

1. Introduction

The Government of Yukon has concluded its assessment of the closure-related risks and liabilities at the Minto Mine site (the “Mine”) and finalized the financial security determination. The Government of Yukon has determined that \$104,274,643 in security, inclusive of the \$72,143,153 currently held by Government of Yukon, is required to be furnished by April 5, 2022. This document presents the process and rationale for the security determination.

2. Legislative and Policy Context

The security determination is based on the closure-related risks and liabilities of the Mine, and ultimately, the costs that would be incurred by the Government of Yukon if it was required to reclaim the site. The determination is made pursuant to the *Quartz Mining Act* (paragraph 139) and Security Regulation (sections 3 and 4), and in accordance with the Quartz Mining License (QML-0001) issued to Minto Explorations Ltd. (“MEL”). Additionally, relevant policy and guidance material is applied, including the Yukon Mine Site Reclamation and Closure Policy (2006), “Reclamation and Closure Planning for Quartz Mining Projects” (2013) and “Financial Guidelines” (2014).

The authority to determine the amount of security to be furnished, as set out in the *Quartz Mining Act*, is delegated to the Director of Mineral Resources Branch (“MRB”), Department of Energy, Mines and Resources.

3. Overview of Security Determination Process

In accordance with the provisions of QML-0001 (clause 7.2), MEL submitted an updated Reclamation and Closure Plan (“RCP”) and proposed security estimate in November 2020¹ to MRB. As part of MRB’s consultation process, as outlined in Section 3 below, MRB sent MEL’s updated RCP and proposed security estimate to Selkirk First Nation (“SFN”) on December 22, 2020. MRB retained an independent technical consultant, GRIT Engineering Consultants Ltd. (“GRIT”), to support the review of the RCP and MEL’s proposed security estimate, and development of MRB’s security determination.

¹ MEL submitted the Minto Mine Reclamation and Closure Plan 2020-01 in the fall of 2020; Mineral Resources Branch determined the submission to be complete in November 2020 and began the review process at that time.

Key milestones in the RCP review and security determination process are:

- MEL presented an overview of the updated RCP on April 6, 2021 to Yukon government officials from several departments, including representatives from the MRB and GRIT.
- MEL subsequently presented an initial overview of their security costing details to Yukon government officials and GRIT on April 8, 2021.
- MRB provided GRIT's preliminary findings memo and associated costing details to MEL on August 5, 2021.
- On August 23, 2021, MRB officials, along with the independent technical consultants, and SFN representatives, visited the Mine to see the current site conditions first-hand and discuss with MEL some of the reclamation and closure and site liability aspects.
- On August 24, 2021, MRB officials, along with the independent technical consultants, met with MEL representatives to review GRIT's preliminary cost estimate and discuss site-visit findings. Several items representing key cost divergences were discussed, including the passive water treatment system, equipment sizing and rates, progressive reclamation, water management and water treatment, and contingencies.
- On August 31, 2021, MRB requested additional information from MEL regarding the ability to treat and discharge water from site; MEL responded to this request on September 30, 2021. The response from MEL did not provide adequate information in response to MRB's request.
- MRB directed GRIT to prepare a revised cost estimate based upon the information gathered from the above-mentioned correspondence. MRB did not receive a revised proposed cost estimate from MEL. MRB provided GRIT's revised cost estimate to MEL on October 7, 2021. MRB received verbal comments from MEL reiterating the company's position on progressive reclamation.

4. Consultation with Selkirk First Nation

The Government of Yukon consults affected First Nations on security determinations for all mining projects in the Yukon. MRB consulted with SFN on the existing site liabilities, the planned reclamation and closure measures, and the amount and form of financial security. Representatives for SFN were in regular communication with MRB during this review and attended a site visit with Yukon government officials in August 2021 to inform assessment of the site liabilities and financial security requirements.

Selkirk First Nation provided both written and verbal input on the determination of financial security, the comments and viewpoints received are included in each section of this document.

5. Key Security Costing Components

This section outlines the key security costing components that represent the substantive risk items and largest drivers of cost. These components are:

- Active water treatment
- Water conveyance
- Equipment and transportation
- Progressive reclamation
- Physical stability
- Contingency costs

5.1 Active Water Treatment

The ability to treat mine impacted water is a critical component of closure of the mine site. Throughout the review period, MRB identified several challenges in relation to the treatment of water that increase the potential environmental risk at site and have a significant impact on the financial security required.

