Appendix 43

Meadowbank and Whale Tail Hazardous Materials Management Plan Version 8

AGNICO EAGLE

MEADOWBANK COMPLEX

Hazardous Materials Management Plan

In Accordance with Water Licenses 2AM-MEA1530 & 2AM-WTP1830

Prepared by:

Agnico Eagle Mines Limited – Meadowbank Complex

Version 8
March 2025

EXECUTIVE SUMMARY

General Information

The Hazardous Materials Management Plan (HMMP) will be executed within the scope of normal operations. The same procedures will be used during the mine closure phase. The Meadowbank and Whale Tail Mine Sites require that the transportation, storage, handling and use of hydrocarbon products, ammonium nitrate and associated explosive materials, as well as all other chemicals be conducted in a safe and efficient manner. Ore and material (including various hazmat products and waste) will be shipped along the Whale Tail Haul Road (WTHR) and All-Weather access road (AWAR).

Review

The HMMP will be reviewed and updated as required. Completion of the review of the HMMP will be documented through signatures of the personnel responsible for reviewing, updating and approving the HMMP.

IMPLEMENTATION SCHEDULE

As required by Water License 2AM-MEA1530 and 2AM-WTP1830, the proposed implementation schedule for this plan is effective immediately and subject to any modification proposed by the Nunavut Water Board as a result of the review and approval process.

DISTRIBUTION LIST

Agnico Eagle – General Mine Manager

Agnico Eagle – General Superintendents

Agnico Eagle – Environmental and Critical Infrastructures Superintendent

Agnico Eagle – Environmental General Supervisor

Agnico Eagle – Environmental Coordinator

Agnico Eagle – Health and Safety Superintendent

Agnico Eagle – Mill Superintendent

Agnico Eagle – Maintenance Superintendent

Agnico Eagle – Mine Superintendent

Agnico Eagle – Energy and Infrastructures Superintendent

Agnico Eagle – Warehouse General Supervisor

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	2007/08			Comprehensive plan for Meadowbank Mine Site and Baker Lake Facilities
2	2012/03/12			Comprehensive review and update.
3	2013/10			Add Baker Lake Jet-A Information and comprehensive review and update
WT	2016/06/15	All	All	Added the Whale Tail pit development to the Plan. Numerous changes were made throughout the document.
4_NIRB	2018-12-17	All	All	Hazardous Materials Management Plan as Supporting Document submitted to Nunavut Impact Review Board for review and approval as part of Whale Tail Pit – Expansion Project.
4	2019/03/31	All	All	Updated plan to reflect active operating licenses
5	2020/03/31	All	All	Updated to reflect explosive storage in Esker 6
6	2020/07/09	All	All	Updated to include storage locations and hazmat inventory at MBK and WT
7	2022/03/31	Section 5.2	20	Updated to include additional Diesel storage (Tank #8) in Baker Lake
		Section 6.2/9.2.1	25/42	Explosive storage section updated to reflect the commissioned Whale Tail Emulsion Plant
		Section 12	48,49,50,51 & 52	Updated maps
8	2025/03/18	Introduction	5	Updated to include statement on closure
		Section 5.2	15	Updated to include additional Diesel storage at MBK and Baker Lake Jet A storage capacity
		Section 5.4	16	Updated to reflect the operation of the Whale Tail Landfarm .
		Section 6.2	19	Updated Explosive storage section to reflect the operations and to include cessation of blasting at Meadowbank for mining purposes
		Section 9.2.1	32	Update inventory Management Section
		Figure 2-3-4	39-42	Updated figures with new satellite imagery
		Figure 6	43	Removed Emulsion plan included in Figure 5
		Appendix B.2	-	Updated SDS

Prepared By: Environmental Department

Approved by: 

Eric Haley

Environmental & Critical Infrastructures Superintendent

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1 INTRODUCTION

1.1 PURPOSE & SCOPE OF THE PLAN

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 that are used at the Meadowbank Complex. 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 Agnico Eagle's Emergency Response Plan (ERP) and Spill Contingency Plan (SCP), this Hazardous Materials Management Plan (HMMP) provides instruction on the prevention, detection, containment, response, and mitigation of accidents that could result from handling hazardous materials. The HMMP will be executed within the scope of normal operations. The same procedures will be used during the mine closure phase.

The plan is based on the following principles of best practice management for 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; and
- Maintain and review records of hazardous material consumption and incidents in order to anticipate and avoid impacts on personal health and the environment.

All hazardous materials to be used at the Meadowbank and Whale Tail mine sites operations will be manufactured, delivered, stored, and handled in compliance with all applicable federal and territorial laws and regulations. Agnico Eagle is committed to prevent, to the greatest extent possible, both inadvertent release of these substances to the environment and accidents resulting from mishandling or mishap. Agnico Eagle has instituted programs for employee training, facility inspection, periodic drills to test systems, and procedural review to address deficiencies, accountability, and continuous improvement objectives.

Agnico Eagle actively works 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.

As with all other aspects of health and safety, all employees will be expected to comply with all applicable precautions and hazardous material handling procedures. Employees are also expected to report any concerns to their supervisors, the Occupational Health & Safety Committee (OH&SC), or senior site management. All staff are encouraged to bring forward suggestions for improvements that can be incorporated into procedure revisions as appropriate.

1.2 APPLICABLE LEGISLATION

Both federal and territorial legislation regulate the management of hazardous materials in Nunavut. Copies of relevant legal documents are kept on file at the mine site. Agnico Eagle will regularly update the HMMP with respect to applicable legislation and ensure that current legislation documents are available at the mine site.

Management and safety personnel provide an overview of the applicable regulations to all employees as part of their initiation and ongoing training. The acts, regulations, and guidelines pertinent to the hazardous products that are used at the Meadowbank Complex[1] are listed in Appendix A.

The *Transportation of Dangerous Goods Act* classifies hazardous materials into nine (9) main classes according to an internationally recognized system, as follows:

- Class 1 – Explosives;
- Class 2 – Gases;
- Class 3 – Flammable liquids;
- Class 4 – Flammable solids;
- Class 5 – Oxidizing substances and organic products;
- Class 6 – Poisonous (toxic) and infectious substances;
- Class 7 – Nuclear substances, within the meaning of the Nuclear Safety and Control Act, which are radioactive;
- Class 8 – Corrosives; and
- Class 9 – Miscellaneous products or substances.

Fuel products hazard classes and potential impacts are presented in Table 1.

[1] The Meadowbank Complex includes the Meadowbank Mine Site, the Baker Lake facilities, the All-Weather Access Road, the Whale Tail Mine Site and the Whale Tail Haul Road and all associated quarries/eskers.

2 OVERVIEW OF HAZARDOUS MATERIALS

2.1 HAZARDOUS MATERIALS AND FUEL STORAGE LOCATIONS

The primary storage locations for hazardous materials, hazardous wastes and fuel are shown on Figures 2 to 5. Figure 2 is a general layout of the Meadowbank Mine Site including hazardous material and hazardous waste storage areas. Figure 3 shows the Diesel and Jet-A Fuel Tank Farm at the Baker Lake Marshalling Area. Figure 4 provides a general layout of the Whale Tail Mine Site and Figure 5 shows the hazardous material and hazardous waste storage areas on site. Hazardous materials are mainly stored in sea can at the laydown area at both sites until delivery to the location for use. Hazardous material will be stocked in lower quantity in all work areas such as the warehouse, emulsion plant, mine maintenance shop, bulk fuel storage facility and Whale Tail Haul Road Esker 6. Hazardous wastes at Meadowbank are stored in the temporary storage area across the incinerator. Once the sea cans are full, they are moved in the permanent storage area on the transit pad until disposal to an accredited facility. At Whale Tail, hazardous wastes are stored at the Pad Q temporary storage area (Figure 5). Once the sea cans are full, they are consigned and sealed and then send to the Meadowbank transit pad until disposal to an accredited facility. Hazardous materials used in the process plant will only be located at the Meadowbank site.

Petroleum products, explosives (ammonium nitrate and ammonium nitrate / fuel oil (ANFO)), sodium cyanide and miscellaneous hazardous materials are stored in facilities that contain no open drains, utilize concrete berms, and incorporate lined areas or secure sea-cans.

Meadowbank's permanent storage facilities are clearly identified as storage facilities for hazardous materials with proper labelling. These are ventilated to prevent the build-up of toxic fumes or dust, which could harm both the personnel present and the environment. The facilities are secured, and only authorized personnel have access to the area. The same holds true for the Whale Tail storage facilities.

2.2 TYPES OF HAZARDOUS MATERIALS

The Meadowbank Complex requires the use of the following types of classified hazardous materials:

- Petroleum products and lubricants – diesel fuel, Jet-A, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Meadowbank Process plant consumables – sodium cyanide, caustic soda (sodium hydroxide), sulphur prills, carbon sodium metabisulphite, nitric acid, calcine lime, flocculants, calcium chloride, borax, silica, lead nitrate, and anti-scalants used in mineral extraction;
- Water treatment chemicals - silica sand and flocculants polymers;
- Explosives – emulsion, caps, and high explosives used for blasting in the mine; and
- Meadowbank Laboratory chemicals and wastes – various by-products classified as hazardous waste and chemicals such as nitric acid used in the assay laboratory.

Sections 5 and 7 contain general information and safe handling procedures for the first four categories above. Laboratory wastes are generally very limited in quantity and will be handled only by specialist laboratory technicians. These wastes will be pumped to the grinding circuit in the process plant for recycling and eventually become part of the tailings disposal stream. As such, they are not addressed separately in this document.

2.3 GENERAL HAZARDOUS MATERIAL STORAGE GUIDELINES

Agnico Eagle is committed to the safe and appropriate storage of fuels, hazardous materials and hazardous wastes. The following sections outline Agnico Eagle's general guidelines for storing fuels, hazardous materials, and hazardous wastes.

2.3.1 General Guidelines for Storage Drums/Containers

Hazardous materials/waste shall be stored in super bags/drums/sea containers according to the following guidelines:

- In the original containers, where possible, or in containers compatible with the material being stored to prevent corrosion or chemical interaction that could lead to leaks or fires;
- Storage containers shall be in good condition, sealable and not damaged or leaking;
- Drums containing hazardous materials/wastes expected to be in storage for more than six months shall be placed on pallets or on a well-drained storage area to prevent rusting;
- Each container shall be clearly labelled to identify the substance being stored according to the requirements of the *Workplace Hazardous Materials Information System* (WHMIS) and as specified in the products Safety Data Sheet (SDS);
- Containers shall be kept closed except when adding or removing product;
- Containers with product shall be kept in the upright position, empty drums can be placed horizontally;
- Containers shall be arranged to prevent damage from falling or dislodging; and
- Containers shall be arranged to allow for easy access and inspections.

2.3.2 General Guidelines for Storage Areas

To assist in the safe and secure storage of fuels, hazardous materials and hazardous wastes, the following general guidelines for storage areas/facilities are followed:

- Design of storage areas are in compliance with the *National Fire Code* and *National Standard of Canada's Explosives*, where appropriate;
- Compliance with the Canadian Council of Ministers of the Environment (CCME) publication, *"Environmental Code of Good Practice for Above Ground Storage Tank Systems Containing Petroleum Products"*. This CCME code deals with inventory control, inspections, corrosion protection, records and monitoring. Environment Canada's *Storage Tank Systems for Petroleum Products and Allied Petroleum Products Regulations* outline registration and documentation requirements for storage tanks;
- Storage areas are adequately signed indicating that hazardous materials/wastes are stored therein;
- Storage locations are clearly defined and marked to prevent damage of storage drums and containers in the event they are covered by snow;
- Incompatible materials are segregated by chemical compatibility within the storage area to prevent contact between materials in the event of a release;
- Storage areas are located at least 30 metres from surface water and on a low permeability area;
- Storage areas are readily accessible for firefighting and other emergency procedures;

- Storage areas are adequately ventilated to prevent the build-up of noxious or toxic vapours;
- Where necessary secondary containment is installed to allow for the containment of at least 110% of the largest container or tank volume within the contained area;
- Storage areas are constructed, or provided with barriers, to protect containers from physical damage;
- Adequate spill and emergency response equipment has been installed at large volume storage areas – i.e., bulk fuel tank facilities (i.e. spill control, fire protection, etc.). A list of spill control equipment is provided in the Spill Contingency Plan.

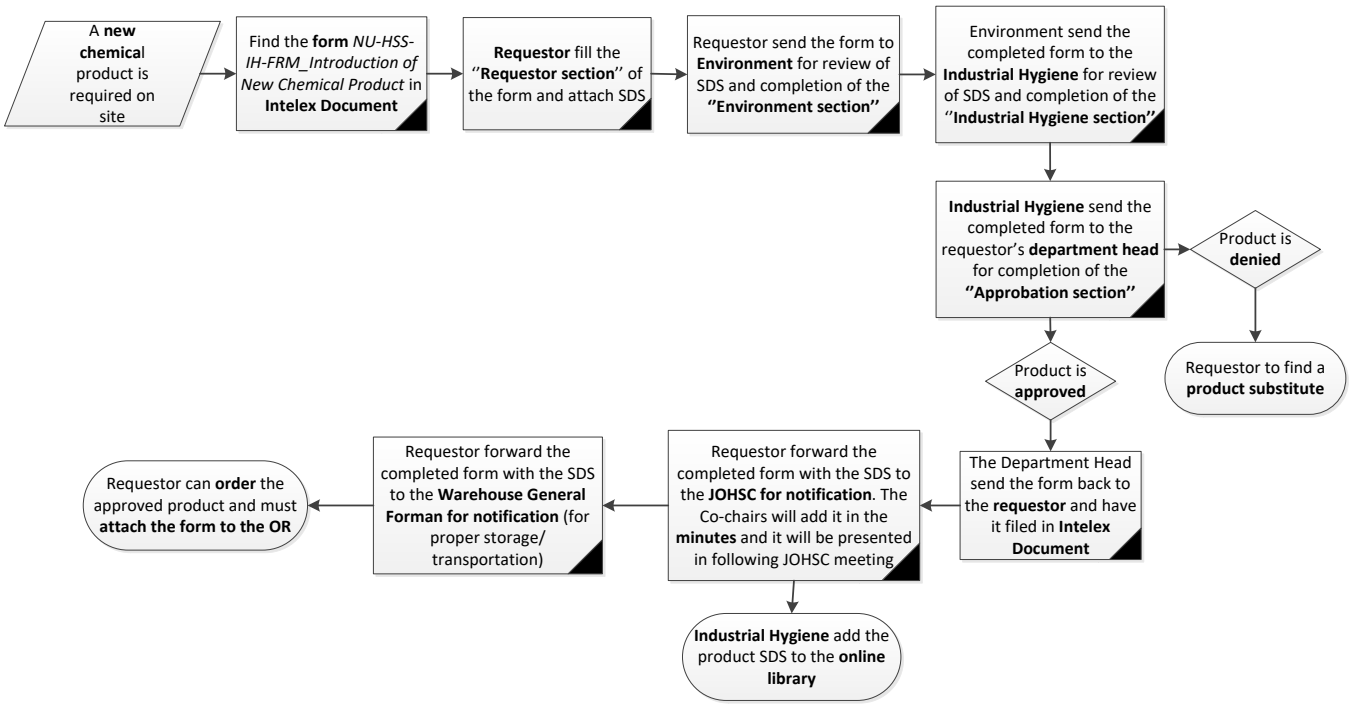
3 HAZARDOUS MATERIALS LIFE CYCLE MANAGEMENT

3.1 LIFE CYCLE MANAGEMENT

"Life cycle management" implies the assessment of a particular product over its entire life — from the time where a material need is identified to the time the product is fully consumed or disposed of as waste. It covers product supply, transportation, storage, handling, recycling, and waste disposal. Agnico Eagle is committed to ensuring proper life cycle management of all products used at the Meadowbank and Whale Tail sites, including hazardous materials. Agnico Eagle and its contractors will deal only with reputable, certified suppliers, transporters, and expediters.

Figure 1 outlined the process that has been designed and implemented for all new products to be assessed considering Health and Safety and Environmental considerations to ensure waste reduction and safe disposal.

Figure 1 New Product Assessment



3.1.1 Delivery

All hazardous materials are delivered to site by commercial carriers in accordance with the requirements of the *Canadian Transportation of Dangerous Goods Act* (TDGA). Carriers are 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 are properly identified and labelled. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, firefighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

Each transportation company is 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. Agnico Eagle intends to periodically

verify the qualifications of transport companies, their personnel and the existence of their spill prevention, control and countermeasures plan.

3.1.2 On-Site 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 SDS, and employee education on how to identify and handle hazardous products. Agnico Eagle has established procedures for obtaining SDS with new product deliveries; maintaining SDS current and maintaining a system of hardcopy or electronic SDS that are readily accessible by all employees. A chemical tracking system is also established, and all news hazardous material used on site are reviewed by Health and Safety and Environmental Department before the first use.

All hazardous materials are stored in secured areas to prevent access by unauthorized personnel or any tampering. All tanks used for the storage of diesel and aviation fuel have been installed in secondary containment areas sized to hold at least 110% of the volume of the largest tank or in double walled storage tanks. Tanks and vessels in the process plant are installed on concrete surfaces sloping to interior sumps that will route spilled solutions to lined collection areas. Additional guidelines for the storage of hazardous materials are provided in Section 2.3.2.

In support of pollution prevention, Agnico Eagle has established procedures for the regular inspection of storage containers and facilities. If deficient conditions are identified, appropriate corrective actions are taken and documented. Additional details for inspection of storage areas are provided in Section 9.

Emergency response procedures for spilled chemical substances are provided in the Spill Contingency Plan (SCP) (see also the Emergency Response Plan (ERP)). These procedures outline the 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.

3.1.3 Wastes

On becoming wastes, materials are stored and/or disposed of in accordance with specific government regulations and guidelines. Agnico Eagle stores most waste materials on the Meadowbank Complex, as describe in Section 2.1, in secure facilities until they can be transported to a provincial jurisdiction for recycling or disposal. Wastes materials originating from Whale Tail are to be sorted directly on site, packaged at the source and delivered to Meadowbank for management, shipment to Baker Lake and ultimately sent on the barge. The length of time the wastes will be stored at Whale Tail will depend on the product and the time it takes to fill a sea can for safe shipment along the Haul Road.

Process plant tailings pass through a treatment plant for cyanide destruction using the standard Inco SO_2/air process or through chemical destruction with Sodium Metabisulphite before being disposed of in the tailings pond. The cyanide content of the tailings material is reduced to a target of 15 ppm (parts per million). Cyanide further degrades naturally with exposure to air and sunlight (UV) in the Tailings Storage Facility. The current regulatory requirement for cyanide content in liquids released to the environment is 1 mg/L for a single grab sample or no greater than 0.5 mg/L average for the month (Nunavut Water Board Water License).

The Nunavut Department of Environment and Environment Protection Service (EPS) monitor the movement of hazardous waste from the generator to final disposal, through use of a tracking document known as a Waste Manifest. Accordingly, a Waste Manifest accompanies movements of hazardous wastes for the

Meadowbank Complex. Agnico Eagle is registered with the EPS as a waste generator and employs only registered waste carriers to transport waste to registered/approved waste receivers. A copy of the completed manifest will be maintained for a period of two years after the hazardous waste is received by the authorized waste disposal facility.

3.1.4 Empty Product Containers

Many empty chemical containers are not safe to dispose of directly and require handling precautions identical to those for full containers. Chemical users must be familiar with safe waste handling and storage procedures supplied by manufacturers in SDS. The containers are backhauled to the Baker Lake Marshalling Area for disposal at an approved facility. These containers are stored and hauled south via sealift.

4 SODIUM CYANIDE

4.1 INTRODUCTION

Large quantities of sodium cyanide are used at the Meadowbank Complex to optimize gold recovery from the ore. Due to transportation restrictions, normally a full year's supply of sodium cyanide will be transported, used and stored at the Meadowbank site. This product will be transported, stored, handled, transferred and used in compliance with appropriate legislation and applicable Best Management Practices. Agnico Eagle became a signatory to the International Cyanide Management Code in 2011.

4.1.1 Physical Properties

Cyanide is one of only a few chemical reagents that will dissolve in water. Gold mining operations use very dilute solutions of sodium cyanide, typically in the range of 0.01% to 0.05% cyanide (100 to 500 ppm). Unlike many synthetic chemicals, cyanide oxidizes and decomposes when exposed to air or other oxidants (UV sunlight rays), and does not persist in the environment. As such, it does not give rise to chronic health or environmental problems when present in low concentrations.

4.1.2 Cyanide Production

Cyanide production and handling are highly regulated. Both the manufacturer and Agnico Eagle employ stringent risk management systems to prevent injury or damage from the use of cyanide.

Sodium cyanide for the Meadowbank Complex is in briquette form and packaged in water-resistant super sac and 4mm bags inside an intermediate bulk container (IBC). The IBC holds 1,000 kg of cyanide and have the following approximate dimensions: 44" x 44" x 44". For shipment, there are normally 20 IBCs in a sea can container.

4.1.3 Cyanide Transport

Cyanide producers audit purchasers and transportation systems. They design special packaging for the transport of cyanide and inventory all shipments against delivery records to ensure proper surveillance at all times. All shipments are accompanied by SDS that provide the chemistry and toxicity of sodium cyanide, instructions in case of accidents, and emergency telephone numbers for assistance.

