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APPENDIX H

EMERGENCY AND SPILL RESPONSE PLAN

- Knight Piésold Report (Ref. No. NB102-00181/6-6, Rev. 0) 133 pages

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BAFFINLAND IRON MINES CORPORATION
MARY RIVER PROJECT

BULK SAMPLING PROGRAM
EMERGENCY AND SPILL RESPONSE PLAN
(REF. NO. NB102-00181/6-6)

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PREAMBLE

This Emergency and Spill Response Plan for the bulk sampling program at the Mary River Project will be in effect upon commencement of the program, and applies to all licensed elements of the program. The Plan was developed with the aid of the *Contingency Planning and Spill Reporting in Nunavut: A Guide to the New Regulations* (Environmental Protection Service).

This plan has been drafted in late 2006 to support environmental screening and permitting activities for the bulk sampling program. The Plan will be updated and revised as appropriate prior to commencement of the bulk sampling program to reflect any changes that may have arisen in the proposal.

Marine spill contingency planning is addressed in the Ship Spill Contingency Plans of the ship operators.

Formal distribution of the Plan has been made to:

Department of Environment
PO Box 1000 Station 1300
Iqaluit, NU, Canada
X0A 0H0
Tel: (867) 975-7700, 1-866-222-9063
Fax: (867) 975-7742

Department of Environment - Environmental Protection Division
PO Box 1000 Station 1300
Iqaluit, NU, Canada
X0A 0H0
Tel: (867) 975-7700, 1-866-222-9063
Fax: (867) 975-7742

Department of Fisheries and Oceans - Central and Arctic Region
501 University Crescent
Winnipeg, MN, Canada
R3T 2N6
Tel: (204) 983-5000
Fax: (204) 984-2401

Hamlet of Pond Inlet
PO Box 180
Pond Inlet, NU, Canada
X0A 0S0
Tel: (867) 899-8934
Fax: (867) 899-8940

Indian and Northern Affairs Canada - Nunavut Regional Office
Land Administration Division
PO Box 2200
Iqaluit, NU, Canada
X0A 0H0
Tel: (867) 975-4280 (Land Administration Manager)

Indian and Northern Affairs Canada - Nunavut Regional Office
Water Resources Division
PO Box 2200
Iqaluit, NU, Canada
X0A 0H0
Tel: (867) 975-4550 (Water Resources Manager)

Mittimatalik Hunters and Trappers Organization
PO Box 189
Pond Inlet, NU, Canada
X0A 0S0
Tel: (867) 899-8856
Fax: (867) 899-8095

Nunavut Impact Review Board
PO Box 1360
Cambridge Bay, NU, Canada
X0B 0C0
Tel: (867) 983-4600, 1-866-233-3033
Tax: (867) 983-2594

Nunavut Water Board
PO Box 119
Gjoa Haven, NU, Canada
X0B 1J0
Tel: (867) 360-6338
Fax: (867) 360-6369

Qikiqtani Inuit Association
PO Box 1340
Iqaluit, NU, Canada
X0A 0H0
Tel: (867) 979-5391, 1-800-6672742 (Land Administrator)
Fax: (867) 979-3238

Additional copies and updates of the Plan may be obtained by contacting:

Baffinland Iron Mines Corporation
Suite 1016, 120 Adelaide Street West
Toronto, ON, Canada
M5H 1T1
Tel: (416) 364-8820
Fax: (416) 364-0193

or

Knight Piésold Ltd.
1650 Main Street West
North Bay, ON, Canada
P1B 8G5
Tel: (705) 476-2165
Fax: (705) 474-8095

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(REF. NO. NB102-00181/6-6)

SECTION 1.0 - INTRODUCTION

1.1 PURPOSE

The purpose of this Emergency and Spill Response Plan is to provide to Baffinland Iron Mines Corporation (Baffinland), its contractors, and government agencies with the necessary information to respond effectively to both emergencies and spill events that might occur in relation to the bulk sampling program at the Mary River Project, the location of which is shown on Figure 1.1. The Plan defines the responsibilities of key response personnel and provides action plans to address the following emergency situations:

- Necessities of life
  - Lack of adequate shelter
  - Power outages
  - Lack of heat
  - Interruptions to potable water supply
  - Interruptions to food supply
  - Sewage system failures
- Personnel issues
  - Medical emergencies
  - Missing persons
  - Missing or overdue aircraft or truck convoys and accidents
  - Trapped at work sites during extreme weather or airstrip inoperability
  - Mine rescue
- Natural environment-related issues
  - Floods
  - Severe winds
  - Whiteout conditions or extreme cold
  - Wild animal incursions
  - Seismicity
- Operational incidents
  - Fires
  - Hostile actions
  - Automobile and equipment accidents
  - Explosions
  - Animal incidents
- Fuel and other spills

This Emergency and Spill Response Plan supersedes the Spill Response Plan developed by Baffinland for the exploration program.

1.2 RESPONSE PRINCIPLES

Response to emergencies or spills will be based on the following principles:

- Ensure safety and well-being
- Evacuate to a place of safety
- Communicate with supervisors, on-site personnel, on-site coordinators, on-site emergency medical professionals, project manager, and regulatory authorities and other external contacts
- Stop or limit an ongoing emergency
- Establish and initiate further response, reporting procedures, and follow-up programs

1.3 TERMS AND CONDITIONS OF PERMITS AND LICENSES

Baffinland's operations are subject to the following licenses/permits:

Type of Authorization	Permit No.	Authorizing Agency	Governing Activity	Dates Valid
Water License (Type B)	NWB2MRY0406	Nunavut Water Board	Water use and waste disposal	Mar 10, 2004 to Dec 31, 2006
Inuit Land Use License	Q05L2C14	Qikiqtani Inuit Association	exploration activities on Inuit Owned Lands	June 17, 2005 to Dec 31, 2006
Land Use Permit	N2004C0017	Department of Indian and Northern Affairs Canada	exploration activities on Crown Land	June 29, 2004 to June 28, 2006

An explosives use permit will also be obtained for the bulk sampling program.

The following paraphrases the terms and conditions of the above authorizations that are relevant to emergency and spill response:

1. Restrict all land use operation to lands designated to the Project.
2. Dispose of all combustible garbage, debris, and other waste products by daily incineration in a suitable container or removal to an approved site.
3. Keep combustible garbage and debris in a covered metal container until disposed of.
4. Remove non-combustible garbage and debris from site to and approved disposal location.
5. Avoid archaeological sites and burial grounds.
6. Flag, report, and protect archaeological sites and burial grounds and carving-stone sites.
7. Keep petroleum or chemical products from spreading to surrounding lands or into water bodies.
8. All petroleum containers should be labelled with the owner's name.
9. Immediately report spills to 24-hour spill line.

10. Implement sediment and erosion control measures prior to and maintained to prevent entry of sediment into water.
11. Locate drill sumps at least thirty (30) m from the ordinary high water mark of any water body.
12. Keep petroleum storage containers at least thirty (30) m from the ordinary high water mark of any water body.
13. Locate waste disposal areas at least thirty (30) m above the ordinary high water mark of any water body.
14. Contain all greywater in a sump located at least thirty (30) m above the ordinary high water mark of any water body.
15. Contain all sewage in latrine pits located at least thirty (30) m above the ordinary high water mark of any water body.
16. Treat latrine pits with lime and cover with 0.5m of native material prior to abandonment.

SECTION 2.0 - PROJECT FACILITIES

Figure 2.1 shows the locations of the following facilities to be used during the bulk sampling program:

- Mary River camp, including the mining and crushing areas
- Roadside “Midway” camp
- Milne Inlet tote road
- Milne Inlet camp and ore loading facilities

Each of these facilities is described below with respect to available resources and equipment to respond to emergencies.

2.1 MARY RIVER FACILITIES

The Mary River camp, shown on Figure 2.2, will consist of an existing, seasonally-operated, 100-person Weatherhaven™ camp and an additional 100-person, all-weather Weatherhaven™ camp; various outbuildings; bulk fuel storage (diesel and Jet-A); an airstrip equipped with lighting, power supply, helipad, lay down area and crushing/screening area. The crushing/screening area will consist of a portable crusher and screens; contractors trailer and shop; bulk fuel storage, generator and fuelling station; explosives storage magazines; and ore stockpiles. The airstrip has been rehabilitated and has a useable length of 760 m in the summer and some 1,280 m when the strip is frozen.

A portion of the road contractor equipment and all the mining equipment will be positioned at the Mary River camp. Spill response equipment will also be positioned at fuel storage areas.

The Mary River camp water supply is Camp Lake, and the pump draws some 5 to 15 m^3/day and the pump intake is covered by a mesh screen. Greywater from the kitchen and shower tent is deposited in a sump beside the camp.

The Mary River camp coordinates are:

Latitude 71 degrees 18' 30" north
Longitude 79 degrees 23' 30" west

Contact telephone number
(416) 619-0538
or
(011) 88 163 146 6078

2.2 MILNE INLET FACILITIES

The Milne Inlet facilities, shown on Figure 2.3, will consist of a 30-person trailer camp, airstrip with lighting, two power supply generators, fuel storage, ore loading facilities, and temporary ore

stockpiles. Various trucks and heavy equipment will be positioned at Milne Inlet. Spill response equipment will also be positioned at fuel storage areas.

The Milne Inlet camp coordinates are:

Latitude 71 degrees 53' 32" north
Longitude 80 degrees 53' 41" west

A satellite telephone will be positioned at the Milne Inlet camp and the telephone number will be included in the update of this Plan.

2.3 MIDWAY CAMP FACILITIES

The Midway camp will consist of an 12-person capacity trailer camp, located next to an old airstrip, which has had limited recent use up to 2006 and will not be equipped with airstrip lighting. Road superintendent trucks and possibly heavy equipment may be positioned at this camp at various times. A small cache of fuel drums will be maintained at this camp, within a lined containment. Spill response equipment will be positioned at the Midway camp. The purposes of the camp are to service road traffic and respond to emergencies between the Mary River and Milne Inlet camps.

The Midway camp coordinates are:

Latitude 71 degrees 26' 07" north
Longitude 80 degrees 10' 37" west

A satellite telephone will be positioned at the Milne Inlet camp and the telephone number will be included in the update of this Plan.

2.4 MILNE INLET TOTE ROAD COMMUNICATIONS AND SAFETY

Radio towers will be established at Mary River, Midway, and Milne Inlet camps and all vehicles will be equipped with radios. Signposts will be placed at every kilometre along the Milne Inlet tote road, Milne Inlet being kilometre zero and Mary River kilometre 110. All operators will transmit their location, direction, and type of vehicle for all other road users (Example: ore truck, loaded, kilometre 34, outbound).

The road will be single-lane with passing areas approximately every five (5) km. Loaded production vehicles will have the right of way over other vehicles. Ore haul trucks will be equipped with GPS tracking systems that will be monitored remotely from computers at camps and serve as an emergency locator system.

The road will have public access and, as such, local people not associated with the project may use it. A communications protocol will be established with the community of Pond Inlet that involves check in and check out with project security personnel when planning to use the road. Radios will be provided for this use and Baffinland will use best efforts to establish a bilingual radio broadcast

person to assist with radio communications for local road users. All Terrain Vehicles (ATV) and snow mobiles will be encouraged to use tracks adjacent and parallel to the road during times of intense usage.

2.5 EQUIPMENT

The following equipment will be positioned at the various project sites:

Baffinland (Mary River)	Road Contractor (Milne Inlet tote road)	Mining Contractor (Mining area)
Excavator (1)	Excavator (1)	50-t haul trucks (3)
Dozers (3)	Dozer (1)	40-t highway trucks (11)
Quads (4)	Front end loader (1)	Tractors with rock boxes
Boom truck and trailer	Vibratory compactor & screen	Front-end loaders (2)
1-t flatbed trucks (2)	Rock truck (1)	Dozer (1)
Articulated forklift truck (1)	Dump truck with plow (1)	Excavator (1)
Spill response units (4)	Housing trailers (2)	Grader (1)
Milne Inlet camp genset	Parts trailer	Service truck (1)
Midway camp genset	Supervisor truck (1)	Rock drills (2)
Mary River camp genset		Crusher with 750 kw genset
Sewage system - rotary disk		Blasting truck
Maintenance shop		Crew cab pick-up trucks (7)
Warehousing sea containers		Fuel Truck (1)
Office trailer		
Explosive magazines (16)		

SECTION 3.0 - RESPONSE ORGANIZATION

3.1 EMERGENCY AND SPILL RESPONSE TEAM

The following table represents the contacts related to the Emergency and Spill Response Team.

Position	Contact
Vice President, Operations	Rod Cooper Baffinland Iron Mines Corporation Suite 1016, 120 Adelaide Street West Toronto, ON, Canada, M5H 1T1 Tel: 416 364 8820 ext. 34 Cell: 416 722 5660
Project Manager	Roland Landry Baffinland Iron Mines Corporation Tel: 88 163 146 6078 or 416 619 0538
On-site Co-Coordinator (alternates)	Jeff Bush or Tom Ianelli Baffinland Iron Mines Corporation Mary River camp Tel: 88 163 146 6078 or 416 619 0538
On-site Co-Coordinator	Kevin Mealey Baffinland Iron Mines Corporation Mary River camp Tel: 88 163 146 6078 or 416 619 0538
On-site Emergency Medical Professional	Contracted services, to be identified
Air Nunavut National Air Ambulance System	Iqaluit Airport, Iqaluit Tel: 867 979 4018
Project Personnel	There will be at least 40 people on-site to aid in emergency response

The responsibilities of the **On-site Co-ordinator** include the following:

- Assume authority over the scene and personnel involved
- Activate the Emergency and Spill Response Plan
- Evaluate the initial response and assesses the severity of the emergency
- Report the emergency to the Project Manager or Vice President, Operations
- Report to the Project Manager and provide recommendations on resource requirements (additional manpower, equipment, material, etc.)
- Mobilize personnel and equipment
- Implement follow-up programs

The responsibilities of the **Project Manager** include the following:

- Manage site activities including but not limited to supporting the On-site Co-ordinator in implementation of Emergency and Spill Response Plan
- Report to the Vice President, Operations on incidents, response measures and outcomes
- Obtain additional required resources not available on-site
- Document the cause of the emergency and effectiveness of the response, and implement the appropriate measures to prevent a recurrence
- Prepare follow-up documentation as required, to be provided to Vice President, Operations for dissemination to shareholders, stakeholders, and regulators
- Ensure that the situation is resolved and all follow-up communication and reports are filed with the necessary regulatory authorities (including spill reports)

The responsibilities of the **Vice President, Operations** include the following:

- Liaise with Project Manager, providing overall direction of corporate resources
- Communicate with stakeholders and government agencies
- Provide media relations, if required

SECTION 4.0 - INITIAL RESPONSE

Anyone working at a Project site may be the first to encounter an emergency and will be expected to initiate a response. To ensure the safety of individuals and initiate response, the following steps should be carried out:

- Assess the severity of the emergency
- Ensure people's safety and evacuate to a temporary place of safety, if necessary
- Report to the On-site Co-ordinator or Project Manager the type and location of the emergency as well as hazards present and other health and safety concerns
- Communicate with individuals in the vicinity of the emergency
- Prepare for possible further evacuation

Emergencies may be minor and of low seriousness or consequence, or may be serious and require the aid of on- and/or off-site resources. The following sections offer descriptions of minor and serious emergencies and response plans.

4.1 MINOR EMERGENCIES

A minor emergency is an emergency that does not interrupt site operations, is not life-threatening, and does not result in any substantial environmental damage. In the event of a minor emergency, on-site resources will be required to remedy the situation. Evacuation or off-site resources will not be necessary, and response can be coordinated by the On-site Co-ordinator and Project Manager without contacting Baffinland's Vice President, Operations. All minor emergencies and incidents are to be documented.

4.2 SERIOUS EMERGENCIES

A serious emergency is an emergency that requires an interruption to site operations. The incident may be life-threatening and may involve substantial environmental damage. A serious emergency may require off-site resources for effective response. In the event of a serious emergency, further severity will be assessed by the Project Manager and a decision made whether on- or off-site resources will be needed to remedy the situation.

SECTION 5.0 - RESPONSE PLANS FOR EMERGENCIES

5.1 NECESSITIES OF LIFE

5.1.1 Lack of Adequate Shelter

Shelter is a basic necessity required for survival. Shelter at each site is provided from individual all-weather tents or trailers. A fire or major storm event could result in the destruction of an entire camp, requiring large scale evacuation, for which there will be fixed-wing and rotary aircraft available at all times. In the event of destruction of the camp at Mary River when evacuation is not possible due to weather, refuge will be sought in one of the steel Quonset buildings or other outbuildings at site, several of which are heated. At Milne Inlet and Midway camp, refuge can be sought in vehicles.

The nearest off-site facilities are in Pond Inlet, about 160 km from the Mary River camp, or Igloolik (230 km) or Arctic Bay (270 km). Evacuation will proceed except when personnel health or safety is at risk.

Events that may result in inadequate shelter could involve remote work (addressed in Section 5.2.4).

5.1.2 Lack of Heat

Each building is equipped with its own oil-fired stove. Events that may cause a lack of heat are those that affect the small oil supply at a tent or trailer. These include extreme weather, damage by wild animals, hostile actions, vandalism, and vehicle accidents. During a lack of heat emergency, oil supply and stove components will be repaired or replaced as needed. Further response will involve personnel being moved to different on-site facilities as per Section 5.1.1.

5.1.3 Power Outages

Power is supplied to camps via generators. Back-up generators will be available at the Mary River and Milne Inlet camps and standby/emergency portable generators will be available at all sites. Events that may cause a power outage are those that affect the generators, such as extreme weather, damage by wild animals, fires, hostile actions, vandalism, and vehicle accidents. Heat is provided by oil furnaces so an interruption of power will not result in a lack of heat. During these outages back-up power supply will be directed at communications equipment and emergency lighting, over other uses.

