

## 8.0 ACCIDENTS AND MALFUNCTIONS

The MVEIRB Terms of Reference (MVEIRB 2009) requested information on the potential effects of accidents and malfunctions that could occur in connection with the YGP. Accidents or malfunctions can be associated with any human activities related to the construction period and/or operations and reclamation periods of the YGP. Environmental consequences of potential accidents or malfunctions related to the YGP and associated activities would relate to:

- Fuel storage, transportation and handling system failures;
- Explosive materials storage, transportation and handling system failures;
- Chemical and reagent (i.e. Cyanide) storage and handling;
- Vehicle, aircraft and industrial accidents.

To minimize risks of accidents or malfunctions occurring and to minimize possible risks to the environment from such potential accidents or malfunctions, a number of preventative and mitigation measures will be employed. They include:

- Implementation of best management and industry practices as appropriate to prevent or minimize the occurrence of accidents or malfunctions.
- Compliance with Land Use Permit and Water License requirements and conditions.
- Conformance with existing applicable federal, GNWT and WSCC standards.
- Compliance of all YGP-related traffic with existing NWT traffic laws and the Winter Road Regulations and Rules of the Road (updated annually by Winter Road Joint Venture).
- Effective implementation of Tyhee NWT Corp's Hazardous Materials Spill Contingency Plan.

## 8.1 MAJOR SPILLS

The MVEIRB Terms of Reference (MVEIRB (2009) requested Tyhee NWT Corp consider *"major fuel spills at the YGP site."*

Tyhee NWT Corp's current Hazardous Materials Spill Contingency Plan (developed for current advanced exploration program, Appendix K) will be expanded to encompass the overall range of types of accidents or malfunctions that may require the initiation of an emergency, medical or environmental response. The plan will be designed to efficiently and effectively respond to any medical or environmental emergency and/or accidental spill that may be associated with the construction, operation or decommissioning of the YGP.

The scope of the Hazardous Materials Spill Contingency Plan will consider the possibility that more than one type of response may be required for any one incident. Response preparedness will be maintained for incidents involving medical, fire or other emergency response, fuel or chemical spills or other environment related incidents (e.g. wildlife collisions).

#### **YGP Construction Phase:**

- Fuel and hazardous materials for the construction phase will be transported to the YGP mine site by truck from local suppliers.
- All YGP traffic will comply with existing NWT traffic laws and the Winter Road Regulations and Rules of the Road (updated annually by Winter Road Joint Venture).
- Fuel and other hydrocarbons will be stored in accordance with the existing CCME environmental code of practice for storage of these products (CCME 2003) and Canadian petroleum products storage tank regulations (CEPA 2008).
- Explosives ingredients (e.g. Ammonium Nitrate, diesel) and hazardous substances will be transported to the mine site in accordance with federal *Transportation of Dangerous Goods* (TDG), *Workplace Hazardous Materials Information System* (WHMIS) and *Explosives Act* requirements.
- All vehicles and equipment will be refueled at least 30 m from water bodies following DIAND fuel storage guidelines.
- Any spills will be immediately reported to the 24-hour Spill Report Line (867) 920 8130 and spill containment and cleanup activities will be implemented in accordance with Tyhee NWT Corp's Hazardous Materials Spill Contingency Plan.

#### **YGP Operations Phase**

- Fuel, process reagents and hazardous chemicals for the operations phase will be transported to the mine site by truck from local suppliers.
- All YGP traffic will comply with existing NWT traffic laws and the Winter Road Regulations and Rules of the Road (updated annually by Winter Road Joint Venture).
- Fuel and other hydrocarbons will be stored in accordance with the existing CCME environmental code of practice for storage of these products (CCME 2003) and Canadian petroleum products storage tank regulations (CEPA 2008).
- All vehicles and equipment will be refueled at least 30 m from water bodies following DIAND fuel storage guidelines.
- Explosives ingredients (e.g. Ammonium Nitrate, diesel) and hazardous substances will be transported to the mine site in accordance with federal *Transportation of Dangerous Goods* (TDG), *Workplace Hazardous Materials Information System* (WHMIS) and *Explosives Act* requirements.

- YGP operations will comply with Land Use Permit and Water License requirements and conditions.
- YGP operations will conform to existing applicable federal, GNWT and Workers' Safety and Compensation Commission (WSCC) standards.
- All hazardous wastes (if any) recovered from spill incidents will be treated and/or disposed of in an approved manner.
- Any spills will be immediately reported to the 24-hour Spill Report Line **(867) 920 8130** and spill containment and cleanup activities will be implemented in accordance with Tyhee NWT Corp's Hazardous Materials Spill Contingency Plan.

With the application and implementation of the preventative and mitigation measures as outlined, it is unlikely that any significant fuel, chemical or reagent spills will occur. As a result, it is equally unlikely that any potential negative effects to the terrestrial or aquatic environments of the YGP area will arise.

