9.0 ACCIDENTS AND MALFUNCTIONS

The MVEIRB Terms of Reference (MVEIRB 2011) requested information on the potential effects of accidents and malfunctions that could occur in connection with the Thor Lake Project. Avalon's corporate policies, industry standards, regulations and/or guidelines to minimize the potential occurrence and magnitude of possible accidents and malfunctions have been previously reviewed in earlier sections (Sections 1.0, 4.0 and 6.0).

Accidents or malfunctions can be associated with any human activities related to the construction period and/or operations and reclamation periods of the Thor Lake Project. Environmental consequences of potential accidents or malfunctions related to the Thor Lake Project and associated activities would be primarily limited to those related to:

- Fuel storage, transportation and handling system failures;
- Explosive materials storage, transportation and handling system failures;
- Concentrate production, storage, transportation and handling system failures;
- Vehicle, aircraft, shipping and industrial accidents.

As indicated previously in Sections 1.0, 4.0 and 6.0 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. The overriding preventative and mitigation measures to be employed 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 Thor Lake Project-related traffic with existing NWT traffic laws.
- Effective application of Avalon's Hazardous Materials Spill Contingency Plan.

Avalon's Hazardous Materials Spill Contingency Plan is 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 Thor Lake Project.

The scope of the Hazardous Materials Spill Contingency Plan encompasses the overall range of types of accidents or malfunctions that may require the initiation of an emergency, medical or environmental response. 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 or other emergency response, fuel or concentrate spills or other environment related incidents (e.g. wildlife collisions).

Thor Lake Project Construction Phase

- Fuel for the construction equipment will be transported to the Nechalacho mine site by barge and to the Hydrometallurgical Plant site by fuel truck from local suppliers in Hay River.
- All Thor Lake Project traffic will comply with existing NWT traffic laws.
- 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 re-fuelled at a safe distance from any lake or wetland areas.
- Any spills will be immediately reported to the 24-hour Spill Report Line **(867) 920 8130** and spill containment and clean-up activities will be implemented in accordance with Avalon's Hazardous Materials Spill Contingency Plan (Appendix L).

Thor Lake Project Operations Phase

- Fuel for the operations phase will be transported to the Nechalacho mine site by barge and to the Hydrometallurgical Plant site by fuel truck from local suppliers in Hay River.
- All Thor Lake Project traffic will comply with existing NWT traffic laws.
- 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 re-fuelled at a safe distance from any lake wetland areas.
- Explosives ingredients (e.g. Ammonium Nitrate, diesel) will be transported to the Nechalacho mine site by either air or barge in accordance with federal *Transportation of Dangerous Goods* (TDG), *Workplace Hazardous Materials Information Syste*m (WHMIS) and *Explosives Act* requirements.
- Concentrate product will be transported from the Nechalacho mine site to the Pine Point area seasonal dock by barge and from there to the Hydrometallurgical Plant site.
- Processed rare earth metal products and concentrates will be transported in covered trucks and sealed intermodal containers from the Hydrometallurgical Plant to the Hay River railhead. These products will subsequently be shipped by rail to Avalon's rare earth separation plant.
- Thor Lake Project operations will comply with Land Use Permit and Water License requirements and conditions.
- Thor Lake Project operations will conform with existing applicable federal, GNWT and 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 clean-up activities will be implemented in accordance with Avalon's Hazardous Materials Spill Contingency Plan (Appendix L).

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

9.1 BARGING OPERATION

The MVEIRB Terms of Reference (MVEIRB (2011) specifically requested Avalon to discuss the potential effects to water/environmental quality of a potential *"complete overturning of all barges during a Great Slave transit of a typical concentrate loaded barge train at various points along the barge corridor between Thor lake and the delivery point on the south shore of Great Slave Lake"*.

9.1.1 Barging Operations on Great Slave Lake

To assess this hypothetical scenario in any reasonable manner, it is initially important to provide some background on the historic operation of barges on Great Slave Lake.

Barging operations have been conducted in Great Slave Lake and points north since 1934 (NTCL 2011). For 75 years, Northern Transportation Company Limited (NTCL) has been providing reliable and critical marine transportation services to communities and resource exploration Projects around Great Slave Lake, along the Mackenzie River and across the Western Arctic, from Prudhoe Bay, Alaska as far east as Taloyoak in Nunavut, and from the Port of Churchill to communities in the Kivalliq region of Nunavut on the west coast of Hudson Bay.

