BREWERY CREEK MINE

RECLAMATION COST ESTIMATE

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EXECUTIVE SUMMARY
BREWERY CREEK MINE
RECLAMATION COST ESTIMATE

Viceroy Minerals Corp. (VMC) owns the Brewery Creek Mine. Gold production has ceased and reclamation is underway. In the summer of 2003, the reclamation security deposit was reduced from $8.1 million to $5.0 million. It is understood that the company is of the opinion that the currently outstanding reclamation liability is less than the remaining security, and is seeking a further reduction.

This report presents an estimate of the cost to complete closure of the Brewery Creek Mine, using a third-party contractor. The estimate is based upon the site conditions as observed in June 2003, and updated based on the recent ARD assessment of the Blue WRSA..

There are a number of issues with the reclamation work to-date and key aspects of the reclamation plan. It is recognized that much of the work has been conducted in a satisfactory manner, primarily the re-sloping of rock piles, and that it is the best recent example of reclamation work by a mine operator in Yukon. However, regulators and other stakeholders should be aware that a higher standard of work would be expected in other jurisdictions.

Problems with the partially completed reclamation work include: unstable slopes, eroding slopes, and insufficient vegetation. The company's plan to minimally reclaim the haul road and leave up to a third of the total disturbed area at the mine in an un-reclaimed condition are not acceptable.

A recent assessment at the Blue WRSA suggests that acid rock drainage has developed in this area. The proposed approach to address this problem relies upon dilution and chemical inter-action with the groundwater regime, which is poorly characterized. This approach does not meet current standards. A conservative approach, based upon a low-permeability cover with a thick frost protection cap over the waste rock, has been assumed in developing the reclamation cost estimate presented here.

An unproven technology has been used to detoxify the heap and stabilize metals. Recent data suggests that these measures may not be completely effective. Provision for post-closure water treatment of uncertain duration is likely to be required.

The estimated outstanding reclamation liability at the Brewery Creek Mine is potentially $10,165,000.

BREWERY CREEK MINE

RECLAMATION COST ESTIMATE

1. INTRODUCTION

1.1. OBJECTIVES

This report presents an estimate of the cost to complete closure of the Brewery Creek Mine, located near Dawson City, Yukon. The estimate assumes that it becomes necessary for the government to carry out the reclamation of the site. It is expected that this cost estimate will be considered in the updating of security requirements for the project.

In order to ensure that the estimated cost is adequate, it is necessary to review the Decommissioning and Reclamation (D & R) plan for completeness and the potential for success of the proposed measures.

Issues and deficiencies in the D & R plan and reclamation work to date are presented in Section 2. The reclamation cost estimate is presented in Section 3. Comments on matters pertaining to the security deposit are presented in Section 4. Conclusions are presented in Section 5.

This report is based upon the site conditions as they existed in June 2003. Reclamation work which may have been undertaken by the company in the summer of 2003 has not been considered. This report has been up-dated from an earlier version, based upon the review of the SRK report on the geochemistry of the Blue WRSA.

Viceroy Minerals Corp. (VMC) has been conducting reclamation work at the mine. In the summer of 2003, the reclamation security deposit was reduced from $8.1 million to $5.0 million. It is understood that the company is of the opinion that the currently outstanding reclamation liability is less than the remaining security. Consequently, it is seeking a release of a further portion of the security deposit.

The approach taken in preparing this estimate is to:

- Identify the cost of site reclamation assuming that all reclamation issues are resolved with the least effort.

- Identify the additional cost for resolution of reclamation issues assuming that reasonably probable efforts are required to achieve a satisfactory condition.
- Identify the additional cost for significant modification of the approach to reclamation assuming that the proposed reclamation measures are found to be ineffective. This applies primarily to the heap detoxification, as it relates to long term metal stability.

1.2. INFORMATION SOURCES

The information sources for this review are listed in Appendix A.

In addition to the sources listed in Appendix A, I inspected the Brewery Creek Mine site on behalf of DIAND in August 2002, and in June 2003 on behalf of YTG.

1.3. LIMITATIONS

The reader should appreciate that this report presents only a preliminary reclamation cost estimate. The reclamation plan and the supporting documents do not comprise a detailed and cohesive plan for reclamation of all components of the Brewery Creek Mine, as described below. There are outstanding issues with the D & R plan at this time.

The estimate which is presented here is based upon reasonable or conservative assumptions regarding the resolution of the outstanding issues. Conceptual reclamation measures are described which could resolve the outstanding issues. However, further work is required to demonstrate that these measures will be effective. Consequently, the conceptual reclamation measures described in this report should not be read as "recommended". It is incumbent upon the company to demonstrate that these or other measures will provide a satisfactory post-closure condition.

