Baffinland Iron Mines Corporation
Mary River Project

Hazardous Materials and Hazardous Waste Management Plan

2013-09-06	1	Approved for Use	C. Gonzalez	T. Mackay	S. Perry	J. Millard
2012-04-19	0	Approved for Use	A. Grzegorczyk	J. Binns	S. Perry	J. Millard
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TRACK CHANGES TABLE

A review and update of the Hazardous Materials and Hazardous Waste Management Plan has been undertaken, with the following salient revisions to the January 2012 version (H337697-0000-07-126-0002, Rev 2, FEIS Appendix 10C-5).

Revision 1, September 2013:

Modification/Addition	Where they appear in the document	
	Section	Page Number
Updated Section to align with Type A Conditions	4.4	14
Updated Section to align with Type A Conditions	4.4.2	15
Updated Section to align with Type A Conditions	4.5	16
Update Roles and Responsibilities Section	6	23-29
Added Milne Port and Mine Site Infrastructure site layouts	Appendix B	N/A
Added Appendix D: Table of Concordance with Type A Conditions	Appendix D	N/A

Table Of Contents

List of Tables

List of Appendices

Abbreviations

Acronym	Description
Baffinland	Baffinland Iron Mines Corporation
CCME	Canadian Council of Ministers of the Environment
EHS	Environmental, Health and Safety
EIS	Environmental Impact Statement
EPCM	Engineering, procurement, and construction management
EPP	Environmental Protection Plan
ERCB	Energy Resources Conservation Board
IIBA	Inuit Impacts Benefits Agreement
the Project	Mary River Project
NIRB	Nunavut Impact Review Board
NWB	Nunavut Water Board
NWT	Northwest Territories
QIA	Qikiqtani Inuit Association
TDG	Transportation of Dangerous Goods
VEC	valued ecosystem components
WMP	waste management plan

1. Introduction

Baffinland Iron Mines Corporation is committed to taking all necessary steps to ensure that the use, collection, handling, storage, transportation and disposal of hazardous wastes generated during the construction, operation and closure of the Mary River Project is conducted in a safe, efficient and environmentally compliant manner. One of the first steps towards achieving these goals is the preparation of this Hazardous Materials and Hazardous Waste Management Plan for Construction, Operation and Closure. This Hazardous Materials and Hazardous Waste Management Plan (HMMP) establishes the roles and responsibilities of employees, contractors and other site personnel as well as protocols for handling, storing and disposing of all hazardous materials onsite. The intent is to afford a high degree of control over the use, collection, handling, storage, transportation and disposal of hazardous materials.

1.1 2013 Work Plan

A camp currently operates at both Milne Port and Mary River Mine site to support exploration activity on site. During the summer of 2013 new equipment will begin to arrive onsite for use during the construction and mining operation phase of the site. Prior to the 2013 sealift, minor site preparation activities will be undertaken at Milne Port and the Mine Site from May to July 2013 to prepare for sea lift and post sea lift construction phase of the work program. The completion of this work is contingent on receipt of a new Type B Licence (currently in process) and approval of applicable Work Plan activities by the QIA. The 2013 Work Plan and site layout plans are presented in Appendix B to this report. Throughout the remainder of 2013 a portion of the construction and operation phase facilities will need to be installed, commissioned and brought into service. The hazardous material and hazardous waste management infrastructure at each project site will continued to be used as approved and

designed for. During start-up and commissioning of the new hazardous material and hazardous waste management infrastructure, personnel levels will remain within the design capacity at each site. For the 2013, this plan will be applied as appropriate to all project sites applicable under the existing/future Type B and future Type A Water Licence including Milne Port and the Mary River Mine Site.

1.2 Purpose

The purpose of this plan is to provide a consolidated source of information on the safe and environmentally sound transportation, storage, and handling of the major hazardous products to be used for the Mary River Project. A hazardous material is one that, as a result of its physical, chemical, or other properties, poses a hazard to human health or the environment when it is improperly handled, used, stored, disposed of, or otherwise managed. In combination with Baffinland Iron Mines (BIM) Emergency Response and "Spill Contingency Plan – H34900-1000-07-126-0002 this Hazardous Materials and Hazardous Waste Management Plan (HMMP) provide instruction on the prevention, detection, containment, response, and mitigation of accidents that could result from handling hazardous materials.

The plan is based on the following principles for best practice management of hazardous materials:

- Identify and prepare materials and waste inventories.
- Characterize potential environmental hazards posed by those materials.
- Allocate clear responsibility for managing hazardous materials.
- Describe methods for transport, storage, handling and use.
- Identify means of long-term storage and disposal.
- Prepare contingency and emergency response plans.
- Ensure training for management, workers, and contractors whose responsibilities include handling hazardous materials.
- Maintain and review records of hazardous material consumption and incidents in order to anticipate and avoid impacts on personal health and the environment.

BIM recognizes that incorporating proper hazardous material management into other environmental management plans and systems leads to risk reduction, improved process control, and cost savings.

All hazardous materials to be used at the Mary River Project will be manufactured, delivered, stored, and handled in compliance with all applicable federal and territorial regulation. BIM is strongly committed to preventing, to the greatest extent possible, both inadvertent release of these substances to the environment and accidents resulting from mishandling or mishap. BIM will institute programs for employee training, facility inspection, periodic drills to test systems, and procedural review to address deficiencies, accountability, and continuous improvement objectives.

BIM will actively work towards minimizing the generation of hazardous wastes by investigating alternatives to the use of hazardous materials, by recycling products and containers wherever feasible, and by treating wastes using state-of-the-art technologies before any release to the environment.

1.3 Definitions

Project: All necessary tasks and work from construction, operation, closure and reclamation phase, during the lifespan of the Project, on the Site.

Site: All of the areas occupied by the Project facilities (permanent or temporary) during the construction, operation, closure and reclamation phase of the Project.

Contractor: A person or business which provides goods, material, equipment, personnel, and/or services to Baffinland Iron Mines Corporation under terms specified in a contract.

Waste: All residual material (hazardous, non-hazardous or Putrescible) generated during the construction, operation, closure and reclamation phase of the Project.

Hazardous Waste: All kind of wastes generated during the lifespan of the Project and that present a threat to the human health or the environment because they posses one or more of the following characteristics: corrosive, reactive, explosive, toxic, inflammable, or biologically infectious.

Non-Hazardous Waste: All kind of wastes generated during the lifespan of the Project and that do not present a threat to human health or the environment.

Putrescible Wastes: All kind of wastes generated during the lifespan of the Project and that are degraded very rapidly, i.e., plants, food scraps or animal remains.

1.4 Hazardous Materials Regulatory Requirements

Both federal and territorial legislation regulates the management of hazardous materials in Nunavut.

Copies of relevant legal documents will be kept on file at the mine site. Management and safety personnel will provide an overview of the applicable regulations to all employees as part of their initiation and ongoing training.

A number of Acts and Regulations provide specific requirements for the management of the different types of hazardous materials at the Mary River Project. They are:

1.4.1 Federal

- Transportation of Dangerous Goods Act and Regulations (TDGA and TDGR).
- Explosives Act.
- National Fire Code.
- Canadian Council of Ministers for the Environment (CCME) Guidelines for Above-Ground Storage Tanks.

1.4.2 Territorial

- Transportation of Dangerous Goods Act (RSNWT 1988) and Regulations.
- Explosives Use Act and Regulations.
- Fire Prevention Act and Regulations.
- Mine Health and Safety Act and Regulations.
- Work Site Hazardous Materials Information System Regulations (WHMIS).

The TDGA classifies hazardous materials into nine main classes according to an internationally recognized system, as follows:

- Class 1 – Explosives.
- Class 1 – Gases.
- Class 3 – Flammable liquids.
- Class 4 – Flammable solids.
- Class 5 – Oxidizing substances and organic products.
- Class 6 – Poisonous (toxic) and infectious substances.
- Class 8 – Corrosives.
- Class 9 – Miscellaneous products or substances.

The Project will be subject to a Type 'A' Water License as well as the applicable Type 'B' Water Licence. Conditions regarding aspects of hazardous waste and hazardous materials as outlined in this Plan will be specified by the water licenses and will likely include:

- The Licensee shall backhaul and dispose of all hazardous wastes generated through the course of the operation, at a licensed waste treatment facilities off site.
- The Licensee shall designate permanent hazardous waste transit areas at Milne Port, the Mine Site and Steensby Port. These designated transit areas shall be used for the temporary storage of hazardous waste on site, until the waste can be shipped to a licensed hazardous waste treatment site. The designated areas will be fenced and secured. Access to these transit areas shall be by authorized personnel only.
- Warning signage identifying the hazardous waste transit area shall be posted on the perimeter fence of the transit area. Signage shall provide the contact information in case of emergency response.
- The design of the hazardous waste transit area must prevent pooling of water within the transit area.
- Hazardous wastes temporarily stored within the transit area must be placed within appropriate and secured containers.

- Waste oils and lubricant can be disposed of in the camp incinerators.
- The Licensee shall maintain records of all waste backhauled and records of confirmation of proper disposal of backhauled waste. These records shall be made available to an Inspector upon request by the Board in writing.
- Biomedical waste generated from onsite clinics shall be sorted.

1.5 Relationship to Other Management Plans

This plan is based on the concepts and principles found in Appendix 10A-1 EHS Management System Framework Standard and 10A-2 Hazard Identification and Risk Assessment Standard submitted as part of the Final Environmental Impact Statement (FEIS) to the NIRB. This plan should be viewed in concert with the following additional plans that have been prepared for the FEIS:

- Construction Environmental Management Plan.
- Construction Environmental Protection Plan.
- Environmental Protection Plan.
- Surface Water and Aquatic Ecosystem Management Plan.
- Wastewater Management Plan.
- Preliminary Mine Closure and Reclamation Plan.
- Air and Noise Management Plan.
- Emergency Response and Spill Contingency Plan.
- Explosives Management Plan.
- Terrestrial Wildlife Management Plan.
- Waste Management Plan.

1.6 Baffinland's Commitments

Baffinland provides adequate resources to implement and maintain the EHS Management System including the necessary human, material and financial resources. Baffinland's Heath Safety and Environment (HSE) are presented in Section 2.

1.7 Update of this Management Plan

The Hazardous Materials and Hazardous Waste Management Plan is a "living document". It will be regularly updated on the basis of management reviews (as outlined in Section 8), incident investigations, regulatory changes or other Project related changes.

2. Baffinland Policy

2.1 Health Safety and Environment (HSE) Policy

Figure: Health Safety and Environment (HSE) Policy

Baffinland
Iron Mines Corporation

Mary River Project
Health, Safety and Environment Policy

The Baffinland Iron Mines Corporation (BIMC) Mary River Project Health, Safety and Environment Policy is a statement of our commitment to achieving a safe, healthy and environmentally responsible workplace. We will not compromise this policy for the achievement of any other organizational goal.

The Mary River Project implements this Policy through the following commitments:

- Continual improvement of safety, occupational health and environmental performance.
- Meeting or exceeding the requirements of regulations and company policies.
- Integrating sustainable development principles into our decision-making processes.
- Maintaining an effective Health, Safety and Environment Management System.
- Sharing and adopting improved technologies and best practices to prevent injuries, occupational illnesses and environmental impacts.
- Engaging stakeholders through open and transparent communication.
- Efficiently using resources, and practicing responsible minimization, reuse, recycling and disposal of waste.
- Rehabilitation of disturbed lands to a safe, acceptable, and localized state.

Our commitment to provide the leadership and action necessary to accomplish this policy is exemplified by the following principles:

- All injuries, occupational illnesses and environmental impacts can be prevented.
- Employee involvement and active contribution is essential and required.
- Management is responsible for preventing injuries, occupational illnesses and environmental impacts.
- Working in a manner that is healthy, safe and environmentally sound is a condition of employment.
- All operating exposures can be safeguarded.
- Training employees to work in a manner that is healthy, safe and environmentally sound is essential.
- Prevention of personal injuries, occupational illnesses and environmental impacts is good business.
- Respect for the communities in which we operate is the basis for productive relationships.

We have a responsibility to provide a safe workplace and utilize systems of work to meet this goal. All employees must be clear in understanding the personal responsibilities and accountabilities in relation to the tasks we undertake.

The Mary River Project has no higher priority than the health and safety of all people working on our behalf and the responsible management of the environment. In ensuring our overall profitability and business success every Baffinland and business partner employee working at one of our work sites is required to adhere to this policy.

Tom Peddon
President and Chief Executive Officer
March 2013

2.2 Baffinland Sustainability 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.

Tom Paddon
President and Chief Executive Officer
September 2011

3. Targeted Valued Ecosystem Components

Hazardous Materials will be used throughout the life cycle of the Project. To ensure that hazardous materials are handled, stored and managed in a safe and environmentally acceptable manner, Baffinland will apply best practices for its hazardous materials management activities.

Inadequate handling, storage and elimination of hazardous materials could impact the following Valued Ecosystem Components (VEC):

- Soils (spills and contamination).
- Water quality (contamination of runoff).
- Fish and fish habitat.
- Vegetation (uptake of contaminants or loss of vegetation).
- Birds (exposure and ingestion of contaminants).
- Terrestrial wildlife (exposure and ingestion of contaminants).
- Human health (exposure and ingestion of contaminants).

3.1 Types of Hazardous Materials

The Mary River Project will require the use of the following types of classified hazardous materials:

- Fuel and Lubricants – diesel fuel, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance.
- Explosives-ammonium nitrate and high explosives used for blasting in the mine.
- Laboratory Wastes- various by-products classified as hazardous waste and chemicals used in the assay laboratory.
- Waste hydrocarbons and hydrocarbon products.
- Liquid chemical waste (glycols, solvent, paint, brake fluid, hydraulic fluids, etc.).
- Solid chemical waste (batteries, florescent lights, aerosol cans, etc.).
- Electronic waste.
- Biomedical waste.
- Ozone depleting substances (ODS) (i.e. refrigerants, etc.).
- Compressed gas cylinders.

4. Hazardous Materials Management Approach

The aim of the Hazardous Materials and Hazardous Waste Management Plan is to implement a sound hazardous materials minimization program that will focus upon the principles of Lifecycle Management, with the goal of managing the material from identification to disposal. The Hazardous Materials and Hazardous Waste Management approach must be in compliance with Appendix 10A-2 Hazard Identification and Risk Assessment Standard. It covers product supply, transportation, storage, and handling, recycle, and waste disposal. BIM is committed to ensuring proper life cycle management of all products used at the Mary River sites, including hazardous materials. BIM and its contractors will deal only with reputable, certified suppliers, transporters, and expediters.

