



**Mackenzie Valley Land and Water Board**

7th Floor - 4910 50th Avenue • Box 2130

YELLOWKNIFE, NT X1A 2P6

Phone (867) 669-0506 • FAX (867) 873-6610

March 25, 2002

Distribution List

Dear Sir/Madame:

**Revised Spill Contingency Plan  
North American Tungsten Corporation Ltd. - N3L2-0004  
Renewal of Mining and Milling Operation - Cantung Mine**

Attached for your review and comments is the aforementioned Revised Spill Contingency Plan. Your comments will be used in the evaluation and Preliminary Screening of this plan. Please note that this licence is within Water Management Area Number 3, Mackenzie River Area.

Please submit your comments in writing to me by **May 10, 2002** quoting Water Licence N3L2-0004. Should you find that additional time is required to complete further studies or investigations, contact me prior to this date.

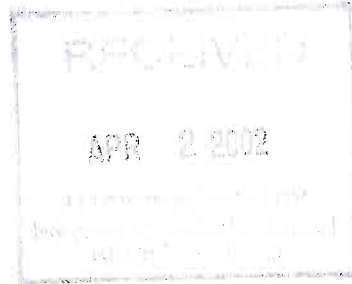
If you have any questions regarding the Revised Spill Contingency Plan, contact me at (867) 669-0506 or email [mvlwbpermit@mvlwb.com](mailto:mvlwbpermit@mvlwb.com).

Yours sincerely,

A handwritten signature in black ink, appearing to read "S. Mathyk".

Stephen Mathyk  
Regulatory Officer

Attachment



File: N3L2-0004

PS file #  
02-219



March 25, 2002

File: N3L2-0004

**Water Licence Application N3L2-0004**

**DISTRIBUTION LIST**

**First Nations**

Don Antoine, Nahendeh Land & Environmental Services, (F) 770-4701  
Leon Konisenta, Nahanni Butte Dene Band, (F) 602-2910  
Judy Kotchea, Acho Dene Koe, (F) 770-4144  
Ernie McLeod, Fort Liard Metis Dev Corp, (F) 770-3266  
Rita Cli, Liidli Kue First Nation, (F) 695-2665  
Micheal Nadlii, Deh Cho First Nation, (F) 695-2038  
Chris Paci, Dene Nation - (F) 920-2254  
Environment Department, Liidlii Kue First Nations – (F) 695-2665  
Environment Department, Deh Cho First Nations – (F) 695-2038  
Environment Department, Metis Local 52 – (F) 695-2040

**Communities**

John McKee, Fort Liard Hamlet, - (F) 770-4004  
Enviroment Department, Fort Simpson, - (F) 695-2005

**Government**

Duane Fleming, GNWT Health (F) 873-0442  
Ed Hornby, South Mackenzie District Office (F) 669-2720  
Tom Andrews, Prince of Wales Heritage Museum (F) 873-0205  
Mark Davy, MACA, (F) 920-6343  
Brett Hudson, GNWT – RWED (F) 873-0114  
Paula Pacholek, Environment Canada (F) 873-8185  
Pete Cott, DFO (F) 669-4940  
Roland Semjanovs, MVEIRB – (F) 920-4761  
Heather Passmore, CPAWS – (F) 695-2665  
Erika Nyyssonen – DOT - (F) 920-2565

**Others**

Chuck Blyth, (F) 695-2446



# CanTung Mine Spill Contingency Plan

**REVISION ONE**  
**February 23, 2002**

Prepared for:

**North American Tungsten Corporation Ltd.**  
Suite 11 – 1155 Melville Street  
Vancouver, BC  
V6E 4C4

Prepared by:

**EBA Engineering Consultants Ltd.**  
#201, 4916 – 49<sup>th</sup> Street  
Yellowknife, NWT  
X1A 2P7

## DISTRIBUTION LIST AND REVISIONS

These pages provide the Distribution Listing as well as a page for noting Revisions and Addendum.

DISTRIBUTION LIST			
COPY #	ORGANIZATION	NAME	LOCATION
01	North American Tungsten Corp.	Udo von Doehren	Vancouver
02	North American Tungsten Corp.	Tom Morrison	Vancouver
03	North American Tungsten Corp.	Udo von Doehren	Vancouver
04	Mackenzie Valley Land and Water Board	Executive Director	Yellowknife
05	Mackenzie Valley Land and Water Board	Executive Director	Yellowknife
06	Mackenzie Valley Land and Water Board	Executive Director	Yellowknife
07	EBA Engineering Consultants Ltd.	Brent Murphy	Yellowknife
08	EBA Engineering Consultants Ltd.	Richard Hoos	Vancouver
09	Workers Compensation Board	Mines Inspector	Yellowknife
10			
11			
12			
13			
14			
15			

# REVISION SHEET

REVISION #	REVISION DESCRIPTION	DATE	SENT BY	CHECKED
1 pg. 9 4.2	Response personnel names added	Feb. 23/02	K.Dortman	
1 A-1	Spill kit description	Feb. 23/02	K. Dortman	
1 C-1	Emergency supplies and equipment	Feb. 23/02	K. Dortman	
1 F-1 & F-2 F-3	Emergency contact information	Feb. 23/02	K. Dortman	

# CONTENTS

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	General	1
1.2	Complementary Plans and Documents	1
1.3	Administration - Responsibility and Document Updating	1
1.4	Purpose	2
1.5	Testing the Contingency Plan	2
1.6	Training of Personnel	2
1.7	Development of Procedures	2
<b>2</b>	<b>SPILL NOTIFICATION</b>	<b>4</b>
2.1	24-hour Centralized Emergency Contact	4
2.2	WITNESS Checklist	Error! Bookmark not defined.
<b>3</b>	<b>SPILL RESPONSE ORGANIZATION</b>	<b>7</b>
3.1	General Responsibilities	7
<b>4</b>	<b>RESPONSE RESOURCES</b>	<b>9</b>
4.1	Response Equipment	9
4.2	Response Personnel	9
<b>5</b>	<b>SPILL RESPONSE OVERVIEW</b>	<b>11</b>
5.1	General	11
5.2	Products	11
5.3	Potential Spill Sources	12
5.4	Preventative Measures	12
5.4.1	General	12
5.4.2	Fuel / Used Oil Storage Tanks	12
5.4.3	Tailings Lines	12



5.4.4	Tailings Pond 3 and Pond 4	13
5.4.5	Powder Magazine (underground and surface)	13
5.4.6	Reagent Storage Warehouse and General Warehouse	13
5.4.7	Propane Tank Farm	13
<b>5.5</b>	<b>Spill Response Strategies</b>	<b>13</b>
5.5.1	General	13
5.5.2	Planning & Logistics	14
5.5.3	Monitoring Spills	14
5.5.4	Containment	14
5.5.5	Spills On Land	15
5.5.6	Spills on Muskeg	16
5.5.7	Spills On Snow and Ice	17
5.5.8	Spills In Open Water	18
<b>5.6</b>	<b>Cleaning Stream Banks, Shoreline &amp; Muskeg</b>	<b>20</b>
<b>5.7</b>	<b>Burning</b>	<b>21</b>
5.7.1	Application	21
5.7.2	Limitations	21
5.7.3	Safety	21
<b>5.8</b>	<b>Recovery</b>	<b>22</b>
<b>5.9</b>	<b>Disposal</b>	<b>22</b>
<b>5.10</b>	<b>Other Concerns</b>	<b>22</b>
5.10.1	Fire	22
5.10.2	Truck (Transportation) Incidents	23
<b>5.11</b>	<b>Spill Response Actions</b>	<b>23</b>
<b>6</b>	<b>KEY OPERATIONS NUMBERS</b>	<b>24</b>

