

**Baffinland Iron Mines Corporation
Mary River Project
Emergency Response and Spill Contingency Plan**

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						Client

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Foreword

The Emergency Response and Spill Contingency Plan (ERP) is a cornerstone of Baffinland's Environmental Management Plans. This current revision is an amalgamation of the Emergency Response and Spill Contingency Plan that was submitted to the Nunavut Water Board (NWB) as part of the Type A Water License Application in February 2012 and Baffinland's current Type B Spill Contingency Plan (Revision 6, dated July 2012). This version of the ERP is intended to support the updated Type B Water License as well as the Type A Water License that Baffinland is anticipating July 2013. As the project evolves, the ERP will undergo updates/revisions annually to reflect the evolving complexities and environmental risks associated with the construction phase, operation phase, and ultimately closure phase of the Mary River Project. This current revision has been updated and expanded to contain potential spill scenarios, emergency response management, and roles and responsibilities applicable to 2013 Work Plan phase of the Project. The next expected revision date is January 2014.

The ERP is supported by the following management plans:

1. Oil Pollution Emergency Plan (OPEP) – Milne Inlet Fuel Storage Facility – currently being updated for the 2013 Work Plan.
2. The Explosives Management Plan – Currently under revision for the 2013 Work Plan.

Shipboard Oil Pollution Emergency Plans (SOPEPs) should also be considered when implementing the ERP. Canadian regulations require every vessel transiting in Canadian water to have Transport Canada approved SOPEP. SOPEPs are proprietary documents specific to each vessel however and therefore are not available for direct incorporation into the ERP.

This Emergency Response and Spill Contingency Plan for the Mary River Project has been implemented and is in effect. For the distribution list of the plan, see Table A. Additional copies of this Plan may be obtained from:

Baffinland Iron Mines Corporation

Suite 1016, 120 Adelaide Street West

Toronto, ON, Canada M5H 1T1

Tel: (416) 364-8820 Fax: (416) 364-0193

Table A: Distribution List for the Emergency Response and Spill Contingency Plan

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
Qikiqtani Inuit Association PO Box 1340 Iqaluit, NU, Canada X0A 0H0 Tel: (867) 979-5391, 1-800-6672742 (Land Administrator) Fax: (867) 979-3238	AANDC - Nunavut Regional Office Land Administration Division PO Box 2200 Iqaluit, NU, Canada X0A 0H0 Tel: (867) 975-4280 (Land Administration Manager)
AANDC - 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 Fax: (867) 983-2594	Nunavut Water Board PO Box 119 Gjoa Haven, NU, Canada X0B 1J0 Tel: (867) 360-6338 Fax: (867) 360-6369
Hamlet of Pond Inlet PO Box 180 Pond Inlet, NU, Canada X0A 0S0 Tel: (867) 899-8934 Fax: (867) 899-8940	Hamlet of Hall Beach
Hamlet of Cape Dorset	Hamlet of Arctic Bay
Hamlet of Igloolik	Hamlet of Clyde River
Hamlet of Kimmirut	

1. Introduction

1.1 Purpose and Scope

This Emergency Response and Spill Contingency Plan (ERP) ('The Plan') has been developed by Baffinland Iron Mines Corporation (Baffinland) to identify potential emergencies that could arise during the construction phase, and in particular the 2013 Work Plan Phase, of the Mary River Project and to establish the framework for responding to these situations. The Emergency Response and Spill Contingency Plan applies to all aspects of the Mary River Project. All Baffinland Iron Mines employees and contractors are required to comply with the requirements of the ERP.

In accordance with Part B, Item 6 of Baffinland's Type B Water Licence No. 2BB-MRY1114 for the Mary River Project, an annual review of the project environmental management plans developed under the licence needs to be undertaken. The year 2013 is a regulatory transition year that will see the granting of a new Type B Water Licence (likely early May) to allow for the site preparation that includes the construction of limited infrastructure prior to the anticipated receipt of the Type A Water Licence (likely late June or early July). In consideration of this, project environmental management plans have been updated to support the 2013 Work Plan (see Appendix B) which spans the applicability between the existing Type B Water Licence, proposed revised Type B Water Licence, as well as the incorporation of the proposed Type A Water Licence. It is recognized that there may be requirements to further update project environmental management plans based on the specific terms and conditions of approval of the proposed Type A Water Licence and QIA commercial lease once known.

The Emergency Response and Spill Contingency Plan, herein, supersedes the current Spill Contingency Plan (Revision 6, dated July 2012) and is an update to the Emergency Response and Spill Contingency Plan presented in the Final Environmental Impact Statement (FEIS: Appendix 3B, Attachment 5). This Plan supports activities of the 2013 Work Plan under the existing Type B Water Licence, proposed revised Type B and the incorporation the proposed Type A Water Licence.

The Plan, herein, is also intended to address specific terms and conditions under the NIRB Project Certificate. To this end, a concordance table is provided in Appendix A.

1.2 Guiding Principles

Emergency events or situations are characterized by immediate threat to life, health, safety, environment, or property. The emergency response plan is designed to address these characteristics using the following principles:

- Ensure safety and well-being of personnel, the environment, and property.
- Identify evacuation route and muster station locations.
- Ensure effective communication between personnel and the emergency team.

- Ensure that procedures exist to respond, intervene, stop, or limit the emergency situation.
- Initiate response procedure and follow-up programs for emergencies.
- Baffinland is committed to provide insurance coverage as required or as deemed appropriate.
- Ensure when occurrences are investigated, root cause determination and mitigating measures are implemented to prevent re-occurrence.

The information contained in this document has been prepared to act as a guide only and may require some additional responses, depending on the circumstances of the individual emergency situation.

1.3 Regulatory Framework

This Emergency Response and Spill Contingency Plan has been developed and implemented to ensure that Baffinland respects all applicable laws, regulations, and requirements from federal and territorial authorities. Baffinland complies with the permits, approvals, and authorizations required for the operations. The following regulatory and government documents constitute an integral part of the plan:

1.3.1 General

- Environmental Code of Practice for Aboveground and Underground Storage Tanks Systems Containing Petroleum and Allied Petroleum Products, 2003, CCME.
- National Fire Code 2010.
- Territorial Lands Act 1985.
- Territorial Land Use Regulations 1524.
- Canada Oil and Gas Operations Act 1985.
- Canadian Environmental Protection Act 1991.
- Fisheries Act 1986.
- Transportation of Dangerous Goods Act and Regulations.
- Storage Tanks Systems for Petroleum Products and Allied Petroleum Products Regulation 2008.
- TP12402 – Oil Handling Facilities Standards, 1995, Transport Canada.

1.3.2 Shipping

- Canada Shipping Act Response Organizations and Oil Handling Facilities Regulations.
- Arctic Waters Pollution Prevention Act.
- Environmental Protection Act.
- Spill Contingency Planning and Reporting Regulations, 1993.

- Mine Site Reclamation Policy for Nunavut.

1.3.3 *Territorial Acts and Regulations*

- Nunavut Waters and Nunavut Surface Rights Tribunal Act 2002.
- Nunavut Environmental Protection Act.
- Nunavut Spill Contingency Planning and Reporting Regulations.
- Nunavut Mine Health and Safety Act and Regulations.
- Nunavut Coroners Act.

1.3.4 *Site Specific*

- Canada National Parks Act 2000.
- Canada Wildlife Act 1985.
- Migratory Birds Convention Act 1994.

For guidelines used to prepare the Emergency Response Plan, see Section 9.

1.4 Organization and Responsibilities

1.4.1 *Emergency Response Team*

The Operations Manager is responsible for establishing and implementing the Emergency Response Team. The team will comprise site employees who receive special training to assist in an emergency. The Operations Manager, in consultation with the Emergency Response Supervisor at each site, will select qualified candidates in sufficient numbers to facilitate the response programs required by the plan.

The Operations Manager (Emergency Response Coordinator) with the support of Emergency Response Management Team will coordinate response actions internally and externally in an emergency. He/she will coordinate response actions with management, regulatory agencies, local authorities, and the communities, when necessary. Contact information for external agencies and local authorities will be made available when responsible personnel are identified. Emergency Response Team organization is represented in Section 2.1.

Baffinland Emergency Personnel Contact Information is presented in Table 1-1.

1.5 Relationship to Other Plans

Emergency situations are often related to specific activities such as explosive handling, shipping, or aircraft operations. In case of an activity-specific emergency, the response plan for that particular activity will be consulted. Specific action plans developed to support this ERP include:

- Milne Inlet Fuel Storage Facility OPEP- FEIS Appendix 10C-2 currently under revision (ship-to-shore bulk fuel transfers at Milne Port).
- Canadian Coast Guard Regional Response Plan (CCG, 2006).

- Shipboard Oil Pollution Emergency Plan (ship-specific plan) (SOPEP).
- Explosives Management Plan (Appendix 10C-4).
- Mary River Aerodrome Operations Manual.

These and other plans developed in support of the Final Environmental Impact Statement (FEIS) comply with relevant regulatory requirements.

1.6 Link with Baffinland Oil Pollution Emergency Plan (OPEP)

The Canada Shipping Act Response Organizations and Oil Handling Facilities Regulations stipulates that operators of designated Oil Handling Facilities must have an onsite Oil Pollution Emergency Plan (OPEP – standards, TP12402 applies). This Act also applies to fuel storage in barges.

The Milne Inlet Fuel Storage Facility OPEP (currently under revision) and ship specific SOPEPs specifically address marine spills at Milne Port (FEIS Appendix 10C-2). The Fuel Storage Facility OPEPs for Milne Port has been designed to complement this ERP. These OPEPs do not supersede existing contingency plans. They are conceived to address the specifics of the Fuel Handling Facility – the bulk fuel ship to shore transfer of fuel and spill scenarios directly relating to these operations as required by TP12402. The ERT will be trained to adequately handle any emergencies that impact the ocean, land and freshwater. The Milne Inlet Fuel Storage Facility OPEP covers emergency response and spill contingency in marine environments while this ERP covers land and freshwater based emergency response and spill scenarios.

1.7 Baffinland's Commitments

Baffinland provides adequate resources to implement and maintain the EHS Management System, including the necessary human, material, and financial resources. For Baffinland's Sustainable Development Policy, see Section 1.11. For Baffinland's Health, Safety and Environment Policy, see Figure 1-2.

1.8 Update of This Management Plan

The Emergency Response and Spill Contingency Plan will be regularly updated on the basis of management reviews, incident investigations, regulatory changes, or other Project-related changes.

This plan has been updated and revised to reflect activities associated with construction activities as described in the 2013 Work Plan (see Appendix B).

In addition to this Baffinland has committed to participating in regular sessions with the 'Emergency Response and Preparedness Working Group'. Attendees will be made up by members of the Company, various government and regulatory bodies, stakeholder groups, and industry professionals. The purpose of these meetings will be to review, update and improve Baffinland's emergency response and spill contingency policies and procedures. Adequate resources will be allocated to the development and deployment of emergency and spill response capabilities.

1.9 Glossary of Emergency Response and Spill Contingency Plan Terms

BIM Crisis Management Team:	Senior Management team based in Toronto Corporate Office responsible for coordination and support of the site/location response and communication with external stakeholders during a crisis/emergency.
Code 1:	A "Code 1" announcement signifies that an emergency situation exists, requiring activation of the Emergency Response and Spill Contingency Plan
Emergency:	A sudden, urgent, usually unexpected occurrence or occasion requiring immediate action
Emergency Response Command Centre:	ERCC - designated location where the Emergency Response Team members gather and coordinate the response to emergency situations
Emergency Response Coordinator	The Emergency Response Coordinator is the Site Operations Manager or his designate. He/She has the overall responsibility, control and coordination of the emergency response. BIM Operations Manager or designate
Emergency Response Management Team:	Supporting Baffinland Department Heads or designates such as Safety, Environment, Exploration etc.
Incident Commander:	The Incident Commander is the mine rescue/emergency response team supervisor or his designate. He/She is responsible for the management of incident activities at the site of the emergency and is in direct control of response.
Emergency Response Resources:	Personnel from internal disciplines, such as health & safety environment, security, maintenance, and site services
Incident:	An unplanned event that can or does result in ill health, injury, property damage or loss, adverse environmental impact, or business interruption
Muster Station:	A designated gathering area for the purpose of identifying and recording all occupants/evacuees present during an emergency and ensuring their safety until the emergency has ended
Muster Station Coordinator	A designated individual appointed to identify and record all occupants/evacuees present in the Muster Station during an emergency and communicating any discrepancies to the Emergency Response Coordinator

1.10 Acronyms

BIM	Baffinland Iron Mines
BCMT	Baffinland Crisis Management Team
EPCM	Engineering, Procurement, Construction Management
ER	Emergency Response
ERCC	Emergency Response Command Centre
ERC	Emergency Response Coordinator
ERMT	Emergency Response Management Team
ERP	Emergency Response and Spill Contingency Plan
ERT	Emergency Response Team
IC	Incident Commander
OPEP	Oil Pollution Emergency Plan
SAR	Search and Rescue

1.11 Sustainable Development Policy



At Baffinland Iron Mines Corporation, we are committed to conducting all aspects of our business in accordance with the principles of sustainable corporate responsibility and always with the needs of future generations in mind. Everything we do is underpinned by our responsibility to protect the environment, to operate safely and fiscally responsibly and to create authentic relationships. We expect each and every employee, contractor, and visitor to demonstrate a personal commitment to this policy through their actions. We will communicate the Sustainable Corporate Policy to the public, all employees and contractors and it will be reviewed and revised as necessary on an annual basis.

These four pillars form the foundation of our corporate responsibility strategy:

- Health and Safety
- Environment
- Investing in our Communities and People
- Transparent Governance

1.0 HEALTH AND SAFETY

We strive to achieve the safest workplace for our employees and contractors; free from occupational injury and illness from the very earliest of planning stages. Why? Because our people are our greatest asset. Nothing is as important as their health and safety.

We report, manage and learn from injuries, illnesses and high potential incidents to foster a workplace

culture focused on safety and the prevention of incidents.

We foster and maintain a positive culture of shared responsibility based on participation, behaviour and awareness. We allow our workers and contractors the right to stop any work if and when they see something that is not safe.

2.0 ENVIRONMENT

We employ a balance of the best scientific and traditional Inuit knowledge to safeguard the environment. We apply the principles of pollution prevention and continuous improvement to minimize ecosystem impacts, and facilitate biodiversity conservation.

We continuously seek to use energy, raw materials and natural resources more efficiently and effectively. We strive to develop pioneering new processes and more sustainable practices.

We understand the importance of closure planning. We ensure that an effective closure strategy is in place at all stages of project development and that progressive reclamation is undertaken as early as possible to reduce potential long-term environmental and community impacts.

3.0 INVESTING IN OUR COMMUNITIES AND PEOPLE

We respect human rights and the dignity of others. We honour and respect the unique culture, values and traditions of the Inuit people.

We contribute to the social, cultural and economic development of sustainable communities adjacent to our operations.

We honour our commitments by being sensitive to local needs and priorities through engagement with local communities, governments, employees and the public. We work in active partnership to create a shared understanding of relevant social, economic and environmental issues, and take their views into consideration when making decisions.

4.0 TRANSPARENT GOVERNANCE

We will take steps to understand, evaluate and manage risks on a continuing basis, including those that impact the environment, employees, contractors, local communities, customers and shareholders.

We ensure that adequate resources are available and that systems are in place to implement risk-based management systems, including defined standards and objectives for continuous improvement.

We measure and review performance with respect to our environmental, safety, health, socio-economic commitments and set annual targets and objectives.

We conduct all activities in compliance with the highest applicable legal requirements and internal standards

We strive to employ our shareholder's capital effectively and efficiently. We demonstrate honesty and integrity by applying the highest standards of ethical conduct.

A handwritten signature in black ink, appearing to read 'Tom Paddon', with a stylized flourish at the end.

Tom Paddon
President and Chief Executive Officer
September 2011

1.12 HSE Policy

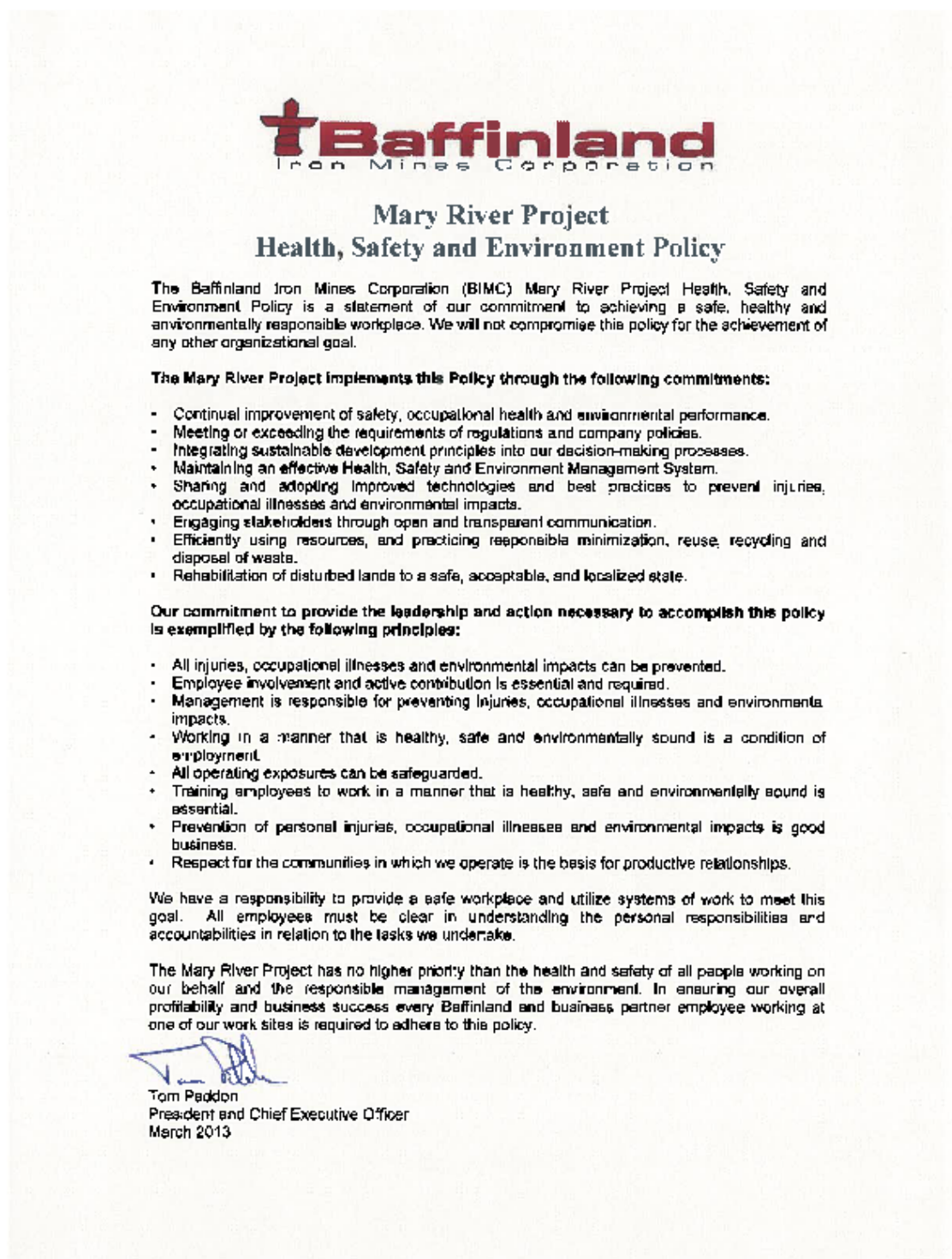


Figure 1-1: Baffinland's Health Safety and Environment Policy

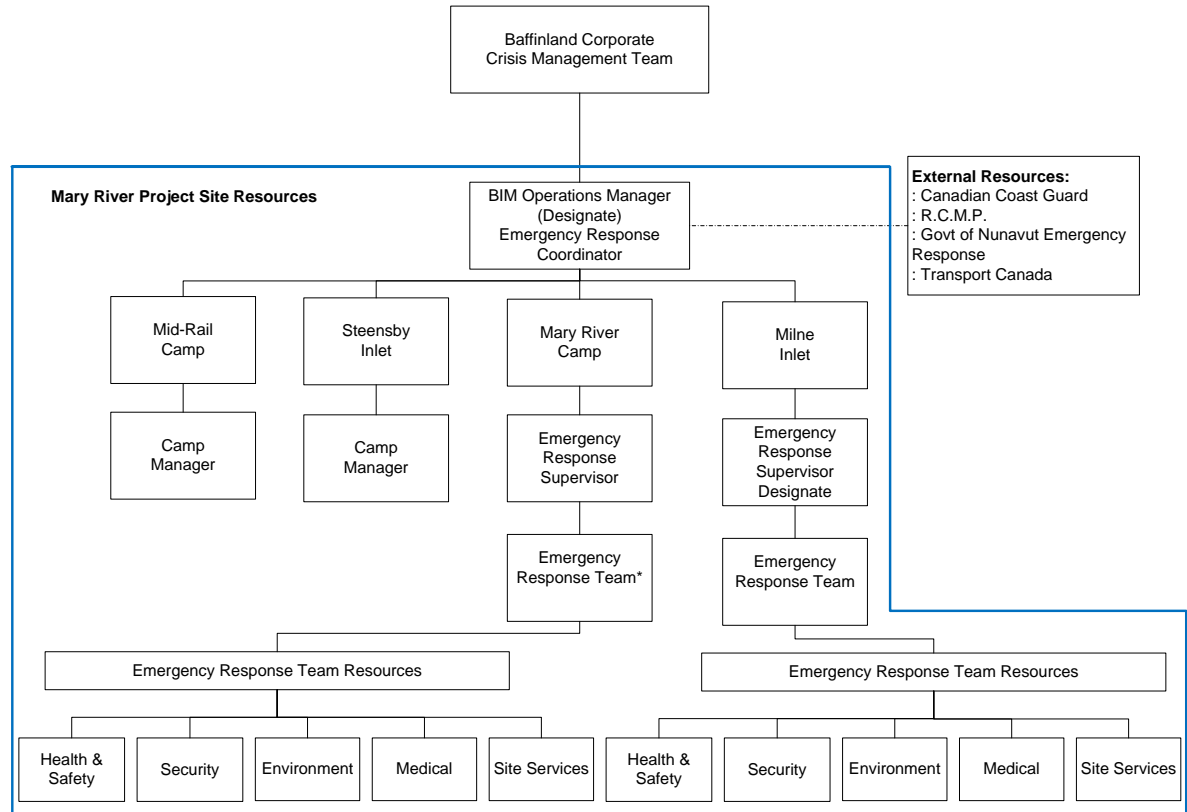
Table 1-1: Baffinland Emergency Personnel Management Team Contact Information

Role	Primary	First Back Up	Secondary Back-Up
Emergency Response Coordinator	Dave McCann	Jeff Bush	Cliff Pilgrim
Primary Phone:	TBD	TBD	TBD
Alternate Phone:	TBD	TBD	TBD
Email:	TBD	TBD	TBD
Incident Commander	Shift Emergency Response Supervisor	Safety Superintendent	
Primary Phone:	TBD	TBD	TBD
Alternate Phone:	TBD	TBD	TBD
Email:	TBD	TBD	TBD
Environmental Superintendent	Jim Millard	Trevor Myers	Allan Knight
Primary Phone:	TBD	TBD	TBD
Alternate Phone:	TBD	TBD	TBD
Email:	TBD	TBD	TBD
Safety Superintendent	Brian Larson	Gerry Courtemanche	
Primary Phone:	TBD	TBD	TBD
Alternate Phone:	TBD	TBD	TBD
Email:	TBD	TBD	TBD

Note: Will update with contact information prior to commencement operations in 2013. Contract information will be provided to all relevant stakeholders.

2. General Response to Emergencies

2.1 Emergency Response Organizational Chart



Note: * Mary River Emergency Response Team Responds Project Wide as Required

Figure 2-1: Mary River Emergency Response Organizational Chart

2.2 Levels of Emergency

In order to effectively manage emergency response, BIM Operations has adopted a classification system that includes three levels of emergencies. Each level of emergency requires varying degrees of response, effort and support. The impact on normal business operations will also differ as will the requirements for investigation and reporting. The three levels are outlined in the following sections. Similarly for spills there are three response levels for spills based on the size and nature of the spill. This is also outlined below. For the flow chart determining which emergency response needs to be activated, see Section 2.2.4 and Appendix I.

2.2.1 Level I (Low):

A Level I incident is defined as an incident where any or all of the following has occurred:

- Minor personal injury.
- Minor accidental release of a deleterious substance with:

- ♦ No threat to public safety; and/or
- ♦ Negligible environmental impact
- No impact on reputation.
- Report to government after the fact.

See spill response level chart (Section 2.2.4)

2.2.2 Level II (Medium):

A Level II emergency is defined as an incident where any or all of the following has occurred:

- Potential modified work or lost time injury
- Major accidental release of a deleterious substance with:
 - ♦ Some threat to public safety; and/or
 - ♦ Moderate environmental impact.
- Minor fire.
- Local impact on reputation.
- Local/regional media interest/coverage.
- Government involvement.
- Activation of ERCC required by Emergency Response Coordinator.

See spill response level chart (Section 2.2.4)

2.2.3 Level III: (High)

A Level III emergency is defined as an incident where any or all of the following has occurred:

- Uncontrolled hazard which:
 - ♦ Jeopardizes project personnel safety; and/or
 - ♦ Jeopardizes public safety; and/or
 - ♦ Significant environmental impacts.
- Major Fire or uncontrolled explosion.
- Negative impact on reputation.
- National/international media.
- Activation of ERCC required by Emergency Response Coordinator.

See spill response level chart (Section 2.2.4).

2.2.4 Spill Response Emergency Level Classification

SPILL RESPONSE LEVELS				
	Level 1	Level 2	Level 3	
Explosives	<10 kg <100 kg	10-100 kg 100-500 kg	>100 kg >500 kg	in water on land
Sewage	<100 L <1,000 L	100-1,000 L 1,000-10,000 L	>1,000 L >10,000 L	in water on land
Hydrocarbons	<1 L	1-100 L	>100 L	in water
Lubricants	<100 L	100 -1,000 L	>1,000 L	on land
Antifreeze	<1,000 L	1,000-10,000 L	>10,000 L	contained area
Hazardous Materials				

2.3 Emergency Response Command Centre

The Emergency Response Command Centre (ERCC) functions to provide a place for the coordination and direction of mitigation response efforts during an emergency. For the purpose of this ERP, the BIM Mary River Office complex will be the primary ERCC. The alternate ERCC shall be located at Mary River aerodrome office and shall have a copy of this plan and associated equipment available for use. As each person enters the ERCC to carry out ER duties, they must sign the attendance form (Appendix D3).

The ERCC will be established for an emergency as deemed necessary by the ER Coordinator. The ERMT personnel will assemble at the ERCC. The primary and alternate ERCC shall be equipped with suitable communications equipment including telephone, radio communication, and teleconferencing.

2.4 ERCC Equipment/Supplies

The ERCC will have all the necessary tools for organizing response to an emergency - dispatching internal/external emergency services, directing strategic deployment of emergency resources and equipment, monitoring response efforts and establishing critical communications with the BIM Corporate Office.

The ERCC shall contain:

- The most current version of the ERP.
- Log book.
- Emergency site maps and plans.
- Site resources equipment list.
- Emergency contact information.
- Communications recording forms.
- ERCC attendance forms.
- 2-way radio communication (base station or handheld).
- Satellite Phone System.
- Backup VOIP phone system.
- Network Connections.

2.5 Emergency Response Team

The Mary River Emergency Response Team will be structured from a worker volunteer base at site. With different work schedules, it will be necessary to have enough team members to maintain sufficient numbers of responders at site at all times.

Recruitment of volunteer ERT members will be a informal process through general solicitation of interest. However, to build an adequate level of team competency, solicitations will indicate a preference for volunteers that have had previous exposure to mine rescue and/or training in some aspect of emergency response.

For emergencies such as lost or missing persons, local aboriginal knowledge of surrounding terrain and traditional travel routes may become valuable. As such, BIM have established a memorandum of understanding with the Government of Nunavut to provide for Search and Rescue support that they may be called upon as a resource in certain Emergency Situations. Likewise, BIM may provide assistance to an emergency situation on Baffin Island, where it is practical and safe to do so. The Operations Manager or designate will consult with the ER Supervisor to determine available response support capabilities.

2.6 Equipment and Personal Protection

Equipment required to prevent or minimize the effects of an emergency are identified during detailed project design and provided at the Project facilities. A list of available Personal

Protective Equipment, cleanup material, medical supply, etc. is also provided when specific project requirements are identified.

To prevent spills and to provide adequate response in case of spill events, Baffinland maintains the appropriate type and quantity of response equipment and materials onsite. The company will also put in place reasonable security measures.

Spill kits are strategically placed primarily in areas of fuel handling to facilitate immediate first response in the event of a hydrocarbon release to land. Appendix C provides a list of the different spill kits and their contents (as purchased) that are available onsite. Appendix H provides indicates their relative locations on site.

Over the course of operations, when materials in spill kits have been utilized, replacement materials may differ from that originally present in kits. Substituted spill kit materials will be of sufficient quality and quantity as appropriate to their locations and potential use.

In addition to the spill response material, a variety of mobile heavy equipment including excavators, front end loaders, bull-dozers, haul trucks, Zodiac boat for in land water use, and marine support boat are available to aid in spill response and recovery efforts.

Along the Tote Road, Baffinland will supply Emergency Shelters at appropriate intervals to provide shelter for and ensure the safety of both Company personnel and local peoples hunting and travelling in the area.

2.7 Communication

Effective communication systems are critical to the success of emergency responses. Personnel involved, from first person on scene to the ER Coordinator rely on the ability to quickly relay accurate information.

Communications available at the project site during an emergency are listed below.

- Hand-held radio communication.
- Telephone.
- Satellite Phone.
- Alarm systems.
- Internet.

2.7.1 Hand-Held Radio Communication

During an emergency, the primary communications link between all emergency response personnel is through radio communication. ERT members will be issued radios. Additionally, other individuals involved in emergency response will also carry hand-held radios as part of their regular work requirement.

During an emergency, radio communications should be kept to a minimum. If radio silence is requested on other channels, Security personnel, upon receiving instruction by the ER Coordinator or Incident Commander, will announce this. This ensures open and free communications among personnel involved in the actual response. For example, if resources have to be requested on any channel other than the designated emergency channel, then this request will be unaffected by other unnecessary conversation.

Additionally, only authorized persons are permitted to release the following information:

- Names of third parties who may have been involved in the incident.
- Identification of fatalities or injured personnel.
- Cause of the incident and liability; and
- Statements that may infer negligence.

Channel 1 and Channel 2 have been designated as Emergency Response Channels. Channel 1 is designed to be used to announce an emergency situation by any employee and is also used by ER Team and other personnel involved in assisting the coordination of the response. Emergency Channel 2 is a private ER Team channel that is accessible only by ERT members, Security and Medical personnel.

During an emergency, other site radio channels may be used to:

- Locate ER personnel.
- Obtain additional internal resources.
- Emergency notification.
- Evacuation of employees from work areas.
- Maintain communications with aircraft/marine vessels.

2.7.2 Telephone Communication

During an emergency, telephone communications will be used to:

- Notify internal personnel and resources.
- Notify external personnel and resources.

To supplement radio communications, the site telephone system may be used to alert site personnel during an emergency response.

Communications links with Corporate BIM Office may also be required during some emergency situations. Constant communications links will be established by telephone where offsite assistance is required (from BIM, or external resources such as medical practitioners or SAR/Coast Guards).

2.8 Communication during Emergency

During emergency, the Emergency Command Centre will be contacted immediately. Information will be transmitted from the Emergency Command Centre to other project facilities. The Emergency Command Centre will be manned 24 hours a day by onsite personnel and will be equipped to handle all radio and telecommunications in the case of an emergency. Project facilities will be equipped with a phone system that will be capable of wide range communication when required. In the event of an emergency, there will be prompt notification of appropriate individuals including the BIM Operations Manager, Baffinland Corporate Crisis Management Center, ER Management Team and the Emergency Response Team.

2.9 Communication with the Public

Only Baffinland Senior Management authorized in the Baffinland Crisis Management Plan shall provide external communication to the public during emergencies.

Local residents, community leaders, other stakeholders, and non-governmental agencies will be contacted as appropriate. The designated officer(s) will coordinate dissemination of information to the media whenever necessary. Provision will also be made to inform family members of those involved in an emergency, if warranted.

2.10 General Evacuation Procedures

All employees will be instructed about emergency evacuation procedures during site orientation. Muster location maps showing evacuation routes will be posted at conspicuous places at the site including working areas, facilities and notice boards. A muster list will be prepared and posted with the muster map (see Appendix D). The list will provide information about emergency signals, instruction for operating emergency alarm systems, and the responsibilities of personnel. The list will be updated periodically to address current emergency response needs.

In an emergency, employees will proceed to the primary muster area for a head count. They will stay at this location, at the discretion of the Muster Station Coordinator, until told to move to a secondary muster, or another location, or be evacuated.

3. Roles and Responsibilities

The initial stage of any emergency is critical. An effective and timely response is essential to prevent an emergency situation from escalating to a higher level. Therefore, all personnel must be fully aware of their individual duties and responsibilities as they are presented in this plan.

Personnel identified as having key roles in effective emergency response include the Emergency Response Supervisor, Emergency Response Team, the Emergency Response Coordinator, Security personnel, ER Management Team and trained medical response professionals.

Specific responsibilities and duties inherent to personnel involved in emergency response are outlined below.

3.1 Incident Commander/Emergency Response Supervisor

The Emergency Response Supervisor (ER Supervisor or Incident Commander) is the site lead administrator for the ERT, responsible for ensuring the necessary emergency response equipment and adequate level of training for ERT members. The ER Supervisor directs the ERT at the scene as ERT Leader. In the absence of the ER Supervisor, a senior team member will be designated as ERT Leader. The following duties are performed by the ER Supervisor/ERT Leader.

3.1.1 *Duties during an emergency*

Upon being notified of an emergency, the Emergency Response Team Supervisor will:

- Immediately report to the Emergency Response Room and brief team members.
- Report to the scene of the emergency.
- Take charge of the scene.
- Evaluate the details of the emergency as presented by the first person on-scene. Assess the immediate situation, confirm the level of emergency and notify the ER Coordinator.
- Maintain contact with the ERCC and provide support in coordination of the response.
- Request internal/external resources as required.
- Advise ERT on aspects of internal/external support as they are received.
- Obtain results of muster station head counts and direct the team accordingly to ensure full evacuation.

3.1.2 *Duties Post Emergency*

Account for all MRT members:

- Announce the 'all clear' to ER Coordinator when the emergency has ended.
- Inform external resources that the emergency has ended (if external resources were mobilized during the emergency).
- Lead the emergency debriefing session.
- Ensure that all ERT equipment is returned to original order and/or replaced to ensure future rapid response.
- Develop a written log of events indicating instructions given, action taken and outcomes achieved.
- Provide assistance with ongoing investigation.
- Prepare a written report on response activities.

3.2 Emergency Response Coordinator – (ERC)

For the purpose of this ERP, the ERC will be the Operations Manager or a designate if absent.

3.2.1 *Duties during an Emergency*

- The Site Emergency Response Coordinator (ERC) will ensure coordination of ERT support systems from the ERCC.
- Upon being notified of a Level II or III emergency by the Incident Commander, the ER Coordinator will initiate activities in the ERCC and assess the situation based on current information from the Incident Commander.
- Activate the ERCC system and escalate according to severity of incident.
- The ER Coordinator will coordinate all activities in the ERCC. In the event the ER Coordinator leaves the ERCC, the ER Coordinator will designate an individual to coordinate the ERCC, notifying the Incident Commander and Security.
- Ensure that the appropriate area manager/s has been notified.
- Provide internal notification as applicable based on the level of emergency.
- Notify the Baffinland crisis management team representative for level two or three emergencies.
- Provide instruction to ensure that appropriate External Resources are notified.
- Receive information from the Incident Commander and ensure appropriate resources are made available.
- Ensure ERP Log Keeper is present in the ERCC at all times to maintain a log of all events, actions and outcomes in ER System.

3.2.2 *Duties Post Emergency*

- Notify Corporate Response Team of the "all clear".
- Ensure the coordination and establishment of an emergency debriefing session.
- Review ERCC incident log and post response incident report.
- Post incident debrief with Incident Commander.
- Provide necessary information to Public Relations for a media statement release if required.
- Complete a report on the events surrounding the incident.
- Coordinate collection of all incident notes, reports, statements and log of events.
- End the event in ER System.

3.3 Security

Security personnel or their designate are key in an emergency response in that they will receive an initial notification of an emergency and provide first communications to essential personnel.

3.3.1 *Duties during an Emergency*

- Receive initial emergency call and document vital information used to plan response.
- All logged information will be given to the ER Coordinator.
- Provide appropriate notification of the ER team members, ER Coordinator and medical response personnel.
- If evacuation is necessary, notify all campsite personnel of emergency evacuation.
- If safe to do so enhance evacuation by sweeping through dorm wings knocking on doors, if smoke, fire or other hazards are identified immediately confirm location to Incident Commander and retreat to safe area.
- For accommodations emergencies, ensure that all evacuated personnel are directed to the muster station.
- Security will report muster and evacuation status to the Incident Commander and await further instruction.
- Provide traffic and crowd control at scene as directed by the Incident Commander.
- Assist in controlling access to the emergency area.
- Maintain open radio communication (via radio or telephone intercom system).
- Keep a written record of events throughout incident.
- Assist in the coordination of support and internal services as directed by the ER Coordinator.
- Document all actions, decisions and communications.

3.3.2 *Duties Post Emergency*

- Relay notification of 'all clear' order when directed by Incident Commander.
- Provide a summary of all documentation to the Incident Commander and ER Coordinator.
- Maintain Security of the scene as directed by the ER Coordinator or Incident Commander.
- Direct all off-site inquiries regarding the emergency to the ER Coordinator or designate.
- Participate in a debriefing session for the emergency response.

3.4 Department Heads – (Emergency Response Management Team)

3.4.1 *Duties during an Emergency*

- For Level II and III emergencies contact the ER Coordinator and report to the ERCC.

- Work closely with the ER Coordinator to determine appropriate response strategy for their respective work area.
- If acting Operations Manager, carry out role of ER Coordinator.
- Provides support for the requirement of additional supplies and resources as requested by the ER Coordinator.
- Contact departmental resources via radio as required during the emergency response.
- Confirm that effective evacuation of the work area occurred.
- Confirm that the shift supervisor has contacted the Incident Commander.

3.4.2 *Duties Post Emergency*

- Participate in an emergency debriefing session.
- Ensure that the incident investigation is entered into the BIM internal incident reporting system.
- Review recommendations from the accident/incident investigation.
- Ensures follow up on remedial action to prevent or mitigate possibility of reoccurrence of emergency.

3.5 Front-Line Supervisors

3.5.1 *Duties during an Emergency*

- Ensure evacuation or stand down of their work area.
- Assist to ensure accountability of evacuees at muster station.
- Pre- investigate alarms if in work structure without harm to self, activate "Code 1" if necessary.
- Report to Incident Commander (Ch. 1) and identify self and location, acting as a direct resource to the Incident Commander.
- Ensure restricted access allowing only authorized personnel.
- Direct the isolation, de-energizing and lock-out of systems if required.

3.5.2 *Duties Post Emergency*

- Confirm that work area is safe to return to after an "all clear" has been called by the Incident Commander.
- Ensure that area of incident is secure until all investigations are completed by SH&E department.
- Participate in an emergency debriefing session.

- Ensure that the incident investigation is completed and entered into BIM internal incident reporting system.

3.6 BIM Environment Superintendent

3.6.1 *Duties during Emergency*

- For Level II and III emergencies contact the ER Coordinator and report to the ERCC.
- At the order of the ER Coordinator, notify the required external agencies.
- Provides support for the requirement of additional supplies and resources as requested by the ER Coordinator.
- Contact departmental resources via radio as required during the emergency response.
- Document all actions and decisions.

3.6.2 *Duties Post-Emergency*

- Participate in post-emergency debriefing.
- Assist in the accident/incident investigation process.
- Complete Government Agencies notification process.
- Ensure that all involved departments complete reporting process.

3.7 BIM Safety Coordinator

3.7.1 *Duties during Emergency*

- For Level II and III emergencies contact the ER Coordinator.
- Respond to the scene and make direct contact with the Incident Commander.
- Establish perimeters around the area of the emergency and direct appropriate resource personnel responsible for traffic flow.
- Assist with identifying and assessment of potential hazards of the ERT response and notify the Incident Commander.
- Ensure appropriate personal protective equipment for involved non ERT personnel.
- Note pertinent information that may be relative to the investigation.

3.7.2 *Duties Post-Emergency*

- Secure the area with red "DANGER" tape and sufficient tags. Post guards if necessary.
- Participate in post-emergency debriefing.
- Assist in the accident/incident investigation and complete report.

3.8 Emergency Medical Personnel

- Respond to all Code 1's as directed by the Incident Commander.

- Responsible for all decisions of medical-related situations on site.
- Act as team leader to the ERT during medical emergencies.
- Responsible for assessing, administering and delegating emergency medical care.
- Advise the Incident Commander of the number and condition of ill/injured personnel.
- Advise the ER Coordinator of off-site resources required and liaise with such agencies.
- Maintain a log of events, actions and outcomes.
- Participate in an emergency debriefing session.

3.9 Environmental Coordinator

In the event of an environmental incident involving accidental release of a hazardous substance, the Environmental Coordinator shall liaise with Incident Commander to direct environmental response efforts once the scene has been assessed by the Incident Commander and all medical and/or fire emergencies are under control.

The Environmental Coordinator will:

- Immediately proceed to the scene of the incident.
- Initiate external environmental emergency response resources as required.
- Coordinate internal resources during spill clean-up.
- Request additional resources through the Incident Commander as necessary.
- Secure the area with red "DANGER" tape and sufficient tags. Post guards if necessary.
- Participate in post-emergency debriefing.
- Maintain contact with regulatory bodies as required.
- Maintain a log of events, actions, and outcomes.

3.10 Muster Captain

During an evacuation of any area that is designated to evacuate BIM Trainer will assume the role of Muster Captain.

The Muster Captain will:

3.10.1 Duties during Emergency

- Ensure up to date Muster List is in place daily.
- Coordinate a head count to ensure that all campsite personnel have mustered to the appropriate muster station.
- Direct evacuees to designated areas.
- Distribute crew lists to department supervisors.

- Receive, log then relay missing person's name, room number, or work area to security.
- Log time of events at muster station.
- Communicate with security on channel 3.

3.10.2 Duties Post-Emergency

- Notify evacuees once the "all clear" has been called to return to work or accommodations.
- Return completed muster list to Incident Commander.
- Confirm security replaces muster list.

3.11 Employees

Employees perform an integral part of emergency response because often times they are the first to witness an incident and provide initial reporting that an emergency has occurred.

Any person involved in, or witnessing an incident should follow the emergency notification procedure and immediately initiate a required emergency response.

- As first person on the scene and after notifying that an incident has occurred, attempt to provide as much information as possible to assist in the initial response (e.g. type of incident, number of people injured and location).
- Assess and attempt to control the scene only without causing self harm or harm to others.
- Upon hearing a site fire alarm, proceed to the designated muster area and await instruction from security personnel.
- Cooperate with instruction and assist only when requested.

4. Response Actions to Emergencies

In order for an emergency response to occur, notification has to reach the Emergency Response Team. This initial notification should occur quickly and provide essential information. Most often, the First Person On-Scene is the individual that provides this information.

An individual involved in, or witnessing, as First Person On-Scene, shall make every effort to quickly initiate the emergency "Code 1" notification procedure. Appendix I contains the Emergency Response Plan Activation Flowchart.

Security, upon hearing/receiving the initial call shall record as much information as possible to ensure the proper notification is given to the Emergency Response Team.

4.1 Initial Responses

Project personnel working at a site or at a facility may be the first to encounter an emergency and will be expected to initiate a response action. In such an emergency, a general response will be followed before any other activities. The general procedures include the following:

- Avoid danger to yourself, others, and the environment.
- Communicate with individuals in the vicinity of the emergency to preliminarily assess their condition.
- Assess the size and severity of the emergency (i.e. minor or major emergency).
- Initiate Emergency Response notification in the event of a Level II or Level III incident.
- Prevent further health or environmental effects, loss of material or damage to equipment, if this can be done safely.
- Ensure the safety of personnel and evacuate to a temporary safe location, if necessary.

4.2 Response Action

Response actions are considered briefly for the following potential general emergency situations:

- Necessities of life.
- Personnel Issues.
- Natural environment-related Issues.
- Operational incidents.

A Level I incident could be an emergency that does not interrupt site operations, is not life-threatening, and does not result in minor environmental impact. In the event of a minor incident, onsite resources will be required to remedy the situation. Evacuation or offsite resources will not be necessary, and response can be coordinated by area management. Level 1 incident shall be communication shall be as described in the Incident Reporting Protocol.

A Level II or Level III incident is an emergency that requires an interruption to site operations. The incident may be life-threatening and could involve substantial environmental or property damage. Such an emergency might require offsite resources for effective response. Serious injuries or environmental spills will be assessed by the Emergency Response Coordinator in consultation with the ER Management Team. A decision will be made whether on- or offsite resources will be needed to remedy the situation.

For a summary of actions to determine external requests for search and rescue and emergency services, see Appendix J.

In the event that multiple incidents occur simultaneously at the same location their cumulative effects will be exponentially greater than the effect of any singular incident or emergency. Baffinland will be prepared to handle a number of minor incidents, or a combination of a major and a minor incident; with effective response plans and training in place. All sites will be equipped with adequate spill response equipment and trained teams. In the event of multiple major incidents at the same location severity will be assessed by the ER Coordinator

and if necessary offsite resources will be called in for an effective response. If events occur at different locations there should be little to no cumulative effect, as each site is designed to be self sufficient in the event of an incident.

4.3 End of Emergency

Activation of the ERT occurs when an emergency has been declared through the announcement of a Code 1, as indicated in the emergency response activation procedure. However, declaring a stand-down and denoting the end of an emergency is left to the discretion of the Incident Commander/ER Supervisor, in consultation with the ER Coordinator. In determining when an emergency has ended consideration will be given for the following:

- Stability of the affected area.
- Requirement for further action by the ERT or assisting external resources; and
- Potential risk of further injury or damage to people, property or the environment.

Through detailed assessment of the emergency response efforts, the area affected, and affected people and/or property the ER Coordinator and Incident Commander may determine that there are no existing circumstances that present potential risk for further injury or property damage if the normal course of activities resume.

4.4 Emergency Management Response

The detailed management and response to emergencies and potential critical incidents is identified in Section 4 and response to spill incidents in Section 7. Each of these detailed responses includes the following information:

- The main “threats” associated with the incident.
- How the incident may be notified (aside from emergency telephone/ radio call).
- Alarms or methods to alert persons of an emergency.
- The management response required (i.e. who should be notified, what action should be taken).
- Any special instructions.
- Possible contacts for specialist advice.

These should be used as a guide only and are not “all inclusive”. That is, there may be additional response steps or the steps may be in a different order of execution, depending on the circumstances of the individual emergency situation.

4.5 Personnel Issues

4.5.1 Medical Emergencies

Baffinland is committed having an on-site medical facility staffed by a registered nurse or certified paramedic in order to attend to any injury that workers might experience on-site, and

is further committed to providing medi-vac services as may be required from the Mine Site to Iqaluit.

4.5.1.1 *Serious Injury*

In the event of an incident involving personal injury, the degree of treatment and response will depend on the severity of the occurrence. However, in the event of an emergency involving personal injury, the following general actions will be initiated.

- Assessment of the emergency situation. Ensure personal safety and the safety of people near emergency location.
- Identify yourself to the injured person(s) and attempt first aid only if safe to do so.
- Activate a Code 1, stating your Name, Nature and Location of the incident.
- Obtain names of all witnesses to the incident and any pertinent information required for investigation purposes.
- All material and equipment involved in the incident is to remain untouched until cleared for use by the Incident Commander or Safety Superintendent.

In the event of medical or related emergencies, any person who discovers someone injured will implement initial response (see Section 3.1), and identify back-up assistance, preferably the dedicated onsite medical professionals or the Emergency Response team will respond.

The onsite medical professionals 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 adjacent hamlets or Iqaluit as necessary.

If the victim(s) will require facilities and services beyond that which can be given onsite, the victim(s) could be evacuated from site to receive further medical treatment in adjacent hamlets or Iqaluit as per agreement. A fixed-wing aircraft or rotary-wing aircraft will be available at Mary River camp or area for medical evacuation. The ER Coordinator or designate will make the necessary arrangements as directed by the onsite medical professional. Information required to initiate a medical evacuation include: name, location and contact information of caller and patient; family or relative information, patient's medical information; and, receiving hospital information.

4.5.1.2 *Fatality*

In case of a fatal incident, the following procedures will be carried out:

- Assessment of the emergency situation. Ensure personal safety and the safety of people near emergency location.
- Shut down/turn off any equipment/machinery that may cause additional safety hazard.
- The first person on-scene activate a Code 1, stating your Name, Nature and Location of the incident.

- Once identified as a scene of a fatal accident/incident, the ERT will secure all material and equipment involved at the scene to preserve evidence until required investigations are complete and cleared by all regulatory agencies.
- External services such as the local RCMP detachment and the hospital shall be contacted as required by the ER Coordinator.
- The Occupational Health and Safety branch of the WSCC shall be immediately contacted in the event of a work related fatality incident.
- The ER Coordinator will be responsible for subsequent communication to the BIM Corporate Office.
- Any reporting to the public or media regarding Emergency Response events or actions will be made directly by or on authority of BIM Corporate Office.
- Notification to next-of-kin shall be conducted under the direction of the BIM Corporate Office.
- Only the RCMP is permitted to release the victim's name. This shall be done only after the employee's next-of-kin have been notified.

In the event of a fatality at a work site, Baffinland will exercise discretion for, offer counselling to, and consult with family and/or community members as well as meet all regulatory requirements for notification and scene preservation. Critical incident stress management services will be organized.

4.5.1.3 *Missing Persons*

The remoteness of the project site, and sometimes-unfavourable weather conditions, necessitates that a person's whereabouts should be known at all times while on the project site during their work rotation. However, there may be instances where workers may inadvertently wander from the project area without properly notifying security personnel, fellow workers or supervisors.

If an individual does not report to work on their next scheduled work shift, the supervisor responsible for the worker shall contact Security personnel to conduct a preliminary search of their personal accommodations area, and the area surrounding. A person may be declared missing if they cannot be accounted for by their supervisor or fellow workers, and cannot be located in other areas of the campsite by Security personnel.

Once a person is declared missing, Security personnel will notify the Incident Commander and subsequently the ER Coordinator. The Incident Commander will assess the situation and initiate and assign responsibility for the following actions, where required:

- Mobilize the ERT and security personnel to conduct a property-wide search.
- The Incident Commander shall determine the requirement to conduct a ground search outside of the property footprint.