5.1.4 Interruptions to Potable Water Supply

The Mary River and Milne Inlet camps will be equipped with water storage tanks. Water is pumped from Camp Lake to supply the Mary River camp and delivered by truck to the Milne Inlet camp. Events that may cause an interruption to the potable water supply include extreme weather (i.e. lines freezing), vandalism, mechanical failures, and fuel and

other chemical spills. When such an interruption occurs, water use will be restricted to drinking and for cooking over other uses. Boiled and bottled water may be provided to personnel during these restrictions. Equipment will be repaired or replaced as needed. Long-term alternative water supply needs will involve consultation with regulatory authorities.

5.1.5 Interruptions to Food Supply

Food arrives at all sites by air, and prolonged poor weather could limit airlifts. Airstrip lighting will make it easier for pilots to land during some events such as extreme weather. When planes cannot fly, food stuffs will be brought in by helicopter if possible. Sufficient food supplies will be kept at each site to account for a prolonged delay in food deliveries.

5.1.6 Sewage System Failures

Sewage at the Mary River and Milne Inlet camps will be treated using package sewage treatment plants. An interruption in sewage disposal could arise out of plant inoperability, poor treatment performance, or due to a frozen outfall. Troubleshooting and repairs will be undertaken immediately if a system fails to ensure treatment continues. If the problem is expected to persist for some time, back-up procedures will be implemented as follows:

- Restrict water use to necessities (drinking, cooking, etc.)
- Switch to latrine toilets and temporarily contain greywater
- Develop emergency or alternate disposal options in consult with applicable government agencies

5.2 PERSONNEL ISSUES

5.2.1 Medical Emergencies

In the event of medical or related emergencies, any person who discovers someone injured will implement initial response (Section 4.0), and identify back-up assistance, preferably the dedicated on-site medical professionals or alternatively someone with First Aid training. The on-site medical professional will implement their protocols to address medical emergencies, providing further care, coordinating uninjured personnel to assist in the response, and arrange transfer to other health care facilities in Pond Inlet or Iqaluit as necessary.

For an emergency not requiring off-site resources or medivac, the victim will receive continuous observation/treatment by the on-site medical professional at the First Aid tent.

If the victim(s) will require facilities and services beyond that which can be given on-site, the victim(s) may be evacuated from site to receive further medical treatment at Pond Inlet or Iqaluit. A fixed-wing aircraft and several rotary-wing aircraft will be available at Mary River camp or area for medical evacuation. Alternatively, Air Nunavut's Medivac service based in

Iqaluit will be engaged. The On-site Coordinator or Project Manager will make the necessary arrangements as directed by the On-site Medical Professional.

The following information is required to initiate a medical evacuation (Air Nunavut National Air Ambulance System, 2006):

1. Caller's information: name, location and phone number where you can be reached
2. Patient information: name, location, phone number, condition, reason for admission to hospital, insurance information, family information and destination
3. Attending physician information: name, location and phone number
4. Family doctor information: name, location and phone number
5. Who admitted the patient?
6. Is patient competent at this time?
7. When will the patient be able to travel?
8. Will family be traveling with the patient?
9. Does the patient have any communicable diseases?
10. Is there a bed waiting at the patient's destination?
11. Does the patient have immigration/customs department documentation?
12. Are there any travel restrictions?
13. Is there anything else we should know?

In the event of a fatality at a work site, Baffinland will exercise discretion for, offer counseling to, and consult with family and/or community members.

5.2.2 Missing Persons

To reduce the potential for missing persons, personnel will check-in regularly and execute proper remote work practices as outlined in Baffinland's or contractor's health and safety plan. Resources such as personnel, equipment, land vehicles, and aircraft will be mobilized to aid search and rescue operations. Additional resources and services from local communities will be drawn upon as needed.

5.2.3 Missing or Overdue Aircraft or Truck Convoys and Accidents

Aircraft and truck convoys will remain in contact with dispatch while departing from and en route between sites. In the event that a vehicle does not report, the On-site Co-ordinator will be notified and they will in turn initiate the Emergency and Spill Response Team. Additional support for rescue operations for incidents will be implemented with site personnel and appropriate regulatory authorities as needed.

In the event of an accident, injuries will be reported to one of the designated trained first aid personnel in camp as soon as possible. Injuries will be reported immediately to medical personnel, Supervisors and Project Manager, who will implement treatment as required.

5.2.4 Trapped at Work Sites during Extreme Weather or Airstrip Inoperability

As previously mentioned, sufficient supplies will be kept at each site in the event of weather-related interruptions. Also, all vehicles have survival packs in case of equipment malfunction en route between camps. Further response will involve moving personnel to other on-site facilities or be evacuated to off-site facilities as per Section 5.1.1.

5.2.5 Mine Rescue

Mining involves shallow open pits with no underground workings, so specialized mine rescue expertise will not be required, and this Plan shall be implemented. Explosions are addressed in Section 5.4.4.

5.3 NATURAL ENVIRONMENT-RELATED ISSUES

5.3.1 Floods

Flooding could potentially occur within local creeks and rivers affecting access along the Milne Inlet tote road if a crossing structure was made inoperable. A serious emergency is not envisaged from a flood. Washed out road sections will be immediately repaired using available equipment. Refer to Section 2.5 for the available equipment.

5.3.2 Severe Winds

Work activities that are exposed to severe winds, such as aircraft departures/arrivals and work at height, will cease when necessary. When severe winds cause poor visibility and present health and safety concerns, activities will cease or be modified, as appropriate.

5.3.3 Whiteout Conditions or Extreme Cold

The region experiences cold weather nearly year-round and snow is possible during any month of the year. When extreme cold or poor visibility presents health and safety concerns, activities will cease or be modified, as appropriate. If white-out conditions persist, communications with the On-site Coordinator may be necessary to decide the course of action and if travel or rescue is necessary.

5.3.4 Animal Incursions

Work within or near coastal areas comes with the possibility of a bear encounter during all times of the year, and polar bear encounters are even possible at Mary River during the open water periods (i.e., August and September). Personnel will be provided with training to respond to polar bears. Workers at coastal areas should have nearby shelter (trailers, operable vehicles, helicopter) to seek refuge to at all times, or should be accompanied by a dedicated bear monitor.

All other animals (hare, fox, wolf and caribou) should be avoided and be given the right-of-way, and feeding animals is not permitted under any circumstances.

A vehicle collision with an animal is possible, although unlikely provided vehicles abide by the 30 km/hr speed limit imposed on Project-related traffic.

If necessary, animals will be relocated as opposed to being destroyed, unless personnel health and safety is at risk. Firearms will be prohibited at all sites, except for trained bear monitors.

Animal fatalities will be reported to the Government of Nunavut wildlife officer and local hunters and trappers organizations.

5.3.5 Seismicity

The potential frequency and magnitude of a seismic event has not been determined as the consequence of such an event is considered low, owing to the lack of large, permanent and rigid structures such as large frame buildings and steel fuel tanks.

5.4 OPERATIONAL INCIDENTS

5.4.1 Fires

Any scheduled burning on-site, such as incineration, will follow regulatory requirements and control procedures. Fire extinguishers will be stationed at work areas including kitchens, incinerators, generators, etc. Personnel will be evacuated from sites if a fire cannot be immediately controlled or impacts necessities of life or personnel issues. Trained, on-site personnel will respond to fires using on-site equipment and notify regulatory authorities as needed.

5.4.2 Hostile Actions

All incidents of hostile actions will be reported to camp management who will subdue the hostile person or people while ensuring the safety of others, including the response team. If necessary, local RCMP will be mobilized to site to assist in managing any hostile person or people as soon as possible.

5.4.3 Automobile and Equipment Accidents

Accidents with vehicles and other equipment will be reported to a supervisor, the Project Manager or drill foreman as soon as possible to initiate the Emergency and Spill Response Team. Priority response will be given to necessities of life and, if a fuel spill has occurred, the Emergency and Spill Response Plan (Section 5.5) will be initiated. After priority issues are resolved, equipment will be “tagged out” and will not operate until repairs have been made.

See Section 5.3.4 for accidents involving a collision with animals.

5.4.4 Explosions

An explosives management plan will be developed by the mining contractor, who will lead response to any explosions arising from the handling of explosives.

5.5 FUEL AND OTHER CHEMICAL SPILLS

A spill is classified as the discharge of petroleum products or other dangerous substances into the environment. Potential hazards to humans, vegetation, water resources, fish and wildlife vary in severity, depending on several factors including nature of the material, quantity spilled, location and season.

Fuel is the main material that may be spilled. Other chemicals that may be spilled include calcium chloride flakes and small quantities of lubricants and oils. Material Safety Data Sheets (MSDS) for the various materials are included in Appendix B.

Clean-up of calcium chloride involves management of a solid. Release of this material in water will result in the rapid dissolution and dispersion of the material.

The following actions have been incorporated to minimize the potential for spills to occur during fuel handling, transfer, or storage operations:

- Immediately clean up minor spills
- Conduct regular inspections of fuel barrel storage areas and hoses for evidence of leaks
- Use impermeable liners at all petroleum transfer sites and under stationary machinery
- Train/retrain personnel in proper fuel handling and spill response procedures. There is no problem with accepting that you are unsure of what to do. Call for help to deal with any incident.

The first person on-site of the spill is responsible for initiating the following actions:

- Identify the product, location and source of the spill - Check container design, warning labels, markings, etc.
- **SAFETY FIRST/PROTECT PEOPLE** - Prevent personnel from approaching the site and keep them at a distance sufficiently removed that they will not be injured by, or cause, a fire or explosion.
- Do not panic, contact help from camp and/or nearest source of personnel. Work as a team, plan the response and then REACT:

    - **Remove/stop the flow-source at the source** - Reduce or terminate the flow of product without endangering anyone, if the fuel source is a drum transfer the fuel to an empty drum. Wherever possible use the empty drums located within the berms specifically designed for

that purpose. Use diesel for diesel, gasoline for gasoline Jet B for Jet B, etc. If using a drum designed for a different product, ensure that it is relabeled in a conspicuous manner.

- **Envelop the spill, assess the seriousness of the spill** - Evaluate potential dangers of the spill to human health and safety, the aquatic environment, wildlife, ground water, vegetation and other land resources. Ensure that the spill is localized and prevent the spread of the spill.
- **Absorb/accumulate** - Utilize the correct spill kit to absorb and clean up spilled material. There are two choices, the small kit that is designed for spills of less than 75 L (20 gallons) and the larger kits designed for spills up to 640 L (65, 75 and 170 gallons). The spill kits are designed to be used from top to bottom. And, remember, safety first, take your time and ensure that the spill cannot do more damage and the initial clean up deals with the spill.
- **Containerize/clean up the spill** - Follow procedures appropriate for the location, environment, and material and time of year. Again, utilize material in the spill kit. There are leak-proof bags in the kits for much of the material and the containers themselves are designed to contain and isolate contaminated material. Remember your training and the first response is to stop, accumulate and clean up the spill.
- **Transmit a report detailing the spill** - Provide basic information such as location of spill, name of polluter, type and amount of material spilled, date and time of the spill and any perceived threat to human health or environment. A blank Spill Report form is included as Appendix A.

5.5.1 Spills on Land

Response to spills on land will include the Initial Action previously detailed and possibly the following specific steps:

- Identify the source of the leak or spill
- Contain the spill at the source if possible
- Stop a leak from a barrel by:
  - Cease filling operations if leaking vessel is receiving fuel
  - Check valves and seals, and use of valves if leaking
  - Transfer all fuels from leaking barrels
  - Place plastic sheeting at the foot of the leak to minimise seepage of the spilled material to the environment
- Contain and clean spills on land (gravel, rock, vegetation) by the following methods:
  - Place a soil berm down slope of the running or seeping fuel. Place plastic tarps at the foot of and over the berm to permit the fuel to pool on the plastic for easy capture. Make berms of snow and line with plastic in the winter. Use absorbent sheeting to soak up fuel. Squeeze fuel from the pads into drums or plastic pails. The pads can be re-used. Pump larger pools of fuel into empty drums. Prevent fuel from entering a body of water where it will have a greater environmental impact.
  - Use absorbent sheeting to soak up petroleum products from rocks. Place sheeting in empty drums for eventual disposal by incineration.

- o Use a light covering of alternate absorbent material to absorb films of petroleum products from arctic vegetation
- o Remove contaminated soil and vegetation for disposal. Contact the appropriate Indian and Northern Affairs (DIAND) regional office for approval before undertaking this action (Section 5.5.5).
- o Use snow as a natural absorbent and compact and use as a berm. Place plastic sheeting over the snow berm.

5.5.2 Spills on Water

Response to spills of petroleum products on water will include the initial action previously detailed and possibly the following specific steps:

- Deploy floating 'boom(s)' to contain the floating product
- Use absorbent pads and similar materials to capture small spills on water. Slowly draw in absorbent booms to encircle spilled fuel and absorb it. These materials are hydrophobic, and therefore, absorb hydrocarbons but repel water. Absorbent booms are often relied on to recover any hydrocarbons that escape containment booms.
- Deploy a skimmer once a boom has been secured to capture the spilled product and pump it through hoses to empty fuel drums
- In the event of a larger spill on water, limit the extent of the spill by using booms. The 24-Hour Spill Report Line should be used to keep government agencies informed of the situation and if required seek assistance.

5.5.3 Spills on Snow and Ice

Response to spills on snow and ice will include the initial action previously detailed and possibly the following specific steps:

- Where a spill occurs on ice, use compacted snow around the edge and line with plastic sheeting to serve as a berm. The ice will prevent seepage of fuel into the water, but contaminated snow and ice must be scraped up immediately. Place contaminated snow and ice in drums or on plastic and within plastic lined berms on land.

5.5.4 Disposal of Spilled Material

Plastic ore sacks may be used to contain and transport spilled material for removal from site to a licensed disposal facility by either air or by road followed by sealift. Alternatively, a lined containment facility may be constructed on-site for the containment and/or treatment of the contaminated materials. Such a facility requires regulatory approval and an amendment to Baffinland's water license.

5.5.5 Spill Reporting

After the initial action to a spill, complete the Spill Report Form (Appendix A) and call the 24-hour Spill Report Line:

24-Hour Spill Report Line
Tel. (867) 920-8130
or
Fax (867) 920-8127
Water Resources Inspector: Tel. (867) 975-4298

It is the responsibility for the Project Manager to prepare the proper reports and transmit them to regulatory authorities.

The following table is an additional contact list for spill reporting.

Department	Person	E-mail	Telephone
DIAND-Waters (Iqaluit)	Jim Rogers	rogersji@inac.gc.ca	(867) 975-4550
DIAND-Inspecter	Andrew Keim	keima@inac-ainc.gc.ca	(867) 975-4289
DIAND-Qikiqtani	David Abernethy	abernethyd@inac-ainc.gc.ca	(867) 975-4555
DIAND-Field Operations	Peter Kusugak	kusugakp@inac-ainc.gc.ca	(867) 975-4289
DFO-Iqaluit	Tania Gordanier	gordaniert@dfo-mpo.gc.ca	(867) 979-8007
EC-Iqaluit	Colette Spagnuolo	colette.spagnuolo@ec.gc.ca	(867) 975-4639
GN-DOE	Robert Eno	reno@gov.nu.ca	(867) 975-7748
Pond Inlet Health Clinic			(867) 899-7500 (867) 899-8431
Pond Inlet RCMP			(867) 899-1111 (867) 899-6055

SECTION 6.0 - ENVIRONMENTAL MAPPING

6.1 PETROLEUM STORAGE FACILITIES

The petroleum products required for exploration project work on site will be transported by conventional sealift from to Milne Inlet for off-loading into the bulk fuel storage facility at Milne Inlet. A portion of the fuel will be transported by fuel truck into the Mary River site. Fuel drums will be used to continue with drilling activities at remote locations, transported to these locations by either fixed wing aircraft or helicopters. Small lined containment areas will be established at drill camps.

The main fuel berms are lined with a 40 mil hypolon liner and sufficient fuel-spill kits will be on site to deal with any anticipated spill. All fuel will be stored a minimum of 33 m from any high water mark and transfer of fuel from supply vehicles to tanks and from tanks to vehicular equipment will be performed with the aid of fuel pumps. Material Safety Data Sheets (MSDS) for all fuels and chemicals are included as Appendix B.

Petroleum storage areas at the camps and other bulk sampling program sites will be visually inspected on a daily basis to check for leakage or damage to any of the containers. Spill kits (20 gal, 65 gal, 75 gal and 170 gal) will be available on site, and will be used dependent upon the severity of the spill. See Section 7.0 for spill kit types and contents.

If any fuel products will be required in other areas within the permit area appropriate amendments to the Land Use License will be applied for and fuel products will be stored and handled at the specific site in accordance with applicable Land Use Permit conditions.

Total petroleum product requirements at the Mary River camp for the bulk sampling program will be:

- 1,400,000 L diesel fuel for camp support
- 1,250,000 L diesel fuel for ground vehicle and equipment support
- 550,000 L Jet-A fuel for aircraft

Total petroleum product storage at the Milne Inlet camp will be up to:

- 8,000,000 L diesel fuel for camp support
- 90,000 L Jet-A fuel for aircraft

Total petroleum product requirements at the Midway camp will be up to:

- 30-200 L drums

Potential sources of petroleum product spills could involve the following:

1. Leaking or ruptured fuel drums.
2. Fuel transfer operations between storage drums, and mobile equipment including aircraft and sea vessels. This could include broken supply pipes, hoses, and associated valves during fuel transfer operations.
3. Aircraft, 4x4 vehicles, sea vessels or equipment involved in accidents.
4. Leaks and drips from machinery, pumps, motors, and other equipment.

Spill kits will be positioned at the following locations:

- Fuel farms
- Fuelling stations
- Warehouses, shops
- Generators and pump stations
- Sewage treatment systems and incinerators
- Explosives storage
- Vehicles and other transport
- Sampling sites
- Along the Milne Inlet tote road

6.2 CHEMICAL STORAGE

Chemical storage will be limited to the calcium chloride storage area adjacent to the airstrip and camp at Mary River, and smaller containers of lubricants and oils at the work shop and at work areas.

