

1. Introduction

The Government of Yukon has concluded its assessment of the closure-related risks and liabilities at the Keno Hill Mine site (the “Mine”) and finalized the financial security determination. 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 were required to reclaim the site. The determination is made pursuant to the Quartz Mining Act (paragraph 139) and Security Regulation (OIC 2007-77, sections 3 and 4), and in accordance with the Quartz Mining License (QML-0009) issued to Alexco Keno Hill Mining Corporation (“AKHMC”). 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-0009 (clause 7.2), AKHMC submitted an updated Reclamation and Closure Plan (“RCP”) and proposed security estimate in November 2021 to MRB. As part of MRB’s consultation process, as outlined in Section 4 below, MRB sent AKHMC’s updated RCP and proposed security estimate to First Nation of Na-Cho Nyäk Dun (“NND”) on January 6, 2022. MRB retained an independent technical consultant, Golder Associates Ltd. (“Golder”), to support the review of the RCP and AKHMC’s proposed security estimate, and development of MRB’s security determination.

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

- November 29, 2021: AKHMC submitted RCP and associated cost estimate in the amount of \$7,969,688.
- April 22, 2022: MRB issued an information request to AKHMC, including cost estimation and closure planning questions and clarifications.
- April 25, 2022: MRB officials, along with the independent technical consultants, met with AKHMC to discuss the information request issued on April 22, 2022.

- May 9, 2022: AKHMC provided an initial response to the April information request, focused solely on the cost estimation aspects. This response included a revised security estimate of \$8,507,112.
- August 24, 2022: MRB issued second information request and directions for RCP/ and cost estimate revisions.
- October 28, 2022: AKHMC provided response and revisions to the RCP and cost estimate, including a revised cost estimate of \$9,643,943.

4. Consultation with First Nation of Na-Cho Nyäk Dun

The Government of Yukon consults affected First Nations on security determinations for all mining projects in the Yukon. MRB initiated consultation and invited the First Nation of Na-Cho Nyäk Dun to review the Reclamation and Closure Plan and proposed security cost estimate. The First Nation of Na-Cho Nyäk Dun provided written input on the Reclamation and Closure Plan and determination of financial security, the comments and viewpoints received have been included in the final determinations presented in this document

5. Cost Estimate Advancement during Review

Throughout the review process, AKHMC has provided updates to their cost estimate in response to information requests and consultant reports. In response to these information requests from Mineral Resources, AKHMC increased their cost estimate by approximately \$1.6 million dollars resulting in a total estimate for peak liability of \$9,643,943.

The cost estimate provided by AKHMC on November 27, 2021, with a peak liability estimate of \$7,969,690, is the estimate that Mineral Resources has used for comparison purposes throughout the remainder of this document to highlight adjustments made during the review period, unless otherwise stated.

6. Key Security Costing Components

This section outlines the key security costing components that represent the most significant differences between the final security determination and AKHMC's cost estimate proposed in November 2021. These components are:

- 6.1. Unit Rates and Labour/Equipment Needs
- 6.2. Interim Care and Maintenance Costs
- 6.4. Contingency Costs

6.1. Unit Rates and Labour/Equipment Needs

Labour and equipment unit rates, labour and equipment need, and the associated hours to complete closure activities are often one of the major cost drivers when implementing closure. During their review, Golder Associates examined both the Yukon Fair Wage Schedule (Yukon 2021) and third party labour rates typical for this region and trade type. They identified several rates as being lower than would be expected from a third-party contractor once all burdens, markup, overhead and profit, and relevant overtime premiums are applied. Golder Associates recommended adjustments to several rates within the cost estimate. In several cases, they also recommended changes to the amount of labour, type of equipment, and hours associated with completing an activity where they felt these items had been underestimated.

AKHMC Response

In the cost estimate revision provided in November 2022, AKHMC accepted all unit rate changes. They also accepted several increases to the amount of labour, type of equipment, and hours associated with completing an activity. In a few cases where they disagreed with Golder's recommendations, they provided additional clarity and details to justify that the original cost estimate was appropriate.

Final Decision

The unit rates recommended by Golder Associates have been accepted in the final determination. In the cases where AKHMC presented justification for the amount of labour, type of equipment, and hours associated with completing an activity, Yukon Government reviewed the information provided by AKHMC and accepted their rationale.

6.2 Interim Care and Maintenance Costs

In the cost estimate revision provided November 2022, AKHMC proposed an adjustment to transportation costs for personnel during interim care and maintenance. This adjustment was for the utilization of local contractors in Mayo, for interim care and maintenance.

Final Decision

Although Yukon Government is supportive, and recommends, local hiring practices, the purpose of holding financial security is to ensure Yukon has sufficient resources in the event it becomes responsible for mine closure. Yukon Government has determined that the transportation costs must be based on a contractor from Whitehorse; this ensures that adequate security is available should a local Mayo contractor not be available at the time of closure.