- The local detachment of the RCMP shall be notified as instructed by the ER Coordinator.
- The ERT shall formulate search patterns and assign priority areas based on information obtained from Security personnel.
- When the ER Coordinator deems that local efforts to locate a missing person are unsuccessful outside assistance will be requested through the RCMP.

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 and if available access external SAR.

4.5.1.4 *Missing or Overdue Aircraft or Truck*

Aircraft and truck will remain in contact with dispatch while departing from and en route between sites. In the event that a vehicle does not report, the ER Coordinator or designate will be notified and they will in turn initiate the Emergency Response action. Additional support for rescue operations will be implemented with site personnel and appropriate regulatory authorities as needed.

In the event of an overdue aircraft the actions/procedures outlined in the Mary River Aerodrome Operations Manual shall be followed.

4.5.2 *Natural Environment Related Issues*

4.5.2.1 *Extreme Weather Conditions*

Baffin Island experiences extreme weather conditions nearly year-round and snow is possible during any month of the year. This, by necessity, requires the Project to develop health and safety plans tailored to these conditions. These extreme weather conditions will be considered emergencies when prolonged and affecting the safety of employees, equipment or facilities.

When prolonged extreme weather conditions such as cold or poor visibility presents health and safety concerns, risk will be assessed and activities will be curtailed or modified, as appropriate. If white-out conditions persist, communications with the ER Coordinator or designate might be necessary to decide the course of action and if travel or rescue is necessary. Work activities that are affected by severe winds, such as aircraft departures/arrivals and work at height, will be curtailed as appropriate.

Individuals travelling by vehicles between camps during the months of October and May are required to follow the directives provided in the Tote Road Safety Travel Procedure.

All vehicles are equipped with survival packs in the event of equipment malfunction between camps. Further response will involve moving personnel to other onsite facilities or evacuation to offsite facilities.

4.5.3 Operational Incidents

Note: All incidents, regardless of damage or injury, will be investigated and root cause determined so control measures will be instituted to prevent reoccurrence.

4.5.3.1 Fires

A fire/explosion emergency is “any uncontained fire that requires an on-site response greater than an individual using a hand-held portable extinguisher”. All fires in critical areas where compressed gas, fuels, lubricants or explosives are in close proximity are to be classified as an emergency.

In providing initial response to a fire/explosion emergency, the cause of the fire and remedial action necessary must be immediately identified and controlled by on-site personnel to prevent escalation of the hazard level, including the possibility of further injury and/or damage to the environment, structures or equipment.

In the event of a fire or explosion, the emergency response will involve:

- Assessing the situation and determining emergency response needs.
- Directing and ensuring evacuation, and accountability of personnel.
- Identifying the requirement for additional internal resources such as heavy equipment, water truck, and others.
- Securing area to prevent unauthorized access and protecting equipment, facilities and records; and
- Taking other actions as required and controlling the emergency situation.

The accommodations centre at the project is critical support infrastructure and the most frequently occupied building at the project site. It is equipped with a fire alarm system including automatic smoke and heat detectors, fire hoses and manual fire pull stations. The fire alarm system is connected directly to a panel in the weather haven. Security personnel upon activation of a fire alarm shall adhere to the following chronological procedures:

- Activate the full fire alarm for the accommodations complex to activate the evacuation and muster of accommodations personnel.
- Call a Code 1 to alert the Emergency Response Team and medical response personnel via radio channel 1 & 2 that an alarm has sounded.
- Verify from the annunciation panel, the location of the alarm and provide that information to the Emergency Response Team.
- Announce the fire emergency on all radio channels to all personnel.
- Assist with evacuation if necessary.
- Contact the muster station to ensure the roll call is being conducted.

- Inform Incident Commander of persons not accounted for at Muster Station and when all employees have been accounted for.
- Once the "all clear" has been issued by the Incident Commander, relay the message to the muster station.
- Reset the local panel at the scene of the alarm.

Upon receiving the 'Code 1' announcement from Security personnel, the Incident Commander shall:

- Determine the nature of the alarm at the activation location. Identify any signs of smoke or fire.

If there is no sign of fire or smoke:

- Check the smoke detectors and heat detectors to determine which one was activated.
- Activated smoke detectors will be indicated by a red light. Activated heat detectors will be dropped down from the mounting base.
- Report the location of the activated detector to Security personnel.
- Silence the local alarm panel once the area is deemed safe to reoccupy.

If there are signs of fire or smoke:

- Immediately notify Security, who will in turn notify the ER Coordinator.
- Ensure back-up resources are available as required by the Incident Commander.

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

4.5.3.2 *Ground Instability*

Incidents relating to ground instability could involve pit wall, waste rock or ore stockpile embankment, road embankment, leading to injuries or damage to equipment or facilities. There will be a focus on incorporating geo-technical knowledge, adequate design and quality installation into all project facilities. If a qualified professional feels there is a risk of geotechnical failure proactive preventative measures will be taken to address the problem and ensure geotechnical stability of the area in question. In such emergencies, the ER Coordinator or designate will be notified so that necessary response action can be implemented. A qualified professional will inspect the suspected area of failure and will ensure that the area is properly secured and isolated. The incident will be documented and

appropriate mitigation and preventative programs developed to limit or minimize subsequent incidents and risks. In the event of an incident pre-existing preventative measures will be reevaluated and updated/adjusted to ensure similar.

4.5.3.3 *Vehicle and Equipment Incidents*

Potential for vehicle incidents at the project site exist with activities such as:

- Passenger vehicle movement carrying people and freight throughout the project site.
- Ore haul from the mill site to the port site.
- Ore/waste load-haul-dump operations; and
- Heavy equipment travel and transport on access roads throughout the project site.

The potential risk of vehicle incident varies according to changing conditions. These conditions may include:

- Road conditions (including dust, loose roadbed or unstable road shoulders, ice/snow cover).
- Mechanical failure in vehicle systems; and/or
- Operator error in judgment.

Where vehicle upset presents risk of injury and environmental spill, preservation of life and health will be first priority.

In case of an incident involving vehicle and operator, the following steps will be taken after the emergency notification procedure has been initiated:

- MRT will secure the scene.
- Assess the situation and determine if the vehicle is stable.
- If fuels are apparent (signs of leaks or odor) eliminate any ignition sources by turning off engines.
- If the vehicle is stable determine if personnel can be immediately extricated from the vehicle without injury or immediate first aid requirements.
- If the vehicle is unstable the ERT must secure it with blocking for stability if required.
- If medical condition is unknown or serious, the ERT will extricate the individual under the direction and assistance of site medical personnel.
- Attempt to secure any leak or spill of hazardous substance that may be leaking from the vehicle (internal storage systems or cargo) and contain any spilled substance if possible.
- Once the vehicle has been stabilized (may be under the direction of designated maintenance personnel) and person(s) extricated, begin spill recovery of accidentally released substances.

Incidents involving vehicles and other equipment will be reported to a supervisor as soon as possible to initiate the Emergency Response Plan. If a fuel spill has occurred, the Emergency and Spill Plan (see Section 6) will be initiated.

4.5.3.4 *Ship Grounding/Collision*

Each ship will have a proprietary general emergency plan/checklist according to the International Safety Management Code (ISM Code) for the Safe Operation of Ships and for Pollution Prevention.

4.5.3.5 *Airplane/Helicopter Incidents*

Contracted commercial air carriers will be equipped with standard operating procedures to address specific response actions to be taken in airplane emergency situations. Baffinland has developed emergency response procedures for aircraft incidents occurring on the airstrips.

In the event of an incident the actions/procedures outlined in the Mary River Aerodrome Operations Manual shall be followed.

4.5.4 ***Bomb Threat***

A bomb threat is always considered an emergency situation and cannot be regarded as false until proven otherwise. During operations there will be a requirement to store large amounts of petroleum products, explosives, and hazardous chemicals. Any bomb threat will be considered real until gathered information confirms otherwise. If a bomb threat is received, primary responsibility for further action and investigation will rest with the RCMP. Since the Pond Inlet RCMP detachment is nearest the project site, notification and request for support during the initial stages of the response will be directed there. Until RCMP officers are available to offer on-site support, site personnel will strictly follow the following procedures.

4.5.4.1 *Threat Received*

When receiving a bomb threat, the person in receipt of the initial call or notification should adhere to the following protocol:

- Listen.
- Be calm and courteous.
- Do not interrupt the caller.
- Concentrate on recording the exact wording of the message.
- Obtain as much information as possible.

4.5.4.2 *When Caller Hangs Up*

- Report all details of threat to immediate Supervisor.
- Unless ordered to evacuate immediately, provide as many details as possible that may aid in further determining the origin/realism of the threat.

4.5.4.3 *Roles and Responsibilities*

Responsibilities during receipt of a bomb threat will focus on securing the safety of workers and minimizing potential damage to infrastructure. The conduct of site search and surveillance shall be the responsibility of the RCMP and their supporting resources that have been highly trained in responses of this nature. Prior to site arrival of external resources, the primary action plan for the site would focus on minimizing risk of injury to site workers and damage to existing infrastructure.

- Notify all site personnel to cease activity and report to the muster station. If the location of the bomb threat is known, immediately remove all personnel from the area.
- Secure fuel systems, equipment and other infrastructure that may have the potential to cause additional safety hazards.
- Maintain contact with the RCMP, providing period updates of site status. Ensure all instruction from the RCMP are communicated and followed.

4.5.5 *Explosives*

An Explosives Management Plan (FEIS, Appendix 10D-4) is developed for the Project to address responses to incidents that may arise from transporting, handling and use, and storage of explosives and explosive components onsite.

4.5.6 *Fuel and Other Chemical Spills*

A Spill Response Plan is developed specifically to address fuel and other hazardous materials land-based spills, releases or discharges at the Mine Site (refer to Section 6 of this document). Marine fuel spills at the Milne Port are addressed with by the Milne Inlet Fuel Storage Facility OPEP (currently under revision) - FEIS, Appendix 10C-2.

4.6 **Multiple Emergencies**

4.6.1 *Multiple Emergencies*

Multiple emergencies can occur either by coincidence or by one incident leading to or causing another. In the case of multiple emergencies, the guiding principles (Section 1.2) will provide direction for appropriate response action. The Emergency Response Team will anticipate potential multiple incidents that could occur due to the occurrence of an emergency and be prepared to take actions as may be required. Sufficient resources will be available to address the potential for multiple emergencies. The Emergency Response Coordinator assisted by the ER Management Team will coordinate response actions.

5. Spills Contingency

5.1 Response Management Structure

All spill procedures and response functions are to be implemented through the Emergency Response Management Team (see Section 1.4). Table 1-1 presents the management team responsible for overseeing emergency spill response operations and their contact information.

Once a spill event is reported, the Incident Commander establishes a specific strategy for containing and controlling the spill and to initiate the cleanup activities. Other site personnel may act as technical advisers before and during the intervention. The trained Emergency Response Team will conduct all emergency spill response operations under the direction of the Environment Department. During the cleanup phase of the intervention other site personnel (e.g., heavy equipment operators, labourers) could be involved in the intervention.

The Emergency Response Organizational Chart is provided as Figure 2-1 .

5.1.1 Environment Department Designate

As part of the spill response plan, the Environment Department Designate is responsible for implementing the following procedures:

- Assume authority over the spill scene and personnel involved.
- Activate the Spill Response Plan.
- Evaluate the initial situation and assesses the magnitude of the spill.
- Develop an overall plan of action.
- Collect photographic records of the spill event and cleanup efforts.
- Prepare a root cause analysis and an incident investigation for major spills.
- Report to the ER Coordinator and provide recommendations on resource requirements (additional manpower, equipment, material) to complete the cleanup effort. The responsibility of the Environment Department Designate is to mobilize personnel and equipment to implement the cleanup.

The Environment Department designate will be accessible to the Canadian Coast Guard during the entire incident.

5.1.2 Environment Superintendent or Designate

The responsibilities of the Environment Superintendent include the following:

- Report the spill to NWT 24-hour Spill Report Line at (867) 920-8130, to Qikiqtani Inuit Association (QIA) Lands Administrator at (867) 975-8422, and Aboriginal Affairs and Northern Development Canada (AANDC) Water Inspector at (867) 975-4555.
- Provide liaison with management to keep them informed of cleanup activities.
- Obtain additional required resources not available onsite for spill response and cleanup.

- Act as the spokesperson with government agencies as appropriate.
- Document the cause of the spill and effectiveness of the cleanup effort, and recommend the appropriate measures to prevent a recurrence of the spill.
- Prepare and submit follow-up documentation required by appropriate regulators.
- Ensure that the spill is cleaned up and follow-up communication and reports are filed with the AANDC and QIA Land Administrator. Ensure that the spill reports submitted to QIA include photographic records and an updated map showing Universal Transverse Mercator (UTM) coordinates, date, and amount and nature of the spill.

5.1.3 Corporate Contact

The responsibilities of the Corporate Contact include the following:

- Work with the Environment Department on regulatory follow-up as necessary; and
- Act as the spokesperson with government agencies as well as the public and media on any significant spill events.

5.1.4 Emergency Response Team

All responders are to be trained under the Response Actions to Emergencies outlined in Section 4. The number of responders and their specific tasks is estimated in accordance with the spill scenarios outlined in Section 7 of the Milne Inlet Fuel Storage Facility OPEP, as applicable.

5.1.5 Onsite Medical/Rescue Team

Depending on the scale of the spills/emergency scenario, fire response and medical emergency procedures will be initiated.

5.1.6 Shipping Companies

When shipping hazardous materials to and from the site, transport companies are required to carry out their operations in accordance with federal and international Transport of Dangerous Goods Regulations [i.e., TDGR – Clear Language, International Maritime Dangerous Goods (IMDG), and International Air Transport Association (IATA)].

In the event of a spill of hazardous materials (exceeding the quantities listed in Part 8.1 (1) of the TDGR) during transport, the shipping company will immediately report the incident to the RCMP and the Nunavut Emergency Services at 1-800-693-1666 (as stated in Part 8.1 (5), TDGR). The immediate report must include as much of the information listed in Part 8.2, TDGR, as is known at the time of the report. A follow-up report must be made, in writing, to the Director General within 30 days after the occurrence of the accidental release, the "dangerous goods accident" or the "dangerous goods incident". The follow-up report must include the information listed in Part 8.3, TDGR.

If a spill occurs on water during transport or during the transfer of hazardous materials from ship to land, the shipping company is responsible to implement the appropriate spill response measures in accordance to their spill response plan. If needed, the Baffinland Emergency Response Team can be available to assist the shipping company in their emergency response operations.

5.2 Coordination with Coast Guards and Government Agencies

5.2.1 *Canadian Coast Guard*

The response to a spill at Milne Port will be managed in coordination with the Canadian Coast Guard, lead response agency north of 60°.

The Central and Arctic Regional Response Plan (2006) and the Baffin Region, Nunavut Area Plan outline the Canadian Coast Guard's response capability for the Baffin region. The plans are components of the Canadian Coast Guard National Response Plan, which is the responsibility of the Director of Safety and Environmental Response Systems, Ottawa. It establishes the framework and procedures by which Central and Arctic Region will prepare for, assess, respond to, and document actions in response to pollution incidents in the region. This capability and the information contained in the Coast Guard plans are considered a valuable resource in planning spill response at Milne Port.

5.2.2 *Regional Environmental Emergencies Team (REET)*

The Environment Canada, Regional Environmental Emergencies Team (REET) is a multi-agency, multi-disciplinary group specializing in environmental emergencies. REET is designed to provide consolidated and coordinated environmental advice, information and assistance in the event of an environmental emergency. REET members represent several federal, provincial and municipal government departments, aboriginal communities, private sector agencies, and local individuals.

During emergency response situations a REET operates as a flexible and expandable multi-disciplinary and multi-agency team brought together to obtain and provide comprehensive and coordinated environmental advice, information and assistance to the Emergency Response Team Supervisor.

5.3 Training

5.3.1 *Purpose*

Training programs designed to ensure the continued competence in proper emergency response skills and in the procedures established by this plan are conducted on a continuing basis.

5.3.2 *Responsibility*

Development and implementation of emergency response training is the responsibility of the emergency response supervisor with the assistance and input from all departments.

5.3.3 *Training*

The Emergency Response Team Supervisor will be responsible for coordinating emergency response training onsite. The Emergency Response Team will participate in training and

emergency response exercises to ensure that all members are trained in equipment use and emergency response methods. The Emergency Response Team members will be trained in emergency identification and currently accepted response action techniques. The course content is to be based on identified task requirements and specialised hazards associated with emergency situations. Basic requirements for training individuals for emergency response include the following:

Key Personnel training requirements:

- Emergency chain-of-command.
- Evacuation procedures.
- Worker health and safety during emergency interventions.
- Fire safety and response.
- Hazardous Material Safe-Handling.
- Water based rescue.
- High angle rescue.
- Search and Rescue (SAR).
- Communication methods and signals.
- Emergency equipment and use.
- Offsite support and use.
- First Aid.
- Surface Mine Rescue.
- Spills:
 - ♦ Marine spill response.
 - ♦ Marine shoreline recovery operations.
 - ♦ All season land based spill response.

ERC and Department training requirements:

- Emergency response plan execution training.

Heads of Department training requirements:

- Emergency chain-of –command.

Employees will undergo formal safety and emergency response training. The training will identify site-specific hazards and hazards associated with the project in general. The training will also review standard operating procedures, use of personal protective equipment,

signalling an emergency, evacuation routes and muster locations, reporting and notification protocol, and other general safety procedures.

As part of site orientation and ongoing awareness training, all site personnel are informed that any spill of fuel or other hazardous liquids or solids, whatever the extent, has to be reported to their immediate supervisor.

In addition to this Baffinland is committed, during operations, to conducting regular annual spill response exercises and training in known and effective techniques for responding to spills and invite the relevant communities of the North Baffin Region to participate.

All training and testing is to be documented by the HS&E and Training Department and is to be repeated at a frequency set out by The Emergency Response (ER) Coordinator.

Training content should be reviewed annually by The Emergency Response Coordinator and modified as necessary to ensure that training adequately reflects changes in hazards and conditions, and complies with license and regulatory requirements.

5.4 Drills and Exercises

While drills and exercises can be used for training purposes, their primary function for this plan is to provide the means of testing the adequacy of the plans provisions and the level of readiness of response personnel.

5.4.1 Responsibility

The Emergency Response Supervisor is responsible for coordinating the development of and assisting in conducting drills and exercises. The following types of drills and exercises are to be used:

- Tabletop Exercises involve presenting to key emergency personnel a simulated emergency situation in an informal setting to elicit constructive discussion as the participants examine and resolve problems based on the plan.
- Functional Drills are practical exercises designed to test the capability of personnel to perform a specific function (i.e. communications, first aid, and rescue).
- Full-Scale Exercises are intended to evaluate the operational capability of Baffinland's emergency organisation and the adequacy of this plan.

5.4.2 Frequency

Tabletop exercises are to be conducted after initial implementation of this plan and after any major revisions of this plan or changes to key personnel.

Functional drills for various emergency aspects are to be conducted at least annually with both shift rotations and this includes Emergency Response Team drills (i.e. mine rescue, etc).

Full-Scale Exercises are to be conducted annually with sufficient notice to allow the correct exercise preparation.

5.4.3 Preparations

Preparations for a drill or exercise will vary depending on the type and scope involved, however the planning should include:

- Plan review and identification of possible problem areas.
- Establishing objectives.
- Identifying resources to be involved including personnel.
- Develop exercise scenarios, a major sequence of events list, and expected action checklists .
- Assigning and training controllers and evacuators.

Baffinland has committed to engaging local community representatives, the Government of Nunavut and the Canadian Coast Guard as applicable in training, drills and exercises.

The scenarios used will be realistic and based upon current operating conditions. The primary event (fire, spill, etc) is to be determined based on the objective of the exercise, and in accordance with regulatory requirements.

A sequence of major events list is to be developed to help simulate an actual emergency incident. Generally conditions for exercises should simulate, as closely as possible, actual emergency situations.

5.4.4 Debrief

The correct responses for each major event should be determined to assist with controllers and evaluators in subsequent debriefs and critiques. Results of drills and exercises are to be reviewed by the participants, evaluators and the Emergency Response Coordinator personnel to identify problem areas such as deficiencies in the plan, training, personnel or equipment. Debriefing will commence immediately after the incident has been resolved.

The Emergency Response Coordinator will prepare a report including details of his debrief and submit it to the Managers of Health, Safety & Environment. The Baffinland Safety and/or Environmental Superintendent will compile an overall report which will include the following:

- A summary of the exercise, including a review of the purpose, objectives and scenario used.
- A summary of the major discrepancies/deficiencies.
- Recommendations and corrective measures.

- A proposed schedule for the completion of these corrective measures.

These reports and recommendations will then be evaluated by the Baffinland Corporate Health, Safety, and Environment Managers for a decision on the merits of all recommendations.

5.5 Communication

The types of communications for which members of the team will participate include the following:

- Formal written correspondence and meetings with stakeholders.
- Site visits by community representatives.
- Design, construction and planning meetings.
- Field inspections and monitoring reports disseminated by the Health Safety and Environment Departments.
- Electronic communications.
- Tailgate/toolbox meetings.
- Formal written correspondence and meetings with government regulatory bodies; and
- Formal environmental awareness training.

Communications will be appropriately recorded and filed for future reference. Where appropriate, the copies of communications will be forwarded to the ER Coordinator and Vice President, Sustainable Development, Health, Safety & Environment

5.6 Facilities, Supplies and Equipment

5.6.1 Purpose

To ensure an effective response to emergency situations, adequate quantities and types of supplies and equipment are to be maintained on site for use by the Emergency Response Coordinator and others.

5.6.2 Responsibility

Responsibility for maintaining project, suppliers and equipment in a ready state and for determining the adequacy of equipment is assigned to the Emergency Response Supervisor.

5.6.3 Procedure

An inspection of specific emergency equipment is performed regularly by the Emergency Response Supervisor in accordance with a designated schedule and the records of these inspections will be kept on file at the Emergency Response Coordinator Center.

Life support equipment (i.e. self-contained breathing apparatus) is to be tested in accordance with the manufacturer's specifications to ensure its reliability, and records of all tests are to be maintained by The Emergency Response Supervisor.

All items with a limited shelf life or items such as sterile first aid supplies should be replaced as required, this would also relate to items expended during an emergency or exercise. Damaged or spoiled items immediately replaced.

A list of vendors capable of providing immediate emergency re-supply of items expended during sustained operations is to be maintained by emergency response supervisor and shall be responsible for stocking the Control Centre with all required equipment, including:

- Stationery.
- Telephone connections.
- Whiteboards.
- PC connections.

5.7 Mutual Aid

5.7.1 Purpose

It is the policies of Baffinland to have its neighbours participate in the response training at the Mary River Project to support the development of emergency response capacity and in potential support to emergencies that may occur in its operations. Baffinland will provide response assistance to the Government of Nunavut, local emergency response agencies authorized by the Government of Nunavut and other organizations. Baffinland's assistance varies depending on the circumstances of each incident but may include technical advice or provision of Baffinland resources authorized by the Emergency Response Coordinator. See Appendix J – Flowchart For External Requests for Search and Rescue and Emergency Services.

Baffinland provides this assistance under written agreement with the Government of Nunavut and assistance is only provided where plant, property and employees could operate in a reasonably safe environment.

6. Spill Response Procedures

A spill is defined as the discharge of a hazardous product out of its containment and 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. Diesel and Jet Fuels are the main products that may be spilled and therefore spill response procedures focus on this hazardous material. Other chemicals that may be spilled include sewage water, calcium chloride flakes, concrete additives, anti-freeze and small quantities of lubricants and oils.

All site personnel are trained on the procedures to be followed to report a spill and initiate spill response. The first person to notice a spill takes the following steps:

1. Immediately warn other personnel working near the spill area.
2. Evacuate the area if the health and safety of personnel is threatened.

3. In the absence of danger, and before the spill response team arrives at the scene, take any safe and reasonable measure to stop, contain and identify the nature of the spill.
4. Notify the Environmental Supervisor, who will initiate the spill response operations.

All spill response interventions carried out by the spill response team follow these general procedures:

Source Control – Reduce or stop the flow of product without endangering anyone. This could involve very simple actions such as turning off a pump, closing a valve, or sealing a puncture hole with almost anything handy (e.g., a rag, piece of wood, tape), raising a leaky or discharging hose to a level higher than the product level inside the tank, or transferring fuel from leaking containers.

Control of Free Product – Prevent or limit the spread of the spilled material. Accumulate/concentrate spilled product in an area to facilitate recovery. Barriers positioned down-gradient of the spill will slow or stop the progression of the spill. Barriers can consist of absorbent booms, dykes, berms, or trenches (dug in the ground or in ice).

Protection – Evaluate the potential dangers of the spill to protect sensitive ecosystems and natural resources. Block or divert the spilled material away from sensitive receptors. This can also be achieved by using various types of barriers.

Clean up the Spill – Recover and containerize as much free product as possible. Recover and containerize/treat contaminated soil, water, and snow. Pressure-wash contaminated bedrock surfaces, shorelines, ice and recover as much as possible oily water for containerization and/or treatment.

Report the Spill – Provide basic information such as date and time of the spill, type and amount of product discharged, photographic records, location and approximate size of the spill, actions already taken to stop and contain the spill, meteorological conditions and any perceived threat to human health or the environment. Reporting requirement forms are presented in Appendix D.

Response procedures specific to spills on land, water, snow and ice are presented in the following sections. Procedures vary depending on the season. Spill response operations, techniques, equipment and materials are further detailed in the spill response training course manual.

6.1 Spills on Land

Response to spills on land will include the general procedures previously detailed. The main spill control techniques involve the use of two types of barriers: dykes and trenches. Barriers should be placed down gradient (down-slope) from the source of the spill, and as close as possible to the source of the spill. Barriers slow the progression of the spill and also serve as containment to allow recovery of the spill.

Depending on the volume spilled, the site of the spill as well as available material, a dyke may be built with soil, booms, lumber, snow, etc. A plastic liner should be placed at the foot of

and over the dykes to protect the underlying soil or other material and to facilitate recovery of the spill. Construct dykes in such a way as to accumulate a thick layer of free product in a single area (V-shaped or U-shaped).

Trenches are useful in the presence of permeable soil and when the spilled fuel is migrating below the ground surface. A plastic liner should be placed on the down-gradient edge of the trench to protect the underlying soil. Liners should not be placed at the bottom of the trench to allow water to continue flowing underneath the layer of floating oil (if applicable).

The use of large quantities of absorbent materials to recover important volumes of spilled fluids should be avoided. Large volumes of free-product should be recovered and containerized, as much as possible, by using vacuums and pumps appropriate to the material. Mixtures of water and fuel may be processed through an oil-water separator. Absorbent sheets should be used to soak up residual fuel on water, on the ground (soil and rock), and on vegetation. Peat moss may also be sprinkled on vegetation to absorb films of petroleum products.

6.2 Spills on Water

Responses to spills on water include the general procedures previously detailed. Various containment, diversion and recovery techniques are discussed in the following sections. The following elements must be considered when conducting response operations:

- Type of water body or water course (lake, ocean, stream, river).
- Water depth and surface area.
- Wind speed and direction.
- Presence and range of tides.
- Type of shoreline; and
- Seasonal considerations (open-water, freeze-up, break-up, frozen).

Containment of a diesel fuel slick on the ocean requires the deployment of mobile floating booms to intercept, control, contain and concentrate (i.e., increase thickness) the floating oil. One end of the booms is anchored to shore while the other is towed by a boat and used to circle the diesel fuel slick and return it close to shore for recovery using a skimmer. Reducing the surface area of the slick increases its thickness and thereby improves recovery. Mechanical recovery equipment (i.e., skimmers and oil/water separators) will be mobilized to site if required. Refer to Milne Inlet Fuel Storage Facility OPEP (FEIS Appendix 10C-2) .

If diesel fuel is spilled in a lake it may not be possible to deploy booms using a boat. In this case, measures are taken to protect sensitive and accessible shoreline (spills resulting from traffic incidents). The diesel fuel slick is monitored to determine the direction of migration. In the absence of strong winds the oil will likely flow towards the discharge of the lake. Measures are taken to block and concentrate the oil slick at the lake discharge using booms

where it will subsequently be recovered using a portable skimmer, a vacuum, or sorbent materials.

In small slowly-flowing rivers, streams, channels, inlets or ditches, inverted weirs (i.e., siphon dams) are used to stop and concentrate moving diesel fuel for collection while allowing water to continue to flow unimpeded. In the case of floating diesel fuel, in a stream, heading for a culvert (i.e., at a road crossing) a culvert block is used to stop and concentrate moving fuel for collection while allowing water to continue to flow unimpeded. In both cases diesel fuel will then be recovered using a portable skimmer or sorbent materials.

In the case of spills in larger rivers, with fast moving currents, diversion booming is used to direct the oil slick ashore for recovery. Single or multiple booms (i.e., cascading) may be used for diversion. Typically, the booms are anchored across the river at an angle. The angle will depend on the current velocity. Choosing a section of a river that is both wider and shallower makes boom deployment easier. Diversion booming may also be used to direct an oil slick away from a sensitive area to be protected.

6.3 Spills on Snow and Ice

In general, snow and ice will slow the movement of hydrocarbons. The presence of snow may also hide the diesel fuel slick and make it more difficult to follow its progression. Snow is generally a good natural sorbent, as hydrocarbons have a tendency to be soaked up by snow through capillary action.

However, the use of snow as absorbent material is to be limited as much as possible. Snow and frozen ground also prevent hydrocarbons from migrating down into soil or at least slow the migration process. Ice prevents seepage of fuel into the water.

Response to spills on snow and ice includes the general procedures previously detailed. Most response procedures for spills on land may be used for spills on snow and ice. The use of dykes (i.e., compacted snow berms lined with plastic sheeting) or trenches (dug in ice) slow the progression of the fuel and also serve as containment to allow recovery of the fuel.

Free-product is recovered by using a vacuum, a pump, or sorbent materials. Contaminated snow and ice is scraped up manually or using heavy equipment depending on volumes. The contaminated snow and ice is placed in containers or within lined berms on land. The contaminated water and product will be treated on site utilizing available oily water treatment systems. Additional contaminated snow storage sites will be identified at Milne Port and the Mine Site in preparation for the 2013 Work Plan. Free phase product that is recovered will be utilized as a source of fuel on site if possible or shipped offsite for processing.

6.4 Wildlife Protection Procedures

In response to a spill event, techniques used to prevent wildlife from becoming oiled or contaminated, by preventing animals from entering the contaminated area, will consist of hazing and other deterrents. This will be accomplished using a combination of both audible and visual devices, including but not limited to:

- Pyrotechnics, i.e. shell crackers, screamers, propane cannons for shore based spills.

- Visual scare tactics, i.e.: helicopters, emergency response vessels or other water vessels.
- Broadcast sounds, i.e. Breco Bird Scarer designed to float with an oil spill.
- Exclusion, i.e. netting applied in smaller contaminated areas such as settling or evaporation ponds.

These techniques need to be set in place immediately after a spill occurrence so as to minimize environmental impact.

The size of the spill and location in relation to sensitive wildlife areas must be assessed at the time of the event as to correctly apply the appropriate level of deterrence. Only workers trained in the safe and proper use of certain hazing equipment will be permitted to haze wildlife. Personal Protective Equipment will be worn by all personnel using equipment, as per manufactures instructions, and that the minimum will include the use of eye and ear protection. Other workers in the vicinity of such devices should also use ear protection or remain a safe distance away. Hazing through the use of pyrotechnics should not be used too close to dry vegetation or flammable spill materials due to fire hazard.

Hazing should be equal and continuous in all contaminated areas to prevent wildlife from being hazed into an area where they may be in danger. It is also important to ensure that hazing efforts do not cause already contaminated animals to scatter and techniques are applied as soon as possible to prevent wildlife from contacting spills off the surface of waters (if applicable).

All emergency response vessels shall be equipped with deterrent devices to ensure timely response in case of a spill occurrence off-shore. To prevent habituation, variation of hazing techniques will be used such as changing the location, appearance and types of hazing or using a combination of hazing techniques.

Efforts shall be made to collect alive or dead oiled wildlife. In the event of a spill occurring in or around a water body, shorelines and beaches shall be inspected for contaminated wildlife to be collected. Emergency Response vessels shall be equipped with dip-nets, large plastic collecting bags for dead wildlife, and cardboard boxes or cloth bags for live oiled wildlife. To ensure alive oiled wildlife be dealt with humanely, capture and handling of wildlife shall only be done by trained and permitted individuals. Gloves shall be worn when handling contaminated wildlife (leather gloves for raptors and mammals, latex/rubber gloves for ducks and small shorebirds). Wildlife will be kept individually within cloth bags or ventilated cardboard boxes and label the date and time animal was found, name of finder, location and name of species, if known. Wildlife treatment facilities will then be contacted for advisement on treatment. All contaminated wildlife will be held in a warm quiet place until treatment. The Canadian Wildlife Services (CWS) will be consulted to determine the most humane treatment strategy to be implemented for live oiled wildlife, whether rehabilitation or euthanization.

For wildlife mortalities each carcass shall be bagged and labelled individually. The date and time animal was found, name of finder, location and name of species, if known shall be documented. CWS shall be consulted and approval obtained prior to disposing of any dead

wildlife. Contact information for experts in bird hazing and bird exclusion, oiled bird rehabilitation, and, permits needed to haze, salvage, hold and clean, or euthanize birds, are shown in Table 6-1.

Table 6-1: Emergency Contacts in Case of Spills Affecting Wildlife

Name	Location	Phone Number	Purpose
Canadian Wildlife Services (CWS)	Qimugjuk	1-867-979-7279	Knowing and providing information on the migratory bird resource and species at risk (under CWS jurisdiction) in the area of a spill (this includes damage assessment and restoration planning after the event) Minimizing the damage to birds by deterring oiled birds from becoming oiled Ensuring the humane treatment of captured migratory birds and species at risk by determining the appropriate response and treatment strategies which may include euthanization or cleaning and rehabilitation.
Cobequid Wildlife Rehabilitation Centre	Brookfield, NS	1-902-893-0253	Provide veterinary care and rehabilitation for wildlife
Nunavut Emergency Management	P.O. Box 1000, Station 700 Iqaluit, NU X0A 0H0	1-800-693-1666	Nunavut Emergency Management is responsible for developing the territorial emergency response plans, coordinating general emergency operations at the territorial and regional levels, and supporting community emergency response operations.
International Bird Rescue	International	1-888-447-7143	Wildlife rehabilitation specialists, can manage all aspects of wildlife response

6.5 Disposal of Spilled Material

Plastic ore sacks, steel drums, or other appropriate containers as approved by the Environmental Supervisor are used to contain and transport contaminated soil for treatment. Depending on the nature of the spilled contaminant, the soil may be treated for remediation at Baffinland's land farm at Milne Port (hydrocarbon based spills, sewage spills). Contaminated soil resulting from the spill of hazardous chemicals will be treated as a hazardous waste and shipped to a licensed facility for treatment and disposal (refer to FEIS, Appendix 10D-4: Waste Management Plan for Construction Operations and Closure). Temporary storage of contaminated materials is within lined berms. Used sorbent material is burned in the site incinerators.

7. Potential Spill Analysis

To prepare for emergency spill response, potential spill analysis was conducted on various worst-case scenarios. The exercise serves to identify potential risk areas, as well as to

determine the fate of spilled products and their environmental effects. This section examines spill scenarios as they relate to the 2013 Work Plan.

Several types of materials that will be used in 2013 have been identified as capable of causing environmental, health, and safety concerns should a spill occur while being transported, used, stored and/or handled. These include: fuel, explosives, untreated sewage and effluent, concrete additives, lubricants, oils and oily water. These materials are planned to be utilized daily during the 2013 Work Plan, often in sufficiently large quantities, warranting the evaluation of potential spill scenarios. All other hazardous materials, chemicals or wastes are handled/used/stored in smaller quantities and packaged/transported in small containers that limit the magnitude of the spills that can occur.

7.1 Fuel Spills

Fuel represents the greatest volume of hazardous material located on site in 2013. For locations of the tank farms and temporary fuel depots at each of the Project sites, see Appendix B. For the quantities of fuel currently stored on site and the expected maximum quantities stored at each location during the 2013 Work Plan, see Table 7-1 and Table 7-2.

Table 7-1: Current Fuel Inventory*

Location	Fuel Currently on Site		Total Fuel Inventory
Milne Port	436,370 L	Jet- A	2.26 ML
	1.83 ML	Diesel	
Mine Site	633,008 L	Jet- A	792,139 L
	159,131 L	Diesel	
Steensby Inlet	1,664 Barrels @ 205 L	Jet- A	495,280 L
	752 Barrels @ 205 L	Diesel	

*Note: Currently on-site March 2013.

Table 7-2: Fuel Storage Capacity for 2013 Work Plan*

Location	Peak Number of Tanks and Capacity of Fuel Storage for 2013	Type of fuel	Total Storage Capacity
Milne Port	3 pre-fabricated steel tanks @ 750,000 L ea	Jet- A	52.25 ML
	2 steel tank @ 5 ML ea, 4 steel tanks @ 10 ML ea.	Diesel	
Mine Site	4 pre-fabricated steel tanks @ 500,000 L ea	Diesel	2.0 ML
Steensby Inlet	1,664 Barrels @ 205 L	Jet- A	495,280 L
	752 Barrels @ 205 L	Diesel	

*Note: Actual fuel inventory will be dependent on fuel delivery considerations.

The fuel tank farms are designed to have bermed spill containment with capacity equal to the volume of the largest tank plus 10% of the volume of the remaining tanks or 110% volume of the largest tank, whichever is greatest. In calculating the volume of the containment, the footprint of the smaller tanks is subtracted.

The above basis is consistent with the document "Design Rationale for Fuel Storage and Distribution Facilities" 3rd Edition 2006, published by the Department of Public Works of the Northwest Territories. The lining in the bermed area is an impervious high-density polyethylene (HDPE) membrane. Refuelling stations are equipped with a lined and bermed area to contain minor spills or leaks during refuelling. The liner (e.g., 40 mm hypolon liner or equivalent) is protected by sand bedding. Vehicles and mobile equipment drive onto this bedding for refuelling. All fuel transfer is done by pumps with auto shut off valves (similar to gas station pump handles). In the event that mobile equipment refuelling is completed outside of the lined containment, drip trays will be utilized by experienced/trained operators, with spill kits located in close proximity in case of emergency.

All bulk fuel storage areas are equipped with spill kits for emergency response (see Appendix H for locations) and a current copy of ERP will be maintained that identifies spill kit locations and response plans. The spill kit contains the appropriate type, size and quantity of equipment for the volume/type of product present in the storage location as well as the environment likely to be affected by a spill (i.e., ground, river, lake, and ocean). For a list of spill response supplies, see Appendix C.

For each method of fuel storage and transfer, Standard Operating Procedures (SOP's) related to fuel storage and transfer have been developed. Proper containment and emergency response equipment will be provided to meet or exceed regulatory requirements. The Emergency Response and Spill Contingency Plan governs land-based operations, and the Transport Canada approved Oil Pollution Emergency Plans (OPEP) govern ship to shore fuel transfers for Milne Port and Steensby Port.

7.1.1 Potential Fuel Spill Scenarios

The tank farms located at Milne Port, Steensby Port and the Mine Site are constructed in an impermeable secondary containment structure (lined and bermed containment area). The construction is in compliance with building codes and best practices for tank farm facilities. The low point of the containment area is fitted with a sump and pumping system for capture/disposal of runoff in this secondary containment area. The same pumping system is used to recover large spills, should they occur. The secondary containment will be designed to a capacity to contain the complete volume of the largest tank, as well as 10% of the volume of all the remaining tanks.

Due to the capacities of the secondary containments, fuel spills outside these containment areas are unlikely to occur. Detailed procedures (site wide application) and work instructions (task specific) are in place (see section 6) as well as the Construction Environmental Protection Plan (CEPP) to deal with the cleaning of equipment and machinery entering and exiting the tank farms as well as dealing with contamination resulting from traffic in and out of the secondary containment areas.

7.1.1.1 Scenario 1: Tank Farms Area Spill

Description of Incident	Rupture or spill from 10ML tank into containment area
Potential Causes	Tank or associated equipment failure. This may include failure as a result of human error, mechanical failure, inadequate maintenance, geotechnical issues, sabotage, etc...
Product Spilled	Diesel or Jet Fuel.
Maximum Volume Spilled	10ML
Estimated Time to Spill Entire Volume	1 hour
Immediate Receiving Medium	Lined containment area
Most Probable Direction of Spill Migration	The fuel will flow into the sump of the containment area.
Distance and Direction to Closest Body of Water	N/A
Resources to Protect	Must ensure fuel does not breach/overtop containment
Estimated Emergency Spill Response Time	20 mins
Spill Response Procedures	If the spill is still occurring the hole/breach will be plugged or stopped if possible. The lined containment will be inspected to ensure that it is safely containing the spill; if not it will be reinforced with temporary berms. The spill will be collected via a vacuum truck and deposited in a suitable site – either an intact fuel tank or, if necessary, the oily water treatment facility.

7.1.1.2 Scenario 2: Day Tank/Temporary Storage Area Spill

All stand-alone day storage facilities, whether temporary (construction period) or permanent (mine pit), will be double-walled iso-tanks. In the 2013 Work Plan an estimated twelve 10,000L ISO-tanks will be required and will be located at multiple sites around the project, including: Milne Port, the Mine Site and the Tote Road. The iso-tanks will be contained in a restricted area so as to avoid collision from vehicles and placed such that they should not be damaged as a result of works.

Detailed procedures (site-wide application) and work instructions (task-specific) are in place, along with the Construction Environmental Protection Plan (CEPP) to deal with refuelling operations. The most likely source of spills is during refuelling or refilling of the day tanks with fuel. Only personnel trained in proper refuelling will have access to these tanks. The fuel transfer operation will be halted whenever a leak is detected; all dispensing will be done with auto shut off fuel dispensers, and drip trays will be utilized during all fuel transfers. In light of the robust nature of the Day Tanks and their built in secondary containment, and the use of proper refuelling techniques and drip trays, fuel spills are unlikely to occur. In the event that a spill does occur a spill kit, containing adequate supplies given the volume of the tank it accompanies, will be available in close proximity. Given the volume of these tanks, access to readily available spill cleanup materials and trained personnel, it is anticipated that staff will be able to identify, contain and mitigate any potential spills in an effective and time sensitive manner. The table below details the most severe incident that could occur.

Description of Incident	Puncture or rupture of Iso-tank
Potential Causes	Equipment failure due to faulty manufacturing or collision with mobile equipment.
Product Spilled	Diesel fuel.
Maximum Volume Spilled	10,000L
Estimated Time to Spill Entire Volume	10 mins
Immediate Receiving Medium	Soil or surrounding environment. It is important to note that no iso-tank will be located within 100m of a water body.
Most Probable Direction of Spill Migration	As iso-tanks will be utilized around the project. So the direction of spill migration will depend on the specific location. That said iso tanks will be placed on relatively flat laydown areas, where the potential flow of spills will be more readily managed.
Distance and Direction to Closest Body of Water	Varies
Resources to Protect	Varies
Estimated Emergency Spill Response Time	15mins
Spill Response Procedures	In the event that both walls of an iso-tank is ruptured and a spill occurs the spill response team will be immediately notified. Personnel in the immediate area will act as first responders making every effort to plug the puncture point. Temporary berms, ditches, trenches and sumps will be set up downstream of the spill. The downstream wall of trenches will be lined with plastic material to ensure that exposed soil does not come in contact with the fuel. Absorbent material will be utilized where required. Once the spill has been contained it will be sucked up by a vacuum truck and brought to an appropriate storage/treatment facility. If necessary, contaminated soil will be removed and brought to the landfarm for treatment. New, uncontaminated soil will be laid down in the exposed area.

7.1.1.3 Scenario 3: Tote Road Accident Tanker Truck Spill

Description of Incident	Spill of the contents of a tanker truck or fuel re-supply truck to ground or stream. Spill occurs in an isolated area along the Tote Road between Milne Port and Mary River.
Potential Causes	Human error, vehicle mechanical failure, traffic accident, poor weather or visibility.
Product Spilled	1. Tote Road: Diesel fuel, Jet-A Fuel 2. Ice Road: Diesel fuel
Maximum Volume Spilled	20 000 to 50 000 L (content of a tanker truck) This would require the rupture of the tanker.
Estimated Time to Spill Entire Volume	Spillage can be limited depending on severity of incident/accident 10 minutes to 48 hours – depending on severity of rupture or piping/valving associated with the tanker truck.
Immediate Receiving Medium	Soil, streams, lakes
Most Probable Direction of Spill Migration	Varies with specific location of spill
Distance and Direction to Closest Body of Water	1. Tote Road - Downstream and into Phillips Creek; the road between Mary River and Milne Port follows Phillips Creek, and crosses many streams (that discharge into Phillips Creek) over a distance of approximately 50 km. Phillips Creek eventually discharges into the ocean at Milne Port. 2. Ice Road – depends on location of accident
Resources to Protect	1. Tote Road: Streams, Phillips Creek and the ocean via Milne Inlet. 2. Ice Road: various water ways and lakes along the ice road
Estimated Emergency Spill Response Time	60 minutes after spill is reported to site personnel (assuming worst case scenario where the truck driver is injured and cannot commence spill response procedures).

Spill Response Procedures	<ol style="list-style-type: none"> 1. Contain and recover diesel slick downriver as described in Section 6.2, protect shorelines using sorbent booms. Collect free-product for temporary storage. Clean-up soiled shorelines. If the response crew arrives before the complete spill, seal the leak where feasible, contain and recover oil spill on ground using dykes and trenches and spill berms. If the truck driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in section 6 using the spill kit kept in the fuel trucks. 2. Once the treatment is achieved, the content of the reservoir is normally pumped by a vacuum truck to be discharged elsewhere. Therefore a vacuum truck is available in the area. In case of a spill of non-treated wastewater (sewage), the slick would be pumped using the vacuum truck. The piping would be repaired and the content of the truck would be discharged back in the oily water treatment unit. Impacted soils (if any) would be excavated and placed within the contaminated soil treatment area (landfarm).
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7.1.1.4 Scenario 4: Marine Resupply Spill – Milne Port or Steensby Port

The Milne Inlet Fuel Storage Facility OPEP (currently under revision) - Appendix 10C-2 of the FEIS, and Steensby Port Fuel Storage Facility OPEP - Appendix 10C-3 of the FEIS, present the range of spill scenarios probable for these facilities.

7.2 Explosives transport and storage

For an overview of the anticipated on-hand quantities of explosives during 2013, see Table 7-3. For the location of the explosives storage facilities at Milne Port, and the Mine Site, see the site layout drawings in Appendix B. The Explosives Management Plan (Appendix 10C-4 of the FEIS) deals with explosives management for the 2013 Work Plan.

Large quantities of ammonium nitrate (AN) will transported to and stored at Milne Port , in one tonne tote bags stored within sea containers. In addition, smaller quantities of AN emulsion pre-packaged explosives will be used to begin development of the quarry sites. AN materials will be transported across the sites. The spill of ammonium nitrate prill to the environment during transportation is thus unlikely to occur as the contents of a ruptured tote bag would be contained within the Sea Can container. Prepackaged AN emulsions pose very little danger to the environment given the hydrophobic nature of emulsion explosives.

Table 7-3: Quantities of Explosives Stored Onsite (2013)

Material	Purpose	Total Quantities 2013 (kg)	Storage Type	Total Quantities Stored on Site (at one time) (kg)
Pre-Packaged Explosives	Explosive agent	200,000	Magazines	100,000
Ammonium Nitrate	Polymer	2,200,000	20,000 kg per Seacan, 37,000 kg per magazine	2,200,000

7.2.1 Potential Spill Scenarios Related to Explosives

7.2.1.1 Scenario 1: Spill of Ammonium Nitrate (AN)

Ammonium nitrate dissociates readily in water to form ammonia, which in its un-ionized form, is toxic to aquatic organisms and fish. Storage on land, away from water sources largely eliminates the risk of ammonia losses to water bodies.

All partially full contaminated or ripped bags of prill, spilled prill and used empty bags are collected and stored in a dedicated contained location for shipment offsite for disposal. Spills within the storage facility are completely contained and will be cleaned up by personnel trained in explosives management. All spills are recorded on a spill report and all tote bags are inspected regularly by the explosives contractor.

Limited AN is expected to be used to produce explosives emulsion however it will be transported to various project areas, therefore the greatest chance an AN spill will occur is during transport. One major opportunity exists for a spill to occur during transport which is as a result of an accident on the Tote Road.

For an AN spill to occur during transportation this would require the explosives transport truck to be in a major collision. In addition to the breakage of individual AN prill tote bag this would also require the facilitation of a significant rupture of the sea can magazine the AN is being transported in. Even this would pose little chance of contamination unless deposited directly into a stream/water body. This will not be an issue during the winter months and if the spill occurs on land the either the driver or response team will be able to quickly and effectively mitigate the spill before any contamination is likely to occur.

Description of Incident	Explosives transport truck rolls over or collides with another vehicle or object. Transport container as well as individual tote bags rupture resulting in a spill.
Potential Causes	Collision, poor driving conditions or visibility, equipment error, operator error.
Product Spilled	Ammonia Nitrate
Maximum Volume Spilled	1 tonne
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	Depending on the location either on land or in a water body.
Most Probable Direction of Spill Migration	Depending on location
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Estimated Emergency Spill Response Time	15min – 60mins

Spill Response Procedures	<p>a) In the event that a spill occurs on land the emergency response team will be contacted immediately. If the driver is unharmed he will act as the spill response first responder. All spilled prills will be contained, with the use of berms if required. Once the spill has been contained the prills will be cleaned up by a trained crew and transported and stored in a dedicated contained location until they can be shipped off site.</p> <p>b) In the event that a spill occurs in water the emergency response team will be contacted immediately. Booms and other spill control devices will be deployed downstream and undissolved prills will be removed from the water body. Recovered material will be stored in a dedicated containment area before it can be shipped off site.</p>
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Any and all accidental spills of ammonium nitrate from an explosives truck will be cleaned up immediately, reported to the Environmental Supervisor and logged as required by regulations. A copy of a Standard Nunavut Spills Report Form can be seen in Appendix D. Clean up will be done by employees licensed to handle explosives and the contaminated material will be handled as per spills occurring within the storage area.

7.2.1.2 *Scenario 2: Spill of Emulsion*

Emulsion materials are acutely toxic to aquatic life. Release of emulsions to receiving water could have adverse impacts on aquatic life and fish. Therefore, emulsion material is stored in either the form of pre-paged explosives in an explosives magazine or at the emulsion plant where spills can be contained 100% within the confines of the building. Spills in confined areas are cleaned by employees licensed to handle explosives. Clean-up materials will be segregated in an appropriate area; incompatible materials will not be stored together, pursuant to MSDS and WSCC regulations.

When and if a spill occurs, a spill report will be filled by the explosives contractor and Environmental Supervisor. If a spill exceeds reportable quantities, notification will be made under the spill reporting regulations applicable in Nunavut.

7.2.1.3 *Scenario 3: Spill of Pre-packaged Emulsion during Transport*

Given the precautions taken in the design of the storage facilities and the suitability of containers used for storage and transport, major spills are most likely to be caused by traffic accident involving the pre-packaged explosives transport truck. If such an accident occurs, explosive material will be recovered by employees licensed to handle explosives and the contaminated material will be handled as disposed of in a designated area before they can be shipped on site.