2. REVIEW OF MINE DEVELOPMENT

2.1. GENERAL

An assessment of the reclamation issues and the approach proposed by the company in the 2002 D&R Plan was prepared by Brodie Consulting Ltd. in January 2003. A copy is attached in Appendix B.

VMC has conducted reclamation work in many areas of the mine. Although there are issues with the outstanding work, it is recognized that much of the work has been conducted in a satisfactory manner, primarily the re-sloping of rock piles. At this stage, much of the work which has been completed is the best recent example of reclamation work by a mine operator in Yukon. However, regulators and other stakeholders should be aware that a higher standard of work would be expected in other jurisdictions. These include Alaska, B.C., other Canadian provinces and the implied standard for activities in northern Canada by DIAND (INAC, 1987).

The reclamation cost estimate which is presented in this report is based on the assumption that the required level of work is equivalent to that which is expected in other jurisdictions.

No attempt is made here to estimate the value of the work which has been completed to date.

2.2. RECLAMATION ISSUES

DISTURBED AREAS

During the meeting held in Whitehorse at Yukon Government offices on June 11, 2003, the company indicated that the total disturbed area at the mine is about 300 ha and that about 165 ha is expected to be reclaimed by the end of 2003 and that there was about 25 ha to be reclaimed in 2004. This leaves roughly 100 ha which was not to be reclaimed. This is not acceptable. The truly un-reclaimable areas of the mine (pit slopes, pit ponds and limited portions of the pit bottoms) probably total less than 25 ha.

It is recognized that some areas are impractical to reclaim. In general, there is no reason why all other areas of the site cannot be ultimately reclaimed. Furthermore, the company has disturbed areas in its exploration activities which are outside the active mining area. Reclamation should be conducted in those areas to off-set the un-reclaimable areas within the mine lease.

It is recommended that the company provide air photographs to accurately delineate those limited areas which cannot be reclaimed and the outstanding disturbed area which can be reclaimed.

It is believed that the assessment presented herein has underestimated the extent of reclaimable disturbed areas, due to the difficultly in determining the extent of disturbance by walking the site. Additionally disturbed areas which are not outlined on the company's maps include: exploration roads within and outside the active mine area, and side-cast sections of the haul road.

SLOPE STABILITY

Slope stability issues include mass movement of dumps and pit slopes, erosion of pit slopes and recontoured dump surfaces. These are addressed separately, below.

MASS MOVEMENT

On the southern part of Lucky dump there are angle of repose sections with tension cracks back from the crest of the slope. There is a nearly vertical section of till in the south west corner of the South Golden pit. Tension cracks were observed in 2002 on the eastern section of the Blue dump. These cracks were obscured by recent activity in the area.

Ideally, all of these potentially unstable areas should be addressed by construction of a toe buttress and/or removal of the material at the crest of the slope and re-contouring to a flatter slope. Alternatively, a geotechnical assessment based upon movement monitoring could be presented to show that no further movement is expected. If the latter option is considered, then compensatory reclamation in other disturbed areas outside the actively mined area should be conducted to account for the steep slopes which will remain.

A pit wall failure occurred in the Blue pit. This was subsequently buttressed with waste rock. As noted below, there are ARD concerns with this area. Mitigation may be compromised by the pit wall failure.

EROSION

Failure of the western section of the Lucky dump occurred during operations. Some effort has been made to off-load the crest and prevent future movement. It is not clear that this will be effective and the comments on mass movement presented above apply here. In addition, the existing slope is eroding. Gully erosion from this area is likely to discharge sediment into Lucky Creek, which is as close as 20 m to the toe of the slope.

Gully erosion is evident on many of the re-sloped waste dumps, as shown on Photograph 1. The re-contouring work has resulted in steep slopes near several of the pit ponds, and gully erosion is initiating in these areas. Erosion of material from the pit slopes is also occurring in several areas, primarily Blue, Kokanee, and Upper Fosters, as shown on Photograph 2. There are many disturbed areas on the cut side of the haul road which are eroding.

Erosion from many of the areas identified above is likely to be ongoing. Some of the pit slopes could continue to erode and accumulate in pit ponds for decades, as shown in Photograph 3. Even if revegetation efforts on the dump areas are ultimately successful, sediment release may continue for at least several years. It is probably impractical to control erosion by further slope flattening. Improved revegetation efforts would help on the waste dumps. Select placement of erosion resistant material on some of the slopes could be conducted to reduce sediment release, although the effectiveness of this is uncertain.

In order to prevent the discharge of eroded sediments from the site, it is recommended that a modification to the surface water management plan be made. The pit ponds should be sized to accommodate the anticipated sediment accumulation over a ten year period, and still have sufficient pond area to provide settling of fines.

