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Project Memorandum

To:	**Kitikmeot Inuit Association**	**Doc. No.:**	**KIA-MEM-16-01**
Attention:	**Geoff Clark**	**cc:**	
From:	**Lukas Arenson, P.Eng.**	**Date:**	**January 8, 2016**
Subject:	**Ulu Camp Reclamation Estimate**		
Project No.:	**0454-006**		

1.0 INTRODUCTION

1.1. Background

BGC Engineering Inc. (BGC) has been retained by the Kitikmeot Inuit Association (KIA) to prepare an updated mine closure cost estimate for the Ulu Project site located in the Nunavut Territory. The site is located within the Kitikmeot Region of the Nunavut, approximately 530 km north of Yellowknife, NT. The lease is surrounded by Inuit Owned Land and surface rights, which are owned by the Nunavut Tunnagivik Inc. and administrated by the KIA. Ulu is currently owned by Mandalay Resources Ltd. but there is a non-binding Letter of Intent in place for the Ulu Project and the Lupin Project to be acquired by WPC Resources Inc. Previous ownership was by Bonita Capital Corporation (BCC), a wholly owned subsidiary of Elgin Mining Inc..

1.2. Scope of Work

BGC was initially contacted by Ms. Wynter Kuliktana via e-mail in February 2015 to review a cost estimate for the site prepared by BCC. On February 26, 2015 BGC submitted a memorandum summarizing our comments. In the review memorandum BGC highlighted various deficiencies of the cost estimate and recommended that the reclamation costs are re-evaluated by the owner as well as by a qualified engineering firm (with significant northern experience). In particular, rationales for their estimates tied back to specific reclamation objectives and criteria were incomplete or missing in the latest estimate.

In May 2015, BGC was contacted again by the KIA to carry out an independent, first-order mine closure cost estimate for the final closure of the Ulu mine site. BGC subcontracted Mr. Steve Januszewski, P.Eng., of SteveJan Consultants Inc. (SJCI), to carry out the work, which was initiated upon KIA accepted the proposal and contract signing on July 21, 2015.

The scope of work agreed on includes:

- Review of technical and historical documents including but not limited to information available on the NWB ftp site and AANDC Policy documents on closure plan requirements and cost estimates;

- Site visit by Mr. Steve Januszewski including gathering of any relevant printed information (reports detailed work done on the site, contractors' quotes, work undertaken, invoices, listing of site assets, etc.) from site or corporate office;
- Meeting with KIA and others (if needed) concerning closure criteria and on-going site decommissioning issues, as required; and
- Compilation of site information, running of costing model and writing of report (text and spreadsheets).

2.0 SUMMARY OF COST ESTIMATE

This section provides a summary of the cost estimate and the key assumptions used. The detailed cost estimate report and spreadsheet prepared by StevJan Consultants Inc. are available in the Appendix at the end of this memorandum.

The review of available information showed that significant uncertainty remains with respect to key aspects of the site, such as detailed material volumes, equipment functionality or accessibility. Accurate information with respect to these items is required in order to develop a detailed and accurate cost estimate. Therefore the first-order cost estimate enclosed used various assumptions, listed in the Appendix of the report, that need to be confirmed and updated at a later stage. As such, the report recommends the following three stages for the final closure work:

- *Stage One*: Undertake investigative studies with the objective of having all the background information in the hands of the parties (BCC, KIA, NU, NWB) to enable determination/selection of the optimal mine closure plan for the site. The cost for such investigations is estimated to be in the order of $170,000.
- *Stage Two*: Development and implementation of a detailed closure plan to be reviewed and accepted by the stakeholders.
- *Stage Three*: Carry out post-closure monitoring for a specified period of time.

The cost estimate presented was developed using the RECLAIM costing model (Version 7.0). The model was originally developed by John Brodie and Patrick Bryan of SRK Consulting in 1992 for the Department of Indian and Northern Development (now Aboriginal Affairs and Northern Development Canada (AANDC)) and subsequently updated by Brodie Consulting Ltd. over the years. SJCI identified three alternate approaches to closure of the site to consider. While the estimate was carried out using only one of the options, the final plan may be a hybrid of the three plans introduced. A detailed and accurate closure cost estimate for the Ulu site cannot be determined before a revised optimal and comprehensive closure plan has been prepared and it cannot be selected until a number of investigative studies (Stage One) are undertaken.

The costed closure plan presented herein utilizes existing site equipment and demobilization of elements that cannot be disposed on site over the winter road. This plan requires to initially fly in equipment and supplies. This is followed by undertaking an active closure program during

one, five month construction season. Then, in the following winter, constructing a winter road and haul out heavy equipment and possibly site debris and hazardous materials to Yellowknife.

Key assumptions are listed below, further details on those and more assumptions are listed in the main report:

- Underground mine is accessible, stable and provides sufficient storage capacity for various materials, such as ore from the ore pad, PAG waste rock, liners, tires and mobile and fixed equipment of no value.
- Equipment available on site can be used and is sufficient for the clean-up, i.e. no additional major equipment is brought to site.
- The existing camp and shop facilities at the site will be adequate without major upgrading for use during the reclamation program.
- The Lupin Mine cannot be utilized as a source of equipment or camp facilities, or to be the final recipient of any equipment or materials.
- Adequate materials (borrow materials, quarry rock, water for camp) are available in the immediate area of the project for reclamation requirements;
- The fuel tank farm diesel fuel tanks on site are effectively empty of fuel.

Based on the assumptions used, a first-order cost estimate of $8.71 M has been determined. The selected plan has a 25% contingency included based on the preliminary nature of the closure plan and the large number of uncertainties. In the end the liability split is approximately ⅔ for land and ⅓ for water. The estimated costs per component is provided in Table 1.

Table 1. Mine Closure Cost Estimate for Ulu Project.

Component		Estimate
Direct Costs	Underground Mine	$430,990
	Waste Rock Piles	$290,758
	Buildings and Equipment	$1,349,903
	Chemicals and Soil Management	$344,109
	Water Management	$10,000
	Post-Closure Monitoring & Maintenance	$188,500
	Direct Costs Subtotal	**$2,425,761**
Indirect Costs	Mobilization & Demobilization	$5,200,750
	Project Management (5%)	$121,288
	Health and Safety Plans / Monitoring & QA/QC	$24,258
	Bonding and Insurance (1%)	$24,258
	Engineering (5%)	$121,288
	Indirect Costs Subtotal	**$5,680,342**
Contingency (15% on Direct Costs)		$606,440
Total Costs		**$8,712,542**
Land Liability (68%)		$5,926,177
Water Liability (32%)		$2,786,366

Compare to cost estimates previously prepared by others, differences exist in two major contributors:

- Buildings and Equipment: The cost estimates have become progressively more detailed over time in including all of the elements that fall under this category as well as itemizing the numbers of all the items rather than using lump sums for entire groups of items. The new estimate is ~3.5 times higher than the BCC estimate (2014) and 1.5 times higher than the AANDC estimate (Feb. 2015).
- Large discrepancy exist in the estimate of the mobilization and demobilization costs, primarily to the use of a winter road as well as a toll on existing road portions. The new estimate is ~16 (!) times higher than the BCC estimate (2014) and 1.4 times higher than the AANDC estimate (Feb. 2015).

3.0 CLOSURE

BGC Engineering Inc. (BGC) prepared this document for the account of Kitikmeot Inuit Association. The material in it reflects the judgment of BGC staff in light of the information available to BGC at the time of document preparation. Any use which a third party makes of this document or any reliance on decisions to be based on it is the responsibility of such third parties. BGC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this document.

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Yours sincerely,

BGC ENGINEERING INC.
per:

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Reviewed by:

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LUA/JWC/gc

APPENDIX A
Acronyms and Abbreviations

AANDC / DIAND / INAC – Federal government agency responsible for policies related to aboriginal peoples in Canada and often assigned to oversee mining projects in the Canadian North. Its various renamings have included Indigenous and Northern Affairs Canada (INAC), Department of Indian Affairs and Northern Development (DIAND), and currently Aboriginal Affairs and Northern Development Canada (AANDC).

BCC Bonita Capital Corporation. A wholly-owned subsidiary of Elgin Mine Inc., previous owners of the Ulu Gold Project.

Boneyard Surface laydown area, typically containing spare parts and sometimes scrap material.

Company Current owners of Ulu Gold Project, understood to have recently changed to WPC Resources Inc. from previous owners Mandalay Resources.

Decline Underground sloped ramp typically blasted out of rock that leads from a surface portal to underground mine workings. It is sized and built at a slope to accommodate the mining equipment to be used in the mine.

Direct Cost Actual costs to undertake the specified tasks of a given project. Typical costs include individual tasks to undertake the specified project such as re-sloping and covering waste rock dumps, demolition/removal of buildings, decontamination of required areas, etc.

Hypalon It is a trademark for chlorosulfonated polyethylene (CSPE) synthetic rubber (CSM) noted for its resistance to chemicals, temperature extremes, and ultraviolet light. It is product of DuPont. It is commonly used at mining projects as an impervious material to line water treatment ponds, as well as some tailings facilities.

Indirect Cost – Overhead costs required to undertake the other costs that are typically called Direct Costs. Examples of Indirect Costs include mobilization and demobilization, head office overheads, insurance and bonding, contractor profits.

Jumbo Underground machine used for rock drilling, consisting of one to three booms each of which has a rotary drill powered by the main unit which supports the diesel engine and operator.

Kinetic Test Cell – A constructed pile of material placed outdoors that is subjected to natural weather (precipitation and temperature ranges) from which seepage is collected to determine the extent of ML/ ARD being generated by the material being tested.

ML / ARD Metal Leaching and/or Acid Rock Drainage.

Mob & Demob – Mobilization and Demobilization, dealing with the bringing of resources, typically manpower and equipment to a project site and then removing them at the project's completion.

NT Northwest Territories

NU Nunavut

NWB Nunavut Water Board; issuer of Water License for mining and mining exploration projects such as the Ulu Gold Project.

PAG Potentially Acid-Generating rock that may produce ARD

Portal Surface opening to underground mine workings, typically blasted out of rock in a hillside

Quonset Hut – Semi-permanent lightweight building structure, pre-fabricated and made of corrugated galvanized steel having a semi-circular cross-section.

RECLAIM Customized Excel spreadsheet program developed for use by NT for mine closure costing, recently produced by Brodie Consulting of Vancouver. The program is also referred to as the "RECLAIM Model" with the most current version is labelled as Version 7.0, which was released in 2014.

Rockfill Run of quarry or mine rock, typically with no mineral value; at an underground mine it is typically produced underground, can also be called waste rock and can be used for a number of applications, both in the underground mine as well as on surface.

Scooptram Low-profile rubber-tired underground mine rock haulage vehicle with large bucket at its front-end with an operator booth and engine in an articulated rear portion.

APPENDIX B
Report: "Closure Cost Estimate for Ulu Gold Project" by SteveJan Consultants Inc.

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January 6, 2016

Mr. Geoff Clark
Director, Lands and Environment
Kitikmeot Inuit Association
P.O. Box 360
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Subject: Closure Cost Estimate for Ulu Gold Project

EXECUTIVE SUMMARY

SteveJan Consultants Inc. (SJCI) has prepared an updated mine closure cost estimate for the Ulu Project site located in Nunavut, approximately 530 kilometers north of Yellowknife, NT and approximately 135 kilometers north of the Lupin Mine. The report was commissioned by the Kitikmeot Inuit Association as the administrators of the land. The update is based on a review of number of the previous closure plans and costings, supplemented by a site inspection by the author on August 14 and 15, 2015.

The mine project is currently owned by Mandalay Resources, having recently acquired it from Elgin Mining in late 2014. The site was developed between 1994 and 1997 with an underground ramp having been excavated and surface infrastructure in place in the hopes of using the orebody as a source of feedstock for the nearby Lupin Mine. From 2004 to 2006 additional drilling was undertaken. A final, limited drilling program for surface was undertaken in the summer of 2012.

The site has been in a state of care and maintenance since that time.

The RECLAIM costing model was utilized to prepare this mine closure cost estimate, consistent with GNWT policy, supplemented by this report which provides additional details.

The updated cost estimate as of August 31, 2015 is $8.7 M versus $7.5 M by AANDC (2015) and the latest cost estimate prepared by the company of $2.8 M (BCC 2015), the company's last estimate being based on $1.6 M by Delta/Carter (2014) and supplementary information provided by BCC for manpower, equipment and logistics costs of $1.17 M (BCC 2015).

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1 INTRODUCTION

1.1 Background

Steve Januszewski of SteveJan Consultants Inc. (SJCI) has prepared this mine closure cost estimate based on BGC's July 23, 2015 acceptance of an SJCI Proposal dated June 23, 2015 to Dr. Lukas Arenson, P.Eng., Senior Geotechnical Engineer of BGC Engineering Inc. (BGC) on behalf of their client, the Kitikmeot Inuit Association (KIA).

The entire project area is located on Inuit Owned Lands in the Kitikmeot Region of Nunavut. The KIA is the Regional Inuit Association for the Kitikmeot Region of Nunavut.

The Ulu Gold Project is currently owned by Mandalay Resources but there is a non-binding Letter Of Intent (LOI) in place for both the Ulu and Lupin sites to be acquired by WPC Resources Inc. Previous ownership of the projects was by Bonita Capital Corporation (BCC), a wholly owned subsidiary of Elgin Mining.

This revised cost estimate considers decommissioning and reclamation liabilities at the Ulu Gold Project site as of August 31, 2015.

This is SJCI's first involvement in the Ulu Gold Project. SJCI has been sub-contracted by BGC to undertake this project as well as having previously provided consulting engineering services related to mine closures to BGC.

1.2 Scope of Work

The KIA has requested an updated independent first order mine closure cost estimate for the final closure of the site (ref: e-mail KIA Lands Officer to BGC dated June 5, 2015). The cost estimate report was to include and break-out both direct and indirect costs. It should also provide classification of the costs as being either water-related or land-related.

To assist in the preparation of this report the author undertook a site visit of the Ulu Gold Project.

This report is based on information available to the author at the time of its preparation. It has been produced by SteveJan Consultants Inc. for BGC for use by KIA. SJCI accepts no liability for its use by any other party.

2 REVIEW CONTEXT

2.1 Closure Criteria

2.1.1 Regulatory Regime

There are two lead licenses which authorize the Ulu project. These include:

- Type 'B' Water License 2BM-ULU1520, recently issued by the Nunavut Water Board (NWB) on May 13, 2015 and expiring May 12, 2020, and includes a water quality and quantity monitoring program; and
- Land Use License KTL311-C013 issued by KIA, currently as a Temporary Renewal that expired Sept. 30, 2015. The temporary renewal was issued pending a mine closure cost estimate being submitted.

2.1.1.1 Nunavut Water Board

The current Water License 2BM-ULU1520 follows expiry of the previous License 2BM-ULU0914 and an application for renewal that was submitted to the Nunavut Water Board by BCC on May 30, 2014. As part of the previous license, BCC submitted a completed reclamation estimate to the KIA on December 31, 2014. KIA considered the estimate to be deficient and unsatisfactory. The NWB also received the security assessment (i.e., mine closure cost estimate) on behalf of the KIA on December 31, 2014 and distributed on January 12, 2015 for public comments (BGC 2015). BCC provided its response to intervenors' comments on March 3, 2015. The renewed Water License follows a NWB review of the renewal application by BCC and intervenors comments and submissions which included a third-party mine closure cost estimate, commissioned by AANDC (2015).

The NWB assigned a five year term to the new license. This duration of the new license is based on "…the Board believes that the project is probably at a juncture where decisions will likely be made over time on the eventual direction of the Project…".

In December 2014, the Licensee revised the amount of security for site reclamation from $1,685,210 to $1,685,542. AANDC had provided a more recent reclamation cost estimate at $7,523,612 (BCC 2015), which followed their earlier estimate of $3,363,140 based on a 2011 closure cost estimate.

The renewed NWB Water License text includes a number of conditions, several of which are listed below:

- The amount of security as well as who should hold the security are on-going issues that will have to be addressed over time.
- The Licensee is required to submit an updated security assessment prior to resuming on-site activities.
- The Licensee shall include any updates to the estimate of the restoration liability, as required under Part B, Item 5 and 6, based upon the results of the restoration research project.

And from subsequent sections of the License, a number of conditions are worth noting:

Part B - General Conditions:

- Development monitoring and any modifications to the site plan (Item 8.f.)
- A summary of hazardous materials shipped out, the treatment received and the location of the approved treatment facility to which they were sent (Item 8.i.)
- A summary of any abandonment and restoration work completed during the year and an outline of any work anticipated for the next year (Item 8.j.)

Part D - Conditions Applying to Waste Disposal:

- Undertake a geotechnical inspection prior to recommencing on-site activities and annually thereafter (Item 10.)
- Undertaken a plan for on-going Acid Rock Drainage and Geochemical Characterization within 60 days of resuming on-site operations (Item 11.)

Part E - Conditions for Spill Contingency Planning:

- The Licensee shall provide secondary containment for hazardous materials and fuel storage areas (Item 4.)

Part G - Conditions Applying to Modifications and Construction:

- Should fill or quarry material be required, it must be obtained from a source approved by the Board (Item 7.)

Part I - Conditions Applying to Abandonment and Restoration or Temporary Closing:

- NWB has approved the Interim C&R Plan, dated March 2013 (Item 2.)
- The Licensee is to make notice of any formal application to achieve Recognized Closed Mine status (Item 4.)
- The Licensee shall make submit a final Abandonment and Restoration Plan within 60 days of the above (Item 5.)
- The Licensee shall remove from the site infrastructures and site material, including but not limited to, all fuel caches, drums, barrels, buildings and contents, water pumps and lines, material and equipment before the expiry of this License (Item 8.)

The last item should direct the Licensee to either re-commence site activities or to undertake a significant portion of a final closure of the mine within the term of the License.

2.1.1.2 Kitikmeot Inuit Association

A number of conditions are included in KIA Land Use License KTL311C013 that apply to aspects dealing with reclamation of the site. Two examples include:

14. The Licensee shall dispose of all combustible, non-hazardous waste products by incineration or removal from the lands. All hazardous or non-combustible waste must be removed from the lands before the term of this License expires.

25. All disturbed areas must be restored in a manner acceptable to Kitikmeot Inuit Association.

In addition the Reclamation Policy of the Nunavut Tunngavik Inc. (2008) includes a number of objectives and goals concerning reclamation of Inuit Owned Lands (IOL) following a land use operation, such as a mining operation.

The Policy includes an excerpt from the Nunavut Land Claims Agreement that states *"…the lands must be reclaimed to a state where they are safe, stable, productive and available to as many future land uses as possible. For a site to be considered safe following reclamation, there should be no public health concerns, such as contaminants emanating from the site, and all physical hazards should be removed. Furthermore, the site must conform to all applicable safety legislation…"*

2.1.2 Corporate Requirements

Background closure and sustainability documents by BCC and Elgin Mining were reviewed and no specific mine closure objectives were noted in the documents reviewed. A 2012 Environmental and Sustainable Development Policy from BCC/Elgin Mining was included in the 2013 Interim Closure and Reclamation Plan and the 2014 Care and Maintenance Plan. Section 3 of the Interim A & R Plan provides a listing of abandonment and restoration objectives. Unfortunately the listing provides very little detailed information to assist what specific closure aspects should apply to the Ulu site apart from 'motherhood-type' statements.

2.2 Closure Plan and Closure Cost Estimate Development

2.2.1 Previous Mine Closure Plans and Closure Cost Estimates

Elgin 2004

The earliest mine closure cost estimate reviewed was in the form of a one-page table received from Mr. Mike Tansey, the previous Ulu Mine Project Manager for Elgin Mining, who prepared a spreadsheet titled *Reclamation Costs for Ulu Minesite (present condition)*, dated March 25, 2004. It included the use of aircraft for bringing in equipment, manpower and fuel for the project, and then using existing site equipment to clean up the site, disposing of some materials underground, followed by the use of a winter road to demobilize materials and equipment. Interestingly, 64% of the total cost of $1.267M was associated with the indirect costs (fuel, mob & demob - winter road, aircraft). More information on Mr. Tansey's costing is provided in Table 1, below.

