NORTH AMERICAN TUNGSTEN CORPORATION LTD.

MACTUNG
EMERGENCY RESPONSE PLAN FOR PREVENTION AND MITIGATION OF POTENTIAL EFFECTS FROM ACCIDENTS AND MALFUNCTIONS

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EBA Engineering Consultants Ltd.
p. 867.668.3068 • f. 867.668.4349
Calcite Business Centre • Unit 6, 151 Industrial Road • Whitehorse, Yukon Y1A 2V3 • CANADA

DISTRIBUTION LIST AND REVISIONS

This page provides the Emergency Response Plan Distribution List and a Revisions List.

DISTRIBUTION LIST		
ORGANIZATION	NAME/TITLE	LOCATION
North American Tungsten Corp.	All Departments	Vancouver
North American Tungsten Corp.	All Departments	Mactung Site
Yukon Water Board	Manager, Yukon Water Board Secretariat	Whitehorse
Government of Yukon – Energy, Mines and Resources	Client Services & Inspections Branch	Whitehorse
Yukon Workers Compensation Health & Safety Board	Chief Mine Safety Officer	Whitehorse
Royal Canadian Mounted Police		Ross River Detachment

REVISION SHEET

REVISIONS LIST				
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1.0 INTRODUCTION

The Mactung Mine Emergency Response Plan (ERP) is designed to provide risk management planning and contingency responses to address accidents, malfunctions and emergency responses during the construction, operation and decommissioning phases at North American Tungsten Corporation Ltd.'s (NATC) Mactung mine site. This plan also provides the notification responsibilities and response procedures for accidents/malfunctions. As development occurs at the site the ERP and response procedures will be adjusted to reflect the phase of development, the personnel and the resources available on site for responding to accidents or malfunctions.

Emergency response preparedness is a key to avoiding or mitigating the effects of accidents and malfunctions, which may be harmful to the environment and site personnel. Having an ERP in place enables site personnel to be prepared in the event of a spill or emergency situation. All personnel should be familiar with emergency response procedures. Personnel should also be aware of the location of equipment to be used in emergency response, and report any concerns regarding emergency response preparedness to their supervisor.

This ERP demonstrates that the planning process has been undertaken and is intended to satisfy requirements of YESAA. Later versions of the ERP will be used to meet other legislated requirements for emergency planning such as the Metal Mining Effluent Regulations which are in force once the mine comes into active production.

This ERP applies to potential situations within the extent of the Mactung mine operations including: the access road (interpreted to start from km 447 of the North Canol Road), the Macmillan Pass airstrip, the mine site (the mill, the mine, laboratories, etc.), and camp facilities. This ERP applies to all persons on-site: mine personnel, contractor management and supervisors, subcontractor supervisors, as well as employees of contractors transporting, handling & transferring hazardous/toxic materials on site.

This plan includes mechanisms and processes for addressing accidents, which may result in medical or chemical emergencies, and malfunctions, such as potential or actual failures of structures, equipment and material stockpiles, and the programs for appropriate training to workers.

1.1 GENERAL

This plan briefly defines the responsibilities of key personnel and outlines general procedures to be followed when responding to emergencies in a way that will avoid or reduce health and safety risks, and minimize trauma, safety hazards and environmental damage. It is expected that the ERP will be revised throughout the various project phases to meet the ranges of potential emergencies that may be encountered. The plan will be

reviewed and updated on an annual basis. Furthermore, a documented program of updating, document control, training and testing will be established to ensure the effectiveness of the ERP during an emergency.

This Plan makes reference to the Mactung Spill Contingency Plan (SCP) which has been included as Appendix B. The chemical spill planning components of the ERP have been developed to a greater level of detail due to the availability of information on the chemicals that are expected to be on-site. As with other components of the ERP, the Spill Contingency Plan will be a stand alone document within the overall framework of the emergency planning process.

This ERP is also intended to be used in conjunction with other field and corporate response plans that may be developed prior to the production phase.

1.2 PURPOSE

The major purpose of the ERP is to provide a course of action for accidents, system failure, or other emergency situation arising during mine construction, operations, and decommissioning. It also provides one component of a comprehensive environmental management system for the site. Typical emergencies situations to be dealt with in this plan include:

- Release of hazardous/toxic substances;
- Security breaches and threats to personnel and infrastructure;
- Medical emergencies;
- Missing persons;
- Fires and explosions;
- Natural disasters; and,
- Site evacuation.

This ERP includes internal response procedures, and notification of external agencies and services that may likely be involved in an emergency situation. A coordinated joint emergency response effort is important for responding to such situations.

1.3 TESTING THE EMERGENCY RESPONSE PLAN

The ERP will be tested to ensure it is current, comprehensive and effective. Appropriate communication drills and notification tests will be prepared and implemented accordingly.

The ERP will be tested periodically with the date and nature of test scenario recorded. Random, unannounced emergency drills may be carried out from time to time with each crew during both the summer and winter seasons to ensure preparedness of response crews.

1.4 TRAINING OF PERSONNEL

All personnel will receive training that includes instruction in general emergency response, spill contingency measures, and communication procedures. Training for preparedness will be conducted in accordance with Occupational Health and Safety Act and Regulations and any other relevant legislation. At a minimum, a first responder awareness level training program will be implemented with all key staff and contractors. Emergency Response Team members will undergo more rigorous training and will be appropriately tested and certified in relevant emergency response procedures. Training will include pertinent emergency response issues such as:

- Internal/external communication networks;
- Available internal/external resources (equipment, emergency response teams, spill cleanup materials);
- Accessing and the deployment of equipment;
- Dealing with seasonal diversities, adverse weather conditions, terrain, snow/ice;
- Personal protective equipment use;
- Properties of substances transported, handled, stored and used on site (Material Safety Data Sheets; MSDS);
- Individual 'Action Plans' for each material/chemical handled;
- On/off-site transportation;
- Response procedure including initial action, clean-up procedures, storage, disposal, reporting and reclamation;
- Responsibilities for updating the ERP and the distribution list;
- Relevant environmental legislation;
- Company Policy and any Environmental Management Plan;
- Workplace Hazardous Materials Information System (WHMIS);
- Standard First Aid and CPR; and
- Dangerous Goods Transportation (TDG) Act and Regulations

The level of training required for site personnel will vary depending on their respective roles, for example:

- Emergency Response Teams - Training exercises for the ER teams will be organized by NATC, and will be designed to cover a comprehensive range of emergency situations. NATC will also maintain a list of names with training modules and specialized simulations completed.

- Any site personnel handling dangerous materials will be appropriately trained with TDG certification, as required.
- New employees – the training of new employees will include environmental awareness, spill cleanup procedures, emergency situations and accident/incident reporting as part of their comprehensive site orientation session.
- Drivers of trucks carrying hazardous materials and concentrate will have additional training including environmental awareness, spill response (along roads and into water bodies), emergency driving techniques, emergency communications, hazard avoidance, etc.
- All site personnel - Refresher training for all site personnel will be held at least once per year.

Training records will be maintained by NATC at the on-site office. The trainees will receive a certificate indicating the title of the course, dates attended and the type of simulation training received. These records will be updated regularly and a summary list provided to NATC senior management monthly. Based on a predetermined schedule, a multi-department emergency response scenario will be organized by the Environmental Department.

Contractors will be required to be familiar with the most recent version of the ERP and to assist response measures in the following ways:

- Advise all employees of the existence of these procedures;
- Assist with evacuation practice sessions and equipment tests;
- Maintain daily employee lists to be used in the event of employee head counts at assembly areas during an evacuation;
- Assist with notification, first-aid, securing of site, and other similar duties during an emergency; and,
- Provide manpower and equipment on a priority basis as requested to assist in emergency evacuation or response.

Both contractors and employees are required to have WHMIS training (provided by NATC or a third party) as is necessary to suit their job responsibilities. Documentation of such training is to be provided to NATC safety staff prior to commencement of their employment on the site.

1.5 DEVELOPMENT AND REFINEMENT OF PLANS AND PROCEDURES

1.5.1 Administration - Responsibility and Document Updating

NATC has overall responsibility for implementing this document and for updating the ERP in accordance with the terms of any licences such as the Type A Water Licence (the Licence) that will be required for Mactung and the requirements of any legislation that may be applicable such as the Quartz Mining Act. Updated versions of the ERP will be distributed to site personnel and individuals identified in the distribution list at the start of this document.

1.5.2 Emergency Response Plan

The ERP, including individual components such as the SCP are to be reviewed on a yearly basis and following any emergency, spill, incident or emergency simulation exercise. The annual review will ensure that the EPR is consistent with current best management practices in the field of emergency response and spill management, and addresses any operational changes that may have occurred in the previous year. This review will involve an audit to allow the assessment and documenting of successful emergency response procedures, unsuccessful emergency response procedures, and what changes should be considered to prevent a reoccurrence of the situation. Updating of the document may be conducted outside of the annual review should it be required.

The original ERP will be maintained by NATC and it will be responsible for updating the applicable components of the ERP at least once per year. The maintenance of Emergency Response Team (ERT) personnel lists is also the responsibility of NATC who will maintain and update the communication hierarchy and the Contact List of all the appropriate site and company personnel. All changes to the plan are to be accompanied by a revised title page showing the latest revision date as well a revision summary page. Revisions are to be forwarded to all personnel on the primary distribution list contained at the beginning of this document. Outdated copies will be disposed of immediately. Each new hardcopy will include an updated distribution list on its cover. In all cases, whether complete or partial replacement of the hard copy, the revised title page with the latest revision date and the revision summary page are required.

1.5.3 Material Safety Data Sheets (MSDS)

The ERT personnel will be provided with an inventory of chemicals and the Material Safety Data Sheets (MSDS) of all materials transported, stored and used on-site. The MSDS will be made available in all strategic locations on-site and near to the hazardous substances storage locations and points of use. Ideally, each registrar will be organized by location and the specific substances relevant to that location in order to facilitate the rapid finding of pertinent information in the event of a spill or emergency. A copy of the MSDS documents will also be available at mine administrative area, and First Aid centre. They will be updated regularly as the project develops.

1.5.4 Resources Inventory

There will be a resources inventory which will provide information regarding emergency response personnel (manpower), machinery, equipment, first-aid kits, spill kits and tools for clean-up works that will be available to respond to incidental spills, emergency situations or clean-up situations. These resources include on-site support as well as external support from other bodies/organizations like the fire department, RCMP, and similar mining establishments or exploration camps in the vicinity. This resource inventory will be reviewed and updated regularly.

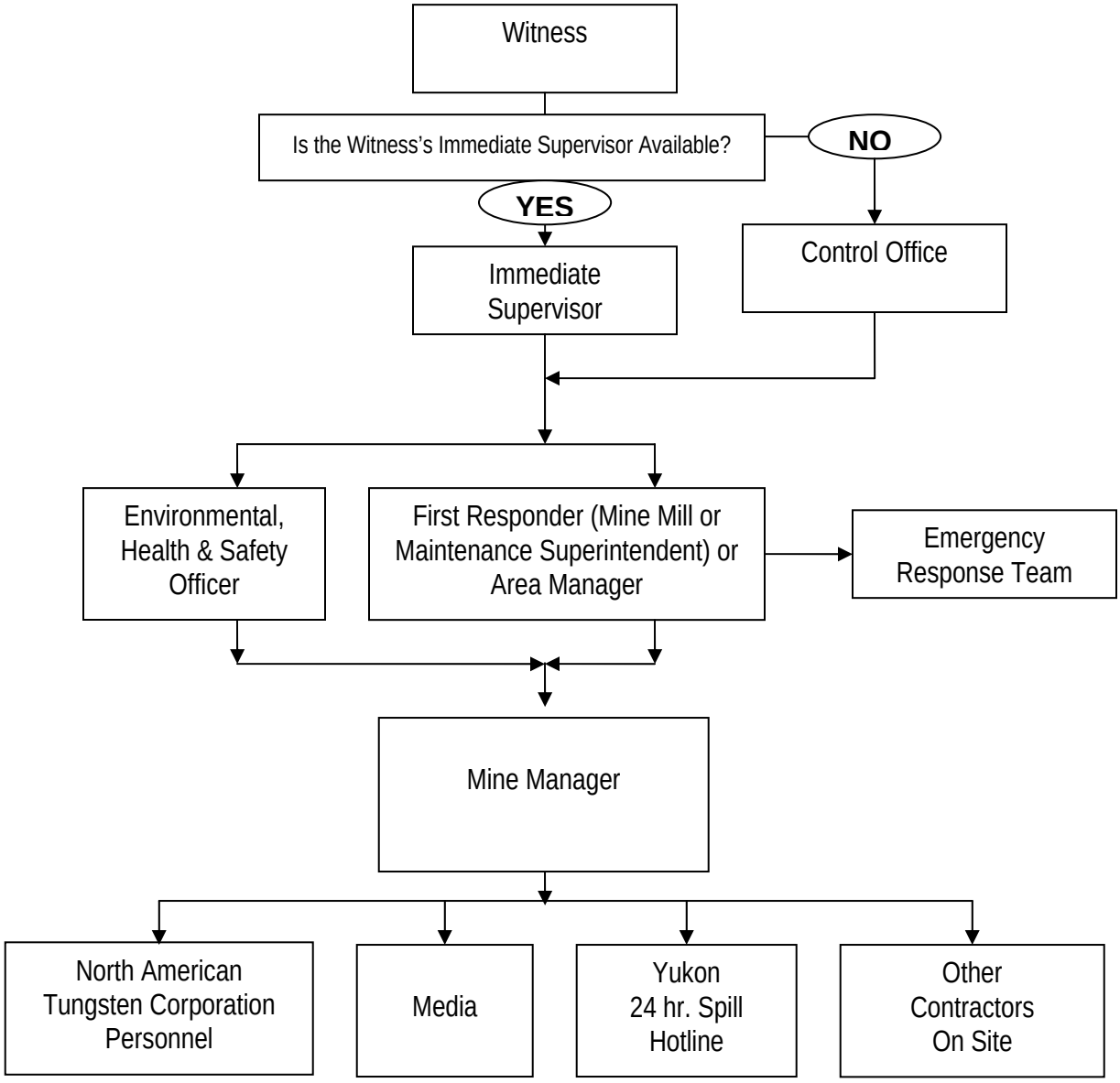
1.5.5 Inspections

Periodic inspections will be carried out to verify that all resources and equipment for emergency response are available and in good working condition. The inspections will also check to ensure that the records of maintenance and repairs for each piece of equipment are current, the repair service is completed, and that appropriate recommendations are made. Inspections will also be carried out at each of the facilities handling or storing hazardous materials or waste streams. An inspection reporting schedule and checklist for relevant site locations will be provided by a designated person from amongst NATC mine management staff.

2.0 GENERAL EMERGENCY RESPONSE SITUATIONS AND PROCEDURES

This section of the Plan addresses general emergency response situations and procedures to be followed for emergency situations. Figure 1 shows the General Emergency Response Procedure for the Mactung Mine. This procedure is meant to be a flowchart for individuals to deal with emergency situations that may potentially be encountered during the life of the Mactung Mine. This flowchart will be included in individual components such as the SCP.