Description of Incident	Emulsion transport truck rolls over or collides with another vehicle or object. Transport container as well as pre-packaged explosives.
Potential Causes	Collision, poor driving conditions or visibility, equipment error, operator error.
Product Spilled	AN emulsion
Maximum Volume Spilled	10,000 L
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	Depending on the location either on land or in a water body.
Most Probable Direction of Spill Migration	Depending on location
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Estimated Emergency Spill Response Time	15min – 60mins
Spill Response Procedures	<p>a) In the event that a spill occurs on land the emergency response team will be contacted immediately. If the driver is unharmed he will act as the spill response first responder. All spilled prills will be contained, with the use of berms if required (though unlikely). Once the spill has been contained the emulsion will be cleaned up by a trained crew and transported and stored in a dedicated contained location until they can be shipped off site.</p> <p>b) In the event that a spill occurs in water the emergency response team will be contacted immediately. Booms and other spill control devices will be deployed downstream and emulsions will be collected and removed from the water body. Recovered material will be stored in a dedicated containment area before it can be shipped off site.</p>

7.2.1.4 Scenario 4: Spill of Emulsion during Blast Hole Loading

Emulsion spills are unlikely to occur during blast hole loading given the nature of emulsion explosives. Pre-packaged explosives are in self contained tubes that are simply dropped into the hole. Emulsion from the emulsion plant will be pumped into blast holes via a hose. Given the hydrophobic nature of emulsion explosives a spillage is unlikely to be absorbed into a waterway and will be able to quickly and easily be mitigated by the trained personnel filling the blast holes.

Description of Incident	Emulsion spilled whilst loading pre-packaged emulsion in blast holes.
Potential Causes	Faulty packaging, operator error.
Product Spilled	AN emulsion
Maximum Volume Spilled	<10kg
Estimated Time to Spill Entire Volume	Instantaneous
Immediate Receiving Medium	land
Most Probable Direction of Spill Migration	No expected to migrate
Distance and Direction to Closest Body of Water	Depending on location
Resources to Protect	Nearby water bodies
Estimated Emergency Spill Response Time	5mins
Spill Response Procedures	In the event that a spill occurs on land the blasting technician will respond. The spilled emulsion will immediately be cleaned up and stored in a dedicated contaminated explosives area until it can be shipped off site.

7.3 Untreated sewage

There will be four camps (the Mine Site, Tote Road, Steensby Port and Milne Port) potentially producing sewage in 2013. The Mine Site and Milne Port will be equipped with a dedicated wastewater treatment facility (WWTF) (see Appendix 10D-3: Fresh Water, Sewage and Wastewater Management Plan) with a Membrane Bio Reactor units (MBR). Sewage from the temporary portable Tote Road Camp will be trucked to either the Mine Site or Milne Port for treatment. Steensby Port is expected to have limited to no activity occurring on site in 2013. If sewage is produced at Steensby Port it will be treated using a latrine system.

At remote areas, such as the mine maintenance/mine office, explosives handling facility, non-serviced railway camps, wastewater will be collected in local holding tanks and transported by tanker truck for treatment at the closest WWTF.

7.3.1 Potential Spills Scenarios Related to Sewage

7.3.1.1 Scenario 1: Sewage Spill at Milne Port

Description of Incident	Spill from the RBC reservoir or MBR tank. A pipe is accidentally dislodged and non treated wastewater escape the reservoir.
Potential Causes	Pipe or mechanical failure, human error.
Product Spilled	Raw sewage
Maximum Volume Spilled	80,000 litres
Estimated Time to Spill Entire Volume	60 minutes
Immediate Receiving Medium	Milne Port
Most Probable Direction of Spill Migration	Milne Port or Steensby Port
Distance and Direction to Closest Body of Water	150 m.
Resources to Protect	Milne Port or Steensby Port
Estimated Emergency Spill Response Time	15 minutes after spill is noticed.
Spill Response Procedures	Report Spill, Contain with berm or sump/ditch. Direct spill to the desired location and suck up spill with a vacuum truck. Put recovered material in a pond or return to the sewage treatment plant. Resurface area with fresh soil.

7.3.1.2 Scenario 2: Mine Site Sewage Spill

Description of Incident	Spill from the RBC reservoir or MBR tank.
Potential Causes	A pipe has accidentally being dislodged and non treated wastewater escapes the reservoir
Product Spilled	Raw sewage
Maximum Volume Spilled	72,000 litres
Estimated Time to Spill Entire Volume	60 minutes
Immediate Receiving Medium	Soil
Most Probable Direction of Spill Migration	Downstream and into a local depression east of the MBR wastewater treatment facility. That local depression dries in the summer and intercepts the maximum spilled volume.
Distance and Direction to Closest Body of Water	200 m.
Resources to Protect	One stream and Camp Lake.
Estimated Emergency Spill Response Time	15 minutes after spill is noticed.
Spill Response Procedures	A vacuum truck is available at the Mine Site. In case of a spill of non-treated wastewater (sewage), the slick would be pumped using the vacuum truck. The piping would be repaired and the content of the truck would be discharged back in the RBC or MBR treatment unit. Impacted soils (if any) would be excavated and disposed of in an incinerator or discharge back in the RBC or MBR.

7.3.1.3 Scenario 3: Sewage Transport Truck Spill

Description of Incident	Spill from the tanker truck transporting raw sewage from one of the temporary camp site to one of the permanent WWTF
Potential Causes	Road accident
Product Spilled	Raw sewage
Maximum Volume Spilled	10 000 litres
Estimated Time to Spill Entire Volume	Depends on severity of accident and damage sustained by the tanker truck
Immediate Receiving Medium	Soil
Distance and Direction to Closest Body of Water	Depends on location of accident
Resources to Protect	Soil and waterways
Estimated Emergency Spill Response Time	Immediate if driver is not injured; up to 60 minutes if ERP Team is required.
Spill Response Procedures	Spillage is contained. Impacted soils (if any) is excavated and disposed of in an incinerator or discharge back in the RBC or MBR.

7.4 Lubricants & oils

Lubricants and machinery oils will be used on site throughout the course of construction and operations. Lubricants and oils have the ability to contaminate waterways and soils if exposed to the environment. That being said the risk of a lubricant or oil spill on site is expected to be minimal. All Lubricants and oils will be handled by trained staff following proper procedures and guidelines. The vast majority of the time lubricants will be stored and transported in small quantities and in the event of a spill appropriate spill response equipment and procedures will be readily available.

7.4.1 Potential Spill Scenarios Related to Lubricants & Oils

7.4.1.1 Scenario 1: Containment puncture during transport

The most likely spill scenario to occur with regards to lubricants and oils is a puncture of an individual storage unit during transport. Lubricants and oils will be stored in 1m by 1 m units within a sea can container. When Lubricants or oils are required a single unit will be removed from the contained via forklift. In the event that the container is punctured by the forklift a maximum spill volume of 1,000 litres could potentially occur. The likelihood of this occurring is minimal as all equipment operators will be trained in proper lubricant and oil transfer procedures, in addition to this in the event that a container is punctured the operator will see the puncture immediately and will be able to take steps to contain the spill and implement mitigation procedures.

Description of Incident	Lubricant or oil container is punctured by a forklift during transport
Potential Causes	Operator error. Equipment failure.
Product Spilled	Lubricant or oil.
Maximum Volume Spilled	1,000 L
Estimated Time to Spill Entire Volume	5 minutes
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on area
Distance and Direction to Closest Body of Water	Depends on area
Resources to Protect	Any nearby water bodies.
Estimated Emergency Spill Response Time	>5 minutes
Spill Response Procedures	If the forklift driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in Section 6 utilizing the spill kit kept in the vicinity. The spill will be contained through the use of temporary berms and ditches until it can be vacuumed up and transported to the oily water treatment plant or an appropriate storage facility. Any contaminated soil will be removed and processed in the contaminated soil treatment area (landfarm)

7.4.1.2 Scenario 2: Spill during Equipment Rollover

It is possible that the equipment carrying a lubricant or oil container could rollover or has a collision causing a spill of the entire 1 m³ container. In the event that this occurs it will be managed the same way as detailed above. The event of a rollover is unlikely given the safe driving procedures, speed limits, road signage and training procedures in place. In addition to this all lubricant and oil containers will be securely fastened inside the vehicle in which they are being transferred making a spill unlikely.

Description of Incident	Spill during equipment rollover
Potential Causes	Operator error. Equipment failure. Poor visibility or adverse weather. Collision.
Product Spilled	Lubricant or oil.
Maximum Volume Spilled	1,000 L
Estimated Time to Spill Entire Volume	instantaneous
Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on area
Distance and Direction to Closest Body of Water	Depends on area
Resources to Protect	Any nearby water bodies.
Estimated Emergency Spill Response Time	15mins-60mins
Spill Response Procedures	<p>If the driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in section 6 utilizing the spill kit kept in the vicinity. The spill will be contained through the use of temporary berms and ditches until it can be vacuumed up and transported to the oily water treatment plant or an appropriate storage facility. Any contaminated soil will be removed and processed in the contaminated soil treatment area (landfarm)</p> <p>In the event a spill occurs in a water body the lubricants and oils will be contain and recovered downriver as described in Section 6.2, with shorelines protected using sorbent booms. All free-product will be collected for temporary storage and soiled shorelines cleaned-up. If the forklift driver is not injured, he will act as a first responder and immediately initiate the spill contingency plan as defined in Section 6 utilizing the spill kit kept in the vicinity. Once the spill is contained the content of the reservoir will be pumped up by a vacuum truck to be discharged to the oily water treatment plant.</p>

7.4.1.3 Scenario 3: Spills during Transfer

It is possible that a minor spill may occur during the transfer of lubricants or oil to equipment. This will most likely be the result of equipment failure such as the pump or hoses or operator error.

As proper maintenance procedures will be in place to reduce the chance of equipment malfunctions, along with proper training procedures it is unlikely a spill will occur in this event. In addition to this drip tray will be utilized in all oil and lubricant transfers in the field. In the event of a spill it will be managed the same way as detailed in Section 7.4.1.1.

Description of Incident	Spill during transfer
Potential Causes	Operator error. Pump failure. Hose failure.
Product Spilled	Lubricant or oil.
Maximum Volume Spilled	1,000 L
Estimated Time to Spill Entire Volume	5m - 15mins

Immediate Receiving Medium	Land
Most Probable Direction of Spill Migration	Depends on location
Distance and Direction to Closest Body of Water	Depends on location
Resources to Protect	Nearby water bodies.
Estimated Emergency Spill Response Time	5mins-15mins
Spill Response Procedures	<p>If this spill occurs in a building it will be contained as all buildings are fully lined and no contaminants will be able reach the natural environment. The spill will be cleaned up by qualified personnel and disposed of as a hazardous material.</p> <p>If a spill occurs during transfer all transfer activities will be halted immediately and clean up of the spill with the available spill kit will commence. The spill will be contained using berms, ditches, sumps and booms where necessary. The downstream wall of trenches will be lined with plastic material to ensure unexposed soil does not come in contact with the lubricant. Absorbent material will be utilized where required. Once the spill has been contained it will be sucked up by a vacuum truck and brought to an appropriate storage/treatment facility. If necessary contaminated soil will be removed and brought to the landfarm for treatment. New soil will be laid down in the exposed area.</p>

8. Reporting Requirements

Quantities of hazardous substances spilled that require reporting are listed in Schedule B of the Nunavut Spill Contingency and Reporting Regulation. Please refer to Appendix G.

After the initial field emergency response to the spill event, spills are reported to the 24-hour Spill Report Line (see Appendix D for Spill Report Form):

24-Hour Spill Report Line

spills@gov.nt.ca

Tel. (867) 920-8130 or

Fax (867) 920-8127

Failure to report a spill can lead to fines. The Qikiqtani Inuit Association (QIA) Lands Administrator will also be promptly notified at (867) 975-8422 or via e-mail. Similarly, the AANDC Water Resources Officer will be promptly notified of the spill event at (867) 975-4289 or via e-mail. In the event of a spill on the ocean, the incident will be reported to the Canadian Coast Guard (Arctic region) 1-800-265-0237 (24-hour).

It is the responsibility of the Environmental Supervisor on behalf of the Operations Manager to prepare the proper reports and transmit them to regulatory authorities. Table 8-1 presents an additional contact list for spill reporting. The Environmental Supervisor will determine on a spill by spill basis that on the list is to be contacted.

Table 8-1: Contact List for Spill Reporting

Department	Person	E-mail	Telephone
AANDC-Waters (Iqaluit)	David Aberenthy	david.aberenthy@aandc.gc.ca	(867) 975-4555
AANDC-Field Operations	Andrew Keim	andrew.keim@aandc.gc.ca	(867) 975-4289
DFO-Iqaluit	Georgina Williston	georgina.williston@dfo-mpo.gc.ca	(613) 925-2865 Ext. 131
EC-Iqaluit	Curtis Didham	curtis.didham@ec.gc.ca	(867) 975-4644
GN-DOE	Robert Eno	reno@gov.nu.ca	(867) 975-5907
Qikiqtani Inuit Association	Salamonie Shoo	landadmin@qia.ca	(867) 975-8422
Pond Inlet Health Clinic			(867) 899-7500
			(867) 899-8431
Pond Inlet RCMP			(867) 899-1111
Qikiqtani General Hospital (Iqaluit)			(867) 979-7300

The spill event is reported in writing using the standard Spill Report Form (see Appendix D).

The written report includes the following information:

- Date and time of incident.
- Location or map coordinates and direction of spill movement if warranted.
- Party responsible for the spill.
- Type and estimated quantities of spilled contaminant(s).
- Specific immediate cause of incident.
- Status of the spill indicating if spilled materials are still moving or now at steady-state.
- Approximate surface of contaminated area.
- Photographic record of spill event and cleanup efforts.
- Factors affecting spill or recovery such as temperature and wind.
- Status on containment actions indicating whether a) naturally, b) booms, dykes, or other, c) no containment implemented.
- Corrective action taken or proposed, to clean, contain, or dispose spilled material.
- Whether assistance is required and in what form.
- Whether the spill poses a hazard to persons or property (i.e., fire, drinking water).
- Comments and recommendations.
- Name, position, and employer of person reporting the spill; and
- Name, position, department of person to whom the spill is reported.

In addition, QIA requests that Baffinland produce a site map(s) listing the location in UTM coordinates, date, amount, and nature of the substance spilled. The map(s) should be updated annually and will be provided along with annual report requirements. The map(s) will also detail major project components and relevant water-bodies.

In the event of a spill involving the marine carrier delivering bulk fuel, Baffinland will ensure that the subcontractor reports any spill event under its responsibility.

9. References

1. The Guidelines for Preparation of Hazardous Material Spill Contingency Plans describe parameters that should be considered in the development of hazardous material spill emergency plans. Tilden, D.C., and H.E. Westermann, *Guidelines for the Preparation of Hazardous Material Spill Contingency Plans*. Environment Canada, Yellowknife, NWT, 1990
2. The CCME Code of Practice for Used Oil Management defines appropriate environmental options for handling, storage, collection, recycling, transport, reuse and/or disposal of used oils in Canada. CCME (Canadian Council of Ministers of the Environment), *Used Oil Management in Canada: Existing Practices and Alternatives*, prepared by Monenco Consultants Ltd. for the Industrial Programs Branch, Conservation and Protection, Environment Canada, Ottawa, Ont., CCME-TS/WM-TRE007 (1989a).
3. The Field Guide for Oil Spill Response in Arctic Waters developed for the Emergency Prevention, Preparedness and Response Working Group, describes precise response methods and strategies for emergency response operations and provides technical support documentation. Owens, E.D., *Field Guide for Oil Spill Response in Arctic Waters*, Prepared by Owens Coastal Consultants and Counterspill Research Inc. for Emergency Prevention, Preparation and Response Working Group (1998).
4. The Land Transportation Emergency Response Guideline for Petroleum Spills developed by the Canadian Petroleum Products Institute outlines scope, emergency response code of practice, response time guidelines, response equipment, and personnel capability requirements. Canadian Petroleum Products Institute, Land Transportation Emergency Response Guideline for Petroleum Spills (2008)
5. INAC, Nunavut Regional Office, Draft Recommended Best Practices for Storage and Handling of Petroleum and Allied Petroleum Products on Federal Crown Lands in Nunavut, March 2009.
6. Department of Sustainable Development, Environmental Protection Service:
 - Environmental Guidelines for Contaminated Site Remediation, January 2002.
 - A Guide to the Spill Contingency Planning and Reporting Regulations.
 - Environmental Guidelines for Industrial Projects on Commissioner's Lands, January 2002.
 - Environmental Guidelines for Industrial Waste Discharges, January 2002.
 - Environmental Guidelines for Management of Hazardous Waste, January 2002.
 - Illustrated Homeowner's Guide to Heating Oil Tank Inspection, March 2011.
7. Canadian Coast Guard, Central and Arctic Region, 2006. Regional Response Plan. April 2006.

8. Government of Nunavut, Good Building Practices Guideline 2nd edition, December 2005.
9. The Mining Association of Canada Crisis Management Planning Guide – March 2007.
Available at:
www.mining.ca/www/media_lib/TSM_Documents/TSM_Publications/2007/Crisis_Man_03_2007.pdf.
10. Canadian Wildlife Services. National Policy on Oiled Birds and Oiled Species at Risk.
January 2000
11. International Petroleum Industry Environmental Conservation Association. A guide to Oiled Wildlife Response Planning. 2004.

Appendix A

Concordance Table

Project Certificate Terms and Conditions Applicable to Emergency Response

Accidents and Malfunctions

No.	Term and Condition	Comments	Reference
173	The Proponent shall employ full containment booms during all ship-to-shore and other marine-based fuel transfer events.		Please refer to the Appendix C and The Oil Pollution Emergency Plan - Milne Inlet.
174	The Proponent and the Canadian Coast Guard are required to provide spill response equipment and annual training to Nunavut communities along the shipping route to potentially improve response times in the event of a spill.		Please refer to the Oil Pollution Emergency Plan - Milne Inlet.

Appendix A to NIRB Decision Report

No.	Subject	Commitment	Action	Reference
8	Fuel Transport (Overwintering of Fuel Vessel)	As part of standard operation procedures, Baffinland is committed to avoiding ship-to-shore transfer of fuel during freeze-up or break-up periods.	This will be applicable for refuelling of tug boats at Milne Port	Not Applicable for 2013 Works
9	Fuel Transfer	Baffinland is committed to undertaking fuel transfer from vessels to shore under good weather conditions. Once the ore dock is constructed at Steensby, fuel transfer will be carried out at the freight dock.	Not applicable until Steensby Port is constructed.	Please refer to the Oil Pollution Emergency Plan - Milne Inlet.
10	Fuel (Spill / Leak Detection)	Baffinland is committed to installing leak detection instrumentation on the overwintering fuel vessel and to conduct ongoing monitoring in the vicinity of the vessel, in accordance with relevant guidelines and regulations. Baffinland is committed to using best management practices to reduce the possibility of spills.	Not applicable until construction at Steensby Port gets underway	Not Applicable for 2013 Works
11	Spill Contingency Planning	Baffinland is committed to maintaining an up to date Spill Contingency Plan and will distribute copies of the Plan to stakeholders.	The present update relates to construction activities undertaken in the 2013 Work Plan.	Please refer to Section 6 & Section 7 of this plan.
12	Disaster Management Plan	Baffinland is committed to developing and implementing a Security Plan in accordance with regulatory requirements.		Please refer to Section 3.3
26	Marine (Safety Officer)	Baffinland is committed to appointing one of its personnel to act as a Marine Safety Officer during the construction, operation, and closure phases of the Mary River Project.		Please refer to the Oil Pollution Emergency Plan - Milne Inlet.

27	Marine (Shipping Vessel)	Baffinland is committed to meeting with the community of Igloolik once the vessels used to transport ore for the Mary River Project are selected.		Not Applicable for 2013 Works
28	Marine (Fuel Vessel)	Baffinland is committed to visiting Igloolik to provide the community with information on the fuel vessel selected for overwintering at Steensby Inlet.		Not Applicable for 2013 Works
29	Marine (Shipping Route)	Baffinland is committed to ensuring that normal shipping activities will be confined to the Nunavut Settlement Area on the north side of the Hudson Strait where conditions are favorable to shipping and to incorporating the necessary mitigation measures to ensure that shipping does not impact marine wildlife and that community concerns are addressed from an operational standpoint.		Please refer to the Shipping Marine Mammals Management Plan
30	Marine (Shipping Notification)	Baffinland is committed to providing shipping notification on a regular and consistent basis to relevant communities prior to shipping and construction activities for the Mary River Project.		Please refer to the Shipping Marine Mammals Management Plan
31	Marine (Shipping Speed)	Baffinland is committed to ensuring that the vessels used to transport ore from the Mary River Project are of appropriate class and specification, and will operate in a manner that is consistent with applicable regulations and guidelines.		Please refer to the Shipping Marine Mammals Management Plan
34	Marine (Shipping Route)	Baffinland is committed to issuing public notices to affected communities advising them of shipping traffic schedules, and marker locations. Baffinland is also committed to installing reflective markers at a distance of approximately 100 metres from the ship track ice edge with approximately 500 metres between each marker on both sides of the shipping lane during the winter period to ensure that shipping lanes are visible at all times. Baffinland is committed to conducting weekly patrols along these shipping lanes to ensure that markers are in place and remain visible.		Please refer to the Shipping Marine Mammals Management Plan
35	Marine (Shipping Route)	Baffinland is committed to providing affected communities and other stakeholders with details on the type and location of all navigational aids installed along the shipping route.		Please refer to the Shipping Marine Mammals Management Plan
36	Marine (Shipping)	Baffinland is committed to providing		Please refer to the

		real-time data on the location of ships or vessels associated with the Mary River Project to all affected communities.		Shipping Marine Mammals Management Plan
57	Management Plans	Baffinland is committed to updating its management plans to reflect new information, new practices and changes to operating conditions.		Please refer to the ERP
99	Medical Facilities (Design)	Baffinland is committed to working with the Government of Nunavut to provide details on the design of medical facilities for the Mary River Project during the regulatory phase of the project.		Please Refer to Sections 3.8 and Section 4.5.
100	Medical Facilities (Staffing)	Baffinland is committed having an on-site medical facility staffed by a registered nurse or certified paramedic in order to attend to any injury that workers might experience on-site, and is further committed to providing medi-vac services as may be required from the mine site to Iqaluit.		Please Refer to Section 4.5.
101	Mitigation (Compensation to Hunters)	Baffinland is committed to implementing mitigation measures which offset the inconvenience and hardship created for Inuit hunters and travelers that have traditionally used the areas encompassed by the shipping route.		Please Refer to Section 2.6
106	Emergency Response Plans	Baffinland is committed to seeking and utilizing external expertise to assist them with the development of emergency response planning and to provide formal training specific to accidents and emergency response for the Emergency Response Team, which will be stationed at site at all times. This training would include responding to Railway specific emergencies.		Please refer to the Oil Pollution Emergency Plan - Milne Inlet.
107	Spill Training/Spill Exercises	Baffinland is committed to conducting routine training exercises and strategically placing resources and equipment on site for spill response.		Please refer to Section 5.3 and Appendix H
108	Spill Training/Spill Exercises	Baffinland is committed, during operations, to conducting regular and annual spill response exercises and training in known and effective techniques for responding to spills and invite the relevant communities of the North Baffin Region to participate.		Please refer to Section 1.8 & 5.3, and the Oil Pollution Emergency Plan - Milne Inlet.
109	Emergency Response	Baffinland is committed to meeting on a regular basis with the emergency response and preparedness working group to review emergency preparedness.		Please refer to Section 1.8, and the Oil Pollution Emergency Plan - Milne Inlet.
110	Emergency/Spill	Baffinland is committed to ensuring		Please refer to Section

	Response Planning	that adequate resources are allocated to the development and deployment of emergency and spill response capabilities.		1.8 & 5.3, and the Oil Pollution Emergency Plan - Milne Inlet.
111	Marine Regulatory (Spill Prevention Plans)	Baffinland is committed to requiring that all project vessels have Shipboard Oil Pollution Emergency Plans (SOPEPs) in place which meets or exceeds the international standards set out in the Port State Control Memorandum of Understanding, as well as trained personnel on board to respond to spills. Baffinland will be self-sufficient for spill response and will contract the services of an established Response Organization to enable the Company to escalate response capabilities to deal with spills of up to 10,000 tonnes. This Response Organization will have expertise in recovery and cleanup of spills along coast line and involving wildlife.		Please refer to the Shipping Marine Mammals Management Plan
112	Spills (Fuel)	Baffinland is committed to ensuring that all spills are reported in accordance with the relevant spill contingency planning and reporting regulations and guidelines.		Please refer to Section 8.0, and the Oil Pollution Emergency Plan - Milne Inlet.
113	Spills (Fuel)	Baffinland is committed to exploring and implementing measures designed to recover residual fuel from spills under the surface of sea ice.		Please refer to Section 6.3, and the Oil Pollution Emergency Plan - Milne Inlet.

Appendix B

2013 Work Plan & Site Layout Drawings

B.1 2013 Work Plan

B.2 Site Maps and Drawings

The following figures present site layouts and tank farm drawings and are attached in FEIS, Appendix 3B, Attachment 9 (Drawings):

- Project Location Map – Figure 1.1
- Milne Port Site Layout - H349000-2000-00-015-0002
- Tote Road - Drainage Crossing Locations Plan (All Crossings) – NB102-181/10 400
- Mine Site Site Layout - H349000-4000-00-015-0002
- Mine Site Enhanced Site Layout - H349000-4000-00-015-0003
- Existing Site Layout At Mid Rail Camp – Figure 1.6
- Existing Site Layout At Steensby Port – Figure 1.7

2013 WORK PLAN

1.0 Introduction

The following document presents the activities Baffinland intends to undertake as part of its 2013 Work Plan. In the event the Project does not advance, all work items described and constructed as per the 2013 Work Plan will be subject to reclamation, as per relevant regulatory and permit obligations.

2.0 Overview of Site Activities for March 2013 to December 2013

This 2013 Work Plan provides for:

- 1) The development and construction of infrastructure required for site capture at Milne Port and the Mine Site for the launching of the 18 MT Mary River Project.
- 2) Ongoing environmental baseline data collection and geotechnical drilling in order to sustain the development of the 18 MT Project. These activities will resume at the Milne Port site, along the Tote Road, at the Mine Site, at numerous quarry sites and at other Project development areas.

The specific scope of activities to be undertaken at each Project site is presented in Section 3 of this Work Plan. The Work Plan is presented within the context of the applicable regulatory authorizations and schedule.

Baffinland holds, or will soon hold, all the permits and authorizations required to carry out the 2013 Work Plan. The main regulatory instruments that allow for the 2013 Work Plan activities include:

- Project Certificate
 - All works and activities proposed have been screened by the NIRB and have been considered in the Project Certificate issued by the NIRB on December 28, 2012.
- Type B Water Licence
 - The current Type B Water Licence (2BB-MRY1114) authorizes Baffinland to operate the existing sewage treatment plants, incinerators, landfill, wastewater treatment and other facilities regulated by the Nunavut Water Board. A request for a modification to this licence will be submitted shortly, for the construction of an additional 5ML fuel tank construction within the existing secondary containment as well as for the construction of a second PWSP pond at Milne Port (these work items are discussed in section 3.1.2 of this letter). The Type B Water Licence also authorizes Baffinland to undertake mineral exploration and geotechnical drilling programs. Prior to March 31st 2013, Baffinland will submit to the NWB an update of all the environmental management plans associated with the Type B water Licence.
- Type A Water Licence
 - The final hearings for the Type A Water Licence associated with the Project Certificate are scheduled for April 23 to 25, 2013, in Pond Inlet. Baffinland expects that the Type A Water Licence will be granted by mid June 2013. The scope of the Type A Water Licence exceeds the requirement of the 2013 Work Plan for all

activities considered in this 2013 Work Plan. Following the issuance of the Type A Water Licence, Baffinland will submit to the NWB updates for the environmental management plans associated with this Water Licence.

- Use and Storage of Explosives
 - Baffinland's Explosives Contractor will obtain the necessary permits and authorizations from NRCan for the use and storage of explosive at the Project sites. It is anticipated that these permits will be obtained prior to commencement of the 2013 Work Plan (expected in mid April 2013).
- Quarry Permits
 - Schedule 'B' Quarry Concession Agreement under IOL Commercial Lease Q10C3001.
 - It is anticipated that quarrying of rock and gravel from permitted quarry locations (as shown on Schedule "A1") of this Lease will continue. In addition, Baffinland will be applying for access and quarry permits to extract rock and gravel material adjacent and near the existing Milne Inlet Tote Road by means of an Amendment to the existing Schedule 'B' to the Lease.
 - The Project Certificate included the detailed assessment of 5 quarries. Two of these quarries will be developed at the onset of the 2013 Work Plan:
 - Quarry Q1 located at Milne Inlet – a site specific Quarry Management Plan was provided in the FEIS (Volume 3, Appendix 3B, Attachment 6: Operation and Management Plan Milne Inlet Quarry). The surface area of the quarry is 200,000 m² and the volume of material to be extracted is approximately 300,000 m³.
 - Quarry QMR2 located at the Mary River Mine Site - a site specific Quarry Management Plan was provided in the FEIS (Volume 3, Appendix 3B, Attachment 6: Operation and Management Plan Mary River Mine Site Quarry). The surface area of the quarry is 252,700 m² and the volume of material to be extracted is approximately 538,000 m³.
 - AANDC Land Use Permit and Quarry Permit to access existing and possibly new borrow and rock quarries adjacent and near the Tote Road.

3.0 Scope of 2013 Construction Activities

3.1 Pre-Sealift Activities – mid April to June 30, 2013

Construction activities will commence in April 2013. Equipment already on site will be used to begin earthworks and site preparation. Beginning in April 2013, key activities will include:

3.1.1 Mary River Mine Site

- Operate the Mary River Exploration Camp and increase occupancy as of mid April 2013. The camp with its associated sewage treatment plant and incinerator will operate in accordance to the terms and conditions of Baffinland's Type B Water Licence.

- Fly in pre-packaged explosives to the Mary River airstrip and transport to explosives magazines at Milne Port for storage and use in quarry operations.
- Construct camp pad and begin installation of construction camp.

3.1.2 Tote Road

Routine maintenance of the Tote Road will continue in 2013. The following activities will be undertaken prior to the sealift:

- Open the Tote Road (snow clearing) in early April;
- Relocate crusher train from the Mary River mine site to Milne quarry site (the crusher will be transported across river ice at four locations where box culverts are now in place);
- Follow up on the requirements pursuant to the Fisheries Authorization for the Tote Road Not Net Loss and Monitoring Program, QIA lease, and AANDC land permit and quarry permit requirements;
- Implementation of a freshet management plan for the Milne Inlet Tote Road to minimize associated environmental risks;
- Develop laydown areas for storage of explosive magazines (3 areas) in proximity of Q1 quarry at Milne Inlet. Position explosive magazines.

Milne Port

- Open the Milne Port camp site (mid April) and operate at full capacity (60 beds). Restart and operate the existing sewage treatment plant at Milne Port and the camp incinerator. The camp will operate in accordance with the terms and conditions of Baffinland's Type B Water Licence.
- Construct a second polishing waste stabilization pond (PWSP) at Milne in preparation for larger off-specification sewage treatment capacity during construction ramp up.
- Begin development of quarry Q1 1+100 (submitted with FEIS) to generate crushed and screened aggregate for the development of the Milne Port site. An estimated aggregate volume of 100,000 m³ will be required for Milne Port site development.
- Earthworks at Milne Port prior to the sealifts will focus on the following areas:
 - Develop laydown area B (used for Owner/Contractor laydown);
 - Develop laydown area A for storage of material and equipment to be received during the 2013 sealift;
 - Develop pad for the expanded camp facilities;
 - Upgrade (extend) the airstrip runway;
 - Construct fuel tank farm secondary containment area;
 - Construct one 5ML diesel fuel storage tank within the secondary containment constructed in 2011 (same construction as existing 5 ML tank);
 - Construct laydown area for waste storage/transfer;
 - Development of parking areas for heavy equipment and rolling stock fleet to be delivered during the sealifts.

3.2 2013 Sealift – July 1st to October 1st, 2013

For Milne Port, it is expected that sealifts will occur between July 1st and October 1st, 2013. An estimated 14 barges/ships (dimension of barges approximately 35 m x 140 m) will be necessary to transport the equipment and material required for the execution of the 2013 Work Plan and execution of the work planned for January to June of 2014.

Material, equipment, fuel and supplies required for construction activities at the Mine Site and the operation of the Mary River facilities will be transported to the Mine Site via the Tote Road during the fall of 2013 and the winter of 2014.

The material, equipment, supplies, buildings and machinery received at Milne Inlet during the sealifts will consist of the following:

3.2.1 Prefabricated Buildings and Fold-away Structures

- Camps complete with dormitories, kitchen facilities, washrooms, laundry facilities;
- Pre-assembled sewage treatment facilities;
- Camp incinerators;
- Emergency services building;
- Power generation equipment with electrical distribution system (several generators ranging from 50 kW to 500 kW);
- Two concrete batch plants;
- Boiler modules;
- Temporary emulsion plant;
- All modular buildings and fold-away structures to be used for offices during the 2013-2014 period. A preliminary list is presented in the table below:

Facility	Quantity
Maintenance shops	3
Trade shops (electrical, carpentry, piping, mechanical)	3
Warehouses	3
Parking garages	3
Tire shops	3
Office complexes	3
Lunchrooms	3
Wash cars	13
Field offices and lunch rooms	10
Fold-away structures	5

3.2.2 Heavy Equipment and Rolling Stock

- All heavy equipment and rolling stock required for the construction activities scheduled from July 2013 to July 2014 (next sealift). An overview of the rolling stock is presented in the table below:

Preliminary list of Rolling Stock and Heavy Equipment			
Description	Quantity	Description	Quantity
Loader	26	Emulsion Delivery Trucks	3
Grader	7	Loader Snow Blower Attachments	5
Track Dozer	13	Development Rock Drills	2
Excavator	11	Production Rock Drill	2
Haul Trucks	23	Crusher 6000 Ton/Day 6" (Cone Crusher)	2
Service trucks (pick-ups)	27	45ft Van Trailer Generator	2
Skidsteer	5	Hot Box	4
Highway Tractor Truck	4	Frost Fighters	12
Low Boy Trailers	8	Drive on Compactor	8
Boom Truck	3	Walk Behind Compactor	4
80 Ton Mobile RT Crane	2	Plate Compactors	4
200 Ton Track Mount	2	Trash Pumps	8
Crane RT	1	Development Drills	4
Crawler Crane	1	Roll Off Truck	2
Vac Truck - Roll Off	2	Potable Water Tank	1
Potable Water Tanks	2	Water Truck	2
Raw Water Tanks	2	Snow Cat	2
Sewage Vac Tanks	4	Fuel and Lube Truck	4
Garbage Bins	25	Tractor Truck	2
Container Handler	2	Low Boy Float	2
Telehandler	4	Low Boy Drop Deck	2
Ambulance	2	Portable Concrete Batch Truck	2
Fire Truck	2	10 cu.yd Mixer Truck	6
Dewatering Pump	4	100ft Pump Trucks	2
Plow/Sand Truck	4	320000BTU Frost Fighter	20
Buses	8	8kW Light Towers	10
Manlift	6	20kW Whisper Watt Gen Set	7
Scissor Lifts	4	185cfm Air Compressor	2
Maintenance Truck c/w Pick	2	400 Amp Welding Machines	
Fuel Delivery Truck - B-Train	2	Portable Grout Plant (3 off Sea Cans)	
Camp Power-Genset(1250)	10	Ice Profiler	
Boiler Modules	1	4" Ice Auger	
Solution Modules	1	4 ton Propane Bullet c/w Refill Station	
Bob Cat	1	10,000 L Gasoline ISO Container	
Air Compressors	2	Rock Breaker	
Magazines	15	Spray Equipment	

3.2.3 Fuel Delivery

At least two bulk fuel deliveries will occur during the 2013 sealift. At the onset of the shipping season, arctic diesel will be delivered to fill the existing 5 ML storage tank and the newly constructed 5 ML steel tank located at the Milne tank farm. In addition, 1.5 ML of jet A fuel will also be included in the initial fuel delivery.

Throughout the summer months, construction will continue on two additional 10 ML steel tanks (within the confine of the tank farm secondary confinement) for the storage of diesel fuel.

Towards the end of the open water season, a second fuel delivery will occur to fill all tankage available at Milne Port. It is expected that this second fuel delivery will consist of 25 ML of arctic diesel and 1.5 ML of jet A fuel.

In addition to bulk fuel delivery, an estimated twelve 100,000L double wall isocontainer fuel storage tanks will be delivered to Milne Port. These isocontainers will provide the fuel storage at various quarry sites and construction sites for the execution of the 2013 Work Plan and the work scheduled for the Tote Road upgrade and bridge construction during the winter of 2014.

3.2.4 Material and Supplies

To the extent practicable, all materials and supplies required to execute the 2013 Work Plan and the work scheduled for January to June 2014 will be received during the 2013 sealifts. This includes:

- Delivery of ammonium nitrate (1.5 million kg);
- Delivery of pre-package explosives;
- Delivery of cement (12,000 tonnes);
- Delivery of construction material (generators, cabling, control centres, etc.);
- Delivery of consumables (lubricants, grease, detergents, dry goods, food, household supplies, etc.);
- Delivery of twelve 100,000L double wall isocontainers for fuel.

3.3 Construction Activities from July 1 to December 31, 2013

As mentioned in Section 2.1, Baffinland expects to be granted its Type A Water Licence by mid June 2013. As equipment and material is delivered by sealifts, additional construction activities will begin. These include:

3.3.1 Milne Port

During the sealift, most of the activities at Milne Port will focus on unloading the barges and positioning received equipment and material in designated laydown areas. In addition, the following construction activities will continue:

- Install emergency response building;
- Construct and commission two 10 ML diesel fuel steel tanks at the tank farm (construction completion before the end of sealift season);
- Construct and commission two additional 10 ML diesel fuel steel tanks at the tank farm;
- Install and commission fuel dispensing system for bulk fuel facility;
- Install and commission camp extension (100 person camp) including sewage treatment plant and incinerator;
- Install concrete batch;
- Construct landfarm;

- Ongoing decommission of the bladder farm;
- Install maintenance shops;
- Install trade shops;
- Install warming shed and parking garage;
- Install warehouses;
- Install administration buildings and field offices.

3.3.2 Tote Road

During the second half of 2013, all equipment, material, fuel, and supplies required for construction activities at Mary River will be transported from Milne Port to the Mine Site via the Tote Road.

The upgrade of the road will commence late in 2013 and is expected to take 8 to 10 months. In order to improve construction efficiency, contractors have expressed the need for establishing a temporary 49 person camp mid-way along the Tote Road.

Should this camp be required, it will be erected in the later part of 2013. Water required for the camp operation would be trucked to this camp from the Mine Site or Milne Port water supply (approved under Type A and current Type B). All sewage generated from this camp would be trucked to either the Mine Site or Milne Port sewage treatment plants. Finally, all waste generated at the camp would also be transported to either the Mine Site or to Milne Port for ultimate disposal. There will be no local discharge from this camp.

3.3.2 Mine Site

Construction activities at the Mine Site will begin shortly after the first sealift. The activities will consist of:

- Development of the quarry QM2 at Mine Site (submitted with FEIS). The expected volume of aggregate required at the Mine Site for the 2013 work is 200,000 m³;
- Complete construction camp pad and installation of the 400 person construction camp facility including sewage treatment plant, incinerator and treated sewage storage pond(s) and discharge pipeline to Mary River;
- Upgrade (extend) of the Mary River airstrip;
- Development of equipment laydown areas for Owner/Contractor;
- Development of parking area for mobile equipment. Mobile equipment fleet will include:
 - Flat bed trucks;
 - Boom trucks;
 - Fuel Tanker trucks;
 - Water tanker trucks;
 - Cranes;
 - Excavators;
 - Graders;

- Pick-up trucks;
- Erect/install:
 - Emergency response building;
 - Concrete batch plant;
 - Emulsion plant;
 - Maintenance shop (including truck wash facility);
 - Trade shops;
 - Warming shed and parking garage;
 - Warehouses;
 - Administration buildings and field offices.
- Construct fuel tank farm secondary containment structure;
- Install 4 x 500,000L double wall diesel fuel tank (tank complete with fuel dispenser);
- Install one 50,000L double wall jet A fuel tank;
- Transfer fuel from Milne Port tankfarm to newly install fuel tanks at the Mine Site;

4.0 Ongoing Exploration and Geotechnical Activities

It is anticipated that the 2013 field work program would include the following items:

- Potentially seasonal occupation of Steensby Inlet and Mid-Rail Camps;
- Fixed wing aircraft and helicopter to support general site activities including environmental monitoring and potentially additional exploration drilling and regional exploration;
- Geotechnical drilling and surveys at project development areas, as required to support Project design requirements:
 - The Tote Road alignment and bridge crossings, a portion of the drilling for bridge design being on ice as well as near water bodies;
 - Port site(s), with land based drilling as well as possible barge based and ice based drilling on the sea ice in Steensby Inlet;
 - Waste rock and ore disposal areas;
 - Milne Inlet Tote Road and bridge crossings, a portion of the drilling for bridge design being on ice as well as near water bodies;
 - Prospective quarry sites and borrow areas along the Tote Road.
- Continue archaeological surveys at project component areas as required.

5.0 Progressive Reclamation of the Exploration and Bulk Sample Project

There will be continued progressive reclamation of areas of current and past use in association with drilling, bulk sample, and historical exploration programs. In addition, progressive reclamation plans will include:

- Development of an action plan to address concerns from stakeholders about long term salt storage;

- The completion of a program to test and dispose of incinerator bottom ash and the development of a plan to management and dispose of ongoing generation of ash;
- Continuing with the ongoing decommissioning of the existing bladder farm at Milne Inlet and the transport of hydrocarbon impacted soils to the planned landfarm facility;
- Development and implementation of a long term multi-year plan to address localized areas of permafrost melting associated with current borrow areas, and taking into consideration the longer term plans for Tote Road upgrades and new quarry development;
- Continued progressive reclamation of areas of current and past use in association with drilling, bulk sample, and historical exploration programs;
- Demobilization of equipment and supplies not required for near term activities, as well as the current inventory of hazardous waste and other materials by means of sealift from Milne Port;
- Continued development of the Mine Site landfill and deposition of non-hazardous wastes in accordance with the landfill operations and maintenance manual; and,
- Discharge of treated sewage stored in PWSPs at Mary River Camp and Milne Inlet after treatment as required. Two periods of discharge are planned, the first corresponding to freshet (May-June), and the second later in the summer if required.

6.0 Workforce and Employment Opportunities

The site work program is expected to begin in April 2013. Until material and equipment are received by sealifts, to a large extent, development activities are limited by availability of equipment currently on site. The work force is expected to peak during the sealifts period. Current estimates of the work force are as follows:

- Milne Port:
 - Pre-sealift period: 70 person
 - Sealift period; 60 to 120 persons
 - Post sealift period: ramp up to 150 person (full camp capacity)
- Mine Site Construction personnel:
 - Pre-sealift period: 8 to 12 persons
 - Sealift period; ramp up to 250 persons
 - Post sealift period: ramp up to 180 person

The 2013 work program will offer employment opportunities for many residents of northern Baffin Island. Baffinland will endeavor to maximize Inuit employment throughout 2013. Baffinland's "Work Ready Program" along with site specific training will prepare potential Inuit employees for these job opportunities. Job advertisements for a number of positions are currently posted in all the North Baffin communities. In addition, Baffinland will provide guidance to all its Contractors for training requirements and Inuit employment in the contract documents.

7.0 Early Revenue Phase (ERP) Environmental Impact Assessment

As stated in correspondence to the NIRB on January 13, 2013, due to various business drivers, Baffinland proposes to make changes to the schedule and some activities in the initial stages of project development associated with the Mary River Project Proposal for which the NIRB recently issued Project Certificate No. 005 (the 'Project Certificate').

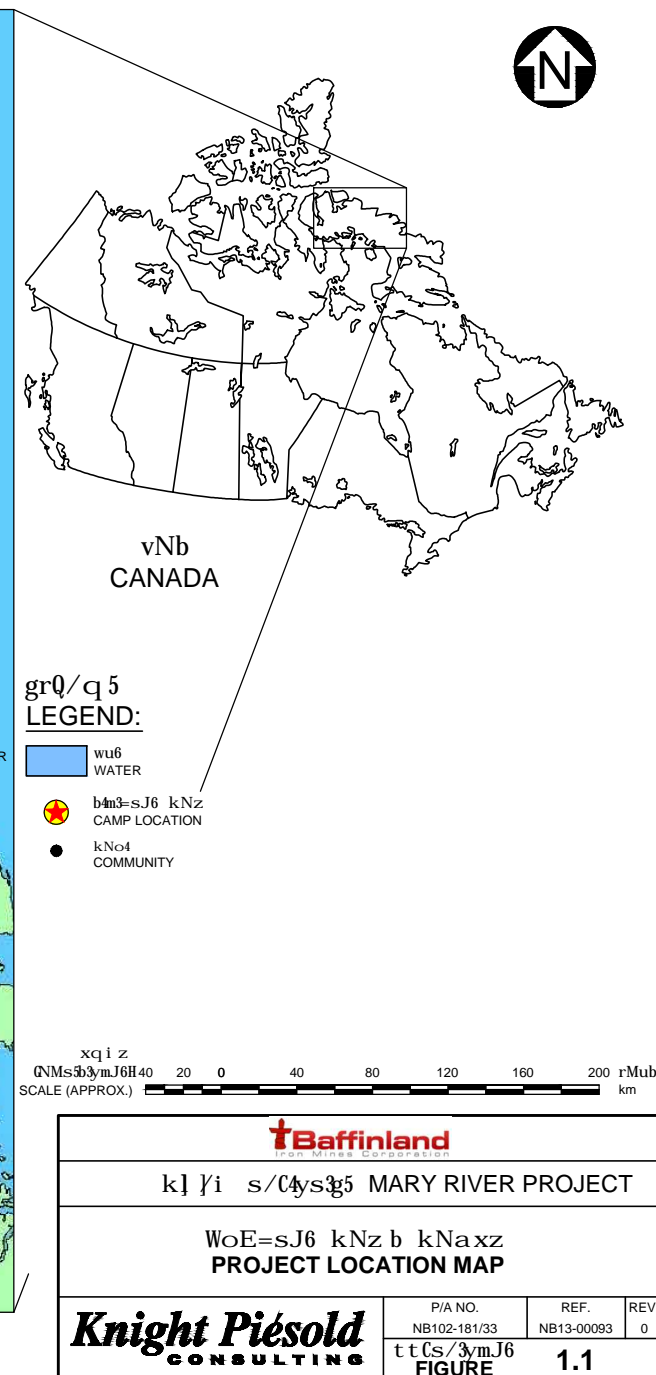
In its request to the NIRB, Baffinland indicated that although the Proponent remains committed in the long-term to developing the Project as authorized in the Project Certificate, in the short term Baffinland proposes to change some development activities and project timelines to accommodate a proposed "Early Revenue Phase" which would include development of a nominal 3.5 million tonnes per annum (Mt/a) road haulage operation from the Mary River mine site to a port facility at Milne Inlet for shipping of iron ore during the open water season. As noted by Baffinland, this development option was presented previously as a project alternative, and was included within the initial technical review of the Draft Environmental Impact Statement for the Mary River Project Proposal.

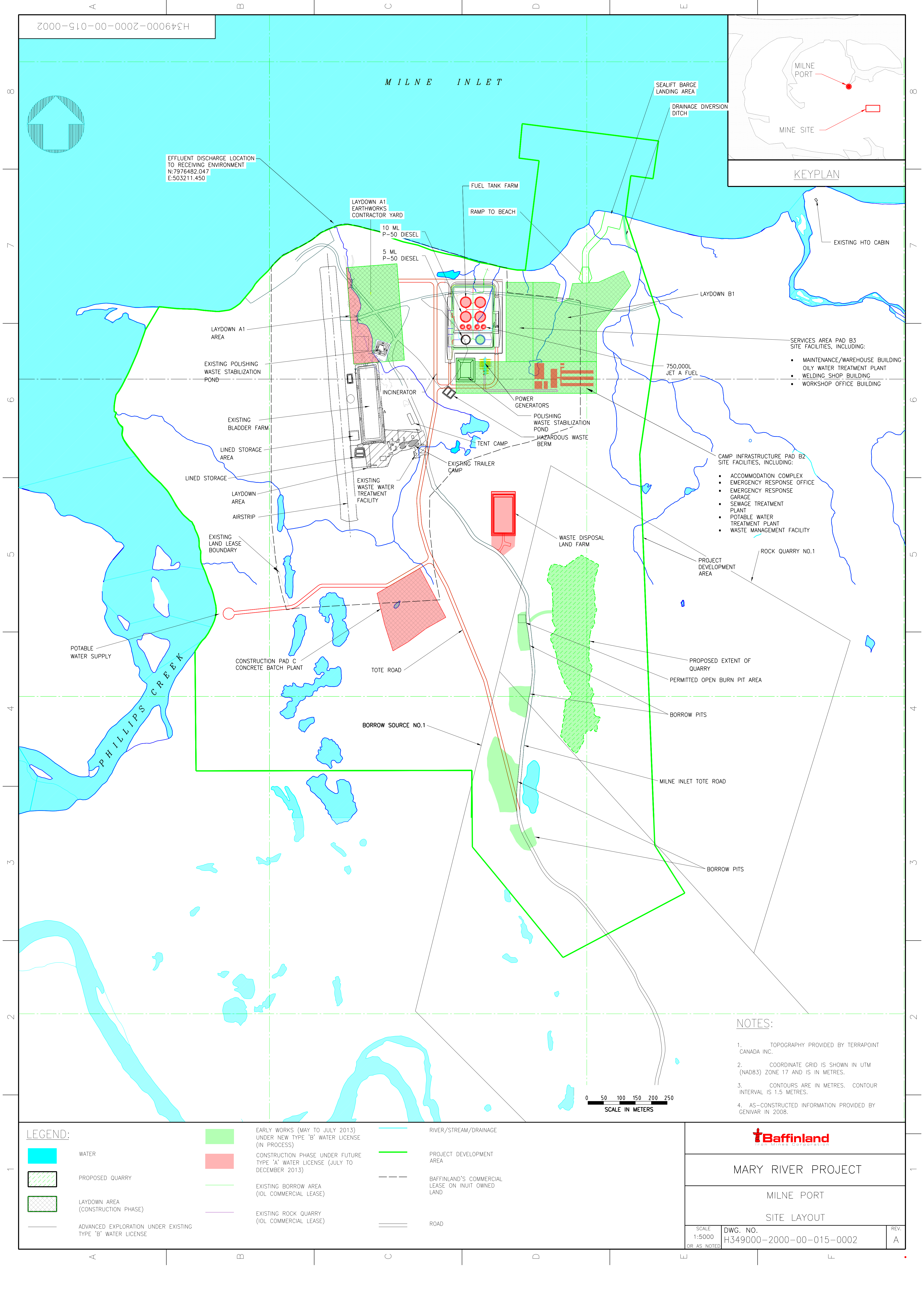
Baffinland recognizes that this Early Revenue Phase will require an amendment to the Project Certificate which in turn requires the submission and review of an Environmental Impact Assessment. In accordance to the directives issued by the NIRB, Baffinland expects to complete its Environmental Impact Assessment for the Early Revenue Phase (ERP) of the Project by June 2013. It is anticipated that this EIA will be submitted to the NIRB by June 30, 2013, and the proposal will be subjected to the NIRB review process which is expected to be completed by the first quarter of 2014.