6.3 Contingency Costs

The cost estimate provided by AKHM included a blanket contingency allowance of 18% for the direct cost and 15% for monitoring and maintenance cost elements. Yukon Government prefers to look at contingencies on a facility specific basis to account for the level of design and confidence in the proposed closure measures for each facility. 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 Government and Yukon Water Board.

In the draft estimate, provided to AKHM on August 24, 2022, Yukon Government included increased contingencies for two areas, the Dry Stack Tailings Facility and the post-closure active and passive water treatment costs. These contingencies were increased to account for a lower level of design, uncertainties in the closure measures proposed, and the need for additional research.

AKHMC Response

In the cost estimate revision provided November 2022, AKHMC accepted all contingency cost changes recommended by Yukon Government.

Final Decision

MRB has determined that facility-specific contingencies are appropriate for this determination. The contingency breakdown is identified in the table below:

Table 1: Facility Specific Contingency Factors

Cost Item	Contingency Amount
General & Administration	18%
Closure Planning	18%
Underground Mines	18%
Waste Rock Dumps	18%
Mill and Infrastructure/Facilities	18%
DSTF	20%
Waste Disposal	18%
Landfills	18%
Roads & Trails	18%
Water and Solutions Management	18%
Interim Care and Maintenance	18%
Water Treatment Costs	25%

7. Breakdown of Security Costs

Table 1 provides a detailed breakdown of MRB's security determination in relation to the cost estimates presented by AKHMC on October 28, 2022.

Table 2: Government of Yukon Final Security Determination

Description of Cost	AKHMC (October, 28 2022)	YG Determination (November 2022)
General & Administration	\$ 1,075,530	\$ 1,075,530
Closure Planning	\$ 221,250	\$ 221,250
Underground Mines	\$ 744,216	\$ 744,463
Waste Rock Dumps	\$ 326,797	\$ 326,797
Mill and Infrastructure/Facilities	\$ 763,412	\$ 763,412
DSTF	\$ 105,606	\$ 105,606
Waste Disposal	\$ 51,321	\$ 51,321
Landfills	\$ 12,565	\$ 12,565
Roads & Trails	\$ 183,459	\$ 183,459
Water and Solutions Management	\$ 324,032	\$ 324,032
Interim Care and Maintenance	\$ 1,602,816	\$ 1,629,816
Sub-total	\$ 5,411,002	\$ 5,438,251
Indirect Costs (%)	15%	15%
Indirect Costs	\$ 811,650	\$ 815,738
Contingency Costs (%) ²	18%	See Table 1
Contingency Costs	\$ 976,093	\$ 980,997
Cost Inflation ¹	\$ 261,351	\$ 262,668
Total Closure Implementation Costs	\$ 7,460,097	\$ 7,497,653
Post Closure Care, Maintenance and Monitoring		
Onsite Monitoring	\$ 128,700	\$ 128,700
Transport Costs	\$ 240,000	\$ 240,000
Water Treatment Costs		
Active Treatment (BK625 & Berm for 1 year)		
Capital Costs	\$ 0	\$ 0
Capital Replacement Costs	\$ 0	\$ 0
Operating Costs	\$ 398,691	\$ 398,691
Passive Treatment (In situ & Bioreactor)		



Reasons for Decision
Financial Security Determination for the Keno Hill Mine Site
Quartz Mining License QML-0009

Capital Costs (Bellekeno & Mill Pond)	\$ 110,000	\$ 110,000
Capital Costs (Bermingham)	\$ 40,000	\$ 40,000
Operation and Maintenance Costs	\$ 142,790	\$ 142,790
Reclamation & Closure Research Plan	\$ 0	\$ 0
Monitoring & Reporting	\$ 912,240	\$ 912,240
Sub-Total	\$ 1,972,421	\$ 1,972,421
Sub-Total NPV (1.0162% DROR)	\$ 1,679,882	\$ 1,679,882
Indirect Costs (%)	15%	15%
Indirect Costs	\$ 251,982	\$ 251,982
Contingency Costs (%)	15%	15%
Contingency Costs	\$ 251,982	\$ 251,982
Total (NPV)	\$ 2,183,847	\$ 2,183,847
Total Financial Security (incl. Indirect Costs)	\$ 9,643,943	\$ 9,681,500

¹Cost inflation uses a rate of 4.2%

²Contingency Cost % see Table 1

8. Closing

Having completed the assessment of security required for the Keno Hill Mine, MRB, on behalf of the Government of Yukon, has determined that \$9,681,500 is required to be furnished to cover the costs that would be incurred by the government if it were required to reclaim the site. MRB has relied on the information provided throughout the review period to inform the security determination.

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

Date