## Appendices

Appendix A Emergency Spill Kits

Appendix B Locations of Emergency Spill Kits

Appendix C Central Storage Emergency Spill Kits

Appendix D On-Site Material Stores

Appendix E Selected Spill Response Strategies

Appendix F Emergency Contact Information

# **GENERAL RESPONSE GUIDELINES**

## **General Actions**

- A. ASSESS THE SITUATION
- B. INITIATE NOTIFICATION AND REPORTING AS PER THE NOTIFICATION CHARTS
- C. MONITOR FOR CHANGES IN SERIOUSNESS OF THE INCIDENT

## **Priorities**

- A. SAFETY OF PERSONNEL
- B. PROTECTION OF THE ENVIRONMENT
- C. SAFETY OF EQUIPMENT

## **First Steps**

- A. ENSURE SAFETY
- B. DETERMINE EXTENT OF SPILL
- C. ESTABLISH BOUNDARY AROUND THE SPILL

## **Respond Quickly**

1. Identify the spilled material.
2. Ensure the safety of yourself and others.
3. Shut off ignition sources - NO SMOKING.
4. Attend to injured.
5. Assess the severity of the spill.
6. Call for assistance.
7. SITE SAFETY OFFICER mobilizes SPILL RESPONSE TEAM
8. Keep unnecessary people out of the area.
9. Wear impervious clothing, goggles, and gloves.
10. Approach spill from upwind IF SAFE TO DO SO.
11. Stop product flow if possible.
12. Contain and recover spill as soon as possible.

## **Respond Safely**

1. Do not contain gasoline/aviation fuel if vapours might ignite.
2. Allow gasoline or aviation fuel spills to evaporate.
3. See the appendices for further information.

# **1 INTRODUCTION**

The CanTung Mine Spill Contingency Plan is designed to show the notification responsibilities and response procedures for a spill at North American Tungsten Corporation Inc.'s CanTung mine site. The CanTung mine site is defined as the extent of the mineral leases located in and around Tungsten, Northwest Territories, at:

Latitude: 61° 57' North  
Longitude: 128° 16' West

The Plan applies to any spill in Tungsten including but not limited to the mine and mill site, tailings disposal area, and underground mine workings. The Plan does not apply to any spill of material along the public road to Tungsten. Spillage along the public road is the responsibility of the transport company hired by North American Tungsten. North American Tungsten will review the transport companies' spill contingency plans to ensure their adequacy.

This Plan provides an overall broad reference on how a spill is reported, how the response would be initiated, the resources available to respond, and the various parties involved.

## **1.1 General**

There are five primary potential spill scenarios that may be encountered at the Tungsten mine site. These include:

- 1) A receiving/offloading spill during re-supply to site storage facilities;
- 2) An overflow or breach of the tailing ponds;
- 3) An accidental release from on-site pipelines;
- 4) An accidental release from a site storage facility; and
- 5) A transfer spill during loading/fuelling of on-site containers/vehicles.

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 Tungsten mine site.

## **1.2 Complementary Plans and Documents**

This plan is intended to be used in conjunction with other existing field and corporate response plans including the Groundwater Pumping Contingency Plan and the CanTung Emergency Response Plan.

## **1.3 Administration - Responsibility and Document Updating**

North American Tungsten has overall responsibility for implementing this document and for updating the Spill Contingency Plan in accordance with the terms of Water Licence N3L2-004

(the Licence). The Mackenzie Valley Land and Water Board has since taken over administering this licence from the Northwest Territories Water Board.

## **1.4 Purpose**

The purpose of the CanTung Mine Spill Contingency 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 clean up costs. The objectives of the plan are:

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

## **1.5 Testing the Contingency Plan**

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

Random, unannounced spill contingency drills will be carried out with each crew during both the summer and winter seasons.

## **1.6 Training of Personnel**

All personnel, as part of their job orientation, 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. As part of this awareness training, each employee will also be made aware of the dangers and appropriate responses should they encounter a spill of these materials.

## **1.7 Development of Procedures**

Following the response to any spill incident, the MINE MANAGER and SITE SAFETY OFFICER will investigate the incident and prepare a report outlining the steps and procedures which would prevent a similar occurrence. These procedures will be distributed to the appropriate personnel at the mine as part of their work description. If appropriate they may be appended to this Spill Contingency Plan.

## **CanTung Site Location Map**

## 2 SPILL NOTIFICATION

### 2.1 24-hour Centralized Emergency Contact

Primary notification of any hazardous spill is done by the WITNESS contacting his immediate supervisor. If it is unknown whether the spill is hazardous or not, the WITNESS is required to report the spill as if it is hazardous. The credo "Better Safe than Sorry" applies to all spills of unknown origin.

The WITNESS will initiate the notification sequence by the quickest means available according to the Incident Notification Chart. Should the WITNESS not be able to contact his IMMEDIATE SUPERVISOR, the WITNESS is then required to contact a FIRST RESPONDER (the mine or mill superintendent or maintenance supervisor) **and** the SITE SAFETY OFFICER.

