APPENDIX B7 - EMERGENCY RESPONSE PLAN, VERSION 6 (AUG. 2013)

MEADOWBANK GOLD PROJECT

Emergency Response Plan

Prepared by:
Agnico-Eagle Mines Limited – Meadowbank Division

Version 6
August 2013

EXECUTIVE SUMMARY

The Emergency Response Plan (ERP) is activated when an operations-related emergency, accident or malfunction occurs, or if such an incident is foreseeable. The ERP outlines potential emergency scenarios, initial actions for emergencies and the internal and external resources available including personnel, emergency response equipment and communication systems.

The ERP will be reviewed and updated as required, but on a minimum basis of at least once per year.

IMPLEMENTATION SCHEDULE

This Plan will be immediately implemented**.**

DISTRIBUTION LIST

AEM – General Mine Manager / Designate

AEM – General Superintendent Operations

AEM – General Superintendent Maintenance

AEM - General Superintendent General Services

AEM – Health and Safety Superintendent / Designate

AEM – Human Resources Superintendent / Designate

AEM – Engineering Superintendent / Designate

AEM – Geology Superintendent / Designate

AEM – Environment Superintendent / Designate

AEM – Mill Superintendent / Designate

AEM – Site Services Superintendent / Designate

AEM – Mine Superintendent / Designate

AEM – Maintenance Superintendent / designate

AEM – Emergency Response Counselors

AEM – OHSC Co-chairs

AEM - Security

DOCUMENT CONTROL

Version	Date (YMD)	Section	Page	Revision
1	08/10/31	Appendix A		Revision to include East Dike design modifications
2	09/11/16	All Sections		Confirmation of specific details and procedures Account for as-built designs and emergency preparedness for dike failure scenarios
3	12/01/31	All Sections		Review of all the documents
4	12/07/27	All Sections		Review of all documents
5	13/05/21	All Sections		Review of all documents – logo change – Duty cards
6	13/08/09	All Sections		Added appendixes at back
7	13/09/05	All Sections		Updated information on Dykes, Storm Water

Prepared By: _____
Norm Ladouceur.
Health and Safety Superintendent

Prepared By: _____
Kevin Buck.
Environment Superintendent

Approved By: _____
Dominique Girard
General Manager

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

SECTION 1 • INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE EMERGENCY RESPONSE PLAN

The purpose of this Emergency Response Plan (ERP) is to provide a consolidated source of information for employees, contractors, and site visitors to respond quickly and efficiently to any foreseeable emergency that would likely occur at the Meadowbank project site. This ERP forms a component of the Environmental Management System (EMS) for the Project. As such, it is a working document that will be reviewed and updated on a regular basis as mine development, construction and operations proceed.

This ERP addresses gold mining, processing, transportation and related activities at the Meadowbank site as well as possible emergency scenarios that may occur off-site along the All Weather Private Access Road or at the Baker Lake Marshalling Facility. Guiding the development of this document has been the principle that an effective ERP must provide:

- A clear chain of command for safety and health activities;
- Well-defined corporate expectations regarding safety and health;
- Comprehensive hazard prevention and control methods; and
- Record-keeping requirements to track program progress.

AEM will ensure that all employees, contractors and site visitors fully understand and comply with all legislated safety standards, and the policies and procedures outlined in the ERP.

This ERP will be reviewed annually, or more frequently as required, to ensure compliance with applicable legislation, to evaluate its effectiveness and to continually improve the procedures. All employees, contractors and site visitors are encouraged to offer suggestions for ways to eliminate potential hazards and improve work procedures.

1.2 AEM'S POLICY STATEMENT

AEM is committed to protecting the health and safety of all its workers and the environment, and to adhering to all legislated safety standards. The necessary resources will be available to respond quickly and efficiently to all emergencies to prevent injury to, or degradation of, the health of individuals or the environment. In implementing this emergency response policy, AEM will set preparedness targets and report its progress on a regular basis.

To this end:

All relevant safety and emergency response laws and regulations will be incorporated into the ERP as minimum standards.

Senior management is responsible for making funds and other resources available, including hiring and training qualified personnel, to ensure the successful implementation of the ERP in the event of an emergency.

All supervisors are responsible for ensuring that their employees are aware of, and trained in, the proper emergency response procedures and that procedures and contact information are posted in all work areas. Supervisors are also responsible for ensuring that all employees follow safe work methods and all related regulations to prevent emergencies from occurring, and that they are provided with the proper tools to do so, including Personal Protective Equipment (PPE).

An emergency response team and coordination centre is establishes at the Meadowbank site.

The ERP will be tested on a periodic basis to ensure its effectiveness.

1.3 POLICY WITH RESPECT TO CONTRACTORS AND VISITORS

Every person working at or visiting the Meadowbank site receives an orientation upon arrival and as such is apprised of, and required to follow the ERP policies and procedures set forth in this manual. For a list of responsibilities, see Section 2.

Major contractors, such as those for mining and hauling, are required to have their own HS services. This is verified by AEM management prior to engagement of the contractor.

1.4 ENVIRONMENTAL POLICY

AEM is committed to achieving a high standard of environmental care in conducting its mineral exploration activities. AEM's Environmental Policy includes:

- Compliance with all applicable legislation including laws, regulations, and standards. Where laws do not exist, appropriate standards will be applied to minimize environmental impacts resulting from exploration activities.
- Open communication with government, the community, and employees on environmental issues.
- Development and adherence to management systems that adequately identify, monitor, and control environmental risks associated with AEM's exploration activities.
- Assurance that the employees are aware of their responsibilities and comply with AEM's Environmental Policy and field guide.

It is the policy of AEM to protect the environment, public health and safety, and natural resources by conducting operations in an environmentally sound manner while pursuing continuous improvement of our environmental performance.

SECTION 2 • ORGANIZATIONAL AND RESPONSIBILITIES

This section details the roles and responsibilities of all parties involved in emergency response planning and implementation at the Meadowbank mine site.

2.1 GENERAL MANAGER

The General Manager is responsible for implementing and maintaining the ERP. In addition, the General Manager's responsibilities are to:

- Act as a spokesperson on behalf of AEM with the public, media, and government agencies, as required;
- Prepare and submit any formal reports (within the required time frame) to regulators and AEM management detailing the occurrence of an emergency; this includes submitting an incident reporting form;
- Ensure that the Health & Safety and Environment Superintendents have the means (financial and otherwise) to ensure that all required resources are made available, or provided from off-site if required;
- Work with the H&S, Human Resources and Environment Superintendent to evaluate what training is required by all staff, ensure that all staff are given appropriate training, and ensure that all staff are retrained as needed;
- Ensure that the Human Resources Superintendent has the means (financial and otherwise) to ensure that all employees' training requirements are current;
- Ensure that inspections of emergency response training practices and emergency response equipment are carried out;
- Ensure that emergency response exercises are conducted annually,
- Ensure that the results of the regular inspections are used to improve emergency response practices, and improve relevant plans accordingly;
- Complete an annual detailed review of the ERP with the management team and the Join Health and Safety Committee with particular emphasis on the objectives and methods of the plan, and the job descriptions of all positions named within;
- Ensure that updates to new emergency communications information (new phone numbers, changes in reporting structure, etc.) are distributed as soon as the new information becomes available;
- Keep a formal record of distribution and amendments to the ERP; and

2.2 EMERGENCY CONTROL TEAM – ***ON SITE MANAGEMENT TEAM***

Appendix: MBK-HSS-3001-F-A Emergency Response Plan - Organizational Flowchart

No single department can handle an emergency situation alone. Everyone must work together to manage the emergency and coordinate the effective use of all available resources.

Therefore at the time of any emergency, all the management team and/or their designate must report to the 3rd floor Emergency Response Control room #1 or to the Emergency Response Control Room #2, at the Training room or to the Emergency Response Control Room #3 at the Meadowbank gatehouse.

The Emergency Control Team structure lends support, fosters efficiency and provides additional knowledge during an emergency response situation.

The Official In-Charge, (General Mine Manager or Designate) maintains the overall coordination and direction of the Emergency and ensures the continued safety of all employees and the public.

However, the Superintendent or designate of the Area affected by the emergency, will assist with the development of the overall emergency response plan.

The remainder of the Emergency Control Team will be given specific tasks to perform that will assist with the management and coordination of the emergency response plan.

Roles & Responsibilities of the Emergency Control Group (See Duty Cards)

2.2.1 Official In-Charge

The Official In-Charge (General Manager or designate) will take charge for overseeing and approving the overall emergency strategy.

Immediate duties of the Official In-Charge include:

- Consult with the Incident Commander the status of emergency.
- Appoint an Emergency Log Recorder to maintain a written record of the time and events, including all discussions, instructions and decisions made by the Emergency Control Team;
- Appoint a Muster Station Coordinator, who will ensure that proper head counts are conducted at three (3) designated Muster Stations.
- Issues specific tasks to the members of the Management as they arrive at the Control Room, as per this guideline;
- Brief the Emergency Control Team;
- Ensure that the safety of personnel is maintained, throughout the operation.

- Ensure procedures are in place for prompt dispatch of requested personnel, materials and equipment to the emergency area.

- Arrange for all reports to be presented at specific intervals to the Emergency Control Team

- Finalize the recommendations of the Incident Commander for rescue and recovery operations.

- The Official In-Charge is the only person authorized to release information to Government Agencies, Corporate Office or the Local Communities. He may delegate this activity to other members of the Emergency Control Team.

    - Verify all information you release;
    - Keep a record of all inquiries (media and non-media);
    - Do not speculate on causes;
    - Do not speculate on resumption of normal operations or when the problem will be solved;
    - Advise that further updates will be forth coming.

- Notify the corporate management, if the following appear probable:
    - fatalities;
    - injuries that could probably become items of local, regional or national media interest;
    - there is a public health or environmental risk;
    - an incident involving chemicals where there is a large volume or the potential for over reaction (e.g., cyanide);
    - a spill of effluent or contaminated water or chemical substance to an area that lies outside the area of drainage control of the mine site (i.e., an external spill);
    - mine operations may be stopped for more than two (2) days;
    - Government authorities will become involved.

- Ensure all response teams, regulatory agencies and any other agency on emergency alert notice are advised when the emergency has ended.

- Ensure all documentation (i.e., notes, log sheets, written instructions, etc.) is gathered for the creation of the final report.

- Participate in debriefing.

2.2.2 **General Superintendents:**

- General Services, Operations and Maintenance will report to the Emergency Control Room and support the General manager/Designate in whatever capacity required.

- They will also ensure that the Superintendent/Designate in each of their respective Department's is aware of the emergency.

- They will assist with the investigation and write up of the final report

2.2.3 **Incident Commander**: – **Usually a Trained Staff Member (ERT Coordinators or Supt. / GF.)**

The responsibilities of the Incident Commander include;

- Ensure Security has been notified of emergency;
- Ensure the evacuation procedures have been activated, if required;
- Ensure that there are sufficient ERT members available to respond to the emergency;
- Ensure that the ERT has back-up support, a standby Team;
- Ensure that ERT Team has refreshments and nourishment (if the emergency requires several hours to resolve);
- Assess the size and severity of the emergency and the likely consequences. Establish response priorities;
- Maintain communication with the ERT Captain.
- Advise the Official In-Charge of the ERT Team's activities, regarding the rescue and recovery operations.
- Appoint sufficient personnel, equipment and outside services are available. Utilize the members of the Emergency Control Team to organize these resources.
- Advise Official In-Charge when the emergency situation is under control and give the "All Clear".
- Participate in emergency investigation.
- Coordinate an orderly return to normal operating conditions.
- Arrange for a debriefing session, and utilize the services of all involved in resolving the emergency.
- Assist to write the final report.

2.2.4 **Emergency Log Recorder / Muster Station Coordinator: - "***keep a systematic record of the emergency events" and get an accurate "Head Count during Emergencies***"**

- These persons can be the Geology/ Engineering Supt/Designate/ General Supt. (whoever is available to perform these duties)

- The log is intended to be a systematic record of the events from the start of the emergency through all phases to termination, and will be used in the preparation of the final report. It is important that the log be legible and that all information is recorded.

Emergency Log Recorder: **"***Keep a systematic record of the emergency events, phone calls and directives,."*

- Date and time the incident was reported, who reported the event;
- Record all subsequent developments as they occur;
- Record all phone calls all discussions and decisions made;
- Record any other information that needs to be captured for the final report;
- Keep all the sheets of paper used to record information numbered, for the final report;
- All the pages will be initialed by the recorder and official in-charge;
- The official document will stay with the Health & Safety Department upon completion of the emergency.

Muster Station Coordinator: "Provide *a Head Count during Emergencies".*

- As soon as Management begins to assemble in the Emergency Control Room , the Person In Charge (the manager/designate) needs to assign a member of the Management Team to be responsible for ensuring that the Muster Stations are contacted.

- The Muster Station Coordinator is required to contact the three Muster Stations by telephone, to ensure that there is a Supervisor is in charge of that specific muster station and give him/her 20 minutes to achieve the head count.

- The Muster Station Coordinator will need to record the time the muster station was called, who is in-charge of the muster station, and any other instructions that have been given.

- The Muster Station Coordinator needs to open the Flo on his/her laptop in order to cross reference the names, once they receive the lists from the Muster Stations.(additional persons may need to be assigned to assist with the cross reference, in order to complete the head count in a timely manner).

2.2.5 Emergency Response Team (ERT Team) Duties:

- The ERT Team Members must report to the Fire Hall, when paged for a "code One" emergency;
- ERT Team Members will be given instructions on the emergency by the Incident Commander;
- ERT Team Members will follow instructions from the Incident Commander and will not put the Team at risk;
- The ERT Team Captain will maintain radio contact with the Incident Commander throughout the emergency:

2.2.6 Mine Superintendent/Designate Duties;

- Ensure that all employees working, are accounted for;
- Ensure that the ERT Members of his crew have responded to the "code One" emergency;
- If the "Emergency" is in the Pit, them assist the Official-in-Charge with the action plan to deal with the emergency:
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.7 Mill Superintendent/Designate Duties;

- Ensure all employees working, at this time, are accounted for;
- Ensure that the ERT Members on his crew, have responded to the " Code One" emergency;
- If the " Emergency" is in the Mill facilities, assist the Official-in-Charge with the action plan to deal with the emergency:
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.8 Environmental Superintendent/Designate Duties:

- The following are the responsibilities of the Environmental Superintendent/Designate;
- Provide technical advice on probable environmental effects resulting from a spill and how to minimize them;
- Provide advice to the Official-in-Charge for appropriate spill response procedures;

- Ensure that Environmental Staff are available to direct the spill response action plan;
- Assist with restoring of the Operations back to normal operating standards:

2.2.9 Health and Safety Superintendent/Designate Duties:

The Health and Safety Superintendent/Designate will be responsible for:

- Ensure that an Incident Commander is in place to oversee the ERT Teams;
- Ensure that all Management respond to the emergency and meet in the emergency control room;
- He will oversee all activities that require Security or Nursing. He will arrange for Medevac transport, if required;
- Will assist with getting a “head count” for the Official in-charge;
- Assist with obtaining outside help if required:

2.2.10 Site Services Superintendent/Designate Duties:

The following are the responsibilities of the Site Services Superintendent/Designate;

- Ensure that all his employees are accounted for
- Ensure that all ERT Member on his Crew, respond to the “ code One” emergency;
- If the “ Emergency” is involves the Site facilities, assist the Official-in-Charge with the action plan to deal with the emergency:
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.11 Maintenance Superintendent/Designate:

The following are the responsibilities of the Maintenance Superintendent/Designate:

- Ensure that all of his employees are accounted for;
- Ensure that all ERT Members of his crew respond to the “Code One” emergency;
- If the “Emergency” is in the Maintenance Shops, then assist the Official-in-Charge with the action plan to deal with the emergency;
- Assist as required by supplying equipment and/or manpower;
- Assist with restoring of the Operations back to normal operating standards:

2.2.12 Human Resources Superintendent/Designate Duties:

The following are the responsibilities of the Human Resources (HR) Superintendent/Designate;

- Ensure that all HR employees are accounted for;
- Provide assistance to the Official-in-Charge if there are employees issues, such as injuries, transportation requirements, etc.:

2.2.13 Health Care Professional (Nurse/Medic):

The on-site health professionals are responsible for the following:

- Providing on-site first aid and other medical support;
- Establish a triage location if there are multiple casualties;
- Arrange for medevac transportation, if required;
- Ensuring that the first aid room is maintained at all times, by using First Responders as support:

2.2.14 Security Department:

The on-Site Security Supervisor is responsible for the following:

- Ensuring that the Security officer has activated the appropriate level of emergency notification;
- Ensure that access points to the emergency are properly guarded.
- Notify the Baker Lake Gatehouse if the emergency involves the All-weather private Road (AWPR).
- Assist with other duties as requested by the Emergency Control Group.