AANDC 2011

Brodie (2011) produced a mine closure estimate for SENES Consultants and AANDC using the RECLAIM model. It was based on a review of information provided by AANDC and KIA including site photographs. There was no site inspection included. The final cost estimate report included direct and indirect costs, and came up with a total cost estimate of $3.63M. The indirect costs made up over half of the entire cost estimate and the Mob & Demob made up 90% of it. The cost estimate also included a contingency equal to 25% of the direct costs.

BCC ICRP 2013

The Company's most recent closure plan for the site was issued in 2013 as the Interim Closure and Reclamation Plan (ICRP) (BCC 2013).

The ICRP proposed a final abandonment of the site to consist of one construction season of active closure work followed by construction of a winter road the following winter and removal of camp components, equipment and materials using that road. That plan would involve flying in all the necessary personnel, equipment and materials to undertake the closure work. The plan states that the vast majority of the Ulu facilities are of a component-type system and can be removed from the site using that road. Exceptions include the constructed pads, roads and airstrip (ICRP Section 4.3).

One statement in Section 4 of the ICRP provided the Company's acknowledgement of the likely very significant cost to decommission the site as it stated:

The costs associated with the removal of equipment and materials and restoration of the area is most often considerably greater than that for initial construction.

BCC 2014

The Company's latest closure cost estimate was undertaken by Delta and Carter (BCC 2014a) which was based on a site inspection of several days. It determined the cost to be $1.64M with a 15% contingency. The primary tasks outlined in the plan included:

- Mobilize fuel, miscellaneous tools and equipment, and workers to the site by plane;
- Use the existing camp to house the workers;
- Utilize existing equipment on site to undertake the closure work;
- Re-open the mine through the portal access which would involve removal of waste rock in the portal along with any ice in the portal;
- Use the mine to dispose of equipment, hydrocarbon contaminated soils, ore, PAG waste rock and debris;
- Dispose of the tanks farms and buildings to an un-specified location;
- Re-slope the rock pads, scarify the site's roads and airstrip and remove 6 culverts;
- Fill the portal with suitable waste. The vent raise is considered to be capped already;
- De-mobilize the remaining materials and workers by aircraft; and
- 5 year post-closure monitoring period.

The report states that *"…several suitable pieces are in working order and are available for use as is while several others are available with minimal upgrades and maintenance…*". This is a critical assumption in making a reclamation program work, i.e., not having to bring in heavy equipment to and out of the site, and thus not requiring a winter road.

There is no mention of all the fixed and mobile equipment at the site and where they are to be disposed.

A cost is provided for diesel fuel for the project. There is no detail provided as to how the estimated quantity was determined. In addition, the unit rate used is likely too low and does not include transport to the site. The report provides no costing for freight charges using the

aircraft that will be required to mobilize and demobilize equipment and materials to site. A lump sum has been provided to mobilize and house workers.

Subsequent to the report's issuance a request was made from KIA to include costs for manpower, equipment and logistics. A further $1.17M was estimated for those costs bringing the total cost estimate up to $2.81M. (Note: The author did not have a copy of the supplementary costing sheets to review them.) With the additional provision the Indirect Costs amounted to approximately $602,000 out of the $2.81M, or approximately 21% of the total cost.

AANDC 2015

A closure cost estimate was prepared in early 2015 by SENES for AANDC using the RECLAIM model and determined a total cost estimate of $7.52M. It involved a review of the 2014 BCC cost estimate report and several reference documents but did not include t a site inspection. It included a contingency based on 25% of the direct costs. The Mob & Demob component of the costing (one of several costs making up the Indirect Costs) amounted to half of the entire cost (and its cost estimate was an order of magnitude higher than the Mob & Demob cost estimated in BCC's 2014 report).

The AANDC closure cost estimate reports from 2011 and 2015 included a winter road to be utilized over two successive winters to bring in equipment and supplies with the winter road during the first winter, undertaking the site work over one summer season and then demobilizing all the equipment, supplies and remaining site materials using a winter road the following winter.

AANDC (2015) and KIA (2015) provided comments on the Company's closure cost estimate (BCC 2014a), dealing mostly with the lack of details and the need for justification for choices made, and the use of low unit costs. The latest AANDC cost estimate report was issued a couple of months after the BCC report was issued. The Company responded to the AANDC costing report in an un-dated 11 page memo to the Nunavut Water Board. A comparison of elements from selected previous closure cost estimates for the site is provided in Table 1, below.

Table 1: Comparison of Selected Closure Components in Previous Closure Cost Estimate Reports.

Component	Tansey 2003 (1 page)	AANDC 2011 (9 pages)	BCC 2014 (16 pages)	AANDC 2015 (18 pages)
Winter road, 1 or 2 seasons	Yes, 1 at $260K to Lupin	Yes, over 2 winters to Lupin. Bring in heavy equipment. Removal at end.	No	Yes, over 2 winters. 2 x 345 km to Lupin ($2.484M), toll for remainder ($160K)
Open up-mine openings	Remove 400 m^3 frozen muck	Remove 400 m^3 rockfill, 30 m length of ice	Lump sum of $200K; remove ice & rockfill plugs	Lump sum of $200K to remove ice & rockfill (400 m^3) plugs
Mine openings-closure methods	Portal-rockfill-800 m^3; Vent raise-concrete (11.5 m^3)	Portal-rockfill-800 m^3; Vent raise-concrete slab (9 m^3)	Portal-'suitable waste', no volume estimate; Vent raise-concrete (11 m^3)	Portal-rockfill-800 m^3; Vent raise-concrete (11 m^3)
Import fuel and volume for reclamation program	Yes, 600,000 L	Not specified. Use existing fuel on site for reclamation program	Yes, 110,000 L	Yes, 130,000 L (based on AANDC 2011 estimate*)
Dismantle 'Weatherhaven' structures	$68,000	Not broken out	$45K to remove	$45K to dismantle 'Weatherhaven' structures
Dismantle other structures	$145K including labor ($25K)	Not specified	$45K to remove trailers	$45K to remove trailers
Workers' Costs-mob/demob & camp	Lump sum of $66K for camp costs	Not specified	Lump sum of $150K for workers' mob & camp	Lump sum of $200K for camp
Dispose materials underground	Yes; ore and tank farm sands	Yes; site debris and PHC-contaminated soils	Yes, ore and 25% of waste rock, site debris, PHC-contaminated soils	Yes, ore and PAG waste rock
No. of barrels on site, and cost	Not included	450	Not specified	450 (using AANDC 2011 estimate*); $105K to prep & remove haz. materials
Freight Haulage & Flights	Yes; haulage to Lupin; $365K	Not specified	Not included	Yes, haulage in & out to Y'knife; $2.64M total
Post-Closure Monitoring & Maintenance	Not included	Minimal; $109K	5 years; $120K	25 years; $240K
Contingency	Not included	25% of Direct Costs	15% of Direct Costs	25% of Direct Costs
Total Cost	$1.267M	$3.363M	$2.81M ($1.64M & $1.17M)	$7.524M

Note: * The AANDC report refers to a more complete version of the AANDC 2011 report, likely with all the RECLAIM costing sheets included although the SJCI copy of the report only included the Summary RECLAIM sheet.

2.2.2 Closure Plan Assessment by SJCI

After a review of the latest closure plan and the past several closure cost estimates, and then completing the site visit the author considered how best to close the site. It became apparent to him that there are several very different approaches on how the closure would be undertaken that should be considered, beyond the one proposed by BCC, and that the work will likely need to be undertaken in several stages to determine the optimal plan before one can be initiated. The most fundamental aspect to resolve is whether a winter road to the site is required or not and secondly, whether there are opportunities to work with the Lupin site on several aspects of the Ulu site closure (although there are no current plans to open a road to the Lupin Mine). But on the assumption such a road was in place it would allow useable Ulu equipment and materials to be relocated and then used at the Lupin site, thus freeing up capacity underground at Ulu for other materials, and/or possibly removing the need for a winter road to remove equipment and materials and tying in to the existing ice road that connects to Yellowknife.

A review of several of the previous closure cost estimate reports for the site reveals a range of options concerning the major elements in the closure cost estimates.

The basic questions that require further discussion include:

- Is the right equipment currently at site to undertake the reclamation program? This would include excavators, excavators with shears, trucks, packers, cranes, dozer, etc. Is the available equipment of the right size for the type of work to be done and to get all the construction done in one season?
- What is the condition of site equipment that could be used for the reclamation program? Can one get a history of the various pieces of equipment being considered? If the required equipment is not operable or cannot be made so with basic (i.e., simple) maintenance work, the right equipment will need to be brought in. All of the equipment on site has been sitting exposed to the full temperature ranges experienced in this northern location. Most of it has been out of operation since 2006 at the most recent and most of it several years longer. In addition, the majority of the mobile equipment has also been parked outdoors throughout that period. Confirming availability of appropriate equipment remains a serious issue and one which will require a comprehensive assessment as part of a First Stage of Investigations prior to determining the optimal reclamation plan, as is discussed in the next section of this report;
- Determining the work required to enable re-entry to the underground mine including dealing with ice and rockfill plugs, underground mine rock stability, water in the mine; its quality and volume, ventilation requirements and the possible need for use of the ventilation raise, etc. All of the options discussed below assume the underground decline will be available for disposal of site materials;
- How much work would be required to re-activate the winter road to the Lupin Mine and from there to the main winter road to Yellowknife, although the latter road (i.e., Lupin to main winter road) has been done on several occasions previously? And a winter road was used to initially establish the Ulu project. A budget estimate is

required to be able to properly assess this method as a possible method of demobilizing materials and equipment from the site, or for mob as well as demob;

- Can the Lupin mine site be used to receive some of the materials and/or equipment from the Ulu site either for re-use or disposal there? (Note: this has been initially considered not possible based on conversations with BGC and KIA);
- Is the waste rock removed during construction of the underground ramp and mine development work and then used for surface pad constructions capable of leaching metals and how much of it is there? Earlier test work suggests yes, in the long term (Echo Bay 1998). The ore has been found to be a geo-chemical concern and previous closure plans have assumed the small amount located on surface will be moved into the underground; and a conservative approach on this has been taken in this report with a sizable portion of the waste rock located on surface to be moved back into the mine. Further work investigating the geochemical nature of the waste rock had been planned and is required to be undertaken to determine the quantity that requires impoundment;
- Determining more accurate estimates of quantities of the various other materials on site that need to be dealt with. This includes a full equipment inventory, inventories of waste materials (both hazardous and non-hazardous) and opportunities for consolidation of them, incinerating some, etc.;
- What materials are permitted to be stored / impounded permanently in the underground mine ramp? This report has assumed that anything that will fit underground (with conditions as outlined in the next paragraph) should be disposed of there, consistent with the approach taken in previous Ulu closure cost estimates and observed at other northern sites; and
- Can a surface landfill be constructed at the Ulu site? (Note: This has not been pursued in this report, at the recommendation of KIA)

Northern mines with underground workings (i.e., those within a permafrost environment, such as the Nanisivik Mine) have been previously used for permanent impoundment of mining equipment (once drained of all hazardous liquids and batteries), as well as contaminated soils and demolition debris. At Nanisivik, the approved operating procedure dictated that storage sites were selected based on the material being deposited there. Non-contaminated demolition debris was stored in areas closer to the portals, whereas material that was either metal or hydrocarbon contaminated was placed in deeper and frozen locations where gravity migration of contaminants was not considered possible (ref: Nanisivik Mine Waste Disposal Plan-March 2004 and Nanisivik Reclamation of Mine Openings As-Built Report-Breakwater 2008).

With that information in hand, the following is a staged approach to consider for decommissioning of the Ulu site:

Stage One

Undertake investigative studies with the objective of having all the background information in the hands of the parties (BCC, KIA, NU, NWB) to enable determination/selection of the optimal mine closure plan for the site. These tasks would include:

- Undertake a geochemical assessment of mine generated rock now on surface (i.e., waste rock, ore). A first assessment was undertaken by Klohn Crippen in 1998, with some work also undertaken by consultants Mehling Environmental Management Inc. (MEMi) as reported in the 2005 Ulu Mine Waste Rock and Ore Storage Plan (WRI 2005). This would include standard geochemistry considerations but also the spatial distribution of where the different materials have been spread across the site's surface and possibly a risk assessment to determine the best remediation plan. This has been given an estimated cost of $75,000 including a risk assessment.
- Check on operational status of equipment required to undertake the decommissioning work. Both fixed (especially gensets and compressors) and mobile (heavy equipment-surface mobile and possibly underground mobile, as well as light-duty mobile including pick-up trucks and ATVs). Estimated cost of $15,000.
- Estimate quantities of the various materials on site to be dealt with including those to put underground as well as materials that can burned on site, or that require removal from site (i.e., removed to Yellowknife). Estimated cost of $20,000.
- Check on feasibility and costs for re-opening underground ramp. This would assess removing ice plug(s), need for vent raise (i.e., a second opening to surface), a mine geotechnical stability, the need to pump out accumulated mine water & likely rehab work, etc. Estimated cost of $20,000.
- Undertake a budgetary cost estimate for re-activation of a winter road (construction, operation, maintenance) to connect the Ulu site to the existing winter road connecting Yellowknife and the northern diamond mines. It would likely be based on a review of the details concerning the previous winter roads used to access the Lupin Mine and the road that had been constructed to access and set up the Ulu Mine. This task has an estimated cost of $10,000.
- Secondary items to check on:
    - Check on whether the current incinerator on site is adequate for site reclamation work (certification, capacity). Check on open-burning opportunities. Estimated cost of $1,000.
    - Undertake a comprehensive count and contents inventorying of:
        - The approximately 22 cubes and 390 barrels and their contents, (e.g., there are~ 57 barrels of good diesel that could be used during the reclamation program)-Estimated cost of $20,000.
        - Fuels and/or sludge in tank farm tanks. Estimated cost (incremental to above site visit) of $2,000.
        - Buildings, structures and equipment. Estimated incremental cost of $5,000.
        - Boneyard, laydown and debris piles. Estimated incremental cost of $2,000.
        - Core in core trays and what is to be done with them. Estimated incremental cost of $500.

The total cost for undertaking the above work is in the order of $170,000.

Stage Two

With the results of the Stage One in hand, the full scope and cost estimate to implement the selected closure plan can be prepared. A meeting of the stakeholders could be undertaken to reach a consensus on the path forward and to approve preparation of a budgetary cost estimate for implementation of the closure plan.

This report has identified three alternate closure plans to consider. The final selected plan may be one of the three or a hybrid of the three involving features from several of the plans as well as potentially other additional tasks, not considered here.

The Stage 2 work would involve selecting and then implementing the selected plan.

This report provides three alternative plans that can be evaluated using the results of the Stage One program (listed below in order of anticipated cost, from the lowest to highest) to determine which plan to implement. The three plans include:

1. **Mob and Demob everything by air:** Fly in all required equipment and supplies to undertake the work in one active summer season, use existing site heavy equipment to undertake all the closure work to dispose of the vast majority/all of the items on site, notably putting it all underground or incinerating what can be and with only minor materials to be removed by air to Yellowknife. This is the basic plan proposed by BCC; or
2. **Use existing site equipment-Demob everything over winter road:** Fly in required equipment and supplies. Undertake an active closure program during one summer. Then in the following winter, construct a winter road and haul out heavy equipment and possibly site debris and hazardous materials to Yellowknife. Stepping up to this option would be required if the heavy equipment or materials on site cannot be removed by air or stored permanently on site; or
3. **Bring in equipment and remove all using 2 successive winter roads:** Construct the winter road one winter and bring in all required heavy mobile equipment and supplies. Undertake the active closure program over one summer. Then the following winter, construct a winter road and haul out all the equipment, debris and hazardous materials as well as the contractor's equipment to Yellowknife. Further to the reasons cited in Plan 2, this option would be required if appropriate equipment to undertake the reclamation program was not available at site.

Pros and cons of each option are discussed below:

1. Mob and Demob everything by air

Pros:

- This is likely the least expensive option
- It is likely the simplest to set up and administer
- All the active closure work can be completed in one summer season

Cons:

- Uncertainty of whether the required heavy equipment currently on site is operable. This includes fixed equipment (gensets, compressors, etc.) and mobile equipment (heavy equipment, underground equipment, pick-up trucks, etc.).
- May not be able to use the optimally-sized equipment to do the work as equipment to be used would be limited to what is on site and is operable, supplemented by what can be brought in by aircraft (for example, a 10 or 20-tonne crane could not be brought in).
- May not be able to fit all site materials, especially large surface mobile equipment into the decline that would also not fit into an aircraft due to the large sizes of the individual pieces as well as potentially not having sufficient room underground (i.e., total volume-wise) to accommodate all of the materials and equipment.
- Additional expenses to make all materials fit into the space/size limitations of the aircraft that can land at the site. This would include size reduction of the larger pieces such as the tank farm shells into smaller pieces or dismantling large mobile equipment into components to fit into the aircraft as freight if the plan is to not put them underground or that they don't fit underground.

2. Use existing site equipment-demob over winter road
(changes relative to those listed for Option 1)

Pros:

- More likely to be able to get everything required for removal off the site using the winter road, that being equipment and materials that cannot be put underground.
- More flexibility-could increase the quantity of materials removed using the winter road. This could reduce the volume of material to be put underground and possibly remove the need to put anything underground (with associated cost reduction and risk reduction of not having to re-open the underground mine).
- Potential cost sharing with Lupin Mine also using the shared portion of the new winter road.

Cons:

- Reliance on the availability of a winter road, both the new section and the use of the regular road between Yellowknife and the Ekati Mine. A winter road may not be possible due to issues such as a mild winter, or other northern mines now using the winter road being shut down and not building the main portion of the winter road.
- Requires establishment of supporting infrastructure for the new section of winter road. This includes intermediate camps and maintenance yard locations along the route, as was the case during the development of the mine.
- The Lupin Mine may not want to be involved in the winter road project, and thus Ulu would have to pay for the entire length of the new winter road.
- May or may not require use of the Lupin Mine along the new winter road route.
- Extra cost to contract out freight haulage along the winter road to move materials along the winter road. Ulu does not have the required equipment fleet to do the freight haulage in house.

3. Bring in equipment & remove all using 2 successive winter roads
(changes relative to those listed for Options 1 & 2)

Pros:

- Ensures higher likelihood of a successful reclamation program, meeting timeline and budget constraints as there are less uncertainties; for example, it will be possible to ensure all the equipment required for the reclamation program can be brought in and it will be fully operational as well as being appropriately sized equipment for the specific needs of the reclamation program.
- Easier for contractors to bid on the project as the tender package can be more detailed and cover the full scope of the project.
- There is much less reliance on aircraft, and especially no need for heavy-lift aircraft.

Cons:

- This plan will likely take the most time from commencement to completion.
- This is likely the most expensive option.
- This option will have the largest administrative component.
- This plan likely has the longest lead time to being able to implement the plan due to its complexity, the larger number of parties involved, and higher cost.

Stage Three
Undertake follow-up monitoring, inspections and any required minor maintenance for a specified period of time. Manpower and any required equipment and supplies will be brought in by air, on a campaign basis. It is likely the program would span the duration of the new Water License for the site, likely 5 years.

This report has prepared a RECLAIM cost estimate based on the selection of the intermediate/middle plan of the three as it is the one considered to be the most likely by the author and based on discussions with KIA and BGC.

2.3 Basis of Closure Cost Estimate

The report provides a mine closure cost estimate update of the Ulu site as of August 31, 2015. The RECLAIM costing model (Version 7.0) was utilized. The RECLAIM mine closure costing model was developed by John Brodie and Patrick Bryan of SRK Consulting in 1992 as Version 1.1 for the Department of Indian and Northern Development (DIAND) and subsequently updated by Brodie Consulting over the years. It has become the standard costing tool utilized by all mine projects for closure cost estimates being reviewed by INAC (now AANDC) in NT. The latest revision of the model (Version 7.0) includes updated unit rates based on recent experience on northern projects as collected by Brodie.