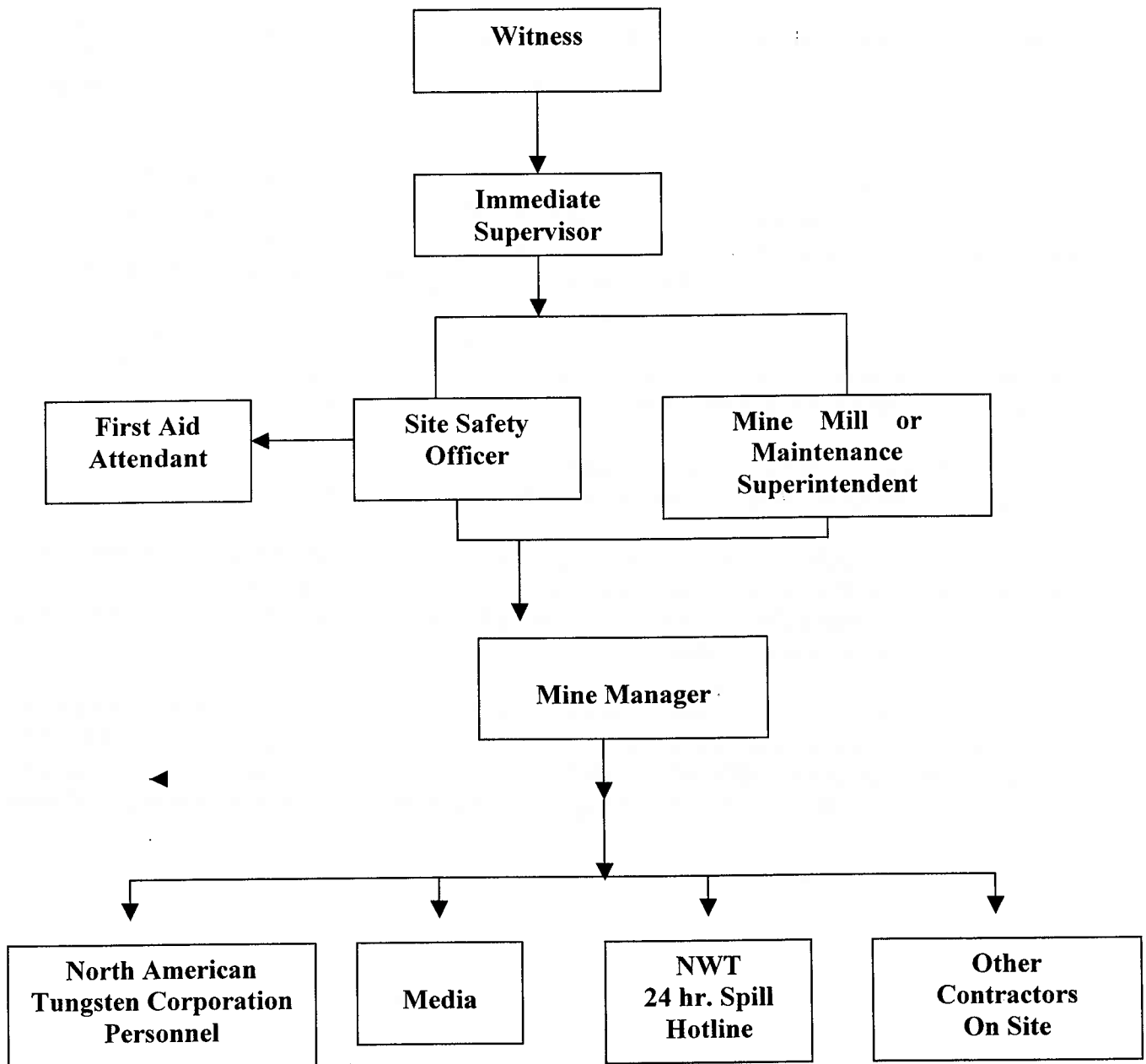
Once at the site of the spill, the FIRST RESPONDER should ensure the safety of personnel and then shut off the source of the spill, if it is safe to do so. The FIRST RESPONDER is then responsible to follow through with the notification and alert the MINE MANAGER.

The SITE SAFETY OFFICER will proceed to the incident site, assess the situation and determine the appropriate level of response with the FIRST RESPONDER.

The MINE MANAGER will contact the designated North American Tungsten personnel once the details of the spill are known and initiate contact with the Northwest Territories 24-hour spill report line at (867) 920-8130. The MINE MANAGER will also contact other contractors on-site and make them aware of the situation.

Designated North American Tungsten personnel will liaise with the appropriate Government Agencies in conjunction with the MINE MANAGER. Only the designated North American Tungsten personnel or the MINE MANAGER will issue statements to the media. All requests for information from the media are to be forwarded to the designated North American Tungsten personnel.

## Incident Notification Chart





## 2.2 WITNESS Checklist

The following provides guidance to the WITNESS on noticing a spill.

1. If the spill is **known** to be non-hazardous, clean it up or, if it is large, report it to your IMMEDIATE SUPERVISOR.
2. If the spill is potentially hazardous or of an unknown material use a phone or radio, or verbally, initiate the Incident Notification Chart by contacting you IMMEDIATE SUPERVISOR as soon as possible. Be prepared to answer the following questions:
  - ☐ Who are you? Name
  - ☐ Where are you?
  - ☐ What kind of spill is it?
  - ☐ How big is it?
  - ☐ Is the spill still in progress?
  - ☐ Are there any injuries?
  - ☐ What are you going to do?
  - ☐ Do you need help? Who? What?
  - ☐ Are you going to call back? If so, when?

## 3 SPILL RESPONSE ORGANIZATION

This section describes the general roles and responsibilities for spill response at CanTung. In some cases additional company and outside resources may need to be brought in to support the cleanup. For a major incident, company, contractor and outside expertise and resources would be mobilized for the response.

### 3.1 General Responsibilities

The following provides a general guide to the Spill Response Organization for the CanTung mine site. In some cases certain company personnel may fill dual roles, depending upon the circumstances of the incident.

In most incidents the SITE SAFETY OFFICER working with the SPILL RESPONSE TEAM will handle the initial response, containment and clean-up. In larger incidents the MINE MANAGER and North American Tungsten staff will play a more active role. In all cases, the SITE SAFETY OFFICER will be made immediately aware of a spill and, along with the FIRST RESPONDER, will be responsible to notify the MINE MANAGER. The MINE MANAGER will in turn notify the NWT Spill Line as necessary and the other contractors and outside personnel in Tungsten.

Other contractors and specialists may be brought in to assist the SITE SAFETY OFFICER in a response to a major 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 member of cleanup crew.

#### FIRST RESPONDERS(Mine or Mill Superintendent or Maintenance Supervisor)

- ☐ Assess and verify the initial severity of the spill and safety concerns.
- ☐ Gather, collect and confirm information on the spill – source, type, size, cause, etc. (As a minimum ensure NWT Spill Form can be completed).
- ☐ Notify MINE MANAGER
- ☐ Stop or contain the spill, if possible.
- ☐ Conduct initial containment and cleanup operations.

#### SPILL RESPONSE TEAM

- ☐ Conduct cleanup of spills under direction of SITE SAFETY OFFICER.
- ☐ Deploy sorbents, booms and other equipment and materials as required.
- ☐ Take appropriate response measures.
- ☐ Continue cleanup as directed by SITE SAFETY OFFICER or until relieved.

### **SITE SAFETY OFFICER**

- ☐ Notify MINE MANAGER.
- ☐ Notify the on-site NURSE if an injury is involved.
- ☐ Assist in initial and ongoing response efforts.
- ☐ Assembles and supervises SPILL RESPONSE TEAM.
- ☐ With SPILL RESPONSE TEAM, takes initial action to seal off the source and contain spill.
- ☐ Continue actions until relieved or supplemented by MINE MANAGER.
- ☐ Decide with MINE MANAGER if mobilization of additional equipment is warranted.
- ☐ Ensure co-ordination of equipment and manpower as needed (company and contractors).
- ☐ Ensure expeditious response and clean up of spill site and impacted areas.

### **MINE MANAGER**

- ☐ Contacts the Emergency Response Team (see Emergency Response Plan) if the situation requires.
- ☐ Responsible for mobilizing additional local company support staff, security, and other contractors as required
- ☐ Records the time of the report, source of information and details on location, size, type of spill and any other information available on the spill report form.
- ☐ Oversees the cleanup operation until it is satisfactorily completed.
- ☐ Together with the SITE SAFETY OFFICER decides if additional equipment is required to contain and clean up spills.
- ☐ Notifies North American Tungsten corporate personnel.
- ☐ Oversees completion and distribution of Spill Report.
- ☐ Ensures investigation identifies measures to prevent similar spills.
- ☐ Provides cleanup advice to the SITE SAFETY OFFICER.
- ☐ Assists with preparation of press releases.
- ☐ Provides advice on storage and disposal options.
- ☐ Ensures that the spill is reported to the 24-hr Spill Line and obtains confirmation of receipt of spill report.
- ☐ Ensures that there are follow up reports prepared on the spill event, clean up and environmental impacts.
- ☐ Ensures that Post-Spill reports are completed and takes action, as necessary, to prevent a recurrence.
- ☐ Liaise with government agencies (as required).

