Minto Explorations Ltd.

REVISION 2007-1
OPERATION, MAINTENANCE, AND SURVEILLANCE MANUAL
DRY STACK TAILINGS STORAGE FACILITY
MINTO MINE, YT

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PAGE

1.0 Introduction....1
1.1 Objective of the OMS Manual 1
2.0 Roles and Responsibilities....1
2.1 Organization, Structure, and Individual Responsibilities 1
2.2 Competency and Training 2
3.0 OMS Manual Control and Update....3
3.1 Distribution of Material 3
3.2 Manual and Supporting Document Location 4
3.3 Reviewing and Updating the Manual....6
4.0 Managing Change....6
5.0 Facility Design Description....7
5.1 Facility Overview 7
5.2 Facility Components....8
5.3 Basis of Design and Design Criteria....9
5.4 Site Conditions 11
5.4.1 General Surficial Geology....11
5.4.2 Surface Features 11
5.4.3 Subsurface Conditions....11
5.4.4 Groundwater 11
5.4.5 Permafrost 11
5.4.6 Bedrock. 12
5.5 Climate 12
5.5.1 Temperature 13
5.5.2 Wind...... 13
5.5.3 Snow..... 60
14
5.5.4 Solar Radiation 14
5.6 Hydrology 14
5.6.1 Hydrological Conditions 15
5.7 Seismicity 15
5.8 Tailings Characteristics 16
5.8.1 Tailings Production 16
5.8.2 Tailings Characterization 16

PAGE

5.8.3 Acid Generation Potential 17

6.0 Regulatory Requirements 17

6.1.1 Regulatory Agencies 17

6.1.2 Regulatory Approval 17

6.1.3 Regulatory Requirements 17

7.0 Operation 18

7.1 Objective 18

7.2 DSTSF Construction Plan 18

7.2.1 Design Life Construction Plan 18

7.2.2 Annual Construction Plan 19

7.2.3 Contingency Plan 20

7.3 DSTSF Construction Components 20

7.3.1 Starter Bench and Drainage Blanket 20

7.3.1.1 Ground Surface Preparation 20

7.3.1.2 Material Composition and Placement 20

7.3.2 Surface Water Diversion Berms 21

7.3.2.1 Ground Surface Preparation 21

7.3.2.2 Material Composition and Placement 21

7.3.3 Airstrip Road Diversion Ditch 21

7.3.4 Finger Drains 22

7.3.4.1 Ground Surface Preparation 22

7.3.4.2 Material Composition and Placement 22

7.3.5 Waste Rock Shell 22

7.3.5.1 Ground Surface Preparation 22

7.3.5.2 Material Composition and Placement 22

7.3.6 Tailings Stack 23

7.3.6.1 Ground Surface Preparation 23

7.3.6.2 Material Composition and Placement 23

7.3.7 Reclamation Material 24

7.3.7.1 Ground Surface Preparation 24

7.3.7.2 Material Composition and Placement 24

7.3.8 Proposed Emergency Discharge Tailings Structure 24

7.4 Equipment Used for Construction 24

7.5 Adverse Operating Conditions 25

7.6 Surface Water Management 25

PAGE

7.7 Environmental Protection 26
7.8 Health, Safety, and Security 26
7.9 Documentation 27
7.10 Reporting 27

8.0 Maintenance 28
8.1 Objective 28
8.2 Maintenance Procedures 28
8.3 Documentation 28
8.4 Reporting 28

9.0 Surveillance 29
9.1 Objective 29
9.2 Responsibility 29
9.3 Surveillance Parameters 29
9.4 Surveillance Procedures 30
9.5 Adaptive Management 33
9.6 Documentation 36
9.7 Reporting 37

10.0 Emergency Planning and Response 37
10.1 Minto Emergency Procedures 37
10.2 DSTSF Emergency Procedures 37
10.3 Environmental Emergencies 38
10.4 Key Contacts 38
10.4.1 Minto Contacts 38
10.4.2 Facility Designer and Geotechnical Consultant 38
10.4.3 Environmental Consultant 38
10.4.4 Regulatory Agencies 38
10.4.5 Local Authorities 39
10.4.6 Climatological Information 39

TABLES

TABLE 1: DESIGNATED PERSONNEL FOR TMT

TABLE 2: DSTSF COMPONENTS

TABLE 3: BASIS OF DESIGN AND DESIGN CRITERIA

TABLE 4: SUMMARY OF MEAN CLIMATIC CONDITIONS AT MINTO USED IN THERMAL ANALYSES

TABLE 5: SUB-CATCHMENTS AREA FREQUENCY ANALYSIS

TABLE 6: ANTICIPATED TAILINGS PRODUCTION

TABLE 7: TAILINGS LABORATORY TEST RESULTS

TABLE 8: TAILINGS PRODUCTION SCHEDULE – PHASE 2 MILL THROUGHPUT

TABLE 9: ANNUAL CONSTRUCTION PLAN

TABLE 10: RECOMMENDED GRADATION OF 75 MM FILTER MATERIAL

TABLE 11: CONSTRUCTION EQUIPMENT

TABLE 12: DSTSF OPERATIONS DOCUMENTATION

TABLE 13: OPERATIONAL MONITORING SCHEDULE FOR DSTSF

TABLE 14: TRIGGERS AND ACTIONS UNDER ADAPTIVE MANAGEMENT FOR TAILINGS MANAGEMENT

TABLE 15: DSTSF SURVEILLANCE DOCUMENTATION

FIGURES

FIGURE 1: SITE PLAN AND DETAILS

FIGURE 2: INSTRUMENTATION SECTION AND DETAILS

FIGURE 3: TYPICAL CROSS SECTIONS

FIGURE 4: SURFACE DRAINAGE SUB-CATCHMENTS

1.0 INTRODUCTION

This Operation, Maintenance, and Surveillance (OMS) manual has been prepared for the Dry Stack Tailings Storage Facility (DSTSF) at the Minto Mine, YT, and acts as a reference document for its operation, maintenance, and surveillance.

Minto Explorations Ltd. (Minto) and EBA Engineering Consultants Ltd. (EBA) have provided representation from site operations personnel and management (Minto) and the facility designers (EBA), for the formation of the OMS manual development team and completion of the OMS manual.

1.1 OBJECTIVE OF THE OMS MANUAL

The objective of the OMS manual is to define and describe:

- Roles and responsibilities of personnel assigned to the facility;
- Procedures and processes for managing change;
- The key components of the facility;
- Procedures required to operate, monitor the performance of, and maintain the facility to ensure that it functions in accordance with its design, meets regulatory and corporate policy obligations, and links to emergency planning and response; and
- Requirements for analysis and documentation of the performance of the facility.

2.0 ROLES AND RESPONSIBILITIES

2.1 ORGANIZATION, STRUCTURE, AND INDIVIDUAL RESPONSIBILITIES

The operation, maintenance, surveillance or emergency preparedness and response of the DSTSF is the responsibility of the Tailings Management Team (TMT). This team is comprised of individuals from Minto, EBA, and Access Mining Consultants Ltd. (Access). Minto is the lead coordinator of the OMS manual and is ultimately responsible to ensure all aspects of the OMS manual of the DSTSF are met. EBA is the facilities designer and acts as a geotechnical consultant for Minto. Access is Minto's environmental consultant.

Designated personnel within the TMT, along with their position and responsibilities, are summarized in Table 1.

TABLE 1: DESIGNATED PERSONNEL FOR TMT		
Personnel and Contact Information	**Position**	**Responsibilities**
Dan Russell 604-759-0860 ext 453 danr@mintomine.com	Mine Manager	Group coordinator of DSTSF, project review and implementation, and budget allocation
Pelly Construction 778-785-3184 minto@pelly.net	Construction Superintendent	Contractor for haul, placement, and compaction of tailings in DSTSF, general operations, maintenance
Dave Archibald / Dennis Dornan 604-759-0860 ext 454	Mill Superintendent	Pumping and conveyor operations and maintenance of tailings filter system to tailings stockpile location
Stu Harris / Vacant 604-759-0860 ext 442	Construction Monitor	Routine inspections for quality assurance and quality control, data collection, surveying, providing planning direction to construction superintendent
Jason Berkers 867-668-2071 x 233 jberkers@eba.ca	Geotechnical Consultant, EBA	Periodic inspections for quality assurance, annual compliance reporting, geotechnical analysis and risk management of ongoing construction, instrumentation data review
Scott Keesey 867-668-6463 skeesey@accessconsulting.ca	Environmental Consultant, Access	Permitting requirements, annual environmental reports, water quality and level monitoring
Cameron Sinclair / Vacant 604-759-0860 ext 444	Safety Coordinator	Training and/or job hazard analysis are completed as required
Cameron Sinclair / Vacant 604-759-0860 ext 444	Minto ERT	Emergency preparedness and response

Responsibility of the TMT and the on-going operation, monitoring, maintenance, and surveillance of the DSTSF falls under the Mine Manager. Furthermore, the Mine Manager must ensure adequate resources (financial and manpower) are made available to ensure the safe operation of the DSTSF. Undertakings at the DSTSF must be prioritized and scheduled with the knowledge of the TMT.

2.2 COMPETENCY AND TRAINING

Appropriate training programs are required for all personnel involved in the operation, maintenance, and surveillance of the DSTSF, including all its components.

The Mine Manager and Construction Monitors are required to fully understand and implement the operation, maintenance, and surveillance requirements of the DSTSF, and ensure the contractor, Pelly Construction, follows and exceeds the design criteria for the facility. This is achieved through consultation with the facility designer and geotechnical consultant, EBA, and the environmental consultant, Access.

The Construction Superintendent is responsible to ensure Pelly Construction's supervisors and operators understand the operational and maintenance requirements of the DSTSF to meet the design criteria for the facility.

All personnel working at the DSTSF are to have an appropriate understanding of the OMS manual and their respective roles and responsibilities. Relevant procedures include the Minto Emergency Procedures, the Minto Spill Response Plan and DSTSF Emergency Preparedness Plan. It is the role of the specific supervisor of the personnel to ensure this is the case.

In conjunction to the understanding of the OMS manual, the responsibility of all site personnel to be continually alert of visual queues regarding facility performance must be highlighted. Anything observed to be outside of normal operating parameters, as outlined in this manual, are to be reported immediately to the Mine Manager.

3.0 OMS MANUAL CONTROL AND UPDATE

This OMS manual is a controlled document, with specified procedures for:

- Distributing, removing and archiving out-of-date materials;
- Filing the manual and supporting documents; and
- Reviewing and updating the manual.

3.1 DISTRIBUTION OF MATERIAL

This OMS manual is to be distributed as follows:

- 1 copy to the Mine Manager;
- 1 copy to the Construction Superintendent (Pelly);
- 1 copy to the Mill Superintendent;
- 1 copy to the Construction Monitor;
- 1 copy to the Manager Reclamation and Corporate Affairs, Whitehorse;
- 1 copy to MintoEx/SWC Vancouver library;
- 1 copy to the Geotechnical Consultant (EBA); and
- 1 copy to the Environmental Consultant (Access).

Additional copies are to be submitted to all regulatory agencies, as required.

Copies of this manual are to be available to all personnel who are responsible or involved in the operation, maintenance, and surveillance of the DSTSF.

The Mine Manager is responsible for maintaining the record of location of each copy of the OMS manual and to ensure that all copies are updated, as and when required.

Any requests for copies are to be made to the Mine Manager who will have that name added to the distribution list, providing a numbered copy for the user, and in doing so ensure the recipient receives on-going updates. No other copies are to be made by the others.

Out-of-date DSTSF materials are to be archived by the Mine Manager. Out-of-date copies of the OMS manual are to be collected by the Mine Manager and destroyed. Several copies of the most recently superseded versions are to be archived in secure storage as required for legal purposes.

3.2 MANUAL AND SUPPORTING DOCUMENT LOCATION

The original copy of the OMS manual along with the following supporting documents will be stored electronically on the Mine Engineering server and/or in the Mine Manager's office on site. These documents are maintained and under the control of the Mine Manager.

The following items shall be covered or referenced in the filing system:

- Operation, Maintenance, and Surveillance Manual;
- As-built drawings from original construction and all subsequent construction phases;
- Construction records including performance and construction plans;
- All design data including both original design data and all modifications or revisions;
- All inspections and annual reviews;
- Photographic records;
- Correspondence with facility designers with relevant supporting information; and
- Correspondence with Regulatory Agencies complete with records of compliance and details of any remedial action.