Once a favorable decision is granted from the Minister of AANDC with respect to the ERP, and subject to obtaining any amendments (if any) which might be necessary to the Water Licence, Baffinland will proceed with the construction of facilities required for the completion of the ERP. This work will be included in the 2014 Work Plan, once the Project Certificate has been amended.

8.0 Potential 2014 Bulk Sampling Campaign

In addition to the scope of activities described herein, Baffinland is also considering the undertaking of a second "bulk ore sampling" campaign. This campaign would consist of mining up to 500,000 tonnes of ore for shipment to potential customers via Milne Port during the 2014 open water season. A feasibility study is in progress and a decision by Baffinland's Board of Directors on whether to proceed with this bulk sampling campaign is expected by the end of March 2013. Should the decision of the Board be favorable, an addendum to this 2013 Work Plan will be submitted in April 2013. This addendum will highlight additional activities that must be undertaken in 2013 in order to execute the 2014 bulk sampling campaign.





H349000-2000-00-015-0002

MILNE INLET

SEALIFT BARGE
LANDING AREA

DRAINAGE DIVERSION
DITCH

EFFLUENT DISCHARGE LOCATION
TO RECEIVING ENVIRONMENT
N:7976482.047
E:503211.450

LAYDOWN A1
EARTHWORKS
CONTRACTOR YARD

FUEL TANK FARM

RAMP TO BEACH

10 ML
P-50 DIESEL

5 ML
P-50 DIESEL

LAYDOWN A1
AREA

EXISTING POLISHING
WASTE STABILIZATION
POND

EXISTING BLADDER FARM

LINED STORAGE
AREA

LINED STORAGE

LAYDOWN
AREA

AIRSTRIIP

EXISTING
LAND LEASE
BOUNDARY

POTABLE
WATER SUPPLY

PHILLIPS CREEK

CONSTRUCTION PAD C
CONCRETE BATCH PLANT

TOTE ROAD

BORROW SOURCE NO.1

BORROW PITS

WASTE DISPOSAL
LAND FARM

PROPOSED EXTENT OF
QUARRY

PERMITTED OPEN BURN PIT AREA

BORROW PITS

MILNE INLET TOTE ROAD

BORROW PITS

LAYDOWN B1

750,000L
JET A FUEL

POWER GENERATORS

POLISHING WASTE STABILIZATION
POND

HAZARDOUS WASTE
BERM

TENT CAMP

EXISTING TRAILER
CAMP

EXISTING WASTE WATER
TREATMENT FACILITY

SERVICES AREA PAD B3
SITE FACILITIES, INCLUDING:

- MAINTENANCE/WAREHOUSE BUILDING
- OILY WATER TREATMENT PLANT
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING

CAMP INFRASTRUCTURE PAD B2
SITE FACILITIES, INCLUDING:

- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE
- EMERGENCY RESPONSE GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY

ROCK QUARRY NO.1

PROJECT DEVELOPMENT
AREA

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.

0 50 100 150 200 250
SCALE IN METERS

LEGEND:

- | | | | | | |
|--|---|--|--|--|---|
| | WATER | | EARLY WORKS (MAY TO JULY 2013)
UNDER NEW TYPE "B" WATER LICENSE
(IN PROCESS) | | RIVER/STREAM/DRAINAGE |
| | PROPOSED QUARRY | | CONSTRUCTION PHASE UNDER FUTURE
TYPE "A" WATER LICENSE (JULY TO
DECEMBER 2013) | | PROJECT DEVELOPMENT
AREA |
| | LAYDOWN AREA
(CONSTRUCTION PHASE) | | EXISTING BORROW AREA
(IOL COMMERCIAL LEASE) | | BAFFINLAND'S COMMERCIAL
LEASE ON INUIT OWNED
LAND |
| | ADVANCED EXPLORATION UNDER EXISTING
TYPE "B" WATER LICENSE | | EXISTING ROCK QUARRY
(IOL COMMERCIAL LEASE) | | ROAD |

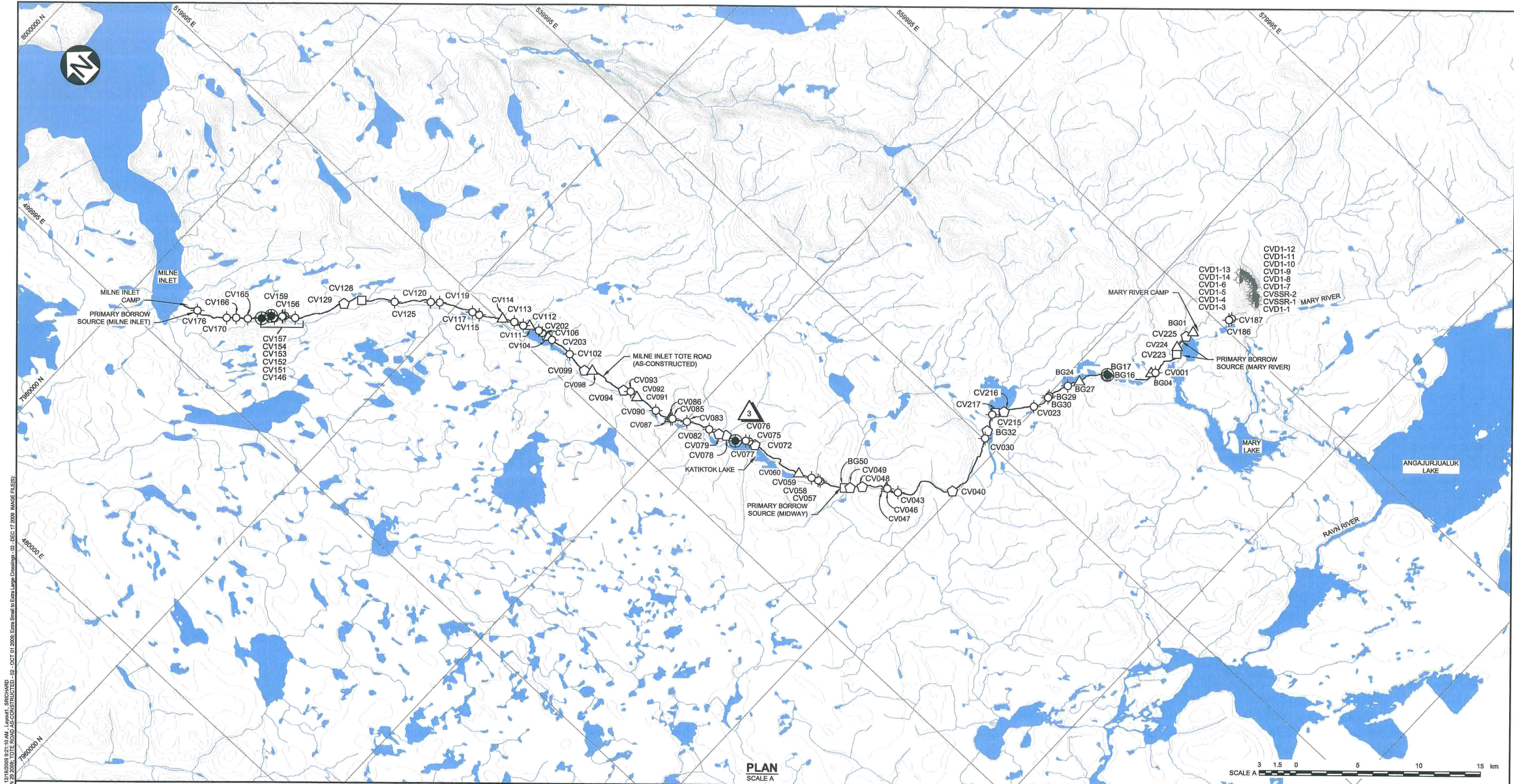


MARY RIVER PROJECT

MILNE PORT

SITE LAYOUT

SCALE 1:5000 OR AS NOTED	DWG. NO. H349000-2000-00-015-0002	REV. A
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XREF FILES: Base Map, Milne Inlet, TOTE ROAD AS-CONSTRUCTED - 01 - JAN 28 2008, TOTE ROAD AS-CONSTRUCTED - 02 - OCT 11 2008, Extra Small to Extra Large Crossings - 02 - DEC 17 2009, IMAGE FILE(S):

PLAN
SCALE A



- LEGEND:**
- WATER
 - MILNE INLET TOTE ROAD
 - AIRSTRIP
 - EXPLORATION CAMP LOCATION
 - CULVERT LOCATIONS
 - EXTRA SMALL CROSSING
 - SMALL CROSSING
 - MEDIUM CROSSING
 - LARGE CROSSING
 - EXTRA LARGE CROSSING

- NOTES:**
1. BASE MAP: © HER MAJESTY THE QUEEN IN RIGHT OF CANADA, DEPARTMENT OF NATURAL RESOURCES, (2004). ALL RIGHTS RESERVED.
 2. CONTOURS ARE IN METRES. CONTOUR INTERVAL VARIES.
 3. COORDINATE GRID IS SHOWN IN UTM (NAD 83) ZONE 17 AND IS IN METRES.
 4. MILNE INLET TOTE ROAD ALIGNMENT SURVEY PROVIDED BY GENIVAR (SURVEY COMPLETED IN JULY 2008).
 5. EXTRA SMALL CROSSINGS DISPLAYED ARE DFO CROSSINGS REGULATED.

3	DEC 18'09	NOTE 5 ADDED - DUPLICATE CV049 REMOVED	EV	SIR	AP	KE
2	DEC 19'08	UPDATED WITH AS-BUILT INFORMATION	CAP	MD/BSP	AP	KE
1	JUL 31'07	ISSUED FOR CONSTRUCTION	KH/BP	MD	AP	KE
0	JUL 13'07	ISSUED IN FINAL	KH/BP	MD	AP	KE
REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D

THIS DRAWING WAS PREPARED BY KNIGHT PIESOLD LTD. FOR THE ACCOUNT OF THE CLIENT LISTED ON THIS DRAWING. THE MATERIAL ON IT REFLECTS KNIGHT PIESOLD'S BEST JUDGEMENT IN THE LIGHT OF THE INFORMATION AVAILABLE TO IT AT THE TIME OF PREPARATION. ANY USE WHICH A THIRD PARTY MAKES OF THIS DRAWING OR ANY RELIANCE ON OR DECISIONS TO BE MADE BASED ON IT ARE THE RESPONSIBILITY OF SUCH THIRD PARTIES. KNIGHT PIESOLD ACCEPTS NO RESPONSIBILITY FOR DAMAGES, IF ANY, SUFFERED BY THE THIRD PARTY AS A RESULT OF DECISIONS MADE OR ACTIONS BASED ON THIS DRAWING. COPIES RESULTING FROM ELECTRONIC TRANSFER OR REPRODUCTION OF THIS DRAWING ARE UNCONTROLLED AND MAY NOT BE THE MOST RECENT REVISION OF THIS DRAWING.

Knight Piesold
CONSULTING

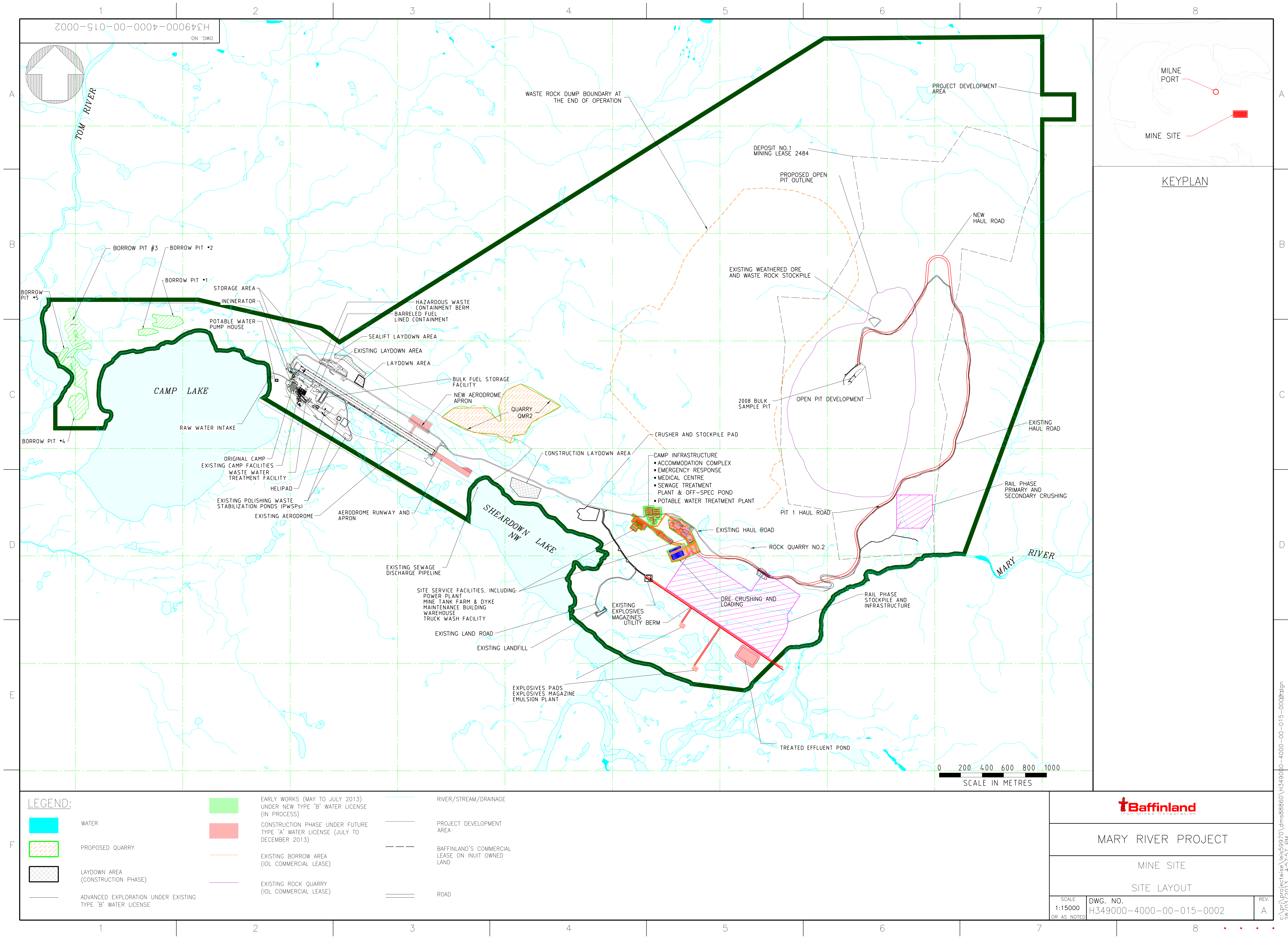
BAFFINLAND IRON MINES CORPORATION

MARY RIVER PROJECT - BULK SAMPLE PROGRAM

**DRAINAGE CROSSING LOCATIONS PLAN
(ALL CROSSINGS)**

P/A NO.	DRAWING NO.	REVISION
NB102-181/10	400	3

DRG. NO.	DESCRIPTION	REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REFERENCE DRAWINGS				REVISIONS				
				REVISIONS				



KEYPLAN

Baffinland
Iron Mines Corporation

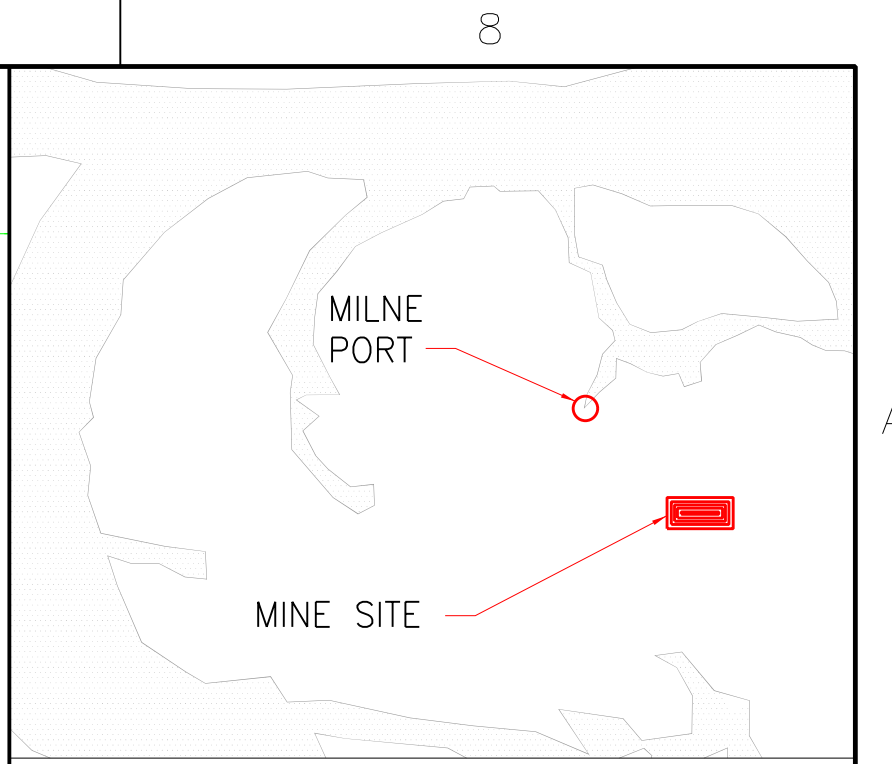
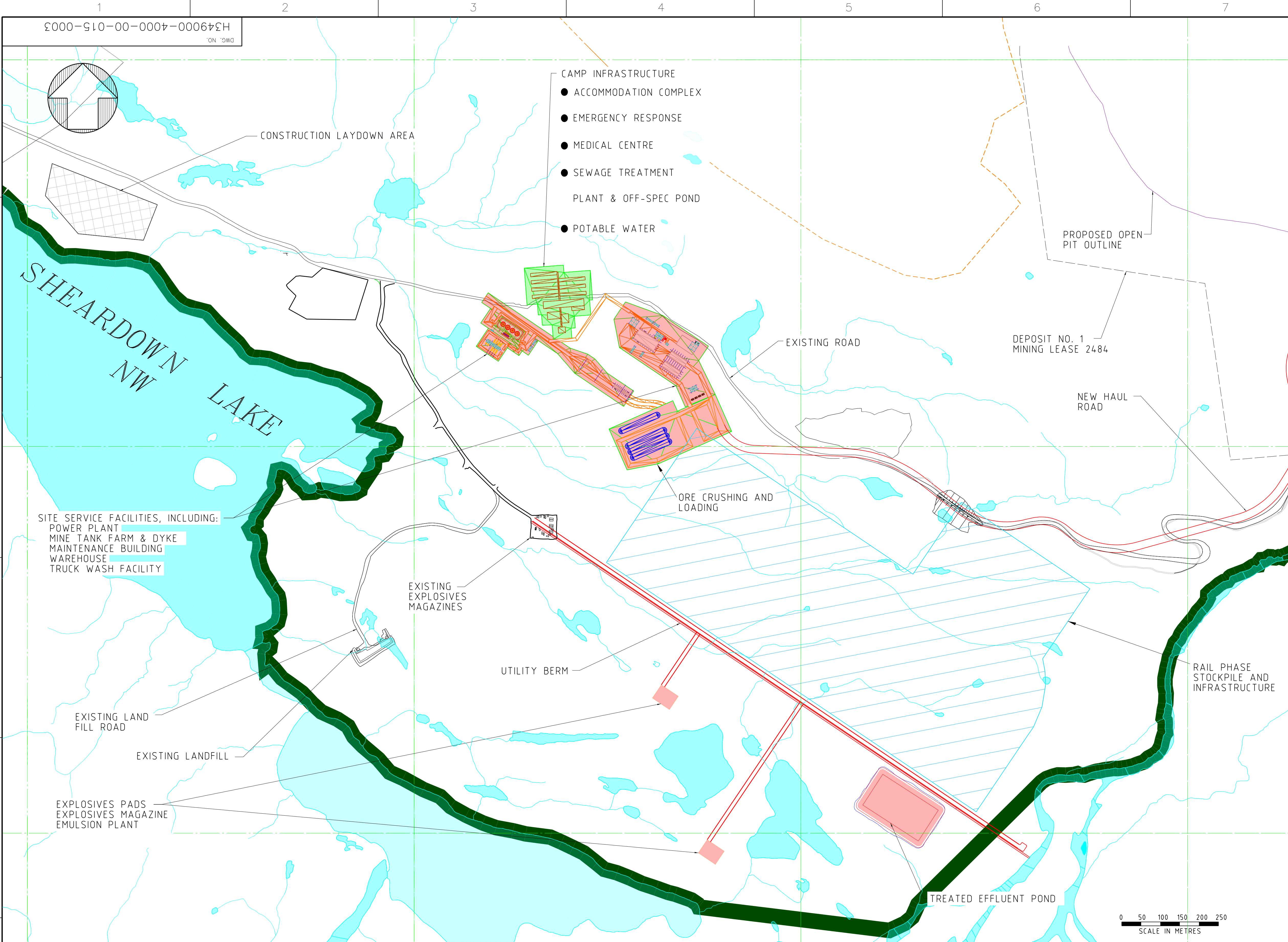
MARY RIVER PROJECT

MINE SITE

SITE LAYOUT

SCALE 1:15000 OR AS NOTED	DWG. NO. H349000-4000-00-015-0002	REV. A
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KEYPLAN

NOTES:

- 1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
- 2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
- 3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
- 4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.
- 5. FOR RAIL PHASE OVERALL GA SEE DWG. H340960-4000-00-014-0001

LEGEND:

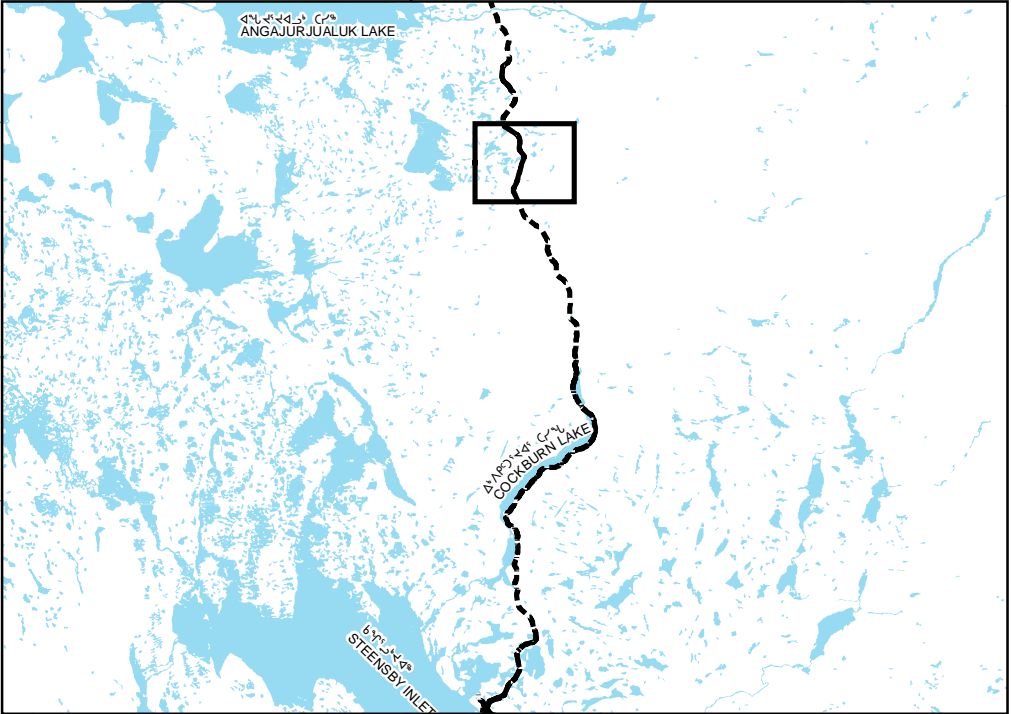
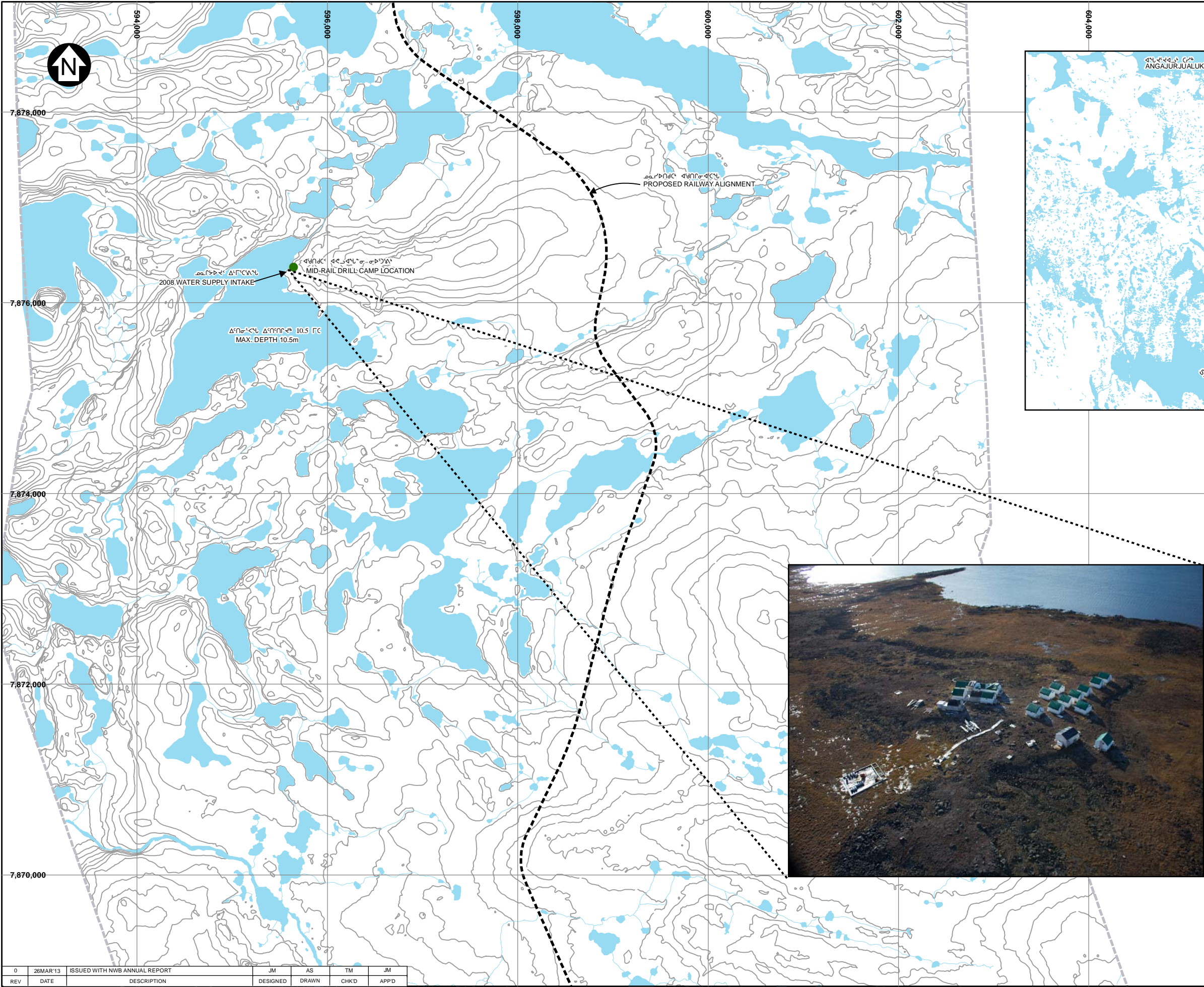
	WATER		EARLY WORKS (MAY TO JULY 2013) UNDER NEW TYPE 'B' WATER LICENSE (IN PROCESS)		RIVER/STREAM/DRAINAGE
	PROPOSED QUARRY		CONSTRUCTION PHASE UNDER FUTURE TYPE 'A' WATER LICENSE (JULY TO DECEMBER 2013)		PROJECT DEVELOPMENT AREA
	LAYDOWN AREA (CONSTRUCTION PHASE)		EXISTING BORROW AREA (IOL COMMERCIAL LEASE)		BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND
	ADVANCED EXPLORATION UNDER EXISTING TYPE 'B' WATER LICENSE		EXISTING ROCK QUARRY (IOL COMMERCIAL LEASE)		ROAD

MARY RIVER PROJECT

MINE SITE

ENHANCED LAYOUT

SCALE 1:5000 OR AS NOTED	DWG. NO. H349000-4000-00-015-0003	REV. A
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- ᐃᑭᑦᑲᑦ
- LEGEND:**
- ᐃᑭᑦ WATER
 - ᑭᑦᑲᑦ/ᐃᑭᑦᑲᑦ/ᐃᑭᑦᑲᑦ RIVER/STREAM/DRAINAGE
 - ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ PROPOSED RAIL ALIGNMENT
 - ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ EXISTING CAMP (CAMP NOT OCCUPIED DURING 2012)

- NOTES:**
- TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ EAGLE MAPPING (2005)
 - COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ UTM (NAD83) ZONE 17
 - CONTOUR INTERVAL IS IN METRES. CONTOUR INTERVAL IS 2.5 METRES.
ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ 2.5 ᑭᑦ
 - PROPOSED RAIL ALIGNMENT PROVIDED BY CANARAIL CONSULTANTS INC.
ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ CANARAIL CONSULTANTS INC



ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ MARY RIVER PROJECT

ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ EXISTING SITE LAYOUT AT MID RAIL CAMP

Knight Piésold CONSULTING	P/A NO. NB102-181/33	REF NO. NB13-00093
	ᐃᑭᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦᑲᑦ FIGURE 1.6	REV 0

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0	26MAR'13	ISSUED WITH NWB ANNUAL REPORT	JM	AS	TM	JM
REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D

Appendix C

Spill Response Supplies

C.1 TYPICAL SPILL RESPONSE KITS AT BAFFINLAND'S MARY RIVER PROJECT

Kit #1 twelve (12) kits
Kit #2 eight (8) kits
Kit #3 eight (8) kits
Kit #4 thirty-six (36) kits
Kit #5 sixteen (16) kits

Kit No./Details	Contents	Quantity
1 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
2 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
3 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

<p style="text-align: center;">4</p> <p style="text-align: center;">HEAVY DUTY DRUM KIT</p> <p>Absorbs up to 75 Gallons Heavy duty plastic Yellow Container Drum sizes include 65 & 94 US gallons or an economy 45 gallon steel drum</p>	<p>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</p>	<p>100 4 1 2 4 2 1 2</p>
<p style="text-align: center;">5</p> <p style="text-align: center;">EXTRA LARGE DRUM KIT</p> <p>Absorbs up to 120 Gallons Heavy duty plastic Yellow Container</p>	<p>Sorbent Pads (19" x 17" x 3/8") Sorbent Socks (4ft) Sorbent Socks (8ft) Sorbent Pillows (large) Sorbent Pillows (small) Plug Putty Drain Cover Disposal Bag (roll) Disposable Coveralls Barrier Tape (roll) Granular Absorbent (12.5kg)</p>	<p>300 8 8 12 8 2 7 1 2 1 1</p>

ADDITIONAL SPILL RESPONSE EQUIPMENT TO BE STORED IN 2 SEA-CAN CONTAINERS AT MILNE INLET FOR BAFFINLAND'S MARY RIVER PROJECT:

Description of additional equipment
<p>Oil containment boom, anchors and towing bridles (300 m) Multisorb granular absorbent (500 bags) Custom pump skid for emergency fuel transfers from one tank to another 2" x 25' transfer hose for emergency transfer pump (8 sections) 18" x 18" x 6" Arctic min berm for under fittings (12 units) 36" x 36" x 6" Arctic min berm for under fittings (12 units) Insta berm 10' x 10' x 15" Arctic (2 units) Oil sheets for replenishing spill kits (300 bags) Oil Skimmer Marine Near Shore Work Boat Spill response Hazardous Materials Trailer complete with spill equipment storage, pump and storage tank</p>

Appendix D:

Standard Forms for Emergency Response

NT-NU 24-HOUR SPILL REPORT LINE		TEL: (867) 920-8190 FAX: (867) 875-6004 EMAIL: spill@govt.nt.ca	
OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS			
REPORT LINE USE ONLY			
A	REPORT DATE: MONTH - DAY - YEAR	REPORT TIME	<input type="checkbox"/> ORIGINAL SPILL REPORT, OR <input type="checkbox"/> UPDATE # _____ TO THE ORIGINAL SPILL REPORT
B	OCCURRENCE DATE: MONTH - DAY - YEAR	OCCURRENCE TIME	REPORT NUMBER _____
C	LAND USE PERMIT NUMBER (IF APPLICABLE)	WATER LICENCE NUMBER (IF APPLICABLE)	
D	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION	REGION <input type="checkbox"/> NWT <input type="checkbox"/> NUNAVUT <input type="checkbox"/> ADJACENT JURISDICTION OR OCEAN	
E	LATITUDE DEGREES MINUTES SECONDS	LONGITUDE DEGREES MINUTES SECONDS	
F	RESPONSIBLE ENTITY OR VESSEL NAME	RESPONSIBLE ENTITY ADDRESS OR OFFICE LOCATION	
G	ANY CONTRACTOR INVOLVED	CONTRACTOR ADDRESS OR OFFICE LOCATION	
H	PRODUCT SPILLED	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
	SECOND PRODUCT SPILLED (IF APPLICABLE)	QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES	U.N. NUMBER
I	SPILL SOURCE	SPILL CAUSE	AREA OF CONTAMINATION IN SQUARE METRES
J	FACTORS AFFECTING SPILL OR RECOVERY	DESCRIBE ANY ASSISTANCE REQUIRED	HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT
K	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS		
L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER
M	ANY ALTERNATE CONTACT	POSITION	EMPLOYER
REPORT LINE USE ONLY			
N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	LOCATION CALLED YELLOWKNIFE, NT
LEAD AGENCY <input type="checkbox"/> EC <input type="checkbox"/> OCG <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> I.A. <input type="checkbox"/> INAC <input type="checkbox"/> NEB <input type="checkbox"/> T.C.		SIGNIFICANCE <input type="checkbox"/> MINOR <input type="checkbox"/> MAJOR <input type="checkbox"/> UNKNOWN	FILE STATUS <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSED
AGENCY	CONTACT NAME	CONTACT TIME	REMARKS
LEAD AGENCY			
FIRST SUPPORT AGENCY			
SECOND SUPPORT AGENCY			
THIRD SUPPORT AGENCY			

D.2 Muster Station Attendance Register

Date	
Muster Location:	
Muster Captain (printed):	
Muster Captain Signature:	

First Name	Last Name	Company	Employee No.	Time	Date	Signature

D.3 Mary River Project Emergency Response Communication Log

Date: _____

Name of Emergency Response Coordinator: _____ Name of Communication Logger: _____

Communication In				
Time	From	To	Description	Comments

Communication Out				
Time	From	To	Description	Comments

D.4 EMERGENCY CALL-IN REPORT for ER DISPATCHER

NAME AND CONTACT NUMBER:	COMPANY:
TYPE OF EMERGENCY: LEVEL: 1 2 3 TIME: _____ CHANGE IN LEVEL: 1 2 3 TIME: _____	MAN DOWN #OF CASUALTIES: _____ ENVIRONMENTAL SPILL FIRE OTHER
EXACT LOCATION OF EMERGENCY:	
ASSISTANCE REQUIRED:	
ADDITIONAL HAZARDS ERT NEED TO BE AWARE OF:	
LOCATION OF MEETING POINT WITH EMERGENCY TEAM FOR GUIDANCE TO EMERGENCY:	
Name of Emergency Response Dispatcher:	
Date:	
Time:	

Appendix E

Hazardous Materials List

E.1 List of MSDS of Hazardous Materials Used on site

- Agricultural Lime (4p.)
- Aluminum Sulphate (1p.)
- APS 703d#3 Flocc Log (2p.)
- APS 705 Silt Stop (2p.)
- APS 706b Flocc Log (2p.)
- Aviation Fuel (7p.)
- Calcium Chloride Flake (4p.)
- Cast Booster (3p.)
- CP-43 Diesel (6p.)
- Detonating Cord (3p.)
- DR-133 POLYMER (4p.)
- Electric Detonators (4p.)
- Emulsion Explosives – Dyno AP (3p.)
- EZ-MUD (6p.)
- Gasoline (6p.)
- Jet A (7p.)
- Lubtrac Rod Grease (4p.)
- Non-Electric Detonators (5p.)
- Packaged Dynamites and Explosive Gelatins (3p.)
- Packaged Emulsion Explosives (3p.)
- Potassium Chloride (Potash) (4p.)
- Shock Tube (3p.)
- Tellus T32 (4p.)
- W-OB POLYMER (4p.)

Environment Laboratory

- AmVer™ High Range Ammonia Test 'N Tube™ Reagent
- Ammonia Cyanurate Reagent
- Ammonia Salicylate Reagent
- COD TNTPlus™, LR (3-150 mg/L)
- Phosphate Acid Reagent Vials
- PhosVer® 3 Phosphate Reagent
- Potassium Persulfate
- Sodium Hydroxide Solution, 1.54 N

Appendix F

Material Safety Data Sheets



Material Safety Data Sheet

1. Identification of the Product and the Company

Product Name: APS 703d#3 Floc Log

Manufacturer: Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

Distributed by: Clear Flow Consulting, Inc.
#125, 65 Chippewa Road
Sherwood Park, AB T8A 6J7
Tel. 780-410-1403
Fax. 780-410-1406
www.clearflowconsulting.com

2. Composition / Information on Ingredients

Identification of the preparation: Anionic water-soluble co-polymer gel

3. Hazard Identification

Placement of these materials on wet walking surface will create extreme slipping hazard.

4. First Aid Measures

Inhalation: None.

Skin contact: Contact with wet skin could cause dryness and chapping, wash with water and soap. Use of gloves recommended.

Eye Contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. Fire-Fighting Measures

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire fighting precautions: Floc Logs that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. Accidental Release Measures

Personal precautions: No special precautions required.

Methods for cleaning up: Dry wipe as well as possible. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. Handling and Storage

Handling: Avoid contact with skin and eyes. Wash hands after handling.

Storage: Keep in a cool, dry place.

8. Exposure Controls / Personal Protection

Engineering Controls: Use dry handling areas only.

Personal Protection Equipment**Respiratory Protection:** none.**Hand Protection:** Dry Cloth, Leather, or Rubber Gloves.**Eye Protection:** Safety glasses with side shields. Do not wear contact lenses.**Skin Protection:** No special protective clothing required.**Hygiene Measures:** Wash hands before breaks and at end of workday.

9. Physical and Chemical Properties

Form: Granular semi-solid gel**Color:** White to Brown**Odor:** None**pH:** 3-10**Melting Point:** N/A**Flash Point:** N/A**Autoignition:** N/A

10. Stability and Reactivity

Stability: Product is stable, no hazardous polymerization will occur.**Materials to Avoid:** Oxidizing agents may cause exothermic reactions.**Hazardous Decomposition Products:** Thermal Decomposition may produce nitrogen oxides (NO_x), carbon oxides.

11. Toxicological / Ecological Information

Acute Toxicity (EPA-821-R-02-012)LC 50 (Survival) / *Ceriodaphnia dubia* / 48h / 673 ppmNOAEC (Survival) / *Ceriodaphnia dubia* / 48h / 420 ppmLC 50 / *Onchorhynchus mykiss* / 96h / 2928 ppm**Chronic Toxicity (EPA-821-R-02-013)**IC 25 (Survival) / *P. promelas* / 7 day / 77.8 ppm IC 25 (Survival) / *C. dubia* / 7 day / 78.7 ppmNOEC (Survival) / *P. promelas* / 7 day / 52.5 ppm NOEC (Survival) / *C. dubia* / 7 day / 52.7 ppmIC 25 (Growth) / *P. promelas* / 7 day / 50.1 ppm IC 25 (Reproduction) / *C. dubia* / 7 day / 66.8 ppmNOEC (Growth) / *P. promelas* / 7 day / 52.5 ppm NOEC (Reproduction) / *C. dubia* / 7 day / 52.5 ppm**Bioaccumulation:** The product is not expected to bioaccumulate.**Persistence / Degradability:** Not readily biodegradable: (~85% after 180 days)

12. Transport and Regulatory Information

Not regulated by DOT, RCRA status-Not a hazardous waste

NFPA and HMIS ratings:**NFPA:** Health: 3 Flammability: 0 Reactivity: 1**HMIS:** Health: 2 Flammability: 0 Reactivity: 1



Material Safety Data Sheet

1. Identification of the Product and the Company

Product Name: APS 705 Silt Stop

Manufacturer: Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

Distributed by: Clear Flow Consulting, Inc.
#125, 65 Chippewa Road
Sherwood Park, AB T8A 6J7
Tel. 780-410-1403
Fax. 780-410-1406
www.clearflowconsulting.com

2. Composition / Information on Ingredients

Identification of the preparation: Anionic water-soluble co-polymer.

3. Hazard Identification

Aqueous solutions or powders that become wet render surfaces extremely slippery.

4. First Aid Measures

Inhalation: Move to fresh air. Use dust mask when handling.

Skin contact: Contact with wet skin could cause dryness and chapping, wash with water and soap. In case of persistent skin irritation, consult a physician.

Eye Contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. Fire-Fighting Measures

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire fighting precautions: Aqueous solutions or powders that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. Accidental Release Measures

Personal precautions: No special precautions required.

Methods for cleaning up: Do Not flush with water. Clean up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. Handling and Storage

Handling: Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Use dust mask during handling. Wash hands after handling.

Storage: Keep in a cool, dry place. (0-30° C).

8. Exposure Controls / Personal Protection

Engineering Controls: Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dust.

Personal Protection Equipment

Respiratory Protection:	Dust safety masks are recommended where dusting may occur.
Hand Protection:	Dry cloth, leather or rubber Gloves.
Eye Protection:	Safety glasses with side shields or face masks. Do not wear contact lenses.
Skin Protection:	No special protective clothing required.
Hygiene Measures:	Wash hands before breaks and at end of workday.

9. Physical and Chemical Properties

Form:	Granular solid
Color:	White
Odor:	None
pH:	5-6
Melting Point:	N/A
Flash Point:	N/A
Autoignition:	N/A

10. Stability and Reactivity

Stability:	Product is stable, no hazardous polymerization will occur.
Materials to Avoid:	Oxidizing agents may cause exothermic reactions.
Hazardous Decomposition Products:	Thermal Decomposition may produce nitrogen oxides (NO _x), carbon oxides.

11. Toxicological / Ecological Information**Acute Toxicity:** (EPA/600/4-90/027F)

LD 50 / *Rattus norvegicus* / oral / >5000 mg/kg
 LC 50 / *Oncorhynchus mykiss* / 96h / 530 mg/L
 LC 50 / *Daphnia magna* / 48h / >420 mg/L
 EC 50 / *Selenastrum capricornutum* / 96h / >500 mg/L

Chronic Toxicity: (EPA/600/R-98/182)

IC 25 (Survival) / <i>P. promelas</i> / 7 day / 358 ppm	IC 25 (Survival) / <i>C. dubia</i> / 7 day / 157.5 ppm
NOEC (Survival) / <i>P. promelas</i> / 7 day / 840 ppm	NOEC (Survival) / <i>C. dubia</i> / 7 day / 105 ppm
IC 25 (Growth) / <i>P. promelas</i> / 7 day / 94 ppm	IC 25 (Reproduction) / <i>C. dubia</i> / 7 day / 27.7 ppm
NOEC (Growth) / <i>P. promelas</i> / 7 day / 105 ppm	NOEC (Reproduction) / <i>C. dubia</i> / 7 day / 26.25 ppm

Inhalation:	The product is not expected to be toxic by inhalation.
Dermal:	The result of testing on rabbits showed no toxicity even at high dose levels.
Bioaccumulation:	The product is not expected to bioaccumulate.
Persistence / Degradability:	Not readily biodegradable: (~40% after 28 days).
Chronic toxicity:	A 2 yr feeding study on rats did not reveal adverse health effects. A 1 yr feeding study on dogs did not reveal adverse health effects.

12. Transport and Regulatory Information

Not regulated by DOT, RCRA status-Not a hazardous waste

NFPA and HMIS ratings:

NFPA:	Health: 3	Flammability: 0	Reactivity: 1
HMIS:	Health: 2	Flammability: 0	Reactivity: 1



Material Safety Data Sheet

1. Identification of the Product and the Company

Product Name: APS 706b Flocc Log

Manufacturer: Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
Tel. 678-494-5998
Fax. 678-494-5298
www.siltstop.com

Distributed by: Clear Flow Consulting, Inc.
#125, 65 Chippewa Road
Sherwood Park, AB T8A 6J7
Tel. 780-410-1403
Fax. 780-410-1406
www.clearflowconsulting.com

2. Composition / Information on Ingredients

Identification of the preparation: Anionic water-soluble co-polymer gel mix.

3. Hazard Identification

Placement of these materials on wet walking surface will create extreme slipping hazard.

4. First Aid Measures

Inhalation: None.

Skin contact: Contact with wet skin causes dryness and chapping, wash with water and soap.

Eye Contact: Rinse thoroughly with plenty of water, also under the eyelids, seek medical attention in case of persistent irritation.

Ingestion: Consult a physician

5. Fire-Fighting Measures

Suitable extinguishing media: Water, water spray, foam, carbon dioxide, dry powder.

Special fire fighting precautions: Flocc Logs that become wet render surfaces extremely slippery.

Protective equipment for firefighters: No special equipment required.

6. Accidental Release Measures

Personal precautions: No special precautions required.

Methods for cleaning up: Dry wipe as well as possible. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. Handling and Storage

Handling: Avoid contact with skin and eyes. Wash hands after handling.

Storage: Keep in a cool, dry place.

8. Exposure Controls / Personal Protection

Engineering Controls: Use dry handling areas only.

Personal Protection Equipment

Respiratory Protection: none.

Hand Protection:	Dry Cloth, Leather, or Rubber Gloves.
Eye Protection:	Safety glasses with side shields. Do not wear contact lenses.
Skin Protection:	No special protective clothing required.
Hygiene Measures:	Wash hands before breaks and at end of workday.

9. Physical and Chemical Properties

Form:	Granular semi-solid gel
Color:	White to Brown
Odor:	None
pH:	3-10
Melting Point:	N/A
Flash Point:	N/A
Autoignition:	N/A

10. Stability and Reactivity

Stability:	Product is stable, no hazardous polymerization will occur.
Materials to Avoid:	Oxidizing agents may cause exothermic reactions.
Hazardous Decomposition Products:	Thermal Decomposition may produce nitrogen oxides (NO _x), carbon oxides.

11. Toxicological / Ecological Information

Acute Toxicity

LC 50 / *Daphnia magna* / 48h / >420 mg/L

LC 50 / *Oncorhynchus mykiss* / 96h / 637 mg/L

Chronic Toxicity

IC 25 (Survival) / *P. promelas* / 7 day / >1680 ppm

NOEC (Survival) / *P. promelas* / 7 day / 1680 ppm

IC 25 (Growth) / *P. promelas* / 7 day / >1680 ppm

NOEC (Growth) / *P. promelas* / 7 day / 1680 ppm

IC 25 (Survival) / *C. dubia* / 7 day / 257.3 ppm

NOEC (Survival) / *C. dubia* / 7 day / 210 ppm

IC 25 (Reproduction) / *C. dubia* / 7 day / 91.6 ppm

NOEC (Reproduction) / *C. dubia* / 7 day / 105 ppm

Bioaccumulation:	The product is not expected to bioaccumulate.
Persistence / Degradability:	Not readily biodegradable (~85% after 180 days)

12. Transport and Regulatory Information

Not regulated by DOT, RCRA status-Not a hazardous waste

NFPA and HMIS ratings:

NFPA:	Health: 1	Flammability: 0	Reactivity: 1
HMIS:	Health: 1	Flammability: 0	Reactivity: 1



Material Safety Data Sheet for Agricultural Lime

Section I - Identity

Manufacturer's name and address: Ash Grove Cement Company
P. O. Box 25900
Overland Park, KS 66225

Emergency Telephone Number: (913) 451-8900

Information Telephone Number: (913) 451-8900

Chemical Name and Synonyms: Agricultural Lime

Chemical Family: Primarily a mixture of calcium carbonate and calcium hydroxide and may contain a minor amount of calcium oxide.

Revision Date: January 2005

Section II - Hazardous Ingredients

	CAS Number	OSHA PEL	1994-1995 ACGIH TLV	MSHA Limit from 1973 TLV
Calcium carbonate, CaCO_3	1317-65-3	Total dust, 15 mg/m^3 Respirable fraction, 5 mg/m^3 **	10 mg/m^3 *	10 mg/m^3
Calcium hydroxide, $\text{Ca}(\text{OH})_2$	1305-62-0	5 mg/m^3	5 mg/m^3	N/A
Calcium oxide, CaO	1305-78-8	5 mg/m^3	2 mg/m^3	5 mg/m^3
*Particulate not otherwise classified containing no asbestos and less than 1% crystalline silica **Unless contains >1% crystalline silica (quartz)				

N/A = Not Applicable

Agricultural Lime can contain quartz >0.1%. The MSHA 1973 TLV/OSHA PEL for quartz is respirable dust only.

$\frac{10\text{mg}/\text{m}^3}{\% \text{SiO}_2+2}$

The 2000 ACGIH TLV for respirable quartz is 0.05 mg/m^3 .

ACGIH American Conference of Governmental Industrial Hygienists
OSHA Occupational Safety and Health Administration
PEL Permissible Exposure Limit
TLV Threshold Limit Value

Section III - Physical/Chemical Characteristics

Chemical Family:	Inorganic Base
Specific Gravity:	Approximate range 2.3 to 2.60
Vapor Pressure(mm Hg):	0
Vapor Density:	(Air=1) NA
Evaporation Rate:	NA
Solubility in Water:	0.0014% (25°C)
Appearance and Odor:	Soft white powder or granules; faint odor
Melting Point:	Calcium hydroxide-decomposes above 600°C Calcium carbonate-decomposes above 900°C

Section IV - Fire and Explosion Hazard Data

Flash Point (method used): NA; Agricultural Lime is non-combustible and not explosive.

Flammable or Explosive Limits: LEL: NA **UEL:** NA

Extinguishing Media: NA

Special Fire Fighting Procedures: Agricultural Lime is incombustible

Firefighting Media: Dry chemical, carbon dioxide, water spray or foam. For larger fires use water spray or fog.

CAUTION: Saturated water solutions of calcium hydroxide or calcium oxide can have pH of 12-12.49. See Section VI for appropriate precautions.