### **North American Tungsten Corporate Personnel**

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

## 4 RESPONSE RESOURCES

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

### 4.1 Response Equipment

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

All equipment is stored in such a manner as to be readily available on short notice. The SITE SAFETY OFFICER would immediately respond to a reported incident site by notifying his 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 are available for immediate mobilization at any time. Appendix A lists the materials inventory for the "Emergency Spill Response" kit, available to be located at a spill site. The "Emergency Spill Response" kits are stored at the locations listed in Appendix B.

A central storage facility exists which holds a larger amount of equipment for handling spills beyond the capacity of the "Emergency Spill Response" kit. Appendix C lists the equipment stored in this central storage. Additionally, for larger incidents earth moving equipment will be required. The following earth moving equipment is available on site to help contain spills:

- Front-end loader,
- Dozer,
- Trucks, and
- Additional earth and rock moving equipment will be available from the mine.

### 4.2 Response Personnel

The following personnel are specifically named within the CanTung Mine Spill Contingency Plan:

Mine Manager	Tom Morrison
Mill Superintendent	Mike Redfearn
Mine Superintendent	Al Boon
Maintenance Supervisor	Murray Weddell
Site Safety Officer	Ken Dortman

Additional manpower will be required to respond to any spill. This group is referred to as the SPILL RESPONSE TEAM and is comprised of the following people:

- 1) Individual who discovered the incident (WITNESS);
- 2) Employee(s) who normally handle the spilled material (if specific and available);
- 3) Heavy equipment operators (if required); and
- 4) Any number of other employees as requested by the SITE SAFETY OFFICER.

The SITE SAFETY OFFICER will assemble the SPILL RESPONSE TEAM. As the team is generated from the pool of all employees at the CanTung mine site it is imperative that all employees are familiar and comfortable with this Spill Contingency Plan. Additionally, all employees should make a special effort to review the health hazards associated with each of the materials listed in Section 5.2 below.

## 5 SPILL RESPONSE OVERVIEW

### 5.1 General

This section details the materials stored on site and the actions to be taken should a spill occur. At all times it is important to acknowledge the priorities of North American Tungsten in the response to all spills:

- 1) The health and safety of employees and site visitors;
- 2) The protection of the environment; and
- 3) The protection of equipment.

### 5.2 Products

Typical materials that are utilized in Tungsten include:

- |                      |                                    |
|----------------------|------------------------------------|
| • Hydrated lime      | • Copper sulphate                  |
| • Flocculants        | • Depramin (starch)                |
| • Hydrofluoric acid  | • Dowfroth (frother)               |
| • Hydrochloric acid  | • Nitric acid                      |
| • Caustic soda       | • Pamak (fatty acid)               |
| • Sodium bicarbonate | • Quebracho (tree extract)         |
| • Sodium carbonate   | • Cement                           |
| • Propane            | • Sodium silicate                  |
| • Oxygen             | • Xanthate Z-6                     |
| • Acetylene          | • P40 detergent                    |
| • Paint              | • Emcol                            |
| • Paint stripper     | • Muriatic acid                    |
| • Adhesives          | • Sulphuric acid                   |
| • Salt               | • Detergents                       |
| • Ammonium nitrate   | • Dynamite and emulsion explosives |

Petroleum products that are utilized include:

- |                                    |                    |
|------------------------------------|--------------------|
| • Diesel fuel P-40 and P-50        | • Lubricating oils |
| • Jet B – Aviation fuel            | • Hydraulic oils   |
| • Gasoline                         | • Used oils        |
| • Ethylene glycol-based antifreeze |                    |

The bulk of the above substances will be stored and used in the mine/mill complex with some being used at the airstrip and in the town.

### **5.3 Potential Spill Sources**

Appendix D outlines which materials are stored on-site, where they are stored, and the general volumes of material stored at that particular location.

### **5.4 Preventative Measures**

By successfully preventing spills of materials at CanTung the environmental and safety risks are mitigated and the costs of training personnel are recovered. As such, North American Tungsten 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 are to be instituted at the CanTung Mine:

- 1) All personnel on-site are to familiarize themselves with this document as part of the site orientation;
- 2) During all transferring of fuel or chemicals an "Emergency Spill Response" kit is to be immediately available;
- 3) At least one "Emergency Spill Response" kit is to be stored at each long-term storage facility; and
- 4) A leak of any size from a storage facility is to be reported to the SITE SAFETY OFFICER.

#### **5.4.2 Fuel / Used Oil Storage Tanks**

The following items should be checked on a monthly basis:

- 1) The level of the tanks should be checked over at least 12 hours to ensure that it does not vary beyond the amount that is withdrawn;
- 2) The secondary containment system should be partially filled with water and checked to ensure that the level remains static over a 12 hour period;
- 3) All pumps, hoses, and valves should be checked to ensure they are tight and in good condition; and
- 4) Logs should be reviewed to ensure that all material is accounted for.

#### **5.4.3 Tailings Lines**

During each month of operation, the tailings lines should be inspected in its entirety. The following items in particular should be examined and tested as appropriate:

- 1) Valves;
- 2) Discharge point (spiggots); and
- 3) All connections.

#### **5.4.4 Tailings Pond 3 and Pond 4**

During each month of operation, Tailing Ponds 3 and 4 should be inspected. The following items in particular should be examined:

- 1) Sides of the embankment for sloughed material;
- 2) Sides and toe of the embankment for seepage; and
- 3) Sides of the embankment for fractures.

#### **5.4.5 Powder Magazine (underground and surface)**

During each month, the magazines should be inspected. The following items in particular should be examined:

- 1) Locks and other security features are in satisfactory condition;
- 2) Logs should be reviewed to ensure that all material is accounted for; and
- 3) Structure is sound with no route available for ingress of weather or wildlife.

#### **5.4.6 Reagent Storage Warehouse and General Warehouse**

During each month, the warehouses should be inspected. The following items in particular should be examined:

- 1) Locks and other security features are in satisfactory condition;
- 2) No stored items are visibly leaking or spilled; and
- 3) Structure is sound with no route available for ingress of weather or wildlife.

#### **5.4.7 Propane Tank Farm**

During each month, the Propane Tank Farm should be inspected. The following items in particular should be examined:

- 1) Locks and other security features are in satisfactory condition;
- 2) Logs should be reviewed to ensure that all material is accounted for; and
- 3) Gas "sniffers" and alarms are to be tested.

### **5.5 Spill Response Strategies**

#### **5.5.1 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 as in petroleum products, or in the form of a solid. A dry chemical spill may transform into a liquid chemical spill if it is allowed to gain access to a water body (i.e. stream) prior to being contained and successfully cleaned up.

Spills may occur on land, snow, ice or in the water or become a combination of one or more depending on the conditions at the time of spill. Various proven practical methods of containment and recovery are well documented for use in northern climates and are summarized



below. Additional technical information is available from Environment Canada – Environmental Emergencies section. Appendix E lists spills response strategies for some specific materials present at the CanTung mine site.

