AGNICO EAGLE

MELIADINE GOLD PROJECT

SD 2-13
Hazardous Materials Management Plan

APRIL 2014
VERSION 3

TABLE OF CONTENTS

TABLES AND FIGURES

DOCUMENT CONTROL

Version	Date	Section	Page	Revision	Author
1	November 2012			First draft of the Hazardous Materials Management Plan	Mélanie Roy, Env. Coord., AEM
2	March 2013	3.1 3.2 3.2 3.4 9	7 7 7 8 31	Env. and health hazards control Shipping containers Air transportation (none to rare) Details; hazardous waste mgmt. at Rankin Inlet and upon closure Purchasing controls	John Witteman, Env. Consultant, AEM
3	April 2014	1.2 3.2 3.3 3.4 3.5 5.3 6.6	2 7 8 8 9 13 20	Reference to TDGR Reference to Nunavut's Environmental Guideline for Contaminated Site Remediation	John Witteman, Env. Consultant, AEM Stéphane Robert, Env. Manager, AEM

EXECUTIVE SUMMARY

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 the Risk Assessment and Emergency Response Plan (SD 2-15) and Spill Contingency Plan (SD 2-16), this Hazardous Materials Management Plan (SD 2-13) provides instruction on the prevention, detection, containment, response, and mitigation of accidents that could result from handling hazardous materials. This Plan also covers the guidelines related to the Fuel Management Plan.

The Meliadine Gold Project will require the use of the following types of classified hazardous materials:

- Petroleum Products and Lubricants – diesel fuel, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- Process Plant Consumables – chemicals for mineral extraction;
- Water Treatment Consumable - chemicals;
- Explosives – emulsion, caps, and explosives used for blasting in the mine;
- Laboratory Wastes – various by-products classified as hazardous waste and chemicals used in the assay laboratory; and
- Other – batteries, paints, compressed gases, materials used and generated at the Health care centre, etc.

Management of these substances will be handled by the Environmental Management System.

Agnico Eagle Mines Limited (AEM) is committed to the safe and appropriate storage of fuels, hazardous materials and hazardous wastes. This Plan outlines the guidelines on product supply, transportation, storage, handling, recycling, and waste disposal. AEM is committed to ensuring proper life cycle management of all products used at the Meliadine project, including hazardous materials.

All hazardous materials will be delivered to site by commercial carriers in accordance with the requirements of the *Canadian Transportation of Dangerous Goods Act* (TDGA). A contract expediting company will arrange all deliveries from the Rankin Inlet off-loading/storage area to the Meliadine site. All required permits, licences, and certificates of compliance will be the responsibility of the carriers. All shipments will be properly identified and labelled. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers. Each transportation company will be required to develop a spill prevention, control, and countermeasures plan to address the materials they are transporting.

The General Mine Manager will have ultimate responsibility for supervising the receipt, inspection, and recording of all material inventories at site. The Departments Managers will reconcile total amounts received against amounts ordered. The quantity of hazardous materials received, used, and in possession of personnel will be recorded by appropriate Departments.

Once hazardous materials are received at the workplace, additional regulations will be applied. The federal *Workplace Hazardous Materials Information System* (WHMIS) calls for the proper labelling of products, the availability of product information in the form of Material Safety Data Sheets (MSDS), and employee training on how to identify and handle hazardous products. AEM will establish procedures for obtaining MSDS with new product deliveries, maintaining MSDS current (i.e. no older than 3 years), and maintaining MSDS readily accessible to all employees. A chemical tracking system will be established.

All hazardous materials will be stored in secured areas to prevent access by unauthorized personnel or any tampering. In support of pollution prevention, AEM will establish procedures for the regular inspection of storage containers and facilities. If deficient conditions are identified, appropriate corrective actions will be taken and documented.

On becoming wastes, materials will be stored and/or disposed of in accordance with specific government regulations and guidelines. The Department of Environment, Environment Protection Service (EPS), monitors 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 will accompany movements of hazardous wastes for the Meliadine Project.

Hazardous wastes at the dock site will be management according to the appropriate regulation. More information can be found in the Shipping Management Plan (SD 8-1) regarded waste generated on board. See the Mine Closure and Reclamation Plan (SD 2-17) for more information regarding unused hazardous materials upon the completion of Project activities.

Due to transportation restrictions, a full year's supply of diesel fuel will have to be transported and stored to support the Project's operation. During the summer months, diesel will be shipped from eastern ports to Rankin Inlet, where it will be transferred into storage tanks. Tanks will be single-walled, constructed of welded steel and tanks and storage locations 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 will include a sloped lined pad to prevent contamination of the receiving environment. A continuous liner sheet will be installed under the tanks and the internal sides of the berm. The containment area will be sized to hold 110% of the volume of the largest tank. From the Rankin Inlet storage tanks, fuel will be transported daily to the Meliadine site via the All-weather Access Road (AWAR).

General procedures will ensure that the handling of fuel during bulk transfer meets the applicable legislation that includes the TDGA. It will include verifying 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/barge 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 proceeds per the established procedures of the contract supplier.

An environmental performance monitoring plan will be implemented for fuel storage at Rankin Inlet and Meliadine site. It will imply visual and operational inspections, routine surface water sampling to control and monitor the quality of the contact water, and event monitoring (in the case of a spill emergency or occurrence).

Any accident or spill will be reported immediately to the Supervisor or Environment Department. Emergency response procedures for spilled materials are provided in the Spill Contingency Plan (SD 2-16; see also the Risk Management and Emergency Response Plan SD 2-15). 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. All staff and contractors at the Meliadine Gold Project will receive the appropriate training to deal with hazardous materials.