Truck, rail, and barge transporters screen their employees, carefully inventory shipments and, establish and maintain systems for loading and unloading cyanide products. Product handling and transportation are in accordance with protocols set by the industries and in compliance with national and international regulations.

For the Meadowbank Complex, the IBCs are properly stacked in sea containers and transported by ship from Bécancour, QC to Baker Lake, NU. At Baker Lake, the containers are transferred from barge to truck for transport to the Meadowbank mine site. At no point during transport on the AWAR the sea container or IBCs will be opened. From the point of cyanide packaging and onwards, the bags will only be opened on site, when and at the location (mill) where the use of cyanide is required.

This method of cyanide transport provides three levels of containment. The cyanide is contained within plastic bags. In the event one of the bags ruptures, the cyanide is contained within the IBC. In the event the IBC container breaks, the cyanide is contained within the sea container, which provides a tertiary precautionary measure for minimizing the impact of the spilled material.

4.1.4 On-Site Storage & Handling

The cyanide is stored on site in a dark, cool, and dry location. Cyanide is stored in sealed sea cans until the time it is needed for processing. Only as much as needed is removed from storage at any one time. The cyanide storage area is located close to the processing plant. Only authorized personnel have access to the cyanide storage.

When cyanide is required, only the quantity required for immediate use will be removed from storage. The cyanide bag will be lifted by its straps (the straps are provided by the manufacturer as part of packaging; see Appendix B for an illustration) using a forklift, and then using an overhead crane to lower onto a specially designed knife slitter that cuts the bag. The contents of the bag will drop into a mixing tank. At no time does the cyanide need to be physically handled by Meadowbank personnel.

The IBC materials are properly decontaminated and disposed of according to all applicable regulations to prevent environmental impact. Before disposal, the bags are visually inspected to ensure they are empty, and triple rinsed and drained to dissolve any residual cyanide left in the bag. Rinse water from the flushing process is recovered and reused in the cyanide mix tank and used in the gold recovery plant.

All personnel potentially exposed to cyanide, including contractors and visitors, receive appropriate training (see Section 10).

4.1.5 Spills

In the event a spill occurs, the cyanide will be promptly cleaned up to minimize its exposure to humans and the environment. A dry spill will be swept up and disposed of in a drum or other suitable container. In the event of a wet spill, the spill procedures will be carried out to prevent environmental contamination and the appropriate authorities will be contacted. For more information on spills handling and containment, see the SCP and ERP.

After cleaning up as much cyanide as possible, the area will be decontaminated using a small amount of caustic solution (i.e., 1 oz. / 5 gal hypochlorite solution). This will help keep the pH in the 10 to 11 range and suppress the formation of lethal HCN gas.

4.1.6 International Cyanide Management Code

Agnico Eagle is a signatory to the International Cyanide Management Code (the Code) for the manufacture, transport and use of cyanide in the production of gold. The Code is administered by a non-profit institute consisting of participants from the gold mining industry, governments, nongovernmental organizations, labour, cyanide producers, and other interested parties.

The Code represents a voluntary commitment on the part of all signatories to identify and follow basic principles and guidelines for safe cyanide use at gold mining operations. This is the first such generic international code in the history of the mining industry. Under the Code, gold mines are required to manage their cyanide from source to site, thus assuming “cradle to grave” responsibility for all cyanide used at their operation.

5 PETROLEUM PRODUCTS

5.1 PRODUCT DESCRIPTION

The Meadowbank and Whale Tail mine sites operations use large amounts of fuel and lubricants (petroleum products). These products are transported, stored, handled, transferred and used in compliance with the appropriate legislation and Best Management Practices.

5.2 DELIVERY TO SITE

With the exception of diesel and aviation fuel, most petroleum fuel and lubricant products are delivered to the two sites and stored in the original packing container from the manufacturer. These types of containers include a variety of sealed drums, pails, 1 tonne super sac, bulk cubes, cans, and tubes.

Due to transportation restrictions, i.e. climate, a full year's supply of fuel and lubricants is transported and stored on-site, in order to meet the demand of the upcoming year. During the summer months, diesel and aviation fuel are shipped from Bécancour, QC to Baker Lake, NU where it is transferred into storage tanks. From the Baker Lake storage tanks, fuel is transported on the AWAR to Meadowbank and on the Whale Tail Haul Road (WTHR) to Whale Tail bulk fuel storage sites via contracted tanker trucks.

Diesel fuel coming from the Baker Lake Tank Farm is stored onsite at the Meadowbank site in two tanks (one 5.6 million litre and one 3.3 million litre) within secondary containment, and the aviation fuel into two (2) – 50,000L double walled tanks at the airstrip.

Similarly for the Whale Tail site, diesel fuel originating from the Baker Lake Tank Farm is stored in one 1,5 million litre tank within secondary containment. For the Expansion Project, an additional above ground 0.5 million litre storage tank is approved and may be placed in the future near the current Whale Tail Fuel Farm. From there, the diesel at both sites is delivered directly to the power plants by above ground pipes or redistributed into different storage tanks by an on-site tanker. The Whale Tail Haul Road has also one diesel double-walled tank of 1,915L installed at Km 132.

The Baker Lake fuel farm consists of eight (8), ten (10) million litre storage tanks for diesel fuel and twenty (20), 100,000L double walled tanks, within secondary containment, for aviation fuel. The diesel fuel tanks are single-walled and constructed of welded steel. The aviation fuel tanks are double-walled and constructed of steel. Both Baker Lake Fuel Farm and storage locations have been designed and constructed to meet the CCME guidelines for *Aboveground Storage Tank Systems Containing Petroleum and Allied Petroleum Products*. The fuel unloading facility in each area includes a sloped lined pad to prevent contamination of the receiving environment. A continuous 60 mm high-density, polyethylene liner sheet is installed under the tanks and the internal sides of the berm. The containment area is sized to hold 110% of the volume of the largest tank.

All fuel transfer and storage facilities have been designed in accordance with the Canadian Council of Ministers for the Environment (CCME, 1994) *Environmental Code of Practice for Above Ground Storage Tank Systems Containing Petroleum Products*, and the *National Fire Code*.

Appropriate measures are in place to minimize impacts to surface water, groundwater and soils from potential vehicle accidents when transporting petroleum products to the site. Details of petroleum product safe handling procedures and proper PPE can be found in Tables 2 and 3. Details of spill response measures are presented in the SCP. The following general precautions will be taken:

- A maximum speed on the All-Weather Access Road and the Whale Tail Haul Road for loaded and empty vehicles has been established based on the road design which considers safety and the protection of wildlife. This speed limit is 50 km/hr;
- All trucks will carry a spill kit;
- Trucks are equipped with a reliable radio; and
- Agnico Eagle commits to being prepared to respond to spills resulting from vehicle accidents on both roads in a timely and efficient manner. Refer to the Spill Contingency Plan.

5.3 FUEL TRUCK TRANSFER PROCEDURES

A contract supplier fills the storage tanks in the main tank farms at both sites. General procedures to be followed are listed below. Similar procedures would be followed for fueling remote station tanks.

Before fuel transfer, verify that:

- All fuel transfer hoses are 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; and
- Fuel transfer will then proceed per the established procedures of the contract supplier.

Any accidents or spills must be reported immediately to the Environmental Department representatives at the Meadowbank or Whale Tail sites. Notification and response procedures are detailed in the Spill Contingency Plan.

5.4 CONTAMINATED SOILS AND SPILLS

All contaminated spill pads, and booms resulting from the storage and handling of fuels and lubricants will be salvaged at the time such impacts are identified, and put into Quatrex bags, labelled, and shipped off-site to an approved disposal facility. All the petroleum hydrocarbon contaminated soil from the Meadowbank and Whale Tail sites is disposed in their respective landfarm.

5.5 USED PETROLEUM PRODUCTS

Used oil that is no longer suitable for its intended use is classified as a liquid waste. The discharge of used oil into the environment, including but not limited to landfills, sewers and water bodies, is prohibited.

Used oil is used as auxiliary fuel in designated waste oil heaters. Used oil was also used in the secondary chamber at the Meadowbank incinerator, when in operation, and could be used in the future. Similarly, at the Whale Tail site, waste oil could be used in an incinerator or waste oil heaters. At this time, there is no incinerator at the Whale Tail site and Meadowbank site. Failing this, the waste oil will be sent to Meadowbank where it will be consumed or shipped to an accredited recycling facility.

All used oil products that are not burned in the incinerators or waste oil heaters are collected in tanks or drums marked “Waste Oil” and disposed of at an approved facility in the south. Empty petroleum containers

are stored on site in a designated area and returned to the supplier on backhauls or disposed at approved facilities in the south. Oil filters are punctured and/or crushed and drained of their contents for 24 hours prior to disposal.

A random sample of used oil will continue to be analysed monthly to ensure that it does not contain unacceptable levels of impurities, including cadmium, chromium, lead, total organic halogens (such as chlorine compounds), polychlorinated biphenyls (PCB) and ash content. Samples will be sent to an accredited laboratory for analysis. Concentrations of parameters listed above will be compared to the criteria set out in Schedule A of the *Used Oil and Waste Fuel Management Regulations*. Alternate arrangements will be made for the off-site disposal, treatment or recycling of used oil that does not meet these criteria.

The following information is recorded in association with the incineration of used oil:

- Volume of used oil generated at each site;
- Volume of used oil incinerated at each site;
- Name and address of the person in charge, management or control of the used oil, and the place where the used oil was produced;
- Analysis of any representative sample of used oil;
- Summary of maintenance performed on the incinerators or processing equipment;
- Volume and nature of the products produced from the used oil; and
- Destination of the used oil products shipped from the Meadowbank Mine (including Whale Tail facilities).

Table 1 - Fuel Products – Hazardous Classes & Potential Impacts

Material	TDGA Class[a]	Potential Environmental Impact
Diesel	3	Water & soil contamination
Motor oil	Not regulated	Water & soil contamination
Aviation fuel	3	Water & soil contamination
Hydraulic fluid	Not regulated	Low risk to water & soil with proper handling
Varsol	3	Water & Soil contamination
Automotive grease	Not regulated	Low risk to water & soil with proper handling
Ethylene glycol	Not regulated	Toxic by ingestion, could potentially be consumed by wildlife.

Table 2 - Fuel Products – Safe Handling Procedures

Product	Handling Procedures
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 PPE 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.
Motor oil	Wear protective clothing and impervious gloves when working with used motor oils. To be handled generally consistent with other petroleum hydrocarbons.
Aviation fuel	See diesel procedures above.
Hydraulic fluid	Keep container closed until ready for use.
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.

Table 3 - Fuel Products – Personal Protective Equipment

Product	Personal Protective Equipment		
	Eyes	Skin	Respiration
Diesel	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required
Motor oil	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required
Aviation fuel	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required; ensure adequate ventilation
Hydraulic fluid	Chemical goggles	None usually required	None usually required
Ethylene glycol	Chemical goggles	Neoprene or nitrile gloves; protective garments	None usually required; ensure adequate ventilation

6 EXPLOSIVES

6.1 PRODUCT DESCRIPTION

Explosives are required for blasting waste rock and ore in the mine. Transportation, storage, use, and handling of blasting materials are strictly regulated by the Federal *Explosives Act* and *Transportation of Dangerous Goods Act* (Class 1 – Explosives), as well as the following territorial Acts:

- Explosives Use Act and Regulations; and
- Mine Health and Safety Act and Regulations.

6.2 EXPLOSIVES STORAGE

Manufacturing, handling, and storage of explosives are carried out by QAAQTUQ – Dyno Nobel Canada Inc. However, a small amount of explosive materials is shipped to Meadowbank Complex in the form of blasting detonators and packaged emulsion. These items are carefully handled and stored by Agnico Eagle. The bulk of the explosives used at site are Open Pit Emulsion (XL-1000) and Underground Emulsion (WL-7000), which are a mixture of nitrites and emulsifier. The Whale Tail site will primarily use emulsion-based explosives during construction and operations. Presplit explosives will also be used to control the final pit walls, where required.

The estimated annual explosives requirement for the Whale Tail pit, IVR pit and underground mining activities is expected to vary from 7,500 to 11,500 tonnes per year, this being roughly the same quantity as was used at Meadowbank. The use of explosives at the Meadowbank mine is limited to blasting within quarries for construction material or to modify/improve current infrastructure at the Meadowbank Complex. Mining of the Portage Pit, Goose Pit, Vault Pit, Phaser Pit and BB Phaser Pit ceased in 2019.

The emulsion is currently mixed at the Whale Tail emulsion plant, in a remote area, located adjacent to the Whale Tail Pit operations (Emulsion Plant shown on Figure 6).

Underground

As for the underground emulsion, 100% of the emulsion mixed is completed at Whale Tail Mine.

Storage

The primary storage area of explosive products is located at the Whale Tail emulsion plant areas (see Figure 6). A small number of sea cans of ammonium nitrate prills are temporary stored by the Meadowbank Emulsion Plant site and brought to Whale Tail site as needed. They are stored within sea cans in quantities of approximately 20,000 kgs per sea can. These items are stored in separate locations to prevent the mixing of the two products. These products are also stored away from any other products, greater than 40m away from the emulsion plant, and greater than 25m from the fuel tanks.

At Whale Tail, the ammonium nitrate (See Figure 6 for location) is store at 342m from the emulsion plant, with a maximum storage capacity of 152 sea cans, covering an area of 2,200m².

The high explosive detonators and blasting caps are stored in an enclosed magazines located near the Meadowbank emulsion plant. At Whale Tail, high explosive detonators and blasting caps are also stored in an enclosed magazines at a safe location and distance from the Whale Tail operations. It is estimated that approximately seven magazines will be required on site, each being approximately 4 m x 14 m (i.e., not much bigger than a sea can).

In addition to the current storage facilities, Agnico Eagle will continue to use Esker 6 for the storage of explosives including packaged emulsion. The storage of explosives in Esker 6 was approved by the Chief Inspector of Mines on November 13, 2020. The approved storage area has a designed storage capacity of 500,000 kg of explosives. A leveled pad was built with NAG material, and any ponding water will be sampled for water quality control as per the Whale Tail Haul Road Management Plan. This storage area will be used until the end of mine operations.

Due to the remote location of the project, a full years' worth of AN is shipped by barge to Baker Lake and then freighted to the storage site. Total of AN ordered by barge is subject to variation based on the mine plan for the coming years and yearly consumption.

The following measures will be implemented for added security at the storage area:

- Sea cans will be not be used for daily supply;
    - When required, entire containers will be delivered directly to the underground ramp portal, where all of its content will be transferred to the underground powder magazine.
- Sea cans will be fully emptied when initially opened and the empty container removed from the storage area without delay. Only one sea container will be considered "opened" at a time;
- Containers have been placed with their doors facing each other to limit access;
- Containers are locked and sealed by the manufacturer until ready to be emptied;
- Sea containers were lined with non-sparking material prior to arrival onsite. This was requested directly by Agnico Eagle to the explosives supplier;
- Only a certified drill and blast supervisor has access to the explosives site;
- Signage has been placed to identify Esker 6 as an explosives site;
- An earth barricade (berm) was created around the sea cans to restrict access, respecting the design criteria set out in the National Standard of Canada's Explosives;
- Access to site has been limited by a single access road.

The explosive mixing plant, product storage, and magazines are safely located away from vulnerable facilities, as stipulated by the federal and territorial *Explosives Use Act* and Regulations.

6.3 USE OF EXPLOSIVES

The responsibility for blasting is split between appropriately trained mine personnel and the explosives supplier. Dyno Nobel is responsible for supplying and delivering blasting agents to the site, manufacturing the blasting product on site, delivering blasting agents to the blastholes and filling the holes. Agnico Eagle Blasters are responsible for charging the holes, placing the detonators and boosters, and tying-in the patterns. The ammonium nitrate and emulsion components are loaded on barges and transported to the Baker Lake Marshalling Area for temporary storage, if necessary, prior to transport to site. Dyno Nobel mixing and delivery trucks. Agnico Eagle provides diesel fuel and accommodations.

Blasting is carried out by certified blasters following blasting regulations and safe practices. All pit activities are under the supervision of certified mine supervisors, knowledgeable in mine operating regulations and best practices.

The manufacture and distribution of explosives is carried out by suppliers under Federal license to conduct such work. They provide and operate the explosives manufacturing plant under such license and authority.

Surface Operations

The primary blasthole drills are diesel-powered rigs capable of drilling 152.4 mm diameter holes. Drilling requirements are determined based on production targets for both ore and waste material. Final pit walls are excavated, first by controlled pre-shear and buffer blasting, followed by mechanical wall cleanup. Blasting operations are affected by several factors, including wall control and weather. A number of modified operating procedures are implemented during the winter season. These may include minimizing the “sleep time” for loaded holes; ensuring that cuttings are mounded around the hole collars after loading to prevent snow drifting into the holes, and utilizing blasthole covers.

Blasting will be approximately daily and will average, in size, the daily production requirement of 50-90,000 tonnes per blast. Blasting will likely be by non-electric with both surface and down-the-hole delays to minimize the vibrations per delay to respect maximum vibrations allowed for surrounding water bodies and Underground mine infrastructures. This will minimize backbreak, fly rock, vibration levels and will optimize fragmentation and minimize digging problems.

6.4 DISPOSAL

Disposal of non-hazardous general waste will follow the Whale Tail Landfill Management Plan. Disposal of emulsion by products such as blasting boxes are incinerated on site.

Wash water that is created at the Emulsion plant is sucked out via vacuum truck and taken to the tailings storage facility for disposal.

Any unusable Emulsion waste is taken to the mines blast pattern for disposal down the bore holes.

7 PROCESS PLANT & WATER TREATMENT REAGENTS & CONSUMABLES

7.1 PRODUCT DESCRIPTION

The Process Plant (mill) uses a number of chemicals and reagents to treat the ore, recover entrained gold and to destroy cyanide. The Water Treatment Plant also uses a number of chemicals and reagents to treat water for TSS and arsenic removal. Water Treatment chemicals would be used for the discharge of the attenuation pond water to the receiving environment. The range in annual quantities used would reflect the different dosages that may be used during different mining stages (early operations, late operations, closure). Material categories, site handling and storage requirements, and PPE recommended by manufacturers are summarized in Tables 4 to 7.

Table 4 - Process Plant & Water Treatment Reagents – Use, Consumption & Storage

Reagent	Use	Phase	Normal Delivery Format	On-Site Storage
Acetylene	Welding	gas	gas cylinders	secured upright
Activated carbon (granular)	Gold recovery	solid	500 kg bags	Pallet
Anti-scalant	Water treatment	liquid	650 kg tote tank	Pallet drums
Borax	Refinery	solid	40 kg bags	Pallet
Silica	Refinery	solid	22.7 kg bags	Pallet
Calcium oxide (Quicklime) (CaO)	pH control	solid	1 t supersacs	Pallet
Calcium peroxide (alternative to hydrogen peroxide)	Potential use: Water treatment	solid	45 kg drum	Pallet drums
Copper sulphate ($CuSO_4$)	Cyanide destruction	solid	1 t supersacs	Pallet
Flocculant (Magnafloc 338 or Magnafloc 10)	Settling aid	solid	25 kg bags	Pallet
Hydrochloric acid (HCl)	Refining/stripping	liquid	20 gal drums	Pallet drums
Hydrofluoric acid	Laboratory	liquid	20 gal drums	Pallet drums
Hydrogen peroxide (alternative to calcium hydroxide)	Potential use: Water treatment	liquid	1 m^3 HDPE tote	Pallet
Lead acid batteries	Vehicles	liquid	-	Pallet
Nitric acid	Stripping	liquid	34 kg bottle	Pallet
Paints	Maintenance	liquid	gallon	Pallet
Sodium cyanide (NaCN)	Leaching	solid	1 t box bags	Pallet
Sodium hydroxide (caustic soda) (NaOH)	Refining/stripping	solid	25 kg bags	Pallet
Sodium hydroxide (caustic soda) (NaOH)	Refining/stripping	solid	1000 kg	Pallet
Sodium metabisulphite ($Na_2S_2O_5$)	Cyanide destruction	solid	1 t supersacs	Pallet
Sodium nitrate	Refinery	solid	50 kg bags	Pallet
Sulphur	Cyanide destruction	solid	1 t bags	Pallet

Note: kg = kilogram; t = ton; gal = gallon; m^3 = cubic metre.

Table 5 - Process Plant & Water Treatment Reagents – Hazard Classes & Potential Environmental Impacts

Material	Class	Potential Impact
Acetylene	2.1	Generally not hazardous for water.
Activated carbon	4.2	No information available.
Anti-scalant	Not regulated	Negligible with proper handling
Borax	Not regulated	Presents no health hazards.
Calcium oxide	Not regulated	No information available.
Calcium peroxide	5.1	Releases oxygen into environment when dissolved in water.
Copper sulphate	9	Harmful to aquatic life.
Flocculant	Not regulated	Acute fish, invertebrate, algae and bacteria toxicity.
Hydrochloric acid	8	Extremely toxic to aquatic life by lowering the pH below 5.5. When released into the soil, this material may leach into groundwater.
Hydrofluoric acid	8.6.1	No information available.
Hydrogen peroxide	5.1	Aquatic Toxicity 96-hour LC50.
Lead acid batteries	8	No information available.
Nitric acid	8	No information available.
Paints	Not regulated	No information available.
Silica	Not regulated	Generally not hazardous for water.
Sodium cyanide	6.1	Expected to be very toxic to aquatic life and to terrestrial life.
Sodium hydroxide	8	No information available.
Sodium metabisulphite	Not regulated	No information available.
Sodium nitrate	5.1	Possibly hazardous short-term degradation products are not likely. However, long term degradation products may arise. The products of degradation are less toxic than the product itself.
Sulphur	9	No info available (insoluble in water).