6.3 EXPLOSIVES STORAGE FACILITIES

Approximately 240 t of pre-packaged emulsion and high explosives (Class A) will be stored in 16 explosives magazines near the mining area at Mary River. The magazines that will be surrounded by a chain-link fence and positioned more than 600 m away from any building or work area, in accordance with the requirements of the *Explosives Use Act*.

SECTION 7.0 - RESOURCE INVENTORY

7.1 SPILL KITS AT MARY RIVER CAMP

Spill kits at the Mary River camp currently include:

Kit # 4	Four (4) at the pump station, incinerator, Boart Longyear shop, Baffinland maintenance shop/warehouse, and three (3) at the fuel storage/lined fuel storage berms
Kit # 5	Three (3) at the Boart Longyear shop, geology office and Baffinland shop
Kit # 6	None
Kit # 7	Five (5) stored at the fuel storage, generator and three lined fuel storage berms

Upon expansion, the camp will have the following additional spill kits:

Kit # 4	Three (3) at the shop, warehouse and sewage treatment system
Kit # 5	Two (2) in the warehouse and shop
Kit # 6	Two (2) at each of the fuel farms
Kit # 7	One (1) at the generator

Spill kits at the crushing/screening area will include:

Kit # 4	Two (2) at the fuelling station and the shop
Kit # 5	One (1) in the shop
Kit # 6	One (1) at the fuel farm
Kit # 7	One (1) at the generator

A full kit #6 will be kept at lined and bermed tank farms at all times.

7.2 SPILL KITS AT MILNE INLET CAMP

Spill kits at the Milne Inlet camp will include:

Kit # 4	Three (3) at the warehouse, sewage treatment system/incinerator, fuelling station
Kit # 5	One (1) in the office/first aid shack
Kit # 6	Three (3) at each of the fuel farms
Kit # 7	Two (2) at each generator

7.3 SPILL KITS AT MIDWAY CAMP

Spill kits at the Midway camp will include:

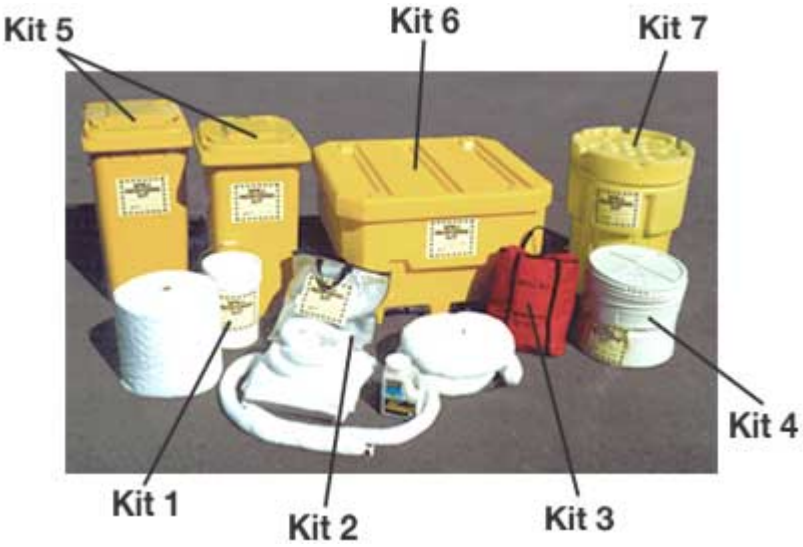
Kit # 4	One (1) at the fuelling station
Kit # 5	One (1) in the office/first aid shack
Kit # 6	One (1) at the tank farm
Kit # 7	One (1) at the generator

7.4 VERSATECH SPILL KITS

Details of the Versatech Spill Kit Contents can be found in the following table.

Kit No./Details	Contents	Quantity
1, 2 or 3 **QUICK RESPONSE KITS** Absorbs up to 12 Gallons 5 Gallon plastic pail/Clear plastic or nylon bag.	Sorbent Pads (19” x 17” x 3/8”) Sorbent Socks (3” x 4ft.) Nitrile Gloves (pair) Disposal Bag	15 3 1 2
4 **20 GALLON LAB PACK** Absorbs up to 18 Gallons Lab Pack Container	Sorbent Pads (19” x 17” x 3/8”) Sorbent Socks (3” x 4ft.) Sorbent Pillows Nitrile Gloves (pair) Disposal Bag Epoxy Putty	20 5 4 2 3 1
5 **PORTABLE RESPONSE KIT** Absorbs up to 65 Gallons Durable Yellow Rollout Container 2 convenient sizes - 64 Gallon 96 Gallon	Sorbent Pads (19” x 17” x 3/8”) Sorbent Socks (3” x 4ft.) Xsorb (6 quart) Hand broom/dust pan Nitrile Gloves (pair) Disposal Bag Disposable Coveralls Drain cover Splash resistant goggles	150 6 1 1 2 4 2 2 2
6 **SPILL CHEST** Absorbs up to 170 Gallons Heavy duty plastic Yellow Container Can be moved with a Forklift	Sorbent Pads (19" x 17" x 3/8") Sorbent Socks (3" x 4ft.) Sorbent Booms (5" x 10ft) Sorbent Pillows (15" x 9ft) Sorbent Roll (38" x 144ft) Nitrile Gloves (pair) Disposal Bag Epoxy Putty Barricade tape (Roll)	100 8 4 16 1 2 4 1 1
7 **HEAVY DUTY DRUM KIT** Absorbs up to 75 Gallons Heavy duty plastic Yellow Container Drum sizes include 65 & 95 US gallons or an economy 45 gallon steel drum	Sorbent Pads (19" x 17" x 3/8") Sorbent Booms (5" x 10ft) Xsorb (6 quart) Nitrile Gloves (pair) Disposal Bag Disposable Coveralls Drain cover Splash resistant goggles	100 4 1 2 4 2 1 2

The spill kits are shown for relative sizing below.



SECTION 8.0 - TRAINING AND EXERCISES

Field personnel will receive training on how to respond to emergencies or a spill and in taking preventative measures to mitigate potential effects. All materials, including this plan, will be posted at the camps and all individuals will be familiar with its contents and what to do in case of an emergency, including reporting requirements.

SECTION 9.0 - REFERENCES

1. Air Nunavut National Air Ambulance System. Medivac. Iqaluit: Air Nunavut. 6 Nov. 2006 <http://www.airnunavut.com/BrochureAir%20NunavutrR7version2.pdf>

2. Cumberland Resources Ltd. Meadowbank Gold Project: Emergency Response Plan. Oct. 2005.

3. Indian and Northern Affairs Canada (INAC). Letter to Baffinland Iron Mines Corporation. 29 Jun. 2004.

4. Nunavut. Department of Sustainable Development. Environmental Protection Service. Contingency Planning and Spill Reporting in Nunavut: A Guide to the New Regulations. Iqaluit: Environmental Protection Service.

5. Nunavut Water Board (NWB). Letter to Baffinland Iron Mines Corporation. 11 Jun. 2004.

6. Qikiqtani Inuit Association (QIA). Letter to Baffinland Iron Mines Corporation. 17 Jun. 2005.

7. Versatech Products Inc. (Versatech). “Versatech spill kits for large fuel storage.” E-mail to information/customer support. 24 Oct. 2006.

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SECTION 10.0 - CERTIFICATION

This report was prepared, reviewed and approved by the undersigned.

Prepared by: _____

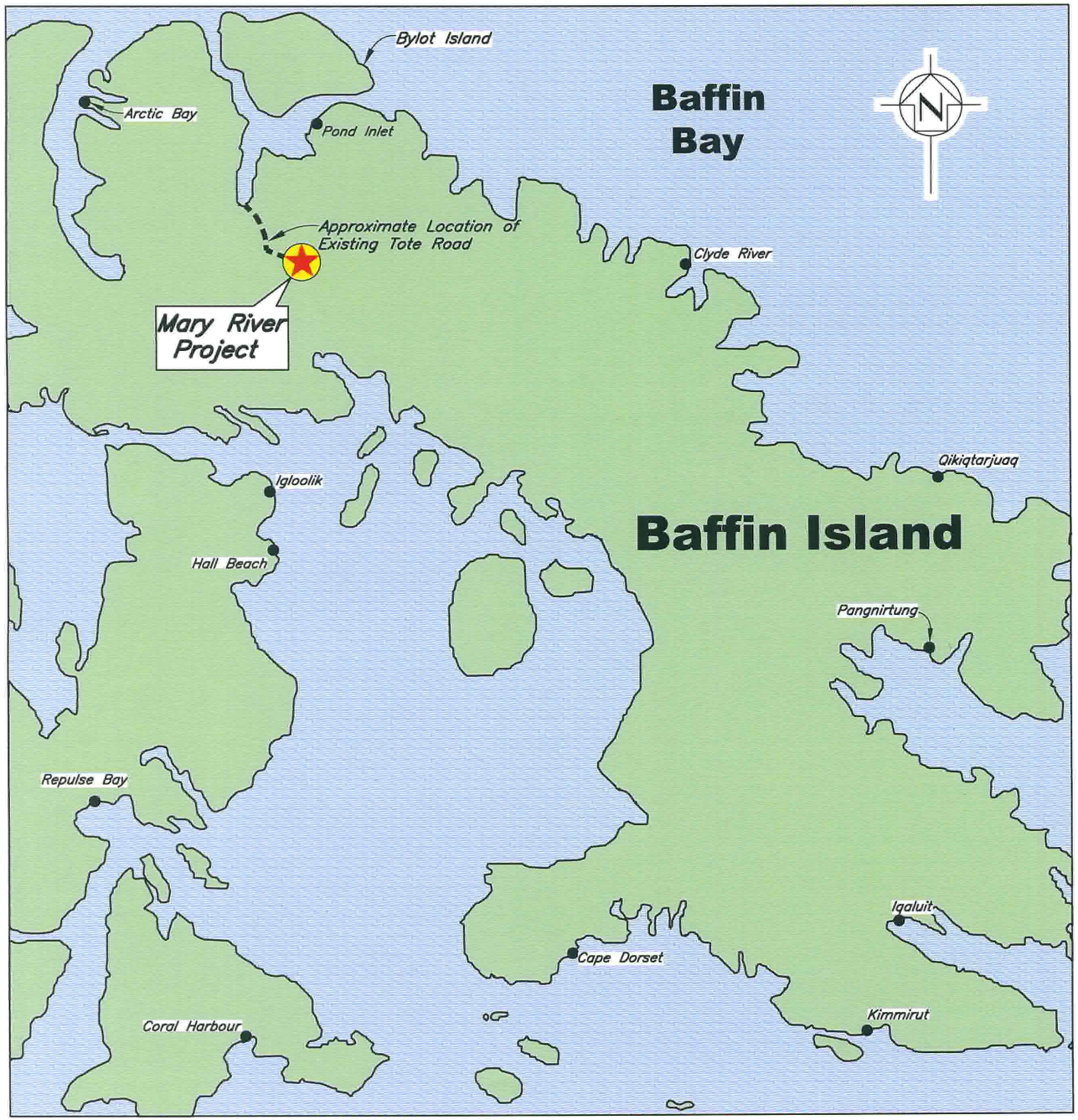
Richard Cook, B.Sc.
Senior Environmental Scientist

Reviewed by: _____

Steve Aiken, P.Eng.
Manager Environmental Services

Approved by: _____

Ken D. Embree, P.Eng.
Managing Director



LEGEND:

Water

Existing Community

Scale (Approx.) 65 32.5 0 65 130 195 260 325 Km

Baffinland

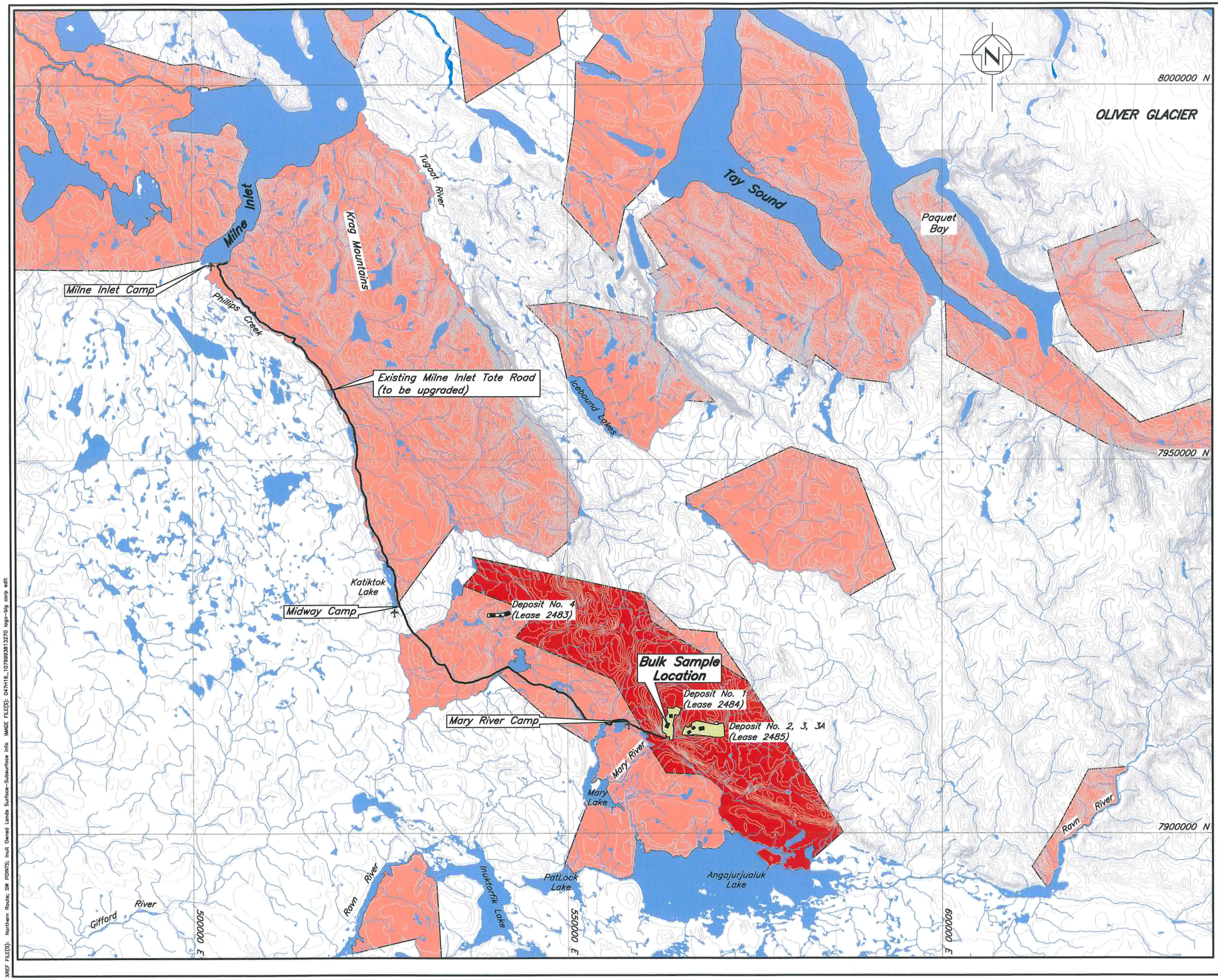
MARY RIVER PROJECT – BULK SAMPLING PROGRAM

PROJECT LOCATION MAP

Knight Piésold CONSULTING

P/A NO.	REF.	REV.
NB102-00181/6	6	0

FIGURE 1.1



LEGEND:

- Water
- Dry river
- Inuit Owned Land–Surface Only Excluding Minerals
- Inuit Owned Land–Surface and Subsurface including Minerals
- Mining Lease
- Existing Airstrip
- River/stream
- Existing Tote Road

NOTES:

1. Mapping is from Natural Resources Canada National Topographic Data Base 1:250000.
2. Contours are in metres. Contour interval for Map 37G is 40 metres. Contour interval for Map 38B is 100 metres. Contour interval for Map 47H, and 48A is 60 metres.
3. Coordinate grid is shown in UTM (NAD 83) Zone 17 and is in metres.