In this report, the decommissioning and reclamation plan is broken down into four sub-sections with individual tasks below them.

Considerations in preparing the updated mine closure cost estimate included:

- Information collected from background reports provided or made available by BGC and KIA;
- The Company's closure plan is considered to be the Interim Closure and Reclamation Plan, dated March 2013 and the follow-up costing prepared by Delta/Carter, dated December 2014. It is understood that a follow-up costing for several specified cost areas (namely indirect costs) was provided by BCC at the request of KIA in February 2015 which nearly doubled the closure cost estimate to $2.81M;
- Current status of the site is based on a visual inspection by the author on August 14 & 15, 2015 accompanied by Patrick Downey (consultant, ex-Elgin Mining CEO) and Geoff Clark (Director, Lands and Environment-KIA). Areas of the site visited included the north end of the airstrip, main camp area, portal and waste rock pad areas, vent raise area, and the Camp 3 area. Areas missed included East and West Lakes, ore pad, areas beyond Camp 3 (i.e., quarry and borrow eskers, caps and explosives magazines), and the south end of the airstrip. No access was possible to the underground mine;
- Previous mine closure cost estimate reports on the site by AANDC (2015) and BCC (2014a), AANDC 2011, and M. Tansey (2004) as well as several reports reviewing the above cost estimate reports. The general format of the cost tables and information in the latest AANDC report was utilized in this report, as theirs was the most recent and detailed of the previous closure cost estimates;
- This report uses unit cost rates provided in the RECLAIM costing model, and typically uses the Higher Cost option if there is both a Low and High choice, due to the remote location of the site, and its longer period of inactivity. In some instances, the author may utilize rates from his database of current rates from other northern mines, if they appear more appropriate compared to the RECLAIM rates. Overall, the RECLAIM model tends to over-simplify the costs and bases for determining costs for the various undertakings, in the opinion of the author, and thus only a first-order mine cost estimate is possible using the RECLAIM model;
- Where more accurate site-specific costing data is available these rates are utilized, with references. However, repeated requests to BCC for information on the specific progressive reclamation work undertaken and their associated costs have been unsuccessful so no actual costs have been used to estimate costs for any of the remaining work;
- The report breaks out the cost estimates as falling under land/terrestrial or water area reclamation, as allowed using the RECLAIM model and as requested by the KIA;
- A discounted value for the remaining (future years) tasks required to complete the decommissioning and reclamation program, and post-closure monitoring program is not included for the post-closure monitoring and maintenance costing area. Costs to implement the active closure tasks and mob and demob will take place within a short period of time (i.e., within several years) and be completed significantly within one year. The post-closure phase is anticipated to only extend a total of 5 years and those costs are not significant;
- Detailed costing provided in this report includes only those components with work remaining to be done. Completed tasks are not shown;
- No credit is given for possible re-sale or salvage values of any equipment and structures from the site, as is the norm in most mine closure cost estimates;

- The report incorporates a contingency allowance of 25% of the Direct Costs Subtotal for uncertainties in the costs to undertake and complete the tasks specified in this report; and
- Other changes from previous mine closure cost estimates are described in specific subsections of this report in Section 4.

2.4 Major Assumptions

Cost areas that have not been included in previous mine closure cost estimates of the Ulu site based on a review by the author include Interim Care and Maintenance and Contractor Overheads and Profits although in certain jurisdictions these are required. They are not typically included in closure cost estimates prepared using the RECLAIM costing model. As a result they have not been provided in this report.

Major assumptions include:

- The Lupin Mine cannot be utilized as a source of equipment or camp facilities, or to be the final recipient of any equipment or materials from the Ulu Gold Project reclamation program, based on conversations with KIA;
- Adequate materials (borrow materials, quarry rock, water for camp) are available in the immediate area of the project for reclamation requirements;
- The borrow eskers area of the site previously used to source granular materials as well as quarry rock is in a stable condition and requires only minor re-contouring for its reclamation;
- The existing camp and shop facilities at the Ulu site will be adequate without major upgrading for use during the reclamation program. It is understood they were utilized as recently as 2012 for a summer exploration program;
- The fuel tank farm diesel fuel tanks on site are effectively empty of fuel, although they have not be drained nor cleaned, in preparation for dismantling;
- The Ulu underground mine decline can be used a repository for a significant portion of the materials (waste rock, ore, clean construction debris) and clean equipment from the site;
- There is a need for additional background information before an informed decision can be made regarding what the closure plan needs to consist of, most specifically questions such as: Is the underground mine available for disposal of materials? Is a winter road required, and is it for mob and demob or just demob? What exactly is on site in the way of hazardous materials and waste rock that needs to be remediated? What is the extent of soil contamination on site? Upon having all the information a closure plan can be selected, detailed and then a detailed closure cost estimate can be prepared;
- This report has selected and undertaken a first order costing on Option 2 of three alternative closure plans that are presented in this report. Option 2 consists of using existing site equipment supplemented by flying in required fuel, smaller equipment, and materials, one active summer reclamation season of site work, disposal of some equipment and materials underground, flying out some materials and equipment and later removing the remaining materials and equipment with a winter road, and a period of post-closure monitoring and maintenance; and

- A third-party independent contractor will undertake the entire program including contract administration with only minimal active involvement from AANDC/KIA/NU government as they have little experience with this type of work.

3 CURRENT SITE CONDITIONS

The site was developed in 1996 as an advanced exploration site to add ore reserves for the Lupin Mine. The site has had several exploration campaigns over the years, the last one being in 2006. It is understood the site has been in a state of care and maintenance since then. Access to the site has been limited to aircraft as the winter road has not been reactivated since the original site development in 1996. The developed site consists of three main areas consisting of 1) the main site area, 2) Camp 3 area and outlying borrow eskers and 3) the airstrip and 14 km of connecting roads linking all of the areas.

Recent activities at the site have involved undertaking annual inspections, environmental monitoring and some removal of materials from the site, with minimal periodic site presence.

Below is a listing of site equipment and disturbances, based on a review of documents, communications with various people and the author's site visit in mid-August 2015.

3.1 Underground Mine

The mine decline was driven and is reported as being ~1762 m long (BCC ICRP 2013) and includes a number of cross-cuts that intersect ore. Waste rock was hauled out of the mine and used to build two pads outside the portal (one for waste rock and one for ore). A quantity of ore was pulled out of the mine (~1,222 m^3), placed on the ore pad and remains there to this day. The waste rock pad area was visited during the author's site visit but not the ore pad.

The underground mine is currently closed with what looks like a shotcreted wooden bulkhead covering the portal opening. A small amount of ice was present in the depression outside of the portal entrance during the site visit. It is understood that a rockfill plug was used to seal the mine portal when underground work was last completed.

It is also understood that the last efforts to gain access to the underground mine in 2005 involved removal of significant ice plug and placed rockfill plug in the main decline at its completion but that full access to the underground was not possible as it was determined that the vent raise needed to be put into service to provide additional ventilation underground and due to the presence of an ice plug in it as well the project was abandoned. This is a serious technical challenge that needs an assessment and resolution (to the extent possible without actually doing the work) before a detailed reclamation plan can be formulated.

3.2 Camp 3 Area

The area contains a large capacity fuel tank farm, and a shop building. During the site visit the shop building was observed to be partially blown apart with two walls down, likely due to strong winds in the hilltop, open location of the building. However, the frame of the building appeared to be intact. The building had several pieces of mobile equipment within it as well as several pieces parked outside. Also outside there were a number of core trays, several full barrels with unknown contents and some debris.

It is understood Camp 3 was the receiving point for fuel for the Ulu project, which was originally brought in by winter road from the Lupin site and later by bladder-equipped aircraft from Lupin. It was also the location of a third camp along the route from Lupin, with Camp Nos. 1 and 2 located between Lupin and Ulu. The fuel tanks in the Camp 3 tank farm all appeared to be empty during the site visit, based on an external 'tapping' of the fuel tanks by the author.

Beyond the Camp 3 area are a number of eskers and a quarry that were used for borrow materials for building the roads and pads throughout the site. Two Sea-cans were used as explosives and caps magazines along that road (which are reportedly empty), although the author didn't see these areas during the site visit.

3.3 Airstrip

A 1,200 m long airstrip is located along the route between the Main Camp Area and Camp 3. It is understood that the airstrip was able to handle large (Hercules and HS748) aircraft during the active period of site activities and was useable year-round. Twin-Otters and Dash-7 aircraft also flew into the site. The airstrip continues to be in satisfactory condition, but only for smaller aircraft. Due to deterioration of the strip over the past few years it requires an annual check and will require maintenance work with heavy equipment before larger aircraft would be permitted to use the strip again (ref: email Bob Schnurr-Air Tindi October 19, 2015).

There were a number of materials stockpiled at the south end of the airstrip based on previous site assessments and photos, including approximately 50 barrels with unknown contents, a pick-up truck and large enclosed truck trailer, a number of pallets and miscellaneous debris, based on aerial photos taken during a DIAND inspection of the site on July 12, 2014. The area was not inspected by the author during his site visit but aerial photos taken during the approach into the site suggest there is still debris in the area but that the barrels are no longer there.

3.4 Main Buildings and Equipment

3.4.1 Buildings and Structures

The site was toured by the author and most of the buildings were assessed for their condition and checked for contents.

The main buildings and structures include:

- Main Camp consisting of an inter-connected complex including a large 'Weatherhaven' shop building and 8 smaller 'Weatherhaven' structures, all in relatively good condition;
- A number of trailers serving as accommodations, offices, kitchen and dining and recreation areas, medical clinic, fresh and sewage water handling systems, etc.;
- A corridor system connecting the 'Weatherhaven structures and a number of the trailers;
- An adjacent group of trailers providing the electrical power for the site;

- Two fuel tank farms within lined containment areas (at Main Camp and Camp 3);
- A stand-alone exploration (core-logging) wooden building; and
- Caches of exploration core trays at both the main site and the Camp 3 area, all stored outdoors, without cover.

During site operations, fuel was transferred from the Camp 3 fuel tank farm to the camp fuel tank farm by road, as required. During the author's site visit the fuel tanks all appeared to be empty based on an external 'tapping' of the fuel tanks by the author. This report assumes there is no residual fuel in the tanks that needs to be removed and there is thus no question as to whether such fuel may have been usable for use in the reclamation program.

The camp fuel tank farm containment area has also been used as a storage area for barrels and cubes of fuel, oil and lubricants, both new and old as well as used and at various levels of fullness.

Most of the caches of barrels and cubes around the site were counted during the site visit. The results are included below.

The contents of the camp fuel tank farm containment area are:

- 5 large vertical fuel tanks;
- 17 cubes of waste oil;
- Over 200 barrels of diesel, jet fuel, aviation gas, oils, lubes, some mixed with water;
- 16 barrels of waste metal materials, garbage, fluorescent light tubes;
- 1 barrel and 3 large boxes of large mobile equipment batteries; and
- 2 sea-cans (intermodal containers) containing a variety of smaller drums of lubes and oils, small fuel transfer pumps, absorbent material, etc.

Immediately outside of the camp fuel tank farm is an additional inventory of fuels and other materials (at various levels of fullness) including:

- 31 barrels of oils, waste water;
- 54 barrels of soil;
- 10 barrels of assorted metal scrap, garbage;
- 5 cubes of waste oil; and
- 102 empty barrels.

Other caches of barrels and dumpsters include:

- Main camp/exploration area boneyard - 30 barrels of miscellaneous debris including metal, liquids, fluorescent light tubes, incinerator ash, debris;
- Outside of main portal-miscellaneous mine debris - ~50 barrels of mine debris and metal scrap and 1 large dumpster full of debris, being mainly vent tubing;
- Adjacent to vent raise - 6 empty barrels;
- At south end of airstrip - ~8 barrels; contents unknown; and
- Outside at Camp 3 - 3 sealed oil barrels and 1 empty barrel.

Fuel on site is limited to what is in barrels located in and adjacent to the Camp Fuel Tank Farm Containment Area. However, its condition for use is unknown and must therefore be considered as a waste product and not for use in the reclamation program.

3.4.2 Equipment

3.4.2.1 Mobile Equipment

There are approximately 38 pieces of mobile equipment on the site (ref: M. Tansey). Notable examples of these are listed below:

Mobile equipment in the Shop Building at the main site includes:

- 1 Underground man carrier-Kubota;
- 1 5 ton truck-Ford;
- 1 48 passenger bus;
- 1 front end loader-Cat 966;
- 1 Backhoe-Cat 311;
- 1 grader-Cat 14G; and
- 1 ATV.

Mobile equipment located outside at the main site includes:

- 3 5 ton tanker trucks-water and fuel-Ford & Mack;
- 1 tanker trailer;
- 1 low tire-pressured flat-bed truck-Commander;
- 2 underground scoop trams-Wagner 2 yd^3 and 3.5 yd^3;
- 1 vibratory compactor-Cat CS-563;
- 2 front end loaders-Cat 988 & 966;
- 2 surface haul trucks-Cat 769;
- 4 pick-up trucks-Ford F-350; and
- 2 portable compressors-Gardner Denver & 1 other.

Mobile equipment in the Shop Building at Camp 3 includes:

- 2 underground scoop trams - Wagner & JDT, both 7.5 yd^3; and
- 1 two-boom jumbo (underground drill) – Tamrock.

Mobile equipment located outside at Camp 3 includes:

- 2 underground haul trucks-Wagner & JDT, 44 and 26 ton, respectively;
- 1 underground utility/lube truck – Getman; and
- 1 surface haul truck, scrap, in pieces - Cat 769.

One piece of critical equipment that appears to be missing is a mobile crane. This is based on a review of the M. Tansey Ulu Equipment List as well as the equipment listing made by the author based on the site visit.

3.4.2.2 Fixed Equipment

There are approximately 13 pieces of major fixed equipment on the site (ref: M. Tansey). These include approximately 10 diesel generators, and 3 diesel compressors, and other equipment as listed below.

Fixed equipment at the main site includes:

- Fresh water supply system consisting of a pump and piping from West Lake, a large outdoor storage tank, inside day tank, hot water heater, distribution piping, etc.;
- Waste water system consisting of distribution piping, sewage lift building, an RBC sewage treatment plant building, and a discharge pipeline to East Lake;
- Communications tower; and
- Electrical system consisting of several gensets inside sea-cans (~10) as noted above, an outdoor main transformer area, and several Motor Control Centers inside sea-cans and buried (likely Teck cable) distribution wiring to the various end users. No overhead electrical wiring with poles was seen. The system's condition for re-energizing is unknown and will therefore need to be assessed before it can be relied on for use.

There was no fixed equipment observed at the Camp 3 area during the site visit.

4 DISCUSSION OF ESTIMATED COSTS FOR INDIVIDUAL COST AREAS

The closure costing cost centers have been separated depending on whether they are considered to be Direct Costs or Indirect Costs. The Direct Costs are the costs incurred to undertake the actual work tasks that will reclaim the project site. The Indirect Costs are those expenditures that need to be made to enable the tasks listed in the Direct Costs section to be undertaken; they can be considered to be the support costs.

This section has been divided into the Direct and Indirect Costs and beneath each are included the discussions of work proposed and the basis on how the specific numbers (both the quantity /volume/number as well as the unit rate) used in the costing tables were determined.

The last sub-section includes a discussion on the terrestrial/land costs versus the water reclamation costs as this is important to enable the separation of the costing liabilities into those two categories as the two costing liabilities securities are held by different parties.

4.1 Direct Costs

4.1.1 Underground Mine

Portal

The portal at the opening of the underground mine is 5.2 m x 4.9 m in size. The condition of the existing ramp is a major uncertainty to using the underground mine as a repository of materials and equipment from the site. This is a critical component to have undertaken before detailed planning and costing for the reclamation program can be worked out. Use of the underground mine for the reclamation program is considered a critical component in having a cost effective closure of the site. This uncertainty cannot be resolved until a rock mechanics engineer assisted by an appropriately trained mine rescue crew is mobilized to site and work is expended to look inside, and then to proceed cautiously in to the mine, as far as is safe and make recommendations on work required to make it safe for access by machinery and workers. The cost for such a mine inspection has been estimated at $15,000.

If access to the underground mine is to be pursued an estimate of $100,000 has been added to allow for rehab of the decline to make it safe for subsequent entry, including establishment of a ventilation system down the portal, using existing equipment on site (Note: This cost excludes the cost for the removal of the rockfill and ice plugs). However, this is an estimate with little basis as the author is not a mining engineer and not qualified in that area, as well as there could be a very significant range in the amount of work required to rehabilitate the mine.

A small pile of ice was observed outside of the wooden/shotcrete bulkhead blocking access to the portal during the August site visit. It is likely the mine has some water in it as evidenced by melting of the outside ice pile with the portal being situated in a depression. The mine has been closed and in care and maintenance since 2006, and there has been no information seen about any other natural water inflows into the mine or to suggest the mine

has been dewatered since 2006 at the most recent. However, any waters that would have seeped into the mine portal or entered as groundwater directly into the mine working have likely become frozen in the permafrost zone, from close to surface to the full depth of the mine, wherever it has been able to collect or pool and then freeze.

It is understood a 400 m^3 rockfill plug is in place behind the bulkhead (WRI 2005, BCC 2014a, AANDC 2015) that was placed at the completion of the original underground mine development program. The rockfill will be removed from the mine and placed on the waste rock pad. The RECLAIM unit rate for moving waste rock underground has been used for this task.

In addition, there is likely an ice plug in the portal, estimated to extend down to the 50 Level (ref: Tansey 2015). Based on a review of the Ulu Mine Waste Rock and Ore Storage Plan by WRI 2005, this would suggest the ice extends approximately 400 m down the length of the decline. This is based on 75 Level being located approximately 632 m down the decline, and the decline being built at a consistent slope from surface to the 75 Level depth.

A lump sum of $200K has been used to remove the bulkhead, rockfill plug and ice plug based on the above information suggesting the significant length of ice plug as well as the previous use of the same figure (AANDC & BCC). No other information was found suggesting an alternate figure (or unit rate) to use.

An additional $10,000 Lump Sum has been added to set up and operate a pump & pipeline/hosing at the bottom of the decline to empty the mine of water, based on the mine being re-opened to its full depth. However, this cost estimate is based on no information about the volume of water to be pumped, its water quality and its possible need for sedimentation ponds (i.e., more than the existing mine sump), treatment, etc.

An 800 m^3 rockfill plug will be used after all the work underground is completed to close the mine to future casual access. This material will replace the existing wooden barrier and 400 m^3 rockfill plug. The new plug will extend into the decline and use some material to build a mound outside of the portal to blend into the surrounding topography. RECLAIM has a unit cost rate of $18.80/$m^3$ for this task, which has been accepted for the purposes of this report.

Vent Raise

A tarp-covered cap of unknown construction is in place based on the site visit. Because of the lack of any construction information on what is currently in place, costing has been provided to install an engineered cap in the raise after the raise is potentially used again if underground mine access is required, as a means of assisting ventilation and secondary/emergency egress from the mine. A provision of $10,000 is also required to prepare an engineering design for a concrete plug for the vent raise.

Based on the site visit and not seeing any evidence of a ventilation fan structure at the vent raise and no previous mention of the need for a ventilation fan at the vent raise in previous mine closure cost estimate reports this report assumes no such unit is required.

It is anticipated that a competent collar will need to be in place before a concrete cap can be installed at the top of the vent raise. No information was found concerning the condition of the collar area. As a result a conservative figure of $50,000 was selected as has been quoted previously.

Previous costings (AANDC & BCC) included 11 m^3 of concrete to cap the vent raise and this number has been accepted for this report based on the small size of the opening based on the site visit. It appears the RECLAIM HIGH unit cost for this work has dropped from $2800 to $640/$m^3$ in its latest revision. This report is using the unit rate for constructing a 'concrete crown pillar', as it appears the most appropriate of the unit rate choices available. The AANDC costing report also included a provision for upgrading the vent raise collar which is reasonable as this is routinely included in securing mine openings, and especially with no knowledge of the collar's integrity.