FIGURE 1: EMERGENCY RESPONSE NOTIFICATION CHART



2.1 RELEASE OF HAZARDOUS/TOXIC SUBSTANCES

The information available on the potential types of chemicals anticipated at the site has enabled the development of a Spill Contingency Plan (Appendix B) The SCP applies to any spill at Mactung occurring at the mine and mill site, tailings disposal area, underground mine workings, and 45 km private access road. The plan deals with the procedures and methods for spill notification, response mobilization, containment, recovery and remedial measures for spills related to those products used and transported to the Mactung mine site.

During the Construction Phase of the project, the construction contractor will implement their own spill response procedures and an Environmental Health & Safety person will be on site. These procedures will be contained in the Project Procedures Manual.

Spills caused by NATC hauling contractors along public roads, such as North Canol Road, will be the responsibility of the hauling contractor. To mitigate the risk, NATC will:

- ensure that the hauling contractors have adequate Spill Contingency Plans and training in place;
- require inspection documentation for all trucks and tankers hauling fuel or chemicals to Mactung; and
- require copies of driver abstracts.

Should a spill occur on a public road or bridge by a NATC hauling contractor, NATC will consult with the hauling contractor and provide assistance, if required or requested.

2.1.1 Potential Spill Scenarios

Potential spill scenarios that may be encountered at the Mactung mine site include:

- A mechanical failure of equipment;
- An accidental release/leak from on-site tanks or piping;
- An accidental release from a container/vehicle along the access road; and
- A receiving/offloading spill during re-supply to fuel storage facilities;
- A transfer spill during loading/fuelling of on-site containers/vehicles.

The spill response procedures will follow the reporting structure outlined in Figure 1. A *Quick Guide to Spill Response* is provided on page 1 of the SCP with details of the plan in the body of the document.

2.2 SECURITY BREACHES OR THREATS

Access to the site along the access route starting south of the Macmillan Pass aerodrome will be controlled by a gate. This gate will not be staffed, but will limit vehicular access to the site. Access to the site from the previous access road from the NWT will be restricted

by a gate at the edge of the mine property. Berms will be used to prevent vehicles from driving around the gates. Additionally, the mine site will be relatively remote in location and there is only a single access road into the mine, which provides added security. The road will not be a public road.

The Mactung Mine management will delegate responsibility to the appropriate staff members or NATC department to be responsible for addressing responses to security breaches and to coordinate the response notification procedure for such security breaches.

Threats against property or personnel cannot be regarded as a meaningless nuisance, and are always considered an emergency situation. The project will require storage of large quantities petroleum products and explosive chemicals; therefore, plans, commensurate with the assessed risk, will be developed to specifically deal with specific threat scenarios, as deemed necessary by NATC management. Any threats will be considered authentic until confirmed otherwise.

2.3 ACCIDENTS RESULTING IN INJURIES

In the event of a major accident or incident, the designated safety/first aid personnel would be deployed to the scene. They will then determine the appropriate level of response, procedures and protocols dependent on the severity of the injuries. A general description of each level of response is provided in Figure 1, below.

A primary emergency response station at the mine site will be equipped for first aid, environmental and mine rescue activities. The first aid room will be separate from the environmental response and mine rescue room where specialized equipment must be stored and maintained. The first aid room will be serviced with necessary medical equipment and facilities typical for treatment of minor injuries or preparation of casualties for medical evacuation. Secondary first aid room(s) will possibly be located at other key site locations, as deemed necessary. In addition, underground refuge stations might also be a part of mine planning. Stations would conform to Yukon Workers' Compensation Health and Safety Board (WCB) standards.

A helicopter may be able to land at the mine site for situations where injuries require immediate transport of the injured to a Medical Treatment Facility. The airstrip also allows for transport of injured personnel via Air Ambulance.

2.3.1 Minor Injuries - Non-Medical Aid

Minor injuries are simple injuries dealt with by on-site personnel. Records, reports, and notification shall conform to WCB requirements.

2.3.2 Major Injury - Medical Aid

Major injuries are situations where off-site medical attention or transport is required. Triage and stabilizing patients would be handled by First Aid personnel. Patients may be held in

the primary emergency response station until transport was arranged. Records, reports, and notification shall conform to WCB requirements.

2.3.3 Fatalities

Fatalities require RCMP notification and the scene is to be secured to allow for a proper investigation. Records, reports, and notification shall conform to WCB requirements, and possibly other jurisdictional requirements. There may be downtime due to investigations into fatality dependent on specific circumstances of fatality.

2.3.4 Missing Persons

Missing person situations may require RCMP and Search and Rescue involvement. Site personnel that work alone at various isolated and remote areas of the Mactung Mine will utilize site radio check-in protocols to minimize the potential for this situation to arise. Radio communications will be available during most of the project phases but there may be some areas along the access road with limited radio communications due to the terrain. Helicopter support for this type of emergency situation could be available from Ross River in the event that is required.

2.4 FIRE OR EXPLOSION

Mine management will make an early determination if the fire can be contained using on-site equipment and supplies. Once detected, fires will be managed immediately in an effort to avoid using outside resources. If the fire is of manageable size when it is detected and can be reasonable contained, the fire will be fought using on-site resources consisting of fire extinguishers, a fire truck and water hoses. The on-site water tank(s) used for supply of freshwater to the camp will be oversized for fire fighting capacity. The tank(s) will be further enhanced with the ability to pump water into the tank from Hess Tributary during fire fighting activities to supplement water volumes already in the tank(s). The water distribution system will be installed to provide for wall hydrants at strategic locations. The water pump will have a backup power source to ensure an uninterrupted supply of water in case of power failure. Office and accommodation complex buildings will have fire suppression systems installed, and fire extinguishers will be placed at strategic locations.

2.5 NATURAL DISASTERS

In the event of a natural disaster or severe weather causing damage to a facility and possibly requiring evacuation, the Mine Manager assumes the position of On-Scene Coordinator. All site employees must follow the Manager's (or designate's) directions through the emergency broadcast system or other means.

A General Evacuation Plan would be developed for this type of scenario and would go into effect upon the sounding of an alarm at any or all of the buildings and facilities on site. The General Evacuation Plan may be triggered:

- Automatically by fire or gas detectors;

- Manually by an individual upon awareness that an incident requires evacuation; and,
- Manually by Site Management in control during an emergency who has decided that evacuation is necessary.

The General Evacuation Plan will provide for quick, safe evacuation of all employees in the event of an emergency and establish the necessary teams and equipment required to respond to the emergency by rescue personnel. Muster stations will be clearly identified around the project area and site personnel will have been made aware of them during orientation and follow-up training programs.

Site evacuation will be under the control of the Site Manager, or his designate. A site- wide notification and alarm system will be established prior to major on-site construction activities. Primary evacuation from the various project areas will be by road. In the event the road is impassable, evacuation by air may be required. Specific evacuation procedures will be developed as this plan is revised prior to site construction commencement. Procedures will include steps to be taken during various scenarios and depending on the severity of the emergency. Site-wide evacuation drills will be a part of the regular testing of the ERP.

2.6 AIR SUPPORT OPERATIONS

Air support may be an important component of an emergency situation at the site. The airstrip may be used during a major emergency to expedite the movement of emergency resources (manpower and equipment) and to help evacuate site personnel (if required). The responsibility for the operation of the airstrip during an emergency situation will fall under the Site Manager (or designate). The closest year-round helicopter support is stationed in Ross River, with Whitehorse as a back-up.

2.7 COMMUNICATIONS

Communications during an emergency situation are of utmost importance. The organizational structure with specific responsibilities and communications protocols for the ERP are nearly the same as those in the Incident Notification Chart for the Spill Contingency Plan. Generally, in the event of an emergency, only absolutely necessary information should be relayed via the site communication system (e.g., radios and/or satellite phones). During the operations phase of the project there will be a dedicated First Aid radio channel which will be utilized during emergency situations.

3.0 ERP FOR MINE PHYSICAL COMPONENTS

The following section describes potential emergency scenarios resulting from failures or malfunctions of physical components of the Mactung Mine. As the Mactung project moves to the construction phase and then to the production phase, it is anticipated that the contents of this section will be refined, to better address potential emergency scenarios that emerge, as physical components are constructed and put into operation. Additional site protocols will become available as corporate policies are refined and implemented prior to

the start up of the mining operation. This Emergency Response Plan will be updated periodically to reflect these new policies. The ERP will be distributed to personnel within NATC, interested government agencies, and members of the local emergency response units.

The goals of the ERP, for scenarios related to the mine physical components, are firstly to prevent the occurrence of emergencies, accidents, and malfunctions, and secondly to reduce their impact, should they arise. In both cases, the ultimate goal is to protect:

- Human life and health;
- Social well-being of the local community and employees;
- Public infrastructure and company facilities; and
- Environment.

The intention in preparation of this section is to not only ensure timely and appropriate response to emergencies, but provide measures to mitigate the potential for occurrence of emergencies, accidents, and malfunctions. Effort has been made to ensure that mitigation measures and response guidelines to possible site scenarios are included to better enable timely and appropriate actions. Emergency preparedness begins with prevention of emergency scenarios. This is achieved through constructing, operating and maintaining systems to high standards, and by implementing continuous monitoring and surveillance programs to identify potential issues.

3.1 DESCRIPTION OF PHYSICAL MINE COMPONENTS

The following sections identify potential emergency scenarios of the physical mine components that might be subject to potential structural failure.

3.1.1 Infrastructure Pads

NATC will construct a network of infrastructure pads to accommodate structures required for the Mactung Mine. These infrastructure pads are required to provide level areas on which the mine buildings will be constructed. Construction of the infrastructure pads will involve clearing of the overburden soil, and blasting the bedrock to below the desired pad elevation. Broken blast rock fill will then be used to extend the pad desired width and to level the pad to the design elevation. The fill used to create the infrastructure pads will be placed and compacted, as they will be used to support foundations for buildings and some equipment. Slope angles will be determined during detailed design, but will be in the order of 45º (1H:1V) for rock cuts and approximately 18.4º (3H:1V) for rock fills. Infrastructure foundations will be cast directly onto the bedrock surface prior to the placement of the levelling fill.

3.1.2 Site Roads

During the advanced exploration stage the proponent is proposing to construct a new 13 km long 5 m wide road to from the camp to the Hess River Tributary. The Hess River Tributary is where the fresh water intake source will be for the mine. The road will be 5 m wide with a 2.5 m cleared section on either side of the alignment. The road will be designed for speeds between 30 and 50 km/h and have an average grade of 8% with a maximum grade of 12%. The road will have a 1 m deep ditch on either side to accommodate stormwater flows and spring melt. Cut sections of the road will have 26.7° (2H:1V) slopes and fill sections of the road will have 18.4° (3H:1V) slopes. The road will be surfaced with at least 0.2 m of crushed gravel. The road will wander in and out of potential avalanche areas.

3.1.3 Water Pipeline

A freshwater intake structure with a pumphouse will be located at the Hess River Tributary. The water pipeline will start at the freshwater intake structure and will continue 13 km to the Mactung mine site. The pipeline will have a diameter varying from 100 mm to 250 mm. The pipeline will be constructed on a pipe bench adjacent to the access roads.

3.1.4 Fuel Storage Facility

Bulk fuel will be stored in three separate tanks. A tank will be located near the process plant to store fuel for use in the power plant. The tank will be 15.5 m in diameter and 11 m high, storing 2,075,000 litres of diesel fuel. A second tank will be located in the same area as the first tank and store fuel for use in ore driers. The tank will have a diameter of 10 m and be 10 m high, storing 785,000 litres of diesel fuel. A third tank will be located near the truck shop to store fuel for the mobile equipment fleet. The tank will have a diameter of 8 m and be 9 m high, storing 450,000 litres of diesel fuel.

All bulk fuel storage tanks will be single walled tanks placed inside of a lined bermed containment area. The containment area will be designed to contain either 110% of the largest tank or 100% of the largest tank and 10% of the total maximum volume to be stored in all other tanks, which ever is greater. Additional details on fuel storage, handling and spill response are contained in the SPC.

3.1.5 Dry Stack Tailings Facility

The dry-stacked tailings facility will be where the dewatered tailings will be stacked on the ground surface. Construction of the area will be limited to removing any organic soil layers and compacting the existing granular soils. The ground will be cleared as it is needed, and the total areas to be cleared will be approximately 25 ha.

The site access road will be developed and the portion of the tailings facility footprint required for placement of tailings in the first year of production will be prepared. Foundation preparation will include removing organic material, which will be stockpiled at

the base of the pile for potential use during reclamation. The existing sand and gravel soils will be compacted using a 15-tonne steel-drum vibratory compactor to provide a compacted base for the tailings placement. The placement and compaction of the tailings will occur during the production phase of the project. The compacted granular base will also act as a blanket drain under the tailings facility structure to allow groundwater and seepage water to freely drain from beneath the pile.

3.1.6 Underground Access to Ore Body

Access to the underground mine will be provided by two portals. One existing portal will be reopened at elevation 1895 m, and the second portal will be new and established at elevation 1845 m.

The components of the underground access and working will include the following:

- The 1895 m portal and drifts
- North and south ramps
- The 1845 m portal
- The conveyor decline
- The crusher station area
- The backfill loading station area
- The ventilation system
- The north-east ramp to mechanized cut-and-fill (MCF) mining area
- Five stope lines

3.1.7 Ravine Dam

A dam and reservoir pond are required to store 120,000 m^3 of process water while it ages 30 days prior to it being reused in the process plant. The dam and reservoir are also required to detain runoff water from the effected mine footprint for water quality testing prior to it being released to natural environment.

The dam for planning purposed has been termed the "Ravine Dam" and will be approximately 315 m long and 35 m high. The dam will have a crest width of 25 m to facilitate two-way haul traffic to cross it. The downstream slope angle will be 21.8º (2.5H:1V), the upstream slope angle will be 18.4º (3H:1V), and the toe buttress will have a slope angle of 14º (4H:1V). The dam will have a geosynthetic liner system with a concrete plinth, geosynthetic drain system, geosynthetic erosion protection system, and a sand and gravel superstructure.

3.2 POTENTIAL ACCIDENTS AND MALFUNCTIONS FOR MINE PHYSICAL COMPONENTS

The physical components will be designed to withstand foreseeable usage values for dynamic and static loading, and incorporate a factor of safety to further reduce the likelihood of structural failure. Design of these physical components will also consider extreme natural events such as earthquakes and storms for specific design return periods.

An accident or malfunction could result when scenarios occur that exceed the design natural events, or from a natural or human-caused event that has not been considered in the design process due to a low probability of occurrence (e.g. lightning strike, earthquake, plane crash, etc.).

Possible emergencies and unusual situations at Mactung may range from a potentially minor incident such as a pipeline breakage to the highly unlikely and extreme event of dam instability.

All of these situations require site personnel to first be observant and recognize a potential emergency or unusual situation, then follow an established communication procedure and respond appropriately.

Possible accident and malfunction scenarios are presented in the following sections.

