FORT KNOX MINE FINANCIAL ASSURANCE REVIEW

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1.0 Introduction

The Fort Knox Mine is an open-pit gold mine with related mill facilities located northeast of Fairbanks, Alaska. This mine has been in operation since 1994, and currently operates at a rate of 35,000 to 50,000 tons per day (tpd). Based on an ore deposit of 200 million tons, the Fort Knox Mine is anticipated to operate until 2012 at this production rate. The Fort Knox Mine is owned and operated by Fairbanks Gold Mining, Inc., a subsidiary of Kinross Gold Corporation.

Ore is removed from the 332 acre open pit, crushed, ground, then gold is extracted with cyanide by vat leaching in the mill facility. Next, gold is recovered from the leach solution with activated carbon absorption/desorption and electrowinning. Cyanide in the tailings generated from the vat-leach gold recovery is reduced by the Inco SO_2/Air process to a concentration of approximately 8 parts per million (WAD) before being deposited in the 1,147 acre tailings storage facility. The mine site also contains the following areas of disturbance: 362 acres of waste rock dump piles, 358 acres of topsoil stockpiles and borrow sites, 152 acres of access roads, 203 acres of mine site facilities including the mill, and a 201 acre water supply reservoir.

Fairbanks Gold Mining, Inc. plans to conduct reclamation both concurrent with operations and after mining and milling have ceased. Final reclamation will be conducted in two phases. Phase I is planned to last 2 to 5 years and includes final contouring and revegetation of waste dumps, borrow areas, the tailings impoundment, and mill facilities. Phase II is anticipated to last 10 years and includes water treatment, monitoring and maintenance until closure standards are achieved. At the end of Phase II reclamation the Alaska Department of Natural Resources (ADNR), Alaska Department of Fish and Game (ADF&G), and Fairbanks Gold Mining, Inc. plan to manage the project area as a public use and recreation site, which includes allowing the open-pit to fill with water for wildlife habitat and public recreation.

Current financial assurances (FGMI 2003) are held by the state of Alaska, as a majority of the mine site is located on state lands. The 7,627 acre mine site has 5,797 acres located on state land, 1,709 acres on Alaska Mental Health Trust land, and 121 acres on private land. The ADNR holds financial assurance in the form of a bond in the amount of $2,153,539 (2000 dollars) to cover the cost of mine site reclamation and closure. The Alaska Department of Environmental Conservation (ADEC) holds financial assurance in the form of a bond in the amount of $9,262,340 (2000 dollars) to cover the cost of water treatment; as well as monitoring and maintenance of the tailings dam, tailings impoundment, and surrounding water quality. Additionally, a post reclamation and maintenance fund bond in the amount of $714,536 is held by ADNR for long term maintenance. The total estimated reclamation cost for the Fort Knox Mine is $12,130,415 (2000 dollars).

The Fort Knox Reclamation Plan and Tailings Storage Reclamation and Closure Cost Estimate were prepared in accordance with standard engineering cost estimation procedures and are consistent with methods commonly used by industry as well as state and federal agencies.

Current financial assurance amounts for the Fort Knox Mine used by the ADEC and the ADNR to guarantee reclamation takes place in the event of bankruptcy, or other circumstances where reclamation is not completed by Fairbanks Gold Mining, Inc., are evaluated in this report. This technical review is based on analysis of the existing reclamation plans and financial assurance cost estimates listed below:

- *Fairbanks Gold Mining, Inc. Fort Knox Mine Reclamation Plan, April 2001*

- *Alaska Interstate Construction LLC, Fort Knox Tailing Storage Reclamation and Closure Cost Estimate, December 2000.*

This evaluation was developed to ensure that the financial assurance amounts held by the state of Alaska are adequate to cover the costs of reclamation and closure as required by Alaska statutes and regulations. The state of Alaska is required to obtain financial assurances to ensure that the approved reclamation tasks are completed in the event Fairbanks Gold Mining, Inc. fails to perform the necessary tasks as outlined in the reclamation plan.

