



REVISION PREPARED BY NORTH AMERICAN TUNGSTEN CORPORATION LTD.



**EMERGENCY PREPAREDNESS PLAN
FOR ABOVE-GROUND TAILINGS STORAGE FACILITY EMERGENCIES
CANTUNG MINE, NT**

ISSUED FOR USE
SEPTEMBER 2, 2022

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RECORD OF REVISIONS AND DISTRIBUTION LIST

Record of Revisions

REVISION NUMBER	DATE	SECTION REVISED, ADDED OR DELETED	
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1	09/31/2011	Update to Original EBA Document	
2	12/31/2011	Update to Original EBA Document	
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		Throughout	Updated contacts, include designates
		Sec. 4.2, 11.1	Revised inspection frequency
		Sec. 13.0	Removed
5.1	02/09/2022	Substantive Changes highlighted	

Distribution List

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1.0 INTRODUCTION

This document outlines the Emergency Preparedness Plan (EPP) for incidents and emergency situations that may occur within the vicinity of the Cantung Mine's Tailings Storage Facilities (TSF). The EPP is a guide to assist all personnel and external emergency planners in developing and executing a response plan should a flood event or dam breach occur. This plan includes measures to help prevent incidents and mitigate the risks to the downstream stakeholders, mine personnel and the surrounding environment. The EPP outlines the basic responsibilities and procedures to be followed should an emergency occur. This document is not a stand-alone document and is intended to be used in conjunction with Cantung's Operation Maintenance and Surveillance (OMS) manual for the TSFs as well as Cantung's General Site Emergency Response Plan (ERP).

To assist personnel and emergency responders in timely identification, evaluation and classification of potential emergencies, this plan includes information on:

- Project Location and Access Information (**Section 2**)
- Being Prepared (**Section 3**)
- What constitutes an emergency (**Section 4**);
- General information on the TSFs (**Section 5**);
- The characteristics of the potential inundation zone (**Section 5**);
- Contact information for responding agencies (**Appendix A**);
- Notification fan-out procedures (**Appendix B**);
- A map showing the extent of inundation (**Appendix F**).

2.0 PROJECT LOCATION AND ACCESS INFORMATION

The Cantung Mine is located in the Nahanni area of the Northwest Territories close to the Yukon border. The TSFs are located just south of the Flat River approximately 100 kilometers northwest of the Nahanni National Park Reserve.

Latitude/Longitude: 61.9717°N, 128.2683°W

Primary access to site from Watson Lake, Yukon is via Robert Campbell highway to the Nahanni Range road (approximately 300 kilometers). The mine site also has an air strip that can be accessed year round accommodating both airplane and helicopter however, the airstrip may be located within the potential inundation zone. Refer to maps in **Appendix E** and **F**.

3.0 BEING PREPARED

3.1 ALL EMPLOYEES

All employees, contractors and visitors at the Cantung Mine Site are inducted and trained on hazard awareness and protective measures to be taken prior to performing any work on the site. Overview of the Mine Health and Safety Act of the NWT, ERP, EPP, roles and responsibilities of supervision and worker, camp rules, personal protective equipment requirements, emergency response provisions, environmental awareness, fire extinguisher use and any specific hazard awareness detailed to the area being worked are covered in this orientation. A medical conditions form is completed by all on site personnel detailing personal contact information, health care number, medications and conditions relevant to their own health.

3.2 MILL EMPLOYEES

In addition to the general orientation provided to all employees on site, specific training, relating to Mill operations and the TSF will be provided to those employees working in these areas including the emergency response procedures outlined in the ERP.

Any sudden change from normal operating conditions may result in an unusual, dangerous, or life threatening situation. Preparedness for an emergency can ensure a systematic and planned response, safe escape, rescue and a detailed report of the incident.

1. All supervisors, workers and contractors must clearly understand their role in the EPP and ERP.
2. All workers must be familiar with the area evacuation alarms, how to initiate them and what to do upon hearing them.
3. All Management personnel must clearly understand their role in the EPP and ERP.
4. A current list of available site Emergency Response Team members shall be posted on the Emergency Response Tag Boards located in the administration office, mine rescue training room and fire hall. A list detailing mutual aid contacts including underground mine rescue personnel, RCMP, ambulance, air medical evacuation, and alternate company mine rescue support and how they can be reached shall be posted in the safety office. The Safety Superintendent is responsible for maintaining the lists. The Safety Superintendent is responsible for ensuring Emergency Response Teams are prepared and all required equipment is available for immediate use.
5. The telephone and radio must be maintained in operable condition. Phones and radios are to be tested daily **when in use** and any deficiencies reported immediately.

3.3 OUTSIDE AGENCIES

A copy of the EPP is provided to all outside agencies and stakeholders directly involved should a dam emergency or breach occur. A distribution list is provided at the beginning of

the plan. Each agency or stakeholder that is involved in the EPP is asked to review the plan to become familiar with their role and to avoid any misinterpretation.

4.0 EMERGENCY IDENTIFICATION

An emergency is the unforeseen combination of circumstances, or resulting state that calls for immediate action from management and/or trained first aid, fire and rescue personnel. Emergencies in the TSF can be initiated in one of two ways; a natural emergency is beyond the control of the mine operational crew (i.e., an earthquake or extreme flood event) while an operational emergency is an incident that is related to the infrastructure or personnel operating the mine (i.e., tailings line burst or pump breakdown). Irrespective of how the emergency is initiated, each incident will require some measure of action to be taken to control and manage the situation. Depending on the severity of the incident, this will involve communication to management groups and, if required, formal notice will be sent to the various environmental and regulatory authorities at a territorial or federal level. A list of possible natural and operational emergencies that may occur in the TSF has been prepared and is presented below.

Natural emergencies could involve, but are not limited, to the following:

- Earthquake;
- Extreme precipitation event;
- Rapid freshet (rapid thawing of winter snow pack);
- Extreme flood event (high surface water run-off and high river levels in the Flat River);
- Tornado;
- Landslide;
- Hail storm;
- Avalanche;
- Rock falls; and
- Site and forest fires.

Operational emergencies could involve, but are not limited, to the following:

- Slope or foundation failure;
- Overtopping of tailings dam or water retention structure;
- Seepage or piping (visual observation of water leaking through dam);
- Visual observation of cracks in dam structure;
- Explosion; and

- Loss of motor vehicle control.

4.1 DAM FAILURE

A **Dam Failure** is defined as an uncontrolled release of the contents of the reservoir which can be identified by the formation of a breach in the dam or its foundation. As it is impossible to foresee or predict the nature of such failure, once a significant breach is observed regular updates will be issued to agencies and stakeholders until the threat has been resolved.

4.2 TSF SURVEILLANCE

NATCL employs a variety of surveillance methodologies in order to assess each structure's integrity and to forecast any potential emergencies. Visual inspections are conducted monthly year-round, weekly during freshet and include but are not limited to;

- Seepage observations
- Significant settling/slumping observations
- Erosion observations
- Dam crest observations
- Tailings dispersion observations
- Inflow/outflow recording
- Water level recording

NATCL also utilizes inclinometers, vibrating wire and standpipe piezometers, surface movement monuments, groundwater monitoring wells, and water level gauge technologies to gather quantitative data to measure trends within each structure. As data is gathered by qualified technicians, it is sent to consultants for review and recommendations. Regular surveying, as well as an annual geotechnical inspection by a certified engineer is also conducted.

5.0 TSF AND EFFECTS OF INUNDATION

The TSFs on site are owned, operated and monitored solely by NATCL personnel or designates. The following is a brief description of the TSF as well as conditions, timing, and general nature of a dam failure and the possible downstream hazards associated. A failure of each structure could present various hazard conditions. When operated under normal conditions and below the recommended freeboard, the structure's integrity should never be compromised however, heavy rain events, freshet, seismic activity, or foundation failure could have an adverse effect on the dam's integrity. An inundation map has been prepared by a qualified consultant and is in **Appendix F**. The methodology of how the inundation map is generated is also included.

5.1 TP 1 AND 2

Tailings Pond (TP) 1 and 2 are located northeast of the Mill and adjacent to the Flat River. Both facilities were used for tailings storage from 1965 to the early 1970's, are currently reclaimed and being used as a storage area for equipment and unused machinery. The surfaces of both facilities are flat and densely compacted to permit the traffic and laydown of heavy equipment. The TP 1 embankment is approximately 50 feet high from the lowest elevation from the downstream toe. The embankment slope is approximately 1.2H:1V. The TP 2 embankment is approximately 43 feet high with a downstream slope of approximately 1.6H:1V slope. The reclaimed surface of TP 1 grades towards the east which allows surface drainage to flow into TP 2. Any surface flow on TP 2 is collected along the northeast to southwest trending trench and diverted into a 12-inch culvert on the east site of the facility that feeds a lagoon.