Along with the above referenced documents, the following specific reports dealing with the DSTSF will also be stored in the Mine Manager's office.

<u>Emergency Planning Documents</u>

- A report by Minto entitled "Minto Project Environmental Monitoring Plan", submitted for the Type A Water Use License 1996. The report is currently being updated.
- A report by Minto entitled "Minto Project Spill Contingency Plan", submitted for the Type A Water Use License 1996. The report is currently being updated.
- MSDS documentation for any material used within the DSTSF.

DSTSF Approval Documents

- A letter by Yukon Government – Energy, Mines and Resources entitled "Approval of Minto Mine Tailings Management Plan", dated April 17, 2007.
- A letter by Minto entitled "QML-0001-Minto Tailings Management Plan, Additional Information", dated March 15, 2007.
- A report by Access Mining Consultants Ltd. (Access) entitled "Minto Mine, Tailings Management Plan", dated January 2007.

Design Reports

- A letter by EBA entitled "Response to Review Questions – Minto Tailings Management Plan", dated March 15, 2007.
- A report by EBA entitled "Geotechnical Design Report, "Dry" Stack Tailings Storage Facility", dated January 2007. This report includes a technical memo by EBA entitled "Thermal Analysis of "Dry" Stacked Tailings Area", dated December 11, 2006.
- A letter by EBA entitled "Final Preliminary Design – Mill Water Pond", dated June 17, 1997. This report includes the preliminary design of the Airstrip Road diversion ditch.
- A report by Hallam Knight Piesold entitled "Minto Creek Surface Hydrology Report", dated November 1994.
- A report by Lakefield Research entitled "The Environmental Characterization of Samples submitted by Minto Explorations Ltd.", Progress Report No. 2, dated September 1994.
- A report by Lakefield Research entitled "An Investigation of The Stability of Flotation Tailings from DEF Project Samples submitted by United Keno Hill Mines Ltd.", Progress Report No. 4, dated January 1977.

Construction Reviews

- A letter by EBA entitled, "Dry Stack Tailings Storage Facility – Interim As-built Construction Report", dated June 29, 2007.
- A letter by EBA entitled, "Inspection Report – Upper Section South Diversion Ditch", dated December 19, 2006. The upper section south diversion ditch is referenced as the Airstrip Road diversion ditch in this document.

Annual Performance Reviews

N/A

3.3 REVIEWING AND UPDATING THE MANUAL

This manual is a compilation of experience and drafts completed in 2007, and in its current form will be referred to as Revision 2007-1.

This manual will be updated every five years or after any significant change to personnel, operations, and/or design criteria.

A current OMS Manual will be in place through the full life cycle of the DSTSF through the end of the operating phase and into decommissioning and closure.

Annual tailings management system reviews are to include an evaluation of this OMS manual.

4.0 MANAGING CHANGE

Various changes to the DSTSF will occur during the life of the facility. These changes must not compromise the performance of the DSTSF or the OMS manual developed for its management. It is the role of the Mine Manager to incorporate changes to the DSTSF design or operating parameters into the OMS manual. Also, it is the responsibility of the Mine Manager to review, update, and improve the OMS manual on an as needed basis. Overall authorization of changes falls under the responsibility of the TMT.

Changes to the OMS manual may result from the following:

- Evolution of design through capacity changes, operational efficiencies, closure requirements, performance feedback and life-cycle changes;
- Incorporation of as-built records of construction;
- Variation of performance from design;
- Changes in site management organization, facility description, roles and responsibilities, and operating and reporting procedures;
- Suggestions for improvement;
- Succession planning/training; and
- Regulatory change.

In addition to updating this OMS manual on an as needed basis, Minto commits to the following:

- Assurance that the standards utilized for the facility are consistent with applicable legislation, codes of practice, relevant standards and sound engineering practice;
- Regular reviews of DSTSF issues by the TMT;
- Regular updates to all copies of the OMS Manual;
- Appropriate training for all new personnel assigned to tasks dealing with the DSTSF; and

- Communication of any changes to the OMS Manual to all relevant personnel.

5.0 FACILITY DESIGN DESCRIPTION

The following sections summarize the design of the DSTSF and the background information used for the design. Additional detailed information can be found in the following reports:

- A letter by EBA entitled "Response to Review Questions – Minto Tailings Management Plan", dated March 15, 2007; and
- A report by EBA entitled "Geotechnical Design Report, "Dry" Stack Tailings Storage Facility", dated January 2007. This report includes a technical memo by EBA entitled "Thermal Analysis of "Dry" Stacked Tailings Area", dated December 11, 2006.

5.1 FACILITY OVERVIEW

The DSTSF is situated southeast of the mill and tailings filter building within the valley profile south of Minto Creek and west of the Water Retention Dam as shown in Figure 1. The DSTSF area covers an area of approximately 0.4 km^2 and is designed to provide for storage and confinement of the tailings based on the Hatch 2006 feasibility plan.

The tailings is hauled from the tailings stockpile directly south of the tailings filter building to the DSTSF and mechanically spread and compacted in controlled lifts to form a stacked tailings deposit.

Components of the DSTSF include; a starter bench and drainage blanket for slope under-drainage, finger drains along the valley lines within the DSTSF footprint, surface water diversion berm and ditch for run-on surface water management, an exterior slope waste rock shell, the tailings stack, and the reclamation material. Also included is instrumentation to monitor the foundation sideslope performance of the DSTSF that consists of vibrating wire piezometers, ground temperature cables, and survey monuments. The location of the instrumentation is shown in Figure 1 and instrumentation sections and details are shown on Figure 2.

The toe of the DSTSF has been located to be above the flood level of Minto Creek and well above the reservoir level created by the Water Retention Dam. The DSTSF will have an outer slope of 4:1 (horizontal:vertical) or 14 degrees and a final stack crest elevation close to 788.5 m. The tailings will be up to 26 m deep in the central area of the DSTSF. Typical cross sections for the DSTSF are shown in Figure 3.

5.2 FACILITY COMPONENTS

The DSTSF is made up of the components outlined in Table 2 and shown in Figures 1 and 2.

TABLE 2: DSTSF COMPONENTS

Components	Details
Starter Bench and Drainage Blanket	Located beneath the ultimate slope and crest of the DSTSF, they provide under-drainage beneath the 4H:1V sideslope. This will allow any excess water, whether surface or from the active layer, to drain away and not build up porewater pressures with the tailings.
Finger Drains	Located along the valley lines beneath the tailings stack to intercept and manage existing seepage flows beneath and from the DSTSF, if any.
Surface Water Diversion Berm	Located outside the east tailings stack perimeter to divert run on surface water away from the tailings stack.
Airstrip Road Diversion Ditch	Located along the upstream shoulder of the airstrip road to divert upgradient surface water to the Mill Water Pond.
Waste Rock Shell	Located above the starter bench, it accounts for the outside 20 m of the sideslope of the DSTSF. The shell acts as an access road for the placement of the tailings and provides additional stability to the ultimate sideslope.
Tailings Stack	Mechanically placed and compacted tailings
Reclamation Material	Growth medium to be used as cover over the waste rock shell and tailings during reclamation of the DSTSF
Instrumentation	Vibrating wire piezometers, ground temperature cables and survey monuments for the monitoring of the foundation and sideslope conditions of the DSTSF.

5.3 BASIS OF DESIGN AND DESIGN CRITERIA

The basis of design and design criteria for the DSTSF are presented in Table 3. Additional background information used to formulate the basis of design and design criteria for the site conditions, climate, hydrology, seismicity, and tailings characteristics are further summarized in Sections 5.4 through 5.8.

TABLE 3: BASIS OF DESIGN AND DESIGN CRITERIA

Site Characterization	Details
DSTSF Capacity	3,758,000 m^3 to accommodate 5,517,000 tonnes of tailings based on an average placed bulk density of 1600 kg/m^3
Approximate Footprint	0.4 km^2
Distance from the Tailings Stockpile at Tailings Filter Building to the DSTSF	Varies between 30 m and 800 m
Site Conditions	Overburden soils up to 45 m thick consisting of a fine grained silt or silt and sand overlying coarse grained sand, overlying bedrock. Groundwater not observed but present within the active layer. Permafrost with variable ground ice contents is present in the foundation soils.
Climatic Conditions	No long term data available for mine site. Meteorological station established at the mine site in 2005.
Hydrology	Peak instantaneous flow rates based on Hallam Knight Piesold 1994. 1 in 10 year event assumed for design of finger drain cross section.
Seismicity	0.055g (10 % probability of exceedance in 50 years, 1/475)
Operating Requirements	**Details**
Life of Mine	8 years based on Hatch 2006 feasibility plan
Mill tonnage	Year 1 = 1563 tonnes per day, Year 2 through 8 = 2400 tonnes per day
Operations	365 days per year
Tailings Tonnage	Year 1 = 489,940 tonnes Year 2 through Year 7 = 766,960 to 847,600 tonnes Year 8 = 118,330 tonnes TOTAL = 5,516,950 tonnes
Tailings Solids Content	83% by mass
Tailings Characteristics	Particle Size Distribution (2 tests): Averaged to 6 % clay, 36 % silt, 58 % sand Specific Gravity Determination: 2.79 Atterberg Limits (2 tests): Plastic Limit: 16 %, Liquid Limit: 20 - 23 %, Plasticity Index: 4 – 7 % Moisture Density Relationship: Optimum Moisture Content: 17.5 %, Standard Proctor Maximum Dry Density: 1685 kg/m^3 Constant Head Permeability Test: $k = 9.65 \times 10^{-8}$ m/s Direct Shear Test: Peak Strength: $\theta' = 35.1°$, $c' = 11$ kPa

TABLE 3: BASIS OF DESIGN AND DESIGN CRITERIA – CONT'D	
Tailings Deposition Procedures	Placement and compaction on a continuous basis
Insitu Tailings Dry Density	1600 kg/m^3 based on 95 % of Maximum Dry Density (MDD), standard effort of 1685 kg/m^3
Insitu Tailings Moisture Content	Approximately 20 % (gravimetric moisture content, $W_{water}/W_{dry\ soil}$)
Surface Water Management	Starter bench and drainage blanket for under-drainage of slope Finger drains along existing valley lines Run on surface water management with the construction of the surface water diversion berm and ditch Removal of snow during winter operations
Acid-generating Potential	Low – existing ABA tests indicate that this is not a concern
Decommissioning, Closure and Reclamation	Placement of waste rock shell and reclamation material
Design Criteria	**Details**
Maximum Crest Elevation	788.5 m
Minimum Slope of Tailings Stack	4H:1V
Ultimate Maximum Thickness of Tailings	Approximately 26 m
Tailings Compaction	Compaction in 500 mm lifts or less to at least 95 % Maximum Dry Density (MDD), standard effort (per ASTM D 698)
Thermal Considerations	Design intent is to retain the permafrost within the foundation or at least slow the rate of regression to provide time for dissipation of pore pressure resulting from thaw. Maximum annual cumulative thickness of 3.0 m in any one area of the facility to promote winter freeze-back of the summer placed tailings. Reduced snow cover will result in colder tailings/ground temperatures; therefore, snow should be regularly cleared off the tailings surface. Snow will tend to accumulate on the lower area along the toe of the DSTSF due to both natural snow-drifting and intentional snow clearing of the tailings surface. Snow should be cleared away from the toe area to promote deeper seasonal frost penetration into the original ground.
Subgrade Preparation	To be completed in winter conditions to ensure the disturbance to the organic soil is minimal.
Critical Design Tailings Stack Failure Surface	Deep failure cutting through stack to a receding permafrost interface in the foundation soil.
Design Factors of Safety	Long Term Stability: 1.3, Seismic (Pseudo-static) Stability: 1.1 based on British Columbia Interim Guidelines for Investigation and Design of Mine Dumps (Waste Rock Design Manual)
Seismic Design Criteria	0.055g (10 % probability of exceedance in 50 years, 1/475)
Liquefaction of Tailings Stack	Tailings placed in unsaturated state and compacted to 95 % MDD; therefore, not susceptible to liquefaction.
Closure Design	Climatic and instrumentation monitoring required to complete closure design

5.4 SITE CONDITIONS

5.4.1 General Surficial Geology

Boreholes drilled within the plan area of the DSTSF have determined that overburden thicknesses may range up to 45 m based on exploration drilling. These deposits are thought to be an extension of an infilled valley which also passes through the southern end of the open pit. The overburden soils generally comprise colluvial sediments of silt and sand with trace gravel, and thin out to the south and east of the DSTSF site.