Since 1985, NTCL has been a 100% Aboriginal-owned company, and is owned by the Inuvialuit Development Corporation of the Western Arctic on behalf of the Inuvialuit of the Western Arctic and Nunasi Corporation, on behalf of the Inuit of Nunavut.

All of NTCL's barges are tested and inspected annually by Transport Canada, Lloyds Register and Imperial Oil. At four year intervals, NTCL's barges are dry-docked, hydro-tested and ultra-sonic thickness tested. Even though NTCL's barges were built in the late 60's and early 70's, the diminution of shell plating is less than 7%. As an example, 20% is the maximum allowable by Transport Canada and Lloyds before the shell plating would need to be replaced. All barges are constructed using mild steel and do not become brittle over time.

9.1.2 Potential Concentrate Spill from Barging Operation

According to NTCL (M. Landry (NTCL), personal communication, 2011) there have been no known records of any barge having been sunk in Great Slave Lake in the past 75 years. Regarding the possibility that an entire three-barge train loaded with concentrate contained in shipping containers could turn over (capsize), NTCL advised EBA that this was not a realistic possibility because NTCL's standard operation is that if any of the barges in a barge train was at risk of sinking/capsizing, NTCL's standard operating practice would be to disconnect the towline between the tug and the barges and then proceed to cut the towlines between the individual barges.

On this basis, as improbable as it would be, a more realistic possible scenario that could potentially occur would involve the overturning or capsizing of one of the barges in a barge train. Assuming that such an incident were to occur, it would be expected that the full load of containers carried on the stricken barge would be dropped into Great Slave Lake and proceed to sink to the bottom

As indicated in Section 4.7.6.7 of the DAR, when fully loaded, a single barge will hold a total of 38 containers stacked two high. Each container will hold 40 tonnes of concentrate for a total container weight of 45 tonnes, comprising a total load of 1,710 tonnes.

Assuming that the containers have all been dumped into the lake, for the purposes of the assessment requested by the MVEIRB, it is subsequently assumed that the containers would remain intact as they sink to the bottom and would not break open on their way down because the containers will not have a perfect seal and thus water and water pressure would equilibrate inside the containers as they sink to the bottom.

As indicated in Section 2.8.6 of the DAR, the bottom of most areas of Great Slave Lake, and in particular in the vicinity of the Slave River delta, are expected to be relatively soft. As a result, it is anticipated that containers landing directly on the lake bottom sediments will most likely remain intact. However, it is also assumed that some containers could break open, particularly if they were to land on other containers. As a result, it is anticipated that a quantity of concentrate, assumed to be in the order of 10% (~171 tonnes) could be released from any damaged containers onto the lake bottom where it would be exposed directly to the receiving environment.

It is then further assumed that, as soon as possible following such an incident, Avalon and its contractors would undertake an initial reconnaissance of the deposition site using Remote Operated Vehicle (ROV) technology to determine the best course of action for the recovery of the containers. Avalon has confirmed that there are recognized underwater salvage firms in Canada (e.g., CanDive) that have direct previous experience with the successful recovery of heavy objects greater than 100 tonnes, including diesel locomotives, sunken ships, etc. from waters up to 300 m deep using conventional, available underwater salvage techniques (Portable Crane and winches – Photo 9.1-1) and hard hat divers.

CanDive has also had direct experience with the recovery of mineral concentrates on underwater substrates using a Venturi Suction system operated by hard hat divers (P. Nuytten (CanDive), personal communication, 2011). With the combination of proven salvage methods that will be employed, it is anticipated that all of the containers and most of the concentrate can likely be recovered within one year of the incident. Nevertheless, it is assumed that a considerable volume of the spilled concentrate will remain on the lake bottom where it will be exposed to the receiving environment.