3.2.1 Possible Accidents/Malfunctions During Construction Phase

- **Infrastructure Pads**
  - Fuel spill from equipment during construction
  - Artesian well encountered during pad construction earthworks
  - Tension or settlement cracking to perimeter of pad
  - Concrete curing or waste water into receiving environment
- **Site Roads**
  - Fuel spill from equipment during construction
  - Equipment accidents
  - Washout of drainage structures
- **Water Intake and Pipeline**
  - Fuel spill from equipment during construction
- **Fuel Storage Facility**
  - Fuel spill from equipment during fuel transfers
  - Failure of fuel storage tanks
- **Dry Stack Tailings Facility**
  - Fuel spill from equipment during construction
  - Equipment accidents
- **Underground Access to Ore Body**

  - Landslide/avalanche triggered
  - Artesian well encountered during construction earthworks
- **Ravine Dam:**
  - Fuel spill from equipment during construction
  - Landslide/avalanche triggered

3.2.2 Possible Accidents/Malfunctions During Production/Operation Phase

- **Infrastructure Pads**
  - Weakening of building foundation – extreme flood or earthquake
  - Uneven settlement of pads – unanticipated field conditions
- **Site Roads**
  - Road wash-out – extreme rainfall event
- **Water Intake and Pipelines**
  - Freezing of pipeline – extreme cold event
  - Breakage of pipeline – earthquake or vehicular impact
- **Fuel Storage Facility**
  - Rupture of fuel tank - earthquake or vehicular impact
  - Fuel Spill
  - Fire or explosion
- **Dry Stack Tailings Facility**
  - Release of tailings during transfer to facility
  - Collapse or shifting of tailings piles
- **Underground Access to Ore Body**
  - Decline or stope collapse – earthquake or unstable rock conditions
  - Landslide/avalanche triggered – unanticipated field conditions
  - Fire or explosion
- **Ravine Dam:**
  - Catastrophic dam breach - earthquake or extreme flood
  - Slumping, sliding, cracking or bulging of the Ravine Dam – earthquake, or extreme cold event
  - Formation of sinkholes on the dam
  - Excessive seepage losses through dam
  - Excessive snow melt or precipitation that causes flooding

3.2.3 Possible Accidents/Malfunctions During Decommissioning, Reclamation and Closure Phase

- **Infrastructure Pads**

  - Fuel spill from equipment during demolition

- **Site Roads**
  - Fuel spill from equipment during decommissioning
  - Equipment accidents
  - Washout of drainage structures during decommissioning
- **Water Intake and Pipelines**
  - Fuel spillage
- **Fuel Storage Facility**
  - Contaminated soil encountered during decommissioning
- **Dry Stack Tailings Facility**
  - Fuel spill from equipment during contouring/stabilization
  - Equipment accidents
- **Underground Access to Ore Body**
  - Decline or stope collapse – earthquake or unstable rock conditions in area of decommissioning
  - Landslide/avalanche triggered as a result of drainage
- **Ravine Dam:**
  - Landslide/avalanche triggered – or unanticipated field conditions

3.3 POTENTIAL EFFECTS OF ACCIDENTS AND MALFUNCTIONS

3.3.1 Infrastructure Pads

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction – poor construction practices
  - Artesian well encountered during pad construction earthworks – unanticipated field conditions
- **Production/Operation**
  - Weakening of building foundation – extreme flood or earthquake
  - Uneven settlement of pads – unanticipated field conditions
- **Reclamation and Closure**
  - None anticipated

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Artesian well: Encountering an artesian well could lead to flooding and erosion. The severity or which would depend on the transmissivity of the aquifer and the pressure at which groundwater is released. The flooding and erosion could affect downstream ecosystems.

Weakening of building foundation: A weakened building foundation, resulting from an earthquake, could result in a structural failure of a building and other unpredictable effects. For example, if a portion of a building that houses chemical substance is structural compromised, this could lead to a potential spill.

Uneven settlement of pads: The effects of this accident or malfunction are similar to those for a weakened building foundation.

3.3.2 Site Roads

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction – unanticipated field conditions **Production/Operation**
  - Road wash-out – extreme rainfall event
- **Reclamation and Closure**
  - None anticipated

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Road wash-out: Equipment and personnel could be trapped as a result of a road wash-out. Also, a road wash-out would complicate emergency response if it were to occur, while another emergency response was in progress, such as a spill response or fire fighting operations.

3.3.3 Water Pipelines

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction
- **Production/Operation**
  - Freezing of pipeline – extreme cold event
  - Breakage of pipeline – earthquake or vehicular impact
- **Reclamation and Closure**

- None anticipated

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Freezing of pipeline: The freezing of the freshwater pipeline could result in a shortage of freshwater for drinking and fire fighting. Additional, if the freezing of the pipe results in the pipe bursting this could lead to erosion, which could affect downstream ecosystems.

Breakage of pipeline: The effects of this accident or malfunction are similar to those for a freezing of the pipeline.

3.3.4 Fuel Storage Facility

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction
- **Production/Operation**
  - Rupture of Fuel Tank - earthquake or vehicular impact
  - Fuel Spill
  - Fire or explosion
- **Reclamation and Closure**
  - Contaminated soil encountered during decommissioning

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Rupture of Fuel Tank: The effects of this accident or malfunction are similar to those for a fuel spill.

Fire or explosion: The effects of a fire or explosion are difficult to predict, and could range from mine downtime to damage to property to a fatality. A potential scenario is that the fire could spread from the fuel area to forested area where it could expand.

Contaminated soil: Contaminated soil would be toxic to biological receptors, and would require a remediation program.

3.3.5 Dry Stack Tailings Facility

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction

- Equipment accidents

- **Production/Operation**
  - Release of tailings during transfer to facility
  - Collapse or shifting of tailings piles

- **Reclamation and Closure**
  - Fuel spill from equipment during construction
  - Equipment accidents

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Release of Tailings: The effects of this accident or malfunction are similar to those for a fuel spill although the magnitude may be much larger.

3.3.6 Underground Access to Ore Body

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction
  - Landslide/avalanche triggered – unanticipated field conditions
  - Artesian well encountered during pad construction earthworks

- **Production/Operation**
  - Decline collapse – unanticipated field conditions
  - Landslide/avalanche triggered
  - Fire or explosion

- **Reclamation and Closure**
  - Blockage of a drainage tunnel leading to water build-up – unanticipated field conditions

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Landslide/avalanche: The effects of a landslide or avalanche could include injuries, fatalities, and damage to mine infrastructure. Damage to mine infrastructure could result in dam breaches, spills, and other unpredictable effects.

Artesian well: Encountering an artesian well could lead to flooding and erosion. The severity or which would depend on the transmissivity of the aquifer and the pressure at which groundwater is released. The flooding and erosion could affect downstream ecosystems.

Decline Collapse: Workers could potentially be trapped as a result of a decline collapse. Such a scenario would require a great deal of logistical coordination and resources in the rescue effort. A second mine exit is available through ventilation adit.

Fire or explosion: The effects of a fire or explosion are difficult to predict, and could range from mine downtime to damage to property to a fatality. A potential scenario is that the fire could trap individuals. Fire fighting underground requires different considerations than aboveground.

3.3.7 Ravine Dam

The following potential accidents have been identified for this component:

- **Construction**
  - Fuel spill from equipment during construction
  - Landslide/avalanche triggered – unanticipated field conditions
- **Production/Operation**
  - Catastrophic Dam Breach – unanticipated field conditions
  - Slumping, sliding, cracking or bulging of the Ravine Dam – unanticipated field conditions
  - Formation of sinkholes on the dam – unanticipated field conditions
  - Excessive seepage losses through dam – unanticipated field conditions
- **Reclamation and Closure**
  - Landslide/avalanche triggered – unanticipated field conditions

The effects of the above potential accidents and malfunctions are discussed below.

Fuel spill: Contaminated soil, groundwater, or surface water could result from a fuel spill. The fuel would be toxic to biological receptors.

Landslide/avalanche: The effects of a landslide or avalanche could include injuries, fatalities, and damage to mine infrastructure. Damage to mine infrastructure could result in dam breaches, spills, and other unpredictable effects.

Catastrophic Dam Breach: The water stored behind the dam, as well as those left in the process water pond could be toxic to the environment and the erosion could affect stream channels used aquatic life. The potential environmental damage in that case could be substantial.

Slumping, sliding, cracking or bulging of the dam: Deformation to dam structure could decrease the performance of the dam, which could result in the slow release of potential toxic water to the environment.

Formation of sinkholes on the dam: The effects of this accident or malfunction are similar to those for slumping, sliding, cracking or bulging of the dam.

Excessive seepage losses through dam: Seepage water could potentially be toxic to the environment. Excessive seepage could also slowly undermine the dam.

3.4 MITIGATING THE POTENTIAL FOR ACIDENTS AND MALFUNCTIONS

NATC will be proactive in its approach to confronting potential emergencies, accidents, and malfunctions. These preventative programs are outlined in the following paragraphs.

3.4.1 Actions to Prevent a Fuel Spill

The SPC contains detailed measures on fuel spill prevention. Such measures include: inspections of vehicles, fuel tanks, and piping; placing fuel tanks within containment berms; and having spill response kits at strategic locations throughout the mine property.

3.4.2 Actions to Prevent a Artesian Well Discovery

A thorough hydrogeological assessment of the Mactung Mine site has been conducted as part of the environmental assessment process. The intention is that this information will reduce the likelihood of an inadvertent discovery of an artesian well is reduced.

3.4.3 Action to Prevent a Forest Fire

Most of the Mactung Mine site is above the tree line, so the forest fire potential will be low. Fire suppression equipment will be available on-site during construction in areas with fire potential.

3.4.4 Actions to Prevent Freezing of Pipelines

Pipelines will be pressurized by gravity and/or the pump, and will also be heat-traced to reduce the potential for freezing.

3.4.5 Actions to Prevent Vehicular Impact to Structures

The water pipeline will be offset from the adjacent roads to limit the potential for a vehicular impact. Other key structures might be protected by bollards and/or guardrails. In some cases, pipes, tanks, and other important infrastructure might be painted with a more visible colour.

3.4.6 Actions to Prevent Release of Tailings

Particular attention will be given to construction of the facility to ensure proper sizing, inspecting and, where necessary, repairing the diversion ditches upgradient of the facility following unusual or extreme events. All unusual events will be reported to supervisory personnel.

In the unlikely event that tailings piles shifted, possibly during an earthquake event, the tailings could be reconfigured to improve stability if required.

3.4.7 Actions to Prevent Ravine Dam Breach

Particular attention will be given to inspecting and, where necessary, repairing the dam following unusual or extreme events. All unusual events will be reported to supervisory personnel. In an unlikely event that high seepage flows occur downstream of the Ravine Dam, and particularly if seepage water is carrying soil particles from the dam or its foundation, which is an early indication of a potential "piping", i.e., internal erosion problem, it will be reported immediately and the engineering consultant notified.

In an unlikely event, the Mactung Ravine Dam could fail due to a breach with ensuing flood threatening the downstream area. It is difficult to predict where a dam breach would be initiated and precisely what corrective actions would be required. Nevertheless, to assist the mine in dealing with emergency situations threatening the dam, this section describes the resources available to the mine and potential course of actions that could be taken promptly to avert a dam breach. These actions could be summarized as: (1) lower reservoir level; (2) arrest or retard dam internal erosion; and (3) arrest or retard dam external erosion. Necessary actions to be taken to mitigate potential impacts on the downstream area, as the efforts to control the dam incident are underway, are also presented herein.

3.4.7.1 Construction Equipment, Materials, Labour and Engineering Expertise

During mining operations there is continual personnel presence around the Mactung Mine. If a situation arises that requires immediate attention, NATC has at its disposal the equipment, material, labour and engineering expertise to respond immediately. These resources include those within the mine and those available through outside contractors and consultants.

3.4.7.2 Lower Process Water Pond Level

In the early stage of either a seepage or overtopping scenario, the most effective action to reduce the threat of further development of the failure mechanism is to lower as fast as practical the level of water in the process water pond upstream of the Ravine Dam. The potential actions are grouped under internal actions and actions that requiring governmental approval as follows:

Internal Actions - Process water discharge into the process water impoundment will be stopped (shut down mill). This action can be taken without acquiring governmental approval, as it would not affect the environment outside of the mine. If this action alone is unable to lower the pond level sufficiently to improve the dam condition, the following actions can be pursued.

Actions Requiring Governmental Approval - The mine will request the Yukon Department of Energy, Mines and Resources and Department of Environment to declare a state of emergency, and to allow NATC to release process water pond water downstream of the Ravine Dam.

If the permission is not granted, NATC could consider other feasible approaches, such as returning process water to the underground mine.

3.4.7.3 Arrest or Retard Dam Internal Erosion

Once excess and/or murky seepage caused by internal erosion of the Ravine Dam is detected, additional actions can be taken to arrest the further development of the erosion, which could lead to seepage failure of the dam. If sinkholes develop, they should be immediately filled with suitable backfill soil compatible with the internal zoning of the dam. If the sinkholes are located upstream of the dam, efforts should be made to prevent pond water from flowing into the sinkholes. This could be accomplished by placing additional earthen berms in the surrounding area to block any potential access of pond water to the sinkholes.

In the area where excess and/or murky seepage exiting from the Ravine Dam toe, a weighted filter buttress berm should be promptly placed along the seepage exit area. The filter berm would allow free exit of seepage water without carrying away existing dam fill and/or foundation materials. The filter berm is to be constructed of filter and drainage materials with progressively increasing particle size towards the berm outer surface.

3.4.7.4 Arrest or Retard Dam External Erosion

As the dam freeboard decreases during a major hydrologic event, additional actions can be taken to arrest external erosion of the dam. Concurrent to lowering the process water pond level, the existing dam crest should be raised by placing additional dam fill on the crest. While raising the crest uniformly across the entire dam, additional dam fill material should be placed in local areas where signs of weakening such as slope slumps, crest deformations and cracks are discovered.

In an event that an open channel begins to form on the dam crest, granular materials should be used to plug the channel. Materials of sufficient size and weight can be dozed into the breach from alternate side of the channel. As the channel is gradually being closed, the materials used to plug the channel should increase in size and weight to cope with the increasing flow velocity. After the channel is completely closed, additional fill material with sufficient fines should be placed upstream of the granular-fill plug in order to stop the seepage through the plug.

3.5 MITIGATING EFFECTS OF ACCIDENTS AND MALFUNCTIONS

3.5.1 General Principles in the Mitigation of Accidents and Malfunctions

In the event of an emergency or unusual situation, all instrumentation in the affected area will be monitored during and/or immediately following the event by either an engineering consultant, if on-site, or by NATC personnel. This information will be forwarded to the design engineer(s) immediately so that the situation can be assessed and any required remedial actions taken promptly.

3.5.2 Emergency Response and Mitigation of Accidents and Malfunctions

Communication of a potential or actual emergency is essential, in order to get others more qualified to assess the situation or to assist in response. Good communication will allow for a more complete and rapid response. In virtually all situations, notification, at a minimum to the Site Manager, is required. If there is imminent and substantial danger to people, the environment, or to company property that overwhelms on-site resources, outside assistance must be summoned quickly. Possible examples include: a spill that threatens the environment and cannot be contained, or a catastrophic dam failure that threatens personnel, the public and the environment.