2.2.15 Duty Cards for each Department/Roles and Responsibilities

Each individual' roles and responsibilities are defined on the following pages:

Name: _____

Date: _____

Time assumed Role: _____

Manager On Duty - Duty Card	Completed	Time
1. Notified of an emergency – Make decision to have the whole Management Paged – control group		
2. Brief Management Team on the emergency		
3. Appoint a Scribe – Engineering department		
4. Decide if communications are to be cut – Notify IT		
5. Ensure that the emergency remains confidential – limit what is said to employees		
6. Conduct a head count – (Muster Stations) Assign duty to Geology Department		
7. Ensure unaffected Departments are put on Standby – E.g.: mine dept. – may need equipment		
8. Ensure all Service Departments are put on Standby – as required by ERT – Camp / Mine / Site Services / Maintenance / Manpower / Equipment / Tools / Equipment		
9. Ensure Power House is on standby		
10. Ensure that Protocol is on standby – flights to and from site for our workers / Mutual Aid teams		
11. Ensure Warehouse is on standby: Note: list of materials taken will be kept and accounted for after the emergency is over		
12. Do we need radios, ERP, Site Drawings out for incident command team		
13. Security / Close Roads		

Once Emergency is over:		
1. Initiate the “Emergency Stand Down” when required		
2. Follow up with HR Designate on any victim or surviving members concerns		
3. Hold a de-briefing with Personnel prior to them exiting the site		
4. Gather any information for Corporate HQ and Regulatory Agencies (Mines Inspector)		
5. Prepare and facilitate a Debriefing Session		
6. **General Manager will liaise with media with ALL information going out from site.**		
*** Write notes on reverse side and return this Card to Scribe after the Incident Debriefing for compilation purposes**		
No information will be relayed to Corporate or Media without the expressed confirmation of the Manager on Duty.		

Name: _____

Date: _____

Time assumed role: _____

Health & Safety Department or Designate Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Offer support to all Incident Command Group Management Team Members		
3. Account for all persons in Health and Safety Dept.		
4. Liaison between Emergency Response Teams and Incident Command Group Management Team Members		
5. Review remaining Emergency Response Capabilities: manning, equipment, resources		
Questions to ask: a) Do we need to stop operations? (Ex: SCBA use – if SCBA's are required for emergency, and we have other confined space work occurring, do we cancel? b) Do we need to reduce or have rescuers stand down during an emergency to ensure that we have adequate numbers available for continuation of normal operations? c) (Ex: mine rescue team called out to an emergency, 12 people show up, only 6 is required for emergency, and then 6 can stand down and go back to work and be available if another emergency occurs at same time. d) If people and equipment are available to meet		

Regulation requirements, then normal operations can continue. If not – consider putting alternate plans in place.		
6. Respond to any field requests		
7. Maintain notes of all decisions made with times as required.		
8. Organize and manage any site security requirements		
9. Liaison with any other emergency resource provider		
10. Provide information updates to the Incident Command Group		
11. Maintain Health and Safety Standards at the Mine Site during any incident		
12. Assist with any trauma management situations and Post Incident Debriefing sessions as required		
13. Participate in the incident debriefing session		
14. Liaison with the Department Head where incident occurred and help with incident investigation process		
15. Advise on corrective action initiatives		
16. Communicate with Mines Inspector – Serious Injury / Dangerous Occurrence – only after approval of Manager on duty		
***Write notes on reverse side and return this Card to scribe after the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Department Head where incident occurred Duty Card	**Completed**	
Print Name:		
1. Report to Command Centre		
2. Gather all available information and share with Incident Command Group Team Members		
3. Account for all persons under area of responsibility – (Need to determine who is missing and where they may be)		
4. Confirm effective Communications with Responders and Relative Supervisors		
5. Confirm Incident losses and status of the incident		
6. Designate an Assistant if required		
7. Assess current resources and determine if additional resources are required		
8. Manage Personnel duty hours, needs, food and other		
9. Visit the incident scene if required – and Safe to do so		
10. Assemble any information required for a report		
11. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to Scribe after the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Logistics or Designate Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons under area of responsibility		
3. Ensure that flights are arranged for outgoing and incoming purposes when required		
4. Ensure IT is available upon request – (cut communications) fix radios etc.		
5. Arrange transportation of all personnel as required		
6. Arrange for provision of food, water, temporary shelter, radios, PPE, etc. when required		
7. Assemble any information required for a report		
8. Participate in the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe after the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Warehouse or Designate Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons under area of responsibility		
3. Assemble lists for inventory of possible equipment or supply needs		
4. Source any supplies and equipment that is requested by the Manager on Duty		
5. Source any requests for external services or supplies		
6. Designate an Assistant if Required		
7. Schedule Support Staff Personnel if required		
8. Ensure that someone is available at all times during the entire emergency to supply equipment materials as necessary		
9. Assemble any information required for a report		
10. Participate in the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe after the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Human Resources/Designate Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons under area of responsibility		
3. Set up a format for any media communications		
4. Confirm information accuracy if required		
5. Designate an Assistant if required		
6. Ensure proper notification systems are followed (RCMP are responsible for initial notification of family in fatal events)		
7. Coordinate any follow up visits to family of victims		
8. Confirm that Employee Assistance Program, Critical Incident Stress or Victim Services is available to injured or survivors or Post Traumatic Stress sufferings of any personnel		
9. Assemble any information required for a report		
10. Help Manager on Duty prepare communication to advise workforce		
11. Participate in the Incident Debriefing		
12. **All communication to media will be done through the Manager on Duty**		
***Write notes on reverse side and return this Card to scribe after the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Emergency Response Team Captain Duty Card	**Completed**	**Time**
Print Name:		
1. Respond to the scene or requested area with all available and applicable equipment		
2. Confirm communication with the Incident Commander at Base Station		
3. Contact Department Head of affected area for any request or directions through Incident Commander		
4. Direct emergency activities with your Team		
5. Maintain Safe Working Standards with you team		
6. Offer periodic Status Reports to Incident Commander at Base Station		
7. Secure the incident scene – as per Regs. 16.03/16.04		
8. Liaison with any other external emergency personnel		
9. Ensure area clearances with Helicopter Pilots – if required		
10. Respond accordingly within you and your team's capabilities		
11. Request any additional resources through your Incident Commander at Base Station		
12. Assemble any information required for a report		

13. Attend the Incident Debriefing		
14. Take Cell Phone with them when going off site – phone number is 867-793-1330		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Note: Captain must have a report that will be submitted at completion of emergency which includes all of the above.

Name: _____

Date: _____

Time assumed role: _____

Environmental Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Maintain a log of events, calls, requests, external personnel and contact lists if requested		
5. Liaison with all field operations on the incident when involving spills/chemicals		
6. Liaise with Government Regulators as necessary for reporting spills/chemicals etc. upon approval of Manager on Duty.		
7. Designate an Assistant if required to help out in the field		
8. Direct external Emergency Spill Response Personnel to proper location(s) if required		
9. Assemble any information required for a report		
10. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Maintenance Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Maintain a log of events, calls, requests, external personnel and contact lists		
5. Liaison with all field operations on the incident when involving equipment, machinery		
6. Have personnel available to deal with broken down machinery etc.		
7. Designate an Assistant if required to help out in the field		
8. Make equipment and manpower available if required by Emergency Response Team		
9. Assemble any information required for a report		
10. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Mine Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Maintain a log of events, calls, requests, external personnel and contact lists		
5. Liaison with all field operations on the incident when involving incidents in the pit		
6. Ensure that contractors in area of responsibility are notified and accounted for		
7. Designate an Assistant if required to help out in the field		
8. Make equipment and manpower available as necessary to help Emergency Response Teams		
9. Assemble any information required for a report		
10. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Engineering Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Maintain a log of events, calls, requests, external personnel and contact lists (SCRIBE) for the incident		
5. Liaison with all field operations on the incident when involving incidents where engineering is required		
6. Designate an Assistant if required to help out in the field		
7. Make equipment and manpower available as necessary to help Emergency Response Teams		
8. Assemble any information required for a report		
9. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Geology Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Conduct a proper head count of all persons assembled in the Muster Stations (Procedure can be found in Emergency Response Plan)		
5. Maintain a log of events, calls, requests, external personnel and contact lists		
6. Designate an Assistant if required to help out in the field		
7. Make equipment and manpower available as necessary to help Emergency Response Teams		
8. Assemble any information required for a report		
9. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Site Services Department Duty Card	Completed	Time
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Ensure that manpower, equipment is available for the proper function and maintenance of fire sprinkler systems		
5. Ensure that manpower, equipment is available to maintain an open road (AWPR) to Baker Lake		
6. Ensure that manpower is available as airport marshal and for moving material arriving in aircraft, fuel, etc.		
7. Ensure that manpower, equipment is available for transportation of men/gear to help Emergency Response Teams		
8. Maintain a log of events, calls, requests, external personnel and contact lists		
9. Designate an Assistant if required to help out in the field		
10. Make equipment and manpower available as necessary to help Emergency Response Teams		
11. Assemble any information required for a report		
12. Attend the Incident Debriefing		

***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Electrical Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Ensure that personnel and equipment is available to maintain the required power supply		
5. Maintain a log of events, calls, requests, external personnel and contact lists		
6. Designate an Assistant if required to help out in the field		
7. Make equipment and manpower available as necessary to help Emergency Response Teams		
8. Assemble any information required for a report		
9. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Mill Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Conduct a proper head count of all persons assembled in the Arctic Corridor Muster Station		
5. Maintain a log of events, calls, requests, external personnel and contact lists		
6. Designate an Assistant if required to help out in the field		
7. Make equipment and manpower available as necessary to help Emergency Response Teams		
8. Assemble any information required for a report		
9. Attend the Incident Debriefing		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Camp / Housekeeping Department Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre through HR		
2. Account for all persons in area of responsibility		
3. Be available as a resource to Incident Command Group		
4. Ensure an adequate supply of food when requested		
5. Ensure that an adequate supply of blankets, washers/dryers are available when requested		
6. Maintain a log of events, calls, requests, external personnel and contact lists		
7. Designate an Assistant if required to help out in the field		
8. Make equipment and manpower available as necessary to help Emergency Response Teams		
9. Assemble any information required for a report		
10. Ensure that HR has all available information		
***Write notes on reverse side and return this Card to scribe during the Incident Debriefing**		

Name: _____

Date: _____

Time Assumed Role: _____

To be filled out by Incident Commander:

Incident Commander Duty Card	Completed	Time
Print Name:		
1. Initiate an emergency response as required		
2. Ensure communications with Emergency Response Team Captain and be there to request assistance or resources		
3. Ensure incident scene is secured as required		
4. Liaise between Emergency Response Team and Incident Command Group		
5. Ensure that all gear, equipment, supplies required by Emergency Response Team is made available to them		
6. Have the gear, equipment, supplies brought to Emergency Response Teams when required		
7. Assemble any information required for a report		
8. Request any additional resources at any time required		
9. Attend the Incident Debriefing if requested		
***Write notes on reverse side and return this Card to ICS during the Incident Debriefing**		

Name: _____

Date: _____

Time assumed role: _____

Scribe Duty Card	**Completed**	**Time**
Print Name:		
1. Report to Command Centre		
2. Scribe all accounts of activity in chronological order		
3. Scribe information as requested by the Incident Command Group – Manager on Duty		
4. Provide a detailed report at end of incident		
5. Assemble any information required for a report		
***Write notes on reverse side and return this Card to ICS during the Incident Debriefing**		

2.3 OCCUPATIONAL HEALTH AND SAFETY COMMITTEE:

The Occupational Health and Safety Committee is responsible for:

- Review the emergency response plan on an annual basis.
- Assist with any investigation resulting from the emergency.

2.4 ALL EMPLOYEES:

All employees are responsible for:

- Reporting to the nearest Muster Station when an fire alarm is sounded;;
- Employees reporting to the Muster Station need to assemble at the placard that has their department name.
- Employee's must be quiet and await the "head count**".**
- Reporting any emergency by either using the radio on the dedicated emergency channel (#1) or using the telephone to call 6911, to describe the type, the location, and nature the emergency, including possible injuries, trapped personnel, and the presence of any chemical or explosive hazards.

2.5 SUPERVISOR:

The Supervisor is responsible for:

- Ensuring the "Code One" call in, is accurate and that all the pertinent information is available for the official-in-Charge. (providing details regarding the type, the location, and the nature of the emergency, including possible hazardous materials involved and health and safety concerns);
- Ensure all workers on his shift are accounted for:

2.6 OTHER PERSONNEL:

Depending on the nature of the emergency (medical, electrical, mechanical, fire, etc.) other site personnel, including the Site Electrician, Site Mechanic, and others, may be called upon to play key roles.

2.7 EMERGENCY RESPONSE CONTACT INFORMATION – INTERNAL & EXTERNAL

AEM internal emergency response personnel, their duties, and phone numbers has been compiled in Table 2.1, Important external contacts such as regulatory agencies, health organizations and transportation companies providing evacuation support are listed in Table 2.2.

Table 2.1: Internal Emergency Response Contact Information Chart

NOTE: 867-793-4610 may be replaced by 819-759-3555		
DEPARTMENT	**NAMES**	**CONTACT**
GENERAL MANAGER	Jean Beliveau	P: 867-793-4610 ext: 6901
Pager 404		C: 819-277-4080
		C: 416-315-6745
INCIDENT COMMANDER		
Pager 402	Andre Rouleau	P: 867-793-4610 ext: 6809
		C: 819-355-2191
Pager 405	Philippe Beaudoin	P: 867-793-4610 ext: 6809
		C:450-847-4214
MAINTENANCE GENERAL SUPER.	Richard Grenier	P: 867-793-4610 ext: 6914
Pager 451		C: 819-354-9531
GENERAL SERVICES SUPER.	Alain Hamel	P: 867-793-4610 ext: 6771
Pager 406		C: 819-856-5411
OPERATIONS GENERAL SUPER.	Alexandre Proulx	P: 867-793-4610 ext: 6915
Pager 421		C: 819-860-6389
HEALTH & SAFETY SUPERINTENDENT	Norman Ladouceur	P: 867-793-4610 ext: 6720
Pager 407		C:819-860-6258
ASSISTANT H & S SUPER.	Yves Levesque	P: 867-793-4610 ext: 6720
Pager 407		C:819-856-9051

INFORMATION TECHNOLOGY	Phillip Quessy	P: 867-793-4610 ext: 6730
Pager 282		C: 819-856-8536
	Bruno Poirier	P: 867-793-4610 ext: 6824
		C: 514-232-8358
	Jerome Lamarre	P: 867-793-4610 ext: 6785
		C: 450-917-0649
	Steve Petit	P: 867-793-4610 ext: 6785
		C: 514-718-1179
SECURITY	Denis Roy	P: 867-793-4610 ext: 6748
Pager 468		C: 819-847-4460
	Charles Blouin	P: 867-793-4610 ext: 6748
		C: 819-564-0357
		Gatehouse: 6817
ENGINEERING	Julie Belanger	P: 867-793-4610 ext: 6721
LOG RECORDER (scribe)		C: 819-856-1667
Pager 486	Stephane Frechette	P: 867-793-4610 ext: 6881
		C: 819-856-3152
	Erika Voyer or	P: 867-793-4610 ext: 6837
	Thomas Lepine	
GEOLOGY	Bernard Waitzenegger	P: 867-793-4610 ext: 6711
MUSTER STATION – (tally)		C: 819-856-7829
Pager 481	Lisa Ragsdale	P: 867-793-4610 ext: 6790
	Robert Badiu	P: 867-793-4610 ext: 6790
	Jean-Francois Desmeules	P: 867-793-4610 ext: 6856

MINE DEPARTMENT	**Martin Beausejour**	**P: 867-793-4610 ext: 6832**
Pager 495		**C: 819-355-2913**
	Brock Johnston	**P: 867-793-4610 ext: 6832**
		C: 480-652-9775
	Joey Audet	**P: 867-793-4610 ext: 6735**
		C: 819-856-1276
	Charlie O'Hara	**P: 867-793-4610 ext: 6735**
		C: none
ENVIRONMENT DEPARTMENT	**Kevin Buck**	**P: 867-793-4610 ext: 6838**
Pager 492		**C: 819-856-1956**
	Jeffrey Pratt	**P: 867-793-4610 ext: 6728**
		C: 819-856-1475
	Martin Theriault	**P: 867-793-4610 ext: 6747**
		C: 450-904-1390
	Robin Allard	**P: 867-793-4610 ext: 6747**
		C: 819-604-1417
PROCESS PLANT DEPARTMENT	**Michel Fortin**	**P: 867-793-4610 ext: 6814**
Pager 418		**C: 819-355-0460**
	Guillaume Gemme	**P: 867-793-4610 ext: 6831**
		C: 819-856-3073
	Luc Tremblay	**P: 867-793-4610 ext: 6831**
		C: None
	Nathalie Ledoux	**P: 867-793-4610 ext: 6755**
		C: None
	Guillaume Blanchette	**P: 867-793-4610 ext: 6862**

		C: None
	Pathies Nawej Mteb	**P: 867-793-4610 ext: 6862**
		C: None
HEALTH & SAFETY DEPARTMENT	**Ken Ludwig**	**P: 867-793-4610 ext: 6756**
		C: 705-929-5156
	Charlie Tautuajuk	**P: 867-793-4610 ext: 6756**
		C: 867-446-0964
SITE SERVICES DEPARTMENT	**Eric Trudel**	**P: 867-793-4610 ext: 6953**
Pager 483		**C: 819-355-9111**
	Roger Sauve	**P: 867-793-4610 ext: 6822**
		C: None
	Rene Baril	**P: 867-793-4610 ext: 6822**
		C: None
HUMAN RESOURCES DEPARTMENT	**Krystel Mayrand**	**P: 867-793-4610 ext: 6723**
Pager 434		**C: 819-856-9556**
	Louise Garon	**P: 867-793-4610 ext: 6890**
		C: None
	Audree Belisle	**P: 867-793-4610 ext: 6890**
		C: None
LOGISTICS & WAREHOUSE	**Monique Cossette**	**P: 867-793-3555 ext: 6903**
Pager 478		**C: 819-444-6023**
	Andre Racicot	**P: 867-793-3555 ext: 6813**
		C: 867-793-1332

	Yves Samuel	**P: 867-793-4610 ext: 6812**
		C: None
	Sebastien Byles	**P: 867-793-4610 ext: 6812**
MAINTENANCE DEPARTMENT	**Lonny Syvret**	**P: 867-793-4610 ext: 6722**
Pager 451		**C: 819-354-6819**
	Sylvain Portelance	**P: 867-793-4610 ext: 6825**
		C: None
	Stephane Boucher	**P: 867-793-4610 ext: 6825**
		C: 519-525-7505
	Pierre Laberge	**P: 867-793-4610 ext: 6825**
		C: None