Being a remote mine site, there are no facilities or downstream stakeholders located within the inundation zone of TP 1 or 2. The Flat River is located immediately adjacent to the east of both TP 1 and 2. Failure of either TP would be highly unlikely as both are capped, heavily compacted and contain very little water. The amount of water/tailings released would depend on the extent of dam failure. These dams have been assigned a "Significant Consequence" Dam Failure Consequence Classification (DCC) in reference to Table 2: CDA (2007) Dam Classification in Terms of Consequences of Failure. Refer to **Appendix I** for details.

- Loss of Life – A loss of life would be highly unlikely as there are no settlements or facilities within the inundation zone.
- Economic and Social Loss – Economic losses would be limited to the company and its shareholders as there would be significant costs associated with clean-up and restoration. As this is a remote mine site no social losses are expected outside of the mine site.
- Environmental and Cultural Loss – Significant loss or deterioration of fish/wildlife habitat within the inundation zone. The area adjacent to TP 1 & 2 has not been deemed culturally significant so there are no cultural losses anticipated.

5.2 TP 3

TP 3 is adjacent to TP 4 and northeast of the airstrip. TP 3 was used for tailings storage after TP 1 and 2 reached full capacity in 1971 and operated until 2007. The TP 3 embankment is constructed to a crest elevation of 3,764 feet and is approximately 135 feet high from the lowest elevation from the downstream toe. The embankment slope is approximately 1.6H:1V and the surface area of the impoundment is approximately 840,000 square feet. The impoundment is currently filled with tailings and the surface was dense enough to permit the traffic of heavy equipment near the drill holes as observed during the 2010 geotechnical drilling investigations. The water table in TP 3 is approximately 75 feet below the tailings surface as observed during the 2010 site investigation program. A decant structure constructed from corrugated steel is located at the north-west side of TP 3

adjacent to TP 4. A sloped tailings beach is built around this decant structure that grades Southeast to Northwest. Water from precipitation (rain and snow) from TP 3 drained via the decant tower and line into TP 4 prior to the decant structure being sealed at both ends. TP 3 is uncapped however, it is quite stable.

Being a remote mine site, there are no facilities or downstream stakeholders located within the inundation zone. The Flat River is located approximately 300 feet north of TP 3. Failure of TP 3 would be considered a very unlikely as it is heavily compacted and contains very little water. The amount of water/tailings released would depend on the extent of dam failure and the operating levels at the time. As the access road to the airstrip runs parallel with and within the projected inundation zone of TP 3 this may leave personal with limited access until clean-up and restoration takes place. There is one alternate access route along the top of the southwest wall of TP 5, however; the width of the road may limit the type of equipment able to travel this route. This dam, TP3, has been assigned a “Significant Consequence” Dam Failure Consequence Classification (DCC) in reference to Table 2: CDA (2007) Dam Classification in Terms of Consequences of Failure. Refer to **Appendix I** for details.

- Loss of Life – A loss of life would be highly unlikely as there are no settlements or facilities within the inundation zone.
- Economic and Social Loss – Economic losses would be limited to the company and its shareholders as there would be significant costs associated with clean-up and restoration. As this is a remote mine site no social losses are expected outside of the mine site.
- Environmental and Cultural Loss – Significant loss or deterioration of fish/wildlife habitat within the inundation zone. The area adjacent to TP 3 has not been deemed culturally significant so there are no cultural losses anticipated.

5.3 TP 4

TP 4 is located southwest of the town site and adjacent to TP 3. TP 4 is currently the only active facility for tailings disposal at Cantung Mine. The tailings slurry and process water from the Mill are discharged into TP 4 with the supernatant water being pumped into TP 5 for exfiltration. The TP 4 embankment elevation is currently at 3757 feet, which is the permitted stage 4 elevation. The TP 4 embankment is approximately 102 feet high from the lowest elevation from the downstream toe. The embankment slope is approximately 2H:1V and the surface area of the impoundment is approximately 375,000 square feet. Tailings are discharged from the crest of the embankment and sloped tailings beaches are developed around the facility. The supernatant pond is located at the southwest end of TP 4. Diversion ditches upslope of TP 4 divert runoff away from the tailings facility. An interim Stage 3 embankment raise was completed in 2010, which raised the crest elevation from 3,730 feet to 3,742.5 feet. Stage 4 raise was completed in 2011 with a crest elevation of 3,757 ft. Stage 5 raise was designed but has not been constructed to date and at this moment, there are no more raises planned on TP4.

A geotechnical investigation program completed in 2011 indicated there are potentially liquefiable soils under the TP 4 embankment. Stability modeling completed for the TP 4 embankment concluded that remedial action is required to improve the post liquefaction stability of the embankment. One of the options considered for remediation included decommissioning and dismantling the TP 4 facility. This option includes re-milling the tailings to recover residual metals. The option to reprocess the tailings in TP 4 makes the most sense, both from a dam safety aspect as well as economically, and is the remediation option adopted for the Tailings Management Plan.

Being a remote mine site, there are no facilities or downstream stakeholders located within the inundation zone. The Flat River is located approximately 250 feet north of TP 4. The amount of water/tailings released would depend on the extent of dam failure. Failure of TP 4 could carry a higher risk as there is at present, pooled water and un-compacted materials contained within the pond which could be mobilized. The road running along the perimeter of TP 4 could be washed out which poses a risk should it be in use at the time of failure. Any activities atop of TP 4 would risk of being caught in the washout. This dam has been assigned a “Significant Consequence” Dam Failure Consequence Classification (DCC) in reference to Table 2: CDA (2007) Dam Classification in Terms of Consequences of Failure. Refer to **Appendix I** for details.

- Loss of Life – A loss of life would be highly unlikely as there are no settlements or facilities within the inundation zone.
- Economic and Social Loss – Economic losses would be limited to the company and its shareholders as there would be significant costs associated with clean-up and restoration. As this is a remote mine site no social losses are expected outside of the mine site.
- Environmental and Cultural Loss – Should TP 4 fail and an uncontrolled release of tailings to the Flat River were to occur, there could be substantial tailings deposition. Such deposition could have significant adverse effects on the biota (vegetation, fish habitat) within the inundation zone contributing to an environmental loss. The area adjacent to TP 4 has not been deemed culturally significant so there are no cultural losses anticipated.

5.4 TP 5

TP 5 is located between TP 3 and the southwest valley slope. TP 5 is currently used as an exfiltration pond. Supernatant water from TP 4 is pumped to TP 5 for exfiltration into the underlying soils. Surface runoff from TP 3 is also routed to TP 5 via a culvert installed in 2011. TP 5 is currently constructed to a crest elevation of approximately 3750 feet but is permitted to a crest elevation of 3,760 feet. The embankment height is approximately 43 feet high from the lowest elevation from the downstream toe and the current pond elevation is approximately 3,760 feet. The storage capacity is sized to store the inflow design flood event from the catchment area of TP 3 and 5, above the operating level of the

exfiltration pond. The embankment slope is approximately 2H:1V and the surface area of the impoundment is approximately 323,000 square feet at elevation 3,760 feet. A diversion ditch is located at the southwest end of TP 5 which diverts clean runoff from the upslope catchment area. The exfiltration rate of TP 5 is, as expected, slowly reducing. The base of the TP 5 impoundment was scraped in 2010 during the short-term hiatus in mine operation, with the dredged material stored on the tailings surface in TP 3.

Being a remote mine site, there are no facilities or downstream stakeholders located within the inundation zone. The Flat River is located approximately 1500 feet north of TP 5 however, there is an unnamed creek that runs along the south and east perimeter. The amount of water/tailings released would depend on the extent of dam failure and the operating level at the time. Failure of TP 5 will only be to the south towards the airstrip unless TP 3 also fails. Failure of TP 5 would carry a higher risk as there is a considerable amount of water and un-compacted materials contained within which could be mobilized. The road running along the perimeter of TP 5 could be washed out which poses a risk should it be in use at the time of failure. Any activities atop of TP 5 would risk of being caught in the washout. This dam has been assigned a “Significant Consequence” Dam Failure Consequence Classification (DCC) in reference to Table 2: CDA (2007) Dam Classification in Terms of Consequences of Failure. Refer to **Appendix I** for details.