4.1 Delivery

All hazardous materials will be delivered to site by commercial carriers in accordance with the requirements of the Canadian Transportation of Dangerous Goods Act (TDGA). Carriers will be licensed and inspected as required by the Department of Transportation. All required permits, licences, and certificates of compliance are the responsibility of the carrier. All shipments must be properly identified and placarded. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

Each transportation company will be required to develop a spill prevention, control, and countermeasures plan to address the materials they are importing. In the event of a release during transport, the commercial transportation company is responsible for first response and cleanup.

4.2 Hazardous Materials Identification and Handling

Once dangerous goods are received at the workplace, additional regulations apply. The federal Workplace Hazardous Materials Information System (WHMIS) calls for the proper labelling of products, the availability of product information in the form of MSDSs, and employee education on how to identify and handle hazardous products. MSDS sheets of hazardous materials used on site are presented in Annex A.

All tanks used for the storage of hazardous materials will be installed in secondary containment areas sized to hold at least 110% of the volume of the largest tank.

BIM has prepared emergency response procedures for spilled chemical substances, as provided in Emergency Response and Spill Contingency Plan. These procedures outline the correct response to accidental spills or releases of hazardous materials to minimize health risks and environmental effects. Included are procedures for evacuating personnel, maintaining safety, cleanup and neutralization activities, emergency contacts, internal and external notifications to regulatory authorities, and incident documentation.

Table 4-1: Types of Hazardous Waste

Waste Type	Location Generated	Additional Storage Requirements	Temporary Storage Location
Waste hydrocarbons and hydrocarbon products	Equipment maintenance shops	Store away from sources of heat and ignition.	In contained area in storage containers at on site waste management facility or lay down area (during construction only).
Liquid chemical waste (glycols, solvents, paint, brake fluid, hydraulic fluids, etc.)	Equipment maintenance shops, general maintenance buildings, aircraft maintenance buildings	If greater than 1,000 L (or 1,000 kg) stored for 180 days, site must be registered as hazardous waste storage facility.	In contained area in storage containers at on site waste management facility or lay down area (during construction only).
Solid chemical waste (batteries, fluorescent lights, aerosol cans, etc.)	Equipment maintenance shops, offices, tents, personal equipment	Use pallets to keep containers off ground (batteries). If greater than 1,000 kg stored for 180 days, site must be registered as hazardous waste storage facility.	In contained area in storage containers at on site waste management facility or lay down area (during construction only).
Electronic waste	Offices, personal equipment	Use pallets to keep containers off ground (best management practice).	In contained area in storage containers at on site waste management facility or lay down area (during construction only).
Laboratory chemical waste	On-site laboratory facilities and offices	If greater than 1,000 L stored for 180 days, site must be registered as hazardous waste storage facility.	In contained area in storage containers at on site waste management facility or lay down area (during construction only).
Biomedical waste	Medical office	Storage area totally enclosed and separate from supply rooms or food preparation areas. Storage area lockable and access restricted to authorized personnel. Storage area identified as containing biomedical waste with clearly displayed biohazard symbol. No other materials stored with biomedical waste. Storage thoroughly cleaned in accordance with facility procedures. Waste stored at 4°C or lower if stored more than (4) four days (or other time-frame specified by jurisdictional authority). Cold storage lockable and	In contained area in storage containers at on site waste management facility or lay down area (during construction only).

Waste Type	Location Generated	Additional Storage Requirements	Temporary Storage Location
		only used for biomedical waste, labelled as containing biomedical waste with clearly displayed biohazard symbol. Contingency plan prepared for large volumes of waste or failure of cold storage. Biomedical waste may not be compacted.	
Ozone depleting substances (ODS) (i.e. refrigerants, etc.)	Kitchens, vehicles	For on-site disposal of units containing ODS's, the ODS must be removed by qualified technician prior to disposal. Store ODS in appropriate container as per instructions from qualified technician. ODS to be disposed of off-site as soon as practicable after removal.	In contained area in storage containers at on site waste management facility or lay down area (during construction only).
Compressed gas cylinders	Equipment maintenance shops, welding shop	Safely empty containers of all gases. Store away from sources of heat and ignition. When feasible, return containers to manufacturer for re-use following TDG procedures. When not shipped off-site, remove valves and purge cylinder with compressed air or inert gas. Dispose of as scrap metal.	In secure area on site waste management facility or lay down area (during construction only).
Hydrocarbon-impacted soil/water/ice/snow	Dependent on spill location	In contained area in storage containers at on site waste management facility or lay down area (during construction only).	In contained area in storage containers at on site waste management facility or lay down area (during construction only). If available direct transport to landfarm will occur.

Table 4-2: Estimated Hazardous Waste [1] below shows the estimated hazardous waste quantities onsite for the Project. This table was taken from the Waste Management Plan H34900-1000-07-126-0007.

Table 4-2: Estimated Hazardous Waste [1]

Waste	Waste Description	Disposal Method	Est. Total Annual Production (tonnes)
2013 Work Plan			
Waste oils and fluids	Maintenance	Shipped off Site or used oil burners	0.64
Batteries	Maintenance	Shipped off Site	0.06
Spent activated carbon	Domestic	Shipped off Site	0.06
Aerosol containers	Misc.	Shipped off Site	0.04
Empty compressed gas cylinders	Misc.	Shipped off Site	minimal
Kitchen grease	Kitchen	Shipped off Site	0.28
Crushed drums/plastic pails	Misc.	Shipped off Site	0.13
Spoiled CaCl	Drilling	Shipped off Site or used as dust suppressent	0.02
Construction Phase			
Waste oils and fluids	Maintenance	Shipped off Site or used in waste oil burners	133
Batteries	Maintenance	Shipped off Site	13
Spent activated carbon	Domestic	Shipped off Site	13
Aerosol containers	Misc.	Shipped off Site	8
Empty compressed gas cylinders	Misc.	Shipped off Site	minimal
Kitchen grease	Kitchen	Shipped off Site	57
Crushed drums/plastic pails	Misc.	Shipped off Site	26
Spoiled CaCl	Drilling	Shipped off Site or used as dust suppressant	4
Operation Phase			
Waste oils and fluids	Maintenance	Shipped off Site as above	76
Batteries	Maintenance	Shipped off Site	7
Spent activated carbon	Domestic	Shipped off Site	8
Aerosol containers	Misc.	Shipped off Site	5
Empty compressed gas cylinders	Misc.	Shipped off Site	minimal
Kitchen grease	Kitchen	Shipped off Site	33
Crushed drums/plastic pails	Misc.	Shipped off Site	15
Spoiled CaCl	Drilling	Shipped off Site as above	3
Contaminated Soils or Snow to Landfarm during all phases (m^3)[2]			
Soils contaminated with Hydrocarbon	Fuel spill	On-site treatment (landfarm)	8400
Water/ice/snow contaminated with Hydrocarbon	Fuel spill	On-site treatment (landfarm)	25200

1 Composition based on Canutuec Hazardous Waste Shipment Manifest from Mary River Project 2011

2 Assume 350 m^3 of contaminated soil 1/4 of the year, Landfarm Design and Management Plan, Meadowbank Mine (Golder, 2007)

3 Assume 350 m^3 of contaminated snow/ice 3/4 of the year, Landfarm Design and Management Plan, Meadowbank Mine (Golder, 2007)

4.3 Hazardous Material Waste Handling

Hazardous wastes include all liquids or solids designated as hazardous wastes under either federal or provincial regulations, i.e. hydrocarbon liquids, used batteries, various chemicals used during concrete operations, coating materials and a wide variety of other materials including any containers, containing residual amounts of hazardous materials. Timber that is chemically treated shall be considered as a hazardous waste. More generally chemicals or materials of unknown properties will be considered as a hazardous waste unless it can be shown otherwise.

Hazardous waste shall only be handled by certified workers and shall strictly follow the procedures set out in the Environmental Protection Plan (EPP). All handling and disposal of hazardous waste shall comply with the appropriate legislation. A detailed list of hazardous wastes generated will be kept by BIM and updated on a monthly basis. Annex A of this management plan includes a detailed list of all hazardous wastes onsite along with MSDS sheets for all of these wastes.

All hazardous waste shall be clearly labelled and at no time shall hazardous waste be combined with other solid non-hazardous waste. A spill kit shall be made available inside the hazardous waste storage area (refer to the updated Emergency Response and Spill contingency Management Plan, H349000-1000-07-126-0002, for requirements of spill kits). Should a hazardous waste spill occur BIM will oversee its cleanup, removal of contaminated material, transportation and disposal of the hazardous waste contaminated material at an approved off-site hazardous waste landfill.

There shall be no smoking within 10 m of the hazardous waste storage location.

A special class of hazardous wastes are biological wastes generated at the medical clinic and first aid stations. While the amounts will be small, the nature of such waste requires separate packaging and disposal. All such waste will be packaged, labelled and transported for disposal to a facility licensed to dispose of such waste.

Waste Oil generated during the construction phase shall be properly handled, stored and disposed of according to Used Oil Control Regulations (82/02).

4.4 Hazardous Waste Temporary Storage On-Site

Hazardous wastes that will be generated on-site will be similar during both construction and operations phases. These wastes will be temporarily stored in containers and/or at designated locations on-site at the Mine Site, Milne Port, and Steensby Port.

Hazardous wastes generated from the temporary and permanent shelters along the Tote Road and the Railway Corridor will be temporarily stored in containers and will be removed to be temporarily stored at one of the designated locations on-site (Mine Site, Milne Port, and Steensby Port).

4.4.1 *Hazardous Waste Containers*

The following general waste storage requirements apply to most hazardous wastes:

- Store in original container when possible or in containers manufactured to store hazardous waste.
- Sound, sealable, undamaged containers.
- Store in 16 gauge (or lower) metal or plastic drums, or other appropriate container.
- Label according to WHMIS and TDG.
- Keep containers closed or sealed at all times unless in use.
- Protect containers from damage and weather.
- Store in secure area with controlled access.
- Train personnel in appropriate practices.
- Store in manner to prevent spills to environment.
- Never store with food or in food containers.

4.4.2 *Hazardous Waste Storage Areas*

The storage areas will abide by the following criteria:

- Storage areas for Hazardous wastes will be located at a minimum distance of thirty-one (31) metres from the ordinary High Water Mark of any water body such that the quality, quantity or flow of water is not impaired.
- Storage areas for hazardous waste will be in lined and bermed facilities that will contain any spillage locally and prevent discharge to adjacent land and water.
- Drainage into and from the site is controlled to prevent spills or leaks from leaving the site and to prevent runoff from entering the site.
- Incompatible wastes are segregated by chemical compatibility to ensure safety of workers and facility.
- Only persons authorized to enter and trained in waste handling procedures have access to the storage area.
- Regular inspections are performed and recorded. Containers are placed so that each container can be inspected for signs of leaks or deterioration. Leaking or deteriorated containers will be removed and their content transferred to a sound container.
- A record is maintained of the type and amount of waste in the storage.
- Storage sites have emergency response equipment appropriate for the hazardous waste stored on the site.
- Storage site will be registered as required by regulations.

When a material becomes a waste it will then be stored and/or disposed of in accordance with specific government regulations and guidelines. Overall, hazardous waste treatment, recycling, and disposal facilities are lacking in Nunavut. BIM will therefore store most waste materials in secure facilities until they can be transported south for recycling or disposal.

4.5 Hazardous Waste Transportation Off-Site

Hazardous Wastes will be shipped to registered hazardous waste disposal facilities or to recycling depots as per the Basel Convention. Hazardous wastes will not go to community hamlets. All storage and shipping containers will have appropriate containment measures. Manifests will be prepared for all materials shipped off-site and the receivers will be required to maintain chain of custody records. Shipping will be undertaken only by those trained in the Transportation of Dangerous Goods (TDG). All hazardous waste storage and handling areas will be routinely inspected for leaks, spills, and the implementation of appropriate containment measures

BIM will maintain records of all Waste backhauled from the Mary River Project and confirmation of proper disposal through the use of Waste manifest tracking systems and registration with the Government of Nunavut, Department of Environment. These records will be made available upon request, to an Inspector or the Board.

4.6 EPP Procedures Relevant to this Hazardous Materials Management Plan

Table 4-3 outlines the EPP procedures that are relevant to the Hazardous Materials Management Plan. The EPP is a living document and is subject to on-going updates.

Table 4-3: Content of the EPP Related to the Hazardous Materials Management Plan

Section	Title/Description
2.5	Geotechnical Drilling Operations
2.6	Equipment Operations
2.7	Fuel Storage and Handling
2.14	Solid Waste Management
2.15	Sewage Treatment
2.16	Hazardous Waste Management
2.17	Road Construction and Borrow Development
2.19	Road Traffic Management
2.21	Exploration Drilling Operations
3.7	Off-Site Waste Disposal Log

5. Major Hazardous Materials On-Site

5.1 Hazardous Waste Materials of Special Interests

Two particular products: ammonium nitrate and diesel fuel will be used in relatively large quantities throughout the life of the Project. Detailed procedures have been developed to ensure that these materials are handled and used with no adverse effect on people or the environment. Product characteristics and use are briefly described below.

5.1.1 *Ammonium Nitrate*

Ammonium nitrate (AN) (NH_4NO_3) is essentially a fertilizer product manufactured and used for agricultural purposes in many parts of the world. It is also used in the manufacture of commercial blasting explosives. In addition to ANFO — a combination of ammonium nitrate and fuel oil — AN is a major raw material in the manufacture of nitro-glycerine, water gels/slurries, and other types of blasting emulsions. Trials with modern ANFO blasting agent were conducted through the 1950s and 1960s, leading to its current status as the most widely used commercial explosive in the world, representing about 70% of total usage. AN-based explosives are a vital part of every construction Project and are indispensable in the mining industry. Millions of tonnes of AN are produced annually throughout the world and handled without incident.