2.0 Methods

If the ADNR and ADEC become responsible for reclamation at the Fort Knox Mine it is critical that adequate funding is available for completion of the required tasks. It is well documented at other mine sites (e.g. Summitville Mine in Colorado; Zortman Landusky, Beal, and Basin Creek mines in Montana; and Brohm Mine in South Dakota) that in the event the operating company files bankruptcy costs incurred by the State to perform reclamation are significantly higher than those originally estimated (Kuipers 2000). In some cases costs incurred by state and federal agencies can be 10 to 100 times higher than those estimated in reclamation plans and financial assurance calculations (Kuipers 2000). For these reasons this review of the Fort Knox Mine reclamation plan and financial assurance(s) takes a conservative approach to cost estimating.

Financial assurance estimates calculated in this review were performed in accordance with standard cost estimation procedures and are consistent with methods commonly used by state and federal regulatory agencies. Site-specific reclamation tasks and associated areas of disturbance were developed from the aforementioned financial assurance estimates. Assumptions, reclamation tasks and associated costs used in this estimate are the same as those used in the existing reclamation plan and financial assurance(s), except where noted in the explanations for each scenario.

First, the existing financial assurance estimates were replicated (as Scenario 0) in a format that allows for unit costs to be determined for specific reclamation tasks. Next, four scenarios were developed where unit costs, indirect costs, and project timelines were evaluated and varied as described in the following sections. Finally, cash flow worksheets were generated for each scenario.

Detailed estimate calculations, and the resulting scenarios and assumptions, are provided as Attachment 1 for the Fort Knox Reclamation Plan, and Attachment 2 for the Fort Knox Mine Tailing Storage Reclamation and Closure Cost Estimate. Attachments 3 and 4 illustrate additional calculations made for the developed scenarios. The $714,536 post reclamation and maintenance fund was not evaluated in this review. Table 1 below summarizes the financial assurance amounts calculated for this review.

Table 1. Fort Knox Mine Financial Assurance Costs Summary

	Fort Knox	CSP² Scenarios			
	Scenario 0	**Scenario 1**	**Scenario 2** (CSP² Preferred Scenario)	**Scenario 3**	**Scenario 4**
	Based on 2001 reclamation plan.	Based on 2001 reclamation plan with increased indirect costs.	Based on Scenario 1 with increases to unit costs.	Based on Scenario 2 with 50 years water treatment.	Based on Scenario 2 with 100 years water treatment.
Reclamation Plan	$2,105,383	$2,390,322	$7,224,521	$7,224,521	$7,224,521
Tailing Storage Reclamation and Closure	$9,104,984	$10,337,238	$38,681,742	$94,544,637	$140,341,737
Post Reclamation & Maintenance Fund	$714,536	$714,536	$714,536	$714,536	$714,536
Total	$11,924,903	$13,442,096	$46,620,799	$102,483,694	$148,280,794

3.0 Review of Fort Knox Reclamation Plan and Financial Assurance Calculations

3.1 Fort Knox Scenario 0

For Scenario 0 labor costs, equipment costs, material costs, and acreages for specific reclamation tasks used duplicate those provided in the cost estimation worksheets in the Fort Knox Reclamation Plan and Fort Knox Tailing Storage Reclamation and Closure Cost Estimate. Equipment costs and efficiencies are based on Caterpillar Performance Handbook standards, and wage rates are based on the Davis Bacon Wages for Alaska. Material costs are based on contractor estimates and mine site experience.

Scenario 0 was generated to determine unit costs for specific reclamation tasks used in the Fort Knox cost estimates. These unit costs are evaluated and changed in subsequent scenarios. Although data inputs for Scenario 0 were derived from Fort Knox estimates slight differences in total amounts are observed. The Scenario 0 reclamation plan financial assurance amount differs by $48,156 ($2,153,539 - $2,105,383); and the Scenario 0 tailing storage reclamation and closure financial assurance amount differs by $157,356 ($9,262,340 - $9,104,984). This results in less than a 2% difference when compared to the Fort Knox generated financial assurances.

Review of the Fort Knox Reclamation Plan and associated financial assurance calculation revealed the following oversights in the original calculation:

- Equipment costs were transposed in the cost estimation worksheet for Borrow/Spoil and Miscellaneous Areas. On this worksheet, the 657E costs are listed as $53.62/hour and the Seed/Fertilizer Costs are listed as $236.90/hour. This is inconsistent with all other cost estimation worksheets in this estimate. This results in a cost difference of $ 55,312.07, and was not accounted for in Scenario 0.