The first initial action is 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 SITE SAFETY OFFICER.

### **5.5.2 Planning & Logistics**

The feasibility of containing and recovering a spill will largely be determined by its location and the rate of the release, spreading, transport and evaporation. These rates should be compared with the total time needed to deploy response equipment in order to evaluate whether or not containment, and/or sorbent and skimming operations can be effectively implemented. The pre-assembly of spill cleanup kits will expedite response and reduce the total deployment time needed, including:

- 1) Equipment and support material mobilization time.
- 2) Personnel mobilization, transit and assembly at spill site time.
- 3) Actual equipment set-up and deployment time.

### **5.5.3 Monitoring Spills**

All spills are to be monitored throughout the response to ensure safety and to direct cleanup efforts. To that effect, the following should be monitored:

- 1) Explosive gas concentrations in the atmosphere using an explosion meter.
- 2) Spill movement and behavior, in order to properly direct response efforts.
- 3) All threats to the safety of people, property and the environment.

### **5.5.4 Containment**

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

**Size of spill** - Berms surrounding large spills that cover extensive areas are difficult and time consuming to build. Earth and snow berms may be more easily put into place than sand bag containment. It is also important to build the berm as close to the source as possible to minimize any spreading.

**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 required additional work to remove contaminated materials. Frozen soils create a natural barrier that aid

in clean up. The tundra vegetation also allows void space, which quickly takes up spills. Trenches or berms can be difficult to construct without the use of heavy machinery.

**Proximity to water** - It is important that every precaution be taken to ensure that spills do not enter the creeks or river around Tungsten. If there is any possibility of contamination, a stream or river should be protected by diversion of the spill from the watercourse.

**Weather** - Weather can play an important role in spill response operation, 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 the 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 greatly influence the type of containment measures and the ability to successfully clean up the spill.

**Daylight** - during the winter season daylight is at a minimum. This greatly reduces the ability to assess the spill and provide an adequate response. Insufficient light requires that additional sources be available to affect the cleanup.

**Temperature** - Air temperatures in the north, with the extremes during the winter, demand attention by response personnel to ensure the safety of the response team. Although the 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.

### 5.5.5 Spills On Land

Spills on land should be contained as close to the source as possible with every effort (taking into account the safety of everyone involved) made to ensure that a spill does not reach water. Petroleum products spilling onto frozen, snow-covered ground may be contained by the construction of snow dykes. For fast initial containment of smaller spills the dykes can be built manually with shovels. Larger spills may require the use of heavy equipment such as front-end loaders and bulldozers.

Lining with a polyethylene plastic liner, plastic tarpaulin or similar synthetic material may ensure the impermeability of dykes. Alternatively, in freezing temperatures, water may be sprayed or poured over the dykes to further enhance the barrier to the spilled material. Synthetically lined dykes are more effective and longer lasting than just snow or snow- and ice-lined dykes.

Alternatively containment dykes may be constructed from sand or gravel if these materials are available in an unfrozen form. Again, for smaller spills, the dykes can be fashioned manually with shovels where for larger spills trucks or other heavy equipment (front-end loaders) will normally be required to transport and handle sand and gravel.

Trenching or ditching can be 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 normally neither practical nor possible.

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

Spills on land should be contained as close to the source as possible, if safety allows. 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:

- 1) A berm or dyke around the spill source
- 2) A trench or ditch down slope of the spill source
- 3) Berms can be constructed from earth, sand bags or snow.

#### 5.5.5.1 Earth Berm/Trench

If possible, locate the berm/trench sufficiently down slope of the release point to complete its construction 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.

#### 5.5.5.2 Sand Bag Berm

Sand bags can be used where available and if the earth is too hard or frozen and cannot be excavated or compacted. A plastic liner can be used to seal the trench and bags and should be anchored with gravel or rocks and be woven between layers of bags.

#### 5.5.5.3 Snow Berm

In winter conditions, snow may provide a quick and efficient berm construction material. The snow should be well packed and water can be sprayed to form an ice layer on the top and sides of the berm to make it impermeable to the spill.

#### 5.5.6 Spills on Muskeg

Muskeg is generally poorly drained, wet and spongy. Internal drainage is usually slow and the depth of peat over mineral soil varies greatly. Muskeg is also highly acidic and low in nutrients, making natural biodegradation very slow, even during the summer months.

It is recommended that small oil spills in muskeg be mixed with peat moss and allowed to degrade during summer months since more damage can be done by attempting cleanup using mechanical removal methods.

It is possible that, due either to safety or the condition of ground (too soft), that cleanup should be delayed until conditions improve. In either case, all parties involved should be consulted in order to determine when and how cleanup should be undertaken. Site monitoring will also be required during the interim phase in order to ensure that the spill does not spread to any sensitive areas around the contaminated site.

In the event of a small spill, it is important to weigh the advantages of cleanup versus the potential negative impacts on the terrain. Considerable damage can be caused by both personnel and equipment on wet or sensitive areas. In many cases, the best solution may be to add nutrients to the contaminated area and monitor the site to ensure that the spill does not migrate to an adjacent sensitive area. In all cases, appropriate environmental advisors and Regulatory Authorities should be consulted.

### **5.5.7 Spills On Snow and Ice**

Containment on snow is readily achieved and is very 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. The snow can be used to its advantage in the construction of snow dykes/dams. Whenever possible, the snow pack should be left in place to avoid contaminating the underlying substrate.

Spills that occur on ice, from either direct spillage or migration to the ice, are greatly affected by the strength of the ice. If the spill does not penetrate the ice, and the ice is safe to work on, then the methods of containment are similar to that on land. Where the spill has penetrated the ice, the situation should be handled similar to that on open water. If, as in petroleum spills, the material floats, then every effort should focus on the recovery of the material using pumping/suction methods, and absorbents.

Oil can remain relatively fresh, i.e., in an un-weathered state, under snow and ice for several months or more after a spill. Evaporation rates will still be high when the oil is ultimately exposed to atmosphere except in very low temperatures approaching its flash point. Oil can also move up and down small hills (several metres high) due to the capillary action of the snow.

#### **5.5.7.1 Containment**

Snow and ice can be used to create berms to keep spills from spreading. In frozen rivers, angled slots about 1 m wide or holes can be cut in the ice, where safety permits, to allow possible spill recovery. The oil will rise up into the openings where it will concentrate, and be available for recovery using skimmers or pumps.

#### **5.5.7.2 Disposal**

Oil spills in snow and ice can sometimes be burned if the spill can be isolated from the source. Although there is generally a reduced fire hazard, due attention to safety of operations is still required. If burning is not effective, recovered contaminated material will need to be collected and transported to a designated disposal/treatment facility

#### 5.5.7.3 Recovery

When large volumes of oil have been contained either through natural or mechanical containment, it will be necessary to remove or recover the accumulated oil. This will generally occur in excavated trenches or adjacent to berms or natural barriers and occasionally in slow running streams or quiet ponds.

Vacuum trucks are ideal at cleanup sites accessible by road and where a large volume of oil has pooled that is generally free of water. The truck must be positioned at a safe distance so that there is no possibility of fire or explosion.