Photo courtesy of P. Nuytten, CanDive

Photo 9.1-1
Train Locomotive Recovered from a BC Lake

9.1.3 Environmental Effects of Concentrate in Great Slave Lake

As previously discussed, although it is highly unlikely that this scenario will ever occur, if containers filled with concentrate were to be dropped into Great Slave lake off a capsized barge, it has been assumed that a quantity of concentrate in the order of 10% of total cargo (~171 tonnes) would be released from any damaged containers onto the lake bottom where the concentrate would be exposed directly to the receiving environment. Although efforts would be undertaken to recover any spilled concentrate, it is assumed that a considerable volume of the spilled concentrate would remain on the lake bottom where it would be exposed to the receiving environment.

To assist in determining the possible environmental consequences associated with spilled concentrate being present on the lake bottom, it is important to review the chemical nature of the concentrates. As indicated in the fall 2010 MVEIRB scoping sessions, the rare earth metals concentrates will be essentially inert and non-reactive. Shake flask tests conducted by SGS (2011) determined that essentially no chemical parameters went into solution during 24 hours of agitation in water.

Table 9.1-1 adapted from SGS (2011) presents shake flask extraction results for the fresh concentrate produced from a pilot plant and provides a comparison with current MMER criteria. As can be noted, all values reported, including radionuclides and metals, are exceedingly low and at least one magnitude below applicable MMER values. In particular, the concentrations of radionuclides measured were below the detection limit for the three radionuclide parameters measured.

According to Dr. John Goode, Avalon's rare earth metals metallurgical expert, *"the component minerals are recognized as some of the most inert on the planet. Our tests show that we have to use strong acids to get any sort of reaction from the concentrate. To get anything to dissolve from the concentrates takes very high free acid conditions. To get substantial dissolution we need to cook the concentrate at 600 °C in molten sodium hydroxide"* (J. Goode, personal communication, 2011).

TABLE 9.1-1: SHAKE FLASK EXTRACTION RESULTS – CONCENTRATE

Parameter	Unit	*MMER	PP1 Conc
Initial pH	units		8.90
Final pH	units		8.80
Radionuclide Analyses			
^{226}Ra	Bq/L	0.37	< 0.01
^{228}Ra	Bq/L		< 0.3
^{210}Pb	Bq/L		< 0.1
General and Metals Analyses			
pH	units	6.0-9.5	7.78
F	mg/L		1.08
Cl	mg/L		2.0
Hg	mg/L		< 0.0001
As	mg/L	0.50	0.0019
Ca	mg/L		10.4
Cu	mg/L	0.30	0.0006
Fe	mg/L		0.014
K	mg/L		1.73
Mg	mg/L		1.53
Na	mg/L		4.56
Ni	mg/L	0.50	0.0004
Se	mg/L		< 0.001
Si	mg/L		2.65
Th	mg/L		0.000039
U	mg/L		0.00154
Zn	mg/L	0.50	0.004

*Department of Justice Canada. 2002. Metal Mining Effluent Regulations, Fisheries Act SOR-2022-222.

Given the essentially inert and heavy nature of the rare earth metals concentrate, any concentrate that may be released into the water column would rapidly sink to the lake bottom along with the containers. Effects on water quality would be limited to a short-term turbidity cloud that would rapidly disappear as the granular concentrate product descends to the lake bottom. Concentrate reaching the lake bottom, either via the water column or by being released from a broken container on the bottom would stay there in perpetuity. As previously described in Section 2.8.3, the environment of most of Great Slave Lake, and in particular, waters deeper than 30 m, comprise more than 95% of the proposed barging route. The water below 30 m and deeper is typically characterized by relatively low water temperatures (3-10°C) and dissolved oxygen (4-6 mg/l) conditions for most of the year or indeed year round.

The aquatic biota anticipated to be present in the deeper waters are expected to be limited to a few species of clams, worms, crustaceans (amphipods and mysids) and bottom-foraging fish such as sculpins, suckers, burbot and deepwater lake trout. The clams, worms, sculpins and suckers are the most likely species that could potentially consume some of the residual concentrate remaining on the lake bottom.

However, because of its essentially inert nature, contaminants bound up in the concentrate would not be expected to be taken up by the biota living on the lake bottom and thus no concentration of potential contaminants in the biota would be expected to occur.

In addition, as previously discussed in Section 2.8-3, much of the bottom of Great Slave Lake, and in particular the area off the front of and to the east of the Slave River Delta (in the vicinity of the barging corridor) is subject to considerable natural sedimentation resulting from the large volume of sediment released annually into Great Slave Lake by the Slave River. Such continuous natural sedimentation would be expected to lead to the eventual burial and isolation of any residual concentrate that may remain on the lake bottom following the completion of all recovery efforts.