5.4.2 Surface Features

The DSTSF site is located over a gently sloping (about 3º to 10º) terrain, south of the mill buildings and Minto Creek.

The terrain steepens to the south and southwest of the DSTSF. The access road to the airstrip bisects these slopes upslope of the DSTSF. A diversion ditch has been constructed along the upstream side of this road (see Figure 1).

The DSTSF area originally had sparse to locally dense tree cover; however, the region was subject to a forest fire in 1995 that has resulted in areas of fallen trees with deciduous species regrowth.

5.4.3 Subsurface Conditions

Geotechnical investigations from previous projects undertaken by EBA on or near the site indicate that the subsurface conditions generally comprise a thin veneer of peat and vegetation overlying a fine-grained silt or silt and sand overlying coarse-grained sand. The only exception to this is one borehole approximately 150 m to the northeast that noted a clay layer from ground surface to 18.9 m.

The fine grained sand and silt is believed to be of colluvial origin while the coarser sand is considered to be a residual soil (residuum). Throughout the mine site these residual soils grade into weathered bedrock.

5.4.4 Groundwater

No groundwater was reported in any of the boreholes drilled within the DSTSF, but is expected within the active layer during the summer and fall.

5.4.5 Permafrost

Permafrost was encountered in each of the boreholes drilled within the vicinity of the DSTSF, at varying depths. The observed ice contents in the five boreholes (Nos. 96-G07 through -G12 excluding -G10) within the footprint of the DSTSF typically ranged from Nbe (Ice not visible – Well bonded, Excess ice) to visible ice at 10% to 20% of the total volume. Two of the boreholes, 96-G09 and 96-G12, showed ice intervals of 1.5 and 4.0 m thick within the upper 10 m.

Initial data from the ground temperature cable installed in 96-G08 indicated a relatively uniform ground temperature of close to -0.8ºC after equilibration with slight seasonal warming over the top 2 or 3 m. The active layer depth was close to 1 m in September 1996.

5.4.6 Bedrock

Depths to bedrock (granodiorite) are indicated to range up to 45 m based on exploration borings drilled nearby. Weathered bedrock outcrops are present within the vicinity of the airstrip, south of the upper reaches of the DSTSF. There is no exposed bedrock within the DSTSF. The bedrock is considered too deep at this site to have any significant effect on the system design.

5.5 CLIMATE

No long-term climatic data is available from the Minto Mine site. A complete meteorological station was established at the site in September 2005 and data for the station was available up to mid-July 2006 during the design. Snow surveys had been carried out by J. Gibson & Associates in 1994, 1995, 1998 and 2006 at three locations in the Minto Creek area.

The closest meteorological station to the Minto site with a long-term climatic record is Pelly Ranch, which is situated about 40 km northeast of the Minto site. In addition, the Carmacks meteorological station is located about 70 km southeast of the site.

The long-term mean climatic data estimated for the Minto site for the geotechnical design of the DSTSF is summarized in Table 4.

TABLE 4: SUMMARY OF MEAN CLIMATIC CONDITIONS AT MINTO USED IN THERMAL ANALYSES

Month	Monthly Air Temperature[a] (ºC)	Monthly Wind Speed[b] (km/h)	Month-End Snow Cover[c] (m)	Daily Solar Radiation[d] (W/m^2)
January	-28.2	7.5	0.40	10.2
February	-21.8	8.9	0.43	39.0
March	-12.4	10.0	0.48	102.0
April	-1.1	11.7	0.08	180.7
May	6.3	11.8	0.00	229.9
June	11.7	10.8	0.00	255.4
July	13.8	9.5	0.00	225.8
August	11.2	9.6	0.00	170.1
September	5.0	10.7	0.01	99.1
October	-4.0	11.9	0.10	41.5
November	-17.1	8.9	0.23	14.2
December	-25.0	7.8	0.31	5.3

Notes:

(a) based on Climate Normals 1971-2000 at Pelly Ranch (Environment Canada website), measured mean air temperatures at Carmacks and Pelly Ranch for the period of 1963 to 2004 (Environment Canada website), and Johnston (1981)

(b) based on Climate Normals 1971-2000 for Burwash, Mayo, Watson Lake, and Whitehorse (Environment Canada website)

(c) based on snow depth survey data at Minto and mean month-end snow data at Mayo (Climate Normals 1971-2000, Environment Canada website)

(d) based on Climatic Normals 1951-1980 at Norman Wells and Whitehorse (Environment Canada, 1982)

5.5.1 Temperature

Measured long-term air temperatures are available for both the stations from the National Climate Data and Information Archive operated by Environment Canada (http://www.climate.weatheroffice.ec.gc.ca). Comparison of the measured air temperatures at the two stations for 29 years of the overlapped periods with complete data indicated that the monthly air temperatures at Carmacks are generally warmer than those at Pelly Ranch. The two stations are located at similar elevations (an average of approximately 490 m), which is lower than the toe of the tailings placement area at an elevation of approximately 760 m. Johnston (1981) reported that climatologists typically estimate a 6°C decrease in temperature for every kilometre increase in elevation for mountain slopes. Therefore, the long-term mean monthly air temperatures at the Minto site for the design were first estimated by interpolating the long-term mean monthly air temperatures at Pelly Ranch and Carmacks based on the distances to the Minto site and then adjusted for the temperature change due to the elevation difference of 270 m. Accordingly, the estimated mean annual air temperature at the Minto site is -5.1°C.

The measured air temperatures for the period from early-September 2005 to mid-July 2006 at the Minto site were warmer (about 1°C in long-term mean annual air temperatures) than the estimated long-term mean values. However, the limited short-term measured air temperatures are not sufficient to verify or adjust the estimated long-term mean values used for the design.

5.5.2 Wind

Long-term mean wind speed data are not available at the Pelly Ranch and Carmacks stations. The mean wind speed data for the design was estimated by averaging those from four meteorological stations in the Yukon: Burwash, Mayo, Watson Lake, and Whitehorse (http://www.climate.weatheroffice.ec.gc.ca). Measured wind speed data from the Minto site were available for a short period (September 2005 to July 2006). Comparison of the monthly wind speed data indicated that the estimated wind speeds are similar to the measured during the summer of 2006 and higher than the measured during the winter of 2005.

5.5.3 Snow

Snow depth surveys at the Minto site were conducted in March, April and May of 1994, 1995, 1998, and 2006. The mean monthly snow depths in March, April and May for the design were estimated by averaging the measured monthly values. The mean monthly snow depths for the other months were estimated based on the mean monthly snow depths at Mayo and then adjusted for the measured snow depth differences between the two sites between March and May. Mayo, located approximately 120 km northeast of the Minto site, is situated in the same snow-depth contour zone as the Minto site based on the snow depth maps presented in Natural Resources Canada's webpage (http://atlas.nrcan.gc.ca).

5.5.4 Solar Radiation

Norman Wells and Whitehorse are the closest stations to the Minto site (latitude of 62°36') with long-term solar radiation data. Norman Wells (latitude of 65°17') is located about 580 km northeast of the Minto site and Whitehorse (latitude of 60°43') is located about 220 km southeast of the Minto site. The mean monthly solar radiation data at the Minto site for the design were estimated by interpolating the long-term mean monthly solar radiation data at Norman Wells and Whitehorse based on the latitudes of the three sites. Measured solar radiation data were available at the Minto site for the period from September 2005 to July 2006. The measured monthly solar radiation data were similar to the estimated.

5.6 HYDROLOGY

Two hydrologic report documents were reviewed during the design to establish the hydrologic site conditions.

- A memorandum by Clearwater Consultants Ltd. entitled "Memorandum CCL-MC1" dated December 4, 2006.
- A report by Hallam Knight Piesold entitled "Minto Creek Surface Hydrology Report" dated November 1994.

Information found in Clearwater 2006 memorandum tends to address average flows and is intended for use in water balance calculations. The design of any diversion or routing structures should be conducted for a peak instantaneous flow.

Hallam Knight Piesold 1994 is a more comprehensive hydrology report and contains a section on peak instantaneous flows for several return intervals, which are specific to the DSTSF. Data presented in this section is described in more detail in Hallam Knight Piesold 1994.

5.6.1 Hydrological Conditions

A regional analysis was conducted on data presented in Hallam Knight Piesold 1994 to determine the peak instantaneous flow rates for six sub-catchment areas in the DSTSF. These six sub-catchment areas are presented in Figure 4. The peak instantaneous flow rates for the six sub-catchments of the tailings facility are presented in Table 5.

TABLE 5: SUB-CATCHMENT AREA FREQUENCY ANALYSIS

Return Period (years)	Peak Instantaneous Flow Rates (m^3/s)							
	Total West Portion	Lower West	Upper West	Upper Southwest	Total East Portion	Lower East	Upper East	Upper Southeast
2	**0.33**	0.16	0.13	0.17	**0.27**	0.13	0.14	0.11
10	**0.56**	0.27	0.22	0.29	**0.45**	0.22	0.23	0.18
25	**0.69**	0.33	0.27	0.35	**0.56**	0.27	0.28	0.23
50	**0.83**	0.40	0.33	0.43	**0.68**	0.32	0.34	0.28
100	**0.85**	0.41	0.34	0.44	**0.69**	0.33	0.35	0.28
200	**0.91**	0.43	0.36	0.47	**0.74**	0.35	0.37	0.30

5.7 SEISMICITY

Information regarding seismicity for the Minto Mine was provided by the Canadian Geological Survey Pacific Geosciences Centre. The mine site is characterized as being in Acceleration Zone 3 and Velocity Zone 4. An acceleration of 0.055 g would have a 10% probability of being exceeded in 50 yrs, which equates to an annual probability of exceedance of 1/475. This probability of exceedance was used in the DSTSF design.

When work was originally undertaken on the mine site in the late 1990's, the Canadian Geological Survey Pacific Geosciences Centre provided a value for the peak horizontal acceleration for the site of 0.15 g (10% probability of being exceeded in 50 yrs). An updated value for the site has been provided by the Pacific Geosciences Centre and the current peak horizontal acceleration that corresponds to a 10% probability of exceedance in 50 years is 0.055g. The reasoning for the decrease in the peak ground acceleration provided by the Pacific Geosciences Centre is due to the fact that seismic data information has increased substantially in the Yukon in recent years. A better understanding of ground motion and improved modelling has resulted in revised predictions, which are considered to be more accurate and representative for the mine site.

5.8 TAILINGS CHARACTERISTICS

5.8.1 Tailings Production

The life of mine plan during the design indicated that the total production of tailings would be in the order of 5,517,000 tonnes during the eight year mine life. The anticipated tailings production by year (based on the 2006 Hatch mine plan) is presented in Table 6.

TABLE 6: ANTICIPATED TAILINGS PRODUCTION

Year	Production (tonnes)
1	489,940
2	766,960
3	812,350
4	824,930
5	820,160
6	836,690
7	847,600
8	118,330
Total	**5,516,950**

5.8.2 Tailings Characterization

EBA undertook two separate laboratory programs to evaluate the geotechnical properties of a tailings sample provided by Minto. A summary of the laboratory test results is presented in Table 7.

TABLE 7: TAILINGS LABORATORY TEST RESULTS

Type of Test	Results
Particle Size Distribution	Clay: 6%, Silt: 35%, Sand 59% Clay: 7%, Silt: 36%, Sand 57%
Specific Gravity Determination	Specific gravity of solids: 2.79
Atterberg Limits	Liquid Limit: 23, Plastic Limit: 16, Plasticity Index: 7 Liquid Limit: 20, Plastic Limit: 16, Plasticity Index: 4
Moisture Density Relationship	Optimum moisture content: 17.5%, Maximum Dry Density (MDD), standard effort: 1685 kg/m^3
Constant Head Permeability Test	$k = 9.65 \times 10^{-8}$ m/s
Direct Shear Test	Peak Strength: $\theta' = 35.1°$, $c' = 11$ kPa

Note:

The above tests report moisture content as a percentage ratio of the mass of water divided by the mass of dry solids, this is consistent with geotechnical engineering practice.