- Loss of Life – A loss of life would be highly unlikely as there are no settlements or facilities within the inundation zone.
- Economic and Social Loss – Economic losses would be limited to the company and its shareholders as there would be significant costs associated with clean-up and restoration. As this is a remote mine site no social losses are expected outside of the mine site.
- Environmental and Cultural Loss – Should TP 5 fail and an uncontrolled release of tailings to the Flat River or the unnamed creek were to occur, there could be substantial deposition. Such deposition could have significant adverse effects on the biota (vegetation, fish habitat) within the inundation zone contributing to an environmental loss. The area surrounding TP 5 has not been deemed culturally significant so there are no cultural losses anticipated.

6.0 POTENTIAL FLOOD EMERGENCY

6.1 DEFINITIONS

A Potential Flood Emergency is any condition that could cause a significant and/or sudden increase in water levels downstream of the dam. A Potential Flood Emergency is a condition that has been identified but not yet confirmed as to severity.

- For this plan, “condition” is defined as an impending flood event or structural/operational situation that threatens, or may threaten, the dam’s integrity.

- For this plan, “significant increase in water level” downstream of the dams is defined as those flows likely to exceed bank full at critical locations downstream of the TSF. This would include the Flat River and any of its tributaries within the inundation zone.
- For this plan, “sudden increase” is defined as an operator directed increase due to dam emergency or dam breach.

6.2 SITE PERSONNEL ACTIONS

If a Potential Flood Emergency progresses to the Imminent Flood Emergency the protocols outlined in the ERP shall be employed. Refer to the Check-Sheets for Potential Flood Emergencies in **Appendix J**.

6.3 EXTERNAL AUTHORITIES

External Authorities shall continue to be notified as the situation develops. It may be requested that they send in a company representative to the EOC to act as a liaison. If applicable, they may need to activate their own internal EPP for the situation.

7.0 IMMINENT FLOOD EMERGENCY

7.1 DEFINITIONS

An Imminent Flood Emergency is defined as any condition that will, or likely will, produce significant and/or sudden increases in flow downstream of the dam. An Imminent Flood Emergency is a condition that has been confirmed as serious; however, timelines might be uncertain.

7.2 SITE PERSONNEL ACTIONS

Should an Imminent Flood Emergency be suspected the protocols outlined in the ERP shall be employed. Refer to the Check-Sheets for Imminent Flood Emergencies in **Appendix J**.

7.3 EXTERNAL AUTHORITIES

External Authorities will be notified as soon as reasonably practical. It may be requested that they send in a company representative to the EOC to act as a liaison. If applicable, they may need to activate their own internal EPP for the situation.

8.0 ACTIVATION OF ERP AND INITIAL RESPONSE

8.1 ALL EMPLOYEES

All employees are trained and responsible to recognize and assess emergency situations in the areas where they work. Sudden change from normal operation may and could result in

an unusual and dangerous situation. Employees that observe a possible emergency should immediately remove themselves from any immediate hazards before initiating the appropriate emergency response action. Where possible, the employee should immediately notify their area supervisor, call the local emergency numbers available to them including the Reporting Station after which an Emergency Operations Centre (EOC) may be established. Operations staff shall also identify the level of emergency based on the following;

- Hazardous condition or incident – The hazard or incident does not pose an immediate danger but could develop into one.
- Potential dam emergency – Onsite personnel may need to take steps to mitigate damage and notify and employees downstream of TSFs.
- Imminent or actual dam emergency – Evacuation of the downstream personnel is appropriate.

Once the level of emergency has been identified it will then be decided by the Mine Manager and Safety Superintendent as to what course of action is appropriate and whether it is necessary to activate the ERP.

8.2 OBSERVER

A person discovering any situation requiring emergency action will initiate the alarm by:

- calling out in a loud voice to warn those in the immediate vicinity;
- informing their immediate supervisor of the situation at hand
- activating the area evacuation alarm; and/or
- activating the fire alarm.

In those areas where alarm systems are not present (e.g., within the TSF), the radio or telephone must be used to initiate the alarm. Using the radio or other systems as appropriate to ensure that all personnel who could be affected by the emergency are aware of a problem and allow for proper evacuation. The observer will then ensure that the Reporting Station and/or the Area Supervisor are notified as soon as it is safe to do so. If safe to do so, an attempt to control the situation may be conducted but notification and having emergency response teams summoned is paramount. Refer to the Observer Check-Sheets for Hazardous Condition, Potential and Imminent Flood Emergencies in **Appendix J**.

8.3 EMERGENCY COORDINATORS

A Unified Command will be established between the Mine Manager and Safety Superintendent. The Mine Manager shall act as the agent of the company and as such is responsible for the following:

- Coordinating all emergency procedures and response actions through various levels of company personnel and delegate authority where appropriate.
- Make available the resources necessary to deal effectively with the emergency including site rehabilitation.
- Be responsible for all inquiries from the public and where necessary set guidelines as to what information may be released to the public. Control of site communication systems may be required.
- Ensure that relatives of possible victims are supplied with as much information as is available, provided this information does not jeopardize the investigation.
- Contact the Chief Mine Inspector as required.
- Contact Environmental Agencies as required.
- Contact Coroner. (If required).
- Contact R.C.M.P. (If required).
- Maintain a log of occurrences.
- In conjunction with the Safety Superintendent, conduct all aspects of the investigation both at and away from the emergency scene.

Refer to the Emergency Coordinator Check-Sheets for Hazardous Condition, Potential and Imminent Flood Emergencies in **Appendix J**.

9.0 EMERGENCY OPERATIONS CENTRE

The designated EOC will be the Main Administration or Mill Shifter's Office. Both offices are equipped with all the necessary items to establish a functioning EOC including and not limited to:

- Radio, telephone, fax (Main Administration), computer communication systems.
- Copies of EPP and ERP.
- Large wall maps including inundation zones.
- Stationary; event logs, clipboards, pens, etc.
- Board room and multiple workstations.

As the central communications centre, it is the responsibility of the EOC to gather the necessary information about the emergency and relay it to the appropriate personnel and outside agencies. The designated EOC shall be equipped with a base station radio transmitter that is solely for monitoring Channel 3, Cantung's emergency channel. Once the EOC has been established notifications should begin as per the Fan-Out procedures listed in **Appendix B**.

10.0 COMMUNICATION SYSTEMS

10.1 TELEPHONE

NATCL utilizes Infosat Communications as their satellite telephone provider as well as portable backup units which are kept current and are checked daily when in use.

10.2 MOBILE RADIO SYSTEM

All vehicles on site including contractors are equipped with a VHF radio system for site wide mobile communication. Both Reporting Station areas are equipped with base stations and nearly every employee is equipped with handheld units. The onsite emergency frequency is RPTR RX 162.285 TX 167.265. Please refer to **Appendix J** for all frequency information.

11.0 TRAINING, TESTING, AND UPDATING

11.1 TRAINING

All NATCL employees who have been identified as emergency responders have been provided with the appropriate training and information pertaining to TSF emergencies. These plans are periodically reviewed ensuring familiarity with all the elements of the ERPs and EPPs. NATCL personnel have been trained in problem detection and conduct routine inspections of all TSFs which are documented and distributed site wide. NATCL ensures that all staff is familiar with ERP and EPP protocols and that the Reporting Station and EOC are functional at all times.

11.2 TESTING

As there are no downstream stakeholders within the immediate inundation zone all testing and training is coordinated internally. NATCL staff participates in periodic testing of the EPP and dam breach emergency procedures. Outcomes and revisions are documented and reviewed with the appropriate agencies.

11.3 UPDATING

Outcomes of all exercises are discussed in detail and any revisions or updates are documented, redistributed, and the recipient's acknowledgement is noted. All pertaining contact information including the distribution list is reviewed and updated once annually. The record of revisions and distribution list is located at the beginning of this document.

12.0 SPILL REPORTING

If any of the TSF structures were to fail and tailings were released into the receiving environment, the NT-NU Spill Line will be notified and the spill will be documented using a NT-NU Spill Report Form. The spill would also be documented internally. A copy of each form has been included in **Appendix I**. An online form can be found at the provided link:

http://www.enr.gov.nt.ca/_live/documents/content/NT-NU_Interactive_Spill_Form.pdf

13.0 REFERENCES

Alberta Environment. 2003. “Emergency Preparedness for Flood Emergencies At Dams Guideline”.

CDA. 2007. “CDA Dam Safety Guidelines, Canadian Dam Association”.

Knight Piesold Ltd. 2012. “Tailings Management Plan”.

SRK Consulting Inc. 2012. “Dam Safety Review”.

NATCL. 2012. “General Site Emergency Response Plan”.