Table 2.2: External Emergency Phone Numbers

Organization / Authority	Telephone Number	Fax Number
NT-NU 24-HOUR SPILL REPORT LINE	867.920.8130	867.873.6924
Nunavut Water Board	867.360.6338	867.360.6369
Environment Canada, Environmental Protection Branch	867.669.4700	867.873.8185
Environment Canada: 24-hour emergency pager monitored by Emergency and Enforcement	867.920.5131	
Manager Pollution Control & Air Quality Environmental Protection, Government of Nunavut	867.975.7748	867.975.5981
General Inquiry Department of Environment, Government of Nunavut	867.975.7700	
Indian and Northern Affairs Canada (INAC) – Water Resources Manager, Nunavut Regional Office	867.975.4550	867.975.4585
Indian and Northern Affairs Canada (INAC) – Manager, Land Administration, Nunavut Regional Office	867.975.4280	867.975.4286
Kivalliq Inuit Association – Reporting Line	867.645.2810 or 867.645.2800	

Department of Fisheries and Oceans (DFO) – Nunavut Regional Office	867.979.8000	867.979.8039
Workers Safety and Compensation Commission Mine Inspector: Martin Van Rooy	800.661.0792 867.979.8527	
Keewatin Health Services – Baker Lake	867.793.2816 867.793.2813	
Keewatin Air Ambulance (Medevac) 24h/7 – Rankin Inlet dispatch	867.645.4455	
Baffin Regional Hospital (Iqaluit)	867.979.7300	
Baker Lake RCMP Baker Lake RCMP – emergency number Cambridge Bay RCMP	867.793.0123 867.793.1111 867.983.2111	
Baker Lake Hamlet Office	867.793.2874	
Baker Lake Fire Emergency	867.793.2900	
Baker Lake Fire Marshall's Office	867.873.7944	
Baker Lake Radio Station	867.793.2962	
Baker Lake Airport	867.793.2564	
Department of Environment Health	867.983.7328	
Poison Control Centre	867.920.4111	
Search and rescue – Artic Armed Forces Rescue Coordination Centre Trenton	800.267.7270 613.965.3870	
NAVCAN (Flight Information Center North Bay)	866.541.4109	
CANUTEC (Spill Support Information)	613.996.6666	
Charter Aircraft (for Evacuation)		
Keewatin Air Ambulance (Medevac) 24h/7 – Rankin Inlet dispatch	867.645.4455	
Calm Air	204.677.0513 204.677.0519	
Nolinor	450.476.0018 888.505.7025	
First Air	867.669.6694 867.444.2002	
Helicopter Transport Services	613.839.5868	
Nunavut Emergency Management – Rankin Inlet	1-867-645-6803	
Nunavut Emergency Management – Iqaluit	1-800-693-1666 1-867-979-6262	

2.8 EMERGENCY COORDINATION CENTRE

Emergency operations will be directed out of the Emergency Control Centre (ECC). The ECC is located in the 3rd Floor of the Service Building Conference Room, or in the Training room on the main floor, or in the Security Guard Building by Air Strip from where the following will take place:

- Key decisions will be made and operations will be managed;

- Technical information to direct emergency activities will be provided;
- A communications centre will be established for emergency operations and to communicate with other organizations;
- Resource procurement will be provided and resource use will be directed;
- Any damage will be assessed and long-range objectives and plans will be developed; and
- Information on the emergency will be stored and disseminated to all necessary internal and external parties.

The following information is available at the centre:

- Shutdown procedures for operations;
- Locations of hazardous material storage areas;
- Locations of emergency and safety equipment;
- Locations of first aid stations and muster areas;
- Maps of communities and environmental maps;
- Information on location of other communications equipment, including portable sets;
- Information on emergency power;
- Contacts for other utilities;
- Operating manuals;
- Materials Safety Data Sheets (MSDS);
- List of personnel with alternate skills for use in emergencies;
- Type and location of alarm systems;
- Accident report forms;
- Accident status board and log book;
- Notification lists, staff lists, contact lists, with regular and emergency telephone/pages numbers, etc.

The ICC will be located at a safe and secure place near the site of the emergency. All responses and mitigation efforts developed at the ECC will be implemented through the ICC.

In the event of an emergency, security personnel may be required to establish and maintain a security perimeter to prevent or minimize injury to personnel, to preserve evidence for investigation, or to prevent unauthorized access to the scene.

2.9 TRAINING

The HR Superintendent is responsible for documenting, tracking, and updating all training activities. Record of training requirements and training attendance will be kept, tracked and updated for all employees by the HR Superintendent to ensure that retraining occurs as required.

For mine operations, AEM will ensure a sufficient number of trained ERT team members are on site at all times. All members of the ERT will be trained and familiar with emergency and spill response procedures. Emergency training will be conducted annually to ensure that a sufficient number of team members are available and that their training is up-to-date. The following will be included in the training:

- A review of the SCP and responsibilities of the team members;
- The nature, status, and location of fuel and chemical storage facilities;
- The location of on-site and off-site spill response equipment, and how to use it;
- Emergency contact lists;
- Desktop exercises of “worst case” scenarios; and
- The likely causes and possible effects of spills.

Emergency Response Equipment

The Emergency Measures Counsellor will ensure that site drawings and equipment lists are posted conspicuously in key locations throughout the site so that important information is always readily available. This will include the following:

- Location and isolation points of energy sources;
- Location of emergency equipment (e.g., fire water pumps, fire extinguishers, monitors, self-contained breathing apparatus);
- Emergency procedures outlines, such as specialist firefighting, chemical neutralization;
- Location of equipment for combating pollution (e.g., booms, skimmers, pumps, absorbents, dispersants);
- Availability of internal and external emergency medical support (e.g., hospitals, clinics, ambulances, medical supplies, personnel with medical or first aid training);

- Location of toxicity testing facilities (e.g., gas and water);
- Location of wind direction / speed indicators;
- Directions on how to contact the local or regional weather forecasting service;
- Location of personal protective equipment and directions on its proper use; and
- Location of first aid stations and muster areas.

The Incident Commander, EMC, and Health and Safety Superintendent will know where, throughout the project site, all of this information is posted and where emergency equipment is stored. These individuals will also be trained in the proper use of emergency equipment.

External emergency response equipment includes the mobile emergency response equipment described in the SCP.

SECTION 3 • COMMUNICATION SYSTEMS

The primary basis for communication will be the phone system; back-up communication will be available via satellite phone. For on-site communication, hand-held radios will be mandatory for all employees working or travelling in remote areas from the main camp. Cell phones can be used as an additional means of communication. Back-up power sources and replacement batteries for communications equipment will be available to provide continuous, uninterrupted operation either at fixed facilities or at emergency sites.

Key site personnel will be accessible at all times by either portable radios, radios in vehicles, or office radios. The Health Care Professional will carry a hand-held radio and will be available at all times. Security personnel will monitor the emergency channel twenty-four hours per day. Senior management personnel will rotate as “On-Call Managers” for after-hour emergencies. An accommodations list that highlights key personnel will be posted and updated as required.

Lists of employees trained in first aid, mine rescue, and Emergency Response will also be posted. Employees and contractors who will be on site for extended periods will be trained initially and then retrained annually. This training will include the locations and use of emergency equipment, terminology used, and who needs to be contacted immediately in the event of an emergency.

SECTION 4 • EMERGENCY MEASURES

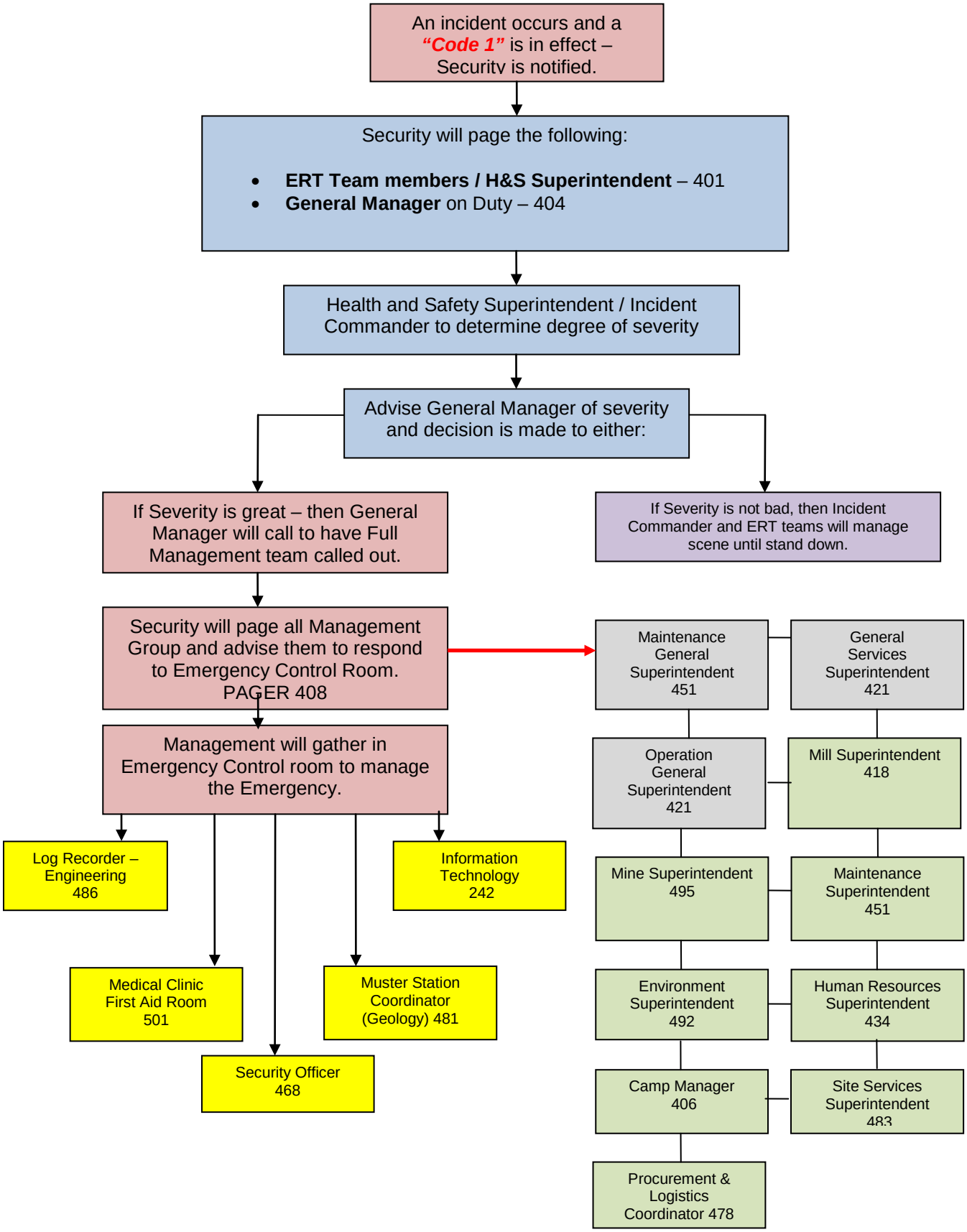
Appendix MBK-HSS-3001-F-B Emergency Measures Response Flowchart

In the event of an emergency, the employee will have to follow our emergency procedure:

- Emergency is initiated - by calling **6911** on desk type phones, or calling on Two-way radio on **"Working Channel" – Code 1 – Code 1 – Code 1.**
- All communication stops except for those involved with the Emergency – I.e.: First Aid Room attendants, Medics, ERT as required.
- All work stops in First Aid Room / Clinic – and in affected area – depending on seriousness of Emergency – the whole site.
- First Aid Room Attendant / Medic will answer the phone and/or radio.

  Note: if the First Aid Room Attendant / Medic do not answer, then Security Guard will answer and/or a Supervisor on radio will answer so that Emergency Response can be initiated.
- **Responder –** will ask where the medic is required?
- **Caller –** will give a brief description of the Emergency – name, location and what is wrong and/or required.
- **Responder –** will confirm location and details of incident and activate the **ERT** team. Security will be notified by responder and a page will be sent out to all **ERT** team members on site. (All **ERT** team members on site now carry pagers).
- The person at the casualty(s) will administer First Aid if trained to do so.
- Incident Commander Center will be immobilized as to ensure that communications, transportation, and effective deployment of **ERT** resources are conducted. It is mandatory that the Official In-Charge be notified immediately.
  - Transportation will be arranged to meet at the **ERT** hall by the two large doors for medical gear and **ERT** team members.

The **ERT** team (minimum of 6 team members) will assemble as quickly as possible. (Expectation – when the page goes off – all **ERT** team members will make their way expediently to the **ERT** hall.


An incident occurs and a "Code 1" is in effect – Security is notified.
Security will page the following:
ERT Team members / H&S Superintendent – 401
General Manager on Duty – 404
Health and Safety Superintendent / Incident Commander to determine degree of severity
Advise General Manager of severity and decision is made to either:
If Severity is great – then General Manager will call to have Full Management team called out.
If Severity is not bad, then Incident Commander and ERT teams will manage scene until stand down.
Security will page all Management Group and advise them to respond to Emergency Control Room. PAGER 408
Management will gather in Emergency Control room to manage the Emergency.
Maintenance General Superintendent 451
General Services Superintendent 421
Operation General Superintendent 421
Mill Superintendent 418
Mine Superintendent 495
Maintenance Superintendent 451
Environment Superintendent 492
Human Resources Superintendent 434
Camp Manager 406
Site Services Superintendent 483
Procurement & Logistics Coordinator 478
Log Recorder – Engineering 486
Information Technology 242
Medical Clinic First Aid Room 501
Muster Station Coordinator (Geology) 481
Security Officer 468

FIRE

The Camp Complex and Process Plant is equipped with a fire detection and audible fire warning system. All site operating personnel receive basic training in the use of fire extinguishers. This training is tracked by the HR Superintendent.

For any situation involving fires, the first action will be to extinguish the fire if it is safe to do so and then report the incident. If the person cannot safely put out the fire, it must be reported as quickly as possible. In the event of a fire alarm, all employees not directly involved with fighting the fire will report to the designated muster location (section 5.2). Employees will remain in this area until assigned other duties by the ERT or until given clearance that the emergency is over.

In the event that a fire causes damage to mining equipment, site buildings, or chemical containers, particulates and/or gases could be released into the air, and hazardous materials and/or other chemicals (e.g., fuels, oils, battery acid, lime, etc.) could be spilled. In the short-term, this could result in air quality degradation, and potentially affect the local vegetation in the case of a spill or burn scar. Should such scenarios occur, the following actions will be taken, as required and WHEN IT IS SAFE TO DO SO:

- Air quality monitoring for airborne emissions;
- Collection and incineration of all putrescible (food items);
- Removal of debris and contaminated soil for disposal on-site or off-site at a licensed disposal facility;

Further details on the cleanup of chemical spills are provided in the Spill Contingency Plan.

The incident commander will;

- Locate the source of fire.
- Dispatch the evacuation at the safest muster point.
- Assign a captain and his team.
- Ensure the security of all the ERT's members or any other service persons (medics, security guard, electricians, etc…).
- If the intervention of the mine inspector is necessary for a special investigation, he will ask to the security department to ensure the integrity of the scene.
- Call the end of the emergency measures and invites everyone evacuated to reintegrates their original locations.

General Manager or designate can decide to use any available machinery to separate all or part of a building to protect people or minimize losses.

Incident Reports are to be filed detailing the causes of the fires and responses undertaken. This information will be used by the EMC in subsequent fire prevention activities

4.1 MUSTER POINT

In the event that an evacuation is necessary, it is important that all affected personnel leave the emergency area and congregate at a pre-determined area or *Muster point* so that a head count can be taken to determine if there are any missing persons. Employees must remain at the muster point until the supervisor of the emergency area gives permission to return to work.

Upon hearing a fire alarm, smoke alarm, or evacuation alarm you shall ….

- ***Do Not Panic*** – Always ensure that you are prepared for the weather conditions – Dress appropriately – (Winter clothing during winter months).
- ***DO NOT*** delay and ***DO NOT*** stay and finish work before taking the proper steps to evacuate.
- Always **close** windows/doors as you leave your office etc.
- ***Always*** head to the ***closest*** **EXIT** door and follow **EXIT** signs to the closest outside door.
- Once outside head to the ***closest*** **"*Muster Station*".**
- Once in **"*Muster Station*"** – Stay put until relieved or instructed otherwise by your Supervisor.
- Your Supervisor and/or Senior Management person in your dept. will ***conduct a tally*** **(head count)** of everyone in his/her department. Ensure that you get your name on the **tally form**.
- Note: on nightshift, the highest level of Management may be a front line Supervisor.
- ***DO NOT*** **enter** a building when the alarm is sounding. Head straight to a "**Muster Station**".
- ***Never*** go through a building to get to a "**Muster Station**". Once you are outside, the first door you open should be the one to the "**Muster Station**".
- ***Never*** disregard an evacuation alarm. We understand that the system goes off without incident on occasion, but to disregard an ***alarm is to endanger your life and the lives of others.***
- ***Stay in*** "**Muster Station**" until you are instructed to "**Stand Down**" by the Incident Commander.
- ***Do Not*** leave "**Muster Station**" to go outside for a smoke. It is important for your Supervisor to know where you are at all times – especially during an "**Emergency**".
- The only person authorized to initiate a "**Stand Down**" is the incident commander or the General Manager or designate.
- **Failure to follow** proper Evacuation Procedures will result in Discipline.
- The following areas are considered "**Muster Stations**" (see Figure)

4.2 MEDICAL EVACUATION PLAN

In the event of serious injury, it may be necessary to remove the individual from the source of the danger and to administer emergency first aid. The Health Professional will be notified immediately in order to take charge of the situation and ensure the safe removal of the injured person to the first aid room if possible.