5.8.3 Acid Generation Potential

Results from static ABA testing of tailings solids by Lakefield Research in 1977 (one sample) and 1994 (three samples) indicate that tailings from milling both the higher and lower grade ores will be acid consuming, with NP/AP ratios from 8.15:1 to 19.85:1. This indicates that acid-generation should not be an issue with the tailings material produced.

6.0 REGULATORY REQUIREMENTS

6.1.1 Regulatory Agencies

The regulatory agencies involved in the operation, maintenance, and surveillance of the DSTSF include:

Mineral Development, Energy, Mines and Resources

- To the Chief: Director, Mineral Resources, Department of Energy, Mines and Resources, P.O. Box 2703, Whitehorse, Yukon, Y1A 2C6, (fax) 867.456.3899

Yukon Water Board

- To the Water Board: Yukon Water Board, Suite 106, 419 Range Road, Whitehorse, Yukon, Y1A 3V1, (fax) 867.456.3890

6.1.2 Regulatory Approval

The DSTSF is authorized with the following document:

- A letter entitled, "Approval of Minto Mine Tailings Management Plan", dated April 17, 2007.

6.1.3 Regulatory Requirements

The regulatory requirements for the DSTSF are outlined in the following document:

- A letter entitled, "Approval of Minto Mine Tailings Management Plan", dated April 17, 2007.

7.0 OPERATION

7.1 OBJECTIVE

Operation of the DSTSF comprises of the on-going construction of the facility and its related components. Construction of the tailings stack itself occurs daily where as the other DSTSF components, the starter bench and drainage blanket, finger drains, surface water diversion berm, waste rock shell, instrumentation, and reclamation material, are completed on a specific project basis. The timeline for construction of these components is based on the upcoming year's tailings placement plan. The airstrip road diversion ditch was constructed in 2006. Instrumentation for the west portion of the DSTSF was installed in November 2007.

Operations of the DSTSF must ensure the following:

- The basis of design remains valid and design criteria are being achieved;
- Changes in the mine plan, milling throughput, and filtering operations are accounted for; and
- Construction planning takes into consideration restrictions on availability of construction materials and time of year construction requirements.

The Mine Manager and the Construction Monitors are responsible for overseeing the general construction of the DSTSF with the support of the geotechnical and environmental consultants. The Construction Superintendent is in charge of completing day to day tailings placement and compaction and specific component projects as required.

7.2 DSTSF CONSTRUCTION PLAN

7.2.1 Design Life Construction Plan

The ultimate footprint of the DSTSF and the location of its components are presented in Figure 1. Figure 2 presents the instrumentation details while Figure 3 presents the typical cross sections for the DSTSF.

Based on Phase 2 mill throughput, the ore reserves of the Minto Pit - Optimized Mine Plan, August 2007 will be expended in the first quarter of 2013 (Year 7).

7.2.2 Annual Construction Plan

The anticipated tailings production schedule based on Phase 2 mill throughput and the 2007 Optimized Mine Plan is shown in Table 8.

TABLE 8: TAILINGS PRODUCTION SCHEDULE – PHASE 2 MILL THROUGHPUT

Year	Production (dry tonnes)
2007	113,000
2008	800,000
2009	830,000
2010	855,000
2011	875,000
2012	873,000
2013 Q1	215,000
TOTAL	4,561,000

Table 9 details Minto's plans for the ongoing construction of the DSTSF.

TABLE 9: ANNUAL CONSTRUCTION PLAN

Year	Details
2007	Starter bench and drainage blanket constructed from Sta. 0+000 to 0+415. The 75 mm filter material on the upstream slope is still required from Sta. 0+290 to 0+415. Finger drains within west portion constructed. Tailings placement between Sta. 0+000 to 0+280 south of the drainage blanket.
2008	Ground surface preparation in the winter of 2008 for construction of the starter bench, drainage blanket, finger drains and 2008 tailings placement area. Construct starter bench, drainage blanket, and finger drain requirements to full DSTSF extent. Continue tailings stack expansion to east, with emphasis on summer construction in downstream zones of tailings stack within vicinity of ultimate slope.
2009	Continue raising tailings stack and downstream waste rock shell, construction not to exceed 3m total tailings fill for construction season.
2010	Continue raising tailings stack and downstream waste rock shell, construction not to exceed 3m total tailings fill for construction season.
2011	Continue raising tailings stack and downstream waste rock shell, construction not to exceed 3m total tailings fill for construction season.
2012	Continue raising tailings stack and downstream waste rock shell, construction not to exceed 3m total tailings fill for construction season.
2013 Q1	Continue raising tailings stack and downstream waste rock shell, construction not to exceed 3m total tailings fill for construction season.

7.2.3 Contingency Plan

Daily monitoring and observational approaches are expected to forewarn of potential adverse conditions that may be a result of thaw induced deformation. These include, but are not limited to: excessive tension cracking on the construction surface, visible slope deformation on the downstream sideslope of the waste rock shell, and scarping on the construction surface, and monitoring of instrumentation. These kinds of observations would trigger geotechnical engineering support and increased measurement frequencies of the instrumentation.

Severity triggers are not easily defined and therefore any conditions and/or trends observed to be uncharacteristic would be handled with urgency to seek a better understanding of risk. Once the risk has been defined, appropriate steps can be engineering and implemented to rectify any nonconformance.

7.3 DSTSF CONSTRUCTION COMPONENTS

7.3.1 Starter Bench and Drainage Blanket

7.3.1.1 Ground Surface Preparation

Surface preparation within the starter bench and drainage blanket footprint is limited to the sequential flattening and removal of trees. This must be completed in the winter with the standing trees being sheared off just above the ground surface. Minimal disturbance to the ground surface is required to protect the underlying permafrost foundation material. Trees that are removed should be stockpiled (not burnt) and then placed against the toe of the starter bench, for additional permafrost preservation.

7.3.1.2 Material Composition and Placement

The starter bench and drainage blanket are constructed with select waste rock material from the development of the open pit. The drainage blanket is then covered with 75 mm filter material or equivalent to act as a separator between waste rock material and overlying tailings. This material will act as a filter for the tailings and restrict it from infiltrating the coarser waste rock material. The use of a properly bedded heavy-weight non-woven geotextile may be used in lieu of the 75 mm filter material. The starter bench does not require a filter material as the waste rock shell will be constructed above it, which is comprised of the same waste rock material.

The waste rock material is specified to have a nominal size of 300 mm, and the fines (< 0.080 mm sieve size) content must be less than 5% by weight. The maximum particle size allowed is 1.0 m, or as approved by the Engineer. It should be placed and compacted in maximum 1.5 m lifts. Compaction of this material is achieved by routing heavy equipment (i.e. haul trucks,) evenly over each lift. A minimum of 5 passes is recommended. This material must be placed in a manner that will minimize segregation or nesting of coarse particles. The effectiveness of this construction technique will be evaluated in the field by the Geotechnical Engineer and changes to the construction procedure will be made as required. Boulders greater than 750 mm size should be removed from the fill as much as practically possible and pushed to the slope face.

The 75 mm filter material must be well-graded sand and gravel with a 75 mm maximum aggregate size and a fines content (< 0.080 mm sieve size) limited to 15%. The recommended gradation for the filter material is shown in Table XX, or other materials as approved by the Engineer.

TABLE 10: RECOMMENDED GRADATION OF 75 mm FILTER MATERIAL

Sieve Size (mm)	% Passing by Mass
75.0	100
25.0	65 – 100
12.5	50 – 100
5.0	35 – 90
0.825	17 – 50
0.425	10 – 35
0.160	2 – 23
0.080	0 – 15

The 75 mm filter material is to be placed in maximum lift thicknesses of 300 mm, with each lift compacted at existing moisture content to approximately 95% of MDD.

7.3.2 Surface Water Diversion Berms

7.3.2.1 Ground Surface Preparation

Surface preparation within the surface water diversion berm footprint is limited to the sequential flattening and removal of trees. This must be completed in the winter with the standing trees being sheared off just above the ground surface. Minimal disturbance to the ground surface is required to protect the underlying permafrost foundation material. Trees that are removed should be stockpiled (not burnt) outside the berm footprint.

7.3.2.2 Material Composition and Placement

The 200 mm material will be used to construct the surface diversion berms. It must be a well-graded material with a nominal 200 mm maximum aggregate size and a fines content (< 0.080 mm sieve size) limited to about 15%, or as approved by the Engineer.

The 200 mm filter material for surface water diversion berms should be placed in maximum lift thicknesses of 400 mm and each lift compacted to approximately 95% of MDD.

7.3.3 Airstrip Road Diversion Ditch

The airstrip road diversion ditch was constructed in 2006 and will only require event-driven maintenance throughout the design life of the DSTSF.

7.3.4 Finger Drains

7.3.4.1 Ground Surface Preparation

Surface preparation within the finger drain footprint is limited to the sequential flattening and removal of trees. This must be completed in the winter with the standing trees being sheared off just above the ground surface. Minimal disturbance to the ground surface is required to protect the underlying permafrost foundation material. Trees that are removed should be stockpiled (not burnt) outside the finger drain footprint.

7.3.4.2 Material Composition and Placement

The finger drains are constructed with select waste rock material from the development of the open pit and then covered with 75 mm filter material or equivalent to act as a separator between waste rock material and the overlying tailings. This filter material will act as a filter for the tailings and restrict it from infiltrating the coarser waste rock material. The use of a properly bedded heavy-weight non-woven geotextile may be used in lieu of the 75 mm filter material.

The finger drain material must be free draining with a nominal size of 300 mm. To facilitate proper drainage, the fines (< 0.080 mm sieve size) content must be less than 5% by weight. The maximum particle size allowed will be 600 mm, or as approved by the Geotechnical Engineer.

The finger drain material should be placed and nominally compacted to ensure rock-on-rock contact, as directed by the Geotechnical Engineer. This material must be placed in a manner that will minimize segregation or nesting of coarse particles. The effectiveness of the construction technique will be evaluated in the field by the Geotechnical Engineer and changes to the construction procedure will be made as required.

The 75 mm filter material must be well-graded sand and gravel with a 75 mm maximum aggregate size and a fines content (< 0.080 mm sieve size) limited to 15%. The recommended gradation for the filter material is shown in Table 10 (above), or other materials as approved by the Engineer.

The 75 mm filter material should be placed in maximum lift thicknesses of 300 mm, with each lift compacted at existing moisture content to approximately 95% of MDD.

7.3.5 Waste Rock Shell

7.3.5.1 Ground Surface Preparation

Ground surface preparation is not required for the waste rock shell as it is founded on the starter bench.

7.3.5.2 Material Composition and Placement

The waste rock shell is constructed with select waste rock material from the open pit development. A 300 mm layer of 75 mm filter material or equivalent must be placed on the inside of the waste rock shell on the tailings sideslope to act as a separator between waste rock material and tailings. This filter material will act as a filter for the tailings and restrict it from infiltrating the coarser waste rock material. The use of a properly bedded heavy-weight non-woven geotextile may be used in lieu of the 75 mm filter material.

The waste rock material is specified to have a nominal size of 300 mm, and the fines (< 0.080 mm sieve size) content must be less than 5% by weight. The maximum particle size allowed is 1.0 m, or as approved by the Engineer. It should be placed and compacted in maximum 1.5 m lifts. Compaction of this material is achieved by routing heavy equipment (i.e. haul trucks,) evenly over each lift. A minimum of five passes is recommended. This material must be placed in a manner that will minimize segregation or nesting of coarse particles. The effectiveness of this construction technique will be evaluated in the field by the Geotechnical Engineer and changes to the construction procedure will be made as required. Boulders greater than 750 mm size should be removed from the fill as much as practically possible and pushed to the slope face.

The 75 mm filter material must be well-graded sand and gravel with a 75 mm maximum aggregate size and a fines content (< 0.080 mm sieve size) limited to 15%. The recommended gradation for the filter material is shown in Table 10 (above), or other materials as approved by the Engineer.

