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**MOUNT NANSEN REMEDIATION PROJECT
30% DESIGN PHASE COST ESTIMATE**

Submitted to:

**Assessment and Abandoned Mines
Energy Mines and Resources**
Whitehorse, YT

Submitted by:

**AMEC Environment & Infrastructure,
a Division of AMEC Americas Limited**
Burnaby, BC

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1 PURPOSE AND DOCUMENT SCOPE

1.1 Introduction

The purpose of this work is to estimate the costs of completing the Mount Nansen Remediation Project (MNRP) scope of work using the execution methods assessed and defined during the 30% Design Phase. The resulting estimate will be used by Assessment and Abandoned Mines (AAM) and other Project Partners to support the planning and decision making that will follow the 30% Design Phase.

1.2 Document Scope

This document provides all of the key inputs and findings of the estimating process, specifically:

- the estimate basis (i.e. this document incorporates the information provided in the draft project Estimate Basis Memorandum (EBM) (AMEC, 2013));
- the construction execution schedule upon which the estimate is based; and
- the 30% Design Phase Estimate.

2 PROJECT DESCRIPTION

2.1 Introduction

Mount Nansen has been the site of mining exploration activity and/or active mining since the 1940s. The general arrangement of the site is shown on Figure 1. The most extensive stage of mining occurred between November 1996 and February 1999 in the Brown-McDade Open Pit. It involved construction of the existing tailings dam and deposition of approximately 240,000 m³ of tailings within the tailings impoundment. A waste rock storage area containing approximately 360,000 m³ of waste rock (Altura, 2009, R73) was also created adjacent to the Brown-McDade Open Pit. Earlier periods of mining contributed to smaller amounts of tailings, some of which are still present near the mill site, and localized zones of waste rock at the mill site and elsewhere on the site. Other site infrastructure includes the mill and camp facilities as well as various ancillary structures, power lines and pipelines.

In 1999, mining was halted because it was no longer economical, and sulphide ore was being mined in contravention of the water licence. The company operating the Mount Nansen property was put into receivership in March 1999. The site is now managed by the Yukon Government through AAM.

In support of site remediation, many studies and investigations have been carried out over the past decade to define the closure objectives and to explore various closure options. Detailed discussion of the closure objectives can be found in Yukon Government (2008) and are presented below.



Data Source:
Roads, trails, streams, waterbodies, watercourses and infrastructure areas digitized using 2008 Quickbird imagery (courtesy of Yukon Geomatics) and spatial data provided by Yukon government.

Heli LIDAR Data Survey and Imagery, 2012

Datum: NAD 1983 CSRS UTM Zone 8N

Legend

- Order in Council Boundary
- Geophysics Lines
- Surveyed Sections
- Contour (5 m)
- Disturbed Area
- Roads
- Streams

AE Associated Engineering

amec

Yukon
Energy, Mines and Resources
Assessment and Abandoned Mines

MOUNT NANSEN REMEDIATION PROJECT
Figure 1
30% DESIGN PHASE COST ESTIMATE
OVERVIEW SITE PLAN

Scale 1:10,000
Metres

0 250 500

April 11, 2014

2.2 Objectives

Broadly speaking, the closure objectives for the Mount Nansen Remediation Project (MNRP) are as follows:

- protect human health and safety;
- protect and restore the environment including land, air, water, as well as fish and wildlife and their habitats;
- return the site to an acceptable state that reflects original, traditional, and pre-mining land use;
- maximize local, Yukon and First Nations benefits; and
- manage risk in a cost effective manner.

2.3 Project Scope

The final remediation alternatives study (LORAX, 2011) presented technical information regarding four remediation options. The options were evaluated by representatives of Government of Yukon, Aboriginal Affairs and Northern Development Canada (AANDC) and the Little Salmon/Carmacks First Nation (LSCFN). Option 4, as described in LORAX (2011), has since been selected as the remediation option for the site. This remediation plan is comprised of the following:

- relocating the tailings and underlying affected soils from the existing tailings impoundment to the Open Pit;
- removing the main tailings dam and downstream seepage dam;
- relocating mineralized waste rock to the Open Pit;
- backfilling the Open Pit so that the tailings are located above the groundwater table and a stable final surface and topography is provided;
- developing a management method for the water currently in the tailings facility and Open Pit and for the short term seepage from the backfilled pit;
- covering the Open Pit area with an engineered low infiltration cover to maintain “dry conditions within the tailings deposit”;
- providing hydrogeological containment to the backfilled Open Pit to minimize seepage from the waste rock and tailings;
- remediating the mill area including building demolition, removing the rail tanker, restoring the water course, removing mineralized rock, removing hazardous waste, removing historic tailings, decommissioning historic settling ponds, providing compliant water quality and, if shown to be necessary, remediating the old landfill;
- remediating the camp area including demolishing existing buildings except those required for maintenance following closure, and removing hazardous waste;
- decommissioning all non-public roads, where not required for future monitoring;
- removing existing infrastructure (power lines, pipelines, sediment ponds, ancillary buildings, etc.);

- remediating hydrocarbon contaminated soils;
- remediating exploration trenches and disturbed areas as appropriate;
- decommissioning the Victoria Creek Wellhouse and existing artesian well;
- reconstructing and reclaiming the Dome Creek channel and valley following removal of the tailings storage facility; and
- creating a remediated landscape that complements the natural topography and vegetation.

2.4 Project Development Status

The current phase of design development is referenced in AAM's process as the 30% Design Development phase. This phase is intended to:

- characterize the technical feasibility of Option 4;
- identify a base case design which can be further optimized and refined;
- provide bracketed predictions of the likely performance of the base case design (e.g. predicted ranges of downstream water quality relative to CCME criteria);
- provide a bracketed understanding of the risks associated with key project features and outcomes;
- characterize the nature and scale of uncertainties related to predictions of performance and risk;
- outline the basic elements of any adaptive management plans that may be needed to manage risks and uncertainties; and
- develop a project execution cost estimate with enough utility and reliability to support the next level of Partner decision making (generally equivalent to an AACE (Association for Advancement of Cost Engineering) Class 3 estimate).

With respect to those scope elements most directly impacting the cost estimate, project definition varies between perhaps 10% and 40%, with 10% corresponding to project scope such as landforms and revegetation and 40% to relocation of tailings from the impoundment to the pit and placement under an engineered cover. Preliminary drawings were available for the estimate and are provided in the Design Report (AMEC, 2014), along with conceptual plans for the sequencing of work in the Tailings Storage Facility (TSF) and pit areas. However, detailed technical specifications or other bid type documents will not be developed until later stages of the design process.

3 ESTIMATE CLASSIFICATION

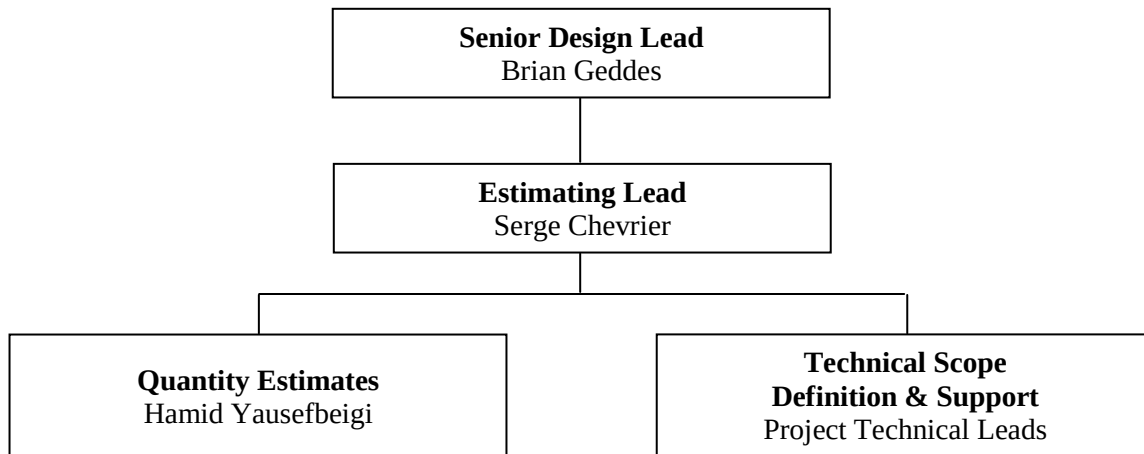
The objective was to prepare an estimate consistent with a Class 3 designation as defined by AACE. The ability to meet this objective was defined in large part by the technical uncertainties that remained at the conclusion of this phase of design development. AMEC/AE believes that the estimate produced for the 30% Design Phase is consistent with AACE's definition of a Class 3 estimate.

Estimate accuracy is traditionally represented as a +/- percentage range around the point estimate (including contingency), with a stated confidence level that the actual cost outcome (after construction is complete) will fall within this range. Based on the maturity level of the Mount Nansen project deliverables and the level of effort and planning used in preparing the estimate, the objective was to produce an estimate with an accuracy ranging between -15% to +25%, eight times out of ten.

4 ESTIMATING METHODOLOGY

4.1 Estimating Team

Responsibility for the estimate will be retained by the Project's Senior Design Lead. Estimate development will rely on inputs from the Project Estimating Lead, the technical discipline leads, project planners/schedulers, and civil modellers. A simplified organization chart for the estimating team follows.



4.2 Estimating Philosophy and Guiding Principles

In general, the construction portion of the estimate has been developed using a “bottom up” approach, in the same manner that a general contractor would price the work in a competitive bid situation. Direct costs have been determined for individual work scope items by assigning labour and equipment to achieve chosen production rates. The estimate has been developed in concert with the project construction execution schedule (Section 7.1), reflecting the direct influence of sequencing and scheduling on contractor productivity and cost. The sum of contractor direct and indirect costs is the total construction cost. Depending on AAM needs, other items such as engineering, construction QA/QC, and Owner costs can be added to provide a total project cost.

4.3 Scope of Work Priced

The estimate scope was developed from the Design Base Case described in Section 6.0 and Appendix A. The detailed description of that Base Case (including scope and sequencing assumptions reflected in the estimate) are provided in the project Design Report (AMEC, 2014).

4.4 Work Breakdown Structure (WBS) and Estimate Coding

The project specific WBS used for the estimate is outlined on the spreadsheets that are provided in Appendix C.

4.5 Estimating Platform

The cost estimate was developed using an Excel spreadsheet designed to mimic commercial estimating software. While this is slightly less efficient, it allows future estimate revisions and updates to be performed by people without formal training in the use of a commercial package.

The construction schedule was developed using Primavera software.

5 ASSUMPTIONS

5.1 Estimate Base Date

The cost estimate is dated Q1 2014.