On August 31, 2021 MRB requested additional information from MEL regarding the ability to treat and discharge water from site; MEL responded to this request on September 30, 2021. The response from MEL did not provide sufficient information that would reduce the liabilities to the Government of Yukon should it be required to undertake reclamation and closure of the Mine. In their response, MEL acknowledged that a higher contingency should be included to address the uncertainties and suggested a 30% contingency be applied.

MEL did not provide an updated closure water balance to support the closure plan and uncertainty remains about the amount of water that would require active treatment on an annual basis prior to the establishment of the passive treatment system. The security estimate provided by MEL uses the treatment costs and volumes from 2015 these volumes are much lower than those encountered in recent years and as such, the costs presented by MEL do not consider current uncertainties or the risks to the Government of Yukon should it be required to undertake site reclamation and closure.

The cost estimate prepared by GRIT reflects treatment of a larger volume of water on a yearly basis to account for the absence of an updated water balance. A contingency was applied to the direct costs associated with water treatment as well.

The September 30th MEL response to MRB's water treatment questions was provided to SFN along with the GRIT cost estimate as part of government to government consultation on financial security matters.

SFN raised concerns regarding the outstanding risks to the Government of Yukon should it be required to undertake reclamation and closure of the Mine in its present state of development. SFN indicated that capital costs for replacement or refurbishment of the plant should be included or a direct risk premium should be applied as a contingency. SFN also raised concerns regarding the volume of water requiring treatment and emphasised that, based on recent water quality data, MRB should assume that all water needs to be treated in some manner.

Final Decision

MRB views the ability to treat and discharge water from site as the most critical component to successful closure of the site. MEL has provided insufficient evidence to demonstrate its ability to adequately treat and discharge water throughout the closure period. Until MEL can provide evidence that the treatment plant is capable of treating water at the required throughput to meet licensed requirements, MRB will include costs to address these uncertainties.

At this time, MRB does not have sufficient information to determine a capital replacement cost for the water treatment plant; instead the financial security determination includes a 50% contingency for the active treatment costs throughout the closure period until the passive system is proven effective. MRB has accepted the increased water volumes requiring treatment presented by GRIT.

5.2 Water Conveyance

Throughout the closure period, water management will be required to convey water from one area to another while closure measures are being implemented. SFN identified two areas that were missed or where insufficient detail was provided by MEL and GRIT estimates with respect to water management: the requirement to pump and manage water throughout the care and maintenance period, and the costs associated with replacing critical pumps.

Final Decision

MRB agrees that capital costs associated with pump replacement should be included in the cost estimates and has included these costs in the final determination. The cost estimate prepared by GRIT includes contingencies for water management and care and maintenance; MRB is accepting these contingencies and is of the opinion that sufficient costs are included for proper water management throughout closure.

5.3 Equipment and Transportation

The cost estimate prepared by MEL included the use of oversized mining equipment that is currently in operation on the Mine site. During security determinations, MRB operates under the assumption that a third party conducts all of the closure measures, including the procurement of suitable equipment. It is

MRB's experience that equipment procured for mine closure contracts is often smaller than the equipment used during operations due to several factors, including, shorter contracting lengths, and mobilization and demobilization costs.

SFN raised concerns regarding the underlying assumption in both the MEL and GRIT cost estimates that the barge would be available to use throughout the closure period. Both estimates include costs for the operations and maintenance of the barge, but do not include a capital cost for replacement.

Final Decision

MRB is accepting the estimates put forward by GRIT, which include a smaller equipment fleet that would be more readily available to Yukon government in the event of an unplanned closure. MRB is of the opinion that smaller equipment will be better suited to the closure activities required.

It is unclear if the costs presented by MEL are inclusive of a rental rate for the barge; as such, MRB will direct MEL to ensure future estimates are inclusive of rental rates or replacement of the barge. For the purposes of this determination, capital costs for the replacement of the barge are not included in the security determination.

5.4 Progressive Reclamation

The cost estimate provided by MEL included full credit for progressive reclamation work completed to date on waste rock, overburden, and tailings management facilities. Work completed to date includes the placement of cover material, seeding and tree planting to form cover system that reduces infiltration and supports the establishment of vegetation.