5.1.1.1 *AN Physical Properties*

AN is a stable, inorganic, solid compound. It is completely soluble in water and must be kept dry to remain effective for its intended purpose. AN products vary in composition, blend, and surface treatment. For instance, granular fertilizer products are coated with various materials to seal the particles from moisture contamination, whereas AN prills (pellets) produced for use in ANFO explosives are intentionally porous to permit the oil to be absorbed. The prills are generally white or off-white, and shelf life in a tightly closed container is unlimited. AN itself is not an explosive, but it is an oxidizer and can explode or decompose under specific conditions, such as: high temperature (between 160°C and 200°C); bulk storage in a confined space; contamination with organic substances such as oil or waxes; contamination with inorganic materials such as chlorides and metals (chromium, copper, cobalt, nickel); and exposure to strong shock waves from other explosions. Similarly, AN is not combustible in itself, but as an oxidizing agent it increases fire hazard when in contact with other combustible materials, even in the absence of air. AN must be stored in a dry, well-ventilated area away from all possible sources of heat, fire, or explosion. AN is odourless under normal conditions but releases toxic nitrous and ammonia fumes on explosion, decomposition, or involvement in a fire. Direct and unprotected contact with dry AN can cause discomfort and inflammation of eyes, skin, and respiratory membranes. Its oral toxicity is slight to moderate, although swallowing large amounts can have serious, if not fatal, effects from the ammonia and nitrate salts. It has no known chronic effects, however, and repeated or prolonged exposure is not known to aggravate pre-existing medical conditions. AN is of low toxicity to aquatic life but may promote eutrophication in waterways (water becomes pollution rich in dissolved nutrients).

5.1.1.2 *Handling and Storage*

Although AN is classified as a hazardous product, its storage and handling at Mary River is not considered to be a significant risk activity. At site, a qualified explosives contractor will manage AN and all other explosives-related materials. The AN bags will be stored in a safe area away from water bodies and from the explosives storage magazine. AN bags will be handled individually when needed for the preparation of batches of explosive.

Any spills will be swept up and placed in suitable containers for use or disposal. Empty bags are not considered to be hazardous waste, and will likely be burned in the site incinerator. All personnel exposed to AN will wear suitable personal protective equipment.

5.1.1.3 Regulatory Context

In Canada, the production, storage, and use of AN are subject to strict precautionary measures under the Explosives Act and Regulations, and the Canada Transportation Act, Ammonium Nitrate Storage Facilities Regulations. The Explosives Act is administered by the Explosives Regulatory Division (ERD) of Natural Resources Canada.

5.1.2 Diesel

Products such as combustible diesel fuels, toxic anti-freeze, compressed gases, lubricants, and cutting oils are widely used in the North. These products meet vital needs for power generation, heating, and vehicle operation. Diesel fuel is by far the largest volume of petroleum product shipped annually to communities in Nunavut. The potential environmental dangers of transporting and burning diesel fuels are well understood. The transportation, storage, and handling of diesel products are strictly regulated by both federal and territorial legislation. Baffinland will ensure that all such requirements are met and emphasize the need for regular inspection of all storage and distribution facilities on site to assure mechanical soundness and to prevent leaks or any other uncontained release of diesel fuel.

5.2 Sewage

Off spec sewage sludge on site must be treated and disposed of in a safe and effective manner. The sections below identify sewage sludge handling guidelines which will be adopted by all staff onsite for off spec sewage.

5.2.1 Personal Protective Equipment (PPE)

Appropriate PPE should be provided for all workers likely to have exposure to treated sewage sludge. The choices of PPE include goggles, splash-proof face shields, respirators, liquid-repellent coveralls, and gloves. Face shields should be made available for all jobs in which there is a potential for exposure to spray or high-pressure leaks. Management and employee representatives should work together to determine which job duties are likely to result in this type of exposure, to conduct appropriate on-site monitoring, and to determine which type of PPE is needed in conjunction with a qualified safety and health professional. If respirators are needed, a comprehensive program would include respirator fit-testing and training or retraining.

5.2.2 Hygiene and Sanitation

Hand-washing stations with clean water and mild soap should be readily available whenever contact with treated sewage sludge occurs. In the case of workers in the field, portable sanitation equipment, including clean water and soap, will be provided. Cabs should be wiped down and cleaned of residual mud (or settled dust) frequently to reduce potential for exposure to treated sewage sludge.

5.2.3 Training

Periodic training on standard hygiene practices for treated sewage sludge workers should be conducted by qualified safety and health professionals to cover issues such as the following:

- Frequent and routine hand washing (the most valuable safeguard in preventing infection by agents present in treated sewage sludge), especially before eating or smoking.
- The proper use of appropriate PPE, such as coveralls, boots, gloves, goggles, respirators, and face shields.
- The removal of contaminated PPE and the use of available on-site showers, lockers, and laundry services.
- Proper storage, cleaning, or disposal of contaminated PPE.
- Instructions that work clothes and boots should not be worn home or outside the immediate work environment.
- Prohibition of eating, drinking, or smoking while working in or around treated sewage sludge.
- Procedures for controlling exposures to chemical agents that may be in treated sewage sludge.

5.3 Fuels and Lubricants

Material categories, site handling and storage requirements, and personal protective equipment recommended by manufacturers in MSDSs are summarized in Table 5-1 and Table 5-2.

Table 5-1: Fuel Products – Hazard Classes, Potential Impacts and Storage Locations

Material	Class	Total Amount – Container	Potential Impact
Diesel	3	Refer to Annex A	Water and soil contamination
Aviation fuel	3		Water and soil contamination
Motor oil	NR	TBD – Barrels and/or pails	Soil contamination
Hydraulic fluid	NR	TBD – Barrels and/or pails	Soil contamination
Varsol	3	TBD – Barrels and/or pails	Soil contamination
Vehicle grease	NR	TBD – Barrels and/or pails	Negligible risk with proper handling
Ethylene glycol	NR	TBD – Barrels and/or pails	Negligible risk with proper handling

NR: Not Regulated

Table 5-2: Fuel Products – Safe Handling Procedures

Material	Handling Procedure	Personal Protective Equipment
Diesel	Do not get in eyes, on skin, or on clothing. Avoid breathing vapours, mist, fume, or dust. Do not swallow. May be aspirated into lungs. Wear protective equipment and/or garments if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use with adequate ventilation. Keep away from heat, sparks, and flames. Store in a well-ventilated area. Store in a closed container. Bond and ground during transfer.	Safety goggles Neoprene or nitrile gloves Protective garments Ensure adequate ventilation
Aviation fuel	See diesel procedures above.	
Motor oil	Wear protective clothing and impervious gloves when working with used motor oils.	Safety goggles Neoprene or nitrile gloves Protective garments
Hydraulic fluid	Keep container closed until ready for use.	Chemical goggles
Varsol	Avoid eye contact. Use with adequate ventilation. Wash thoroughly after handling. Empty container retains residue. Follow label instructions. Avoid repeated skin contact. Store in cool, ventilated area, away from ignition sources and incompatibles. Keep container tightly closed.	Chemical goggles Rubber gloves Protective garments Ensure adequate ventilation
Vehicle grease	Minimize breathing vapor, mist, or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water. To prevent fire or explosion risk from static accumulation and discharge, effectively ground product transfer system in accordance with the National Fire Code. Keep containers closed when not in use. Do not store near heat, sparks, flame, or strong oxidants.	Safety goggles Neoprene or nitrile gloves Protective garments Ensure adequate ventilation
Ethylene glycol	Ensure adequate ventilation. Wear protective gloves and chemical safety goggles. Keep in tightly closed container, stored in a cool, dry, ventilated area. Separate from acids and oxidizing materials. Empty containers of this product retain product residues and may be hazardous.	Chemical goggles Neoprene or nitrile Gloves Protective garments Ensure adequate ventilation

A contract supplier will fill the storage tanks in the main tank farm. General procedures to be followed are listed below. Similar procedures would be followed for fuelling remote station tanks.

Before fuel transfer, verify that:

- All fuel transfer hoses have been connected properly and couplings are tight.
- Transfer hoses are not obviously damaged.
- Fuel transfer personnel are familiar with procedures.
- Personnel are located at both the fuel delivery truck and fuel transfer tank(s) and can manually:
  - Shut off the flow of fuel.
  - If a high liquid level shutoff device is installed at the delivery tank, verify that the shutoff is operating correctly each time it is used.
  - Fuel transfer will then proceed per the established procedures of the contract supplier.
  - Any accidents or spills must be reported immediately to the HSE Manager.

On closure of the mine and facilities, some storage capacity will be left in place at site for diesel fuel for the use of personnel involved in close-out and reclamation activities. Small amounts of other petroleum products will also continue to be available. More details are provided in the “Reclamation and Closure Plan.”

5.4 Explosives

Explosives are required for blasting rock required for construction, waste rock and ore in the open pit mine. Storage, use, and handling of blasting materials are strictly regulated in Nunavut. All explosives handling, use and storage will be performed in accordance to the Mary River Project: Explosives Management Plan and will be performed by a licensed contractor.

Material categories, site handling and storage requirements, and personal protective equipment recommended by manufacturers in MSDSs are summarized in Table 5-3.

Table 5-3: Explosives – Hazard Classes and Potential Impacts

Material	Class	Potential Impact
Ammonium nitrate	5.1	Water contamination
High explosive detonators	1	Negligible with proper handling
Blasting caps	1	Negligible with proper handling

5.5 Small Quantity Hazardous Waste

Material categories, site handling and storage requirements, and personal protective equipment for minor quantity hazardous waste are summarized in Table 5-4.

Table 5-4: Minor Quantity Hazardous Waste Handling Requirements

Material	Handling Procedure	Personal Protective Equipment
Liquid chemical waste (glycols, solvents, paint, brake fluid, hydraulic fluids, etc.)	Do not get in eyes, on skin, or on clothing. Avoid breathing vapours, mist, fume, or dust. Do not swallow. May be aspirated into lungs. Wear protective equipment and/or garments if exposure conditions warrant. Wash thoroughly after handling. Launder contaminated clothing before reuse. Use with adequate ventilation. Keep away from heat, sparks, and flames. Store in a well-ventilated area. Store in a closed container. Bond and ground during transfer.	Safety goggles Neoprene or nitrile gloves Protective garments Ensure adequate ventilation
Solid chemical waste (batteries, fluorescent lights, aerosol cans, etc.)	Avoid breathing vapours mist fumes and ensure they are stored in well ventilated area. Store in an area away from direct sunlight and ensure containers are sealed at all times. Ensure no visible leaks or damage to containers holding the waste. Keep away from heat, sparks and flames. Use self closing and flame resistant containers where possible.	
Electronic waste (TVs, computer CRTs (screens) and computer hard drives	Where possible Environmental Protection Act (EPA) encourages reuse and recycling of end-of life electronic waste. Dismantling and providing reuse possibilities, enables intact natural resources to be conserved and air and water pollution caused by hazardous disposal avoided. Sanitize before disposal and return to manufacturer where possible.	Safety goggles Rubber gloves Protective garments – Lab coat and safety shoes
Laboratory chemical waste	Avoid contact with eyes skin clothing. Do not breathe dust or other vapours. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product. Store between 10° and 25°C. Keep away from: acids/ acid fumes. Oxidizers - Protect from heat moisture and ensure container lids are tightly closed at all times	Safety glasses with top and side shields Disposable latex gloves Lab coat and other protective garments Ensure adequate ventilation Have an eyewash station nearby Have a safety shower nearby. Use a fume hood to avoid exposure to dust, mist or vapor.

Material	Handling Procedure	Personal Protective Equipment
Biomedical waste	Avoid eye contact. Use with adequate ventilation. Wash thoroughly after handling. Ensure waste is stored in areas away from general traffic and accessible only to authorized person. Follow label instructions. Avoid repeated skin contact. Store in cool, ventilated area. Keep container tightly closed. Waste cannot be stored for long periods and shall be transported in leak proof containers.	Chemical goggles Disposable latex gloves Protective garments Ensure adequate ventilation
Ozone depleting substances (ODS) (i.e. refrigerants, etc.)	Should be permanently labelled with the quantity and type of ozone depleting substance contained within that equipment. All compressor rooms housing stationary refrigeration and air conditioning systems should have refrigerant detectors and alarms installed to detect refrigerant leaks and emissions. Ensure trained licensed personal.	Safety goggles Disposable latex gloves Protective garments Ensure adequate ventilation
Compressed gas cylinders	Do not smoke when handling or transporting these cylinders. Store cylinders in the upright position and secure with an insulated chain or non-conductive belt. Ensure that all protective caps are in place and that the area is well ventilated. Protect cylinders from contact with ground, ice, snow, water, salt, corrosion and high temperatures. Storage areas for compressed gas cylinders must not contain any unnecessary combustible materials or uncontrolled ignition sources. Be aware that environmental conditions, such as heat exposure, may cause the temperature of the cylinder to rise to excessive levels that could lead to a release of product even if the ambient temperature is relatively low.	Disposable latex Gloves, Safety glasses Safety shoes Protective garments

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6. Roles and Responsibilities

6.1 Organization Chart for Environment

The Baffinland environmental team is organised into two parts, on site as well as off site. The organisational structure for the Mary River Project in relation to the environment discipline is shown in Table 6-1 below. Communication channels are described as liaisons in the tables outlining the responsibilities and accountabilities in the following sections.

6.1.1 *The Baffinland Environmental Team*

The Baffinland Environmental Team will oversee all environmental and community works on and off site. The Baffinland Corporate Environmental Team responsibilities are summarized in Table 6.1.

The Baffinland Environmental Team will oversee all environmental activities on site. These responsibilities on site are outlined in Table 10-2.

6.1.2 *Construction Contractor's Environmental Team*

The Construction Contractor will have their own organisational structure which is yet to be defined, but at a minimum the responsibilities for the environmental portion are summarized in Table 6-3.

6.2 Monitoring and Inspection

Responsibilities have been assigned to various personnel on the Project team. Where required, third party resources will be retained to supplement in-house resources and capabilities.