- The **ERT** team will respond with (Nurse / Medic) and assist as necessary with equipment, treatment etc.
- The (Nurse / Medic) and as many **ERT** team members as required will respond to the incident site. When the (Nurse / Medic) arrives at the scene, they will notify the First Aid Treatment Room.
- First Aid will be administered to casualty(s); the casualty(s) will be secured and transported to the First Aid Room. Vehicles transporting casualty(s) will have priority over any other vehicle on site.
- Once the “Mechanisms of Injury” and the patient’s condition have been assessed, a decision will be made by the (Nurse / Medic) whether a Medevac is required and decide on ground or air transportation. There are guidelines to follow to make this determination.

- As per guidelines for transportation, the "Mechanism of Injury" and/or patient condition, the (Nurse / Medic) will contact one of the following Medical facilities:

Winnipeg Health and Science Centre

Trauma team **204-774-6511** **or** **204-787-3901**

Main ER doctor in charge **204-774-6511**

Baker Lake Health Centre **867-793-2816**

Churchill Hospital **204-675-8881**

Rankin Inlet Health Care Centre - 867-645-2816

In addition: **Dr. Lee (AEM – MBK) Medical Director - will be notified.**

If a **MEDEVAC** is required, the Health Care Provider, will call one of the following airlines::

- Baker Lake Medical Clinic (**867)-793-2816**
- Rankin Inlet Medical Clinic (**867)-645-2816**

The following **INFORMATION** will be relayed to **Medical Facility** that you have reached and to **MEDEVAC** dispatcher:

- Give Patient's Name, Age, Mechanism of Injury, Nature of Injuries, and Medical Condition. Give all tests, treatment which you have done as well as ALL of the medication that has been administered to patient including the patient's past medical history and medications that he/she is taking.
- The TRANSFER sheet should be included and if possible FAX: to the Health Care Facility who will be receiving the **MEDEVAC and patient.**

If a **MEDEVAC** is required and decision is made to go with one:

- The patient will STAY in First Aid Room until his/her **Condition is stabilized.**
- Unnecessary delays will be avoided in transportation of Patient to Receiving Health Care Provider.
- When **MEDEVAC** personnel arrive on site – they will help establish the patient for air transportation.
- (Nurse / Medic) will take instructions from Medical Director and act according to his/her instructions.
- All decision/interventions will be documented with time lines.

Depending on the **MEDEVAC** Company that has been chosen, the (Nurse / Medic) may have to escort the patient to the receiving Health Care Facility.

The Official In-Charge will notify the (Nurse / Medic) when the **MEDEVAC** has arrived and landed. The (Nurse / Medic) with the help of the **ERT** team will transfer the patient into the ambulance, to the aircraft.

If the **MEDEVAC** comes to site with a **Medical crew:**

- The **MEDEVAC** team will call ahead to notify their ETA.
- The Manager on Duty or designate will ensure that a vehicle is sent to the airstrip at the ETA.
- The **Medical crew** with their equipment will be brought to the First Aid Room.
- Once the **MEDEVAC** equipment is in place, the **ERT** team will assist the **MEDEVAC Medical crew,** and (Nurse / Medic) with the transfer of the patient to the ambulance, and into the aircraft.

After the aircraft has left AEM – MBK site, the (Nurse / Medic) will notify the receiving Medical facility with the ETA to their closest airport. The **MEDEVAC** pilot will advise receiving airport air traffic controller that an ambulance is required for transportation to receiving Medical facility.

All Operations type work will be suspended until (Nurse / Medic) are back in First Aid Room. The incident scene, materials, machinery, medical equipment etc. will remain undisturbed until the investigating team has conducted the investigation. This type of incident is considered a “Reportable Incident” therefore the Mines Inspector shall be notified (without delay). The Official In-Charge will be responsible for ensure that this occurs. Under no circumstances shall any person move, or otherwise interfere with any wreckage or equipment at the scene of a “reportable incident” until an inspector has conducted an investigation of the incident and has given permission to do so.

The Official In-Charge will make all necessary calls to the outside for notification purposes: I.e.: Corporate Office notification, Mines Inspector, RCMP, etc.

If the incident is of a fatality, it is CLEAR that the Coroner or in his/her absence, the RCMP are in total control of the incident scene. The scene is to remain undisturbed until orders have been issued by either of these two authorities.

The scene will then be released to the local authorities such as the Mines Inspector for their portion of the investigation.

Upon arrival of the aircraft to the airport of the Receiving Medical Facility (other than Baker Lake), the receiving team will be notified and a designated person will call the Incident Command (control center) and update them on their arrival and the next steps to be taken. I.e.: transportation to Receiving Medical Facility.

The Receiving Medical Facility will communicate with AEM – MBK Division (Nurse / Medic) on frequent basis to update site on patient’s condition and treatment. Such as surgery required,

As soon as steps have been implemented to properly attend to the injuries, the Incident Commander will notify the appropriate authorities of the accident by telephone, providing as much information as possible. A complete accident description and investigation form is required to be submitted as soon as possible. The accident description and investigation form will be completed and submitted by the General Mine Manager. Unless some action is required to remove an immediate hazard, the site of

any serious accident will be cordoned off and remain unchanged until clearance is received from the appropriate authorities.

4.3 AIRPLANE CRASH DISASTER

Emergency Response begins as soon as an air crash is identified or reported.

- When the Meadowbank Air Traffic Controller or Meadowbank Security is notified that an approaching aircraft is having difficulty, they will immediately notify the General Manager or Designate.
- In the event of reported air crash off-site the Meadowbank Air Traffic Controller or Meadowbank Security will notify the General Manager or Designate.
- Emergency Response procedure will be initiated if required for response by ERT
- The ERT Team on scene will make a preliminary assessment and notify the Nursing Clinic.
- The Nurse or Medic, with the ERT Team, shall establish triage, treatment, transportation, communication, and staging.
- The ERT Incident Commander will direct all emergency response actions, and assess the need for additional resources keeping the Command Post updated as to all actions
- The RCMP will establish access and traffic control and assist the Coroner in body recovery and identification, if necessary.
- The Incident Commander will instruct emergency response personnel to not move debris associated with the wreckage, ie. cargo, plane remnants, passenger belongings, unless there is imminent danger of items being destroyed, or unless they inhibit access to passenger rescue.
- The Coroner/RCMP is responsible for the identification, movement and/or removal of the fatality. Unauthorized personnel are not to move the dead without express approval of the Coroner/RCMP, except when there is a question of whether the person is deceased or if the body is in danger of being destroyed. In all cases involving the movement of a body, personnel moving the body shall make careful note of the location and condition of the body for the Coroner/RCMP.
- Upon notification of an air disaster, NAV Canada will be responsible for air traffic in proximity to the scene, with immediate regulatory control of airspace around the area.

They will keep the airspace clear of intrusive air traffic, to the limits of the regulations.

Recovery:

- Recovery immediately follows emergency response. It involves direction from the General Manager or Designate.

- Maintaining access control to the scene.
- Providing emergency social services (critical stress debriefing), for employees and rescue workers.
- Investigating the accident.
- Clean-up of the crash site.

4.4 PIPELINE BREAKAGE

Pipelines will be used to transport tailings solids, reclaim water, freshwater, and domestic sewage on site. Pipeline breakage could lead to localized, short-term smothering of vegetation, the release of poor-quality water, and potentially exposure of mine personnel to infectious or toxic substances. In the event of a pipeline breakage, the following actions will be taken as required and when it is safe to do so:

- Shut off the feed to the pipeline;
- Physically contain the spill through the construction of dikes, berms, sumps and collection ditches;
- Pump collected water to the tailings reclaim pond or sewage treatment plant;
- Collect and remove solids for disposal in the tailings facility, incineration, or off-site disposal at a licensed disposal facility; and
- Monitor for residual contaminants on land and in surface water.

A general response procedure for the handling of spilled domestic sewage (infectious substances) is provided in the Spill Contingency Plan.

4.5 TOXIC GAS RELEASES

In the event of a toxic gas release, the following actions will be taken:

- Immediately evacuate the area/building and notify the incident commander;
- If possible and safety permits, turn off the source of the gas and ventilate (i.e., open windows/doors to outdoors) the area;
- Isolate the area and restrict access to ERT personnel only; and
- Implement air quality monitoring

For the mill, refer to the specific procedure *Toxic gas alarm emergency evacuation procedure*. A general response procedure for the release of compressed gases is provided in the SCP.

4.6 DIKE FAILURE

A detailed Emergency Preparedness Plan (EPP) was developed to address the consequences of failure of any of the dikes on site. The procedure was developed by the Geotechnical Engineering team with the assistance of the dike designer (Golder Associates provided the first version of the dike OMS and EPP, which was then elaborated upon by AEM) and the review of the EMC and the Satety Superintendent. The EPP for the dewatering dikes and Tailings Storage Facility are available in the Operation, Maintenance and Surveillance Manual (OMS manual) for the Tailing Storage Facilities and the Dewatering Dikes. Background information and potential failure scenarios of the dewatering dikes and Tailings Storage Facility are provided in Appendix A.

4.7 EMULSION PLANT

A detailed Emergency Response Plan (ERP) was prepared by Dyno Nobel and addresses incidents and potential incidents involving the manufacturing, handling and storage of explosives and related products in Dyno Nobel Canada Inc.' magazines, emulsion plants and worksites at Meadowbank. The ERP for Dyno Nobel emulsion plant is provided in Appendix B.

4.8 BAKER LAKE MARSHALLING FACILITY

The Baker Lake Marshaling facilities is located 2 Km., east of the Hamlet of Baker Lake and is used for the interim storage of supplies, including hazardous materials, prior to being transported to the mine site. The fuel farm at the Facility is used for bulk storage of:

60,000,000 liters of fuel

900,000 liters of Jet ''A'' fuel.

By the summer of 2013, 10 more tanks will be installed, in order to increase the Jet ''A'' fuel storing capability to a total of 1,900,000 liters.

Spill emergencies occurring at the Marshaling Facility will be handled according to the Spill Contingency Plan.

In case of any other major disaster, the primary Emergency procedures will fall under the Hamlet of Baker Lake authorities' responsibility.

By-Law no 212 (Emergency Response Plan) has already been adopted by local authorities. This By-Law for Baker Lake Hamlet's ERP plan is provided in Appendix C.

Maps and drawings of the Baker Lake fuel farm installations are also provided under Appendix C.1. and C.2.

Also, it is understood that major disaster occurring to Agnico Eagle Mines installations in Baker will be managed by RCMP's Baker Lake detachment, under Hamlet's governance as required under their contingency plans as revised on 2013-01-17

4.9 EMERGENCIES DEALING WITH REAGENTS

At Meadowbank mine site, we carry the following reagents:

- Cyanide (Sodium Cyanide)
- Copper Sulphite
- Lime (Calcium Oxide) (Quick Lime)
- Sodium Metabisulphite
- Caustic Soda (Sodium Hydroxide)
- Sulphur (Prill form)
- Nitric Acid
- Calcium Chloride (Dust Suppression)
- Flocculants
- Lead Nitrate
- Milsperse (Antiscalant)

Emergency Procedures for dealing with these reagents are found in Appendix B of this Emergency Response Plan.

SECTION 5 • REFERENCES

AMEC. December 2003. Meadowbank Gold Project Baseline Hydrology Report

Canadian Dam Association (CDA) 1999. Dam Safety Guidelines.

Canadian Standards Association. 1995. Emergency planning for industry: A national standard for Canada (CAN/CSA-Z731-95). Toronto: Canadian Standards Association.

Echo Bay Mines Ltd. 2001. Lupin Winter Road Spill Contingency Plan.

Echo Bay Mines Ltd. 2000. Winter Road Rules and Regulations.

Emergency Response Guidebook. (2008) Transport Canada

Environment Canada's Guidelines for Preparing or Reviewing an Emergency Response Plan for a Canadian Pulp and Paper Mill.

Environment Canada's Implementing Guidelines for *Canadian Environmental Protection Act*, 1999 Section 199 - authorities for requiring environmental emergency plans; the Government of the Northwest Territories' Spill Contingency Planning and Reporting Regulations; and, the Government of the Northwest Territories' Mine Health and Safety Regulations.

Environment Canada. 1994. Guidelines for preparing or reviewing an emergency response plan for a Canadian pulp and paper mill. Environmental protection series report EPS 1/PF/2. Renewable Resources Division, Industrial Sectors Branch, Environment Canada.

Environment Canada. 2001. Implementation guidelines for *Canadian Environmental Protection Act*, 1999, Section 199 – authorities for requiring environmental emergency plans. Environmental Emergencies Program, Environment Canada.

GNWT Consolidation of Mine Health and Safety Regulations R-125-95. GNWT Spill Contingency Planning and Reporting Regulations R-068-93.

Golder Associates Ltd. November 2006. Report on Bathymetric Surveys, Meadowbank Project, Nunavut.

Golder Associated Ltd. October 2008. Draft Report on East Dike Design, Meadowbank Gold Project,

Golder Associated Ltd. March 2007b. Final Report Detailed Design of Central Dike, Meadowbank Gold Project, Volumes 1 to 3.

ICOLD. 1995. Dam failures statistical analysis – International Commission on Large Dams, Paris, Bulletin 99.

NWT Water Board. January 1987. Guidelines for Contingency Planning. Government of the Northwest Territories.

SECTION 6 • LIST OF ACRONYMS

AEM	Agnico-Eagle Mines Limited – Meadowbank Division
AWPAR	All Weather Private Access Road
CDA	Canadian Dam Association
DFO	Fisheries and Oceans Canada
ECC	Emergency Coordination Centre
EIA	Environmental Impact Assessment
EMS	Environmental Management System
EPP	Emergency Preparedness Plan
ERG	Emergency Response Guidebook
ERP	Emergency Response Plan
ERT	Emergency Response Team
FoS	Factors-of-Safety
GN	Government of Nunavut
HAZCOM	Hazard Communication
HMMP	Hazardous Materials Management Plan
HR	Human Resources
HSC	Occupational Health & Safety Committee
IATA	International Air Transport Association
ICC	Incident Command Centre
INAC	Indian and Northern Affairs Canada
KIA	Kivalliq Inuit Association
MMER	Metal Mining Effluent Regulations

MSDS	Materials Safety Data Sheets
MSHA	Mine Safety and Health Administration
NWB	Nunavut Water Board
OHSA	Occupational Health and Safety Administration
OHSP	Occupational Health & Safety Plan
PPE	Personal Protective Equipment
SCP	Spill Contingency Plan
TDG	Transportation of Dangerous Goods
TSF	Tailings Storage Facility
WCB	Worker's Compensation Board
WHMIS	Workplace Hazardous Materials Information System

APPENDIX A

Dike Failure Scenarios

A.1 Dewatering Dikes

A.2 Central Dike

A.3 Saddle Dams

A.4 Storm water Dike

Appendix A.1

Dewatering Dikes

Dewatering Dike System

The Dewatering Dike System includes the East Dike, Bay Goose Dike, South Camp Dike and Vault Dike as shown on the general mine site plan provided at the beginning of this document. The dike construction for East Dike and Bay Goose Dike involved the dumping of rockfill into water to create the shells of the dikes, excavation through rockfill and lakebed soils to bedrock, placement of granular filter and core materials, dynamic compaction, construction of the cut off wall using slurry supported trench techniques and grouting of the bedrock and contact between the cut off wall and bedrock using cementitious grout. South Camp Dike and Vault Dike both include a bituminuous liner and a key trench cut-off to make the structure impermeable. East Dike and Bay Goose Dike have crest widths in excess of 50 m and are not used by haul trucks during normal mine operation. South Camp Dike and Vault Dike have crest widths in excess of 25 m and may be used as haul roads during normal mine operation.

East Dike and Bay Goose Dike are considered high consequence structures, based on Canadian Dam Association (CDA, 2007) Dam Safety Guidelines. South Camp Dike is considered to be a significant consequence structure, based on Canadian Dam Association (CDA, 2007) Dam Safety Guidelines. Vault Dike is considered to be a low consequence structure, based on Canadian Dam Association (CDA, 2007) Dam Safety Guidelines. The dikes are relatively low, wide structures that exceed the minimum design criteria factors-of-safety (FoS) for stability for pre-drawdown conditions, operation conditions with maximum head difference across the dikes, pseudo-static earthquake conditions, and post closure conditions. Consequently, the probability of dike failure is considered to be low provided that the dikes are constructed according to the design. Mitigation against failure of the dikes includes a quality control and quality assurance program during construction, and an ongoing program of dike surveillance and monitoring during operations, as specified in the design.

For information on the consequences and monitoring/action for the various embankment failure modes possible at the Dewatering Dikes see Table A.1 below.

East Dike

The East Dike was constructed in 2008, with foundation grouting continuing into early 2009. The East Dike has a crest length of 800 m, including abutments, and was constructed in water with a maximum water depth to bedrock at the cut off of 7.2 m. The crest of the East Dike is at elevation 137.1 m and the average lake level along the dike is 133.1 m. The main components of the East Dike include a rockfill shell, a granular core with downstream filter zone, a soil-bentonite cut-off wall through the densified granular core zone to the underlying foundations, and a grout curtain from the base of the cut-off wall into the underlying bedrock.

During operations, the East Dike separates the eastern portion of Second Portage Lake from the Portage Pit and the Tailings Storage Facility behind the Central Dike. Following closure, the East Dike will remain as a permanent structure that will separate Third Portage Lake (El. 134.1 m) from Second Portage Lake (El. 133.1 m) and maintain the existing water elevation difference of 1 metre.