Given the essentially inert nature of the rare earth metals concentrate as discussed, this basic assessment would apply to other water depths or locations in Great Slave Lake where such an incident could potentially occur.

As a result of the combination of factors described, as summarized in Table 9.2-1, the anticipated environmental effects of any residual rare metals concentrates remaining on the bottom of Great Slave Lake in the vicinity of such a most unlikely incident would be expected to be of a negligible and insignificant nature with no significant residual impacts expected to occur.

9.1.4 Potential Fuel Spill from Barging Operation

As indicated earlier in this Section, fuel for the construction and operation of the Nechalacho Mine and Flotation Plant will be shipped to the site by barge for the life of the Project. At the site, fuel and other hydrocarbons will be stored in accordance with the existing CCME environmental code of practice for storage of such products (CCME 2003) and Canadian petroleum products storage tank regulations (CEPA 2008).

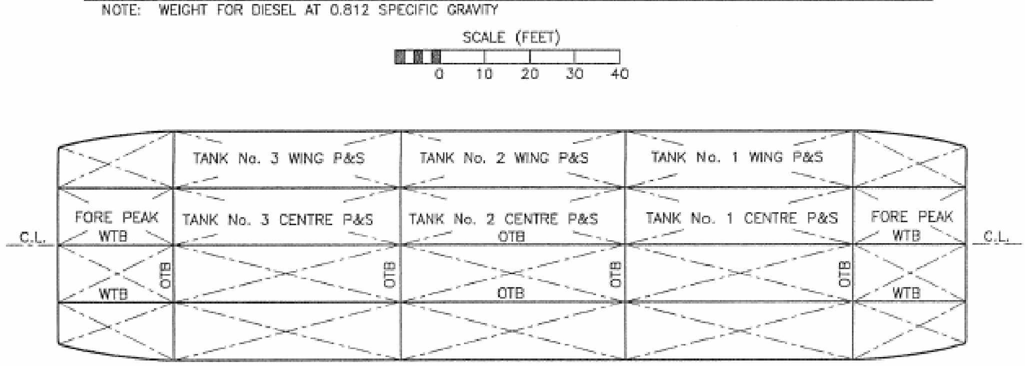
All of NTCL's barges are tested and inspected annually by Transport Canada, Lloyds Register and Imperial Oil. Fuel contained in the barges is stored in segregated tanks as illustrated in Figure 9.1-1. Such a fuel storage arrangement is designed to minimize the total quantity of fuel that could potentially be released from a barge in the event a portion of the barge hull was compromised due to a collision or other incident.

northern transportation company limited
NT 1000 SERIES BARGES (NT 1001 - NT 1024)

TANK CAPACITIES

TANK	95% CAPACITY VOLUME (LITRES)	95% CAPACITY WEIGHT (METRIC TONNES.)	100% CAPACITY VOLUME (LITRES)	100% CAPACITY WEIGHT (METRIC TONNES.)
TANK No. 1 CENTRE – PORT OR STBD	127,933	103.9	134,666	109.4
TANK No. 1 WING – PORT OR STBD	124,603	101.2	131,161	106.6
TANK No. 2 CENTRE – PORT OR STBD	127,933	103.9	134,666	109.4
TANK No. 2 WING – PORT OR STBD	124,603	101.2	131,161	106.6
TANK No. 3 CENTRE – PORT OR STBD	127,933	103.9	134,666	109.4
TANK No. 3 WING – PORT OR STBD	124,603	101.2	131,161	106.6

NOTE: WEIGHT FOR DIESEL AT 0.812 SPECIFIC GRAVITY



TANK CAPACITY PLAN

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Source: NTCL 2005

Figure 9.1-1
NT 1000 Series Barges General Arrangement

A more likely potential spill from a barge could arise during fuel loading or unloading operations. The fuel delivery contractor (NTCL or other) will retain ownership and responsibility for the fuel transported by barge until the entire volume of product is delivered to Avalon's Temporary Fuel Storage Tanks at the Nechalacho Project dock site and the transfer equipment is disconnected.