The 75 mm filter material should be placed in maximum lift thicknesses of 300 mm, with each lift compacted at existing moisture content to approximately 95% of MDD.

7.3.6 Tailings Stack

7.3.6.1 Ground Surface Preparation

Surface preparation within the tailings footprint, excluding the drainage blanket area, is limited to the sequential flattening of trees. This must be completed in the winter with the standing trees being sheared off just above the ground surface. Minimal disturbance to the ground surface is required to protect the underlying permafrost foundation material.

7.3.6.2 Material Composition and Placement

The composition of the tailings is subject to the milling and filtering processes. Milling operations, particularly the ore crushing and grinding system, are not subject to dramatic changes; therefore, the particle size distribution of the tailings is fairly consistent. Any planned changes in grinding will be monitored closely against tailings particle size distribution, moisture content, and compaction performance. Some variation will be the result of the variability in the host rock ore. The filter system is to produce the dry stack tailings to have a solids content of 83% for the solid-water mixture when delivered to the DSTSF.

The tailings should be placed in maximum lift thicknesses of 500 mm, with each lift compacted to no less than 95% of MDD.

7.3.7 Reclamation Material

7.3.7.1 Ground Surface Preparation

No ground surface preparation is required prior to the placement of the reclamation material.

7.3.7.2 Material Composition and Placement

The reclamation material will comprise select overburden material sourced during open pit development. It must provide a suitable growth medium for revegetation. Some reclamation material to be used for progressive reclamation of the DSTSF is currently stockpiled between the ore stockpiles and the exploration camp on the downstream slope of the Airstrip Road.

The reclamation material should be graded and nominally compacted to prevent surface erosion.

7.3.8 Proposed Emergency Discharge Tailings Structure

During the intial operations of the Tailings Filter Building, there were infrequent shortfalls in the filtering system that required the underflow (slurry tailings) to be removed from the circuit. This slurry tailings was hauled and placed within the Ice Rich Overburden Dump. Once the slurry drains to tailings solids at a moisture content around 15 % to 20 % (similar to DSTSF tailings), it is removed and hauled to the DSTSF and placed and compacted as dry stack tailings.

Although the filtering system is currently operating without any shortfalls, Minto is proposing to design and construct an Emergency Discharge Tailings Structure within the vicinity of the DSTSF. This proposed structure is being designed by EBA and, should it be permitted and constructed, will become a component of the DSTSF.

7.4 EQUIPMENT USED FOR CONSTRUCTION

The mining contractor, Pelly Construction, will provide the necessary tools for all aspects of construction to achieve the design criteria of DSTSF. Table 11 lists typical equipment employed in the construction of the DSTSF.

TABLE 11: CONSTRUCTION EQUIPMENT

Unit	Use
Cat 988 Wheel Loader	Loading tailings from stockpile at the tailings filter building into the haul truck
Cat D8/D9 Dozer	Spreading of construction material and construction of components
Cat 740 Articulated Rock Truck	Hauling tailings from stockpile to the DSTSF
Cat 777/769 Rock Truck	Hauling waste rock, 75 mm filter material, 200 mm material and reclamation material to the DSTSF
Cat 573 Packer	Packing placed tailings to achieve design criteria
Cat 14G/16G Grader	Clearing and leveling lifts for general erosion control and snow removal

7.5 ADVERSE OPERATING CONDITIONS

Potentially adverse conditions must be accounted for in the operation of the DSTSF. These conditions, along with mitigative measures of dealing with them, are as follows.

- High Rainfall
  - Erosion control – grade control and compaction of tailings stack during construction to seal lifts and prevent pooling of water.
  - Compaction – may require drying out material prior to achieving compaction. At the discretion of the Geotechnical Engineer, material requiring additional compactive effort will be moved to less critical areas of the DSTSF; i.e. south portion of the placement area away from the ultimate tailings slope, if required.
- High snow accumulation
  - Removal prior to lift placements.
  - Snow dumps will be sited to minimize any erosional impacts during thaw conditions.
- Freezing temperatures
  - Location of placement – south portion of placement area away from the ultimate tailings slope as compaction prior to freezing problematic.
  - Compaction – must be completed prior to the tailings freezing
- Tailings Characteristics (higher moisture)
  - Location of placement – south portion of placement area away from the ultimate tailings slope
  - Compaction – may require drying out material prior to achieving compaction. At the discretion of the Geotechnical Engineer, material requiring additional compactive effort will be moved to less critical areas of the DSTSF; i.e. south portion of the placement area away from the ultimate tailings slope, if required.

7.6 SURFACE WATER MANAGEMENT

Run on surface water entering the DSTSF is managed through the construction of the surface water diversion berm and the Airstrip Road diversion ditch.

Surface water within the DSTSF is managed with the construction of the starter bench, drainage blanket, and finger drains, and ensuring the tailings stack is graded to reduce the potential of surface erosion and direct any surface water to areas in which it can drain away from the facility.

Snow is to be removed from the tailings stack throughout the winter; therefore, the potential for surface water issues during spring thaw will be greatly reduced.

7.7 ENVIRONMENTAL PROTECTION

A paramount consideration in minimizing the damage due to an unforeseen event is the reliance on as many people as possible to be watchful for possible problems or upset conditions at the facility. It is every employee's responsibility to report a suspected spill or uncontrolled release event to their supervisor. This includes suspicious flows of water out of the area, escaping tailings, turbid creek water, etc. The significance of multiple sets of eyes is the reality that time plays a critical role in being able to mitigate an emergency situation, should one arise. The sooner appropriate persons can begin to correct a situation, the less likely it is that severe impacts will follow.

Given that the tailings are placed in an unsaturated state and filter materials are a part of the design to restrict the tailings from transport, it is not likely that any tailings will be released from the DSTSF. Although unlikely, any tailings that are released from the DSTSF would eventually report to the pond above the Water Retention Dam.

7.8 HEALTH, SAFETY, AND SECURITY

The Minto Mine is located in a remote setting approximately 240 km northwest of Whitehorse and is accessed either by land via the North Klondike highway and the radio controlled Minto access road or by air. Access by land requires crossing the Yukon River; this is completed by barge in the summer and ice road in the winter. There is a short period of time in the spring and fall that land access is not possible, as neither the ice road nor barge is available for use. The mine site is not subject to general public traffic.

Access roads from the mill site to and around the DSTSF are shown on Figure 1.

Established communication throughout the mine site and the DSTSF consists of short wave radio.

All personnel working at the DSTSF, including contractors, are to have an appropriate understanding of the OMS manual and their respective roles and responsibilities. It is the role of the specific supervisor of the personnel to ensure this is the case. In addition to the general understanding of the OMS manual, it is the responsibility of all personnel involved in the construction of the DSTFS to be continually vigilant of changes reflecting facility performance. Anything observed to be outside of normal operating parameters, as outlined in this manual, are to be reported immediately to the Mine Manager.

The tailings materials themselves contain trace amounts of reagents added in the milling process. These reagents include, but may not be limited to, Flomin F500 (frother), AE4270 (polymer), AE4330 (polymer) and C3505 (better known as PAX). As a general precaution, it is recommended that any worker handling or coming into contact with the tailings wash there hands prior to ingesting any food. Further information regarding these reagents is available in the MSDS compilations found around site and in the Mine Manager's office.

Workplace safe operating procedures will be inplace for those working in the area.

7.9 DOCUMENTATION

The following table identifies the overall responsibilities for operational record keeping completed by Minto personnel:

TABLE 12: DSTSF OPERATIONS DOCUMENTATION

Task	Responsible Party	Information Recipients
Daily Dry Tailings Production	Completed by Mill Operations – under Mill Superintendent	Mine Manager – copy; Minto Mill Engineering Server
Daily Construction Activity	Construction Superintendent	Mine Manager – copy; Original with Pelly Construction
Daily Check Sheet	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server
Monthly Placement As built	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server
Instrumentation Data	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server
Construction Photographs	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server

All consultants' reports are retained in the Mine Manager's files. Consultants' reports include, but are limited to, the following:

- Particle size distribution testing for construction materials;
- Moisture density relationship testing for construction materials;
- Density testing on placed tailings; and
- Water quality monitoring.

7.10 REPORTING

Any observations through the daily monitoring of the facility that identify significant change in the condition of the facility, or that the design criteria are not being achieved should be reported to the Mine Manager, the facility designer, and the geotechnical consultant.

Changes to the on-going operations of the DSTSF should be reported to the facility designer and the geotechnical consultant.

Any environmental changes to the DSTSF should be reported to the environmental consultant and the Manager of Regulatory & Corporate Affairs.

8.0 MAINTENANCE

8.1 OBJECTIVE

The objective of the maintenance program is to maintain the DSTSF in accordance with all the performance criteria, legislative requirements, Minto company standards, and sound operating practices.

Maintenance for the DSTSF is limited to the heavy equipment used for the on-going construction and the DSTSF components themselves. Maintenance of the heavy equipment could consist of routine, predictive, and event-driven maintenance and will be managed by the Construction Superintendent. Maintenance for the DSTSF components is strictly event-driven maintenance and will result from inspections completed by the Construction Monitor, Mine Manager, or the geotechnical consultant.

8.2 MAINTENANCE PROCEDURES

A preventive maintenance program is in place for the heavy equipment used by the contractor at the DSTSF under the direction of the Construction Superintendent. This program is the direct responsibility of the contractor. Event-driven maintenance for the heavy equipment would be due to breakdowns or incidents. Whether a piece of equipment is down due to preventive, routine, or event-driven maintenance, other equipment on site can be made available for use at the DSTSF as required.

Event-driven maintenance to the DSTSF components will be directed by the Construction Monitor or Mine Manager under the consultation of the facility designer and geotechnical consultant. The actual maintenance program completed will depend on the severity of the occurrence.

8.3 DOCUMENTATION

Record keeping and documentation the any heavy equipment maintenance is the responsibility of the Construction Superintendent.

Event-driven maintenance for a DSTSF component is the responsibility of the Construction Monitor. It involves completion of inspection reports and depending on the severity of the event involves the geotechnical consultant. Documentation of any maintenance completed will be used to access the performance of the specific component and determine whether the design, operation, or surveillance of that component must be adjusted.

8.4 REPORTING

Reporting of any heavy equipment maintenance is limited to a specific request by the Mine Manager to the Construction Superintendent.

Inspection reports and any other documentation regarding event-driven maintenance for a DSTSF component should be submitted to the facility designer and geotechnical consultant to determine whether any adjustments to the design, operation, or surveillance are required.

9.0 SURVEILLANCE

9.1 OBJECTIVE

Surveillance involves inspection and monitoring of the operation, structural integrity, and safety of a DSTSF, and must be consistent with the life cycle and regulatory requirements of the facility. Surveillance of the DSTSF consists of both routine and event-driven activities.

Key surveillance parameters and procedures must be identified for:

- Monitoring the operation, safety, and environmental performance of the DSTSF;
- Promptly identifying and evaluating deviations from expected behaviour that affect operation safety, structural integrity, and environmental performance of the facility; and
- Reporting significant observations for response.

The DSTSF surveillance program will continue to evolve as the facility changes in design or performance criteria, site conditions and/or the operation it is accommodating.

All personnel working at the DSTSF will be involved in surveillance as a routine part of daily activities, maintaining visual awareness of the facility in the course of their regular and/or routine duties, in addition to surveillance-specific site engineering, instrument monitoring, analysis, inspection, periodic review and oversight.

It is the combination of all the regular inspections assisted by the eyes of all site personnel that ensures continued integrity and performance of the facility.

Outside consultants will also be on site periodically inspecting the facility as part of a regular program of expert review.

9.2 RESPONSIBILITY

A number of personnel conduct routine inspections of the DSTSF. The Construction Monitor, or his designated replacement is assigned the responsibility of obtaining the monitoring information and preparing a monthly report for the facility designer and geotechnical consultant to review.

9.3 SURVEILLANCE PARAMETERS

Key parameters of surveillance are identified through identifying and describing potential failure modes of the DSTSF.

Visual observations of the DSTSF can indicate potential failure modes such as:

- Surface – cracking, bulging, depressions, sink holes;
- Seepage – new seepage areas, changes in seepage areas;
- Turbid water in the natural drainages around or downstream of the facility;
- Water or tailings flowing down the stack indicating improper grading; and

- A failure or breach of a component of the facility.