Scale 5 2.5 0 5 10 15 20 25 Km

Baffinland Iron Mines Corporation

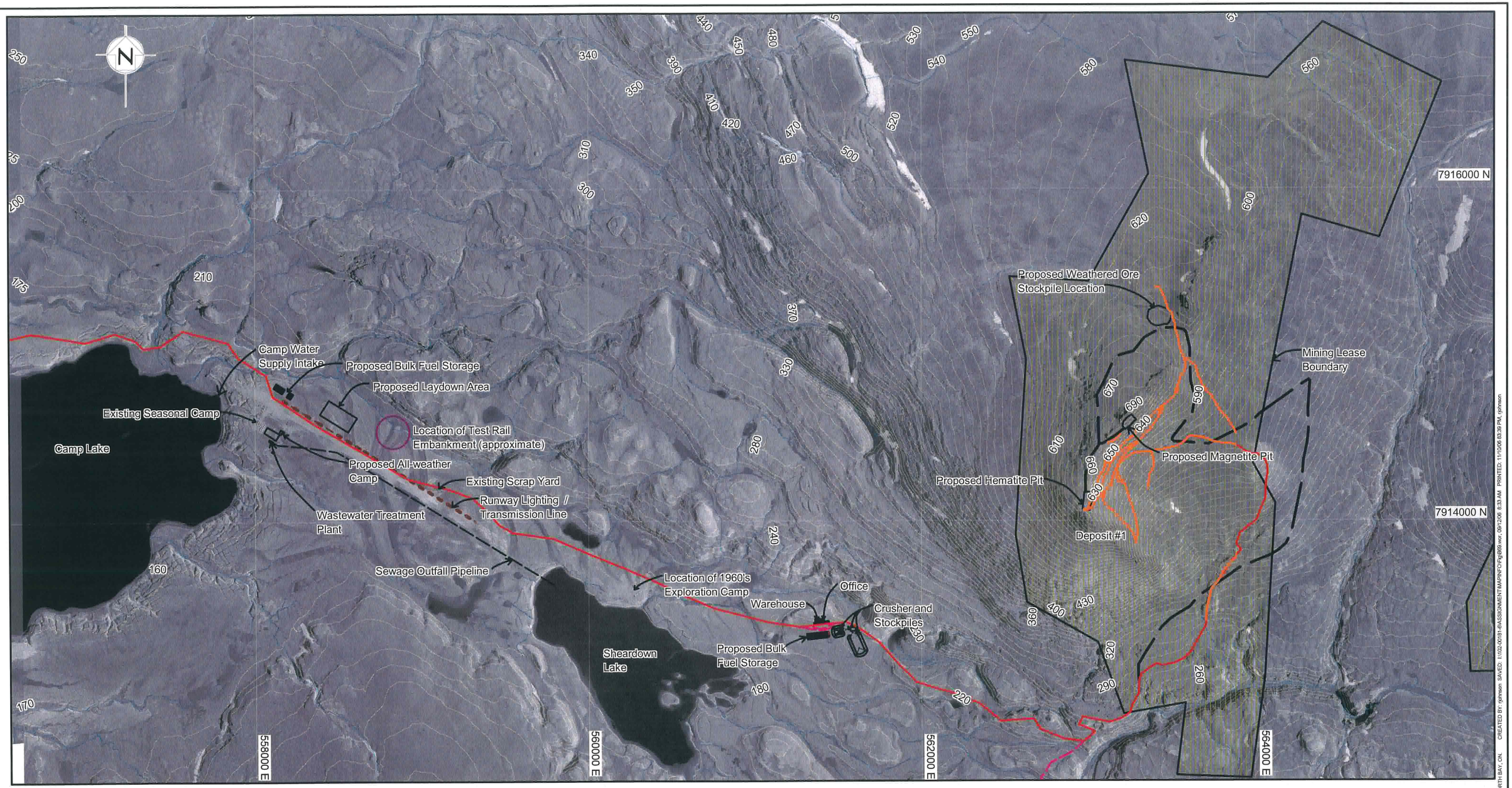
MARY RIVER PROJECT – BULK SAMPLING PROGRAM

PROJECT FACILITIES

Knight Piésold CONSULTING

P/A NO.	REF.	REV.
NB102-00181/6	6	0

FIGURE 2.1



LEGEND:

- *Existing Tote Road*
- *Existing Trails for Drills*
- *Proposed Pit / Stockpile Road*
- *New Roads*
- *River/Stream*
- *Mining Lease Boundary*

NOTES:

1. *Airphotos and topography provided by Eagle Mapping (2005).*
2. *Contour interval is 10 metres.*
3. *Coordinate grid is shown in UTM (NAD83) Zone 17 and is in metres.*
4. *Mining lease boudaries from Indian and Northern Affairs (2006).*

Scale 0 500 1,000 Metres

Baffinland Iron Mines Corporation

MARY RIVER PROJECT - BULK SAMPLING PROGRAM

MARY RIVER SITE LAYOUT

Knight Piésold CONSULTING

P/A NO.	REF.	REV.
NB102-00181/6	6	0

FIGURE 2.2

NORTH BAY, ON. CREATED BY: jjohnson SAVED: I:\102-00181-eASSIGNMENTMAPINFO\Fig669.wor, 09/12/06 8:33 AM PRINTED: 11/10/06 8:39 PM, rjohnson

LEGEND:

- Existing Tote Road
- New Road
- River/Stream
- Transmission Line
- Alternative Stockpile Location

NOTES:

1. Airphotos provided by Eagle Mapping (2005).
2. Infrastructure provided by B.H. Martin Consultants Ltd.
3. Contour interval is 5 metres and was provided by Eagle Mapping.
4. Coordinate grid is shown in UTM (NAD83) Zone 17 and is in metres.

Scale 0 250 500 Metres

Baffinland Iron Mines Corporation

MARY RIVER PROJECT - BULK SAMPLING PROGRAM

MILNE INLET SITE LAYOUT

Knight Piésold CONSULTING

P/A NO.	REF.	REV.
NB102-00181/6	6	0

FIGURE 2.3

Knight Piésold
CONSULTING

APPENDIX A

SPILL REPORT FORMS

- Nunavut Spill Report 1 page

NUNAVUT SPILL REPORT (Oil, Gas, Hazardous Chemicals or other Materials)

ᓄᓇᕗᑦ ᑯᐃᓴᓄᑦ ᐅᓂᒃᑲᖅ (ᐅᖃᓕᓴᕐᔪᑦ, ᓴᓇᑦ, ᐊᑦᑕᓇᖅᑐᑦ, ᐃᓕᓴᕐᓂᐊᑦ ᐅᑦᔨᒪ ᐊᓗᓐᓂᑦ)

24-Hour Report Line 24-ᓄᑦ ᐃᒃᑦᓇᓄᑦ ᐅᓂᒃᑲᕕᐅᔪᓐᓇᖅᑐᖅ ᐅᖃᓕᐅᑦ

Phone/ᐅᖃᓕᐅᑦ **(867) 920-8130**

Fax/ᓱᒃᑐᒃᑯᑦ **(867) 873-6924**

A Report Date and Time ᐅᑎᔭᖅ ᓯᑭᓐᓴᐅᑦᓴᓗ ᖃᓄᐃᒍᑎᓕᔭᐅᔪ ᐅᓂᒃᑲᐅᑎᕐᓂᐅᕐᔪᑦ	**B** Date and Time of Spill(if known) ᐅᑎᔭᖅᓱᒃ ᐊᕙᑎᓕᔭᐅ ᖃᓄᐃᒍᑎᓕᔭᐅᔪ (ᖃᐅᔨᒪᓕᕐᐅᑦᑐᑦ)	**C** ☐ Original Report ᓯᕗᓪᓕᖅᑐᑦ ᐅᓂᒃᑲᕕᓯᐅᔪᖅ ☐ Update No. _____ ᓂᒃᑲᕕᓯᐅᒃᖢᓂᖅᓱᒃ ᓇᓗᐅᑦ	Spill Number ᐊᕙᑎᑦ ᓇᓗᐅᑦ
D Location and Map Coordinates (if known) and Direction (if moving) ᓇᓂ ᐊᕙᑎᑦ ᐋᒪᓗ ᓄᓇᓕᖕᒪᑦ ᓇᓗᐅᑎᕐᓂᑦ (ᖃᐅᔨᒪᓕᕐᐅᑦᑐᑦ) ᐋᒪᓗ ᓇᒪᓕᖕᒪᓕᓪᓕᐊᓕᒪᓕᒫᓂᑦ (ᐃᕐᓂᕐᖓᑦᑐᑦ)			
E Party Responsible for Spill (Full Name and Address) ᑭᒃᑯᑦ ᐊᕙᑎᕐᑎᐅᑦ (ᐃᓕᑦ ᐋᒪᓗ ᑐᕋᑎᓕᒫ)			
F Product(s) Spilled and Estimated Quantities(provide metric volumes/weights if possible) ᑭᓯᑦ ᑭᓯᓚᐅᖅᑯᑦ ᐊᕙᑎᑦ ᖃᓄᑎᓗ ᐊᕐᕈᓂᖃᖅᑐᑦ (ᐊᕐᕈᓂᓕᒫ ᐅᑭᐊᓪᓂᓚᐅᖅᑯᑦ ᐊᓯᓇᖏᑦᑐᑦ)			
G Cause of Spill ᑭᓯ ᐊᕙᑦᓴᑕᐅᑉᐸᑦ			
H Is Spill Terminated? ᐊᕙᑎᖅ ᓄᖅᖃᑕᐅᑉᐸᑦ? ☐ Yes/ᐃ ☐ No/ᐊᒃᑲ	**I** If Spill is Continuing, Give Estimated Rate ᓯᓚ ᐊᕙᑎᑦᑐᑦ ᖃᓄᑎᑎ ᓯᖏᓚᑎᑎᕐᖃᓯᒪᓕᐊᑦ	**J** Is Further Spillage Possible? ᐊᕙᑎᖏᓐᓄᐃᓇᓇᕐᖃᖅᖢᓂᐊᕐᓂᖅᐸᑦ? ☐ Yes/ᐃ ☐ No/ᐊᒃᑲ	**K** Extent of Contaminated Area (in square metres if possible) ᖃᓄ ᐊᕐᑎᑎᒋᑦ ᐊᕙᑎᓯᐊᐅᔪᖅ (ᐅᓪᓗᒥᓯᒪᓕᕆᔨ ᐊᓚᓐᓇᕐᓂᑦᑐᑦ)
L Factors Affecting Spill or Recovery(weather conditions, terrain, snow cover, etc.) ᑭᓯᑦ ᐱᓕᕐᑕᑦᑦ ᐊᕙᑎᓕᒍ ᐅᑦᔨᓗ ᐊᖏᕐᑎᑕᐅᓇᓱᑎᓕᔭᐅᔪ (ᓯᓚ ᖃᓄᐃᓕᓴᕐᓂᖏᓕᓄᑦ, ᓄᓇ ᖃᓄᐃᓕᓴᕐᓂᖏᓕᓄᑦ ᐊᐅᓚᐅᓯᒪᓕᕐᓂᖏᓕ, ᐊᓯᖏᓪᓕᖅᖢᓂᓕ)		**M** Containment (natural depression, dykes, etc.) ᐅᖃᓯᐊᓕᖃᕐᓂᖏᓕᐅᑦ ᑭᓕᐊᑦ ᐃᓯᖏᓐᓂᓯᒪᓕᕐᒥ (ᓄᓇᒥ ᐃᓯᖏᓐᓄᐃᑦ, ᐊᓯᔪᓕᓕᓚᖅᖢᓂᓕᓕᒫ)	
N Action, if any, taken or Proposed to Contain, Recover, Clean Up or Dispose of Product(s) and Contaminated Materials ᖃᓄᐃᓕᓴᐅᑦ, ᖃᓄᐃᓕᓴᐅᑎᑦᑎᓯᒪᔪᑦ ᐅᑦᔨᓗ ᖃᓄᐃᓕᓴᐅᑎᑦᑎᓂᐊᕐᓂᖅᑐᑦ ᐊᑕᐅᓯᕐᒥᑎᑕᐅᓇᓱᒃᑐᑦ, ᓄᖅᑎᑎᑕᐅᓇᓱᒃᑐᑦ, ᓴᓇᒪᓂᕐᒪᑦᑎᓯᒪᓕᕐᓂᖅᑐᑦ ᐅᑦᔨᓗ ᐃᑎᑕᐅᓂᐊᕐᓂᖅᑐᑦ ᑯᐃᓴᖅᑐᑦ (ᑯᐃᓴᖅᓱᒃᖢᓂᓕᒫ) ᐋᒪᓗ ᑯᐃᓴᐃᓕᐅᔪᓐᓇᖅᑐᑦ.			
O Do You Require Assistance? ᐃᖃᓗᐊᑕᐅᓴᕆᓇᖅᑐᑦ? ☐ No ᐊᒃᑲ ☐ Yes, describe: ᐃ, ᓇᓗᓇᐃᑦᓴᓗᒍ	**P** Possible Hazards to Persons, Property or Environment e.g. fire, drinking water, fish or wildlife ᐊᑦᑕᓇᖏᑦᑐᓂᓇᖅᑐᖅ ᐃᓇᓐᓂᑦ, ᐱᖁᑎᑎᕐᐅᑉᐸᓂᑦ ᐅᑦᔨᓗ ᐊᐊᑎᒪᑦ ᓂᓴ - ᐃᑭᓐᓄᓂ, ᐃᒥᑦᓯᑦ ᓂᐅᖅᖃᕐᑕᐅᓂᒍᓂᓂ, ᐃᖃᓄᐊᓂᑦ ᐅᑦᔨᓗ ᓂᑦᔪᑎᓂᑦ		
Q Comments and/or Recommendations ᐅᖃᐅᓂᓴᐃᑦ ᐋᒪᓗ ᐅᑦᔨᓕᖅᑐᑦ ᖃᓄᐃᓕᓴᕐᓂᖏᓕᐅᑦᑐᑦ		**FOR SPILL LINE USE ONLY** ᐊᑐᖃᑕᐅᔪᓚᖅᓱᒃ ᑯᐃᓴᓂᑦ ᐅᖃᓕᓴᐃᐅᑦᑐᑉᐸᑦᓄᑐᐃᑦᓱᒃ Lead Agency ᐃᖅᑲᓇᐃᖅᑐᓂᓕᕆᔨᑦ ᑯᐃᓴᐃᑦ ᑲᒪᒋᔭᖅᓱᒃ ..... Spill Significance ᑯᐃᓴᑦ ᖃᓄᐃᓕᓴᕐᓂᖅᓱᒃ ..... Lead Agency Contact and Time ᐃᖅᑲᓇᐃᖅᑐᓂᓕᕆᔨᑦ ᑯᐃᓴᐃᑦ ᑲᒪᒋᔭᖅᓱᒃ ᖃᐅᔨᓴᖅᑎᑕᐅᓂᖅ ᐋᒪᓗ ᖃᓄᐃᒍᑎᓕᔭᐅᔪ .... Is this file now closed? ᑕᒪᓐᓇ ᐅᓂᒃᑳᓕᐅᔪᓱᒃ ᒪᑐᐅᑦᑐᖅ?		
Reported By ᐅᓂᒃᑲᖅᓱᒃ	Position, Employer, Location ᖃᓄᐃᑦᑐᒥᑦ ᐃᖅᑲᓇᐃᒪᓕᓂᑦ, ᐃᖅᑲᓇᐃᒪᓕᕆᓂᖅ, ᓇᓐ	Telephone ᐅᖃᓕᐅᑦ	
Reported To ᐅᓂᓴᐅᔪᓱᒃ	Position, Employer, Location ᖃᓄᐃᑦᑐᒥᑦ ᐃᖅᑲᓇᐃᒪᓕᓂᑦ, ᐃᖅᑲᓇᐃᒪᓕᕆᓕᖅᓂᖅ, ᓇᓂ	Telephone ᐅᖃᓕᐅᑦ	

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APPENDIX B

MATERIALS SAFETY DATA SHEETS (MSDS)

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APPENDIX B1
AVIATION FUEL

- Shell Canada Limited. Material Safety Data Sheet. MSDS #101-200 6 pages

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2002-08-14
Supersedes: 2001-03-09

Class B2 Flammable Liquid

Class D2B Other Toxic Effects - Skin Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**SHELL AVGAS 100 LL**
SYNONYMS:	AVIATION GASOLINE
PRODUCT USE:	Fuel
MSDS Number:	101-200

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

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Naphtha (Petroleum), Light Alkylate	64741-66-8	70 - 90	Yes
Toluene	108-88-3	10 - 30	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Blue Colour Clear Typical Gasoline Odour

Routes of Exposure: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.

Hazards:

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Flammable Liquid.
Irritating to skin.
Vapours are moderately irritating to the eyes.
Vapours are moderately irritating to the respiratory passages. The liquid when accidently aspirated into the lungs can cause a severe inflammation of the lung.

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

For further information on health effects, see Section 11.

4. FIRST AID

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

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

Ingestion: Do not induce vomiting. Guard against aspiration into lungs by having the individual turn on to their left side. If vomiting occurs spontaneously keep head below hips to prevent aspiration of liquid into the lungs. Do not give anything by mouth to an unconscious person. Obtain medical attention immediately.

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

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

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

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

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

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Flammable". Eliminate all ignition sources. Isolate hazard area and restrict access. Handling equipment must be grounded. Try to work upwind of spill. Avoid direct contact with material. Saturated clothing should be immediately removed to avoid flammability hazard. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Dike and contain land spills; contain water spills by booming. Use water fog to knock down vapours; contain runoff. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal. Recommended materials: Clay or Sand Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. Dispose of recovered material as noted under Disposal Considerations. Explosion and fire is the most immediate problem. Notify appropriate environmental agency(ies).

7. HANDLING AND STORAGE

Handling:	Extremely flammable. Avoid excessive heat, sparks, open flames and all other sources of ignition. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours are heavier than air and will settle and collect in low areas and pits, displacing breathing air. Extinguish pilot lights, cigarettes and turn off other sources of ignition prior to use and until all vapours are gone. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Never siphon by mouth. Do not use as a cleaning solvent. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse. Use good personal hygiene.
Storage:	Use explosion-proof ventilation to prevent vapour accumulation. Keep container tightly closed.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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

Gasoline: 300 ppm (STEL: 500 ppm)
Toluene (skin): 50 ppm
Skin Notation: The occupational exposure limit is based on the fact that skin and/or eye is a major route of exposure through absorption.

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

PERSONAL PROTECTIVE EQUIPMENT:

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

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

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

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Blue Colour Clear
Odour:	Typical Gasoline Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Freeze Point = -58 degrees C
Boiling Point:	75 - 170 degrees C
Density:	Not available
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	>285 mm Hg @ 38 degrees C
pH:	Not applicable
Flash Point:	Method Tag Closed Cup <1 degrees C
Lower Explosion Limit:	1.4 % (vol.)
Upper Explosion Limit:	7.6 % (vol.)
Autoignition Temperature:	Not available
Viscosity:	Not available
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (K_{OW}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Incompatible Materials:	Avoid strong oxidizing agents.

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

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Naphtha (Petroleum), Light Alkylate	LC50 Inhalation Rat >11000 mg/m3 for 4hours LD50 Dermal Rat >4000 mg/kg LD50 Oral Rat >8000 mg/kg
Toluene	LD50 Oral Rat = 5000 mg/kg LC50 Inhalation Rat = 8000 ppm for 4 hours LD50 Dermal Rabbit = 14000 mg/kg

Routes of Exposure: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.

Formulation: This product contains n-hexane.

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

Chronic Effects: Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged or repeated exposure to high vapour concentration or ingestion can cause headache, nausea, dizziness, and central nervous system depression, and in rare cases may sensitize heart muscles causing heart arrythmia. Peripheral neurotoxicity has been reported in connection with over exposure to n-hexane. This product contains low levels of lead. Chronic, low grade exposure to lead compounds could lead to insomnia, anorexia, nausea and vomiting, diarrhea, anemia, sensory loss and muscular weakness.