The responsibility for successful seasonal bulk fuel transfer without incident will be shared between the fuel delivery contractor and the receiving facility operator (Avalon). If a barge spill were to occur, the incident would be immediately reported to the 24-hour Spill Report Line **(867) 920 8130** and spill containment and clean-up activities would be implemented in accordance with the spill contingency plan of the fuel delivery contractor (e.g. NTCL's Shipboard Oil Pollution Emergency Plan – SOPEP) and Avalon's Hazardous Materials Spill Contingency Plan (Appendix L).

To minimize potential environmental effects associated with a fuel spill that could occur during fuel loading or unloading operations, the fuel delivery contractor (e.g. NTCL) will be following detailed standard practices to prevent, contain and recover any spilled fuel. Such practices typically include pre-transfer preparations and verifications including shore fuel tank and barge tank dips, providing equipment and personnel to assist the transfer in the form of trained tank/valve/hose/pipeline monitors, the installation of floating booms and restricting activities in the transfer area.

A spill of hydrocarbon fuel into the waters of Great Slave Lake would have the greatest potential to affect birds (ducks, geese, other waterbirds, Osprey) that may be in or around the lake during the time of, and in the vicinity of such an incident. Other aquatic resources such as fishes and plankton in the water column and benthic biota living on and in the lake bottom, including nearshore underwater areas, would be considerably less vulnerable to the possible effects of such an incident.

The degree of effect on the more vulnerable resources such as birds would be a function of various factors including:

- Type and volume of hydrocarbon released (diesel, gasoline, aviation fuel);
- Timing of the release (summer, fall), when concentrations of vulnerable aquatic life may be present;
- Weather and lake surface conditions (waves, currents) prevailing at the time of and following the release; and
- Ability of the responsible party (fuel delivery contractor, Avalon) to contain and recover or otherwise mitigate the release.

As previously indicated, the more likely location where a fuel spill could occur is in the vicinity of the seasonal dock at the Nechalacho Mine and Flotation Plant site. Based on the application of the preventative and mitigation measures described, it is likely that the type of spills which could occur in this area would be relatively small, effectively contained and the spilled product recovered.

However, in the event that some of the fuel product (e.g. Arctic diesel) escaped the containment booms, this fuel would be expected to begin to move and spread over the local surface of the lake in the prevailing direction of surface water circulation, which is typically from the east to the west. Although the onsite spill response effort would continue to attempt to recapture any of this fuel, it is important to note that Arctic diesel and any of the other, lighter fuel products that could potentially be accidentally spilled are relatively volatile and rapidly evaporate and disperse.

To demonstrate this, the ADIOS2 (Automated Data Inquiry for Oil Spills), a readily available oil weathering model (NOAA 2011), was run using typical winter or summer diesel fuels at a nominal temperature of 10 °C and light winds. The resultant graph illustrated in Figure 9.1-2, shows that approximately 50% of winter grade arctic diesel would be expected to evaporate within about 24 hours and 80% of this fuel would likely dissipate within about a week. A summer grade of diesel fuel is projected to degrade somewhat more slowly (~ 50% in one week), but Avalon does not intend to use any summer grade fuel in its Nechalacho Mine and Flotation Plant operations.

As a result, the effects of a typical fuel spill that could potentially occur in the vicinity of the seasonal dock at the Nechalacho Mine and Flotation Plant site would be expected to be of a generally localized, short-term, low magnitude and rapidly reversible nature.