APPENDIX A

APPENDIX A EMERGENCY CONTACT INFORMATION

EMERGENCY CONTACT INFORMATION			
Internal Contacts	Phone	Fax	Contact
Mine Manager	604 759 0913 ext. 222,	604 759 0918	Brian Delaney/Steve Sherwood
Environmental Coordinator	604 759 0913 ext. 275	604 759 0918	Leo Barroilhet
NATCL – Vancouver (A&M)	604.638.7445		Todd Martin
Engineer of Record (Tetra Tech)	867.668.9214		Chad Cowan
Watson Lake	Phone	Fax	Contact
Ambulance	867 536 4444		
Air Medevac EMS Dispatch	867 667 3333		
Hospital	867 536 4444	867 536 7302	
Doctor	867 536 2565	867 536 2506	
Pharmacy	867 536 2568	867 536 2506	
RCMP – EMERGENCY	867 536 5555		
RCMP	867 536 2677		
Fire Department – EMERGENCY	867 536 2222		
Fire Department	867 536 7442		
Health Center	867 536 7483		
Trans North Helicopters	867 536 2100		
Wild Fires – Watson Lake Base	867 536 2005		
Provincial Emergency Plan P.E.P.	800 663 3456		
NATCL Satellite Phone	011 8816 316 29741 011 8816 316 65799		
Whitehorse	Phone	Fax	Contact
Alcan Air	867 668 2107		
Alcan Air –Weather Report	867 668 2107		
Air Medevac EMS Dispatch	867 667 3333		
Horizon Helicopters	867 633 6044		
Hospital	867 393 8700		
Poison Control Center	867 668 8497		
Chemical Emergencies	800 663 3456		
Chemical Spills N.W.T.	867 920 8130		
CANUTEC – EMERGENCY	613 996 6666		
CANUTEC – non-emergency 24h	613 992 4624		
Yellowknife	Phone	Fax	Contact
CIRNAC Inspector	867 669-2442	867 669-2871	Tim Morton
CIRNAC CARD	867-445-5847		Sam Kennedy
NWT Mines Inspector - Yellowknife	867 920-3852	866 277 3677	Viktor Mubili
WSCC Yellowknife	867 920 3888	867 873 4596	General Inquiries
General	Phone	Fax	Contact
N.T. Air	800 963 9611		
Simpson Air	867 695 2505		
Simpson Air - EMERGENCY	867 695 6595		
Environmental	Phone	Fax	Contact
MVLWB	(867) 444-8463	867 873 6610	Sean Joseph

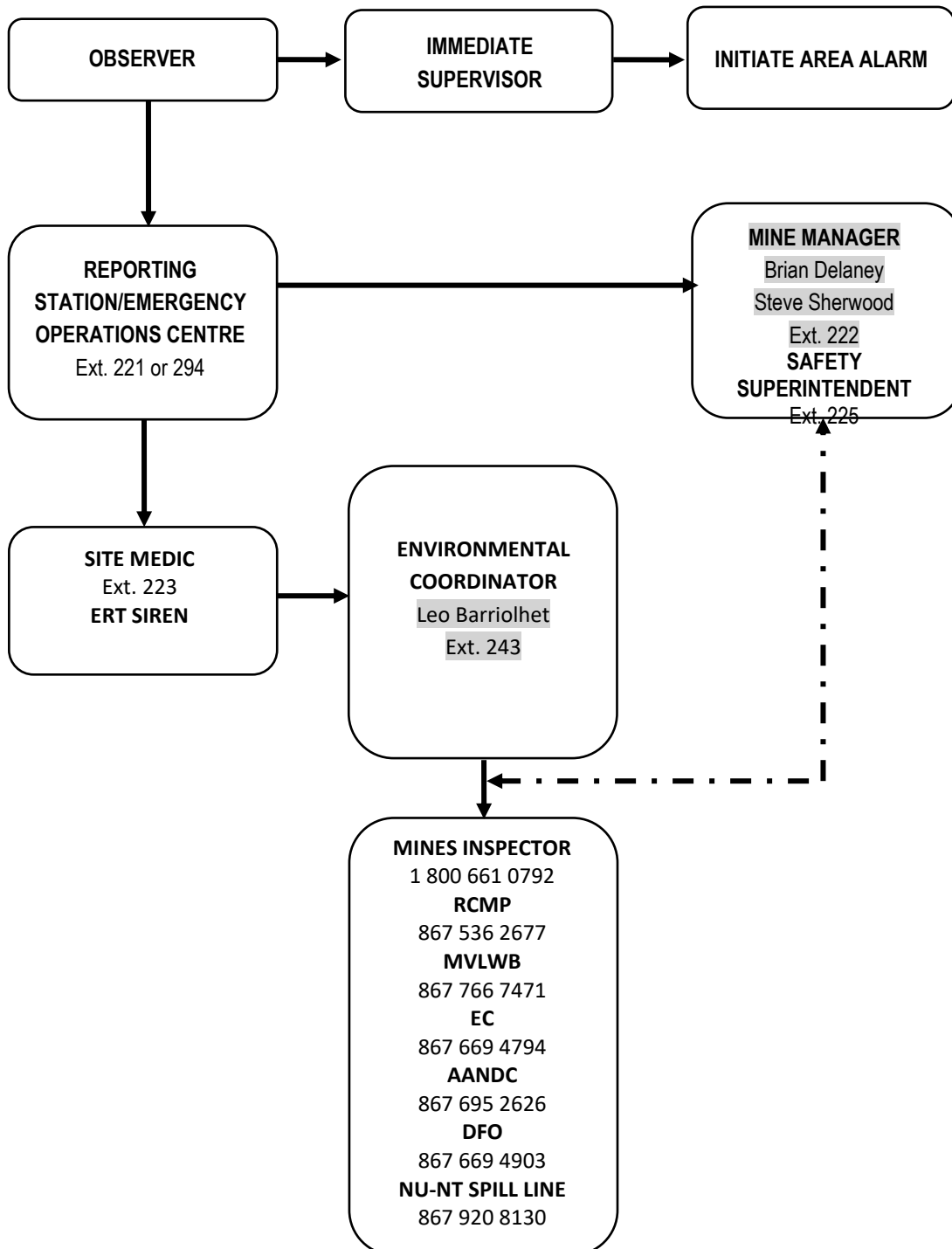
ISSUED FOR USE

NU-NWT Spill Report Line	867 920 8130	867 873 6924	
Environment Canada – Environmental Enforcement Division	867 669 4794	867 669 6831	
Fort Simpson Wildlife Emergency Line	867 695 7433		
DFO Habitat Coordinator	867 669 4911		
DFO Conservation and Compliance	867 669 4903		
Nahanni National Park	867 695 2446		

APPENDIX B

APPENDIX B NATCL TSF FAN-OUT PROCEDURES

NATCL TSF FAN-OUT PROCEDURES



APPENDIX C

APPENDIX C REPORTING STATION EMERGENCY CALL SHEET

REPORTING STATION EMERGENCY CALL SHEET

Who is reporting the Emergency?

What happened?

Where are you and where is the help required?

What help do you need (first aid, rescue)?

Who else has been notified?

Check off when complete:

- ☐ Instruct caller to remain by phone/radio for further instructions if appropriate
- ☐ Initiate call to Site Medic
- ☐ Initiate call to Safety Superintendent
- ☐ Activate ERT siren or initiate ERT response by radio
- ☐ Notify Mine Manager and area Superintendent of situation

Date:

Time:

Reporting Station	Phone #	Local	Radio Channel
Main Office	604.759.0913	221 or 225	Tungsten Repeater Channel
Mill Shifter	604.759.0913	294	Tungsten Repeater Channel

ISSUED FOR USE

ERT siren can be activated in main administration, mill shifters' office, and at the fire hall. Cancellation is achieved in the fire hall only.

If reporting station notification is not possible, direct reporting to Site Medic, Safety Superintendent, or ERT member may be initiated by radio or personal contact.