Routine monitoring for ensuring facility performance include:

- Checking for settlement or holes in embankment crest or benches;
- Checking for holes on the surface of the tailings indicating possible piping of material to outside;
- Measuring piezometer pore pressures in the foundation soils during operation;
- Measuring ground temperatures using cables in the foundation soils during operation;
- Surveying DSTSF components - displacements of waste rock shell and/or survey monuments;
- Water sampling of Minto Creek - quality in surrounding and downstream Minto Creek; and
- Recording weather conditions.

These parameters are further described in the following sections.

9.4 SURVEILLANCE PROCEDURES

Table 13 summarizes surveillance requirements for the components of the DSTSF as detailed in Minto's letter "QML-0001 – Minto Mine Tailings Management Plan, Additional Information" dated March 15, 2007. These surveillance requirements are the licensed monitoring requirements and conditions regarding the tailings presented in Minto's Quartz Mining and Water Use licenses.

TABLE 13: OPERATIONAL MONITORING SCHEDULE FOR DSTSF

Frequency	Provision	Source/Location	Personnel	Scope	Deliverable
Periodically During Construction	EBA Design Report and Quality Assurance Program	Entire Facility	Engineering Supervision	Follow monitoring and inspection procedures in Quality Assurance Program	Interim Reporting to Site Management with recommendations for construction process
Daily	WUL Application Table 10.2 – Operational Monitoring Program	Structure of the tailings (toe, dam, tailings, etc.)	Operational personnel	Visual assessment of tailings, diversion ditches, dam, diversion berms, and finger drains	Daily Log, included in annual report.
Daily	WUL Application – 5.2.9(d)	Tailings final runoff	Operational personnel	Visual inspection for suspended solids and erosion evidence, at W8 location	Daily Log, included in annual report.

TABLE 13: OPERATIONAL MONITORING SCHEDULE FOR DSTSF – CONT'D

Daily	WUL Application – 5.2.9(e)	Diversion ditches	Operational personnel	Visual inspection for failures (possible or occurring) with more frequent checks during spring breakup period	Daily Log, included in annual report.
Daily	WUL – Section 66 and WUL Application 5.2.9(a)	Tailings Material	Operational personnel	Record tailings moisture content	Daily Log, included in annual report.
Daily	WUL Appendix 6 ABA Test Program	Tailings Solids ABA Testing	Operational Personnel	Split a 200-500g sample from the daily 24-dried, metallurgical composite sample and retain in a plastic bag	Send a composite sample once per month to an accredited laboratory, as per Appendix C – evaluate results
Biweekly (May – Oct) Monthly (Nov – Apr)	EBA Design Report	Vibrating Wire Piezometer	Operational Personnel (Engineer review)	Record readings and submit to Engineer for review	Results included in annual report.
Monthly	EBA Design Report	Ground Temperature Cable	Operational Personnel (Engineer review)	Record readings and submit to Engineer for review	Results included in annual report.
Monthly	EBA Design Report	Settlement Monument Survey	Qualified Surveyor (Engineer review)	Record elevations and submit to Engineer for review	Results included in annual report.
Monthly	WUL Application Table 10.2 – Operational Monitoring Program	Tailings Seepage	Operational Personnel	Sample and lab analysis of tailings supernatant, inspect for seepage, estimate flow – at W8 regular sampling location	Representative samples shall be collected for laboratory analyses according to Set A[1] requirements outlined in the WUL.[2]
Monthly	EBA Design Report	Tailings Deposit	Operational Personnel	Confirm design moisture content density is being achieved	Results included in annual report.

TABLE 13: OPERATIONAL MONITORING SCHEDULE FOR DSTSF – CONT'D					
Quarterly	WUL Application 5.3.5 and License Appendix 6 ABA Test Program	Pit and Borrow Sources	Operational Personnel	ABA sampling and testing of potential material to be used for the construction of the starter bench/access road	Non acid generating material will be used as construction material for the tailings deposition area.[2]
Bi-annually (on or about June 1 and November 1)	WUL Application – 5.2.9(b)	Tailings Disposal Basin	Qualified surveyor	A surface profile of the tailings along the centre line of the tailings disposal basin	Map and written description of profile.[2]
Annually	QML – Section 9.3.2	Tailings Disposal Basin	Professional engineer licensed to practice in the Yukon	Thorough visual assessment and physical inspection of the tailings, review of monitoring data to confirm design assumptions, preparation of inspection report	Representative samples shall be collected for laboratory analyses of grain size distribution, densities and moisture content.[2] Submission of inspection report.
Annually	WUL – Section 67 and WUL Application 5.2.9(c)	Center Line of Tailings	Operational personnel	Full depth of tailings will be sampled at four stations along the center line.	Samples will be checked in the field for the presence of frozen tailings. Screen analyses will be done in the laboratory as a check on the homogeneity of the tailings and densities and moisture contents will be determined.[2]

Notes:

1 Set A - water quality analysis includes physical parameters, anions, nutrients, dissolved metals, total metals, and total suspended solids (Table 10.2 - WUL Application)

2 All results from the operation monitoring schedule will be included in the annual report to the Water Board

9.5 ADAPTIVE MANAGEMENT

Fundamental to successful adaptive management of the tailings production, handling and placement are triggers for management action. If the tailings handling and deposition is not meeting critical performance objectives according to specific conditions within either the WUL or the QML, the Mine Manager will be expected to follow Table 14 for appropriate corrective action. Close monitoring of the performance of the DSTSF will be critical in determining if and when action will be required. It is expected that improvements will be made to the system on an ongoing basis once initial operating experience has been gained.

TABLE 14: TRIGGERS AND ACTIONS UNDER ADAPTIVE MANAGEMENT FOR TAILINGS MANAGEMENT

Provision	Monitored Item	Triggers/Thresholds	Action
EBA March 2007	Vibrating Wire Piezometers P1, P2, P3, P4	Tip @ 1.0 m or 1.7 m depth - Porewater pressure parameter (Ru) exceeds 0.3	Engineer will review piezometer data. Monitoring and review will be increased to semi-weekly until determined unnecessary.
		Tip @ 1.0 or 1.7 m depth - Porewater pressure parameter (Ru) exceeds 0.4	Engineer will review existing piezometer data Engineer will conduct a site visit and determine if tailings placement and/or construction plan requires modification Monitoring and review will be increased to daily until determined unnecessary. Engineer will determine if additional instrumentation is required. Engineer will complete analysis of mitigative measures should exceedance continue.
EBA March 2007	Ground Temperature Cables T1, T2, T3, T4, T5	Temperature > 0°C at 1.5 m depth	Engineer will review temperature data.

TABLE 14: TRIGGERS AND ACTIONS UNDER ADAPTIVE MANAGEMENT FOR TAILINGS MANAGEMENT – CONT'D

EBA March 2007	Ground Temperature Cables T1, T2, T3, T4, T5	Temperature > 0^{o}C at 2.0 m depth and greater	Engineer will review existing temperature data Engineer will conduct a site visit and determine if tailings placement and/or construction plan requires modification Engineer will determine if additional instrumentation or analysis is required. Engineer will complete analysis of mitigative measures should exceedance continue. Minto to complete survey of area of interest to monitor any future displacement, if any.
EBA March 2007	Survey Monuments SM1, SM2, SM3, SM4	Displacements between 150 and 500 mm in any direction	Engineer will review survey data. Monitoring and review will be increased to bi-weekly until determined unnecessary. Minto to complete survey of area of interest to monitor any future displacement, if any. Engineer will determine if tailings placement and/or construction plan requires modification. Engineer will determine if additional instrumentation is required.

TABLE 14: TRIGGERS AND ACTIONS UNDER ADAPTIVE MANAGEMENT FOR TAILINGS MANAGEMENT – CONT'D

EBA March 2007	Survey Monuments SM1, SM2, SM3, SM4	Displacements greater than 500 mm in any direction	Engineer will review existing piezometer, temperature, and survey data. Engineer will conduct a site visit and determine if tailings placement and/or construction plan requires modification. Monitoring and review will be increased to semi-weekly until determined unnecessary. Minto to complete survey of area of interest to monitor any future displacement, if any. Engineer will determine if additional instrumentation is required. Engineer will complete analysis of mitigative measures should exceedance continue.
WUL – clause 47, revised for new tailings specification	Tailings Material Moisture Content	If tailings are less than 82% solids by weight	Evaluate filter operations to determine methods to increase efficiency in collecting water from mill slurry
WUL Physical Monitoring Program	Diversion Ditches	Presence of abnormal cracking or failure	Report to mine managers, take corrective action as required
None	Tailings Runoff	Visible turbidity in runoff and/or excessive erosion evidence	Address runoff at source Apply appropriate runoff, erosion or sediment control measures
WUL Appendix 6 – ABA Test Program	Tailings Solids	ARD potential is indicated	Expand monitoring program Conduct study of options to minimize acid generation
WUL Application s.5.3.5	Pit and Borrow Sources (Construction Material)	ARD potential is indicated	Change source material and use material without ARD potential

TABLE 14: TRIGGERS AND ACTIONS UNDER ADAPTIVE MANAGEMENT FOR TAILINGS MANAGEMENT – CONT'D			
WUL Application - Section 5.2.10 (b)	Tailings Surface Elevation	Survey indicates >3m/yr tailings placement	Stop tailings placement in that area. EBA review ground temperature data and assess permafrost development.
		EBA determines not sufficient freezing in area with >3m/yr placement	Regrade and compact tailings to comply with maximum of 3.0 m depth criteria. Re-survey/regrade/compact until tailings depth meets criteria.
WUL Application - Section 5.2.10 (c)	Tailings Cores along Centre Line	Tailings core characteristics not consistent with EBA's Design Report thermal modeling	Re-evaluate thermal model against existing conditions. EBA to re-assess implications to stability.

9.6 DOCUMENTATION

Routine reporting of surveillance results is essential to provide time to make adjustments to existing systems or to initiate Emergency Response Plans. It is imperative that any unusual information (outliers) gathered from these undertakings be communicated to the facility designer, geotechnical and/or environmental consultant.

Document control is vital to ensuring the on-going performance of the facility. The topic was presented in Section 3.0.

Table 15 identifies the overall responsibilities for surveillance record keeping:

TABLE 15: DSTSF SURVEILLANCE DOCUMENTATION

Task	Responsible Party	Information Recipients
Daily Check Sheet	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server
Monthly Placement As built	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server EBA - copy
Instrumentation Data	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server EBA - copy
Construction Photographs	Completed by Construction Monitor	Mine Manager – copy; Minto Mine Engineering Server
ABA Testing	Completed by Geology Dept	Mine Manager – copy; Minto Mine Engineering Server
Water Quality Monitoring	Completed by Environmental Consultant	Mine Manager and Yukon Water Board Original reports located with Manager of Regulatory and Corporate Affairs

9.7 REPORTING

Observation of any unusual occurrence should be reported immediately to the Mine Manager, facility designer, geotechnical, and/or environmental consultant. Unusual occurrences include but are not limited to the following;

- Triggers/Thresholds outlined in Table 14;
- Any seismic event;
- Settlement, cracks or slumping of the tailings stack;
- Slope failure of any of the slopes;
- Abnormal seepage from any of the slopes;
- Increased or high turbidity flow from the finger drains; and
- Damage to any component of the DSTSF.

All reports are to be maintained by the Mine Manager and filed in a suitable format and location for easy access by authorized mine personnel, and for review by government agencies. Annual performance reviews will be copied to the regulatory agencies.

The requirements of the consulting geotechnical engineer, other departments, or governmental agencies may dictate certain items that require inspection, monitoring, or reporting.

10.0 EMERGENCY PLANNING AND RESPONSE

10.1 MINTO EMERGENCY PROCEDURES

The mine site has established procedures and response plans detailing in the following reports:

- A report by Minto entitled "Minto Project Environmental Monitoring Plan", submitted for the Type A Water Use License 1996. The report is currently being updated.
- A report by Minto entitled "Minto Project Spill Contingency Plan", submitted for the Type A Water Use License 1996. The report is currently being updated.
- MSDS documentation for any material used within the DSTSF.

These documents provide the detailed plans on actions to be taken in case of an emergency. They also provide notification procedures.