4.1.2 Rock Piles

The total volume of material brought to surface from the underground mine consisted of 742 m^3 of ore and 42,300 m^3 of waste rock (Table 2, WRI 2005). The material was placed at a number of locations including:

- Camp Pad-waste rock-14,920 m^3, surface area of 92,342 m^2;
- Ore Pad-waste rock-19,157 m^3, surface area of 15,964 m^2;
    - Ore 742 m^3 (recent closure cost reports show the volume as 1,222 m^3);
- Waste Rock Pad-waste rock-7,573 m^3, surface area of 6,311 m^2; and
- Portal Plug-waste rock-500 m^3 located just inside portal.

The WRI report states that the specific gravity (S.G.) of the ore and waste is in the order of 3.0.

Previous mine closure cost estimate reports (Brodie 2011, BCC 2014a) assumed that 25% of the waste rock brought to surface may be PAG and should be relocated to the underground workings, while AANDC (2015) assumed that 50% should be relocated underground.

This report assumes that without further information in hand on the quantity of PAG rock on surface, the more conservative 50% number should be used.

This report will utilize the volumes from the WRI report for the existing rockfill volume as well as the volume of ore on surface (742 m^3 versus 1,222 m^3 from 3 referenced mine closure cost estimate reports) until the original sources of the other volume estimates can be checked. (Note: the WRI report states that 2,200 tons of ore were brought to surface, at a specific gravity of 3.0)

Other differences between WRI and recent closure cost estimate reports include:

- Camp pad surface area-9.2 ha vs. 2.6 ha;
- Ore pad surface area-1.6 ha vs. 1.9 ha;
- Waste rock pad surface area-0.6 ha vs 0.8 ha; and
- Airstrip and apron area-not mentioned vs. 2.3 ha.

Most of the above areas were later top-dressed with finer material excavated from the borrow esker area.

This report assumes that after the PAG material has been removed from the waste rock pads the entire remaining surface areas of the pads will be graded to a shallow slope of ~3H:1V. The costing assumes the surface of the pads will be graded with the cores of the areas remaining untouched, with the volumes of materials to be graded estimated to be 50% of the remaining volumes of the pads (i.e., 50% of the three pad volumes after removal of the 50% considered to be PAG, i.e., 50% of (7,460 m^3 + 9,580 m^3 + 3,787 m^3)). No toe buttress is considered to be required as has been included previously) as the volume of the pads will have been significantly reduced and the perimeters re-sloped as part of their reclamation.

Pending results from advanced geochemical assessments of the waste materials used for the ore and waste rock pads, a provision is required for the possible need for water treatment of seepage/runoff from these areas. Initial studies were conducted by Klohn-Crippen (KC) in 1998 for Echo Bay Mines. However, the Company has acknowledged the need for further test work in this area, including in the latest Interim C&R Plan (BCC 2013). However, it has not been included in its latest mine closure cost estimate (BCC 2014a). This report includes a provision of $50,000 for follow-up geochemical characterization of surface waste rock as was recommended in the KC report. This should include several kinetic test cells as well as detailed chemical and mineralogical analyses, including a review of previous test work and site monitoring data.

Until a more definitive determination can be undertaken, a $50,000 provision has been included for possible water treatment due to the possibility of ML/ARD seepage/runoff from the waste rock pads as well as from any underground mine water pumping to surface. The cost estimate for water treatment is highly uncertain and could be too high or significantly low.

Due to the harsh tundra terrain in the area of the Ulu site, re-vegetation efforts focused on the scarification of the ground surfaces so as to promote natural invasion of native species with only selected sloped areas (sloped area around portal, edges of rock pads, etc.) receiving introduced revegetation by hand-seeding, with a species blend specific to the north. Terrain stabilization is also being encouraged with re-grading to reduce the risk of erosion of any sloped surfaces. No revegetation is being proposed as the area is quite barren and the Water License only requires re-contouring and ripping of the various surfaces.

4.1.3 Chemicals and Soil Management

A site contamination survey needs to be undertaken to assess the extent of soil contamination at the site. A simplified Phase 1 and 2 Environmental Site Assessment (ESA) will probably be sufficient due to the limited areas of potential oil/fuel contamination (i.e., mobile equipment leakage and spill from fueling vehicles) and there having been no ore processing done on site and thus it has been anticipated there are no metals-contaminated soils. A cost of $75,000 has been assigned for this ESA audit.

Vehicle Batteries

There are approximately 50 batteries in several caches at the site as well as additional batteries expected to be found on all the mobile equipment. With the batteries on those machines there are probably close to 100 batteries on site. Costs have been estimated to remove the batteries by winter road using the regular freight cost. There is no disposal fee anticipated as the lead in the batteries makes them worth recycling.

Fuel in Tank Farm Tanks

Visual inspections (tapping on tank skins from outside) during the SJCI site visit suggest none of the bulk fuel tanks (5 at Ulu camp area, and 8 at Camp 3) has significant fuel inside. However, it has been assumed the tanks have a residual small quantity of fuel and sludge in the bottom of the tanks that will require flushing out and subsequent cleaning, in advance of the tanks being cut up for collapsing and removal.

Barrels and Cubes

There are approximately 500 barrels (45 IG capacity each) on site estimated to consist of 110 empty drums and 390 containing various materials, but many sealed, unlabeled and with unknown contents. A breakdown of the contents of those 390 drums has been provided earlier in this report (Section 3.4.1, above).

22 cubes (1,600 liter capacity each) with various degrees of fullness and unknown contents - likely waste oil, but also likely dirty and not-useable directly in waste oil burners.

Contaminated Soils

There is no recent estimate of the quantity of Type 1 and Type 2 contaminated soils. It would likely include all the sands within the two tank farm areas, some contaminated soils outside of the main camp tank farm (based on seeing staining outside of the containment during the site visit), some from the various boneyard areas and the camp as well as from the portal pad areas where fuel and oil products were being transferred and may have leaked. In addition, the mine sump contents of soil and sludge need to be considered as contaminated. Brodie (2011), BCC (2014a), and AANDC (2015) estimated 537 m^3 of each (~1074 m^3 total) without any basis or rationale provided in the reports. Without that information an environmental assessment / site contamination survey is required to determine defensible numbers. For the purposes of an initial estimate this report provides a cushion over the previous estimate of 1074 m^3 to include historical spillage that was not reported or seen, more recent minor releases and observed areas of stained soils that may have come from the significant number of stockpiled barrels and cubes of miscellaneous petroleum hydro-carbon products. A number of 1,500 m^3 has therefore been used for this report.

4.1.4 Buildings and Equipment

Buildings and structures at the Ulu project include:

- Camp area-interconnected shop, camp accommodations and office trailers including a large Weatherhaven Shop (1) and accommodations structures (8) as well as ATCO-type accommodations/office/kitchen trailers (5) and one small ‘Quonset hut’ style building that serves as the Mine Dry;

- Miscellaneous adjacent structures including:
  - Electrical system consisting of an outdoor transformer, and several trailers containing gensets, motor control centers, etc.;
  - Water supply and storage system including pump & pipeline from West Lake, storage tanks and heating systems and distribution network;
  - Waste water handling system consisting of a collection pipeline network, lift station, RBC treatment unit and pipeline to East Lake; and
  - Fuel tank farm & lined containment area;
- Camp 3 Area:
  - It is understood that this was the main fuel storage area for the Ulu site. It was also the 3rd camp along the winter road from the Lupin Mine to the Ulu site. It is unknown if there are any remnants of the other 2 camps along the access route;
  - Shop building-this structure has 2 of 4 walls blown away, and dismantling/demolition would be a simple task;
  - Fuel tank farm & lined containment area;
  - Caps and explosives magazines, located along road from Camp 3 to esker borrow areas; and
  - Esker borrow area and quarry;
- Other areas:
  - Landfill-It is understood there is no clean putrescible waste landfill nor a Land Treatment Farm landfill at the Ulu site; and
  - The main road connecting the various areas and the airstrip are 14 km in length. Along the main roads there are 6 culverts overtop of various creeks and streams. The culverts are of a smaller size as there are no significant streams flowing across the site.

The shop building is approximately 30 m L x 16 m W x 8 m H. The inside base consists of a 'rig mat' (wood and steel framed) floor to provide a solid base on which to park and move heavy mobile equipment. One corner of the shop contains an indoor two story high parts storage area.

Six of the other eight structures in the main camp area are of the same size and serve as accommodations, 2 are smaller and serve as a washroom and clinic and the other as offices.

Mike Ball of Weatherhaven in Burnaby was consulted re the history of the structures and estimates of effort (and cost) for dismantling/tearing down the structures. He said their structures were all brought in to the Ulu site on the winter road in ~1996 for Echo Bay Mining. Apparently there were 15 standard containers of 6 m (20') length each. He said that if the structures are dismantled carefully, they can be re-used and could even fit into the same volume of containers that were originally shipped to the site. But it may not be practical to do so, as the units are coming up on 20 years in age with minimal maintenance over a good number of those years. So it may not be worth taking the extra time to dismantle them carefully, and instead they could be torn down and only the larger pieces dismantled with the debris being disposed of in the mine. That has been the approach taken in this report.
Other trailers used as part of the camp include:

- 2 trailers making up Sleeper C;
- 3 trailers making up Sleeper D; and
- 1 'Quonset-hut' type structure being used as a mine dry.

The various buildings and structures will be emptied of contents, disconnected from services, and prepared for removal. A lump sum of $2,500 has been assigned per non-main camp structure, trailer, sea-can, etc. This is based on the units not containing asbestos or mold. If an initial assessment of the camp and various trailers and sea-cans indicates there may be a problem, appropriate additional cost provisions will need to be added.

Electrical System

The site electrical system (See Section 3.4.2.2 for a list of all the equipment involved) will need to be partially re-activated for the reclamation program. Upon its completion the remainder of the system will need to be de-energized, dismantled and removed.

Storage Facilities-Sea-Cans and Trailers

A number of sea-cans and trailers have been used across the site for a variety of purposes primarily for storage of supplies but also as offices, mini-warehouses, housing of gensets and electrical equipment, etc. These will also be cleaned of contents, disconnected of any services at a lump sum of $2,500 per unit, with the assumption there are no asbestos or mold issues or other hazardous wastes in the units.

Water and Wastewater Treatment

The fresh-water supply and waste water treatment systems are housed in several buildings associated with the camp with 1) a pump at West Lake feeding a line running to a storage tank adjacent to the camp, and a distribution system and 2) a wastewater discharge line starting at the camp, going through a small sewage treatment plant structure and a treated waste water pipeline running down to East Lake. These two systems will be dismantled and prepared for removal at an estimated cost of $7,500 apiece.

Exploration Building

The stand-alone exploration building will require removal. The building is constructed of wood and it is suspected most of it can be disposed of by burning it. Its contents were not checked during the site visit. It will be emptied of contents, disconnected from services, and torn down with debris going into a burn pile or a debris pile. A lump sum of $5,000 has been allocated for its removal.

Fuel Tank Farms

The fuel tank farm tanks at the Main and Camp 3 sites include the following; 2 of 32'H x 48'Dia. tanks at Camp 3, and 11 of 20'H x 12' Dia. sized tanks split between Camp 3 and the Main Camp. The tanks are assumed to be basically empty but have not been drained of residual fuel and sludge nor cleaned and flushed. For the RECLAIM model and estimating the cost of dismantling such structures, the surface area of the tanks is required. Based on the above sizes the total surface area (Sides and tops and bottoms) of all 13 tanks is 2570.8 m^2. It is unclear how the previous mine closure cost estimate reports calculated a number of 1500 m^2 of steel. RECLAIM 7.0 does not have a unit cost rate for cutting up large steel fuel

tanks, and the nearest task is tearing down and cutting up a building made of steel This work is significantly more equipment intensive than a tear-down, and as a result a significantly higher rate is appropriate than the $100/m^2 listed, this report has used the same rate that was used by AANDC, i.e., $240/m^2 of tank skin surface area. It is assumed the custom rate includes a provision for the draining and cleaning of the tanks and disposal of the residual sludge, fuel, and dirty water as well as the containment area liners.

Mobile Equipment

An extensive mobile equipment fleet for an exploration project is on site, with all of the pieces listed in Section 3.4.2.1, above. No provision for mobile equipment disposal was included in the latest closure cost estimate by BCC.

Foundations / Concrete Pads

The entire camp complex is constructed of detachable mobile units and thus, there are no building foundations at the site. There may be footings for the largest structures such as the Weatherhaven Shop structure. The only poured concrete foundation /pad observed during the author's site visit was the vehicle wash pad located outside in the main camp area. It is estimated to have an area of 85 m^2. The RECLAIM unit cost rate of $40/m^2 was used to cover the cost to break it up and dispose of the pieces underground.

Debris

All of the non-burnable debris material from the camp area, the various buildings as well as the boneyards/laydown areas will be consolidated and then disposed of underground. This includes a large volume of materials including furniture, machinery, tires, piping and insulation, etc. An estimated volume of 1,000 m^3 of debris needs to be dealt with. This will involve labor for sorting, equipment time for sorting and hauling to the portal and then using a scoop tram to run the material down into the mine. An estimated total cost of $600 per 5 m^3 load to be hauled underground has been used in this costing.

Other Materials on Site

Additional miscellaneous items, not mentioned above, that are outside include:

- Lined mine portal sump-for settlement of solids from mine water pumped up from underground, approximately 20m x 35m; and
- Exploration area- Loaded exploration core trays-Over 1500 at the main camp and ~500 at the Camp 3 site.

The sea-cans around the site include the following contents:

- Spare parts (i.e., caches of electrical, mechanical, mining supplies); and
- Clean-up materials.

4.1.5 Water Management

A number of aspects related to water management at the site have been addressed in other sections of this report. However, removal of the mine sump just outside of the portal has not been addressed. A $10,000 provision has been included here for the removal of contained sludge and contaminated sands and removal of the liner to underground.

4.1.6 Monitoring and Maintenance

Water quality monitoring will be required to continue during the reclamation program.

Water License 2BM-ULU1520 includes 12 environmental water quality and quantity monitoring stations for the Ulu project. Of those, 2 were not included as the ponds for which discharge is to be sampled were never built. This leaves a total of 10 sites which may require sampling during periods of site inactivity but only while waters are being discharged.

Post-closure monitoring will include flying into site for a day and collecting the necessary water samples. These can likely be collected at the same time and possibly by the same person undertaking the annual geotechnical inspection. It the sampling program will require more than one day, the flights up to Ulu can be based out of Lupin and the camp there (if it is available) or otherwise, out of Yellowknife.

No post-closure maintenance with heavy equipment is anticipated. Thus, no grading equipment will be kept at the site after the completion of the site reclamation program. The final task for the grader before it is pulled underground or removed by winter road will be to grade the airstrip. Previous experience has demonstrated the durability of the strip and the need for no maintenance over a period of years and it is thus assumed that small aircraft will be able to land on the strip for a number of years beyond the mine closure period, after a simple aerial fly-by and inspection of the strip from the air before setting down. No large aircraft will be required to bring in heavy equipment to the site after the completion of the reclamation program.

4.1.7 Post-Closure Monitoring and Maintenance

The RECLAIM Costing Model includes this cost center under the Indirect Cost heading although it should be included as a Direct Cost. As a result, the percentage split between land and water of the costs for this cost center is based on the split of the total of all the Direct Costs rather than being based on a split specific to the Post-Closure Monitoring and Maintenance cost center which would have been more accurate. For simplicities sake this report has not changed the location of this item in the Summary table.

Upon completion of the site reclamation program and the removal of the remainder of the materials the following winter a Final Site Audit will be undertaken to provide a comprehensive assessment of the site, and provide final information with drawings of the underground and surface features.

A provision has been provided for the preparation of Final Closure Plan and costing as well as for going through the regulatory process of permit applications and the potential for final site abandonment. $50,000 has been provided for this.

During the post closure period, there will be on going regulatory costs for routine reporting, preparation of management plans and progress reports, etc. A provision of $2,500 per year has been provided for this.

The new Water License specifies a 5 year term with all reclamation work to have been undertaken during that time, unless a reactivation of site activities is to take place. This report is thus working with a 5 year timeframe. Due to the small size of the site, the minor amount of site disturbances and the five year term of the new Water License a monitoring and maintenance horizon of five years is proposed.

Similarly, geotechnical inspections will be undertaken annually for the five year term of the new Water License.

BCC and AANDC both proposed collecting annual surface water quality samples from 5 locations per sampling round based on the previous Water License.

Based on the new Water License, all of the above stations are to be sampled twice annually during open water period if there are flows present. And the final 3 stations are only required to be sampled when discharge to East Lake is planned (i.e., when the camp is being operated and grey/black water is being produced, which should be for one summer when the active closure and reclamation of the site is being undertaken).

Previous closure cost estimate reports included a total of 5 samples per year. Although not specified in those reports the station numbers for sampling during the post-closure period and their anticipated sampling frequencies are likely to be:

- ULU-7 Runoff from waste rock storage area (5 yrs. with 2 samples per year);
- ULU-8 Runoff from ore storage area (5 yrs. with 2 samples per year);
- ULU-9 Outflow from East Lake (1yr. with 2 samples);
- ULU-10 Inflow to Ulu Lake from East Lake (1 yr. with 2 samples); and
- ULU-11 Outflow from Ulu Lake (1 yr. with 2 samples).

Based on the above a total of 26 water quality samples will be required to be taken. The same unit rate of $1,000 was used as has been seen in the other recent mine closure cost estimate reports.

It is proposed the water sampling as well as regulatory reporting be conducted at the same frequency as the geotechnical inspections.

The next renewal of the Water License will have a new timeframe, specified monitoring program and requirement for an updated closure cost estimate, and the providing of financial security as it does currently (WL 2BM-ULU1520 Part B-General Conditions). Thus any additional requirements beyond the upcoming five year period will be included and thus financially secured under that License.

No provision has been provided for on-going maintenance at the site as there will be very limited areas vulnerable to any erosion after the closure work is completed.

4.1.8 Disposition Plan with Closure Plan Option 2

Using Option 2 of the closure plan alternatives, the breakdown of the disposition plans for the various items is as follows:
Burned on site (incinerator and open-burn, if permitted):

- All wooden materials-old camp frames, cable reels, wood portions of camp buildings, etc.

Material to be placed in the underground mine (in order of priority in the event of lack of space):

- Ore from ore pad;
- PAG waste rock from various surface pad areas;
- Hypalon liners and containment soils from 2 tank farms, and from 1 genset day tank and 1 mine sump containments;
- Tires - from stockpile;
- Debris - torn-down 'Weatherhaven' structures, Camp 3 shop building skin and steelwork, electrical cabling, crushed barrels, cut-up tankage, fresh and sewage water systems, misc. piping (e.g., water & air piping runs to portal), insulation, rig mat-shop flooring, broken-up concrete slabs, non-burnable camp building components and contents, vent tubing, hosing, fluorescent light tubes, incinerator ash, used culverts, etc.;
- Sea-cans and trailers, that will be dragged underground intact, and possibly filled with materials (especially if space underground is an issue);
- Laydown materials (with some re-sale/scrap value)-good steel plate & piping, communications tower, new culverts; and
- Mobile and fixed equipment-considered to be of no value. There are ~ 38 pieces of mobile equipment and 14 pieces of fixed equipment on the site (ref: M. Tansey) of which all but ~6 of the largest pieces will be disposed of underground. Each vehicle will be drained of all hazardous fluids (fuel, lubricant, antifreeze, hydraulic fluid, brake fluid, grease, etc.) as well as the removal of batteries and decontaminated, the final step being pressure-washing. This work will be done on surface on a concrete pad with containment with the contents either burned or removed from site in accordance with Nunavut Hazardous Waste Management Guidelines. The largest pieces of mobile equipment will be cleaned and prepared for removal off-site at a unit cost of $5,000, but excluding freight costs to Yellowknife. For the other mobile equipment, a provision of $5,000 per piece has been provided for decontamination and removal to the underground has been provided. All of the fixed equipment will also be disposed of underground at an estimated unit cost of $2,000.