Unusual Fire and Explosion Hazards: None

Section V - Health Hazard Data

Agricultural Lime can contain quartz greater than 0.1%. Chronic long term exposure to respirable crystalline silica without the use of a proper respirator can cause silicosis. Silicosis may aggravate other chronic pulmonary conditions and may increase the risk of pulmonary tuberculosis infection.. Smoking aggravates the effects of silica exposure. NTP and IARC list respirable quartz crystalline silica as a carcinogen; OSHA does not.

Route(s) of Entry of calcium hydroxide, calcium oxide, and calcium carbonate: Inhalation; skin; eyes; ingestion

1. Inhalation: corrosive

- a. **Acute exposure:** Inhalation of low concentrations may cause sore throat, coughing, choking, dyspnea, and variable symptoms of headache, dizziness, and weakness. Intense exposures may result in tightness in the chest and delayed pulmonary edema. The solubility of the substance allows further penetration that may continue for several days.
- b. **Chronic exposure:** Bronchial irritation with chronic cough are common.

Section V - Health Hazard Data - (Continued)

- c. **First aid:** Remove from exposure; move to fresh air immediately. If breathing has stopped, give artificial respiration. Keep affected person warm and at rest. Get medical attention.
- 2. **Skin contact:** corrosive
 - a. **Acute exposure:** The substance can penetrate the skin slowly, producing soft, necrotic, deeply penetrating areas on contact. The solubility may allow further penetration that may continue for several days. The extent of damage depends on duration of contact.
 - b. **Chronic exposure:** A chronic dermatitis may follow repeated contact.
 - c. **First aid:** Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water until no evidence of chemical remains (approximately 15-20 minutes). In the case of chemical burns, cover the affected areas with sterile, dry dressing. Bandage securely, but not too tightly. Get medical attention.
- 3. **Eye contact:** corrosive
 - a. **Acute exposure:** Direct contact with the solid or aqueous solutions may cause conjunctival edema and corneal destruction; can lead to and may cause blindness.
 - b. **Chronic exposure:** Prolonged contact may cause conjunctivitis.
 - c. **First aid:** Wash eyes immediately with large amounts of water, occasionally lifting the upper and lower lids, until no evidence of chemical remains (approximately 15-20 minutes). Get medical attention immediately. Qualified medical personnel should perform administration of drugs to the eyes.
- 4. **Ingestion:** corrosive. If ingested, consult a physician immediately.

Quartz listed as an OSHA carcinogen: NO **By NTP:** YES **By IARC:** YES

Calcium carbonate, calcium oxide, calcium hydroxide listed as an OSHA carcinogen: NO **By NTP** NO
By IARC: NO

Medical conditions generally aggravated by exposure: Respiratory disorders or diseases, dermatitis or other skin disorders may be aggravated by exposure.

Section VI - Reactivity Data

Stability: Stable under normal temperatures and pressures. Calcium hydroxide and calcium oxide will gradually absorb carbon dioxide when exposed to air, forming calcium carbonate.

Incompatibility (Materials to avoid): maleic anhydride, nitroparaffins, nitromethane, nitroethane, and nitropropane; all can form explosive salts with calcium hydroxide.

Phosphorous, when boiled with alkaline hydroxides, yields mixed phosphines that may ignite spontaneously in air.

Hazardous Polymerization: Will not occur.

Water: Calcium hydroxide and calcium oxide form corrosive solutions with water; pH: 12-12.49.

Hazardous Decomposition or By-Products: When heated above 580°C, calcium hydroxide loses water to form calcium oxide, quicklime.

Conditions to Avoid: NA

Section VII - Precautions for Safe Handling and Use

Steps to be Taken in Case Material is Released or Spilled:

Pick up spilled powder; avoiding dusting conditions. Spills should not be flushed to surface waters or sewers. Dispose of in accordance with all applicable local, state and federal requirements.

Handling: Avoid generation of excessive dust.

Storing: Protect against physical damage and store in dry place away from water or moisture.

Section VIII - Control Measures

Respiratory Protection: Use NIOSH/MSHA-approved (under 30 CFR 11) or NIOSH-approved (under 42 CFR 84) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation. (Advisory: Respirators and filters purchased after July 10, 1998 must be certified under 42 CFR 84.)

Firefighting: Self-contained breathing apparatus with a full facepiece operated in pressure-demand or positive-pressure mode.

Ventilation: Enclose all dusty processes; use local exhaust ventilation. Use mechanical ventilation to vent dust to collector.

Protective Gloves: Gauntlet type work gloves.

Eye Protection: Tight fitting goggles.

Other Protective Equipment: To avoid contact with skin, use long sleeve shirt and long pants; can use protective cream on exposed skin areas.

Work/Hygienic Practices: Avoid skin contact with product. If skin contact has occurred promptly remove from skin with soap and water. Follow listed precautions as appropriate during the repair and/or maintenance of contaminated equipment.

This product neither contains nor is directly manufactured with any controlled ozone depleting substances, Class I and II.

MATERIAL SAFETY DATA SHEET

Revision #: 02

Section 1 - Product Identification & Use

Product Name: Aluminum Sulphate
 WHMIS Classification: Class D2B, Toxic Materials
 TDG Classification: Only regulated for TDG under class 9 if intended for disposal.
 Supplier: Advance Chemicals Ltd.
 2023 Kingsway Avenue
 Port Coquitlam, BC V3C 1S9
 Phone: (604) 945-9666
 Fax: (604)945-9617
 Emergency phone: CANUTEC 24 hrs. (613) 996-6666

Section 2 - Hazardous Ingredients

Hazardous Components	%(w/w)	C.A.S. No.	LD ₅₀ & LC ₅₀
Sulphuric acid, aluminum salt	60-100	10043-01-3	6207mg/kg, Oral(Mouse)

Section 3 - Physical Data

Physical state: Solid. Granules, or powder. Boiling point: 290°C
 Liquid density: 1.61 g/mL Freezing point: 86°C
 pH: >2.9 @ 5% Solubility in water: Yes
 Vapour pressure: N/A Evaporation rate: N/A
 Odour & Appearance: White to creamy white odourless solid.

Section 4 - Fire or Explosion Hazard

Flammability: The product is not considered to be flammable.
Extinguishing media: Use an extinguishing media for surrounding the fire, or all purpose foam by manufacturer's recommended techniques for large fires. Use water to cool fire exposed containers to prevent vapour build-up and rupture.
Hazardous Combustion Products: Wear self contained breathing apparatus. Product reacts with most metals to produce hydrogen gas, which may accumulate to produce explosive and/or flammable mixtures with air. Reacts violently with water with the evolution of heat.

Section 5 - Reactivity Data

Stability: Stable.
Incompatible substances: Strong bases. Strong oxidizing agents. Alkalis. Water-reactive materials such as oleum cause exothermic reactions.
Polymerization: Will not occur.
Conditions to Avoid: Temperatures over 760°C. Contact with water forms sulphuric acid. May corrode ferrous metals and mild steel in presence of moisture.
Hazardous Combustion Products: At temperatures above 760°C, sulfur oxide gases are released which are toxic, corrosive and are oxidizers. The remaining residue is caustic. The trioxide is also a fire hazard. Oxides of aluminum.

Section 6 - Toxicological Properties

Acute Toxicity: Aluminum Sulphate has been shown to cause liver, kidney and nervous system toxicity when tested on animals. Repeated ingestion may cause phosphate deficiency, which can weaken bones.
Skin contact: Burning, inflammation, blisters.
Eye contact: May irritate or burn eyes.
Inhalation: Dust or mist inhalation may irritate nose, throat and lungs.
Ingestion: May irritate the gastrointestinal tract and cause nausea, vomiting and purging. Acute exposure can cause incoordination, muscle spasms and kidney effects.

Section 7 - Preventative Measures

Personal Protective Equipment: Avoid contact with skin and eyes. Wear chemical protective gloves, goggles and face shield, rubber apron and boots. Eye wash fountains and safety shower facilities should be provided nearby for emergency use.
Respiratory protection: Use a NIOSH approved dust mask, for concentrations of up to 10 mg/m³. A NIOSH approved air-purifying respirator equipped with acid gas/fume, mist cartridges for concentrations up to 20 mg/m³. An air supplied respirator if concentrations are unknown.
Ventilation Requirements: This product should be used in a well ventilated area at all times.
Action to take for spills & leaks: Wear chemical protective clothing, rubber gloves and suitable respiratory protection. Small spills should be wiped up with absorbent material and disposed of in government approved waste containers. The spilled product can be neutralized with a soda ash or baking soda and wet down with a little water to form a slurry. The spill area may then be flushed with large quantities of water. Larger spills should be contained by diking with sand, soil or other absorbent, non-combustible material, then transferred into approved waste containers for proper disposal. Keep product out of sewers, storm drains, surface

run-off water and soil. Restrict access to non-protected personnel. Comply with all government regulations on spill reporting, handling and disposal of waste.

Disposal methods: Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, provincial and local regulatory agencies to ascertain proper disposal procedures.

Note: Empty containers can have residues, gasses and mists, and are subject to proper waste disposal as mentioned above.

Storage & Handling Precautions: Warning, harmful or fatal if swallowed. Causes eye, skin and respiratory irritation. Avoid contact with eyes and repeated contact with skin and clothing. Do not ingest. Keep away from sources of heat and open flame. Keep container tightly closed when not in use. Store upright in a cool, dry, well ventilated place away from incompatible materials. Do not use pressure to empty container. Wash thoroughly after handling. Use with adequate ventilation. Tanks must be grounded and ventilated. Ensure proper electrical grounding procedures are in place during product transfer.

Repair and Maintenance Precautions: Do not cut, grind, weld or drill in, on or near this container.

Section 8 - First Aid Measures

If inhaled: Remove victim to fresh air. Give artificial respiration if not breathing. Get immediate emergency medical attention.

In case of eye contact: Immediately flush eyes with clean water for at least twenty (20) minutes, lifting the upper and lower eye lids occasionally. Get immediate emergency medical attention. Do not transport victim until the recommended flushing period has been completed, unless eye flushing can be continued during transport to the nearest emergency medical treatment facility.

In case of skin contact: Immediately flush skin with plenty of clean running water for at least fifteen (15) minutes. Remove contaminated clothing and shoes. If irritation persists after washing, get immediate medical attention. Wash and launder clothes before re-use.

In case of ingestion or swallowing: If victim is conscious and not convulsing, give one or two glasses of water to dilute material. Immediately contact the local poison control centre. Vomiting should only be induced under the direction of a physician or poison control centre. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in the vomitus. Rinse mouth and administer more water. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS VICTIM. GET IMMEDIATE EMERGENCY MEDICAL ATTENTION.

Section 9 - Preparation Information

Advance Chemicals Limited expressly disclaims all expressed or implied warranties of merchantability and fitness for a particular purpose with respect to the product provided. The information contained herein is offered only as a guide to the handling of this specific product, and has been prepared in good faith by technically knowledgeable personnel. This M.S.D.S. is not intended to be all inclusive, and the manner and conditions of use may involve other and additional considerations.

Revised: 19 October 2006; 15 December 2006



Shell Canada Limited Material Safety Data Sheet

Effective Date: 2008-08-01

Supersedes: 2008-08-01



Class B2 Flammable Liquid



Class D2A Embryo/Fetotoxicity
Class D2B Skin Irritation

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: **SHELL AVGAS 100 LL**
SYNONYMS: AVIATION GASOLINE
May contain anti-icing additive (Diethylene Glycol Monomethyl Ether)
PRODUCT USE: Fuel
PRODUCT CODE: **101-200**

SUPPLIER

Shell Canada Limited (SCL)
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 1-613-996-6666
For general information: 1-800-661-1600
www.shell.ca

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	80 - 90	Yes
Toluene	108-88-3	8 - 10	Yes
i-Pentane	78-78-4	5 - 10	Yes
Ethanol, 2-(2-methoxyethoxy)-	111-77-3	0 - 0.15	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Volatile Liquid Blue Colour Clear Typical Gasoline Odour
Routes of Exposure: Exposure will most likely occur through skin contact or inhalation.
Hazards:

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

Flammable Liquid.
Irritating to skin.
May be absorbed by skin contact.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
At very high concentrations this product can have an anesthetic (drowsiness, weakness) and asphyxiant effect. In rare cases may sensitize heart muscle causing heart arrhythmia.

Handling: Eliminate all ignition sources.
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.
Avoid prolonged exposure to vapours.

For further information on health effects, see Section 11.

4. FIRST AID MEASURES

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 at least 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 symptoms such as loss of gag reflex, convulsions or unconsciousness occur before vomiting, gastric lavage with a cuffed endotracheal tube should be considered. If more than 2.0 mL/kg has been ingested, vomiting should be induced with supervision.

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

Firefighting Instructions: Flammable. Clear area of unprotected personnel. Do not use water except as a spray. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Avoid breathing vapours. 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. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.

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. Wear appropriate breathing apparatus (if applicable) and protective clothing. Handling equipment must be grounded. Work upwind of spill if it is safe to do so. Avoid direct contact with material. Stop leak only if safe to do so. Dike and contain land spills; contain spills to water by booming. Use water fog to knock down vapours; contain runoff. Adsorb residue or small spills with adsorbent material and remove to non-leaking containers for disposal. Notify appropriate environmental agency(ies). After area has been cleaned up to the satisfaction of regulatory authorities, flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations.

7. HANDLING AND STORAGE

- Handling:** Flammable. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Avoid breathing vapours and prolonged or repeated contact with skin. Vapours may accumulate and travel to distant ignition sources and flashback. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers. Provide adequate ventilation. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities. Launder contaminated clothing prior to reuse.
- Storage:** Store in a cool, dry, well ventilated area, away from heat and ignition sources. Use explosion-proof ventilation to prevent vapour accumulation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

The following information, while appropriate for this product, are 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 and provincial authorities for acceptable values.

Gasoline: 300 ppm (STEL: 500 ppm)

Pentane: 600 ppm

Toluene: 20 ppm

Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation:

Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. 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. Impervious gloves (viton, nitrile) should be worn at all times when handling this material. 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. 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 AND CHEMICAL PROPERTIES

Physical State:	Volatile Liquid
Appearance:	Blue Colour Clear
Odour:	Typical Gasoline Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Freeze Point < -58 °C
Boiling Point:	70 - 170 °C
Density:	Not available
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	38 - 49 kPa @ 38 °C
pH:	Not applicable
Flash Point:	TCC < 1 °C
Lower Flammable Limit:	1.4 % (vol.)
Upper Flammable Limit:	7.6 % (vol.)
Autoignition Temperature:	Not available
Viscosity:	Not available
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{OW}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	Toxicological Data
Naphtha (Petroleum), Light Alkylate	LC50 Inhalation Rat > 11000 mg/m ³ 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
i-Pentane	
Ethanol, 2-(2-methoxyethoxy)-	LD50 Oral Rat 4140 - 5180 mg/kg LD50 Dermal Rabbit > 2000 mg/kg

Routes of Exposure:	Exposure will most likely occur through skin contact or inhalation.
Formulation:	No data is specifically available for this product and therefore this toxicological information is based on testing completed with the ingredients.
Irritancy:	Based on the ingredients, this product is expected to be irritating to skin.
Acute Toxicity:	Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression. 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.
Feto/Teratogenicity:	A component of this product has shown adverse effects on the growth and development of the fetus in some animal studies.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

12. ECOLOGICAL INFORMATION

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

Biodegradability:	Readily biodegradable. Rapid volatilization.
Bioaccumulation:	Not likely to bioaccumulate.
Partition Coefficient (log K_{OW}):	Not available
Aquatic Toxicity:	Product is expected to be toxic to aquatic organisms.

Ingredient:	Toxicological Data
Naphtha (Petroleum), Light Alkylate	LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. EL50 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L.
Toluene	LL50 Rainbow Trout (96hr) 10 - 100 mg/L. EL50 Daphnia Magna (48hr) 10 - 100 mg/L. EL50 - growth rate Algae (72hr) 10 - 100 mg/L.
i-Pentane	
Ethanol, 2-(2-methoxyethoxy)-	

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 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. TRANSPORT INFORMATION

Canadian Road and Rail Shipping Classification:

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

15. REGULATORY INFORMATION

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

WHMIS Class:	Class B2 Flammable Liquid Class D2A Embryo/Fetotoxicity Class D2B Skin Irritation
DSL/NDL 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. Provincial criteria are likely and should be requested when notifying provincial authorities.

16. OTHER INFORMATION

LABEL STATEMENTS

Hazard Statement :	Flammable Liquid. Irritating to skin. May be absorbed by skin contact.
Handling Statement:	Eliminate all ignition sources. 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

First Aid Statement : residue or vapours. Keep away from sparks and open flames.
Avoid prolonged exposure to vapours.
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 3 Section 4 Section 5 Section 6 Section 7 Section 8 Section 9 Section 10 Section 11 Section 12 Section 15



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 - 2H ₂ O		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.	

C. HAZARDS (Cont.)

FLASH POINT: Not flammable	AUTO IGNITION TEMPERATURE NA	FLAMMABLE LIMITS IN AIR (% BY VOL.) LOWER - NA UPPER - NA
OPEN CUP <input type="checkbox"/> CLOSED CUP <input type="checkbox"/>		
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 unloading 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: LIQUID <input type="checkbox"/> SOLID <input checked="" type="checkbox"/> GAS <input type="checkbox"/> <input type="checkbox"/> _____		APPEARANCE AND COLOR: Small white flakes; odorless.	
BOILING POINT: Unknown °C MELTING POINT: 176 °C	SPECIFIC GRAVITY: (H ₂ O = 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) <input type="checkbox"/> (PSIG) <input type="checkbox"/> NA
EVAPORATION RATE: (Butyl acetate=1) <input type="checkbox"/> (Ether = 1.0) <input type="checkbox"/> NA	% VOLATILES BY VOLUME: (AT 20°C) NA		

G. REACTIVITY DATA

STABILITY: UNSTABLE <input type="checkbox"/> STABLE <input checked="" type="checkbox"/>	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 <input type="checkbox"/> WILL NOT OCCUR <input checked="" type="checkbox"/>	CONDITIONS TO AVOID: NA

H. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

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

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 <input type="checkbox"/> NO <input checked="" type="checkbox"/> 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 DISCARDED: 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, 60 th Edition, 1979-80, CRC Press, Inc., Boca Raton 33431. (c) Hawley, G.N., editor, Condensed Chemical Dictionary, 9 th Edition, 1977, Van Nostrand Reinhold, NYC. (d) Brethwick, L., Handbook of Reactive Chemical Hazards, 2 nd 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

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Material Safety Data Sheet

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FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666**MSDS # 1108****Date 08/05/08**

Supersedes

MSDS # 1108 01/23/06

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):DYNO[®] CORD SENSITIVE BOOSTERS - CS35, CS45, CS90, CS135TROJAN[®] SPARTAN[®]TROJAN[®] SPARTAN[®] SliderTROJAN[®] StingerTROJAN[®] NBTROJAN[®] NB UNIVERSALTROJAN[®] Twinplex**Product Class:** Cast Boosters**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

Ingredients:	CAS#	% (Range)	<u>Occupational Exposure Limits</u>	
			ACGIH TLV-TWA	OSHA PEL-TWA
Pentaerythritol Tetranitrate (PETN)	78-11-5	35-70	None Established	None Established
Trinitrotoluene	118-96-7	30-50	0.1 mg/m ³ (skin)	1.5 mg/m ³ (skin)
RDX	121-82-4	0-25	0.5 mg/m ³ (skin)	1.5 mg/m ³ (skin)
HMX	2691-41-0	0-5	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 de minimus 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.

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: 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.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>% By Weight</u>
None Applicable		

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MSDS Number: **C4730** * * * * *Effective Date: 09/16/09* * * * * *Supercedes: 08/02/07*

MSDS Material Safety Data Sheet	24 Hour Emergency Telephone: 908-859-2151 CHEMTREC: 1-800-424-9300
	National Response in Canada CANUTEC: 613-996-6666
From: Mallinckrodt Baker, Inc. 222 Red School Lane Phillipsburg, NJ 08865	Outside U.S. and Canada Chemtec: 703-527-3887
 Mallinckrodt CHEMICALS 	NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.
All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.	

CITRIC ACID

1. Product Identification

Synonyms: 2-Hydroxy-1,2,3-propanetricarboxylic acid, monohydrate

CAS No.: 77-92-9 (Anhydrous) 5949-29-1 (Monohydrate)

Molecular Weight: 210.14

Chemical Formula: H₃C₆H₅O₇.H₂O

Product Codes:

J.T. Baker: 0110, 0115, 0116, 0118, 0119, 0120

Mallinckrodt: 0616, 0627, 7788

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Citric Acid	77-92-9	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 1 - Slight

Reactivity Rating: 2 - Moderate

Contact Rating: 3 - Severe

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:

Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.

Ingestion:

Causes irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea. Extremely large oral dosages may produce gastrointestinal disturbances. Calcium deficiency in blood may result in severe cases of ingestion.

Skin Contact:

Causes irritation to skin. Symptoms include redness, itching, and pain.

Eye Contact:

Highly irritating; may also be abrasive.

Chronic Exposure:

Chronic or heavy acute ingestion may cause tooth enamel erosion.

Aggravation of Pre-existing Conditions:

No adverse health effects expected.

4. First Aid Measures

Inhalation:

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

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:

Autoignition temperature: 1011C (1852F)

As with most organic solids, fire is possible at elevated temperatures or by contact with an ignition source.

Explosion:

Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established.

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. **WARNING:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White granules.

Odor:

Odorless.

Solubility:

ca. 60 g/100 ml @ 20C (Anhydrous)

Density:

1.542

pH:

2.2 (0.1 N sol)

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

No information found.

Melting Point:

ca. 100C (ca. 212F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Metal nitrates (potentially explosive reaction), alkali carbonates and bicarbonates, potassium tartrate. Will corrode copper, zinc, aluminum and their alloys.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 3 gm/kg; irritation skin rabbit: 500 mg/24H mild; eye rabbit: 750 ug/24H severe.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	

Citric Acid (77-92-9)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia

Citric Acid (77-92-9)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.
Citric Acid (77-92-9)	Yes	Yes	No	Yes
-----\Federal, State & International Regulations - Part 1\-----				
Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Citric Acid (77-92-9)	No	No	No	No
-----\Federal, State & International Regulations - Part 2\-----				
Ingredient	-RCRA-		-TSCA-	
	CERCLA	261.33	8(d)	
Citric Acid (77-92-9)	No	No	No	

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 1 Reactivity: 0

Label Hazard Warning:

WARNING! CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes, skin and clothing.

Avoid breathing dust.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

**Avjet Holding Inc.**
Material Safety Data Sheet

Effective Date: 2009-12-09

Supersedes: 2009-09-02

Class B3 Combustible Class D2B Other Toxic
Liquid Effects - Skin Irritant**1. PRODUCT AND COMPANY IDENTIFICATION**

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

MANUFACTURER
Avjet Holding Inc.**TELEPHONE NUMBERS**
Avjet Emergency Number

1-866-472-0007

900, Lemire Boulevard
Drummondville, QC Canada
J2C 7W8For general information:
For MSDS information:(819) 479-1000
(819) 479-1000

This MSDS was prepared by the Toxicology and Product Stewardship Section of Avjet Holding Inc.

2. COMPOSITION/INFORMATION ON INGREDIENTS

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

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION**Physical Description:** Liquid Clear To Yellow Hydrocarbon Odour**Routes of Exposure:** Exposure will most likely occur through skin contact or inhalation.**Hazards:**

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

Combustible Liquid.

Irritating to skin.

Vapours are moderately irritating to the eyes.

Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.

Vapours are moderately irritating to the respiratory passages.

Handling: Eliminate all ignition sources.

Avoid prolonged exposure to vapours.

Wear suitable gloves and eye protection.

Bond and ground transfer containers and equipment to avoid static accumulation.

Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

For further information on health effects, see Section 11.

4. FIRST AID

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

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

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

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

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

5. FIRE FIGHTING MEASURES

Extinguishing Media: Dry Chemical
Carbon Dioxide
Foam
Water Fog

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

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

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

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

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

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

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

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

Diesel fuel, as total hydrocarbons: 100 mg/m³

Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

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

PERSONAL PROTECTIVE EQUIPMENT:

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

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

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

9. PHYSICAL DATA

Physical State:	Liquid
Appearance:	Clear To Yellow
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	Cloud Point-43 °C
Boiling Point:	150 - 330 °C
Density:	< 850 kg/m ³ @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	Not available
pH:	Not available
Flash Point:	Pensky-Martens CC > 40 °C
Lower Explosion Limit:	1 % (vol.)
Upper Explosion Limit:	6 % (vol.)
Autoignition Temperature:	250 °C
Viscosity:	1.3 - 2.1 cSt @ 40 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	Not available
Water Solubility:	Insoluble
Other Solvents:	Hydrocarbon Solvents

10. STABILITY AND REACTIVITY

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

Hazardous Decomposition**Products:****Incompatible Materials:****Conditions of Reactivity:**

Thermal decomposition products are highly dependent on combustion conditions.

Avoid strong oxidizing agents.

Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified) Toxicological Data

Fuels, Diesel, No. 2

LD50 Dermal Rabbit > 5000 mg/kg

LD50 Oral Rat = 9000 mg/kg

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

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

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

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

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

Carcinogenicity and Mutagenicity: The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk. The American Conference of Governmental Industrial Hygienists (ACGIH) has classified this product as A3 - confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

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

Biodegradability: Not readily biodegradable.

Bioaccumulation: Potential for bioaccumulation.

Partition Coefficient (log K_{OW}): Not available

Aquatic Toxicity

May be harmful to aquatic life.

Ingredient: Toxicological Data

Fuels, Diesel, No. 2 EL50 - growth rate Algae (72hr) 10 - 100 mg/L.

EL50 Daphnia Magna (48hr) 10 - 100 mg/L.

LL50 (WAF method) Rainbow Trout (96hr) 10 - 100 mg/L.

Definition(s): LL and EL are the lethal loading concentration and effective loading concentration respectively. The concentration represents the amount of substance added to the system to obtain a toxic concentration. They replace the traditional LC and EC for low solubility substances.

WAF is the water accommodated fraction. A slightly soluble hydrocarbon is stirred into water and the insoluble portions are removed. The remaining solution is the water accommodated fraction.

13. DISPOSAL CONSIDERATIONS

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

14. TRANSPORTATION INFORMATION

Canadian Road and Rail Shipping Classification:

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

15. REGULATORY INFORMATION

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

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

16. ADDITIONAL INFORMATION

LABEL STATEMENTS

Hazard Statement : Combustible Liquid.
Irritating to skin.

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

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

Revisions: This MSDS has been reviewed and updated.
Changes have been made to:
Section 1
Section 3
Section 5
Section 8
Section 9
Section 12

Material Safety Data Sheet

Dyno Nobel Inc.

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Salt Lake City, Utah 84119

Phone: 801-364-4800 Fax: 801-321-6703

E-Mail: dnnn.hse@am.dynonobel.com**FOR 24 HOUR EMERGENCY, CALL** CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666**MSDS # 1126****Date 08/13/08**

Supersedes

MSDS # 1126 01/24/05

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: UN0065 Cord, Detonating 1.1D II

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

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	%	<u>Occupational Exposure Limits</u>	
			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/m³; respirable fraction, 5 mg/m³.

² Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m³; respirable part., 3 mg/m³.

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 de minimus 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

Percent Volatile by Volume: Not Applicable

Vapor Density: (Air = 1) Not Applicable

Solubility in Water: Insoluble.

Material Safety Data Sheet

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

Material Safety Data Sheet

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.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>% By Weight</u>
None		

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MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.** DATE: Jan. 3, 2006
8750 – 53rd Ave. PHONE: 604-940-6050
Edmonton, AB T6E 5G2 FAX: 604-940-6080

PRODUCT NAME: **DR-133 POLYMER**

PRODUCT USE: Drilling mud additive.
CHEMICAL FAMILY: Anionic polyacrylamides in oil-water emulsion CAS#: Mixture

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: B3; D2B
WORKPLACE HAZARD: Combustible liquid; skin and eye irritant

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated under TDG
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

<u>INGREDIENT</u>	<u>% (v/v)</u>	<u>CAS NUMBER</u>	<u>LD₅₀ Oral-Rat</u>	<u>LC₅₀ Inhal-Rat</u>	<u>ACGIH-TLV</u>
Mineral spirits	30-60	64742-47-8	>5000 mg/kg	Not available	Not established
Alkylphenol ethoxylate	3-7	68412-54-4	3000 mg/kg	Not available	Not established
Ethoxylated C ₁₂₋₁₅ alcohol	0.5-1.5	68131-39-5	>3200 mg/kg	Not available	Not established

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: [XX]EYE CONTACT [XX]SKIN []INHALATION [XX]INGESTION
EYE CONTACT: Severe irritant. Can cause redness, tissue destruction, and irritation.
SKIN CONTACT: Irritant. Low acute dermal toxicity. Can cause redness, inflammation and irritation on prolonged contact.
INGESTION: Low acute oral toxicity. May cause nausea, diarrhea and abdominal cramps.
INHALATION: Not a likely source of exposure.

Diversity Technologies Corp. is the parent company of
Canamara-United Supply, Hollimex Products, The Drilling Depot and
Westcoast Drilling Supplies

CARCINOGENICITY: No information available.
TERATOGENICITY: No information available.
REPRODUCTIVE
TOXICITY: No information available.
MUTAGENICITY: No information available.
SYNERGISTIC
PRODUCTS: No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT: Wash thoroughly with soap and water. If irritation develops or persists, obtain medical attention. Wash contaminated clothing prior to re-use.
EYE CONTACT: Flush with gently flowing warm water for 15 minutes or until irritation subsides. Obtain medical attention when flushing period is complete.
INGESTION: Do not induce vomiting. Give 1-2 glasses of water. Obtain immediate medical attention. Do not give anything by mouth if patient is unconscious, rapidly losing consciousness or convulsing.
INHALATION: Move to fresh air. Apply oxygen or artificial respiration as required. If breathing difficulties or distress continues obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR: Liquid emulsion; petroleum odour
SPECIFIC GRAVITY: Not available
BOILING POINT (°C): Not available
MELTING POINT (°C): Not available
SOLUBILITY IN WATER: Forms gel pH: 7-9 (@ 0.6%)
PERCENT VOLATILE BY VOLUME: Not available
EVAPORATION RATE: Not available
VAPOUR PRESSURE (mmHg): Not available
VAPOUR DENSITY (air = 1): Not available
BULK DENSITY: Not applicable

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: 65°C (TCC)
FLAMMABLE LIMITS: Not applicable
EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, foam, in preference to a water spray.
SPECIAL FIRE FIGHTING
PROCEDURES: Self contained breathing apparatus required for fire fighting personnel. Move containers from fire area, or cool with water spray, if possible.

**UNUSUAL FIRE AND
EXPLOSION HAZARDS:**

Vapours may travel to ignition source and flash back.

SECTION VII: REACTIVITY DATA

STABILITY:	STABLE [XX]	UNSTABLE []
INCOMPATIBILITY (CONDITIONS TO AVOID):	Avoid contact with strong oxidizers and strong reducing agents. Avoid ignition sources.	
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxides of carbon and nitrogen upon combustion	
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX]	MAY OCCUR []

SECTION VIII: PREVENTATIVE MEASURES**SPECIAL PROTECTION INFORMATION**

RESPIRATORY PROTECTION:	Use approved respirators with organic vapour cartridges if TLV is exceeded.
VENTILATION:	Use in well-ventilated area, or use local exhaust ventilation, process enclosure or other engineering controls to maintain vapour/mist level below TLV.
PROTECTIVE GLOVES:	Neoprene or viton recommended.
EYE PROTECTION:	Wear chemical goggles when handling.
OTHER PROTECTIVE EQUIPMENT (Specify):	As necessary to prevent contact. Ensure eyewash station and emergency shower are available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid all contact with material. Remove contaminated clothing; launder or dry-clean before re-use. Cleanse skin thoroughly after contact, before breaks and meals and at end of work period. Product is readily removed from skin by washing thoroughly with soap and water. Store in a cool, dry location away from incompatibles. Store in original container. Empty packages contain residual hazardous material; handle and store as if full.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Use appropriate safety equipment. Eliminate ignition sources. Stop leak if possible to do so without risk. Dike spill to prevent spread. Use vacuum to pick up large spills. Soak up residual and small spills with absorbent materials. Collect uncontaminated material for repackaging. Collect contaminated material and absorbents in appropriate container for disposal.

WASTE DISPOSAL METHOD

Dispose in accordance with federal, provincial and local regulations. It is the responsibility of the end-user to determine if material meets the criteria of hazardous waste at the time of disposal.

SECTION IX: PREPARATION

THE INFORMATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH,
BUT NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE.

DATE ISSUED:	January 3, 2006	BY:	Product safety committee
SUPERSEDES:	March 31, 2003	PHONE:	780-440-4923

Material Safety Data Sheet

Dyno Nobel Inc.

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CANUTEC (CANADA) 613-996-6666**MSDS # 1076****Date 08/13/08**

Supersedes

MSDS # 1076 10/25/07

SECTION I - PRODUCT IDENTIFICATION

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

Product Class: Detonators, Electric

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

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

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

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	EXPOSURE LIMITS	
		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)	0.01 mg (Cr)/m ³
Lead Compounds	-----	0.5 mg (Ba)/m ³ 0.5 mg (Pb)/m ³	0.5 mg (Ba)/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/m³; respirable fraction, 5 mg/m³.

² Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m³; respirable part., 3 mg/m³.

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.

Material Safety Data Sheet

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 de minimus 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

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.

Flammable Limits: Not Applicable

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

Material Safety Data Sheet

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, repack 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.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>Max. lbs/1000 units</u>
Lead	7439-92-1	0.016
(Use Toxic Chemical Category Code)		
Barium Compounds	N040	0.093*
Chromium Compounds	N090	0.093*
Lead Compounds	N420	0.091

Amount of Lead in Detonator Product Line *		
Product	lb Pb compounds per 1000 detonators	lb Pb per 1000 detonators
Electric Super SP	0.0908	0.0000
Electric Super LP	0.0908	0.0000
Electric Super Coal	0.0908	0.0000
Electric Instant	0.0908	0.0000
Electric Super Seismic	0.0000	0.0000
Electric Super DiPED	0.0000	0.0157

* No barium or chromium compounds are present in the Electric Super Instant, Seismic or DiPED detonators. The exact quantity and weight percent of Section 313 Chemicals in each delay period and wire length for each product is available upon request.

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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 # 1030****Date 09/05/07**

Supersedes

MSDS # 1030 03/27/07

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

DYNO® AP	POWERMITE®
DYNO® AP PLUS	POWERMITE® AP
DYNO® AP PLUS LD	POWERMITE® Canadian
DYNO® E5	POWERMITE® LD
DYNO® MC	POWERMITE® LD PLUS
DYNO® MC PLUS	POWERMITE® PLUS
DYNO® SL	POWERMITE® RAISE BOMB™
DYNO® SL PLUS	POWERMITE® SL
DYNO® TX	POWERMITE® SL PLUS
DYNO® XTRA	
DYNOSPLIT® AP	

Product Class: Emulsion Explosives, Packaged**Product Appearance & Odor:** White or pink opaque semi-solid, which will appear gray if product contains aluminum.
Little or no odor. Typically paper or plastic chub packaging.**DOT Hazard Shipping Description:** Explosive, Blasting, Type E 1.1D UN0241 II**NFPA Hazard Classification:** Not Available (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

<u>Ingredients:</u>	<u>CAS#</u>	<u>% (Range)</u>	<u>Occupational Exposure Limits</u>	
			<u>ACGIH TLV-TWA</u>	<u>OSHA PEL-TWA</u>
Ammonium Nitrate	6484-52-2	60-80	None	None
Sodium Nitrate	7631-99-4	10-18	None	None
Aluminum	7429-90-5	0-15	10 mg/m ³ (dust)	15 mg/m ³ (total)
Mineral Oil	64742-35-4	0-3	5 mg/m ³ (mist)	None

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 de minimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

Material Safety Data Sheet

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable

Vapor Pressure: Not Applicable

Vapor Density: (Air = 1) Not Applicable

Density: 0.95-1.25 g/cc

Percent Volatile by Volume: <20 (water)

Solubility in Water: Product partially dissolves very slowly in water.

Evaporation Rate (Butyl Acetate = 1): <1

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: None known.

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: 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 quantity.

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.

Disclaimer

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MATERIAL SAFETY DATA SHEET

Product Trade Name: **EZ-MUD®**

Revision Date: 02-Jan-2007

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: (281) 575-5000

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

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200Min: > 200
Flash Point/Range (C):	Not DeterminedMin: > 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

9. PHYSICAL AND CHEMICAL PROPERTIES

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 (centistokes):	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 Follow all applicable 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.

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



Shell Canada Limited Material Safety Data Sheet

Effective Date: 2007-05-25

Supersedes: 2005-07-29



Class B2 Flammable Liquid

Class D2A Carcinogenicity

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: **REGULAR UNLEADED GASOLINE MARKED**

SYNONYMS: Automotive Fuel
Petrol

PRODUCT USE: Fuel

PRODUCT CODE: **215-002**

SUPPLIER

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

TELEPHONE NUMBERS

Shell Emergency Number

CANUTEC 24 HOUR EMERGENCY NUMBER

For general information:

1-800-661-7378

1-613-996-6666

1-800-661-1600

www.shell.ca

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

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

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	CAS Number	% Range	WHMIS Controlled
Gasoline	86290-81-5	> 90	Yes
Benzene	71-43-2	< 1.5	Yes

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Volatile Liquid Dyed for tax purposes Typical Gasoline Odour

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

Hazards:

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

Flammable Liquid.

Contains Benzene.

May cause cancer.

Handling: 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.
In rare cases may sensitize heart muscle causing heart arrhythmia.
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 MEASURES

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

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. Work upwind of spill if it is safe to do so. 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 spills to water by booming. Use water fog to knock down vapours; contain runoff. Adsorb residue or small spills with adsorbent material and remove to non-leaking containers for disposal. Notify appropriate environmental agency(ies). After area has been cleaned up to the satisfaction of regulatory authorities, flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations.

7. HANDLING AND STORAGE

- Handling:** Flammable. Fixed equipment as well as transfer containers and equipment should be grounded to prevent accumulation of static charge. Vapours may accumulate and travel to distant ignition sources and flashback. Avoid breathing vapours and prolonged or repeated contact with skin. Empty containers are hazardous, may contain flammable/explosive dusts, residues or vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers. Provide adequate ventilation. Launder contaminated clothing prior to reuse. Wash with soap and water prior to eating, drinking, smoking, applying cosmetics or using toilet facilities.
- Storage:** Store in a cool, dry, well ventilated area, away from heat and ignition sources. Use explosion-proof ventilation to prevent vapour accumulation.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

The following information, while appropriate for this product, are 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: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

- Mechanical Ventilation:** Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. 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.

**Respiratory
Protection:**

Safety showers should be available for emergency use.

Avoid breathing vapour or mists. If exposure has the potential to exceed occupational exposure limits, use an appropriate NIOSH-approved 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 AND CHEMICAL PROPERTIES

Physical State:	Volatile Liquid
Appearance:	Dyed for tax purposes
Odour:	Typical Gasoline Odour
Odour Threshold:	> 0.25 ppm
Freezing/Pour Point:	Not available
Boiling Point:	35 - 220 °C
Density:	720 - 760 kg/m ³ @ 15 °C
Vapour Density (Air = 1):	3.5
Vapour Pressure (absolute):	< 107 kPa @ 38 °C
Specific Gravity (Water = 1):	0.74
pH:	Not applicable
Flash Point:	TCC -30 °C
Lower Flammable Limit:	1.4 % (vol.)
Upper Flammable Limit:	7.6 % (vol.)
Autoignition Temperature:	280 °C
Viscosity:	< 1 cSt @ 38 °C
Evaporation Rate (n-BuAc = 1):	Not available
Partition Coefficient (log K_{ow}):	2.3
Water Solubility:	Insoluble
Formula:	C4 - C11

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes
Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No
Sensitive to Static Discharge:	Yes
Incompatible Materials:	Avoid 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	LD50 Oral Rat > 18 mL/kg LD50 Dermal Rabbit > 5 mL/kg
Benzene	LD50 Oral Rat 690 - 3400 mg/kg LC50 Inhalation Rat 13700 ppm for 4 hours LD50 Dermal Rabbit > 8260 mg/kg

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

Formulation:	No data is specifically available for this product and therefore this toxicological information is based on testing completed with the ingredients.
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.
Acute Toxicity:	Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression. Prolonged and repeated exposure may cause serious injury to blood forming organs, resulting in anemia and similar conditions. Myelodysplastic syndrome (MDS) has been observed in people exposed to very high levels (50 to 300 ppm) of benzene over a long period of time in the workplace. The relevance of these results to lower levels of exposure is not known.
Carcinogenicity and Mutagenicity:	According to the International Agency for Research on Cancer (IARC) this product is considered to be possibly carcinogenic to humans. This product contains benzene. Carcinogenic hazard. Repeated exposure to benzene concentrations greater than the recommended TLV/TWA may reduce the cellular components of peripheral blood and bone marrow. Epidemiological studies indicate that long term inhalation of benzene vapour can cause leukaemia in man. Benzene has also produced chromosomal aberrations in peripheral blood lymphocytes.

12. ECOLOGICAL INFORMATION

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

Biodegradability:	Inherently biodegradable. Rapid volatilization.
Bioaccumulation:	Potential for bioaccumulation.
Partition Coefficient (log K_{ow}):	2.3
Aquatic Toxicity:	Product is expected to be toxic to aquatic organisms.

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

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery 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. TRANSPORT INFORMATION**Canadian Road and Rail Shipping Classification:**

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

15. REGULATORY INFORMATION

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

WHMIS Class:	Class B2 Flammable Liquid Class D2A Carcinogenicity
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. OTHER INFORMATION**LABEL STATEMENTS**

Hazard Statement :	Flammable Liquid. Contains Benzene. 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. Section 1 Section 2 Section 3 Section 4 Section 5 Section 6 Section 7 Section 8 Section 11 Section 12
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Material Safety Data Sheet

Issue Date: 17-APR-2008
Supersedes: 17-APR-2008

POLYFLOC AP1138

1 Identification

Identification of substance or preparation

POLYFLOC AP1138

Product Application Area

Flocculant

Company/Undertaking Identification

GE Water & Process Technologies Canada
3239 Dundas Street West
Oakville, Ontario, L6M 4B2
T 905-465-3030

Emergency Telephone

(800) 877-1940

Prepared by Product Stewardship Group: T 215-355-3300 Prepared on: 17-APR-2008

2 Hazard(s) identification

EMERGENCY OVERVIEW

May cause slight irritation to the skin. May cause moderate irritation to the eyes. Dusts may cause irritation to the upper respiratory tract.

Odor: None; Appearance: White, Powder

Fire fighters should wear positive pressure self-contained breathing apparatus(full face-piece type). Proper fire-extinguishing media: dry chemical, carbon dioxide, foam or water

POTENTIAL HEALTH EFFECTS

ACUTE SKIN EFFECTS:

Primary route of exposure; May cause slight irritation to the skin.

ACUTE EYE EFFECTS:

May cause moderate irritation to the eyes.

ACUTE RESPIRATORY EFFECTS:

Dusts may cause irritation to the upper respiratory tract.

INGESTION EFFECTS:

May cause gastrointestinal irritation.

TARGET ORGANS:

No evidence of potential chronic effects.

MEDICAL CONDITIONS AGGRAVATED:

Not known.

SYMPTOMS OF EXPOSURE:

May cause redness or itching of skin.

3 Composition / information on ingredients

Information for specific product ingredients as required by the WHMIS Regulations is listed. Refer to additional sections of this MSDS for our assessment of the potential hazards of this formulation.

HAZARDOUS INGREDIENTS:

Product contains no hazardous ingredients reportable under WHMIS regulation

No component is considered to be a carcinogen by the U.S. National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC), the American Conference of Governmental Industrial Hygienists (ACGIH), or under WHMIS.

4 First-aid measures

SKIN CONTACT:

Wash thoroughly with soap and water. Remove contaminated clothing. Get medical attention if irritation develops or persists.

EYE CONTACT:

Remove contact lenses. Hold eyelids apart. Immediately flush eyes with plenty of low-pressure water for at least 15 minutes. Get immediate medical attention.

INHALATION:

If nasal, throat or lung irritation develops - remove to fresh air and get medical attention.

INGESTION:

Do not feed anything by mouth to an unconscious or convulsive victim. Do not induce vomiting. Immediately contact physician. Dilute contents of stomach using 2-8 fluid ounces (60-240 mL) of milk or water.

NOTES TO PHYSICIANS:

No special instructions

5 Fire-fighting measures

FIRE FIGHTING INSTRUCTIONS:

Fire fighters should wear positive pressure self-contained breathing apparatus (full face-piece type).

EXTINGUISHING MEDIA:

dry chemical, carbon dioxide, foam or water

HAZARDOUS DECOMPOSITION PRODUCTS:

oxides of carbon

FLASH POINT:

> 200F > 93C P-M(CC)

6 Accidental release measures

PROTECTION AND SPILL CONTAINMENT:

Ventilate area. Use specified protective equipment. Sweep up and remove. Minimize dust generation.

DISPOSAL INSTRUCTIONS:

The waste characteristics of the absorbed material, or any contaminated soil, should be determined in accordance with provincial regulations. Water contaminated with this product may be sent to a sanitary sewer treatment facility, in accordance with any local agreement or discharged under provincial regulations. Incinerate or land dispose in an approved landfill.

7 Handling and storage

HANDLING:

This material may be combustible. As with all dry powders it is advisable to ground mechanical equipment in contact with dry material to dissipate the potential buildup of static electricity.

STORAGE:

Keep containers closed when not in use. Do not expose to moisture.

8 Exposure controls / personal protection

EXPOSURE LIMITS

Consult local authorities for acceptable provincial values.

Product contains no hazardous ingredients reportable under WHMIS regulation

ENGINEERING CONTROLS:

Adequate ventilation to maintain air contaminants below exposure limits.

RESPIRATORY PROTECTION:

If air-purifying respirator use is appropriate, use any of the following particulate respirators: N95, N99, N100, R95, R99, R100, P95, P99 or P100.

SKIN PROTECTION:

rubber, butyl, viton or neoprene gloves -- Wash off after each use. Replace as necessary.

EYE PROTECTION:

airtight chemical goggles

9 Physical and chemical properties

Density	43.120 lb/cu.	Vapor Pressure (mmHG)	< 0.1
Freeze Point (F)	NA	Vapor Density (air=1)	< 1.00
Freeze Point (C)	NA		
Viscosity(cps 70F,21C)	NA	% Solubility (water)	1.0
Odor	None		
Appearance	White		
Physical State	Powder		
Flash Point	P-M(CC)	> 200F	> 93C
pH 0.5% Sol. (approx.)	8.0		
Evaporation Rate (Ether=1)	< 1.00		
Percent VOC:	0.0		

NA = not applicable ND = not determined

10 Stability and reactivity

STABILITY:

Stable under normal storage conditions.

HAZARDOUS POLYMERIZATION:

Will not occur.

INCOMPATIBILITIES:

May react with strong oxidizers.

DECOMPOSITION PRODUCTS:

oxides of carbon

INTERNAL PUMPOUT/CLEANOUT CATEGORIES:

"B"

11 Toxicological information

Oral LD50 MOUSE:	>2,000 mg/kg
NOTE - Supplier estimate; Rat oral LD50: >5,000 mg/kg per alternate supplier	
Carcinogenicity RAT/DOG:	NEGATIVE
Dermal LD50 RABBIT:	>2,000 mg/kg
NOTE - Estimated value	
Skin Irritation Score RABBIT:	NONIRRITANT
Eye Irritation Score RABBIT:	SLIGHT
Skin Sensitization G.PIG:	NEGATIVE

12 Ecological information

AQUATIC TOXICOLOGY

Bluegill Sunfish 48 Hour Static Screen

0% Mortality= 100 mg/L

Daphnia magna 48 Hour Static Renewal Bioassay

LC50= 470; No Effect Level= 178 mg/L

Fathead Minnow 96 Hour Static Renewal Bioassay

LC50= 239; No Effect Level= 45 mg/L

BIODEGRADATION

BOD-28 (mg/g): 0

BOD-5 (mg/g): 0

COD (mg/g): 775

TOC (mg/g): 349

13 Disposal considerations

Incinerate or bury in approved landfill. Please be advised that there may be additional local or provincial requirements relating to the disposal of waste. Consult provincial and local regulations regarding the proper disposal of this material.

14 Transport information

Transportation of Dangerous Goods:

DOT EMERGENCY RESPONSE GUIDE #: Not applicable

15 Regulatory information

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

CEPA:

All components of this product comply with substance notification requirements under CEPA.

WHMIS CLASSIFICATION:

NOT REGULATED

FOOD AND DRUG ADMINISTRATION:

The ingredients in this product are approved by FDA under 21 CFR 173.5 and 21 CFR 573.120

16 Other information

NFPA/HMIS

CODE TRANSLATION

Health	1	Slight Hazard
Fire	1	Slight Hazard
Reactivity	0	Minimal Hazard
Special	NONE	No special Hazard
(1) Protective Equipment	B	Goggles, Gloves

(1) refer to section 8 of MSDS for additional protective equipment recommendations.

CHANGE LOG

	EFFECTIVE DATE	REVISIONS TO SECTION:	SUPERCEDES
	-----	-----	-----
MSDS status:	07-MAY-1997		** NEW **
	01-MAY-1998	8;EDIT:9	07-MAY-1997
	01-JUN-1999	15	01-MAY-1998
	13-SEP-2000	4	01-JUN-1999
	11-DEC-2000	15	13-SEP-2000
	02-DEC-2003	16	11-DEC-2000
	03-NOV-2006	16	02-DEC-2003
	17-APR-2008	4, 5, 6, 7, 8, 10	03-NOV-2006



Shell Canada Limited Material Safety Data Sheet

Effective Date: 2008-08-01

Supersedes: 2005-08-15



Class B3 Combustible Liquid

Class D2A Embryo/Fetotoxicity
Class D2B Skin Irritation

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
PRODUCT CODE: **142-011**

SUPPLIER

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

TELEPHONE NUMBERS

Shell Emergency Number
CANUTEC 24 HOUR EMERGENCY NUMBER
For general information:

1-800-661-7378
1-613-996-6666
1-800-661-1600
www.shell.ca

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
Ethanol, 2-(2-methoxyethoxy)-	111-77-3	0 - 0.15	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:

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

Handling: Irritating to skin.
Ingestion may result in vomiting. Avoid aspiration of vomitus into lungs as small quantities may result in aspiration pneumonitis.
Eliminate all ignition sources.
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.
Avoid prolonged exposure to vapours.

For further information on health effects, see Section 11.

4. FIRST AID MEASURES

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 at least 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: Carbon Dioxide
Foam
Dry Chemical
Water Fog

Firefighting Instructions: Caution - Combustible. Do not use a direct stream of water as it may spread fire. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus. Avoid inhalation of smoke. 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. Delayed lung damage can be experienced after exposure to combustion products, sometimes hours after the exposure.