The East Dike is approximately 800 m in length through an average water depth of approximately 2.3 metres, and a maximum water depth to bedrock of about 7.2 m. Crest width is approximately 55 metres. Minimum setback from the Portage Pit (distance between dike toe and pit crest) is greater than 170 metres.

Bay Goose Dike

The Bay Goose Dike together with the South Camp Dike isolates the Bay-Goose Pit from Third Portage Lake. The Bay Goose Dike acts as a permanent structure to allow mining of the Goose Pit and the southern portion of Portage Pit. The main components of the Bay Goose Dike include a rockfill shell, a granular core with downstream filter zone, a soil-bentonite and cement-soil-bentonite cut-off wall through the densified granular core zone to the underlying foundations, a jet grouted wall between the base of the cut-off wall and bedrock where the cutoff wall was not constructed on bedrock, and a grout curtain from the base of the cut-off wall or jet grouted wall into the underlying bedrock.

The Bay Goose Dike is approximately 2,200 m in length, and was constructed in water depths less than 9 metres at the cut off. Crest width varies between approximately 85 and 100 m. Minimum design setback from the Portage and Goose Pit is 70 metres.

South Camp Dike

The South Camp Dike covers a narrow channel within Third Portage Lake and in conjunction with the Bay Goose Dike isolates the Bay Goose Pit from Third Portage Lake.

The South Camp Dike is located south of the plant site area and is used to connect the mainland to South Camp Island. It covers a narrow channel, approximately 60 m in width, where water depths were between 0.5 and 1 m.

The South Camp Dike was primarily constructed between April and June of 2009, prior to ice breakup. During the winter of 2009-2010 additional thermal capping material and rockfill for the haul road was added to the dike. The South Camp Dike has a broad rockfill shell with a bituminous geomembrane liner installed on the upstream side of the shell. The liner was founded on native frozen (permafrost) till material, in a trench approximately 3 to 5 m below the lakebed surface. Compacted granular material mixed with bentonite was placed above the toe of the liner. The haul road is located on the downstream side of the dike. The South Camp Dike is approximately 85 m in length through water depths between 0.5 and 1m. Crest width is approximately 25 metres.

Vault Dike

The construction of the Vault Dike at Meadowbank was conducted from February 2013 to March 2013. Vault Dike is located across a shallow creek which connects Wally Lake and Vault Lake, at the Vault Pit area approximately 8 km north of the main Meadowbank site. Vault Dike is essential to allow the dewatering of Vault Lake and to isolate Vault Pit from Wally Lake during mining activities.

Vault Dike is designed and constructed as a zoned rockfill dam with filter zones, an impervious upstream liner consisting of a bituminous membrane, and an upstream key trench made of aggregate mixed with bentonite. The filter zones minimize seepage and internal erosion and facilitate seepage collection. Vault Dike includes a key trench at the base of the upstream side filled with a 0-25 mm fill amended with bentonite surrounding the liner. Coarse and fine filter material was placed on the upstream slope as geomembrane bedding. The bulk part of the dike consists of coarse rockfill material. The embankment crest is at El. 142.4 m and the upstream toe is at approximately El. 139.4 m. The downstream toe is at approximately El. 139.6 m and the bottom of the key trench ranges from El. 135.6m to El. 142.3m, with an average height of El. 137.0m. The upstream and downstream fill

slopes of the dam are 1.5H: 1V. The Vault Dike is approximately 275 m in length through a maximum water depth of 1 m. The crest width is approximately 25 metres.

Table A.1: Meadowbank Dewatering Dikes Summary of Consequences and Proposed Monitoring/Action for Rare Events Based on Water Retaining Embankment Failure Modes Identified in ICOLD Study (1995)

Failure Mode	Scenario	Consequence	Monitoring/Action
Overtopping	(1) Lake level rise because of restricted outflow from Third Portage, Second Portage Lake or Wally Lake (excessive inflow is a far less likely scenario).	Water spilling over the crest. The crest is wide and comprises coarse rockfill. Significant damage to the dike is not credible, based on performance of other rockfill structures subjected to overtopping or flow through events. Mining operations might need to be suspended, but there will be considerable warning time given the design freeboard and the storage volume within the lakes.	Lake levels should be part of safety information provided to mine management. Outflow channels should be inspected weekly during thaw, open water season, and during ice break-up. If overtopping is likely, a temporary spillway could be constructed and armoured to control and localize flow at shallow dike sections.
	(2) Dam crest settles more than 2m over a distance of (say) 50m or so. This scenario requires extensive loss of support in the foundation since the rockfill of the dikes is essentially not settlement prone itself. For foundation settlement of this magnitude to occur, a piping event must develop and which in itself might be a failure mode. Or, there would have to be an unexpected layer of compressible soil in the foundation.	Same as (1).	The situation envisaged in this scenario should develop slowly with crest settlement evident at least several weeks before a run-away event develops. Easily observed cracks should be evident. Monitoring of crest settlement is appropriate, and is included in the design. Rockfill and till available from the mining operation can be placed to raise the dike crest.
Internal Erosion	(1) Dike Section: Cut off wall, cut off key trench or bituminuous liner is defective, allowing high water flow across the wall. This defect occurs at a deep water location where the core backfill and filters are segregated and permeable; the combination allows erosion of the cut off wall and increasing seepage.	The cut off wall will develop a progressively increasing void ratio, thereby increasing the rate of water flow through the dike. This is not a catastrophic failure mode as the rockfill shoulders of the dike will be stable, and at its worst, would lead to temporary suspension of mining.	Monitor seepage from downstream face for rate of seepage, and for presence of sediment in seepage. Will become evident as localized intensive seepage at dike toe and can be repaired. May also see settlement in the cut off wall. Will be most likely in deep water sections. Gradients across the cut off wall in shallow water are not high enough to cause piping.
	(2) Dike Section: Cut off wall loses bentonite because of improper construction.	Same consequences as erosion because of defect, as above.	Bentonite makes up 2% of the cut off wall fill. Loss of this material will increase the permeability of the cut off wall and increase the rate of seepage.

Failure Mode	Scenario	Consequence	Monitoring/Action
	(3) Foundation: Till is possibly non-uniform with more transmissive zones and not self-filtering. It is possible that one of these zones may align with defective construction of the core backfill and defective construction of the cut off wall allowing high flows. Seepage along the transmissive zone beneath the downstream rockfill section could erode the foundation tills at the downstream toe or flow into the downstream rockfill because of the lack of filtering.	Limited seepage at the toe or into the rockfill would accelerate into a large inflow, and could lead to the undermining of the dike if no action was taken. This is a credible catastrophic failure mode if increased seepage is not detected in time.	No particular instrumentation is needed as this failure mode will show itself as localized and increasing seepage. It could be detected by walk-over inspection by an experienced engineer or technician. Remedial action could comprise a reverse filter and rockfill buttress depending on location of the flow and configuration of the foundation, freezing, or grouting if identified in time. Quality control of cut off is important, and most important for deep water sections. In the worst case, the pit may be deliberately flooded in a controlled manner, the cut off repaired, and the pit dewatered.
Seepage within Embankment	Seepage on its own is not a credible failure scenario. The downstream rockfill shell has extremely high flow through capacity. The rockfill zone is both large and pervious, so that seepage will daylight on the downstream face and lead to instability. Any seepage related failures must include internal erosion, see above.	No credible consequences. May require upgrade of the seepage collection system. May need to suspend mining activities while reducing seepage.	Seepage monitoring program.
Seepage within Foundation	Defective construction of cut off leading to transfer of unexpectedly high fraction of the reservoir head into the downstream part of the dike foundation, or leading to a piping event as above.	This failure mechanism has caused embankment failures elsewhere because of straightforward pore pressure induced instability. However, it is unclear that it could cause failure of the Dewatering Dikes because of their large width compared to the retained water head. The most likely consequence is downstream toe slumping requiring a localized stabilizing berm before the crest roadway could be reinstated.	If this mechanism arises it should show itself during initial dewatering or very shortly thereafter.

Failure Mode	Scenario	Consequence	Monitoring/Action
Internal Conduit Rupture	There are no water off take works or other structures extending through the dikes.	Not applicable.	Not applicable.
Slope Instability	(1) Normal Operation: The rockfill shoulders of the dikes are wide and have high shear strength, making it a conservative design. Slope failure requires failure in the foundation and which would then extend into the overlying dike. Sliding failure is considered unlikely given the low horizontal forces generated by water and ice forces relative to the normal frictional force due to the weight of the dikes and the friction angles of foundation materials	A foundation failure would cause a rotational slip or sliding failure until equilibrium was reached. This mechanism would limit access along the dike until repaired. Failure through the rockfill shoulders will not necessarily compromise the water retaining function of the dikes. Failures which reach the core may cause failure.	This mechanism should develop during construction or dewatering, due to increase in load and associated pore water pressure increase. Initial stages of failure should be observable as tension cracks in the dike crest. Walk-over inspection of the dikes by a trained inspector is an appropriate monitoring strategy. Survey of crest, face, and toe is also appropriate. Stabilizing berms can be placed inside the dikes or through water along the upstream shoulder.
	(2) Earthquake Induced: Occurrence of an extreme earthquake, much in excess of the current understanding of seismicity of the area.	The extreme earthquake loading for this site is a low magnitude. Settlement of the dikes could occur in the event of a large earthquake. Dynamic compaction of the core during construction may have subjected the rockfill shells to accelerations equivalent to the expected earthquake loading. This would not be a failure situation. The crest is also erosion resistant for any earthquake induced wave action in the impounded water.	Dike inspection following earthquakes felt on site.

Failure Mode	Scenario	Consequence	Monitoring/Action
Failure of Cut off Wall or Bituminuous Liner Due to Movement of the Dikes	Differential horizontal movement of dikes due to water or ice loading, or pit wall failure. Creates a breach in the cut off wall, cut off key trench or bituminuous liner. Ice and water forces are not credible due to the ratio of frictional forces generated by the weight of the dike versus ice loads and water pressure. Pit wall failure involving the dike unlikely based on assessments of pit wall stability and setback distance between the pit and the dikes.	Large inflows through the breach. Pit would flood requiring suspension of mining activities. Potential for loss of life for workers inside dikes.	No enhanced monitoring. Prism monitoring program sufficient. If the pit floods, then repairs to cut off or bituminuous liner would be done prior to dewatering.
Unexpected Settlements	Unexpected foundation soils consolidate during dike construction. A significant quantity of clay that was not recognized during foundation excavation would be required to generate settlement required for a water release event. Settlement of the core will be limited by dynamic compaction.	2 m of core settlement would be required to allow water flow through the rockfill and over the settled core. This flow would not cause failure of the rockfill shells. It would also be readily repaired by placing more end-dumped till into the settled zone.	No enhanced monitoring required, as settlement would be apparent from prism monitoring data and visual inspection. Excessive settlements may be remediated by excavating rockfill above the core and placing more till. Soil conditions will be observed during construction, and design revised to accommodate actual conditions.

A.1.1 Failure Scenario during Operations

The 'worst-case' scenario for failure of the dewatering dikes during operations would involve a movement of the dikes that compromises the integrity of the cut off wall, cut off key trench or bituminous liner. However, the rockfill has a very high flow-through capacity and a high strength and will not move unless the foundation is involved. The water will flow through the upstream rockfill first, then through the core and cut off wall, cut off key trench or bituminous liner, and finally through the downstream rockfill berm. Flow through cracks opening in the foundation may erode the foundation soils and the core. The upstream rockfill will choke the flow to some degree, and flow will decrease once the downstream toe of the dike is inundated and the head difference across the dike begins to reduce.

Although this describes a 'worst-case' scenario, a catastrophic failure of the pit dewatering dike system is not considered a credible failure mode. Elements of the dike design, including the width of the dike section, and the inclusion of filters, in addition to the cut off wall, cut off key trench and bituminous liner make catastrophic failure of the dike highly unlikely. However, for the purposes of this document, the effects of such a failure are described below.

Potential Effect

In the case of East Dike, the worst-case scenario would be associated with the short portion of the dike through the deepest water along the alignment at the centre of the dike. In this area the water depth is as much as 7 m to bedrock at the cut off wall within the dike. This inflow could potentially result in loss of workers caught in flowing water. Breach of the East Dike would be unlikely to trap workers in the pit when access ramps are on the west side, opposite the inflows. Breach of the East Dike would result in cessation of mining, either temporarily or permanently.

Upon completion of the East Dike and dewatering of the northwest arm of Second Portage Lake, there was approximately 17 million m^3 (Mm^3) of water remaining in Second Portage Lake. If the segment of dike at the deepest portion were suddenly removed, flow from Second Portage Lake into the pit would continue until the elevation of the lake drops by several metres, at which time the current lake bottom would be exposed and would act as a barrier to flow towards the pit. This scenario is the worst in the final year of pit operation when pit volume is the largest. The volume of water associated with this drawdown would be on the order of about 10 Mm^3. Some erosion of the till between the pit crest and dike toe would be expected, so the depth of water loss from the lake may be larger, but this would take some time to fully develop.

Inflow to the pit could expose large amounts of shoreline and shoal habitat around the lake. Water flowing into the pit could entrain suspended solids and dissolved constituents from the dike material and pit walls. If necessary, the water could be retained within the pit and diked area and would be amenable to treatment (e.g., particle settling, in-situ amendment) before discharge, should it be required.

The ecological effects of the exposure of shoreline and shoal habitat on fish and fish habitat would be to temporarily eliminate spawning areas and result in reduced water quality from exposure of sediment to wave and wind induced erosion. The effect of this would last approximately one year as inflow from Third Portage Lake to Second Portage Lake averages 10 Mm^3 annually (AMEC, 2003). Presuming that the dike breach is repaired, water levels in Second Portage Lake would rise over the

spring and summer to return to pre-breach elevations and would re-fill the lake in the event of a 'worst-case' scenario.

In the case of Bay Goose Dike, the worst-case scenario dike breach that could allow the greatest amount of water inflow would be associated with the southeast segment of the dike through the deepest water along the alignment. In this area, water depth is as much as 20 m deep at the cut off, and the pit could be as deep as 130 m. This inflow could potentially result in loss of workers caught in flowing water. Breach of the Bay Goose Dike would be unlikely to trap workers in the pit when access ramps are on the northwest side, opposite the inflows. Breach of the Bay Goose Dike would result in cessation of mining of the Goose Pit, either temporarily or permanently.

In the unlikely event that such a failure of the Bay Goose Dike were to occur, the rate and volume of water entering the downstream pit would depend on the magnitude of the breach and the length of time to repair the breach. Third Portage Lake has an estimated volume of 446 Mm^3 (Golder, 2006). The final volume of Portage Pit (30.0 Mm^3) is roughly 6.7% of the volume of the lake, while Goose Pit (14.8 Mm^3) is approximately 3.3% of the volume. In the case of a catastrophic breach of the Bay Goose Dike, the estimated Third Portage Lake water level drawdown would be approximately 1.0 m and 0.5 m, respectively assuming that the failure occurs when the pits are completely excavated and a complete filling of the pits. These estimated worst-case scenario changes in water level are comparable to the mean average annual difference between high and low water (0.3 m) on Third Portage Lake.

There would be a small impact to fish and fish habitat in Third Portage Lake in the event of a 0.5 m to 1.0 m drop in water level. Areas used for spawning may be slightly nearer to the ice cover and a small amount of habitat might be vulnerable to freezing. Water quality within the pit would be temporarily impaired from an increase in suspended and dissolved solids, although water quality would return to near background during the first winter as sediment would settle under the ice cover.

In the case of South Camp dike, the worst-case scenario dike breach that could allow the greatest amount of water inflow would be associated with the centre segment of the dike through the deepest water along the alignment. In this area, the water depth is only a maximum of 1 m. This inflow could put the workers at risk at the site on a temporary basis and a potential loss of life between 0 and 10 due to workers caught in flowing water. Breach of South Camp Dike could eventually result in cessation of mining, either temporarily or permanently.

If the segment of dike at the deepest portion were suddenly removed, flow from Third Portage Lake into the pit would continue until the elevation of the lake drew down slightly as South Camp Dike retains a maximum depth of 1 m of water. The impact of a potential failure would likely be limited.

Inflow to the pit could expose a limited amount of shoreline and shoal habitat around the lake. Water flowing into the pit could entrain suspended solids and dissolved constituents from the dike material and pit walls. If necessary, the water could be retained within the pit and diked area and would be amenable to treatment (e.g., particle settling, in-situ amendment) before discharge, should it be required.

The ecological effects of the dike failure will probably have no significant fish or wildlife habitat, affected or deteriorated. Presuming that the dike breach is repaired, water levels in Third Portage Lake would rise over the spring and summer to return to pre-breach elevations and would re-fill the lake in the event of a 'worst-case' scenario.

In the case of Vault dike, the worst-case scenario dike breach that could allow the greatest amount of water inflow would be associated with the centre segment of the dike through the deepest water along the alignment. In this area, the water depth is only a maximum of 1 m. This inflow could put the workers at risk at the site on a temporary basis and a potential loss of life between 0 and 10 due to workers caught in flowing water. Breach of the Vault Dike could eventually result in cessation of mining, either temporarily or permanently.

If the segment of dike at the deepest portion were suddenly removed, flow from Wally Lake into the pit would continue until the elevation of the lake drew down slightly as Vault Dike retains a maximum depth of 1 m of water. The impact of a potential failure would be limited.

Inflow to the pit could expose a limited amount of shoreline and shoal habitat around the lake. Water flowing into the pit could entrain suspended solids and dissolved constituents from the dike material and pit walls. If necessary, the water could be retained within the pit and diked area and would be amenable to treatment (e.g., particle settling, in-situ amendment) before discharge, should it be required.