Removed from site by winter road to Yellowknife:

- Large mobile equipment for re-sale or that won't fit underground (e.g., CAT 769 haul trucks, CAT 120G & 14H graders);
- Select fixed equipment for re-sale (e.g., electrical transformer and gensets, compressors, etc.) or that won't fit underground (e.g., small tank farm diesel tanks-uncut);

- Cubes, barrels & smaller drums of various liquids including residual fuel and sludge from cleaning of fuel tanks and draining of fluids from equipment moved to underground (to licensed disposal facility and/or recyclers);
- Loaded exploration core trays (for secure storage, if so determined by the Company, otherwise into underground);
- Explosives (although it is suspected these have already been used or removed from site); and
- Hazardous waste.

The assignment of where the materials should end up will require much more careful assessment to determine the most economical and most secure locations for the items. For example, a cost-benefit analysis would be required for many of the items that may be considered to have some residual value to determine whether their value is higher than the cost of their removal by the winter road or aircraft. But the environmental and space limitations of impounding items in the underground mine must also be considered. Approval for the final disposition plan will be required.

Based on the author's site visit, several pieces of equipment located on site will likely require upgrading to be able to undertake the closure plan (regardless of which option is selected):

- A larger incinerator would benefit burning of sizable volume of wood debris at the site, if open-burning is not permitted. It is possible the current incinerator may also not meet current certification requirements

4.2 Indirect Costs

The costs are based on the selection of Option 2 from the three choices on closure approach, that being using existing site equipment, and one winter road at the completion of the project to remove the materials and debris that could not be left/disposed of on site.

4.2.1 Mobilization and Demobilization

The active summer work phase of the reclamation program would likely require approximately 150 days with a 10 man-crew.

4.2.1.1 Mobilization

Mobilize Misc. Equipment

There should be minimal additional equipment required to be brought in. This would be done by aircraft. Equipment required would likely include:

- Steam machine-to use steam to melt ice plug;
- Incinerator-for burning of clean burnable debris; and
- Barrel crusher-for crushing empty, cleaned barrels.

This report assumes it will require 5 flights with a Dash-7 to mobilize all the required equipment to the site, but excluding bringing diesel fuel to the site, as it has been costed

separately. A price quote of $13,500 + GST was secured from Air Tindi for flying into the Ulu site from Yellowknife.

Mobilize Camp

The existing camp should be readily re-commissioned for use for one summer season. No major work is anticipated. A provision of $75,000 for a logistics company to assess and prepare the camp for use should be sufficient. It has been assumed there will be minimal issues with structural concerns, mold, critters, etc. or other issues to deal with. The work is estimated to take a total of 2 weeks.

Crew Flights

The workforce for the reclamation program would likely consist of a crew of 10 persons, including 2 camp/kitchen support staff. It is anticipated the workers would work a 2 week on-2 week off cycle. A price quote of $13,500 + GST was secured from Air Tindi for flying into the Ulu site from Yellowknife.

Worker Accommodations

Accommodations would be in the existing camp facilities. A set $/man-day fee is included that would likely be charged by the contractor providing the camp services. This fee would include required food, camp supplies, fuels, etc. It is based on a 10 man-crew being on the site for a 5 month period (June-Oct). It does not include accommodations costs for workers undertaking construction and operation of the winter road.

Mobilize Fuel

All of the fuel required to run the gensets, compressed air for mine ventilation and for all the heavy equipment will need to be flown into the site, as it is uncertain what good fuel is currently available at the site, in the tank farms or in barrels.

The fuel requirement would be based on the equipment required to undertake the reclamation program.

An estimate of 300,000L has been used until a firmer number can be determined. Previous mine closure cost estimates used a range of numbers from 110,000L to 600,000L. Costs are provided for the cost of the fuel and a cost to transport it by air to the site. The unit rates used for this report are those provided in RECLAIM 7.0.

4.2.1.2 Demobilization

Winter Road

Nuna Logistics had previously constructed and operated the winter road to the Lupin Mine and then up to the Ulu site.

The RECLAIM 7.0 model suggests unit costs of $2,000 (low) and $11,500 (high) per kilometer. Upon telephone and e-mail enquiries from SJCI, a generic cost estimate of $50,000 per kilometer was offered by Nuna Logistics (Sep. 24, 2015 e-mail) for a winter road

from Ulu to the Ekati Diamond Mine winter road turn-off. The cost quoted did not include maintenance costs to keep the road open. The high price was explained as being due to the extremely treacherous terrain between the two sites consisting mostly of boggy swamps and large boulder fields, all made the more difficult by a typically low snow cover to work with. It was suggested that they could provide a more accurate costing for a fee, and that such an estimate would require flying the route to be able to map it and using their experience to prepare an updated accurate cost estimate. However, winter road(s) have previously been used to access the Ulu site (and the Lupin site for a number of years) and they were constructed and operated by Nuna Logistics so they should have historic cost data and it is also likely some of the road is still be in place along the earthen sections (i.e., sections that were not built out of ice or snow) that may have been undertaken to build the road.

An estimated toll of $0.28/ton-kilometer for the 2016 winter road was obtained from Rio Tinto (e-mail Sept.10, 2015) for using the winter road between Yellowknife and the Ekati Mine winter road and a new fork leading to the Ulu site, a distance of 405 km on their road. The RECLAIM 7.0 rate is specified as $0.29/km-ton. A new 323 km long winter road would then be required to be built from there to the Ulu site. The Rio Tinto rate was used as it was the most recent and was also very close to the 2014 RECLAIM unit rate.

The total weight of freight anticipated to be required for removal from Ulu using the winter road is currently estimated at 2,000T, based on the latest AANDC estimate. This number has been accepted for this report, pending more detailed information being prepared on what will need to be removed by the winter road.

The AANDC costing (2015) suggests the winter road distance from Ulu to the Ekati Mine road as being 345 km and the length of the Ekati Mine winter road to be utilized as being 567 km.

Air Freight

Cost estimates were solicited for the use of several alternate aircraft to bring supplies in and out to the site. These included:

- The first was for the use of a Buffalo aircraft with an 18,000 pound maximum payload from Summit Air (Sep. 10, 2015 Quotation) at a cost of $16,835 for a round-trip from Yellowknife to the Ulu site (one-way distance of 325 km);
- Second was a Dash-7 aircraft with a 10,000 pound payload from Air Tindi (Oct.19, 2015 e-mail) was given a budget price of $13,500+GST; and
- A quotation was received for a Hercules aircraft that could be brought in from Alaska, at a cost of $42,761+ taxes for the Yellowknife-Ulu portion, but also $87,988 to bring the aircraft in from Alaska (Oct. 21, 2015 Quotation from Lynden Air Cargo).

4.2.2 Project Management

This component is typically given a value of 5% of direct costs, based on the author's experience at other northern mine projects. This is considered a reasonable number for the Ulu site due to its northern location, difficult access and significant logistical effort. BCC 2014

used 3%, AANDC 2015 used 5%. Some of the costs associated with project management are also covered by Engineering (below) which should help cover the higher costs to manage such a remote site.

If the reclamation project is to be administered by a third-party, drawings and specs will need to be prepared and tendered out. This will require a significant amount of work and will be costly.

Similarly, if the reclamation project is to be administered by the NU government or KIA there will be additional administrative costs, which will be onerous for them and costly.

4.2.3 Taxes

It has been assumed that there is no provincial/territorial tax applicable in Nunavut. It has been further estimated that there will be limited supplies requiring payment of GST so this item has not been included in this mine closure cost estimate report.

4.2.4 Engineering

This component is typically given a value of 5% of the Direct Costs sub-total or 10% of specified items in the Direct Costs section. A provision of 5% of Direct Costs has been included as a first-order estimate as there will be a number of requirements that have not been captured elsewhere. For this report, Engineering includes:

1. Engineering designs and submission for closure work including portal and vent plugs, pulling down tanks as these will likely be required for final regulatory submissions to NWB;
2. Surveyor / Engineering support during closure construction to make field decisions and to document as-built conditions and materials. This information will be required to prepare later mine closure as-built report and drawings; and
3. Engineer prepares as-built report and drawings to be stamped by a P. Eng.

Engineering is not considered to be a significant component to the proposed closure plan at this site; however the various engineering related tasks listed above support the use of a 5% of Direct Costs provision.

4.2.5 Bonding and Insurance

Provision for these costs is typically included in mine closure cost estimates.

- A typical rate for Bonding is 0.5% of direct costs and that figure has been used here; and.
- Similarly, a typical rate used for mine closure project Insurance is 0.5% of direct costs which has been used in this report.

4.2.6 Contractor Overheads and Profits

This heading is not typically utilized in the RECLAIM cost estimates as it is implied to be included in the unit rates used and it has therefore not been included as a separate line item in this report.

4.2.7 Contingency

A 25% figure is included due to the preliminary and conceptual nature of the Interim Closure Plan, and large uncertainties concerning costs to undertake the project given its remote location. AANDC/SENES used 25% whereas BCC/Delta& Carter used 15%, AANDC/Brodie in 2011 also used 25%. The contingency allowance is typically applied to the Direct Costs only, and this has been applied in this report as well.

4.2.8 Land versus Water Reclamation Costs

The NWB in the Ulu Water License requires the closure cost estimate to be broken out into the 1) global reclamation amount and the 2) cost of land reclamation. KIA is also interested in the split as they would like to administer the land/terrestrial portion of the financial security. Thus, the two final numbers should be reported. This report estimates the split as being approximately 2/3 land and 1/3 water. Interestingly, using the RECLAIM model, the split is determined using the Direct Costs alone as the land/water split figure for all of the Indirect Costs is calculated from the final Direct Costs split, determined further up the Summary spreadsheet.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the selection of Option 2 of the suggested three alternate closure plans for the Ulu site, a cost estimate of $8.71 M has been determined. This is a different approach to that proposed in the Interim C&R Plan by BCC (2013), but is considered a more likely plan to consider, and is the middle plan (in terms of complexity and cost) of the three alternate plans discussed in this report.

The selected plan has had a 25% contingency included based on the preliminary nature of the 'interim' plan and the large number of uncertainties as to what tasks are required and what they will cost.

The $8.7 M cost estimate is split approximately 2/3: 1/3 for land: water. The exact numbers are $5,926,177 for terrestrial/land relates closure liabilities and $2,786,366 for water related closure liabilities.

However, an accurate closure cost estimate for the site cannot be determined before a revised optimal and comprehensive closure plan has been prepared and it cannot be prepared until a number of investigative studies are undertaken as has been proposed in this report. The proposed steps are outlined in the following recommendations section.

The summarized costs for the Option 2 closure are provided in Table 2, below. It compares the previous two mine closure cost estimates prepared by 1) Delta/Carter for Bonito Capital Corporation (BCC) in late 2014 and by 2) SENES Consultants for AANDC to this report prepared by SJCI for KIA as of late 2015.

Table 2 Comparison of Mine Closure Cost Estimates.

Cost Center	2014 BCC-Delta/Carter Estimate	February 2015 AANDC-SENES Estimate	October 2015 KIA-SJCI Estimate
Direct Costs			
Underground Mine	$230,850	$317,920	$430,990
Waste Rock Piles	$113,400	$422,679	$290,758
Buildings and Equipment	$385,400	$859,777	$1,349,903
Chemicals and Soil Management	$117,200	$749,368	$344,109
Water Management	$4,800	$29,800	$10,000
Monitoring and Maintenance	$65,000	-	-
Post-Closure Monitoring & Maintenance	$120,217	$322,500	$188,500*
Direct Costs Subtotal	$1,036,867	$2,701,214	2,425,761
Indirect Costs			
Mobilization & Demobilization	$317,300	$3,714,900	$5,200,750
Project Management	3% $40,625	5% $135,061	5% $121,288
Health and Safety Plans	0% -	1% $27,012	1% $24,258
Bonding and Insurance			1% $24,258
Engineering	3% $40,625	10% $270,121	5% $121,288
Indirect Costs Subtotal	$81,250	$4,147,094	$5,680,342
Contingency (on Direct Costs)	(15%) $203,125	(25%) $675,303	(25%) $606,440
Total Costs	**$1,638,542**	**$7,523,612**	**$8,712,542**

Note: * RECLAIM categorises Post-Closure Monitoring and Maintenance as Indirect Costs, however it is considered as direct costs in this report (see comments in Section 4.1.7). In order to have this table comparable with the RECLAIM model, Post-Closure Monitoring and Maintenance Costs were added in the Subtotal of the Indirect Costs.

Major contributors to the cost differences between the three closure cost estimates (BCC, AANDC, KIA as listed above) include:

- Buildings and Equipment ($385 K, $860 K, $1.3 M): The cost estimates have become progressively more detailed in including all of the elements that fall under this category as well as itemizing the numbers of all the items rather than using lump sums for entire groups of items, including the mobile equipment, and increasing the cost for removal of the tank farm tanks; and
- Mob & Demob ($317 K, $3.7 M, $5.2 M): The large discrepancy in the cost estimate values is due primarily to the use of a winter road; a new portion as well as a toll on existing portion, inclusion of additional elements such as mobilizing workers, increased cost for camp for workers, and including freight cost on fuel being brought to site.

5.2 Recommendations

It is recommended that:

- This report is reviewed by the parties and a Plan is developed towards being able to prepare an appropriate and defensible comprehensive closure and reclamation plan for the site.
- The NWB Water License and KIA Land Use License should be amended to include the tasks and timelines presented in this report.
- The Plan should likely include the Company immediately implementing the investigative studies proposed herein as Stage 1. The cost estimate for that work has been estimated to be $170,000.
- The Closure Cost Estimate developed in this report for the Option 2 closure plan scenario should be used as a basis on which to determine an interim financial security that the Company would be required to provide to the NWB and KIA for the water and terrestrial aspects of the project until the detailed comprehensive closure plan and costing can be developed and accepted.
- The parties should utilize all the information provided from the completed Stage 1 investigations to develop the final closure plan. At that time, a detailed closure cost estimate report for that option can be prepared. The new closure plan cost estimate should be utilized to determine a financial security that the Company would provide to the NWB and KIA.
- A Reclamation Security Release Agreement can be prepared to include a mechanism by which security monies can be returned to the Company as work is completed, although for this project with the short duration of the active closure work and significant expenditures this may not be required.

<original signed by>
Steve Januszewski, P. Eng. (YK, BC, ON)
Principal Consultant
SteveJan Consultants Inc.

REFERENCES

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BCC 2015, Re: Additional cost estimate for manpower, equipment and logistics, e-mail response to KIA, dated February 12, 2015.

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BCC 2014b, *Ulu Gold Project Nunavut, Canada Care and Maintenance Plan May 2014*, prepared by Bonito Capital Corp. Elgin Mining Inc., dated May 2014.

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BGC 2015, *Review of Ulu Camp Reclamation Estimate submitted by Bonito Capital Corporation*, BGC Project Memorandum, prepared for Wynter Kuliktana-Kitikmeot Inuit Association, by Lukas Arenson-BGC Engineering, dated February 26, 2015.

Breakwater 2008, *Reclamation of Mine Openings As-Built Report-Nanisivik Mine, NU Final Report,* prepared for Breakwater Resources Ltd., by BGC Engineering, dated April 30, 2008.

Brodie 2011, *Ulu Gold Project-Elgin Mining Inc. Reclamation Cost Review*, prepared for SENES Consultants, by Brodie Consulting, dated December 28, 2011.

Echo Bay 1998, *Ulu Project-Kinetic Testing of Sulfide-Rich Material from Ulu*, prepared for Echo Bay Mines Limited, by Klohn-Crippen Consultants, dated April, 1998.

KIA 2015, *Re: 2BM-ULU0914 Security Assessment for the Ulu Gold Project*, letter report to the Nunavut Water Board, by the Kitikmeot Inuit Association, dated February 27, 2015.

NVI 2008, *Reclamation Policy-Nunavut Tunngavik Incorporated*, approved by NTI Board of Directors, dated September 17, 2008.

Tansey 2015, Conversations and e-mail correspondence between Steve Januszewski and Mike Tansey-ex-Ulu Project Manager, conversations September 22 & 24, 2015 and e-mailed information *Ulu Equipment List*-undated, *Ulu Regulatory Log*-dated June 2002, & *Reclamation Costs for Ulu Mine site-March 25, 2004*, received September 24, 2015.

WRI 2005, *Ulu Mine Waste Rock and Ore Storage Plan-Final*, prepared for Wolfden Resources Inc., by BGC Engineering and Lorax Environmental, March 21, 2005.

RECLAIM COST ESTIMATE

Project Name: *Gold Project*

Reclaim Model - Overview of Program

All users are urged to read the Reclaim Model User Manual - Scroll down for overview description of program.

Important! Reclaim 7.0 works better with no other excel files open.
If other excel files are open ignore run time error and proceed

Reclaim Menu	The default Excel menu bar has an additional tab labelled "Add-Ins" that provides options specific to the Reclaim Model.
Clear	This option deletes all input data, deletes any duplicated elements and blanks out the project name. It also allows for segregation into land costs vs water costs if required.
Duplicate	This option Duplicates components of the project. E.g. if there is more than one Open Pit, use duplicate to add a second Open Pit. Quantities for the new Open Pit are erased, but the Activities and Cost Codes are carried over from the original Open Pit. The new Open Pit subtotal is added to the Summary page.
Unit Costs	This option opens a window of unit costs to provide easy reference. NOTE: the unit cost table has a filter in the 'UNITS' column. You can select to only see a particular unit (eg km) or multiple units (km and m3) or all units.
Print All	This option prints the Summary Worksheet, Unit Cost Worksheet, and the individual component worksheets having non-zero balances. Individual worksheets can be printed directly using standard printing methods, such as Ctl - P.
Quit	Select Quit to exit the program
Help	Redirects user to Instructions worksheet.

WorkSheets	
Summary	This worksheet contains a cumulative summary of costs for each component of the project. Associated costs such as engineering and project management are added as a percentage of the component costs.
Components	Costs are derived for individual closure and reclamation activities by multiplying a "quantity" of activity by a "unit cost". An activity can be edited, added, or deleted from worksheet. However, care should be taken not to modify cells that are defined and used elsewhere in the program. ***Do not change the content or column width of the first column of each component worksheet.***
Unit Costs	This worksheet contains a look up table with costs for typical work associated with each closure and reclamation activity

Limitations	***The Reclaim Program will NOT work if the worksheets are changed such that the following requirements are not met. Please review the following prior to modifiying worksheets.***
WorkSheet Names	*The names of the worksheets must not be changed.*
Defined Names	Certain cells have defined names, which must not be changed. Where the cell is named, the name will appear in the "Name Box" to the left of the formula bar.
First line of data	The first line of data for any component worksheet starts on line 4. ***Do not change the first line of a component worksheet, ie the component name.***
Cell A1	Cell A1 on the component sheet MUST always contain the count of that component for the duplicate function to operate. ***DO NOT CHANGE.***
Adding Lines	You can add lines to components and the unit cost table, as long as they are not the last lines. The last line might fall outside the named ranges. You can check the size of the named range by selecting the name from the drop down box at the top left of the sheet. Usually this box has a cell reference, or a name.
Printing	A component will only be printed if its sub-total is greater than zero. In addition, a component and the summary sheet cannot be printed if there is an error. Printing has been set to print 1 page per component.

Conditions of Use	The Reclamation Cost Estimating Model was prepared to serve as a guide for Government Agencies, mining companies, and others to estimate the cost of mine reclamation. This model is not intended to replace reclamation planning or to be used to determine the activities required to reclaim a site or to dictate how much should be spent on reclamation. Reclaim was prepared by Brodie Consulting Ltd. on behalf of AANDC. AANDC and Brodie Consulting Ltd. are not responsible for the completeness or accuracy of any reclamation estimate made using this model. The user agrees to check and take responsibility for all aspects of any cost estimate made using this model.

The following table provides guidance as to whether water management and treatment is considered short term or long term. Short term closure activities may be costed within a component (eg 'Open Pit' or 'Rock Pile') or 'Water Management'. Long term or post-closure water treatment is costed in 'Water Treatment'. and included in "Post-closure Monitoring and Maintenance".