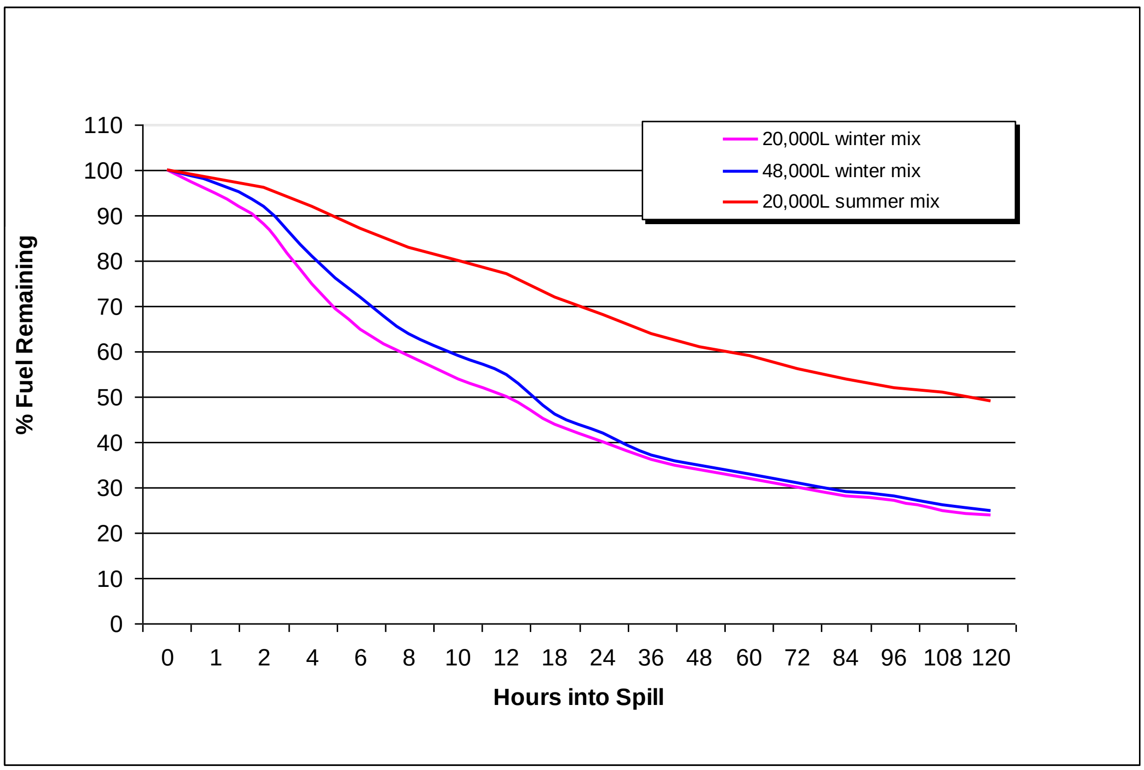

Figure 9.1-2
Typical Diesel Fuel Evaporation Rates

9.2 TAILINGS DAM FAILURE

The MVEIRB Terms of Reference (MVEIRB (2011) also requested Avalon to discuss the potential *"failure of existing dams/containment structures, tailings management facilities at both sites"*.

Since the tailings containment facility associated with the Hydrometallurgical Plant site will be the abandoned L-37 mine pit, which by its physical nature, cannot "fail" the following discussion will focus on the Tailings Management Facility related to the Nechalacho Mine and Flotation Plant site.

As previously discussed in Section 4.4, the central region of the Northwest Territories where the Thor Lake Project is located is a historically quiet earthquake zone. A seismic hazard assessment for the Thor Lake Property was completed using probabilistic calculations based on design tables from the 2005 National Building Code of Canada. The maximum acceleration for the proposed Nechalacho Mine and Flotation Plant site ranged from 0.007 g for a 1 in 100 year return period to 0.16 g for a 1 in 10,000 year return period.

A review of the tailings management facility consequence classification, following the Canadian Dam Association's 2007 Dam Safety Guideline, classified the Nechalacho Mine and Flotation Plant site's proposed tailings management facility as 'Significant'. The resulting earthquake design ground motion is a 1 in 1,000 year event, which corresponds to a maximum acceleration of 0.035 g for the Nechalacho Mine and Flotation Plant site (Knight Piésold 2010a).

The proposed tailings management facility will be located northeast of Thor Lake in the local catchment of Ring Lake and Buck Lake. The location was selected based on a review of available sites within the Project area and consideration of environmental and economic factors. The Ring and Buck Lakes basin provides adequate and efficient storage, thereby minimizing embankment construction and development costs.

The principle objective of the tailings management facility design is to ensure protection of the environment during operations and in the long-term (after closure) 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 management facility are based on federal standards for the design of dams. In particular, all aspects of the design have been completed in general 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).

The tailings management facility design is based on an approximate production life of 20 years, a total ore resource of approximately 14 million tonnes, and storage for approximately 3.5 million tonnes of tailings.

Phase 1 of the facility will include the construction of several small embankments and a temporary separator dyke to confine the tailings basin and establish a polishing pond. Phase 2 of the facility will include the raising of the existing phase one tailings basin embankments and the construction of two additional small embankments to establish a downstream polishing pond if required. Construction materials will consist of local borrow materials and development waste rock.