Safety Superintendent – Admin Building, Tungsten Repeater Channel 3

Site Medic – Admin Building, Channel 3

APPENDIX D

APPENDIX D EMERGENCY COMMUNICATIONS LOG

EMERGENCY COMMUNICATIONS LOG

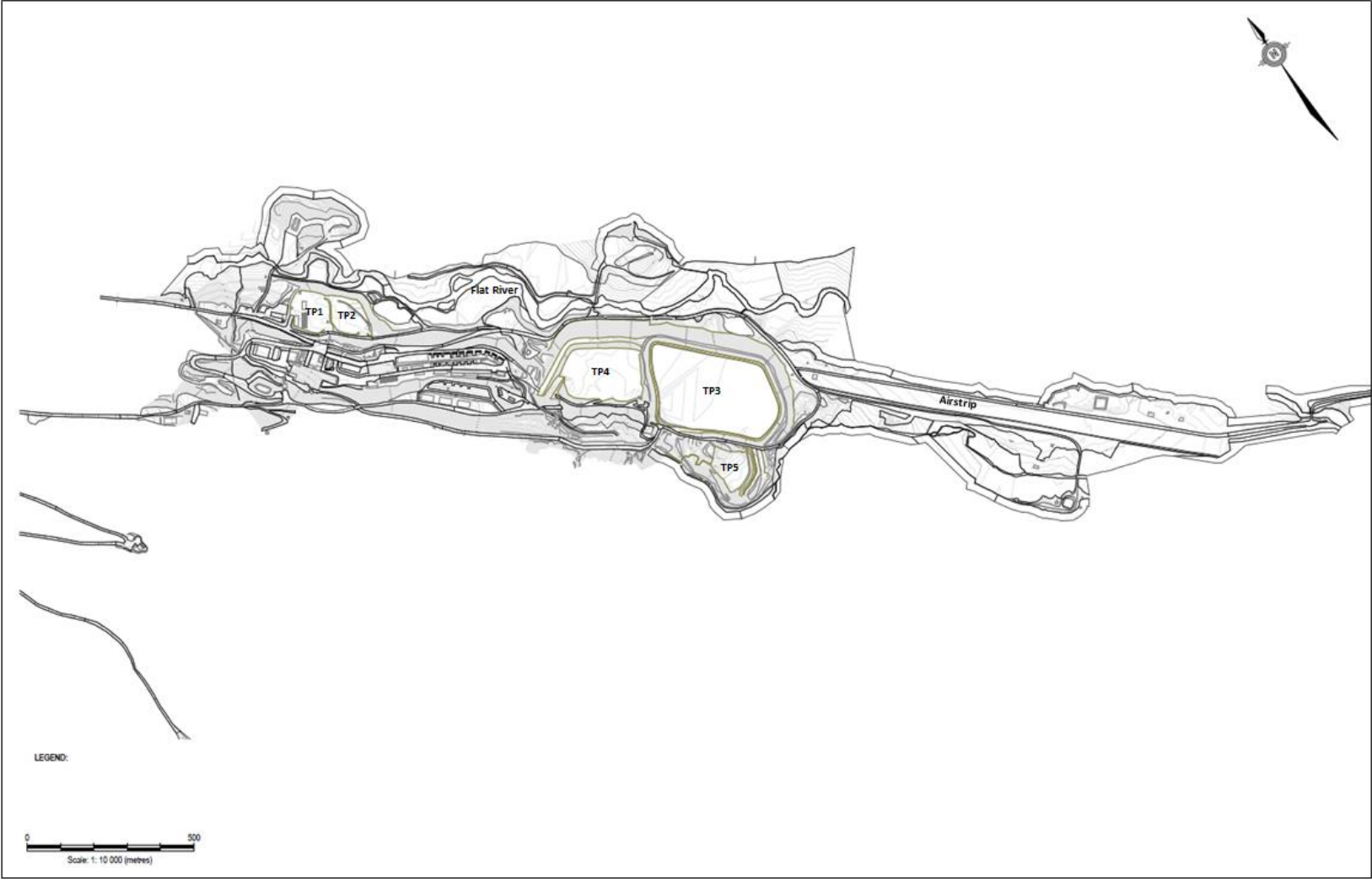
Date	Name

[illegible]