5.2 Taxes

There are few external supplier materials expected to be incorporated into the work, so federal and Yukon taxes will be minimal. The project is exempt from GST.

5.3 Project Currency & Foreign Exchange

Project costs are reported in Canadian dollars.

6 DESIGN BASIS

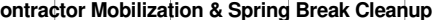
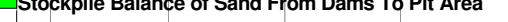
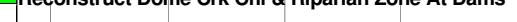
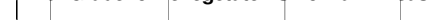
The project Design Basis Memorandum (DBM) (AMEC, 2014a) outlines the Design Base Case prepared by the AMEC/AE team at the onset of design. This base case sets out the design team's consensus view on the likely methods for executing the project scope. The description of the Base Case that was provided in the DBM is reproduced in Appendix A. The development of this Base Case at the conclusion of the 30% design phase is described in the Project Design Report (AMEC, 2014). The drawings from the Design Report upon which the cost estimate is based are listed in Appendix B.

7 PLANNING BASIS

7.1 Construction Schedule

The construction schedule upon which the estimate is based is provided on Figure 2. The key elements of this schedule are as follows:

- The construction schedule was developed first (in Primavera) to understand the quantities and then logically sequence all the rock and tailing movements onsite.

Activity	Description	Days	Early Start	Early Finish	Qty	UOM																								
							2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025	
CONSTRUCTION SEASON #3 (double shift)																														
305	Construction Season #3 Starts	0	17MAY19																											
310	Contractor Mobilization & Spring Break Cleanup	15	17MAY19	31MAY19																										
315	Move Wellpoint System During Tailings Excavation	110	01JUN19	18SEP19																										
320	Haul PAG From W. Mid Pile To TSF (for roads/mix)	110	01JUN19	18SEP19	68,050	CM																								
325	Haul Tails/Rock/Subexc Mixture From TSF To Pit	110	01JUN19	18SEP19	353,200	CM																								
330	Place Sand From Dam Over Exposed Surfaces In TSF	92	01JUL19	30SEP19	34,325	CM																								
335	Place NAG from Mill & W.Lwr Pile Over TSF Sand	92	01JUL19	30SEP19	137,250	CM																								
340	Reconstruct Dome Crk Chnl & Riparian Zone In TSF	61	01AUG19	30SEP19	2,000	CM																								
345	Haul NAG From Waste Dumps To Pit (for buttress)	61	01JUN19	31JUL19	63,200	CM																								
350	Haul Mill, Rds, Ktza, Sed Pd PAG/Tails/HC To Pit	92	01JUN19	31AUG19	44,506	CM																								
355	Haul PAG From Dumps To Pit (for horiz layers)	110	01JUN19	18SEP19	170,280	CM																								
360	Remove Special Waste For Off-Site Disposal	10	01JUN19	10JUN19	2,076	CM																								
365	Rough Grade Remaining Waste Rock Dump Areas	92	01JUL19	30SEP19																										
370	Rough Grade Mill And Camp Areas	92	01JUL19	30SEP19																										
375	Place Interim Cover Over Pit (with ditches)	65	28JUL19	30SEP19	104,000	CM																								
380	Contractor Demob & Site Winterizing	15	01OCT19	15OCT19																										
385	Construction Season #3 Ends	0		15OCT19																										
390	Site Winter Maintenance Between Seasons #3 & #4	229	16OCT19	31MAY20																										
CONSTRUCTION SEASON #4 (single shift)																														
405	Construction Season #4 Starts	0	01JUN20																											
410	Contractor Mobilization & Spring Break Cleanup	15	01JUN20	15JUN20																										
415	Stockpile Balance of Sand From Dams To Pit Area	92	16JUN20	15SEP20	69,890	CM																								
420	Place Sand/Rock Frm Stckple On Exposed Dam Areas	92	16JUN20	15SEP20																										
425	Reconstruct Dome Crk Chl & Riparian Zone At Dams	92	16JUN20	15SEP20																										
430	Final Grade & Revegetate TSF & Dam Areas	92	16JUN20	15SEP20																										
435	Final Grade & Revegetate Mill & Camp Areas	92	16JUN20	15SEP20																										
440	Final Grade & Revegetate Dump & Cover Areas	92	16JUN20	15SEP20																										
445	Backfill & Revegetate Exploration Trenches	92	16JUN20	15SEP20																										
450	Decommission Site Roads (unless req'd long term)	92	16JUN20	15SEP20																										
455	Final Cleanup & Demobilization From Site	30	16SEP20	15OCT20																										
460	Phase 1 Site Closure Complete	0		15OCT20																										
465	Site O&M Between Interim Cover & Final Cover	2,054	16OCT20	31MAY26																										
FINAL CLOSURE																														
1005	Place Final Cover Over Pit	122	01JUN26	30SEP26	72,000	CM																								
1010	Phase 2 Site Closure Complete	0		30SEP26																										

- Each schedule activity has a unique 3-digit Activity ID code, with the first number representing the construction season.
- Each schedule activity was estimated individually, with the Activity code noted on the individual cost spreadsheets for easy cross-reference to the schedule.
- Construction will require four seasons, with a season lasting from June 1 through September 30 each year. Mob/demob activities take place outside this nominal four month window.
- All work is assumed to occur over 10 hour days, seven days/week, except for tails/rock relocation from TSF to pit in Season #3 (which is double shifted due to the large quantities involved).
- Season 1 starts late to match an AAM schedule provided. It would remove some criticality from the schedule if work was allowed to start earlier in Season #1.
- It is critical that the WTP be constructed and commissioned in Season 1 and the pit dewatered before the onset of winter. Dewatering of the TSF then needs to start first thing in Season 2.
- Season 1 is essentially used to prepare the site for production work the following two years. The bulk of the work takes place in Seasons 2 and 3, with final reclaim and revegetation occurring in Season 4.

The Figure 2 schedule should be viewed as preliminary, consistent with the 30% design definition for the Base Case. Optimizing the schedule in subsequent design phases will examine the impacts of adjusting key schedule variables (e.g. shift duration) in more detail. In addition, it may be possible to advance those early works that don't require Water License approvals into 2016. Again, the possibility of doing this and the associated schedule, and potentially cost, benefits will be examined in more detail in later phases.

7.2 Project Execution Plan

No formal project execution plan covering the construction work yet exists for the Mount Nansen project. This will be developed by AAM with input from the project team during later stages of design.

7.3 Procurement Plan

AMEC/AE will work with AAM to identify potential procurement approaches that will promote local employment while meeting the Government of Yukon Contracting and Procurement Regulation and the associated directives. Some work, such as building demolition, may need to be performed by outside specialty contractors, but much of the civil works can be performed by readily available equipment such as excavators, articulated or tandem dump trucks, and dozers.

Bidding for the work will be done in accordance with established Government of Yukon Contracting and Procurement Regulations and associated directives, including how the work is advertised for bidding.

7.4 Specialized Equipment

There is no specialized equipment anticipated for this project.

8 QUANTITY DEVELOPMENT

Most civil quantities were developed using Civil 3D software. The 2013 site investigation program results were used to firm up details such as original subgrade elevations and expected sub-excavation quantities.

The above methodology captured the bulk of the important quantities affecting total project costs, including tailings volumes, dam embankment volumes, in-pit capacities, engineered cover extent and volumes, and landform contouring needs. In addition, the relocation of the tailings and dam fills to the Open Pit took into consideration the extensive requirements for rock fill roads within the tailings impoundment and the Open Pit (to provide haul truck access) and the Open Pit (to contain relocated tailings in individual cells within the pit).

Other quantities for smaller scope items were covered by lump sums or allowances, with an explanation provided in the estimate on how costs for those items were assigned.

9 DIRECT COSTS

9.1 Major Equipment

A lookup table has been created in the Excel estimate workbook (Appendix C) that shows all contractor equipment necessary to complete the work. Individual tabs are provided for each work scope item and costs to perform that work developed by drawing labour and equipment costs from the lookup table. This methodology allows labour or equipment costs to be revised or updated as the estimate is developed without having to go through each individual workbook tab to make changes.

9.2 Bulk Material and Commodities

Not applicable.

9.3 Labour

9.3.1 Labour Productivity

Productivity has been developed from assessments of local contractor capabilities.

9.3.2 Labour Hours and Work Week

The estimate has been developed assuming all work is completed using a single 10 hour shift, seven days per week, except the tailings relocation activity in year 3 which requires double 10 hour shifts, seven days per week.

9.3.3 Labour Rate Build Up

As for construction equipment costs, the lookup table created in the Excel estimate workbook contains all individual labour rates required to perform the work. The build-up of labour rates is shown in Appendix C.

9.4 Contractor Distributables

When developing a cost estimate from “the bottom up”, contractor distributables are generally spread across the direct cost items to come up with total costs for each anticipated bid item. For example, a unit price for relocating tailings to the pit would not only include the labour and equipment to load, haul, dump, and place the tailings, but would also include (for example) a portion of distributable costs for haul road construction, haul road maintenance (grading, dust control, snow removal), contractor field staff, and profit. The only time a distributable cost might not be spread among direct cost items would be in situations where the item is paid separately through its own bid item (such as is often the case for mob/demob).

For the 30% Design Phase estimate, contractor indirect costs required to support the construction work were estimated separately for each construction season (on a dedicated worksheet) and then distributed proportionately against all the direct cost entries for that season.

10 INDIRECT COSTS

Section 10 is intended to cover non-contractor project costs.

10.1 General Scope and Assumptions

For Mount Nansen, indirect costs as defined here will generally involve costs associated with design engineering and construction management in the field.

10.2 Engineering & Supervision (E&S)

The E&S item covers engineering costs to complete the design and technical specifications, prepare construction bid documents, provide support as required during the tendering process, and advise AAM with bid evaluations and recommendations.

The estimate also includes provisions for engineering QA/QC during each construction season. These provisions capture requirements for materials testing services (confirmatory sampling and analyses, and any other third party testing services required). Note that these provisions do not include the costs of any onsite engineering supervision that the Owner may require; they cover materials testing services only. The amounts in the current estimate are lump sum provisions based on AMEC/AE’s experience and judgement.

10.3 Construction Management and Field Staff

This cost item includes the construction management team required onsite during the construction works and the engineering support required from home office.

10.4 Start-up Cost

None.

10.5 Temporary Construction Facilities

Temporary construction facilities are facilities required to accommodate the team described in Section 10.3.

10.6 Construction Camp and Catering

The construction, operation and decommissioning of an onsite camp to support the project workforce has been included in the Appendix C estimate.

10.7 Freight & Duties

Likely not applicable.

10.8 Third Party Engineering Services

Third party engineering costs have been included in the Appendix C estimate.

10.9 Spare Parts

Not applicable.

10.10 First Fill

Not applicable.

10.11 Vendor Representatives

Not applicable.