REVEGETATION

Revegetation efforts have been started in many areas of the mine. A few small areas, on and near to the Canadian Waste Rock Storage Area (WRSA), were revegetated about 5 years ago. Fair to good growth has resulted, although barren patches exist. Grass in the

silt borrow area, which had previously been observed to be stressed, now appears to be growing satisfactorily.

Seed and fertilizer were spread over reclaimed waste dump slopes in many areas of the mine in the fall of 2002. It is recognized that there has been little time for the grass to grow since that time. However, the grass observed on June 11, 2003 was thin and patchy in all but a few very limited areas.

According to the information presented on the seed manufacturer's quote, the seed application rate for wet and dry areas is 25 kg/ha. Revegetation trials in 1996/97 were conducted at seed application rates up to 75 kg/ha (and as noted above, produced patchy, fair to good, grass). The Reclamation Guidelines for Northern Canada (INAC, 1987) recommend a minimum seed application of 30 kg/ha for areas where the slope is less than 12% and 50 kg/ha where the slope is greater than 12%. The higher application rate on the steeper slopes is to reduce soil erosion. Virtually all of the re-sloped areas are steeper than 12% (~8H:1V) and the higher application rate is appropriate for essentially all of the site.

In attachment 11 of the 2002 D&R Plan it is suggested that the lower seed application rate for the outstanding work will allow quicker invasion by native colonizing species. This rationale is not appropriate in temperate regions where the growing season is longer and natural invasion is faster than in northern Canada. Applying the "light seeding rationale" in northern Canada is even more likely to result in soil erosion and further delay other use of the land.

It is understood that most of the seed and fertilizer spreading was conducted using an ATV with a rear-mounted seeder. This approach is likely to result in irregular and insufficient seed spreading on the steeper slopes, as can be seen in Photograph 4.

Extensive revegetation, consisting of application of additional seed and fertilizer, is likely to be required on most of the areas which were seeded in 2002. Special efforts may be required in areas where gully erosion has started.

BLUE WRSA

The recent geochemical assessment of the Blue WRSA by SRK Consulting concluded that the rock has already generated acid or that portion which has not yet produced acidity will not do so due to low acid potential, and that future contaminant releases from the waste rock could increase slightly (~30% over current levels).

A geochemical evaluation of the potential contaminant flushing from the WRSA has been presented in the SRK report. The report considers the mitigation of the leachate water quality by the alkaline groundwater. There are four issues with this approach, which are discussed as follow.

The main issue with the impact prediction for the Blue WSRA is that it is based upon dilution and geochemical moderation in the receiving environment as the primary mechanism for reducing impacts. In principle, reliance upon dilution, in surface or groundwater, is not an acceptable means for achieving environmental protection. Engineered mitigative measures should be employed first. The “store and release” cover, as was being constructed by the company in the summer of 2003, does not meet this criteria.

The second issue is that the company has suggested that a 0.5 m thick “store and release” cover will mitigate environmental impacts. That modeling assumes “good grass”. It is not clear that good grass which can be achieved at the Brewery Creek site is the equivalent of good grass at more temperate settings. Furthermore, if oxidation is occurring then capillary wicking of contaminants from the underlying waste rock up into the cover may eventually impact the grass. Finally, the results of the modeling suggest that infiltration may be limited to between 19 and 34% of annual infiltration. This may not be much different than a “do-nothing” scenario. Further work is required to demonstrate that this strategy could be effective. An approved field monitoring program would be required to show that an improved cover does, and would continue to, perform as expected.

The third issue relates to the release of water from the WRSA. As noted in the SRK report, the nitrate concentration in the seep at BC-11 has risen from 12 to 41 mg/l over the past three years; implying an increasing influence from the waste rock. The SRK assessment has not considered the effect of direct discharge of this, and other, seeps to Laura Creek without the benefit of groundwater dilution and geochemical interaction.

Finally, the dilution in the groundwater regime is based upon assumed infiltration from the catchments of the WRSA and the areas up and down-slope of the WRSA. It has been observed that the depth to groundwater is in the order of 80 m. This implies that the groundwater table is nearly flat, at the elevation of Laura Creek. Consequently, there may be little groundwater flow, a result which is not consistent with the assumption of 19% of precipitation entering the groundwater regime. The company has not demonstrated a satisfactory understanding of the groundwater flow paths in the area of the WRSA.

Based on these concerns, the store and release concept coupled with dilution and chemical interaction in groundwater has not been demonstrated to be protective of the environment. It may be that a thicker store and release cover with good vegetation could provide adequate environmental protection. Design of such measures is the responsibility of the company. A conservative level of environmental protection, based upon a low-permeability infiltration barrier over the waste rock, is assumed for the purpose of developing this estimate.