3.5.2.1 Emergency Response Procedures

- On-scene site staff should respond to the incident, ensuring safety of themselves and others.
- On-scene site staff must notify, as soon as possible, the supervisor(s), including the senior management, as appropriate.
- In case of an emergency requiring immediate outside assistance, site safety personnel will call appropriate emergency numbers (to request for assistance by police and/or other emergency personnel).
- The following information will be required when reporting an emergency:
  - Name and telephone number or first responder;
  - The location and time of the incident;
  - The structure involved;
  - The nature of the emergency situation (e.g., spill, dam incident, etc.);
  - The cause of the emergency (e.g., pipeline break, slope instability, or other unknown causes);
  - Actions taken to control the problem and their effect (e.g., close off isolation valves, repair dam slope);
  - The names of the agencies on the scene; and
  - The names of other persons or agencies advised concerning the incident.

3.5.2.2 Notification and Communication Protocols

Notification is done to alert others of an unusual condition that has occurred or is still occurring, that may require action. It is to be done promptly, but there is typically time to first gather more information on a situation, to analyze possible causes, and to perhaps take some initial remedial measures.

Internal Notification - is given to the supervisor(s) according to the chain of command including senior management, as appropriate. As a general rule, always inform the supervisor(s) of any unusual incident that has occurred on site, any anomalous monitoring

results, or any potentially hazardous condition. If in doubt about the significance or importance of something you have observed, err on the side of caution - report it to the supervisor(s). The supervisor(s) will then investigate and determine necessary actions.

External Notification - is communication to persons or agencies outside of the Mactung Mine site. Typically, external notification is done by the senior management, or a designate. Contact details (names of key individuals, their agencies and telephone numbers) will be provided prior to the start up of mining operations. Some key persons or agencies that will be notified of an incident include:

- a) Government: in the event of a significant spill, or dam incident, the site manager will notify the Department of Energy, Mines and Resources and Department of Environment, Yukon Territory, and other appropriate agencies.
- b) Downstream-Affected Persons: a dam incident could result in off-site effects, for example a spill, water quality issue, or dam breach. In this case, effort must be made to ensure that all those potentially affected by the situation are notified and given directions to reduce their exposure. Actions must also be taken to prevent the public from unknowingly being affected by the situation (e.g., possibly by restricting access to nearby roads and waterways). The site manager will work closely with territorial and appropriate authorities to ensure that notification of downstream-affected persons is timely and comprehensive.
- c) Dam Consultant: in the unlikely event of a potential dam instability or leakage situation, the dam consultant will be immediately contacted, and investigative and mitigate actions will be taken as recommended by the consultant.
- d) Corporate: corporate personnel are typically notified in the event of significant incidents on site, particularly events where external notifications to government agencies or downstream-affected persons has been necessary.

Other Communications - During and after a significant event, it may be necessary to respond to questions and concerns by the media, general public, special interest groups, and other stakeholders. The corporate office is responsible for this communication.

3.5.3 Actions to Mitigate Downstream Effects

As soon as a dangerous situation is perceived to be developing, downstream stakeholders should be notified and alerted to the fact that NATC has an unusual situation related to its dam facility occurring. In the unlikely event that the flood storage available in the pond is being used up, while the storm is not abating and the condition of the dam is deteriorating, the conditions may warrant the notification of imminent threat of dam breach, and the restriction of access to downstream low-lying areas threatened by the dam-breach flood. By providing effective communications with agencies and downstream affected stakeholders, the impact to the downstream area can be kept to a minimum.

3.5.4 Specific Training

During mining operations, senior management will provide annual training workshops for personnel working at the Mactung Mine who are part of the Emergency Response Team. The workshop will focus on operational procedures, improvements planned for the mine operation system and an overview of planned construction and maintenance activities. Moreover, a more detailed version of this Emergency Response Plan will be covered. Participants will be required to pass a written examination to demonstrate their understanding of the workshop material.

4.0 KEY OPERATIONS NUMBERS

The Emergency Response Plan will contain a list of contacts for site personnel during each phase of the project. A copy of this list will also be posted in the project safety office, environmental office, and a number of other key locations dependent on the project phase.

5.0 CONTACTS

Should there be any questions regarding this Emergency Response Plan, please contact one of the following:

Wade Stogran
VP Environmental and Corporate Affairs
North American Tungsten Corporation
Direct Line: (604) 684-5300 ext. 316
e-mail: wstogran@natungsten.com

Don Wilson, B.Sc.
Senior Environmental Scientist
Whitehorse Environment Group, EBA
Direct Line: (867) 668-2071 ext. 223
e-mail: dwilson@eba.ca

Scott Davidson, M.Sc., P.Geo.
Geoscientist
Whitehorse Environment Group, EBA
Direct Line: (867) 668-2071, ext. 248
e-mail: sdavidson@eba.ca

APPENDIX

APPENDIX A IMPORTANT CONTACT INFORMATION

EMERGENCY CONTACT INFORMATION			
SITE/CONTACT	TITLE	NUMBER	ALTERNATE
To be named prior to Production Phase	Mine Manager	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Environmental, Health & Safety Officer	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Area Manager Process Plant	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Area Manager Tailings	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Area Manager Powerline and Substations	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Area Manager Yard Services and Off-site Infrastructure	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Mill Superintendent	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Maintenance Superintendent	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Mine Superintendent	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Warehouse	To be named prior to Production Phase	To be named prior to Production Phase
To be named prior to Production Phase	Environmental Coordinator	To be named prior to Production Phase	To be named prior to Production Phase

INTERNAL NATC CONTACT INFORMATION					
TITLE	NAME	BUSINESS PHONE	CELL	FAX	HOME PHONE
President/CEO					
CFO					
G.M.					
Mill Superintendent					
Mill Superintendent #2					
Mine Superintendent					
Mine Foreman					
Maintenance Superintendent					
Environmental, Health & Safety Officer					
Environmental Coordinator					
Administration / Human Resources					
Engineer					
Geologist					

To be determined prior to production phase

Revised: December 9, 2008

EXTERNAL CONTACT LIST		
ORGANIZATION	CONTACT	PHONE
Government of Northwest Territories	24-HOUR SPILL REPORT LINE	867-920-8130
Government of Yukon	24-HOUR SPILL REPORT LINE	1-867-667-7244
Yukon Workers Compensation Health & Safety Board	24 – HOUR REPORTING LINE	867-667-5450

Revised: December 9, 2008

EXTERNAL RESOURCES		
PRODUCT / SERVICE	ORGANIZATION	NUMBER
SPECIALTY SUPPORT:		
Ambulance-Ross River		867-969-4444
Nurse- Ross River		867-969-4444
Police- Ross River	RCMP	867-969-5555
Fire Department	Ross River Fire Department	867-969-2222
Emergency Spill Reporting	Yukon Government, Dept. of Environment	867-667-7244
Environment Complaint	Environmental Protection Service – Whitehorse	867-667-7244
Fisheries and Oceans – Habitat and Enhancement	Federal Department of Fisheries and Oceans	867-393-6721
Wildlife Activity – Ross River C.O.	Yukon Government, Dept. of Environment	867- 969-2202
Forest Fire-Yukon		888-798-3473
Poison Centre-Whitehorse		867-393-8700
Telephone Problems	Northwestel	611
Occupational Health and Safety-Whitehorse (24hrs)	Yukon Workers Compensation Health & Safety Board	867-667-5450
DIAND	DIAND Waste and Contaminants	867-667-3272
Yukon Wildlife and Environmental Protection- reporting fishing, hunting, dumping offences	Yukon Wildlife and Environmental Protection	1-800-661-0525
Ross River Dena Council		867-969-2278
LOCAL AIR CHARTER:		
Helicopter	TNTA	867 536 2100
Helicopter	Great Slave	867 695 2326
Fixed wing	Alkan Air	867 668 2107
EQUIPMENT AND MATERIAL SUPPLIERS:		
Equipment	Jedway	867 536 2611
Propane	Superior Propane Scott Hauer	867 667 7113
Engineering	EBA	867 668 3068
Tails engineering	Nigel Goldup	780 451 2130 X301
Tails engineering	Nigel Goldup- cell	780 405 2985
Explosives	Simon Cropper	403 259 0424
K.P.I. Northern (equipment)	Watson Lake	1-867-536-7361
Tu-Nagel Service (suction truck)	Watson Lake	1-867-536-2308
Arctic Backhoe Service (clean up)	Whitehorse	1-867-633-5951
Northern Metallic Sales	Watson Lake	1-867-536-2205

Revised: December 9, 2008

APPENDIX

APPENDIX B SPILL CONTINGENCY PLAN

NORTH AMERICAN TUNGSTEN CORPORATION LTD.

MACTUNG SPILL CONTINGENCY PLAN

W23101110.003

December 2008

EBA Engineering Consultants Ltd.
p. 867.668.3068 • f. 867.668.4349
Calcite Business Centre • Unit 6, 151 Industrial Road • Whitehorse, Yukon Y1A 2V3 • CANADA

DISTRIBUTION LIST AND REVISIONS

The following pages provide the Distribution List as well as a page for noting Revisions.

DISTRIBUTION LIST				
COPY #	ORGANIZATION	NAME/TITLE	E-MAIL	LOCATION
	North American Tungsten Corp.	All Departments		Vancouver
	North American Tungsten Corp.	All Departments		Mactung Site
	Yukon Water Board	Manager, Yukon Water Board Secretariat		Whitehorse
	Government of Yukon – Energy, Mines and Resources	Client Services & Inspections Branch		Whitehorse
	Yukon Workers Compensation Health & Safety Board	Chief Mine Safety Officer		Whitehorse

REVISION SHEET				
REVISION #	REVISION DESCRIPTION	DATE	SENT BY	CHECKED

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QUICK GUIDE TO SPILL RESPONSE

1. ENSURE SAFETY OF YOURSELF AND OTHERS

a) Call for assistance - notify **Environmental, Health & Safety Officer** and **Mine Manager**

b) Wear appropriate personal protective equipment (i.e., impervious clothing, goggles and gloves).

c) Approach the spill from upwind, if safe to do so.

d) Shut off ignition sources and do NOT smoke.

e) Attend to injured personnel. Begin first aid if required.

f) Keep unnecessary people out of the area.

2. ASSESS THE SITUATION

a) Identify the spill material.

b) Assess the severity of the spill and determine a spill volume, if possible.

c) Determine the lateral extent of the spill and establish a boundary around the spill.

d) Consider the effect of vapours and wind direction, especially for flammable and poisonous gases.

3. PROTECT THE ENVIRONMENT

a) Mine Environmental, Safety & Health Officer mobilizes Spill Response Team.

b) Stop product flow if possible.

c) Contain and recover spill as soon as possible.

d) Take necessary measures to mitigate the impacts of the spill to the natural environment.

e) Monitor for changes in seriousness of the incident

4. ENSURE SAFETY OF EQUIPMENT

5. INITIATE NOTIFICATION AND REPORTING

a) Notify **Environmental, Health & Safety Officer** and **Mine Manager.**

b) Phone **Yukon Spills Hotline - (867) 667-7244**

1.0 INTRODUCTION

The Mactung Mine Spill Contingency Plan (the Plan) is designed to show the response and notification procedures for a spill at North American Tungsten Corporation Ltd. (NATC) Mactung mine site. Emergency preparedness and spill response planning are key to avoiding accidents and minimizing environmental impacts, should accidents occur. All personnel working at the Mactung mine site should be familiar with the Spill Response Plan, locations of fuel and chemical storage areas, locations of emergency spill response kits, and the procedures to follow in the event of a spill.

1.1 PURPOSE

The purpose of this Plan is to outline the means for responding to spills of petroleum, chemical products, or mill process wastes in a way that will minimize potential health hazards, environmental impact, and remediation costs. The objectives of the Plan are:

- to define the reporting procedure and communications network in the event of a spill.
- to identify specific individuals and their responsibilities during a spill response situation.
- to define procedures for the containment and clean up of the spills.
- to provide an inventory of equipment and materials that are available on-site to safely contain a spill.
- to provide a list of contacts that could provide additional information about specific spill substances and acceptable methods of containment, treatment and disposal.
- to provide a list of contacts through which additional equipment and resources could be obtained during a spill response.
- to minimize the environmental impacts of spills to water, land, or wildlife.

1.2 SCOPE

The Plan applies to any spill at Mactung occurring at the mine and mill site, tailings disposal area, underground mine workings, and 45 km private access road. This Plan deals with the procedures and methods for spill notification, response mobilization, containment, recovery and remedial measures for spills related to those products used and transported to the Mactung mine site.

During the Construction Phase of the project, the construction contractor will implement their own spill response procedures and an Environmental Health & Safety person will be on site. These procedures will be contained in a "Project Procedures Manual".

Spills caused by NATC hauling contractors along public roads, such as North Canol Road, will be the responsibility of the hauling contractor. To mitigate the risk, NATC will:

- ensure that the hauling contractors have adequate Spill Contingency Plans and training in place;

- require inspection documentation for all trucks and tankers hauling fuel or chemicals to Mactung; and
- require copies of driver abstracts.

Should a spill occur on a public road or bridge by a NATC hauling contractor, NATC will consult with the hauling contractor and provide assistance, if required or requested.

1.3 POTENTIAL SPILL SCENARIOS

Potential spill scenarios that may be encountered at the Mactung mine site include:

- A mechanical failure of equipment;
- An accidental release/leak from on-site tanks or piping;
- An accidental release from a container/vehicle along the access road; and
- A receiving/offloading spill during re-supply to fuel storage facilities;
- A transfer spill during loading/fuelling of on-site containers/vehicles.

1.4 COMPLEMENTARY PLANS AND DOCUMENTS

This plan is one component of the overall (Mactung) Emergency Response Plan (ERP). It is intended to be used in conjunction with other field and corporate response plans including the construction contractor's Spill Response Plan.

1.5 ADMINISTRATION - RESPONSIBILITY AND DOCUMENT UPDATING

NATC has overall responsibility for implementing this document and for updating the various components of the ERP in accordance with the terms of the Yukon Water Board's Type A Water Licence (the Licence), required for Mactung and the requirements of any legislation that may be applicable such as the Spills Regulations. Updated versions of the Plan will be distributed to site personnel and individuals identified in the document's distribution list.

1.6 TESTING THE CONTINGENCY PLAN

The plan will be tested to ensure it is current, comprehensive and effective. Random, unannounced spill contingency drills may be carried out from time to time during both the summer and winter seasons to ensure preparedness of response crews. Similarly, communication drills and notification tests may be prepared and implemented.

1.7 TRAINING OF PERSONNEL

All personnel, as part of their job orientation, will be informed of the existence of the Plan and those who will be expected to be involved will be required to read and understand this document. Each employee will be made aware of the hazardous materials to be used as part of their regular duties, including the potential dangers and appropriate responses should

they encounter a hazardous materials spill. Plan updates will be discussed during regular safety meetings.