Table 6-1: Baffinland Iron Mines Corporation Senior Management

Baffinland Iron Mines Corporation Senior Management	
Position	**Responsibilities and Accountabilities**
Project Director	- Reports to Baffinland's CEO - Overall accountability for the Project execution - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during Construction of the Project - Accountable for on-site environmental, health and safety performance during construction of the Project
VP Operation	- Reports to Baffinland's CEO - Overall accountability for the Operation of the Project once constructed - Allocation of resources (human and financial) for the implementation of Baffinland's commitments and objectives related to health, safety and environment during Operation - Accountable for on-site environmental, health and safety performance during Operation
VP Sustainable Development, Health, Safety and Environment	- Reports to Baffinland's CEO - Establish corporate environmental policies and objectives - Monitors and reports on Baffinland's performance related to environmental, health and safety policies and objectives - Community liaison - Liaise with regulatory authorities - Obtains necessary permits and authorizations - Monitors compliance with terms and conditions of permits and licences - Routine EHS audit of contractor performance while on site

Baffinland Iron Mines Corporation Senior Management	
Position	**Responsibilities and Accountabilities**
Manager Purchasing and Contract	- Reports to Baffinland's Project Director - Accountable for procurement and purchasing - Ensure that environmental commitments, policies and objectives are included in all contract documents
VP Corporate Affairs	- Reports to Baffinland's CEO - Accountable for external communication (Governments, media, NGO, others) related to Baffinland's press release and overall communication of site incidents/events

Table 6-2: Baffinland Iron Mines Corporation On-Site Management Team

Baffinland Iron Mines Corporation On-Site Management Team	
Construction Manager	- Reports to the Project Director - Responsible for daily on-site management of construction activities - Accountable to the Project director for site environmental, health and safety performance - Organize and provides necessary induction, safety and environmental training for all employees - Ensure that all contractors on-site abide by Baffinland's policies, EHS commitments
Environmental Manager	- Reports to VP EHS & Sustainability - Monitors environmental performance of contractors on site - Monitors compliance with permits, licences and authorizations - Regulatory environmental monitoring and reporting (monthly, annual) - Routine audit of contractor's environmental performance on-site - Initiate/supervise environmental studies - Investigate and reports on accidents and incidents when they occur - Review and update environmental management plans
Environmental Supervisor(s)	- Reports to Environmental Manager - Specific accountabilities for environmental monitoring and reporting - Provides induction and environmental awareness training to new employees and contract workers
Environmental Support Group	- Reports to the Environmental Supervisor - Environmental database management - Various sampling, monitoring and reporting activities as required by permits, licences and environmental management plans - Prepare updates to environmental protection plan and management plans
Environmental Monitors	- Reports to the Environmental Superintendent

Table 6-3: Construction Contractor(s)

Construction Contractor(s)	
Construction Manager	- Reports to the Baffinland's Construction Manager - Accountable for the EHS components of his scope of work - Accountable for implementation of the Construction Environmental Protection Plan - Co-ordination/interaction with Baffinland and Baffinland's Representative Environmental Monitors.
EHS Superviser	- Reports to the Contractor's Construction Environmental Manager - Liaise with Baffinland's Environmental Supervisors and monitors. - Holds daily EHS briefing - Monitors and ensures that Contractor complies with requirements of management plans, terms and conditions of all authorization, licences and permits associated with the Contractor's scope of work - Investigate, reports and follow up on environmental accidents and incident - Provides site specific environmental monitoring - Daily supervision of construction activities for environmental performance - Attendance at all environmental meetings/Project meetings (as required). - Routine interaction with construction crews to ensure all construction activities are in compliance with requirements of the CEPP and Contractors Environmental Method Statements. Monitor the environmental permitting status of the Project to ensure that no work proceeds until appropriate and complete permitting is received for the applicable facility.

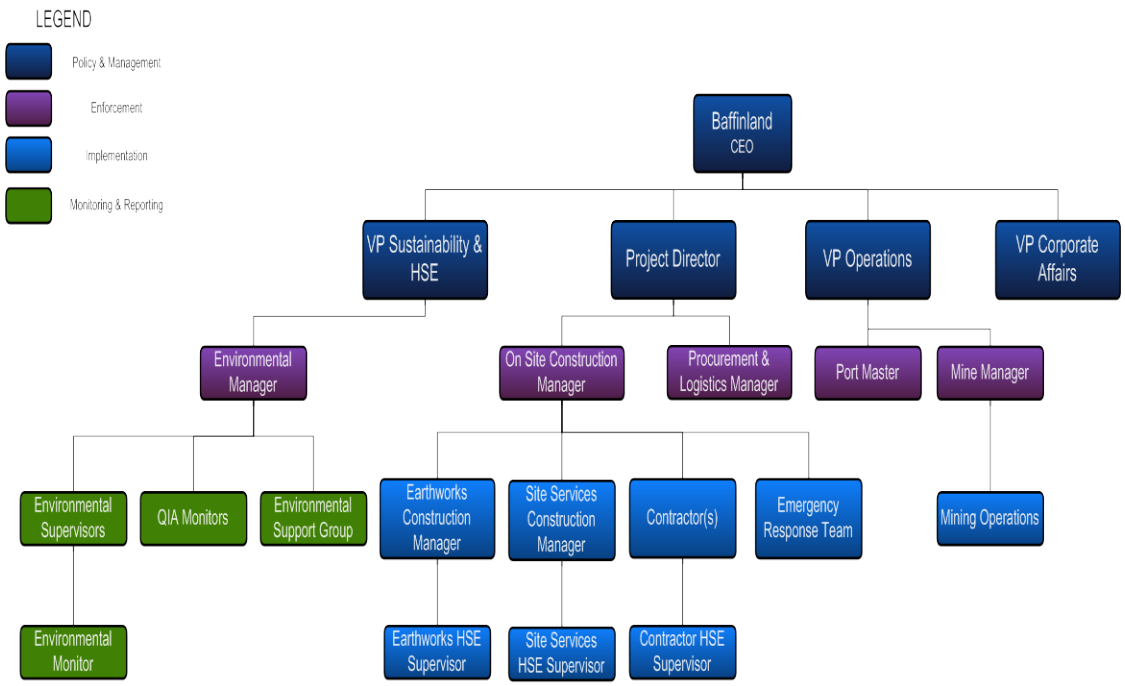

Figure 6-1: Mary River Project Organization Chart

6.3 Training and Awareness

Staff and sub-contractors working on site will receive environmental training as part of the Site Orientation, to achieve a basic level of environmental awareness understanding of their obligations regarding compliance with regulatory requirements, commitments and best practices.

Operations superintendents and contractor supervisors will be provided with this Management Plan, and will receive additional orientation with respect to the requirements outlined in this Plan. In addition, all supervising level staff and sub-contractors will be provided with the Operational Standards (found in the Environmental Protection Plan) as a written guidance for their work.

Targeted environmental awareness training will be provided to both individuals and groups of workers assuming a specific authority or responsibility for environmental management or those undertaking an activity with an elevated high risk of environmental impact. These will be delivered in the form of toolbox/tailgate meetings or other means as appropriate.

The content of the environmental component of the site induction will include at a minimum:

a) Location of environmental sensitivities.

b) Location of additional information on environmental matters.

c) Due diligence responsibilities.

d) Responsibilities related to waste management, minimizing noise as necessary, road traffic rules, etc.

e) Principles and necessary steps to avoid encounters with bears or other wildlife and what to do if one such encounter occurs.

With respect to hazardous materials management, Baffinland will have a written training and awareness plan which will consider:

- The differing level of risks and potential consequences associated with different types of hazardous materials.
- The different responsibilities, abilities, and literacy of employees.
- The culture of the employees.
- Contractors involved and their relevant experience/expertise.
- The trainers, training methods, and settings.
- Training frequency.
- Documentation of training and evaluation of training.

Baffinland will regularly review and update the training and awareness plan based on changes in training needs and regulatory required training.

6.4 Communication

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

a) Formal written correspondence and meetings with stakeholders.

b) Site visits by community representatives.

c) Design, construction and planning meetings.

d) Field inspections and monitoring reports disseminated by the Environmental Manager.

e) Electronic communications.

f) Tailgate/toolbox meetings.

g) Formal written correspondence and meetings with government regulatory bodies.

h) 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 Operations Manager(s), and Environmental Manager.

6.5 External Communications

Effective forms of communication include the proactive notification to external stakeholders of Project activity. Project activity updates will be provided to the communities of North Baffin through various means including regular meetings, public notices and radio announcements as appropriate. Baffinland will maintain Community Liaison Offices to assist in this regard.

6.6 Construction

During the construction phase of the Project, the Baffinland Environmental Manager and EPCM (Engineering Procurement and Construction Management) contractor will be responsible for implementing this Plan.

This Management Plan will be updated to take into account the numerous construction sites, and types of construction equipment utilized. The organizational structure of the EPCM contractor will reflect the complexity of the construction phase.

The EPCM contractor and its subcontractors will appoint a Construction Phase Environmental Supervisors who will oversee the application and adherence to all of Baffinland`s EMMP. They will report to the site Construction Manager as well as to the Environmental Manager or his designate.

6.7 Operation and Closure

For the operations and closure phases, Baffinland will revise its organizational structure to reflect the realities of the operation. The Environmental Manager will be responsible for subsequent updates and implementation of the Plan.

7. Performance Indicators, Thresholds and Incident Response

Periodic inspections of hazardous materials management facilities will ensure compliance with this Hazardous Materials Management Plan. The EPP and associated operations procedures/work instructions outline detailed procedures for handling and storage of fuel, lubricants and other hazardous materials. These procedures are in place and training will be provided to all employees and contractors on hazardous materials handling. Accidental spills are the most likely type of environmental incident to occur while conducting the above mentioned activities. Response procedures, documented in the EPP and the Emergency and Spill Response Plan, are in place to deal with these occurrences.

The ultimate performance indicator for hazardous materials management is the number of incidents of non compliance reported on a daily or monthly basis. Incidents of non-compliance are classified by type and each type entails remedial actions as outlined in Appendix 10A-2: Hazard Identification and Risk Assessment Standard.

Where an investigation triggers a review and update of established EPP procedures, these reviews and update will be carried out in accordance the procedures established by Baffinland`s EHS Framework.

8. Monitoring and Reporting Requirements

8.1 Hazardous Materials Monitoring

Hazardous materials monitoring includes the visual inspection of three main components of the hazardous materials management system (described below) and the measurement and recording of all hazardous materials taken off site. The following information will be reported on an annual basis as currently is the practice:

- The quantities hazardous materials transported off-site for disposal.
- The location and name of the disposal facility for each hazardous materials type.
- The date that each was hauled off-site for disposal, for each occasion that these are removed from the site.
- Quantities of non-hazardous inert solid hazardous materials disposed in the landfill.
- Quantities of hydrocarbon contaminated soils and water processed in treatment facilities.

Regular visual inspection of hazardous materials management facilities will be conducted by the HSE Manager to ensure proper operation and adequate environmental/health and safety controls are in place.

Hazardous materials audits will be undertaken periodically generation points to ensure hazardous materials streams are properly segregated.

Landfarm monitoring on the Project will be done in accordance to Annex 5 of the Waste management Plan – H49000-1000-07-126-0007.

8.2 Operations Monitoring

In addition to specific monitoring and reporting requirements under the regulatory approvals such as the water license, QIA land lease, land use permits, and fisheries authorization as well as monitoring of Project effects, the Environmental Lead will coordinate routine inspections of various aspects of the operations. Routine inspections are conducted to confirm overall conformance with the requirements of the Hazardous Materials Management Plan, companion EPP, and operating procedures/work instructions, and will include inspections of site-based hazardous materials management activities.

Compliance Monitoring Forms are used to document the findings and required actions. These reports are generated as an internal operational management tool to promote continuous improvement in environmental performance and stewardship. Checklists are used as internal operational monitoring and compliance tools. These checklists are integrated into the EPP and other operating procedures/work instructions.

8.3 Data Management

The Environmental Lead is responsible for data management and reporting related to hazardous materials management. The data management system includes conducting routine inspections and monitoring, and providing these results to appropriate parties as required.

8.4 Stakeholder Reporting

Reporting of waste management activities will be included in the respective NWB and NIRB annual reports. In addition, interested stakeholders and the public may request detailed information as part of the Stakeholder Consultation Plan.

9. Adaptive Strategies

Baffinland is committed to continual improvement in its work activities with the aim of reducing risks to the environment and improving operational effectiveness. The strategy employed at Baffinland is regular monitoring supported by operational change and adoption of other mitigating measures if warranted.

Housekeeping and operational measures have been instituted. As part of the EPP, work procedures will continuously be adapted with the goal to reduce the use of hazardous materials. Regular scheduled inspections of hazardous materials storage facilities along with the non-compliance reporting system described in Section 6 will ensure continual improvement and adaptation of hazardous materials management strategies throughout the life cycle of the Project.

As per the requirements of Baffinland`s EHS Management Framework, the company will conduct and document management reviews of its Hazardous Materials and Hazardous Waste Management Plan on a regular basis. Such reviews will ensure the integration of monitoring results for the Hazardous Materials and Hazardous Waste Management Plan are integrated with other aspects of the Project and that necessary adjustments are implemented as required. These reviews also provide a formal mechanism to assess the effectiveness of the management in achieving the company's objectives and maintaining on-going compliance with Project permits and authorizations.

10. QA/QC

As per the requirements of Baffinland`s EHS Framework, regular audits will be undertaken to ensure compliance with the current Hazardous Materials and Hazardous Waste Management Plan and that best management practices are implemented for hazardous materials management. The result of these audits will form the basis for an annual written statement of assurance by management on the effectiveness of its Hazardous Materials Management Plan.

11. References

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- Government of Nunavut. Department of Environment. Manager, Pollution Control. Eno, Robert. Personal Communication. 15 Aug. 2008.
- Northwest Territories (NWT). Municipal and Community Affairs. Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories. Prepared by Kent, R., P. Marshall and L. Hawke. Yellowknife: Ferguson Simek Clark, (April 21) 2003.