10.12 Insurance, Bonds, Permits and Licenses

Provisions for contractor insurance and bonding have been included in the Appendix C estimate. Similarly, contractors are assumed to secure any permits needed to execute their scope (e.g. road permits). Any costs related to the project's regulatory permitting and licensing have been assumed to be beyond the scope of this cost estimate.

10.13 Pre-commissioning Work

Not applicable.

10.14 Commissioning & Ramp-up Work

Not applicable.

10.15 Others

Not applicable.

11 OWNER'S COSTS

Section 11 is intended to cover non-contractor project costs that AAM may include in the project estimate (e.g. AAM staff costs, field trailers for AAM staff, etc.). In the current estimate, Owner's costs are limited to the provisions identified for detailed design, tender documents and support, and field engineering QA/QC. Any other Owner costs would be incremental to those described in this document.

12 OTHER COST FACTORS AND COMPONENTS

12.1 Escalation

The estimate does not include any escalation.

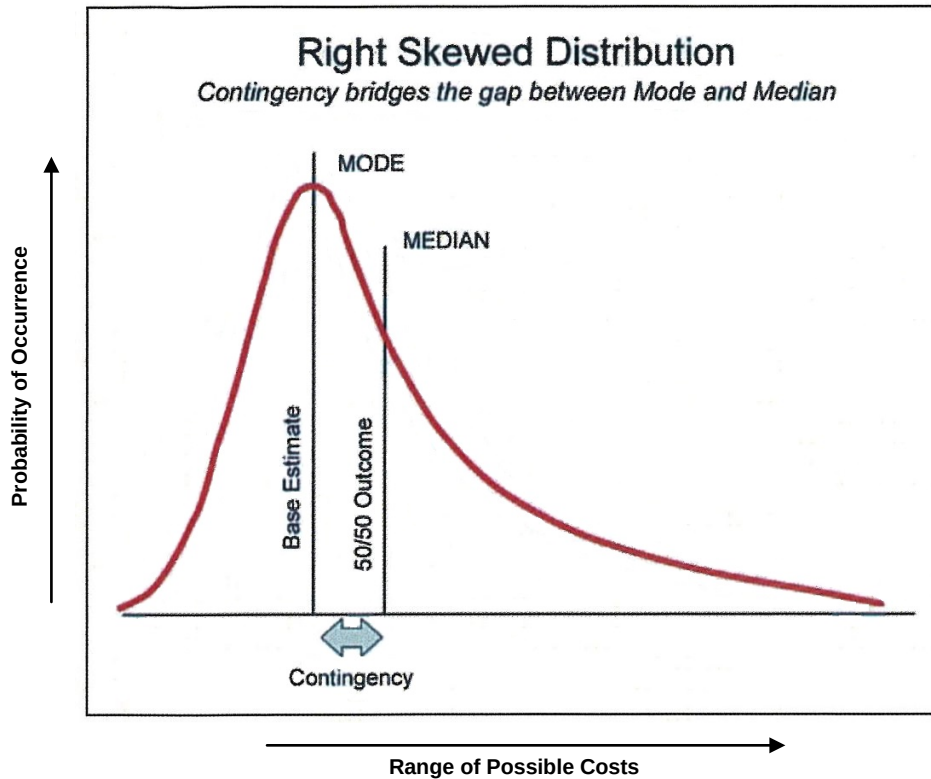
12.2 Contingency

Estimating contingency is often defined, applied and understood in various ways by different organizations. To provide some clarity, this section first defines contingency as it is applied in this estimate, and then describes the basis of the contingency percentage used.

12.2.1 Definition

The AACE defines contingency as “an amount added to an estimate to allow for items, conditions or events for which the state, occurrence and/or effect is uncertain and that experience shows will likely result, in aggregate, in additional costs (AACE, 2005; as cited in Lawrence, 2007)”. The need for contingency results from that fact that the set of possible cost outcomes is not normally distributed on a plot of probability versus cost. Contingency is typically applied to bridge the gap between the base and median estimates (i.e. the estimate that is equally likely to be over or underrun; per Figure 3).

Figure 3: Definition of Contingency (from Lawrence, 2007)

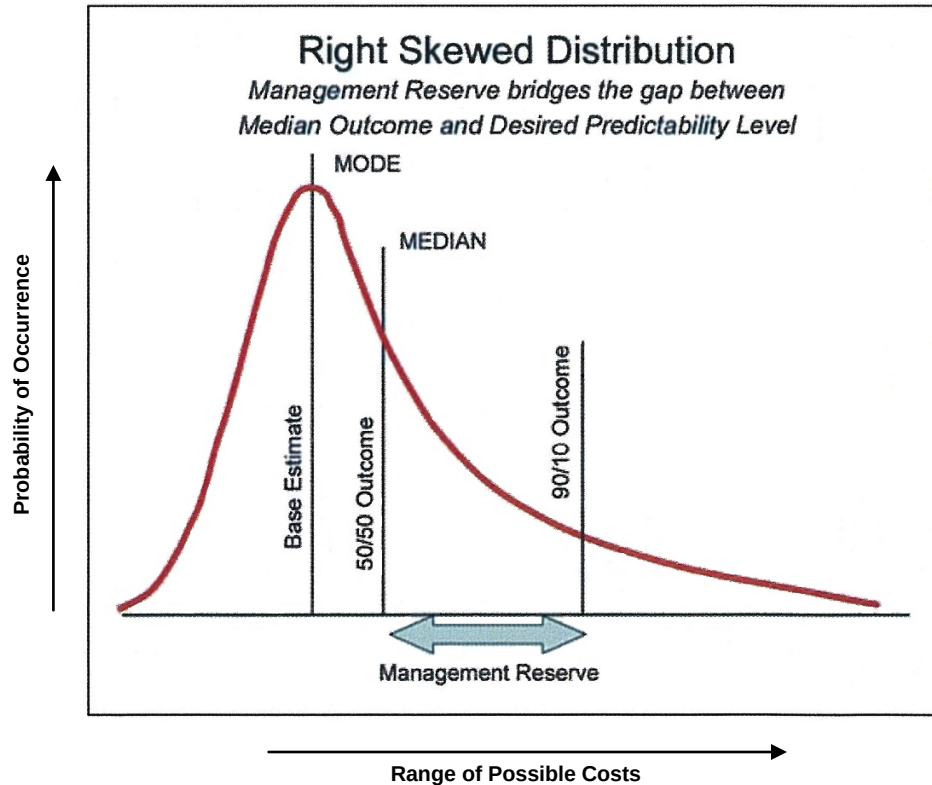


In applying this definition of contingency, it is important to acknowledge that (Lawrence, 2007):

- design allowances are not part of contingency;
- contingency is required to ensure a 50/50 likelihood of over or underrun;
- contingency is not the same as estimate accuracy;
- contingency should be expected to be consumed since 50% of the time it will be totally consumed; and
- contingency is not a fund for scope changes since it is related purely to the project scope as estimated.

It is also useful to distinguish between contingency and other allocations that might be applied to reduce the probability of cost overruns. For example, some organizations maintain a Management Reserve separate from the funds controlled by the project to address the difference between the median cost and the cost that has a 10% chance of overrun (per Figure 4).

Figure 4: Definition of Management Reserve (from Lawrence, 2007)



12.2.2 MNRP Contingency

Contingencies can be established:

- on the basis of a statistical analysis of cost risks;
- by applying a predetermined percentage prescribed by an organization's policy; or
- on the basis of the experience and judgement of the project estimator.

For the MNRP, the third of these approaches was used with a single percentage applied to the total base estimate. In setting the percentage, AMEC/AE considered the completeness and accuracy of the quantities, the degree of planning associated with major work items, and AMEC/AE's knowledge of and confidence in local contractor capabilities.

Consideration was given to setting contingencies on a task specific basis; however, it was concluded that at the current level of project definition, there would not be enough variation in contingency to warrant incorporating this additional complexity in the estimate. As the level of project definition increases, this decision can be re-examined. Similarly, there may be some merit in developing statistically driven predictions of contingency in later design stages when the higher level of definition increases the utility of these kinds of risk driven predictions.

12.3 Benchmarking

Reference has been made to other bid pricing to ensure that construction costs derived from first principles are generally in line with actual industry experience.

12.4 Estimate Discount Rate

The potential impact of future monitoring, maintenance and adaptive management expenditures on total project costs has been evaluated by calculating the present worth of future expenditures using a discount rate of 2%. This discount rate is intended to reflect the real cost of capital (i.e. without inflation) and has been selected based on input from the Project Partners on rates typically applied for federal government projects. Because this evaluation excludes the impacts of inflation, none of the future costs have been increased from the base estimating year.

13 30% DESIGN PHASE ESTIMATES

The Project Design Report (AMEC, 2014) examined two methods of material placement in the Open Pit, specifically:

- Controlled Placement: which involves the conventional bottom up placement of tailings, in situ soils and PAG waste rock. While this method would not employ compaction equipment, it would provide a degree of control that would reduce the level of backfill consolidation and settlement;
- End Dump Placement: which involves dumping material from pockets constructed around the entire perimeter of the Open Pit. This method reduces safety risks (by limiting in-pit work), introduces the potential for higher placement rates and facilitates the initial placement of wet material because there is no requirement to traffic on the tailings until they reach the pit rim.

Base Case estimates were prepared for both the controlled and end dump placement options and are provided in Appendices C and D, respectively. Note that these estimates make reference to the movement of waste rock volumes that are greater than the general figure of 360,000 m³ that is referenced in the Project Description (Section 2.1). That is because the 360,000 m³ figure includes only the PAG waste rock volumes in the pit area whereas the Appendix C and D estimates capture the entire waste rock inventory (including NAG volumes) that will require movement to execute the base case designs.

13.1 Controlled Placement Option

The 30% Design Phase estimate for the controlled placement option is provided on the worksheets included in Appendix C. The key elements and features of the Appendix C workbook are as follows:

- The costs for each individual worksheet were developed from the bottom up (mimicking how a contractor would typically price the work).
- A bottom up estimating approach requires that equipment and labour required to execute an activity be identified and then an applicable production rate selected to match the crew.