ACRONYMS

AEM	Agnico Eagle Mines Limited
AWAR	All-weather Access Road
CCME	Canadian Council of Ministers of the Environment
EPS	Environment Protection Service (Department of Environment)
ERP	Emergency Response Plan
HCN	Hydrogen Cyanide
HMMP	Hazardous Materials Management Plan
IBC	Intermediate Bulk Container
ICMC	International Cyanide Management Code
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NU	Nunavut
OHSC	Occupational Health and Safety Committee
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
SCP	Spill Contingency Plan
SD	Support Document
TDG	Transportation of Dangerous Goods
TDGA	Canadian Transportation of Dangerous Goods Act
WHMIS	Workplace Hazardous Materials Information System

SECTION 1 • INTRODUCTION

1.1 Purpose and 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 may be used at the Meliadine Gold Project. A hazardous material is one that, as a result of its physical, chemical, or other properties, poses a hazard to human health or the environment when it is improperly handled, used, stored, disposed of, or otherwise managed. It can take many form, for example, hydrocarbons contaminated soils, snow and water, fuel, lubricants, process reagents, chemical reagents, solvents and paint, medical wastes, batteries, etc. In combination with AEM's (Agnico Eagle Mines Limited) Meliadine Risk Management and Emergency Response Plan (ERP; SD 2-15) and Spill Contingency Plan (SCP; SD 2-16), 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 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 materials consumption and incidents in order to anticipate and avoid impacts on personal health and the environment.

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

AEM 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 the Sustainable Development Policy at the Meliadine Project, all employees will be expected to comply with all applicable precautions and handling procedures with regard to hazardous materials. Employees will also be expected to report any concerns to their supervisors, the Occupational Health and Safety Committee (OHSC), the Environment Committee or senior site management. All staff will be 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 will be kept on file at the Project site. AEM will regularly update the HMMP with respect to applicable legislation, and ensure that current legislation documents will be available at the Project site.

Management and safety department will provide an overview of the applicable regulations to all employees as part of their initiation and ongoing training.

The *Transportation of Dangerous Goods Act* (TDGA) established the classes of dangerous goods as per the schedule in the Act. This classifies hazardous materials into nine 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

Class 9 – Miscellaneous products or substances

As well, the *Transportation of Dangerous Goods Regulations* applies and AEM will comply with all applicable requirements.

SECTION 2 • OVERVIEW OF HAZARDOUS MATERIALS

2.1 Hazardous Materials and Fuel Storage Locations

Comprehensive lists of all hazardous materials and the estimated quantities that could be stored for the Meliadine Project are presented in the following sections. Figure 2-1 identifies fuel storage location at Itivia in Rankin Inlet. Figure 2-2 identifies storage areas at the Meliadine site.

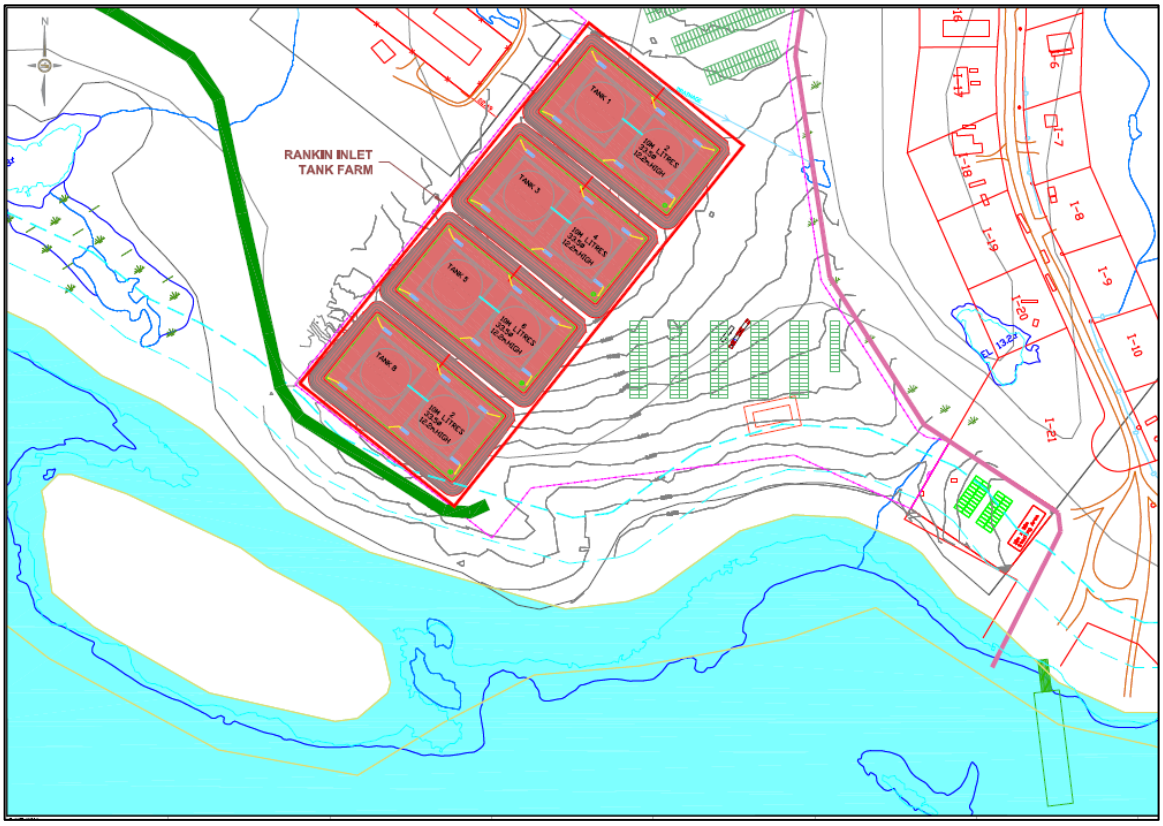

Figure 2-1 Fuel Storage Location at Itivia (Rankin Inlet)