Appendix A
Material Safety Data Sheets

MSDS of hazardous materials used on site

- Agricultural Lime (4p.)
- Aluminum Sulphate (1p.)
- APS 703d#3 Floc Log (2p.)
- APS 705 Silt Stop (2p.)
- APS 706b Floc Log (2p.)
- Aviation Fuel (7p.)
- Calcium Chloride Flake (4p.)
- Cast Booster (3p.)
- CP-43 Diesel (6p.)
- Detonating Cord (3p.)
- DR-133 POLYMER (4p.)
- Electric Dentonators (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

CLEAR FLOW CONSULTING INC.
SOIL SOLIDIFICATION
EROSION CONTROL
WATER CLARIFICATION

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 ppm

NOAEC (Survival) / *Ceriodaphnia dubia* / 48h / 420 ppm

LC 50 / *Onchorhynchus mykiss* / 96h / 2928 ppm

Chronic Toxicity (EPA-821-R-02-013)

IC 25 (Survival) / *P. promelas* / 7 day / 77.8 ppm
NOEC (Survival) / *P. promelas* / 7 day / 52.5 ppm

IC 25 (Survival) / *C. dubia* / 7 day / 78.7 ppm
NOEC (Survival) / *C. dubia* / 7 day / 52.7 ppm

IC 25 (Growth) / *P. promelas* / 7 day / 50.1 ppm
NOEC (Growth) / *P. promelas* / 7 day / 52.5 ppm

IC 25 (Reproduction) / *C. dubia* / 7 day / 66.8 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) / *P. promelas* / 7 day / 358 ppm
NOEC (Survival) / *P. promelas* / 7 day / 840 ppm

IC 25 (Survival) / *C. dubia* / 7 day / 157.5 ppm
NOEC (Survival) / *C. dubia* / 7 day / 105 ppm

IC 25 (Growth) / *P. promelas* / 7 day / 94 ppm
NOEC (Growth) / *P. promelas* / 7 day / 105 ppm

IC 25 (Reproduction) / *C. dubia* / 7 day / 27.7 ppm
NOEC (Reproduction) / *C. dubia* / 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

CLEAR FLOW CONSULTING INC.
SOIL SOLIDIFICATION
EROSION CONTROL
WATER CLARIFICATION

Material Safety Data Sheet

1. Identification of the Product and the Company

Product Name: APS 706b 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 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: 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

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 (Survival) / *C. dubia* / 7 day / 257.3 ppm
NOEC (Survival) / *C. dubia* / 7 day / 210 ppm

IC 25 (Growth) / *P. promelas* / 7 day / >1680 ppm
NOEC (Growth) / *P. promelas* / 7 day / 1680 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, $Ca(OH)_2$	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.

$$\frac{10 mg/m^3}{\% SiO_2 + 2}$$

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 VII 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 incoorination, 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-purrifying 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 arrythmia.

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/m3 for 4hours LD50 Dermal Rat > 4000 mg/kg LD50 Oral Rat > 8000 mg/kg

Toluene	LD50 Oral Rat = 5000 mg/kg LC50 Inhalation Rat = 8000 ppm for 4 hours LD50 Dermal Rabbit = 14000 mg/kg
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/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. 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

residue or vapours. Keep away from sparks and open flames.
Avoid prolonged exposure to vapours.

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

Revisions: This MSDS has been reviewed and updated. Changes have been made to: Section 1 Section 2 Section 3 Section 4 Section 5 Section 6 Section 7 Section 8 Section 9 Section 10 Section 11 Section 12 Section 15

General Chemical

Material Safety Data Sheet

CALCIUM CHLORIDE, FLAKE

A. GENERAL INFORMATION

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

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER: (800) 631-8050

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

C. HAZARDS INFORMATION

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

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

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

EYES:
May irritate or burn eyes.

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J)
Also, no TLV established by ACGIH.

BIOLOGICAL
None

UNUSUAL CHRONIC TOXICITY:
None.

B2-1

C. HAZARDS (Cont.)

FLASH POINT:	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS IN AIR (% BY VOL.)
Not flammable OPEN CUP ☐ CLOSED CUP ☐	NA	LOWER - NA UPPER - NA

UNUSUAL FIRE AND EXPLOSION HAZARDS

See hazard of contact with zinc as in galvanized iron: Section G.

D. PRECAUTIONS/PROCEDURES

FIRE EXTINGUISHING AGENTS RECOMMENDED:
NA

FIRE EXTINGUISHING AGENTS TO AVOID:
NA

SPECIAL FIREFIGHTING PRECAUTIONS:
None.

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

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

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

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

SPECIAL: PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS:

SIGNAL WORD
WARNING!

E. PERSONAL PROTECTIVE EQUIPMENT

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

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

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

OTHER CLOTHING AND EQUIPMENT:
Eye-wash facility.

F. PHYSICAL DATA

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

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

G. REACTIVITY DATA

STABILITY:	CONDITIONS TO AVOID:
UNSTABLE ☐ STABLE ☒	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:	CONDITIONS TO AVOID:
MAY OCCUR ☐ WILL NOT OCCUR ☒	NA

H. HAZARDOUS INGREDIENTS (MIXTURES ONLY)

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

B2-3

I. ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY:	OCTANOL/WATER PARTITION COEFFICIENT NA

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

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

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

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

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

J. REFERENCES

PERMISSIBLE CONCENTRATIONS REFERENCES:

None.

REGULATORY STANDARDS	DOT CLASSIFICATION: Not regulated	49 CFR 173

None.

GENERAL:

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

K. ADDITIONAL INFORMATION

None.

GC-1002

Material Safety Data Sheet

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

MSDS # 1108
Date 08/05/08

Supercedes
MSDS # 1108 01/23/06

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

DYNO® CORD SENSITIVE BOOSTERS - CS35, CS45, CS90, CS135

TROJAN® SPARTAN®
TROJAN® SPARTAN® Slider
TROJAN® Stinger
TROJAN® NB
TROJAN® NB UNIVERSAL
TROJAN® 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

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**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 deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

Material Safety Data Sheet

SECTION III - PHYSICAL DATA

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

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

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

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

Emergency and First Aid Procedures

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

SECTION VI - REACTIVITY DATA

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

SECTION VII - SPILL OR LEAK PROCEDURES

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

SECTION VIII - SPECIAL PROTECTION INFORMATION

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

SECTION IX - SPECIAL PRECAUTIONS

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

SECTION X - SPECIAL INFORMATION

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

Chemical Name	CAS Number	% By Weight
None Applicable		

Disclaimer

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

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

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.

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.

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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.

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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--- Known	Anticipated	IARC Category
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.

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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\---------------------------------
                                                    --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
--------------------------------------------  -----  ---   ----  -----
Citric Acid (77-92-9)                          Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Citric Acid (77-92-9)                     No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                    -RCRA-    -TSCA-
Ingredient                                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 Liquid

Class D2B Other Toxic 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	**TELEPHONE NUMBERS**	
Avjet Holding Inc.	**Avjet Emergency Number**	1-866-472-0007
900, Lemire Boulevard Drummondville, QC Canada J2C 7W8	For 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/m3 @ 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:	Thermal decomposition products are highly dependent on combustion conditions.
Incompatible Materials:	Avoid strong oxidizing agents.
Conditions of Reactivity:	Avoid excessive heat, open flames and all ignition sources.

11. TOXICOLOGICAL INFORMATION

Ingredient (or Product if not specified)	**Toxicological Data**
Fuels, Diesel, No. 2	LD50 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.
2650 Decker Lake Boulevard, Suite 300
Salt Lake City, Utah 84119
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL CHEMTREC (USA) 800-424-9300
CANUTEC (CANADA) 613-996-6666

MSDS # 1126
Date 08/13/08

Supercedes
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

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

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

SECTION III - PHYSICAL DATA

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

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

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

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

Emergency and First Aid Procedures

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

SECTION VI - REACTIVITY DATA

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

SECTION VII - SPILL OR LEAK PROCEDURES

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

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

SECTION VIII - SPECIAL PROTECTION INFORMATION

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

SECTION IX - SPECIAL PRECAUTIONS

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

SECTION X - SPECIAL INFORMATION

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

Chemical Name	CAS Number	% By Weight
None		

Disclaimer

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

INGREDIENT	% (v/v)	CAS NUMBER	LD_{50}Oral-Rat	LC_{50}Inhal-Rat	ACGIH-TLV
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.

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

MSDS # 1076
Date 08/13/08

Supercedes
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

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

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

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

SECTION III - PHYSICAL DATA

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

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

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

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

Emergency and First Aid Procedures

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

SECTION VI - REACTIVITY DATA

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

SECTION VII - SPILL OR LEAK PROCEDURES

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

SECTION VIII - SPECIAL PROTECTION INFORMATION

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

SECTION IX - SPECIAL PRECAUTIONS

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

SECTION X - SPECIAL INFORMATION

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

Chemical Name	CAS Number	Max. lbs/1000 units
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.**

Disclaimer

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
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CANUTEC (CANADA) 613-996-6666

MSDS # 1030
Date 09/05/07

Supercedes
MSDS # 1030 03/27/07

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

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

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

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
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 deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable

Vapor 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.

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

HALLIBURTON

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

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

6. ACCIDENTAL RELEASE MEASURES

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

7. HANDLING AND STORAGE

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

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

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

9. PHYSICAL AND CHEMICAL PROPERTIES

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

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 (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

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

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause severe eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Lung disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.

Other Information None known.

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

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

Bio-accumulation Not Determined

Ecotoxicological Information

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

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

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

Contaminated Packaging 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.

Disclaimer Statement

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

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

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	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
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.

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 arrythmia.

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

For further information on health effects, see Section 11.

4. FIRST AID 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.

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:	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/m3 @ 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

GE
Water & Process Technologies

Material Safety Data Sheet

Issue Date: 17-APR-2008
Supercedes: 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	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
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.

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

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 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/m3 @ 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

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/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. 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
Fax (08) 9249 7699
BRISBANE
Tel (07) 3271 5900
Fax (07) 3271 5907

VSEDS
Southern Exploration & Drilling Supplies

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

PO Box 148,
Kingsway WA 6065

Material Safety Data Sheet

Lubtac Rod Grease

MI
A Smith/Schlumberger Company

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

HEALTH SAFETY HSE ENVIRONMENTAL

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ENVIRONMENTAL AND SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

TRADE NAME: **LUBTAC ROD GREASE**

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

2. HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENT	%	DATA
NONE		

3. PHYSICAL DATA

BOILING POINT : **120 °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**

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

5. HEALTH HAZARD INFORMATION

ROUTES OF EXPOSURE AND EFFECTS

EYES : **MODERATE TO SEVERE IRRITATION**

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

INGESTION : **MAY CAUSE NAUSEA**

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

6. EMERGENCY AND FIRST AID PROCEDURES

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

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

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

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

7. REACTIVITY DATA

CONDITIONS CONTRIBUTING TO INSTABILITY: **EXTREME HEAT**

INCOMPATABILITY: **NONE**

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

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

8. SPILL OR LEAK PROCEDURES

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

9. INDUSTRIAL HYGEINE CONTROL MEASURES

VENTILATION: **NORMAL**

SPECIFIC PERSONAL PROTECTIVE EQUIPMENT

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

10. SPECIAL PRECAUTIONS

NONE

11. OTHER HANDLING AND STORAGE REQUIREMENTS

NONE

Material Safety Data Sheet

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

MSDS # 1122
Date 01/22/09

Supercedes
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

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

Molybdenum	7439-98-7	None[1]	None[2]
Tungsten	7440-33-7	None[1]	5 mg/m^3 (TWA) 10 mg/m^3 (STEL)
Aluminum	7429-90-5	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)	5 mg/m^3
Antimony	7440-36-0	0.5 mg/m^3	0.5 mg/m^3
Cyclotetramethylene Tetranitramine (HMX)	2691-41-0	None[1]	None[2]

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

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

SECTION III - PHYSICAL DATA

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

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

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

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

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

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

Emergency and First Aid Procedures

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

SECTION VI - REACTIVITY DATA

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

SECTION VII - SPILL OR LEAK PROCEDURES

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

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

SECTION VIII - SPECIAL PROTECTION INFORMATION

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

Respiratory Protection: None required for normal handling.

Protective Clothing: Cotton gloves are recommended.

Eye Protection: Safety glasses are recommended.

Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

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

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

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

Material Safety Data Sheet

ECTION X - SPECIAL INFORMATION

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

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

Range* of Section 313 Chemicals in each product

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

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

Disclaimer

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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 # 1063
Date 10/30/08

Supercedes
MSDS # 1063 07/02/07

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

BLASTEX®
BLASTEX® PLUS
BLASTEX® PLUS HD
BLASTEX® TX
BLASTEX® TX PLUS
BLASTGEL® 1000
BLASTGEL® 1070
SUPER BLASTEX®
SUPER BLASTEX® TX
SUPER BLASTEX® TX
DYNO® 1.5 SB
DYNO® 1.5 SBC
DYNO® 1.5 SB30
DYNO® 900
DYNO® 1300
DYNO® 1500
DYNO® 1520
DYNO® 1540
DYNOTEX
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

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
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 deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

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

Evaporation Rate (Butyl Acetate = 1): <1

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

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: May cause irritation, redness and tearing.
Skin: Prolonged contact may cause irritation.
Ingestion: Large amounts may be harmful if swallowed.
Inhalation: Not a likely route of exposure.
Systemic or Other Effects: 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

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

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 # 1019
Date 03/27/07

Supercedes
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

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
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 deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable

Evaporation Rate (Butyl Acetate = 1): Not Applicable

Vapor Pressure: Not Applicable
Density: 0.8-1.48 g/cc
Solubility in Water: Ammonium and sodium nitrates are completely soluble. NG and EGDN are very slightly soluble.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: May cause irritation, redness and tearing.
Skin: Contact may result in headache, nausea and blood vessel dilation.
Ingestion: May result in headache, nausea, intestinal upset and blood vessel dilation.
Inhalation: May result in headache, nausea and blood vessel dilation.
Systemic or Other Effects: 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 (H_2S), Nitrous Oxides (NO_X), and Sulfur Oxides (SO_X).
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements. Contact of this product with water may result in a reportable release.

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

SECTION VIII - SPECIAL PROTECTION INFORMATION

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

SECTION IX - SPECIAL PRECAUTIONS

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

SECTION X - SPECIAL INFORMATION

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

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

Disclaimer

MATERIAL SAFETY DATA SHEET

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY: **Diversity Technologies Corp.**
8750 – 53rd Ave.
Edmonton, AB T6E 5G2

DATE: February 15, 2007
PHONE: 780-468-4064
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

INGREDIENT	% (w/w)	CAS NUMBER	LD_{50} Oral-Rat	LC_{50} Inhal-Rat	ACGIH-TLV
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. LD_{50} (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/m^3

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_2O.	
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	BY:	Product safety committee
SUPERSEDES:	April 27, 2004	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.

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.

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/m^3 (Inhalable); 3 mg/m^3 (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m^3 (Total); 5 mg/m^3 (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.

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 (H2O = 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)

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.

Biodegration: 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 Catagories: 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

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 guartantee 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.

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.

Environmental Precautions: Waste must be disposed of in accordance with federal, state and local laws. In the U.S., for products with reportable quanitity (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/m^3 (Inhalable); 3 mg/m^3 (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m^3 (Total); 5 mg/m^3 (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

Color:	Dark brown.
Odor:	Distinctive
Physical State:	Thick Liquid
pH:	7 - 7.5
Specific Gravity (H2O = 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.
Biodegration:	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.