- Material costs for fertilizer and seed in the cost estimation worksheet for Borrow/Spoil and Miscellaneous Areas does not include 37 acres listed in the reclaimed dump acres. This was not accounted for in Scenario 0.

- Cost estimation for haul road reclamation seems to exclude 68 acres. Text indicates at the end of 2005 there will be 220 acres of roads (p 27), however the cost estimation worksheet for Haul Roads indicates a total of 152 acres of roads for reclamation. This was not accounted for in Scenario 0.

3.2 CSP² Scenario 1

Scenario 1, developed by CSP², duplicates the Fort Knox Reclamation Plan cost estimate capital and operating costs with changes made to indirect costs as noted below. Scenario 0 indirect costs are calculated at 33% of the estimated contract costs, and Scenario 1 indirect costs are 51% of the estimated contract costs. The difference results from increases in Scenario 1 indirect costs for engineering redesign, procurement, construction management, and contractor overhead.

A financial assurance cost estimate should be performed under the assumption that reclamation is performed by a third-party under contract to the appropriate regulatory agency. Factors including contractor ownership, standby, overhead, engineering redesign, etcetera result in higher costs than those typical of reclamation costs when performed by mining companies. Indirect costs represent one of the most common areas in which financial assurance requirements are underestimated (Kuipers 2000). Indirect costs are added to this estimate to account for additional costs incurred in the event of agency management and oversight of reclamation and closure.

The Fort Knox Mine cost estimate included indirect costs for contingency (5%), mobilization and demobilization (5%), contractor profit (10%), contract administration (5%), and inflation (1.5% per year for 5 years, or 8% of contract cost). In this estimate, indirect costs amount to 33% of the operating and capital contract costs.

The following indirect costs were applied to CSP² Scenario 1:

- *Contingency*. Contingency costs reflect the level of detail and completeness of the cost estimate, as well as the degree of uncertainty of factors and assumptions used in the cost estimate. A contingency amount of 5% was applied to the estimated contract costs in the Scenario 1 cost estimate, which is the same percentage used in the Fort Knox Mine cost estimate.

- *Mobilization / Demobilization*. Mobilization/demobilization costs account for the transport of equipment and materials to and from the mine site, as well as infrastructure needs. A mobilization/demobilization amount of 5% was applied to contract costs estimated in Scenario 1, which is the same percentage used in the Fort Knox Mine cost estimate.

- *Engineering Redesign*. Engineering redesign costs stem from a lack of detailed information and plan development in a financial assurance estimate, as well as the need to account and design for actual conditions at the time of reclamation and closure. An engineering redesign cost of 3% was applied to the estimated contract costs used in Scenario 1. The Fort Knox Mine cost estimate did not include any amount for engineering redesign.

- *Engineering, Procurement, Construction Management*. This indirect cost accounts for the requirement of construction engineering, procurement, and construction management on behalf of the agencies in the event they become responsible for reclamation. An indirect cost of 5% of the contract costs was used in Scenario 1, while the Fort Knox Mine cost estimate does not account for the cost of this activity.

- *Contractor Overhead*. Contractor overhead accounts for administrating, management, public relations, safety, environmental, legal, performance bonding and other costs associated with doing business. A contractor overhead cost of 15% was applied to the estimated contract costs used in the Scenario 1 cost estimate. The Fort Knox Mine cost estimate did not include any amount for contractor overhead.

- *Contractor Profit*. This indirect cost accounts for contractor profit. A contractor profit amount of 10% was applied to contract costs estimated in Scenario 1, which is the same percentage used in the Fort Knox Mine cost estimate.

- *Agency Administration*. Agency administration includes costs incurred by state and federal agencies in situations where reclamation and closure are performed by regulatory agencies. Agency administration costs were accounted for as 5% of the contract costs in both the Fort Knox Mine cost estimate and Scenario 1.

- *Inflation*. Inflation indirect costs account for the difference in the dollar value between the time the estimate was generated and reclamation and closure are performed. An inflation amount of 3% was applied to the contract costs estimated in Scenario 1. The Fort Knox Mine cost estimate uses 8%.