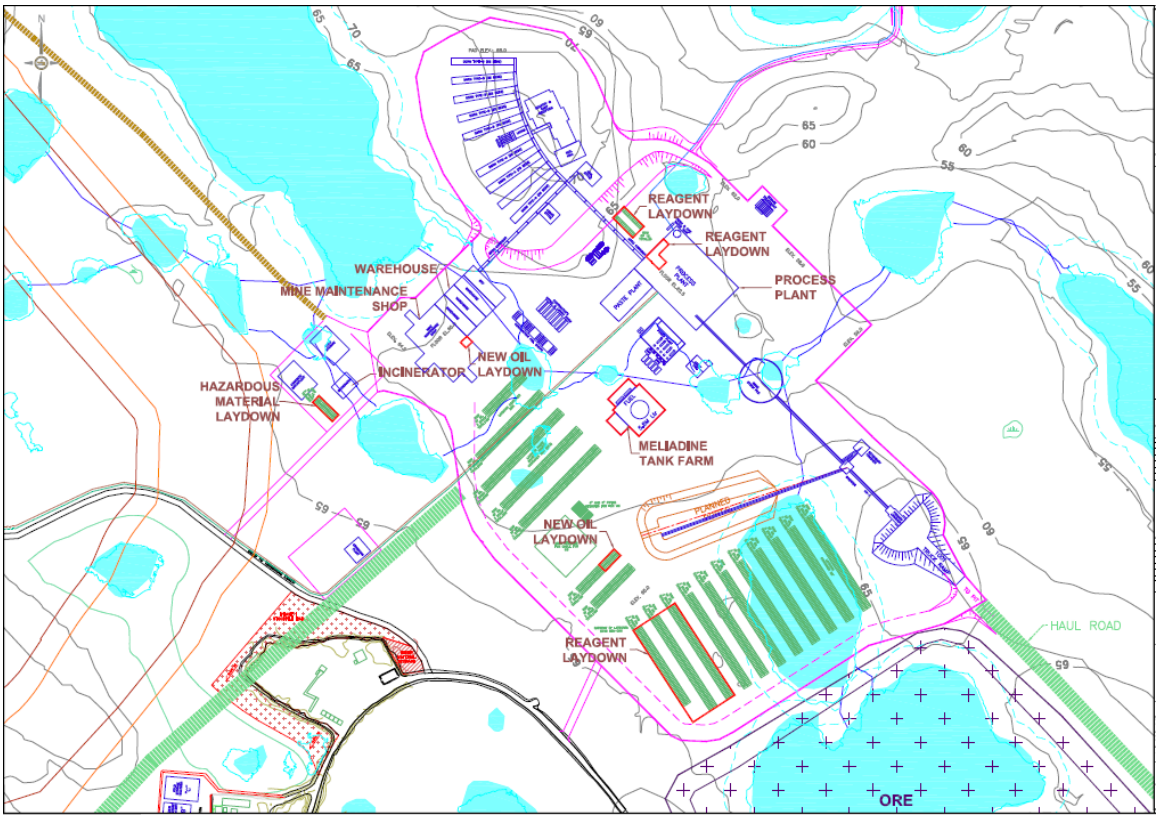

Figure 2-2 Fuel/Chemicals Storage at Meliadine Site

Petroleum products, explosives, sodium cyanide and miscellaneous hazardous materials will be stored in facilities that contain no open drains and in concrete bermed and lined areas, or within sea cans. Storage tanks on site will be regularly inspected and maintained.

The permanent storage facilities will be clearly identified as storage facilities for hazardous materials with proper labelling. These will be ventilated in order to prevent the build-up of toxic fumes or dust, which could harm both the personnel present and the environment. The facilities will be secured and only authorized personnel will have access to the areas.

2.2 Types of Hazardous Materials

The Meliadine Gold Project will require the use of the following types of classified hazardous materials:

- *Petroleum Products and Lubricants* – diesel fuel, oils, greases, anti-freeze, and solvents used for equipment operation and maintenance;
- *Process Plant Consumables* – chemicals for mineral extraction;

- *Water Treatment Consumable* - chemicals;
- *Explosives* – emulsion, caps, and explosives used for blasting; and
- *Laboratory Consumable and Wastes* – various by-products classified as hazardous waste and chemicals used in the assay laboratory.

Sections 5 to 7 contain general information and safe handling procedures regarding petroleum products and chemicals for process plant and water treatment. Details concerning explosives are available in the Explosives Management Plan (SD 2-14). Laboratory wastes will be very limited in quantity and will be handled only by specialist lab technicians. These wastes will be pumped to the grinding circuit in the process plant for recycle and eventually become part of the tailings disposal stream. As such, they will be not addressed separately in this document.

2.3 General Hazardous Materials Storage Guidelines

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

2.3.1 General Guidelines for Storage Drums/Containers

Hazardous materials and wastes shall be stored in super sacs, drums or 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 or 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 MSDS (Material Safety Data Sheet) available;
- 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 will be followed:

- Design of storage areas will be in compliance with the *National Fire Code*, 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"* will be followed. 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 will have controlled access. Only authorized and trained personnel will have access to storage areas;
- Storage areas will be adequately signed indicating that hazardous materials/wastes are stored therein;
- Storage locations will be clearly defined and marked to prevent damage of storage drums and containers in the event they are covered by snow.
- Incompatible materials will be segregated by chemical compatibility within the storage area to prevent contact of incompatible materials in the event of a release;
- Storage areas will be located at least 31 metres from surface water;
- Storage areas will be readily accessible for firefighting and other emergency procedures;
- Storage areas will be adequately ventilated to prevent the build-up of noxious or toxic vapours;
- Secondary containment will be installed to allow for the containment of at least 110 % of the largest container or tank volume within the contained area;
- Storage areas will be constructed, or provided with barriers, to protect containers from physical damage; and
- Adequate spill and emergency response equipment will be installed at each storage area (i.e. spill control, fire protection, etc.). A list of spill control equipment is provided in the Spill Contingency Plan (SD 2-16).