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: 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

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 guartantee 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

Supercedes
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

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

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

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

SECTION III - PHYSICAL DATA

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

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

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

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

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

Emergency and First Aid Procedures

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

SECTION VI - REACTIVITY DATA

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

SECTION VII - SPILL OR LEAK PROCEDURES

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

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

SECTION VIII - SPECIAL PROTECTION INFORMATION

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

SECTION IX - SPECIAL PRECAUTIONS

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

SECTION X - SPECIAL INFORMATION

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

Chemical Name	CAS Number	% By Weight
None		

Disclaimer

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 al 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, EC_{50}, 48 hours, 265 mg/l Fishes, Lepomis macrochirus, LC_{50} 96 hours, 300 mg/l Algae, Nitszcheria linearis, EC_{50}, 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. Threshhold 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*** * * * * * *Supercedes:* ***01/25/06***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

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.

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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.

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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.

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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--- Known	Anticipated	IARC Category
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	Korea	--Canada-- DSL	NDSL	Phil.

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-------------------------------------------  -----  ---   ----  -----
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

PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

****

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.

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.

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/m^3 (Inhalable); 3 mg/m^3 (Respirable) and an OSHA particulate not otherwise regulated (PNOR): 15 mg/m^3 (Total); 5 mg/m^3 (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.

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.

Biodegration:	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 Catagories: 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.

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:

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 guartantee 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	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

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

aspiration of liquid into the lungs.

Inhalation: 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

prolonged contact with this product.

Respiratory Protection: 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/m3 @ 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.

THIS PRODUCT IS NOT A WHMIS CONTROLLED SUBSTANCE.

DSL/NDSL Status:	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

INGREDIENT	% (v/v)	CAS NUMBER	LD_{50} Oral-Rat	LC_{50} Inhal-Rat	ACGIH-TLV
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 LD_{50} = 57 mg/kg; Oral mouse LD_{50} = 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/m^3 (0.0235 ppm) as Cr^{+6}
PEL: 5 µg/m³ (0.00235 ppm Cr^{+6}), 8 Hr TWA; Action Level is 2.5 µg/m^3 (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

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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.

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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.

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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 $\mu g/m^3$ (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) LD_{50} = 428 mg/kg; Oral rat (female) LD_{50} = 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 LD_{50} = 2140 mg/kg; Mercuric Sulfate: Oral rat LD_{50} = 57 mg/kg, Oral mouse LD_{50} = 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 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.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

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 LD_{50} = 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

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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

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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
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Ingredient Toxicological Data: Potassium Pyrosulfate Oral rat LD50 = 2340 mg/kg; Sodium Molybdate Oral rat LD50 = 4000 mg/kg, Inhalation rat LC50 > 2080mg/m^3/4 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.

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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.

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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:

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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World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

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: $K_2S_2O_8$
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/m^3
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 irritiation 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

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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.

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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.

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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/m^3
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.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(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

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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

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.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(970) 669-3050

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

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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.

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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

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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
--
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.

World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(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 LD_{50} = 1200 mg/kg; Oral mouse LD_{50} = 540 mg/kg; Oral rabbit LD_{50} = 1700 mg/kg.
LC50: None reported.
TLV: Respirable particles: 3 mg/m^3; Inhalable particles: 10 mg/m^3
PEL: Total dust: 15 mg/m^3; Respirable fraction: 5 mg/m^3
Ingredient WHMIS Symbol: Other Toxic Effects

Sodium Nitroferricyanide
Percent Range: < 1.0
Percent Range Units: weight / weight
CAS No.: 14402-89-2
LD50: Oral rat LD_{50} = 99 mg/kg (anhydrous).
LC50: None reported.
TLV: 5 mg/m^3 as CN^-
PEL: 5 mg/m^3 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

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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 irritiation
Skin Contact: May cause irritiation
Skin Absorption: Harmful if absorbed through the skin Effects similar to those of ingestion Sodium nitroferricyanide produces a delayed cyanide poisoning reaction.
Target Organs: Central nervous system Blood
Ingestion: Sodium nitroferricyanide produces a delayed cyanide poisoning reaction. May cause: headache nausea vomiting central nervous system effects
Target Organs: Central nervous system Blood
Inhalation: Sodium nitroferricyanide 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.

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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

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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 LD_{50} = 1200 mg/kg; Sodium Citrate: Oral rat LD_{50} > 8 g/kg; Sodium Tartrate: Oral rabbit LD_{50} = 5290 mg/kg; Sodium Nitroferricyanide: Oral rat LD_{50} = 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.

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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.

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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

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World Headquarters
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/m^3/4H
TLV: 3mg/m^3 Respirable Particles; 10 mg/m^3 Inhalable particles
PEL: 5 mg/m^3 Respirable Fraction; 15 mg/m^3 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

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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

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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/m^3 Respirable Particles; 10 mg/m^3 Inhalable particles
PEL: 5 mg/m^3 Respirable Fraction; 15 mg/m^3 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

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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.

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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/k; Sodium Tartrate Oral rabbit LD50 = 5290 mg/kg; Lithium Hydroxide Oral rat LD50 = 225 mg/kg; Sodium Dichloroisocyanurate Oral rat LD50 = 1400 mg/kg

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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.

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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.

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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.

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ND - Not Determined	w/v - weight/volume
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World Headquarters
Hach Company
P.O.Box 389
Loveland, CO USA 80539
(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

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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.

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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.

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1

Appendix B
2013 Work Plan and Site Layout Drawings

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 m^2 and the volume of material to be extracted is approximately 300,000 m^3.
    - 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 m^2 and the volume of material to be extracted is approximately 538,000 m^3.
  - 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 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 m^3 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 m^3;
- 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.

XREF FILE(S): IMAGE FILE(S): 4 Baffinland logo-big corp NORTH BAFFINLAND

grQ/q5
LEGEND:

- wu6 WATER
- b4m3=sJ6 kNz CAMP LOCATION
- kNo4 COMMUNITY

xqiz
0NMs5b3ymJ6# 40 20 0 40 80 120 160 200 rMub
SCALE (APPROX.) km

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	27MAR'13	ISSUED WITH NWB ANNUAL REPORT	JM	AS	TM	JM

Baffinland Iron Mines Corporation

k]l]/i s/C4ys3g5 MARY RIVER PROJECT

WoE=sJ6 kNzb kNaxz
PROJECT LOCATION MAP

Knight Piésold CONSULTING

P/A NO.	REF.	REV.
NB102-181/33	NB13-00093	0

ttCs/3ymJ6 **FIGURE** **1.1**

H349000-2000-00-015-0002

MILNE INLET

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

LAYDOWN A1
EARTHWORKS
CONTRACTOR YARD

10 ML
P-50 DIESEL

5 ML
P-50 DIESEL

FUEL TANK FARM

RAMP TO BEACH

SEALIFT BARGE
LANDING AREA

DRAINAGE DIVERSION
DITCH

EXISTING HTO CABIN

LAYDOWN B1

LAYDOWN A1
AREA

EXISTING POLISHING
WASTE STABILIZATION
POND

INCINERATOR

EXISTING
BLADDER FARM

LINED STORAGE
AREA

LINED STORAGE

LAYDOWN
AREA

AIRSTRIP

EXISTING
WASTE WATER
TREATMENT
FACILITY

EXISTING TRAILER
CAMP

TENT CAMP

POWER
GENERATORS

POLISHING
WASTE STABILIZATION
POND

HAZARDOUS WASTE
BERM

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

WASTE DISPOSAL
LAND FARM

ROCK QUARRY NO.1

PROJECT
DEVELOPMENT
AREA

EXISTING
LAND LEASE
BOUNDARY

POTABLE
WATER SUPPLY

CONSTRUCTION PAD C
CONCRETE BATCH PLANT

TOTE ROAD

PROPOSED EXTENT OF
QUARRY

PERMITTED OPEN BURN PIT AREA

BORROW PITS

BORROW SOURCE NO.1

MILNE INLET TOTE ROAD

BORROW PITS

PHILLIPS CREEK

0 50 100 150 200 250
SCALE IN METERS

MILNE
PORT

MINE SITE

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.

LEGEND:

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

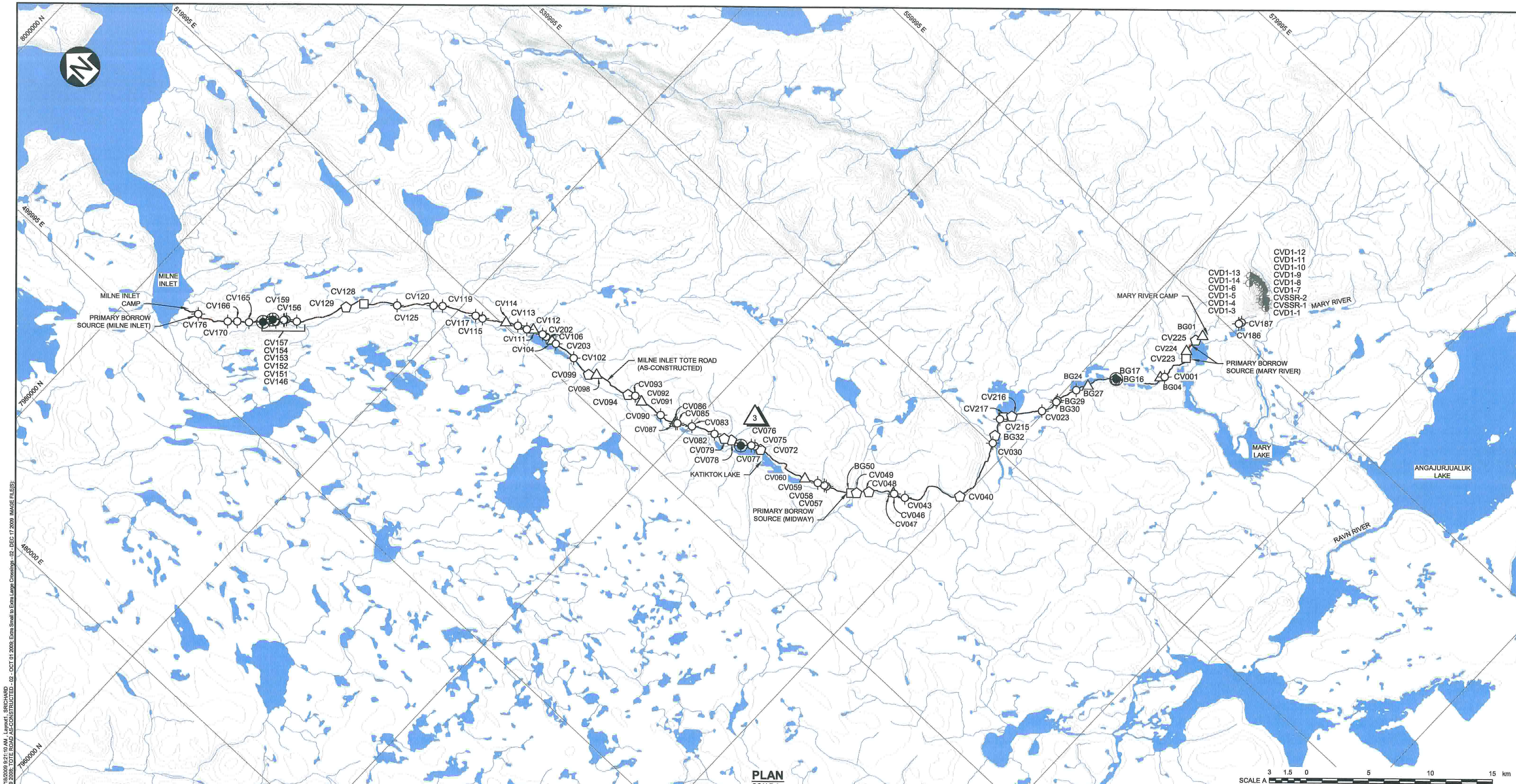
Baffinland Iron Mines Corporation

MARY RIVER PROJECT

MILNE PORT

SITE LAYOUT

SCALE	DWG. NO.	REV.
1:5000 OR AS NOTED	H349000-2000-00-015-0002	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. (3) EXTRA SMALL CROSSINGS DISPLAYED ARE DFO CROSSINGS REGULATED.

DRG. NO.	DESCRIPTION
REFERENCE DRAWINGS	

REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
REVISIONS						

REV	DATE	DESCRIPTION	DESIGN	DRAWN	CHK'D	APP'D
3	DEC 18'09	NOTE 5 ADDED - DUPLICATE CV049 REMOVED	EV	SIR	[signature]	[signature]
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

REVISIONS

Knight Piésold
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

DWG. NO. H349000-4000-00-015-0002

TOM RIVER

CAMP LAKE

SHEARDOWN NW LAKE

MARY RIVER

WASTE ROCK DUMP BOUNDARY AT THE END OF OPERATION

PROJECT DEVELOPMENT AREA

DEPOSIT NO.1 MINING LEASE 2484

PROPOSED OPEN PIT OUTLINE

NEW HAUL ROAD

EXISTING WEATHERED ORE AND WASTE ROCK STOCKPILE

2008 BULK SAMPLE PIT

OPEN PIT DEVELOPMENT

EXISTING HAUL ROAD

BORROW PIT #3

BORROW PIT •2

BORROW PIT •1

BORROW PIT •5

BORROW PIT •4

STORAGE AREA

INCINERATOR

HAZARDOUS WASTE CONTAINMENT BERM

BARRELED FUEL LINED CONTAINMENT

POTABLE WATER PUMP HOUSE

SEALIFT LAYDOWN AREA

EXISTING LAYDOWN AREA

LAYDOWN AREA

BULK FUEL STORAGE FACILITY

NEW AERODROME APRON

QUARRY QMR2

RAW WATER INTAKE

CRUSHER AND STOCKPILE PAD

CONSTRUCTION LAYDOWN AREA

CAMP INFRASTRUCTURE
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE
- MEDICAL CENTRE
- SEWAGE TREATMENT PLANT & OFF-SPEC POND
- POTABLE WATER TREATMENT PLANT

ORIGINAL CAMP

EXISTING CAMP FACILITIES

WASTE WATER TREATMENT FACILITY

HELIPAD

EXISTING POLISHING WASTE STABILIZATION PONDS (PWSPs)

EXISTING AERODROME

AERODROME RUNWAY AND APRON

PIT 1 HAUL ROAD

RAIL PHASE PRIMARY AND SECONDARY CRUSHING

EXISTING HAUL ROAD

ROCK QUARRY NO.2

EXISTING SEWAGE DISCHARGE PIPELINE

SITE SERVICE FACILITIES, INCLUDING:
- POWER PLANT
- MINE TANK FARM & DYKE
- MAINTENANCE BUILDING
- WAREHOUSE
- TRUCK WASH FACILITY