The ecological effects of the dike failure will probably have no significant fish or wildlife habitat, affected or deteriorated. Presuming that the dike breach is repaired, water levels in Wally Lake would rise over the spring and summer to return to pre-breach elevations and would re-fill the lake in the event of a 'worst-case' scenario.

Mitigation, Management, and Monitoring

A major cut off breach scenario due to pit wall movement, while possible, has a low probability of occurrence in East Dike or Bay Goose Dike. If foundation movement was sufficient to compromise the cut off wall, then the core backfill would act as a semi-permeable element and limit flow. Water would first need to flow through the rockfill shell, the core backfill, the damaged cut off wall, and then through more of the core, filters, and the downstream rockfill. Provided that the downstream filter elements against the rockfill shell are properly constructed, then migration of the core and cut off wall into the rockfill will not occur. Some additional seepage may occur due to failure of the cut off wall; however this would be noted during regular monitoring. Mitigation could be by jet grouting, freezing, or installation of sheet piling through the cut off wall.

The use of appropriately graded filters in the design of dikes and dams is standard engineering practice, and is the key to preventing internal erosion. The dike design includes the use of a two zone filter on the upstream face of the pit side rockfill. During the construction of the dikes a quality control and quality assurance program was undertaken.

Routine visual inspection of the dikes is to be conducted on a regular basis to document any changes in the dikes.

During the operation of the dikes, a series of monitoring instrumentation will be installed, including:

- Thermistors to monitor the thermal regime in the dike and foundations;
- Slope inclinometers and prisms to monitor deformations within the dikes; and
- Piezometers to measure pressure and to infer flow through the dikes.

Piezometers downstream of the cut off wall would be monitored for pressure changes as the pits are deepened. Increasing pressure would indicate that less head loss is occurring across the seepage cut off, which might indicate that a crack has formed, permeability is increasing, or the pit is experiencing inflows from some other potential flow pathway. The instrumentation will be monitored to identify any potentially problematic areas relating to dike instability. Mitigation measures for seepage and piping could include:

- Additional pressure grouting of bedrock materials;
- De-pressurization wells;
- Construction of a slurry cut off wall within the core just upstream of the suspected seepage area;
- Jet grouting of the core and foundation in the suspected seepage or crack area;
- Construction of a cutter soil mixing (CSM) wall in the suspected crack area;
- Freezing;
- Installation of toe drains; and
- Construction of interceptor ditches within the down-stream overburden materials.
- Allow pit to flood, install new cut off or bituminous liner under no-flow conditions, then dewater and resume mining.

Specific monitoring and mitigation strategies have been be developed as part of an Operations Plan (OMS Manual) for the dewatering dikes.

A.1.2 Failure Scenario during Closure

At end of mine life, once the water quality of the pit lake has been determined to be suitable for release, a portion of the south end of the Bay-Goose Dike will be removed resulting in a hydraulic connection between the Goose/Portage Pit Lake and Third Portage Lake. The East Dike will be the only dike that will remain in service. The elevation of the pit lake will be equal to Third Portage Lake. The elevation difference between the pit lake and Second Portage Lake will be approximately 1 m. Consequently, there will be a low hydraulic gradient from the pit lake towards Second Portage Lake. During the closure and post-closure period, the natural central and east channel outlets that connect Third Portage to Second Portage Lake will continue to carry the entire flow between the two lakes.

Potential Effect

A breach of the East Dike would create an additional outlet and cause water to leave the Portage/Goose pit area and spill into Second Portage Lake at a greater rate, partly at the expense of flow from the central and east channel outlets. This would cause a rise in water level in Second Portage Lake and a reduction in level in Third Portage Lake. The additional water would flow through the channel connecting Second Portage Lake to Tehek Lake until the water elevations in Second and Third Portage lakes equilibrated.

In the event of such a scenario, water would flow from Third Portage Lake, northward through the pit lake area, and then east through a potential East Dike breach and into Second Portage Lake. There is a naturally large outlet capacity via the connecting channel from Second Portage to Tehek Lake. Water residence time in Second Portage Lake during and after mine development is less than one year. Thus, in the event of an East Dike breach, any additional water added to Second Portage Lake would leave the system relatively quickly. Given the flow-through nature of the lake there would be little net change in Second Portage Lake volume or lake elevation as water would easily be absorbed into the much larger Tehek Lake.

Drawdown of Third Portage Lake would be limited, given the large size of the lake (33 km^2) and the constriction points within the system that would slow drawdown. Specifically, the magnitude of drawdown in the event of a breach would depend on the magnitude and depth of the breach, time of year (winter ice cover would prevent loss of water), response time, flow rate (i.e., the loss of water depends on the location of the breach and friction through the system), and the outlet capacity of Second Portage Lake. For example, total annual average discharge from Third Portage to Second Portage Lake is approximately 10 Mm^3 with a mean annual difference in water level between spring and fall of 0.3 m. Given the large size of Third Portage Lake, a breach resulting in the loss of 10 Mm^3 of water, which is equivalent to an entire open water season of runoff through all discharge channels would result in a drawdown of only about 0.3 m. Maximum drawdown would be one metre.

Reductions in water level would therefore be small and have only minor impacts to fish habitat in Third Portage Lake. Adverse impacts to water quality would not be expected given that water quality within Goose/Portage pits is expected to be very high.

Mitigation, Management and Monitoring

Internal erosion of the cut off wall could result in an increase of the rate of water flow through the East Dike. However, this is extremely unlikely due to the low hydraulic gradient across the East Dike (~ 1 m of head difference) and the filter effect of the core backfill. Such a scenario is more likely to occur during the operational phase of the East Dike when the hydraulic gradient across the dike section is much higher, though in the opposite direction. If such a scenario were to occur, it would not be considered a catastrophic failure mode due to the stability of the rockfill shoulders comprising the outside structural elements of the dike.

A breach in the East Dike during closure could be managed by the placement of material to reduce the flow of water and reduce potential erosion of the till core. The hydraulic gradient across the dike at closure is low. The dike could be repaired and hydrologic conditions restored without any danger to the overall stability of the dike, provided annual monitoring is carried out following closure.

Appendix A.2

Central Dike

Central Dike

The Central Dike system is comprised of a Central Dike, a series of perimeter dikes, and the natural basin of the northwest arm of Second Portage Lake, as shown on the general mine site plan provided at the beginning of this document. The Central Dike cross-section consists of:

- A rockfill embankment, constructed from run-of-mine waste rock, placed in lifts and compacted, with the upstream face designed at 3H:1V and 2H:1V and the downstream face designed at a 1.5H:1V slope;
- An upstream two zone granular filter and inverted granular filter along the foundation;
- A bituminous liner with appropriate cover on the upstream face and part of the foundation;

A central or upstream key trench; The Central Dike is a high consequence structure, based on Dam Safety Guidelines (CDA, 2007). Slope stability analyses show that the dike will meet or exceed design FoS for stability under static and pseudostatic earthquake load conditions. Consequently, the probability of failure of the Central Dike is considered to be very low.

For information on the consequences and monitoring/action for the various embankment failure modes possible at the Central Dike see Table A.2 below.

Table A.2: Meadowbank Tailings Storage Facility Summary of Consequences and Proposed Monitoring / Action for Rare Event Based On Water Retaining Embankment Failure Modes Identified in ICOLD Study (1995)

Failure Mode	Scenario	Consequence	Monitoring/Action
Overtopping	(1) Pond Level rises because of restricted outflow (excessive inflow is a far less likely scenario). Water will spill at the low point on the dike system, which will depend on the construction schedule.	Water spills over the crest but, as this crest is both wide and comprises coarse compacted rock fill, minimal damage to the dike is credible. There will be considerable warning time prior to overtopping given the design freeboard and the storage volume.	Adjust decant and/or deposition rate. Add spillway in Central Dike, Saddle Dam, or natural ground.
	(2) Dam crest settles more than available freeboard over a distance of (say) 50m or so. This scenario requires unexpected foundation condition, such as glacial lake clay deposit. Settlement would occur upon placement of rock fill during dike raise construction. Freeboard is greatest immediately after a raise and this scenario is therefore unlikely to occur.	Water and tailings spill over crest and if settlement was rapid might erode the crest. Travel of tailings will be dependent on volume of water available, and level of thaw. Tailings would only go to the pit, and not reach the lake.	The situation envisaged is unlikely. This scenario would develop slowly during construction of the dike. Crest settlement would be evident at least several weeks before an overtopping event occurred. Easily observed cracks should be evident during summer period, but could be hidden during the winter. Systematic crest settlement monitoring is appropriate, and included in the design. Production and addition of tailings to the Tailings Storage Facility could be stopped to maintain freeboard. A spillway could also be constructed. The tailings deposition plan maintains a long beach between the dike and the pond, which provides additional freeboard to overtopping of the dike by pond water.

Internal Erosion	(1) Dike Section: Upstream bituminous liner contains defects arising from undetected damage during installation. May lead to loss of water, but filter retains tailing.	Loss of water into the rock fill. This is not a catastrophic failure mode, because the rock fill of the dike will be stable, and at its worst, would lead to temporary suspension of mining. Plus the bituminous liner does not propagate a tear like a plastic liner, so undetected damage is typically small and does not grow. Also, the foundation slopes down towards the tailings, so seepage impounds in the rock fill and will tend to reduce further seepage	Not necessary to monitor directly. Will become evident as possible seepage at dike toe. QA/QC program during construction is the main defence against this scenario.
	(2) Dike Section: Upstream bituminous liner contains defects arising from undetected damage during installation. This defect occurs at the same location as a filter defect.	Loss of tailings and water into the rock fill. This is not a catastrophic failure mode, because the rock fill of the dike will be stable, and at its worst, would lead to temporary suspension of mining. Accumulation of ponded water within the rock fill would decrease the head difference driving flow, thereby limiting the potential for a catastrophic failure.	Not necessary to monitor directly. Will become evident as possible intensive seepage at dike toe, and potentially as tailings fines within seepage downstream of the toe. QA/QC program during construction is the main defence against this scenario.
Seepage within Embankment	Seepage on its own is not a credible failure scenario. The rock fill is pervious so seepage will daylight on the downstream face. Flow through the rock fill will not lead to instability. Any seepage related failures must include internal erosion, see above.	No credible consequences.	No scenario specific monitoring required.
Seepage within Foundation	If the till foundation had a zone of more pervious soil (e.g. gravel seams) and the more pervious zone was preferentially exposed to water pressure, then normal seepage would transmit an unexpectedly high fraction of the reservoir head into the downstream part of the dike foundation. This scenario requires construction defects in filters, liner, and cut off trench fill.	This failure mechanism has caused other embankment failures elsewhere because of straightforward pore pressure induced instability. However, it is unclear that it could cause failure of the Central Dike because of its large width compared to the retained water head. The most likely consequence is downstream toe slumping requiring a localized stabilizing berm.	If this mechanism arises it should show itself gradually as the tailings and water level increase in the basin by buildup of pore water pressures in the foundation. This would be detected during routine monitoring of piezometers installed in the foundation. Pressure relief wells could be installed in the foundation during operations. The tailings deposition plan maintains a long beach between the pond and the dike. This will reduce seepage gradients beneath the dike. In addition, the tailings act as an upstream blanket on the bottom of the TSF to limit seepage into the foundation.

Internal Conduit Rupture	There are no water off take works or other structures extending through the dikes.	Not applicable.	Not applicable.
Slope Instability	(1) Normal Operation: The rockfill has high frictional strength and the design widths make it conservative. Slope failure requires failure in the foundation, which would then extend into the overlying dike.	A foundation failure would cause a rotational slip or sliding failure until equilibrium was reached. This mechanism would limit access along the dike until repaired. Failure through the rock fill will not necessarily compromise the tailings or water retaining function of the dike.	Initial stages of failure should be observable as tension cracks in dike crest and movement at dike toe. Walk-over inspection of dikes by a trained inspector is an appropriate monitoring strategy. Survey of crest, face and toe is also appropriate. If movements associated with increases in foundation pore pressures are discovered, then construction could be stopped or staged to allow pore pressure dissipation. Placement of rockfill as a downstream toe berm could help prevent failure.
	(2) Earthquake Induced: Occurrence of an extreme earthquake, a very rare event.	The extreme earthquake loading for site is a low magnitude event. A large earthquake would not be expected to cause a catastrophic failure, rather the dike would settle. The Central Dike rock fill is placed in the dry and compacted, and will therefore have limited settlement. This would not be a failure situation. The crest is also erosion resistant for earthquake induced wave action in the impounded water.	No monitoring is necessary. Dike should be inspected following any earthquakes felt on site.
Liner Failure Due To Foundation Movement	Differential horizontal movement of the dike due to pit wall failure. Creates a breach in the liner and filter. Pit wall failure is unlikely based on assessments of pit wall stability and the setback between the pit and the toe of the dike. Also, the liner and rock fill can withstand significant deformation, making this an unlikely scenario.	Tailings and water escape into the dike rock fill, but pond there because the foundation slopes towards the dike, rather than the pit. It is noted that the tailings pond is operated approximately 500 metres away. Rapid escape of water will therefore be limited.	No enhanced monitoring. Prism monitoring program and visual inspection sufficient. Movement would be evident in setback area between dike and pit. Tailings at face of dike may be excavated to allow repair of liner, or placement of filter material. Other options include freezing tailings at face of dike.
Unexpected Settlements	The foundation till is expected to consolidate during construction and operations. There is no credible mechanism for a large degree of unexpected settlement following construction required to eliminate freeboard and release tailings/water.	A large settlement could lead to water flowing through the rock fill, but this would not cause failure of the rock fill. It could also be readily repaired by placing more end-dumped rock fill, and extending the liner, in a manner similar to the periodic raise.	No enhanced monitoring required, as excessive settlement would be apparent from prism monitoring data, and visual inspection.

A.2.1 Failure Scenario during Operations

In the case of failure of the Central Dike during operations, the 'worst-case' scenario would involve a flow of unfrozen water and tailings in association with a catastrophic failure of the dike in the later stages of mining when personnel and machinery are working in the open pit directly down-stream of the Tailings Storage Facility (TSF).

Potential Effect

The failure of the Central Dike could result in the sudden release of dike material and tailings from the TSF into that portion of the Portage Pit immediately adjacent to the dike. This could potentially result in loss of life. This would result in cessation of mining activities, either temporarily or permanently.

There would be no effect on the receiving environment water quality, fish or fish habitat because tailings would be contained within the pit and the dewatering dikes and the area would not yet be flooded.

Mitigation, Management and Monitoring

The calculated FoS for this failure mode, under static and pseudo-static conditions, are above design criteria in the Dam Safety Guidelines (CDA, 2007). Consequently, the probability of such a failure developing is low. Based on the tailings deposition plan, it is expected that the tailings pond will typically be 500 m or more from the face of the Central Dike. Furthermore, thermal modeling indicates the tailings and Central Dike will be frozen or partially frozen, and that the facility will tend to the frozen state in the long term. Therefore, a catastrophic failure of the Central Dike without some form of prior dam distress providing a warning of deteriorating conditions is not considered a credible catastrophic failure mode.

Mitigation against such a failure mode occurring will be to construct the Central Dike to design so that it is physically stable under all loading conditions. A comprehensive quality control and quality assurance program will be undertaken during dike construction to confirm foundation conditions, material type and quality, and to adjust designs as necessary to accommodate actual or unexpected conditions found at site.

- A management plan was developed for the operation of the tailings facility, and includes appropriate operational controls and monitoring activities. During operations, instrumentation will be installed to monitor not only the physical performance of the Central Dike itself, but also the performance of the TSF. The instrumentation installed and to be installed includes thermistors to monitor the thermal regime in the dike and foundations, and deposited tailings.

- Piezometers to measure pressure and to infer flow through the dike and foundation materials

- Prisms to monitor deformations within the dike.

If necessary, the stability of the foundation materials and of the dike during operations can be enhanced through the construction of a stabilizing toe berm or through freezing.

A.2.2 Failure Scenario during Closure

In the case of failure of the Central Dike during or following closure, the 'worst-case' scenario would involve a catastrophic failure of the dike and the release of tailings into the lake.

Potential Effect

Failure of the Central Dike during or following closure is not expected to result in loss of life, as mining operations will have finished.

Under this scenario, a catastrophic failure of the Central Dike could result in the sudden and unexpected release of dike material and tailings into the Portage Pit lake area. This could potentially produce a wave of sediment laden water that could over-top the East Dike.

Such a scenario would destroy fish habitat along the dike face and smother benthic habitat outwards from the failure area. Suspended solids and dissolved metals would increase in the water column and would cause displacement of fish and possible toxicity of some bottom sediments, depending on how much tailings material was lost. The new face would be subject to chronic erosion of fine tailings material until such time as a new, stable dike face could be established. Failure of the dike would not cause a change in water level. Impacts would be localized because the Central Dike is situated in the upper part of a blind arm of the lake with an extremely limited drainage area and low turnover. Consequently, transport of suspended sediment away from the area would be restricted and the area of impact would be relatively small.

Mitigation, Management, and Monitoring

The calculated FoS for the Central Dike design are greater than design criteria for post closure for static and pseudo-static (earthquake) conditions. Consequently, the likelihood of a failure occurring is low. Furthermore, thermal modeling indicates the tailings and Central Dike will progressively freeze, and that the facility will tend to the frozen state in the long term. Freezing will increase dike and tailings stability and decrease tailings mobility, and therefore this is not considered a credible catastrophic failure mode.

Mitigation against such a failure mode occurring will be to construct the Central Dike to the design so that it is physically stable under static and pseudo-static loading conditions, and to monitor during the mine life to assess the overall performance of the dike and the TSF. Data gathered during the operational period of the TSF can be used to re-evaluate the performance of the Central Dike structure in the context of longer term stability post closure.