## 8.2 TRANSPORTATION-RELATED MAJOR SPILLS

The MVEIRB Terms of Reference (MVEIRB (2009) requested Tyhee NWT Corp discuss "*major fuel spills along transportation routes;*" along with "*accidents involving the transportation and handling of cyanide containing compounds.*"

To minimize risks of accidents or malfunctions occurring and to minimize possible risks to the environment from such potential accidents or malfunctions, a number of preventative and mitigation measures will be employed. They include:

- Implementation of best management and industry practices as appropriate to prevent or minimize the occurrence of accidents or malfunctions;
- Compliance with Land Use Permit and Water License requirements and conditions issued for the Seasonal Overland Road Project;
- Conformance with existing applicable GNWT and WSCC standards;
- Compliance of all winter road-related traffic with the Winter Road Rules and Regulations and as applicable, NWT traffic laws;
- Fuel and other hydrocarbons will be stored in accordance to storage tank regulations under the *Canadian Environmental Protection Act* and the CCME's environmental code of practice for storage of these products (CCME 2003);
- Explosives ingredients (e.g. Ammonium Nitrate, diesel) and hazardous substances will be transported to the mine site in accordance with federal *Transportation of Dangerous Goods* (TDG), *Workplace Hazardous Materials Information System* (WHMIS) and *Explosives Act* requirements.
- All vehicles and equipment will be refueled at least 30 m from water bodies following DIAND fuel storage guidelines;

- Any uncontrolled discharge will be immediately managed to stop discharge and begin the mitigation process. Spills will be reported to the 24-hour Spill Report Line (867-920-8130) according to current guidelines; and
- Spill containment and cleanup activities will be implemented in accordance with the current approved Winter Road Emergency Response/Spill Contingency Plan.

The YGP will, when operational, utilize the 'Secondary Route' of the Tibbitt to Contwoyto Winter Road (TCWR) for its transportation requirements and will therefore be required to follow the TCWR Winter Road Emergency Response/Spill Contingency Plan. The Winter Road Emergency Response/Spill Contingency Plan is updated annually by the Winter Road Joint Venture as per the terms of the License of Occupation. It is designed to define processes to efficiently and effectively respond to any medical or environmental emergency and/or accidental discharge that may be associated with the annual construction and operation of the existing winter road. Should the Secondary Route not be constructed by the TCWR Joint Venture for any particular year, Tyhee NWT Corp will construct and operate the winter road from Prosperous Lake to the YGP and will follow the same protocols as outlined above.

The scope of the Plan also considers the possibility that more than one type of response may be required for any one incident. Response preparedness will be maintained for incidents involving medical, fire, fuel, hazardous substances or other cargo spills or other environment related incidents involving commercial traffic along the winter road.

With the application and implementation of the preventative and mitigation measures as outlined, no significant fuel, chemical or other product spills are expected to occur.

### **8.2.1 Introduction of Harmful Substances**

The introduction of potentially harmful substances due to accidental discharge into lakes and streams represents a continuing public concern related to the operation of the existing winter road. Diesel fuel and other petroleum products represent approximately 60% of the bulk consumables transported by truck to the mines each winter. Other products transported by truck which could cause harmful effects if discharged into water include: ammonium nitrate, glycol, lime and small quantities of acids, salts, sodium cyanide and organic emulsifiers.

The key strategy employed by all commercial interests using the winter road has, and will continue to be, to prevent accidents from occurring through education and enforcement of the TCWR Winter Road Rules and Regulations.

Independently contracted winter road security personnel (SECURECheck) diligently enforce the requirements 24-hours per day. The requirements specify speed limits for the various conditions encountered along the winter road, right-of-way rules for traffic on lake surfaces and portages, load limits, vehicle spacing, and other specifications to optimize traffic safety and minimize the potential risk of accidents occurring which could result in uncontrolled discharge.

According to the spill records, to date, there have been no significant discharges of petroleum products into any waters along the winter road corridor where fish or other aquatic resources have been affected. In all cases, the winter conditions, which generally facilitate the containment and recovery of spilled products, combined with effective response from the spill clean-up teams, were successful in preventing the occurrence of potentially harmful effects to the aquatic environment. Mitigation of incidents on portages has continued until DIAND was satisfied with the clean-up.

The records also indicate that the number of uncontrolled discharge incidents per year has decreased significantly in recent years despite the higher levels of commercial vehicle traffic that have developed since the mid-1990's. Tyhee NWT Corp places a high priority on diligent transportation practices, operational safety, and continuous improvement of operating on the winter road. Given this continuing focus and emphasis, similar results can be expected in the years ahead with regard to the proposed YGP.