EXISTING EXPLOSIVES MAGAZINES

UTILITY BERM

ORE CRUSHING AND LOADING

RAIL PHASE STOCKPILE AND INFRASTRUCTURE

EXISTING LAND ROAD

EXISTING LANDFILL

EXPLOSIVES PADS
EXPLOSIVES MAGAZINE
EMULSION PLANT

TREATED EFFLUENT POND

EXISTING HAUL ROAD

0 200 400 600 800 1000
SCALE IN METRES

MILNE PORT

MINE SITE

KEYPLAN

LEGEND:

- WATER
- PROPOSED QUARRY
- LAYDOWN AREA (CONSTRUCTION PHASE)
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- ROAD

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

MINE SITE

SITE LAYOUT

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

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28/10/2013 4:57:57 PM
eis59970

DWG. NO. H349000-4000-00-015-0003

CAMP INFRASTRUCTURE
- ACCOMMODATION COMPLEX
- EMERGENCY RESPONSE
- MEDICAL CENTRE
- SEWAGE TREATMENT PLANT & OFF-SPEC POND
- POTABLE WATER

CONSTRUCTION LAYDOWN AREA

SHEARDOWN NW LAKE

PROPOSED OPEN PIT OUTLINE

DEPOSIT NO. 1
MINING LEASE 2484

EXISTING ROAD

NEW HAUL ROAD

ORE CRUSHING AND LOADING

SITE SERVICE FACILITIES, INCLUDING:
POWER PLANT
MINE TANK FARM & DYKE
MAINTENANCE BUILDING
WAREHOUSE
TRUCK WASH FACILITY

EXISTING EXPLOSIVES MAGAZINES

UTILITY BERM

RAIL PHASE STOCKPILE AND INFRASTRUCTURE

EXISTING LAND FILL ROAD

EXISTING LANDFILL

EXPLOSIVES PADS
EXPLOSIVES MAGAZINE
EMULSION PLANT

TREATED EFFLUENT POND

0 50 100 150 200 250
SCALE IN METRES

MILNE PORT

MINE SITE

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
- PROPOSED QUARRY
- LAYDOWN AREA (CONSTRUCTION PHASE)
- ADVANCED EXPLORATION UNDER EXISTING TYPE 'B' WATER LICENSE
- EARLY WORKS (MAY TO JULY 2013) UNDER NEW TYPE 'B' WATER LICENSE (IN PROCESS)
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- ROAD

Baffinland Iron Mines Corporation

MARY RIVER PROJECT

MINE SITE

ENHANCED LAYOUT

SCALE	DWG. NO.	REV.
1:5000 OR AS NOTED	H349000-4000-00-015-0003	A

N

5994,000
596,000
598,000
600,000
602,000
604,000
7,878,000
7,876,000
7,874,000
7,872,000
7,870,000

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ANGAJURJUALUK LAKE

ᐊᑲᐅᓚᓕᒃ ᒥᓇ
COCKBURN LAKE

ᐃᑎᓐᓴᓕᕐᓂ
STEENSBY INLET

ᐊᖏᕐᕋᓱᒃᑐᖅ ᐊᐅᓚᓕᒃ ᒥᓇᐅᑎᓪᓗᒥ
PROPOSED RAILWAY ALIGNMENT

ᓂᐲᔪᒥᒃ ᐊᐅᓚᓕᒃᓴᓂᒃ ᓂᐅᐃᑎᒍᖅ
MID-RAIL DRILL CAMP LOCATION

ᓄᓇᕗᑦᓴᓂᒃ ᐃᒥᑎᑕᐃᓐᓇᒃ
2008 WATER SUPPLY INTAKE

ᐃᑎᓐᓴᑦᑕᒃ ᐃᑎᑎᑎᓐᓂᒃ 10.5 ᒥᑦ
MAX. DEPTH 10.5m

ᑐᑭᓯᒪᔭᕐᓗᒃᑐᑦ
LEGEND:

- ᐃᒥᒃ WATER
- ᓄᓇᕗᑦ/ᑲᒪᓪᓚᕐᓂᖅ/ᐊᑲᐃᑎᒃᓴᒃ RIVER/STREAM/DRAINAGE
- ᓄᓇᕗᑎᑦ ᐊᖏᕐᕋᓱᒃᑐᖅ PROPOSED RAIL ALIGNMENT
- ᐱᒋᖑᓱᓕᕐᓂᖅ ᑕᒪᓐᓇᒃ EXISTING CAMP (CAMP NOT OCCUPIED DURING 2012)

ᖃᐅᔨᒪᔭᕐᕕᒃᓴᑦ
NOTES:

1. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
   ᓄᓇᕗᑦ EAGLE MAPPING (2005)
2. COORDINATE GRID IS SHOWN IN UTM (NAD83) ZONE 17 AND IS IN METRES.
   ᓄᓇᕗᑦ ᑎᑎᕋᒪᓂᖅ ᒪᓕᓕᒃ UTM (NAD83) ZONE 17
3. CONTOUR INVTERVAL IS IN METRES. CONTOUR INTERVAL IS 2.5 METRES.
   ᑎᑎᕋᒪᓕᑦ ᒥᑦ ᐊᖑᓂᓕᒃ ᑲᒪᓐᓇᑎᒃᓴᑦ 2.5 ᒥᑦ
4. PROPOSED RAIL ALIGNMENT PROVIDED BY CAINARAIL CONSULTANTS INC.
   ᓄᓇᕗᑎᑦ ᐊᖏᕐᕋᓱᒃᑐᖅ CANARAIL CONSULTANTS INC

ᐊᔪᓂᖅ SCALE 500 250 0 500 1,000 1,500 2,000 ᒥᑦ m

Baffinland
IRON MINES CORPORATION

ᓄᓕᒋᑦᓂ ᑲᒪᕐᓂᐸᑦᑐᑦ MARY RIVER PROJECT

ᒪᓐᓇ ᖃᓄᐃᓕᓚᓐᓂᖅ ᐊᖏᕐᕋᓱᒃᑐᖅ ᐊᐅᓚᑲᓚᓐᓂ ᓄᓇᕗᑦᑲᐅᑦᑐᖅ
EXISTING SITE LAYOUT AT MID RAIL CAMP

Knight Piésold CONSULTING

P/A NO.	REF NO.
NB102-181/33	NB13-00093

ᑎᑎᕋᐅᓕᕐᒪᑦ **FIGURE** 1.6 REV 0

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

SAVED: I:\1\02\00\181\133\AVGIS\Figs\B04_r0.mxd; Mar 27, 2013 10:26 AM;

ᑲᖏᕐᓗᓵᕆᔨᖅ
STEENSBY INLET

7803750 N
7802500 N
7801250 N
7800000 N
7798750 N

5937 E
596000 E
596250 E
597500 E
598750 E

ᒪᓕᓂ ᐃᐱᑭᑐᐊᔪᖓᒥ ᓄᓇᒃᑎᓂᖅ ᑲᓇᖓᑎᓂᓐᓂᖅ (ᑕᐃᓚᐅᕐᓄ)
EXISTING STEENSBY INLET CAMP LIMITS (APPROX.)

ᑲᑎᑭᒃᑐᐊᓂᕐᓂᖅ
FUEL DRUM STORAGE

ᐃᓂᒃᑎᓐᓄ
LAYDOWN AREA

ᑲᓇᖓ ᐃᒥᑦᑕᓐᓄᑦ ᑕᑭᓂᖏᑐᖅ 3 ᑭᓚᒥᑕ
3 Km LAKE WATER SOURCE

ᒫᓐᓇᐅᔭᖅᑎᑦ ᓂᕆᔨᒋᐊᖅᑐᑦ
METEOROLOGY STATION

ᑐᑭᓯᐊᖓ
LEGEND:

ᐃᒥᖅ
WATER

ᓄᑕᖅᓱᓚᒃᑕᕐᓂᖅ
RIVER/STREAM/DRAINAGE

ᓴᖅᓂᖅ ᓄᓇ
WETLAND

NOTES:

1. COORDINATE GRID IS UTM (NAD83) ZONE 17 AND IS IN METRES.
2. CONTOUR INTERVAL IS 5 METRES.
3. TOPOGRAPHY PROVIDED BY EAGLE MAPPING (2005).
4. PROPOSED RAIL ALIGNMENT PROVIDED BY CANARAIL CONSULTANTS INC. OCTOBER 7, 2008.
5. STEENSBY INLET INFRASTRUCTURE PROVIDED BY GENIVAR. DECEMBER 9, 2008.

ᖃᐅᔨᓴᓕᖅᑎᑦ

1. ᓄᓇᕗᑦ ᑎᑎᕋᓕᓂᖓ ᒪᓕᒐᖓ UTM (NAD83) Zone 17
2. ᑎᑎᕋᒪᓕᒃᑯ ᑎᑕ: ᐊᖏᔪᓂᖅᑐᑦ ᑲᖏᓐᓇᑎᒋᑦ 5 ᑎᑕ
3. ᓄᓇᕗᐊᓕᓚᓴᑦ Eagle Mapping (2005)
4. ᓄᓇᕋᐅᑎᓄᑦ ᑭᖑᓂᖓᓂᖓ Canarail Consultants Inc
5. ᐅᐅᕐᑎᐃᐅᔪᓂᖅ ᑎᑎᕋᐅᓵᕆᔨᓂᖓ Genivar

ᓂᕆᓂᖓ SCALE 250 12.5 0 250 500 750 1000 1250 ᒥᑕ m

Baffinland
Iron Mines Corporation

ᓄᓇᕗᑦ ᐅᓴᖅᑭᐅᑎᒋᑦ MARY RIVER PROJECT

ᐃᐸᐱᕐᒋᔭᐊᑦ ᓄᓇᕐᒥᖓ ᖃᓄᐃᑐᖅᓯᒪᓂᖓᓄᑦ
EXISTING SITE LAYOUT AT STEENSBY PORT

Knight Piésold CONSULTING

P/A NO. NB102-181/33
REF NO. NB13-00093
ᑎᑎᕋᐅᓵᕆᔨᒪᔪᖅ FIGURE **1.7**
REV 0

REV	DATE	DESCRIPTION	DESIGNED	DRAWN	CHK'D	APP'D
0	27MAR'13	ISSUED WITH NWB ANNUAL REPORT	JM	AS	TM	JM

SAVED: \\1V2\0001\81\13\A\Acad\FIGS\BRB r0 3/26/2013 8:31:55 AM ASIMPSON PRINTED: 3/26/2013 8:33:02 AM Layout1 ASIMPSON
XREF FILE(S): STEENSBY PORT AREA 01 APRIL 22 2008 steensby lakes 1MGE FILE(S): Bathymetrytopography.dwg Pg 24

DWG. NO. H349000-2000-00-014-0004

FOR FUEL TANK FARM DETAILS SEE DRAWING* H349000-2613-10-014-0001

MILNE INLET

E 503 600

E 503 800

E 504 000

N 7 976 200

N 7 976 000

2615-BLD-001 MARINE MANIFOLD BUILDING

2521-BLD-002 WELDING SHOP BUILDING

2521-BLD-001 MAINTENANCE BUILDING

7232-BLD-011 SMOKE SHACK

2521-BLD-003 WORKSHOP OFFICE BUILDING

2521-BLD-004 WORKSHOP OFFICE WASHCAR

2750-BLD-003 SERVICES AREA E-HOUSE *1

7235-BLD-002 SITE SERVICES HEATED WAREHOUSE

7235-BLD-003 SITE SERVICES UNHEATED WAREHOUSE

7232-BLD-009 SITE SERVICES WASHCAR *1

7232-BLD-010 SITE SERVICES WASHCAR *2

7232-BLD-008 SITE SERVICES LUNCHROOM *2

7232-BLD-007 SITE SERVICES LUNCHROOM *1

7231-BLD-001 CONSTRUCTION OFFICE *2

2511-BLD-003 ACCOMMODATION LAUNDRY

2750-BLD-001 ACCOMMODATION AREA E-HOUSE *1

TEMP. POWER GEN. UNIT

2511-BLD-002 ACCOMMODATION OFFICE

2511-BLD-001 ACCOMMODATION SERVICE CORE

2512-BLD-003 ACCOMMODATION WING C

2512-BLD-004 ACCOMMODATION WING D

2512-BLD-002 ACCOMMODATION WING B

2512-BLD-001 ACCOMMODATION WING A

2510-PP-001 RAW SEWAGE LIFT STATION

2750-BLD-002 ACCOMMODATION AREA E-HOUSE *2

2513-BLD-001 EMERGENCY RESPONSE OFFICE

2513-BLD-002 EMERGENCY RESPONSE GARAGE

2720-BLD-001 WATER BUILDING

4731-VP-005 SEWAGE TREATMENT PLANT

FOR SERVICE BERM DETAILS SEE DWG* H349000-2000-00-014-0005

2750-BLD-004 SERVICES AREA E-HOUSE *2

2732-BLD-001 SEWAGE TRUCK BUILDING

INCINERATOR

2540-BLD-001 WASTE MANAGEMENT BUILDING

2530-BLD-009 & 010 POWER GENERATION E-HOUSE *1 AND *2

2530-BLD-001 TO 007 POWER GENERATION MODULE *1 TO *7 FOR DETAILS SEE DRAWING* H349000-2530-50-042-0001

2750-BLD-005 FUEL TANK FARM E-HOUSE

EFFLUENT POND

SERVICE BERM

INCINERATOR YARD (32mX30m)

SHIPPING CONTAINERS (TYP.)

℄ RAMP TO SEALIFT BARGE LANDING AREA

SHIPPING CONTAINERS (TYP.)