Table 6 - Process Plant & Water Treatment Reagents – Safe Handling Procedures

Product	Handling Procedure
Acetylene	Do not mix with air or oxygen above atmospheric pressure. Store away from oxidizing agents. Open and handle cylinder with care. Keep ignition sources away - Do not smoke. Protect from heat. Protect against electrostatic charges. Pressurized container: protect from sunlight, store in a cool location and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Prevent impact and friction. Store in accordance with local fire code and/or building code or any pertaining regulations.
Activated carbon	Wash thoroughly after handling. Use with adequate ventilation. Minimize dust generation and accumulation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Activated Carbon, especially when wet, can deplete oxygen from air in enclosed spaces, and dangerously low levels of oxygen may result. Store in a tightly closed container. Keep from contact with oxidizing materials. Store in a cool, dry, well-ventilated area away from incompatible substances.
Anti-scalant	Used in extremely small quantities. Can cause mild to moderate irritation of eyes, skin, and upper respiratory tract. Wash thoroughly after handling. Use sensible industrial hygiene and housekeeping products. Not flammable. Keep containers tightly closed
Borax	No special steps required.
Calcium oxide	Store in closed containers in a controlled drainage area under cover. Use in a well-ventilated area. Empty containers retain product residues and may be hazardous.
Calcium peroxide	Wash thoroughly after handling. Avoid all situations that could lead to harmful exposure. Store in a cool, dry, well-ventilated place. Keep container tightly closed and away from incompatible materials and sources of heat.
Copper sulphate	Avoid contact with skin and eyes. DO NOT breathe dust. Always wash hands thoroughly after contact. Store and use only in dry, well-ventilated areas. Keep container tightly closed.
Flocculant	Dust generated in handling of this product can be explosive if sufficient quantities are mixed in air, in which case ignition sources should be avoided. Employ grounding, venting and explosion relief provisions in accord with accepted engineering practices in process operations capable of generating dust/or static electricity. Handle in accordance with good industrial practice, handle with care and avoid unnecessary personal contact. Avoid contact with eyes and prolonged or repeated skin contact. Avoid continuous or repetitive breathing of dust. Use only with adequate ventilation. Remove contaminated clothing; launder or dry-clean before reuse. Wash thoroughly with soap and water after using. For industrial use only. Slip hazard when wet. Material is slippery when wet. Store in the original container, securely closed, in a cool and dry location. Avoid extremes of temperature and ignition sources.
Hydrochloric acid	Do not get in eyes, on skin, or on clothing. Wear protective clothing. Avoid breathing vapours or fumes. Store in cool, dry, ventilated area with acid-resistant floors. Keep container closed, out of direct sunlight, and away from heat, water, and incompatible materials. When diluting, add acid slowly to water and in small amounts. Never use hot water and never add water to acid. When opening metal drum, use non-sparking tools because hydrogen gas may be present. Do not wash out container and use for other purposes. Empty containers retain product residues and may be hazardous.

Product	Handling Procedure
Hydrofluoric acid	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Do not get on skin, in eyes or on clothing. Do not ingest or inhale. Store in a cool, dry, well-ventilated area away from incompatible substances. Do not store in metal or glass containers. Do not store in direct sunlight. Keep tightly closed. Empty container may contain hazardous residue. Do not add any other material to the container. Do not wash down the drain. Do not allow smoking or food consumption while handling. Store in approved containers only. Do not add water to acids.
Hydrogen peroxide	Use extreme care when attempting any reactions because of fire and explosion potential (immediate or delayed). Conduct all initial experiments on a small scale and protect personnel with adequate shielding as the reactions are unpredictable, and may be delayed, and may be affected by impurities, contaminants, temperature, etc. Do not get in eyes. Avoid contact with skin and clothing. Wash thoroughly after handling. Avoid contact with flammable or combustible materials. Avoid contamination from any source including metals, dust, and organic materials. In the event of an accident where large volumes of hydrogen peroxide might come into contact with external fires or with incompatible chemicals, a one-half mile area from the incident should be evacuated. Store in a properly vented container or in approved bulk storage facilities. Do not block vent. Do not store on wooden pallets. Do not store where contact with incompatible materials could occur, even with a spill (see "Hazardous Reactivity" on SDS). Have water source available for diluting. Do not add any other product to container. Never return used or unused peroxide to container, instead dilute with plenty of water and discard. Rinse empty containers thoroughly with clean water before discarding. (See "Waste Disposal" on SDS).
Lead Acid Batteries	Store batteries in a well-ventilated cool area. Handle carefully to avoid damaging or turning batteries over.
Nitric acid	Class 8 products are not to be loaded with class 1, 4.3, 5, 6, 7 or foodstuffs or foodstuff empties. Store in a well-ventilated area and out of direct sunlight. Keep containers closed at all times. Store away from oxidisable, caustic, and combustible materials. Vapours heavier than air; prevent concentration in sumps and hollows. DO NOT enter confined spaces where vapour may have collected. Strong oxidising agent; can lead to fire or explosion with organic and/or combustible materials.
Paints	No special steps required.
Silica	Prevent formation of dust. This product is not flammable. When pouring into a container of flammable liquid, ground both containers electrically to prevent static electric spark. Keep containers tightly sealed.
Sodium cyanide	Highly toxic, corrosive to eyes, skin, and respiratory tract. Can be fatal if swallowed, inhaled, or absorbed through skin. Keep cyanide antidote kit available in any cyanide work area. Always wear personal protective clothing. Keep in tightly closed container in cool, dry, ventilated area. Protect against physical damage to containers. Do not store under sprinkler systems. Do not wash out container and use for other purposes. Empty containers retain product residues and may be hazardous.
Sodium hydroxide (caustic soda)	Can cause severe injury to eyes, skin, and respiratory tract. Always use PPE and DO NOT contact product directly. Wash thoroughly after handling. Store in dry, well-ventilated area. Keep in original container, tightly closed. Empty containers retain product residues and may be hazardous.
Sodium Metabisulphite	May cause irritation to eyes, skin, and respiratory tract with prolonged exposure.

Product	Handling Procedure
	Sulphite-sensitive individuals may experience severe allergic reaction to dust. Releases sulphur dioxide gas when mixed with water. Wear PPE and wash thoroughly after handling. Store in dry, well-ventilated area away from heat, acids, and oxidizers. Keep container tightly closed. Use vacuum to clean up dust.
Sodium nitrate	Keep away from heat. Keep away from sources of ignition. Keep away from combustible materials. Empty containers pose a fire risk; evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, acids. Keep container dry. Keep in a cool place. Keep container tightly closed. Keep in a cool and well-ventilated area. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.
Sulphur	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. May form flammable dust-air mixtures. Avoid contact with skin, eyes and clothing. Empty containers contain product residue, (liquid and/or vapour), and can be dangerous. Keep containers tightly closed. Avoid contact with heat, sparks, and flame. Use with adequate ventilation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat spark, or open flames. Store away from heat, sparks, and flame. Keep away from sources of ignition. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances (oxidizing agents).

Table 7 - Process Plant & Water Treatment Reagents – Personal Protective Equipment

Product	Personal Eyes	Protective Skin	Equipment Respiration
Acetylene	Tightly sealed goggles	Protective gloves	Use atmosphere supplying respirators (e.g. supplied-air: demand, pressure demand, or continuous flow or self-contained breathing apparatus: demand or pressure demand or combination supplied-air with auxiliary self-contained air supply atmosphere supplying respirator in case of insufficient ventilation).
Activated carbon	None required	None required	None required
Anti-scalant	For splash protection use chemical goggles or full-face shield	Rubber or neoprene gloves; impervious apron or coveralls and boots	Not normally needed
Borax	Avoid eye contact	None required	None required
Calcium oxide	For splash protection use chemical goggles or full-face shield.	Rubber, neoprene, or nitrile gloves; impervious apron or coveralls and boots.	NIOSH/MSHA approved respirator, if required.
Calcium peroxide	Chemical goggles, full-face shield, or a full-face respirator is to be worn at all times when product is handled. Contact lenses should not be worn; they may contribute to severe eye injury.	Impervious gloves of chemically resistant material (rubber or neoprene) should be worn at all times. Wash contaminated gloves and dry thoroughly before reuse. Body suits, aprons, and/or coveralls of chemical resistant material should be worn at all times. Wash contaminated clothing and dry thoroughly before reuse. Impervious boots of chemically resistant material should be worn.	NIOSH-approved respirator for dust should be worn if needed.
Copper sulphate	Chemical goggles or full-face shield.	Rubber or neoprene gloves; impervious apron or coveralls and boots.	Dust mask; NIOSH/MSHA approved respirator, if required.
Flocculant	For splash protection use chemical goggles or full-face shield	Rubber or neoprene gloves; impervious apron or coveralls and boots	Dust mask
Hydrochloric acid	For splash protection use chemical goggles or full-face shield	Rubber or neoprene gloves; impervious apron or coveralls and boots	NIOSH/MSHA approved respirator
Hydrofluoric acid	Wear appropriate protective eyeglasses or	Wear appropriate protective neoprene gloves to prevent skin	Wear appropriate OSHA/MSHA approved

Product	Personal Eyes	Protective Skin	Equipment Respiration
	chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133. Wear face shield.	exposure. Wear acid resistant jacket, trousers and boots sufficient to protect skin.	chemical cartridge respirator regulations found in 29CFR 1910.134. If more than TLV, do not breathe vapour. Wear self contained breathing apparatus. Always use a NIOSH-approved respirator when necessary.
Hydrogen peroxide	Wear coverall chemical splash goggles. In addition, where the possibility exists for eye or faces contact due to splashing or spraying of material, wear chemical splash goggles/full-length face shield combination.	Where there is potential for skin contact, have available and wear as appropriate: impervious gloves, apron, pants, jacket, hood, and boots; or totally encapsulating chemical suit with breathing air supply. Permeation data supplied by vendors indicate that impervious materials such as natural rubber, natural rubber plus neoprene, nitrile, or polyvinylchloride afford adequate protection. Do not wear leather gloves or leather shoes (uppers or soles) because they can ignite following contact with peroxide. Cotton clothing can also ignite. This effect may be within minutes, or delayed. Clothing fires and skin damage occur less quickly with 50% or lower hydrogen peroxide than with 70% material, but adequate personal protection is essential for all industrial concentrations. Protective skin creams offer no protection from hydrogen peroxide and should not be used.	Where there is potential for airborne exposure in excess of applicable limits, wear NIOSH approved respiratory protection.
Lead Acid Batteries	Safety glasses must be worn when moving, connecting, disconnecting, or maintaining batteries, or cleaning up acid spills; as well as, when brushing battery posts or handling solids from inside a battery.	When moving, connecting, disconnecting or maintaining batteries, or cleaning up acid spills acid resistant gloves and full coverage acid resistant clothing must be worn. When brushing battery posts or handling solids from inside a battery gloves and apron must be worn.	When brushing battery posts or handling solids from inside a battery, dust masks must be worn.

Product	Personal Eyes	Protective Skin	Equipment Respiration
Nitric acid	Chemical safety goggles. A face shield may also be necessary.	Impervious gloves, coveralls, boots, and/or other resistant protective clothing. An impervious full-body encapsulating suit and respiratory protection may be required in some operations.	NIOSH/MSHA approved respirator, if required
Paints	None required.	None required.	None required.
Silica	Safety goggles	Wear impervious gloves, shoes and protective clothing to prevent skin contact.	NIOSH/MSHA approved respirator, if required
Sodium cyanide	For dust and splash protection use chemical goggles or full-face shield	Rubber or neoprene gloves; impervious lab coat, apron, or coveralls and boots	NIOSH/MSHA approved respirator, if required
Sodium hydroxide (caustic soda)	Tight-fitting goggles if dust is generated. For splash protection use chemical goggles or full-face shield	Gauntlet type rubber or neoprene gloves; impervious apron or coveralls and boots	NIOSH/MSHA approved respirator
Sodium metabisulphite	Chemical safety goggles	Cotton gloves adequate for handling dry product. For solutions, use rubber or neoprene gloves; impervious apron or overalls and boots	NIOSH/MSHA approved respirator
Sodium nitrate	Contact lenses should not be worn; they may contribute to severe eye injury.	Impervious gloves of chemically resistant material (rubber or PVC), body suits, aprons, and/or coveralls of chemical resistant material and impervious boots of chemically resistant material should be worn at all times	For dusty or misty conditions, wear NIOSH-approved dust or mist respirator. In case of spill or leak resulting in unknown concentration, use NIOSH approved supplied air respirator.
Sulphur	Chemical safety goggles	Wear impervious gloves, shoes and protective clothing to prevent skin contact.	NIOSH/MSHA approved respirator, if required

8 MISCELLANEOUS HAZARDOUS/TOXIC MATERIALS

8.1 PRODUCT DESCRIPTION

Acids such as nitric acid, as well as emulsifiers and ammonium nitrate are used at the mine site. Gases such as propane, oxygen, acetylene; solvents; water/effluent treatment chemicals and various additives are also utilized.

The release or spillage of any of these substances would possibly result in environmental impacts and pose a potentially hazardous situation for those personnel exposed to some of these materials. It is essential that materials deemed to be potentially hazardous be dealt with in a cautious manner, in strict adherence to laws and regulations outlined in the legislation, whether the substance is provided in large or smaller quantities as this will prevent serious repercussions should an accidental release of material happen.

8.2 STORAGE FACILITIES OF HAZARDOUS/TOXIC CHEMICALS

All explosive related chemicals will be stored as discussed in Section 6 of this Plan.

All other chemicals and gases will be stored in appropriate locations.

These storage facilities ensure that chemicals that could interact and cause a serious incident will be kept segregated.

9 INVENTORY, INSPECTION & RECORDS

A contract expediting company arranges all deliveries from the Baker Lake Marshalling Area to the Meadowbank and Whale Tail sites. This includes the hazardous materials discussed in this plan. The General Mine Manager has ultimate responsibility for supervising the receipt, inspection, and recording of all material inventories at site. The division managers reconcile total amounts received against amounts ordered.

9.1 PETROLEUM PRODUCTS

9.1.1 Inventory Management

Diesel fuel use is metered automatically when it is pumped from the Meadowbank and Whale Tail bulk tanks. The metered volumes are summarized weekly and reconciled against tank levels determined manually with a dipstick from the top of the tanks. Diesel fuel consumption for the power generators is recorded weekly at Meadowbank and Whale Tail.

Aviation fuel is dispensed as required under the supervision of aircraft personnel and Energy and Infrastructure. Helicopters may be stationed at Whale Tail Mine for exploration and operation activities with periodic use of a fixed wing aircraft. Fixed wing aircrafts and helicopters will continue to use the Meadowbank airstrip. Consumption and on-site volumes are reconciled monthly at both locations. Lubricants and other petroleum products are inventoried monthly.

9.1.2 Inspection

The Environmental Department performs regularly scheduled inspections of all fuel and lubricant storage areas at all sites. The inspection schedule and procedures to be followed are summarized in Table 8. All inspections are logged with the date and time of inspection, facility inspected, and name of the person making the inspection. See Appendix C for the inspection report of any hazardous material storage area.

The condition of hazardous materials storage areas, containers, tanks, connectors, and associated plumbing will be checked on a regular basis. Observations on their condition will be logged, dated, and kept near the corresponding storage area. Drums/containers will be inspected for the presence and legibility of symbols, words or other marks identifying the contents, signs of deterioration or damage such as corrosion, rust, leaks at seams or signs that the drum/container is under pressure such as bulging and swelling, spillage or discoloration on the top or sides of the drum/container. If leaks or deterioration is encountered it will be noted and addressed in a timely manner.

The hazardous materials area's secondary containment will be inspected, and the condition of the secondary containment will be noted. Arrangements will be made for repairs if necessary.

Table 8 - Inspection of Petroleum Storage Sites

Location	Schedule & Responsible Department
Fuel Tanks	*Schedule* – Weekly by Energy and Infrastructure Supervisor, Weekly by Environmental Technician *Procedure* – Repair leaks and report promptly. Inspections will be reported annually and filed with the General Mine Manager or Energy and Infrastructure Superintendent and Environmental and Critical Infrastructures Superintendent.

Location	Schedule & Responsible Department
Electrical Generating Plant (diesel)	*Schedule* – Daily by powerhouse operator, weekly by Environmental Technician as part of internal environmental inspections. *Procedure* – Inspections will be reported annually and filed as above.
Other Fueling Stations	*Schedule* – Daily by Energy and Infrastructure Supervisor, Weekly by Environmental Technician as part of regular inspections. *Procedure* – Inspections will be reported annually and filed as above.
Spill Kits	*Schedule* – Weekly by Environmental Technician *Procedure* – Inspections will be reported annually and filed as above.
Other Hazardous Material Storage	*Schedule* – Daily by Energy and Infrastructure Supervisor, Weekly by Environmental Technician when materials are on site. *Procedure* – Inspections will be reported annually and filed as above.

Any accidental damage to containment structures will be inspected immediately and appropriate repairs undertaken. The extent of damage will be reported in writing to the General Mine Manager and Environmental and Critical Infrastructures Superintendent. The report will note any remedial repairs that may be made, the date of any repairs, and the need for any follow-up inspection.

9.1.3 Records

Records pertaining to storage, use, and loss of fuels and lubricants are required by CCME and the Fire Marshal (under the *National Fire Code).* The following records are prepared by the Procurement and Logistics and Energy and Infrastructure departments:

- Reconciliation of bulk inventory from resupply logs;
- Weekly use summary;
- Weekly reconciliation for each storage tank;
- Overfill alarm tests;
- Pressure tests (if applicable);
- Inspections and maintenance checks of the storage tank, piping, and delivery systems;
- Any alteration to the systems;
- Reports of leaks or losses;
- Reports of spill responses; and
- Records of training.

9.2 EXPLOSIVES

9.2.1 Inventory Management

See Figure 2 for the Meadowbank Emulsion Plant and Figure 3 for the Whale Tail Emulsion Plant. As detailed in Section 6.2, in 2022, the transition has been completed and 100% of the emulsion mixed is produced at Whale Tail Mine.

Refer to the Ammonia Management Plan for more details on emulsion storage. Agnico Eagle's explosive contractor, Dyno Nobel Inc., performs daily and weekly inspections on the Emulsion Plant to ensure that inventory used is documented. Agnico Eagle conducts daily inspections of the sea can's storing the boosters, delays and detonator cords and provides an inventory to the Mine Manager.

Regarding the storage areas in Esker 6, sea cans will not be used for daily supply and when required, entire containers will be delivered directly to the underground ramp portal, where all of its content will be transferred to the underground powder magazine.

9.2.2 Inspection

Access to and use of explosives will be under the exclusive control of Agnico Eagle. Agnico Eagle will be responsible for inspection of all explosive's equipment and facilities, including the ammonium nitrate storage areas and the magazines for high explosive detonators and blasting caps. The explosive manufacturing plant is inspected by Dyno Nobel Inc. and reports this to Agnico Eagle Management.

Weekly inspections are conducted by the environmental department in esker along the WTHR. If water ponding is found in the Esker 6 or in the vicinity of the explosive storage, water will be sample and manage as per the Whale Tail Haul Road Management Plan.

9.2.3 Records

The *Federal Explosives Act* requires that the following records be kept with regard to explosives products:

- Quantity and strength of each explosive manufactured; and
- Quantity of each explosive issued to the mine site from the factory, including the dates of shipments and quantity of each explosive on site.

Agnico Eagle staff will provide weekly reports to the General Mine Manager that will include:

- Staffing;
- Safety concerns or incidents;
- Total explosives consumption;
- Amount of ammonium nitrate remaining on site; and
- Inventory of other explosives and accessories to be audited for fiscal month-end balances.

9.3 MISCELLANEOUS HAZARDOUS/TOXIC MATERIALS

9.3.1 Inventory Management

Adequate quantities of all hazardous chemicals are reconciled against orders on receipt. The appropriate department responsible for the miscellaneous chemicals at each site is responsible for reconciling the resupply inventory.

9.3.2 Inspection

During operations, the appropriate department responsible for storage and handling of the miscellaneous chemicals are to regularly inspect all areas where such hazardous materials are used and stored. Any problems will be noted and reported to the Department Manager. The Department Manager is responsible for weekly or monthly inspections of miscellaneous hazardous materials and storage areas.

9.3.3 Records

The quantity of hazardous materials received, used, and in possession of personnel are recorded by appropriate Departments. The departments are to comply with the environmental regulations.

10 TRAINING

10.1 GENERAL

All staff and contractors at the Meadowbank and Whale Tail sites will receive the following training:

- WHMIS;
- Emergency and spill response (see also the SCP and ERP);
- Operations overview; and
- Mine Standard Operating Procedures.