Oleophilic devices, such as disc or drum skimmers, can selectively recover oil in water, and are better suited to applications where the oil has formed a distinct layer on top of quiet water. Accumulations adjacent to an inverted weir are an example. A vacuum truck would be largely ineffective in this instance since it would recover large amounts of water, particularly in a thin layer of oil with water flowing through the pipe or culvert.

When using disc or drum skimmers, ensure that small items of debris are periodically removed from scrapers to ensure their efficient operation.

#### 5.5.7.4 Transfer

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 advisor.

Centrifugal ("trash") pumps are capable of moving oil but will emulsify oil and water, resulting in the generation of larger volumes of liquid waste.

Peristaltic, diaphragm and other positive displacement type pumps tend to reduce oil/water emulsification.

Ensure that pumps and drives selected for transferring Jet-B, gasoline or other flammable products are explosion proof.

Solid wastes, such as contaminated sediment, used sorbent, spent boom and other debris, will require the use of rakes and shovels for initial pickup and then lined containers, pickup trucks, etc. for their transfer to disposal sites. Care should be taken during such operations to prevent the contamination of soil and water at transfer points.

#### 5.5.8 Spills In Open Water

Containing spills on water is often 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 if a spill reaches water, that containment be attempted as close to the source as possible, and that the spill be prevented from reaching a flowing stream. Efforts to contain spills in streams and rivers should be limited to land-based

operations where the oil might pool in accessible back eddies. The recovery of water-soluble chemicals is not possible and so the remainder of this discussion is based on spills of petroleum products.

In flowing streams, petroleum products travel at the same speed as the surface current. On larger rivers or in open lake areas, slicks are also transported at 3.5% of the wind speed. Although a comparatively small effect, it can be an important factor if the wind is at right angles to the water flow and if the water surface involved is extensive. The wind can force the spill to the sides of the river where flows are slower or to the shore of a lake. Long reaches of the river may become contaminated although containment and recovery might also be possible. This situation may apply to the Flat River, depending on the flow rates at that time.

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 ( $36 / \text{time (sec)} = x \text{ km/h}$ ) to determine the estimated travel time to a confluence or other sensitive area.

#### 5.5.8.1 Containment Strategies

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

- 1) Speed of slick travel
- 2) Location of possible containment sites
- 3) Availability of personnel and equipment
- 4) Location of sensitive areas
- 5) Safety of operations

Spills on water can be contained by using floating booms (sorbent or non-sorbent) or by constructing a temporary berm and inverted weir. The objective is to build a barrier against which the (normally floating) petroleum products will pool while allowing the underflow of water.

**IMPORTANT:** Whenever the construction of a berm or flume is 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 should be consulted if fish spawning streams are involved (phone (867) 669-4902). The Flat River is a fish spawning stream.

Barriers can be constructed from earth or rocks although if large rocks are used, plastic sheets or packed mud should be used to ensure that a complete seal is made. Choosing and positioning the pipe is critical to effective operation of the weir. 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. Underflow of oil (under the pipe) should also be prevented by ensuring that the pipe inlet is not located on loose gravel.

#### 5.5.8.2 Booms

Booming with either sorbent or non-sorbent booms can also be an effective means of containing spills on slow-moving waters and in lakes. 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 m/s) if the boom is deployed at an angle of less than 90° to the direction of flow.

Sorbent booms or socks can also be used to 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 that occurs they will tend to float very low in the water or even sink and release petroleum products downstream.

## 5.6 Cleaning Stream Banks, Shoreline & Muskeg

Site restoration, stream banks and general "shoreline" cleanup of lakes are the final spill response steps. Due to seasonal variations and various types of stream banks and muskeg, a standard restoration program cannot be prescribed. Consultation with environmental advisors is critical to ensuring cleanup efforts do not create adverse impacts. General cleanup rules include:

- 1) Minimize the impact to shoreline or muskeg, particularly vegetated areas, during all phases of spill response. Cleanup can cause more damage to such habitat than an untreated spill, especially where permafrost and vegetation are involved.
- 2) Assess area requiring cleanup in terms of three factors:
  - Environmental sensitivity
  - Property, archaeological or other damage
  - Natural cleansing action at the site
- 3) Petroleum products typically do not adhere to the banks of fast moving rivers. Little or no cleanup action can usually be taken. On the other hand, muskeg can undergo long-term contamination and reduced environmental productivity that cleanup may or may not help to alleviate because of other damage inflicted. Whatever method is chosen to deal with an area affected by a spill, minimizing damage to root systems is vital.
- 4) Obtain approval and instruction prior to conducting cleanup operations.
- 5) 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. Damage to both upland and water areas may result.

- 6) Approach vegetated areas and other sensitive zones from the water side, if possible and if cleanup is to be attempted. Be aware that various plant species, birds, fish and animals can all be adversely affected by cleanup operations. In the Arctic, breeding and blooming periods during the summer months are particularly critical.

## **5.7 Burning**

The in-situ burning of spilled petroleum products may be a useful option, particularly in the North, where terrain and/or safety concerns may make conventional cleanup methods impractical. It is important that the decision to burn be made as soon as possible after the spill because as the more volatile light ends evaporate, burning becomes more difficult. For this reason, it is recommended that operators obtain prior approval from the necessary regulatory agencies.

### **5.7.1 Application**

The best results will be achieved when burning fresh (less than 24 hours old) spills in winter or in muskeg with a high water table. Burning can also be effective in containment trenches or ponds where a significant thickness of petroleum products can collect. Special care should be taken in winter conditions, 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 containers) prior to burning if there is ANY chance of adjacent areas being inadvertently set on fire.

### **5.7.2 Limitations**

The burning of heavy or weathered oil is 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.

### **5.7.3 Safety**

As with conventional cleanup methods, safety of operations is paramount in burning operations. 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. Consultation with the Territorial Forest Fire Centre in Fort Smith is advised ((867) 872-2103). 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.



## **5.8 Recovery**

Spilled petroleum products contained within a dyked or trenched area should be recovered by pumping into a standby tanker, portable storage tank or drums. Pump and suction hoses should be screened to prevent snow, ice or debris from clogging the line or pump.

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.

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. It also ensures that all materials, including absorbent sand, snow etc. have been removed from the site.

Containment of the spill should be attempted using the methods discussed earlier. Special care should be taken to ensure that spilled material does not reach water bodies where recovery is more difficult. Ice augers can be effective in terms of locating and exposing oil for burning or pumping off.

## **5.9 Disposal**

Petroleum products such as oil that has been recovered by pumping into portable tanks, drums or a standby tanker can often 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.

As discussed earlier, 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 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.

Spilled chemical products should be recovered and reused wherever possible. Materials unable to be used will be disposed of at an approved disposal site.

## **5.10 Other Concerns**

### **5.10.1 Fire**

In the event that the accident/incident is in combination with a fire, extinguishing the fire may be required prior to initiating efforts to stop the spillage.

In order to control the resulting runoff (in cases where water is used), and the subsequent spreading of the spilled material, any indication of slope away from the area of the spill should be dyked off for containment.

Petroleum and chemical fires have the potential to generate toxic fumes under poor combustion conditions. Approaching and dealing with any fire from upwind is recommended as well as caution with regard to breathing the vapours generated from the fire.