BLUE PIT

The water quality in the Blue pit has shown a trend of increasing sulphate, as shown in Figure 1. In addition, an iron-rich seep was observed flowing at about 2 lpm into the northern Blue pit pond. These observations suggest that oxidation and acid generation may be occurring in either the pit infill waste rock or the pit wall rocks, or both.

It is understood that an acidic seep was detected on the Blue pit wall a number of years ago and was subsequently covered when the pit was backfilled to stabilize the slope failure. Considering that seep, and the SRK assessment, it is assumed that at least a

portion of the pit wall rocks will have similar geochemical properties to the rock in the WRSA.

The source of the acidic seepage emerging in the pit pond may be associated with the rock in the vicinity of the pit slope failure. Construction of a cover to mitigate seepage from the unstable pit slope is impractical. Therefore, mitigation of the seepage in the pit should be conducted as the water quality trend shows it is getting poorer with time.

HEAP DETOXIFICATION

Analyses indicate that the water quality of the heap effluent is substantially improved. At this stage we do not know that organic based precipitates in the heap will remain stable once sugar addition ceases and biological activity wanes.

Figure 2, attached, shows the trend of arsenic in the heap effluent since December 2001. The addition of nutrients for detoxification commenced in May 2002. The concentration of arsenic decreased from about 0.7 ppm to a low of about 0.34 ppm in December 2002. Since then the concentration has gradually risen to 0.44 ppm (May 15, 2003). This level is just below the Water Licence limit of 0.5 ppm.

To date, there has not been any scientifically credible explanation as to the chemistry of the heap detoxification. We do not know if the recent increasing trend in arsenic is a variation within a stable system or signs that the metal precipitation is only temporary.

The company has suggested that the mechanism for metal stabilization in the heap detoxification is biologically-assisted sulphide precipitation in an anaerobic environment. There are several problems with this concept, including:

- There is no field data (oxygen monitoring, presence of anaerobic bacteria) to support the opinion that anaerobic conditions were established in the heap.
- There is little likelihood that anaerobic conditions existed everywhere in the heap, or for long enough in oxygen depleted areas to fully stabilize the metals.

The company has addressed the potential for uncertainty in the future heap water quality in that they have proposed 7 potential contingency measures (Section 6 of the D and R

Plan). In fact, only measures 4 and 5, may mitigate poor water quality. The others only detect or delay any problems. Measure 4, land application, has been successfully conducted. It is not known if the precipitates which may be produced in the proposed biological treatment cell (BTC), measure 5, will be stable in the long term. In the event that the precipitates which were formed in the heap during the detoxification of 2002 are not stable, then the proposed contingency measures may be ineffective in mitigating the effluent water quality. Consequently, it is appropriate to consider what additional measures may be necessary.

There are several possible trends in heap water quality. The most optimistic case is that the metals have been effectively stabilized by sulphide precipitation and that limited future treatment (involving only land application) will be required. A second case is that the metals have been temporarily captured as a result of the biological activity and that they will be released over time. This would necessitate some level of ongoing, probably batch, water treatment followed by land application. A third scenario is that the metal concentration will rapidly rise back to pre-detoxification levels. In this case, some form of ongoing conventional water treatment could be required. This could involve oxidation followed by precipitation using ferric or ferrous sulphate and lime. Polishing treatment by settling with flocculants and then land application would be conducted before discharge. This treatment could be required for at least several decades.

At this stage it is very difficult to predict with any confidence which of the potential water quality trends will emerge from the heap. It is not clear that the proposed cover will have any effect other than reducing the volume of water which passes through the heap. There may be little or no effect on the load of metals flushed from the heap.

It is understood that the company added another 30,000 kg of nutrients to the heap in 2003 with the objective of achieving further detoxification. While this step may repeat the reduction in metal concentration in the heap effluent, it will also delay for another year our ability to determine the trends in metal concentration in the heap effluent.

3. RECLAMATION COST ESTIMATE

3.1. GENERAL

The primary purpose of this report is to present an estimate of the current reclamation liability at the Brewery Creek Mine. This estimate is to be considered in determination of the financial security requirements so that in the event that the company does not fulfill its obligations then the Government is able to do so without any burden to the citizens of Yukon.

An estimate of the cost to carry out reclamation of the Brewery Creek Mine has been developed assuming the company abandons the site in its configuration as of June 2003. This estimate is based on the following assumptions:

- the company goes bankrupt or abandons the property,
- no allowance for the reclamation work which is currently underway or proposed for 2003 and beyond,
- all work is based on independent contractor rates,
- all costs are 2003 Canadian dollars,
- the cost estimate does not include revenue from recovery of assets.