Application of these indirect costs in Scenario 1 results in an increase of 13% over Scenario 0. The Fort Knox Mine Reclamation Plan costs were estimated as $2,390,322, and the Tailing Storage Reclamation and Closure Plan costs were estimated as $10,337,238 under Scenario 1. Indirect costs for Scenario 1 amount to 51% of the estimated operating and capital contract costs, while indirect costs were 33% for Scenario 0.

3.3 CSP² Scenario 2

Scenario 2 includes the addition of indirect costs as described for Scenario 1, as well as changes to unit costs and reclamation tasks as described below.

- *Cover application*. The Fort Knox Mine Reclamation Plan uses a 6 inch cover of growth media where required before revegetation. This cover depth may not be adequate to apply sufficient amount of growth media to all surfaces.

  Scenario 2 assumes application of a 12 inch cover of growth media to ensure that all surfaces are adequately covered with the growth media upon application. Unit costs for this item were increased by 50% to account for additional contouring and cover work required. Unit costs were changed for each specific reclamation task for this item. These changes increased the cover application costs from $3,211,908 in Scenario 1 to $4,817,862 in Scenario 2.

- *Revegetation Costs*. The unit costs estimated in the Fort Knox Reclamation Plan for revegetation assume that only one-time planting is necessary and weed control is not required. The seed application rate of 11 pounds/acre also seems low when compared to other operations.

  Scenario 2 uses a revegetation unit cost of $1,500/acre on flat surfaces and $2,500/acre on sloped surfaces. These unit costs are based on Montana Department of Environmental Quality (MDEQ) financial assurance recommendations based upon agency experience. These changes increased the revegetation costs from $470,383 in Scenario 1 to $3,304,305 in Scenario 2.

- *Building Demolition*. The Fort Knox Mine Reclamation Plan assumes that buildings are removed for salvage prior to the cost estimation for demolition, and only includes demolition costs for removal of foundations. This estimate does not include waste disposal costs associated with demolition.

  In the event of bankruptcy, buildings will most likely be demolished rather than salvaged by the regulatory agencies. Scenario 2 uses unit costs for demolition based on RS Means Heavy Construction Cost Data (Chandler 2001). Demolition and removal of buildings was estimated with a unit cost of $\$0.19/ft^3$. Assumptions were made that buildings are steel with an average height of 30 feet, which resulted in an estimation of building volume at 4,646,460 ft^3 requiring demolition. A unit cost of $\$0.75/ft^2$ was used to estimate the cost of foundation demolition (break and bury), which is based on the MDEQ concrete demolition estimate for the Stillwater Mining Company East Boulder Mine. These changes increased the building demolition costs from $84,566 in Scenario 1 to $998,989 in Scenario 2.

- *Additional reclamation*. The Fort Knox Mine Reclamation Plan does not include reclamation activities for Borrow MB-Pit 1 and Scenic Overlook, Borrow MB-Pit 2, and Borrow #11 due to plans for conversion of the mine site to a recreational facility.

  Scenario 2 assumes that all borrow areas, including those mentioned above, will be reclaimed at closure. Reclamation tasks were assumed to be the same as tasks planned for other borrow areas, with the addition of a 12 inch cover as described above. Acreages for the additional borrow areas were determined from Figure 1 of the Fort Knox Reclamation Plan. A unit cost of $1,733/acre, based on the average unit cost for contouring other borrow areas, was used to calculated the costs of contouring the additional borrow areas. These changes resulted in additional reclamation costs of $30,714 for Borrow MB-Pit 1 and the Scenic Overlook, $17,782 for Borrow MB-Pit 2, and $95,374 for Borrow #11.

- *Wetlands Reclamation*. The Fort Knox Mine Reclamation Plan does not account for additional expenses incurred for wetlands earthwork (contouring) and revegetation.

  The earthwork (contouring) costs assumed for Scenario 1 are $375/acre. Scenario 2 assumes a unit cost of $1,500/acre for both contouring and revegetation activities in wetland areas. These changes increased the wetlands reclamation costs from $38,638 in Scenario 1 to $201,000 in Scenario 2.

- *Water Treatment Plant*. The Fort Knox Mine Reclamation Plan assumes the existing cyanide detoxification plant can be converted to a ferric sulfate water treatment plant at 5% of the total reclamation cost. There is no basis or justification provided for the appropriateness of this cost estimation.