The tailings management facility embankments will be constructed from rock fill (mine development and/or waste rock) and till (local borrow). The embankments will be raised using the downstream method of construction. The embankment section will consist of a downstream rockfill zone and upstream till zone with a transition/filter zone.

A bituminous geomembrane will be placed on the upstream slope of the till zone, tied into the foundation with a concrete plinth to reduce seepage. A till cover and riprap layer will be placed on top of the geomembrane as a protection layer. The Phase 1 temporary separator dyke will be constructed of waste rock and/or till as its primary purpose is to contain tailings solids. The maximum height of the tailings basin and polishing pond embankments will be 9.5 m and 4.5 m, respectively. The final crest width will be 9.0 m and slide slopes will be 3.0H:1V.

A review of the geotechnical conditions in the Thor Lake Project area was completed based on a brief site visit in 2009 and a review of available information and previous baseline studies. The available information and site review indicates that the majority of tailings management facility basin and embankments will be underlain by syenite bedrock, with localized areas of till deposits.

The bedrock at surface is typically strong, slightly weathered and competent, providing good foundation conditions for embankment construction. Review of available data suggests that bedrock permeability will be low and is a function of discontinuities within the rockmass. Some glaciolacustrine or glaciofluvial deposits may also be present in low lying areas, which remains to be confirmed. Discontinuous permafrost may be present in these fine grained soils as well as north facing rock outcrops.

The design has assumed that foundation preparation for the embankment will mainly consist of the removal of organics and unsuitable materials from the bedrock surface. In some areas, removal of unsuitable material (organics or frozen soils with high ice content) may be completed up to a depth of 2.5 m in low lying areas. For estimating purposes, an average foundation excavation depth of approximately one metre has been assumed for areas where overburden is present. Removal of unsuitable materials would include the removal of organic soils and frozen soils with high ice content.

With the application of the many design considerations described, and the natural physical features of the area selected for the Tailings Management Facility, a tailings embankment failure would be an extremely remote possibility. In particular, the existing tailings containment capacity of the Buck and Ring lakes basins will effectively retain the first 4-5 years of tailings production before the contained tailings reaches an elevation that could potentially be released from the TMF. Furthermore, it is a standard practice for annual engineering inspections to be carried out of the tailings embankments to ensure that the integrity of the TMF is fully maintained.

Nevertheless, even with all of these preventative and mitigative measures in place, if the main tailings embankment were to fail, an unknown (dependant on the magnitude of the failure) of tailings could be released from the TMF at some time in the operational life of the Nechalacho Mine. The released tailings would initially flow into the polishing pond. Assuming that the volume of tailings released exceeded the available capacity of the polishing pond, some of the tailings could conceivably migrate into Drizzle Lake where it would be contained.

This again is considered to be an extremely remote possibility because if such a failure of the main TMF embankment were to occur, Avalon personnel and equipment would be immediately on site to initiate preventative measures and to contain any released tailings.

The environmental consequences of such a most improbable event occurring would be minimal, primarily because the tailings is essentially inert and would be expected to be contained between the polishing pond and Drizzle Lake. As a result, no significant effects on the downstream fish and aquatic environment would be expected to occur.

TABLE 9.2-1: ACCIDENTS AND MALFUNCATIONS EFFECTS TABLE

	Evaluation of Residual Effect												
Description of Residual Effect (after Mitigation)	**Magnitude**	**Geographic Extent**	**Duration**	**Frequency**	**Reversibility**	**Likelihood**			**Consequence**				
Concentrate Spill	Low	Local	Short-term	Isolated	Reversible Long-term	Low		**Magnitude**	**H**				
									M				
									L	X			
										S	**M**	**L**	**I**
										Duration			
Fuel Spill	Low	Local	Short-term	Isolated	Reversible Short-term	Low		**Magnitude**	**H**				
									M				
									L	X			
										S	**M**	**L**	**I**
										Duration			
Tailings Dam Failure	Moderate	Local	Long-term	Isolated	Reversible Long-term	Low		**Magnitude**	**H**				
									M			X	
									L				
										S	**M**	**L**	**I**
										Duration			