Mine employees will receive additional training in mine safety as specified by the *Mine Health and Safety Act* and regulations. Agnico Eagle will ensure compliance with the training requirements specified in the Act and regulations.

Process plant employees will receive additional training specific to their area of work and duties, including safe operating practices, safe handling and storage of chemicals, and use of PPE. Other training includes cyanide and chemical awareness, specific chemical training for specific tasks, and a mill induction training. This training will be the responsibility of Agnico Eagle.

A record of training received will be maintained for each employee and also for contractors.

In Appendix D you will find a procedure poster that is placed at the applicable hazardous material storage location. This poster will also be used during toolbox meetings with all departments to ensure that hazardous material is being segregated and placed in the appropriate containers for storage.

10.2 PETROLEUM PRODUCTS HANDLERS

Personnel who handle petroleum products will be expected to be conversant with relevant SDS information. As well, these personnel will be given training in the following:

- Transportation of dangerous goods (TDG);
- Agnico Eagle's fuel handling procedures (outlined in Section 5);
- Spill response and cleanup procedures for petroleum (see the SCP); and
- Emergency response, especially firefighting procedures (see the ERP).

10.3 EXPLOSIVES HANDLERS

Only trained and certified persons will work with explosives. The explosives personnel will undertake formal training and on-the-job training to ensure compliance with legislation. The Mine Inspector will check the adequacy of training. Training requirements will include (but not necessarily be limited to):

- Specific fire procedures as per the *Federal Explosives Act*;
- First aid;
- Transportation of dangerous goods (TDG); and
- WCB Blasting Certificate.

10.4 PLANT EMPLOYEES

Process plant operators may receive TDG training, if appropriate. All plant employees will be trained in spill and emergency response procedures. Emergency response procedures for spilled chemical substances are provided in the SCP.

10.5 THIRD PARTY CONTRACTORS

It is expected that third party contractors receive adequate and comprehensive training to conduct their work tasks from their employer. Agnico Eagle intends to review the general qualifications of third-party contractors prior to having them work at the site. In addition, the contractor companies may also be requested to confirm the qualifications of specific individuals that they may have working at the site.

Third party contractors working on the site are required to participate in and complete a site-specific health and safety training session. The training session is envisioned to be valid for a period of three (3) years, after which time the contractor may be required to complete the training again or attend a refresher. The training session will outline site specific hazardous and response procedures that they should be aware of while conducting their work on site. The training session will cover hazardous materials management.

11 PLAN EVALUATION, AUDIT & IMPROVEMENT

As part of Agnico Eagle's commitment under the International Cyanide Management Code, it will sponsor regular (every three years) audits by Institute-approved, third-party professionals to verify its compliance with the Code's principles and standards of practice with regard to cyanide handling.

12 FIGURES

Figure 2 Meadowbank Site Sampling Locations

Figure 3 Baker Lake Marshalling Area: Diesel and Jet-A Tank Sampling Locations

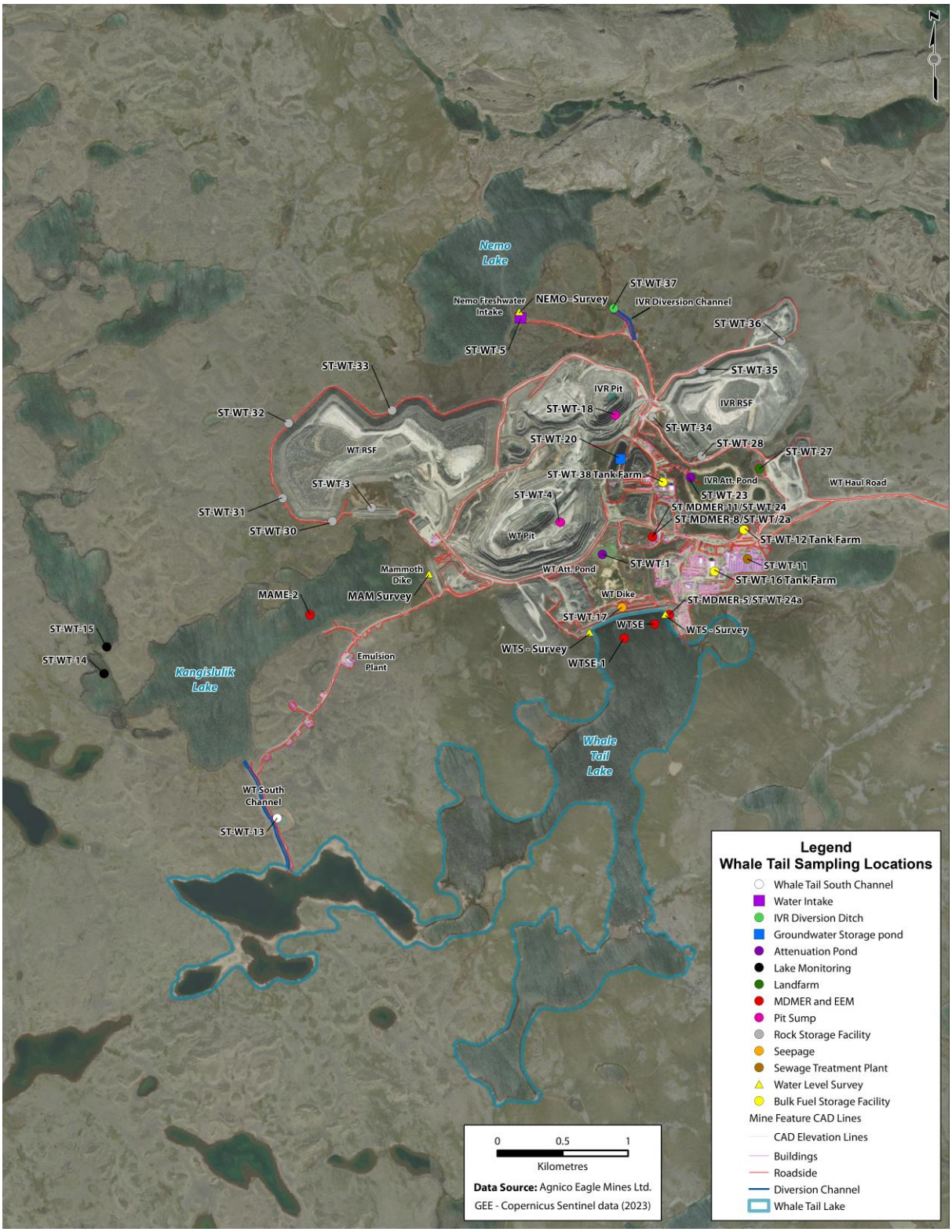


Figure 4 Whale Tail Site Sampling Locations

Figure 5 Whale Tail Site – HAZMAT Storage Location
*Represented by red rectangles on map

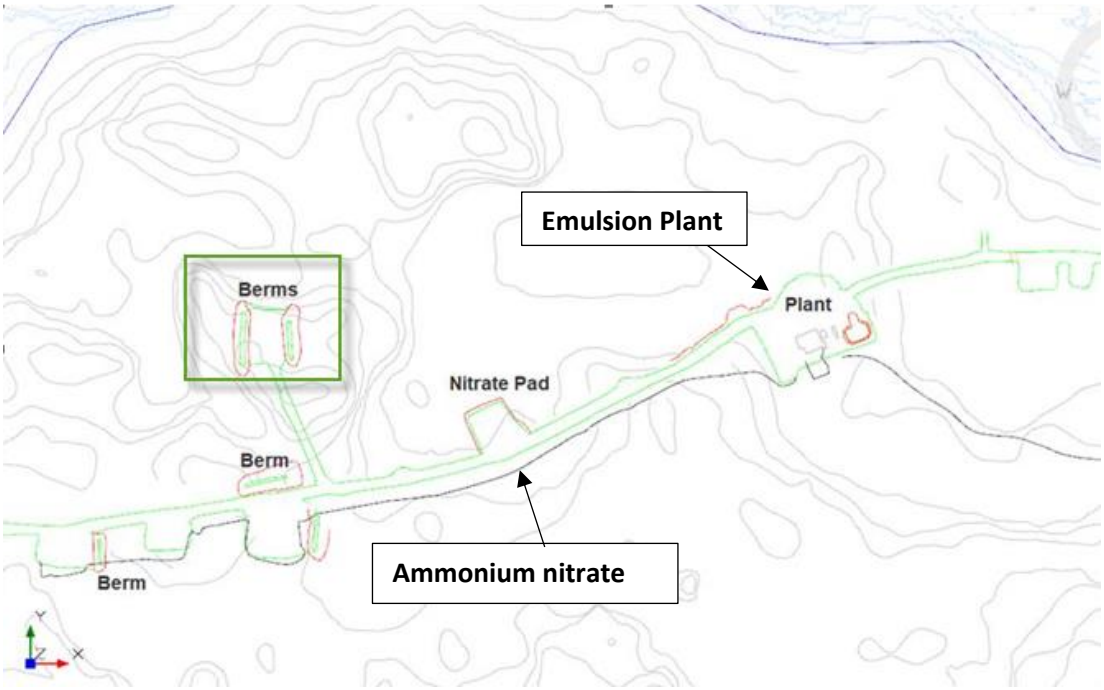


Figure 6 Whale Tail Emulsion Plant Storage

13 LIST OF ACRONYMS

Agnico Eagle	Agnico Eagle Mines Ltd.
AN	Ammonium Nitrate
ANSI	American National Standards Institute
ANFO	Ammonium Nitrate Fuel Oil
AWAR	All-Weather Access Road
CCME	Canadian Council of Ministers of the Environment
EPS	Environmental Protection Service
ERD	Explosives Regulatory Division, Natural Resources Canada
ERP	Emergency Response Plan
ERT	Emergency Response Team
FS	Fuel Storage Area
HAZCOM	Hazard Communication
HCN	Hydrogen Cyanide
HM	Hazardous Materials Storage Area
HMMP	Hazardous Materials Management Plan
HR	Human Resources
HSC	Occupational Health & Safety Committee
HW	Hazardous Waste Storage Area
IBC	Intermediate Bulk Container
ISO	International Organization for Standardization
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
OHSA	Occupational Health and Safety Administration
OHSP	Occupational Health & Safety Plan
PCB	Polychlorinated Biphenyls
PPE	Personal Protective Equipment
SCP	Spill Contingency Plan
SDS	Safety Data Sheets
TDG	Transportation of Dangerous Goods
TDGA	Transportation of Dangerous Goods Act
WCB	Workers’ Compensation Board
WHMIS	Workplace Hazardous Materials Information System
WTHR	Whale Tail Haul Road

Appendix A

List of Applicable Legislation

The following is a list of federal and territorial legislation and guidelines that regulate the management of hazardous materials in Nunavut, and which are considered potentially applicable to the Meadowbank Complex. As part of Meadowbank Mining Corp's overall environmental management system for the mine site, this list is updated at least annually to ensure it represents current and relevant information.

Federal Legislation

- **CANADIAN ENVIRONMENTAL PROTECTION ACT, 1999 S.C. 1999, c. 33**

  Code of Practice for the Reduction of Chlorofluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

  Environmental Code of Practice for Elimination of Fluorocarbon Emissions from Refrigeration and Air Conditioning Systems.

  Environmental Code of Practice on Halons Code of Practice EPS 1/RA/3E.

  Environmental Emergency Regulations SOR/2003-307.

  Environmental Guidelines for Controlling Emissions of Volatile Organic Compounds from Aboveground Storage Tanks, CCME-EPC-87-E, as amended.

  Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulations SOR/2005-149.

  Federal Halocarbon Regulations, 2003 SOR/2003-289.

  Interprovincial Movement of Hazardous Waste Regulations SOR/2002-301.

  Ozone-Depleting Substances Regulations, 1998 SOR/99-7.

- **EXPLOSIVES ACT R.S.C 1985, c. E-17**

  Ammonium Nitrate and Fuel Oil Order C.R.C. 1978, c. 598.

  Explosives Regulations C.R.C. 1978, c. 599.

- **TRANSPORTATION OF DANGEROUS GOODS ACT, 1992 S.C. 1992, c. 34**

  Transportation of Dangerous Goods Regulations SOR/2001-286.

  Transportation of Dangerous Goods Regulations - Schedules SOR/2001-286.

Federal Codes and Other Guidance Documents

- National Fire Code.
- Indian and Northern Affairs Canada. 2005. DEW Line Cleanup Barrel Protocol.
- Canadian Council of Ministers for the Environment (CCME) - Environmental Code of Practice for Above-Ground and Underground Storage Tanks Systems containing Petroleum Products and Allied Petroleum Products (2003).
- CCME - Canadian Wide Standards for Petroleum Hydrocarbons in Soil.
- CCME - Canadian Environmental Quality Guidelines.

- Environment Canada (Tilden & Westerman). 1990. Guidelines for the Preparation of Hazardous Material Spill Contingency Plans.
- Department of Fisheries and Oceans. 1998. Guidelines for the Use of Explosives in or Near Canadian Fisheries Water.

Territorial Legislation

- **ENVIRONMENTAL PROTECTION ACT R.S.N.W.T. 1988, c. E-7**

  A Guide to the Spill Contingency Planning and Reporting Regulations January 2002.

  Environmental Guideline for Contaminated Site Remediation November 2003.

  Environmental Guideline for Waste Lead and Lead Paint.

  Guideline for Ozone Depleting Substances.

  Guideline for the General Management of Hazardous Waste in the NWT.

  Guideline for the Management of Waste Antifreeze.

  Guideline for the Management of Waste Batteries.

  Guideline for the Management of Waste Paint.

  Guideline for the Management of Waste Solvents.

  Guideline for Dust Suppression, February 1998.

  Spill Contingency Planning and Reporting Regulations R-068-93.

  Used Oil and Waste Fuel Management Regulations R-064-2003.

  Plain Language Guide to the Used Oil and Waste Fuel Management Regulations.

- **TRANSPORTATION OF DANGEROUS GOODS ACT, 1990 S.N.W.T. 1990, c. 36**

  Transportation of Dangerous Goods Regulations R-049-2002.

- **EXPLOSIVES USE ACT R.S.N.W.T. 1988, c. E-10**

  Explosives Regulations R.R.N.W.T. 1990, c. E-27.

Appendix B

Cyanide

B.1: Cyanide – Properties, Uses, Storage & Handling (Dupont)

B.2: Safety Data Sheets – Sodium Cyanide

B.1 Cyanide – Properties, Uses, Storage & Handling (Dupont)

Sodium Cyanide

PROPERTIES, USES, STORAGE, AND HANDLING

DUPONT CHEMICAL SOLUTIONS ENTERPRISE

DUPONT

The miracles of science™

Notice:

Sodium cyanide may be fatal if swallowed, inhaled, or with prolonged skin contact. Contact with acids, water, or weak alkalies liberates poisonous gas. Causes eye burns and may irritate skin. See "Personal Safety and First Aid." See DuPont's Sodium Cyanide Material Safety Data Sheet (MSDS) for more detailed safety and health information.

For Emergency Assistance, Call DuPont at

(901) 357-1546

(This is a transportation emergency Cyanide Hotline to our Memphis, TN plant.
Do not use for routine technical or commercial information.)

For Transportation Emergencies,

Call DuPont at (901) 357-1546, Then Call

CHEMTREC at (800) 424-9300

(See "Transportation Emergencies")

For commercial or technical information, call your DuPont marketing representative or a sales office listed on the back cover.

Sodium Cyanide: UN 1689

DO NOT USE AS A PESTICIDE.

See DuPont's MSDS for detailed instructions for treatment of cyanide poisoning.

Table of Contents

Product Information

Introduction

DuPont sodium cyanide (NaCN) is a white crystalline solid, available in a briquette or granular form. The briquettes are uniform in size, average 18 g (about ⅔ oz) in weight, and have overall dimensions of approximately 3.5 × 3.5 × 1.3 cm (1⅜ × 1⅜ × ½ in). They are resistant to breakage and dusting, easy to scoop up, and readily soluble in water. The granules are irregularly shaped particles, typically sized to generate a minimum of dust, and pass 90–100% through a ⅜-in screen and 3% maximum through a USS Sieve No. 50. Cyanobrik® and Cyanogran® are DuPont trade names (see **Figures 1** and **2**).

The Chemical Abstract Service Registry Number for NaCN is 143-33-9.

Table 1. Physical Properties of Sodium Cyanide

Formula Weight	49.007
Melting Point, °C (°F)	564 (1047)
Boiling Point, °C (°F)	1496 (2725)
Specific Gravity, Solid, 25°C (77°F)	1.60
Apparent Bulk Density, Solid, kg/m³ (lb/ft³)	880–960 (55–60)
Specific Gravity, Liquid, 850°C (1560°F)	1.19
Heat of Formation, ΔH° *f*	
25°C, cal/g	–438
25°C, kJ/kg	–1833
77°F, Btu/lb	–788
Specific Heat, 26–73°C (78–163°F)	
Btu/lb·°F or cal/g·°C	0.335
kJ/kg·K	1.402
Heat of Fusion, mp, Btu/lb	77
cal/g	43
kJ/kg	179
Heat of Vaporization, bp, Btu/lb	1309
cal/g	727
kJ/kg	3041
Vapor Pressure, mmHg	
800°C (1470°F)	0.76
1200°C (2190°F)	89.8
1360°C (2480°F)	314.0
Solubility in Water, g NaCN/100 g water	
(see **Figure 3**), –20°C (–4°F)	35.4
20°C (68°F)	58.3

Table 2. Specifications and Typical Analysis

	Cyanobrik®/Cyanogran® and Bulk Solution Specifications	Typical Analysis*
Product Code 1220 (Cyanobrik®)		
Product Code 1222 (Cyanogran®)		
Sodium Cyanide, %	98.0 minimum	99
Sodium Hydroxide, %	0.5 maximum 0.06 minimum	0.3**
Product Code 1254 (Mining Grade)		
Sodium Cyanide, %	96.0 minimum	98
Sodium Hydroxide, %	0.5 maximum 0.06 minimum	0.3**
Product Code 1249 (30% Solution)		
Sodium Cyanide, %	28 minimum	30
Sodium Hydroxide, %	0.5 minimum	1

* Typical analyses based on historical production performance. DuPont does not make any express or implied warranty that future production will demonstrate or continue to possess these analyses.

** **CAUTION:** Sodium hydroxide (NaOH) content can be below 0.1% versus 0.3%, typical. NaOH should be added as outlined on page 3 to suppress hydrogen cyanide formation when making a water solution.

Figure 1. Cyanobrik®

Figure 2. Cyanogran®

Uses and Applications

The mining, metal, and chemical industries are the principal consumers of sodium cyanide. Typical uses include:

Ore Extraction and Ore Flotation

The cyanide process for extracting gold and silver from low-grade ores uses aqueous solutions of sodium cyanide with oxygen (air) to convert the noble metal (M) to soluble $NaM(CN)_2$, from which M can be recovered either by precipitation with zinc dust or aluminum powder, carbon absorption, or electrowinning.

In the flotation of galena (lead sulfide) to separate it from mixed ores containing sphalerite (zinc sulfide) and pyrite (iron sulfide), sodium cyanide acts as a depressor; that is, it reduces the tendency of gangue materials to travel along on the froth and so impair the separation. Sodium cyanide finds similar use in the separation of pentlandite from pyrrhotite and molybdenite from copper concentrates by flotation. It is also used to purify the molybdenite by extraction of copper impurities.

Electroplating

Cyanide brass, cadmium, copper, gold, silver, and zinc baths deposit decorative and/or functional metal coatings on a variety of substrates. The good throwing power of the electrolyte causes relatively uniform deposition of the metal on intricately shaped parts. Small amounts of special additives in the baths give bright metal deposits, even on recessed surfaces of the work. Cyanide electroplating baths are versatile and capable of high production rates, whether plating large or small parts.

Case Hardening Steel

Molten salt baths containing 10–30% sodium cyanide find extensive use for case hardening steels at temperatures below 870°C (1600°F). The molten bath process is fast, easy to operate, and yields mixed carbon-nitrogen cases that have excellent wear resistance and uniformity. The addition of activators or accelerators to the bath results in deeper cases than those obtained with plain cyanide baths, but nitrogen pickup is usually less.

The life of keen-edged tools improves when the high-speed steel is cyanide-nitrided in molten cyanide baths at about 565°C (1050°F).

Metal Cleaning

Aqueous solutions of sodium cyanide are effective metal cleaners, especially for smut removal after acid pickling.

Chemical Manufacture

Sodium cyanide is used to make other chemicals that lead to such diverse products as pharmaceuticals, vitamins, animal food supplements, dyes and pigments, insecticides, sequestrants, polymers, and catalysts (see "Chemical Reactions" section).

In any synthesis or formulation involving sodium cyanide, no cyanide compound should survive in the final product as an impurity. This is especially important with regard to consumer products.

Chemical Reactions

The most hazardous reaction of sodium cyanide is with acids to form lethal hydrogen cyanide (HCN) gas, which is invisible and has a very weak odor. Smaller amounts of HCN gas can develop from contact with water and weak alkalies. When working with sodium cyanide, special provisions are needed to address HCN and cyanide toxicity.