		Short Term/ Capital Ex.	Long term
Open Pit	flood pit - install/operate pumping system	x	
	construct diversion ditches	x	
	treat 1st filling	x	
	install pump/decant system	x	
	passive/biological treatment	x	
	overflow treatment		x
Rock Pile/Heap Leach Facility	construct diversion ditches	x	
	install groundwater collection system	x	
	install toe seepage collection system	x	
	collect and treat groundwater		x
	collect and treat seepage (ARD/ML)		x
	install passive treatment system	x	
	operate and maintain passive treatment system		x
	operate pump and detoxify heap leach pile (cyanide destruction)	x	
Tailings Facility	construct diversion ditches	x	
	pump supernatant (to pit, U/G)	x	
	treat supernatant	x	
	install toe seepage collection system	x	
	collect and treat seepage (ARD/ML)		x
	install passive treatment system	x	
	operate and maintain passive treatment system		x
U/G Mine	accelerate flooding	x	
	install seepage collection system	x	
	install dewatering/pumping system	x	
	operate seepage/dewatering system (ARD/ML)		x
Water Management	refill lakes		
	redirect creeks/streams	x	
	stabilize water management ponds	x	
	stabilize/close sediment ponds	x	
	fresh water supply - breach embankment	x	
	fresh water supply - remove piping system	x	
	construct water treatment plant	x	
	construct sludge pond	x	
	water control in reclamation quarry	x	
	operate/maintain water treatment plant		x

SUMMARY OF COSTS

CAPITAL COSTS	COMPONENT NAME	COST	LAND LIABILITY	WATER LIABILITY
OPEN PIT		$0	$0	$0
UNDERGROUND MINE		$430,990	$350,990	$80,000
TAILINGS FACILITY		$0	$0	$0
ROCK PILE		$290,758	$199,041	$91,717
BUILDINGS AND EQUIPMENT		$1,349,903	$921,643	$428,261
CHEMICALS AND CONTAMINATED SOIL MANAGEMEN		$344,109	$178,302	$165,807
SURFACE AND GROUNDWATER MANAGEMENT		$10,000	-	$10,000
INTERIM CARE AND MAINTENANCE		$0	-	$0
	SUBTOTAL: Capital Costs	**$2,425,761**	**$1,649,976**	**$775,785**
	PERCENT OF SUBTOTAL		**68%**	**32%**

INDIRECT COSTS		COST	LAND LIABILITY	WATER LIABILITY
MOBILIZATION/DEMOBILIZATION		$5,200,750	$3,537,494	$1,663,256
POST-CLOSURE MONITORING AND MAINTENANCE		$188,500	$128,216	$60,284
ENGINEERING	5%	$121,288	$82,499	$38,789
PROJECT MANAGEMENT	5%	$121,288	$82,499	$38,789
HEALTH AND SAFETY PLANS/MONITORING & QA/QC	1%	$24,258	$16,500	$7,758
BONDING/INSURANCE	1%	$24,258	$16,500	$7,758
CONTINGENCY	25%	$606,440	$412,494	$193,946
MARKET PRICE FACTOR ADJUSTMENT	0%	$0	$0	$0
	SUBTOTAL: Indirect Costs	**$6,286,782**	**$4,276,200**	**$2,010,581**

TOTAL COSTS	**$8,712,542**	**$5,926,177**	**$2,786,366**

1 **Open Pit Name:** **Pit # *1***

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0.00	$0		$0	$0
Signs		each		#N/A	$0.00	$0		$0	$0
Berm at crest		m3		#N/A	$0.00	$0		$0	$0
Block roads		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
STABILITY STUDY									
Conduct stability and setback study		allow		#N/A	$0.00	$0		$0	$0
STABILIZE SLOPES									
Off-load crest, soil A		m3		#N/A	$0.00	$0		$0	$0
Off-load crest, soil B		m3		#N/A	$0.00	$0		$0	$0
Doze/trim overburden at crest		m3		#N/A	$0.00	$0		$0	$0
Drill & blast pit crest		m3		#N/A	$0.00	$0		$0	$0
Buttress slope		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
COVER/CONTOUR SLOPES									
Place fill, soil A		m3		#N/A	$0.00	$0		$0	$0
Place fill, soil B		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Vegetate slopes		ha		#N/A	$0.00	$0		$0	$0
Vegetate pit floor		ha		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0.00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0		$0	$0
CONSTRUCT SPILLWAY									
Excavate channel		m3		#N/A	$0.00	$0		$0	$0
Concrete		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
RECLAIM QUARRIES									
Contour slopes		m3		#N/A	$0.00	$0		$0	$0
Place overburden		m3		#N/A	$0.00	$0		$0	$0
Vegetate		m3		#N/A	$0.00	$0		$0	$0
FLOOD PIT-Captital									
Remove stationary equipment (sump pumps)		each		#N/A	$0.00	$0		$0	$0
Remove dewatering pipeline		m		#N/A	$0.00	$0		$0	$0
Remove power lines		each		#N/A	$0.00	$0		$0	$0
Construct diversion ditches		m3		#N/A	$0.00	$0		$0	$0
-Ditch, mat'l A		m3		#N/A	$0.00	$0		$0	$0
-Ditch, mat'l B		m3		#N/A	$0.00	$0		$0	$0
Construct embankment/dam		m3		#N/A	$0.00	$0		$0	$0
Supply/install pump station		each		#N/A	$0.00	$0		$0	$0
Supply/install piping system		m		#N/A	$0.00	$0		$0	$0
Remove pump post-closure		each		#N/A	$0.00	$0		$0	$0
Remove pipeline post-closure		m		#N/A	$0.00	$0		$0	$0
FLOOD PIT-Annual Cost									
Operate pumps (power)		m3		#N/A	$0.00	$0		$0	$0
Maintain pump/pipeline		allow		#N/A	$0.00	$0		$0	$0
Labour:fuel management, comissioning/decom		$/h		#N/A	$0.00	$0		$0	$0
Chemical addition, _____ kg/m3 of water		tonne		#N/A	$0.00	$0		$0	$0
Chemicals, purchase and shipping		tonne		#N/A	$0.00	$0		$0	$0
Passive/biological additives		$/ha		#N/A	$0.00	$0		$0	$0
Passive additives purchase and shipping		tonne		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
					Annual pumping costs	$0			
Number of years of pump flooding		years							
					Total pumping costs	$0		$0	$0
					Total	$0		$0	$0
					% of Total			0%	0%

1 **Underground Mine Name** **UG Mine # *1***

ACTIVITY/MATERIAL	Notes	Unit	Qty	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Mine inspection	Rock mechanics engineer-mine assessment	LS	1	#N/A	########	$15,000	100%	$15,000	$0
Signs		each		#N/A	$0.00	$0		$0	$0
Block roads		m3		#N/A	$0.00	$0		$0	$0
Berm		m3		#N/A	$0.00	$0		$0	$0
Concrete wall in portals		m3		#N/A	$0.00	$0		$0	$0
Backfill portal #1	draw from WR pad, backfill & blend into area topography	m3	800	SCSS	$18.80	$15,040	100%	$15,040	$0
Backfill portal #2		m3		#N/A	$0.00	$0		$0	$0
Cap raise vent raise	install engineered concrete cap	m3	11	CLFS	$2,130.00	$23,430	100%	$23,430	$0
Cap raise #2		m3		#N/A	$0.00	$0		$0	$0
Cap shaft #1		m3		#N/A	$0.00	$0		$0	$0
Cap shaft #2		m3		#N/A	$0.00	$0		$0	$0
Backfill adits		m3		#N/A	$0.00	$0		$0	$0
Open up access to underground mine	remove 400 m3 rockfill plug-scooptram	m3	400	SCSS	$18.80	$7,520	100%	$7,520	$0
Open up access to underground mine	remove bulkhead and ice plug	LS	1	#N/A	########	$200,000	80%	$160,000	$40,000
Provision for any required rehab work	to enable access into full depth of mine & ver	LS	1	#N/A	########	$100,000	100%	$100,000	$0
REMOVE HAZARDOUS MATERIALS									
Remove hazardous materials, U/G labor		mandays		#N/A	$0.00	$0		$0	$0
Remove/decontam. stationary & elect. equip		mandays		#N/A	$0.00	$0		$0	$0
Remove/decontam. mobile equipment		each		#N/A	$0.00	$0		$0	$0
Remove misc. haz. mat & explosives		kg		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
INSTALL BULKHEADS									
Bulkheads to control water flow		each		#N/A	$0.00	$0		$0	$0
Grout bulkhead		m3		#N/A	$0.00	$0		$0	$0
FLOOD MINE									
Supply/install pump		each		#N/A	$0.00	$0		$0	$0
Supply/install piping system		each		#N/A	$0.00	$0		$0	$0
Operate pumps to flood workings		m3		#N/A	$0.00	$0		$0	$0
Other	pump out accumulated water from mine: supply, install and operate	LS	1	#N/A	########	$10,000	0%	$0	$10,000
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m2		#N/A	$0.00	$0		$0	$0
Install pumping wells		m3		#N/A	$0.00	$0		$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0		$0	$0
SPECIALIZED ITEMS									
Engineering design for vent raise plug		LS	1	#N/A	########	$10,000	50%	$5,000	$5,000
Upgrade of vent raise collar		LS	1	#N/A	########	$50,000	50%	$25,000	$25,000
Other				#N/A	$0.00	$0		$0	$0
					Total	$430,990		$350,990	$80,000
					% of Total			81%	19%

1 **Tailings Impoundment Name:** **Pond # *1***

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
CONTROL ACCESS									
Fence		m		#N/A	$0.00	$0		$0	$0
Signs		each		#N/A	$0.00	$0		$0	$0
Berm		m3		#N/A	$0.00	$0		$0	$0
Block roads		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
STABILIZE EMBANKMENT(S)									
Toe buttress, drainage layer		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, bulk fill		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Raise crest		m3		#N/A	$0.00	$0		$0	$0
Flatten slopes		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
COVER TAILINGS									
Grade/shape tailings surface		m3		#N/A	$0.00	$0		$0	$0
Liner bedding		m3		#N/A	$0.00	$0		$0	$0
Subgrade preparation - compact		m2		#N/A	$0.00	$0		$0	$0
Supply geotextile/geosynthetic		m2		#N/A	$0.00	$0		$0	$0
Install geotextile/geosynthetic		m2		#N/A	$0.00	$0		$0	$0
Soil cover		m3		#N/A	$0.00	$0		$0	$0
Rock cover		m3		#N/A	$0.00	$0		$0	$0
Vegetate		m2		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
BURY PAG ROCK									
Relocate PAG rock		m3		#N/A	$0.00	$0		$0	$0
Place cover over PAG rock		m3		#N/A	$0.00	$0		$0	$0
Raise crest of dam		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
STABILIZE DECANT SYSTEM									
Excavate and replace		m3		#N/A	$0.00	$0		$0	$0
Plug/backfill with concrete or clay		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
REMOVE TAILINGS DISCHARGE									
Cyclones		m3		#N/A	$0.00	$0		$0	$0
Pipe		m3		#N/A	$0.00	$0		$0	$0
Remove reclaim barge		allow		#N/A	$0.00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0.00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0		$0	$0
FLOOD TAILINGS									
Doze tailings to final contour		m3		#N/A	$0.00	$0		$0	$0
Raise crest of dam		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
UPGRADE SPILLWAY									
Excavate channel, rock		m3		#N/A	$0.00	$0		$0	$0
Excavate channel, soil		m3		#N/A	$0.00	$0		$0	$0
Concrete		m3		#N/A	$0.00	$0		$0	$0
Rip rap		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
CONSTRUCT SEEPAGE COLLECTION POND									
Excavate seepage collection pond		m3		#N/A	$0.00	$0		$0	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0		$0	$0
Vegetate spread material		ha		#N/A	$0.00	$0		$0	$0
Bedding layer		m3		#N/A	$0.00	$0		$0	$0
Supply geomembrane		m2		#N/A	$0.00	$0		$0	$0
Install geomembrane		m2		#N/A	$0.00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0		$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m3		#N/A	$0.00	$0		$0	$0
Install pumping wells		m3		#N/A	$0.00	$0		$0	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0		$0	$0
SPECIALIZED ITEMS									
Install permanent instrumentation, supply & technican		each		#N/A	$0.00	$0		$0	$0
Install permanent instrumentation, drilling		each		#N/A	$0.00	$0			$0
TREAT SEEPAGE - see "Water Management" and "Water Treatment"									
TREAT SUPERNATANT									
Pump water (to pit, U/G)		m3		#N/A	$0.00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0		$0	$0
Supply reagents		tonne		#N/A	$0.00	$0		$0	$0
					Annual treatment costs	$0			
Number of years of treatment		years							
					Total treatment costs	$0			$0
					Total	$0		$0	$0
					% of Total			0%	0%

* for construction of passive treatment system refer to "Water Management"

1 **Rock Pile Name:**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
STABILIZE SLOPES									
Stbilize slope		m3		#N/A	$0.00	$0		$0	$0
Re-grade waste pad perimeter to 3:1 slope	based on 50% of remaining pad volume	m3	1894	DRL	$1.05	$1,988	50%	$994	$994
Re-grade ore pad perimeter to 3:1 slope	based on 50% of remaining pad volume	m3	4790	DRL	$1.05	$5,030	50%	$2,515	$2,515
Re-grade camp pad perimeter to 3:1 slope	based on 50% of remaining pad volume	m3	3730	DRL	$1.05	$3,917	50%	$1,958	$1,958
Toe buttress, drain mat'l		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, fill mat'l A		m3		#N/A	$0.00	$0		$0	$0
Toe buttress, fill mat'l B		m3		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
COVER ROCK PILE									
Subgrade preparation - doze surface		m3		#N/A	$0.00	$0		$0	$0
Soil cover - excavate,haul,spread&compact		m3		#N/A	$0.00	$0		$0	$0
Rock cover - excavate,haul & spread		m3		#N/A	$0.00	$0		$0	$0
Excavate downslope drainage channel & chute		m3		#N/A	$0.00	$0		$0	$0
Rip rap drainage channel and chute		m3		#N/A	$0.00	$0		$0	$0
Vegetate	hand-seeding of selected sloped areas	ha	5	VHSL	$4,500.00	$22,500	50%	$11,250	$11,250
Other				#N/A	$0.00	$0		$0	$0
VERY LOW PERMEABILITY COVER (in addition to above)									
Liner subgrade preparation - compact		m2		#N/A	$0.00	$0		$0	$0
Supply geomembrame		m2		#N/A	$0.00	$0		$0	$0
Install geomembrane		m2		#N/A	$0.00	$0		$0	$0
Protective cover - excavate,haul,spread&compact		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0.00	$0		$0	$0
CONSTRUCT DIVERSION DITCHES									
Excavate ditches -soil		m3		#N/A	$0.00	$0		$0	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0		$0	$0
Rip rap in channel base		m3		#N/A	$0.00	$0		$0	$0
CONSTRUCT SEEPAGE COLLECTION POND									
Excavate seepage collection pond		m3		#N/A	$0.00	$0		$0	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0		$0	$0
Vegetate spread material		ha		#N/A	$0.00	$0		$0	$0
Bedding layer		m3		#N/A	$0.00	$0		$0	$0
Supply geomembrane		m2		#N/A	$0.00	$0		$0	$0
Install geomembrane		m2		#N/A	$0.00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0		$0	$0
INSTALL GROUNDWATER COLLECTION SYSTEM									
Excavate/install sumps		m3		#N/A	$0.00	$0		$0	$0
Install pumping wells		m3		#N/A	$0.00	$0		$0	$0
Install pumps/pipelines/power supply		allow		#N/A	$0.00	$0		$0	$0
RELOCATE DUMPS									
Load, haul, dump ore from ore pad to portal		m3	742	SC1H	$9.30	$6,901	100%	$6,901	$0
Load, haul, dump PAG rock from rock pads to portal		tonne	20827	SC1L	$6.80	$141,624	100%	######	$0
Geologist to direct PAG / NAG rock sorting	Undertaken during excavation, grading of pa	days	40	engH	$220.00	$8,800	100%	$8,800	$0
Other				#N/A	$0.00	$0		$0	$0
SPECIALIZED ITEMS									
Waste rock geo-chem testing	from materials stored on surface	each	1	L.S.	########	$50,000	50%	$25,000	$25,000
Provision for possible water treatment	for rock dumps seepage, underground m/w	each	1	L.S.	########	$50,000	0%	$0	$50,000
TREAT ROCK PILE SEEPAGE - see "Water Treatment"									
HEAP LEACH SEEPAGE TREATMENT - Cyanide Detox									
Cyanide destruction water treatment pumping		m3		#N/A	$0.00	$0		$0	$0
Reagents		tonnes		#N/A	$0.00	$0		$0	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0.00	$0		$0	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0		$0	$0
				Annual treatment costs		$0			
Number of years of treatment		years							
				Total treatment costs		$0			$0
HEAP LEACH SEEPAGE TREATMENT - ARD/ML**									
Upgrade/modify pumping system - report to WTP		allow		#N/A	$0.00	$0			$0
					Total	$290,758		######	$91,717
					% of Total			68%	32%

* For construction of passive treatment system refer to "Water Management". ARD/ML seepage treatment becomes post-closure water treatment cost

**Heap leach ARD/ML seepage treatment becomes post-closure water treatment cost

1 **Chemicals/Soil Area Name:**

Note: The procedures, equipment and packaging for clean up and removal of chemicals or contaminated soils are highly dependent on the nature of the chemicals and their existing state of containment. Government guidelines should be consulted on an individual chemical basis. Any estimate made here should be considered very rough unless specific evaluations have been conducted.