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

12. ECOLOGICAL INFORMATION

Environmental Effects: Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May be harmful to aquatic life. Fish Toxicity: 5 to 40 ppm | 96 hr TLm | Rainbow Trout | Freshwater

Biodegradability: Not available. Rapid volatilization.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

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

15. REGULATORY INFORMATION

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

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

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Flammable Liquid. Irritating to skin.
Handling Statement:	Eliminate all ignition sources. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Avoid prolonged exposure to vapours. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. Changes have been made to: Section 14

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APPENDIX B2

CALCIUM CHLORIDE FLAKE

- General Chemical. Material Safety Data Sheet. 4 pages
  Current issue date: May, 2001.
- General Chemical. Material Safety Data Sheet. 4 pages
  Current issue date: March, 2004

General Chemical

Material Safety Data Sheet

CALCIUM CHLORIDE, FLAKE

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME): FLAKE CALCIUM CHLORIDE		**CAS NUMBER:** 10043-52-4 (anhydrous)	
CHEMICAL NAME AND/OR SYNONYM: Calcium Chloride, Dihydrate			
FORMULA: $CaCl_2 \cdot 2H_2O$		**MOLECULAR WEIGHT:** 147.02	
MANUFACTURER/ADDRESS: GENERAL CHEMICAL CORPORATION 90 East Halsey Road Parsippany, NJ 07054			
CONTACT: Manager, Product Safety	**PHONE NUMBER:** (973) 515-1840	**LAST ISSUE DATE:** September, 1994	**CURRENT ISSUE DATE:** May, 2001

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER:
(800) 631-8050

EYES:	Flush promptly with plenty of water, continuing for at least 15 minutes. Get medical attention.
SKIN:	Wash with plenty of water.
INHALATION:	Remove to fresh air.
INGESTION:	If conscious, immediately give 2 to 4 glasses of water, and induce vomiting by touching finger to back of throat. Get medical attention for irritation, ingestion, or discomfort from inhalation.

C. HAZARDS INFORMATION

INHALATION:
Dust or mist inhalation may irritate nose, throat, and lungs.

INGESTION:
Low in toxicity. LD_{50} (rat): 1.4 g/kg.* - Reference (e)
May irritate gastrointestinal tract. *anhydrous basis.

SKIN:
May cause skin irritation. Under conditions of prolonged contact or when moisture is present, superficial burns may result. Contact with abraded skin or cuts can cause severe necrosis.

EYES:
May irritate or burn eyes.

PERMISSIBLE CONCENTRATION: AIR **(SEE SECTION J)** Also, no TLV established by ACGIH.	**BIOLOGICAL** None

UNUSUAL CHRONIC TOXICITY:
None.

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C. HAZARDS (Cont.)

FLASH POINT: Not flammable OPEN CUP ☐ CLOSED CUP ☐	AUTO IGNITION TEMPERATURE NA	FLAMMABLE LIMITS IN AIR (% BY VOL.) LOWER - NA UPPER - NA
UNUSUAL FIRE AND EXPLOSION HAZARDS See hazard of contact with zinc as in galvanized iron: Section G.		

D. PRECAUTIONS/PROCEDURES

FIRE EXTINGUISHING AGENTS RECOMMENDED:
NA

FIRE EXTINGUISHING AGENTS TO AVOID:
NA

SPECIAL FIREFIGHTING PRECAUTIONS:
None.

VENTILATION:
Local exhaust: In packaging and uploading areas, over open processing equipment, and any other places where dusty or misty condition prevails.
Natural ventilation: Adequate for other areas.

NORMAL HANDLING:
Avoid contact with eyes, skin or clothing. Avoid breathing mist. Use good personal hygiene and housekeeping.

STORAGE:
Store in a cool, dry area. Prolonged storage may cause product to cake and become wet from atmospheric moisture.

SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE QUIPMENT – SECTION E)
Shovel up dry chemical and place in metal drum with a cover. Cautiously spray residue with plenty of water.

SPECIAL: PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS:	SIGNAL WORD WARNING!

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION:
For dusty or misty condition, wear NIOSH-approved mist respirator.

EYES AND FACE:
For dusty or misty condition, or when handling solution where there is reasonable probability of eye contact, wear chemical safety goggles and hat. Under these conditions, do not wear contact lenses.

HANDS, ARMS, AND BODY:
As a minimum, wear long-sleeve shirt and trousers, boots, and gloves for routine product use.
Cotton gloves permitted for dry product, impervious gloves when using solutions.

OTHER CLOTHING AND EQUIPMENT:
Eye-wash facility.

F. PHYSICAL DATA

MATERIAL IS AT NORMAL CONDITIONS:	APPEARANCE AND COLOR:
LIQUID ☐ SOLID ☒ GAS ☐ ☐ _____	Small white flakes; odorless.

BOILING POINT: Unknown °C MELTING POINT: 176 °C	SPECIFIC GRAVITY: (H_2O = 1) 0.835 - Reference (b)	VAPOR DENSITY: (AIR =1) NA: water vapor only.
SOLUBILITY IN WATER: (% BY WEIGHT) 42 (anhydrous) @ 20°C	pH: Neutral or slightly alkaline - Reference (c).	VAPOR PRESSURE: (mm Hg @ 20°C) ☐ (PSIG) ☐ NA
EVAPORATION RATE: (Butyl acetate=1) ☐ (Ether = 1.0) ☐ NA	% VOLATILES BY VOLUME: (AT 20°C) NA	

G. REACTIVITY DATA

STABILITY: UNSTABLE ☐ STABLE ☒	CONDITIONS TO AVOID: NA

INCOMPATIBILITY (MATERIALS TO AVOID):
Sulfuric acid: yields hydrogen chloride gas, which is corrosive, irritating, and reactive. Water-reactive materials, such as sodium: cause an exothermic reaction. Methyl vinyl ether: starts runaway polymerization reaction – Reference (d). Zinc as in galvanized iron: yields hydrogen gas with solutions, which may explode under these conditions. – Reference (d).

HAZARDOUS DECOMPOSITION PRODUCTS:

None.

HAZARDOUS POLYMERIZATION: MAY OCCUR ☐ WILL NOT OCCUR ☒	CONDITIONS TO AVOID: NA

H. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

MATERIAL OR COMPONENT/C.A.S. #	WT.%	HAZARD DATA (See Sect. J)
NA		

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I. ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY:	OCTANOL/WATER PARTITION COEFFICIENT
	NA

Aquatic Toxicity: TLm96: over 1000 ppm (anhydrous) – Reference (a).

EPA HAZARDOUS SUBSTANCE? (CLEAN WATER ACT SECT. 311) YES ☐ NO ☒ IF SO, REPORTABLE QUANTITY:	40 CFR 116-117

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS):

Treatment or disposal of waste generated by use of this product should be reviewed in terms of applicable federal, state and local laws and regulations. Users are advised to consult with appropriate regulatory agencies before discharge, treatment or disposal.

RCRA STATUS OF UNUSED MATERIAL IF DISCARDERD:	HAZARDOUS WASTE NUMBER: (IF APPLICABLE)	40 CFR 261
Not a "hazardous waste".	--	

J. REFERENCES

PERMISSIBLE CONCENTRATIONS REFERENCES:

None.

REGULATORY STANDARDS	DOT CLASSIFICATION:	49 CFR 173
	Not regulated	

None.

GENERAL:

(a) NIOSH, Registry of Toxic Effects of Chemical Substances, 1979, Accession No. EV 98 00 000.
(b) Weast, R.C. editor, CRC Handbook of Chemistry and Physics, 60th Edition, 1979-80, CRC Press, Inc., Boca Raton 33431.
(c) Hawley, G.N., editor, Condensed Chemical Dictionary, 9th Edition, 1977, Van Nostrand Reinhold, NYC.
(d) Brethwick, L., Handbook of Reactive Chemical Hazards, 2nd Edition, 1979, Butterworths, Boston.
(e) General Chemical Corporation tests, unpublished. (A solution of 25 g/100 ml water was used).

K. ADDITIONAL INFORMATION

None.

GC-1002

General Chemical

Material Safety Data Sheet

CALCIUM CHLORIDE, FLAKE

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME): FLAKE CALCIUM CHLORIDE		**CAS NUMBER:** 10043-52-4 (anhydrous)	
CHEMICAL NAME AND/OR SYNONYM: Calcium Chloride, Dihydrate			
FORMULA: $CaCl_2 \cdot 2H_2O$		**MOLECULAR WEIGHT:** 147.02	
MANUFACTURER/ADDRESS: GENERAL CHEMICAL INDUSTRAL PRODUCTS 90 East Halsey Road Parsippany, NJ 07054			
CONTACT: Manager, Product Safety	**PHONE NUMBER:** (973) 515-1840	**LAST ISSUE DATE:** September, 1994	**CURRENT ISSUE DATE:** March, 2004

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER:
(800) 631-8050

EYES:	Flush promptly with plenty of water, continuing for at least 15 minutes. Get medical attention.
SKIN:	Wash with plenty of water.
INHALATION:	Remove to fresh air.
INGESTION:	If conscious, immediately give 2 to 4 glasses of water, and induce vomiting by touching finger to back of throat. Get medical attention for irritation, ingestion, or discomfort from inhalation.

C. HAZARDS INFORMATION

INHALATION:
Dust or mist inhalation may irritate nose, throat, and lungs.

INGESTION:
Low in toxicity. LD_{50} (rat): 1.4 g/kg.* - Reference (e)
May irritate gastrointestinal tract. *anhydrous basis.

SKIN:
May cause skin irritation. Under conditions of prolonged contact or when moisture is present, superficial burns may result. Contact with abraded skin or cuts can cause severe necrosis.

EYES:
May irritate or burn eyes.

PERMISSIBLE CONCENTRATION: AIR **(SEE SECTION J)** Also, no TLV established by ACGIH.	**BIOLOGICAL** None

UNUSUAL CHRONIC TOXICITY:
None.

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C. HAZARDS (Cont.)

FLASH POINT: Not flammable OPEN CUP ☐ CLOSED CUP ☐	AUTO IGNITION TEMPERATURE NA	FLAMMABLE LIMITS IN AIR (% BY VOL.) LOWER - NA UPPER - NA
UNUSUAL FIRE AND EXPLOSION HAZARDS See hazard of contact with zinc as in galvanized iron: Section G.		

D. PRECAUTIONS/PROCEDURES

FIRE EXTINGUISHING AGENTS RECOMMENDED:
NA

FIRE EXTINGUISHING AGENTS TO AVOID:
NA

SPECIAL FIREFIGHTING PRECAUTIONS:
None.

VENTILATION:
Local exhaust: In packaging and uploading areas, over open processing equipment, and any other places where dusty or misty condition prevails.
Natural ventilation: Adequate for other areas.

NORMAL HANDLING:
Avoid contact with eyes, skin or clothing. Avoid breathing mist. Use good personal hygiene and housekeeping.

STORAGE:
Store in a cool, dry area. Prolonged storage may cause product to cake and become wet from atmospheric moisture.

SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE QUIPMENT – SECTION E)
Shovel up dry chemical and place in metal drum with a cover. Cautiously spray residue with plenty of water.

SPECIAL: PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS:

SIGNAL WORD
WARNING!

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION:
For dusty or misty condition, wear NIOSH-approved mist respirator.

EYES AND FACE:
For dusty or misty condition, or when handling solution where there is reasonable probability of eye contact, wear chemical safety goggles and hat. Under these conditions, do not wear contact lenses.

HANDS, ARMS, AND BODY:
As a minimum, wear long-sleeve shirt and trousers, boots, and gloves for routine product use.
Cotton gloves permitted for dry product, impervious gloves when using solutions.

OTHER CLOTHING AND EQUIPMENT:
Eye-wash facility.

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F. PHYSICAL DATA

MATERIAL IS AT NORMAL CONDITIONS: LIQUID ☐ SOLID ☒ GAS ☐ ☐ _____		APPEARANCE AND COLOR: Small white flakes; odorless.
BOILING POINT: Unknown °C MELTING POINT: 176 °C	SPECIFIC GRAVITY: (H_2O = 1) 0.835 - Reference (b)	VAPOR DENSITY: (AIR =1) NA: water vapor only.
SOLUBILITY IN WATER: (% BY WEIGHT) 42 (anhydrous) @ 20°C	pH: Neutral or slightly alkaline - Reference (c).	VAPOR PRESSURE: (mm Hg @ 20°C) ☐ (PSIG) ☐ NA
EVAPORATION RATE: (Butyl acetate=1) ☐ (Ether = 1.0) ☐ NA	% VOLATILES BY VOLUME: (AT 20°C) NA	

G. REACTIVITY DATA

STABILITY: UNSTABLE ☐ STABLE ☒	CONDITIONS TO AVOID: NA
INCOMPATIBILITY (MATERIALS TO AVOID): Sulfuric acid: yields hydrogen chloride gas, which is corrosive, irritating, and reactive. Water-reactive materials, such as sodium: cause an exothermic reaction. Methyl vinyl ether: starts runaway polymerization reaction – Reference (d). Zinc as in galvanized iron: yields hydrogen gas with solutions, which may explode under these conditions. – Reference (d).	
HAZARDOUS DECOMPOSITION PRODUCTS: None.	
HAZARDOUS POLYMERIZATION: MAY OCCUR ☐ WILL NOT OCCUR ☒	CONDITIONS TO AVOID: NA

H. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

MATERIAL OR COMPONENT/C.A.S. #	WT.%	HAZARD DATA (See Sect. J)
NA		

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I. ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY:	OCTANOL/WATER PARTITION COEFFICIENT NA
Aquatic Toxicity: TLm96: over 1000 ppm (anhydrous) – Reference (a).	

EPA HAZARDOUS SUBSTANCE? (CLEAN WATER ACT SECT. 311) YES ☐ NO ☒ IF SO, REPORTABLE QUANTITY:	40 CFR 116-117

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS):

Treatment or disposal of waste generated by use of this product should be reviewed in terms of applicable federal, state and local laws and regulations. Users are advised to consult with appropriate regulatory agencies before discharge, treatment or disposal.

RCRA STATUS OF UNUSED MATERIAL IF DISCARDERD: Not a "hazardous waste".	HAZARDOUS WASTE NUMBER: (IF APPLICABLE) --	40 CFR 261

J. REFERENCES

PERMISSIBLE CONCENTRATIONS REFERENCES:

None.

REGULATORY STANDARDS	DOT CLASSIFICATION: Not regulated	49 CFR 173

None.

GENERAL:

(a) NIOSH, Registry of Toxic Effects of Chemical Substances, 1979, Accession No. EV 98 00 000.
(b) Weast, R.C. editor, CRC Handbook of Chemistry and Physics, 60th Edition, 1979-80, CRC Press, Inc., Boca Raton 33431.
(c) Hawley, G.N., editor, Condensed Chemical Dictionary, 9th Edition, 1977, Van Nostrand Reinhold, NYC.
(d) Brethwick, L., Handbook of Reactive Chemical Hazards, 2nd Edition, 1979, Butterworths, Boston.
(e) General Chemical Industrial Products tests, unpublished. (A solution of 25 g/100 ml water was used).

K. ADDITIONAL INFORMATION

None.

GC-1002

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APPENDIX B3
CAST BOOSTER

- Dyno Novel Inc. Material Safety Data Sheet. MSDS #1108 3 pages

Material Safety Data Sheet

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1108
Date 01/23/06

Supercedes
MSDS # 1108 01/24/05

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):
DYNO® Cast BOOSTERS - D10, D15, D25, D35, D45, D65, D90, D135
DYNO® Cast BOOSTERS – C30, C35, C40, C45, C90
DYNO® SLIDER BOOSTERS - DS35, DS45, DS90
DYNO® CORD SENSITIVE BOOSTERS - CS35, CS45, CS90, CS135
SEIS X®
DYNO® STINGER
TROJAN® SPARTAN®
TROJAN® SPARTAN® Slider
TROJAN® Stinger
TROJAN® NB
TROJAN® Twinplex
TROJAN® OPTIPRIME®

Product Class: Cast Booster

Product Appearance & Odor: Tan to brown solid with no odor. May also be silvery gray. Packaged in paper or plastic tube.