Sodium cyanide deliquesces in moist air. Crystals of the dihydrate, $NaCN{\cdot}2H_2O$, form when saturated solutions of sodium cyanide cool at temperatures below 35°C (95°F) (see **Figure 3**). Sodium cyanide dissolves in methanol (6.05 g/100 mL saturated solution at 15°C [59°F]). It also dissolves in liquid ammonia (3.7 g/100 mL NH_3 at –33°C [–27°F]).

Sodium Cyanide Reactions in Water

Sodium cyanide dissolved in water forms an equilibrium between ionized sodium cyanide and highly volatile HCN. In sodium cyanide solutions, HCN concentrations must be kept low and/or contained to avoid toxic fumes. HCN formation varies with pH, cyanide concentration, and temperature. HCN in the air around a sodium cyanide solution will also be influenced by the amount of solution surface area and ventilation. At pH 8 or less, essentially all of the cyanide will be in the HCN form in dilute solutions (see **Figure 5**). To suppress HCN formation in typical concentrated sodium cyanide make-up solutions, a pH of 12 minimum (preferably 12.5–13) should normally be used. In operating tanks, HCN in the vapor space above a 23% solution at room temperature typically will be about 250 ppm (without pH adjustment). With the pH raised to 12–12.5, HCN levels drop to around 125 ppm and below 50 ppm, around pH 13. Higher temperatures and solution concentrations increase HCN fumes. The following recommendation is made to minimize HCN formation with a modest pH increase.

When making a concentrated (e.g., 10–30%) cyanide solution, the proper procedure is to add about 0.5% sodium hydroxide (caustic) (about 50 lb [22.7 kg] sodium hydroxide/1000 gal [3785 L] water) before adding the cyanide. More sodium hydroxide will not be chemically harmful to the cyanide and will further reduce HCN levels; however, increased alkalinity increases eye hazards from splashes. For most operations, pH 12.5–13.0 is a good compromise to reduce HCN without excessively high alkalinity. If process chemistry prevents adding caustic, adequate precautions in design and operation must be taken to protect against HCN fumes, HCN polymerization, and cyanide hydrolysis.

pH is a log scale measurement, which means it takes about ten times as much sodium hydroxide to raise the pH each subsequent unit than the previous. For example, if it took 1 lb (0.45 kg) of sodium hydroxide to go from pH 9 to 10, it would take 10 lb (4.5 kg) to raise the pH from 10 to 11 and 100 lb (45.4 kg) from 11 to 12, etc. Therefore, even pH 11 water will need

Figure 3. Solubility of Sodium Cyanide in Water

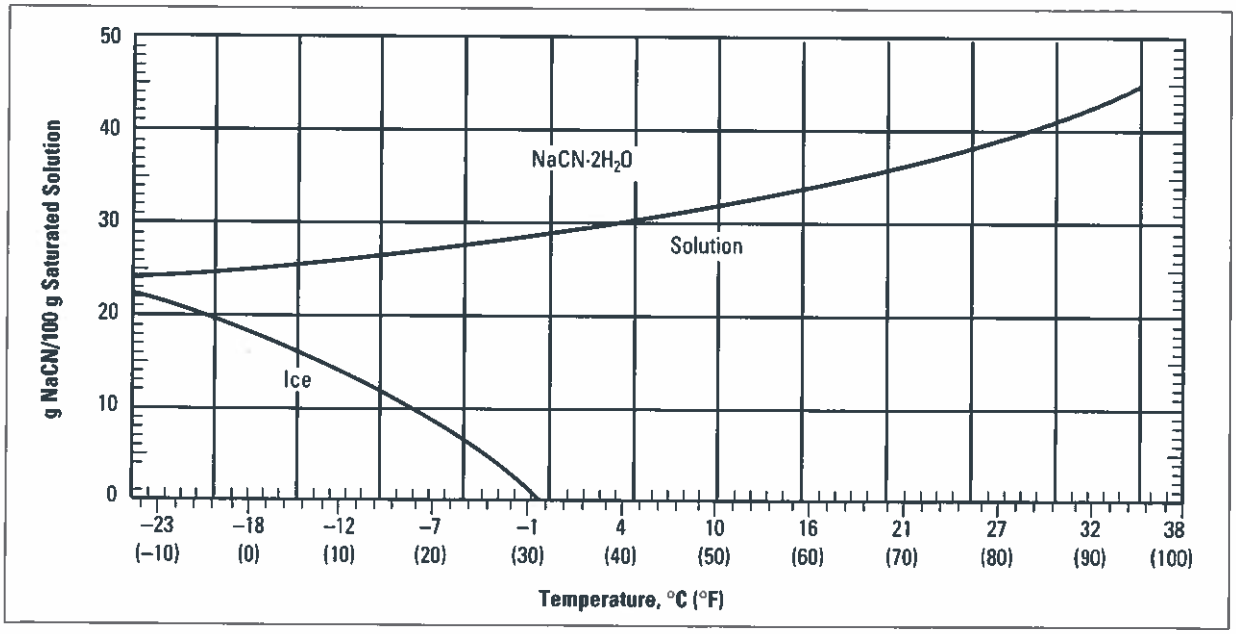


Figure 4. Densities of NaCN Solutions

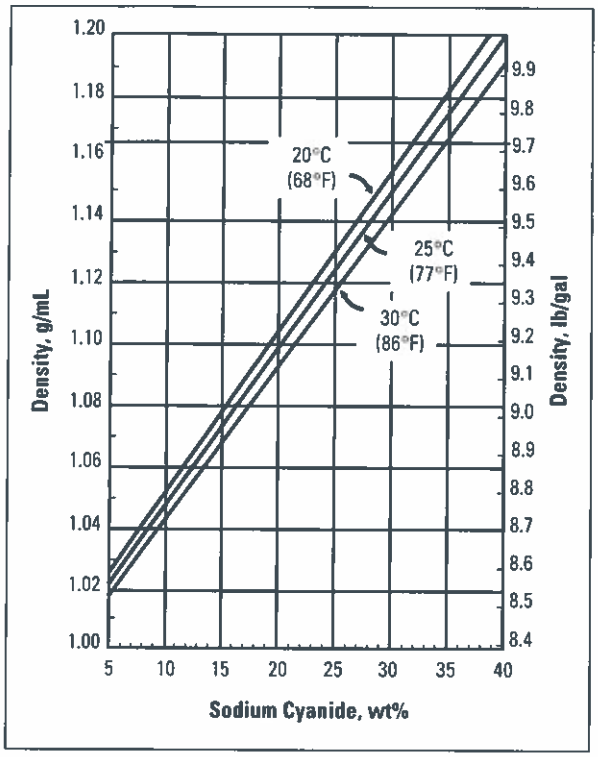
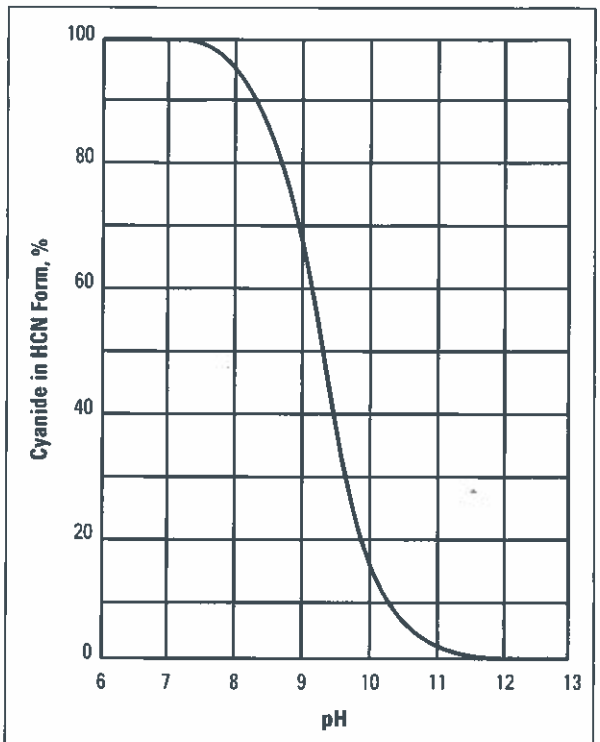


Figure 5. Effect of pH on Cyanide Ionization



Data based on work by D. Milne, 1950, for dilute sodium cyanide solutions at ambient temperature. Toxic HCN fumes increase as temperature and solution concentrations increase, requiring higher pH for safe operation.

nearly as much sodium hydroxide added to it as would the same amount of water with pH 6 to 11. Water at pH 10 or 11 does not eliminate the need to add sodium hydroxide to reduce HCN.

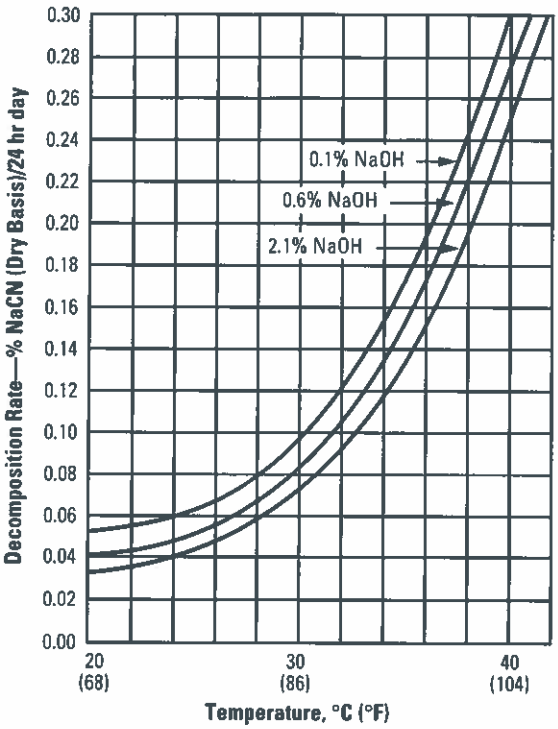
NOTE: Lime (calcium hydroxide) is not as effective as sodium hydroxide because of limited solubility, but it can be substituted to raise the pH to around 12.

Hydrogen cyanide molecules will polymerize to form the extremely inert HCN polymer. It is not unusual for HCN polymerization to occur in sodium cyanide solutions made without additional alkali, particularly if stored at elevated temperatures. In dilute solutions, HCN polymer will generate colors ranging from pale yellow to dark reddish brown. In stronger solutions, a dark brown precipitate resembling iron rust can form, which will interfere with heat transfer, plug pumps, orifices, etc., and may cause significant cyanide loss. HCN polymer will discolor chemical products. Again, high pH values give low HCN concentrations, which reduces the tendency for polymer formation.

Cyanide also reacts with water to form ammonia and formate ions. In the acid pH range, hydrolysis products are formic acid and ammonium salts. Alkaline solutions produce formate salts and volatile ammonia. With strong solutions, the volume of ammonia evolved can cause dangerous pressure buildup. One gallon of 30% sodium cyanide solution can produce more than 25 ft^3. For this reason, extra vent capacity is recommended for large, heated storage tanks.

Ordinarily, the reaction between cyanide and water proceeds slowly. However, the reaction rate increases exponentially with an increase in temperature. The critical range is around 60–70°C (140–158°F). At temperatures below this range, the reaction can be controlled by cooling and, where practical, by dilution. At higher temperatures, however, the reaction can be uncontrollable in large tanks for highly concentrated solutions and may proceed until substantially all the cyanide has been consumed, unless temperature control and adequate cooling and venting capacity exist (see **Figure 6**).

Figure 6. Decomposition Rate of NaCN Solutions



NOTE: The % NaOH shown above is the concentration in the final solution. The NaCN (as shipped–containing 0.1% NaOH), when diluted to a 30% solution, will have only 0.03% NaOH in the final solution, unless additional NaOH is added. (Decomposition rates based on DuPont experimental data using 35% NaCN solution.)

Heated sodium cyanide solution storage tanks should be equipped with facilities to measure and control solution temperature (see "Equipment" section). Heating may be needed to assist in dissolving the NaCN and to prevent freezing (see **Figures 3** and **7**). Cooling could be critically important, if the hydrolysis reaction begins to generate heat faster than it can be dissipated to the surroundings.

All the reactions discussed above consume a portion of the stored cyanide, and all are inhibited by maintaining low solution temperature and high pH.

If special precautions are taken, acidification of sodium cyanide to produce HCN gas for a chemical reaction is an acceptable procedure, but only when handled in special equipment by technically qualified people after detailed planning. HCN operations require much more stringent plans, procedures, and standards for safe operation.

CAUTION

Even in laboratory quantities, the accumulation and storage of liquid or gaseous HCN should not be considered until its properties and the required safety precautions for handling it have been studied carefully. In addition to toxicity considerations, violent exothermic polymerization reactions can occur with liquid HCN, even in the absence of air or oxygen.

Other Reactions

Oxidants, such as alkaline hypochlorite solutions, hydrogen peroxide solutions, and permanganate solutions can oxidize cyanide to sodium cyanate. These oxidation reactions find wide use in the control of cyanides in effluents. They must be done in dilute solutions at proper pH to avoid formation of highly toxic gases (see "Cyanide Destruction" section).

Strong oxidants, such as nitrites and chlorates, react violently when added to molten sodium cyanide (or vice versa).

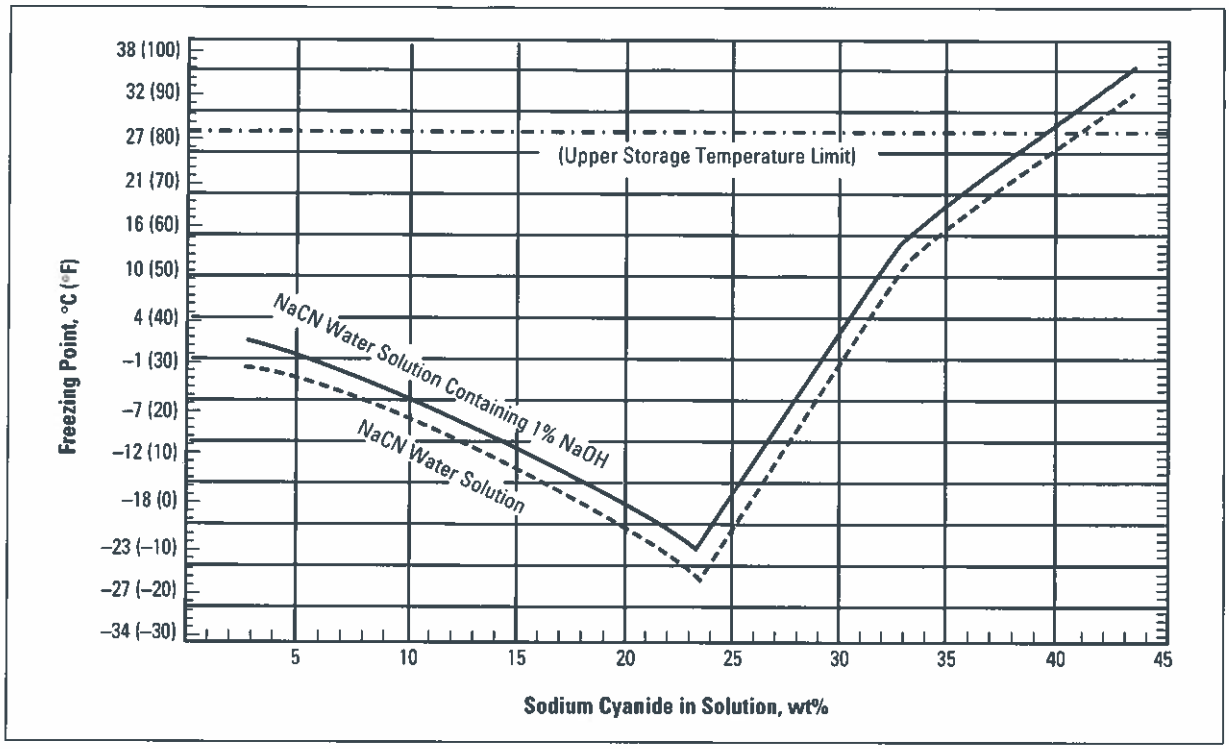
With the exception of lead and platinum, most metals (when finely divided) dissolve in aqueous sodium cyanide in the presence of oxygen.

Alkaline solutions of sodium cyanide dissolve water-insoluble cuprous and zinc cyanide with formation of sodium tricyanocuprate and tetracyanozincate, respectively.

Reacting an alkyl halide, sulfate, or toluene-sulfonate (p-$CH_3C_6H_4SO_2OR$) with sodium cyanide in aqueous alcohol, dimethylformamide (DMF), or similar aprotic solvent, leads to an alkyl cyanide (nitrile). Fusing a sodium aryl sulfonate with sodium cyanide yields the aryl nitrile; for example, sodium benzene-sulfonate (sodium phenyl sulfonate) gives benzonitrile (phenyl cyanide).

Hydrogen cyanide, generated by reacting an acid with sodium cyanide, is capable of adding to isolated double bonds and to the carbonyl group of an aldehyde or ketone. In the case of acetophenone, for example, the corresponding cyanohydrin forms, which hydrolyzes to atrolactic acid (a-phenylacetic acid, $C_6H_5[CH_3]C[OH]COOH$). Similarly, when preparing an alpha-amino acid from an aldehyde or ketone by Strecker synthesis, the hydrogen cyanide and ammonia needed can come from ammonium cyanide formed in the reaction of sodium cyanide with ammonium chloride.

Figure 7. Freezing Points of Sodium Cyanide Solutions



One method of synthesizing the sodium salt of ethylen ediaminetetraacetic acid (tetrasodium EDTA, a chelating agent) combines ethylenediamine with formaldehyde and sodium cyanide in hot (80°C [175°F]) alkaline solution.

Personal Safety and First Aid

Health and Safety Hazards

See DuPont's MSDS for detailed instructions for treatment of cyanide poisoning.

Because of the toxicity of sodium cyanide, all persons working with it should be completely familiar with and observe the established safety practices.

Sodium cyanide is a fast-acting poison that can cause death quickly at low levels of exposure. Its toxic effect results from the inhibition of specific processes in body cells by restricting oxygen use in cellular respiration, particularly cells in the brain and heart. Poisoning can result from breathing cyanide gas, dust, or solution; absorption through the skin, particularly the eyes and other membranes and feet; and from ingestion. Contact with the skin may cause irritation and poisoning, particularly with prolonged contact, or if open wounds, skin abrasions, or mucous membranes are involved. Sodium cyanide is alkaline and causes eye burns. Because of the possibility of skin absorption of hydrogen cyanide fumes, air monitoring for HCN is required, even for someone wearing an air mask.

Cyanide is not a cumulative poison, and it is not a carcinogen. It is believed that there are no chronic effects of cyanide poisoning, unless repeated, prolonged exposures, well above the established limits, were to occur. With prompt treatment, recovery from overexposure is normally quick and complete.

CAUTION

Sodium cyanide in contact with acids liberates highly toxic and flammable hydrocyanic acid gas. Also, toxic amounts of HCN can be liberated from water solutions of sodium cyanide or from contact with weak alkalies, if ventilation is inadequate (see "Sodium Cyanide Reactions in Water").

Safety Precautions

The basic safety precautions are:

- Do not breathe sodium cyanide dust, solution mist, or HCN gas. Wear an approved toxic dust and mist respirator when there is danger of inhaling cyanide dust or mist. Additional protection is required for HCN gas. The respirator should be one approved by the Mine Safety and Health Administration (MSHA) or by the National Institute for Occupational Safety and Health (NIOSH).
- Avoid skin contact with cyanides, particularly contact with open wounds or skin abrasions. Wash skin promptly and thoroughly if contact occurs. Wear protective gloves when handling solid cyanides. Wear rubber gloves when handling cyanide solutions (butyl rubber has very low permeability; neoprene is more rugged with low HCN permeability and is best for many jobs involving sodium cyanide).
- Do not get in eyes. Wear approved chemical splash goggles when handling cyanide solutions and when there is danger of splashing.
- Have available and wear other protective clothing as needed for job safety. Develop clothing change procedures to ensure cyanide is not scattered around the site or inadvertently carried home.
- Immediately sweep up any spilled cyanide and place in a suitable container. Wash area and/or treat contaminated area with dilute hypochlorite solution to destroy the cyanide. Comply with federal, state, or local regulations. If approved, drain to neutral chemical waste sewer.
- Take every precaution to keep acids from contacting sodium cyanide. Do not store with acids or weak alkalies.
- Do not eat, drink, or smoke in areas where cyanide is present. Do not handle or store food or beverages in cyanide areas.
- Store sodium cyanide in a ventilated, locked area. Containers should be kept closed and their contents dry. Do not store under sprinklers; sodium cyanide will not burn, but sprinkler activation could cause an environmental problem. Local fire regulations may require sprinklers. Always check and follow local regulations. If sprinkling is required, the area must be diked to contain the runoff.
- Have antidote, emergency plans, and training in place before using cyanide. See DuPont's Sodium Cyanide MSDS for detailed instructions.

Sodium Cyanide Exposure Limits

The U.S. Department of Labor (OSHA) has ruled that an employee's exposure to sodium cyanide in any 8-hr work shift of a 40-hr week shall not exceed a time-weighted average (TWA) of 5 mg of cyanide per cubic meter of air.[2,3] It also cautions that because cyanide may penetrate the skin, control of vapor or dust inhalation alone may not be sufficient to prevent absorption of an excessive dose.