10.2 DSTSF EMERGENCY PROCEDURES

Daily visual and routine instrumentation monitoring programs outlined in Tables 13 and 14 are expected to forewarn of potential adverse conditions to the DSTSF. Triggers/Thresholds presented in Table 14 must be adhered to and reported on as outlined.

The DSTSF has been designed to maintain its structural integrity throughout its operational life; however, a number of conditions can affect the performance of the DSTSF. Now that DSTSF operations are being completed and instrumentation data is available, the requirement for additional emergency procedures will be reviewed as a part of the 2008 DSTSF performance and OMS manual review.

10.3 ENVIRONMENTAL EMERGENCIES

Environmental emergencies of various natures and their specific response procedures are outlined in the project's Spill Contingency Plan. This document includes immediate response procedures and follow up and notification measures appropriate to the particular nature of the emergency.

10.4 KEY CONTACTS

10.4.1 Minto Contacts

General Number Phone: (604) 759-0860

Mine Manager: Dan Russell — Local 453, Mobile: (867) 334-1038

Construction Monitor: Stu Harris/Vacant — Local 442

Manager of Regulatory and Corporate Affairs: Bill Dunn — Work: (867) 456-8291, Mobile: (867) 334-5584

10.4.2 Facility Designer and Geotechnical Consultant

EBA Engineering Consultants Ltd – Whitehorse

General Numbers:	Phone: (867) 668-3068	Fax:	(867) 668-4349
Project Manager:	Jason Berkers	Work:	(867) 668-2071 x 233
Project Director:	Richard Trimble	Work: Mobile:	(867) 668-2071 x 222 (867) 334-1640

10.4.3 Environmental Consultant

Access Consulting Group Ltd.

General Numbers:	Phone: (867) 668-6463	Fax:	(867) 668-6680
Project Manager:	Scott Keesey		

10.4.4 Regulatory Agencies

Yukon Government – EMR, Mineral Resources Branch

Contact: Steve Colp Phone: (867) 456-3839 Fax: (867) 667-3193

Yukon Government – Water Resources Division

Contact:	Steve Colp	Phone: (867) 456-3839	Fax:	(867) 667-3193

Yukon Government – Environmental Programs Branch

Contact:	Ruth Hall	Phone: (867) 667-5851	Fax:	(867) 393-6205

Yukon Water Board

Contact:	Judy White	Phone: (867) 456-3890

10.4.5 Local Authorities

RCMP / Fire / Ambulance – Carmacks 911

10.4.6 Climatological Information

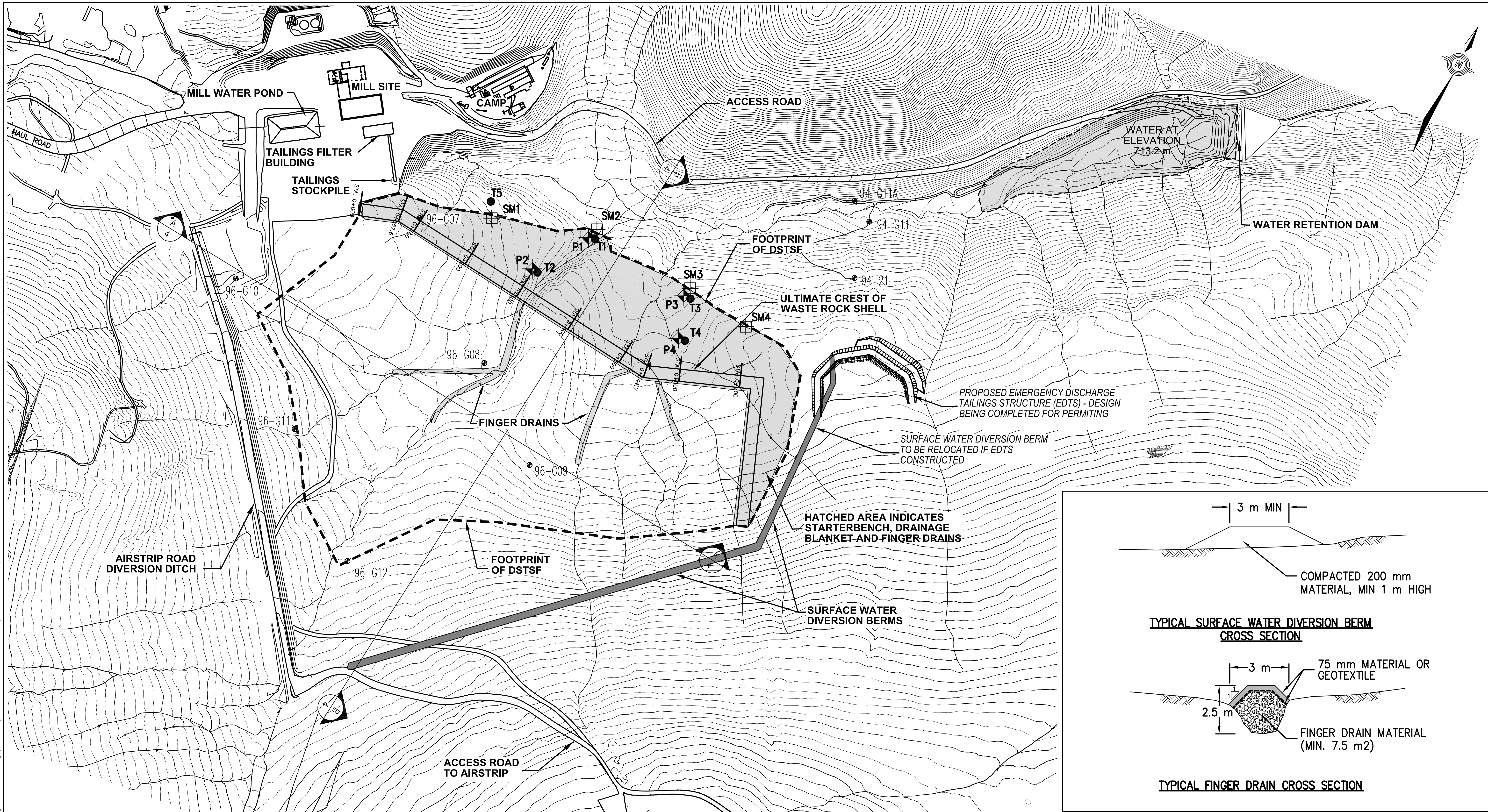
Environment Canada Weather office (weather forecasts):

http://weatheroffice.ec.gc.ca/canada_e.html

Pacific Geoscience Center (earthquake information):

http://www.pgc.nrcan.gc.ca/seismo/table.htm

FIGURES



LEGEND

- ● THERMISTOR LOCATION
- PIEZOMETER LOCATION
- ⊞ SURVEY MONUMENT LOCATION

0 200 400 600 metres

SCALE 1 : 6,000

CLIENT

Minto Explorations Ltd.

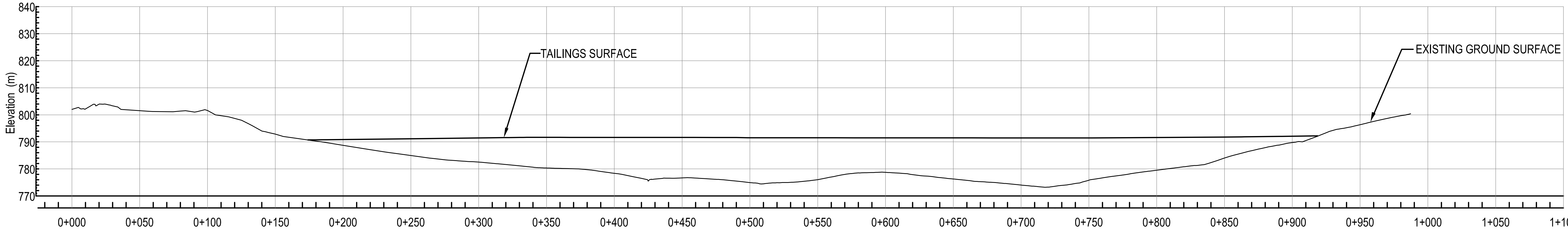
OMS Manual
Dry Stack Tailings Storage Facility
Minto Mine, YT

Site Plan and Details

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV
W14101068.001	KJT	JPB	0
OFFICE	DATE		
EBA-WHSE	December 19, 2007		

Figure 1



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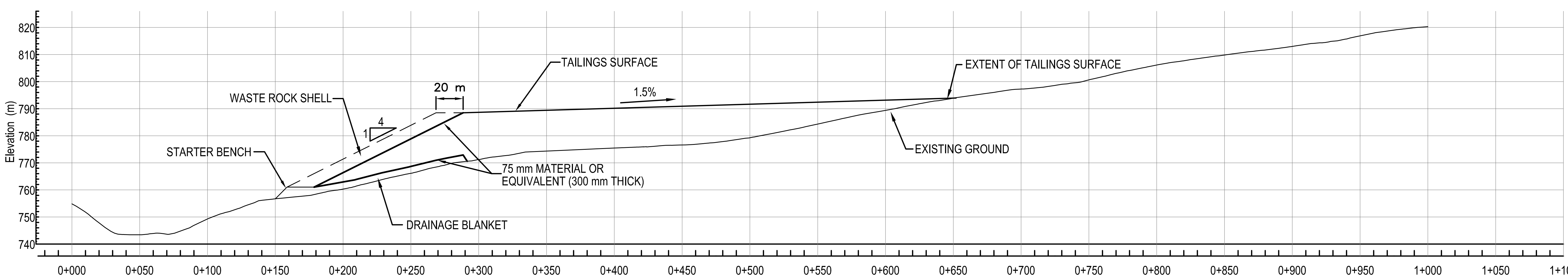

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Cross-Section B

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CLIENT Minto Explorations Ltd.	**OMS Manual** **Dry Stack Tailings Storage Facility** **Minto Mine, YT** **Typical Cross Sections**

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PROJECT NO.	DWN	CKD	REV	
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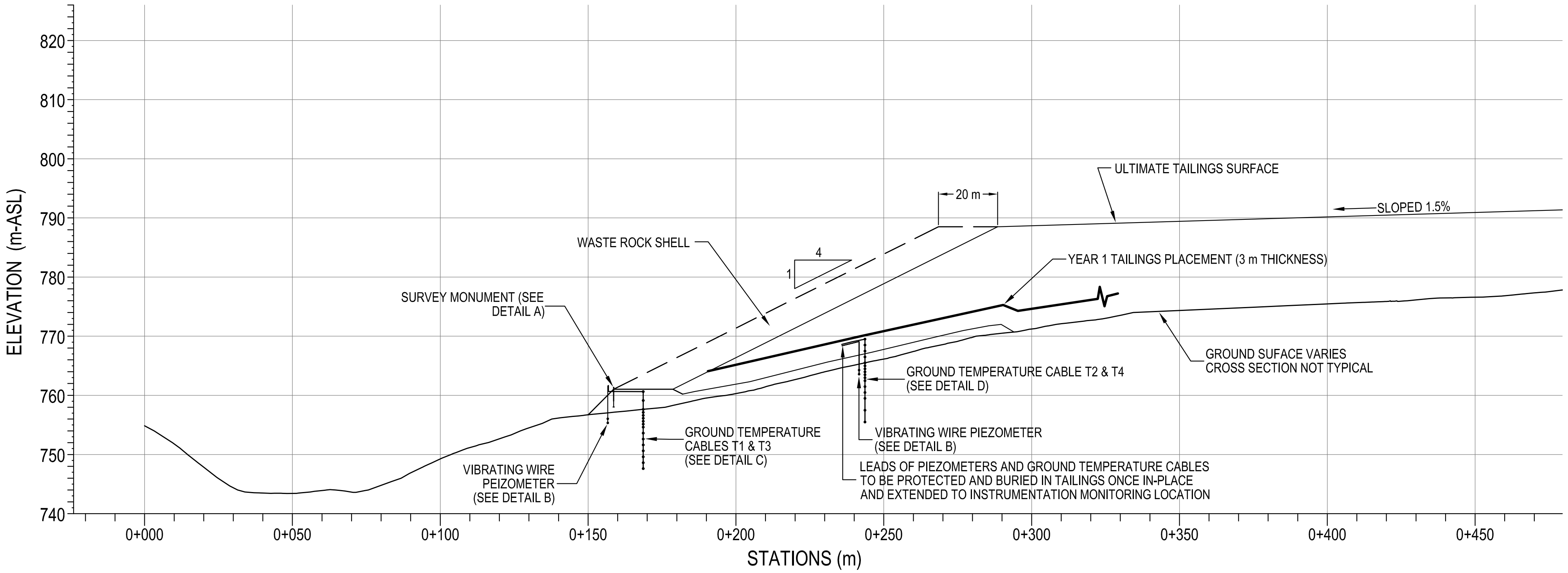
OFFICE: EBA-WHSE	DATE: December 19, 2007			