Appendix A.3

Saddle Dams

Saddle Dams

Five Saddle dams will be constructed around the limits of the tailings basin. Two Saddle Dams were built between 2009 and 2011, the three other Saddle Dams will be built later during the mine operation. The saddle dam locations are shown on the general mine site plan provided at the beginning of this document. The saddle dams will be constructed by dumping a rockfill berm with a crest width of 30 m to allow haul truck traffic. The Saddle Dams will be re-sloped, with a minimum 6 m crest width. The downstream face will be angle of repose, or 1.32H:1V (Horizontal:Vertical), and the upstream face will be 3H:1V. The Saddle Dams will have an upstream two-zone granular filter and a liner. There is a potential for release of attenuation water, reclaim water, or tailings to Third Portage Lake in the event of an overtopping or catastrophic failure.

For information on the consequences and monitoring/action for the various embankment failure modes possible at the Saddle Dams see Table A.2 for the Central Dike.

A.3.1 Failure Scenario during Operation

Depending upon the phase of operations, breach or complete failure of a Saddle Dam could result in the uncontrolled release of Attenuation Pond water, Reclaim Pond water or tailings to Third Portage Lake. There is also the possibility of the Saddle Dams being overtopped through the formation of a wave resulting from a slope failure within the Portage Waste Rock Storage Facility and the sudden release of waste rock into the TSF.

A tailings beach will be formed on the toe of each Saddle Dam. As a result, the Reclaim Pond will be pushed away from the Saddle Dams. As the tailings and Saddle Dams are expected to freeze, and freezing will reduce the chance of tailings reaching Third Portage Lake, failure of the Saddle Dams with release of tailings to Third Portage Lake is not considered to be credible.

An overtopping or breach failure of the section of the Saddle Dams located just south of the intersection with the Stormwater Dike could potentially result in flow of Reclaim Pond water and/or tailings toward Third Portage Lake.

<u>Potential Effect</u>

Should an overtopping event or breach occur in a Saddle Dam, water flowing toward Third Portage Lake would consist of Reclaim Pond water which is predicted to exceed Metal Mining Effluent Regulations (MMER) guidelines for a number of constituents.

As a worst case of failure resulting in a dam breach, the total predicted Reclaim Pond volume of 0.75 Mm^3 could be released towards Third Portage Lake. The Saddle Dams would not be expected to fail due to overtopping. This failure mode is not expected to release a considerable volume of water to Third Portage Lake. Given the size of Third Portage Lake, the impacts to water quality and on fish from a release of Reclaim Pond water would likely be localized.

A worst case scenario would also involve the flow of non-frozen tailings into Third Portage Lake. The distance between the toe of the Saddle Dams and Third Portage Lake is on the order of 150 m to 300 m. Such a scenario would destroy fish habitat and smother benthic habitat outwards from the failure area. Suspended solids and dissolved metals would increase in the water column and would cause displacement of fish and possible toxicity of some bottom sediments, depending on how much tailings material was lost.

Mitigation, Management, and Monitoring

The dams are designed according to Dam Safety Guidelines (CDA, 2007), and were and will be constructed under controlled conditions. A comprehensive quality control and quality assurance program was and will be undertaken during construction to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual conditions found at site. The dams are predicted to eventually freeze, which will enhance stability. Therefore, failure of Saddle Dams by overtopping, full breaching or foundation and slope failure is not considered to be credible.

With respect to slope stability failure, the Saddle Dams are constructed of rockfill, which has high shear strength. Slope stability failures must therefore occur through foundation soils. The calculated FoS for slope stability failure modes through foundation soils are above the design criteria in the Dam Safety Guidelines (CDA, 2007) for static and pseudo-static conditions. Consequently, the probability of such a failure developing is low.

The tailings are expected to freeze, and freezing will reduce the chance of tailings reaching Third Portage Lake. The distance from Saddle Dam 1 to Third Portage Lake is about 300 m at its closest point. Leaks of supernatant water and or tailings from the South Saddle Dam would be most likely to occur during operations. Leaks would be visible, and could be mitigated during operations.

A.3.2 Failure Scenario during Closure

At closure Reclaim Pond water will be pumped to an Attenuation Pond, the basin behind the Saddle Dams will be drained and filled with run-of-mine, acid-buffering ultramafic waste rock (NPAG). The rock is expected to freeze over time. Failure of the Saddle Dams following closure is not considered to be credible. Further, the lack of water will reduce mobility of tailings if failure occurs.

Potential Effect

No effects to water quality, fish or fish habitat is expected.

Mitigation, Management, and Monitoring

As described previously, the dams were and will be designed to meet Dam Safety Guidelines (CDA, 2007). The dams were and will be constructed under controlled conditions. During the construction of the dams a comprehensive quality control and quality assurance program was and will be undertaken to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual or unexpected conditions found at site. Monitoring during operations will

ensure the Saddle Dams perform as intended. The dams will eventually freeze, which will enhance stability. Therefore, post-closure failure of the Saddle Dams by full breaching or foundation and slope failure is not considered to be credible.

Appendix A.4

Stormwater Dike

Stormwater Dike

The Stormwater Dike is located at the northwest end of Second Portage Lake, within the TSF as shown on the general mine site plan provided at the beginning of this document. The location of the Stormwater Dike was selected to optimize the storage capacity of the main tailings basin, and of the Portage Attenuation Pond. The dike separates the tailings basin from the Attenuation Pond until approximately 2014 at which point the tailing deposition will start in the South tailing Cell. At the end of mine life, any remaining water will be treated within the TSF and released once discharge criteria are met.

The Stormwater Dike was constructed using rock fill, with a upstream slope of 3H: 1V and a downstream slope at angle of repose for rock fill. The minimum crest width is 6 m. Final crest is at elevation 150.0 m. The dike has a filter zone placed on the south face, underlying an impermeable element of bituminous geo-membrane. The maximum height of the dike is about 13 m. At the maximum cross section, the width of the base of the dike is approximately 95 m.

For information on the consequences and monitoring/action for the various embankment failure modes possible at Storm water Dike see Table A.2.

A.4.1 Failure Scenario during Operation

If slope failure of the Stormwater Dike were to occur when tailings are at their maximum elevation in the main tailings basin, and if the tailings are not frozen, this could potentially result in the sudden flow of tailings into the Attenuation Pond area. This in turn could potentially result in the development of a wave which overtops the Saddle Dam at the northwest end, releasing tailings and reclaim water to Third Portage Lake.

Potential Effect

A breach or failure of the Stormwater Dike may cause a wave-induced overtopping of the Saddle Dam at the northwest end. The Saddle Dam would not be expected to fail due to a single overtopping wave event.

This failure mode is not expected to release water to Third Portage Lake. The distance between the toe of the Saddle Dam and Third Portage Lake is on the order of 150 m, so tailings would likely settle out. The potential impacts on Third Portage Lake water quality, fish and fish habitat would likely be minor, localized and short-lived.

Mitigation, Management, and Monitoring

The Stormwater Dike was designed to meet Dam Safety Guidelines (CDA, 1999). The upstream side slopes were designed to allow machine traffic, and are therefore highly conservative with respect to slope stability. The dike was constructed in the dry under controlled conditions. During the construction of the dike a comprehensive quality control and quality assurance program was undertaken to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual conditions found at site. The dike will eventually freeze, which will enhance stability. Therefore, failure of the dike due to overtopping is not considered to be credible.

A.4.2 Failure Scenario during Closure

The Stormwater Dike will be covered by tailing on both upstream and downstream side, to equal out the different elevations. At closure Reclaim Pond water will be pumped to an Attenuation Pond, the basin behind the Saddle Dams and Stormwater Dike will be drained and filled with run-of-mine, acid-buffering ultramafic waste rock (NPAG). The rock is expected to freeze over time. Failure of the Stormwater Dike following closure is not considered to be credible. Further, the lack of water will reduce mobility of tailings if failure occurs.

Potential Effect

No effects to water quality, fish or fish habitat is expected.

Mitigation, Management, and Monitoring

The Stormwater Dike was designed to meet Dam Safety Guidelines (CDA, 1999). The dike was constructed under controlled conditions. During the construction of the dike a comprehensive quality control and quality assurance program was undertaken to confirm foundation conditions, material type and quality, and to adjust designs as necessary to reflect actual or unexpected conditions found at site. Monitoring during operations ensure the Stormwater Dike performs as intended. The dike will eventually freeze, which will enhance stability. Therefore, post-closure failure of the Stormwater Dike by full breaching or foundation and slope failure is not considered to be credible.

APPENDIX B

Emergencies involving Reagents.

Emergencies involving reagents might be addressed by first responders, by using **EMERGENCY RESPONSE GUIDEBOOK**

ERG2012.pdf

In an emergency, CANUTEC may be called collect at
613-996-6666 (24 hours)
***666 cellular (Press star 666, Canada only)**

B.1: Cyanide (Sodium Cyanide)

UN #: 1689 (Guide 157)

Common Names:

- Sodium salt of hydrocyanic acid

Agent Characteristics

- **APPEARANCE**: White crystalline or granular powder.
- **DESCRIPTION**: Sodium cyanide releases hydrogen cyanide gas, a highly toxic chemical asphyxiant that interferes with the body's ability to use oxygen. Exposure to sodium cyanide can be rapidly fatal. It has whole-body (systemic) effects, particularly affecting those organ systems most sensitive to low oxygen levels: the central nervous system (brain), the cardiovascular system (heart and blood vessels), and the pulmonary system (lungs). Sodium cyanide is used commercially for fumigation, electroplating, extracting gold and silver from ores, and chemical manufacturing. Hydrogen cyanide gas released by sodium cyanide has a distinctive bitter almond odor (others describe a musty "old sneakers smell"), but a large proportion of people cannot detect it; the odor does not provide adequate warning of hazardous concentrations. Sodium cyanide is odorless when dry. Sodium cyanide is shipped as pellets or briquettes. It absorbs water from air (is hygroscopic or deliquescent).
- **METHODS OF DISSEMINATION**:
  - Indoor Air: Sodium cyanide can be released into indoor air as fine droplets, liquid spray (aerosol), or fine particles.
  - Water: Sodium cyanide can be used to contaminate water.
  - Food: Sodium cyanide can be used to contaminate food.

- Outdoor Air: Sodium cyanide can be released into outdoor air as fine droplets, liquid spray (aerosol), or fine particles.
- Agricultural: If sodium cyanide is released as fine droplets, liquid spray (aerosol), or fine particles, it has the potential to contaminate agricultural products.

- **ROUTES OF EXPOSURE**: Sodium cyanide can affect the body through ingestion, inhalation, skin contact, or eye contact.

Personal Protective Equipment

- **GENERAL INFORMATION**: First Responders should use a NIOSH-certified Chemical, Biological, Radiological, Nuclear (CBRN) Self Contained Breathing Apparatus (SCBA) with a Level A protective suit when entering an area with an unknown contaminant or when entering an area where the concentration of the contaminant is unknown. Level A protection should be used until monitoring results confirm the contaminant and the concentration of the contaminant.
  NOTE: Safe use of protective clothing and equipment requires specific skills developed through training and experience.

- **LEVEL A: (RED ZONE)**: Select when the greatest level of skin, respiratory, and eye protection is required. This is the maximum protection for workers in danger of exposure to unknown chemical hazards or levels above the IDLH.
  - A NIOSH-certified CBRN full-face-piece SCBA operated in a pressure-demand mode or a pressure-demand supplied air hose respirator with an auxiliary escape bottle.
  - A Totally-Encapsulating Chemical Protective (TECP) suit that provides protection against CBRN agents.
  - Chemical-resistant gloves (outer).
  - Chemical-resistant gloves (inner).
  - Chemical-resistant boots with a steel toe and shank.
  - Coveralls, long underwear, and a hard hat worn under the TECP suit are optional items.

- **LEVEL B: (RED ZONE)**: Select when the highest level of respiratory protection is necessary but a lesser level of skin protection is required. This is the minimum protection for workers in danger of exposure to unknown chemical hazards or levels above the IDLH. It differs from Level A in that it incorporates a non-encapsulating, splash-protective, chemical-resistant splash suit that provides Level A protection against liquids but is not airtight.
  - A NIOSH-certified CBRN full-face-piece SCBA operated in a pressure-demand mode or a pressure-demand supplied air hose respirator with an auxiliary escape bottle.
  - A hooded chemical-resistant suit that provides protection against CBRN agents.
  - Chemical-resistant gloves (outer).
  - Chemical-resistant gloves (inner).
  - Chemical-resistant boots with a steel toe and shank.
  - Coveralls, long underwear, a hard hat worn under the chemical-resistant suit, and chemical-resistant disposable boot-covers worn over the chemical-resistant suit are optional items.

- **LEVEL C: (YELLOW ZONE)**: Select when the contaminant and concentration of the contaminant are known and the respiratory protection criteria factors for using Air Purifying Respirators (APR) or Powered Air Purifying Respirators (PAPR) are met. This level is appropriate when decontaminating patient/victims.
  - A NIOSH-certified CBRN tight-fitting APR with a canister-type gas mask or CBRN PAPR for air levels greater than Acute Exposure Guideline (AEGL) L-2.
  - A NIOSH-certified CBRN PAPR with a loose-fitting face-piece, hood, or helmet and a filter or a combination organic vapor, acid gas, and particulate cartridge/filter combination or a continuous flow respirator for air levels greater than AEGL-1.
  - A hooded chemical-resistant suit that provides protection against CBRN agents.
  - Chemical-resistant gloves (outer).
  - Chemical-resistant gloves (inner).
  - Chemical-resistant boots with a steel toe and shank.
  - Escape mask, face shield, coveralls, long underwear, a hard hat worn under the chemical-resistant suit, and chemical-resistant disposable boot-covers worn over the chemical-resistant suit are optional items.

- **LEVEL D: (GREEN ZONE)**: Select when the contaminant and concentration of the contaminant are known and the concentration is below the appropriate occupational exposure limit or less than AEGL-1 for the stated duration times.
  - Limited to coveralls or other work clothes, boots, and gloves.

Emergency Response

- **CHEMICAL DANGERS**:
  - Sodium cyanide is water-reactive.
  - Sodium cyanide decomposes on contact with acids, acid salts, water, moisture, and carbon dioxide, producing highly toxic, flammable hydrogen cyanide gas.
  - Sodium cyanide solution in water is a strong base; it reacts violently with acid and is corrosive.
  - Sodium cyanide is incompatible with strong oxidants.
  - Carbon dioxide from the air is sufficiently acidic to liberate toxic hydrogen cyanide gas on contact with sodium cyanide.

- **EXPLOSION HAZARDS**:
  - Sodium cyanide reacts violently with strong oxidants such as nitrates, chlorates, nitric acid, and peroxides, causing an explosion hazard.
  - Upper and lower explosive (flammable) limits in air are not available for sodium cyanide.
  - Containers may explode when heated or if they are contaminated with water.

- **FIRE FIGHTING INFORMATION**:
  - Sodium cyanide is non-combustible.

- The agent itself does not burn.
- Sodium cyanide releases highly flammable and toxic hydrogen cyanide gas on contact with acids or water.
- Fire will produce irritating, corrosive, and/or toxic gases.
- Note: Most foam will react with the agent and release corrosive/toxic gases.
- For small fires, do not use carbon dioxide; **use dry chemical**, dry sand, or alcohol-resistant foam.
- For large fires, use water spray, fog, or alcohol-resistant foam. Move containers from the fire area if it is possible to do so without risk to personnel. Use water spray or fog; do not use straight streams. Dike fire control water for later disposal; do not scatter the material.
- For fire involving tanks or car/trailer loads, fight the fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after the fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tanks. Always stay away from tanks engulfed in fire.
- Run-off from fire control or dilution water may be corrosive and/or toxic, and it may cause pollution.
- If the situation allows, control and properly dispose of run-off (effluent).

- **INITIAL ISOLATION AND PROTECTIVE ACTION DISTANCES**:
  - If a tank, rail car, or tank truck is involved in a fire, isolate it for 0.5 mi (800 m) in all directions; also consider initial evacuation for 0.5 mi (800 m) in all directions.
  - Small spills (when spilled in water)
    - First isolate in all directions: 200 ft (60 m).
    - Then protect persons downwind during the day: 0.1 mi (0.2 km).
    - Then protect persons downwind during the night: 0.4 mi (0.7 km).
  - Large spills (when spilled in water)
    - First isolate in all directions: 1300 ft (390 m).
    - Then protect persons downwind during the day: 0.8 mi (1.3 km).
    - Then protect persons downwind during the night: 3.0 mi (4.9 km).

- **PHYSICAL DANGERS**:
  - Vapors may collect and stay in confined areas (e.g., sewers, basements, and tanks).
  - Hazardous concentrations may develop quickly in enclosed, poorly-ventilated, or low-lying areas. Keep out of these areas. Stay upwind.
  - Hydrogen cyanide gas produced from sodium cyanide mixes well with air; explosive mixtures are easily formed.

- **NFPA 704 Signal**:

- **Health:** 3
- **Flammability:** 0
- **Reactivity:** 0
- **Special:**

Signs/Symptoms

- **TIME COURSE**: Effects occur rapidly following exposure to sodium cyanide. Inhalation exposure to hydrogen cyanide gas released from sodium cyanide produces symptoms within seconds to minutes; death may occur within minutes.