DOT Hazard Shipping Description: Booster 1.1D UN0042 II

NFPA Hazard Classification: Not Available (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
Pentaerythritol Tetranitrate (PETN)	78-11-5	30-70	None Established	None Established
Trinitrotoluene	118-96-7	30-60	0.1 mg/m^3 (skin)	1.5 mg/m^3 (skin)
RDX	121-82-4	0-30	0.5 mg/m^3 (skin)	1.5 mg/m^3 (skin)
HMX	2691-41-0	0-10	None Established	None Established
Aluminum	7429-90-5	0-15	10 mg/m^3 (dust)	15 mg/m^3 (total)

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

Material Safety Data Sheet

SECTION III - PHYSICAL DATA

Melting Point: 176° F (80° C) (TNT)
Vapor Density: Not applicable
Percent Volatile by Volume: Not applicable
Evaporation Rate (Butyl Acetate = 1): Not applicable

Vapor Pressure: 0.042mm Hg at 80° C (TNT)
Density: 1.55 - 1.65 g/cc
Solubility in Water: < 0.01%

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not applicable
Flammable Limits: Not applicable
Extinguishing Media: (See Special Fire Fighting Procedures section).
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: Particulates in the eye may cause irritation, redness, and tearing. Prolonged or repeated contact may cause cataracts, optic neuritis, blurred vision or amblyopia.
Skin: Prolonged contact may cause irritation, severe eczema and sensitization dermatitis. TNT may be absorbed through the skin, which may be indicated by orange staining on exposed skin. See systemic effects below.
Ingestion: Harmful if swallowed. See systemic effects below.
Inhalation: Inhalation of dusts may cause irritation, sneezing or coughing. See systemic effects below.
Systemic or Other Effects: TNT is an irritant, neurotoxin, hepatotoxin, nephrotoxin and bone marrow depressant. Although exposure is unlikely, acute or chronic exposure may cause sensitization dermatitis, headache, dizziness, jaundice, lethargy, or problems with the liver or blood such as toxic nephritis, aplastic anemia, hemolytic anemia or methemoglobin formation. **PETN** is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Remove contaminated clothing. Wash skin thoroughly with soap and water.
Ingestion: Seek medical attention.
Inhalation: In case of irritation, remove to fresh air. Seek medical attention if chronic symptoms occur.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, friction, impact, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Non-permeable gloves and work clothing that reduce skin contact are recommended.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry location. Store in compliance with all Federal, State and local regulations. Keep away from heat, flame, ignition sources or strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosives material be familiar with the Institute of Makers of Explosives Safety Library publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None Applicable		

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APPENDIX B4

CP-43 DIESEL

- Shell Canada Limited. Material Safety Data Sheet. MSDS #329-143 6 pages

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2002-11-06
Supersedes: 2002-08-14

Class B3 Combustible Liquid

Class D2B Other Toxic Effects - Skin Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**LOW SUL. DIESEL FUEL MARKED CP -43 - GEN. ELECTRICITY**
SYNONYMS:	Diesel Automotive Gas Oil
PRODUCT USE:	Fuel Solvent
MSDS Number:	329-143

MANUFACTURER	**TELEPHONE NUMBERS**	
Shell Canada Limited	**Shell Emergency Number**	1-800-661-7378
P.O. Box 100, Station M	**CANUTEC 24 HOUR EMERGENCY NUMBER**	613-996-6666
400-4th Ave. S.W.		
Calgary, AB Canada	For general information:	1-800-661-1600
T2P 2H5	For MSDS information:	403-691-3982
	(From 7:30 to 4:30 Mountain Time)	403-691-2220

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Fuels, Diesel, No. 2	68476-34-6	>99	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Red Colour Hydrocarbon Odour

Routes of Exposure: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.

Hazards:

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Combustible Liquid.
Irritating to skin.
Vapours are moderately irritating to the eyes.
Vapours are moderately irritating to the respiratory passages. The liquid when accidently aspirated into the lungs can cause a severe inflammation of the lung.

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

For further information on health effects, see Section 11.

4. FIRST AID

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

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

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

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

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

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

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

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

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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

North American exposure limits have not been established for the product. Consult local authorities for acceptable provincial values.
Diesel fuel, as total hydrocarbons: 100 mg/m3

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

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection:	Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
Skin Protection:	Impervious gloves (viton, nitrile) should be worn at all times when handling this material. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.
Respiratory Protection:	If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Red Colour
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Varies with region and season
Boiling Point:	150 - 380 degrees C
Density:	<876 kg/m3 @ 15 degrees C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	Not available
pH:	Not available
Flash Point:	Method Pensky-Martens CC >40 degrees C
Lower Explosion Limit:	1 % (vol.)
Upper Explosion Limit:	6 % (vol.)
Autoignition Temperature:	250 degrees C
Viscosity:	1.4 - 4.1 cSt @ 40 degrees C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (K_{OW}):	Not available
Water Solubility:	Insoluble

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Hazardous Decomposition Products:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified) **Toxicological Data**

Fuels, Diesel, No. 2	LD50 Oral Rat >5000 mg/kg LD50 Dermal Rabbit >2000 mg/kg

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

12. ECOLOGICAL INFORMATION

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1202
Proper Shipping Name	DIESEL FUEL
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG III
Shipping Description	DIESEL FUEL Class 3 UN1202 PG III

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15. REGULATORY INFORMATION

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

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

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Combustible Liquid. Irritating to skin.
Handling Statement:	Eliminate all ignition sources. Avoid prolonged exposure to vapours. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. Changes have been made to: Section 8 Section 14 Section 11

B4-6

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APPENDIX B5
DETONATING CORD

- Dyno Nobel Inc. Material Safety Data Sheet. MSDS #1126 3 pages

Material Safety Data Sheet

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1126
Date 01/24/05

Supercedes
MSDS # 1126 10/20/03

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): PRIMALINE®
PRIMACORD®
PRIMASHEAR™
OPTICORD®
GEOSEIS®
LOW FLEX™
FIRELINE CORD

Product Class: Detonating Cord

Product Appearance & Odor: Flexible cord of woven textile with a protected explosive core of PETN (white crystalline powder) and covered by a white or colored plastic or textile jacket. May have a waxed finish. No odor.

DOT Hazard Shipping Description: Cord, Detonating 1.1D UN0065 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients	**CAS#**	**%**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Pentaerythritol tetranitrate (PETN)	78-11-5	-----*	None[1]	None[2]

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3.
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3.
Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).
* Core powder is 100% PETN. The approximate amount of PETN in a given grade of cord is expressed as that number of grams of PETN per linear meter of cord. Range is from 1 to 280 gram/meter. Example: PRIMALINE® 5 contains approximately 5 grams PETN per meter of cord. (1 gram/meter = 4.7 grains/foot)

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable (PETN decomposes at melting point, about 141°C)
Vapor Pressure: Not Applicable
Vapor Density: (Air = 1) Not Applicable
Percent Volatile by Volume: Not Applicable
Solubility in Water: Insoluble.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers). For transportation fires involving large quantities of detonating cord, such as a trailer load, evacuate no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning or detonating material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive core material under normal conditions of use.

Eyes: May cause irritation, redness and tearing.
Skin: PETN is not known as a skin irritant or sensitizer.
Ingestion: PETN is moderately toxic if ingested. See systemic effects below.
Inhalation: See systemic effects below.
Systemic or Other Effects: PETN is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure. Systemic effects by ingestion include dermatitis.
Carcinogenicity: No constituents are listed by NTP, IARC or OSHA.

Emergency and First Aid Procedures

Eye: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Remove to fresh air. If symptoms persist, seek medical attention.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and strong bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If explosive powder is spilled from damaged detonating cord, remove all other explosives from the spill area. Wet down and clean spilled powder using a damp sponge or rag, avoid applying friction or pressure to the explosive, and place in a (Velostat) electrically conductive bag. Contamination of this material with sand, grit or dirt will render the material more sensitive to detonation. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other

clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Work gloves and work clothing that reduce the possibility of skin abrasion and that would prevent contact with spilled explosive powder is suggested.
Eye Protection: Safety glasses or goggles are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.
Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None		

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APPENDIX B6
ELECTRIC DETONATORS

- Dyno Nobel Inc. Material Safety Data Sheet. MSDS #1076 4 pages

Material Safety Data Sheet

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1076
Date 01/24/05

Supercedes
MSDS # 1076 01/22/03

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): ELECTRIC SUPER™ COAL
ELECTRIC SUPER™ LP
ELECTRIC SUPER™ SP
ELECTRIC SUPER™ SEISMIC
ELECTRIC SUPER™ INSTANT

Product Class: Commercial Electric Detonators and Accessory Products

Product Appearance & Odor: Metal cylinder with varying length of attached plastic coated wires.

DOT Hazard Shipping Description: Detonators, Electric 1.1B UN0030 II
Or
Detonators, Electric 1.4B UN0255 II
Or
Detonators, Electric 1.4S UN0456 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

		EXPOSURE LIMITS	
Ingredients	**CAS#**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Tungsten	7440-33-7	None[1]	5 mg/m^3 (TWA) 10 mg/m^3 (STEL)
Barium Chromate	10294-40-3	1 mg (CrO_3)/10m^3 (ceiling) 0.5 mg (Ba)/m^3	0.01 mg (Cr)/m^3 0.5 mg (Ba)/m^3
Lead Compounds	----------	0.5 mg (Pb)/m^3	0.5 mg (Pb)/m^3
Pentaerythritol Tetranitrate (PETN)	78-11-5	None[1]	None[2]
Boron	7440-42-8	No Value Established	No Value Established
Potassium Perchlorate[3]	7778-74-7	None[1]	None[2]
Diazodinitrophenol (DDNP)	4682-03-5	No Value Established	No Value Established
Nitrocellulose	9004-70-0	No Value Established	No Value Established

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3 .
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3 .
[3] Not all delay periods contain perchlorate. Those that do contain between from about 4 to a maximum of about 25 mg perchlorate per detonator.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable
Flammable Limits: Not Applicable
Extinguishing Media: None
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

Eyes: No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness and tearing.
Skin: No exposure to chemical hazards anticipated with normal handling procedures.
Ingestion: No exposure to chemical hazards anticipated with normal handling procedures.
Inhalation: Not a likely route of exposure.
Systemic or Other Effects: None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
Carcinogenicity: ACGIH classifies Lead as a "Suspected Human Carcinogen" and insoluble Chromium VI as "Confirmed Human Carcinogen". NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.
Perchlorate: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Not applicable.
Special Considerations: None

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources, strong shock and electrical impulse. Do not attempt to disassemble.
Materials to Avoid (Incompatibility): Corrosives (acids and bases)
Hazardous Decomposition Products: Carbon Monoxide (CO), Nitrous Oxides (NO_x), Lead (Pb) and various oxides and complex oxides of metals.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Cotton clothing is suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, strong shock, and electrical impulses.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

Material Safety Data Sheet

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number (Use Toxic Chemical Category Code)	% By Weight
Barium Compounds	N040	1.2
Lead Compounds	N420	0 – 0.59
Chromium Compounds	N090	1.2

Amount of Lead in Detonator Product Line *				
Product	**Pb compounds in detonator [grams]**	**Pb compounds in detonator [Wt.%]**	**Pb in detonator [grams]**	**Pb in detonator [Wt. %]**
Electric Super SP	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super LP	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super Coal	**0.0412**	**0.588%**	**0.0357**	**0.5093%**
Electric Super Seismic	**0.0000**	**0.0000%**	**0.0000**	**0.0000%**
Electric Super Instant	**0.0000**	**0.0000%**	**0.0000**	**0.0000%**

*Applies to only the detonator (source of lead). Do not use case weight or weight of any other component.

Disclaimer

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APPENDIX B7

EZ-MUD

- Halliburton. Material Safety Data Sheet. 6 pages

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **EZ-MUD®**

Revision Date: 16-Feb-2004

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: EZ-MUD®
Synonyms: None
Chemical Family: Blend
Application: Shale Inhibitor

Manufacturer/Supplier

Baroid Drilling Fluids
a Product Service Line of Halliburton Energy Services, Inc.
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (800) 666-9260 or (713) 753-3000

Prepared By

Chemical Compliance
Telephone: 1-580-251-4335

2. COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	200 mg/m^3	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview

May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation

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

Skin

Wash with soap and water. Get medical attention if irritation persists. Remove contaminated shoes and discard.

Eyes

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion

Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician

Not Applicable

B7-1

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200**Min:** > 200
Flash Point/Range (C):	Not Determined**Min:** > 93
Flash Point Method:	PMCC
Autoignition Temperature (F):	> 392
Autoignition Temperature (C):	> 200
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Decomposition in fire may produce toxic gases. Use water spray to cool fire exposed surfaces.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 2, Flammability 1, Reactivity 0
HMIS Ratings:	Flammability 1, Reactivity 0, Health 2

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	Prevent from entering sewers, waterways, or low areas.
Procedure for Cleaning / Absorption	Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.
Storage Information	Store away from oxidizers. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.
Respiratory Protection	Organic vapor respirator with a dust/mist filter. In high concentrations, supplied air respirator or a self-contained breathing apparatus.
Hand Protection	Impervious rubber gloves.
Skin Protection	Rubber apron.
Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White to gray
Odor:	Mild hydrocarbon
pH:	6-8

Specific Gravity @ 20 C (Water=1):	1.0
Density @ 20 C (lbs./gallon):	8.3
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	347
Boiling Point/Range (C):	175
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	0.002
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	70
Evaporation Rate (Butyl Acetate=1):	< 1
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Lung disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.
Toxicity Tests	

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability BOD(28 Day): 40% of COD

Bio-accumulation Not Determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: >1000 mg/l (Pimephales promelas)
Acute Crustaceans Toxicity:	TLM48: 98 mg/l (Acartia tonsa)
Acute Algae Toxicity:	EC50: 16.70 mg/l (Skeletonema costatum)

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging If empty container retains product residues, all label precautions must be observed. Store away from ignition sources. Transport with all closures in place. Return for reuse or disposal according to national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity For This Product	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

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APPENDIX B8
GASOLINE

- Shell Canada Limited. Material Safety Data Sheet. MSDS #215-002 6 pages

Shell Canada Limited

Material Safety Data Sheet

Effective Date: 2002-08-14
Supersedes: 2001-01-08

Class B2 Flammable Liquid

Class D2A Other Toxic Effects - Carcinogen

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**REGULAR UNLEADED GASOLINE MARKED**
SYNONYMS:	Automotive Fuel Petrol
PRODUCT USE:	Fuel
MSDS Number:	215-002

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

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Gasoline, Natural	8006-61-9	80 - 100	Yes
Benzene	71-43-2	<1.5	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Dyed for tax purposes Typical Gasoline Odour

Routes of Exposure: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.

B8-1

Hazards:

Flammable Liquid.
May cause cancer.
Vapours are moderately irritating to the eyes.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
May be absorbed by skin contact. Prolonged immersion in liquid may lead to chemical burns.
Vapours are moderately irritating to the respiratory passages. The liquid when accidently aspirated into the lungs can cause a severe inflammation of the lung.
Excessive exposure to benzene may cause leukemia in man.

Handling:

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

For further information on health effects, see Section 11.

4. FIRST AID

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

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

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

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

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

5. FIRE FIGHTING MEASURES

Extinguishing Media:

Dry Chemical
Carbon Dioxide
Foam
Water Fog

B8-2

Firefighting Instructions:	Extremely flammable. Vapour forms a flammable/explosive mixture with air between upper and lower flammable limits. Vapours may travel along ground and flashback along vapour trail may occur. Do not use water except as a fog. Product will float and can be reignited on surface of water. Containers exposed to intense heat from fires should be cooled with water to prevent vapour pressure buildup which could result in container rupture. Container areas exposed to direct flame contact should be cooled with large quantities of water as needed to prevent weakening of container structure. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus.
Hazardous Combustion Products:	Carbon dioxide, carbon monoxide and unidentified organic compounds may be formed upon combustion.

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

Handling:	Extremely flammable. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Avoid all direct contact with this material. Avoid prolonged or repeated inhalation of vapours. Vapours may accumulate and travel to distant ignition sources and flashback. Do not cut, drill, grind, weld or perform similar operations on or near containers. Never siphon by mouth. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Launder contaminated clothing prior to reuse. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities.
Storage:	Store in a cool, dry, well ventilated area, away from heat and ignition sources. Protect against physical damage to containers.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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

Gasoline: 300 ppm (STEL: 500 ppm)
Benzene (skin) : 0.5 ppm (STEL: 2.5 ppm)
Skin Notation: The occupational exposure limit is based on the fact that skin and/or eye is a major route of exposure through absorption.

B8-3

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

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection:	Chemical safety goggles and/or full face shield to protect eyes and face, if product is handled such that it could be splashed into eyes. Provide an eyewash station in the area.
Skin Protection:	Impervious gloves should be worn at all times when handling this product. PVC or nitrile rubber gloves are recommended. In confined spaces or where the risk of skin exposure is much higher, impervious clothing should be worn. Safety showers should be available for emergency use.
Respiratory Protection:	If exposure exceeds occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges. For high airborne concentrations, use a NIOSH-approved supplied-air respirator, either self-contained or airline breathing apparatus, operated in positive pressure mode.

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Dyed for tax purposes
Odour:	Typical Gasoline Odour
Odour Threshold:	>0.25 ppm
Freezing/Pour Point:	Not available
Boiling Point:	35 - 220 degrees C
Density:	750 - 850 kg/m3 @ 15 degrees C
Vapour Density (Air = 1):	3.5
Vapour Pressure (absolute):	Not available
pH:	Not applicable
Flash Point:	Method Tag Closed Cup = -30 degrees C
Lower Explosion Limit:	1.4 % (vol.)
Upper Explosion Limit:	7.6 % (vol.)
Autoignition Temperature:	280 degrees C
Viscosity:	<1 cSt @ 38 degrees C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (K_{OW}):	200
Water Solubility:	Insoluble

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Gasoline, Natural	LD50 Oral Rat = 18800 mg/kg LD50 Dermal Rabbit >8000 mg/kg
Benzene	LD50 Oral Rat = 930 - 5600 mg/kg LC50 Inhalation Rat = 13700 ppm for 4 hours

Routes of Exposure: Exposure may occur via inhalation, ingestion, skin absorption and skin or eye contact.

Irritancy: Based on testing with similar materials, this product is not expected to be a primary skin irritant after exposure of short duration, would not be a skin sensitizer and would not be irritating to the eye.

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

Carcinogenicity and Mutagenicity: This product contains benzene. Epidemiological studies indicate that long term inhalation of benzene vapour can cause leukaemia in man. Benzene has also produced chromosomal aberrations in peripheral blood lymphocytes.

12. ECOLOGICAL INFORMATION

Environmental Effects: Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May be harmful to aquatic life. Fish Toxicity: 5 to 40 ppm | 96 hr TLm | Rainbow Trout | Freshwater

Biodegradability: Not readily biodegradable. Potential for bioaccumulation. Rapid volatilization.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

UN Number	UN1203
Proper Shipping Name	GASOLINE
Hazard Class	Class 3 Flammable Liquids
Packing Group	PG II

B8-5

Additional Information	Marine Pollutant
Shipping Description	GASOLINE Class 3 UN1203 PG II Marine Pollutant

15. REGULATORY INFORMATION

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

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

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement :	Flammable Liquid. May cause cancer.
Handling Statement:	Eliminate all ignition sources. Wear suitable gloves and eye protection. Bond and ground transfer containers and equipment to avoid static accumulation. Avoid prolonged exposure to vapours. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.
First Aid Statement :	Wash contaminated skin with soap and water. Flush eyes with water. If overcome by vapours remove to fresh air. Do not induce vomiting. Obtain medical attention.
Revisions:	This MSDS has been reviewed and updated. Changes have been made to: Section 1 Section 2 Section 14

B8-6

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APPENDIX B9

JET A

- Shell Canada Limited. Material Safety Data Sheet. MSDS #142-011 7 pages

Shell Canada Limited

Material Safety Data Sheet

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

Class B3 Combustible Liquid

Class D2B Other Toxic Effects - Skin Irritant

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT:	**SHELL* JET A-1**
SYNONYMS:	Aviation Turbine Fuel (Kerosene Type) May contain anti-icing additive (Diethylene Glycol Monomethyl Ether)
PRODUCT USE:	Fuel Solvent
MSDS Number:	142-011

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

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

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Bright Clear Hydrocarbon Odour

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

B9-1

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

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

For further information on health effects, see Section 11.