1.8 DEVELOPMENT AND REFINEMENT OF PROCEDURES

Following the response to any spill incident, the **Mine Manager**, **Environmental, Health, & Safety Officer**, and specific **Area Manager** (of the effected area) will investigate the incident and prepare a report outlining the steps and procedures that would prevent a similar recurrence. These procedures will be distributed to the appropriate personnel at the mine as part of their work description. If appropriate, these procedures may be appended to this Spill Contingency Plan, and additional training would be offered to site personnel, if deemed by mine management to be necessary.

2.0 SPILL NOTIFICATION

2.1 INCIDENT NOTIFICATION

Witness

The **Witness** will initiate the notification sequence according to the **Incident Notification Chart** (Figure 1, below). Primary notification of any spill will be to the **Immediate Supervisor** (or alternatively the **Control Office**) by the **Witness**. If a person on the notification list is unavailable, it is acceptable to contact his/her designate. For unknown substances, the spill should be reported and treated as hazardous.

Immediate Supervisor/ Control Office

The **Immediate Supervisor** or **Control Office** notifies the **Environmental, Health & Safety Officer** and a **First Responder** (i.e., **Mine or Mill Superintendent** or **Maintenance Supervisor**) or the **Area Manager** for the area where the spill has occurred.

First Responder

Once at the site of the spill, the **First Responder** should ensure the safety of personnel and stop product flow, if safe and possible to do so.

Environmental, Health & Safety Officer

In all cases, the **Environmental, Health & Safety Officer** will be immediately notified of a spill and, along with the **First Responder**, will be responsible for notifying the **Mine Manager**. The **Environmental, Health & Safety Officer** will proceed to the incident site, assess the situation and determine the appropriate level of response with the **First Responder**.

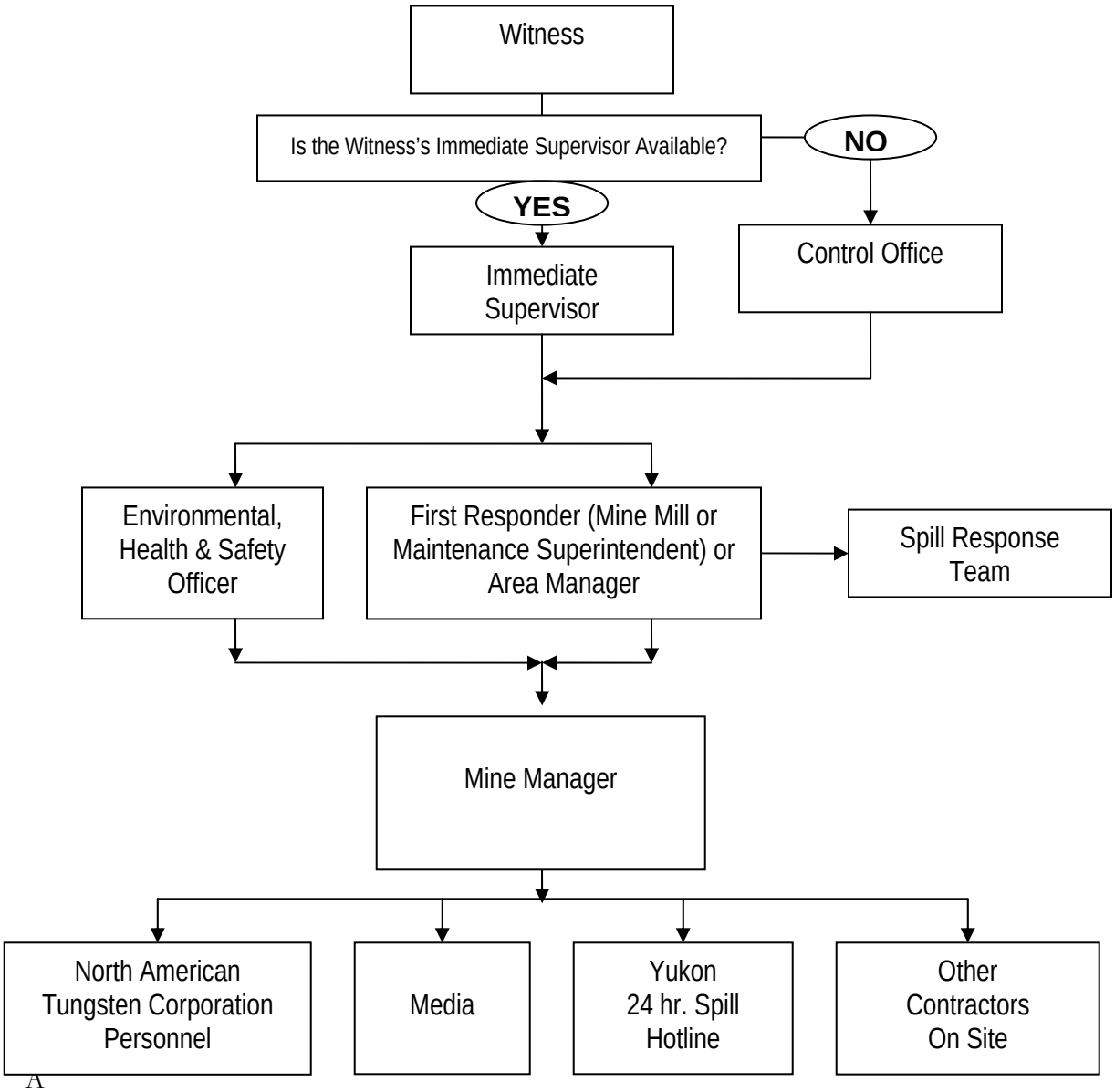
For most incidents, the **Environmental, Health & Safety Officer** and the **Spill Response Team** will handle the initial response, containment and clean-up. For larger incidents, the **Mine Manager** and NATC staff will play a more active role. Other contractors and specialists may be brought in to assist the **Environmental, Health & Safety Officer** in a response to a major incident.

Mine Manager

The **Mine Manager** will contact designated NATC personnel once the details of the spill are known and initiate contact with the Yukon 24-hour spill report line: (867) 667-7244. The **Mine Manager** will also contact other contractors on-site and make them aware of the situation.

Designated NATC personnel will liaise with the appropriate Government Agencies in conjunction with the **Mine Manager**. **Only the Mine Manager, or their designate, will issue statements to the media.** All requests for information from the media are to be forwarded to the **Mine Manager**.

INCIDENT NOTIFICATION CHART



A

2.2 IMMEDIATE SUPERVISOR CHECKLIST

The following provides guidance to the **Witness** and **Immediate Supervisor** when responding to a spill.

1. If the spill is small and **known** to be non-hazardous, clean it up. If it is large, report it to your **Immediate Supervisor**.

2. If the spill is potentially hazardous or of an unknown material, initiate the Incident Notification Chart by contacting your **Immediate Supervisor** as soon as possible. Be prepared to provide the following information, or respond to:

   - Who are you? [*Your Name*]
   - Where are you? [*Location of spill*]
   - What type of materials were spilled?
   - Are there any injuries?
   - How large is the spill?
   - Is the spill still in progress, and, if so, can it be easily stopped?
   - Is the spill adjacent to (within 100 m of) or into a watercourse?
   - What is being done to respond to the spill?
   - Do you need help? Who? What?
   - Are you going to call back? If so, when?

3.0 SPILL RESPONSE ORGANIZATION

This section describes the general roles and responsibilities of the parties that may be involved in spill response at Mactung, including NATC, contractors and other experts and resources that may be mobilized.

3.1 GENERAL ROLES AND RESPONSIBILITIES

The following section describes the general roles and responsibilities during spill response at the Mactung mine site. NATC personnel may fill dual roles, depending upon the circumstances of the incident.

WITNESS

- Assess the initial severity of the spill and safety concerns.
- Identify the source of the spill.
- Report all spills to your **Immediate Supervisor** as soon as possible.
- Determine the size of the spill and stop or contain it, if possible.
- Participate in spill response as a member of the clean-up crew.

ENVIRONMENTAL, HEALTH & SAFETY OFFICER

- Notify **Mine Manager**.
- Notify on-site **First Aid Attendant** if an injury has occurred.
- Assess and verify the severity of the spill, and potential environmental and safety concerns.
- Assemble and supervise **Spill Response Team**.
- Take initial action to seal off the source and contain spill, with the **Spill Response Team**,
- Complete and submit a Spill Report Form (Appendix A).
- Continue actions until relieved or supplemented by **Mine Manager**..
- Decide with **Mine Manager** if mobilization of additional equipment and outside expertise is warranted.
- Ensure co-ordination of equipment and resources as needed (i.e.,NATC, contractors, and consultants).
- Ensure that all established procedures for clean-up and material handling are followed.
- Ensure quick response and clean-up of spill site and impacted areas.

FIRST RESPONDERS (Mine or Mill Superintendent or Maintenance Supervisor)

- Assist in initial and ongoing response efforts.
- Stop or contain the spill, if possible.
- Notify **Mine Manager,** unless already done by the **Environmental Health & Safety Officer**.
- May assist with assembly and supervision of **Spill Response Team**.
- Take initial action to seal off the source and contain spill, with the **Spill Response Team**,
- Conduct initial containment and clean-up operations.

SPILL RESPONSE TEAM

- Clean-up spill as directed by **Environmental, Health & Safety Officer**.
- Deploy sorbents, booms and other equipment and materials as required.
- Take appropriate response measures.
- Continue clean-up as directed by **Environmental, Health & Safety Officer** or until relieved.

MINE MANAGER

- Obtain Spill Report from **Environmental, Health & Safety Officer.**
- Report spill to Yukon 24-hr Spill Line at (867) 667-7244.

- Notify NATC corporate personnel.
- Contact the Emergency Response Team (see Emergency Response Plan) if the situation requires.
- Oversee the clean-up operation until it is satisfactorily completed.
- Provide clean-up advice and support to the **Environmental, Health & Safety Officer**.
- Provide advice on storage and disposal options.
- Together with the **Environmental, Health & Safety Officer,** decide if additional equipment is required to contain and clean up spills.
- Mobilize additional local company support staff, security, and other contractors, as required.
- Retains an environmental consultant, as required.
- Assist with preparation and delivery of press releases, as required.
- Conduct investigation to identify measures to prevent similar spills.
- Prepare Post-Spill Reports that document the spill event, clean-up actions, impacts, and preventative measures that should be implemented.
- Implement necessary actions to prevent a recurrence.
- Liaise with government agencies (as required).

NATC CORPORATE PERSONNEL

- Active in major incidents
- Responsible for communication with media. Ensures that all press releases are accurate and in accordance with company policy.
- Liaise with government agencies (as required).
- With the **Mine Manager**, make financial decisions on major expenses during large spill response.

4.0 RESPONSE RESOURCES

This section provides an overview on the spill equipment resources that are available at Mactung and the personnel who would be involved in an incident.

4.1 SPILL RESPONSE EQUIPMENT

A wide variety of spill control/recovery equipment and materials will be maintained at the mine for dealing with emergency spills of petroleum products and chemical reagents. Heavy construction equipment will also be available for use on demand for major spills.

All equipment will be stored in such a manner as to be readily available on short notice. The **Environmental, Health & Safety Officer** would immediately respond to a reported incident site by notifying their on-duty equipment operators to move equipment and material necessary to provide control and clean-up measures to the reported incident.

Emergency spill containment and recovery materials and supplies will be available for immediate mobilization at any time. Appendix B lists the typical materials stocked in each Emergency Spill Response Kit, which are stored at strategic locations around the mine site, as identified in Appendix C.

Additional materials and equipment will be stored at the Fire Bay central storage facility (see Appendix D). Other heavy equipment will be available on-site, which may be required for large spills, such as a front-end loader, dozer and trucks.

4.2 KEY RESPONSE PERSONNEL

Appendix E contains a list of response personnel, external agencies, and others that may need to be contacted during a spill event. A copy of this list will also be posted in the mine safety office, environmental office, and other key locations.

Key response personnel are identified in Table 4.2-1:

TABLE 4.2-1: KEY RESPONSE PERSONNEL

Position	Name
Mine Manager	TBA
Environmental, Health & Safety Officer	TBA
Area Manager: Process Plant	TBA
Area Manager: Tailings	TBA
Area Manager: Powerline and Substations	TBA
Area Manager: Yard Services & Offsite Infrastructure	TBA
Mill Superintendent	TBA
Mine Superintendent	TBA
Maintenance Superintendent	TBA
Environmental Coordinator	TBA

A **Spill Response Team** will be sourced as required to respond to any spill. The **Environmental, Health & Safety Officer** will assemble or direct the assembly of the team, which may comprise the following people:

- Individual who discovered the incident (**Witness**);
- Employee(s) who normally handle the spilled material (if specific and available);
- Heavy equipment operators (if required); and
- Other employees, as requested by the **Environmental, Health & Safety Officer**.

It is imperative that all employees are familiar with this Spill Contingency Plan, as they may be directed to assist on the **Spill Response Team** at any time.

Should there be any questions regarding this Spill Contingency Plan, please contact one of the following:

CONTACT	POSITION	COMPANY	PHONE	E-MAIL
Wade Stogran, R.P. Bio	VP, Environmental and Corporate Affairs	NATC	(604) 684-5300 x316	wstogran@natungsten.com
Kirn Dhillon, P.Eng.	Environmental Project Engineer	EBA	(867) 668-2071 x 225	kdhillon@eba.ca
Scott Davidson, P.Geo. (BC)	Geoscientist	EBA	(867) 668-2071 x 248	sdavidson@eba.ca
Don Wilson, B.Sc.	Team Leader ,Contaminants	EBA	(867) 668-2071 x 223	dwilson@eba.ca

5.0 SPILL SOURCES AND PREVENTATIVE MEASURES

5.1 GENERAL

This section details the materials stored on site and the actions to be taken should a spill occur. During a spill event, the NATC's priorities are:

- the health and safety of employees and site visitors;
- the protection of the environment; and
- the protection of equipment.

5.2 PRODUCTS

Typical materials that are utilized in tungsten production include:

- Hydrated lime
- Flocculants
- Hydrofluoric acid
- Hydrochloric acid
- Caustic soda
- Sodium bicarbonate
- Copper sulphate
- Depramin (starch)
- Dowfroth (frother)
- Nitric acid
- Pamak (fatty acid)
- Quebracho (tree extract)

- Sodium carbonate
- Propane
- Oxygen
- Acetylene
- Paint
- Paint stripper
- Adhesives
- Salt
- Ammonium nitrate
- Cement
- Sodium silicate
- Xanthate Z-6
- P40 detergent
- Emcol
- Muriatic acid
- Sulphuric acid
- Detergents
- Dynamite and emulsion explosives

Petroleum products that are utilized include:

- Diesel fuel P-40 and P-50
- Gasoline
- Ethylene glycol-based antifreeze
- Lubricating oils
- Hydraulic oils
- Used oils

The majority of these substances will be stored and used in the mill complex and the Maintenance Shop

5.3 POTENTIAL SPILL SOURCES

Appendix F identifies the type of materials that are stored on-site, their volume, and their storage location.