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
HAZARDOUS MATERIALS AUDIT									
Hazardous materials audit (Phase I & II ESA	assessment of suspected areas	each	1	CS2	$75,000.00	$75,000	75%	$56,250	$18,750
HAZARDOUS MATERIALS - CONSOLIDATION FOR REMOVAL									
Waste oils		mandays		#N/A	$0.00	$0		$0	$0
Fuels-diesel		mandays		#N/A	$0.00	$0		$0	$0
Fuels-gasoline, av gas, jet fuel		mandays		#N/A	$0.00	$0		$0	$0
Shop-solvents, lubes, paints		mandays		#N/A	$0.00	$0		$0	$0
Waste batteries	consolidation and prep for removal	each	50	#N/A	$10.00	$500		$0	$500
Fuel Tank Farms-residual contents		mandays		#N/A	$0.00	$0		$0	$0
Hazardous materials abatement program	administration, supervision, and reporting	andays		#N/A	$0.00	$0		$0	$0
Barrels with Contents-consolidation	consolidate into barrels/cubes/totes with similar materials, prepare for removal to u/g or off-site	each	390	#N/A	$100.00	$39,000	25%	$9,750	$29,250
Barrels-cleaning of newly emptied barrels	estimate 1/2 man-hour per barrel at $44/man	each	390	#N/A	$22.00	$8,580	25%	$2,145	$6,435
Barrels-crushing, and prepare for removal	using barrel crusher, 5min per barrel, $44/man-hour	each	32.5	lab-ush	$43.98	$1,429	25%	$357	$1,072
HAZARDOUS MATERIALS REMOVAL									
Waste oils		litre		#N/A	$0.00	$0		$0	$0
Waste fuel		litre		#N/A	$0.00	$0		$0	$0
Waste batteries-remove by winter road	100 batteries, aver of 30kgs apiece, freight c	kg	3000	#N/A	$0.20	$600	50%	$300	$300
Assay & environmental lab reagents		kg		#N/A	$0.00	$0		$0	$0
Machine shop paints, solvents etc		litre		#N/A	$0.00	$0		$0	$0
Glycol		litre		#N/A	$0.00	$0		$0	$0
Process reagents		kg		#N/A	$0.00	$0		$0	$0
Nuclear sources		allow		#N/A	$0.00	$0		$0	$0
Other hazardous materials		allow		#N/A	$0.00	$0		$0	$0
HAZARDOUS MATERIALS									
Transportation to disposal facility		allow		#N/A	$0.00	$0		$0	$0
Disposal fees		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
CONTAMINATED SOILS									
Contam. soil investigation - Phase 1		each		#N/A	$0.00	$0		$0	$0
Contam. soil investigation - Phase 2		each		#N/A	$0.00	$0		$0	$0
CONTAMINATED SOIL REMOVAL									
Excavate and transport to onsite facility		m3		#N/A	$0.00	$0		$0	$0
Manage hydrocarbon remediation at facility		m3		#N/A	$0.00	$0		$0	$0
Reagents/stabilizing agent		m2		#N/A	$0.00	$0		$0	$0
Excavate and transport to offsite facility	total, from all areas of the site	m3	1500	CSRH	$146.00	$219,000	50%	$109,500	$109,500
Contour decontaminated area		m3		#N/A	$0.00	$0		$0	$0
CONTAMINATED SOIL VERY LOW PERMEABILITY COVER									
Supply geomembrame, HDPE, ES3, GCL		m2		#N/A	$0.00	$0		$0	$0
Upper and lower bedding layers		m3		#N/A	$0.00	$0		$0	$0
Install geomembrane, HDPE, ES3, GCL		m2		#N/A	$0.00	$0		$0	$0
Erosion protection layer		m3		#N/A	$0.00	$0		$0	$0
Vegetate		m2		#N/A	$0.00	$0		$0	$0
Install infiltration/seepage instrumentation		allow		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
OTHER									
				#N/A	$0.00	$0		$0	$0
					Total	$344,109		$178,302	########
					% of Total			52%	48%

1 **Building / Equip Name:** **Bldg / Equip #: *1***

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost	% Land	Land Cost	Water Cost
DISPOSE MOBILE EQUIPMENT									
Decontaminate and prep to ship off-site	largest pieces	allow	6	#N/A	$5,000.00	$30,000	75%	$22,500	$7,500
Decontaminate and dispose on-site	All but largest pieces	allow	32	#N/A	$5,000.00	$160,000	75%	$120,000	$40,000
Decontaminate and dispose on-site	fixed equipment, excluding electrical eqpmnt	allow	4	#N/A	$2,000.00	$8,000	75%	$6,000	$2,000
REMOVE BUILDINGS - see note below									
Accomodation/kitchen/shop complex	Weatherhaven structures (8 @$10K & 1 @ $30K) & corridors-remove contents, tear-down, prep for removal	m2	1	#N/A	$110,000.00	$110,000	100%	$110,000	$0
Adjoining trailers (6)-camp area	remove contents & prepare for removal	m2	6	#N/A	$2,500.00	$15,000	100%	$15,000	$0
Electrical System	dismantle and prepare for removal	m2	1	#N/A	$50,000.00	$50,000	100%	$50,000	$0
Storage Facilites-sea cans (25) & stand-alone trailers (10)	remove contents & prepare for removal	m2	35	#N/A	$2,500.00	$87,500	100%	$87,500	$0
Water and Wastewater Treatment Facilities	two systems-dismantle structures & pipelines, prepare for removal	m2	2	#N/A	$7,500.00	$15,000	0%	$0	$15,000
Exploration building-wooden	remove contents, teardown, burn wooden portions, scrap remainder	allow	1	#N/A	$5,000.00	$5,000	100%	$5,000	$0
Emulsion plant		m2		#N/A	$0.00	$0		$0	$0
AN Storage Facility		m2		#N/A	$0.00	$0		$0	$0
Warehouse, Shops and Other		m2		#N/A	$0.00	$0		$0	$0
Storage Facility at Laydown/Airstrip		m2		#N/A	$0.00	$0		$0	$0
Fuel tanks-Main and Camp 3 tank farm tanks	draining and cleaning tanks, cutting up metal skins with excavator shear	m2	2580	BRS1H	$240.00	$619,200	50%	$309,600	$309,600
Fuel Tanks		m2		#N/A	$0.00	$0		$0	$0
Freshwater intake		m2		#N/A	$0.00	$0		$0	$0
Reclaim pumps		m2		#N/A	$0.00	$0		$0	$0
Outfall & Diffuser		m2		#N/A	$0.00	$0		$0	$0
Airstrip lighting, navigation, electrician		mandays		#N/A	$0.00	$0		$0	$0
Airstrip lighting, navigation, mechanical		mandays		#N/A	$0.00	$0		$0	$0
Break foundation slabs	outdoor wash pad	m2	85	BRCL	$40.00	$3,400	100%	$3,400	$0
Debris - Consolidate & remove to underground	from camp areas & boneyards, estimate $600 per 5m3 load	m3	1000	#N/A	$120.00	$120,000	80%	$96,000	$24,000
Empty barrels- consolidate, crush and prepare for removal	using barrel crusher, 5min per barrel, $44/man-hour	hrs	9	lab-ush	$43.98	$403	80%	$323	$81
LANDFILL FOR DEMOLITION WASTE									
Place rock cover		m3		#N/A	$0.00	$0		$0	$0
Place soil cover		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
GRADE AND CONTOUR PADS									
Ulu-main camp area		ha		#N/A	$0.00	$0		$0	$0
Portal Pad area		ha		#N/A	$0.00	$0		$0	$0
Ore pad area		ha		#N/A	$0.00	$0		$0	$0
Storage Facilites		ha		#N/A	$0.00	$0		$0	$0
Water and Wastewater Treatment Facilities		ha		#N/A	$0.00	$0		$0	$0
U/G Heating Plant		ha		#N/A	$0.00	$0		$0	$0
Emulsion Plant		ha		#N/A	$0.00	$0		$0	$0
Warehouse, Shops and Other		ha		#N/A	$0.00	$0		$0	$0
Place rock cover		m3		#N/A	$0.00	$0		$0	$0
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
PUNCTURE LINED SUMPS									
Puncture liner and place soil cover		m3		#N/A	$0.00	$0		$0	$0
RECLAIM ROADS									
Remove culverts		each	6	#N/A	$1,000.00	$6,000	0%	$0	$6,000
Remove bridges		each		#N/A	$0.00	$0		$0	$0
Scarify roads	14 km length x 10m width	ha	14	SCFYL	$4,300.00	$60,200	80%	$48,160	$12,040
Scarify airstrip & apron area	1200m x 25m & 2 apron areas (1ha each)	ha	5	SCFYL	$4,300.00	$21,500	80%	$17,200	$4,300
Scarify main camp, camp 3 and laydown areas		ha	9	SCFYL	$4,300.00	$38,700	80%	$30,960	$7,740
Vegetate		ha		#N/A	$0.00	$0		$0	$0
Other				#N/A	$0.00	$0		$0	$0
SPECIALIZED ITEMS									
Dispose of misc. debris and laydown area refuse				#N/A	$0.00	$0		$0	$0
					Total	$1,349,903		$921,643	$428,261
					% of Total			68%	32%

Note: Unit costs are based on 3m high, single storey building. Scale larger building areas accordingly. E.g. 10m high building multiply area by 3.3 (10/3)

1 **Capital Expenditures and Short Term Water Treatment identified in 'Instructions' worksheet**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
BREACH DYKE EMBANKMENT						
Remove fill		m3		#N/A	$0.00	$0
Contour water intake area		m3		#N/A	$0.00	$0
STABILIZE SEDIMENT PONDS/WATER MANAGEMENT PONDS						
Decommission mine sump		allow	1	#N/A	$10,000.00	$10,000
Doze & spread excavated material		m3		#N/A	$0.00	$0
Vegetate spread material		ha		#N/A	$0.00	$0
Rip rap in channel base		each		#N/A	$0.00	$0
REDIRECT RUNOFF/CONSTRUCT DIVERSION DITCHES						
Excavate ditches -soil		m3		#N/A	$0.00	$0
Excavate ditches -rock		m3		#N/A	$0.00	$0
Stabilize side slopes		m3		#N/A	$0.00	$0
Rip rap in channel base		m3		#N/A	$0.00	$0
BREACH DITCHES						
Excavate breaches		m3		#N/A	$0.00	$0
Backfill/recontour		m3		#N/A	$0.00	$0
Install flow dissipation		m3		#N/A	$0.00	$0
Vegetate remainder of ditch		m2		#N/A	$0.00	$0
DECOMISSION FRESH WATER SUPPLY						
Breach embankment		m		#N/A	$0.00	$0
Remove pump		LS		#N/A	$0.00	$0
Remove pipeline		m		#N/A	$0.00	$0
WATER CONTROL IN RECLAMATION QUARRY						
Install pumping system		LS		#N/A	$0.00	$0
Remove pumping system		LS		#N/A	$0.00	$0
REMOVE PIPELINES						
Remove pipes		m		#N/A	$0.00	$0
Concrete plug deep pipes		m3		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
GROUNDWATER COLLECTION SYSTEM						
Excavate/install sumps		m3		#N/A	$0.00	$0
Install pumping wells		m3		#N/A	$0.00	$0
Install pumps/pipelines/power supply		LS		#N/A	$0.00	$0
CONSTRUCT CONTAMINATED WATER STORAGE POND						
Excavate pond		m3		#N/A	$0.00	$0
Doze & spread excavated material		m3		#N/A	$0.00	$0
Vegetate spread material		ha		#N/A	$0.00	$0
Bedding layer		m3		#N/A	$0.00	$0
Supply geomembrane		m2		#N/A	$0.00	$0
Install geomembrane		m2		#N/A	$0.00	$0
Erosion protection layer		m3		#N/A	$0.00	$0
CONSTRUCT PASSIVE TREATMENT SYSTEM (e.g. Constructed Wetland)						
Construct access roads		km		#N/A	$0.00	$0
Install HDPE piping system from collection pond		m		#N/A	$0.00	$0
Inter-cell flow structures		allow		#N/A	$0.00	$0
Install liners		m2		#N/A	$0.00	$0
Install growth media		m3		#N/A	$0.00	$0
Wetland vegetation		ha		#N/A	$0.00	$0
CONSTRUCT WATER TREATMENT PLANT						
Build treatment plant		LS		#N/A	$0.00	$0
Build sludge containment facility		LS		#N/A	$0.00	$0
SHORT TERM WATER TREATMENT*						
Annual water treatment cost, from "Water Treatment"						$0
					Total	$10,000

*Note: include water treatment cost from "Water Treatment" worksheet if treatment is considered short term and is not included in a particular component worksheet.

1 **Water Treatment**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
ADDITION OF REAGENTS						
H2O2		kg		#N/A	$0.00	$0
lime		kg		#N/A	$0.00	$0
ferric sulphate		kg		#N/A	$0.00	$0
ferrous sulphate		kg		#N/A	$0.00	$0
flocculents		kg		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
LABOUR AND SUPPLIES						
Annual fuel		litres		#N/A	$0.00	$0
Annual power		kW-h		#N/A	$0.00	$0
Electrician/mechanic to maintain treatment plant		allow		#N/A	$0.00	$0
Equipment maintenance and parts		allow		#N/A	$0.00	$0
Misc. supplies, hoses, tools		allow		#N/A	$0.00	$0
Communications		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
WATER SAMPLING AND ANALYSES						
Sampling equipment		allow		#N/A	$0.00	$0
Analyses		allow		#N/A	$0.00	$0
Shipping to laboratory		allow		#N/A	$0.00	$0
Reporting		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SITE ACCESS						
Road maintenance (incl. snow removal)		allow		#N/A	$0.00	$0
Winter road tariff		allow		#N/A	$0.00	$0
Truck rental		allow		#N/A	$0.00	$0
Air support		allow		#N/A	$0.00	$0
			Annual water treatment costs			$0
Number of years of water treatment		years				
					Total	$0

Note: Short term water treattment is intended to be included in "Water Management", whereas long term, or post-closure, water treatment is included in "Post-Closure Monitoring and Maintenance"

1 Post-Closure Monitoring & Maintenance:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MONITORING & INSPECTIONS						
Final site audit		each	1	#N/A	########	$25,000
Preparation of Final Closure Plan & Permit applications		each	1	#N/A	########	$50,000
Regulatory costs*		each	5	#N/A	$2,500.00	$12,500
Site water monitoring	5 stations	each	26	#N/A	$1,000.00	$26,000
Geo-technical inspections		each	5	#N/A	########	$75,000
- Post pit flooding		each		#N/A	$0.00	$0
Air Quality Monitoring Program (AQMP)		each		#N/A	$0.00	$0
Wildlife Effects Monitoring Program (WEMP)		each		#N/A	$0.00	$0
Vegetation Monitoring		each		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
COVER MAINTENANCE						
Repair erosion - infill gullies		allow		#N/A	$0.00	$0
Repair erosion - upgrade diversion ditches		allow		#N/A	$0.00	$0
Remove problem vegetation		allow		#N/A	$0.00	$0
Repair animal damage		allow		#N/A	$0.00	$0
Repair/upgrade access controls		allow		#N/A	$0.00	$0
Other				#N/A	$0.00	$0
SPILLWAY MAINTENANCE						
Repair erosion		m3		#N/A	$0.00	$0
Clear spillway		each		#N/A	$0.00	$0
CWTS MAINTENANCE						
Maintain flow, restore vegetation		allow		#N/A	$0.00	$0
POST-CLOSURE WATER TREATMENT**						
Annual water treatment cost, from "Water Treatment"						$0
Subtotal, Annual post-closure costs						$188,500
Discount rate for calculation of net present value of post-closure cost, %				0.00%		
Number of years of post-closure activity					years	
Present Value of payment stream						$188,500

*Regulatory costs - annual reporting, management plans, progress reports etc.

Include water treatment cost from "Water Treatment" worksheet if treatment is considered long term, such as ARD/ML.

1 **Interim Care and Maintenance**

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
INTERIM CARE & MAINTENANCE						
on-site caretaker		manmonths		#N/A	0	$0
extra personnel		manmonths		#N/A	0	$0
-electrician		manmonths		#N/A	0	$0
-mechanic		manmonths		#N/A	0	$0
annual fuel		litre		#N/A	0	$0
misc. supplies		allow		#N/A	0	$0
pick-up truck		each		#N/A	0	$0
small dozer		allow		#N/A	0	$0
small excavator		allow		#N/A	0	$0
snow machine		allow		#N/A	0	$0
communications		allow		#N/A	0	$0
SNP/AEMP water sampling & reporting		each		#N/A	0	$0
geotechnical assessment		each		#N/A	0	$0
interim water treatment				#N/A		$0
other		each		#N/A	0	$0
			Annual	Interim C&M Cost		$0
Number of years of ICM		years			**Total**	$0

1 Mobilization/Demobilization:

ACTIVITY/MATERIAL	Notes	Units	Quantity	Cost Code	Unit Cost	Cost
MOBILIZE HEAVY EQUIPMENT						
Excavators		each		#N/A	0	$0
Dump trucks		each		#N/A	0	$0
Dozers		each		#N/A	0	$0
Demolition shears		each		#N/A	0	$0
Crane		each		#N/A	0	$0
Loader		each		#N/A	0	$0
Compactor		each		#N/A	0	$0
Light duty vehicles		each		#N/A	0	$0
MOBILIZE MISC. EQUIPMENT						
Pump shipping		each		#N/A	0	$0
Re-packing supplies-contaminated materials	totes, cubes, salvage drums, & fuel/oil pump	allow	1	#N/A	20000	$20,000
Minor tools and equipment	incl fuel/oil x'fer pumps	allow	1	#N/A	50000	$50,000
Other	to fly required supplies to site, 4 flights-Dash	allow	4	#N/A	13500	$54,000
Other	steam machine ($50K), incinerator ($25K) & barrel crusher ($10K)-purchase	allow	1	#N/A	85000	$85,000
MOBILIZE CAMP						
Reclamation activities	to re-commission the existing camp	allow	1	#N/A	75000	$75,000
Long term reclamation activities (eg pump flooding)		allow		#N/A	0	$0
MOBILIZE WORKERS						
Crew transportation-aircraft cost	Dash 7 flights	each	11	#N/A	13500	$148,500
Crew transportation - travel time	3hrs per roundtrip, 11 trips for 10 people	inhours	330	OPERH	65	$21,450
Long term reclamation activities (eg pump flooding) - transport		each		#N/A	0	$0
Long term reclamation activities (eg pump flooding) - travel time		each		#N/A	0	$0
Monitoring Airfare		each		#N/A	0	$0
WORKER ACCOMODATIONS						
Reclamation activities	season	andays	1500	ACCMH	175	$262,500
Long term reclamation activities (eg pump flooding)		manmonths		#N/A	0	$0
MOBILIZE FUEL						
Fuel - fuel cost - for reclamation activities	one summer program	litre	300000	FCDH	1.39	$417,000
Fuel - freight	use bladders in aircraft	litre	300000	FCMH	0.42	$126,000
Fuel freight accomodations		litre		#N/A	0	$0
WINTER ROAD						
Construction and operation		km		#N/A	0	$0
Limited winter use		km		#N/A	0	$0
Winter road tarriff		km		#N/A	0	$0
DEMOBILIZE HEAVY EQUIPMENT						
Excavators		km		#N/A	0	$0
Dump trucks		km		#N/A	0	$0
Dozers		km		#N/A	0	$0
Demolition shears		km		#N/A	0	$0
Crane		km		#N/A	0	$0
Loader		km		#N/A	0	$0
Compactor		each		#N/A	0	$0
Light duty vehicles		km		#N/A	0	$0
Other		allow		#N/A	0	$0
DEMOBILIZE CAMP						
		allow		#N/A	0	$0
DEMOBILIZE WORKERS						
crew travel time		mandays		#N/A	0	$0
crew transportation		each		#N/A	0	$0
WINTER ROAD						
Construction and operation	1 season (1 x 323 km-main road to Ulu)	km	323	WRCH	11500	$3,714,500
Limited winter use		km		#N/A	0	$0
Winter road tarriff	1 season x 405 km, 2,000T & $0.28/km-tonn	km	810000	WRU	0.28	$226,800
					Total	**$5,200,750**