It is recognized that calculation of the reclamation liability without recognition for the reclamation in progress is financially punitive to the company. However, until this work is completed it is still an outstanding liability just like any reclamation which is scheduled for future completion. Therefore, financial security should be established to ensure that this work is conducted as proposed. If the company carries out the necessary reclamation work, then the company's costs may be lower than estimated here.

The estimate has been developed using the RECLAIM model (DIAND 2001), a spreadsheet developed by DIAND for estimation of mine reclamation costs. The model is based, as much as possible, upon costs from other mine reclamation activities completed in the north. The results of the reclamation cost estimate are presented in Appendix C.

3.2. RECLAMATION MEASURES

This section presents an outline of the specific reclamation measures for each part of the mine. Detailed comments regarding the specific reclamation measures for each component are presented in Appendix D.

Lucky Pit & WRSA

Reclamation measures which are required in this area include:

- Construction of a berm to form a sediment basin, and a pit bottom drainage channel.
- Final contouring and placement of erosion resistant material in the pit bottom area.
- Excavation of the haul road fill and failed slope.
- Revegetation of thinly seeded areas.
- Scarify and place growth media on internal haul road areas.

North & South Golden Pit & WRSA

Reclamation measures which are required in this area include:

- Excavation of a pit pond discharge channel.
- Construction of a berm in South Golden pit pond to direct sediment bearing water into the pond and prevent the flow from short circuiting to the pond outlet.
- Excavation of a drainage channel from North Golden to South Golden.
- Final contouring and placement of erosion resistant material in the North Golden pit pond.
- Revegetation of thinly seeded areas and primary seeding of barren areas.
- Scarify and place growth media on internal haul road and pit bottom areas.

Kokanee Pit & WRSA

Reclamation measures which are required in this area include:

- Excavation of a pit pond discharge channel.
- Final contouring and placement of erosion resistant material in the pit pond.
- Contour the growth media stockpile.
- Revegetation of thinly seeded areas and primary seeding of barren areas.

Fosters Upper and Lower Pit & WRSA

Reclamation measures which are required in this area include:

- Revegetation of thinly seeded areas and primary seeding of barren areas.
- Scarify and place growth media on internal haul road areas.

Canadian Pit & WRSA

Reclamation measures which are required in this area include:

- Revegetation of thinly seeded areas and primary seeding of barren areas.
- Scarify and place growth media on internal haul road and explosives preparation areas.

Moosehead Pit & WRSA

Reclamation measures which are required in this area include:

- Excavation of a pit pond discharge channel.
- Revegetation of thinly seeded areas and primary seeding of barren areas.
- Scarify and place growth media on internal haul road and pit bottom areas.

Pacific Pit & WRSA

Reclamation measures which are required in this area include:

- Excavation of a pit pond discharge channel.
- Final contouring and placement of erosion resistant material in the pit pond.
- Revegetation of thinly seeded areas and primary seeding of barren areas.
- Scarify and place growth media on internal haul road and pit bottom areas.

Blue Pit & WRSA

Reclamation measures which are required in this area include:

- Excavation of a pit pond discharge channel.
- Final contouring and placement of erosion resistant material in the pit pond. This task includes earthworks for construction of an alkaline drain to manage the acidic seepage.
- Supply of alkaline material (limestone) for management of the acidic seepage.
- Revegetation of thinly seeded areas and primary seeding of barren areas.

- Scarify and place growth media on internal haul road and pit bottom areas.

A cover will be required to mitigate acidic seepage which is expected to emerge from the Blue waste rock. A two-layer cover is considered for the purpose of this estimate. The first layer would be an infiltration barrier composed of 0.75 m of silt material placed in thin lifts and compacted. The second layer would be a frost protection layer to prevent degradation of the infiltration barrier. Based on the information presented in the Canadian Foundation Engineering Manual (Canadian Geotechnical Society, 1985), the freezing index at the Brewery Creek site is slightly greater than 3500. The depth of frost penetration versus freezing index is shown on Figure 3. It is estimated that annual frost penetration at Brewery Creek could be 3.75 m. An insulating layer of this thickness should be placed over the infiltration barrier.

Heap

Reclamation measures which are required in this area include:

- Placement of growth media and revegetation.
- Removal of pipes.
- Excavation of a breach in the toe dike and excavation of a drainage channel.
- Flatten the slopes in cell 7.
- Heap water management, consisting of three potential scenarios
    - Least effort water management consisting of 3 seasons of collection of heap drainage and land application of the effluent,
    - Reasonably probable water management consisting of 7 additional seasons of collection of heap drainage, treatment in a biological treatment cell (BTC), followed by land application,
    - Possible water management consisting of a further 20 years of effluent collection, conventional water treatment to reduce metal levels followed by polishing in the BTC and land application.