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

6. ACCIDENTAL RELEASE MEASURES

Issue warning "Combustible". Eliminate all ignition sources. Isolate hazard area and restrict access. Wear appropriate breathing apparatus (if applicable) and protective clothing. Handling equipment must be grounded. Work upwind of spill if it is safe to do so. Avoid direct contact with material. Stop leak only if safe to do so. Dike and contain land spills; contain spills to water by booming. Use water fog to knock down vapours; contain runoff. Adsorb residue or small spills with adsorbent material and remove to non-leaking containers for disposal. Notify appropriate environmental agency(ies). After area has been cleaned up to the satisfaction of regulatory authorities, flush area with water to remove trace residue. Dispose of recovered material as noted under Disposal Considerations.

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, are general in nature. The selection of personal protective equipment will vary depending on the conditions of use.

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

Kerosene/Jet fuels, as total hydrocarbon vapour (skin) : 200 mg/m³ (Application restricted to conditions in which there are negligible aerosol exposures.)

Skin Notation: Absorption through skin, eyes and mucous membranes may contribute significantly to the total exposure.

Mechanical Ventilation: Concentrations in air should be maintained below the occupational exposure limit if unprotected personnel are involved. Use explosion-proof ventilation as required to control vapour concentrations. 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

Skin Protection:	handled such that it could be splashed into eyes. Provide an eyewash station in the area. 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 AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Bright Clear
Odour:	Hydrocarbon Odour
Odour Threshold:	Not available
Freezing/Pour Point:	< -47 °C
Boiling Point:	145 - 300 °C
Density:	775 - 840 kg/m ³ @ 15 °C
Vapour Density (Air = 1):	Not available
Vapour Pressure (absolute):	1 - 1.4 kPa @ 37.8 °C
pH:	Not available
Flash Point:	TCC > 43 °C
Lower Flammable Limit:	0.7 % (vol.)
Upper Flammable 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 Oral Rat > 5000 mg/kg
	LD50 Dermal Rabbit > 2000 mg/kg

Ethanol, 2-(2-methoxyethoxy)-	LD50 Oral Rat 4140 - 5180 mg/kg LD50 Dermal Rabbit > 2000 mg/kg
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Routes of Exposure:	Exposure will most likely occur through skin contact or inhalation.
Irritancy:	This product is expected to be irritating to skin but is not predicted to be a skin sensitizer.
Acute Toxicity:	Vapour concentrations above the recommended exposure level are irritating to the eyes and respiratory tract, may cause headaches and dizziness, are anesthetic and may have other central nervous system effects.
Chronic Effects:	Prolonged and repeated contact with skin can cause defatting and drying of the skin resulting in skin irritation and dermatitis. Prolonged exposure to high vapour concentration can cause headache, dizziness, nausea, blurred vision and central nervous system depression.
Feto/Teratogenicity:	A component of this product has shown adverse effects on the growth and development of the fetus in some animal studies.
Pre-existing Conditions:	Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.
Carcinogenicity and Mutagenicity:	The International Agency for Research on Cancer (IARC) considers that this product is not classifiable as to its carcinogenicity to humans. Middle distillates have caused skin cancers in laboratory animals when applied repeatedly and left in place between applications. This effect is believed to be caused by the continuous irritation of the skin. Good personal hygiene should be maintained to avoid this risk. The American Conference of Governmental Industrial Hygienists (ACGIH) has classified this product as A3 - confirmed animal carcinogen with unknown relevance to humans.

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities. May cause physical fouling of aquatic organisms. The immediate effect of a release is the physical impairment of the environment from the coating of surfaces, resulting in the disruption of oxygen, water and light to flora and fauna. Prolonged exposure may result in the partitioning of light-end hydrocarbon fractions into the water and gas phases of the subsurface soil environment, adversely affecting the soil quality.

Biodegradability:	Not readily biodegradable.
Bioaccumulation:	Potential for bioaccumulation. Potential for bioconcentration.
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	LL50 (WAF method) Rainbow Trout (96hr) 1 - 10 mg/L. EL50 (WAF method) Daphnia Magna (48hr) 1 - 10 mg/L. EL50 - growth rate (WAF method) Algae (72hr) 1 - 10 mg/L.
Ethanol, 2-(2-methoxyethoxy)-	

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 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. TRANSPORT 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 D2A Embryo/Fetotoxicity Class D2B Skin Irritation
DSL/NDL 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. Provincial criteria are likely and should be requested when notifying provincial authorities.

16. OTHER INFORMATION

LABEL STATEMENTS

Hazard Statement :	Combustible 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. Empty containers are hazardous, may contain flammable / explosive dusts, liquid residue or vapours. Keep away from sparks and open flames.

First Aid Statement : Avoid prolonged exposure to vapours.
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
2 Section 3 Section 6 Section 8 Section 11 Section 15

ADG Technology

PERTH

Tel (08) 9249 7599

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BRISBANE

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Southern Exploration & Drilling Supplies

MELBOURNE

Tel (03) 9545 1277

Fax (03) 9545 1299

INTERNATIONAL

Tel +61 (8) 9249 7599

Fax +61 (8) 9249 7699

Material Safety Data Sheet

Lubtac Rod Grease

PO Box 148,

Kingsway WA 6065



Down hole hammers & bits
Top hole hammer equipment



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



MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data is obtained from sources beyond our direct supervision. We cannot make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions in which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, neither warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.

For all drilling, mining, geological, geotechnical & radio communications equipment
Web: www.adgtech.com Email: info@adgtech.com



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 COMPONENT	OR	%	DATA
NONE			

3. PHYSICAL DATA

BOILING POINT : 120 °C

MELTING POINT : NA

FREEZING POINT : < 0 °C

pH : 7-8

SPECIFIC GRAVITY : 0.99

APPEARANCE AND : DARK BROWN STRINGY GREASE

4. FIRE AND EXPLOSION DATA

FLASH POINT °C: (AUTO IGNITION TEMPERATURE) > 200 °C

EXTINGUISHING 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

Material Safety Data Sheet

Dyno Nobel Inc.

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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 01/22/09**

Supersedes

MSDS # 1122 08/13/08

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): NONEL[®] MS
NONEL[®] MS ARCTIC
NONEL[®] LP
NONEL[®] SL
NONEL[®] TD
NONEL[®] MS CONNECTOR
NONEL[®] TWINPLEX[™]
NONEL[®] STARTER

NONEL[®] EZ DET[®]
NONEL[®] EZTL[™]
NONEL[®] EZ DRIFTER[®]

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

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

SECTION II - HAZARDOUS INGREDIENTS

Ingredients	CAS#	<u>Occupational Exposure Limits</u>	
		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)	0.01 mg (Cr)/m ³
Lead Chromate	7758-97-6	0.5 mg (Ba)/m ³ 0.05 mg (Pb)/m ³ 1 mg (CrO ₃)/10m ³ (ceiling)	0.5 mg (Ba)/m ³ 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)

Material Safety Data Sheet

Molybdenum	7439-98-7	None ¹	None ²
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/m³; respirable fraction, 5 mg/m³.

² Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m³; respirable part., 3 mg/m³.

Note: The OSHA PEL for crystalline silica is calculated as follows:

Quartz, respirable: $10 \text{ mg/m}^3 \times \% \text{ SiO}_2 + 2$ Quartz, total dust: $30 \text{ mg/m}^3 / \% \text{ SiO}_2 + 2$

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 de minimus 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.

Material Safety Data Sheet

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, repack 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.

Material Safety Data Sheet

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.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>Max. lbs/1000 units</u>
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

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

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Material Safety Data Sheet

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CANUTEC (CANADA) 613-996-6666**MSDS # 1063****Date 10/30/08**

Supersedes

MSDS # 1063 07/02/07

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

BLASTEX [®]	DYNO [®] 1.5 SB
BLASTEX [®] PLUS	DYNO [®] 1.5 SBC
BLASTEX [®] PLUS HD	DYNO [®] 1.5 SB30
BLASTEX [®] TX	DYNO [®] 900
BLASTEX [®] TX PLUS	DYNO [®] 1300
BLASTGEL [®] 1000	DYNO [®] 1500
BLASTGEL [®] 1070	DYNO [®] 1520
SUPER BLASTEX [®]	DYNO [®] 1540
SUPER BLASTEX [®] TX	DYNOTEX
SUPER BLASTEX [®] TX	DX-2011
	DX-2012

Product Class: Emulsion Explosives, Packaged**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:** UN0332 Explosive, blasting, type E 1.5D II**NFPA Hazard Classification:** Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

<u>Ingredients:</u>	<u>CAS#</u>	<u>% (Range)</u>	<u>Occupational Exposure Limits</u>	
			<u>ACGIH TLV-TWA</u>	<u>OSHA PEL-TWA</u>
Ammonium Nitrate	6484-52-2	60-85	None	None
Sodium Nitrate	7631-99-4	0-12	None	None
Methylamine Nitrate*	22133-87-7	0-3	None	None
Aluminum	7429-90-5	0-10	10 mg/m ³ (dust)	15 mg/m ³ (total)
Mineral Oil	64742-35-4	0-6	5 mg/m ³ (mist)	None
Kerosene	8008-20-6	0-6	None	None

* This ingredient may be used only in products produced at the Paige Plant.

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 de minimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

Material Safety Data Sheet

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: None known.

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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CANUTEC (CANADA) 613-996-6666**MSDS # 1019****Date 03/27/07**

Supersedes

MSDS # 1019 01/24/05

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): D-GEL™ 1000
DYNOSPLIT®: D1, D 3/4, 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: 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

<u>Ingredients:</u>	<u>CAS#</u>	<u>% (Range)</u>	<u>Occupational Exposure Limits</u>	
			<u>ACGIH TLV-TWA</u>	<u>OSHA PEL-TWA</u>
Nitroglycerin (NG)	55-63-0	1-20	0.05 ppm	0.05 ppm
Ethylene Glycol Dinitrate (EGDN)	628-96-6	8-76	0.05 ppm	0.05 ppm
Nitrocellulose	9004-70-0	0-6	None	None
Ammonium Nitrate	6484-52-2	0-75	None	None
Sodium Nitrate	7631-99-4	0-50	None	None
Sulfur ¹	7704-34-9	0-4	None	None

¹ 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 de minimus 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:** 0.8-1.48 g/cc**Solubility in Water:** Ammonium and sodium nitrates are completely soluble. NG and EGDN are very slightly soluble.

Material Safety Data Sheet

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: None known.

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 (H₂S), 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.

Material Safety Data Sheet

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

Nitroglycerin

CAS Number

55-63-0

% By Weight

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.

Disclaimer

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MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.** DATE: February 15, 2007
8750 – 53rd Ave. PHONE: 780-468-4064
Edmonton, AB T6E 5G2 FAX: 780-469-1899

PRODUCT NAME: **POTASSIUM CHLORIDE (POTASH)**

PRODUCT USE: Oil well drilling fluid and cement additive.
CHEMICAL FAMILY: Inorganic salt CAS#: 7447-40-7

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: Not WHMIS controlled.
WORKPLACE HAZARD: Treat as nuisance dust.

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated under TDG
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

<u>INGREDIENT</u>	<u>% (w/w)</u>	<u>CAS NUMBER</u>	<u>LD₅₀ Oral-Rat</u>	<u>LC₅₀ Inhal-Rat</u>	<u>ACGIH-TLV</u>
Contains no WHMIS controlled ingredients.					

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: [XX]EYE CONTACT []SKIN []INHALATION []INGESTION
EYE CONTACT: May cause mild irritation, including stinging, watering and redness.
SKIN CONTACT: May cause mild irritation including redness and a burning sensation.
Prolonged or repeated contact may cause dry skin. No information available on skin absorption.
INGESTION: Low to moderate degree of toxicity. LD₅₀ (oral-rat) = 2.6 g/kg.
INHALATION: High dust levels may cause upper respiratory tract irritation.
CARCINOGENICITY: No information available.
TERATOGENICITY: No information available.

REPRODUCTIVE TOXICITY: No information available.
MUTAGENICITY: No information available.
SYNERGISTIC PRODUCTS: No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT: Flush with water. Dry area thoroughly and apply skin cream or moisturizing cream. If irritation persists, obtain medical attention.
EYE CONTACT: Flush with gently flowing warm water for 15 minutes, or until irritation ceases. Hold eyelids open to ensure thorough flushing. If irritation persists, obtain medical attention.
INGESTION: Do not induce vomiting unless directed to do so by medical personnel. If large amount swallowed, obtain medical attention.
INHALATION: Move to fresh air. Apply oxygen or artificial respiration if required. If breathing difficulties, or distress, continue obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR: White to reddish-brown crystals; odourless
SPECIFIC GRAVITY: 2.0
BOILING POINT (°C): 1500 (sublimes)
MELTING POINT (°C): 773
SOLUBILITY IN WATER: 342 g/L @ 20°C pH: 8-9 (5% sol'n)
PERCENT VOLATILE BY VOLUME: 0
EVAPORATION RATE: Not applicable
VAPOUR PRESSURE (mmHg): ~0
VAPOUR DENSITY (air = 1): 2.57
BULK DENSITY: Loose; 1025 – 1200 kg/m³

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: Not flammable
FLAMMABLE LIMITS: Not applicable
EXTINGUISHING MEDIA: Use media suitable for surrounding materials and packaging.
SPECIAL FIRE FIGHTING PROCEDURES: Self-contained breathing apparatus required for fire fighting personnel.
UNUSUAL FIRE AND EXPLOSION HAZARDS: None known.

SECTION VII: REACTIVITY DATA

STABILITY:	STABLE [XX]	UNSTABLE []
INCOMPATIBILITY (CONDITIONS TO AVOID):	Avoid contact with hot nitric acid; may cause evolution of toxic nitrosyl chloride. Contact with other strong acids may produce hydrogen chloride gas. May react violently with bromine trifluoride and may explode if mixed with potassium permanganate and sulfuric acid.	
CONDITIONS OF REACTIVITY:	Contact with incompatible materials.	
HAZARDOUS DECOMPOSITION PRODUCTS:	Hydrogen chloride and fumes of Na ₂ O.	
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX]	MAY OCCUR []

SECTION VIII: PREVENTATIVE MEASURES**SPECIAL PROTECTION INFORMATION**

RESPIRATORY PROTECTION:	Use NIOSH approved dust mask, or respirator with dust/mist filters, if TLV is exceeded. 8 hour OEL Nuisance Dust Total Mass = 10mg/m ³ .
VENTILATION:	Suggest local exhaust ventilation, if TLV's are exceeded.
PROTECTIVE GLOVES:	Suggest cloth or leather work gloves be worn to prevent skin contact.
EYE PROTECTION:	Safety glasses with side shields or goggles recommended.
OTHER PROTECTIVE EQUIPMENT (Specify):	Ensure eyewash station and emergency shower are available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing. Store in a cool, dry well-ventilated place away from incompatibles. Keep bags or fibre drums dry at all times. Product is hygroscopic (may absorb moisture from the air when relative humidity >72%).

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Use appropriate safety equipment. Collect by sweeping and scoop up or shovel. Collect uncontaminated material for repackaging. Collect contaminated material in an approved container for disposal. Keep out of sewers, storm drains, surface waters and soils.

WASTE DISPOSAL METHOD

Dispose in accordance with federal, provincial and local regulations. This product may be suitable for disposal in landfills; check with local operator. It is the responsibility of the end-user to determine if material meets the criteria of hazardous waste at the time of disposal. Dispose of all packaging in accordance with local regulations.

SECTION IX: PREPARATION

THE INFORMATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH,
BUT NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE.

DATE ISSUED: February 15, 2007
SUPERSEDES: April 27, 2004

BY: Product safety committee
PHONE: 780-440-4923

**Diversity Technologies Corp. is the parent company of
Canamara-United Supply, Hollimex Products, The Drilling Depot and
Westcoast Drilling Supplies.**



MATERIAL SAFETY DATA SHEET

MSDS No. 10068

Trade Name: POLY-PLUS* RD

Revision Date: 06/03/2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: POLY-PLUS* RD

Chemical Family: Acrylamide polymer.
Product Use: Drilling fluid additive.

Supplied by: M-I L.L.C.
P.O. Box 42842
Houston, TX 77242
www.miswaco.com

Telephone Number: 281-561-1511
Emergency Telephone (24 hr.): 281-561-1600
Prepared by: Product Safety Group

Revision No. 5

HMIS Rating

Health: 1

Flammability: 1

Physical Hazard: 0

PPE: E

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. *Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

2. HAZARDS IDENTIFICATION

Emergency Overview: Caution! May cause mechanical irritation of eyes, skin and respiratory tract. Long term inhalation of particulates may cause lung damage.

Canadian Classification:

UN PIN No: Not regulated.

WHMIS Class: Not a controlled product.

Physical State: Powder.

Color: White

Odor: Odorless

Potential Health Effects:

Acute Effects

Eye Contact: May cause mechanical irritation
Skin Contact: May cause mechanical irritation.
Inhalation: May cause mechanical irritation.
Ingestion: May cause gastric distress, nausea and vomiting if ingested.

Acute Effects Note:

This product may release ammonia or amines when heated or exposed to high pH. Ammonia is a severe eye, skin and respiratory irritant. Ammonia has a very strong odor and can be detected at levels as low as 5 ppm. Many amines are also eye, skin and respiratory irritants.

Carcinogenicity & Chronic Effects: See Section 11 - Toxicological Information.

Routes of Exposure: Eyes. Dermal (skin) contact. Inhalation.

MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS* RD

Revision Date: 06/03/2009

MSDS No. 10068

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Target Organs/Medical
Conditions Aggravated by
Overexposure:

Eyes. Skin. Respiratory System.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Wt. %	Comments:
Anionic acrylamide copolymer		90 - 100	No comments.

4. FIRST AID MEASURES

Eye Contact:	Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.
Skin Contact:	Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.
Inhalation:	Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:	Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. If signs of irritation or toxicity occur seek medical attention.
General notes:	Persons seeking medical attention should carry a copy of this MSDS with them.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: F (C):	NA
Flammable Limits in Air - Lower (%):	ND
Flammable Limits in Air - Upper (%):	ND
Autoignition Temperature: F (C):	ND
Flammability Class:	NA
Other Flammable Properties:	Particulate may accumulate static electricity. Dusts at sufficient concentrations can form explosive mixtures with air.
Extinguishing Media:	Use extinguishing media appropriate for surrounding fire.

Protection Of Fire-Fighters:

Special Fire-Fighting Procedures: Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.

Hazardous Combustion Products: Ammonia or amines. Oxides of: Carbon. Nitrogen.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Use personal protective equipment identified in Section 8.
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MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS* RD

Revision Date: 06/03/2009

MSDS No. 10068

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Spill Procedures: Evacuate the spill area with the exception of the spill response team. Wet product may create a slipping hazard. Contain spilled material. Do not allow spilled material to enter sewers, storm drains or surface waters. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.

Environmental Precautions: Waste must be disposed of in accordance with federal, state and local laws.

7. HANDLING AND STORAGE

Handling: Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid generating or breathing dust. Product is slippery if wet. Use only with adequate ventilation. Wash thoroughly after handling.

Storage: Store in dry, well-ventilated area. Keep container closed. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits (TLV & PEL - 8H TWA):

Ingredient	CAS No.	Wt. %	ACGIH TLV	OSHA PEL	Other	Notes
Anionic acrylamide copolymer		90 - 100	NA	NA	NA	(1) (6)

Notes

(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).

(6) Ammonia or amines may be released when this component is heated or exposed to high pH. The recommended exposure limits for ammonia are ACGIH TLV 25 ppm and OSHA PEL 50 ppm. No general recommended exposure limit is available for amines. A NIOSH/MSHA approved respirator with ammonia/methylamine cartridges should be used to protect against ammonia or amine inhalation exposure.

Engineering Controls: Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazards present and the risk of exposure to those hazards. The PPE recommendations below are based on our assessment of the chemical hazards associated with this product. The risk of exposure and need for respiratory protection will vary from workplace to workplace and should be assessed by the user.

Eye/Face Protection: Dust resistant safety goggles.

Skin Protection: Not normally necessary. If needed to minimize irritation: Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear chemical resistant gloves such as: Nitrile. Neoprene.

MATERIAL SAFETY DATA SHEET

Trade Name: **POLY-PLUS* RD**

Revision Date: 06/03/2009

MSDS No. 10068

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Respiratory Protection:

All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

General Hygiene Considerations: Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	White
Odor:	Odorless
Physical State:	Powder.
pH:	7.7 (1% solution)
Specific Gravity (H ₂ O = 1):	1.25 - 1.40 at 68F (20C)
Solubility (Water):	Soluble
Melting/Freezing Point:	ND
Boiling Point:	ND
Vapor Pressure:	NA
Vapor Density (Air=1):	NA
Evaporation Rate:	NA
Odor Threshold(s):	ND

10. STABILITY AND REACTIVITY

Chemical Stability:	Stable
Conditions to Avoid:	Heat. Moisture.
Materials to Avoid:	Oxidizers.
Hazardous Decomposition Products:	For thermal decomposition products, see Section 5.
Hazardous Polymerization	Will not occur

11. TOXICOLOGICAL INFORMATION

Component Toxicological Data: Any adverse component toxicological effects are listed below. If no effects are listed, no such data were found.

Ingredient	CAS No.	Acute Data
Anionic acrylamide copolymer		Oral LD50: Estimated >2000 mg/kg (rat)

Product Toxicological Information:

Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may develop.

This product may contain trace amounts of acrylamide (< 0.1%). Acrylamide (CAS 79-06-1) has been classified by the International Agency for Research on Cancer (IARC) as a Group 2A carcinogen (probably carcinogenic to humans) and a suspect carcinogen by the National Toxicology Program (NTP). (LOLI)

MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS* RD

Revision Date: 06/03/2009

MSDS No. 10068

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12. ECOLOGICAL INFORMATION

Component Ecotoxicity Data: Component ecotoxicity data are listed below. If no data are listed, none was found in the component review.

Product Ecotoxicity Data: Contact M-I Environmental Affairs Department for available product ecotoxicity data.

Biodegradation: ND
Bioaccumulation: ND
Octanol/Water Partition Coefficient: ND

13. DISPOSAL CONSIDERATIONS

Waste Classification: ND

Waste Management: Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

Disposal Method: Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

14. TRANSPORT INFORMATION

U.S. DOT Shipping Description:	Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.
Canada TDG Shipping Description:	Not regulated.
UN PIN No:	Not regulated.
IMDG Shipping Description:	Not regulated.
ICAO/IATA Shipping Description:	Not regulated.

15. REGULATORY INFORMATION

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories: Not a SARA 311/312 hazard.

SARA 302/304, 313; CERCLA RQ, California Proposition 65: Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

International Chemical Inventories

MATERIAL SAFETY DATA SHEET

Trade Name: POLY-PLUS* RD

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MSDS No. 10068

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Australia AICS - Components are listed or exempt from listing.
Canada DSL - Components are listed or exempt from listing.
China Inventory - Components are listed or exempt from listing.
European Union EINECS/ELINCS - Components are listed or exempt from listing.
Japan METI ENCS - Components are listed or exempt from listing.
Korea TCCL ECL - Components are listed or exempt from listing.
New Zealand - Components are listed or exempt from listing.
Philippine PICCS - Components are listed or exempt from listing.
U.S. TSCA - Components are listed or exempt from listing.
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

Canadian Classification:

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

WHMIS Class: Not a controlled product.

16. OTHER INFORMATION

The following sections have been revised: 1, 4, 6, 15, 16

NA - Not Applicable, ND - Not Determined.

*A mark of M-I L.L.C.

Disclaimer:

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.



MATERIAL SAFETY DATA SHEET

MSDS No. 12011

Trade Name: ROD EASE

Revision Date: 07/21/2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: ROD EASE

Chemical Family: Mixture

Product Use: Drilling fluid additive. Lubricant.

Supplied by: M-I L.L.C.
P.O. Box 42842
Houston, TX 77242
www.miswaco.com

Telephone Number: 281-561-1511

Emergency Telephone (24 hr.): 281-561-1600

Prepared by: Product Safety Group

Revision No. 6

HMIS Rating

Health: 1

Flammability: 1

Physical Hazard: 0

PPE: J

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. *Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

2. HAZARDS IDENTIFICATION

Emergency Overview: Occupational exposure not expected to present a health or physical hazard. Prolonged exposure, however, may cause eye, skin and respiratory irritation.

Canadian Classification:

UN PIN No: Not regulated.

WHMIS Class: Not a controlled product.

Physical State: Thick Liquid

Color: Dark brown.

Odor: Distinctive

Potential Health Effects:

Acute Effects

Eye Contact: Not expected to irritate eyes. Prolonged contact, however, may cause irritation.

Skin Contact: Not expected to irritate skin. Prolonged contact, however, may cause irritation.

Inhalation: Not expected to be an inhalation hazard. Prolonged inhalation of vapors or mists, however, may cause irritation.

Ingestion: May cause gastric distress, nausea and vomiting if ingested.

Carcinogenicity & Chronic Effects: See Section 11 for additional information.

Routes of Exposure: Eyes. Dermal (skin) contact. Inhalation.

Target Organs/Medical Conditions Aggravated by Overexposure: None expected from occupational exposure.

MATERIAL SAFETY DATA SHEET

MSDS No. 12011

Trade Name: ROD EASE

Revision Date: 07/21/2009

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3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Wt. %	Comments:
Vegetable oil		60 - 100	No comments.
Additives		10 - 30	No comments.

4. FIRST AID MEASURES

Eye Contact: Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.

Skin Contact: Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.

Inhalation: Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Ingestion: Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. Get medical attention.

General notes: Persons seeking medical attention should carry a copy of this MSDS with them.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: F (C): 734F (390C)
Flash Point Method: COC
Flammable Limits in Air - Lower (%): ND
Flammable Limits in Air - Upper (%): ND
Autoignition Temperature: F (C): ND
Flammability Class: IIIB
Other Flammable Properties: ND
Extinguishing Media: Carbon dioxide. Dry chemical. Foam. Water mist.

Protection Of Fire-Fighters:

Special Fire-Fighting Procedures: Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.

Hazardous Combustion Products: Oxides of Carbon. Sulfur.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions: Use personal protective equipment identified in Section 8.

Spill Procedures: Evacuate the spill area with the exception of the spill response team. Keep personnel removed and upwind of spill. Extinguish all ignition sources. Avoid sparks, flames, heat and smoking. Shut off leak if it can be done safely. Contain spilled material. Do not allow spilled material to enter sewers, storm drains or surface waters. Absorb in vermiculite, dry sand or earth. Place into containers for disposal.

MATERIAL SAFETY DATA SHEET

MSDS No. 12011

Trade Name: **ROD EASE**
Revision Date: 07/21/2009

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Environmental Precautions: Waste must be disposed of in accordance with federal, state and local laws. In the U.S., for products with reportable quantity (RQ) components - if the RQ is exceeded, report to National Spill Response Office at 1 800 424 8802.

7. HANDLING AND STORAGE

Handling: Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid breathing vapors or spray mists. Use only in a well ventilated area. Wash thoroughly after handling.

Storage: Store in dry, well-ventilated area. Keep container closed. Keep away from heat, sparks and flames. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits (TLV & PEL - 8H TWA):

Ingredient	CAS No.	Wt. %	ACGIH TLV	OSHA PEL	Other	Notes
Vegetable oil		60 - 100	NA	NA	NA	(1)
Additives		10 - 30	NA	NA	NA	None

Notes

(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).

Engineering Controls: Local exhaust ventilation as necessary to maintain exposures to within applicable limits.

Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazards present and the risk of exposure to those hazards. The PPE recommendations below are based on our assessment of the chemical hazards associated with this product. The risk of exposure and need for respiratory protection will vary from workplace to workplace and should be assessed by the user.

Eye/Face Protection: Wear chemical safety goggles.

Skin Protection: Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear chemical resistant gloves such as nitrile or neoprene.

Respiratory Protection: All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent. If exposed to airborne mist/aerosol of this product, use at least a NIOSH-approved N95 half-mask disposable or re-usable particulate respirator. In work environments containing oil mist/aerosol, use at least a NIOSH-approved P95 half-mask disposable or reuseable particulate respirator.

General Hygiene Considerations: Wash promptly with soap and water if skin becomes contaminated. Change work clothing daily if there is any possibility of contamination.

9. PHYSICAL AND CHEMICAL PROPERTIES

MATERIAL SAFETY DATA SHEET

MSDS No. 12011

Trade Name: **ROD EASE**
Revision Date: 07/21/2009

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Color:	Dark brown.
Odor:	Distinctive
Physical State:	Thick Liquid
pH:	7 - 7.5
Specific Gravity (H ₂ O = 1):	0.887
Solubility (Water):	ND
Flash Point: F (C):	734F (390C)
Melting/Freezing Point:	-13F (-25C)
Boiling Point:	>572F (>300C)
Vapor Pressure:	ND
Vapor Density (Air=1):	ND
Evaporation Rate:	ND
Odor Threshold(s):	ND

10. STABILITY AND REACTIVITY

Chemical Stability:	Stable
Conditions to Avoid:	Keep away from heat, sparks and flame.
Materials to Avoid:	Oxidizers.
Hazardous Decomposition Products:	For thermal decomposition products, see Section 5.
Hazardous Polymerization	Will not occur

11. TOXICOLOGICAL INFORMATION

Component Toxicological Data: Any adverse component toxicological effects are listed below. If no effects are listed, no such data were found.

Product Toxicological Information:

Oral LD50: >5000 mg/kg (rat).

12. ECOLOGICAL INFORMATION

Component Ecotoxicity Data: Component ecotoxicity data are listed below. If no data are listed, none was found in the component review.

Product Ecotoxicity Data: Contact M-I Environmental Affairs Department for available product ecotoxicity data.

Biodegradation:	ND
Bioaccumulation:	ND
Octanol/Water Partition Coefficient:	ND

13. DISPOSAL CONSIDERATIONS

Waste Classification: This product does not meet the criteria of a hazardous waste if discarded in its purchased form.

MATERIAL SAFETY DATA SHEET

MSDS No. 12011

Trade Name: **ROD EASE**
Revision Date: 07/21/2009

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Waste Management: Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

Disposal Method: Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

14. TRANSPORT INFORMATION

U.S. DOT

Shipping Description:

Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

Canada TDG Shipping Description:

Not regulated.

UN PIN No:

Not regulated.

IMDG Shipping Description:

Not regulated.

ICAO/IATA Shipping Description:

Not regulated.

15. REGULATORY INFORMATION

U.S. Federal and State Regulations

SARA 311/312 Hazard Categories: Immediate (acute) health hazard.

SARA 302/304, 313; CERCLA RQ, California Proposition 65: Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.
Canada DSL - Components are listed or exempt from listing.
China Inventory - Components are listed or exempt from listing.
European Union EINECS/ELINCS - Components are listed or exempt from listing.
Japan METI ENCS - Components are listed or exempt from listing.
Korea TCCL ECL - Components are listed or exempt from listing.
New Zealand - Components are listed or exempt from listing.
Philippine PICCS - Components are listed or exempt from listing.
U.S. TSCA - Contains a component(s) that is not listed.
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

Canadian Classification:

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

WHMIS Class: Not a controlled product.

16. OTHER INFORMATION

The following sections have been revised: 1, 4, 6, 15, 16

MATERIAL SAFETY DATA SHEET

MSDS No. 12011

Trade Name: **ROD EASE**

Revision Date: 07/21/2009

Page 6/6

NA - Not Applicable, ND - Not Determined.

Disclaimer:

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.

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 # 1124****Date 08/13/08**

Supersedes

MSDS # 1124 01/24/05

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:** UN0349 Articles, explosive, n.o.s. (HMX) 1.4S 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

Ingredients:	CAS#	% (Range)	<u>Occupational Exposure Limits</u>	
			OSHA PEL-TWA	ACGIH TLV-TWA
Cyclotetramethylene	2691-41-0	0.35	None ¹	None ²
Tetranitramine (HMX)				
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/m³; respirable fraction, 5 mg/m³.² Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m³; respirable part., 3 mg/m³.

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 de minimus 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

Material Safety Data Sheet

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable

Flammable Limits: Not Applicable

Extinguishing Media: Water, inert powder, CO₂

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

Material Safety Data Sheet

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.

<u>Chemical Name</u>	<u>CAS Number</u>	<u>% By Weight</u>
None		

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MATERIAL SAFETY DATA SHEET

Soda Ash

Date: November 4, 2005

I Company Identification

Company Name: BHS Marketing / Western Briquette
Mailing Address: P.O. Box 27955 SLC, UT 84127-0955
Physical Address: 2320 West Indiana Ave. SLC, UT 84104
Telephone: (801) 973-8232
Fax: (801) 973-8838
Emergency Number: PERS (800) 633-8253

II Product Identification

Product Name: Soda Ash
Product Class: 55
Chemical Description: Sodium Carbonate, anhydrous, is a white odorless, granular material, free of contamination. Meets federal specification O-S-571 G, Type II. Meets AWWA Std.
Cas Number: 497-19-8

III Typical Physical Properties

Physical Appearance: White granules solid
Odor: Odorless
Molecular Weight: 105.99
pH: 11.3 at 1wt/wt%
Boiling Point: Decomposes at 1800 F
Melting Point: 851 Deg C (1564 F)
Specific Gravity: 2.53 at (68F)
Solubility in Water: Soluble 7wt/wt% at (77 F)

IV Reactivity Data

Chemical Stability:	This material is stable under normal handling and storage conditions
Conditions to Avoid:	Extreme Heat
Materials to Avoid:	Aluminum, Fluorine, Humid Air, Moisture, Sulfuric Acid, Acids, Magnesium, Phosphorus Pentoxide
Hazardous Decomposition Products:	Carbon Dioxide
Hazardous Polymerization:	Will not occur
Decomposition Temperature Range:	400 Deg. C (752 Deg F)

V Toxicological Information and Interpretation

Acute	
Eye irritation:	Eye-Eye irritation, 50 mg Rabbit. Severely irritating
Skin Irritation:	Skin-Skin irritation, Rabbit. Mildly irritating
Dermal Toxicity:	No test data found for Product
Respiratory Irritation:	No test data found for Product.
Acute Inhalation Toxicity:	LC50-Lethal concentration. 50% of Test Species, 2300 mg/cu m/2hrs, rat
Acute Oral Toxicity:	LD50-Lethal Dose. 50% of Test Species, 4090 mg/kg, rat
Chronic Toxicity:	This product does not contain any substances that are considered by OSHA, NTP, IARC or ACGIH to be "probable" or "suspected" human carcinogens

VII Fire and Explosion Hazard Data

Effects of Overexposure:

Acute

Eye Contact:	Causes Irritation.
Skin Contact:	May cause redness, swelling
Ingestion:	Low acute oral toxicity. May cause nausea, vomiting, diarrhea, irritation, corrosion.
Inhalation:	May cause upper respiratory tract irritation, lung irritation
Chronic Effects:	This product does not contain any ingredient designated by IARC, NTP, ACGIH, OSHA as probable or suspected human carcinogens.

VIII Recommended First Aid Measures

Eye Exposure:	Hold eyelids open and flush with a steady, gentle stream of water for at least 15 mins. Seek immediate medical attention.
Skin Exposure:	In case of contact, immediately wash with plenty of soap and water for at least 5 mins. Seek medical attention if irritation develops or persists. Remove contaminated clothing and shoes. Clean contaminated clothing and shoes before re-use.
Inhalation Exposure	Remove and assure that the victim is breathing. If breathing is difficult, administer oxygen, if available. If victim is not breathing, administer CPR (cardio-pulmonary resuscitation). Seek immediate medical attention.
Ingestion Exposure:	If victim is conscious and alert, give 1-2 glasses of water to drink. Do not give anything by mouth to an unconscious person. Seek immediate medical attention. Do not leave victim unattended. To prevent aspiration of swallowed product, lay victim on side with head lower than waist. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.
Medical conditions possible aggravated by exposure:	Inhalation of product may aggravate existing chronic respiratory problems such as asthma emphysema or bronchitis. Skin contact may aggravate existing skin disease.
Notes to Physician:	All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

IX Fire Fighting Measures

Extinguishing Media:	Not combustible. Use extinguishing methods suitable for surrounding fire.
Special Fire Fighting Procedures:	Firefighters should wear NIOSH/MSHA approved self-contained breathing apparatus and full protective clothing. Dike area top prevent runoff and contamination of water sources. Dispose of fire control water later.
Unusual Fire and Explosion Hazard:	Not combustible

X Accidental Release Measures

Evacuation Procedure & Safety:	Ventilate closed spaces before entering. Wear appropriate protective gear for situation. See personal information.
Containment of Spills:	Follow Procedure described below under Cleanup and Disposal of spill
Environmental & Regulatory Reporting:	Do not flush to drain. If spilled on the ground, the affected area should be scraped clean placed in an appropriate container for disposal. Prevent material from entering public sewer system or any waterway. Large spills should be handled according to a predetermined plan. For assistance in developing a plan contact with the Technical Service Department using the Product Information phone number.

XI Handling & Storage

Handling:	Do not get in eyes. Do not breath dusts. Avoid direct or prolonged contact with skin.
Storage:	Store in area that is cool, dry, well-ventilated.

XII Exposure Controls/ Personal Protection

Appropriate

Hygienic Practices:
procedure,
prompt

As part of good industrial, personal hygiene and safety avoid all unnecessary exposure to the product and ensure removal from eyes, skin and clothing. Maintain good housekeeping to control dust accumulations.

Personal Protection Equipment

Eye Protection:

Eye and face protection requirements will vary dependent upon work environment conditions and material handling practices. Appropriate ANSI Z87 approved equipment should be selected for the particular use intended for this material.

Skin Protection:

Skin contact should be minimized through use of gloves and suitable long-sleeved clothing (i.e. shirts and pants.) Consideration must be give both to durability as well as permeation resistance.

XIII Ecological Information

Acute Ecotoxicity:

Crustaceans, Daphnia magna, EC₅₀, 48 hours, 265 mg/l
Fishes, Lepomis macrochirus, LC₅₀ 96 hours, 300 mg/l
Algae, Nitzscheria linearis, EC₅₀, 5 day(s), 242 mg/l

Chronic Ecotoxicity:

Phytoplankton, EC biomass, 7 day(s), 14 mg/l

Mobility:

Considerable solubility and mobility

Degradation

Abiotic:

Water, hydrolysis. Degradation products: carbonate (pH. 10/bicarbonate (pH 6-10)/carbonic acid/carbon dioxide (ph<6))

Soil-result: N/A

Biotic:

N/A

Potential for

Bioaccumulation:

Log Po/w: Result- N/A

Other Adverse

Effects/ Comments:

Observed effects are related to alkaline properties of product. Product is not significantly hazardous for the environment.

XIV Disposal Consideration

Waste Treatment: Sodium Carbonate is not a listed hazardous waste under 40 CFR 261. However, state and local regulations for waste disposal may be more restrictive. Spilled product should be disposed of in an EPA-approved disposal facility in accordance with applicable national, state and local environmental laws and regulations.

Packing Treatment: Use dedicated containers where possible
Rinse the empty containers and treat the effluent in the same way as waste
Consult current federal, state and local regulations regarding the proper disposal of emptied containers.

RCRA Hazardous Waste: Not listed

XV Transport Information

Mode	DOT	IMDG	IATA
UN Number	Not a regulated hazardous material	Not a regulated hazardous material	Not a regulated hazardous material
Other	It is not recommended that ERG guide #111 be used for all non-DOT-regulated material		
STCC#	28-123-22		

XVI Regulatory Information

National Regulations (US)

TSCA Inventory 8(b): Yes

SARA Title III
Sec. 302/303
Extremely Hazardous
Substances (40 CFR 355): No

SARA Title III Sec 311/312
(40 CFR 370): Hazard Category: Acute health hazard; Chronic health hazard. Threshold planning quantity: 10,000 lbs

SARA Title III Sec 313
Toxic Chemical
Emissions Reporting
(40 CFR 372): No

CERCLA Hazardous
Substance (40 CFR Part 302) Listed: No
Unlisted Substance: No
Characteristic: N/A

State Component Listing: None identified

National Regulations (Canada)
Canadian DSL Registration: DSL

WHMIS Classifications: D2B—Material causing other toxic effects
 This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations, and the SDS contains all the information required by the Controlled Products Regulations.

EEC Labeling: Name of dangerous product- sodium carbonate

Symbols	Xi	Irritant
Phrases R	36	Irritating to eyes
Phrases S	(2)	Keep out of reach of children
	22	Do not breath dust.
	26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice

Labeling “Dangerous for the environment.” Not dangerous.
 Provisions classification of WG from EU-DGXI-1/3-04-98

XVII Other Information

Ratings:

NFPA (National Fire Protection Association)

Health = 2 Flammability = 0 Instability = 0 Special = None

HMIS (Hazardous Material Information system)

Health = 2 Fire = 0 Reactivity = 0 PPE = Supplied by User; dependent on local conditions

XVIII Additional Information

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied, regarding its correctness.

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

*n/a= Not Applicable

MSDS Number: **S4040** * * * * *Effective Date: 11/21/08* * * * * *Supersedes: 01/25/06*

MSDS**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865



Mallinckrodt
CHEMICALS



24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SODIUM HYDROXIDE SOLUTIONS AND CONCENTRATES

1. Product Identification

Synonyms: Sodium hydroxide, 0.2 to 2.0 normal volumetric solutions; DILUT-IT® analytical concentrates; Sodium Hydroxide Concentrate Solution StandARd®

CAS No.: 1310-73-2

Molecular Weight: 40.00

Chemical Formula: NaOH in water

Product Codes:

J.T. Baker: 0328, 0329, 0387, 0388, 0389, 0390, 3726, 4687, 4691, 4715, 5633, 5634, 5635, 5636, 5638, 5665, 5667

Mallinckrodt: 4693, H361, H380

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Hydroxide	1310-73-2	0.8 - 8%	Yes
Water	7732-18-5	92 - 99%	No

3. Hazards Identification

Emergency Overview

DANGER! CORROSIVE. HARMFUL IF SWALLOWED OR INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe

Flammability Rating: 0 - None

Reactivity Rating: 2 - Moderate

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

Storage Color Code: White Stripe (Store Separately)

Potential Health Effects

The health effects from exposure to diluted forms of this chemical are not well documented. They are expected to be less severe than those for concentrated forms which are referenced in the descriptions below.

Inhalation:

Severe irritant. Effects from inhalation of mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.

Ingestion:

Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appear days after exposure.

Skin Contact:

Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.

Eye Contact:

Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.

Chronic Exposure:

Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:

Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:

Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.

Special Information:

Use protective clothing and breathing equipment appropriate for the surrounding fire.

6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.

US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRACIT®-2 or BuCAIM® caustic neutralizers are recommended for spills of this product.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Protect from freezing. Always add the caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do not store with aluminum or magnesium. Do not mix with acids or organic materials.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Sodium hydroxide:

-OSHA Permissible Exposure Limit (PEL):

2 mg/m³ Ceiling

-ACGIH Threshold Limit Value (TLV):

2 mg/m³ Ceiling

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Physical data is displayed for a 5% solution of sodium hydroxide.

Appearance:

Clear, colorless solution.

Odor:

Odorless.

Solubility:

Miscible in water.

Density:

5% solution: 1.05

pH:

14.0

% Volatiles by volume @ 21C (70F):

No information found.

Boiling Point:

102C (216F) (5% solution)

Melting Point:

-4C (25F) (5% solution)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

No hazardous decomposition products.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Sodium hydroxide in contact with acids and organic halogen compounds, especially trichloroethylene, may causes violent reactions. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin, and zinc cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.

Conditions to Avoid:

Heat, moisture, incompatibles.

11. Toxicological Information

Sodium hydroxide: irritation data: skin, rabbit: 500 mg/24H severe; eye rabbit: 50 ug/24H severe. Investigated as

a mutagen.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Sodium Hydroxide (1310-73-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SODIUM HYDROXIDE SOLUTION

Hazard Class: 8

UN/NA: UN1824

Packing Group: II

Information reported for product/size: 460LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM HYDROXIDE SOLUTION

Hazard Class: 8

UN/NA: UN1824

Packing Group: II

Information reported for product/size: 460LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----				
Ingredient	TSCA	EC	Japan	Australia
Sodium Hydroxide (1310-73-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----				
Ingredient	--Canada--			
	Korea	DSL	NDSL	Phil.

Sodium Hydroxide (1310-73-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes
-----\Federal, State & International Regulations - Part 1\-----				
	-SARA 302-		-----SARA 313-----	
Ingredient	RQ	TPQ	List	Chemical Catg.
Sodium Hydroxide (1310-73-2)	No	No	No	No
Water (7732-18-5)	No	No	No	No
-----\Federal, State & International Regulations - Part 2\-----				
	-RCRA-		-TSCA-	
Ingredient	CERCLA	261.33	8(d)	
Sodium Hydroxide (1310-73-2)	1000	No	No	
Water (7732-18-5)	No	No	No	

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2R**Poison Schedule: S5****WHMIS:**

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**

Label Hazard Warning:

DANGER! CORROSIVE. HARMFUL IF SWALLOWED OR INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

Label Precautions:

Do not get in eyes, on skin, or on clothing.

Do not breathe mist.

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Label First Aid:

If swallowed, give several glasses of water or milk to drink. Vomiting may occur spontaneously, but DO NOT INDUCE! Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR

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Prepared by: Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)



MATERIAL SAFETY DATA SHEET

MSDS No. 10374

Trade Name: SUPER-VIS*

Revision Date: 07/21/2009

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name: SUPER-VIS*

Chemical Family: Polysaccharide gum Biopolymer.
Product Use: Drilling fluid additive.

Supplied by: M-I L.L.C.
P.O. Box 42842
Houston, TX 77242
www.miswaco.com

Telephone Number: 281-561-1511
Emergency Telephone (24 hr.): 281-561-1600
Prepared by: Product Safety Group

Revision No. 4

HMIS Rating

Health: 1 **Flammability:** 1 **Physical Hazard:** 0 **PPE:** E

4=Severe, 3=Serious, 2=Moderate, 1=Slight, 0=Minimal Hazard. *Chronic effects - See Section 11. See Section 8 for Personal Protective Equipment recommendations.

2. HAZARDS IDENTIFICATION

Emergency Overview: Caution! May cause mechanical irritation of eyes, skin and respiratory tract. Long term inhalation of particulates may cause lung damage.

Canadian Classification:

UN PIN No: Not regulated.

WHMIS Class: Not a controlled product.

Physical State: Powder, dust. **Color:** White to tan **Odor:** Slight

Potential Health Effects:

Acute Effects

Eye Contact: May cause mechanical irritation
Skin Contact: May cause mechanical irritation.
Inhalation: May cause mechanical irritation.
Ingestion: May cause gastric distress, nausea and vomiting if ingested.

Carcinogenicity & Chronic Effects: See Section 11 - Toxicological Information.

Routes of Exposure: Eyes. Dermal (skin) contact. Inhalation.
Target Organs/Medical Conditions Aggravated by Overexposure: Eyes. Skin. Respiratory System.

MATERIAL SAFETY DATA SHEET

MSDS No. 10374

Trade Name: **SUPER-VIS***

Revision Date: 07/21/2009

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3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No.	Wt. %	Comments:
Xanthan gum	11138-66-2	100	No comments.

4. FIRST AID MEASURES

Eye Contact:	Promptly wash eyes with lots of water while lifting eye lids. Look for and remove contact lenses. Continue to rinse for at least 15 minutes. Get medical attention if any discomfort continues.
Skin Contact:	Wash skin thoroughly with soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if any discomfort continues.
Inhalation:	Move person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:	Dilute with 2 - 3 glasses of water or milk, if conscious. Never give anything by mouth to an unconscious person. If signs of irritation or toxicity occur seek medical attention.
General notes:	Persons seeking medical attention should carry a copy of this MSDS with them.

5. FIRE FIGHTING MEASURES

Flammable Properties

Flash Point: F (C):	NA
Flammable Limits in Air - Lower (%):	ND
Flammable Limits in Air - Upper (%):	ND
Autoignition Temperature: F (C):	>392 (F)
Flammability Class:	NA
Other Flammable Properties:	Particulate may accumulate static electricity. Dusts at sufficient concentrations can form explosive mixtures with air.
Extinguishing Media:	Use extinguishing media appropriate for surrounding fire.

Protection Of Fire-Fighters:

Special Fire-Fighting Procedures: Do not enter fire area without proper personal protective equipment, including NIOSH/MSHA approved self-contained breathing apparatus. Evacuate area and fight fire from a safe distance. Water spray may be used to keep fire-exposed containers cool. Keep water run off out of sewers and waterways.

Hazardous Combustion Products: Oxides of: Carbon.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions:	Use personal protective equipment identified in Section 8.
Spill Procedures:	Evacuate the spill area with the exception of the spill response team. Wet product may create a slipping hazard. Contain spilled material. Do not allow spilled material to enter sewers, storm drains or surface waters. Avoid the generation of dust. Sweep, vacuum, or shovel and place into closable container for disposal.
Environmental Precautions:	Waste must be disposed of in accordance with federal, state and local laws.

MATERIAL SAFETY DATA SHEET

MSDS No. 10374

Trade Name: **SUPER-VIS***

Revision Date: 07/21/2009

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7. HANDLING AND STORAGE

Handling: Put on appropriate personal protective equipment. Avoid contact with skin and eyes. Avoid generating or breathing dust. Product is slippery if wet. Use only with adequate ventilation. Wash thoroughly after handling.

Storage: Store in dry, well-ventilated area. Keep container closed. Store away from incompatibles. Follow safe warehousing practices regarding palletizing, banding, shrink-wrapping and/or stacking.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Limits (TLV & PEL - 8H TWA):

Ingredient	CAS No.	Wt. %	ACGIH TLV	OSHA PEL	Other	Notes
Xanthan gum	11138-66-2	100	NA	NA	NA	(1)

Notes

(1) Control as an ACGIH particulate not otherwise specified (PNOS): 10 mg/m³ (Inhalable); 3 mg/m³ (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m³ (Total); 5 mg/m³ (Respirable).

Engineering Controls: Use appropriate engineering controls such as, exhaust ventilation and process enclosure, to ensure air contamination and keep workers exposure below the applicable limits.

Personal Protection Equipment

All chemical Personal Protective Equipment (PPE) should be selected based on an assessment of both the chemical hazards present and the risk of exposure to those hazards. The PPE recommendations below are based on our assessment of the chemical hazards associated with this product. The risk of exposure and need for respiratory protection will vary from workplace to workplace and should be assessed by the user.

Eye/Face Protection: Dust resistant safety goggles.

Skin Protection: Not normally necessary. If needed to minimize irritation: Wear appropriate clothing to prevent repeated or prolonged skin contact. Wear chemical resistant gloves such as: Nitrile. Neoprene.

Respiratory Protection: All respiratory protection equipment should be used within a comprehensive respiratory protection program that meets the requirements of 29 CFR 1910.134 (U.S. OSHA Respiratory Protection Standard) or local equivalent.

If exposed to airborne particles of this product use at least a NIOSH-approved N95 half-mask disposable or re-useable particulate respirator. In work environments containing oil mist/aerosol use at least a NIOSH-approved P95 half-mask disposable or re-useable particulate respirator.

General Hygiene Considerations: Work clothes should be washed separately at the end of each work day. Disposable clothing should be discarded, if contaminated with product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Color: White to tan
Odor: Slight
Physical State: Powder, dust.