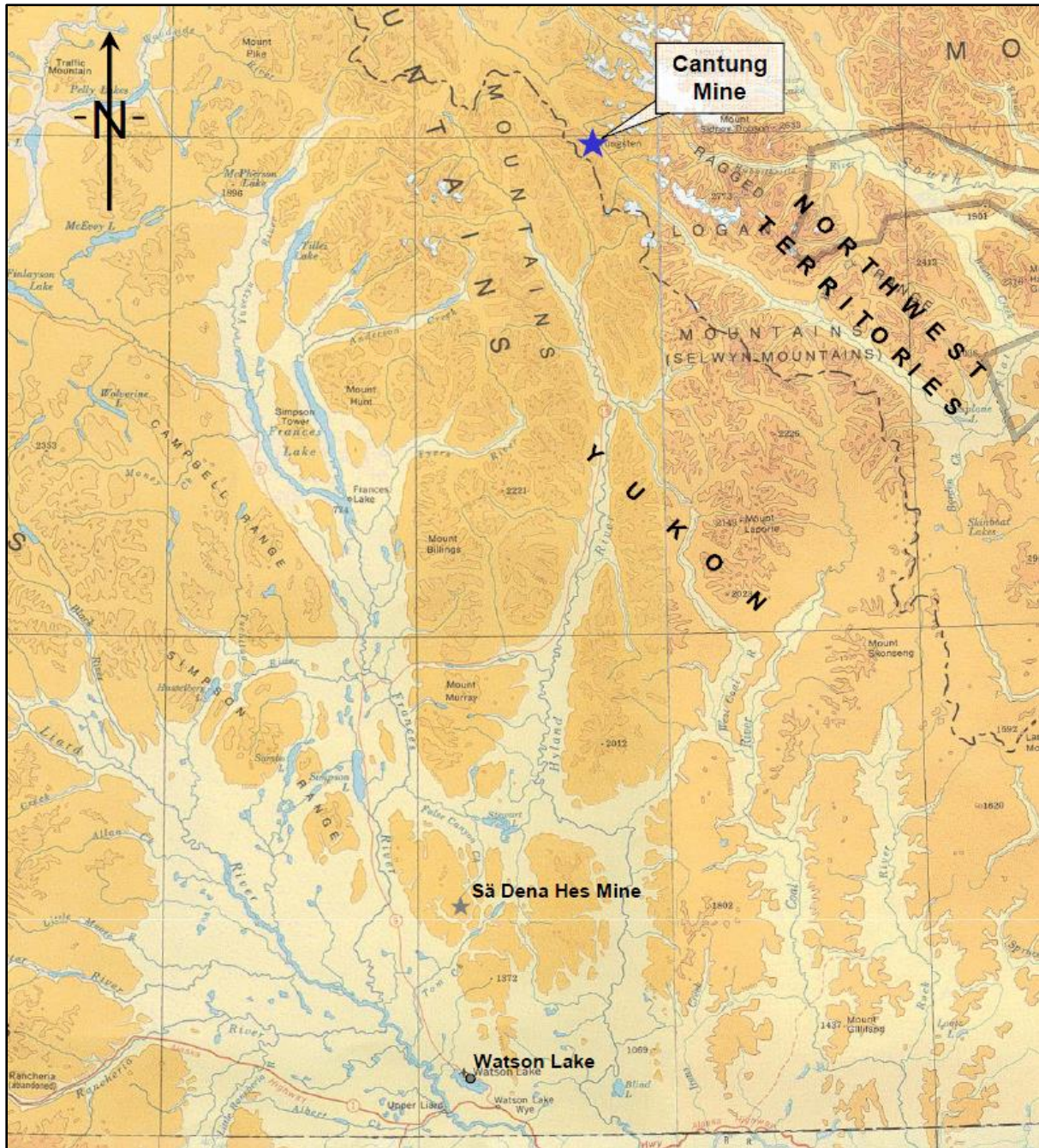
APPENDIX E

APPENDIX F MINE SITE MAPS

MAP OF MINE SITE



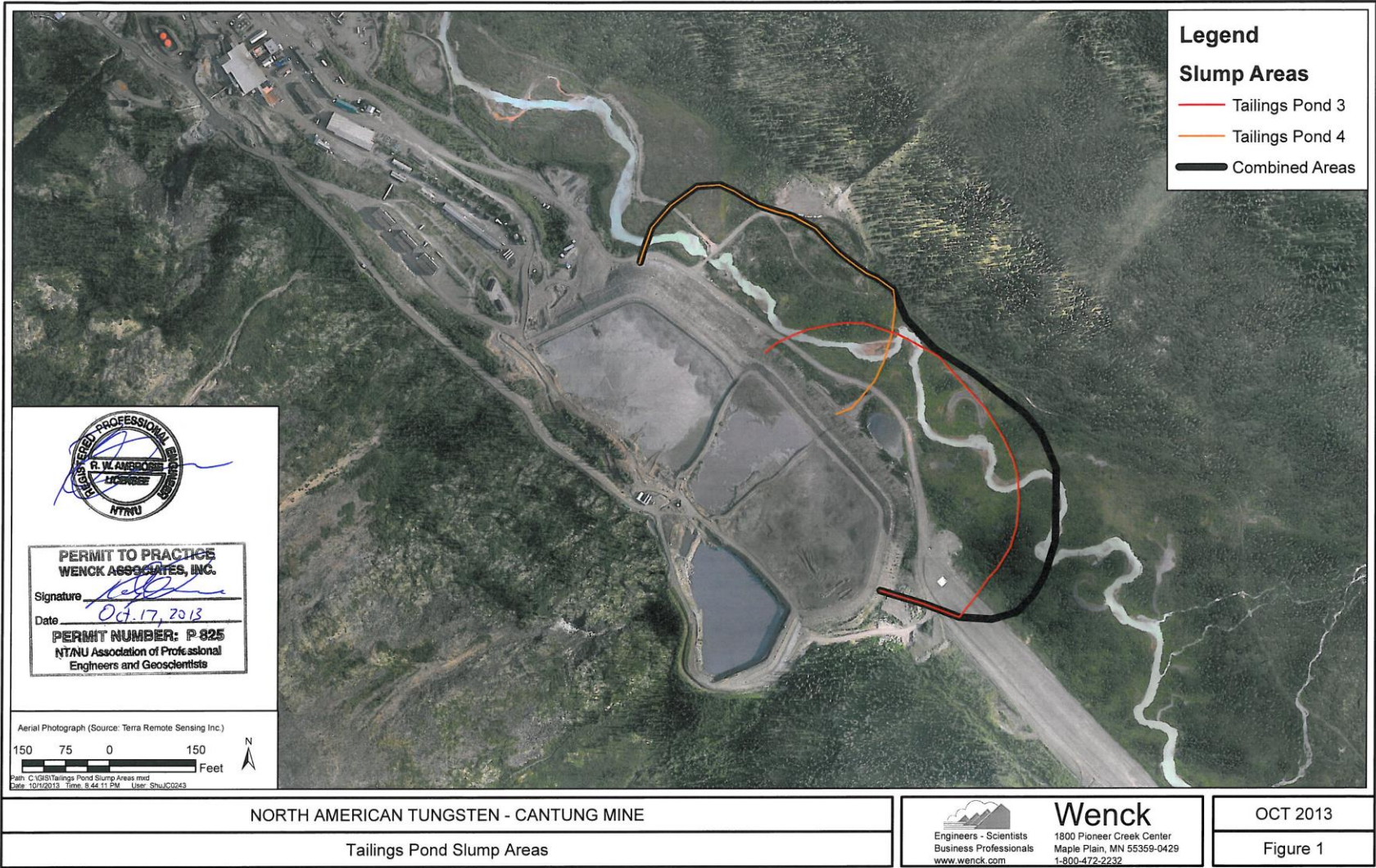
MAP OF MINE SITE LOCATION



APPENDIX F

APPENDIX F INUNDATION MAP

The Inundation Map has developed by a consultant and is included with the technical memo.





Wenck Associates, Inc.
3303 Flechtner Drive,
Suite 100
Fargo, ND 58103

(701) 297-9600
Fax (701) 297-9601
E-mail: wenckmp@wenck.com

TECHNICAL MEMORANDUM

TO: Deborah Flemming
Environmental Superintendent
NATCL Cantung Mine

FROM: Rodney Ambrosie, P. Eng.
Wenck Associates, Inc.

DATE: October 18, 2013

SUBJECT: Inundation Map
NATCL Cantung Mine – TP3/PT4
Wenck File #2075-04

As requested by NATCL, Wenck Associates, Inc. (Wenck) has completed the analysis and mapping for the inundation limits of material from TP4 or TP3 should a failure occur. This analysis was completed to comply with requirements of the MVLWB and the Canadian Dam Safety regulations.

The inundation map was prepared based on a comprehensive review of the Stability Assessments of TP4 completed by both Knight Piesold (January 30, 2012) and EBA (October 5, 2011.) These reports indicated that the TP4 may undergo slight deformation upon earthquake loading in a 1/1000 year event. Therefore, indication mapping was completed to assess the impact of dam movement and instability.

As part of our analysis to evaluate the amount of material that would be mobilized in a failure, Wenck evaluated the stability analysis of EBA and KP. (See attached Figure from EBA). The cross-section shows the potential future surface. Wenck has calculated the amount of material that could potentially mobilize with these movements and determined the quantity to be as follows:

TP4	800,000 cubic yards
TP3	1,160,000 cubic yards

Combined TP4 and TP3 1,960,000 cubic yards

The basis for the quantity determination was the dam itself would move as well as portions of materials (tailings) behind the dam as well. Since TP4 and TP3 are relatively full and contain mainly porewater and not free-standing water, the limit of inundation would be based on the liquidfaction or slump of tailing's material behind the dam as well as dam material itself and not water. This would limit the overall extent of the inundation.

Technical Memo
Inundation Map
NATCL Cantung Mine
October 18, 2013

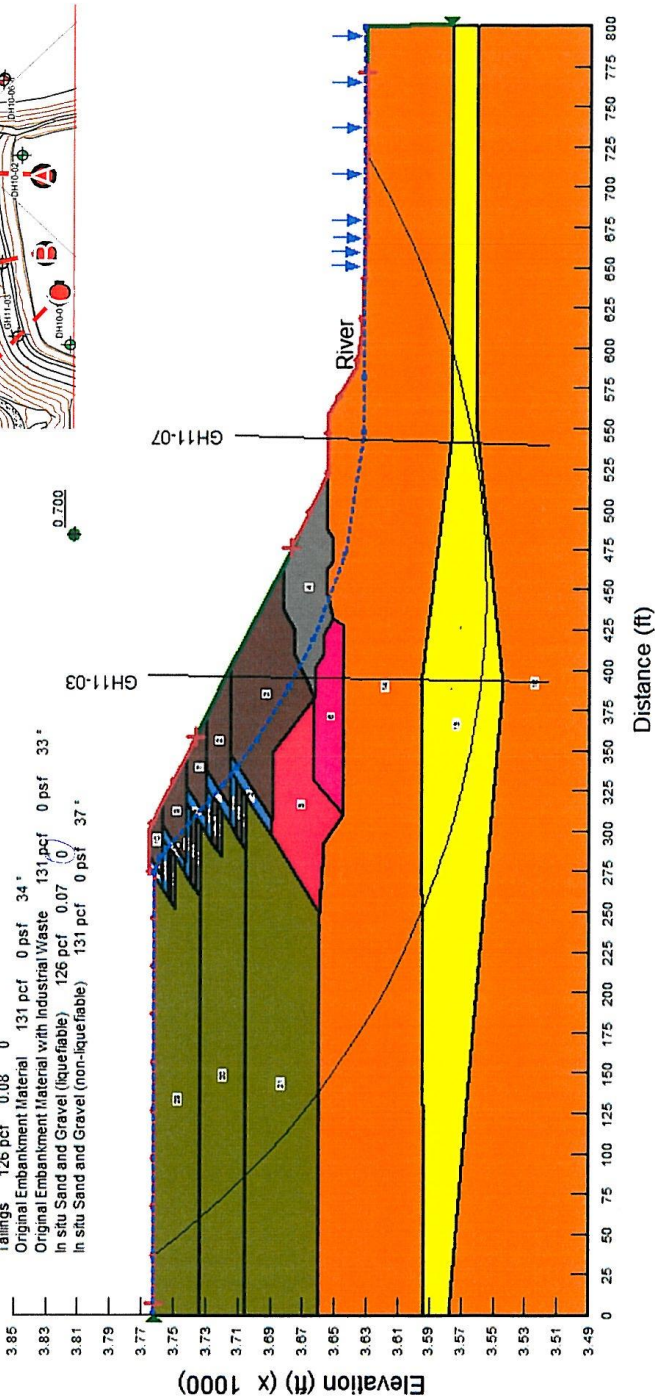
A map based on actual contours from a LiDAR survey (2013) was then developed to determine the limits of the material. The inundation boundaries developed for the three above referenced scenarios are shown on the attached Figure 1.