4. FIRST AID

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

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

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

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

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

5. FIRE FIGHTING MEASURES

Extinguishing Media: Carbon Dioxide
Foam
Dry Chemical
Water Fog

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

B9-2

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

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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

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

B9-3

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

PERSONAL PROTECTIVE EQUIPMENT:

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

Skin Protection: Avoid contact with skin. Use protective clothing and gloves manufactured from nitrile. Safety showers should be available for emergency use.

Respiratory Protection: Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved respirator. Use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges or use a NIOSH-approved supplied-air respirator.

9. PHYSICAL DATA

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

10. STABILITY AND REACTIVITY

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

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

11. TOXICOLOGICAL INFORMATION

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

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

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

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

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

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

12. ECOLOGICAL INFORMATION

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

Biodegradability: Not readily biodegradable.
Rapid volatilization.

Bioaccumulation: Potential for bioaccumulation.

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

Aquatic Toxicity

Product is expected to be toxic to aquatic organisms.

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

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

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

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

15. REGULATORY INFORMATION

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

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

16. ADDITIONAL INFORMATION

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

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

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

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

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APPENDIX B10

LUBTAC ROD GREASE

- ADG Technology. Material Safety Data Sheet. 4 pages

ADG Technology

PERTH
Tel (08) 9249 7599
Fax (08) 9249 7699
BRISBANE
Tel (07) 3271 5900
Fax (07) 3271 5907

VSEDS
Southern Exploration & Drilling Supplies

MELBOURNE
Tel (03) 9545 1277
Fax (03) 9545 1299
INTERNATIONAL
Tel +61 (8) 9249 7599
Fax +61 (8) 9249 7699

PO Box 148,
Kingsway WA 6065

Material Safety Data Sheet

Lubtac Rod Grease

HDD MINING & WATERWELL

Drillteck Mission SANDVIK

Down hole hammers & bits
Top hole hammer equipment

BOART LONGYEAR

Diamond drilling
Three cone rotary drill bits
(TCI or Mill Tooth)
Geological supplies
Radio communications
Drag & blade bits
Drilling fluids
Drilling rigs - all types
Elgi air compressors
Augers, teeth,
ground engaging tools
Drill pipe & subs
Geotechnical drilling supplies
International procurement
Machinery parts & equipment

A Smith/Schlumberger Company

M-I Australia Pty Ltd, 11/251 Adelaide Tce, Perth, WA, 6000
Tel: 08 9325 4822 Fax: 08 9325 1897

HEALTH SAFETY HSE ENVIRONMENTAL

ENVIRONMENTAL AND SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

TRADE NAME: **LUBTAC ROD GREASE**

GENERIC DESCRIPTION: **A MIXTURE OF INORGANIC INERT VISCOSIFIERS, TACKIFIERS, HYDROCARBON OILS AND VEGETABLE OILS.**

2. HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	DATA
NONE		

3. PHYSICAL DATA

BOILING POINT : **120 ^{o}C**

MELTING POINT : **NA**

FREEZING POINT : **< 0 ^{o}C**

pH : **7-8**

SPECIFIC GRAVITY : **0.99**

APPEARANCE AND : **DARK BROWN STRINGY GREASE**

4. FIRE AND EXPLOSION DATA

FLASH POINT ^{o}C: (AUTO IGNITION TEMPERATURE) **> 200 ^{o}C**

EXTINGUISING MEDIA : **USE EXTINGUISHER USED FOR EXTINGUISHING HYDROPHOBIC MATERIALS**

5. HEALTH HAZARD INFORMATION

ROUTES OF EXPOSURE AND EFFECTS

EYES : **MODERATE TO SEVERE IRRITATION**

INHALATION : **NO IRRITATING FUMES ARE PRODUCED AT NORMAL TEMPERTURES**

INGESTION : **MAY CAUSE NAUSEA**

SKIN : **MAY BE IRRITATING TO SENSITIVE SKINS ON PROLONGED EXPOSURE**

6. EMERGENCY AND FIRST AID PROCEDURES

EYES : **WIPE OUT WITH DRY CLOTH. USE EYE DROPS IF NECESSARY. OBTAIN MEDICAL ATTENTION IF NECESSARY**

INHALATION : **NO IRRITATING FUMES ARE PRODUCED AT NORMAL TEMPERATURES**

INGESTION : **WASH MOUTH WITH WATER. INDUCE VOMITING. OBTAIN MEDICAL ADVICE AS SOON AS POSSIBLE**

SKIN : **WASH WITH SOAPY WATER. IF DEGREASING OF SKIN HAS OCCURED, APPLY MOISTURISING CREAM**

7. REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: **EXTREME HEAT**

INCOMPATABILITY: **NONE**

HAZARDOUS DECOMPOSITION PRODUCTS: **CAN PRODUCE HYDROCARBON DECOMPOSITION PRODUCT ON BURNING.**

CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERISATION: **WILL NOT OCCUR**

8. SPILL OR LEAK PROCEDURES

CONTAIN SPILL. SCRAPE UP EXCESS PRODUCTS WITH A SPADE. THROW SAND OR WOOD SHAVINGS OVER CONTAMINATED AREA AND SCRAPE UP WITH ASPADE. CONTAMINATED WOOD SHAVINGS OR SAND CAN BE DISCARDED IN ANY RUBBISH STORAGE AREA.

9. INDUSTRIAL HYGEINE CONTROL MEASURES

VENTILATION: **NORMAL**

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY:		**NONE**
EYES	:	**NONE**
GLOVES	:	**YES**
OTHER	:	**CLOTHING PROTECTOR AS REQUIRED TO PROTECT CLOTHES FROM GREASE WHICH IS DIFFICULT TO REMOVE.**

10. SPECIAL PRECAUTIONS

NONE

11. OTHER HANDLING AND STORAGE REQUIREMENTS

NONE

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APPENDIX B11

NON-ELECTRIC DETONATORS

- Dyno Nobel Inc. Material Safety Data Sheet. MSDS #1122 5 pages

Material Safety Data Sheet

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1122
Date 05/13/05

Supercedes
MSDS # 1122 01/24/05

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

NONEL® MS
NONEL® LP
NONEL® SL
NONEL® TD
NONEL® MS CONNECTOR
NONEL® TWINPLEX™
NONEL® STARTER
NONEL® EZ DET®
NONEL® EZTL™
NONEL® EZ DRIFTER ®
OPTIMIZER® OPTISLIDE®
OPTIMIZER® OPTISURFACE®
OPTIMIZER® OPTI-TL®

Product Class: NONEL® Non-electric Delay Detonators

Product Appearance & Odor: Aluminum cylindrical shell with varying length and diameter of attached colored plastic tubing. The detonator may be enclosed in a plastic housing, and an assembly may contain two detonators. Odorless.

DOT Hazard Shipping Description: Detonators, non-electric 1.1B UN0029 II
-or- Detonator assemblies, non-electric 1.1B UN0360 II
-or- Detonator assemblies, non-electric 1.4B UN0361 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

		Occupational Exposure Limits	
Ingredients	**CAS#**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Pentaerythritol Tetranitrate (PETN)	78-11-5	None[1]	None[2]
Lead Azide	13424-46-9	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Lead	7439-92-1	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Silicon	7440-21-3	15 mg / m^3 (total dust) 5 mg / m^3 (respirable fraction)	10 mg / m^3
Selenium	7782-49-2	0.2 mg/m^3	0.2 mg/m^3
Red Lead (Lead tetroxide)	1314-41-6	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Titanium dioxide	13463-67-7	15 mg/m^3	10 mg/m^3
Barium Chromate	10294-40-3	1 mg (CrO_3)/10m^3 (ceiling) 0.5 mg (Ba)/m^3	0.01 mg (Cr)/m^3 0.5 mg (Ba)/m^3
Lead Chromate	7758-97-6	0.05 mg (Pb)/m^3 1 mg (CrO_3)/10m^3 (ceiling)	0.15 mg (Pb)/m^3 0.012 mg (Cr)/m^3
Barium Sulfate	7727-43-7	0.5 mg (Ba)/m^3	10 mg/m^3
Potassium Perchlorate[3]	7778-74-7	None[1]	None[2]
Silica (crystalline)	61790-53-2	See Note Below	0.05 mg/m^3 (resp frac)
Molybdenum	7439-98-7	None[1]	None[2]

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Tungsten	7440-33-7	None[1]	5 mg/m^3 (TWA) 10 mg/m^3 (STEL)
Aluminum	7429-90-5	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)	5 mg/m^3
Antimony	7440-36-0	0.5 mg/m^3	0.5 mg/m^3
Cyclotetramethylene Tetranitramine (HMX)	2691-41-0	None[1]	None[2]

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3 .
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3 .
Note: The OSHA PEL for crystalline silica is calculated as follows:
Quartz, respirable: 10 mg/m$^{3\,e}$ / % SiO_2 + 2 Quartz, total dust: 30 mg/m^3 / % SiO_2 + 2
[3] Not all delay periods contain perchlorate. Those that do contain between from about 4 to a maximum of about 60 mg perchlorate per detonator.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable
Evaporation Rate (Butyl Acetate = 1): Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable **Flammable Limits:** Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers).
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

Eyes: No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness, swelling, itching, pain and tearing.
Skin: No exposure to chemical hazards anticipated with normal handling procedures. Exposure to post-detonation reaction products may cause irritation.
Ingestion: No exposure to chemical hazards anticipated with normal handling procedures. Post-detonation reaction product residue is toxic by ingestion. Symptoms may include gastroenteritis with abdominal pain, nausea, vomiting and diarrhea. See systemic effects below.

Inhalation: Not a likely route of exposure. See systemic effects below.
Systemic or Other Effects: None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
Carcinogenicity: ACGIH classifies Lead as a "Suspected Human Carcinogen" and insoluble Chromium VI as "Confirmed Human Carcinogen". NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.

Perchlorate: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Not applicable.
Special Considerations: None

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact.
Conditions to Avoid: Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock. Do not attempt to disassemble.
Materials to Avoid (Incompatibility): Corrosives (acids and bases or alkalis).
Hazardous Decomposition Products: Carbon Monoxide (CO), Nitrous Oxides (NO_X), Sulfides, Chromates, Lead (Pb), Antimony (Sb) and various oxides and complex oxides of metals.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. If loose explosive powder is spilled, such as from a broken detonator, only properly qualified and authorized personnel should be involved with handling and clean-up activities. Spilled explosive powder is extremely sensitive to initiation and may detonate. Follow applicable Federal, State, and local spill reporting requirements.

Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: None required for normal handling. Provide enhanced ventilation after use if in underground mines or other enclosed areas.

Respiratory Protection: None required for normal handling.

Protective Clothing: Cotton gloves are recommended.

Eye Protection: Safety glasses are recommended.

Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.

Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.

Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

Material Safety Data Sheet

SECTION X - SPECIAL INFORMATION

These products contain the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	Max. lbs/1000 units
Lead	7439-92-1	39.4
	(Use Toxic Chemical Category Code)	
Lead Compounds	N420	2.0
Barium Compounds	N040	1.8
Chromium Compounds	N090	1.9

Range* of Section 313 Chemicals in each product

Product	lb Pb per 1000 detonators	lb Pb compounds per 1000 detonators	lb Ba compounds per 1000 detonators	lb Cr compounds per 1000 detonators
NONEL® MS	0 - 27	0.3 – 1.5	0 – 0.9	0 – 0.9
NONEL® LP	0 - 30	0.3 – 2.0	0 - 1.8	0 - 1.9
NONEL® SL	7 - 27	0.3 – 1.5	0	0
NONEL® TD	0 - 18	0.3 – 0.7	0	0
NONEL® MS Connector	5 - 16	0.3 – 0.4	0	0
NONEL® TWINPLEX™	5 - 15	0.3 – 0.7	0	0
NONEL® STARTER	0	0.3	0	0
NONEL® EZ DET®	22 - 36	2.0	0	0
NONEL® EZTL™	5 - 15	0.5 – 0.7	0	0
NONEL® EZ DRIFTER	39.4	1.3	1.2	1.3
NONEL® OPTISLIDE®	0	0	0	0
NONEL® OPTISURFACE®	0	0	0	0
NONEL® OPTI-TL®	0	0	0	0

*** The exact quantity and weight percent of Section 313 Chemicals in each delay period and tubing length for each product is available upon request.**

Disclaimer

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APPENDIX B12

PACKAGED EMULSION EXPLOSIVES

- Dyno Nobel Inc. Material Safety Data Sheet. MSDS #1063 3 pages

Material Safety Data Sheet

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FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1063
Date 01/24/05

Supercedes
MSDS # 1063 01/23/04

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): BLASTEX®
BLASTEX® PLUS, BLASTEX® PLUS HD
BLASTEX® TX, BLASTEX® TX PLUS
SUPER BLASTEX®, SUPER BLASTEX ®TX
DYNOTEX
DYNO® 1.5 SB, DYNO® 1.5 SBC, DYNO® 1.5 SB30
DX-2011, DX-2012

Product Class: Packaged Emulsion Explosives

Product Appearance & Odor: White or pink opaque semi-solid, which will appear gray if product contains aluminum.

Little or no odor. Packaged in cylindrical cartridges of paper or plastic film.

DOT Hazard Shipping Description: Explosive, blasting, type E 1.5D UN0332 II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients:	CAS#	% (Range)	ACGIH TLV-TWA
Ammonium Nitrate	6484-52-2	60-85	No Value Established
Sodium Nitrate[1]	7631-99-4	0-12	No Value Established
Aluminum	7429-90-5	0-10	10 mg/m^3
Mineral Oil	64742-35-4	0-6	5 mg/m^3
Kerosene	8008-20-6	0-6	No Value Established

[1] Our source of Sodium Nitrate (Chilean) may contain perchlorate ion, which occurs naturally. Although Dyno Nobel does not analyze for the presence of perchlorate anion, based on published studies, the products listed above may contain between 0 and 250 ppm perchlorate.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: (Air = 1) Not Applicable
Percent Volatile by Volume: <20 (water)

Evaporation Rate (Butyl Acetate = 1): <1

Vapor Pressure: Not Applicable
Density: 1.15-1.35 g/cc
Solubility in Water: Product partially dissolves very slowly in water.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: >100°C
Flammable Limits: Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: May cause irritation, redness and tearing.
Skin: Prolonged contact may cause irritation.
Ingestion: Large amounts may be harmful if swallowed.
Inhalation: Not a likely route of exposure.
Systemic or Other Effects: *Perchlorate*: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least 15 minutes. If irritation persists seek medical attention.
Skin: Remove contaminated clothing. Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: If irritation occurs, remove to fresh air.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and strong bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur

Material Safety Data Sheet

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Gloves and work clothing that reduce skin contact are suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Keep away from heat, flame, ignition sources and strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listing of the previously referenced regulation should be reviewed.

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APPENDIX B13

PACKAGED DYNAMITES AND EXPLOSIVE GELATINS

- Dyno Nobel Inc. Material Safety Data Sheet. MSDS #1019 3 pages

Material Safety Data Sheet

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FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1019
Date 01/24/05

Supercedes
MSDS # 1019 09/09/04

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

D-GEL™ 1000
DYNOSPLIT®: D1, D3/4, D 7/8
EXTRA GELATIN: 40%, 75%
GELAPRIME® F
UNIGEL®
UNIMAX®
VIBROGEL®: 1,3
Z POWDER™
DYNOMAX PRO™
Oil Well Explosive 80%
Oil Well Explosive 100%
STONECUTTER™
REDH®A
RED H® B
POWERGEL D
60% Hi-Pressure Gelatin
IRESPLIT® D
IP: 724, 738

Product Class: Packaged Dynamites and Blasting Gelatins
Product Appearance & Odor: Powdery to gelatinous solid, light tan to dark brown color. Faint, waxy odor.
DOT Hazard Shipping Description: Explosive, blasting, type A 1.1D UN0081 II
NFPA Hazard Classification: Not Available (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

Ingredients:	CAS#	% (Range)	ACGIH TLV-TWA
Nitroglycerin (NG)	55-63-0	1-20	0.05 ppm
Ethylene Glycol Dinitrate (EGDN)	628-96-6	8-76	0.05 ppm
Nitrocellulose	9004-70-0	0-6	No Value Established
Ammonium Nitrate	6484-52-2	0-75	No Value Established
Sodium Nitrate[1]	7631-99-4	0-50	No Value Established
Sulfur[2]	7704-34-9	0-4	No Value Established

[1] Our source of Sodium Nitrate (Chilean) may contain perchlorate ion, which occurs naturally. Although Dyno Nobel does not analyze for the presence of perchlorate anion, based on published studies, the products listed above may contain between 0 and 1,000 ppm perchlorate.

[2] This ingredient is not found in most of the products listed above.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Vapor Pressure: Not Applicable
Density: 0.8-1.48 g/cc

Percent Volatile by Volume: Not Applicable

Evaporation Rate (Butyl Acetate = 1): Not Applicable

Solubility in Water: Ammonium and sodium nitrates are completely soluble. NG and EGDN are very slightly soluble.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable

Flammable Limits: Not Applicable

Extinguishing Media: (See Special Fire Fighting Procedures section.)

Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.

Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: May cause irritation, redness and tearing.