TYPICAL CROSS SECTION
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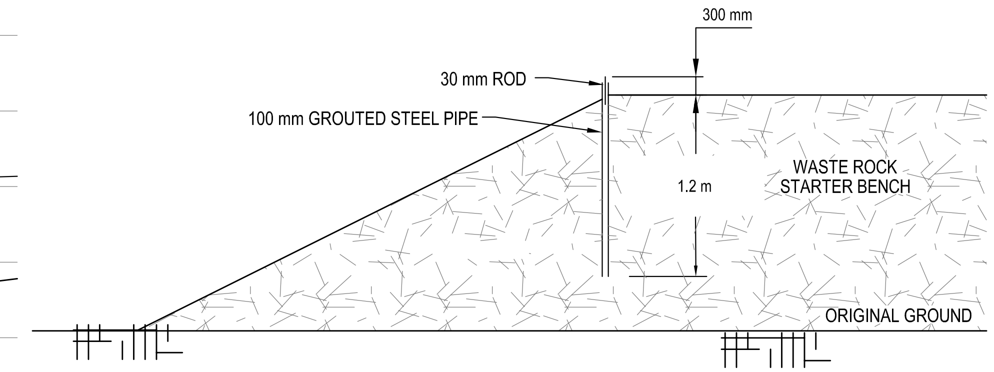
VERTICAL 1:1000



DETAIL A - SURVEY MONUMENT
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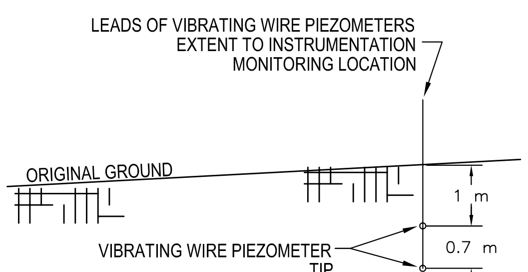

DETAIL B - VIBRATING WIRE PIEZOMETERS
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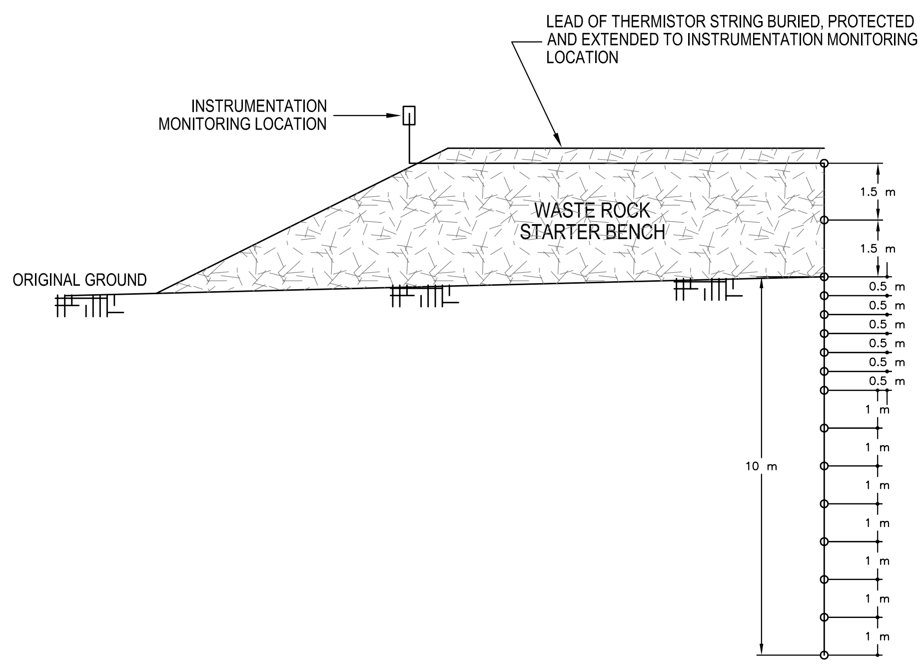

DETAIL C - GROUND TEMPERATURE CABLES T1 & T3
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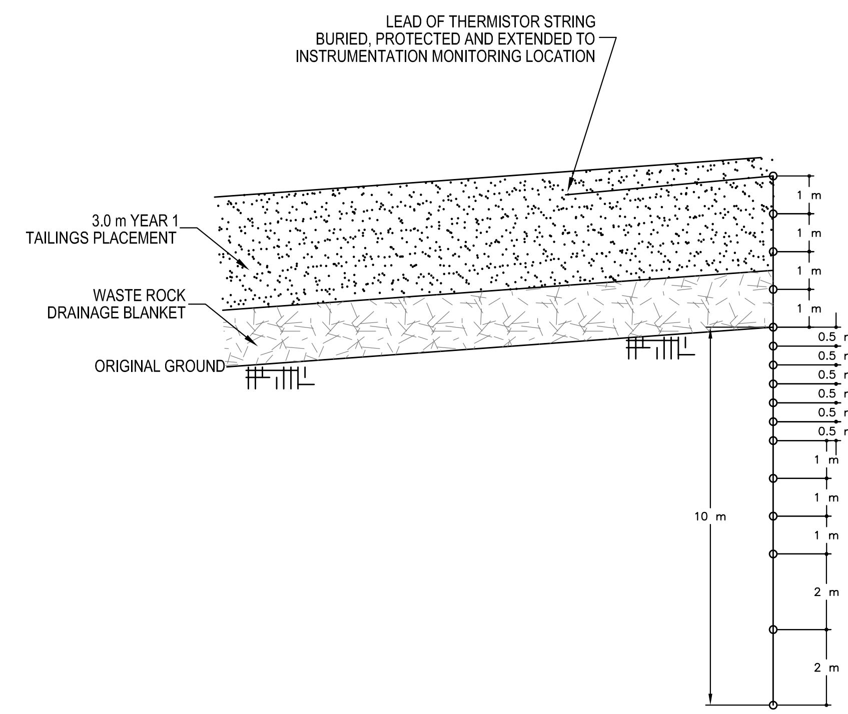

DETAIL D - GROUND TEMPERATURE CABLES T2 & T4
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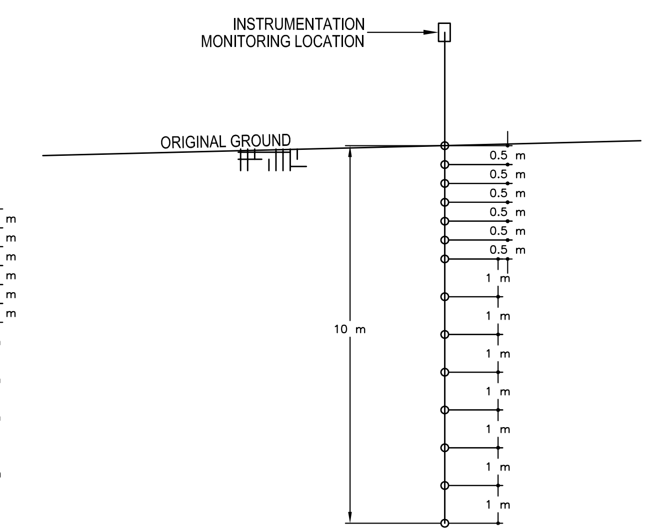

E/01 GROUND TEMPERATURE CABLE T5
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CLIENT	**OMS Manual** **Dry Stack Tailings Storage Facility** **Minto Mine, YT**
Minto Explorations Ltd.	**Instrumentation Section and Details**

EBA Engineering Consultants Ltd.

PROJECT NO.	DWN	CKD	REV	
W14101068.001	KJT	JPB	0	**Figure 2**
OFFICE	DATE			
EBA-WHSE	December 19 2007			

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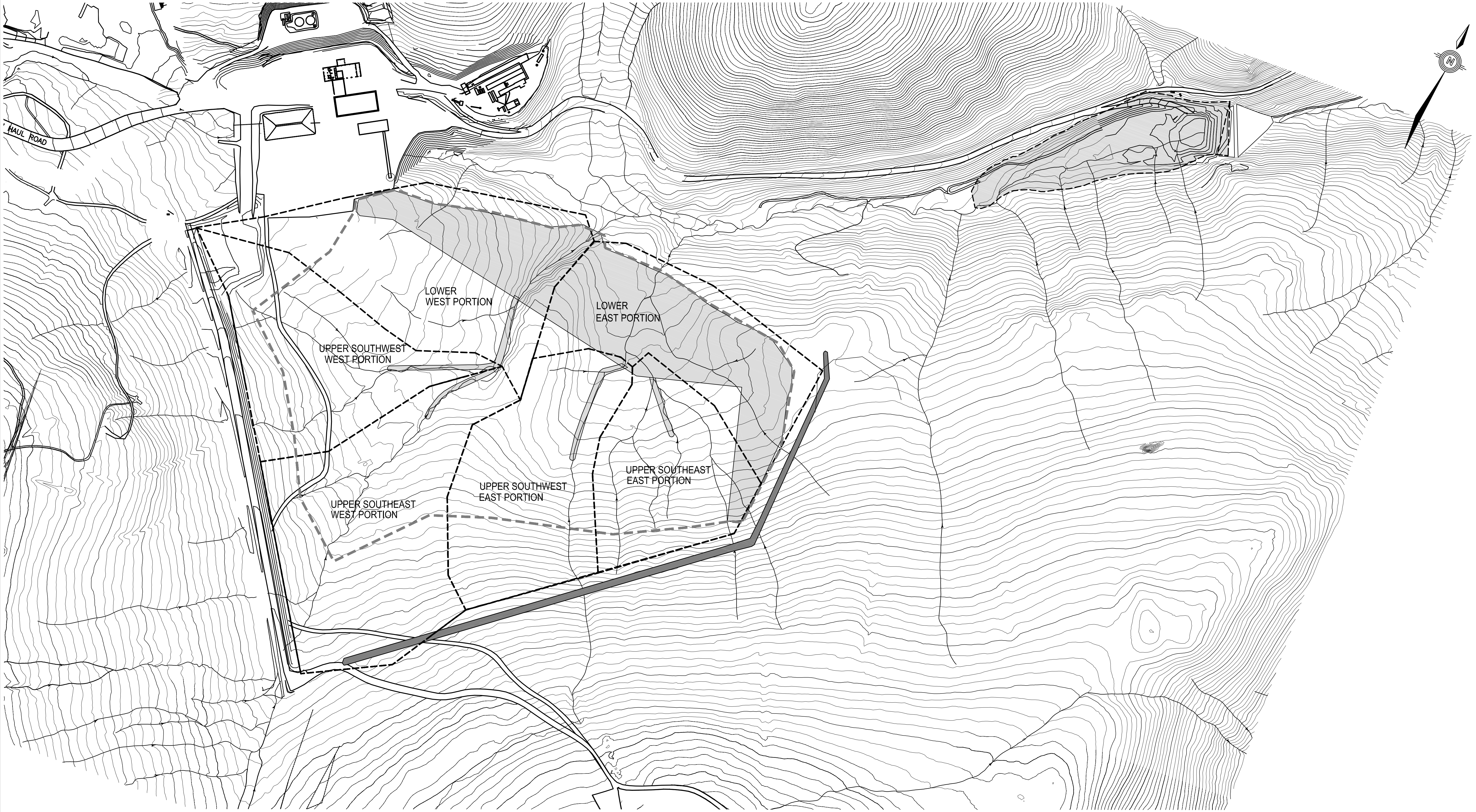

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Minto Mine, YT

Surface Drainage Sub-catchments

EBA Engineering Consultants Ltd.

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w14101068.001	KJT	JPB	0
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EBA-WHSE	December 19, 2007		

Figure 4

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