#### **5.10.2 Truck (Transportation) Incidents**

Truck incidents typically result in spills similar to those from other sources, such as storage tanks, and share the same safety and response concerns. However, due to the nature of the equipment involved, and the remoteness, typical of transportation incidents, there are a number of issues which should be considered.

When truck incidents occur, personnel are potentially at risk due to the cargo (fire and explosion), and to the incident itself (injuries). There is also a possibility that the incident might involve other people, either directly i.e., multiple vehicle incidents, or indirectly i.e., where the proximity of the incident to a residence, camp or depot might require evacuation.

In all cases, the health and safety of company (or contractor) personnel and the public is of highest priority.

### **5.11 Spill Response Actions**

Appendix E contains key summaries of spill response action for some of the products that may be present in Tungsten.

Detailed MSDS information for each product on site is maintained in the SITE SAFETY OFFICER'S office, in the SITE SAFETY OFFICER'S truck, and relevant MSDS' are posted where the materials are stored. In the event of a spill, responders would be directed to obtain the MSDS information from the SITE SAFETY OFFICER.

## **6 KEY OPERATIONS NUMBERS**

Appendix F lists the contact information for site personnel, North American Tungsten personnel, emergency response companies, appropriate government agencies, and all material suppliers.

---

## **Appendix A**

## Emergency Spill Kits

Emergency spill containment and recovery materials and supplies are available for immediate mobilization at any time. This section lists the materials inventory for the "Emergency Spill Response" kit located at each potential spill site. As equipment is used from a kit it is to be replaced from general stores.

These supplies are for immediate use, and if required, until more equipment and supplies are brought to the scene.

The supplies listed below are contained in a (approx.) 30 gallon plastic container.

1. 10 – 2 ft x 2 ft absorbent pads.
2. 2 – 3in x 4 ft. long absorbent socks (booms).
3. 2 – pair rubber gloves.
4. 5 – large heavy duty plastic type garbage bags.
5. 1 – chemical respirator c/w chemical cartridges
6. 5 – dust masks.
7. 1 – aluminum clean up shovel.

---

## **Appendix B**

**Locations of Emergency Spill Kits**

“Emergency Spill Response” kits, as outlined in Appendix A, are stored at the following locations:

- Mill – 1 kit
- Aboveground fuel dump – 1 kit
- Underground powder magazine – 1 kit
- Underground workshop – 1 kit
- Aboveground workshop – 1 kit
- Reagent storage warehouse – 1 kit

---

## **Appendix C**



**Central Storage Emergency Supplies:**

Various types of equipment and supplies for plant site and off site emergencies are located in the Fire Garage Building. Additional equipment and supplies can be obtained from the warehouse or shops, as required.

**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 Response 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 bags

**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		

---

## **Appendix D**

**On-Site Material/Chemical Storage**

The following materials are maintained on site. Quantities will vary depending on usage and so are representative of expected quantities upon re-supply.

<b>Chemical/Product</b>	<b>Quantity Stored</b>	<b>Location</b>
Acetylene	50 cylinders	Warehouse
Adhesives	10 kg	Warehouse
Cement	5 tonnes	Warehouse
Muriatic acid	45 litres	Warehouse
Oxygen	50 cylinders	Warehouse
Paint	225 litres	Warehouse
Paint stripper	45 litres	Warehouse
Propane	50 cylinders	Warehouse
Salt	1 tonne	Warehouse
Caustic soda	1,000 – 10,000 kg	Reagent Storage Warehouse
Copper sulphate	500 – 3,000 kg	Reagent Storage Warehouse
Depramin (starch)	500 – 10,000 kg	Reagent Storage Warehouse
Dowfroth (frother)	500 – 3,000 kg	Reagent Storage Warehouse
Emcol	500 – 3,000 kg	Reagent Storage Warehouse
Flocculants	500 – 3,000 kg	Reagent Storage Warehouse
Hydrated lime	1,000 – 10,000 kg	Reagent Storage Warehouse
P40 detergent	200 – 1,000 kg	Reagent Storage Warehouse
Pamak (fatty acid)	500 – 5,000 kg	Reagent Storage Warehouse
Quebracho (tree extract)	5,000 – 15,000 kg	Reagent Storage Warehouse
Sodium carbonate	1,000 – 10,000 kg	Reagent Storage Warehouse
Sodium silicate	2,000 – 28,000 kg	Reagent Storage Warehouse
Xanthate Z-6	500 – 3,000 kg	Reagent Storage Warehouse
Dynamite and emulsion explosives	20 tonnes	Magazine
Ammonium nitrate	20 tonnes	Designated Site
Detergents	230 kg	Cookhouse
Hydrochloric acid	100 – 400 kg	Reagent Storage Warehouse and Assay Lab
Hydrofluoric acid	50 – 200 kg	Reagent Storage Warehouse and Assay Lab
Nitric acid	100 – 400 kg	Reagent Storage Warehouse and Assay Lab
Sodium bicarbonate	500 – 1,000 kg	Reagent Storage Warehouse and Assay Lab
Sulphuric acid	100 – 400 kg	Reagent Storage Warehouse and Assay Lab

<b>Chemical/Product</b>	<b>Quantity Stored</b>	<b>Location</b>
Diesel fuel P-40 and P-50	180,000 litres	Site Tankage
Ethylene glycol-based antifreeze	450 litres	Site Tankage
Gasoline	22,500 litres	Site Tankage
Hydraulic oils	2,250 litres	Site Tankage
Jet B – Aviation fuel	9,000 litres	Site Tankage
Lubricating oils	2,250 litres	Site Tankage
Used oils	2,250 litres	Site Tankage

---

## **Appendix E**

## **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 if there is NO chance of ignition.
- Small fires can be extinguished with dry chemical or CO<sub>2</sub>.
- 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	<p>Block entry into waterways.</p> <p>Do not flush into ditches or drainage systems.</p> <p>Contain spill by diking with earth, sand or other barrier.</p> <p>If liquid remove minor spills with sorbent, large spills with pumps or vacuum equipment.</p> <p>Prills/granules can be shoveled or removed mechanically.</p> <p>On tundra, spread and leave as fertilizer, if feasible to do so.</p>
On Snow & Ice	<p>Block entry into waterways; dike using snow or other barrier.</p> <p>Remove ammonium nitrate and contaminated snow with shovels or other mechanical means.</p>
On Muskeg	<p>Do not deploy personnel and equipment on marsh or vegetation.</p> <p>Remove ammonium nitrate with shovels or other mechanical means if feasible to do so.</p> <p>Burning is not a feasible response option.</p> <p>Minimize damage caused by equipment and excavation.</p> <p>Low pressure water flushing can be tried, if feasible.</p> <p>Minor spill amounts can be left in place to serve as a fertilizer.</p>
On Water	<p>Ammonium nitrate is completely soluble in water.</p> <p>Isolate/confine spill by damming or diversion if feasible.</p> <p>Water flushing can be tried to disperse spill.</p>
Storage & Transfer	<p>Store closed, labeled containers in cool ventilated areas away from incompatible materials, e.g., oxidizable materials.</p>
Disposal	<p>Segregate waste types.</p> <p>Place contaminated materials into marked containers.</p> <p>Consult Environmental Manager on any post-spill requirements.</p>