Buildings & Infrastructure

Reclamation measures which are required in this area include:

- Removal of the ADR plant, assay lab, and office/shop complex

- Remove the pond liners, place growth media and vegetate.
- Contour and vegetate the process plant and pond areas.
- Remove the haul road safety berm and pull back the crest of the haul road fill.
- Scarify the haul road, place growth media and vegetate.
- Excavation of 6 stream crossings on the haul road.

3.3. ESTIMATED RECLAMATION LIABILITY

The estimated total reclamation liability for the Brewery Creek Mine is listed by mine component in the following table.

ESTIMATED RECLAMATION LIABILITY – JUNE 2003
BREWERY CREEK MINE

COMPONENT		COST
Lucky Pit & WRSA		$61,014
Golden/Kokanee Pits & WRSA		$128,664
Foster/Canadian Pits & WRSA		$52,418
Moosehead/Pacific Pits & WRSA		$42,180
Blue Pit & WRSA		$3,148,772
Buildings & Infrastructure		$1,925,922
Heap – physical reclamation		$692,012
Heap Water Mgmt	Least effort	$160,950
	Reasonably probable	$494,550
	Possible	$1,173,000
	Sub-total	$7,745,647
Contractor Mob/Demob.		$100,000
Monitoring		$693,200
Project Management		$232,369
Engineering		$232,369
Contingency @ 15%		$1,161,847
	Grand Total	**$10,165,433**

In keeping with conventional engineering practice, and considering the stage of A & R planning and the above uncertainties, this estimate includes a contingency of 15%. A lower contingency would be indicative of a plan based on a comprehensive data base of site specific parameters, detailed engineering, and proven reclamation measures.

As noted above, there are uncertain and optimistic elements of the closure plan. Resolution of these issues may increase costs. Some reclamation issues may have been missed or understated in this estimate. The reclamation cost estimate presented here should be considered as a pre-feasibility or order of magnitude estimate. Therefore, the

contingency is an integral part of the cost estimate and the estimated cost is not complete without it.

A common question with this type of estimate is "Will the actual cost be lower than the estimated cost due to the conservative approach taken in the estimate?" Further assessment of the problem may find more economical solutions to some aspects of the work. However, it is just as common for further assessment to reveal issues which were not addressed. It is believed that it is equally likely for the actual cost to be higher than the estimated cost as it is to be lower than the estimated cost.

In the event that the Government must carry out reclamation work at the Brewery Creek Mine, then the Government would probably incur additional costs. These costs, which are not included in this cost estimate, would be for activities such as:

- increased frequency of inspections leading up to assuming responsibility for the site,
- internal administration of contracts for planning and implementing the outstanding reclamation work,
- legal costs associated with "orphaning" of the site and making claims against the security deposit,
- interest charges on outlays until recovery of funds from any security deposit which has been provided, and,
- maintenance of the road from the Dempster Highway turn-off.

4. SECURITY DEPOSIT

4.1. GENERAL

This estimate of the reclamation liability for the Brewery Creek Mine is expected to be considered in the establishment of a security deposit to be provided by the mine owner.

This estimate does not include the reclamation which is currently in progress. When the company satisfactorily completes this work it should be entitled to a reduction in the security requirements.

The ideal form of security deposit is cash or Government of Canada bonds. Both of these deposits will accumulate interest and may adequately counter the negative effects of inflation on the value of the deposit. If the company proposes a letter of credit (LOC) and it is accepted by the Water Board and the Yukon Government, then the LOC should include an annual adjustment for inflation. It is suggested that this adjustment be linked to the Canadian Consumer Price Index or other accepted measure of the effects of inflation.

There is an additional issue related to the use of a LOC. If an LOC is used then it should be established in a manner which ensures that it remains in effect and accessible to the Government for a period which is sufficiently long for the Government to contract and carry out the necessary reclamation work. In this manner, any claims against the LOC would be based upon actual expenses. It is suggested that the bond should remain in effect for a minimum of two years past the date at which the site is legally declared an orphan and becomes the responsibility of the government.

5. CONCLUSIONS

Based on this review and the June 2003 site inspection, the following conclusions are presented:

1. Reclamation work has been initiated at many areas of the mine. Progress has been made on waste dump contouring, and heap detoxification and water management. This work to date has been conducted at a standard which is below that which is expected in other jurisdictions.

2. ARD has developed in Blue WRSA and is likely to appear in the pit. A prediction that the associated metal leaching will have minimal impacts due to 0.5 m soil cover and interaction of the leachate with groundwater is not acceptable. The estimate presented here is based upon conservative measures to mitigate ARD.

3. There has not been any work to demonstrate that the precipitates which have been produced in the heap or may be produced in the BTC will be stable in the long term. Three potential scenarios for future water management have been estimated.

4. The total cost for reclamation of the Brewery Creek Mine, including provision for post-closure water management and monitoring, is potentially $10,165,000.