HCN Exposure Limits

The current OSHA workplace exposure limit for HCN is 11 mg/m^3 (10 ppm), ***8-hr average***. A 1989 revision of the HCN limit (along with several hundred other chemicals) to 5 mg/m^3 (4.7 ppm), ***15-min average***, was vacated by court order, and the pre-1989 limit has been reinstated. OSHA (and others) also cautions that because hydrogen cyanide may penetrate the skin, control of vapor inhalation alone may not be sufficient to prevent absorption of an excessive dose.[2,3] During all of this, the U.S. Mine Safety and Health Administration (MSHA) limit stayed at 10 ppm for HCN. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a 4.7 ppm limit instantaneous ceiling value with a similar skin notation.[4] DuPont's experience supports the current OSHA and MSHA regulatory levels. However, as a matter of practice, DuPont does not have people working for prolonged periods under conditions approaching our upper limits, because we can design/operate to avoid prolonged exposure.

In summary, HCN air quality requirements will vary from jurisdiction to jurisdiction, and it is incumbent on each user to be aware of and comply with the rules regulating exposure to HCN in their regulatory jurisdiction. The specific OSHA and MSHA exposure limit for HCN is currently 11 mg/m^3 (10 ppm) for an 8-hr TWA. The ACGIH Threshold Limit Value (TLV) is 5 mg/m^3 (4.7 ppm), 15-min TWA. This is also a ceiling value. The DuPont Acceptable Exposure Limit (AEL) is 4.7 ppm, 15-min TWA with current regulatory ceiling limitations. All of these exposure limits carry a "skin" notation indicating that HCN may penetrate the skin; therefore, control of vapor inhalation alone may not be sufficient to prevent cyanide poisoning. Also, exposure limits are subject to change, and users should stay current with regulatory changes.

Symptoms of Cyanide Poisoning

Personnel should be constantly alert for symptoms of cyanide poisoning in themselves and others. The following poison symptoms can result from other causes, but should be investigated promptly when they occur around cyanide:

Reddening of the eyes*	Nausea*
Irritation of the throat	Headache*
Palpitation	Weakness of arms and legs
Difficulty in breathing	Giddiness
Salivation	Collapse
Numbness	Convulsions

Effects of Exposure to HCN Vapor

The following toxicity data show the "Reported Human Response to Various Concentrations of HCN Vapor"[5]:

2–5 ppm	Odor threshold
10 ppm	OSHA and MSHA exposure limit, 8-hr TWA[2]
20–40 ppm	Slight symptoms after several hours
45–54 ppm	Tolerated for ½ to 1 hr without significant immediate or delayed effects
100–200 ppm	Fatal within ½ to 1 hr
300 ppm	Rapidly fatal (if no treatment)

These numbers should be considered reasonable estimates only, because data are not exact and effects vary for different people. Also, *heavy breathing from physical work will increase cyanide intake and reduce the time for symptoms to show.* The "rapidly fatal" exposure level of 300 ppm assumes no first aid or medical treatment; either is very effective if used quickly.

* Reddening of the eyes (and skin) is one of the earliest symptoms, with nausea and/or headache common in low level exposure. These three are the most readily identifiable symptoms of low level cyanide overexposure.

Prompt administration of the recovery techniques has proven very effective, but emphasis must be placed on quick action. Seconds count, and treatment should be provided within about 200 sec (3–4 min). In case of overexposure to cyanide, quick action is required to sound the alarm, remove the patient from the contaminated area, and provide treatment. With prompt treatment as prescribed, recovery is normally quick and complete with no serious aftereffects. Treatment after 3–4 min can still be effective, but chances of recovery are reduced without prompt treatment. Unlike many poisons, cyanide is not cumulative. While cyanide poisoning can be rapidly fatal, no case should be considered hopeless. Treatment should be continued until a physician certifies death.

First Aid and Medical Treatment

See DuPont's MSDS for detailed instructions for treatment of cyanide poisoning.

Ordering Cyanide Poisoning Antidote Kits and Amyl Nitrite

To obtain cyanide poisoning antidote kits and/or amyl nitrite ampules:

1. Obtain a prescription from your local physician (required because amyl nitrite is a prescription product).
2. Purchase the cyanide antidote kit from your pharmacy. The pharmacy can obtain the kit from Akorn Pharmaceuticals at (800) 932-5676.
3. Amyl nitrite can also be purchased from your local pharmacy or from Save-A-Life Systems in Ft. Wayne, IN at (800) 933-5885.

Shipping

Containers

DuPont produces sodium cyanide in briquette and granular forms.

A variety of containers are used as follows:

Nonreturnable Drums

Net weight 50-kg (110.2-lb) steel drums stacked 9–27 to a pallet.

Net weight 100-kg (220.4-lb) steel drums stacked eight to a pallet (see **Figure 8**).

Note: Drums can be stored three pallets high in a warehouse.

Figure 8. Palletized 100-kg (220-lb) Drums Being Loaded into a Truck

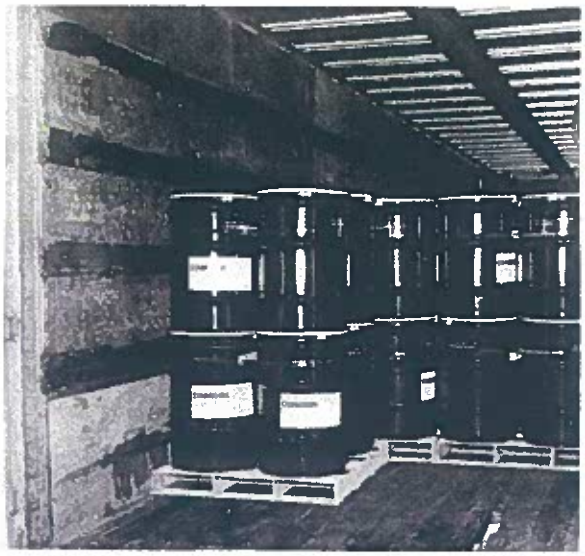


Figure 9. A Tuff-Pak Box Full of Bags

Tuff-Pak

- 48 20-kg (44-lb) pinch-bottom, multiwall composite bags that are hermetically sealed and water-resistant. The bags are packaged in a wooden box on a self-contained pallet. Net weight 960 kg (2116 lb). Individual bags are not to be sold separately (see **Figure 9**).

Figure 10. Partially Loaded Container of IBCs

Nonreturnable Intermediate Bulk Container (IBC)

- Water-resistant package holding 1000 kg (2205 lb). Box dimensions are 44¾ × 44¾ × 44⅜ in high (see **Figure 10**). For shipment, there are normally 20 IBCs in a container.

Returnable FLO-BIN® Containers (Briquettes Only)

- 1361- and 1497-kg (3000- and 3300-lb) net returnable FLO-BIN® containers, 12–14 bins per truck (see **Figures 11** and **14**).

Bulk Trucks

- 30% solution tank trailers (18,000 lb, 100% basis—8180 kg) are available from the Carlin, NV terminal. They can be unloaded using the customer's pump or by plant or truck air (see **Figure 13**).
- Excel I tank trucks (6804–9526 kg [15,000–21,000 lb]). These trucks are equipped with circulation pumps that will permit water addition, dissolving by circulation, and then pumping off into the customer's tank (see **Figure 15**).
- Excel II tank trucks (15,876–18,144 kg [35,000–40,000 lb]) are unloaded by circulating premeasured water from a storage tank by a driver/technician (see **Figures 12** and **16**).

Figure 11. Bins corded two abreast on a flatbed trailer. The bins are strapped to the trailer to prevent movement during transportation.

Transportation

Sodium cyanide must not be shipped by U.S. mail. The U.S. Department of Transportation (DOT)[3,6] hazard classification is Class 6.1 (Toxic) with an ID number of UN1689. A DOT toxic label is required. Transportation equipment must also be placarded with toxic placards in accordance with DOT requirements.

Sodium cyanide drums, Tuff-Paks, and IBCs should be shipped in vehicles that have secondary containment, such as vans. Pickup trucks, etc., should not be used. In case of an accident, secondary containment will minimize the impact of spilled material. Also, the driver must be in a separate compartment isolated from the cyanide.

Sodium cyanide must not be shipped with any acids (dry or liquid), food (human or animal), or ingredients for products used for human or animal consumption, including food, pharmaceuticals, food supplements, etc. Shipment with flammables and strong oxidizers should be avoided, as these mixed shipments can cause fire fighting complications, including cyanide runoff, in case of an accident and subsequent fire.

Storage and Handling

Storage and use areas should be designed so that accidental spillage can be contained and disposed of safely.

Storage Security

When sodium cyanide is stored, security should be maintained so only authorized people have access to it. Locked rooms or locked fenced areas can be used. Only the quantity required for immediate use should be removed from storage.

Figure 12. Excel II Truck

Drums

Drums of sodium cyanide should be stored inside and segregated from acids, weak alkalies, and strong oxidizing materials such as nitrates. It is also recommended that sodium cyanide be stored away from flammables and combustibles to minimize the chance of cyanide-water runoff as a result of fire fighting. Where local regulations permit, sodium cyanide drums should not be stored under sprinklers, because sodium cyanide will not burn in ordinary fires and cyanide runoff must be avoided. Storage with food or intermediates for human or animal products must be avoided. Observe all the precautions given under "Safety Precautions."

Figure 13. NaCN Solution Truck

If possible, open cyanide containers in the areas in which the cyanide is to be used. Remove the cover from the container, and remove the cyanide with a metal scoop or dump the cyanide from the container as required. Replace the cover on the container if the drum still contains cyanide. Store appropriately. Immediately pick up any spillage.

Drum Disposal

Sodium cyanide drums are nonreturnable, and it is against U.S. DOT regulations to reship or recoup the drum, except when approved for disposal of waste materials. Empty drums should be visually inspected for cyanide removal, flushed with large volumes of water, and then drained. This flush and drain cycle should be repeated three times to comply with federal regulations. Rinse water should be collected, treated, and disposed of according to local regulations (see "Cyanide Destruction" section). After cleaning, drum labels should be removed or obliterated to confirm cleaning, and the drum destroyed to prevent reuse. After the above, recycling as scrap metal is appropriate.

FLO-BIN®

A typical FLO-BIN® unloading and storage system is shown in **Figure 14**. A special design manual is available from DuPont. Contact DuPont's sales representative to discuss package and delivery options to meet specific needs.

Sodium cyanide is shipped in returnable FLO-BIN® containers (600 lb tare weight) to customers by truck or rail. In trailers, bins are shipped two abreast. Road weight limitations restrict the truck load to 12–14 bins. The advantages of FLO-BIN® deliveries are:

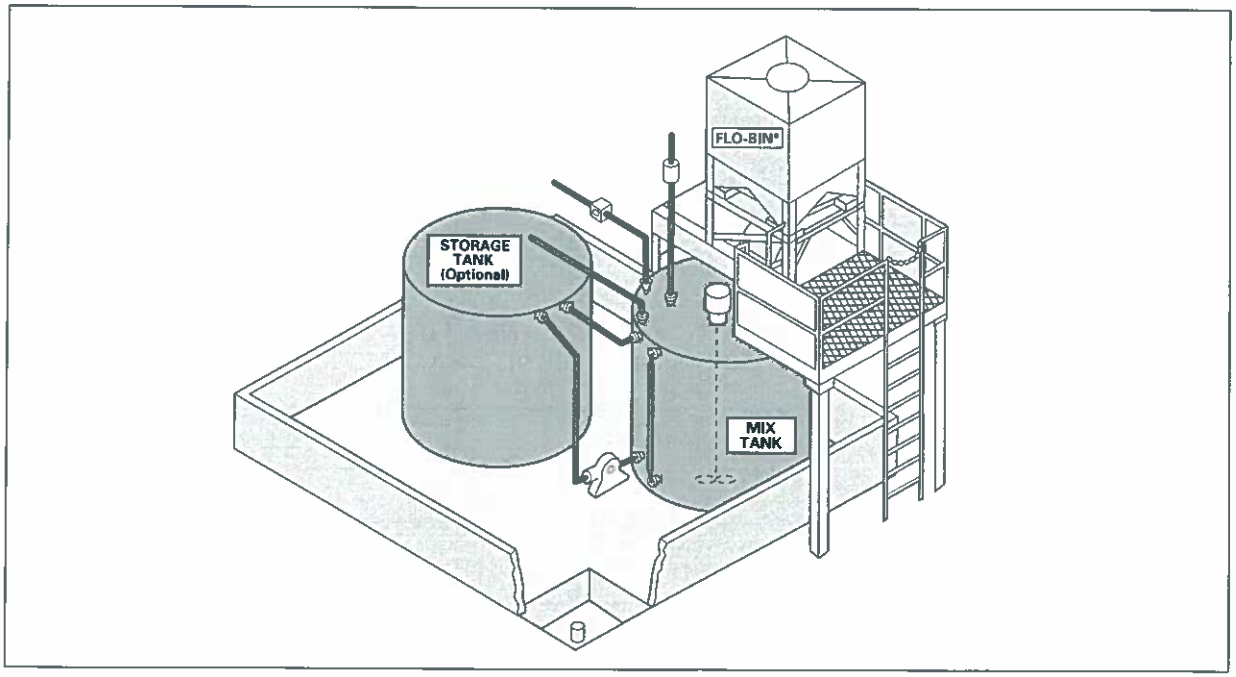
Economics—Customers using about 100,000 kg (200,000 lb) or more per year of sodium cya-nide can effect direct cost savings versus other smaller packages.

FLO-BIN® Customer Shipping Responsibility

When returning bins, the customer becomes the shipper and bears the responsibility for seeing that all safety precautions are carried out. DOT regulation 49 CFR 173.29 requires that a returnable container offered for transportation must meet the same standards as when the container previously held a greater quantity of a hazardous material. Returning bins do not have to be cleaned internally. Internal water washing is discouraged, because cyanide solution rundown is likely to create spillage, unless the bins are dried. External cleaning and inspection of each bin is required to ensure no cyanide is left on the outside and that the camlocks are locked closed with locking pins or wires.

When returning bins, secure bins with equipment provided. DO NOT reverse the poison placards (four) on car or truck. DO NOT remove or deface product label on bin.

Figure 14. Typical FLO-BIN® Unloading System



Intermediate Bulk Container (IBC)

IBCs are the ideal package for most large consumers of NaCN who are not near a manufacturing facility. IBCs are readily handled with forklift trucks. DuPont recommends stacking IBCs two high for storage. The DuPont IBC holds 1000 kg (2205 lb) of NaCN. When diluted to 23% (the minimum freezing point of a NaCN/water solution) with pH at 12 or above, the IBC will make about 3900 L (1030 gal).

The IBC is emptied by lifting the bag by the straps using a forklift or hoist and then positioning and lowering the bag onto the specially designed knife slitter that cuts the bag, allowing the contents to drop into the dissolving tank.

IBC Decontamination and Disposal

Decontamination and disposal of used IBC materials must be properly handled to prevent environmental contamination and meet regulations. The bags should be empty—this should be confirmed visually or by weight before they are sent to a disposal facility. Then, a flush and drain cycle, repeated three times, will dissolve any residual cyanide left in the bag. Care must be taken to ensure the bag material does not overlap and prevent water contact—interfering with the dissolving process. Rinse water should be collected and recycled or treated and disposed of according to local regulations. As part of the cleaning process, labels should be removed or obliterated. If burning is the method of disposal, keep in mind that all of the NaCN will probably not be destroyed during the burning process, and the ashes must be properly contained.

30% NaCN Solution

The DuPont terminal in Carlin, NV ships 30% NaCN solution as far away as 300 miles. The specially designed trailers hold 6300 gal—equivalent to 18,000 lb of dry NaCN. DuPont 30% NaCN solution is often the most convenient way to receive NaCN. The drivers are specially trained to make these deliveries and have a safety record envied in the trucking industry. DuPont offers technical assistance and support to assist with the design or modification of an existing system.

Excel Trucks

Excel trucks combine transportation and unloading safety by permitting shipment of solid sodium cyanide and unloading by dissolving the cyanide in place and then pumping the solution into appropriate storage. Excel I (see **Figure 15**) is ideal for customers with annual usage of ½ to 1 million lb, where 30% solution may not be desirable, but Excel I is only available in limited geographical areas. Excel II delivery systems (see **Figure 16**) are ideal for many large sodium cyanide users and usually require an annual NaCN usage of about 1 million lb per year to justify the larger investment compared to handling FLO-BIN® containers. Cost factors such as location (transportation), expected operating life, available space, inventory requirements, etc., should be evaluated with DuPont to determine the best system for each specific situation. Design manuals are available for Excel systems.

When dissolving the sodium cyanide in Excel systems, position the tank truck so that the hose connection can be made between the truck pipe headers and the storage tank and pump piping.

For Excel II, meter into the storage tank the amount of water and sodium hydroxide (NaOH) needed to make the desired concentration of sodium cyanide solution (about 363 kg [800 lb] NaOH for 18,144 kg [40,000 lb] NaCN). The water temperature needed for dissolving the NaCN depends on the solution concentration needed, the circulation rate, and weather conditions. The water can be preheated up to about 38°C (100°F) to speed the dissolving, but heated water is frequently not needed, unless cold weather and cold water are involved (see "Chemical Reactions" section).

Cyanide decomposition rates increase with higher temperatures, with sodium formate and ammonia being formed. Because the decomposition reaction is exothermic, provision must be made for temperature monitoring and emergency cooling, if heating is used (see "Temperature Indicators, Insulation, Heating, and Cooling").

Excel II Unloading Procedures

Position valves. Start the pump. Check the system for leaks. Circulate the water continuously from the storage tank through the tank truck from the bottom to top to flood the truck and overflow back to the storage tank. Listen to the rattling briquettes by placing your ear near the bottom of the tank trailer. Dissolving should be complete about 30 min after the rattling stops, but system experience will provide the best guide. Then, pump the sodium cyanide solution from the tank truck into the storage tank. The dissolving time varies with circulation rate, water temperature, and final concentration, but dissolving can be complete in about 1½ hr under best conditions. Typically, 3–4 hr are needed in winter, without heat, for a 20–25% concentration.