5.4 PREVENTATIVE MEASURES

NATC gives the highest priority to preventing spills from occurring. To that end, the following procedures have been established.

5.4.1 General

The following practices will be instituted at the Mactung mine site:

- All personnel on-site will familiarize themselves with this document as part of their job and work site orientation;
- An Emergency Spill Response Kit will be immediately available while transferring any fuels or chemicals;
- At least one Emergency Spill Response Kit will be stored at each long-term storage facility; and

- A leak of any size from a storage facility will be reported to the **Witness' Immediate Supervisor** and the **Environmental, Health & Safety Officer**.

5.4.2 Above Ground Storage Tanks

The following items should be checked as indicated:

- The level of products stored in tanks should be checked over a 12-hour period to ensure that there are no cracks/ leaks and the level remains static;
- The secondary containment system should be partially filled with water over a 12-hour period to ensure that there are no cracks/leaks and the level remains static;
- All pumps, hoses, and valves should be checked each shift to ensure they are tight and in good condition; and
- Logs should be reviewed monthly to ensure that all materials are accounted for.

5.4.3 Powder Magazine (Underground)

Magazines should be inspected on a monthly basis. In particular, the following items should be examined:

- Locks and other security features are in satisfactory condition;
- Logs should be reviewed to ensure that all materials are accounted for; and
- The structure and doors are sound.

5.4.4 Reagent Storage Warehouse and General Warehouse

Warehouses should be inspected on a monthly basis. In particular, the following items should be examined:

- Locks and other security features are in satisfactory condition;
- Stored items are not leaking or spilled; and
- Structure is sound, with no route available for ingress of weather or wildlife.

5.4.5 Propane Storage Tanks

Propane storage tanks should be inspected on a monthly basis. In particular, the following items should be examined:

- Locks and other security features are in satisfactory condition;
- Logs should be reviewed to ensure that all materials are accounted for; and
- Gas meters (i.e., "sniffers") and alarms are tested and in working order.

6.0 SPILL RESPONSE STRATEGIES

6.1 GENERAL

The potential exists for spills of petroleum products, various chemicals, and mill process wastes. A spill may be in the form of a liquid (i.e., petroleum products) or a solid. A dry chemical spill may become a liquid chemical spill if it comes into contact with water (i.e. stream) prior to being contained and successfully cleaned up.

Spills may occur on land, snow/ice, water or a combination of receiving environments depending on the conditions at the time of spill. Various proven practical methods of containment and recovery are documented for use in northern climates and are summarized in the following section. Additional technical information regarding Environmental Emergencies is available from Environment Canada. Appendix G identifies specific spill response strategies for materials present at the Mactung mine site.

The first initial action will be to prevent any direct health risk to responding personnel. Persons not directly associated with the clean-up operations are to be directed to leave the immediate area. The area should be isolated and limited to traffic as directed by the **Environmental, Health & Safety Officer**.

Detailed Material Safety Data Sheets (MSDS) for each product will be posted where the materials are stored and a copy kept in the office of the **Area Manager** of the areas where the product is used. Additionally, copies will be on file in the **Environmental, Health & Safety Officer's** office, and in a binder in the **Environmental, Health & Safety Officer's** truck. In the event of a spill, responders would be directed to obtain the MSDS information from the **Environmental, Health & Safety Officer**.

6.2 PLANNING AND LOGISTICS

The feasibility of containing and recovering a spill is primarily determined by the spill location and rates of release, movement and/or evaporation. Total deployment time considers:

- Equipment and support material mobilization.
- Personnel mobilization, transit and assembly at spill site.
- Actual equipment set-up and deployment.

The pre-assembly of Emergency Spill Response Kits will expedite the deployment time.

6.3 CONTAINMENT

The type and size of the containment method chosen will depend on the following factors.

Size of spill - Berms and/or cut-off trenches surrounding large spills that cover extensive areas are difficult and time consuming to build. It is important to build the berm and/or cut-off trenches as close to the source as possible to minimize any spreading. It is usually

quicker and easier to construct temporary earth and snow berms, instead of using sand bag containment.

Terrain - Steep or varied terrain can make work difficult, particularly with heavy equipment. Spills will travel faster on steep inclines and require faster response times. Larger, flat areas will require longer berms to contain a spill; however, spills travel much slower, allowing additional time for the construction of barriers.

Soil types - Loose, coarse or dry soils will allow liquid spills to be absorbed and require additional work to remove contaminated materials. Frozen soils create a natural barrier that aid in clean-up. Trenches or berms can be difficult to construct without the use of heavy machinery.

Proximity to water - Every precaution should be taken to ensure that spills do not enter a water body. Spills should be diverted away from a watercourse to protect the water body from contamination.

Weather - Weather can play an important role in spill response operations, particularly if the ground is frozen (or beginning to thaw). The presence of water (either from rainfall or spring melt) can increase the clean-up requirements. Water will also increase the tendency for the spill to spread and pose a hindrance to effective clean-up. Soluble chemicals are also a concern when water is present as contamination can spread rapidly.

Location - The location where the spill occurs will influence the type of containment measures used.

Daylight - Daylight is at a minimum during the winter season, which creates challenges when initially assessing and responding to the spill, and may require additional lighting resources be available.

Temperature – Cold winter temperatures require attention to ensure the safety of the response team. Although extreme cold can be beneficial to the containment of a spill on land, it can also be detrimental in the efficiency and response time to control and contain the spill.

6.3.1 Spills On Land

Spills on land should be contained as close to the source as possible with every effort made to ensure that a spill does not get absorbed in the soil or reach water. Petroleum products spilling onto frozen, snow-covered ground may be contained by the construction of snow berms. For fast, initial containment of smaller spills, the berms can be built manually with shovels. Larger spills may require the use of heavy equipment such as front-end loaders and dozers.

Generally, the spillage of solid materials on land will be self-contained due to its nature. Some precaution with regard to wind-blown dispersion may be required with lighter materials (i.e., lime). In these cases, a layer of snow or sand placed on top of the spilled material will suffice until removal to an appropriate disposal facility is arranged.

Every effort should be made to ensure that a spill does not reach water, where its containment and recovery are much more difficult and the potential environmental impacts are much greater. Containment can be achieved using:

- Berms constructed from earth, sand bags, or snow; or
- Interception trenches or ditches excavated down slope of the spill source.

If possible, locate the berm/trench sufficiently down slope of the release point to ensure that construction can be completed before the spill arrives. Dig the trench along a natural drainage contour. It should be approximately 0.5 m deep with a relatively flat bottom. The excavated material can then be combined with other available material to build a berm.

Containment berms may be constructed from sand or gravel if these materials are available in an unfrozen form. Sand bags can be used if the earth is too hard or frozen and cannot be excavated or compacted. In winter conditions, snow may provide a quick and efficient berm construction material. For smaller spills, the berms can be fashioned manually with shovels or for larger spills, heavy equipment (front-end loaders) can be used to.

Lining berms with a polyethylene plastic liner, plastic tarpaulin or similar synthetic material will increase the impermeability and improve the spill containment. A plastic liner should be anchored by gravel or rocks and/or woven between layers of bags to seal the berm. Alternatively, in freezing temperatures, water may be sprayed or poured over the berms to further enhance the barrier to the spilled material.

Trenching or ditching is used as a method for containing and/or intercepting the flow of liquid spills on land. During the predominantly frozen conditions of winter, some ice, snow, loose sand, gravel and surface layers of organic material may be scraped or dug away until the underlying frozen substrate is reached. This can be effective in re-directing flow or allowing simple containment prior to pumping or absorbing the spilled material. Trenching in solid frozen ground or rocky substrate is usually not practical or possible.

6.3.2 Spills on Snow and Ice

Containment on snow is readily achieved and is effective due to its absorbent quality. Liquid spills (petroleum) will become immobile within the snow pack and easily removed for transport and recovery or disposal. Snow can be used to construct snow berms. Whenever possible, the snow pack should be left in place to avoid contaminating the underlying soil media.

The level of potential impact from spills that occur on ice, from either direct spillage or migration to the ice, is primarily determined by the strength of the ice. If the spill does not penetrate the ice, and the ice is safe to work on, then interception trenches (cut into the ice, but not through it) are effective in collecting moving oil for recovery or burning. The flow direction of the oil should be anticipated and an interception trench cut and/or dug into the ice ahead of the flow. The use of liners is not necessary in ice. The area can be flushed to hasten the movement of the oil to the recovery area. If oil is trapped under the ice on ice-

covered waters, a slot can be cut entirely through the ice to allow for the oil to float to the surface where it may be collected as in a trench.

6.3.3 Spills in Water

Containing spills on water may be difficult, because petroleum products quickly spread. In turbulent water, oil and chemicals are likely to mix into the water column, making recovery impractical. For these reasons, it is important that spills be prevented from reaching water, and if the spill does reach water, that containment occurs as close to the source as possible.. Since the recovery of water-soluble chemicals is not possible, this section will focus on petroleum product spills.

In flowing streams, petroleum products travel at the same speed as the surface current. In smaller streams, the wind will have less impact and the slick speed can be easily estimated. Placing a small stick in the middle of the stream and determining the length of time required for it to travel a given distance, typically 10 m. This information can be quickly converted to speed (km/h) to determine the estimated travel time to a confluence or other sensitive area.

On larger rivers or lakes, slicks are transported at 3.5% of the wind speed. Depending on the direction of the current or wind, spills may flow to shores, back eddies, or areas with slower current. Efforts to contain spills in streams and rivers should be limited to land-based operations unless directed by the **Environmental, Health & Safety Officer** or the **Mine Manager**.

Determining the best possible strategy for containment will depend on a number of factors:

- Speed of slick travel
- Location of possible containment sites
- Availability of personnel and equipment
- Location of sensitive areas
- Safety of operations

Spills on water can be contained by using floating booms (sorbent or non-sorbent) or by constructing a temporary berm with an inverted culvert (see Figure 6.3.3-1).

IMPORTANT: Whenever the construction of a berm or flume will be considered as part of a spill response operation, the impacts of the disturbance must be weighed against the potential impacts of the uncontained spill. Care must be taken to minimize any adverse effects. **The Federal Department of Fisheries and Oceans (867-393-6722) should be consulted prior to construction of a barrier in a stream, river or lake.**

The earthen berm provides a barrier against which the (normally floating) petroleum products will pool while allowing the underflow of water.

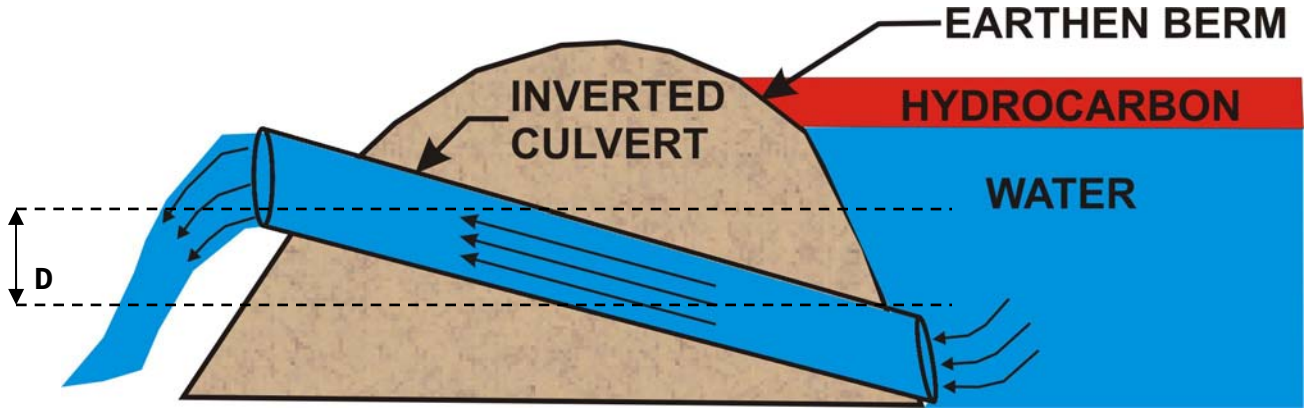


Figure 6.3.3-1: Illustration of typical inverted culvert and berm for containing spills on water. In the above illustration, **D** must be greater than the thickness of the hydrocarbon product (ideally twice the thickness or more).

If authorized, in-stream barriers can be constructed from earth or rocks, although, if large rocks are used, plastic sheets, packed mud, or bentonite chips should be used to ensure that a complete seal will be made. Choosing and positioning the pipe will be critical to the effective operation of the berm. The pipe should be low enough at the inlet end to ensure that an increase of the slick thickness or substantial lowering of the water will not result in a loss of oil through the pipe. Larger pipes that allow greater volume (and slower) flows will minimize the tendency of the petroleum products to become entrained in the water at the inlet side. The outlet end of the pipe should be positioned to create a continuous, smooth flow. The flow of oil through the berm should also be prevented by ensuring that the pipe inlet will be not located on loose gravel.

6.4 MONITORING

All spills are to be monitored throughout the response to ensure safety and to direct clean-up efforts. As such, the following should be monitored:

- Explosive gas concentrations in the atmosphere using equipment capable of measuring the lower explosive limit (LEL) of the gas, when safe to do so.
- Spill movement and behaviour, in order to properly direct response efforts.
- All threats to the safety of people, equipment and the environment.

6.5 BURNING

In-situ combustion may be used as a final means of disposal after every effort has been made to remove the spilled fuel/oil etc. **Approval for burning of petroleum products must be obtained** (i.e., Yukon Department of Environment) prior to combustion. Burning

should never be carried out on land where combustible organics are present and the oil has migrated into the soil. Removal is the method of choice in this case.

6.5.1 Application

The best results will be achieved when burning fresh (less than 24 hours old) spills in winter. Burning can also be effective in containment trenches or ponds where a significant thickness of petroleum products can collect. Special care should be taken as the heat from the burn will melt adjacent snow, increasing the potential for penetration of the oil, and potentially transporting the petroleum products to the surrounding area.

Care must also be exercised during the summer. Natural occurring bog and other plants can burn, creating more damage than the original spill. Material for burning should be isolated from the surrounding terrain (in windrows or piles) prior to burning if there will be any chance of adjacent areas being inadvertently set on fire.

The most efficient means of igniting diesel oil for in-situ combustion is with a large size portable propane torch. Other highly flammable products such as gasoline or alcohol, or combustible products, such as wood may also be used to promote ignition of the spilled product. Spilled oil should be ignited where it has pooled naturally or been contained by dykes, trenches or depressions. Oil, which has collected in slots in river ice, may also be disposed of by in-situ combustion if sufficient holes are drilled in the ice. Once holes are drilled, the oil, which collects in the holes, may be ignited.

6.5.2 Limitations

The burning of heavy or weathered oil will be very difficult or impossible. Severe weather conditions such as high winds, snow and rain may also make burning impossible. Areas with vegetation cover, which have not been severely damaged by the petroleum products, should not be burned, as more damage will result than if the petroleum products are left to degrade naturally. Care should also be taken in muskeg with a relatively low water table as burning may destroy sensitive root systems.