- Resources used in the estimate are all found on one worksheet tab and referenced using VLOOKUP equations from the individual spreadsheet tabs. Not all resources shown were actually used.
- Labour and equipment costs were mostly provided by a senior AMEC estimator from Mining & Metals (ex-Ledcor employee with lots of heavy civil experience). Those rates were cross-checked against other reference info.
- Labour costs provided were for “regular” operations. In order to reflect overtime and premium charges for working more than a standard work week, as well as turnaround costs, the labour costs were uplifted 20%.
- Some resource costs are simply “best guesses” at this time and will require confirmation before the estimate is issued in final. Overall, this tends to affect less significant cost items.
- Contractor indirect costs required to support the construction work (i.e. field staff, vehicles, field office costs, profit, etc.) were estimated individually and then distributed against all the direct cost entries.
- Some items (i.e. WTP and well point operations) were based on conceptual estimates provided by others. Many lump sum allowances were broken into labour, equipment, and materials to capture camp and fuel costs.
- Camp requirements were captured on each estimate worksheet and the corresponding camp catering/housekeeping charges included with the contractor indirects.
- All civil work was assumed accomplished using 40-ton articulated trucks with 18 ccm payloads (approximately 20 loose m³). This falls between the struck and heaped capacities, leaning towards the struck side.
- The estimate assumes that 1 m³ of rock is brought to the TSF for every 2 m³ of tailings to be removed. The rock is first used for equipment traffic over the TSF surface, then is later mixed with the tails for removal to the pit.
- Except for the initial rock platform over the wetter central portion of the TSF, all rock is assumed brought to the TSF on backhauls from the pit. Otherwise, all trucking assumes no backhaul opportunities.
- An extensive well point dewatering system is assumed to support the TSF operations. Well points will require frequent relocation within the TSF to stay ahead of excavation operations.
- The WTP is assumed to treat pit water, TSF pond water, and wellpoint water. There are, therefore, four separate WTP operating cost entries in the estimate.
- The estimate assumes a new camp is required, beginning with a 75-man camp in Season 1, expanded to 100-men in Season 3 (when there is the most intense activity onsite). The camp is removed from site after Season 4.
- The estimate assumes that the WTP is winterized each winter, then mothballed after Season 4.
- Contractor bonds (for things like performance and labour/materials), insurance, and profit are included with the contractor indirects.

13.2 End Dump Placement Option

Appendix D provides the estimating worksheets for the end dump placement option. These worksheets reflect the following adjustments (in rounded figures) to the Appendix C (controlled placement) estimate.

• Deleted costs for pit wall support - Activity 130	(290,000)
• Removed dozer from pit backfill operations - Activity 250	(150,000)
• Increased production rate of tails/rock removal from TSF from 9 loads/hr to 15 loads/hr - Activity 250	(340,000)
• Reduced number of trucks from five to three to reflect shorter haul - Activity 250	(160,000)
• Removed dozer from pit backfill operations - Activity 325	(600,000)
• Increased production rate of tails/rock removal from TSF from 9 loads/hr to 15 loads/hr - Activity 325	(1,460,000)
	(3,000,000)

In AMEC/AE's view, the benefit of this cost reduction is likely outweighed by the performance compromises associated with end dumping (specifically, greater material consolidation, differential settlement and cover integrity degradation) and, therefore, the cost summaries in this document carry forward the controlled placement option costs. That said, end dumping should not be discounted as an option should additional limitations to the controlled placement approach be identified during subsequent design phases, or during the contract tendering process.

14 MONITORING AND MAINTENANCE COSTS

14.1 Monitoring Costs

Estimated monitoring costs for the periods during and after remediation are outlined in the worksheets provided in Appendix E. These worksheets provide the assumed levels of effort for:

- groundwater monitoring;
- surface water monitoring;
- pit cover monitoring; and
- reclamation monitoring.

Estimates are provided for the following distinct intervals:

- Years 1 to 5: the period covering construction and the period shortly thereafter;
- Years 6 and 7: extending roughly to the lifespan of the interim pit cover; and
- Year 8 and following: the period following permanent cover placement and over which monitoring is expected to continue indefinitely.

These annual monitoring costs are discounted to a single present value for the base estimating year in the last worksheet of Appendix D, using the estimate discount rate (Section 12.4) and an assumed total monitoring period of 33 years (approximately 25 years after permanent cover placement). A duration of 25 years was selected for estimating purposes (i.e. not on technical grounds) because durations beyond that do not have a major influence on the calculated present value, and because these values are more sensitive to the assumed discount rate than extended monitoring durations. Note that the long term monitoring costs outlined in Appendix D are incremental to the capital costs detailed in Appendix C.

14.2 Maintenance Costs

The primary post remediation maintenance cost will relate to expenditures required to ensure the integrity and performance of both interim and permanent covers. The expectation is that some degree of maintenance or rebuilding will be needed because of the large differential settlements that have been predicted for the interim cover. In addition, water induced tailings collapse or earthquake movements could produce significant, localized differential settlements in the permanent cover. Estimates for these cover maintenance or rebuilding activities are not possible because the specific scopes are largely indeterminate. However, to provide some perspective on the potential impact of these requirements on total project costs, provisions for cover maintenance have been added to the monitoring and maintenance costs outlined in Appendix E. The following provisions were applied on the basis of AMEC/AE's experience and judgement:

- interim cover rebuild required three years after construction at a cost of 50% of the original cover capital cost; and
- permanent cover maintenance required 15 years after completion of remedial activity at a cost of 25% of the original cover capital cost.

Similar to the monitoring costs, the present value of these future maintenance expenditures has been calculated on the Appendix F worksheet using the estimate discount rate.

15 DESIGN CONTINGENCIES AND ADAPTIVE MANAGEMENT

This section evaluates the potential influence of the design contingencies and adaptive management measures outlined in the Project Design Report (AMEC, 2014) on total project costs.

15.1 Design Contingencies

The Water Quality Management Plan in the Design Report noted that it may be prudent to incorporate features into the Open Pit design that would facilitate the containment, collection and treatment of pit waters should this prove necessary to mitigate a future water quality excursion. The specific features proposed included:

- a liner placed at a level and configuration in the waste rock bench that would mound groundwaters reporting to the bench and facilitate collection via wells completed above the liner; and
- side wall drainage designed to redirect any lateral flows to the bench collection zone.

Costs for these features were estimated from approximate quantity take-offs and some of the unit prices developed for the Base Case Estimate. The resulting estimates are shown on the worksheets provided in Appendix G.

The total capital cost estimate for these pit water containment and collection contingencies is just over \$1.4 M. This estimate should not be viewed as directly comparable to the Base Case estimates given the current limits to the scope definition for these requirements (they might be generally comparable to an AACE Class 4 estimate). The conclusion that AMEC/AE draws from this figure is that the costs for installing these features is likely to be small relative to the total Base Case capital costs and, therefore, warrant consideration given that they cannot be retrofitted, and that alternate containment and collection measures installed in the future (i.e. in response to a monitoring excursion that may occur many years after remediation) are not likely to be as effective.

15.2 Adaptive Management

The Design Report also describes an adaptive management hierarchy (Section 5.5.2 of AMEC, 2014) that might be applied in response to significant and sustained water quality excursions at some point in the future. The potential cost implications associated with this hierarchy are evaluated using the provisions included in the summary worksheet in Appendix G. This worksheet includes provisions and potential timelines for:

- the assessments that would be undertaken in response to a water quality excursion;
- assessments of the pit cover monitoring and maintenance history, and evaluations of cover integrity and performance over the period preceding the excursion;
- installation of the well and pumping systems needed to collect pit waters (assuming the design contingency measures described in Section 15.1 were installed during the initial remedial effort);
- construction of a water treatment capability (or recommissioning of the original plant if it was mothballed at the conclusion of remediation) (construction or recommissioning costs were assumed to be 50% of the WTP capital costs in the Base Case estimate); and
- operation of the water treatment capability for a period of 20 years (annual operating costs were assumed to be 50% of those included in the Base Case estimate).

Again, the figures included in the worksheet for these requirements are judgement based provisions, not estimates, because the required scope is largely speculation (i.e. these estimates have much higher uncertainties associated with them than the Base Case estimates).

The worksheet in Appendix G provides the present value of future expenditures using the estimate discount rate. The total present value of these adaptive management measures, some \$3.8 M, is not highly sensitive to the assumed operating period for the water treatment capability (i.e. the extended timelines associated with longer durations have a limited influence on the discounted present value).

16 COST ESTIMATE SUMMARY

16.1 Summary Table

The outputs of the various worksheets in Appendices C, E, F and G are summarized in Table 16.1. This table provides estimates for the Base Case (CAPEX and O&M), design contingencies and adaptive management measures. As discussed previously, the level of scope definition and, therefore, estimating uncertainty, is not consistent among these cost components. Table 16.1, therefore, provides a general description of the estimating class and uncertainty associated with each of these estimate components.

Table 16.1: 30% Design Phase Cost Estimate Summary

Estimate Component	Estimate ^(a)	Estimate Description
1. Base Case Estimate		
1.1 Capital Costs		
Base Case CAPEX	\$66,528,158	
20% Contingency	\$13,305,632	
Subtotal (Base Case)	\$79,833,789	AACE Class 3
1.2 Operating and Maintenance (O&M) Costs		
Annual Monitoring	\$254,000/year	AACE Class 3
Interim Cover Maintenance	\$1,260,000 @ yr 3	Judgement based provision
Permanent Cover Maintenance	\$927,000 @ yr 5	Judgement based provision
Discounted Present Value (PV) of O&M Costs	\$4,738,729	
Total Base Case Estimate (including PV of O&M Costs)	\$84,572,518	
2. Design Contingencies		
2.1 Waste Rock Liner	\$274,943	AACE Class 4
2.2 Pit Side Wall Drains	\$1,136,916	AACE Class 4
Subtotal (Design Contingencies)	\$1,411,859	AACE Class 4
Total Project Estimate with Design Contingencies	\$85,984,378	
3. Adaptive Management (AM) Actions		
3.1 PV of AM Hierarchy	\$3,819,844	Judgement based provision
Total Project Estimate with Design Contingencies and Adaptive Management Measures	\$89,804,221	

(a) Significant figures have been retained to match worksheet values.

Yellow indicates estimate carrying more uncertainty than an AACE Class 3 estimate.

Green indicates estimate carrying much more uncertainty than an AACE Class 3 estimate.

16.2 Cost Optimization

The Project Design Report acknowledges that additional work is required to optimize various elements of the current Option 4 design Base Case. Examples of scope and/or schedule elements that would benefit from optimization include:

- the water treatment plant capacity and configuration;
- tailings wellpoint dewatering execution details;
- tailings relocation equipment productivity and sequencing details; and
- disposition of Special Waste soils (i.e. on or offsite).

In addition, a dedicated cost reduction study could be undertaken to identify circumstances where changes in objectives, design criteria, scope and/or execution method could offer economies with adjusted, but still acceptable, Option 4 outcomes. The definition of acceptable outcome adjustments would obviously require close collaboration with the Project Partners.

AMEC/AE is of the view that design optimization and cost reduction activities offer a good potential for reducing the estimated costs of Option 4 from those outlined in this document. However, AMEC/AE does not consider it prudent to assume that costs would fall below the range typically specified for an AACE Class 3 estimate (i.e. -15% to +25%, eight times out of ten).