Figure 15. Typical Excel I Unloading System

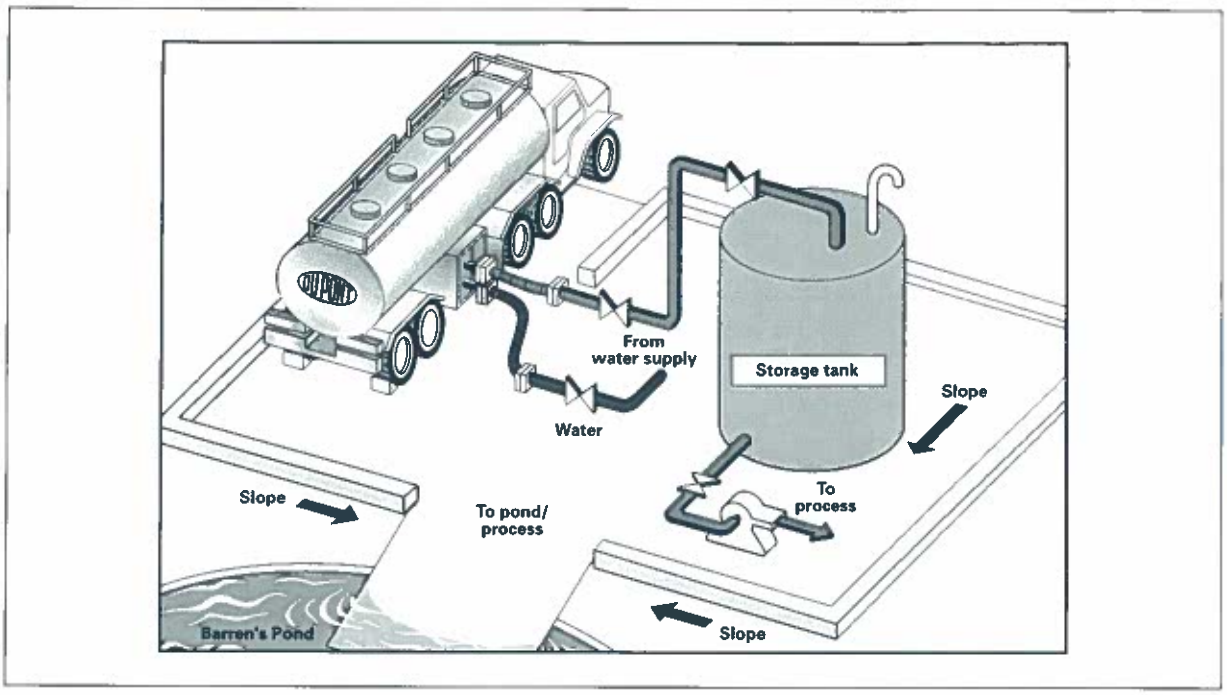
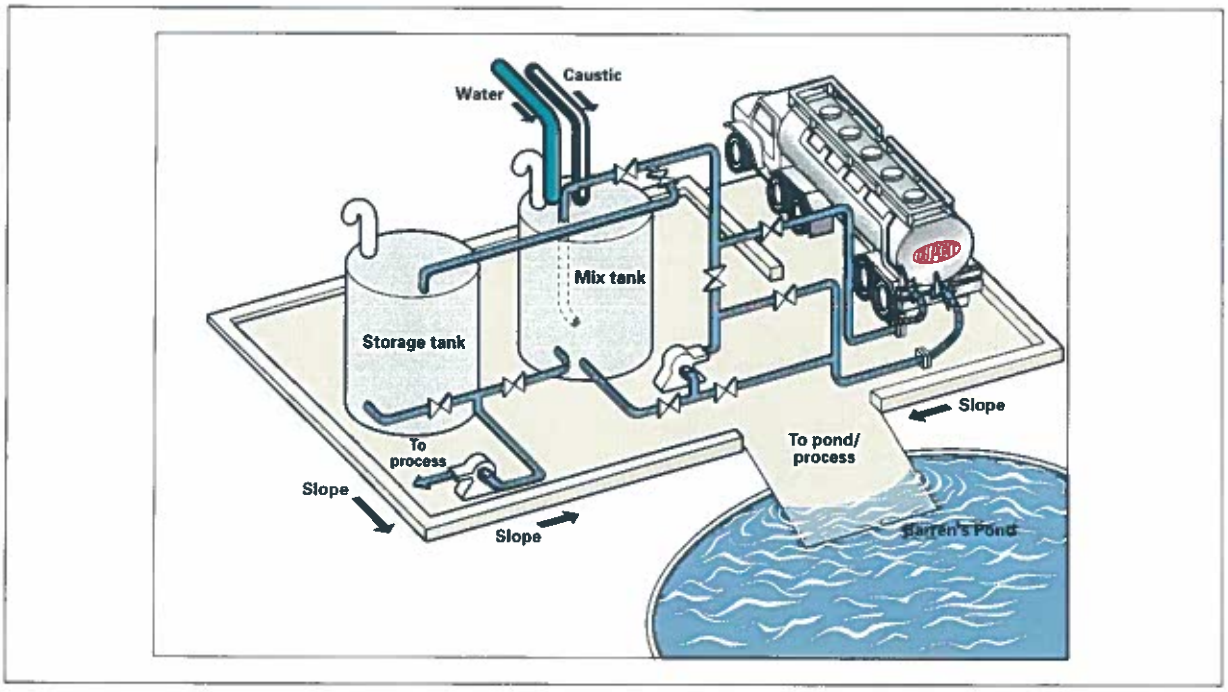


Figure 16. Typical Excel II Unloading/Storage System



Equipment

Materials of Construction

Carbon steel equipment is usually satisfactory for sodium cyanide solutions where velocities are not over 1.2–1.5 m/sec (4–5 ft/sec). At higher velocity, 304 or 316 stainless steel is sometimes recommended, because an erosion-corrosion effect occurs on steel. Carbon steel with a corrosion allowance may be acceptable instead of stainless to reduce cost, particularly if flow is frequently shut off so no erosion-corrosion is occurring. Even at very low velocities, welded, not threaded, piping should be used for all pipe materials to avoid leaks. To avoid leaks, no threaded connections should be used for piping instruments, drains, or any other connection. For pumps and instruments, 316 stainless is recommended. Valve operating conditions will determine whether carbon steel versus stainless can be used. Gaskets of Teflon® or nitrile-butadiene rubber (NBR), with Kevlar® filler, are recommended for sodium cyanide solutions.

Solution Storage Tank

Sodium cyanide solution is stored in a tank typically fabricated from ¼-in carbon steel plate. For bulk installations, top nozzles are recommended for a 15.2- to 20.3-cm (6- to 8-in) pipe vent, a 10-cm (4-in) fill and circulating line, level indicator, high-level alarm, provision for water, and caustic additions and manway. A top 4-in nozzle with a physical break in the water line will prevent backflow. Bottom openings must also be provided for a 15-cm (6-in) pump suction line, temperature control-alarm, and (optional) heating/cooling coils. The size of the storage tank depends upon the sodium cyanide shipment size and concentration of solution required. For example, 18,150 kg (40,000 lb) of sodium cyanide makes 71,000 L (18,750 gal) of 23% solution. A vertical tank 4.9 m (16 ft) in diameter by 5.0 m (16½ ft) high has a nominal 95,000-L (25,000-gal) capacity, which is sufficient to allow some outage and/or solution inventory (see **Figure 17**). The tank may be lined with neoprene to prevent buildup of iron content, if this is critical to the process. All pipe nozzles should be schedule 40 pipe minimum.

To provide mixing, a properly aligned dip tube/mixer with a siphon vent must be installed.

If the storage tank is located inside a building, all tank openings must be sealed and the tank vent routed outside the building to a safe location. This will prevent the discharge of hydrogen cyanide inside the building when the tank is being filled (see "Caustic Addition" on page 15).

Pump

For Excel II, a 316 stainless steel pump with a 10.2-cm (4-in) suction and a 7.6-cm (3-in) discharge is needed. It should be capable of delivering 2271–2650 L (600–700 gal) per minute at 18.3–21.3 m (60–70 ft) head. Small pumps will not provide sufficient agitation for tank car cyanide dissolving. Totally enclosed, fan-cooled, 25-HP motors are recommended.

Water Meter and Supply

A 7.6-cm (3-in) water meter with a preset totalizer and an automatic cutoff is recommended in the storage tank water addition line. There should be a physical disconnection in the water supply line to prevent cyanide from backing up into the water system.

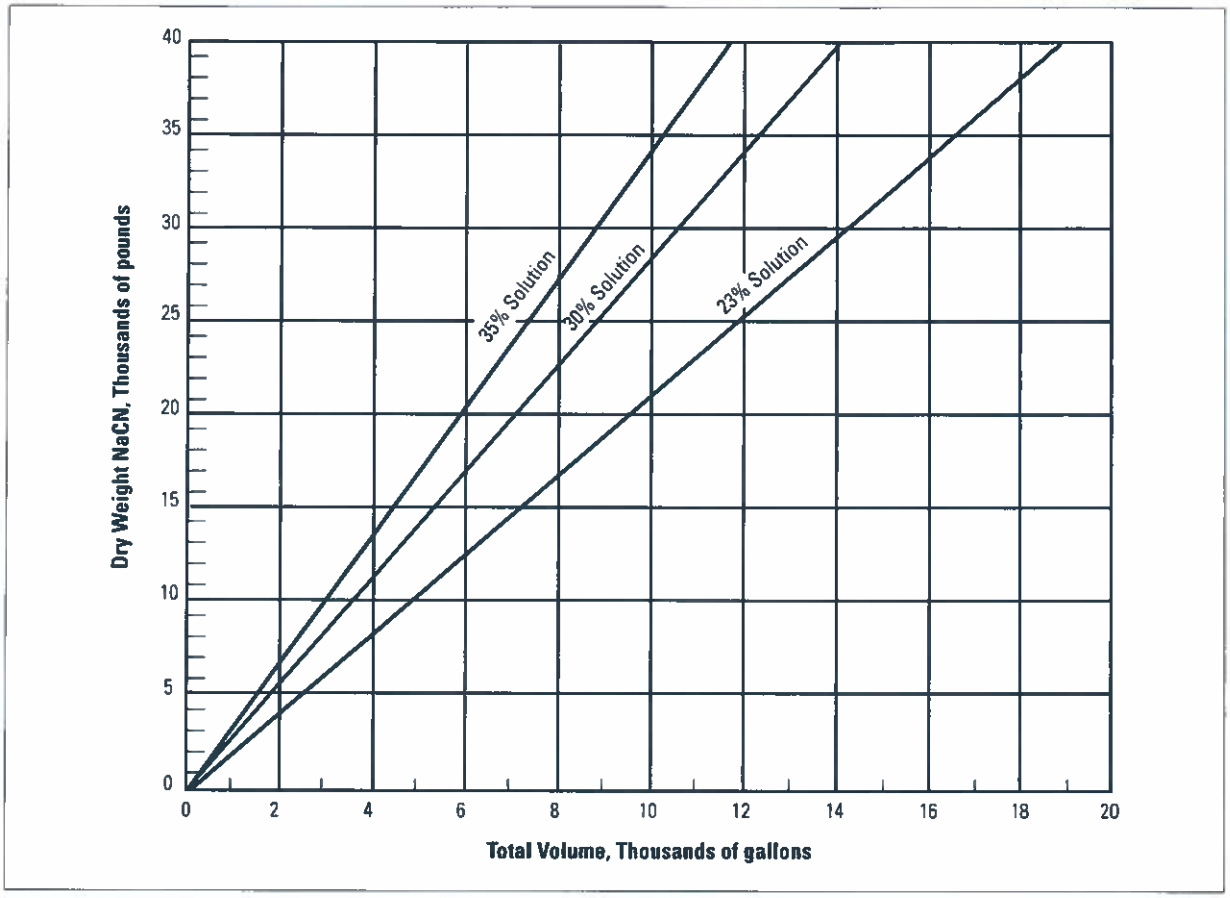
Pipe and Hoses

Welded, not threaded, carbon steel (or 304 or 316 stainless steel) pipe with minimum flanges can be used (see "Materials of Construction" for piping and gaskets). Excel II circulation piping of 10.2-cm (4-in) is recommended (except for the line from the tank to the pump inlet, which should be 6 in, to minimize NPSH losses) with all valves, pumps, etc., located inside the dike and minimum flanges outside the dike. Tank car and truck hoses should be overdesigned to ensure against failure. Hose pressure rating should be 225 psi minimum with burst pressure (including end connections) at least twice the rated pressure. Contact DuPont for hose design and vendor recommendations. Circulation piping system, including hoses, should be inspected before each use to protect against failure and a major spill. Hoses should be long enough to permit hookup, regardless of the direction the vehicle comes into the facility. Sodium cyanide solution trailer connections are located at the rear (bumper level) and middle (on top) of the trailer; Excel II trailer connections are located at the rear (bumper level); and Excel I connections are in the box located in the middle of the trailer (ground level). All connections are quick connects, except for the top solution connection, which may be either bolted or quick connect.

Drainage Control

The storage tank should be diked and have a sealed concrete bottom. No dike drain should be installed, because it might leak or be left open. The unloading area should be curbed and drainage control provided that will prevent spilled cyanide solution from draining into public water courses (see "Pipe and Hoses"). Specific spill control requirements depend on surroundings and local regulations. Impounded sodium cyanide can be reclaimed or chemically destroyed.

Figure 17. Solution Volume Curves—Gallons of Solution from Dry Weight at 35°C (95°F)



Filter

To obtain a clear solution, a filter can be used. It should be located so that it filters the solution between the tank car and the storage tank and, also, between the storage tank and process. Filters are not needed if a clear solution is not required.

Level Indicator and Alarm

A sonic liquid level indicator is preferred over a float-type instrument, as it is more reliable, easier to read, and can be installed at a convenient location. It is recommended that a high-level alarm system, equipped to shut off the pump, be installed to prevent overflowing the storage tank.

Temperature Indicators, Insulation, Heating, and Cooling

Sodium cyanide solution should be stored above the crystallization point (see **Figure 3**), but normally below 38°C (100°F), when possible, to reduce decomposition (see **Figure 6**). A temperature control system may be needed for high concentrations. Tank insulation can be fiberglass with a sheet aluminum cover, if climate and solution concentration warrant. Low pressure steam can be used to reduce localized overheating. The same coils can be used for circulating cold water when necessary. Alternately, live steam can be injected, if small concentration changes from condensation are acceptable.

CAUTION

Read the "Chemical Reactions" section carefully and note the dangers at high temperatures.

Caustic Addition

To minimize highly toxic HCN formation and prevent color formation from HCN polymerization in the stored sodium cyanide solution, sufficient caustic (sodium hydroxide) is added to give a pH 12, preferably 12.5–13. Caustic addition to provide a 0.3–0.5% solution (about 50 lb NaOH per 1000 gal water) is usually sufficient. A 50% caustic solution can be used during the summer, but 25% solution is recommended for winter to avoid freezing. Use of 22.7-kg (50-lb) bags of bead caustic may be convenient. Additions can be made directly to the tank. Caustic should be added before sodium cyanide is added. Where process chemistry prevents caustic addition, HCN formation will increase, which must be controlled by ventilation and/or other means.

Transportation Emergencies

How to Get Help

DuPont wants to be called about any transportation incident involving DuPont cyanide, regardless of whether a spill occurred. In the event of a transportation incident or other problem involving DuPont cyanide that requires immediate help, call the DuPont Cyanide Hotline at our Memphis, Tennessee plant:

Call Collect, Day or Night

(901) 357-1546

NOTE: Do not use this number for non-emergencies. Contact the sales office listed on the back cover for routine commercial or technical information.

Calling the DuPont Cyanide Hotline is the fastest way DuPont can provide guidance to assist in handling an emergency. DuPont will evaluate whether a team of specialists should be sent to the scene.

In the United States and Canada, CHEMTREC can also be called at:

(800) 424-9300

In the rest of the world, call CHEMTREC at:

001-703-527-3887

CHEMTREC uses Language Services for non-English speakers.

The DuPont or CHEMTREC information specialist on duty will ask the name and location of the caller, the name of the shipper, the product, the shipping point and destination as well as what happened, nature of any injuries, weather conditions, proximity to populated areas, etc. If you call CHEMTREC, the information specialist will then contact the manufacturer (DuPont) for further assistance.

In Canada, CANUTEC can also be called in Ottawa, Ontario, at:

(613) 996-6666

Action at the Scene

The following is intended to provide guidance to first responders to a DuPont sodium cyanide transportation emergency incident.

1. For any transportation incident involving DuPont sodium cyanide, call DuPont for assistance as soon as possible, regardless of whether there is a spill.
2. Avoid overreaction that can occur because "cyanide" is involved. Remember, in most cases, you are dealing with a dry, solid, nonvolatile material that is normally easy to clean up, unless the cyanide has contacted acid or some other incompatible chemical or is spilled into a water system. If sodium cyanide solution is spilled, the amount of HCN gas evolved will probably be greater than if dry sodium cyanide was spilled, but because of the amount of caustic contained in sodium cyanide solution, the amount of HCN will probably still be well below lethal limits (see "Effects of Exposure to HCN Vapor" on page 8)—unless the HCN vapors are somehow contained or the solution is in contact with an acid. Gasoline, diesel, or other motor oils do not generally cause large amounts of cyanide gas.
   a. The need for evacuation is highly unlikely. Unless acid and cyanide are mixed, hydrogen cyanide gas formation is limited.
   b. While rain or any water contact with sodium cyanide can produce hydrogen cyanide gas, the amount of gas is small and would not require evacuation. While dangerous levels of gas can develop in enclosed spaces, wet sodium cyanide in the open can be shoveled up by standing upwind during cleanup.
3. Shovel the cyanide into drums, plastic bags, or any suitable container.
4. If sodium cyanide solution is spilled, contain the spill as soon and as much as possible. Keep sodium cyanide out of lakes, streams, or any other water. Block off sewer system, drainage, or any other water access. Even small concentrations of cyanide can be fatal to aquatic life. As soon as is practical, place the spilled material into a container suitable for movement to a proper disposal area.
5. As with all chemical spills, approach the scene from upwind to determine what chemicals are involved. With sodium cyanide spillage, check for battery acid spillage.
6. Keep people (nonresponders) away.
7. Halt or divert traffic to prevent spreading the cyanide.
8. If raining, cover any spilled sodium cyanide with a tarp, plastic, or anything available to minimize water contact and subsequent cyanide-water runoff. Divert any water streams around the cyanide.
9. To repeat, call the DuPont Cyanide Hotline at:

(901) 357-1546

Cyanide Destruction

The entire process in which by-products are generated should be reviewed for possible recycle of sodium cyanide, instead of disposal. If recycle is not feasible, ion exchange and reverse osmosis may be useful for concentrating cyanides, but destruction is usually easier and more economical.

The most effective and widely used chemical methods to destroy cyanide are oxidizing it to cyanate (CNO^-) with hypochlorite or hydrogen peroxide. Both methods are effective for oxidizing free and weak acid-dissociable cyanide.

For concentrated cyanide solutions, long-term high-temperature heating will destroy much of the cyanide with associated ammonia release.

Chlorination

CAUTION

Concentrated hypochlorite should not be mixed with concentrated cyanide solutions or solid cyanide, because highly toxic cyanogen chloride gas will be released. Very dilute solutions, in the correct pH range, should be used.

Chlorination of dilute sodium cyanide solutions can be accomplished by treatment with diluted solutions of sodium hypochlorite, calcium hypochlorite, or by generating hypochlorite from NaOH and Cl_2 gas. The choice of hypochlorite is an economic and safety decision. Solution concentrations of 1% sodium cyanide and 1% hypochlorite can be reacted if mixed slowly (over, say, 10 min) and with proper pH control.

Hypochlorite reacts with cyanide ions (CN^-) to produce highly toxic cyanogen chloride, which, at pH 10–11, hydrolyzes promptly to form cyanate ions (CNO^-). Because cyanogen chloride is a poisonous gas with little water solubility, the treatment process must be designed and operated to prevent cyanogen chloride fumes. Fumes are best controlled by limiting the cyanide concentration to a few thousand parts per million and controlling pH. Below pH 10, cyanogen chloride release increases; above pH 11, cyanide destruction slows, particularly above pH 11.5.

Further chlorination to destroy cyanate, sometimes referred to as "complete" chlorination, can be accomplished with additional chlorine. After reaction at pH 10.5 for 10 min or more, the pH must be reduced to 7.5–9, preferably 8–8.5, and maintained at that pH until the reaction is complete. Completion of both reactions typically requires at least 2 hr and can use eight or more parts of Cl_2 per part of CN^- (versus about three parts of Cl_2 for oxidation to CNO^-), while producing CO_2 and N_2 as reaction products. Chlorination is effective for cyanide destruction and can be automated for continuous systems. However, other waste stream components are often chlorinated, which increases chlorine consumption and may produce undesirable by-products in the effluent.

pH 10–11

Normally fastest reaction rate. Reduced HCN release and pH drop during treatment favor starting around pH 11. Higher pH will slow reaction, particularly above 11.5.

CAUTION

Adequate ventilation and HCN monitoring are important and more so as cyanide concentrations increase and pH decreases, particularly below pH 11.

pH Below 10

Causes slower reaction and release of HCN and/or cyanogen chloride gas (highly toxic, like HCN, and a powerful lachrymator, causing tearing of the eyes). Also, there is greatly increased concern about HCN release.

Acid pH

CAUTION

In addition to toxic gas release, acidic conditions can result in nitrogen trichloride formation that can separate as an insoluble oil-like material and explode violently, even in small amounts.

Hydrogen Peroxide Oxidation

CAUTION

Concentrated hydrogen peroxide should not be mixed with concentrated cyanide solutions or solid sodium cyanide, because highly toxic HCN or ammonia gas could be released. Also, high heat and oxygen gas release may cause foaming or eruption and splash workers. Dilution minimizes these problems.

Depending on the composition of the waste, additions of copper or formaldehyde may be required to destroy cyanide. The waste liquor is adjusted to pH 11 (10.5–11.5), formaldehyde or copper ions (typically with copper sulfate) added if needed, and hydrogen peroxide mixed with the solution. The solution must be agitated mechanically or with air. The reaction rate is dependent on temperature. Dilute wastes can be warmed to 38–54°C (100–130°F), but temperature elevation is usually less economical than adding 10–20% excess peroxide to shorten reaction time (which is normally about ½–1 hr at ambient temperature). Dilution and/or controlled addition rate may be needed when treating more concentrated wastes.

Chlorination is faster than peroxide oxidation and is frequently more adaptable to continuous destruction systems. Where speed is not critical, such as in batch tanks, hydrogen peroxide has several advantages including:

- Cyanogen chloride and chlorinated by-products are not produced.
- More concentrated cyanide wastes can be treated safely.
- The hazards of handling chlorine are avoided.
- Chlorine/chloride in water discharges are prohibited in some locations and can be avoided with peroxide.
- Sulfur compounds will react with hypochlorite, but not peroxide, and can increase hypochlorite costs substantially.
- Peroxide may destroy other objectionable organics.

By-products from peroxide treatment are cyanate, ammonia, and glycolic acid amide. Cyanate does not revert to cyanide in surface waters or sewage treatment systems, according to a U.S. Public Health Service study. Both the cyanate and glycolic acid amide are biodegradable. The cyanate can be readily hydrolyzed in acid solutions to ammonia.

Hydrolysis

Hydrolysis is sometimes a practical treatment for strong sodium cyanide solutions. Simply heating a 10% sodium cyanide solution for about 36 hr to 95–100°C (about 210°F) should reduce the cyanide content well below 1%, where chemical oxidation can be used more effectively. Provisions should be made to accommodate the ammonia that will be generated (see "Sodium Cyanide Reactions in Water").

Metal Complexes

Strongly bonded metal cyanides, especially iron cyanides (ferrocyanide and ferricyanide), are apt to be found in cyanide waste streams. These will not be detected by simple analytical procedures, such as titration with silver nitrate, which are normally used for measuring "free" or "weak acid-dissociable" cyanides. However, they will be included in the "total cyanide" analyses using acid distillation procedures. These complexes are not effectively destroyed by the commonly used waste treatment processes. If regulations require removal of these generally stable complexes of low toxicity, other treatment methods such as precipitation to produce a solid waste may be required.