6.5.3 Safety

As with conventional cleanup methods, safety of operations will be paramount in burning operations. **The Yukon Wildland Fire Management (1-888-798-3473) should be consulted prior to burning.** Burning should only be done in contained areas or where firebreaks are employed. Muskeg and tundra can smoulder for a considerable time after a burn and care should be taken to ensure that it does not ignite later, either from underground (root) systems or surface materials. Personnel involved in the burn should be fully trained in safe burning procedures including methods for avoiding the inhalation of potentially dangerous smoke and/or vapours.

6.6 RECOVERY

The availability of shovels, rakes and pitchforks are invaluable in any spill clean up and recovery operation. The use of heavy equipment, such as front-end loaders and haul trucks, for larger spill situations makes the removal of material easier.

All materials used during spill clean-up, including absorbent materials, contaminated snow, ice and snow should be removed from the spill site and disposed of in an appropriate manner (see Section 6.7). Care should be taken during such operations to prevent the contamination of soil and water at transfer points.

6.6.1.1 Spills on Snow and Ice

Spilled liquid petroleum products contained within a berm or trench should be recovered by pumping into a standby tanker, portable storage tank or drums. Pumps can be used to transfer oil recovered by a skimmer to temporary and/or final storage facilities. Pumps can also be used for low-pressure flushing of contaminated areas, although this spill response technique should only be carried out under the guidance of an environmental consultant. Pump and suction hoses should be screened to prevent snow, ice or debris from clogging the line or pump. When transferring flammable products, such as gasoline, ensure that selected pumps and drives are explosion proof.

Any remaining material may be absorbed by use of a variety of natural and commercially available products. Synthetic products such as 3M Brand, Conweb and others are easier to use and more efficient than natural products. Products such as Floor Gator® may be used to absorb spilled materials on hard ground surfaces. Absorbent pads can be used on soft ground surfaces.

6.6.1.2 Spill in Water

Sorbent or non-sorbent booms can also be an effective means of containing spills on slow-moving waters and in lakes.

Booms provide a barrier to floating petroleum products. These types of booms should be checked regularly to ensure that they do not become saturated with either water or petroleum products. If saturation occurs, the booms will float very low in the water or even sink, releasing petroleum products downstream.

Effective containment using conventional booming techniques will be very difficult in streams or rivers where currents exceed 0.7 knots (0.4 m/s). At these speeds, petroleum products will become entrained in the water flowing under the boom resulting in significant losses. Some improvement can be achieved in waters flowing at 1- 2 knots (0.5 – 1.0 m/s) if the boom is deployed at an angle of less than 90° to the direction of flow. Multiple berms can be deployed in series to increase effectiveness.

Devices, such as disc or drum skimmers, can selectively recover oil from water. These devices are suited to applications where the oil has formed a distinct layer on top of

stagnant water, such as at an earthern berm. When using disc or drum skimmers, ensure that small items of debris are periodically removed from scrapers to ensure efficient operation. In this instance, a vacuum truck is relatively ineffective, since it would recover large amounts of water.

6.7 DISPOSAL

Recovered products, contaminated materials (snow and surface soils), and waste absorbents must be disposed of appropriately. The Environmental Coordinator will determine which of the following practices are to be employed to facilitate proper disposal.

6.7.1 Petroleum Products

Recovered petroleum products should be prepared for off-site recycling or disposal by authorized personnel by transferring (as necessary) into properly labelled containers. Some recovered products may be reclaimed and reused. Water and debris can be separated from the pure fuel by gravimetric means in a tank. In this manner disposal can be minimized and financial losses reduced. Waste materials will either be treated in an approved facility on-site, or transported off-site to appropriately authorized handling facilities.

6.7.2 Contaminated Snow

Relatively large volumes of contaminated snow are commonly associated with a spill. Dedicated snow dump locations should be established as a means to consolidate materials for central management. Residual contamination resulting from contaminated snow will be treated in an appropriate manner during the summer season of each year.

6.7.3 Contaminated Soils

In cases where spilled materials have impacted underlying soils, clean up may require the removal of contaminated surface soils. The decision to remove surface soil is made on a site and spill specific basis as often soil removal can, in some locations, pose more risk and environmental damage than allowing small residual amounts of contaminated materials to remain. The decision to remove impacted soils is made by the **Environmental, Health & Safety Officer** in consultation with the **Mine Manager** and other experts. Excavated soils should be transported to a government-permitted land treatment facility on-site or off-site as required.

6.7.4 Waste Absorbents

Absorbents generated through normal camp operations and as a result of spills are stored in drums at the Mactung mine site for subsequent incineration, or on-site of off-site disposal at an approved/registered waste handling facility.

6.8 OTHER CONCERNS: FIRE

In the event that the accident/incident occurs in combination with a fire, extinguishing the fire may be required prior to initiating efforts to stop the spillage. Runoff from fire extinguishing actions should be contained using a berm or other sorbent materials.

Petroleum and chemical fires have the potential to generate toxic fumes under poor combustion conditions. Personal protective gear, such as a respirator or ventilator, should be put on. If it is safe to approach a fire to extinguish it, approach from the upwind direction.

6.9 CLEAN-UP AND SITE RESTORATION

Clean-up and site restoration are the final spill response steps. Due to seasonal variations and various types of environmental conditions encountered, a standard restoration program cannot be prescribed. Consultation with an environmental consultant is critical to ensuring clean-up efforts do not create adverse impacts.

However, the following general principles may be applied:

- Obtain approval and instruction from the Federal Department of Fisheries and Oceans prior to conducting clean-up operations within a water body.
- Be particularly careful if petroleum products have entered marshy areas and wetlands. Personnel and equipment should NOT be deployed into such areas without explicit approval from environmental authorities.
- Be aware that various plant species, birds, fish and animals can all be adversely affected by clean-up operations.

APPENDIX

APPENDIX A SPILL REPORT FORM

SPILL REPORT

The Spill Report should be completed by the **Environmental, Health & Safety Officer** or their appointed alternate. The spill should be reported to the appropriate contacts listed in the Emergency Response Procedures.

Date and Time: _____

Person Reporting: _____

Date and Time of Spill: _____

Exact Location of Spill: _____

_____

Cause of Spill: _____

_____

Spilled Substance and Amount Estimated: _____

_____

Action Taken: _____

_____

_____

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Additional Notes: _____

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APPENDIX

APPENDIX B EMERGENCY SPILL RESPONSE KITS

Emergency Spill Response Kits

This section lists the materials inventory for each Emergency Spill Response Kit. Several kits will kept stocked and stored at several locations around the mine site, as per Appendix C. Materials will be stored in clearly labelled plastic containers or storage boxes, ready for immediate use. Kits must be kept stocked at all times.

Each kit shall include the following materials:

- Ten (10) – 61 cm x 61 cm (2 ft x 2 ft) absorbent pads
- Two (2) – 8 cm x 1.2 m (3 in x 4 ft) absorbent booms
- Two (2) – pair rubber gloves
- Five (5) – large heavy duty plastic type garbage bags
- One (1) – chemical respirator with chemical cartridges
- Five (5) – dust masks
- One (1) – aluminum shovel

APPENDIX C LOCATIONS OF EMERGENCY SPILL RESPONSE KITS

Locations of Emergency Spill Response Kits

Emergency Spill Response Kits will be stored at the following locations:

- Main Administrative Office – 1 kit
- Mine Safety Office – 1 kit
- Power House – 1 kit
- Underground Workshop – 1 kit
- Aboveground Workshop – 1 kit
- Reagent Storage Warehouse – 1 kit
- Tank Farm – 1 kit

The above list will be revised, as required, to suit mine operational requirements upon initiation of the Production Phase.

APPENDIX

APPENDIX D CENTRAL STORAGE OF EMERGENCY SPILL RESPONSE KITS

Central Storage of Emergency Spill Response Kits

Equipment and supplies for on- and off-site emergencies will be stored in the Fire Bay. Additional equipment and supplies can be obtained from the warehouse or shops, as required.

Items required to be kept at the Fire Bay include the following:

HAND TOOLS:			
4	Long handle round mouth shovels	2	Short crow bars
4	Long handle square mouth shovels	2	10 lb. sledge hammers
4	Aluminum scoop shovels	2	Rakes (garden style)
2	Long pry bars	2	Hoe's (garden style)
2	Heavy gauge straw brooms	2	Heavy duty push brooms
2	Picks	2	Grub hoe's
2	Long handle axe's	1	Jack-all lift jack
1	Claw hammer	2	12 in. crescent wrench wrenches
1	Pair large pliers	2	12 in. pipe wrenches
1	Hack saw – c/w extra blades	2	Razor knives
1	Rock hammer	6	Assorted screw drivers

SPILL RESONSE SUPPLIES:			
1	Bail (200) absorbent pads. 2ft. x 2ft.	20	5 gallon plastic pails with lids
10	Absorbent booms (4 in. x 10 ft long)	5	25 gallon plastic garbage cans with lids
10	Absorbent booms (2½ in x 4 ft. long)	10	45 gallon drums (bung lids)
5	Bags absorb all	10	45 gallon drums (removal snap lids)
20	10 wooden wedges 10 wooden plugs	25	Large heavy duty garbage gags

PERSONAL PROTECTIVE EQUIPMENT:			
1	Level 2 first aid kit	1	Box (25) particle dust masks
1	Box vinyl gloves	5	Chemical respirators – c/w cartridges
5	Pair chemical gloves	5	Pair complete rain gear
5	Pair leather work gloves	5	Pair chemical splash goggles
5	Pair "tyvek" disposable coveralls	5	Pair safety glasses

MISCELLANEOUS EQUIPMENT/ SUPPLIES:			
1	Portable generator	2	Rolls- do not enter flagging
2	Portable fire pumps	10	Road flares
5	50 lengths hose	2	Rolls duct tape
5	flashlights	10	Fire Extinguishers

APPENDIX

APPENDIX E IMPORTANT CONTACT INFORMATION

EMERGENCY CONTACT INFORMATION			
SITE/CONTACT		NUMBER	ALTERNATE
To be completed prior to Production Phase	Mine Manager	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Environmental, Health & Safety Officer	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Area Manager Process Plant	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Area Manager Tailings	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Area Manager Powerline and Substations	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Area Manager Yard Services and Off-site Infrastructure	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Mill Superintendent	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Maintenance Superintendent	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Mine Superintendent	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Warehouse	To be completed prior to Production Phase	To be completed prior to Production Phase
To be completed prior to Production Phase	Environmental Coordinator	To be completed prior to Production Phase	To be completed prior to Production Phase

INTERNAL NATC CONTACT INFORMATION					
TITLE	NAME	BUSINESS PHONE	CELL	FAX	HOME PHONE
President/CEO					
Chief Operating Officer					
Mine Manager					
Mill Superintendent					
Assistant Mill Superintendent					
Mine Superintendent					
Mine General Foreman					
Maintenance Superintendent					
Environmental, Health &Safety Officer					
Environmental Coordinator					
Administration / Human Resources					
Engineer					
Geologist					

To be determined prior to construction phase

Revised: December 9, 2008

EXTERNAL CONTACT LIST		
ORGANIZATION	CONTACT	PHONE
Government of Northwest Territories	24-hr Spill Report Line	1-867-920-8130
Government of Yukon	24-hr Spill Report Line	1-867-667-7244
Yukon Workers Compensation Health & Safety Board	24-hr Reporting Line	1-867-667-5450

Revised: December 9, 2008

EXTERNAL RESOURCES		
PRODUCT / SERVICE	ORGANIZATION	NUMBER
SPECIALTY SUPPORT:		
Ambulance-Ross River		867-969-4444
Nurse- Ross River		867-969-4444
Police- Ross River	RCMP	867-969-5555
Fire Department	Ross River Fire Department	867-969-2222
Emergency Spill Reporting	Yukon Government, Dept. of Environment	867-667-7244
Environment Complaint	Environmental Protection Service – Whitehorse	867-667-7244
Fisheries and Oceans – Habitat and Enhancement	Federal Department of Fisheries and Oceans	867-393-6721
Wildlife Activity – Ross River C.O.	Yukon Government, Dept. of Environment	867- 969-2202
Forest Fire-Yukon		888-798-3473
Poison Centre-Whitehorse		867-393-8700
Telephone Problems	Northwestel	611
Occupational Health and Safety-Whitehorse (24hrs)	Yukon Workers Compensation Health & Safety Board	867-667-5450
DIAND	DIAND Waste and Contaminants	867-667-3272
Yukon Wildlife and Environmental Protection- reporting fishing, hunting, dumping offences	Yukon Wildlife and Environmental Protection	1-800-661-0525
Ross River Dena Council		867-969-2278
LOCAL AIR CHARTER:		
Helicopter	TNTA	867 536 2100
Helicopter	Great Slave	867 695 2326
Fixed wing	Alkan Air	867 668 2107
EQUIPMENT AND MATERIAL SUPPLIERS:		
Equipment	Jedway	867 536 2611
Propane	Superior Propane Scott Hauer	867 667 7113
Engineering	EBA	867 668 3068
Tails engineering	Nigel Goldup	780 451 2130 X301
Tails engineering	Nigel Goldup- cell	780 405 2985
Explosives	Simon Cropper	403 259 0424
K.P.I. Northern (equipment)	Watson Lake	1-867-536-7361
Tu-Nagel Service (suction truck)	Watson Lake	1-867-536-2308
Arctic Backhoe Service (clean up)	Whitehorse	1-867-633-5951
Northern Metallic Sales	Watson Lake	1-867-536-2205

Revised: December 9, 2008

APPENDIX

APPENDIX F ON-SITE MATERIAL/ CHEMICAL STORAGE

On-Site Material/Chemical Storage*

The following materials are maintained on site. Quantities will vary depending on usage; therefore, this list is representative of expected quantities upon re-supply.