SECTION 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 a material need is identified to the time the product is fully consumed or disposed of as waste. Life cycle management is important to managing and minimizing the potential environmental and health hazards posed by hazardous materials. It covers product supply, transportation, storage, handling, recycling, and waste disposal. AEM is committed to ensuring proper life cycle management of all products that will be used at the Meliadine Project, including hazardous materials. AEM and its contractors will deal only with reputable, certified suppliers, transporters, and expediters.

3.2 Delivery

All hazardous materials will be delivered to site by commercial carriers in accordance with the requirements of the Canadian *Transportation of Dangerous Goods Regulations, Part 3* and will be properly documented. Air transportation will not be used for the transfer of hazardous materials with the exception of rare emergency situations, as required. Carriers will be licensed and inspected as required by the Department of Transportation. All required permits, licences, and certificates of compliance will be the responsibility of the carrier.

Purchasing controls will ensure that no excess hazardous materials are purchased beyond that requested by the Project for the coming year. The hazardous materials will be shipped in approved containers housed in a sea can. All shipments will be properly identified and labelled. Shipping papers must be accessible and include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

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

Appropriate measures will be in place to minimize impacts to surface water, groundwater and soils from potential vehicle accidents when transporting hazardous materials to the site. Details of spill responses are presented in the SCP (SD 2-16). The following general precautions will be taken:

- A maximum speed on the All-weather Access Road (AWAR) for loaded and empty vehicles will be established based on the road design; this speed limit should be 50 km/h;
- All trucks will carry a spill kit;
- Trucks will be equipped with a reliable radio and/or satellite phone; and

- AEM commits to being prepared to respond to spills resulting from vehicle accidents in a timely and efficient manner.

3.3 On-Site Handling

Once hazardous materials will be received at the workplace, additional regulations will be applied. The federal Workplace Hazardous Materials Information System (WHMIS) calls for the proper labelling of products, the availability of product information in the form of MSDS, and employee education on how to identify and handle hazardous products. AEM will establish procedures for obtaining MSDS with new product deliveries, maintaining MSDS current (i.e. no older than three (3) years), and maintaining a system of hardcopy or electronic MSDS that is readily accessible by all employees. A chemical tracking system will be established.

All hazardous materials will be stored in secured areas to prevent access by unauthorized personnel or any tampering. All tanks used for the storage of diesel fuel will be installed in secondary containment areas sized to hold at least 110 % of the volume of the largest tank. Tanks and vessels in the process plant will be 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.

In support of pollution prevention, AEM will establish procedures for the regular inspection of storage containers and facilities. If deficient conditions are identified, appropriate corrective actions will be 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 SCP (SD 2-16; see also the ERP SD 2-15). 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.

In the case of accidental release and imminent accidental release, AEM will also comply with the *Transportation of Dangerous Goods Regulations*, *Part 8* reporting requirements.

3.4 Waste Management

On becoming wastes, materials will be stored and/or disposed of in accordance with specific government regulations[1] and guidelines. This includes hazardous wastes that may be generated at the Rankin Inlet fuel storage, port facility and laydown area. The management of shipping wastes generated on board is discussed in SD 8-1. AEM will store most waste materials at the mine site in secure facilities until they can be transported to other provincial jurisdictions for recycling or

[1] The transportation of containers previously containing dangerous goods may be subject to the TDGR.

disposal. Likewise, any unused hazardous materials upon completion of Project activities will be inventoried and transported to a licensed waste disposal facility to be recycled or disposed. See the Mine Closure and Reclamation Plan (SD 2-17) for more information regarding unused hazardous materials upon the completion of Project activities.

The Department of Environment, Environment Protection Service (EPS) monitors 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 will accompany movements of hazardous wastes for the Meliadine Project. AEM 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 (2) years after the hazardous waste is received by the authorized waste disposal facility.

Process plant tailings will pass through a treatment plant for cyanide destruction using the standard Inco SO_2/air process before being disposed of in the Tailings Storage Facility (TSF). The cyanide WAD content of the tailings material will be reduce as specified in the International Cyanide Management Code (ICMC). AEM will integrate practices to respect the ICMC. The current regulatory requirement for cyanide content in liquids released to the environment is 1 mg/L for a single grab sample as specify in the MMER regulation, or no greater than a 0.5 mg/L average for the grab samples in any month.

3.5 Empty Product Containers

Many empty chemical containers are not safe to dispose of directly and require handling precautions identical to those for full containers and may be subject to TDGR. Chemical users must be familiar with safe waste handling and storage procedures supplied by manufacturers in MSDS. When prescribed, the containers will be backhauled to the Rankin Inlet Itivia area for disposal at an approved facility. These containers will be stored and hauled south via sealift.

SECTION 4 • SODIUM CYANIDE

The Meliadine Gold Project operation will use sodium cyanide. Due to transportation restrictions, about a full year's supply of sodium cyanide will be transported and stored on site. This product will be transported, stored, handled, transferred and used in compliance with appropriate legislation and applying best management practices as the ICMC.

4.1 Physical Properties

Cyanide is one of only a few chemical reagents that 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, 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.

4.2 Cyanide Production

Cyanide production and handling is highly regulated, and its risk management is well documented. Both the manufacturer and AEM employ stringent risk management systems to prevent injury or damage from the use of cyanide.

4.3 Cyanide Transport

Sodium cyanide for the Meliadine Project will be shipped in briquette form, and packaged in water-resistant super sac and 4 mm bags inside an Intermediate Bulk Container (IBC). The IBC will hold 1,000 kg of cyanide, and will have the following approximate dimensions: 1.1 m x 1.1 m x 1.1 m. For shipment, there are normally 20 IBCs in a container (sea can). 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.

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 will be accompanied by MSDS 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 packages, and establish and maintain systems for loading and unloading cyanide products. Product handling and transportation will be in accordance with protocols set by the industries and in compliance with national and international regulations.