It should also be noted that the estimates described herein represent the current perspectives on costs for executing Option 4. There remains the possibility that alternate remediation objectives, design concepts and/or execution methods could deliver a lower overall project cost.

17 ESTIMATE QUALITY ASSURANCE

The estimate has been reviewed per AMEC/AE project review policies.

18 LIMITATIONS AND CLOSURE

This report was prepared exclusively for Assessment and Abandoned Mines, Energy Mines and Resources by AMEC Environment & Infrastructure, a wholly owned subsidiary of AMEC Americas Limited. The quality of information, conclusions and estimates contained herein is consistent with the level of effort involved in AMEC services and based on: i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions and qualifications set forth in this report. This report is intended to be used by Assessment and Abandoned Mines, Energy Mines and Resources only, subject to the terms and conditions of its contract with AMEC. Any other use of, or reliance on, this report by any third party is at that party's sole risk.

Yours truly,

AMEC Environment & Infrastructure

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Appendix A - Project Base Case

Table A.1: MNRP Design Base Case

Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
Tailings Relocation	- Tailings will be dewatered to the extent possible prior to excavation with a vacuum wellpoint dewatering facility. - Tailings pond water and wellpoint production will be directed to a water treatment capability. - Dewatered tailings will be relocated using a conventional truck and shovel operation. - Adjustments to conventional equipment and methods will be incorporated to address the relatively small proportion of tailings that cannot be dewatered. - Relocation will be completed via an integrated process of dewatering, tailings removal and dam removal undertaken over at least two summer construction seasons. - The dam (or a portion of it) will likely remain following tailings removal as a sediment control measure until all work is complete and then be removed as a final layer for reclamation or cover.	- The option of excavating wet tailings was discounted for the following reasons: - excavating tailings in the wet will have very slow production so the costs of a dewatering operation are not likely to be significantly greater than inefficient truck/shovel operations; - wet excavation is subject to safety concerns as saturated loose tailings are subject to static liquefaction which can occur with little to no warning (i.e. creating a potential to engulf people and equipment); - dewatering tailings is aligned with “dry” Option 4 objectives. Tailings are placed “dry” so seepage is reduced and there is less time required to meet the general remediation objectives of Option 4; “dry” tailings can be placed in a denser state and/or compacted if this is determined to be the most cost effective placement option (as opposed to end dumping from the pit walls). This will reduce post placement settlement in the Open Pit so cover performance may be improved; and - the storage volume available in the pit requires that tailings be stored above ground. Placing wet tailings above ground would introduce more significant stability concerns and would be particularly challenging in the areas constrained by the public road. - Materials will be excavated with a conventional truck and shovel operation because alternatives (i.e. conveying, dredging) are impractical (i.e. insufficiently flexible to accommodate the particulars of the site and/or work scope), because truck/shovel operations align better with a local procurement strategy/preference and because mobilizing large equipment to site would be constrained by the road access. A dredging operation would be counter-productive relative to the “dry” tailings objective.	More detailed assessments of the uncertainties associated with the proposed tailings relocation methods with a view towards defining the need for tailings excavation trials as an early component of project execution (e.g. excavation methods validation, adjustment and potentially, repricing, as an early task in the field execution contract).



Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
		- Assessments of the tailings and of the capabilities of vacuum wellpoint dewatering technology have confirmed that dewatering followed by truck/shovel excavation and relocation will likely be feasible for most, but not all of the tailings inventory. - About 30% of the tailings inventory will probably not be dewaterable and will be transported wet. Excavation, haulage and pit placement for wet materials will use equipment and methods largely common to the drier materials with some adjustments in handling and sequencing. - Current and predicted air temperatures indicate that it is unlikely backfill placed into the pit will freeze/remain frozen (i.e. the design will need to assume thawed conditions in pit backfills post remediation). - The pit backfilling approaches described above (i.e. either controlled placement or end dumping) for the current Design Base Case will not invoke the requirements of the Canadian Dam Association's (CDA's) Dam Safety Guidelines in the pit.	
Dam Material Excavation and Relocation	- Dam materials will be excavated with a conventional truck and shovel operation. - Dam material excavation will be integrated with tailings relocation and removed in stages consistent with geotechnical stability and sediment control (construction water quality) requirements. - Uncontaminated dam materials will be utilized for: - reclamation requirements (to improve revegetation performance in granular surface soil profiles); - backfill required for the restoration of Dome Creek (in this case, sands will be utilized with other materials as needed to provide non-erodible surfaces); - source of material for the cover over the backfilled pit; and	Assessments of the dam materials suggest that a large proportion of the materials will be classified as uncontaminated (i.e. not exhibiting significant, anthropogenically derived parameter excursions) and will, therefore, be available for other project purposes (e.g. reclamation requirements, cushions/filters for cover or liner geosynthetics, general fill for site grading).	- More definitive assessments of background soil, sand and rock metal levels for the Mount Nansen area. Current determinations that these levels are likely elevated naturally will require confirmation via technically robust and statistically valid methods. - Additional assessments of dam removal sequencing

Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
	- general fill to restore ground surfaces to proposed profiles and topographies. ▪ Contaminated dam materials will be directed to the Open Pit and may be used to facilitate the handling, transport and placement of that portion of the tailings inventory that is not amenable to wellpoint dewatering.		
Open Pit Cover	▪ An interim pit cover will be required over the period following tailings relocation because the limits on differential settlements needed to permanently maintain cover integrity cannot be provided initially (even with placement of “dry” tailings). ▪ Pit covers will be constructed with geosynthetic materials and/or granular materials that are available, or can be processed, within or near the OIC (i.e. there are insufficient fine grained material volumes within economically practical distances of the site to warrant consideration of earth based barrier systems). ▪ A permanent cover constructed after differential settlements have declined to tolerable levels will be included in the initial project execution scope (i.e. this component will be a defined scope item, not an adaptive management element that may, or may not be necessary). ▪ The impacts of large differential settlements in both interim and permanent covers will be mitigated by an ongoing program of cover monitoring and maintenance/repair. ▪ Interim and permanent cover designs will minimize infiltration by utilizing contours and configurations that redirect precipitation to Pony and/or Dome Creeks. ▪ The cover will be configured to avoid encroaching on the public road at the north end of the Open Pit that will remain post closure.	▪ Differential settlements will result from the consolidation of tailings and settling of waste rock (the latter cannot be reduced as they might typically be accomplished by sluicing, because of the increase in the contaminated pit water inventory that would result from sluicing). ▪ The maximum differential settlements during the interim cover period (due largely to consolidation of the tailings) are anticipated to be large and well beyond the capabilities of any cover system to accommodate without damage. Similarly, maximum differential settlements over the long term (i.e. after the permanent cover has been installed, and largely the consequence of water induced collapses of tailings, or earthquake induced settlements) will, in all likelihood, exceed the accommodative capabilities of any cover system. In both cases (i.e. for both the interim and permanent covers), the most practical mitigation for large differential settlements will be monitoring, maintenance and/or repair (i.e. design mitigations for the range of differential settlements are not available). ▪ The length of time over which an interim cover is required will depend on the settlement of the backfilled pit. There will be uncertainty associated with these settlement timelines (although it is known they will be measured in years) and that uncertainty will be influenced by the details of the tailings/dam relocation method selected (i.e. end-dumping tailings from the pit wall will produce a more uncertain settlement behaviour than controlled placement and compaction of tailings within the pit itself). ▪ Modelling indicates that surface water quality outcomes at likely receiving environments are not	▪ Assessments of the benefits of more robust predictions of settlement timelines (i.e. are there any material benefits provided via settlement predictions over observational monitoring of cover settlements and performance). ▪ Assess relative cost of providing a long term geosynthetic liner (i.e. Coletanche) versus Bentonite Admixture.



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Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
		highly sensitive to short term degradations in interim cover performance, in part because the tailings will be largely unoxidized/acidified during this period. That said, monitoring interim cover condition and performance and responding to evident settlement damage will be required.	
Open Pit Containment Structure	- Open Pit pond water removed prior to tailings and waste rock will be relocated and treated prior to discharge. - The Pony Creek Adit will be decommissioned. - A non Potentially Acid Generating (PAG) waste rock bench will be constructed at the base of the Open Pit to maintain the base of the tailings above the likely maximum groundwater level. - Tailings will be placed in the pit with two options advanced – end dumping and direct bottom up placement. - The low grade ore at the south end of the pit will be relocated within the drainage catchment of the pit footprint. - Other contaminated materials will be placed above the tailings within the footprint of the pit. - NPAG (Non-Potentially Acid Generating) waste rock will be placed above the tailings and the existing low grade ore for physical stabilization and to provide suitable topography for surface drainage and end land use. - NPAG will be used to fill in the ramp and re-contour the south end of the pit and may be used to flatten the slopes of the final pit cover once the final cover system is in place. - Diversion ditches will redirect runoff originating upstream of the pit structure and protect portions of the cover from erosion and collect and control runoff from the cover. Long term surface water management	- The existing quality of the Open Pit pond water is not compatible with direct discharge requirements and will require treatment prior to release. - Characterizations of the pit water balance suggest that post remediation groundwater levels are unlikely to rise above the Pony Creek Adit. If levels do, on an infrequent basis, rise temporarily above the base of the tailings, there would be a short term increase in contaminant mass transport from the pit. However, this increase is unlikely to cause an unacceptable degradation of surface water quality at receiving environments (i.e. groundwater level increases are likely to be low probability, low consequence events). - Current pit outflows are strongly influenced by precipitation and are likely to be reduced post remediation to levels that are small in relation to the local/regional surface water flow regime. - These assessments of pit hydrogeology and surface water quality have concluded that groundwater level control via the Pony Creek Adit (or some alternate level control structure) will not be necessary. - The current “most likely” modelling estimate suggests that the mass transport of contaminants from the pit post remediation will not likely create an unacceptable incremental impact at surface water receiving environments in Victoria Creek. There are uncertainties with this finding and scenarios where unacceptable water quality for specific parameters could occur. These uncertainties could be mitigated by cover maintenance or replacement and/or pit design contingencies that would provide for the containment, collection and management of pit outflows (e.g. via pit liners and sidewall drainage that would be produced via wells completed in the waste rock bench, discharging	- Additional assessments of the uncertainties related to post remediation water quality predictions leading to a decision on the need for providing active containment, collection and treatment of pit flows and contaminants in the Design Base Case. - Additional development of the regional model of groundwater flow to confirm the assumptions inherent in the water quality model. - Confirmation that the Pony Creek Adit does not need to be hydrogeologically sealed (i.e. groundwater flows restricted) to maintain downstream water quality. - Additional adit investigations will be required to fully understand the current state and performance of the existing adit bulkhead.

Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
	will be provided by the contouring of the pit which will be designed to shed water. Contaminant fluxes from the pit will be passively reduced during transport in the local/regional hydrogeological flow regime to meet water quality criteria at an agreed upon compliance point.	to a water treatment facility), if at any time, post remediation monitoring identifies unacceptable degradations in surface water quality. At the 30% design stage, these contingencies will be identified and conceptually developed. - The following qualifiers apply to the modelling estimates described above: - discussions with Project Partners and regulators will be required to establish site specific water quality criteria that reflect the influence of elevated parameter levels upstream of the site (i.e. will require relief on some typical aquatic life criteria (e.g. CCME criteria) to reflect background water quality conditions applicable to the Mount Nansen site); - the water quality modelling conclusions are influenced by the location of the compliance point. Compliance at Victoria Creek is more feasible than at various points upstream; - the predicted risks to water quality are sensitive to the assumed characteristics and conditions of the tailings source terms. This is particularly true for the period following tailings acidification, the critical period with respect to water quality impacts and a condition that is not anticipated to occur until many years (potentially measured in decades) after tailings placement in the pit; and - the nature of the modelling platform used (GoldSim), while appropriate for this level of design, has inherent limitations in its predictive capabilities that require consideration in the characterization of, and response to, modelling uncertainties.	
Water Treatment	All contaminated waters produced before and during remediation (i.e. pond waters at the Open Pit and Tailings Storage Facility, porewaters produced by the wellpoint dewatering system, surface runoff incompatible with agreed upon discharge criteria) will be directed to a single, fixed	The water treatment capacity required to treat pond and porewater volumes over timelines that would support the desired base case schedule (one month to drain the tailings pond) is beyond that which can practically be provided by mobile, skid mounted facilities.	Additional assessments to optimize the balance between water treatment capacity and onsite water storage (i.e. determining if schedule objectives can be realized more economically via the provision of storage with a lower water treatment flow capacity).

Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
	(i.e. non-mobile) water treatment plant constructed for, and dedicated to, the project.	Project flows will be managed and directed to a single, fixed water treatment location.	Additional assessments of the potential range in raw water qualities to refine estimates of reagent requirements.
Mill Area Remediation	- Non-hazardous contaminated soils, tailings and PAG waste rock will be removed and directed to dedicated areas of the pit containment structures with methods of placement and/or containment engineered appropriately for the nature of the materials involved. - Hazardous contaminated soils will be removed and directed to appropriate offsite treatment and/or disposal facilities.	- Utilizing the air space that can be developed within the Open Pit containment structure for non-hazardous mill area soils will be more cost effective than developing dedicated facilities elsewhere onsite, or directing the materials to offsite facilities. - The non-PAG waste rock inventory in the mill area will be left in place, or recontoured to suit the area regrading plan, consistent with the general site philosophy that non-PAG waste rocks do not require remediation and/or management. - The Huestis Adit does not appear to be producing any significant deterioration of downstream water quality. - The upstream reaches of Dome Creek have high background metals concentrations.	- More definitive assessments of background soil, sand and rock metal levels for the Mount Nansen area will be needed to finalize the mill area volumes requiring removal. Current determinations that these levels are likely elevated naturally will require confirmation via technically robust methods vetted by the Project Partners. - Assessments of the potential utility of human health and/or ecological risk assessments as a cost efficient method for limiting excavation requirements, particularly for materials at depth.
Structures	- Site structures will be brought to grade in accordance with structure specific dismantling and/or demolition plans. - Non-hazardous materials generated by dismantling/demolition activity will be directed to offsite reuse or recycling options, or to dedicated areas of the pit containment structure with methods of placement and/or containment engineered appropriately for the nature of the materials involved. - Structural elements containing or incorporating hazardous materials will be cleaned of these materials prior to onsite disposition, or directed to appropriate offsite treatment and/or disposal facilities. - Hazardous materials stored in containers within, or ancillary to, site structures will be directed to appropriate offsite treatment and/or disposal facilities. - Victoria Creek well will be used as a water source during remediation activities and subsequently decommissioned and the Wellhouse dismantled/demolished.	- Utilizing the available disposal capacity that can be developed within the Open Pit containment structure for non-hazardous dismantling/demolition wastes will be more cost effective than developing dedicated facilities elsewhere onsite, or directing the materials to offsite facilities. - The quantities of hazardous materials generated by the project are expected to be small and below thresholds that would warrant assessments of options with lower unit costs than commercial, offsite treatment and/or disposal facilities.	

Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
General Site Reclamation	- Final surfaces will be restored largely with materials available locally. - The capabilities of surfaces restored with non-erodible granular materials will be enhanced by rebuilding local environments compatible with the surrounding landscape. - Vegetated zones will be re-established within the disturbed area footprint using local sand sources (borrow and clean dam materials) supplemented (in relatively low volumes) with appropriate amendments to satisfy fines requirements and to support revegetation objectives.	- The project will not have silt and finer materials available in quantity for reclamation (sources are generally too distant to be economically viable). - The proportion of the site disturbed area that can potentially be revegetated is limited by the local sand volumes (from dam removal and/or site borrow) that can be made available for reclamation purposes. - There is uncertainty about the potential success of revegetation efforts relying on materials no finer than sands. - Lands within the disturbed area that are not revegetated will be surfaced, contoured and/or configured in ways that, while different from the surrounding lands, meet the broad objective of providing compatible, complementary and/or equivalent land uses.	- More definitive assessments of background soil metal levels for the Mount Nansen area will be needed to accurately define the volumes of sand (both from the dam and site borrow areas) that can be devoted to reclamation. Current determinations that these levels are likely elevated naturally will require confirmation via technically robust methods vetted by the Project Partners. - Additional assessments of the nature and long term viability of vegetated lands that can be supported with soil profiles incorporating materials no finer than sands including an examination of the potential utility of field trials. - Additional assessment of the specific reclamation configuration proposed for lands outside revegetated zones in consultation with the Project Partners (to ensure that the more subjective elements of providing land use compatibility and/or equivalency are considered and incorporated into final plans).
Dome Creek Valley Reclamation	- Contaminated organic debris underlying the tailings and/or dam materials will be removed and directed to a dedicated location within the pit containment structure. - Uncontaminated organic debris or silt beneath the tailings will be removed, stockpiled and dewatered for potential use as a reclamation material or amendment (although the volumes involved will not be large enough to materially impact the need for a reclamation plan based largely on no/low minus sands materials gradations). - The original ground will be secured soon after exposure through placement of free draining and erosion resistant materials. - The creek channel and disturbed valley slopes will be restored with layers of sand	- Sediment quality downstream of the tailings facility suggests that tailings may be present in localized areas. These areas will require sediment removal and creek bed restoration. - The lack of local organic reclamation materials requires a creek valley restoration Base Case relying largely on granular, non-erodible materials. - The impact of warming air temperatures that is evident from the meteorological record over the last few decades will be considered in the stability assessments and design of restored valley slopes. - The stability of the slopes considers the impact of thaw induced pore pressures.	- Additional assessment of Dome Creek downstream of the tailings pond with regards to sediment quality and possibility of tailings migration /deposition in the lower portions of Dome Creek. - Assessments of the potential utility of constructed wetlands in the restored Dome Creek Valley, both to improve the aesthetics of the reclaimed area and potentially as a means of improving creek water quality. - Development of details for the tie-ins between the reclaimed and undisturbed areas to minimize degradation of permafrost. - Shallow probing/hand core auguring of near surface active layers in undisturbed terrain in the tailings area slopes that must be "connected" to reclaimed surfaces.

Element	Description of Current Base Case	Design Issues Addressed in Phase One (30% Design)	Design Issues Requiring Resolution Post Phase One
	overlain by stable and non-erodible rock materials (e.g. NAG rock). The aesthetics of the creek valley restoration concept may be enhanced by incorporating stream restoration techniques that create natural features without compromising the fundamental hydrologic properties and/or capabilities of the restored channel, or the geotechnical stability of valley walls.		
Exploration Trench Reclamation	- Reclamation will be completed for trenches that: - are likely to create major erosion, water quality or land use constraints if left unreclaimed; and - can be reclaimed without creating a reclamation liability greater than that being mitigated (e.g. where machine access will not cause inordinate damage). - Those trenches that are reclaimed will use a common reclamation specification. That method will be comprised of: - replacing available side cast materials back into the trench; no new fill will be imported or incorporated; and - vegetation that has become established on side cast materials will be stripped prior to moving the side cast material; produced mulch will be placed over side cast materials replaced in trench.	- Trench reclamation requirements will need to be established on an individual basis giving due consideration to the intrusive impacts that reclamation activity will inevitably create, revegetation that has occurred naturally and the resulting fact that in some areas, reclamation efforts will cause damage disproportionate to the available benefits. - Trench reclamation will proceed without the large scale import or placement of materials.	Additional assessments of the need for more detailed characterization of individual trench reclamation requirements, likely in consultation with the project Partners or alternatively, an execution specification that equips the field execution team with the flexibility to adjust reclamation specifics to the particular characteristics and circumstances of each trench.
Climate Change	Has been accounted for by considering two scenarios (1) today's temperatures continuing on, and (2) making an allowance for warming as per IPCC/ Canadian guidelines. In both scenarios the long term expectation is that most permafrost will thaw out. If colder conditions eventuate permafrost that has been lost will reform and pit infill tailings will freeze.	- Current seepage patterns from the Pit to receiving waters are understood at a conceptual level based on limited hydrogeological and permafrost data. As future permafrost patterns evolve, seepage patterns may change in unpredictable ways. Maintaining a "dry" pit will help mitigate this risk. - The Adaptive Management measures proposed for responding to water quality excursions are intended to mitigate the impacts of unpredictable, climate related changes in seepage patterns.	