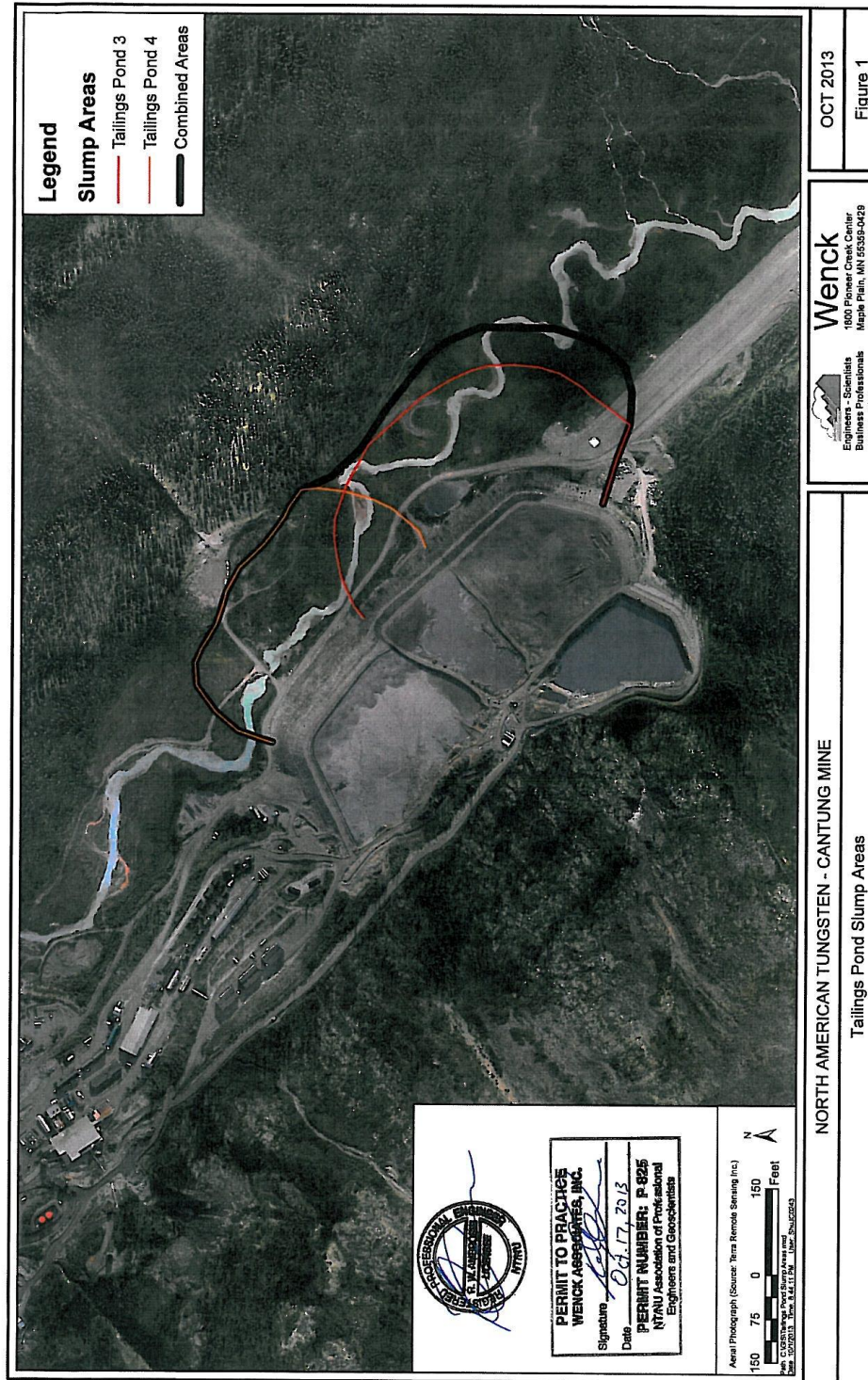
Post-Seismic Analysis



Section C

75 mm Filter Material 135 pcf 0 psf 34°
300 mm Material 138 pcf 0 psf 36°
Waste Rock 140 pcf 0 psf 40°
Tailings 126 pcf 0.08 0
Original Embankment Material 131 pcf 0 psf 34°
Original Embankment Material with Industrial Waste 131 pcf 0 psf 33°
In situ Sand and Gravel (liquefiable) 126 pcf 0.07 0
In situ Sand and Gravel (non-liquefiable) 131 pcf 0 psf 37°





APPENDIX G

APPENDIX G NT-NU & INTERNAL SPILL REPORT FORMS



Canada

NT-NU SPILL REPORT

OIL, GASOLINE, CHEMICALS AND OTHER HAZARDOUS MATERIALS

NT-NU 24-HOUR SPILL REPORT LINE

TEL: (867) 920-8130

FAX: (867) 873-6924

EMAIL: spills@gov.nt.ca

REPORT LINE USE ONLY

A	REPORT DATE: MONTH – DAY – YEAR		REPORT TIME		<input type="checkbox"/> ORIGINAL SPILL REPORT, OR <input type="checkbox"/> UPDATE # _____ TO THE ORIGINAL SPILL REPORT	REPORT NUMBER _____
	OCCURRENCE DATE: MONTH – DAY – YEAR		OCCURRENCE TIME			
B	LAND USE PERMIT NUMBER (IF APPLICABLE)		WATER LICENCE NUMBER (IF APPLICABLE)			
C	GEOGRAPHIC PLACE NAME OR DISTANCE AND DIRECTION FROM NAMED LOCATION		REGION <input type="checkbox"/> NWT <input type="checkbox"/> NUNAVUT <input type="checkbox"/> ADJACENT JURISDICTION OR OCEAN			
D	LATITUDE DEGREES MINUTES SECONDS		LONGITUDE DEGREES MINUTES SECONDS			
E	RESPONSIBLE PARTY OR VESSEL NAME		RESPONSIBLE PARTY ADDRESS OR OFFICE LOCATION			
F	ANY CONTRACTOR INVOLVED		CONTRACTOR ADDRESS OR OFFICE LOCATION			
G	PRODUCT SPILLED		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES		U.N. NUMBER	
	SECOND PRODUCT SPILLED (IF APPLICABLE)		QUANTITY IN LITRES, KILOGRAMS OR CUBIC METRES		U.N. NUMBER	
H	SPILL SOURCE		SPILL CAUSE		AREA OF CONTAMINATION IN SQUARE METRES	
I	FACTORS AFFECTING SPILL OR RECOVERY		DESCRIBE ANY ASSISTANCE REQUIRED		HAZARDS TO PERSONS, PROPERTY OR ENVIRONMENT	
J	ADDITIONAL INFORMATION, COMMENTS, ACTIONS PROPOSED OR TAKEN TO CONTAIN, RECOVER OR DISPOSE OF SPILLED PRODUCT AND CONTAMINATED MATERIALS					
K						
L	REPORTED TO SPILL LINE BY	POSITION	EMPLOYER	LOCATION CALLING FROM	TELEPHONE	
	ANY ALTERNATE CONTACT	POSITION	EMPLOYER	ALTERNATE CONTACT LOCATION	ALTERNATE TELEPHONE	
REPORT LINE USE ONLY						
N	RECEIVED AT SPILL LINE BY	POSITION STATION OPERATOR	EMPLOYER	LOCATION CALLED YELLOWKNIFE, NT	REPORT LINE NUMBER (867) 920-8130	
	LEAD AGENCY <input type="checkbox"/> EC <input type="checkbox"/> CCG <input type="checkbox"/> GNWT <input type="checkbox"/> GN <input type="checkbox"/> ILA <input type="checkbox"/> INAC <input type="checkbox"/> NEB <input type="checkbox"/> TC			SIGNIFICANCE <input type="checkbox"/> MINOR <input type="checkbox"/> MAJOR <input type="checkbox"/> UNKNOWN		FILE STATUS <input type="checkbox"/> OPEN <input type="checkbox"/> CLOSED
AGENCY		CONTACT NAME		CONTACT TIME		REMARKS
LEAD AGENCY						
FIRST SUPPORT AGENCY						
SECOND SUPPORT AGENCY						
THIRD SUPPORT AGENCY						



Cantung Mine

Internal Spill Report (Oil, Gas, Hazardous Chemicals or other Materials)

Report to Environment for Review and Follow up

Report Date and Time		Date and Time of spill (if known)		Internal Spill Number:	
Location of Spill, Coordinates (if known) and direction (if moving)					
Party Responsible for Spill					
Product(s) spilled and estimated quantities (provide metric volumes/weights if possible)					
Cause of Spill					
Is Spill terminated (Y/N)	If spill continuing, give estimated rate	Is further spillage possible (Y/N)	Extent of contaminated area (m ²)		
Factors effecting spill or recovery (weather conditions, terrain, snow cover, etc.)					
Action, if any, taken or proposed to contain, recover, clean up or dispose of product(s) and contaminated materials					
Possible hazards to person, property, or environemtn; eg: fire, drink water, fish or wildlife					
Comments or recommendations					
Reported by:		Position, Employer, Location		Telephone	
Reproted to:		Position, Employer, Location		Telephone	
Environmental Review by	Date of Review	Environmental Department Comments (Reportable Spill, Date, follow up, etc)			