For the Meliadine Project, the IBCs will be properly stacked in sea cans and transported by ship from eastern ports to Rankin Inlet, NU. At Rankin Inlet, the containers will be transferred from barge to truck for transport to the Meliadine site. At no point during transport will the sea container or IBCs be opened. From the point of cyanide packaging and onwards, the bags will only be opened on site, when use of the cyanide is required.

4.4 On-Site Storage and Handling

The cyanide will be stored on site in a dark, cool, dry, location. It will be stored within seal sea cans until cyanide is needed for ore process. The cyanide storage area will be located close to the process plant. Only authorized personnel will have access to the cyanide storage area.

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 will be provided by the manufacturer as part of packaging) using a forklift. An overhead crane will then be used to lower the bag onto a specially designed knife slitter that will cut the bag. The contents of the bag will then drop into a mixing tank. At no time the cyanide will have to be physically handled by Meliadine personnel.

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

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

4.5 Spills

In the event a spill occurs, the cyanide will be promptly cleaned up to minimize 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, then 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 Spill Contingency Plan (SD 2-16) and Risk Management and Emergency Response Plan (ERP; SD 2-15).

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.

4.6 International Cyanide Management Code

AEM is a signatory to the International Cyanide Management Code (ICMC) for the manufacture, transport and use of cyanide in the production of gold. The ICMC is administered by a non-profit

institute consisting of participants from the gold mining industry, governments, non-governmental organizations, labour, cyanide producers, and other interested parties.

The ICMC 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 ICMC, 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.

SECTION 5 • PETROLEUM PRODUCTS

5.1 Product Description

The operation will use fuel and lubricants (petroleum products) presented at Table 5-1. These products will be transported, stored, handled and transferred and used in compliance with the appropriate legislation.

Table 5-1 Fuel Products, Hazard Classes and Potential Impacts

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

5.2 Fuel Storage in Rankin Inlet and at Meliadine Mine Site

The storage tank at the Meliadine site will have a capacity of 5.6 million litres and will be refuelled via tanker trucks from the Rankin Inlet tank farm. The Rankin Inlet tank farm will consists of 8x10 million liter tanks, for a total capacity of up to 80,000,000 L of diesel. The tanks will be single-walled, constructed of welded steel and tanks and storage locations 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 will include a sloped lined pad to prevent contamination of the receiving environment. A continuous 60 mm high-density, polyethylene liner sheet will be installed under the tanks and the internal sides of the berm. The containment area will be sized to hold 110 % of the volume of the largest tank.

5.3 Fuel Management Plan

The transportation of fuel from Itivia to the mine site and around the mine site will be subject to the TDGR, Part 5.

5.3.1 Storage, Delivery to Site and Safe Handling

With the exception of diesel fuel, most petroleum fuel and lubricant products will be delivered to site and stored in the original packing container from the manufacturer. These types of containers include a variety of sealed drums, pails, 1-ton super sac, bulk cubs, cans, and tubes.

Due to transportation restrictions, a full year's supply of fuel and lubricants will be transported and stored on site. During the summer months, diesel will be shipped from eastern ports to Rankin Inlet, where it will be transferred into storage tanks. From the Rankin Inlet storage tanks, fuel will be transported daily to the Meliadine site via the All-weather Access Road (AWAR). Table 5-2 provides the varieties and volumes of petroleum products that will be stored on-site and the storage locations.

Table 5-2 Fuel Products – Storage Location

Product	Storage Location	Container
Diesel	Rankin Inlet	Bulk total of 80 ML in bermed area
	Mine site	Bulk of 5.6 ML in bermed area
	Powerhouse	3 x 25,000 L tank
	Mechanical shop	1,000 L tank
	Emulsion plant	25,000 L tank
Hydraulic fluid	Mechanical shop	Cubes or barrels
	Powerhouse	Cubes or barrels
	Process plant	Cubes or barrels
Ethylene glycol	Mechanical shop	Cubes

Safe handling procedures and personal protective equipment (PPE) regarding fuel products are presented in Table 5-3 and Table 5-4.

Table 5-3 Fuel Products – Safe Handling Procedures

Product	Handling Procedures
Diesel	Avoid contact with eyes, skin, or 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.
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; may be hazardous.

Table 5-4 Fuel Products – Personal Protective Equipment (PPE)

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
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

5.3.2 Fuel Truck Transfer Procedures

A contract supplier will fill the storage tanks in the Rankin Inlet tank farm. General procedures will ensure that the handling of fuel will meet the applicable legislation that includes the *Transportation of Dangerous Goods Act*. The general procedures to be followed are listed below. Similar procedures would be followed for fuelling remote station tanks.

Before fuel transfer, verify that:

- All fuel transfer hoses 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/barge 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 transfer tank, verify that the shutoff is operating correctly each time it is used; and
- Fuel transfer proceeds per the established procedures of the contract supplier.

Any accident or spill must be reported immediately to the Supervisor or Environment Department. Notification and response procedures are detailed in the Spill Contingency Plan (SD 2-16).

5.3.3 Fuel Tank Performance Monitoring

The following section outlines the monitoring plan to evaluate the performance of the bulk fuel storage facilities capacity to protect the nearby environment. The environmental performance monitoring plan is a tiered approach with an emphasis on visual and operational inspections, routine surface water sampling to control and monitor the quality of the contact water, and event monitoring (in the case of a spill emergency or occurrence). This section of the document will assist

the Environment Department in the identification and management of the environmental performance of the fuel storage.

Visual and Operational Inspections

Visual and operational inspections are a central component of this monitoring. Visual inspections of the secondary containment structure are important because if the integrity of the berm walls or liner is compromised, this presents the greatest potential for leaks or seepage.

Visual inspections will be conducted by operations staff during manual or electronic dip for inventory reconciliation once per week. Staff will inspect the facilities for: tank and piping condition, secondary containment berm structure and integrity, indicators of liner damage, precipitation/run-off accumulation, evidence of tampering or misuse, any structural abnormalities, and visible sheens on contact water pools and crush material inside the secondary containment. Environmental staff will follow-up with operations staff and conduct periodic visual inspections during routine-mine environmental conformity inspections. As licensed, a weekly written log will be completed and be available upon request.