Appendix B - Project Drawings List

D001	Key Map and Location Plan
D002	Overview Site Plan
D003	Location of Contaminated Soil and PAG Material – Site Overview
D004	Location of Contaminated Soil and PAG Material – Mill Area
D005	Location of Contaminated Soil and PAG Material – Waste Rock Area
D006	Location of Contaminated Soil and PAG Material – Ketza Shop
D007	Final Open Pit Configuration, Direct Placement Method, Plan and Profile
D008	Final Open Pit Configuration, Direct Placement Method, Sections
D009	Tailings Isopach
D010	Existing Tailings Distribution Cross Sections, Sheet 1
D011	Existing Tailings Distribution Cross Sections, Sheet 2
D012	Existing Tailings Distribution Cross Sections, Sheet 3
D013	Extent of Tailings Remediation and Excavation
D014	Construction Haul Roads
D015	Schematic of Tailings Excavation Sequence
D016	Schematic of Tailings Excavation Section
D017	Placement of Waste Rock Platform
D018	Direct Tailings Placement at Elevation 1210 m
D019	End Dump Tailings Placement at Elevation 1215 m
D020	Final Open Pit Configuration, End Dump Method, Plan and Profile
D021	Final Open Pit Configuration, End Dump Method, Sections
D022	Diversion Ditches at Open Pit
D023	Principal Components of Interim and Final Covers
D024	Mount Nansen Conceptual Model Existing Conditions
D025	Mount Nansen Conceptual Model Proposed Option 4 Conditions
D026	Catchment Areas

Project Drawings List (cont'd)

D027	Water Treatment Plant Conceptual General Plan View
D028	Water Treatment Plant The Legend
D029	Water Treatment Plant Process Flow Diagram
D030	Water Treatment Plant Process and Instrumentation Diagram
D031	Water Treatment Plant Process and Instrumentation Diagram
D032	Water Treatment Plant Process and Instrumentation Diagram
D033	Water Treatment Plant Process and Instrumentation Diagram
D034	Schematic of Pit Collection Design Contingencies
D035	Miscellaneous Infrastructure
D036	Mill Complex Random Views
D037	Compilation of Miscellaneous Buildings
D038	Electrical Power Distribution
D039	Electrical Single Line Diagram
D040	Electrical Power Distribution Descriptions
D041	Site Grading Plan
D042	Mill Regrading Sections
D043	Mill Regrading Sections
D044	Site Typical Road and Culvert Deactivation
D045	Wildlife Use and Potential Reclamation Areas (ELR, 2013)
D046	Mount Nansen Landscape Stratification for Reclamation Treatment Intensity
D047	Tailings Area After Tailings Removal and Slope Stabilization, Plan
D048	Tailings Area After Tailings Removal and Slope Stabilization, Section 2
D049	Tailings Area After Tailings Removal and Slope Stabilization, Section 3
D050	Tailings Area After Tailings Removal and Slope Stabilization, Section 4
D051	Dome Creek Channel Reconstruction

Appendix C - Controlled Placement Cost Estimate

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Schedule Activity ID	Description of Work	Quantity	Unit	\$/unit	DIRECT COST BREAKDOWN			2014 \$ CDN		
					EQUIPMENT	LABOUR	OTHER	DIRECT COSTS	INDIRECT COSTS	TOTAL COSTS

CAMP DAYS	FUEL LITRES
--------------	----------------

Detail design, construction documents, support during tender phase	2,250,000
	2,250,000

Subtotal

Season #1 (single shift)

110	Contractor Mobilization & Early Works (camp trailers, office trailers)				96,450	169,420	610,000	875,870	0	875,870
115	Construct / Install Sitewide Runoff & Sediment Control Measures				218,260	143,136	50,000	411,396	133,318	544,714
120	Upgrade Haul Roads & Crossing Over TSF Diversion Ditch				221,790	80,808	25,000	327,598	106,162	433,760
125	Upgrade Tunnel Plug In Pony Creek Adit				30,000	45,000	75,000	150,000	48,609	198,609
130	Install Safety Measures In Pit				100,000	100,000	50,000	250,000	81,015	331,015
135	Establish Revegetation Test Plots				26,215	15,036	25,000	66,251	21,469	87,720
140	Begin Mill Demolition (mostly inside stripping)				30,000	105,000	15,000	150,000	48,609	198,609
145	Construct / Commission Water Treatment Plant				750,000	1,000,000	3,250,000	5,000,000	1,620,308	6,620,308
150	Set Up & Pump Water From Pit Through Water Treatment Plant				23,445	6,552	200,000	229,997	74,533	304,530
155	Constructor Demobilization				4,650	10,920	122,500	138,070	0	138,070
OH1	Contractor Indirects				401,583	490,054	1,242,388	0	0	0
					1,902,393	2,165,926	5,664,888	7,599,182	2,134,025	9,733,207

Subtotal

% indirects to directs ----->

28.1

Engineering QC/QA during Season #1 construction	500,000
General site maintenance during winter months between Season #1 and Season #2 (currently done by Denison)	700,000
	1,200,000

Subtotal

Season #2 (single shift)

210	Contractor Mobilization And Spring Break Cleanup				18,600	52,560	162,500	233,660	0	233,660
215	Haul NAG Rock From South Pile To Pit Bottom (for platform to 1190 m)	38,750	cm	17.86	366,188	108,218	0	474,406	217,549	691,955
220	Haul Processed Filters To Pit Bottom (placed over top of NAG platform)	4,550	cm	72.28	42,150	12,707	170,625	225,481	103,400	328,881
225	Reshape Pit Entrance (relocate ore to pit bottom, bring in NAG rock to flatten grades)				167,686	46,342	0	214,028	98,147	312,176
230	Set Up & Pump Water From TSF Through Water Treatment Plant				29,985	6,552	250,000	286,537	131,398	417,935
235	Haul PAG Rock From SW Lower Pile To TSF (initial rock cover over central wet areas)	46,500	cm	17.21	424,458	124,155	0	548,613	251,579	800,191
240	Setup Initial Wellpoint Configuration And Connect System To Water Treatment Plant				70,000	115,000	215,000	400,000	183,429	583,429
245	Move Wellpoint Setup During Tailings Excavation				1,918,800	438,797	150,000	2,507,597	1,149,915	3,657,511
250	Haul Tailings / Rock Mixture From TSF To The Pit	83,250	cm	22.27	983,130	287,837	0	1,270,967	582,830	1,853,798
255	Haul PAG Rock From West Mid Pile To TSF (for equipment support and mixing with tailings)	29,000	cm	9.81	150,256	44,805	0	195,061	89,450	284,511
260	Haul PAG Rock From Waste Rock Dumps To Pit (forming horizontal layers at 2 m intervals)	40,800	cm	17.21	372,428	108,936	0	481,364	220,740	702,103
265	Complete All Mill And Site Infrastructure Demolition				120,000	420,000	60,000	600,000	275,143	875,143
270	Contractor Demobilization And Site Winterizing				9,300	21,840	197,500	228,640	0	228,640
OH2	Contractor Indirects				903,285	887,350	1,512,945	0	0	0
					5,576,265	2,675,099	2,718,570	7,666,354	3,303,580	10,969,934

Subtotal

% indirects to directs ----->

43.1

Engineering QC/QA during Season #2 construction	750,000
General site maintenance during winter months between Season #2 and Season #3 (currently done by Denison)	700,000
	1,450,000

Subtotal

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

					DIRECT COST BREAKDOWN			2014 \$ CDN		
Schedule Activity ID	Description of Work	Quantity	Unit	\$/unit	EQUIPMENT	LABOUR	OTHER	DIRECT COSTS	INDIRECT COSTS	TOTAL COSTS
Season #3 (double shift for Activity 325)										
310	Contractor Mobilization And Spring Break Cleanup				52,900	116,340	442,500	611,740	0	611,740
315	Move Wellpoint Setup During Tailings Excavation				4,059,000	928,224	300,000	5,287,224	1,772,273	7,059,497
320	Haul PAG Rock From West Mid Pile To TSF (for equipment support and mixing with tailings)	68,050	cm	8.98	352,584	105,137	0	457,721	153,428	611,149
325	Haul Tailings / Rock Mixture From TSF To The Pit (incl subexc below tailings & u/s dam berm)	353,200	cm	20.90	4,307,936	1,221,189	0	5,529,125	1,853,358	7,382,484
330	Remove Sand From The TSF Dam And Place Over Exposed Surfaces In The TSF (300 mm)	34,325	cm	9.91	196,244	58,518	0	254,763	85,396	340,159
335	Place NAG Rock From The Mill & The W. Lower Pile Areas Over The TSF Sand Bedding (1.2 m)	137,250	cm	14.89	1,183,190	347,574	0	1,530,763	513,111	2,043,874
340	Reconstruct Dome Creek And Its Riparian Zone Through The TSF Area				93,056	28,000	25,000	146,056	48,958	195,013
345	Haul NAG Rock From Various Waste Dumps To The Pit For Buttress At South End	63,200	cm	14.73	528,115	169,218	0	697,333	233,745	931,078
350	Haul PAG, Tailings, And Hydrocarbons From Various Areas On Site To Pit	44,506	cm	23.08	593,247	176,125	0	769,372	257,893	1,027,265
355	Haul PAG Rock From Waste Rock Dumps To Pit (forming horizontal layers at 2 m intervals)	170,280	cm	11.24	1,106,288	326,938	0	1,433,225	480,416	1,913,641
360	Remove Special Waste For Disposal Off Site				0	0	2,500,000	2,500,000		2,500,000
365	Rough Grade Remaining Waste Rock Dump Areas				78,000	13,200	0	91,200	30,570	121,770
370	Rough Grade Mill And Camp Areas				156,000	26,400	0	182,400	61,140	243,540
375	Place Interim Cover Over Pit (0.3 m crushed NAG, 1.0 m of Victoria Creek S&G)	104,000	cm	25.80	1,093,600	364,080	552,000	2,009,680	673,643	2,683,323
380	Contractor Demobilization And Site Winterizing				18,600	43,680	290,000	352,280	0	352,280
OH3	Contractor Indirects				1,574,045	1,398,504	3,191,383	0	0	0
					15,392,805	5,323,127	7,300,883	21,852,883	6,163,932	28,016,815

% indirects to directs ----->

28.2

Engineering QC/QA during Season #3 construction
General site maintenance during winter months between Season #3 and Season #4 (currently done by Denison)

1,500,000
700,000
2,200,000

Subtotal

Season #4 (single shift)										
410	Contractor Mobilization And Spring Break Cleanup				16,275	45,990	72,500	134,765	0	134,765
415	Remove Balance Of TSF and Seepage Pond Dams And Stockpile In Area of Pit Cover	69,890	cm	17.46	637,965	186,606	0	824,571	395,950	1,220,521
420	Haul Sand & Rock From Stockpile And Place Over Exposed Dam Areas	35,000	cm	10.99	200,103	59,669	0	259,772	124,740	384,512
425	Reconstruct Dome Creek And Its Riparian Zone Through The Dam Areas				23,264	7,000	6,250	36,514	17,534	54,047
430	Final Grade And Revegetate The TSF And Dam Areas				111,375	187,920	260,625	559,920	268,868	828,788
435	Final Grade And Revegetate The Mill And Camp Areas				82,500	139,200	190,500	412,200	197,934	610,134
440	Final Grade And Revegetate The Waste Dump & Pit Cover Areas				132,000	222,720	303,550	658,270	316,094	974,364
445	Backfill And Revegetate The Exploration Trenches				127,463	107,250	0	234,713	112,707	347,419
450	Decommission All Site Roads (unless required for long term care & maintenance)				343,140	83,076	0	426,216	204,665	630,881
455	Final Site Cleanup And Contractor Demobilization				6,975	16,380	257,500	280,855	0	280,855
OH4	Contractor Indirects				366,985	434,170	837,336	0	0	0
					2,048,044	1,489,981	1,928,261	3,827,796	1,638,491	5,466,287