5. Additional costs, above those identified here, would be incurred by the Government if it were to carry out the reclamation. These costs relate to contract administration, legal, contract timing and scope and financial carrying costs.

Please contact the undersigned if you have any questions concerning this report.

Brodie Consulting Ltd.

M. John Brodie, P. Eng.

6. REFERENCES

Indian and Northern Affairs Canada, 1987, Reclamation Guidelines For Northern Canada

Indian and Northern Affairs Canada, 2001, RECLAIM MODEL

Canadian Geotechnical Society, 1985, Canadian Foundation Engineering Manual, BiTech Publishers Ltd.

APPENDIX A

INFORMATION SOURCES

INFORMATION SOURCES

The following information was considering in preparation of this estimate:

- SRK Consulting, August 2003, Geochemical Assessment Blue WRSA Brewery Creek Mine, prepared for Viceroy Minerals Corporation
- Viceroy Minerals Corporation, Brewery Creek Mine, 2002 Annual Water License Report, Feb. 2003
- Viceroy Minerals Corporation, Brewery Creek Mine Decommissioning and Reclamation Plan, Volume IV, 2002 (2002 D&R Plan)
- Viceroy Minerals Corporation, Brewery Creek Mine, 2001 Responses to CEAA Review Comments,
- Viceroy Minerals Corporation, Brewery Creek Mine, letter to Water Resources – status of Contingency Pumping System, Feb. 13, 2001.
- Viceroy Minerals Corporation, Brewery Creek Mine, Updated Solution Management Plan, December 2000
- Viceroy Minerals Corporation, Brewery Creek Mine, Decommissioning & Reclamation Plan, July 1999
- Review of Brewery Creek Mine Updated Solution Management Plan by Les Sawatsky, P. Eng. Dec. 1999,

APPENDIX B

RECLAMATION REVIEW LETTER
JANUARY 2003

APPENDIX C

RECLAMATION COST ESTIMATE

APPENDIX D

RECLAMATION COST ESTIMATE SUPPORTING DETAILS

BREWERY CREEK MINE
RECLAMATION COST ESTIMATE
SUPPORTING DETAILS FOR INPUT TO RECLAIM MODEL

Lucky pit & WRSA

- Stabilize haul road, excavate 110 m @ 40.5 m3/m = 4455 m3
- Stabilize haul road, doze down, 70 m @ 40.5 m3/m = 2835 m3
- Pit pond berm, 1.5 m high rock berm1.5:1 slopes, 54 m long = 132 m3
- West dump area – doze slope into existing wrap around berm -60 m long = 2400 m3
- West dump area – supply erosion resistant material 50 m x 80 m x 0.25 m3/m2 = 1000 m3
- Pit pond area, final waste rock contouring, allow 1000 m3
- Pit pond area, growth media, allow 500 m3
- Pit pond discharge channel, channel cross-section as per D&R plan, excavation – 30 m x 30m3/m = 900 m3, rip rap 30 m x 6 m3/m= 180 m3,
- Seed and fertilize thinly seeded area 11.57 ha,
- Rip internal haul road, 395 m x 10m width = 3950 m2, supply growth media 3950 m2 x 0.15 m3/m2 = 593 m3

North & South Golden

- South Golden drainage channel, invert @ 892 m elev., assume mostly in bedrock, deepest section 4 m deep, excavate volume = 900 m3, swell to 1200 m3, use excavated material for berm to direct flow
- Stabilize SW pit wall in South Golden, buttress- 50 m x 100 m3/m = 5000 m3
- Rip internal haul road, 550m x 15m width = 8250 m2, rip pit bottom area 7825 m2, supply growth media 16,075 m2 x 0.25 m3/m2 = 4020 m3
- North Golden Pit pond discharge channel, channel cross-section as per D&R plan, excavation – 125 m x 30m3/m = 3750 m3, rip rap 125 m x 6 m3/m= 180 m3,
- Seed and fertilize thinly seeded area 5.99 ha,
- Primary revegetation, 4.57 ha

Kokanee pit & WRSA

- Pit pond discharge channel, channel cross-section as per D&R plan, excavation – 55 m x 30m3/m = 1650 m3, rip rap 55 m x 6 m3/m= 330 m3,
- Pit pond area, cover for eroding slopes, 40 m x 11m x 0.5 m3/m + 65 m x 12 m x 0.5 m3/m = 610 m3
- Primary vegetation 1.4 ha
- Seed and fertilize thinly seeded area 10.97 ha,
- Growth media stockpile, contour – allow 500 m3 dozing, primary vegetation 0.72 ha