Routine Contact Water Monitoring

Due to snow accumulation, melting and precipitation, contact water will unavoidably collect inside the secondary containment berm. As licensed, contact water from inside the secondary containment area will be routinely sampled prior to its release into the terrestrial environment.

During visual inspections, the quantity of contact water collected inside the secondary containment berm will be evaluated. If there is a visible sheen on the contact water or if water withdrawal is deemed necessary, water samples will be collected and analyzed to meet discharge criteria prior to withdrawal.

Event Monitoring

In the event of a spill occurrence at a bulk fuel storage tank, the spill contingency plan will be followed (Spill Contingency Plan SD 2-16). As a follow-up to the spill response, if deemed necessary, the environmental staff will conduct an environmental assessment to determine the extent of impacts of the spill occurrence on the nearby environment. This may include the identification of the potential environmental pathways of concern that may result in impacts to surface water, soil or groundwater.

5.4 Contaminated Material

Contaminated material, as for example spill pads, resulting from the storage and handling of fuels and lubricants will be salvaged at the time such impacts are identified, put into appropriate container and labelled for temporary storage. Depending on the nature of the contamination, material will be either: treated on-site (biopile), disposed of on-site if possible, or eventually shipped off-site to an approved disposal facility.

5.5 Used Petroleum Products

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

AEM intends to apply for a permit to incinerate used oil in the camp incinerator as per Schedule B of the *Used Oil and Waste Fuel Management Regulations.* All used oil products will be collected in tanks or drums marked “Waste Oil” and disposed of appropriately. Empty petroleum containers will be stored on site in a designated area and returned to the supplier on backhauls. Oil filters will be punctured and/or crushed and drained of their contents for 24 hours prior to disposal.

SECTION 6 • BIOPILE

What is a biopile?

A biopile is an environmental friendly, relatively simple and cost effective means of biotreatment of a waste or hazardous substance using living organisms. It is presently being used in the Arctic along the winter road from Yellowknife to the diamond mines where it has found effective in treating fuel hydrocarbons (diesel and gasoline) spilled onto soils.

The methodology consists of excavating the contaminated soil from a spill site and place it in a pile on an impervious liner. After one or two years, samples are collected and analysed. If the analyses meet CCME and Nunavut hydrocarbon guidelines, the soil can then be reused.

6.1 Application

A biopile facility will be constructed to treat soils, rock, ice and snow contaminated by light hydrocarbon such as diesel fuel and by antifreeze. This facility will not treat soils contaminated by heavy hydrocarbons such as hydraulic fluid or grease. These will be segregated, packaged and shipped south for proper treatment and/or disposal. The biopile area will biotreat soils contaminated with fuel hydrocarbons over the life of the Project.

A biopile is a low cost and easy implemented remedial solution to treat impacted soils in remote locations as it requires minimal supervision and guidance from bioremediation specialists, as well as minimal heavy machinery and specialized equipment. In addition, the on-site treatment of soils removes the need for transportation for off-site disposal and/or treatment.

This technology relies on the biodegradation of petroleum hydrocarbons constituents by indigenous soil microorganisms which metabolize and break down hydrocarbons products. It has been successfully implemented in northern area (see Dessau 2011 for examples).

6.2 Design

The designed area will be of approximately 130 m in length by 25 m in width to accommodate up to 6,000 m³ of contaminated soils (~2.5 m thick of material). Contaminated soil will be collected with the appropriate tool (shovel, backhoe, loader) and transported to the biopile location for treatment. Soils will be sampled prior to treatment and regularly to monitor the progress of treatment. Once they meet the remediation objectives, the soils will be removed from the treatment area and may be reused on the mine site.

6.3 Water Management

Leachate water flowing out of the treatment area will flow through an underground oil/water separator located before a concrete or a geomembrane lined trench filled with activated carbon. Treated leachate waters may be discharged to the environment or an on-site drainage ditch. Water samples will be collected at the outlet of the water treatment trench to ensure that the quality of discharged waters meets the applicable guidelines and standards.

6.4 Soil Testing

Collected soil samples will be analyzed for pH, available nitrogen, available phosphorus, specific microbial density and total microbial density in order to monitor the performance of treatment. If these analyses indicate that soil conditions are not optimal for microbial growth and activity, bioremediation products may be added to the biopile.

At the end of treatment, final soil testing will be conducted to confirm the achievement of bioremediation objectives. Soils that meet remediation objectives will be removed from the treatment area and may be reused on the mine site as backfilling material.

6.5 Location of Biopile

The biopile area will be located immediately east and adjacent to the landfill. The area will be within the B7 east waste rock storage facility and will be separated from the landfill by a 5.5-metre berm of waste rock. A drainage collection structure, including an oil/water separation system, will be installed to collect seepage and runoff.

6.6 Biopile Operations Plan

a) Materials Acceptable for Biotreatment

Only soils, rock, ice and snow contaminated with light hydrocarbons will be suitable for biotreatment using a biopile. Examples include diesel, Jet B and gasoline.

b) Materials not Acceptable for Biotreatment

All soils, rock, ice and snow contaminated with heavy hydrocarbons will not by suitable for biotreament using a biopile. Examples include heavy fuel, lubricating and engine oil, hydraulic fluids and grease.

c) Site Development and Biopile Method

The biopile area will be located within the B7 east waste rock storage facility, immediately adjacent to the landfill. It will have a level base of waste rock that is at least two (2) metres thick, the same as the landfill.