### 8.3 TAILINGS CONTAINMENT AREA (TCA)

The MVEIRB Terms of Reference (MVEIRB (2009) requested Tyhee NWT Corp discuss the potential *"failure of any feature of the tailings containment area"*.

As previously discussed in Section 4.4.5, the Yellowknife Gold Project area lies in a tectonically inactive plate zone within the Canadian Shield. The Shield area is considered relatively stable compared to more active boundary plates located to the west in the Yukon and Alaska. The highest seismicity is associated with the coastal zone (Seismic Zone 1) to the west of the Northwest Territories. Further inland, the seismicity reduction increases from Zone 2 into Zone 3.

The principle objective of the tailings containment area design is to ensure protection of the environment during operations and in the long-term in order to achieve effective reclamation at Mine closure. The design takes into account the following requirements:

- Permanent, secure and total containment of all tailings solids within an engineered facility;
- Control, collection and removal of free draining liquids from the tailings during operations to recycle process water to the maximum practical extent; and
- Include monitoring features for all aspects of the facility to ensure performance goals are achieved and design criteria and assumptions are met.

The design criteria for the tailings containment area are based on industry standards for the design of dams. In particular, all aspects of the design have been completed in conformance with:

- Canadian Dam Association (CDA) Dam Safety Guidelines (CDA 2007); and
- The Mining Association of Canada (MAC) Guide to the Management of Tailings Facilities (MAC 1998).

Where the TCA perimeters against an undisturbed area, the tailings containment dams will comprise of internally lined structures keyed into the bedrock, namely; Southwest Dam, South Dam, Southeast Dam, East Dam, Saddle Dam, North Dam and the southern leg of the West Dam (Figure 4.3-1). The portion of the West Dam that divides the de-watered portion of Winter Lake (the northern arm) will be a rock fill dam that will blind off with tailings. This dam embankment structure will be constructed in stages according to the mine tailings storage requirements. During operations, water seepage through this structure will be collected and managed within a containment ditch located in the northern portion of the de-watered Winter Lake. Any seepage that is collected in the containment ditch will then be pumped back into the TCA.

Over time, tailings deposition on the dam face will contribute to creating an impermeable barrier that will eliminate seepage in the long-term. All tailings dam structures will be constructed to a design crest elevation of 297 masl using suitable material borrowed from the Ormsby Pit or other areas. Material will be blasted, crushed, hauled, placed and engineered to construct the dams.

The West Dam, South Dam and Southeast Dam will be constructed prior to the commencement of tailings deposition (Figure 4.12-1). The remaining dams will be constructed during the mine life as they are only required for containment at higher elevations. Initial deposition of tailings within the TCA will commence with spigot discharge along the upstream face of the West Dam to blind off the structure and limit future seepage northwards into the drained portion of Winter Lake. Tailings will continue to be discharged upstream of the West Dam and will be augmented by additional spigot points around the perimeter of the TCA to maximise tailings storage capacity within the facility. The estimated final tailings elevation will be approximately 292.5 masl with a water cap elevation of 293.5 masl which equates to a freeboard and wet year water storage allowance of 3.5 metres for all dams.

During operation of the TCA, a water cap of approximately 1 metre will be maintained over the majority of the tailings surface. For closure and reclamation it is the intent to construct a material cap, either with or without a liner, over the exposed tailings instead of maintaining a water cover. This material cover will be a more effective long term closure scenario by returning the mine site to its pre-mining undisturbed state thereby ensuring minimal environmental impacts on the receiving environment and will be easier to maintain. There is precedence in this closure scenario with the adjacent historic Discovery Mine tailings having a cap in place.

The Tailings Management Plan includes a periodic release of water from the Winter Lake tailings containment area to the downstream receiving environment at the north end of Narrow Lake via a pipeline or possibly a half culvert. The control of flows would be accomplished by a pump rating curve. Final design and practice would be made available during the regulatory phase. This will control the maximum water level within the TCA facility.

## 8.4 ADDITIONAL CONSIDERATIONS AND EMERGENCY RESPONSE MEASURES

The MVEIRB Terms of Reference (MVEIRB (2009) also requested 'Tyhee NWT' to address:

- *"The occurrence of 100-year extreme precipitation events causing greater than expected inflows into the tailings facility."* This is considered an effect of the environment on the project and is discussed in Section 9.1.
- *"The developer's contingency plans for higher than expected inflows to any mine workings."* The installation and operation of additional pumps will be used for unexpected inflows to any mine workings.
- *"Emergency response measures that include:*
  - *storage, transportation and handling system failures of cyanide and other hazardous compounds;*
  - *storage, transportation and handling system failures of hydrocarbons;*
  - *storage, transportation and handling system failures of explosives; and*
  - *failures of the tailings containment area."*

Emergency response measures are presented and discussed in Section 6.8.