUR)

1:1/50

m 0 25 50 15 m

m 0 50 100 150 m

1:2500

1:1/50

0

1/2

1

2

3

4

5