MRB encourages operators to conduct progressive reclamation, but completion of these activities does not mean the liability is eliminated; monitoring must demonstrate that the measures implemented are effective and meet desired closure objectives. MRB does not have a standard procedure for determining credits for progressive reclamation activities; therefore a site-specific approach has been taken to recognize the work completed by MEL.

The cost estimate prepared by GRIT proposes a scaled approach to providing progressive reclamation credits and retains the full contingency amounts for each facility. Throughout the review period SFN has indicated that MRB should retain sufficient security to ensure these facilities meet the desired closure objectives. SFN is supportive of a scaled approach, such as the one proposed by GRIT.

Final Decision

MRB has determined that credits can be provided for the movement and placement of material on the waste management facilities, but cannot be provided for regrading or revegetation efforts at this time.

Credits for revegetation cannot be provided until the vegetation is demonstrated to be self-sustaining. The credit provided for these line items is described in Table 1. To ensure sufficient contingencies are in place, the security determination assumes the full contingency amounts as though all closure measures were required to be completed.

Table 1 Credits Provided to MEL for Progressive Reclamation Activities

Cost Item	Credit Provided
Movement of material to final location	75%
Placement of material on final location	75%
Regrading of area to final closure design	0%
Revegetation of area	0%

5.5 Physical Stability

The closure plan includes the removal of SAT² material from on top of the south wall buttress, placement of these material below the long-term water level in the Main Pit, and replacement of this material with non-SAT waste material. The cost estimate prepared by MEL indicates that 1,040,000 cubic meters of SAT material will be removed and replaced with 245,000 cubic meters of waste rock.

SFN identified that removal of the SAT material and replacement with 24% of the original volume may result in a physical stability risk for the Main Pit Dump, and potentially the south wall of the Main Pit. SFN noted that the 2017 stability analysis of the Main Pit Dump, performed by SRK, indicated that additional stability analyses would be required for the closure scenario if SAT material were to be removed.

Final Decision

Long-term physical stability is one of the main objectives of mine closure. At this time, sufficient evidence has not been presented to demonstrate that the Main Pit Dump will remain stable with the removal of the SAT material. MRB has assumed a 1:1 replacement of the SAT volumes removed and replaced below the long-term water elevation within the Main Pit, which has been reflected in the security determination.

5.6 Closure Implementation Contingency Costs

² “SAT” material refers to potentially acid generating and/or metal leaching material required to be saturated (i.e., submerged in water) in the long-term.

The cost estimate presented by MEL included a blanket contingency of 12% for all cost items. GRIT has proposed that facility-specific contingencies be applied based upon the level of design and the confidence in the proposed closure measures. Contingencies based upon the level of design is consistent with the 2013 guidance “Reclamation and Closure Planning for Quartz Mining Projects” issued by the Yukon of Government and Yukon Water Board.

Final Decision

MRB accepts the facility-specific contingencies in the cost estimate prepared by GRIT. The contingency breakdown for the closure implementation is identified in the table below.

Table 2 Facility Specific Contingency Factors

Cost Item	Contingency Amount
Waste Dumps	20%
Overburden Dumps	15%
Ore Stockpiles	15%
Open Pits	15%
Underground Openings	20%
External Tailings Facilities	15%
Roads	15%
Demolition	15%
Surface Infrastructure	15%
Water Detention Structures	25%
Yards and Laydown Areas	15%
Waste Disposal	25%
Surface Water Conveyance	25%
Water Treatment (passive)	30%
Mobilization and Demobilization	15%
Transport Costs	15%
Site and Road Maintenance	15%

6. Breakdown of Security Costs

Table 3 provides a detailed breakdown of MRB’s security determination in relation to the cost estimates presented by MEL and GRIT.