APPENDIX H

APPENDIX H MOBILE RADIO SYSTEM FREQUENCIES

ISSUED FOR USE

Zone 1: LADDs (Left CH - 100)															
			Frequency (MHz)				C.Tone								Scan List
CH	Atr	Inh	RX	TX	TX Inh	W/N	SQL Tight	RX	TX	Text	TOT	RF PWR	PWR Save	Lock- out	Scan List
1- 1	AB		154.100000	<-		W				LADD 1		H	ON		1
1- 2			158.940000	<-		W				LADD 2		H	ON		1
1- 3			154.325000	<-		W				LADD 3		H	ON		1
1- 4			173.370000	<-		W				LADD 4		H	ON		1
1- 5			162.285000	167.265000		W				RPTR		H	ON		1
1- 6			158.550000	<-		W				TUNG 1		H	ON		1
1- 7			164.040000	<-		W				TUNG 2		H	ON		1
1- 8			159.330000	<-		W				TUNG 3		H	ON		1
1- 9			159.750000	<-		W				TUNG 4		H	ON		1
1-10			148.275000	173.975000		W		67.0	<-	U-GND 1		L1	ON		1
1-11			147.325000	173.750000		W		71.9	<-	U-GND 2		L1	ON		1
1-12			146.050000	173.475000		W		74.4	<-	U-GND 3		L1	ON		1
1-13			146.700000	174.000000		W		82.5	<-	U-GND 4		L1	ON		1

Emergency Frequency - RPTR

APPENDIX I

APPENDIX I DAM FAILURE CONSEQUENCE CLASSIFICATION TABLE

Table 2: CDA (2007) Dam Classification in Terms of Consequences of Failure

Dam Class	Population at risk [note 1]	Incremental losses		
		Loss of life [note 2]	Environmental and cultural values	Infrastructure and economics
Low	None	0	Minimal short-term loss No long-term loss	Low economic losses; area contains limited infrastructure or services
Significant	Temporary only	Unspecified	No significant loss or deterioration of fish or wildlife habitat Loss or marginal habitat only Restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces, and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of <i>important</i> fish or wildlife habitat. Restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very high	Permanent	100 or fewer	Significant loss or deterioration or <i>critical</i> fish or wildlife habitat Restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	Major loss of <i>critical</i> fish or wildlife habitat Restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances)

Note 1. Definitions for population at risk:

None – There is no identifiable population at risk, so there is no possibility of loss of life other than through unforeseeable misadventure.

Temporary - People are only temporarily in the dam-breach inundation zone (e.g. seasonal cottage use, passing through on transportation routes, participating in recreational activities).

Permanent - The population at risk is ordinarily located in the dam-breach inundation zone (e.g., as permanent residents); three consequence classes (high, very high, extreme) are proposed to allow for more detailed estimates of potential loss of life (to assist in decision-making if the appropriate analysis is carried out).

Note 2. Definitions for population at risk:

Unspecified - The appropriate level of safety required at a dam where people are temporarily at risk depends on the number of people, the exposure time, the nature of their activity, and other conditions. A higher class could be appropriate, depending on the requirements. However, the design flood requirement, for example might not be higher if the temporary population is not likely to be present during the flood season.

APPENDIX J

APPENDIX J OBSERVER AND EMERGENCY COORDINATOR CHECK-SHEETS

OBSERVER DUTIES		
#	ACTION	NOTES (Date/Time)
1.	Assess and determine the nature of the hazard. Record as many details as possible.	
2.	Notify direct supervisor of hazardous condition. Ensure that hazard is continuously monitored.	
3.	Maintain a log of all communications and observations until advised otherwise.	
4.	Discuss with Mill Superintendent and Mine Manager the level of emergency and determine what level of action should be taken based on the following: <ul style="list-style-type: none"> • Hazardous Condition • Potential Flood Emergency • Imminent Flood Emergency 	
Additional Notes:		

EMERGENCY COORDINATOR DUTIES		
#	ACTION	NOTES (Date/Time)
1.	Review full report with observer.	
2.	As soon as practical, go to the area of concern to observe and assess the level of emergency as one of the following: <ul style="list-style-type: none"> • Hazardous Condition • Potential Flood Emergency • Imminent Flood Emergency • 	
3.	When the level of emergency has been established select the appropriate Check-Sheet and begin completing the action items outlined within. If the present condition appears to worsen proceed to next level of emergency and activate the ERP.	
Additional Notes:		

HAZARDOUS CONDITION - OBSERVER		
#	ACTION	NOTES (Date/Time)
1.	Notify direct supervisor of hazardous condition. Ensure that hazard is continuously monitored.	
2.	Take all measures required to ensure the safety of all site personnel.	
3.	Take the appropriate mitigation measures without compromising ones safety or the safety of site personnel.	
4.	Continue to monitor site and fill out observation log with pertaining details. Notify supervisor if the hazardous conditions changes.	
Additional Notes: <div style="height: 200px; border: 1px solid black;"></div>		
<p>*NOTE: A “Hazardous Condition” poses no immediate threat to the structure but, if left unattended may put the structure and personnel at risk.</p>		

HAZARDOUS CONDITION - EMERGENCY COORDINATOR		
#	ACTION	NOTES (Date/Time)
1.	As soon as practical, go to the hazard site to observe the situation.	
2.	Take all measures required to ensure the safety of all site personnel.	
3.	Determine what resources are required to take appropriate mitigation measures without compromising ones safety or the safety of site personnel.	
4.	If Emergency Coordinator's presence is not required assign the Mill Superintendent to assume the project lead and begin mitigation actions.	
Additional Notes: <div style="height: 300px; border: 1px solid black;"></div>		
<p>*NOTE: A "Hazardous Condition" poses no immediate threat to the structure but, if left unattended may put the structure and personnel at risk.</p>		

POTENTIAL FLOOD EMERGENCY - OBSERVER		
#	ACTION	NOTES (Date/Time)
1.	Notify direct supervisor of Potential Flood Emergency. Ensure that hazard is continuously monitored.	
2.	Take all measures required to ensure the safety of all site personnel.	
3.	Take the appropriate mitigation measures as directed by the Mine Manager or Safety Superintendent.	
4.	Continue to monitor site from a safe location filling out observation log with pertaining details until advised to do otherwise.	
5.	Take no remedial action until the ERT arrives and you are instructed to do so.	
Additional Notes: <div style="height: 200px;"></div>		

POTENTIAL FLOOD EMERGENCY – EMERGENCY COORDINATOR		
#	ACTION	NOTES (Date/Time)
1.	If remedial action can delay the hazards progression assign the Mill Superintendent as project lead to coordinate the mitigation activities. Ensure that all required resources are at their disposal.	
2.	Inform internal personnel and notify external agencies that a Potential Flood Emergency status has been assigned to the situation.	
3.	Activate ERP. Establish the EOC. Assemble all responders and delegate tasks based on safety and priority.	
4.	Log all actions taken and any information pertaining to the emergency event.	
5.	As the Emergency Coordinator you must action the following duties: <ul style="list-style-type: none"> • Fan-Out procedures. • Coordinating all emergency procedures and response actions through various levels of company personnel and delegate authority where appropriate. • Make available the resources necessary to deal effectively with the emergency. • Responsible for all inquiries from the public. • Conduct all aspects of the investigation. 	
Additional Notes: <div style="height: 100px;"></div>		

IMMINENT FLOOD EMERGENCY - OBSERVER		
#	ACTION	NOTES (Date/Time)
1.	<p>Should an Imminent Flood Emergency be detected the observer should take action by doing the following:</p> <ul style="list-style-type: none"> calling out in a loud voice to warn those in the immediate vicinity; informing their immediate supervisor of the situation at hand activating the area evacuation alarm; and/or activating the fire alarm. 	
2.	Give a full briefing of the situation to Mine Manager, Safety Superintendent, and ERT as they arrive.	
3.	Continue to monitor site from a safe location filling out observation log with pertaining details until advised to do otherwise.	
Additional Notes:		

IMMINENT FLOOD EMERGENCY – EMERGENCY COORDINATOR		
#	ACTION	NOTES (Date/Time)
1.	Once an Imminent Flood Emergency condition has been confirmed activate ERP, establish the EOC, assemble all responders and required resources.	
2.	Inform internal personnel and notify external agencies that a Imminent Flood Emergency status has been assigned to the situation.	
3.	Log all actions taken and any information pertaining to the emergency event.	
4.	As the Emergency Coordinator you must action the following duties: <ul style="list-style-type: none"> • Contacting external agencies. • Coordinating all emergency procedures and response actions through various levels of company personnel and delegate authority where appropriate. • Make available the resources necessary to deal effectively with the emergency. • Responsible for all inquiries from the public. • Conduct all aspects of the investigation. 	
Additional Notes:		