Scenario 2 assumes a water treatment plant cost of $16,337,500 for sulfide precipitation, plus a sludge disposal cost of $100,000. This scenario assumes that the conversion of the existing detoxification plant is not adequate for water treatment. Additional information describing water treatment methods is needed in the reclamation plan to assign a more accurate cost. The water treatment plant cost is based on a unit cost of $6,535/gpm (see Attachment 4) for an average treatment rate of 2,500 gpm as planned in the Fort Knox Reclamation Plan. These changes increased the water treatment costs from $120,756 in Scenario 1 to $16,437,500 in Scenario 2.

Application of these additional costs in Scenario 2 results in an increase of the current financial assurance amount by 291%. The Fort Knox Reclamation Plan costs were estimated as $7,224,521, and the Tailing Storage Reclamation and Closure Plan costs were estimated as $38,681,742 under Scenario 2.

Scenario 2 is the CSP² preferred alternative presented in this review. This scenario includes additional costs for indirect expenses, application of a 12 inch (vs. 6 inch) cover, revegetation, building demolition, reclamation of borrow areas planned for recreational use, wetlands reclamation, and water treatment plant construction. The 5 year duration of water treatment is accepted under Scenario 2, but it is strongly noted that the Fort Knox Mine Reclamation Plan does not include technical justification regarding the estimated 5 year treatment period. For that reason, Scenarios 3 and 4 were developed to assess reclamation and closure costs in the event water treatment is required for longer than 5 years.

3.4 CSP² Scenario 3

Scenario 3 utilizes the same assumptions and changes made in Scenario 2, with the addition of 50 years of water treatment for tailings water and seepage. The Fort Knox Mine Reclamation Plan does not include adequate details regarding water quality and quantity to assess the adequacy of the estimated 5 years of treatment and 30 years of monitoring and maintenance.

Therefore, Scenario 3 was developed to determine the cost differences should water treatment, monitoring, and tailings impoundment/dam maintenance need to be extended for 80 years (50 years water treatment plus 30 years monitoring and maintenance). In this case, water treatment plant operation and maintenance costs were increased to reflect an operational period of 50 years. Water treatment plant capital replacement costs were also assumed. Monitoring and maintenance under this scenario is performed as described in the reclamation plan with the time period extended. See Attachment 3 for detailed calculations and assumptions made in regard to extending water treatment and monitoring.

Application of these additional costs in Scenario 3 results in an increase of the current financial assurance amount by 759%. The Fort Knox Reclamation Plan costs were estimated as $7,224,521, and the Tailing Storage Reclamation and Closure Plan costs were estimated as $94,544,637 under Scenario 3.

3.5 CSP² Scenario 4

Scenario 4 utilizes the same assumptions as Scenario 2, with the addition of 100 years of water treatment for tailings water and seepage. This scenario was developed to determine the cost difference if water quality standards of tailings impoundment water and seepage were not met for 100 years after closure. In this case, water treatment plant operation and maintenance costs were increased to reflect an operational period of 100 years. Water treatment plant capital replacement costs were also assumed. Monitoring and maintenance under this scenario is performed as described in the reclamation plan with the time period

extended to a total of 130 years. See Attachment 3 for detailed calculations and assumption made in regard to extending water treatment and monitoring.

Application of these additional costs in Scenario 4 results in an increase of the current financial assurance amount by 1143%. The Fort Knox Reclamation Plan costs were estimated as $7,224,521, and the Tailing Storage Reclamation and Closure Plan costs were estimated as $140,341,737 under Scenario 4.

4.0 Conclusions

As illustrated by this review, the Fort Knox Mine financial assurance of $12,130,451 currently established may not be adequate to cover the costs of reclamation and closure incurred when these tasks are performed by a regulatory agency. As shown in Scenarios 1 and 2 presented above, financial assurance costs could increase from between 13% and 291% when assuming that water quality standards are met after 5 years of water treatment. If water treatment is required for 50 years the financial assurance amount could increase by 759% and by 1143% if water treatment is required for 100 years. This results in a potential increase of the overall financial assurance amount to between $13,442,096 and $148,280,794.

5.0 References

Alaska Interstate Construction LLC. December 29, 2000. *Fort Knox Tailing Storage Reclamation and Closure Cost Estimate*. Anchorage: Alaska Interstate Construction LLC. 44 pages.

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