MATERIAL SAFETY DATA SHEET

MSDS No. 10374

Trade Name: **SUPER-VIS***
Revision Date: 07/21/2009

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pH: 5.4 - 8.6 (1% solution)
Specific Gravity (H₂O = 1): ND
Solubility (Water): Soluble
Melting/Freezing Point: ND
Boiling Point: ND
Vapor Pressure: NA
Vapor Density (Air=1): NA
Evaporation Rate: ND
Odor Threshold(s): ND

10. STABILITY AND REACTIVITY

Chemical Stability: Stable
Conditions to Avoid: ND
Materials to Avoid: Oxidizers.
Hazardous Decomposition Products: For thermal decomposition products, see Section 5.
Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Component Toxicological Data: Any adverse component toxicological effects are listed below. If no effects are listed, no such data were found.

Ingredient	CAS No.	Acute Data
Xanthan gum	11138-66-2	Oral LD50: > 5,000 mg/kg (rat)

Product Toxicological Information:

Long term inhalation of particulate can cause irritation, inflammation and/or permanent injury to the lungs. Illnesses such as pneumoconiosis ("dusty lung"), pulmonary fibrosis, chronic bronchitis, emphysema and bronchial asthma may develop.

12. ECOLOGICAL INFORMATION

Component Ecotoxicity Data: Component ecotoxicity data are listed below. If no data are listed, none was found in the component review.

Ingredient	CAS No.	Data
Xanthan gum	11138-66-2	LC50 96H: 490 mg/l (rainbow trout); LC50 48H: 980 mg/l (Daphnia magna)

Product Ecotoxicity Data: Contact M-I Environmental Affairs Department for available product ecotoxicity data.

Biodegradation: ND
Bioaccumulation: ND
Octanol/Water Partition Coefficient: ND

13. DISPOSAL CONSIDERATIONS

MATERIAL SAFETY DATA SHEET

MSDS No. 10374

Trade Name: **SUPER-VIS***
Revision Date: 07/21/2009

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Waste Classification: ND

Waste Management: Under U.S. Environmental Protection Agency (EPA) Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user to determine at the time of disposal, whether the product meets RCRA criteria for the hazardous waste. This is because product uses, transformations, mixtures, processes, etc., may render the resulting materials hazardous. Empty containers retain residues. All labeled precautions must be observed.

Disposal Method: Recover and reclaim or recycle, if practical. Should this product become a waste, dispose of in a permitted industrial landfill. Ensure that the containers are empty by the RCRA criteria prior to disposal in a permitted industrial landfill.

14. TRANSPORT INFORMATION

U.S. DOT

Shipping Description: Not regulated for transportation by DOT, TDG, IMDG, ICAO/IATA.

Canada TDG Shipping Description: Not regulated.

UN PIN No: Not regulated.

IMDG Shipping Description: Not regulated.

ICAO/IATA Shipping Description: Not regulated.

15. REGULATORY INFORMATION

U.S. Federal and State Regulations

SARA 311/312 Hazard Catagories:Not a SARA 311/312 hazard.

SARA 302/304, 313; CERCLA RQ, Note: If no components are listed below, this product is not subject to the referenced SARA and CERCLA regulations and is not known to contain a Proposition 65 listed chemical at a level that is expected to pose a significant risk under anticipated use conditions.

State Comments: Proposition 65: This product is not known to contain chemicals considered by the State of California's Safe Drinking Water and Toxic Enforcement Act of 1986 as causing cancer and/or reproductive toxicity at levels that are expected to pose a significant risk under anticipated use conditions.

International Chemical Inventories

Australia AICS - Components are listed or exempt from listing.
Canada DSL - Components are listed or exempt from listing.
China Inventory - Components are listed or exempt from listing.
European Union EINECS/ELINCS - Components are listed or exempt from listing.
Japan METI ENCS - Components are listed or exempt from listing.
Korea TCCL ECL - Components are listed or exempt from listing.
New Zealand - Components are listed or exempt from listing.
Philippine PICCS - Components are listed or exempt from listing.
U.S. TSCA - Components are listed or exempt from listing.
U.S. TSCA - No components are subject to TSCA 12(b) export notification requirements.

Canadian Classification:

MATERIAL SAFETY DATA SHEET

MSDS No. 10374

Trade Name: **SUPER-VIS***

Revision Date: 07/21/2009

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

WHMIS Class: Not a controlled product.

16. OTHER INFORMATION

The following sections have been revised: 1, 4, 6, 15, 16

NA - Not Applicable, ND - Not Determined.

*A mark of M-I L.L.C.

Disclaimer:

MSDS furnished independent of product sale. While every effort has been made to accurately describe this product, some of the data are obtained from sources beyond our direct supervision. We can not make any assertions as to its reliability or completeness; therefore, user may rely on it only at user's risk. We have made no effort to censor or conceal deleterious aspects of this product. Since we cannot anticipate or control the conditions under which this information and product may be used, we make no guarantee that the precautions we have suggested will be adequate for all individuals and/or situations. It is the obligation of each user of this product to comply with the requirements of all applicable laws regarding use and disposal of this product. Additional information will be furnished upon request to assist the user; however, no warranty, either expressed or implied, nor liability of any nature with respect to this product or to the data herein is made or incurred hereunder.



Shell Canada Limited Material Safety Data Sheet

Effective Date: 2006-06-05

Supersedes: 2003-06-05

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: **TELLUS* T 32**
SYNONYMS: LOW TEMPERATURE HYDRAULIC OIL
PRODUCT USE: Hydraulic Fluid
PRODUCT CODE: **407-159**

SUPPLIER

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

TELEPHONE NUMBERS

Shell Emergency Number

CANUTEC 24 HOUR EMERGENCY NUMBER

For general information:

1-800-661-7378

1-613-996-6666

1-800-661-1600

www.shell.ca

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

THIS PRODUCT IS NOT A WHMIS CONTROLLED SUBSTANCE.

See Section 8 for Occupational Exposure Guidelines.

3. HAZARDS IDENTIFICATION

Physical Description: Liquid Lightly Coloured Hydrocarbon Odour

Routes of Exposure: Exposure will most likely occur through skin contact or from inhalation of mechanically or thermally generated oil mists.

Hazards:

This product is not expected to be irritating and has a low level of toxicity under normal use.

Inhalation of oil mist or vapours from hot oil may cause irritation of the upper respiratory tract.

For further information on health effects, see Section 11.

4. FIRST AID MEASURES

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

Skin: Wipe excess from skin. Wash contaminated skin with mild soap and water for at least 15 minutes. If irritation occurs and persists, obtain medical attention. If material is injected under the skin, get medical attention promptly to prevent serious damage; do not wait for symptoms to develop.

Ingestion: Not normally required; obtain medical attention if large amounts have been ingested. Do not induce vomiting. If vomiting occurs spontaneously, keep head below hips to prevent

- Inhalation:** aspiration of liquid into the lungs. Remove victim from further exposure. Additional first aid treatment is not ordinarily required.
- Notes to Physician:** In general, lubricating oils have low oral toxicity. High pressure injection under the skin may have serious consequences and may require urgent treatment.

5. FIRE FIGHTING MEASURES

- Extinguishing Media:** Dry Chemical
Carbon Dioxide
Foam
Water Fog
- Firefighting Instructions:** Material will not burn unless preheated. Product will float and can be reignited on surface of water. Do not use a direct stream of water as it may spread fire. Use water to cool fire exposed containers. Water may be used to flush spills away from exposure. Do not enter confined fire space without adequate protective clothing and an approved positive pressure self-contained breathing apparatus.
- Hazardous Combustion Products:** Carbon monoxide, carbon dioxide and dense smoke are produced on combustion.

6. ACCIDENTAL RELEASE MEASURES

Eliminate all ignition sources. Isolate hazard area and restrict access. Wear appropriate breathing apparatus (if applicable) and protective clothing. Stop leak only if safe to do so. Spilled material is slippery. Dike and contain land spills; contain spills to water by booming. For large spills remove by mechanical means and place in containers. Adsorb residue or small spills with adsorbent material and remove to non-leaking containers for disposal. 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, formation of oil mist, breathing of vapours and mist of hot oil and prolonged or repeated contact with skin. 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.

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):

Oil mist (mineral): 5 mg/m³ (STEL: 10 mg/m³)

- Mechanical Ventilation:** Not normally required. Local ventilation is recommended if oil mist is present or if exposure limit is exceeded. Make up air should always be supplied to balance air exhausted (either generally or locally).

PERSONAL PROTECTIVE EQUIPMENT:

- Eye Protection:** No special eye protection is routinely necessary. Wear safety glasses as appropriate.
- Skin Protection:** Not normally needed. Chemically-resistant gloves should be worn for frequent or

Respiratory Protection: prolonged contact with this product.
Not normally required under intended conditions of use. If airborne concentration is high (e.g. when product is heated), use a NIOSH-approved chemical cartridge respirator with organic vapour cartridges in combination with a P95 particulate filter.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid	Odour:	Hydrocarbon Odour
Appearance:	Lightly Coloured	Odour Threshold:	Not available
Pour Point	Pour Point < -39 °C	Boiling Point	
Vapour Pressure (absolute):		Vapour Density (air = 1):	Not available
Density:	approximately 869 kg/m ³ @ 15 °C	Flash Point	COC > 160 °C
Specific Gravity (Water = 1):		Lower Flammable Limit:	Not available
pH:	Not applicable	Upper Flammable Limit:	Not available
Viscosity:	28.8 - 35.2 cSt @ 40 °C	Auto-ignition Temperature:	Not available
Evaporation Rate (n-BuAc = 1):	Not available	Partition Coefficient (log K_{ow}):	Not available
Water Solubility:	Insoluble	Molecular Weight:	
Other Solvents:	Hydrocarbon Solvents	Formula:	

10. STABILITY AND REACTIVITY

Chemically Stable:	Yes	Hazardous Polymerization:	No
Sensitive to Mechanical Impact:	No	Sensitive to Static Discharge:	No
Incompatible Materials:	Avoid strong oxidizing agents.		
Conditions of Reactivity:	Avoid excessive heat, formation of vapours or mists.		

11. TOXICOLOGICAL INFORMATION

Routes of Exposure:	Exposure will most likely occur through skin contact or from inhalation of mechanically or thermally generated oil mists.
Irritancy:	This product is not a primary skin irritant after exposure of short duration, is not a skin sensitizer and is not irritating to the eyes.
Acute Toxicity:	This product is not expected to be irritating and has a low level of toxicity under normal use.
Chronic Effects:	Prolonged or repeated contact may cause various forms of dermatitis including folliculitis and oil acne. Long term intensive exposure to oil mist may cause benign lung fibrosis.

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.
Biodegradability:	Not readily biodegradable.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are: 1. recycle (reprocess), 2. energy recovery 3. incineration, 4. disposal at a licenced waste disposal facility. Do not attempt to combust waste on-site.

14. TRANSPORT INFORMATION**Canadian Road and Rail Shipping Classification:**

This product is not regulated under the Canadian Transportation of Dangerous Goods Regulations for transport by road and rail.

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.

DSL/NDSL Status:

THIS PRODUCT IS NOT A WHMIS CONTROLLED SUBSTANCE.

One or more of the components of this product are listed on the NDSL. All other components are on the DSL. This product and/or all components are listed on the U.S. EPA TSCA Inventory.

Other Regulatory Status:

No Canadian federal standard; however, for general discharge guidance, federal installations limited to 15 mg/L for total oil and grease. Provincial criteria are likely and should be requested when notifying provincial authorities.

16. OTHER INFORMATION**Revisions:**

This MSDS has been reviewed and updated. Changes have been made to: Section 5
Section 8 Section 15

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.** DATE: Dec. 23, 2008
8750-53 Ave. PHONE: 780-468-4064
Edmonton, AB T6E 5G2 FAX: 780-469-1899

PRODUCT NAME: **W-OB POLYMER**

PRODUCT USE: Drilling mud additive
CHEMICAL FAMILY: Polysaccharide suspension CAS #: Mixture

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: D2B
WORKPLACE HAZARD: Skin and eye irritant

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

<u>INGREDIENT</u>	<u>% (v/v)</u>	<u>CAS NUMBER</u>	<u>LD₅₀ Oral-Rat</u>	<u>LC₅₀ Inhal-Rat</u>	<u>ACGIH-TLV</u>
Ethoxylated nonylphenol	1-5	9016-45-9	5100 mg/kg	Not determined	Not available

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: [XX] EYE CONTACT [XX] SKIN [XX] INHALATION [XX] INGESTION
EYE CONTACT: Irritant. Can cause redness, tearing and inflammation.
SKIN CONTACT: Irritant. Can cause redness, irritation and inflammation.
INGESTION: Low oral toxicity. May cause nausea, abdominal cramps and diarrhea.
INHALATION: High concentrations of vapour and mist can cause irritation of the nose and throat
CARCINOGENICITY: No information available.
TERATOGENICITY: No information available.
REPRODUCTIVE TOXICITY: No information available.

MUTAGENICITY: No information available.
SYNERGISTIC
PRODUCTS: No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT: Remove contaminated clothing. Immediately wash exposed area with water and soap for 5 minutes. If irritation persists, obtain medical attention.

EYE CONTACT: Immediately flush with gently flowing warm water for 15 minutes, or until irritation ceases. When flushing period is completed, obtain medical attention.

INGESTION: Rinse mouth and give 1 - 2 glasses of water to dilute. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs keep head below hips to prevent aspiration. Even small amounts of liquid drawn into the lungs from swallowing, or vomiting may cause severe health effects. Obtain medical attention. Never give anything by mouth if patient is unconscious, rapidly losing consciousness or convulsing.

INHALATION: Move patient to fresh air. Apply oxygen or artificial respiration if required. If breathing difficulties or distress continues obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	Opaque dark yellow to beige liquid; little odour	
SPECIFIC GRAVITY:	1.078	
BOILING POINT (°C):	Not determined	
MELTING POINT (°C):	Not determined	
SOLUBILITY IN WATER:	Dispersible	pH: Not determined
PERCENT VOLATILE BY VOLUME:	Not determined	
EVAPORATION RATE:	Not determined	
VAPOUR PRESSURE (mmHg):	Not determined	
VAPOUR DENSITY (air = 1):	Not determined	
BULK DENSITY:	Not applicable	

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	Not flammable
FLAMMABLE LIMITS:	Not determined
EXTINGUISHING MEDIA:	CO ₂ , water, mist, foam
SPECIAL FIRE FIGHTING PROCEDURES:	Self-contained breathing apparatus required for fire fighting personnel.

**UNUSUAL FIRE AND
EXPLOSION HAZARDS:**

None known.

SECTION VII: REACTIVITY DATA

STABILITY:	STABLE [XX]	UNSTABLE []
INCOMPATIBILITY (CONDITIONS TO AVOID):	Strong oxidizers and acids.	
CONDITIONS OF REACTIVITY:	Not applicable.	
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxides of carbon on combustion.	
HAZARDOUS POLYMERIZATION:	WILL NOT OCCUR [XX]	MAY OCCUR []

SECTION VIII: PREVENTATIVE MEASURES**SPECIAL PROTECTION INFORMATION**

RESPIRATORY PROTECTION:	An approved respirator with organic vapour cartridge if TLV is exceeded.
VENTILATION:	Use local exhaust ventilation, process enclosure or other engineering control to prevent exposure.
PROTECTIVE GLOVES:	Rubber or viton gloves recommended.
EYE PROTECTION:	Chemical goggles and/or face shield required. Do not wear contact lenses.
OTHER PROTECTIVE EQUIPMENT (Specify):	It is recommended that chemical resistant protective clothing be worn at all times when handling this product. Make eye bath and emergency shower available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid ingestion. Practice reasonable caution and personal cleanliness. Avoid skin and eye contact. Avoid inhalation of vapours or mists. Wear suitable protection for eyes and skin when handling. Launder contaminated clothing before reuse. Avoid contact with incompatible materials. Store in cool, well-ventilated area away from sources of ignition. Keep container tightly closed when not in use. Store unused material in original container. Handle and store empty containers as if full.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Use appropriate safety equipment including respiratory protection. Eliminate ignition sources. Ventilate area. Stop leak if possible to do so without risk. Soak up small spills with absorbent material. Contain large spills using absorbent materials. Collect spilled material and absorbents in approved containers for disposal. Prevent entry into bodies of water or sewer systems.

WASTE DISPOSAL METHOD

Dispose in accordance with federal, provincial and local regulations. It is the responsibility of the end-user to determine at the time of disposal whether the product meets criteria for hazardous waste. Empty containers, which have not been cleaned and purged, contain residual hazardous material and must be disposed of, or recycled, according to local regulations.

SECTION IX: PREPARATION

THE INFORMATION CONTAINED HEREIN IS GIVEN IN GOOD FAITH,
BUT NO WARRANTY, EXPRESSED OR IMPLIED, IS MADE.

DATE ISSUED:	December 23, 2008	BY:	Product safety committee
SUPERSEDES:	January 18, 2006	PHONE:	780-440-4923

**Diversity Technologies Corp. is the parent company of
Canamara-United Supply, Hollimex Products, The Drilling Depot and
Westcoast Drilling Supplies.**

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

MSDS No: M00486

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: COD TNTPlus™, LR (3-150 MG/L)
Catalog Number: TNT821

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00486
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
PIN: 1830
Intended Use: Determination of Chemical Oxygen Demand
Date of MSDS Preparation:
Day: 22
Month: February
Year: 2010
MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Mercuric Sulfate

Percent Range: 0.1 - 1.0
Percent Range Units: weight / weight
CAS No.: 7783-35-9 Contains Mercury. Dispose Per Local, State or Federal Laws.
LD50: Oral rat LD₅₀ = 57 mg/kg; Oral mouse LD₅₀ = 25 mg/kg.
LC50: None reported
TLV: 0.05 mg/m³ (Hg)
PEL: 0.1 mg/m³ (Hg)
Ingredient WHMIS Symbol: Acute Poison

Demineralized Water

Percent Range: 15.0 - 25.0
Percent Range Units: weight / weight
CAS No.: 7732-18-5
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

Chromic Acid

Percent Range: 0.01 - 0.1
Percent Range Units: weight / weight
CAS No.: 13530-68-2
LD50: None reported
LC50: Inhalation human TCLo = 110 µg/m³

TLV: 0,05 mg/m³ (0.0235 ppm) as Cr⁺⁶
PEL: 5 µg/m³ (0.00235 ppm Cr⁺⁶), 8 Hr TWA; Action Level is 2.5 µg/m³ (0.00117 ppm), 8 Hr TWA
Ingredient WHMIS Symbol: Not applicable

Silver Sulfate

Percent Range: 0.5 - 3.0
Percent Range Units: weight / weight
CAS No.: 10294-26-5
LD50: None reported
LC50: None reported
TLV: 0.01 mg/m³ (Ag)
PEL: 0.01 mg/m³ (Ag)
Ingredient WHMIS Symbol: Not applicable

Sulfuric Acid

Percent Range: 80.0 - 90.0
Percent Range Units: weight / weight
CAS No.: 7664-93-9
LD50: Oral rat LD50 = 2140 mg/kg.
LC50: Inhalation rat LC50 = 87 ppm/4 hr
TLV: 1 mg/m³ (TWA); 3 mg/m³ (STEL)
PEL: 1 mg/m³
Ingredient WHMIS Symbol: Acute Poison Corrosive

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: Turbid, light orange liquid
Physical State: Liquid
Odor: Not determined
MAY BE FATAL IF SWALLOWED CAUSES SEVERE BURNS HARMFUL IF INHALED OR ABSORBED THROUGH SKIN
CANCER HAZARD CONTAINS MATERIAL WHICH CAN CAUSE CANCER CAN CAUSE KIDNEY AND CENTRAL NERVOUS SYSTEM EFFECTS

HMIS:

Health: 3*
Flammability: 0
Reactivity: 2
Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: Causes severe burns
Skin Contact: Causes severe burns
Skin Absorption: Will be absorbed through the skin. Effects similar to those of ingestion
Target Organs: Central nervous system Kidneys
Ingestion: Causes: severe burns May cause: abdominal pain circulatory disturbances diarrhea loosening of the teeth nausea vomiting rapid pulse and respirations toxic nephritis (inflammation of the kidneys) shock collapse kidney damage death
Target Organs: Central nervous system Kidneys
Inhalation: Toxic. Causes: severe burns May cause: difficult breathing mouth soreness teeth erosion Effects similar to those of ingestion. Inhalation of mists / sprays: Causes asthma Causes damage to the nasal epithelia Causes lung cancer
Target Organs: Central nervous system Kidneys Lungs Teeth Nasal cavity
Medical Conditions Aggravated: Pre-existing: Eye conditions Skin conditions Respiratory conditions Allergies or sensitivity to chromates or chromic acid. Allergies or sensitivity to mercury.
Chronic Effects: Chronic overexposure may cause destruction of any tissue contacted erosion of the teeth mouth soreness chronic irritation or inflammation of the lungs accumulation of silver in body tissues which causes a slate-gray

to bluish discoloration. Chromate and dichromate salts may cause ulceration and perforation of the nasal septum, severe liver damage, central nervous system effects, and lung cancer. Mercury is a general protoplasmic poison; it circulates in the blood and is stored in the liver, kidneys, spleen and bones. Main symptoms are sore mouth, tremors and psychic disturbances.

Cancer / Reproductive Toxicity Information:

An ingredient of this mixture is: IARC Group 1: Recognized Carcinogen

Hexavalent Chromium Compounds Sulfuric Acid - The IARC evaluation was based on exposure to the mist or vapor of concentrated sulfuric acid generated during chemical processes.

An ingredient of this mixture is: NTP Listed Group 1: Recognized Carcinogen

Hexavalent Chromium Compounds

Additional Cancer / Reproductive Toxicity Information: Contains: an experimental teratogen.

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Class D, Division 1, Subdivision A - Very toxic materials (immediate effects) Class D, Division 2, Subdivision A - Very toxic materials (other toxic effects) Class E - Corrosive material

WHMIS Symbols: Acute Poison Corrosive

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with plenty of water for 15 minutes. Remove contaminated clothing. Call physician immediately.

Ingestion (First Aid): Do not induce vomiting. Give large quantities of water. Never give anything by mouth to an unconscious person. Call physician immediately.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: Not Flammable, but reacts with most metals to form flammable hydrogen gas. During a fire, corrosive and toxic gases may be generated by thermal decomposition.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not applicable

Hazardous Combustion Products: This material will not burn.

Fire / Explosion Hazards: Contact with metals gives off hydrogen gas which is flammable. May react violently with: strong bases water

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Use media appropriate to surrounding fire conditions

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear. Evacuate area and fight fire from a safe distance. Water runoff can cause environmental damage. Dike and collect water used to fight fire.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Releases of this material may contaminate the environment. Absorb spilled liquid with non-reactive sorbent material. Stop spilled material from being released to the environment. Dike the spill to contain material for later disposal.

Clean-up Technique: Mercury and its compounds are extremely toxic! Be extremely careful not to contact the spill or breathe any vapors. Absorb spilled liquid with non-reactive sorbent material. Dispose of all mercury contaminated material at an E.P.A. hazardous waste facility. Dispose of material in an E.P.A. approved hazardous waste facility. Decontaminate area with commercially available mercury absorbing compounds.

Evacuation Procedure: Evacuate general area (50 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. Deny access to unnecessary and unprotected personnel. Remain up-wind from spilled material. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: 137

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe mist or vapors. Use with adequate ventilation. Maintain general industrial hygiene practices when using this product.

Storage: Protect from: light contamination by organic materials (will affect product stability) heat

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Have a safety shower nearby. Use a fume hood to avoid exposure to dust, mist or vapor. Maintain general industrial hygiene practices when using this product. Refer to the OSHA Standard at 29CFR1910.1026 for Cr (VI) (See Federal Register 28 February 2006 Page 10100.)

Personal Protective Equipment:

Eye Protection: chemical splash goggles

Skin Protection: disposable latex gloves lab coat

Inhalation Protection: laboratory fume hood

Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: mist/vapor Wash thoroughly after handling. Use with adequate ventilation. Protect from: light organic materials heat Keep away from: alkalies metals other combustible materials oxidizers reducers

TLV: Not established. 0.05 mg/m³ (0.0235 ppm as Cr⁺⁶).

PEL: Not established. 5 µg/m³ (0,00235 ppm Cr⁺⁶), 8 Hr TWA; Action Level is 2,5 µg/m³ (0,00117 ppm), 8 Hr TWA

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Turbid, light orange liquid

Physical State: Liquid

Molecular Weight: Not applicable

Odor: Not determined

pH: < 0.5

Vapor Pressure: Not determined

Vapor Density (air = 1): Not determined

Boiling Point: ~ 105°C (~ 221°F)

Melting Point: Not applicable

Specific Gravity (water = 1): ~ 1.78

Evaporation Rate (water = 1): Not determined

Volatile Organic Compounds Content: Not applicable

Coefficient of Water / Oil: Not applicable

Solubility:

Water: Miscible

Acid: Not determined

Other: Not determined

Metal Corrosivity:

Steel: Corrosive

Aluminum: Corrosive

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.

Conditions to Avoid: Exposure to light or contamination by organic materials will affect this product's stability.

Reactivity / Incompatibility: May react violently in contact with: caustics

Hazardous Decomposition: Heating to decomposition releases toxic and/or corrosive fumes of: mercury compounds sulfur oxides

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:

LD50: Oral rat (male) LD₅₀ = 428 mg/kg; Oral rat (female) LD₅₀ = 360 mg/kg.

LC50: None reported

Dermal Toxicity Data: None reported

Skin and Eye Irritation Data: None reported

Mutation Data: None reported

Reproductive Effects Data: None reported

--

Ingredient Toxicological Data: Sulfuric Acid: Oral rat LD₅₀ = 2140 mg/kg; Mercuric Sulfate: Oral rat LD₅₀ = 57 mg/kg, Oral mouse LD₅₀ = 25 mg/kg.

12. ECOLOGICAL INFORMATION

Product Ecological Information: --

No ecological data available for this product.

Ingredient Ecological Information: --

No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Dispose of all mercury contaminated material at an E.P.A. hazardous waste facility. Dispose of material in an E.P.A. approved hazardous waste facility.

Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash. Rinsate from empty containers may contain sufficient product to require disposal as hazardous waste.

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:

Proper Shipping Name: Sulphuric Acid Solution

--

Hazard Class: 8

PIN: 1830

Group: II

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL Listed.

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

16. OTHER INFORMATION

References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. Cassaret and Doull's Toxicology, 3rd Ed. New York: Macmillan Publishing Co., Inc., 1986. CCINFO RTECS. Canadian Centre for Occupational Health and Safety. Hamilton, Ontario Canada: 30 June 1993. Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Association, 1991. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. World Health Organization (Volumes 1-42) Supplement 7. France: 1987. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992. Outside Testing. Sixth Annual Report on Carcinogens, 1991. U.S. Department of Health and Human Services. Rockville, MD: Technical Resources, Inc. 1991. Technical Judgment. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Verschueren, Karel. Handbook of Environmental Data on Organic Chemicals. New York: Van Nostrand Reinhold Co., 1977.

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

**THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE.
HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA
OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.**

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MSDS No: M00035

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: PhosVer ® 3 Phosphate Reagent
Catalog Number: 2106046

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00035

Chemical Name: Not applicable

CAS No.: Not applicable

Chemical Formula: Not applicable

Chemical Family: Not applicable

PIN: NA

Intended Use: Phosphate determination

Date of MSDS Preparation:

Day: 15

Month: October

Year: 2009

MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Potassium Pyrosulfate

Percent Range: 75.0 - 85.0

Percent Range Units: weight / weight

CAS No.: 7790-62-7

LD50: Oral rat LD50 = 2340 mg/kg

LC50: None reported

TLV: Not established

PEL: Not established

Ingredient WHMIS Symbol: Other Toxic Effects

Ascorbic Acid

Percent Range: 15.0 - 25.0

Percent Range Units: weight / weight

CAS No.: 50-81-7

LD50: Oral rat LD50 = 11900 mg/kg

LC50: None reported

TLV: Not established

PEL: Not established

Ingredient WHMIS Symbol: Not applicable

Sodium Molybdate

Percent Range: 1.0 - 10.0

Percent Range Units: weight / weight

CAS No.: 10102-40-6

LD50: Oral rat LD₅₀ = 4000 mg/kg.

LC50: Inhalation rat LC50 = > 2080 mg/m³/4 hrs
TLV: 5 mg/m³ (as Mo)
PEL: 5 mg/m³ (as Mo)
Ingredient WHMIS Symbol: Not applicable

Other components, each

Percent Range: 0.1 - 1.0
Percent Range Units: weight / weight
CAS No.: Not applicable
LD50: Not applicable
LC50: Not applicable
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: White to off-white powder

Physical State: Solid

Odor: None

CAUSES EYE BURNS MAY CAUSE RESPIRATORY TRACT IRRITATION

HMIS:

Health: 3

Flammability: 1

Reactivity: 0

Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: Causes eye burns.

Skin Contact: No effects are anticipated

Skin Absorption: None Reported

Target Organs: None Reported

Ingestion: May cause: copper deficiency anemia gout loss of appetite loss of coordination listlessness diarrhea liver damage May effect enzyme activity.

Target Organs: Blood Liver

Inhalation: May cause: respiratory tract irritation Effects similar to those of ingestion.

Target Organs: Blood Liver

Medical Conditions Aggravated: Pre-existing: Eye conditions Respiratory conditions Gout

Chronic Effects: Chronic overexposure may cause copper deficiency enzyme activity effects liver damage Molybdenum poisoning signs include loss of appetite, listlessness and reduced growth rate. Excessive exposure to molybdenum compounds may cause gout and anemia.

Cancer / Reproductive Toxicity Information:

This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: Contains: an experimental mutagen.

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Class D, Division 2, Subdivision B - Toxic material (other toxic effects)

WHMIS Symbols: Other Toxic Effects

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with plenty of water.

Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: Can burn in fire, releasing toxic vapors.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not determined

Hazardous Combustion Products: Toxic fumes of: sulfur oxides. carbon monoxide, carbon dioxide. sodium monoxide

Fire / Explosion Hazards: None reported

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Use media appropriate to surrounding fire conditions

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Stop spilled material from being released to the environment.

Clean-up Technique: Scoop up spilled material into a large beaker and dissolve with water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.

Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled.

D.O.T. Emergency Response Guide Number: NONE

7. HANDLING / STORAGE

Handling: Avoid contact with eyes. Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Store between 10° and 25°C.

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Maintain general industrial hygiene practices when using this product.

Personal Protective Equipment:

Eye Protection: safety glasses with top and side shields

Skin Protection: disposable latex gloves lab coat

Inhalation Protection: adequate ventilation

Precautionary Measures: Avoid contact with: eyes. Do not breathe: dust. Wash thoroughly after handling.

TLV: Not established

PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: White to off-white powder

Physical State: Solid

Molecular Weight: Not applicable

Odor: None

pH: of a 5% solution = 1.5

Vapor Pressure: Not applicable

Vapor Density (air = 1): Not applicable
Boiling Point: Not applicable
Melting Point: 105 °C (221 °F)
Specific Gravity (water = 1): 2.22
Evaporation Rate (water = 1): Not applicable
Volatile Organic Compounds Content: Not applicable
Coefficient of Water / Oil: Not applicable
Solubility:
 Water: Soluble
 Acid: Soluble
 Other: Not determined
Metal Corrosivity:
 Steel: Not Applicable
 Aluminum: Not Applicable

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Extreme temperatures
Reactivity / Incompatibility: Incompatible with: oxidizers dyes alkalies iron copper
Hazardous Decomposition: Heating to decomposition releases: carbon dioxide carbon monoxide sulfur oxides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:

LD50: None reported

LC50: None reported

Dermal Toxicity Data: None reported

Skin and Eye Irritation Data: Not corrosive to skin, no erythema

Mutation Data: None reported

Reproductive Effects Data: None reported

--

Ingredient Toxicological Data: Potassium Pyrosulfate Oral rat LD50 = 2340 mg/kg; Sodium Molybdate Oral rat LD50 = 4000 mg/kg, Inhalation rat LC50 > 2080mg/m³/4 hr; Ascorbic Acid Oral rat LD50 = 11.9 g/kg

12. ECOLOGICAL INFORMATION

Product Ecological Information: --

No ecological data available for this product.

Ingredient Ecological Information: --

No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Work in an approved fume hood. Dilute material with excess water making a weaker than 5% solution. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.

Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:

Proper Shipping Name: Not Currently Regulated

--

Hazard Class: NA

PIN: NA

Group: NA

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL Listed.

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

16. OTHER INFORMATION

References: TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. In-house information. Technical Judgment. Outside Testing. NIOSH/OSHA Occupational Health Guidelines for Chemical Hazards. Cincinnati: Department of Health and Human Services, 1981. Sax, N. Irving. Dangerous Properties of Industrial Materials, 7th Ed. New York: Van Nostrand Reinhold Co., 1989. Gosselin, R. E. et al. Clinical Toxicology of Commercial Products, 5th Ed. Baltimore: The Williams and Wilkins Co., 1984. Vendor Information. Patty, Frank A. Industrial Hygiene and Toxicology, 3rd Revised Edition. Volume 2. New York: A Wiley-Interscience Publication, 1981.

Legend:

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ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

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MSDS No: M00039

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Potassium Persulfate
Catalog Number: 2084766

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00039
Chemical Name: Peroxydisulfuric Acid, Dipotassium Salt
CAS No.: 7727-21-1
Chemical Formula: K₂S₂O₈
Chemical Family: Oxidizing Agents
PIN: 1492
Intended Use: Laboratory Reagent
Date of MSDS Preparation:
Day: 15
Month: October
Year: 2009
MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Potassium Persulfate
Percent Range: 100.0
Percent Range Units: weight / weight
CAS No.: 7727-21-1
LD50: Oral Rat LD50 = 802 mg/kg
LC50: None reported
TLV: 5 mg/m³
PEL: Not established
Ingredient WHMIS Symbol: Oxidizing Other Toxic Effects

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: White to light yellow crystals
Physical State: Solid
Odor: None
CAUSES EYE AND RESPIRATORY TRACT IRRITATION
MAY CAUSE ALLERGIC SKIN AND RESPIRATORY REACTIONS
STRONG OXIDIZER: CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE

HMIS:
Health: 2
Flammability: 0
Reactivity: 0
Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: Causes severe irritation

Skin Contact: May cause irritation May cause allergic reaction

Skin Absorption: None Reported

Target Organs: None Reported

Ingestion: May cause: gastrointestinal irritation

Target Organs: None reported

Inhalation: Causes: irritation of nose and throat May cause: allergic respiratory reaction

Target Organs: None reported

Medical Conditions Aggravated: Pre-existing: Allergies or sensitivity to potassium persulfate.

Chronic Effects: Chronic overexposure may cause allergic skin reactions allergic respiratory reactions

Cancer / Reproductive Toxicity Information:

IARC Listed: No

NTP Listed: No

Additional Cancer / Reproductive Toxicity Information: None reported

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Class D, Division 2, Subdivision B - Toxic material (other toxic effects) Class C - Oxidizing materials

WHMIS Symbols: Oxidizing Other Toxic Effects

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with plenty of water. Call physician if irritation develops.

Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, this product decomposes to form toxic gases.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not determined

Hazardous Combustion Products: Toxic fumes of: sulfur oxides.

Fire / Explosion Hazards: May react violently with: strong reducers combustible materials

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Water.

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear. Evacuate area and fight fire from a safe distance.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Stop spilled material from being released to the environment. Cover spilled solid material with sand or other inert material.

Clean-up Technique: Remove all combustible materials from the spill area. Cover with an inert material, such as sand. Sweep up material. Incinerate material at an E.P.A. approved hazardous waste facility. Decontaminate the area of the spill with a soap solution.

Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: a pound or more of loose powder is spilled. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: 140

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Keep away from: reducers oxidizable materials Protect from: moisture heat

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Use a fume hood to avoid exposure to dust, mist or vapor.

Personal Protective Equipment:

Eye Protection: safety glasses with top and side shields

Skin Protection: lab coat disposable latex gloves

Inhalation Protection: laboratory fume hood

Precautionary Measures: Avoid contact with: eyes skin Do not breathe: dust Wash thoroughly after handling. Keep away from: oxidizable materials reducers

TLV: 5 mg/m³

PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: White to light yellow crystals

Physical State: Solid

Molecular Weight: 270.32

Odor: None

pH: of 5% solution = 4.1

Vapor Pressure: Not applicable

Vapor Density (air = 1): Not applicable

Boiling Point: Not applicable

Melting Point: Decomposes at >100°C or 212°F

Specific Gravity (water = 1): 2.477

Evaporation Rate (water = 1): Not applicable

Volatile Organic Compounds Content: 0.0%

Coefficient of Water / Oil: Not determined

Solubility:

Water: Soluble

Acid: Not determined

Other: Not determined

Metal Corrosivity:

Steel: 0.704 in/yr

Aluminum: 0.137 in/yr

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.

Conditions to Avoid: Excess moisture Exposure to air. Heating to decomposition.

Reactivity / Incompatibility: May react violently in contact with: oxidizable material reducers

Hazardous Decomposition: Heating to decomposition releases toxic and/or corrosive fumes of: sulfur oxides

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:

LD50: Oral Rat LD50 = 802 mg/kg

LC50: None reported

Dermal Toxicity Data: None reported

Skin and Eye Irritation Data: Testing showed only slight erythema to rabbit skin.

Mutation Data: None reported

Reproductive Effects Data: None reported

--

Ingredient Toxicological Data: --
Not applicable

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
Not applicable

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Incinerate material at an E.P.A. approved hazardous waste facility.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash. Rinsate from empty containers may contain sufficient product to require disposal as hazardous waste.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:
Proper Shipping Name: Potassium Persulphate
--
Hazard Class: 5.1
PIN: 1492
Group: III
Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:
Canadian Inventory Status: DSL Listed: Yes
This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

16. OTHER INFORMATION

References: TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. The Merck Index, 11th Ed. Rahway, New Jersey: Merck and Co., Inc., 1989. Technical Judgment. Sax, N. Irving. Dangerous Properties of Industrial Materials, 7th Ed. New York: Van Nostrand Reinhold Co., 1989. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992. In-house information. Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Association, 1991. CCINFO RTECS. Canadian Centre for Occupational Health and Safety. Hamilton, Ontario Canada: 30 June 1993. CCINFO MSDS/FTSS. Canadian Centre for Occupational Health and Safety. Hamilton, Ontario Canada: 30 June 1993. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor).

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

**THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE.
HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA
OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.**

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(970) 669-3050

MSDS No: M01622

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Sodium Hydroxide Solution, 1.54N
Catalog Number: 2743042

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M01622
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
PIN: 1824
Intended Use: Standard solution
Date of MSDS Preparation:
Day: 22
Month: February
Year: 2010
MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Sodium Hydroxide

Percent Range: 5.0 - 15.0
Percent Range Units: weight / volume
CAS No.: 1310-73-2
LD50: Oral rat LDLo = 500 mg/kg.
LC50: None reported
TLV: 2 mg/m³ Ceiling/STEL
PEL: 2 mg/m³
Ingredient WHMIS Symbol: Corrosive

Demineralized Water

Percent Range: > 90.0
Percent Range Units: volume / volume
CAS No.: 7732-18-5
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: Clear, colorless liquid

Physical State: Liquid
Odor: None
CAUSES SEVERE BURNS

HMIS:

Health: 3
Flammability: 0
Reactivity: 0
Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: Causes severe burns
Skin Contact: Causes severe burns
Skin Absorption: None Reported
Target Organs: None Reported
Ingestion: Causes: severe burns vomiting rapid pulse and respirations shock collapse death
Target Organs: None reported
Inhalation: Causes: severe burns
Target Organs: None reported
Medical Conditions Aggravated: Pre-existing: Eye conditions Skin conditions Respiratory conditions
Chronic Effects: None reported
Cancer / Reproductive Toxicity Information:
This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: None reported
Toxicologically Synergistic Products: None reported
WHMIS Hazard Classification: Class E - Corrosive material
WHMIS Symbols: Corrosive

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.
Skin Contact (First Aid): Wash skin with plenty of water for 15 minutes. Remove contaminated clothing. Call physician immediately.
Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.
Inhalation: Remove to fresh air.

5. FIRE FIGHTING MEASURES

Flammable Properties: Material will not burn.
Flash Point: Not applicable
Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not applicable
Hazardous Combustion Products: This material will not burn.
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Absorb spilled liquid with non-reactive sorbent material. Stop spilled material from being released to the environment.

Clean-up Technique: Cover spilled material with a dry acid, such as citric or boric. Scoop up slurry into a large beaker. Dilute with a large excess of water. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a weak acid solution.

Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: 154

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe mist or vapors. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Protect from: heat Keep away from: acids

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have a safety shower nearby. Have an eyewash station nearby. Maintain general industrial hygiene practices when using this product.

Personal Protective Equipment:

Eye Protection: chemical splash goggles

Skin Protection: disposable latex gloves lab coat

Inhalation Protection: adequate ventilation

Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: mist/vapor Wash thoroughly after handling. Protect from: heat Keep away from: acids/acid fumes

TLV: Not established

PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Clear, colorless liquid

Physical State: Liquid

Molecular Weight: Not applicable

Odor: None

pH: >13

Vapor Pressure: Not determined

Vapor Density (air = 1): Not determined

Boiling Point: Not determined

Melting Point: Not applicable

Specific Gravity (water = 1): Not determined

Evaporation Rate (water = 1): Not determined

Volatile Organic Compounds Content: Not applicable

Coefficient of Water / Oil: Not applicable

Solubility:

Water: Miscible

Acid: Reacts with acid

Other: Not determined

Metal Corrosivity:

Steel: Not determined

Aluminum: Not determined

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.

Conditions to Avoid: Heat Evaporation Exposure to air.

Reactivity / Incompatibility: May react violently in contact with: strong acids Incompatible with: halogenated organic compounds tin aluminum zinc nitro compounds

Hazardous Decomposition: No hazardous decomposition products known.

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:

LD50: None reported

LC50: None reported

Dermal Toxicity Data: None reported

Skin and Eye Irritation Data: None reported

Mutation Data: None reported

Reproductive Effects Data: None reported

--

Ingredient Toxicological Data: Sodium hydroxide: oral rat LDLo = 500 mg/kg

12. ECOLOGICAL INFORMATION

Product Ecological Information: --

No ecological data available for this product.

Ingredient Ecological Information: --

No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Dilute to 3 to 5 times the volume with cold water. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.

Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash. Rinsate from empty containers may contain sufficient product to require disposal as hazardous waste.

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:

Proper Shipping Name: Sodium Hydroxide Solution

--

Hazard Class: 8

PIN: 1824

Group: II

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL Listed.

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

16. OTHER INFORMATION

References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Technical Judgment. In-house information. Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Fire

Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Association, 1991. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992.

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

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MSDS No: M01616

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Phosphate Acid Reagent Vials
Catalog Number: 2742900

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M01616
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
PIN: 3264
Intended Use: Standard solution
Date of MSDS Preparation:
Day: 18
Month: February
Year: 2010
MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water

Percent Range: 90.0 - 100.0
Percent Range Units: volume / volume
CAS No.: 7732-18-5
LD50: None reported
LC50: None reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

Sulfuric Acid

Percent Range: 1 - 9
Percent Range Units: weight / weight
CAS No.: 7664-93-9
LD50: Oral rat LD50 = 2140 mg/kg.
LC50: Inhalation rat LC50 = 87 ppm/4 hr
TLV: 1 mg/m³ (TWA); 3 mg/m³ (STEL)
PEL: 1 mg/m³
Ingredient WHMIS Symbol: Corrosive Other Toxic Effects

3. HAZARDS IDENTIFICATION

Emergency Overview:
Appearance: Clear, colorless liquid

Physical State: Liquid

Odor: None

CAUSES EYE BURNS MAY CAUSE RESPIRATORY TRACT IRRITATION

CANCER HAZARD CONTAINS SULFURIC ACID WHICH CAN CAUSE CANCER

HMIS:

Health: 4

Flammability: 0

Reactivity: 0

Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: Causes eye burns.

Skin Contact: No effects are anticipated

Skin Absorption: None Reported

Target Organs: None Reported

Ingestion: Causes: irritation of the mouth and esophagus May cause: vomiting diarrhea

Target Organs: None reported

Inhalation: May cause: respiratory tract irritation teeth erosion mouth soreness difficult breathing

Target Organs: Lungs

Medical Conditions Aggravated: Pre-existing: Eye conditions Respiratory conditions

Chronic Effects: Chronic overexposure may cause erosion of the teeth chronic irritation or inflammation of the lungs cancer

Cancer / Reproductive Toxicity Information:

An ingredient of this mixture is: IARC Group 1: Recognized Carcinogen

Sulfuric Acid - The IARC evaluation was based on exposure to the mist or vapor of concentrated sulfuric acid generated during chemical processes.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: None reported

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Class E - Corrosive material Class D, Division 2, Subdivision A - Very toxic materials (other toxic effects)

WHMIS Symbols: Corrosive Other Toxic Effects

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with plenty of water.

Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air.

5. FIRE FIGHTING MEASURES

Flammable Properties: Material will not burn. During a fire, irritating and highly toxic gases may be generated by thermal decomposition.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not determined

Hazardous Combustion Products: This material will not burn.

Fire / Explosion Hazards: This product will not burn or explode.

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Use media appropriate to surrounding fire conditions

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Absorb spilled liquid with non-reactive sorbent material. Stop spilled material from being released to the environment.

Clean-up Technique: Cover spilled material with an alkali, such as soda ash or sodium bicarbonate. Scoop up slurry into a large beaker. Dilute with a large excess of water. Adjust to a pH between 6 and 9. Use sulfuric or citric acid to lower pH. Use soda ash or sodium bicarbonate to increase pH. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.

Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: 154

7. HANDLING / STORAGE

Handling: Avoid contact with eyes. Do not breathe mist or vapors. Use with adequate ventilation. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Store between 10° and 25°C.

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Use general ventilation to minimize exposure to mist, vapor or dust. Maintain general industrial hygiene practices when using this product.

Personal Protective Equipment:

Eye Protection: chemical splash goggles

Skin Protection: disposable latex gloves lab coat

Inhalation Protection: adequate ventilation

Precautionary Measures: Avoid contact with: eyes skin. Do not breathe: mist/vapor. Use with adequate ventilation. Protect from: heat

TLV: Not established

PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Clear, colorless liquid

Physical State: Liquid

Molecular Weight: Not applicable

Odor: None

pH: Not determined

Vapor Pressure: Not determined

Vapor Density (air = 1): Not determined

Boiling Point: Not determined

Melting Point: Not applicable

Specific Gravity (water = 1): Not determined

Evaporation Rate (water = 1): Not determined

Volatile Organic Compounds Content: Not applicable

Coefficient of Water / Oil: Not applicable

Solubility:

Water: Soluble

Acid: Not determined

Other: Not determined

Metal Corrosivity:

Steel: Not determined

Aluminum: Not determined

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.

Conditions to Avoid: Extreme temperatures Heating to decomposition.
Reactivity / Incompatibility: Incompatible with: alkalies oxidizers reducers
Hazardous Decomposition: Heating to decomposition releases toxic and/or corrosive fumes of: sulfur oxides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:

LD50: None reported

LC50: None reported

Dermal Toxicity Data: None reported

Skin and Eye Irritation Data: Skin irritation testing performed on 10% sulfuric acid showed SLIGHT to NO IRRITATION effects

Mutation Data: None reported

Reproductive Effects Data: None reported

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Ingredient Toxicological Data: Sulfuric acid: oral rat LD50 = 2140 mg/kg; inhalation rat LC50 = 87 ppm/4h

12. ECOLOGICAL INFORMATION

Product Ecological Information: --

No ecological data available for this product.

Ingredient Ecological Information: --

No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Work in an approved fume hood. Dilute to 3 to 5 times the volume with cold water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.

Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash. Rinsate from empty containers may contain sufficient product to require disposal as hazardous waste.

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:

Proper Shipping Name: Corrosive Liquid, Acidic, Inorganic, N.O.S.

(< 10 % Sulphuric Acid Solution)

Hazard Class: 8

PIN: 3264

Group: III

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL Listed.

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

16. OTHER INFORMATION

References: TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. In-house information. Technical Judgment. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. Vendor Information. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. World Health Organization (Volumes 1-42) Supplement 7. France: 1987.

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

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(970) 669-3050

MSDS No: M00127

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Ammonia Salicylate Reagent
Catalog Number: 2395266

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00127

Chemical Name: Not applicable

CAS No.: Not applicable

Chemical Formula: Not applicable

Chemical Family: Not applicable

PIN: NA

Intended Use: Reagent for ammonia test

Date of MSDS Preparation:

Day: 15

Month: October

Year: 2009

MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Sodium Salicylate

Percent Range: 40.0 - 50.0

Percent Range Units: weight / weight

CAS No.: 54-21-7

LD50: Oral rat LD₅₀ = 1200 mg/kg; Oral mouse LD₅₀ = 540 mg/kg; Oral rabbit LD₅₀ = 1700 mg/kg.

LC50: None reported.

TLV: Respirable particles: 3 mg/m³; Inhalable particles: 10 mg/m³

PEL: Total dust: 15 mg/m³; Respirable fraction: 5 mg/m³

Ingredient WHMIS Symbol: Other Toxic Effects

Sodium Nitroferri cyanide

Percent Range: < 1.0

Percent Range Units: weight / weight

CAS No.: 14402-89-2

LD50: Oral rat LD₅₀ = 99 mg/kg (anhydrous).

LC50: None reported.

TLV: 5 mg/m³ as CN⁻

PEL: 5 mg/m³ as CN⁻

Ingredient WHMIS Symbol: Other Toxic Effects

Other components, each

Percent Range: 0.1 - 1.0

Percent Range Units: weight / weight

CAS No.: Not applicable

LD50: Not applicable

LC50: Not applicable
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

Sodium Citrate

Percent Range: 40.0 - 50.0
Percent Range Units: weight / weight
CAS No.: 68-04-2
LD50: Oral rat LD50 >8 g/Kg
LC50: None Reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

Sodium Tartrate

Percent Range: 10.0 - 20.0
Percent Range Units: weight / weight
CAS No.: 6106-24-7
LD50: Oral rabbit LD50 = 5290 mg/kg
LC50: None Reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: Tan powder

Physical State: Solid

Odor: None

HARMFUL IF SWALLOWED, INHALED OR ABSORBED THROUGH SKIN MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION

CONTACT WITH ACIDS FORMS TOXIC FUMES

HMIS:

Health: 3

Flammability: 1

Reactivity: 0

Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: May cause irritation

Skin Contact: May cause irritation

Skin Absorption: Harmful if absorbed through the skin Effects similar to those of ingestion Sodium nitroferrocyanide produces a delayed cyanide poisoning reaction.

Target Organs: Central nervous system Blood

Ingestion: Sodium nitroferrocyanide produces a delayed cyanide poisoning reaction. May cause: headache nausea vomiting central nervous system effects

Target Organs: Central nervous system Blood

Inhalation: Sodium nitroferrocyanide produces a delayed cyanide poisoning reaction. May cause: headache nausea, vomiting central nervous system effects

Target Organs: Central nervous system Blood

Medical Conditions Aggravated: Allergies or sensitivity to aspirin or salicylates.