## 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 by diking with earth, sand 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 by diking with snow 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 closed, labeled 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
<b>On Land</b>	Do not flush into ditches or drainage systems Block entry into waterways and contain with earth or other barrier(s) Remove small spills with sorbent pads On tundra use peat moss and leave in place to degrade, if practical
<b>On Snow &amp; Ice</b>	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 Tiger Torches if unrecoverable by other methods, feasible and safe to do so
<b>On Muskeg</b>	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
<b>On Water</b>	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
<b>Rivers &amp; Streams</b>	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
<b>Storage &amp; Transfer</b>	Store closed labeled containers outside away from flammable items Electrically ground containers and vehicles during transfer to designated disposal/treatment area
<b>Disposal</b>	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 by diking with earth 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 by diking with snow 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 closed, labeled containers in cool ventilated areas away from incompatible materials, e.g., organics, finely divided metals and oxidizable
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 by diking with earth 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 by diking with snow 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 closed labeled 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 by diking with earth or other non-combustible absorbent material. Small spills can be neutralized by carefully covering with soda ash or lime.
On Snow & Ice	Remove small spills with vermiculite or earth sorbents. Block entry into waterways by diking with snow or other barrier(s). Do not flush into ditches or drainage systems. Contain spill by dyking with snow or other barrier. 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 closed, labeled 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	<p>Block entry into waterways.</p> <p>Do not flush into ditches or drainage systems.</p> <p>Contain spill by diking with earth, sand or other barrier.</p> <p>Remove minor spills with dry earth, sand or fly ash.</p> <p>Remove large spills with pumps or vacuum equipment after neutralization.</p> <p>Neutralization with lime, sodium bicarbonate or crushed limestone.</p>
On Snow & Ice	<p>Block entry into waterways</p> <p>Do not flush into ditches or drainage systems.</p> <p>Contain spill by diking with snow or other barrier.</p> <p>Remove minor spills with dry earth, sand or fly ash.</p> <p>Remove large spills with pumps or vacuum equipment after neutralization.</p> <p>Remove contaminated snow with shovels or mechanical equipment.</p>
On Muskeg	<p>Do not deploy personnel and equipment on marsh or vegetation.</p> <p>Remove pooled nitric acid after neutralization with pumps.</p> <p>Burning is not recommended.</p> <p>Minimize damage caused by equipment and excavation.</p> <p>Low pressure water flushing can be tried, if feasible.</p>
On Water	<p>Nitric acid sinks and mixes with water producing a violent reaction.</p> <p>Isolate/confine spill by damming or diversion.</p> <p>Water flushing can be tried to disperse acid.</p> <p>Neutralization with lime or sodium bicarbonate can be tried</p>
Storage & Transfer	<p>Store closed, labeled containers in cool ventilated areas away from incompatible substances such as wood, oil, oxidizable materials</p>
Disposal	<p>Segregate waste types.</p> <p>Place contaminated materials into marked containers.</p> <p>Consult Environmental Manager on any post-spill requirements.</p>

## 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
<b>On Land</b>	Prevent contact with water and block entry into waterways. Do not flush into ditch or drainage systems. Contain spill by diking with earth or other barrier. 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.
<b>On Snow &amp; Ice</b>	Confine and contain spill to as small an area as possible. Recover using shovels and place in waterproof containers. Small spills can be removed by picking up snow.
<b>On Muskeg</b>	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.
<b>On Water</b>	Percol Flocculants are soluble in water. Isolate/confine spill by damming or diversion. Water flushing can be tried to disperse spills into water.
<b>Storage &amp; Transfer</b>	Place in waterproof container(s). Store closed labeled containers in cool, ventilated areas away from incompatible materials.
<b>Disposal</b>	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	Do not flush into ditches or drainage systems. Block entry into waterways. Prevent contact with water. Contain spill by diking with earth or other barrier. If soda ash contacts water, confine to as small an area as possible. On dry surfaces, shovel soda ash into containers. On tundra, shovel into containers, if feasible to do so.
On Snow & Ice	Block entry into water; dike using snow or other barrier. 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.
On Water	Minimize damage caused by equipment and personnel. 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 soda ash in closed labeled 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 by diking with earth, sand or other barrier. 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 by diking with snow or other barrier. 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 Disposal	& Store closed, labeled containers in cool, and ventilated areas away from incompatible materials, e.g., acids. Segregate waste types. Keep away from lime. Place contaminated materials into marked containers. Consult Environmental Manager on any post spill requirements.



---

## **Appendix F**

**Emergency Contact Information**

SITE/CONTACT		NUMBER	ALTERNATE
Tom Morrison	Mine Manager	Loc. 222	
Mike Redfearn	Mill Superintendent	Loc. 234	
Ken Dortman	Safety Officer	Loc. 225	
Murray Weddell	Maintenance Superintendent	Loc. 227	
Al Boon	Mine Superintendent	Loc. 230	
Scotty Carr	Mill Foreman	Loc. 235	
Bob Gilchrist	Electrical foreman	Loc. 227	

TITLE	NAME	LOCATION	BUSINESS PHONE	CELL	FAX	HOME PHONE
President & CEO	Udo Von Doehren	Vancouver	(604) 684-5300	(604) 880-4440	(604) 684-2992	(604) 988-8256
Mine's inspector	Hugh McKercher	Yellowknife	1-867 669-4416		1-867 873-0262	1-867 873-8009
Mine Manager	Tom Morrison	Vancouver				1-604 943-6645
Mill Supt.	Mike Redfearn	Whitehorse		1-250 304-8325		
Maint Supt	Murray Weddell	Kamloops				1-250 828-0087
Safety Officer	Ken Dortman	Kamloops	1-250 573-4121	1-250 319-5643	1-250 573-4121	1-250 573-3058

## External Contact List

ORGANIZATION	CONTACT	PHONE
<b>GNWT</b>	24-HOUR SPILL REPORT LINE	<b>1-867-920-8130</b> <b>1-867-873-6924 fax</b>
<b>Yukon</b>	24-HOUR SPILL REPORT LINE	<b>1-867-667-7244</b>
<b>Provincial Emergency Program</b>	24 – HOUR REPORTING LINE	<b>1-800-663-3456</b>
<b>DIAND</b>	Ed. Hornby                      Yellowknife	<b>1-867-669-2720</b>
<b>DIAND</b>	Dan. Quevillon              Ft. Simpson	<b>1-867-695-2736</b>
<b>MVLWB</b>	Laurie. Cordell              Yellowknife	<b>1-867-873-6610</b>
<b>Nahanni National Park</b>	Chuck. Blythe              Ft. Simpson	<b>1-867-695-2446</b>
<b>W.C.B.</b>	Steven Wong              Yellowknife	<b>1-867-873-4596</b>
<b>Ministry of Mines</b>	Hugh McKercher – Mines Inspector Yellowknife	<b>1-800-661-0792</b> <b>1-867-669-4416</b>
<b>Canutec</b>	Ottawa (spill advise)	<b>1-613-996-6666</b>
<b>FEDERAL GOVERNMENT</b>	Transportation reporting	<b>1-800-567-6865</b>

[illegible]