Skin: Contact may result in headache, nausea and blood vessel dilation.

Ingestion: May result in headache, nausea, intestinal upset and blood vessel dilation.

Inhalation: May result in headache, nausea and blood vessel dilation.

Systemic or Other Effects: *Perchlorate*: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.

Skin: Remove contaminated clothing. Wash with soap and water.

Ingestion: Seek medical attention.

Inhalation: Remove to fresh air. If irritation persists, seek medical attention.

Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions. May explode when subjected to fire, supersonic shock, or high-energy projectile impact, especially when confined or in large quantities.

Conditions to Avoid: Keep away from heat, flame, ignition sources and strong shock.

Materials to Avoid (Incompatibility): Corrosives (mineral acids, bases, strong acids).

Hazardous Decomposition Products: Carbon Monoxide (CO), Hydrogen Sulfide (H_2S), Nitrous Oxides (NO_X), and Sulfur Oxides (SO_X).

Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged

and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements. Contact of this product with water may result in a reportable release.

Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Forced ventilation may be necessary where natural ventilation is limited. Magazines containing NG and/or EGDN based explosives must be ventilated before entry.
Respiratory Protection: None normally required.
Protective Clothing: Chemical resistant (nitrile) gloves are suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: Inhalation and skin contact should be minimized to avoid headaches, nausea, and blood vessel dilation. Protective clothing should be changed daily, more often if contaminated.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, and strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

Chemical Name	CAS Number	% By Weight
Nitroglycerin	55-63-0	1-20

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listing of the previously referenced regulation should be reviewed.

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APPENDIX B14
SHOCK TUBE

- Dyno Nobel Inc. Material Safety Data Sheet. MSDS #1124 3 pages

Material Safety Data Sheet

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CANUTEC (CANADA) 613-996-6666

MSDS # 1124
Date 01/24/05

Supercedes
MSDS # 1124 10/20/04

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): NONEL® LEAD LINE

Product Class: Shock Tube

Product Appearance & Odor: Hollow plastic tubing (normally yellow) with dusty inner coating of HMX and aluminum. No detectable odor.

DOT Hazard Shipping Description: Articles, explosive, n.o.s. (HMX) 1.4S UN0349 II.
For 10,000 ft spools with Wire Lock Terminations only, Not regulated as an explosive, 0000

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Cyclotetramethylene Tetranitramine (HMX)	2691-41-0	0.35	None[1]	None[2]
Aluminum (dust)	7429-90-5	0.04	15 mg/m^3 (total) 5 mg/m^3 (respirable)	10 mg/m^3

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3.
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3.
Note: The above hazardous dust mixture is present at approximately 15 mg per meter of tubing.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Melting Point: HMX decomposes violently at melting pt., about 278°C
Evaporation Rate (Butyl Acetate = 1): Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Soluble
Percent Volatile by Volume: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable
Flammable Limits: Not Applicable
Extinguishing Media: Water, inert powder, CO_2
Special Fire Fighting Procedures: For shock tube only, consider initial isolation of at least 15 meters (50 feet) in all directions. Fight fire with normal precautions and methods used for plastic fires from a reasonable distance. IF DETONATORS OR OTHER EXPLOSIVES ARE PRESENT, DO NOT FIGHT FIRE.
Unusual Fire and Explosion Hazards: May burn vigorously with localized detonations and projection of fragments, with effects usually confined to the immediate vicinity of packages. Toxic smoke from combustion of the plastic material may be emitted. If product functions, high heat and pressure are released from the end of the tube if not covered or enclosed, typically by a metal device.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to hazardous ingredients (inner coating materials) under normal conditions of use.
Eyes: Not a likely route of exposure. Dust particles may be irritating.
Skin: Not a likely route of exposure. Dust particles may cause skin irritation.
Ingestion: Not a likely route of exposure. Ingestion of large amounts of the reactive powder (HMX) is poisonous and may cause cardiovascular collapse.
Inhalation: Not a likely route of exposure. Breathing dust can cause respiratory irritation. During manufacture and at processing temperatures, irritating fumes may evolve.
Systemic or Other Effects: None known.
Carcinogenicity: No constituents are listed by NTP, IARC or OSHA.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Not Applicable
Inhalation: Not Applicable
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable
Conditions to Avoid: Keep away from heat, flame, impact, friction, ignition sources and strong shocks. Also avoid stretching to failure.
Materials to Avoid (Incompatibility): Incompatible with strong oxidizers and acids.
Hazardous Decomposition or Combustion Products: Hazardous carbon monoxide (CO), nitrogen oxide (NO_X) gases and products of plastic decomposition produced.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 50 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, repackage undamaged devices in original packaging, accounting for every device. If the ends or tube wall have been opened such that powder may have

B14-2

been released from the tube, isolate the spill area. Contamination of the HMX/Aluminum powder with sand, grit or dirt will render the material more sensitive to detonation. Carefully wet down and clean "loose" powder spills using a damp sponge or rag, avoid applying friction or pressure to the explosive, and place in a (Velostat) electrically conductive bag. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: None normally required. Provide enhanced ventilation if used in underground mines, indoors or other enclosed areas.
Respiratory Protection: None normally required. Extended testing of the product indoors or in enclosed areas may necessitate respiratory protection.
Protective Clothing: None normally required. Wear chemical-resistant gloves during post-detonation cleanup or spill cleanup operations.
Eye Protection: Safety glasses or goggles are recommended for handling, testing or cleanup.
Other Precautions Required: None

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources and strong shock. Only properly qualified and authorized personnel should handle and use Shock Tube.
Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None		

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APPENDIX B15

TELLUS T32 OIL

- Sopus Products. Material Safety Data Sheet. MSDS #60532E-9 11 pages

MATERIAL SAFETY DATA SHEET
Revision Date: 06/04/2003

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: Tellus® Oil T 32
MSDS NUMBER: 60532E - 9
PRODUCT CODE(S): 65401

MANUFACTURER ADDRESS:SOPUS Products, P.O. Box 4453, Houston, TX. 77210-4453

TELEPHONE NUMBERS
Spill Information: (877) 242-7400
Health Information: (877) 504-9351
MSDS Assistance Number: (877) 276-7285

SECTION 2 PRODUCT/INGREDIENTS

CAS#	CONCENTRATION	INGREDIENTS
		Hydraulic Oil
Mixture	85 - 94.99 %weight	Highly refined petroleum oils
Proprietary	3 - 8.99 %weight	Proprietary additives (contains <1% zinc)

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Appearance & Odor: Pale liquid. Mild odor.
Health Hazards: No known immediate health hazards. High-pressure injection under the skin may cause serious damage.
Physical Hazards: No known physical hazards.
NFPA Rating (Health, Fire, Reactivity): 0, 1, 0
Hazard Rating:Least - 0 Slight - 1 Moderate - 2 High - 3 Extreme - 4

Inhalation:
Inhalation of vapors (generated at high temperatures only) or oil mist may

cause mild irritation of the nose, throat, and respiratory tract.

Eye Irritation:
Lubricating oils are generally considered no more than minimally irritating to
the eyes.

Skin Contact:
May cause slight irritation of the skin. If irritation occurs, a temporary burning sensation and minor redness and/or swelling may result. Release of the material during high-pressure applications may result in injection under the skin causing possible extensive tissue damage which is difficult to heal.
Other adverse effects not expected from brief skin contact.

Ingestion:
Lubricating oils are generally no more than slightly toxic if swallowed.
Other Health Effects:
Material may release hydrogen sulfide (H2S), a highly toxic and extremely flammable gas, when heated to 180 Degrees F or higher. H2S can cause irritation of the eyes and respiratory tract, headache, dizziness, nausea, vomitting, diarrhea, and pulmonary edema. The odor ("rotten egg") threshold is 0.02 ppm. Do not depend on sense of smell for warning; H2S rapidly deadens the sense of smell.

Signs and Symptoms:
Irritation as noted above. Local necrosis is evidenced by delayed onset of pain and tissue damage a few hours following injection.

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

For additional health information, refer to section 11.

SECTION 4 FIRST AID MEASURES

Inhalation:
If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or CPR as required and transport to the nearest medical facility.

Skin:
Remove contaminated clothing and shoes and wipe excess from skin. Flush skin
with water, then wash with soap and water. If irritation occurs, get medical
attention. Do not reuse clothing until cleaned. If material is injected under the skin, transport to the nearest medical facility for additional

treatment. If redness, swelling, pain and/or blisters occur, transport to the
nearest medical facility for additional treatment.

Eye:
Flush with water. If irritation occurs, get medical attention.

Ingestion:
Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention. Have victim rinse mouth out with water, then drink sips of water to remove taste from mouth. If vomiting occurs spontaneously, keep head below hips to prevent
aspiration.

Note to Physician:
In general, emesis induction is unnecessary in high viscosity, low volatility
products such as oils and greases.

SECTION 5 FIRE FIGHTING MEASURES

Flash Point [Method]: >350 °F/>176.67 °C [Cleveland Open Cup]

Extinguishing Media:
Material will float and can be re-ignited on surface of water. Use water fog,
'alcohol foam', dry chemical or carbon dioxide (CO2) to extinguish flames. Do
not use a direct stream of water.

Fire Fighting Instructions:
Material will not burn unless preheated. Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure, NIOSH approved, self-contained breathing apparatus.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures:
May burn although not readily ignitable.

Wear appropriate personal protective equipment when cleaning up spills. Refer

to Section 8.

Spill Management:
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for
proper disposal.

Place in container for proper disposal.

Reporting:
CERCLA: Product is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) petroleum exclusion. Releases to air,
land, or water are not reportable under CERCLA (Superfund).

CWA: This product is an oil as defined under Section 311 of EPA's Clean Water
Act (CWA). Spills into or leading to surface waters that cause a sheen must be
reported to the National Response Center, 1-800-424-8802.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures:
Wash with soap and water before eating, drinking, smoking, applying cosmetics,
or using toilet. Launder contaminated clothing before reuse. Properly dispose of contaminated leather articles such as shoes or belts that cannot be
decontaminated. Avoid heat, open flames, including pilot lights, and strong oxidizing agents. Use explosion-proof ventilation to prevent vapor accumulation. Ground all handling equipment to prevent sparking.

Material may release hydrogen sulfide (H2S), a highly toxic and extremely flammable gas, when heated to 180 Degrees F or higher. H2S may collect in the
headspace of the container.

Storage:
Store in a cool, dry place with adequate ventilation. Keep away from open flames and high temperatures.

Container Warnings:
Keep containers closed when not in use. Containers, even those that have been
emptied, can contain explosive vapors. Do not cut, drill, grind, weld or

perform similar operations on or near containers.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Oil mist, mineral ACGIH TLV TWA: 5 mg/m3 STEL: 10 mg/m3
Oil mist, mineral OSHA PEL TWA: 5 mg/m3
Hydrogen sulfide ACGIH - TLV TWA: 10 ppmm STEL: 15 ppmm
Hydrogen sulfide OSHA - PEL_IS TWA: 10 ppmm STEL: 15 ppmm
Hydrogen sulfide Elevated Temperatures > 180 F.

EXPOSURE CONTROLS
Adequate ventilation to control airborne concentrations below the exposure guidelines/limits.

PERSONAL PROTECTION
Personal protective equipment (PPE) selections vary based on potential exposure conditions such as handling practices, concentration and ventilation.
Information on the selection of eye, skin and respiratory protection for use
with this material is provided below.

Eye Protection:
Chemical Goggles, or Safety glasses with side shields

Skin Protection:
Use protective clothing which is chemically resistant to this material. Selection of protective clothing depends on potential exposure conditions and
may include gloves, boots, suits and other items. The selection(s) should take into account such factors as job task, type of exposure and durability requirements.

Published literature, test data and/or glove and clothing manufacturers indicate the best protection is provided by:
Neoprene, or Nitrile Rubber

Respiratory Protection:
If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, an approved respirator must be worn. Respirator selection, use and maintenance should be in accordance with
the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Types of respirator(s) to be considered in the selection process include:
For Mist: Air Purifying, R or P style NIOSH approved respirator.
For Vapors: Air Purifying, R or P style prefilter & organic cartridge, NIOSH approved respirator. Self-contained breathing apparatus for use in

environments with unknown concentrations or emergency situations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Pale liquid. Mild odor.
Substance Chemical Family: Lubricants
Appearance: Pale liquid.

Flash Point: > 350 °F [Cleveland Open Cup]

Odor: Mild odor.

Pour Point: -20 °F - -40 °F

Specific Gravity: 0.86 - 0.87

Viscosity: > 20 cSt @ 40 °C

SECTION 10 REACTIVITY AND STABILITY

Stability:
Material is stable under normal conditions.

Conditions to Avoid:
Avoid heat and open flames.

Materials to Avoid:
Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products:
Thermal decomposition products are highly dependent on combustion conditions.
A complex mixture of airborne solids, liquids and gases will evolve when this
material undergoes pyrolysis or combustion. Aldehydes, Carbon Monoxide, Carbon Dioxide, Hydrogen Sulfide, Ketones
and other unidentified organic compounds may be formed upon combustion.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute Toxicity
  Dermal LD50 >5.0 g/kg(Rabbit) OSHA: Non-Toxic Based on components(s)
  Oral LD50 >5.0 g/kg(Rat) OSHA: Non-Toxic Based on components(s)
Carcinogenicity Classification
Hydraulic Oil
  NTP: No IARC: Not Reviewed ACGIH: No OSHA: No

SECTION 12 ECOLOGICAL INFORMATION

Environmental Impact Summary:
There is no ecological data available for this product. However, this product
is an oil. It is persistent and does not readily biodegrade. However, it does not bioaccumulate.

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA Information:

Under RCRA, it is the responsibility of the user of the material to determine,
at the time of the disposal, whether the material meets RCRA criteria for hazardous waste. This is because material uses, transformations, mixtures, processes, etc. may affect the classification. Refer to the latest EPA, state
and local regulations regarding proper disposal.

SECTION 14 TRANSPORT INFORMATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or
highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

International Air Transport Association

Not regulated under IATA rules.

International Maritime Organization Classification
Not regulated under International Maritime Organization rules.

SECTION 15 REGULATORY INFORMATION

FEDERAL REGULATORY STATUS

OSHA Classification:
Product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200, because it carries the occupational exposure limit for mineral
oil mist.

Ozone Depleting Substances (40 CFR 82 Clean Air Act):
This material does not contain nor was it directly manufactured with any Class
I or Class II ozone depleting substances.

Superfund Amendment & Reauthorization Act (SARA) Title III:

There are no components in this product on the SARA 302 list.

SARA Hazard Categories (311/312):
Immediate Health:NO Delayed Health:NO Fire:NO Pressure:NO
Reactivity:NO

SARA Toxic Release Inventory (TRI) (313):
There are no components in this product on the SARA 313 list.

Toxic Substances Control Act (TSCA) Status:
All component(s) of this material is(are) listed on the EPA/TSCA Inventory of
Chemical Substances.

Other Chemical Inventories:
Component(s) of this material is (are) listed on the Australian AICS, Canadian DSL, European EINECS,

State Regulation
This material is not regulated by California Prop 65, New Jersey Right-to-Know
Chemical List or Pennsylvania Right-To-Know Chemical List. However for details on your regulation requirements you should contact the appropriate agency in your state.

SECTION 16 OTHER INFORMATION

Revision#: 9
Revision Date: 06/04/2003
Revisions since last change (discussion): This Material Safety Data Sheet (MSDS) has been newly reviewed to fully comply with the guidance contained in
the ANSI MSDS standard (ANSI Z400.1-1998). We encourage you to take the opportunity to read the MSDS and review the information contained therein.

SECTION 17 LABEL INFORMATION

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF
PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL
IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

PRODUCT CODE(S): 65401

Tellus® Oil T 32

ATTENTION!

PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE OIL ACNE OR DERMATITIS.
HIGH-PRESSURE INJECTION UNDER SKIN MAY CAUSE SERIOUS DAMAGE.

Precautionary Measures:
Avoid prolonged or repeated contact with eyes, skin and clothing. Avoid breathing of vapors, fumes, or mist. Use only with adequate ventilation. Wash thoroughly after handling.

FIRST AID

Inhalation: If the victim has difficulty breathing or tightness of the chest,
is dizzy, vomiting or unresponsive, give 100% oxygen with rescue breathing or
CPR as required and transport to the nearest medical facility.
Skin Contact: Remove contaminated clothing and shoes and wipe excess from

skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned. If material is injected under the skin, transport to the nearest medical facility
for additional treatment. If redness, swelling, pain and/or blisters occur, transport to the nearest medical facility for additional treatment.
Eye Contact: Flush with water. If irritation occurs, get medical attention.
Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention. If vomiting occurs spontaneously, keep head below hips to prevent
aspiration. Have victim rinse mouth out with water, then drink sips of water
to remove taste from mouth.

FIRE

In case of fire, Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO2) to extinguish flames. Do not use a direct stream of water. Material will float and can be re-ignited on surface of water.

SPILL OR LEAK
Dike and contain spill.
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for
proper disposal.

CONTAINS: Highly refined petroleum oils, Mixture; Proprietary additives (contains <1% zinc), Proprietary

NFPA Rating (Health, Fire, Reactivity): 0, 1, 0

TRANSPORTATION
US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or
highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flames or heat. Keep container closed and drum bungs in place.

Name and Address
SOPUS Products
P.O. Box 4453
Houston, TX 77210-4453

ADMINISTRATIVE INFORMATION
MANUFACTURER ADDRESS: SOPUS Products, P.O. Box 4453, Houston, TX. 77210-4453
Company Product Stewardship & Regulatory Compliance Contact: Timothy W Childs
Phone Number: (281) 874-7708

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US AT THIS TIME, AND IS BELIEVED TO BE ACCURATE BASED UPON THAT : IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT, FOR PURPOSE OF HAZARD COMMUNICATION. IT IS NOT INTENDED TO CONSTITUTE PRODUCT PERFORMANCE INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, UNDERLYING DATA OR THE INFORMATION CONTAINED HEREIN. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS, USE OR
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