- **EFFECTS OF SHORT-TERM (LESS THAN 8-HOURS) EXPOSURE**: Early symptoms of cyanide poisoning include lightheadedness, giddiness, rapid breathing, nausea, vomiting (emesis), feeling of neck constriction and suffocation, confusion, restlessness, and anxiety. Accumulation of fluid in the lungs (pulmonary edema) may complicate severe intoxications. Rapid breathing is soon followed by respiratory depression/respiratory arrest (cessation of breathing). Severe cyanide poisonings progress to stupor, coma, muscle spasms (in which head, neck, and spine are arched backwards), convulsions (seizures), fixed and dilated pupils, and death. The CNS is the most sensitive target organ of cyanide poisoning. Cardiovascular effects require higher cyanide doses than those necessary for CNS effects. In serious poisonings, the skin is cold, clammy, and diaphoretic. Blue discoloration of the skin may be a late finding. Severe signs of oxygen deprivation in the absence of blue discoloration of the skin suggest cyanide poisoning.

- **EYE EXPOSURE**:
  - Redness, pain, and severe deep burns.
  - Contact with the eyes can contribute to whole-body (systemic) toxicity. See Inhalation Exposure.

- **INGESTION EXPOSURE**:
  - Nausea, vomiting (emesis), abdominal pain, and irritation or corrosion of the lining of the esophagus and stomach.
  - Whole-body (systemic) toxicity can occur. See Inhalation Exposure.

- **INHALATION EXPOSURE**:

- Mild to moderate: Central Nervous System (CNS) effects: headache, confusion, anxiety, dizziness, weakness (malaise), and loss of consciousness. Cardiovascular effects: palpitations. Respiratory effects: respiratory tract irritation, difficulty breathing or shortness of breath (dyspnea), and transient increase in rate and depth of breathing (hyperpnea). Gastro Intestinal effects: nausea and vomiting (emesis).
- Severe: CNS effects: coma, seizures, and dilated pupils (mydriasis). Cardiovascular effects: shock, abnormal or disordered heart rhythms (dysrhythmias), critically low blood pressure, and cardiac arrest. Respiratory effects: abnormally rapid, followed by abnormally slow respirations; accumulation of fluid in the lungs (pulmonary edema); and respiratory arrest. Eye effects: dilated pupils, inflammation of the surface of the eye, and temporary blindness.

- **SKIN EXPOSURE**:
  - Irritation, tissue damage (ulceration), burning sensation, and pain
  - Absorption through the skin can contribute to whole-body (systemic) toxicity. See Inhalation Exposure.

Decontamination

- **INTRODUCTION**: The purpose of decontamination is to make an individual and/or their equipment safe by physically removing toxic substances quickly and effectively. Care should be taken during decontamination, because absorbed agent can be released from clothing and skin as a gas. Your Incident Commander will provide you with decontaminants specific for the agent released or the agent believed to have been released.

- **DECONTAMINATION CORRIDOR**: The following are recommendations to protect the first responders from the release area:
  - Position the decontamination corridor upwind and uphill of the hot zone. The warm zone should include two decontamination corridors. One decontamination corridor is used to enter the warm zone and the other for exiting the warm zone into the cold zone. The decontamination zone for exiting should be upwind and uphill from the zone used to enter.
  - Decontamination area workers should wear appropriate PPE. See the PPE section of this card for detailed information.
  - A solution of detergent and water (which should have a pH value of at least 8 but should not exceed a pH value of 10.5) should be available for use in decontamination procedures. Soft brushes should be available to remove contamination from the PPE. Labeled, durable 6-mil polyethylene bags should be available for disposal of contaminated PPE.

- **INDIVIDUAL DECONTAMINATION**: The following methods can be used to decontaminate an individual:
  - Decontamination of First Responder:

- Begin washing PPE of the first responder using soap and water solution and a soft brush. Always move in a downward motion (from head to toe). Make sure to get into all areas, especially folds in the clothing. Wash and rinse (using cold or warm water) until the contaminant is thoroughly removed.
- Remove PPE by rolling downward (from head to toe) and avoid pulling PPE off over the head. Remove the SCBA after other PPE has been removed.
- Place all PPE in labeled durable 6-mil polyethylene bags.

o Decontamination of Patient/Victim:

- Remove the patient/victim from the contaminated area and into the decontamination corridor.
- Remove all clothing (at least down to their undergarments) and place the clothing in a labeled durable 6-mil polyethylene bag.
- Thoroughly wash and rinse (using cold or warm water) the contaminated skin of the patient/victim using a soap and water solution. Be careful not to break the patient/victim's skin during the decontamination process, and cover all open wounds.
- Cover the patient/victim to prevent shock and loss of body heat.
- Move the patient/victim to an area where emergency medical treatment can be provided.

First Aid

➢ **GENERAL INFORMATION**: Careful observation, supplemental oxygen, and supportive care may be sufficient therapy for the patient/victim who does not exhibit physical findings of cyanide toxicity. For the patient/victim exhibiting physical findings of cyanide toxicity, initial treatment consists of administration of antidotes under a physician's direction, respiratory and circulatory support (oxygen and IV fluids), correction of chemical imbalances in the blood, and seizure control. Speed is critical. Avoid mouth-to-mouth resuscitation regardless of route of exposure. Avoid contact with vomitus, which may off-gas hydrogen cyanide.

➢ **ANTIDOTE**: Amyl nitrite, sodium nitrite, and sodium thiosulfate are antidotes for cyanide toxicity; however, amyl nitrite and sodium nitrite should not be administered to patient/victims suffering from smoke inhalation. In these cases, only administer sodium thiosulfate. The described administration of nitrites is based on a patient having normal hemoglobin levels. Below normal hemoglobin levels require titration of nitrites.

➢ **For mild to moderate physical findings** such as nausea, vomiting, palpitations, confusion, anxiety, dizziness (vertigo), and/or abnormally fast or deep respiration (hyperventilation):

o **Child (less than 55 lbs. (25 kg)** - Observe the patient/victim and administer 0.75 mL per pound of a 25% solution (1.65 mL per kilogram of a 25% solution) of sodium thiosulfate intravenously over a period of 10 minutes. (Note: All persons working at Meadowbank are adults – 18 years of age and older). This has been put in as a result of delivery of Cyanide in Baker Lake) close to this community.

- **Adult** Observe the patient/victim and administer 12.5 g of a 25% solution (50 mL of a 25% solution) of sodium thiosulfate intravenously over a period of 10 minutes.

- **For severe physical findings** such as coma; cessation of breathing (apnea); seizures; slowness of the heart rate, usually to fewer than 60 beats per minute (bradycardia); abnormally low blood pressure (hypotension); bluish skin coloring due to abnormally low levels of oxygen in the blood (cyanosis); irregular heart beat (dysrhythmias); and/or accumulation of fluid in the lungs (pulmonary edema):
  - **Child (less than 55 lbs. (25 kg)** Until sodium nitrite becomes available, break one ampule of amyl nitrite into a cloth. Out of every minute, hold the cloth containing amyl nitrite in front of the patient's mouth for 30 seconds, and then remove it for 30 seconds, until sodium nitrite can be administered. A new ampule of amyl nitrite should be broken into a cloth every 3 minutes. Discontinue use of amyl nitrite when sodium nitrite becomes available. Administration of an entire dose (10 mL of a 3% solution) of sodium nitrite to a child can produce overwhelming lethal methemoglobinemia. Therefore, children should receive 0.15 mL per pound of body weight of sodium nitrite (0.33 mL per kg body weight of 3% sodium nitrite) over a period of 5 to 20 minutes.
  - Next, administer 0.75 mL per pound body weight of 25% sodium thiosulfate (1.65 mL per kilogram body weight of 25% sodium thiosulfate) intravenously over a period of 10 minutes. If physical findings persist for 30 minutes after antidote administration, sodium nitrite and sodium thiosulfate may be re-administered at half their original respective doses. However, methemoglobin levels should be monitored and not allowed to exceed 40%.
  - **If a child weighs more than 55 lbs. (25 kg)**, administer antidote as described for the adult (see below).
  - **Adult** Until sodium nitrite becomes available, break one ampule of amyl nitrite into a cloth. Out of every minute, hold the cloth containing amyl nitrite in front of the patient's mouth for 30 seconds, and then remove it for 30 seconds, until sodium nitrite can be administered. A new ampule of amyl nitrite should be broken into a cloth every 3 minutes. Discontinue use of amyl nitrite when sodium nitrite becomes available. Administer 300 mg of a 3% solution (10 mL of a 3% solution) of sodium nitrite intravenously over a period of 5 to 20 minutes.
  - Next, administer 12.5 g (50 mL of a 25% solution) of sodium thiosulfate intravenously over a period of 10 minutes. If physical findings persist for 30 minutes after antidote administration, sodium nitrite and sodium thiosulfate may be re-administered at half their original respective doses. However, methemoglobin levels should be monitored and not allowed to exceed 40%.

- **EYE**:
  - Immediately remove the patient/victim from the source of exposure.
  - Immediately wash eyes with large amounts of tepid water for at least 15 minutes.
  - Monitor the patient/victim for signs of whole-body (systemic) effects.
  - If signs of whole-body (systemic) poisoning appear, see the Inhalation section for treatment recommendations.
  - Seek medical attention immediately.
- **INGESTION**:

- Immediately remove the patient/victim from the source of exposure.
- Establish secure large-bore IV access.
- Ensure that the patient/victim has an unobstructed airway.
- Do not induce vomiting (emesis).
- Immediately administer 100% oxygen.
- Prepare a cyanide antidote kit, for use under a physician's direction, for symptomatic patient/victims. See the Antidote section for antidote administration procedures.
- Treat seizures with benzodiazepines.
- Seek medical attention immediately.

➢ **INHALATION**:

- Immediately remove the patient/victim from the source of exposure.
- Evaluate respiratory function and pulse.
- Ensure that the patient/victim has an unobstructed airway.
- Immediately administer 100% oxygen.
- Assist ventilation as required.
- If breathing has ceased (apnea), provide artificial respiration.
- Establish secure large-bore intravenous (IV) access.
- Prepare a cyanide antidote kit, for use under a physician's direction, for symptomatic patient/victims. See the Antidote section for antidote administration procedures.
- Monitor for respiratory distress.
- Seek medical attention immediately.

➢ **SKIN**:

- Immediately remove the patient/victim from the source of exposure.
- See the Decontamination section for patient/victim decontamination procedures.
- Monitor the patient/victim for signs of whole-body (systemic) effects.
- If signs of whole-body (systemic) poisoning appear, see the Inhalation section for treatment recommendations.
- Seek medical attention immediately.

Long-Term Implications

➢ **MEDICAL TREATMENT**: Evidence for the benefit of gastric decontamination in cases of cyanide ingestion is limited at best and should come after all other known life-saving measures have been instituted. Gastric lavage (stomach pumping) is recommended only if it can be done shortly after ingestion (generally within 1 hour), in an emergency department, and after the airway has been secured. Activated charcoal may be administered as slurry (240 mL water/30 g charcoal). Usual dose: 25 to 100 g in adults/adolescents, 25 to 50 g in children (1 to 12 years), and 1 g/kg in infants less than 1 year old. Patient/victims who have ingested hydrogen cyanide solutions or patient/victims who have direct skin or eye contact should be observed in the Emergency Department for at least 4 to 6 hours for the development of delayed symptoms. Patient/victims with significant inhalation exposure

should be monitored for the accumulation of fluid in the lungs (pulmonary edema), which may occur up to 24 to 72 hours following exposure.

- **DELAYED EFFECTS OF EXPOSURE**: Usually death occurs rapidly or there is prompt recovery. Survivors of severe cyanide exposures may suffer brain damage due to a direct effect of the poison (toxin) on nerve cells, or to a lack of oxygen, or possibly due to insufficient blood circulation. Examples of long-term neurological effects caused by cyanide poisoning include personality changes, memory loss, and disturbances in movement (both voluntary and involuntary movement disorders); some damage may be permanent.

- **EFFECTS OF CHRONIC OR REPEATED EXPOSURE**: Hydrogen cyanide has not been classified for cancer-causing (carcinogenic) effects, and no carcinogenic effects have been reported for hydrogen cyanide. No reproductive or developmental effects of hydrogen cyanide have been reported. Chronically exposed workers may complain of headache, eye irritation, easy fatigue, chest discomfort, palpitations, loss of appetite (anorexia), and nosebleeds (epistaxis). Workers such as electroplaters and picklers, who are exposed daily to cyanide solutions, may develop a "cyanide" rash, characterized by itching and by macular, papular, and vesicular eruptions. Exposure to small amounts of cyanide compounds over long periods of time is reported to cause loss of appetite, headache, weakness, nausea, dizziness, and symptoms of irritation of the upper respiratory tract and eyes.

On-Site Fatalities – Scene is not be disturbed until it has been release as per MSHR section 16.01 “serious injury” – 16.02, 16.03, 16.04.

- **INCIDENT SITE**:
  - Incident site must be kept barricaded off and guarded and undisturbed until appropriate personnel (RCMP), (Coroner), (Mines Inspector) have conducted their investigations and have released the scene.
  - Consult with the Incident Commander regarding the agent dispersed, dissemination method, level of PPE required, location, geographic complications (if any), and the number of person(s) involved.
  - Ensure that all person(s) involved have the proper level of PPE protection, training and knowledge to deal with the situation.

- **RECOVERY AND ON-SITE MORGUE**:
  - Wear PPE until all bodies(s) are deemed free of contamination.
  - Establish a preliminary (holding) morgue.
  - Gather all necessary information and document all findings.
  - See the Decontamination section for decontamination procedures.
  - Decontaminate affected bodies before they are removed from the incident site.

Occupational Exposure Limits

- **ACGIH TLV**:

- Hydrogen Cyanide – Ceiling 4.7 ppm (Skin)
- Cyanide Salts - Ceiling: 5 mg/m^3 (skin)

➢ **NIOSH IDLH**: 25 mg/m^3 (as CN [cyanide ion])

➢ **BC MINE RESCUE MANUAL**:

- Hydrogen Cyanide – 10 ppm for 8 hours
- Hydrogen Cyanide – 5 ppm for 12 hours

Acute Exposure Guidelines

Hydrogen cyanide 74-90-8 (Final)					
ppm					
	10 min	30 min	60 min	4 hr	8 hr
AEGL 1	2.5	2.5	2.0	1.3	1.0
AEGL 2	17	10	7.1	3.5	2.5
AEGL 3	27	21	15	8.6	6.6

Decontamination (Environment and Equipment)

➢ **ENVIRONMENT/SPILLAGE DISPOSAL**: The following methods can be used to decontaminate the environment/spillage disposal:

- Do not touch or walk through the spilled agent if at all possible. However, if you must, personnel should wear the appropriate PPE during environmental decontamination. See the PPE section of this card for detailed information.
- Keep combustibles (e.g., wood, paper, and oil) away from the spilled agent. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact the spilled agent.
- Do not direct water at the spill or the source of the leak.
- Stop the leak if it is possible to do so without risk to personnel, and turn leaking containers so that gas rather than liquid escapes.
- Prevent entry into waterways, sewers, basements, or confined areas.
- Isolate the area until gas has dispersed.
- Ventilate the area.

➢ **EQUIPMENT**: Agents can seep into the crevices of equipment making it dangerous to handle. The following methods can be used to decontaminate equipment:

- Not established/determined

Agent Properties

- **Chemical Formula:**
  NaCN

- **Aqueous solubility:**
  Soluble

- **Boiling Point:**
  2725°F (1496°C)
- **Density:**
  1.60 g/mL at 77°F (25°C)

- **Flammability:**
  Noncombustible

- **Flashpoint:**
  Not established/determined

- **Ionization potential:**
  Not established/determined

- **Melting Point:**
  1045°F (563°C)

- **Molecular Mass:**
  49.01
- **Soluble In:**
  Ammonia, alcohol (slightly soluble)

- **Specific Gravity:**
  1.60

- **Vapor Pressure:**
  Approximately 0 mm Hg at 68°F (20°C)

Hazardous Materials Warning Labels/Placards

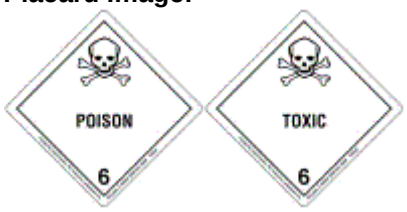
- **Shipping Name:**
  Sodium cyanide, solid or solution

- **Identification Number:**
  1689 (Guide 157)

- **Hazardous Class or Division:**
  6.1

- **Label:**
  Poison (Toxic)

- **Placard Image:**



Who to Contact in an Emergency

In the event of an emergency, call 6911/ Code 1 X 3 on two-way radio Channel #1 – Mine site.
Baker Lake Health Clinic – 867-793-2816 (Day)
Baker Lake Health Clinic – 867-793-1350 (After Hours)
Poison Control – 867-920-4111
In the event of an emergency, call ***Chemtrec*** immediately at **1-800-424-9300**.

APPENDIX C

MBK-HSS-3002 Emergency Response Plan for DYNO Nobel Emulsion Plant

APPENDIX D

MBK-HSS-3003 Oil Pollution Emergency Response Plan

APPENDIX E

***MBK-HSS-3004* Nolinor ERP Plan (Note: accessible only on Intelex under Plans – Emergency Response (access limited)**

APPENDIX F

MBK-HSS-3005 F-A Baker Lake Facilities O M Manual- Drawings Appendix

APPENDIX G

MBK-HSS-3005 Baker Lake Facilities O M Manual

APPENDIX H

***MBK-HSS-3006* Baker Lake Bulk Fuel Storage Facility Environmental Performance Monitoring Plan Ver. 2**

APPENDIX I

MBK-HSS-3007 Meadowbank Transportation Management Plan AWPAR

APPENDIX J

MBK-HSS-3008 Vault Emergency Response Plan

APPENDIX K

MBK-HSS-3009 Emergency Response Guideline Handbook – ERG 2012

APPENDIX L

MBK site map to be linked here