NEW PAD CORNER
N: 7 975 972.690
E: 504 030.682

UNPREPARED AREA OF PAD

0 10 20 30 40 50
SCALE IN METRES

MILNE PORT

MINE SITE

KEY-PLAN

1

BUILDING COORDINATES

BUILDING TAG*	A	B
2511-BLD-003	N: 7 976 083.541 E: 503 925.750	N: 7 976 083.541 E: 503 944.035
2750-BLD-001	N: 7 976 091.970 E: 503 958.644	N: 7 976 091.970 E: 503 971.019
2750-BLD-002	N: 7 975 981.196 E: 503 958.514	N: 7 975 981.196 E: 503 952.235
2750-BLD-003	N: 7 976 168.368 E: 503 821.200	N: 7 976 162.089 E: 503 821.200
2750-BLD-004	N: 7 975 965.094 E: 503 790.819	N: 7 975 965.094 E: 503 784.541
2750-BLD-005	N: 7 976 081.438 E: 503 657.762	N: 7 976 075.159 E: 503 657.762
7231-BLD-001	N: 7 976 082.801 E: 503 893.111	N: 7 976 082.801 E: 503 911.399
7232-BLD-008	N: 7 976 072.050 E: 503 853.070	N: 7 976 072.050 E: 503 871.358
7232-BLD-010	N: 7 976 072.050 E: 503 877.359	N: 7 976 072.050 E: 503 887.111
4731-VP-005	N: 7 975 971.672 E: 503 808.540	N: 7 975 996.122 E: 503 808.540
2530-BLD-009	N: 7 976 057.146 E: 503 677.252	N: 7 976 043.397 E: 503 677.252
2513-BLD-001	POSITION TO SUIT AS-BUILT LOCATION OF THE BUILDING 2513-BLD-002 & THE ARTIC CORRIDOR	
2521-BLD-003	POSITION TO SUIT AS-BUILT LOCATION OF THE BUILDING 2521-BLD-001 & THE ARTIC CORRIDOR	

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. ALL 7000 SERIES MODULAR BUILDINGS ARE FOR CONSTRUCTION AND THEIR FINAL LOCATIONS WILL BE DETERMINED AT SITE BY THE CONSTRUCTION GROUP.
5. FOR FOLD-AWAY BUILDINGS SETOUT COORDINATES REFER TO APPLICABLE FOUNDATION DRAWINGS.

FOR CONSTRUCTION

H349000-2000-00-014-0001	EARLY REVENUE PHASE – SITE LAYOUT
DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date Aug 29 2013
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
2	CHANGED BUILDING LOCATIONS & COORDINATES	DK	CL	TT	2013-08-28
1	SCALE CHANGED & BLDG. COORDINATES ADDED	DK	CL	TT	2013-08-13

REVISIONS

REGISTERED PROFESSIONAL ENGINEER J. J. LEMAY LICENSEE No. 3956 NT/NU

REV.	ISSUE FOR	AUTH.	BY	DATE
2	FOR CONSTRUCTION	TT	JC	2013-08-29
1	FOR CONSTRUCTION	TT	JC	2013-08-13
0	FOR CONSTRUCTION	TT	JC	2013-05-09

ISSUE AUTHORIZATION

HATCH

DESIGNED BY	DRAWN BY
T. THERTELL DATE 2013-08-27	D. KARUNAKARAN DATE 2013-08-27
CHECKED BY	DISCIP. ENGR.
T. THERTELL DATE 2013-08-29	J. LEMAY DATE 2013-08-29
PROJ. DES. COORD.	PROJ. ENGR.
T. THERTELL DATE 2013-08-29	J. CLELAND DATE 2013-08-29
PROJ. MGR.	
S. PERRY DATE 2013-08-29	

Baffinland

MARY RIVER PROJECT

MILNE PORT
INFRASTRUCTURE
SITE LAYOUT

SCALE	DWG. NO.	REV.
1:1000 OR AS NOTED	H349000-2000-00-014-0004	2

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

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29/08/2013 9:38:31 AM
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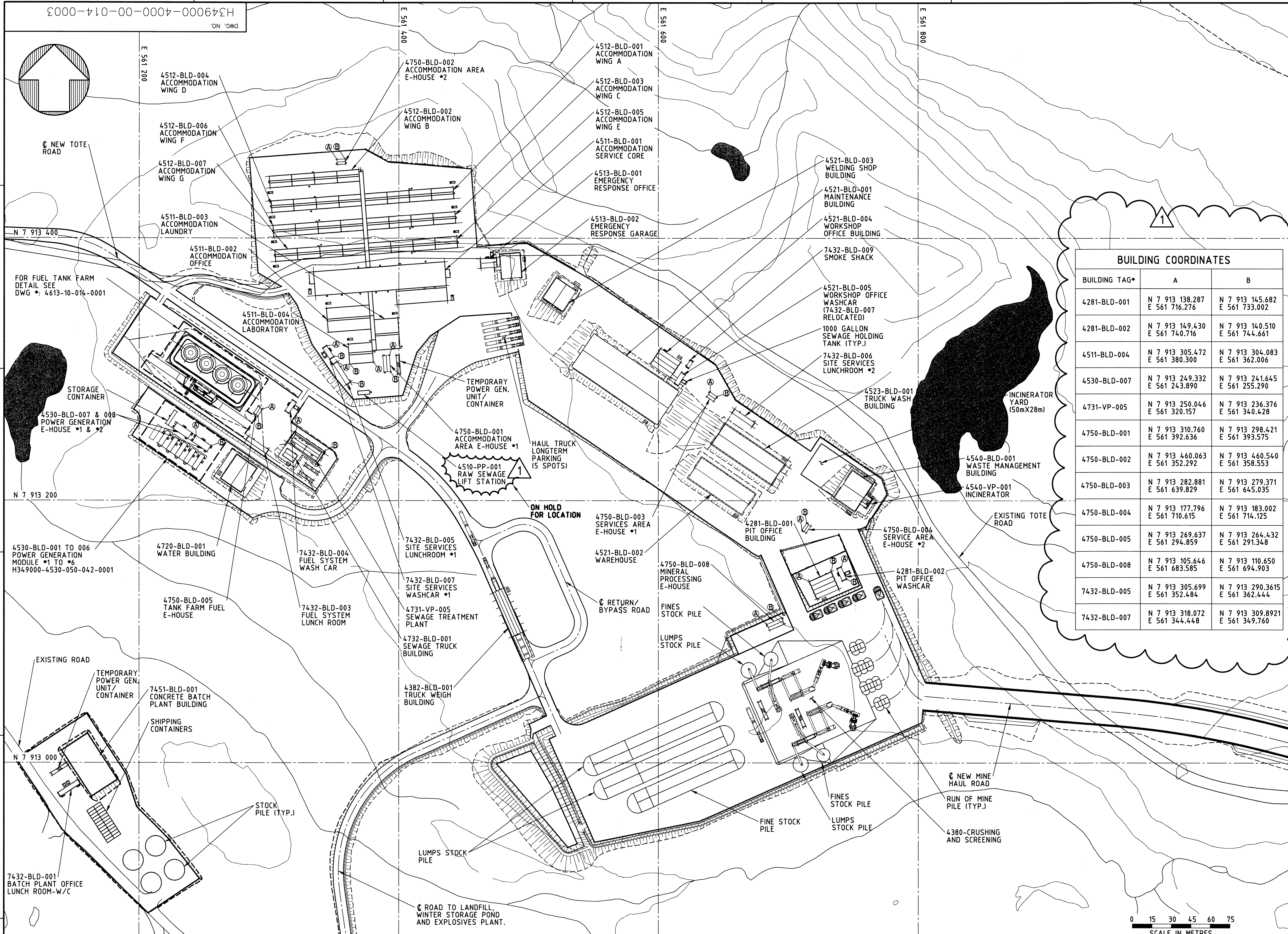
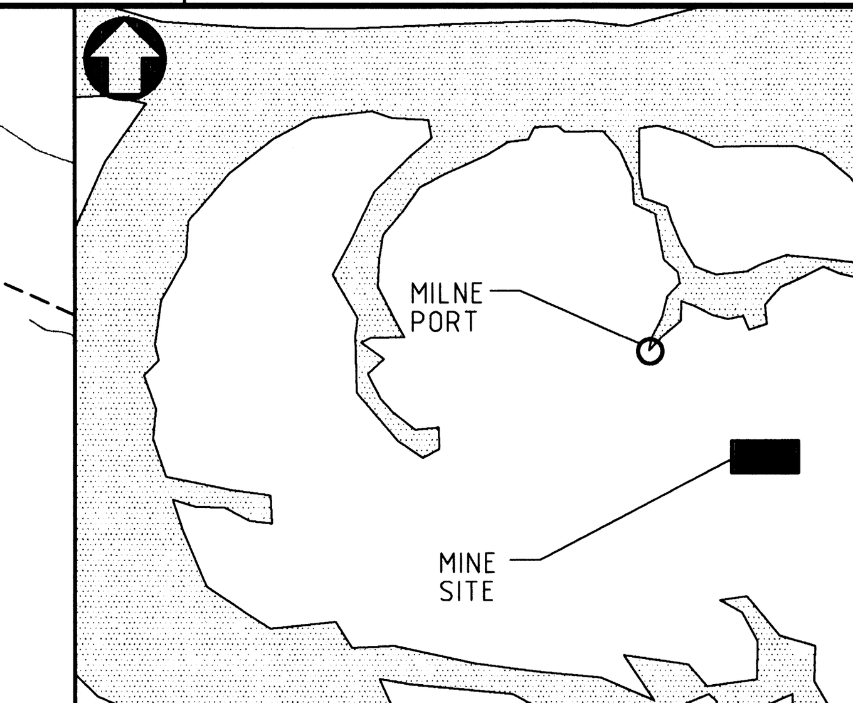


BUILDING COORDINATES		
BUILDING TAG*	A	B
4281-BLD-001	N 7 913 138.287 E 561 716.276	N 7 913 145.682 E 561 733.002
4281-BLD-002	N 7 913 149.430 E 561 740.716	N 7 913 140.510 E 561 744.661
4511-BLD-004	N 7 913 305.472 E 561 380.300	N 7 913 304.083 E 561 362.006
4530-BLD-007	N 7 913 249.332 E 561 243.890	N 7 913 241.645 E 561 255.290
4731-VP-005	N 7 913 250.046 E 561 320.157	N 7 913 236.376 E 561 340.428
4750-BLD-001	N 7 913 310.760 E 561 392.636	N 7 913 298.421 E 561 393.575
4750-BLD-002	N 7 913 460.063 E 561 352.292	N 7 913 460.540 E 561 358.553
4750-BLD-003	N 7 913 282.881 E 561 639.829	N 7 913 279.371 E 561 645.035
4750-BLD-004	N 7 913 177.796 E 561 710.615	N 7 913 183.002 E 561 714.125
4750-BLD-005	N 7 913 269.637 E 561 294.859	N 7 913 264.432 E 561 291.348
4750-BLD-008	N 7 913 105.646 E 561 683.585	N 7 913 110.650 E 561 694.903
7432-BLD-005	N 7 913 305.699 E 561 352.484	N 7 913 290.3615 E 561 362.444
7432-BLD-007	N 7 913 318.072 E 561 344.448	N 7 913 309.8921 E 561 349.760



KEY-PLAN

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. ALL 7000 SERIES MODULAR BUILDINGS ARE FOR CONSTRUCTION AND THEIR FINAL LOCATIONS WILL BE DETERMINED AT SITE BY THE CONSTRUCTION GROUP.
5. FOR FOLD-AWAY BUILDINGS SETOUT COORDINATES REFER TO APPLICABLE FOUNDATION DRAWINGS.

REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE
H349000-4613-10-014-0001	MINE SITE – EARLY REVENUE PHASE – SITE G.A.

PERMIT TO PRACTICE
HATCH LTD.
Signature
Date 15 AUG 13.
PERMIT NUMBER: P 512
The Association of Professional Engineers, Geologists and Geophysicists of NWT/NU

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REVISIONS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
1	BUILDING COORDINATES TABLE ADDED	D.K	T.T	T.T	2013-08-14

ISSUE AUTHORIZATION

REV.	ISSUE FOR	AUTH. BY		DATE
1	FOR CONSTRUCTION	T.T	J.C	2013-08-14
0	FOR CONSTRUCTION	T.T	J.C	2013-06-07

HATCH™

DESIGNED BY T. THERTELL DATE 2013-04-11	DRAWN BY D. KARUNAKARAN DATE 2013-04-11
CHECKED BY C. LEISTNER DATE 2013-08-14	DISCIP. ENGR. J. LEMAY DATE 2013-08-14
PROJ. DES. COORD. T. THERTELL DATE 2013-08-14	PROJ. ENGR. J. CLELAND DATE 2013-08-14
PROJ. MGR. S. PERRY DATE 2013-08-14	

Baffinland

MARY RIVER PROJECT

MINE SITE
INFRASTRUCTURE
SITE LAYOUT

SCALE 1:1500 OR AS NOTED

DWG. NO. H349000-4000-00-014-0003

REV. 1

ORIGINAL SHEET SIZE: ISO A1 (841 x 594)

Appendix C
Typical Hazardous Waste Berm Drawing (in development)

Appendix D
Table of Concordance with Type A Water Licence (2AM-MRY1325) Conditions

Table D-1 shows the Part, number and Condition of the Type A water License (Water Licence No: 2AM-MRY1325) and the location where the condition is located within the Hazardous Materials and Hazardous Waste Management Plan.

Table D-1: List of Commitments Identified and Location of the Corresponding Answers

Hazardous Materials and Hazardous Waste Management Plan - Concordance table			
Part	**Number**	**Condition**	**Section**
D	20	The Licensee shall prevent any chemicals, fuel or wastes associated with the undertaking from entering any Water body.	Section 4.4.2
F	5	The Board has approved with the issuance of the licence, the Plan entitled “Baffinland Iron Mines Corporation Mary River Project Hazardous Materials and Hazardous Waste Management Plan”, dated April 22, 2013.	N/A
F	6	The Licensee shall locate areas designated for waste disposal at a minimum distance of thirty-one (31) meters from the ordinary High Water Mark of any water body such that the quality, quantity or flow of water is not impaired, unless otherwise approved by the Board in writing.	Section 4.4.2
F	11	The Licensee shall submit to the Board and the Inspector, thirty (30) days prior to the removal and transfer of waste, a declaration of authorization from any community receiving waste from the project, which clearly states that authorization has been granted for the deposit by the Licensee at the Hamlet’s appropriately licensed facilities.	Section 4.5
F	14	The Licensee shall remove any waste generated from temporary and permanent shelters along the tote road and along the railway corridor for treatment at appropriately licenced Waste Management Facilities.	Section 4.4
F	29	The Licensee shall remove from the project site, all hazardous wastes generated through the course of the Construction and Operations Phases, for disposal at an approved Waste Disposal Facility.	Section 4.5
F	30	The Licensee shall maintain records of all Waste backhauled from the Mary River Project and confirmation of proper disposal through the use of Waste manifest tracking systems and registration with the Government of Nunavut, Department of Environment. These records shall be made available upon request, to an Inspector or the Board.	Section 4.5