Table 3 Government of Yukon Final Security Determination

	MEL Cost Estimate	GRIT Cost Estimate	MRB Final Determination
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Closure Implementation			
Direct Costs			
Waste Dump	\$7,935,918	\$13,682,795	\$17,452,536
Overburden Dumps	\$472,870	\$481,029	\$481,029
Ore Stockpiles	\$3,408,266	\$4,774,579	\$4,774,579
Open Pits	\$641,203	\$836,041	\$836,041
Underground Openings	\$92,291	\$92,291	\$92,291
External Tailings Facilities	\$77,263	\$791,733	\$791,733
Roads	\$153,441	\$153,441	\$153,441
Demolition	\$2,005,083	\$2,005,083	\$2,005,083
Surface Infrastructure	\$175,792	\$175,792	\$175,792
Water Detention Structures	\$840,997	\$840,997	\$840,997
Yards/Laydown Areas	\$827,890	\$1,025,283	\$1,025,283
Waste Disposal	\$461,883	\$461,883	\$461,883
Surface Water Conveyance	\$3,417,069	\$3,489,259	\$3,489,259
Water Treatment	\$574,445	\$574,445	\$574,445
Subtotal Direct Implementation	\$21,084,411	\$29,384,650	\$33,154,391
Monitoring and Care and Maintenance			
Planning, Permitting, Monitoring	\$2,542,030	\$2,957,042	\$3,145,529
Care and Maintenance	\$7,849,897	\$9,949,549	\$12,610,316
Subtotal Monitoring and Care and Maintenance	\$10,391,928	\$12,906,592	\$15,610,316
Indirect Costs			
Mobilization/Demobilization	\$344,806	\$441,356	\$441,356
Transport Costs	\$420,735	\$420,735	\$420,735
Site/Road Maintenance	\$832,270	\$832,270	\$832,270
Construction Support	\$5,341,188	\$5,601,985	\$5,752,716
QA and Project Management	\$1,737,427	\$1,737,427	\$1,737,427
Other Indirects	\$7,284,653	\$9,336,785	\$10,572,286
Contingency	\$4,799,067	\$7,784,206	\$8,965,542
Subtotal Indirect Costs	\$20,760,146	\$26,154,764	\$28,722,333
Cost Inflation	\$5,761,732	\$7,504,446	\$8,477,901
Subtotal Implementation Costs	\$57,998,217	\$75,950,453	\$86,110,471

Post-Closure Implementation			
Direct Costs			
Monitoring	\$1,844,567	\$1,844,567	\$1,844,567
Water Treatment - Active Treatment	\$4,653,957	\$6,753,609	\$9,414,377



Passive Treatment	\$583,243	\$583,243	\$583,243
Reclamation Maintenance	\$1,905,246	\$1,905,246	\$1,905,246
Site Maintenance	\$1,685,224	\$1,685,224	\$1,685,224
Site Management	\$4,412,702	\$4,412,702	\$4,412,702
Transportation Costs	\$1,009,561	\$1,009,561	\$1,009,561
Subtotal Direct Costs	\$16,094,502	\$18,194,154	\$20,854,921
Indirect Costs			
Indirects	\$2,936,544	\$3,327,272	\$3,815,278
Contingency	\$1,950,605	\$2,768,171	\$3,167,286
Subtotal Indirect Costs	\$4,887,149	\$6,095,442	\$6,982,564
Subtotal Post-Closure Costs	\$20,981,651	\$24,289,596	\$27,837,485
Post-Closure Net Present Value	\$14,753,778	\$17,561,418	\$20,662,872
Progressive Reclamation Credit			
Waste Dumps		-\$1,916,827	-\$1,916,827
Overburden Dumps		\$0.00	\$0.00
Ore Stockpiles		-\$72,564	-\$72,564
Open Pits		-\$7,830	-\$7,830
External Tailings Facilities		-\$501,478	-\$501,478
Subtotal Progressive Reclamation		-\$2,498,699	-\$2,498,699
Total Financial Security	\$72,751,995	\$91,013,171	\$104,274,643

7. Closing

Having completed the assessment of security required for the Minto Mine, MRB, on behalf of the Government of Yukon, has determined that \$104,274,643 is required to be furnished by April 5, 2022 to cover the costs that would be incurred by the government if it was required to reclaim the site. MRB has relied on the information provided by the licensee, the independent technical consultant, as well as SFN, to inform the security determination.



The licensee is directed to contact MRB regarding appropriate forms of security.

A handwritten signature in blue ink that reads "T. Powell".

January 4, 2022

Todd Powell, Director
Mineral Resources Branch
Energy, Mines and Resources

Date