The biopile area will be filled progressively in an orderly manner with its use dependent on the number of hydrocarbons spills and the quantity of contaminated material. Each biopile will be placed on an impermeable layer. It will be leveled but compacted as little as possible to allow air movement through the soil. A year after placement, soil samples will be collected and analysed for hydrocarbons. If the soil meets Nunavut guideline criteria[2] for industrial use, it will be directed to a Waste Rock Storage Facility to be covered with waste rock. If the soil does not meet the Nunavut guideline, it will be left another year before being tested again. Only after the guidelines are met will the soil be removed from the treatment area.

d) Staffing and Equipment

The biopile will not require a full-time attendant. Trucks will haul contaminated material to the biopile area and place it on an impermeable layer. It will be roughly leveled by a dozer while trying to avoid compacting it as much as possible. Staff handling contaminated material will receive training in safe work procedures.

e) Leachate Management

The leachate from the biopile is expected to contain measurable hydrocarbons. Most to all of the leachate is expected to remain on the impermeable layer but any that escapes is expected to freeze within the waste rock floor. Nonetheless, contact water found in the sedimentation ponds associated with the waste rock storage facility will be sampled as necessary to confirm that it meets discharge quality criteria.

f) Surface Water and Erosion Control

The base of the biopile will be constructed of waste and crushed rock and should not be subject to erosion. Erosion of the biopiles themselves is not expected as they will be leveled using a dozer. The biopile area will have no walls or berms.

Should it prove necessary, surface water and erosion control will be incorporated into the biopile design.

g) Operational Inspections

The General Mine Manager or delegate will designate a biopile inspector to undertake periodic inspections of the biopile operations to verify compliance with the water licence and applicable plans, including the condition of biopile works, evidence of erosion, excessive ponding or unusual biopile settlement, and adequacy of safety measures.

[2] Government of Nunavut, Department of Environment. 2009. Environmental Guideline for Contaminated Site Remediation. Available online at: http://www.gov.nu.ca/env/environment

SECTION 7 • PROCESS PLANT AND WATER TREATMENT REAGENTS AND CONSUMABLES

7.1 Product Description

The process plant will use a number of chemicals and reagents to treat the ore, recover entrained gold. Any necessary Water Treatment Plant will also use a number of chemicals and reagents to treat water. Water treatment chemicals would be used over approximately 3 to 4 month period during frost-free months only. The next tables present specific description for each reagent:

- Table 7-1 and Table 7-2 present an average annual consumption of reagents during the operation and in which format they will be deliver;
- Table 7-3 presents hazard classes and potential environmental impacts for each reagent;
- Table 7-4 presents handling procedures; and
- Table7-5 presents Personal Protective Equipment.

Table 7-1 Process Plant Reagents – Use and Consumption

Reagent	Circuit	Quantity Needed (kg/t)	Quantity per Bag (kg)	Estimated Annual Consumption (t)
Steel balls	Grinding	1.5	2,000	5,058
Flocculant	Grinding	0.04	750	135
Lead nitrate	Carbon-in-leach	-		-
Cyanide	Carbon-in-leach	0.6	1,000	2,023
Lime	Carbon-in-leach	2.5	1,743	8,431
Activated carbon	Carbon-in-leach	0.03	500	101
Sodium hydroxide	Elution-Regeneration	0.25	1,000	843
Chlorhydric acid	Elution-Regeneration	0.7		2,361
Antiscalant	Mill	0.035		118
Borax	Refinery	0.005		17
Sodium nitrate	Refinery	0.005		17
Silica	Refinery	0.005		17
Sodium metabisulfite	Cyanide destruction	-	1,000	-
Copper sulfate	Cyanide destruction	0.15	2,500	506
Sulfur prills	Cyanide destruction	0.7	1,000	2,172

Table 7-2 Water Treatment Reagents and Others– Use and Consumption

Reagent	Use	Quantity Needed (kg/t)	Quantity per Bag (kg)	Estimated Annual Consumption (t)
Acetylene	Welding	1		365
Paints	Maintenance	-		100 gallons
Hydrofluoric acid	Laboratory	minimal		1,825 gallons
Hydrogen peroxide (alternative to calcium hydroxide)	Potential use: water treatment	minimal	1000	minimal
Calcium peroxide (alternative to hydrogen peroxide)	Potential use: water treatment	minimal	45	minimal

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

Table 7-3 Process Plant and Water Treatment Reagents – Hazard Classes and Potential Environmental Impacts

Material	Class	Potential Impact
Acetylene	2.1	Generally not hazardous for water.
Activated carbon	4.2	No information available.
Antiscalant	Not classified	Negligible with proper handling.
Borax	Not classified	Presents no health hazards.
Calcium oxide	Not classified	No information available.
Calcium peroxide	5.1	Releases oxygen into environment when dissolved in water.
Copper sulphate	9	Harmful to aquatic life.
Flocculant	Not classified	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 permafrost.
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 classified	No information available.
Silica	Not classified	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 classified	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 7-4 Process Plant and Water Treatment Reagents – Safe Handling Procedures

Product	Handling Procedures
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.
Antiscalant	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 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. 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.
Lime	Avoid contact with skin and eyes. Do not breathe dust. Wear suitable protective clothing, gloves and eye/face protection. In case of insufficient ventilation, wear suitable respiratory equipment. Hydrated lime should be stored in a cool protected place away from moisture, strong oxidants or acids and to minimize dust emissions. Storage in steel or concrete bins and silos, or plastic lined bags, is appropriate. An alkaline material that reacts vigorously with acids, generating some heat. May absorb carbon dioxide from the atmosphere, forming calcium carbonate. Soluble in glycerol, aqueous solution of sucrose, and ammonium chloride. Incompatible with maleic anhydride, nitroparaffins, and phosphorus.

Product	Handling Procedures
Chlorhydric 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.
Hydrofluoric acid	Wash thoroughly after handling. Remove contaminated clothing and wash before re-use. 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, at 1 km 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 MSDS). 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 MSDS).
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. Wear personal protective clothing at all times. 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. Use PPE at all times 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.