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

Filter by unit

ITEM	Detail	COST CODE	UNITS	LOW $	HIGH $	SPECIFIED $	COMMENTS
Accomodation							
		ACCM	manday	100.00	175.00		
Buildings - Decontaminate							
	Asbestos	BDA	m2	25.60	51.20		Low: removal of asbestos siding & flooring; High: removal of insulated pipes, friable asbestos
Buildings - Remove							Unit costs are based on 3m high, single storey building. Scale areas accordingly.
	Wood	BRW	m2	27.50	41.00		
	Concrete	BRC	m2	40.00	65.00	6.00	Specified: puncture concrete foundation slabs
	Steel - teardown	BRS1	m2	45.00	65.00		
	Steel - for salvage	BRS2	m2	67.00	100.00		
Concrete work							
	Small pour	CSF	m3	426.50	639.75		Low: YK; High=1.5xLow was $600 & $2800 /m3 in BCC 2014
	Large pour	CLF	m3	353.50	530.25	2,130.00	Specified: concrete crown pillar
Contaminated Soils							
	ESA Phase 1	CS1	each	7500.00			Low: small, "clean" site
	ESA Phase 1	CS2	each	50000.00			Low: small, "clean" site
	Remediate on site	CSR	m3	47.00	146.00		
Dozing							
	doze rock piles	DR	m3	1.05	2.40		Low cost: doze crest off dump
	doze overburden/soil piles	DS	m3	0.95	3.80		High cost: push up to 300 m
Excavate Rock; Low Spec's and QA/QC							
	drill/blast/load/short haul	RB1	m3	11.40	17.05		Low:quarry operations for bulk fill
	drill/blast/load/long haul	RB2	m3	12.05	17.80		
	RB1 + spread and compact	RB3	m3	12.05	17.80		
	RB2 + spread and compact	RB4	m3	12.50	30.75		
	Specified activity	RBS	m3				
Excavate Rock; High Spec's and QA/QC							(e.g. ditch/spillway excavation)
	drill/blast/load/short haul	RC1	m3	12.05	17.80		Low:foundation excavation;High:spillway excavation
	drill/blast/load/long haul	RC2	m3	12.70	18.40		
	RC1 + spread and compact	RC3	m3	12.70	18.40		e,g, cover construction
	RC2 + spread and compact	RC4	m3	13.50	19.20		e,g, cover construction
	Specified activity	RCS	m3			175.00	Specified-drift excavation
Excavate Rip Rap							
	drill/blast/load/short haul/place	RR1	m3	13.50	17.75		High: quarry & place rip rap in channel
	drill/blast/load/long haul/place	RR2	m3	14.20	20.65		
	source is waste dump/short haul	RR3	m3	7.00			cost includes sorting
	source is waste dump/long haul	RR4	m3	7.60			
	Specified activity	RRS	m3				
Excavate Soil; Low Spec's and QA/QC							
	clear & grub	SBC	m2	3.40	5.00		
	excavate/load/short haul	SB1	m3	4.30	5.90		
	excavate/load/long haul	SB2	m3	4.60	7.30		
	SB1 + spread and compact	SB3	m3	5.10	8.90		Low: non-engineered; High:engineered
	SB2 + spread and compact	SB4	m3	5.50	11.00		Low: non-engineered; High:engineered
	Specified activity	SBS	m3	3.20	6.30		Low: rehandle waste rock dump by dozing; High:rehandle waste rock by hauling
	Tailings	SBT	m3	1.35	3.70	15.50	High:contour surface - wet or frozen; Specified:haul/place wet infill
Excavate Soil, High Spec's and QA/QC							
	excavate/load/short haul	SC1	m3	6.80	9.30		
	excavate/load/long haul	SC2	m3	7.10	11.75		
	SC1 + spread and compact	SC3	m3	8.90	14.20		Low: non-engineered; High:engineered
	SC2 + spread and compact	SC4	m3	9.30	23.20		Low: non-engineered; High:engineered (e.g. complex covers, low volume dam construction)
	Specified activity	SCS	m3			18.80	Backfill adit with waste rock
Fence							
		FNC	m	13.55	203.00		
Fuel and Electricity							
	Fuel cost - gas	FCG	litre	1.05	1.40		
	Fuel cost - diesel	FCD	litre	0.99	1.39		
	Fuel mobilization	FCM	litre	0.22	0.42		High: winter road usage
	Electricity	FCE	kW-h	0.17	0.19	0.49	Low and High:Yellowknife; Specified:diesel generator
Geo-Synthetics							
	geotextile	GST	m2	3.44			Supply and install
	geogrid	GSG	m2	5.75			
	liner, HDPE	GSHDPE	m2	7.95			Supply and install; large quantity
	liner, ES3	GSES3	m2	20.20			FOB Yellowknife
	geosynthetic installation	GSI	m2	3.16	14.00		Low:geotextile; High:ES3 or HDPE
	bentonite soil ammendment	GSBA	tonne	308.30	348.50		FOB Edmonton, add shipping & mixing
Grouting (/m3 of rock grouted)							
		grout	m3	236.55	286.75		High: cement, FOB Yellowknife
Labour & Equipment Rates							
	Site manager	sman	$/hr	125.00	152.00		
	Supervisor	super	$/hr	52.00	91.84		
	Registered engineer	eng	$/hr	95.00	220.00		
	Environmental coordinator	envco	$/hr	74.16	130.00		
	Evironmental technologist	envtech	$/hr	36.00			
	Electrician	elec	$/hr	74.00	95.00		
	Journeyman - various	journey	$/hr	44.00	71.79		

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

	Filter by unit					
Labour - skilled	lab-s	$/hr	41.00	49.60		
Labour - unskilled	lab-us	$/hr	31.00	43.98		
Equipment operator	oper	$/hr	41.00	65.00		
Heavy duty mechanic	mech	$/hr	49.00	72.85		
Water treatment plant operator	oper-wt	$/hr	41.00	59.86		
Security / first aid	safety	$/hr	36.00	66.97		
Administative staff	admin	$/hr	38.00	57.89		
Equipment rates include operator and fuel						
Loader - 4 cu.yd (3.06m3)	load-s	$/hr	175.00			
Loader - 7 cu.yd (5.35m3)	load-l	$/hr	315.00			
Excavator - 26.76-30.84 tonnes	exc-s	$/hr	190.00			
Excavator - 68.95+tonnes	exc-l	$/hr	420.00			
Grader	grad	$/hr	190.00			
Dump truck off hwy 30-50 tonnes	truck-s	$/hr	225.00			
Dump truck off hwy 55-75 tonnes	truck-l	$/hr	300.00			
dozer, small	dozers	$/hr	205.00	260.00		
dozer, large	dozerl	$/hr	490.00	565.00		
smooth drum compactor	comp	$/hr	155.00			
scooptram, 6 yd3 bucket	scoop	$/hr	170.00			
flat bed truck with hiab	hiab	$/hr	155.00			
fuel truck	ftruck	$/hr	150.00			
water truck	wtruck	$/hr	58.00	150.00		
Mobilize Heavy Equipment						
Road access	MHER	kmtonne	3.40	10.25		
Air access	MHEA	kmtonne	12.00			cargo rate>500lb
Mobilize Camp						
Road access	MCR	each	50000.00			refurbish existing camp
Mobilize Workers						
flight	MW	each	4500.00	9100.00		Low:e.g. 8 passenger; High: Dash 7
Oil Removal						
oil removal	OR	litre	0.43	1.20		Low:waste oil heater; High: ship offsite
PCB Removal						
Remove from site	PCBR	litre	40.20	46.90		Low: shipping, handling & disposal from Yellowknife
Pipes, small (<6in dia.)						
remove/dispose on site	PSR	m	1.00	24.00		Low: remove/dispose on site; High: remove/re-use
supply	PSS	m	6.10	11.10		Low:supply; High:supply and ship
install	PSI	m	25.00			
Pipes, large (>6in dia.)						
remove/dispose on site	PLR	m	22.00	72.00		Low: remove/dispose on site; High: remove/re-use
supply	PLS	m	129.00	143.00		Low:supply; High:supply and ship
install	PLI	m	50.00			
Power Lines						
remove/dispose on site	POWR	m	25.50			
Process Chemicals						
Remove from site	PCR	kg	0.45	2.50		Low: shipping, handling & disposal from Yellowknife
Pumps						
Pump capital cost	PC	each	#######			
Pump shipping	PS	each	2500.00			
Pump operating cost	POC	m3	0.12			pump operating costs should be calculated based on pump capacity, fuel costs, etc.
Pump maintenance	PM	allow	25000.00			
Pump sand BackFill						
	PBF	m3	85.00	300.00		
Scarify - road/mine site						
	SCFY	ha	4300	6030	2150	
Shaft, Raise & Portal Closures						
Shaft & Raises	SR	m2	645.00	2132.00		Low:pre-cast concrete slabs, little site prep. Area=shaft+>1m all around
Portals	POR	m3	18.80	250.00	1200.00	Low:unit cost code SCS;High:excavate & backfill collapsed portal;Spec: installed pressure plug
Site Inspection Report						
	RPT	each	10000.00	20000.00		
SpillWay - Clear						
	SW	each	3000.00	7000.00		
Survey/Instrumentation						
	SI	each	1800.00	3600.00		2 person crew
Treatment Plant - Construct						
Small (< 1000 m3/d)	TPS	lump sum	9000000	15000000		
Large (> 1000 m3/d)	TPL	lump sum	1.5E+07	46000000		
Constructed Wetland	CWTS	ha	200000	300000		
Treatment Plant - Operate						
	TPO	m3	0.35	2.00		
Treatment Chemicals						
ferric sulphate	ferric	kg	1.19			
ferrous sulphate	ferrous	kg	1.32			
lime	lime	kg	0.56			
hydrogen peroxide, 35%	hperox	kg	1.50			
Sodium Metabisulfate	Nametab	kg	1.18			
Caustic soda, 50%	caustic	kg	0.74			

Unit Cost Table (for refining unit costs see "Estimator" worksheet)

	Filter by unit					
Sulfuric acid, 93%	sulfuric	kg	0.31			
flocculant	flocc	kg	6.00			
copper sulphate	copper	kg				
shipping	shipping	kg	0.20			
Vegetation						
Hydroseed, Flat	VHF	ha	4000.00			
Hydroseed, Sloped	VHS	ha	4500.00			
Veg. blanket/erosion mat	VB	ha	13000.00			
Tree planting	VT	ha	2600.00	6000.00		
Wetland species	VW	ha			47.72	Specified= /m3, Wetland Growth Media Substrate mixed and installed (sand, biochar and fertilizer, woodchips)
Water Sampling/Analysis/Reporting						
	WS	each	7000.00	10000.00		
Winter Road						
Construction	WRC	km	2000.00	11500.00		
Usage	WRU	kmtonne	0.29			

APPENDIX C
CV - Mr. Steve Januszewski, P.Eng.

Steven Januszewski, P. Eng.
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Canada
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HIGHLIGHTS

- Over 30 years progressive technical and management experience in mine Environmental Management and Mineral Processing. Positions have included Process Engineer, Senior Environmental Engineer and Environmental Coordinator with the following firms: Rio Algom Limited, Denison Mines Limited, Westmin Resources Limited, Boliden–Westmin (Canada) Limited, and currently Principal of SteveJan Consultants Inc.;

- Environmental Engineer preparing plans and coordinating decommissioning and reclamation work at a number of mining operations;

- Participation in environmental assessment review and public hearings concerning mine development and closure plans;

- Development and implementation of Environmental Management Systems (EMS) and Tailings Facility Management Systems;

- Author, co-author and presenter of a number of technical reports in the field of Environmental Health and Safety, specifically in the areas of waste management, tailings relocation, mitigation measures to minimize environmental impacts of development projects, habitat compensation programs, mine closure planning including site restoration, re-vegetation & costing. Author of course text on mine waste management for local community college. Provided peer review for professional papers and chaired technical sessions at a number of international conferences and symposiums;

- Participation in nine formal environmental audits of operations related to mining as the audit team leader or as a member. Types of audits included regulatory and EMS compliance, including gap analyses against ISO 14000 series criteria, process, performance, environmental impact and liability, conformance to company policies and procedures, and good management practices. These audits were conducted for a number of national and international clients at sites in Canada, Europe and South America; and

- Member of a multi-disciplinary team developing and implementing environmental monitoring programs after a major mine tailings facility dam failure in Europe. Presentation of lessons learned from that incident to senior management of Imperial Metals after Mount Polley tailings dam failure in 2014.

EMPLOYMENT HISTORY & ACCOMPLISHMENTS

2002-current Principal of SteveJan Consultants Inc. (SJCI)
Providing mine environmental engineering consulting services to a range of clients from home office located in central Vancouver Island, British Columbia, Canada. A partial list of clients includes:

- Arktis Solutions Inc;
- BGC Engineering;
- Boliden Limited;
- Cambior Limited;
- ERM Rescan;
- Lundin Mining;

- Stantec Consulting;
- Taseko Mines Limited; and
- Whillans Mine Studies Limited; and
- Yukon Government.

1996-2002 Environmental Coordinator, Nyrstar (previously Boliden Ltd. and Westmin Resources Limited), Myra Falls Operations, Campbell River, B.C., Canada

Senior environmental staff member at the site. Also provided assistance to corporate EH&S initiatives. Projects included:

- MFO Tailings Disposal Facility Seismic Upgrade Project (~$20M initial capital cost estimate over 4 yrs)-Project Manager for first two years of project just prior to leaving Company;
- MFO Lynx Tailings Relocation Program (1999)-Project Manager. Involved relocation of entire tailings facility to a secure impoundment (192K m^3 at a total cost of $1.4M);
- Provided technical assistance to Boliden led team dealing with major tailings dam failure at company's Los Frailes-Apirsa Mine in Southern Spain; and
- Environmental audit team member undertaking corporate program of auditing company's mine sites using internal company Environmental Standards and Guidelines and Industry Best Management Practices.

1992-1996 Senior Environmental Engineer, Denison Mines Limited, Elliot Lake, Ontario, Canada

Highlight was overseeing closure planning investigations, directing engineering and environmental consulting projects, site field investigations, mine closure in 1992, and then mine reclamation work:

- Preparation of detailed mine closure plans for several mines located within the region;
- Senior site person liaising with government agencies on all aspects regarding closure work;
- Participated in Federal Environmental Assessment Review Office (FEARO)review hearings as one of three company representatives; and
- Assistance with overseeing site decommissioning activities- demolition, tailings relocation (dredging, hydraulic monitoring, excavation), site decontamination, environmental monitoring, etc.

1986-1992 Mill Project Engineer, Denison Mines Limited, Elliot Lake, Ontario, Canada

Notable aspects included:

- Project Engineer for Mill Automation Project;
- Optimizing unit operations areas in Hydrometallurgical Plant; and
- Technical assistance with Tailings Dam construction projects, as part of engineering staff

1981-1986 Mill Process Engineer, Rio Algom Ltd., Quirke and Stanleigh Mines, Elliot Lake, Ontario, Canada

Commissioning of new Stanleigh Mill: responsible for process areas including high temperature Acid Leaching, Horizontal Belt Filters, and a fully automated remote Effluent Treatment Plant. Previous to that a short term at Quirke Mill where work involved optimizing several unit operations areas.

Earlier Summer Placements

- Broken Hill South – *Cobar Mine*, Cobar, New South Wales, Australia (mill engineer);
- Hamersley Iron – *Paraburdoo Mine*, Western Australia, Australia (mine engineer);
- Madawaska Mines Ltd. - *Madawaska Mine*, Bancroft, Ontario, Canada (mill operator); and
- Denison Mines Ltd. - *Denison Mine*, Elliot Lake, Ontario, Canada (underground/equipment operator and laborer).

SJCI - RECENT CLIENT LIST AND PROJECT EXPERIENCE (partial listing)

Arktis Solutions Inc. (on-going) – Technical support involving several mining and oil and gas projects in the Canadian north, on behalf of the Government of the Northwest Territories including:

- Imperial Oil Ltd. *Norman Wells Operations*-Third party review of closure plan and costing estimate which was undertaken by AMEC;
- Rio Tinto *Diavik Diamond Mine*-Third-party review of Construction Environmental Management Plan for new kimberlite containment dyke; and
- Avalon *Nechalacho Mine*-Third-party review of mine closure plan and closure cost estimate.

BGC Engineering (on-going) – Contract mine environmental and engineering consulting work including:

- Kitikmeot Inuit Association – Preparation of independent closure cost estimate of Mandalay Resources' Ulu Gold exploration project in Nunavut, for submission to Nunavut Water Board;
- Centerra Gold's Boroo Gold Mine, Mongolia - Preparation of an updated detailed mine Closure and Reclamation Plan (C&R Plan) for submission to Mongolian government agencies.

Boliden Ltd. – Boliden AB (Sweden), *Myra Falls Operation* and *Premier Gold Project* (Canada): Engineering consulting services which included a variety of environmental projects for corporate group, at exploration sites and mine operations including environmental due diligence study related to minesite acquisition, permitting, mine closure planning, project management, health & safety audits, preparation of operational, emergency response and emergency preparedness manuals, tailings facility OM&S manuals and preparation of environmental reports for government submission.

Cambior Inc. - *Omai Gold Mine* & *Linden Mine*, Guyana: Environmental audit of mine operations and associated sites (pre-ISO 14001 maintenance audit).

ERM Rescan Environmental (on-going) – Consulting services including work on the following projects:

- NovaGold's *Galore Creek Mine Project*, British Columbia: assistance with writing sections of EIA report for permit application under harmonized provincial & federal environmental assessment process;
- Barrick Gold's *Pueblo Viejo Project*, Dominican Republic: assistance with writing of text for EIA Project Description and a number of supplementary environmental management plans;
- BHP-Billiton's *Escondida Mine*, Chile: assistance with preparation of updated closure plan and several environmental management plans, and work on their *Jansen Mine* project, currently under development in Saskatchewan: assistance with specifying permitting requirements and timelines for Company; and
- *Silver Bear Mines*, NT, Canada: preparation of demolition plans and several environmental sub-components of a remediation plan for the four abandoned mines, under contract to the Federal Government's Indigenous and Northern Affairs Canada-Contaminants and Remediation Directorate.

Lundin Mining – Consulting services including:

- Due diligence site assessment followed by baseline environmental studies and establishment of an environmental management system at the *Ozernoe Mine* development project site in southern Buryatia, Former Soviet Union; and
- Team Leader of a five-person internal EH&S compliance audit of the *Aguablanca Mine* in Spain.

Taseko Mines Ltd - Consulting services including updating Corporate Environmental Policy and initiating preparation of an Environmental Management System for their *Gibraltar Mine* in central British Columbia.

Whillans Mine Studies – One of the Qualified Persons preparing a NI43-101 compliant pre-feasibility report for a new (confidential) gold mine in Venezuela. Work involved responsibility for preparing several sections of final report dealing with regulatory environment, permitting and environmental conditions.

Yukon Government (on-going) – On-going consulting services for Department of Energy, Mines and Resources and Department of Environment-Water Resources Branch. Work has included:

- Assisting in the preparation of a new Reclamation and Closure Policy: It involved a new Regulatory Policy and associated Guidelines document with a section on risk management;
- Preparation of guidance document concerning mine closure financial contingency allowances; and
- Undertaking a range of tasks including reviews of mine development plans, environmental management plans and closure plans, assistance with preparing mine permits and licences, preparing closure reclamation liability estimations & negotiating securities, technical assistance at Yukon Water Board Hearings, site inspections, etc. This included mining and exploration projects in the Yukon such as Yukon Zinc's *Wolverine Mine Project,* Veris Gold's *Ketza River Mine,* Capstone's *Minto Mine,* Teck's *Sa Dena Hes Mine,* Western Copper's *Carmacks Copper Mine,* Golden Predator's *Brewery Creek Mine* and Alexco Resources' *Keno Hill District Mines,* the abandoned *Mount Nansen* minesite for AAMB and several placer and smaller "Quartz Mine" projects (as hard-rock (i.e., non-placer) mines are called in the Yukon).

EDUCATION

ISO 14001 Registered Lead Auditor, KPMG Registrar Inc., Certificate Number E461- ANSI/RAB- EMS accredited designation (2001);

Various short courses in mine tailings management, decommissioning, metal leaching/acid rock drainage, risk assessments, dam engineering & safety, hazardous materials management and Contaminated Sites Regulations, health & safety, emergency preparedness, spill response, crisis & emergency communications;

Bachelor of Science in Mineral Processing Engineering, Queen's University, Kingston, Ontario, Canada.

PARTIAL LIST OF PROFESSIONAL AFFILIATIONS

- Registered Professional Engineer in Canadian provinces of British Columbia, Ontario and the Yukon;
- Member, City of Campbell River Watershed Committee;
- Member, City of Campbell River South Island Highway Project Liaison Committee;
- Previous member, B.C. Mining Association (MABC) Environmental Committee; and
- Previous member, several sub-committees of NRCan's Mine Environment Neutral Drainage program.

RELATED SKILLS

- Working knowledge of federal and provincial mining environmental regulations in Canadian provinces of British Columbia, Ontario, Yukon and Northwest Territories as well as several foreign jurisdictions;
- Conducting risk assessments at a number of sites using several different protocols;
- Overseeing multi-disciplinary projects utilizing professional consultants, contractors and site resources;
- Developing and delivering EH&S training programs for mine operations and management groups;
- Developing site monitoring programs including establishment of database management systems;
- Mine closure planning field work including contamination surveys and demolition assessments;
- Project Manager of several large engineering projects at operating sites with project budgets up to 20 MCAD including mill process and instrumentation upgrades, tailings area relocation, a seismic upgrade of a major tailings facility, and various projects associated with closure of several mining operations;
- Extensive work with mine tailings facilities: design, construction, operation, closure planning, decommissioning and post-closure monitoring and maintenance; and
- Fluency in English language. Conversational French and Polish. Some Spanish speaking experience.

HOBBIES / INTERESTS

Avid mountain biker, skier (downhill and nordic), sea kayaker, hiker, sailor, and photographer