Chronic Effects: Chronic overexposure may cause confusion diarrhea fatigue weakness death Salicylates may cause ringing in the ears (tinnitus), abnormal bleeding, gastric ulceration, mental deterioration, skin eruption, temporary vision loss, and other optical effects.

Cancer / Reproductive Toxicity Information:

This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: Contains: an experimental mutagen. an experimental teratogen.

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Class D, Division 2, Subdivision A - Very toxic materials (other toxic effects)

WHMIS Symbols: Other Toxic Effects

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with soap and plenty of water. Remove contaminated clothing. Call physician immediately.

Ingestion (First Aid): Never give anything by mouth to an unconscious person. Call physician immediately.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: During a fire, this product decomposes to form toxic gases.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not determined.

Hazardous Combustion Products: May emit acrid smoke and fumes.

Fire / Explosion Hazards: This product will not burn or explode.

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Dry chemical. Carbon dioxide. Alcohol foam.

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear. Evacuate area and fight fire from a safe distance.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Releases of this material may contaminate the environment. Stop spilled material from being released to the environment.

Clean-up Technique: Avoid contact with spilled material. Sweep up material. Dilute with a large excess of water. Flush the spilled material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.

Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: a pound or more of loose powder is spilled. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Store between 10° and 25°C. Keep away from: acids / acid fumes. oxidizers

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Use a fume hood to avoid exposure to dust, mist or vapor.

Personal Protective Equipment:

Eye Protection: safety glasses with top and side shields

Skin Protection: lab coat disposable latex gloves

Inhalation Protection: laboratory fume hood
Precautionary Measures: eyes skin clothing Do not breathe: dust Wash thoroughly after handling. Use with adequate ventilation. Keep away from: acids/acid fumes oxidizers
TLV: Not established.
PEL: Not established.

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Tan powder
Physical State: Solid
Molecular Weight: Not applicable
Odor: None
pH: 7.84 (5% solution)
Vapor Pressure: Not applicable
Vapor Density (air = 1): Not applicable
Boiling Point: Not applicable
Melting Point: 97°C (206.6°F)
Specific Gravity (water = 1): 1.689
Evaporation Rate (water = 1): Not applicable
Volatile Organic Compounds Content: None.
Coefficient of Water / Oil: Not applicable
Solubility:
 Water: Soluble.
 Acid: Soluble.
 Other: Not determined.
Metal Corrosivity:
 Steel: Not applicable
 Aluminum: Not applicable

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Heating to decomposition. Extreme temperatures
Reactivity / Incompatibility: Incompatible with: acids iodine iron salts lead acetate organic materials oxidizers silver nitrate sodium phosphate
Hazardous Decomposition: Heating to decomposition releases toxic and/or corrosive fumes of: cyanide nitrogen oxides sodium oxides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
 LD50: None reported.
 LC50: None reported.
 Dermal Toxicity Data: None reported.
 Skin and Eye Irritation Data: None reported.
 Mutation Data: None reported.
 Reproductive Effects Data: None reported.
 --
Ingredient Toxicological Data: Sodium Salicylate: Oral rat LD₅₀ = 1200 mg/kg; Sodium Citrate: Oral rat LD₅₀ > 8 g/kg; Sodium Tartrate: Oral rabbit LD₅₀ = 5290 mg/kg; Sodium Nitroferriacyanide: Oral rat LD₅₀ = 99 mg/kg.

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Dilute to 3 to 5 times the volume with cold water. Flush system with plenty of water.

Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:

Proper Shipping Name: Not Currently Regulated

--

Hazard Class: NA

PIN: NA

Group: NA

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL/NDSL Listed.

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

16. OTHER INFORMATION

References: TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Technical Judgment. Sixth Annual Report on Carcinogens, 1991. U.S. Department of Health and Human Services. Rockville, MD: Technical Resources, Inc. 1991. Sax, N. Irving. Dangerous Properties of Industrial Materials, 7th Ed. New York: Van Nostrand Reinhold Co., 1989. List of Dangerous Substances Classified in Annex I of the EEC Directive (67/548) - Classification, Packaging and Labeling of Dangerous Substances, Amended July 1992. In-house information. IARC Monographs on the Evaluation of the Carcinogenic Risks to Humans. World Health Organization (Volumes 1-42) Supplement 7. France: 1987. Gosselin, R. E. et al. Clinical Toxicology of Commercial Products, 5th Ed. Baltimore: The Williams and Wilkins Co., 1984. Cassaret and Doull's Toxicology, 3rd Ed. New York: Macmillan Publishing Co., Inc., 1986. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor).

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

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Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

MSDS No: M00128

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Ammonia Cyanurate Reagent
Catalog Number: 2395466

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M00128
Chemical Name: Not Applicable
CAS No.: Not Applicable
Chemical Formula: Not Applicable
Chemical Family: Not applicable
PIN: 1759
Intended Use: Reagent for ammonia test
Date of MSDS Preparation:
Day: 15
Month: October
Year: 2009
MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Sodium Dichloroisocyanurate

Percent Range: 1.0 - 5.0
Percent Range Units: weight / weight
CAS No.: 2893-78-9
LD50: Oral rat LD50 = 1400 mg/kg; Oral human LDLo = 3570 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

Lithium Hydroxide, Anhydrous

Percent Range: 1.0 - 5.0
Percent Range Units: weight / weight
CAS No.: 1310-65-2
LD50: Oral rat LD50 = 225 mg/kg
LC50: Inhalation rat LC50 = 980 mg/m³/4H
TLV: 3mg/m³ Respirable Particles; 10 mg/m³ Inhalable particles
PEL: 5 mg/m³ Respirable Fraction; 15 mg/m³ Total Dust
Ingredient WHMIS Symbol: Corrosive

Sodium Citrate

Percent Range: 80.0 - 90.0
Percent Range Units: weight / weight
CAS No.: 68-04-2
LD50: Oral rat LD50 >8 g/Kg

LC50: None Reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

Sodium Tartrate

Percent Range: 5.0 - 15.0
Percent Range Units: weight / weight
CAS No.: 6106-24-7
LD50: Oral rabbit LD50 = 5290 mg/kg
LC50: None Reported
TLV: Not established
PEL: Not established
Ingredient WHMIS Symbol: Not applicable

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: White powder
Physical State: Solid
Odor: Chlorine
CAUSES BURNS HARMFUL IF SWALLOWED
MAY CAUSE KIDNEY OR LIVER DAMAGE BASED ON ANIMAL DATA

HMIS:

Health: 3
Flammability: 1
Reactivity: 1
Protective Equipment: X - See protective equipment, Section 8.

Potential Health Effects:

Eye Contact: Causes eye burns.
Skin Contact: Causes burns.
Skin Absorption: None Reported
Target Organs: None Reported
Ingestion: Causes: burns May cause: dizziness nausea kidney damage liver damage
Target Organs: Liver Kidneys Central nervous system Bone marrow
Inhalation: Causes: burns May cause: shortness of breath coughing
Target Organs: None reported
Medical Conditions Aggravated: Pre-existing: Eye conditions Skin conditions Respiratory conditions
Chronic Effects: Lithium compounds have been implicated in development of aplastic anemia. Signs of lithium poisoning include dehydration, extreme weight loss, fine tremor of hands, nausea, vomiting and diarrhea, Chronic overexposure may cause central nervous system effects kidney damage liver damage
Cancer / Reproductive Toxicity Information:
This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: None reported

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Class E - Corrosive material Class D, Division 2, Subdivision B - Toxic material (other toxic effects)

WHMIS Symbols: Corrosive Other Toxic Effects

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with soap and plenty of water for 15 minutes. Remove contaminated clothing. Call physician immediately.

Ingestion (First Aid): Do not induce vomiting. Give 1-2 glasses of water. Call physician immediately. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. Call physician.

5. FIRE FIGHTING MEASURES

Flammable Properties: During a fire, irritating and highly toxic gases may be generated by thermal decomposition.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not determined

Hazardous Combustion Products: May emit toxic and corrosive fumes.

Fire / Explosion Hazards: Not combustible.

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Dry chemical. Carbon dioxide. Water.

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Cover spilled solid material with sand or other inert material. Stop spilled material from being released to the environment.

Clean-up Technique: Scoop up spilled material into a large beaker and dissolve with water. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.

Evacuation Procedure: Evacuate local area (15 foot radius or as directed by your facility's emergency response plan) when: any quantity is spilled. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: 154

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Protect from: heat moisture Store away from: acids / acid fumes.

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Have a safety shower nearby. Use a fume hood to avoid exposure to dust, mist or vapor. Maintain general industrial hygiene practices when using this product.

Personal Protective Equipment:

Eye Protection: safety glasses with top and side shields

Skin Protection: disposable latex gloves lab coat

Inhalation Protection: adequate ventilation

Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: dust Wash thoroughly after handling. Keep away from: acids/acid fumes metals

TLV: 3mg/m³ Respirable Particles; 10 mg/m³ Inhalable particles

PEL: 5 mg/m³ Respirable Fraction; 15 mg/m³ Total Dust

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: White powder

Physical State: Solid

Molecular Weight: Not applicable
Odor: Chlorine
pH: of a 5% solution = 12.33
Vapor Pressure: Not applicable
Vapor Density (air = 1): Not applicable
Boiling Point: Not applicable
Melting Point: >240 °C, >464 °F
Specific Gravity (water = 1): 1.783
Evaporation Rate (water = 1): Not applicable
Volatile Organic Compounds Content: None reported
Coefficient of Water / Oil: Not applicable
Solubility:
 Water: Soluble
 Acid: Soluble
 Other: Not determined
Metal Corrosivity:
 Steel: 0.00 in/yr
 Aluminum: 0.803 in/yr

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Heating to decomposition. Extreme temperatures Excess moisture
Reactivity / Incompatibility: Incompatible with: acids
Hazardous Decomposition: Contact with acids releases toxic and/or corrosive fumes of: chlorides nitrogen oxides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
 LD50: None Reported
 LC50: None Reported
 Dermal Toxicity Data: None Reported
 Skin and Eye Irritation Data: None Reported
 Mutation Data: None Reported
 Reproductive Effects Data: None Reported

--

Ingredient Toxicological Data: Sodium Citrate Oral rat LD50 > 8 g/kg; Sodium Tartrate Oral rabbit LD50 = 5290 mg/kg;
Lithium Hydroxide Oral rat LD50 = 225 mg/kg; Sodium Dichloroisocyanurate Oral rat LD50 = 1400 mg/kg

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Dilute to 3 to 5 times the volume with cold water. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Open cold water tap completely, slowly pour the reacted material to the drain. Flush system with plenty of water.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:

Proper Shipping Name: Corrosive Solid, N.O.S.
(Lithium Hydroxide Mixture)

Hazard Class: 8

PIN: 1759

Group: II

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL Listed.

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

16. OTHER INFORMATION

References: NIOSH Registry of Toxic Effects of Chemical Substances, 1985-86. Cincinnati: U.S. Department of Health and Human Services, April, 1987. Patty, Frank A. Industrial Hygiene and Toxicology, 3rd Revised Edition. Volume 2. New York: A Wiley-Interscience Publication, 1981. Gosselin, R. E. et al. Clinical Toxicology of Commercial Products, 5th Ed. Baltimore: The Williams and Wilkins Co., 1984. Technical Judgment. In-house information. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992.

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

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(970) 669-3050

MSDS No: M01553

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: AmVer™ High Range Ammonia Test 'N Tube™ Reagent
Catalog Number: 2607000

Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

Emergency Telephone Numbers:
(Medical and Transportation)
(303) 623-5716 24 Hour Service
(515)232-2533 8am - 4pm CST

MSDS Number: M01553

Chemical Name: Not applicable

CAS No.: Not applicable

Chemical Formula: Not applicable

Chemical Family: Not applicable

PIN: NA

Intended Use: Determination of ammonium nitrogen

Date of MSDS Preparation:

Day: 10

Month: March

Year: 2010

MSDS Prepared: MSDS prepared by Product Compliance Department extension 3350

2. COMPOSITION / INFORMATION ON INGREDIENTS

Demineralized Water

Percent Range: > 99.0

Percent Range Units: volume / volume

CAS No.: 7732-18-5

LD50: None reported

LC50: None reported

TLV: Not established

PEL: Not established

Ingredient WHMIS Symbol: Not applicable

Other components, each

Percent Range: < 1.0

Percent Range Units: weight / volume

CAS No.: Not applicable

LD50: Not applicable

LC50: Not applicable

TLV: Not established

PEL: Not established

Ingredient WHMIS Symbol: Not applicable

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: Colorless liquid

Physical State: Liquid
Odor: None

HMIS:

Health: 0

Flammability: 0

Reactivity: 0

Protective Equipment: Not applicable

Potential Health Effects:

Eye Contact: No effects are anticipated

Skin Contact: No effects are anticipated

Skin Absorption: No effects anticipated

Target Organs: Not applicable

Ingestion: No Effects Anticipated

Target Organs: Not applicable

Inhalation: No effects anticipated

Target Organs: Not applicable

Medical Conditions Aggravated: None reported

Chronic Effects: No effects anticipated

Cancer / Reproductive Toxicity Information:

This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: None reported

Toxicologically Synergistic Products: None reported

WHMIS Hazard Classification: Not applicable

WHMIS Symbols: Not applicable

4. FIRST AID

Eye Contact: Flush eyes with water. Call physician if irritation develops.

Skin Contact (First Aid): Wash skin with plenty of water.

Ingestion (First Aid): Give large quantities of water. Call physician immediately.

Inhalation: None required.

5. FIRE FIGHTING MEASURES

Flammable Properties: Material will not burn.

Flash Point: Not applicable

Method: Not applicable

Flammability Limits:

Lower Explosion Limits: Not applicable

Upper Explosion Limits: Not applicable

Autoignition Temperature: Not applicable

Hazardous Combustion Products: This material will not burn.

Fire / Explosion Hazards: None reported

Static Discharge: None reported.

Mechanical Impact: None reported

Extinguishing Media: Use media appropriate to surrounding fire conditions

Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear. Evacuate area and fight fire from a safe distance.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances should respond to a spill involving chemicals. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Stop spilled material from being released to the environment.

Clean-up Technique: Cover spilled material with a dry acid, such as citric or boric. Scoop up slurry into a large beaker. Adjust to a pH between 6 and 9 with an acid, such as sulfuric or citric. Flush reacted material to the drain with a large excess of water.

Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.

D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Maintain general industrial hygiene practices when using this product.

Storage: Keep container tightly closed when not in use.

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Maintain general industrial hygiene practices when using this product.

Personal Protective Equipment:

Eye Protection: safety glasses with top and side shields

Skin Protection: disposable latex gloves

Inhalation Protection: adequate ventilation

Precautionary Measures: Avoid contact with: eyes

TLV: Not established

PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Colorless liquid

Physical State: Liquid

Molecular Weight: Not applicable

Odor: None

pH: 11

Vapor Pressure: Not determined

Vapor Density (air = 1): Not determined

Boiling Point: ~ 100° C (~212° F)

Melting Point: Not determined

Specific Gravity (water = 1): ~1.00

Evaporation Rate (water = 1): Not determined

Volatile Organic Compounds Content: Not applicable

Coefficient of Water / Oil: Not applicable

Solubility:

Water: Miscible

Acid: Miscible

Other: Not determined

Metal Corrosivity:

Steel: Not determined

Aluminum: Not determined

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.

Conditions to Avoid: Extreme temperatures

Reactivity / Incompatibility: None reported

Hazardous Decomposition: None reported

Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:

LD50: None reported

LC50: None reported

Dermal Toxicity Data: None reported
Skin and Eye Irritation Data: None reported
Mutation Data: None reported
Reproductive Effects Data: None reported

--
Ingredient Toxicological Data: --
No toxicological data available for the ingredients of this product.

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

Special Instructions (Disposal): Dilute to 3 to 5 times the volume with cold water. Adjust to a pH between 6 and 9 with an alkali, such as soda ash or sodium bicarbonate. Open cold water tap completely, slowly pour the reacted material to the drain. Allow cold water to run for 5 minutes to completely flush the system.

Empty Containers: Dispose of empty container as normal trash.

NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

T.D.G.:
Proper Shipping Name: Not Currently Regulated

--

Hazard Class: NA

PIN: NA

Group: NA

Subsidiary Risk: NA

Additional Information: There is a possibility that this product could be contained in a reagent set or kit composed of various compatible dangerous goods. If the item is NOT in a set or kit, the classification given above applies. If the item IS part of a set or kit, the classification would change to the following: UN3316 Chemical Kit, Class 9, PG II or III. If the item is not regulated, the Chemical Kit classification does not apply.

15. REGULATORY INFORMATION

National Inventories:

Canadian Inventory Status: All ingredients of this product are DSL Listed.

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

16. OTHER INFORMATION

References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. Technical Judgment.

Legend:

NA - Not Applicable	w/w - weight/weight
ND - Not Determined	w/v - weight/volume
NV - Not Available	v/v - volume/volume

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HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA
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Appendix G

Relevant Spill Contingency and Reporting Regulations

CONSOLIDATION OF REGULATION R -068-93 *SPILL CONTINGENCY PLANNING AND REPORTING REGULATIONS* (Dated 22 July, 1993)

AS AMENDED BY:

USE OF CONSOLIDATION

This Consolidation is provided for use by the Department of Resources, Wildlife and Economic Development staff only. It is not provided to the public. The public may purchase Gazette copies of Legislation or subscriptions to receive Legislation from the company contracted by the Government of the Northwest Territories for that purpose.

This Consolidation is not an Official (Gazette) copy of the Law.
It is prepared by Manager, Enforcement and Legislative Services,
Department of Resources, Wildlife and Economic Development
Government of the Northwest Territories
for use by:
Department of Resources, Wildlife and Economic Development staff only.

SPILL CONTINGENCY PLANNING AND REPORTING REGULATIONS

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Schedule A - Facilities

Schedule B - Spill Report Minimum

ENVIRONMENTAL PROTECTION ACT

SPILL CONTINGENCY PLANNING AND REPORTING REGULATIONS

The Commission, on the recommendation of the Minister, under section 34 of the *Environmental Protection Act* and every enabling power, makes the *Spill Contingency Planning and Reporting Regulations*.

1. In this regulations,

Aabove ground facility \equiv means a facility that is stationary for a period of 30 days or more and is not an underground facility;

AAct \equiv means the *Environmental Protection Act*;

Afacility \equiv means any thing capable of storing or containing contaminants and includes any thing used in the transfer of contaminants to and from the facility;

APCB \equiv means the chlorobiphenyls that have the molecular formula $C_{12}H_{10-N}Cl_N$ in which N is great than 2;

Aspill \equiv means a discharge of a contaminant in contravention of the Act or regulations made under the Act or a permit or license issued under the Act or regulations made under the Act;

Astorage capacity \equiv means the aggregate capacity of all facilities placed together in one location;

ATDGA Class \equiv means a class of dangerous goods set out in the Schedule to the *Transportation of Dangerous Goods Act, 1992* (Canada), and any division of a class established in regulations made or continued under that Act;

Aunderground facility \equiv means a facility having more than 10% of its structure beneath ground level.

2. (1) Sections 3 to 8 of these regulations to not apply to the following:

- (a) a motor vehicle, as defined in the *Motor Vehicles Act*, unless that motor vehicle is an above ground facility;
- (b) sewage and sewage sludge.

- (2) Contaminants used solely for domestic purposes and discharged from within a dwelling-house are exempt from the requirements of these regulations.
- (3) In Schedule A, the amounts set out in column 3 under the heading AStorage Capacity \equiv refer to liquids, where the amount is expressed in liters, and to solids, where the amount is expressed in kilograms.
- (4) In Schedule B, the amounts set out in column 4 under the heading AAmount Spilled \equiv refer to liquids, where the amount is expressed in liters, and to solids, where the amount is expressed in kilograms.

SPILL CONTINGENCY PLAN

- 3. (1) No person shall store contaminants in a facility where the storage capacity of the facility equals or exceeds the storage capacity shown in Schedule A unless a spill contingency plan has been prepared and filed in accordance with these regulations.
- (2) Where the storage capacity of a facility is less than the storage capacity shown in Schedule A and where, in the opinion of the Chief Environmental Protection Officer a spill contingency plan is necessary for the protection of the environment, the Chief Environmental Protection Officer may require the owner or person in charge, management or control of a facility to prepare a spill contingency plan.
- (3) Where the Chief Environmental Protection Officer is satisfied, on reasonable grounds, that a person uses a means of storing contaminants and a method of dealing with the spill of contaminants, that provide a level of environmental protection at least equivalent to that which would be provided by compliance with these regulations, the Chief Environmental Protection Officer may, in writing, subject to such conditions as the Chief Environmental Protection Officer considers necessary,
 - (a) exempt a person from the requirement to file a spill contingency plan under subsection (1); or
 - (b) exempt a person from the requirement to include in a spill contingency plan information required in one or more of paragraphs 4(2)(a) to (j).
- 4. (1) The owner or person in charge, management or control of a facility shall ensure that a spill contingency plan is prepared.

- (2) A spill contingency plan for a facility must contain the following information:
- (a) the name, address and job title of the owner or person in charge, management or control;
 - (b) the name, job title and 24-hour telephone number for the persons responsible for activating the spill contingency plan;
 - (c) a description of the facility including the location, size and storage capacity;
 - (d) a description of the type and amount of contaminants normally stored at the location described in paragraph (c);
 - (e) a site map of the location described in paragraph (c);
 - (f) the steps to be taken to report, contain, clean up and dispose of contaminants in the case of a spill;
 - (g) the means by which the spill contingency plan is activated;
 - (h) a description of the training provided to employees to respond to a spill;
 - (i) an inventory of and the location of response and clean-up equipment available to implement the spill contingency plan;
 - (j) the date the contingency plan was prepared.
5. (1) Subject to subsection (2), the person responsible for preparing a spill contingency plan shall file the plan with the Chief Environmental Protection Officer before making use of a facility.
- (2) Where a facility is already in use on the day these regulations come into force, the person responsible for preparing a spill contingency plan shall file the plan with the Chief Environmental Protection Officer within one year after that day.
6. (1) The Chief Environmental Protection Officer shall review each spill contingency plan after it is filed.
- (2) The Chief Environmental Protection Officer may require the person who filed the spill contingency plan to make changes to it.
- (3) Where the Chief Environmental Protection Officer requires changes under subsection (2), he or she may indicate a reasonable period of time within which the changes must be filed.
- (4) The person who filed a spill contingency plan shall make and file any changes required under subsection (2).
7. (1) The person responsible for preparing a spill contingency plan shall review the plan annually.
- (2) The person responsible for preparing a spill contingency plan shall, in writing,

notify the Chief Environmental Protection Officer when a review under subsection (1) has been completed and shall immediately file with the Chief Environmental Protection Officer any changes made to the plan.

8. Once a spill contingency plan has been filed, the person responsible for preparing the plan shall implement the plan.

SPILLS

9.
 - (1) The owner or person in charge, management or control of contaminants at the time a spill occurs shall immediately report the spill where the spill is of an amount equal to or greater than the amount set out in Schedule B.
 - (2) Where there is a reasonable likelihood of a spill in an amount equal to or greater than the amount set out in Schedule B, the owner or person in charge, management or control of the contaminants shall immediately report the potential spill.
10. A person reporting a spill shall contact the 24 Hour Spill Report Line by calling **(403) 920-8130**.
11.
 - (1) A person reporting a spill shall give as much of the following information as possible:
 - (a) date and time of spill;
 - (b) location of spill;
 - (c) direction spill is moving;
 - (d) name and phone number of a contact person close to the location of spill;
 - (e) type of contaminant spilled and quantity spilled;
 - (f) cause of spill;
 - (g) whether spill is continuing or has stopped;
 - (h) description of existing contaminant;
 - (i) action taken to contain, recover, clean-up and dispose of spilled contaminant;
 - (j) name, address and phone number of person reporting spill;
 - (k) name of owner or person in charge, management or control of contaminants at time of spill.
 - (2) No person shall delay reporting a spill because of lack of knowledge of any of the factors listed in subsection (1).
12. No person shall knowingly make a false report of a spill or a potential spill.

- 13. (1)** For the purposes of evaluating the effectiveness of the spill contingency plan, the Chief Environmental Protection Officer may require, in writing, the owner or person in charge, management or control of a facility at the time a spill occurred to prepare and file a written report concerning the spill.
- (2)** The person required to prepare the report described in subsection (1) shall provide all information required by the Chief Environmental Protection Officer.

Dated at Yellowknife July 22, 1993.

Original signed by
D.L. Norris
Commissioner of the Northwest Territories

SCHEDULE A

(Section 3)

<i>Item No.</i>	<i>Type of Facility</i>	<i>Storage Capacity</i>
1.	Above-ground facility	20,000 l or 20,000 kg
2.	Under-ground facility	4,000 l or 4,000 kg

SCHEDULE B

(Section 9)

<i>Item No.</i>	<i>TDGA Class</i>	<i>Description of Contaminant</i>	<i>Amount Spoiled</i>
1.	1	Explosives	Any amount
2.	2.1	Compressed gas (flammable)	Any amount of gas from containers with a capacity greater than 100 l.
3.	2.2	Compressed gas (non-corrosive, non flammable)	Any amount of gas from containers with a capacity greater than 100 l.
4.	2.3	Compressed gas (toxic)	Any amount
5.	2.4	Compressed gas (corrosive)	Any amount
6.	3.1, 3.2, 3.3	Flammable liquid	100 l
7.	4.1	Flammable solid	25 kg
8.	4.2	Spontaneously combustible solids	25 kg
9.	4.3	Water reactant solids	25 kg
10.	5.1	Oxidizing substances	50 l or 50 kg
11.	5.2	Organic Peroxides	1 l or 1 kg
12.	6.1	Poisonous substances	5 l or 5 kg
13.	6.2	Infectious substances	Any amount
14.	7	Radioactive	Any amount
15.	8	Corrosive substances	5 l or 5 kg
16.	9.1 (in part)	Miscellaneous products or substances, excluding PCB mixtures	50 l or 50 kg
17.	9.2	Environmentally hazardous	1 l or 1 kg
18.	9.3	Dangerous wastes	5 l or 5 kg
19.	9.1 (in part)	PCB mixtures of 5 or more parts per million	0.5 l or 0.5 kg
20.	None	Other contaminants	100 l or 100 kg

Appendix H

Spill Response Element Site Maps

H.1 Spill Response Elements Site Maps

The following drawings provide a site maps that emphasize the spill response elements of the site. The drawings identify spill response equipment, fuel storage areas, water bodies and infrastructure. The following figures are as follows:

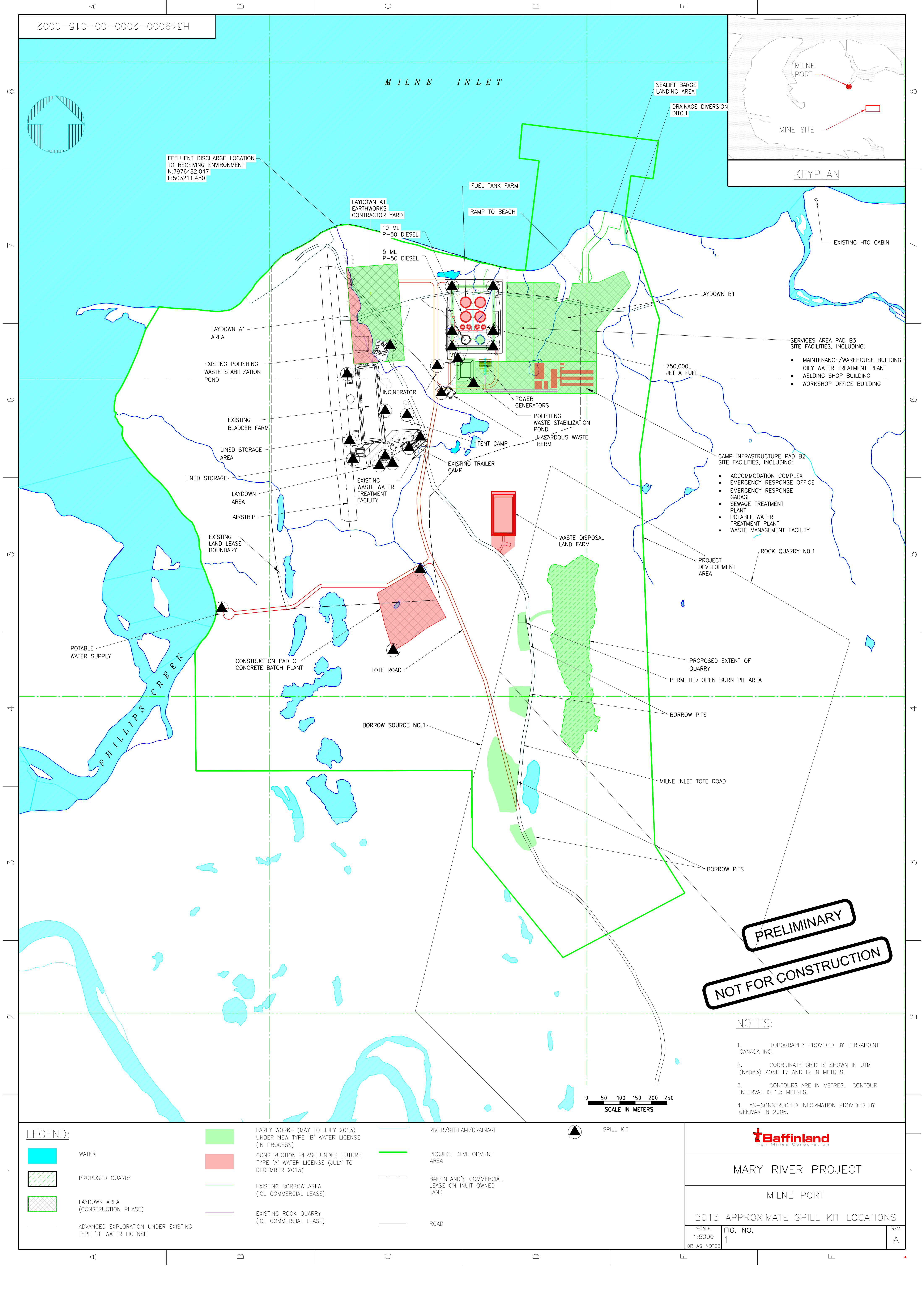
Figure 1) Milne 2013 Approximate Spill Kit Locations

Figure 2) Mine Site Existing Approximate Spill Kit Locations

Figure 3) Mine Site 2013 Approximate Spill Kit Locations

Figure 4) Mid-Rail Camp Layout Approximate Spill Kit Locations

Figure 5) Steensby Camp Layout Approximate Spill Kit Location



H349000-2000-00-015-0002

MILNE INLET

SEALIFT BARGE LANDING AREA

DRAINAGE DIVERSION DITCH

EFFLUENT DISCHARGE LOCATION TO RECEIVING ENVIRONMENT
N:7976482.047
E:503211.450

LAYDOWN A1
EARTHWORKS CONTRACTOR YARD

FUEL TANK FARM

RAMP TO BEACH

10 ML
P-50 DIESEL

5 ML
P-50 DIESEL

LAYDOWN A1
AREA

EXISTING POLISHING
WASTE STABILIZATION
POND

INCINERATOR

EXISTING BLADDER FARM

LINED STORAGE
AREA

LINED STORAGE

LAYDOWN
AREA

AIRSTRIP

EXISTING LAND LEASE
BOUNDARY

POTABLE
WATER SUPPLY

PHILLIPS CREEK

CONSTRUCTION PAD C
CONCRETE BATCH PLANT

TOTE ROAD

BORROW SOURCE NO.1

EXISTING TRAILER
CAMP

POWER GENERATORS

POLISHING WASTE STABILIZATION
POND

HAZARDOUS WASTE
BERM

WASTE DISPOSAL
LAND FARM

750,000L
JET A FUEL

SERVICES AREA PAD B3
SITE FACILITIES, INCLUDING:

- MAINTENANCE/WAREHOUSE BUILDING
- OILY WATER TREATMENT PLANT
- WELDING SHOP BUILDING
- WORKSHOP OFFICE BUILDING

CAMP INFRASTRUCTURE PAD B2
SITE FACILITIES, INCLUDING:

- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE OFFICE
- EMERGENCY RESPONSE GARAGE
- SEWAGE TREATMENT PLANT
- POTABLE WATER TREATMENT PLANT
- WASTE MANAGEMENT FACILITY

ROCK QUARRY NO.1

PROJECT DEVELOPMENT
AREA

PROPOSED EXTENT OF
QUARRY

PERMITTED OPEN BURN PIT AREA

BORROW PITS

MILNE INLET TOTE ROAD

BORROW PITS

PRELIMINARY

NOT FOR CONSTRUCTION

NOTES:

1. TOPOGRAPHY PROVIDED BY TERRAPOINT CANADA INC.
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
3. CONTOURS ARE IN METRES. CONTOUR INTERVAL IS 1.5 METRES.
4. AS-CONSTRUCTED INFORMATION PROVIDED BY GENIVAR IN 2008.

0 50 100 150 200 250
SCALE IN METERS

LEGEND:

- | | | | | | |
|--|--|--|--|--|---|
| | WATER | | EARLY WORKS (MAY TO JULY 2013) UNDER NEW TYPE 'B' WATER LICENSE (IN PROCESS) | | RIVER/STREAM/DRAINAGE |
| | PROPOSED QUARRY | | CONSTRUCTION PHASE UNDER FUTURE TYPE 'A' WATER LICENSE (JULY TO DECEMBER 2013) | | PROJECT DEVELOPMENT AREA |
| | LAYDOWN AREA (CONSTRUCTION PHASE) | | EXISTING BORROW AREA (IOL COMMERCIAL LEASE) | | BAFFINLAND'S COMMERCIAL LEASE ON INUIT OWNED LAND |
| | ADVANCED EXPLORATION UNDER EXISTING TYPE 'B' WATER LICENSE | | EXISTING ROCK QUARRY (IOL COMMERCIAL LEASE) | | ROAD |

Baffinland
Iron Mines Corporation

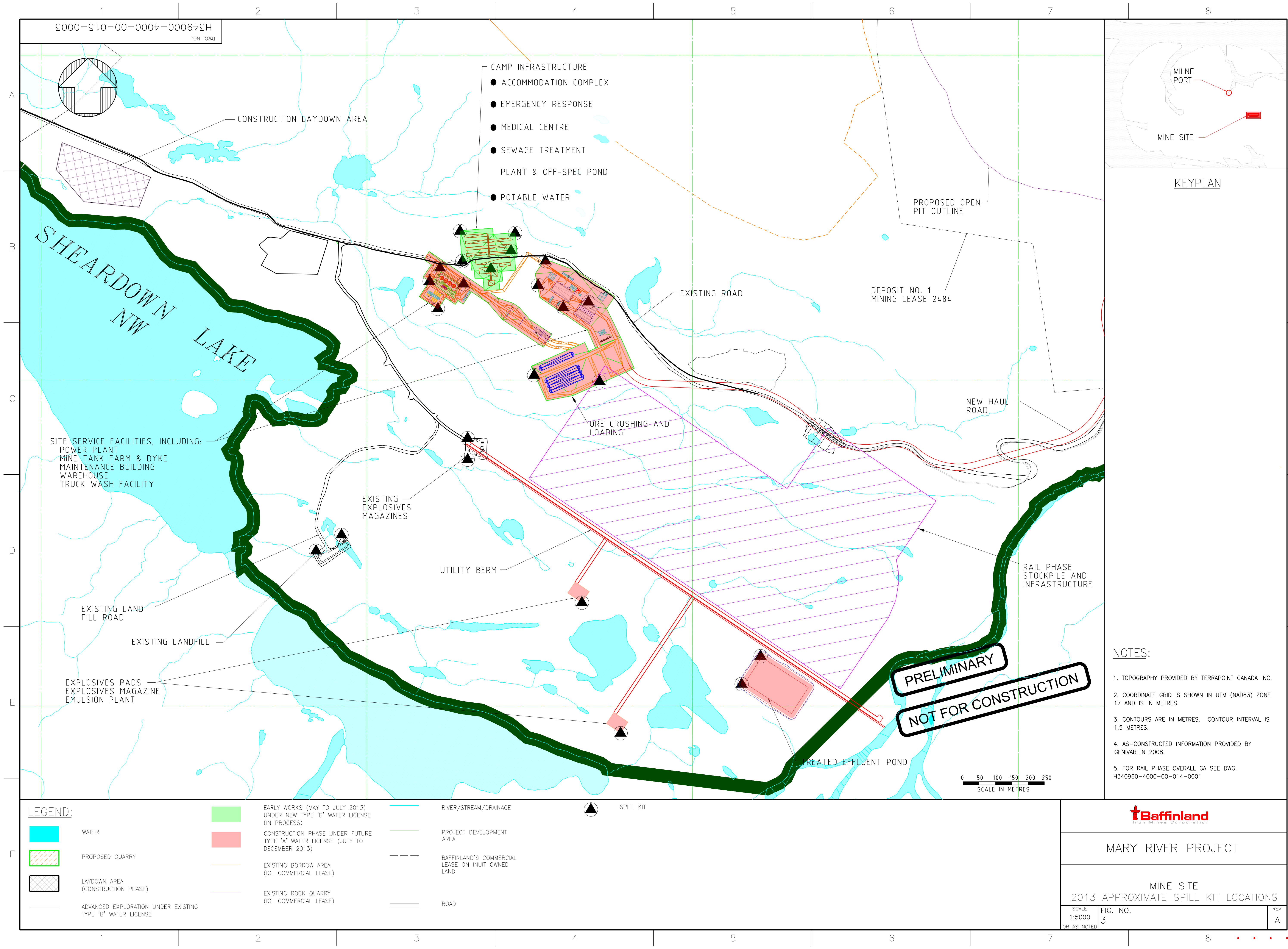
MARY RIVER PROJECT

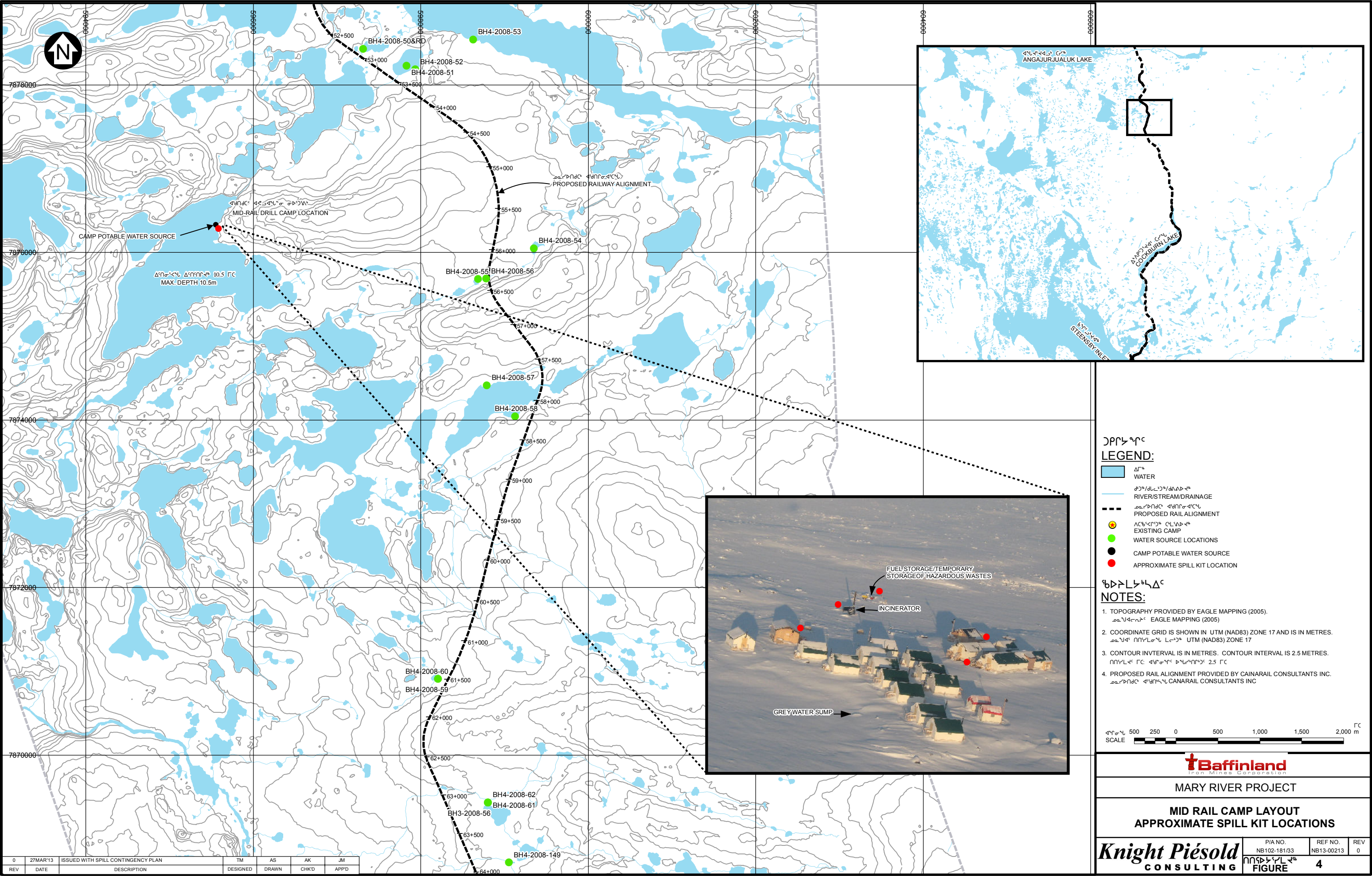
MILNE PORT

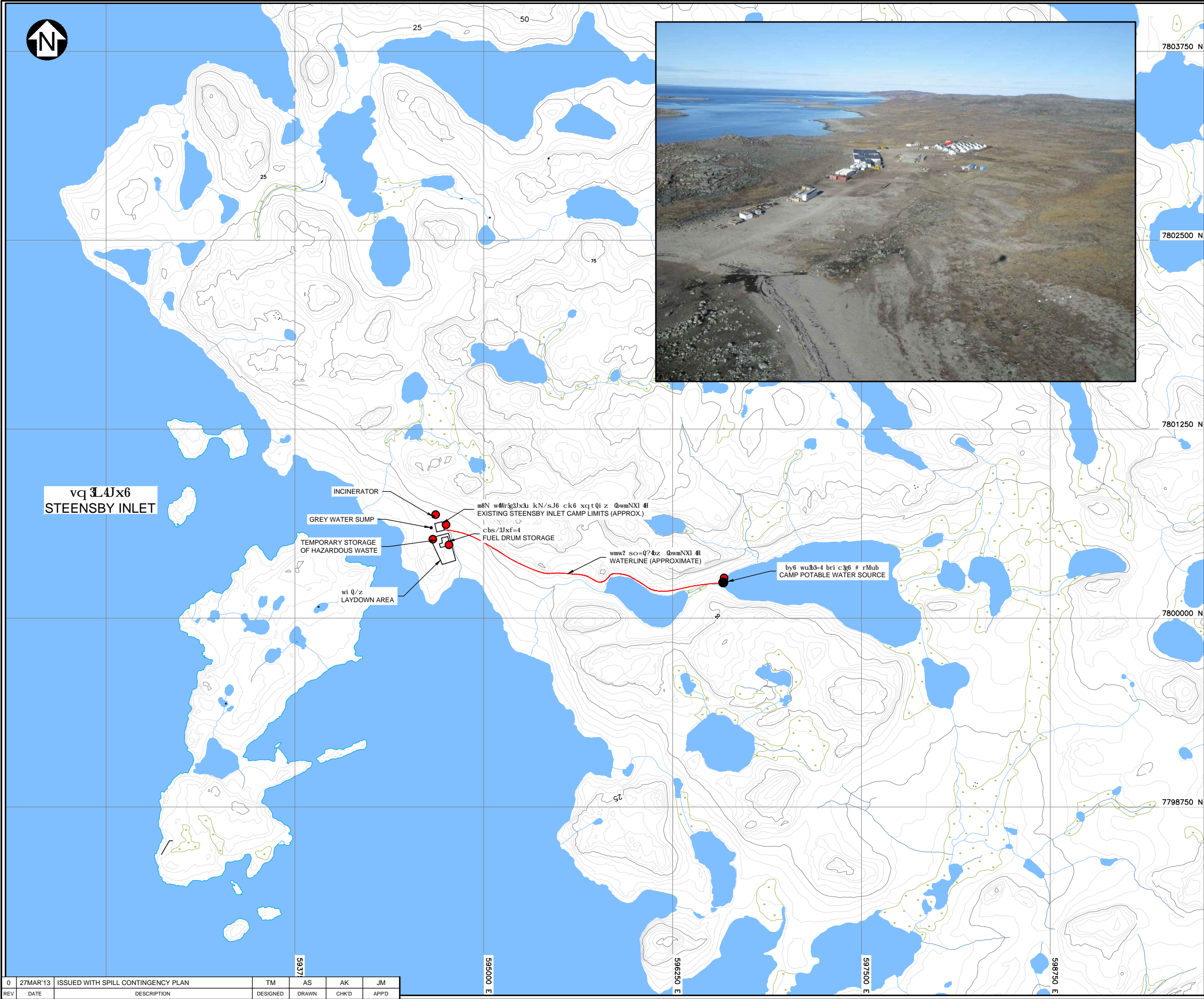
2013 APPROXIMATE SPILL KIT LOCATIONS

SCALE 1:5000 OR AS NOTED	FIG. NO. 1	REV. A
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<p>MARY RIVER PROJECT</p>			
<p>MARY RIVER CAMP LAYOUT APPROXIMATE SPILL KIT LOCATION</p>			
	P/A NO. NB102-181/32	REF. NB12-00131	R
	t t c s / 3 m J 6 FIGURE: 2		







XREF FILE(S): STEENSBY PORT AREA, 01-APRIL 22 2008, steensby lakes IMAGE FILE(S) topog.dwg corp Steensby 2011.

0	27MAR'13	ISSUED WITH SPILL CONTINGENCY PLAN	TM	AS	AK	JM
REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHKD	APPD

gr0/q 5
LEGEND:

- WATER
- RIVER/STREAM/DRAINAGE
- CAMP POTABLE WATER SOURCE
- APPROXIMATE SPILL KIT LOCATION

NOTE(S):

- COORDINATE GRID IS UTM (NAD83) ZONE 17 AND IS IN METRES.
- CONTOUR INTERVAL IS 10 METRES.
- TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).

cspm/4nw5

- kNax3 tt3mi z mo46 TM (NAD83) Zone 17
- tt3mJ5 ub: xd8i q5 sz y# Q45 % ub
- kNaxoEp5 Eagl e Mappi ng (2005)
- kNystfb4 x3lt4nz Canarail l Consul tants Inc
- s/(43-sJ6 ttCs/3mi z Geni var

SCALE 250 12.5 0 250 500 750 1000 1250 m



MARY RIVER PROJECT

STEENSBY CAMP LAYOUT
APPROXIMATE SPILL KIT LOCATION

Knight Piesold
CONSULTING

P/A NO.
NB102-181/33
t t Cs/3mJ6

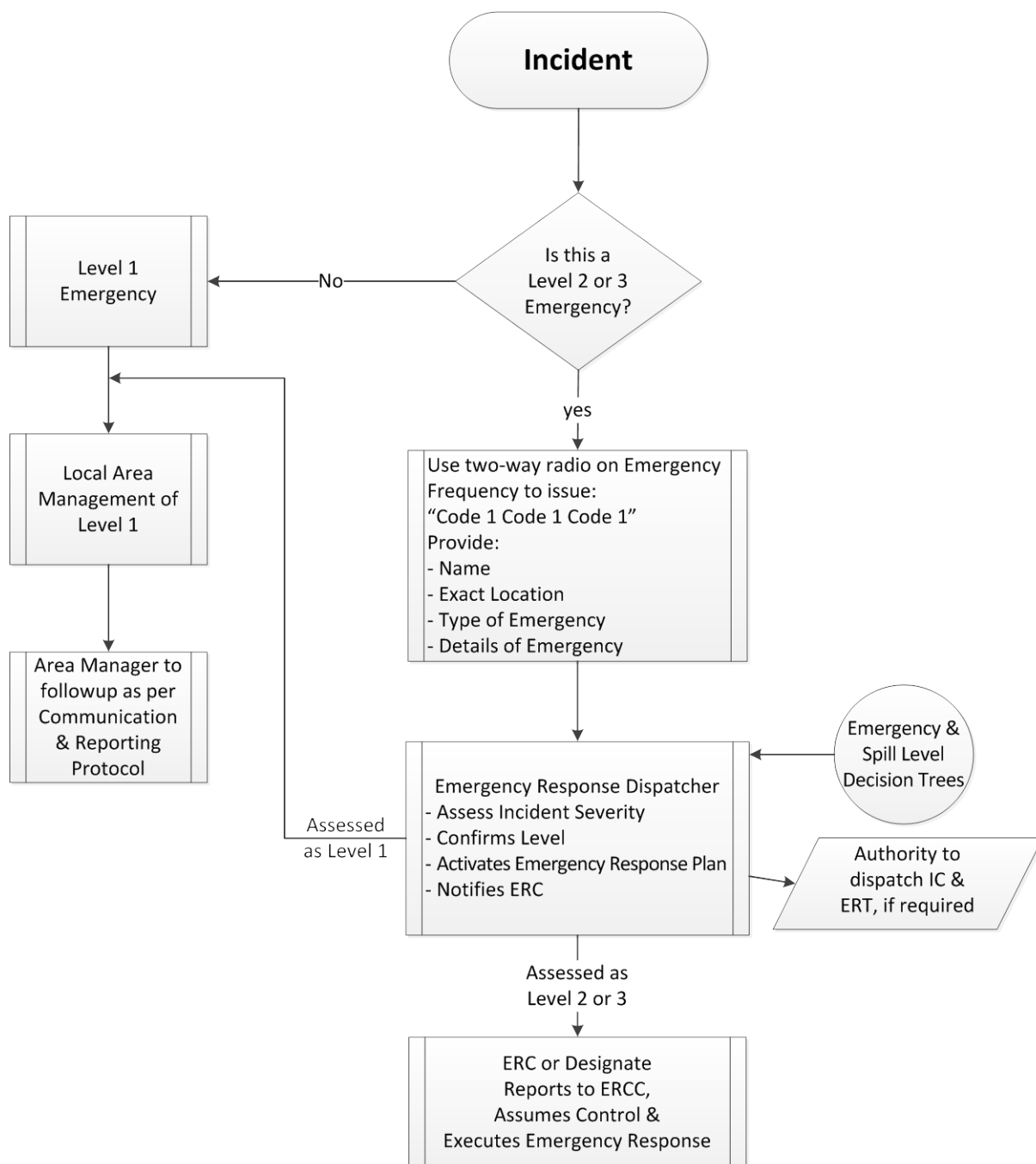
REF.
NB13-00213
FIGURE: 5

NORTH BAY ON, SAVED: 11/02/2013 13:41:27 PM, PRINTED: 3/27/2013 3:42:24 PM, Layout1, asmpson

Appendix I

Mary River Project Emergency Response Activation Flowchart

Mary River Project Emergency Response Activation



Appendix J

Mary Flowchart for External Requests for Search and Rescue and Emergency Services

FLOWCHART FOR EXTERNAL REQUESTS FOR SAR AND EMERGENCY SERVICES