Fosters Upper & Lower pit & WRSA

- Rip internal haul road, 580m x 10m width = 5800 m2, supply growth media 5800 m2 x 0.5 m3/m2 = 2900 m3
- Primary vegetation 3.69 ha
- Seed and fertilize thinly seeded area 7.08 ha,

Canadian Pit & WRSA

- Rip internal haul road and explosives mix site, 350m x 15m width + 40 m x 130 m = 10,450 m2, supply growth media 10,5000 m2 x 0.5 m3/m2 = 5250 m3
- Primary vegetation 3.82 ha
- Seed and fertilize thinly seeded area, allow 30% of seeded area 4.5 ha,

Moosehead

- Primary vegetation, 50% of pit area, 6.51 ha
- Pit pond discharge channel, channel cross-section as per D&R plan, excavation –75 m x 30m3/m = 2250 m3, rip rap 75 m x 6 m3/m= 550 m3,

Pacific

- Seed and fertilize thinly seeded area, incl. 50% of pit area and east dump area 4.20 ha
- Pit pond discharge channel, channel cross-section as per D&R plan, excavation – 32 m x 30m3/m = 960 m3, rip rap 32 m x 6 m3/m= 192 m3,

Blue

- Infiltration barrier, 0.75 m silt x 13.91 ha = 104,340 m3
- Frost protection layer, 3.75 m cover x 13.91 ha = 521,625 m3
- Growth media, 0.15 m3/m x 13.91 ha = 20,870 m3
- Seed and fertilize, 13.91 ha
- Seed & fertilize silt borrow area, 2.5 ha
- Pit pond berm, 1.5 m high rock berm1.5:1 slopes, 54 m long = 132 m3
- Pit pond discharge channel, channel cross-section as per D&R plan, excavation – 40 m x 30m3/m = 1200 m3, rip rap 40 m x 6 m3/m= 240 m3,
- Pit pond area, erosion cover, 12 m x 55 m x 0.5 m3/m2 = 330 m3
- Blue pit alkaline drain, 10 m x 20 m x 3 m = 600 m3 limestone = 300 tonnes

Heap

- Place growth media, from D&R plan, 105,000 m3
- Seed and fertilize, 29.4 ha
- allowance for soil, fertilizer and grass seed on affected area is provided
- Remove pipelines, allowance
- Breach toe dike, volume = 864 m3, excavate drainage channel, 105 m x 30 m3/m = 3150 m3, rip rap (105 m + 30 m) x 6 m3/m= 810 m3,
- Doze cell 7, 30m3/m x 560 m = 16,800 m3

Buildings & equipment

- ADR plant, demolish, 20 m x 75 m x 3 floors = 4500m2
- Assay lab, demolish, 18 m x 30 m = 540 m2
- Office/shop, demolish, 70 x 25 m 1750 m2
- Main haul road & service roads, 10,360 m x 15 m = 155,400 m2, scarify & vegetate

- Excavate 6 stream crossings on haul road, from D&R plan, 83,602 m3, rip rap 4508 m3,
- Remove berm on edge of haul road, 6 m3/m) + pullback crest @ 10 m3/m x 75% of haul road length (7960 m) = 95,520 m3
- Place growth media, 0.15 m3/m3 x 155,400 m2 = 23,310 m3
- Remove pond liners, total area = 73,000, allow removal of slopes and fold back onto base area, place growth media @ .5 m3/m3 = 17,250 m3
- Contour process plant and ponds area, 20,000 m3
- Primary revegetation, 9 ha
- allow for removal of tank farm tanks and piping

Heap Water Management

Optimistic case, years 1 - 3

- allow for 3 years collection and treatment, per year costs are:
- Monitor snow pack, inventory of contam. water, water quality, $15,000,
- Supply & install pumps, allow $5000,
- Re & Re pipelines and land application system, $2000
- fuel and supplies at $1000,
- laborers, 2 men x 10 hrs x 4 days, + 1 man x 10 hrs x 45 days + 2 men x 10 hrs x 2 days at $45/hr
- pick-up truck, 1.5 months at $3120
- allow 1.5 months @ $500 for communications,

Probable Case, years 4 to 10

- As above, plus:
- Construction of biological treatment cell, $98,000 as per D&R plan
- Supply and inject nutrients, 12 months @ $250/month

Possible Case: years 11 to 30

- Optimistic plus Probable Cases, plus:
- Supply of reagents (lime, H2O2, FeSO4, flocculants) annual allowance $2000
- Supply and inject nutrients, 12 months @ $250/month

Mobilization & Demobilization

- allow $100,000,

Post-Closure Monitoring & maintenance

- cost as per company's proposed schedule of monitoring,

Reclamation summary

- in addition to the cost of the primary reclamation activities, an allowance of 3% of the cost is included for each of project management and engineering for the reclamation work,
- a contingency of 15% is allowed.