SUMMARY OF HAZARDOUS ON-SITE MATERIALS/ CHEMICALS		
Material	Quantity	Production Phase Storage
Fuel/ Hydrocarbons		
Diesel fuel	1,500,000 litres	Site Tankage
Propane	50 cylinders	Warehouse
Acetylene	50 cylinders	Warehouse
Ethylene glycol-based antifreeze	1,000 litres	Site Tankage
Gasoline	10,000 litres	Site Tankage
Hydraulic oils	2,250 litres	Site Tankage
Jet B — Aviation fuel	5,000 litres	Site Tankage
Lubricating oils	2,250 litres	Site Tankage
Mill Reagents		
Copper sulphate	500 — 3,000 kg	Reagent Storage Area
Dowfroth (frother)	500 — 4,000 kg	Reagent Storage Area
Caustic soda	1,000 — 20,000 kg	Reagent Storage
Quebracho (tree extract)	5,000 — 25,000 kg	Reagent Storage Area
Pamak (fatty acid)	500 — 10,000 kg	Reagent Storage Area
Emcol (K-8300)	500 — 3,000 kg	Reagent Storage Area
Flocculants	500 — 3,000 kg	Reagent Storage Area
Depramin (starch)	500 — 10,000 kg 500 — 4,000 kg	Reagent Storage Area
Hydrated lime	1,000 — 21,000 kg	Reagent Storage Area
P40 detergent	200 — 1,000 kg	Reagent Storage Area
Sodium silicate	2,000 — 30,000 kg	Reagent Storage Area
Xanthate Z-6	500 — 5,000 kg	Reagent Storage Area
KAX		
Filter Aide Aerodri 104		
Water Treatment		
Chlorine		

MACTUNG SITE SUMMARY OF HAZARDOUS MATERIALS (CONTINUED)		
Material	**Quantity**	**Production Phase Storage**
Explosives		
Dynamite and emulsion explosives	30 tonnes	Magazine
Ammonium nitrate	30 tonnes	Designated Site
Other Chemicals		
Adhesives	10 kg	Warehouse
Cement	20 tonnes	Warehouse
Muriatic acid	45 litres	Warehouse
Oxygen	50 cylinders	Warehouse
Paint	150 litres	Warehouse
Paint stripper	45 litres	Warehouse
Salt	1 tonne	Warehouse
Detergents	230 kg	Cookhouse
Hydrochloric acid	100 — 400 kg	Reagent Storage Area & Assay Lab
Hydrofluoric acid	50 — 200 kg	Reagent Storage Area & Assay Lab
Nitric acid	100 — 400 kg	Reagent Storage Area & Assay Lab
Sodium bicarbonate	500 — 1,000 kg	Reagent Storage Area & Assay Lab
Sulphuric acid	100 400 kg	Reagent Storage Area & Assay Lab

* To be revised for Production Phase, as required.

APPENDIX

APPENDIX G SPILL RESPONSE ACTIONS

Spill Response Actions

Acetylene and Propane

Consider action only if safety permits!

Gases stored in cylinders can explode when ignited!
Keep vehicles away from accident area.

Refer to Product Guide in MSDS Binder for:

Physical/Chemical Properties
Response to Fires
First Aid

- Vapours cannot be contained when released.
- Water spray can be used to knock down vapours to minimize chance of ignition.
- Small fires can be extinguished with dry chemical or CO_2.
- Personnel should withdraw immediately from area unless a small leak is stopped immediately after it has been detected.
- If tanks are damaged, gas should be allowed to disperse and no attempt at recovery should be made.
- Personnel should avoid touching release point on containers since frost quickly forms.
- Keep away from tank ends.

Spill Response Actions
Ammonium Nitrate

Consider action only if safety permits!

Prolonged contact and repeated skin contact can cause irritation.

Eliminate ignition sources.

Stop source of spill if safe to do so.

Location	Response
On Land	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with earth berms or other barrier. If liquid, remove minor spills with sorbent, large spills with pumps or vacuum equipment. Prills/granules can be shoveled or removed mechanically. On tundra, spread and leave as fertilizer, if feasible to do so.
On Snow & Ice	Block entry into waterways with snow berms or other barriers. Remove ammonium nitrate and contaminated snow with shovels or other mechanical means.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove ammonium nitrate with shovels or other mechanical means if feasible to do so. Burning is not a feasible response option. Minimize damage caused by equipment and excavation. Low pressure water flushing can be tried, if feasible. Minor spill amounts can be left in place to serve as a fertilizer.
On Water	Ammonium nitrate is completely soluble in water. Isolate/confine spill by damming or diversion if feasible. Water flushing can be tried to disperse spill.
Storage & Transfer	Store sealed labelled containers in cool ventilated areas away from incompatible materials, e.g., oxidizable materials.
Disposal	Segregate waste types. Place contaminated materials into marked containers. Consult Environmental Manager on any post-spill requirements.

Spill Response Actions

Caustic Soda (NaOH)

Consider action only if safety permits!

Avoid contact with caustic soda - it is a corrosive liquid!

Eliminate ignition sources.

Stop source of spill if safe to do so.

Location	Response
On Land	Block entry into waterways or confined areas Do not flush into ditches or drainage systems. Contain spill with earth berm or other barrier. Remove minor spills with dry earth, sand or other non-combustible material. Remove large spills with pumps or vacuum equipment. Neutralization with dilute hydrochloric acid can be tried in unconfined areas.
On Snow & Ice	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with snow berms or other barrier. Remove minor spills with dry earth, sand or other non-combustible sorbent. Remove contaminated snow with shovels or mechanical equipment.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled caustic soda after neutralization with pumps. Burning is not feasible. Minimize damage caused by equipment and excavation. Low pressure water flushing can be tried, if feasible.
On Water	Caustic soda sinks and mixes with water generating heat. Isolate/confine spill by damming or diversion. Water flushing can be tried to disperse the caustic soda. Neutralization with dilute hydrochloric acid can also be tried.
Storage & Transfer	Store sealed, labelled containers in cool, and ventilated areas away from incompatible materials, e.g., finely divided metals, and combustible materials. Do not get water inside any storage container.
Disposal	Segregate waste types. Place contaminated materials into marked containers. Consult Environmental Manager on any post-spill requirements.

Spill Response Actions
Diesel, Hydraulic, Lube and Waste Oil

Consider action only if safety permits!

Eliminate ignition sources.

Stop source of spill if safe to do so.

Location	Response
On Land	Do not flush into ditches or drainage systems Block entry into waterways and contain with earth berms or other barrier(s) Remove small spills with sorbent pads On tundra, peat moss may be used if no spill kit/sorbent pads are available. Contaminated peat must be removed and treated as would sorbent pads
On Snow & Ice	Block entry into waterways, contain with snow or other barrier Block entry into waterways, and contain with snow or other barrier Remove minor spills with sorbent pads and/or snow Use ice augers and pump when feasible to recover diesel under ice Slots in ice can be cut over slow moving water to contain oil Burn using propane torches if unrecoverable by other methods, authorized to do so by government agencies, feasible, and safe to do so
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation Remove pooled oil with sorbent pads and/or skimmer Flush with low-pressure water to herd oil to collection point Burn only in localized areas, e.g., trenches, piles or windrows Do not burn if root systems can be damaged (low water table) Minimize damage caused by equipment and excavation
On Water	Contain spill as close to release point as possible Use spill containment boom to concentrate slicks for recovery On small spills, use sorbent pads to pick up contained oil On larger spills, obtain and use skimmer on contained slicks
Rivers & Streams	Prevent entry into water, if possible, by building a berm or trench Intercept moving slicks in quiet areas using (sorbent) booms Do not use sorbent booms/pads in fast currents and turbulent water
Storage & Transfer	Store sealed, labelled containers outside, away from flammable items Electrically ground containers and vehicles during transfer to designated disposal/treatment area
Disposal	Segregate waste types Place contaminated materials into marked containers Consult Environmental Manager on any post spill requirements

Spill Response Actions

Ethylene Glycol (Antifreeze)

Consider action only if safety permits!

Location	Response
On Land	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with earth berm or other barrier. Remove minor spills with universal sorbent. Remove large spills with pumps or vacuum equipment.
On Snow & Ice	Block entry into waterways Do not flush into ditches or drainage systems. Contain spill with snow berm or other barrier. Remove minor spills with universal sorbent. Remove contaminated snow with shovels and mechanical equipment.
On Muskeg	Remove pooled antifreeze with pumps. Do not deploy personnel and equipment on marsh or vegetation. Burning is not feasible. Minimize damage caused by equipment and excavation.
On Water	Ethylene glycol sinks and mixes with water. Isolate/confine spill by damming or diversion.
Storage & Transfer	Store sealed, labelled containers in cool ventilated areas away from incompatible materials, e.g., organics, finely divided metals and oxidizable materials
Disposal	Segregate waste types. Place contaminated materials into marked containers. Consult Environmental Manager on any post-spill requirements.

Spill Response Actions

Gasoline and Jet B Aviation Fuel

Consider action only if safety permits!

Gasoline and Jet B form vapours that can ignite and explode!

No smoking!

Eliminate ignition sources.

Stop source of spill if safe to do so.

Location	Response
On Land	Block entry into waterways with earth berms or other barrier. Do not contain spill if there is any chance of igniting vapours. On shop floors and in work/depot yards, apply particulate sorbents. On tundra use peat moss and leave to degrade if feasible to do so.
On Snow & Ice	Block entry into waterways with snow berms or other barrier(s). Do not contain spill if there is any chance of igniting vapours. In work/depot yards, apply particulate sorbents.
On Muskeg	Remove pooled gasoline or Jet B with pumps, if safe to do so. Do not deploy personnel and equipment on marsh or vegetation. Low pressure flushing can be tried to disperse small spills. Burn carefully only in localized areas, e.g., trenches, piles or windrows. Do not burn if root systems can be damaged (low water table). Minimize damage caused by equipment and excavation.
On Water	Do not attempt to contain or remove spills. Use booms to protect water intakes and sensitive areas.
Storage & Transfer	Store sealed, labelled containers in cool ventilated areas away from incompatible materials. Electrically ground containers and vehicles during transfer to designated disposal/treatment area.
Disposal	Segregate waste types, if necessary. Place contaminated materials into marked containers. Consult Environmental Manager on any post spill requirements.

Spill Response Actions

Hydrochloric Acid

Consider action only if safety permits!

Avoid contact with hydrochloric acid, it is a strong acid

First aid and medical treatment for HCl exposure is very specific and critical.
Always use complete protective equipment in response to an HCl spill or leak.

Location	Response
On Land	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with earth bermsor other non-combustible absorbent material. Small spills can be neutralized by carefully covering with soda ash or lime. Remove small spills with vermiculite or earth sorbents.
On Snow & Ice	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with snow berms or other barriers. Remove minor spills with vermiculate or earth sorbents. Remove contaminated snow with shovels.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled HCl with pumps only after neutralization. Burning is not feasible. Minimize damage caused by equipment and excavation. Low pressure water flushing can be tried, if feasible.
On Water	HCl readily mixes with water producing a vigorous exothermic reaction. Isolate/confine spill by damming or diversion. Water flushing can be tried to disperse acid. Neutralization with lime or soda ash can also be tried.
Storage & Transfer	Store sealed, labelled containers in cool ventilated areas away from incompatible materials Avoid contact with glass, concrete, metals, other acids, oxidizers, reducers, alkalis, combustibles, organics and ceramics.
Disposal	Carefully place spilled material into clean dry polyethylene containers. Recommended safety apparel includes goggles, face shield, neoprene gloves and acid resistant apron. Consult Environmental Manager on any post spill requirements.

Spill Response Actions

Nitric Acid

Consider action only if safety permits!

Avoid breathing in/contact with skin and eyes - nitric acid is a severe irritant!

Reacts violently with water and fuels

Stop source of spill if safe to do so.

Location	Response
On Land	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with earth berms or other barriers. Remove minor spills with dry earth, sand or fly ash. Remove large spills with pumps or vacuum equipment after neutralization. Neutralization with lime, sodium bicarbonate or crushed limestone.
On Snow & Ice	Block entry into waterways Do not flush into ditches or drainage systems. Contain spill with snow berms or other barriers. Remove minor spills with dry earth, sand or fly ash. Remove large spills with pumps or vacuum equipment after neutralization. Remove contaminated snow with shovels or mechanical equipment.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled nitric acid after neutralization with pumps. Burning is not recommended. Minimize damage caused by equipment and excavation. Low pressure water flushing can be tried, if feasible.
On Water	Nitric acid sinks and mixes with water producing a violent reaction. Isolate/confine spill by damming or diversion. Water flushing can be tried to disperse acid. Neutralization with lime or sodium bicarbonate can be tried
Storage & Transfer	Store sealed, labelled containers in cool ventilated areas away from incompatible substances such as wood, oil, oxidizable materials
Disposal	Segregate waste types. Place contaminated materials into marked containers. Consult Environmental Manager on any post-spill requirements.

Spill Response Actions
Percol Flocculants

Consider action only if safety permits!

All three Percol products, 156, 368 and E-10 have similar properties.

Location	Response
On Land	Block entry into waterways. Do not flush into ditch or drainage systems. Contain spill with earth berms or other barriers. Attempt to avoid wetting any spills of the dry white granular powder. Remove minor spills with shovels. Remove large spills with backhoes, other mechanical methods.
On Snow & Ice	Block entry into waterways. Confine and contain spill to as small an area as possible. Contain spill with snow berms or other barriers. Recover using shovels and place in waterproof containers. Small spills can be removed by picking up snow.
On Muskeg	Remove accumulations manually with shovels. Do not deploy personnel and equipment on marsh or vegetation. Burning is not a feasible response option. Minimize damage caused by equipment and personnel.
On Water	Percol Flocculants are soluble in water. Isolate/confine spill by damming or diversion. Water flushing can be tried to disperse spills into water.
Storage & Transfer	Place in waterproof container(s). Store sealed, labelled containers in cool, ventilated areas away from incompatible materials.
Disposal	Segregate waste types. Keep away from lime. Place contaminated materials into marked containers. Consult Environmental Manager on any post spill requirements.

- Spilled Percol solutions on smooth surfaces can create a hazard because of their slippery nature.

Spill Response Actions
Soda Ash

Soda ash (sodium carbonate) is a non-flammable white powder.
It is an eye, skin and respiratory tract irritant. Avoid ingestion!

Location	Response
On Land	Prevent contact with water. Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with earth berms or other barriers. On dry surfaces, shovel soda ash into containers. On tundra, shovel into containers, if feasible to do so. If soda ash contacts water, confine to as small an area as possible.
On Snow & Ice	Block entry into water with snow berms or other barriers. Remove soda ash with shovels or other mechanical means.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove soda ash with shovels or other mechanical means, if feasible. Burning is not a response option. Minimize damage caused by equipment and personnel.
On Water	Soda ash mixes with water (17%) and is difficult to recover. Isolate and confine spill by damming or diversion. Water flushing can be tried to disperse spill.
Storage & Transfer	Place collected material in waterproof containers. Store in sealed, labelled containers in cool, ventilated areas away from incompatible materials (lime). Do not heat.
Disposal	Segregate waste types. Keep away from lime. Place contaminated materials into marked containers. Consult Environmental Manager on any post spill requirements.

Spill Response Actions
Sodium Bicarbonate

Sodium bicarbonate (baking soda) is a non-flammable white powder.
It can be an eye, skin and respiratory tract irritant. Avoid ingestion!

Location	Response
On Land	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with earth berms or other barriers. Remove spills of solids with shovels or mechanically. Remove spills of dissolved materials with universal sorbent, pumps or vacuum equipment.
On Snow & Ice	Block entry into waterways. Do not flush into ditches or drainage systems. Contain spill with snow berms or other barriers. Remove spills with shovels or my mechanical means.
On Muskeg	Do not deploy personnel and equipment on marsh or vegetation. Remove pooled baking soda solution with pumps. Burning is not feasible. Minimize damage caused by equipment and excavation. Low pressure water flushing can be tried, if feasible.
On Water	Baking soda sinks and mixes with water. Isolate/confine spill by damming or diversion. Water flushing can be tried to disperse material.
Storage & Transfer	Store sealed, labelled containers in cool, and ventilated areas away from incompatible materials, e.g., acids.
Disposal	Segregate waste types. Keep away from lime. Place contaminated materials into marked containers. Consult Environmental Manager on any post spill requirements.