Product	Handling Procedures
Sodium metabisulphite	May cause irritation to eyes, skin, and respiratory tract with prolonged exposure. 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.
Sulfur prills	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/of 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 7-5 Process Plant and Water Treatment Reagents – Personal Protective Equipment

Product	Personal Protective Equipment		
	Eyes	**Skin**	**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
Antiscalant	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 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
Lime	Safety goggles	Wear impervious gloves, shoes and protective clothing to prevent skin contact.	NIOSH/MSHA approved respirator, if required

Product	Personal Protective Equipment		
	Eyes	Skin	Respiration
Chlorhydric 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 chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133. Wear face shield.	Wear appropriate protective neoprene gloves to prevent skin exposure. Wear acid-resistant jacket, trousers and boots sufficient to protect skin.	Wear appropriate OSHA/MSHA approved chemical cartridge respirator regulations found in 29CFR 1910.134. If more than TLV, do not breathe vapour. Wear self-contained breathing apparatus. Always use an NIOSH-approved respirator when necessary.
Hydrogen peroxide	Wear coverall chemical splash goggles. In addition, where the possibility exists for eye or face 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.	Where there is potential for airborne exposure in excess of applicable limits, wear NIOSH approved respiratory protection.

Product	Personal Protective Equipment		
	Eyes	Skin	Respiration
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.
Sulfur prills	Chemical safety goggles	Wear impervious gloves, shoes and protective clothing to prevent skin contact.	NIOSH/MSHA approved respirator, if required

SECTION 8 • MISCELLANEOUS HAZARDOUS/TOXIC MATERIALS

8.1 Product Description

Acids such as nitric acid, as well as emulsifiers and ammonium nitrate will be used at the mine site. Gases such as propane, oxygen, and acetylene, solvents, water/effluent treatment chemicals and various additives will also be 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 these materials. It is essential that materials deemed to be potentially hazardous be dealt with in a cautious manner, in strict adherence to recommended regulations outlined in the legislation, whether the substance is provided in large or small 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 the Explosives Management Plan (SD 2-13).

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.

SECTION 9 • INVENTORY, INSPECTION AND RECORDS

A contract expediting company will arrange all deliveries from the Rankin Inlet offloading/storage area to the Meliadine site. This will include the hazardous materials discussed in this Plan. The General Mine Manager will have ultimate responsibility for supervising the receipt, inspection, and recording of all material inventories at site. The division managers will reconcile total amounts received against amounts ordered. Purchasing controls will ensure that no excess hazardous materials are purchased beyond that requested by the Project for the coming year.

9.1 Petroleum Products

9.1.1 Inventory Management

Diesel fuel use will be metered automatically when it is pumped from the bulk tanks. The metered volumes will be 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 will be recorded weekly.

9.1.2 Inspection

The Environment Department will perform regularly scheduled inspections of all fuel and lubricant storage areas. The inspection schedule and procedure to be followed are summarized in Table 9-1. All inspections will be logged with the date and time of inspection, facility inspected, and name of the person making the inspection.

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. 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 9-1 Inspection of Petroleum Storage Sites

Site	Inspection
Fuel Tanks	*Schedule* – Daily by Site Services Supervisor; weekly by Environment Technician; quarterly by Environment Coordinator. *Procedure* – Locate leaks and report promptly. Inspections will be reported annually and filed with the General Mine Manager or Site Services Superintendent and Environment Superintendent.
Diesel Power Generating Plant	*Schedule* – Daily by powerhouse operator; weekly by Environment Technician as part of regular internal environmental inspections. *Procedure* – Inspections will be reported annually and filed as above.
Other Fuelling Stations	*Schedule* – Daily by Site Services Supervisor; weekly by Environment Technician as part of regular internal environmental inspections. *Procedure* – Inspections will be reported annually and filed as above.
Spill Kits	*Schedule* – Monthly by Environment Technician; quarterly by Environment Coordinator. *Procedure* – Inspections will be reported annually and filed as above.
Other Hazardous Material Storage Areas	*Schedule* – Daily by Site Services Supervisor; weekly by Environment 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 Environment Superintendent. The report will note any remedial repairs that have/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 the CCME and the Fire Marshal (under the *National Fire Code).* The following records will be prepared by the Procurement and Logistics and Site Services Departments:

- Reconciliation of bulk inventory from resupply logs;
- Weekly use summaries;
- 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 Miscellaneous Hazardous/Toxic Materials

9.2.1 Inventory Management

Quantities of all hazardous chemicals will be reconciled against orders on receipt. The appropriate department responsible for the miscellaneous chemicals will be responsible for reconciling the resupply inventory.

9.2.2 Inspection

During operations, the appropriate department responsible for storage and handling of the miscellaneous chemicals will 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 will be responsible for weekly or monthly inspections of miscellaneous hazardous materials and storage areas.

9.2.3 Records

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

SECTION 10 • TRAINING

10.1 General

All staff and contractors at the Meliadine Gold Project will receive the following training:

- Workplace Hazardous Materials Information System (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. AEM will ensure compliance with the training requirements specified in the Act and regulations.

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 will include cyanide and chemical awareness, specific chemical training for specific tasks, and a mill induction training. This training will be the responsibility of AEM.

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

10.2 Petroleum Products Handlers

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

- Transportation of dangerous goods (TDG);
- AEM'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 Plant Employees

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.

10.4 Third Party Contractors

It is expected that third party contractors receive adequate and comprehensive training to conduct their work tasks from their employer. AEM 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 will be required to participate in, and complete, a site specific health and safety training session. The training session will be envisioned to be valid for a period of three (3) years, after which time the contractor will 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 in the course of conducting their work on site. The training session will cover hazardous materials management.

SECTION 11 • PLAN EVALUATION, AUDIT AND IMPROVEMENT

As part of AEM's commitment to attain certification under the International Cyanide Management Code, it will sponsor regular (every three (3) 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.

The HMMP will be reviewed regularly and be updated as required.

REFERENCES

Dessau. 2011. Biopile Management Plan. Agnico Eagle Mines Limited, Meliadine Gold Project, Nunavut, Canada. 11 p.