Handling Spills

Sodium cyanide spills should be cleaned up promptly to minimize exposure of people and the environment. Shovel and sweep dry spilled material into a drum or suitable container. Keep dry spilled material dry. If solutions are spilled, immediately contain them to prevent contaminating nearby water. Contact DuPont for additional actions at a spill scene. If raining, covering the spill will reduce sodium cyanide dissolving and runoff. Decontamination of an area, after cleaning up as much cyanide as possible, can be accomplished with hypochlorite solution. A small amount of caustic (1 oz/5 gal hypochlorite solution) will help keep the pH in the 10–11 range.

References and Notes

1. Elial, E. L., and Freeman, J. P., "Organic Syntheses," Wiley, New York, Coll. Vol. 4, 58–62.
2. OSHA, 29 CFR 1910.1000, Air Contaminants.
3. Due to changing governmental regulations, such as those of the Department of Transportation, Department of Labor, U.S. Environmental Protection Agency, and the Food and Drug Administration, references to governmental requirements may be superseded. Consult and follow the current governmental regulations, such as Hazard Classification, Labeling, Worker Exposure Limitations, and Waste Disposal procedures, for up-to-date requirements for sodium cyanide.
4. "HYDROGEN CYANIDE and CYANIDE SALTS" published in 2001 by American Conference of Governmental Industrial Hygienists (ACGIH) 1330 Kemper Meadow Drive, Cincinnati, OH 45240; telephone (513) 742-2020. The ACGIH recommends a 4.7 ppm ceiling for HCN. Both OSHA and ACGIH advise avoiding skin contact.
5. "Occupational Exposure to Hydrogen Cyanide and Cyanide Salts," NIOSH Criteria Document, U.S. Department of Health, Education, and Welfare, 1976.
6. DOT, 49 CFR 712.101, Hazardous Material Table.

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B.2 Safety Data Sheets – Sodium Cyanide

SAFETY DATA SHEET

Sodium Cyanide Briquette

Draslovka

Version	Revision Date:	SDS Number:	Date of last issue: 06/29/2022
4.4	07/19/2022	1634229-00015	Date of first issue: 05/05/2017

SECTION 1. IDENTIFICATION

Product name	:	Sodium Cyanide Briquette
Other means of identification	:	No data available
SDS-Identcode	:	130000000101

Manufacturer or supplier's details

Company name of supplier	:	Covoro Mining Solutions Canada – A Draslovka Company
Address	:	Suite 1300 - 1969 Upper Water St McInnes Cooper Tower – Purdy's Wharf Halifax, NS B3J3RZ Canada
Telephone	:	(901) 357-1546
Emergency telephone	:	1-800-424-9300

Recommended use of the chemical and restrictions on use

Recommended use	:	Transported isolated intermediate used under strictly controlled conditions. Chemical intermediate Formulation Metal surface treatment products, including galvanic and electroplating products Degreasing agent Cleaning Hardener Plating agents and metal surface treating agents Non-metal-surface treatment products Inhibitor Extraction agents Recycling Processing aid, mining
Restrictions on use	:	Use in production of weapons or narcotics, Fishing aid, Pest control, Fertilizers, Disinfectants, Consumer uses: Private households (= general public = consumers), For professional users only.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with the Hazardous Products Regulations

Corrosive to Metals	:	Category 1
Acute toxicity (Oral)	:	Category 2
Acute toxicity (Inhalation)	:	Category 1

Acute toxicity (Dermal)	:	Category 1
Specific target organ toxicity - repeated exposure	:	Category 1 (Thyroid)

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements :
H290 May be corrosive to metals.
H300 + H310 + H330 Fatal if swallowed, in contact with skin or if inhaled.
H372 Causes damage to organs (Thyroid) through prolonged or repeated exposure.

Supplemental Hazard Statements : In contact with water releases gases which are fatal if inhaled.

Precautionary Statements :

Prevention:

P234 Keep only in original packaging.
P260 Do not breathe dust, fume, gas, mist, vapors or spray.
P262 Do not get in eyes, on skin, or on clothing.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear protective gloves and clothing.
P284 Wear respiratory protection.

Response:

P301 + P310 + P330 IF SWALLOWED: Immediately call a POISON CENTER. Rinse mouth.
P302 + P352 + P310 IF ON SKIN: Wash with plenty of water. Immediately call a POISON CENTER.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER.
P314 Get medical attention if you feel unwell.
P320 Specific treatment is urgent (see supplemental first aid instructions on this label).
P361 + P364 Take off immediately all contaminated clothing and wash it before reuse.
P390 Absorb spillage to prevent material damage.

Storage:

P405 Store locked up.

Disposal:

P501 Dispose of contents and container to an approved waste disposal plant.

Other hazards

Contact with acids liberates very toxic gas.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Substance name : Sodium cyanide

CAS-No. : 143-33-9

Common Name/Synonym : No data available

Components

Chemical name	Common Name/Synonym	CAS-No.	Concentration (% w/w)
Sodium cyanide	No data available	143-33-9	>= 80 - <= 100 *

* Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

General advice : Emergency pre-planning and training are needed before beginning to work with sodium and/or potassium cyanide since prompt treatment is essential in cases of cyanide poisoning.
Always have cyanide antidote on hand.
In the case of accident or if you feel unwell, seek medical advice immediately.
When symptoms persist or in all cases of doubt seek medical advice.

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

In case of skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
Get medical attention immediately.
Wash clothing before reuse.
Destroy contaminated shoes.

In case of eye contact : Flush eyes with water as a precaution.
Get medical attention if irritation develops and persists.

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

Most important symptoms and effects, both acute and delayed	:	Redness Rash Weakness Nausea Headache Breathing difficulties Palpitation Fatal if swallowed, in contact with skin or if inhaled. Causes damage to organs through prolonged or repeated exposure.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists (see section 8).
Notes to physician	:	If the victim is conscious and shows symptoms of exposure, administer oxygen. If the victim is unconscious but breathing, administer oxygen and antidote. If victim is not breathing, use resuscitator and administer the antidote simultaneously. Call a physician. Keep victim under supervision according the physician's advice. If victim has swallowed cyanide and is conscious: Rinse the mouth with water. Administer activated charcoal slurry.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Alcohol-resistant foam Dry chemical
Unsuitable extinguishing media	:	Carbon dioxide (CO2) Water
Specific hazards during fire fighting	:	Exposure to combustion products may be a hazard to health. Contact with water liberates toxic gas.
Hazardous combustion products	:	Nitrogen oxides (NOx) Hydrogen cyanide (hydrocyanic acid) Carbon oxides Metal oxides
Specific extinguishing methods	:	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.
Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Evacuate personnel to safe areas. Only trained personnel should re-enter the area. Follow safe handling advice (see section 7) and personal protective equipment recommendations (see section 8).
Environmental precautions	:	Avoid release to the environment. Prevent further leakage or spillage if safe to do so. Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Surround spill with absorbents and place a damp covering over the area to minimize entry of the material into the air. Add excess liquid to allow the material to enter into solution. Soak up with inert absorbent material. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	If sufficient ventilation is unavailable, use with local exhaust ventilation.
Advice on safe handling	:	Do not get on skin or clothing. Do not breathe dust, fume, gas, mist, vapors or spray. Do not swallow. Do not get in eyes. Wash skin thoroughly after handling. Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment Keep container tightly closed. Keep away from water. Protect from moisture. Keep away from metals. Store in original container or corrosive resistant and/or lined container. Do not eat, drink or smoke when using this product. Keep only in original packaging. Take care to prevent spills, waste and minimize release to the environment.
Conditions for safe storage	:	Keep in properly labeled containers.

Store in original container.
Store in a closed container.
Store locked up.
Keep tightly closed.
Keep in a dry place.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.

Materials to avoid : Do not store with the following product types:
Strong oxidizing agents
Self-reactive substances and mixtures
Organic peroxides
Flammable liquids
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Self-heating substances and mixtures
Substances and mixtures which in contact with water emit flammable gases
Explosives
Gases

Further information on storage stability : No decomposition if stored and applied as directed.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Sodium cyanide	143-33-9	(c)	5 mg/m³ (Cyanide)	CA AB OEL
		C	10 ppm 11 mg/m³ (Cyanide)	CA QC OEL
		C	5 mg/m³ (Cyanide)	CA BC OEL
		C	5 mg/m³ (Cyanide)	ACGIH

Occupational exposure limits of decomposition products

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Hydrogen cyanide	74-90-8	(c)	4.7 ppm 5.2 mg/m³ (Cyanide)	CA AB OEL
		C	4.7 ppm (Cyanide)	CA BC OEL
		C	10 ppm 11 mg/m³	CA QC OEL

			(Cyanide)	
		C	4.7 ppm (Cyanide)	ACGIH

Engineering measures : Processing may form hazardous compounds (see section 10).
Minimize workplace exposure concentrations.
If sufficient ventilation is unavailable, use with local exhaust ventilation.

Personal protective equipment

Respiratory protection : If adequate local exhaust ventilation is not available or exposure assessment demonstrates exposures outside the recommended guidelines, use respiratory protection.

Filter type : Combined particulates and inorganic gas/vapor type

Hand protection
Material : Impervious butyl rubber gloves

Remarks : Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Eye protection : Wear the following personal protective equipment:
Safety glasses
If splashes are likely to occur, wear:
Face-shield

Skin and body protection : Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure potential.
Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).

Hygiene measures : If exposure to chemical is likely during typical use, provide eye flushing systems and safety showers close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : solid

Color : white

Odor	:	odorless
Odor Threshold	:	No data available
pH	:	11.7 (as aqueous solution)
Melting point/freezing point	:	561.7 °C
Initial boiling point and boiling range	:	1,500 °C (1,013 hPa)
Flash point	:	Not applicable
Evaporation rate	:	Not applicable
Flammability (solid, gas)	:	Will not burn
Self-ignition	:	The substance or mixture is not classified as self heating.
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	1 hPa (800 °C)
Relative vapor density	:	Not applicable
Relative density	:	No data available
Bulk density	:	840 kg/m³
Solubility(ies)		
Water solubility	:	370 g/l (20 °C)
Partition coefficient: n-octanol/water	:	log Pow: 0.25 (20 °C)
Autoignition temperature	:	No data available
Decomposition temperature	:	The substance or mixture is not classified self-reactive.
Viscosity		
Viscosity, kinematic	:	Not applicable
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.

Metal corrosion rate	:	Corrosive to metals
Particle size	:	No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Contact with water liberates toxic gas.
Chemical stability	:	Stable if used as directed. Follow precautionary advice and avoid incompatible materials and conditions.
Possibility of hazardous reactions	:	Can react with strong oxidizing agents. Reacts with water. May be corrosive to metals. Hazardous decomposition products will be formed upon contact with water or humid air.
Conditions to avoid	:	Exposure to moisture.
Incompatible materials	:	Oxidizing agents Acids Water

Hazardous decomposition products

Contact with water or humid air	:	Hydrogen cyanide

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Skin contact
Ingestion
Eye contact

Acute toxicity

Fatal if swallowed, in contact with skin or if inhaled.

Product:

Acute oral toxicity	:	Acute toxicity estimate: 5.05 mg/kg Method: Calculation method
Acute inhalation toxicity	:	Acute toxicity estimate: 0.0051 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: Calculation method
Acute dermal toxicity	:	Acute toxicity estimate: 11.96 mg/kg Method: Calculation method

Components:

Sodium cyanide:

Acute oral toxicity	:	Acute toxicity estimate: 5 mg/kg Method: Expert judgment
Acute inhalation toxicity	:	Acute toxicity estimate: 0.005 mg/l Exposure time: 4 h Test atmosphere: dust/mist Method: Expert judgment Remarks: Based on data from similar materials
Acute dermal toxicity	:	LD50 (Rabbit, female): 11.83 mg/kg

Skin corrosion/irritation

Not classified based on available information.

Serious eye damage/eye irritation

Not classified based on available information.

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Germ cell mutagenicity

Not classified based on available information.

Components:

Sodium cyanide:

Genotoxicity in vitro	:	Test Type: Bacterial reverse mutation assay (AMES) Result: negative Test Type: In vitro mammalian cell gene mutation test Method: Directive 67/548/EEC, Annex V, B.17. Result: negative Remarks: Based on data from similar materials
Genotoxicity in vivo	:	Test Type: Mutagenicity (in vivo mammalian bone-marrow cytogenetic test, chromosomal analysis) Species: Rat Application Route: Ingestion Method: OPPTS 870.5385 Result: negative Remarks: Based on data from similar materials

Carcinogenicity

Not classified based on available information.

Components:

Sodium cyanide:

Species	:	Rat
Application Route	:	Ingestion

Exposure time	:	2 Years
	:	21.43 mg/kg body weight
Result	:	negative
Remarks	:	Based on data from similar materials

Reproductive toxicity

Not classified based on available information.

Components:

Sodium cyanide:

Effects on fertility	:	Test Type: Reproduction/Developmental toxicity screening test Species: Rat Application Route: Inhalation Result: negative Remarks: Based on data from similar materials
Effects on fetal development	:	Test Type: Fertility/early embryonic development Species: Rat Application Route: Ingestion Result: negative Remarks: Based on data from similar materials

STOT-single exposure

Not classified based on available information.

STOT-repeated exposure

Causes damage to organs (Thyroid) through prolonged or repeated exposure.

Components:

Sodium cyanide:

Routes of exposure	:	Ingestion
Target Organs	:	Thyroid
Assessment	:	Causes damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

Components:

Sodium cyanide:

Species	:	Rat
NOAEL	:	21.43 mg/kg
Application Route	:	Ingestion
Exposure time	:	90 Days

Aspiration toxicity

Not classified based on available information.

Experience with human exposure

Components:

Sodium cyanide:

Ingestion : Target Organs: Thyroid

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Sodium cyanide:

Toxicity to fish	:	LC50 (Gasterosteus aculeatus (threespine stickleback)): 44.33 µg/l Exposure time: 96 h
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Chironomus riparius (harlequin fly)): 12.4 µg/l Exposure time: 48 h
Toxicity to algae/aquatic plants	:	EC50 (Pseudokirchneriella subcapitata (green algae)): 116 µg/l Exposure time: 72 h Method: ISO 8692 Remarks: Based on data from similar materials NOEC (Chlamydomonas reinhardtii (green algae)): 100 µg/l Exposure time: 10 d
Toxicity to fish (Chronic toxicity)	:	NOEC (Salmo salar (Atlantic salmon)): 9.3 µg/l Exposure time: 12 d Remarks: Based on data from similar materials NOEC (Pimephales promelas (fathead minnow)): 5.6 µg/l Remarks: Based on data from similar materials
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	EC10 (Ceriodaphnia dubia (water flea)): 42 µg/l Exposure time: 7 d Remarks: Based on data from similar materials
Toxicity to microorganisms	:	EC50: 2.3 mg/l Exposure time: 30 min Remarks: Based on data from similar materials

Persistence and degradability

Components:

Sodium cyanide:

Biodegradability	:	Result: Inherently biodegradable. Biodegradation: 99 % Exposure time: 42 d

Remarks: Based on data from similar materials

Bioaccumulative potential

Components:

Sodium cyanide:

Partition coefficient: n-octanol/water : log Pow: -0.25

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
If not otherwise specified: Dispose of as unused product.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	UN 1689
Proper shipping name	:	SODIUM CYANIDE, SOLID
Class	:	6.1
Packing group	:	I
Labels	:	6.1

IATA-DGR

UN/ID No.	:	UN 1689
Proper shipping name	:	Sodium cyanide, solid
Class	:	6.1
Packing group	:	I
Labels	:	Toxic
Packing instruction (cargo aircraft)	:	673
Packing instruction (passenger aircraft)	:	666

IMDG-Code

UN number	:	UN 1689
Proper shipping name	:	SODIUM CYANIDE, SOLID (Sodium cyanide)
Class	:	6.1
Packing group	:	I

Labels	:	6.1
EmS Code	:	F-A, S-A
Marine pollutant	:	yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

TDG

UN number	:	UN 1689
Proper shipping name	:	SODIUM CYANIDE, SOLID
Class	:	6.1
Packing group	:	I
Labels	:	6.1
ERG Code	:	157
Marine pollutant	:	yes(Sodium cyanide)

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION

SECTION 16. OTHER INFORMATION

Before use read Draslovka safety information.
For further information contact the local Draslovka office or nominated distributors.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
CA AB OEL	:	Canada. Alberta, Occupational Health and Safety Code (table 2: OEL)
CA BC OEL	:	Canada. British Columbia OEL
CA QC OEL	:	Québec. Regulation respecting occupational health and safety, Schedule 1, Part 1: Permissible exposure values for airborne contaminants
ACGIH / C	:	Ceiling limit
CA AB OEL / (c)	:	ceiling occupational exposure limit
CA BC OEL / C	:	ceiling limit
CA QC OEL / C	:	Ceiling

AIIC - Australian Inventory of Industrial Chemicals; ANTT - National Agency for Transport by Land of Brazil; ASTM - American Society for the Testing of Materials; bw - Body weight; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; IARC - International Agency for Research on Cancer; IATA

- International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; n.o.s. - Not Otherwise Specified; Nch - Chilean Norm; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NOM - Official Mexican Norm; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; SADT - Self-Accelerating Decomposition Temperature; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TDG - Transportation of Dangerous Goods; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative; WHMIS - Workplace Hazardous Materials Information System

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	07/19/2022
Date format	:	mm/dd/yyyy

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

CA / Z8

Appendix C

Hazardous Material Storage Area Inspection Report

Environmental Inspection Report for the Hazardous Material Storage Area

Date: **Inspected By:**

Time: **Weekly Inspection**

In Compliance with	Subject	Conform	Non-conform	N/A	Comments
NWB Part B Item 15	Sign posted to inform of a waste disposal facility				
NWB Part D Item 29 MBK SCP NIRB Condition 26	Are there any visual spills?				
NWB Part F Item 19	All Hazardous Waste disposal is located 30m from the ordinary high water mark.				
NWB Part H Item 3	Resources in place to prevent any chemicals, petroleum products, or unauthorized Wastes from entering a water body.				
NWB Part H Item 4	Is secondary containment for chemical storage provided.				
NWB Part I Item 9	Monitoring signs are posted in English, French, and Inuktitut.				
MBK SCP	Spill Kits Present				
NWB Part F Item 14	All Hazardous waste generated is sent off site to an approved disposal facility				
NWB Part F Item 15	All Hazardous waste sent off site is manifested				
NWB Part F Item 15	Manifests are sent to Government of Nunavut				
NIRB Condition 26	Ensure that spills, if any, are cleaned up immediately and that the site is kept clean of				

	debris, including wind-blown debris.				
NIRB Condition 25	Management and control waste in a manner that reduces or eliminates the attraction to carnivores and/or raptors.				
NIRB Condition 27	Ensure the hazardous material area is contained using environmentally protective methods based on practical best management practices				
	Are storage containers clearly labelled to identify Hazmat substance?				
	Are storage containers in good condition? Is there any visible damage or leaks? Can the doors be sealed shut?				
	Is HAZMAT in containers properly segregated?				
	Is HAZMAT arrangement to prevent from falling or dislodging?				
	Where necessary – Is HAZMAT placed on pallets i.e. Drums?				
	Where necessary – Are containers with product stored in an upright position?				
	Where necessary – Are Quatrex bags closed properly?				
	Do you see any potential environmental hazards posed by these HAZMAT containers/materials?				
NIRB-No.008.6.1 (Condition 25)	Monitoring for the potential introduction of invasive vegetation species for the terrestrial environment				
BMP	Are there any additional environmental hazards/potential				

	impacts that require attention?				
MINE ACT	Are there any Health and Safety issues that should be addressed to prevent injury to workers?				
Misc.	In the punctured spray can c-can, do we have non-punctured spray can?				
	In the grease c-can, do we have open top drums without top, or screw?				
	In the empty pails c-can, do we have metal pails that should be in the metal recycling c-can?				

Comments/Recommendations :

Environmental Personnel Name:

Actions Corrected:
_____
_____
_____
_____

Site Service Supervisor Name: _____

Signature: _____

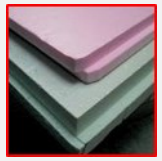
Appendix D

Procedure Poster Hazardous Material Storage

MEADOWBANK WASTE MANAGEMENT

GENERAL WASTE

Wood, Cardboard, Plastic, Insulation, Roofing, Rubber, Clothing


LANDFILL

ORGANIC WASTE

Food or anything that touches food


COMPOSTER

INDUSTRIAL WASTE/HAZARDOUS MATERIALS

Rags with Oil or Grease, Chemicals, Neon Lights, Empty Paint Cans, Solvents, Hoses, Drums or Pails with Grease/Oil Residue, Glycol, Contaminated/Oily Solids, Batteries



INDUSTRIAL WASTE/HAZMAT STORAGE AREA

RECYCLED MATERIALS

Waste Oil, Punctured Aerosol Cans, Crushed Oil Filters, Tire Casings, Wire, Empty Drums, Steel or Copper Pipe, Empty Plastic Oil Pails, Pipe, Soda Cans, Electronics

WASTE OIL FURNACES

INDUSTRIAL WASTE/HAZMAT STORAGE AREA

SODA CAN & ELECTRONICS SEA-CAN