% indirects to directs ----->

42.8

Engineering QC/QA during Season #4 construction

250,000
250,000

Subtotal

Final Cover in Season #10 (granular materials, synthetic liners, borrow development & reclaim; see Worksheet 1005)

4,991,915
4,991,915

Subtotal

Costs in Q1 2014 \$Cdn

66,528,158
13,305,632

Subtotal

Contingency (@20%)

Total Estimated Capital Cost of Base Case

79,833,789

Total

CAMP DAYS	FUEL LITRES
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213	7,767
1,804	425,040
170	62,946
1,987	774,833
95	35,035
568	206,348
54	16,778
277	91,640
286	105,188
532	194,758
0	0
20	12,000
40	24,000
662	188,200
80	2,400
2,221	323,795
9,008	2,470,728

88	2,100
306	110,514
97	35,724
14	3,528
378	25,650
280	19,000
448	30,400
193	25,575
129	59,340
155	900
691	66,280
2,777	379,010

Mount Nansen Remediation Project

30% Design Phase Cost Estimate

March 2014

RESOURCE COSTS Q1 2014

[illegible]

Marked diesel (\$/litre)	1.50
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LABOUR	Total Labour Rate	Base Hourly Rate	Fringe Costs
Operator foreman	65.00	46.00	19.00
Labour foreman	58.00	42.00	16.00
Small equip operator	51.00	36.00	15.00
Large equip operator	55.00	38.00	17.00
Teamster	50.00	36.00	14.00
Skilled labourer	45.00	31.00	14.00
Unskilled labourer	37.00	25.00	12.00
Skilled tradesman	62.00	45.00	17.00
Mechanic	55.00	38.00	17.00
	(per week)		
Project manager	6,000		
General superintendent	5,500		
Project engineer	4,750		
Project controller	4,000		
Office administrator	3,750		
Field engineer	3,750		
Survey crew (2-man)	6,000		

Markup on labour (for overtime & rotations)	20	%
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Hours/day (single shift)	10
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Hours/day (double shift)	20
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MATERIALS, SUPPLIES, SUBCONTRACTA, LUMP SUMS, ALLOWANCES	Rate	UOM
Crushing/screening	15.00	tonne
Light jaw crushing	10.00	tonne
Screening for cobbles	5.00	tonne
Camp charges	75.00	day
Small tools	2.00	hr
Lowbed loads	2,500	ea
Hiboy loads	1,000	ea
Crane rental	5,000	ls
Camp allowance (initial)	750,000	ls
Camp allowance (expansion)	250,000	ls
Water line allowance	50,000	ls
Sediment control material allowance	50,000	ls
Culvert crossing allowance	25,000	ls
Tunnel plug allowance	150,000	ls
Pit wall support allowance	250,000	ls
Test plot material allowance	25,000	ls
Demolition allowance (strip only)	150,000	ls
Demolition allowance (bulk)	600,000	ls
WTP allowance	5,000,000	ls
WTP operating costs (pit)	200,000	ls
WTP operating costs (TSF)	250,000	ls
WTP operating costs (season 2 dewatering)	150,000	ls
WTP operating costs (season 3 dewatering)	300,000	ls
Camp winterizing	25,000	ls
Camp unwinterizing	15,000	ls
Camp removal	100,000	ls
WTP winterizing	75,000	ls
WTP unwinterizing	50,000	ls
WTP mothballing	100,000	ls
Terminal travel allowance	750	trip
Rotation allowance	750	trip
Trailer rentals	750.00	week
Office & other supplies	100.00	man-week
Office equipment & computers	75.00	man-week
Radios, phones	50.00	man-week
Consultant/lab allowance	10,000	ls
Dewatering system mob	250,000	ls
Dewatering system setup	150,000	ls
Chemical waste removal allowance	400,000	ls
Special waste removal allowance	2,100,000	ls
Seed w/ native mix	150.00	kg
Fertilizer	2.50	kg
Mulch	2,000	tonnes
Biochar	5.00	kg
Staked willows	7.50	ea
Transplants (white spruce & trembling aspen)	10.00	ea
60 ml textured HDPE	13.00	m2
GCL	11.50	m2
Victoria Creek borrow develop/restore	150,000	ls

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 110 -> Contractor Mobilization & Early Works (camp trailers, office trailers)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	50.0	4,650	600	60.0	Teamster	50.00	3,000				
														180.0	Labourer (3)	37.00	6,660				
														60.0	Labour F/M	58.00	3,480				
	Crane rental for heavier lifts																	1.0	ls	5,000	5,000
	Lowbed loads to site																				
	Hiboy loads to site																				
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers (assist with camp construction, set up contractor/engineer trailers, fuel storage, etc)							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														360.0	Labourer (3)	37.00	13,320				
														120.0	Labour F/M	58.00	6,960				
New Camp	Allowance for new 75-man camp							1.0		75,000		75,000	12,500	1.0	ls	112,500	112,500	1.0	ls	562,500	562,500
	Allowance for extending water line from Victoria creek to new camp													1.0	ls	17,500	17,500	1.0	ls	25,000	25,000

Total Cost ----->	96,450	Equipment	Subtotal ----->		96,450	Subtotal ----->		169,420	Subtotal ----->		610,000
	169,420	Labour									
	610,000	Other	Fuel Consumption (litres) ----->		15,550	Camp Days ----->		292			
	875,870										
Direct Unit Cost ----->	n/a										

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
Mobilization of the water treatment plant is included with Activity 145.
A 75-bed camp is assumed constructed in Season #1, followed by an expansion to 100 beds in Season #3. It is torn down at the end of Season #4 and removed from site.
The camp is assumed to be shut down during the winter months. Winterizing costs are included with the demobilization costs (Activities 155, 270, and 380).
Mobilization assumed to start on July 14, 2016 to match an available AAM project schedule. There are important benefits if the start date for Season #1 can be moved forward.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 115 -> Construct / Install Sitewide Runoff & Sediment Control Measures								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Runoff & Sediment Control	Generic crew (equipment & labour)							1.0	Hiab	93.00	280.0	26,040	3,360	336.0	Teamster	50.00	16,800				
								1.0	Excavator	218.50	280.0	61,180	12,040	336.0	Operator	55.00	18,480				
								1.0	Dozer	189.50	280.0	53,060	9,800	336.0	Operator	51.00	17,136				
								1.0	ADT	156.00	280.0	43,680	6,720	336.0	Teamster	50.00	16,800				
								1.0	Backhoe/loader	53.50	280.0	14,980	3,080	336.0	Operator	51.00	17,136				
								2.0	Pickups	34.50	560.0	19,320	5,040	336.0	Labour F/M	58.00	19,488				
														1008.0	Labourer (3)	37.00	37,296				
Allowance for silt fencing, hay bales, plastic liners, stakes, other materials																		1.0	ls	50,000	50,000

Total Cost ----->	218,260	Equipment	Subtotal ----->	218,260	Subtotal ----->	143,136	Subtotal ----->	50,000	
	143,136	Labour							
	50,000	Other		Fuel Consumption (litres) ----->		40,040		Camp Days ----->	252
	411,396								
Direct Unit Cost ----->	n/a								

Estimator Notes -----> Assumed the above work requires 4 weeks, over a total period of about 1.5 months.
The specific scope of work is not known. This sheet is intended to cover works required at the front end of the project to manage site water at the macro level (new ditches, ponds, culverts, silt fences, hay bales, etc).

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Activity 120 -> Upgrade Haul Roads & Crossing Over TSF Diversion Ditch								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Haul road upgrades	Generic crew (equipment & labour)							1.0	Excavator	218.50	280.0	61,180	12,040	336.0	Operator	55.00	18,480				
								2.0	Dozer	189.50	560.0	106,120	19,600	672.0	Operator	51.00	34,272				
								1.0	Grader	178.00	280.0	49,840	8,960	336.0	Operator	51.00	17,136				
New culvert crossing at TSF	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	50.0	4,650	600	60.0	Teamster	50.00	3,000				
														120.0	Labourer (2)	37.00	4,440				
														60.0	Labourer F/M	58.00	3,480				
	Allowance for culvert materials at new diversion ditch crossing																	1.0	ls	25,000	25,000

Total Cost ----->		221,790	Equipment	Subtotal ----->		221,790	Subtotal ----->		80,808	Subtotal ----->		25,000
		80,808	Labour									
		25,000	Other	Fuel Consumption (litres) ----->		41,200	Camp Days ----->		132			
		327,598										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Assumed the above work requires 4 weeks, over a total period of about 1.5 months.
No specific details on the scope of work. Haul road near TSF will be realigned and twinned and existing overgrown roads around the pit area (for sure) and from mill area to TSF (maybe) upgraded for haul trucks.
Allowed for a crew w/ hiab to help with the culvert installation across the TSF diversion ditch. The crew may also need to do a bit of tree/shrub clearing as well in other locations.

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Activity 125 -> Upgrade Tunnel Plug In Pony Creek Adit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Tunnel plug	Allowance for tunnel plug work							1.0		30,000		30,000	5,000	1.0		45,000	45,000	1.0	ls	75,000	75,000

Total Cost ----->	30,000	Equipment										Subtotal ----->	30,000				Subtotal ----->	45,000			Subtotal ----->	75,000
	45,000	Labour																				
	75,000	Other										Fuel Consumption (litres) ----->	5,000				Camp Days ----->	75				
	150,000																					
Direct Unit Cost ----->	n/a																					

Estimator Notes -----> There is no as-built information available on the existing "plug" constructed years ago in the adit. Allowance assumes fairly robust upgrades, including some possible pressure grouting.

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Activity 130 -> Install Safety Measures In Pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Pit wall safety support	Allowance for safety measures in pit							1.0		100,000		100,000	5,000	1.0		100,000	100,000	1.0	ls	50,000	50,000

Total Cost ----->	100,000	Equipment										Subtotal ----->	100,000				Subtotal ----->	100,000			Subtotal ----->	50,000
	100,000	Labour																				
	50,000	Other										Fuel Consumption (litres) ----->	16,667				Camp Days ----->	167				
	250,000																					
Direct Unit Cost ----->	n/a																					

Estimator Notes -----> A study undertaken a few years ago by another consultant prescribed various measures for the pit walls depending on assessed conditions.
Allowance used in the estimate is of the same order-of-magnitude as the amount suggested by the other consultant.

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Activity 135 -> Establish Revegetation Test Plots								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Revegetation test plots								1.0	Excavator	218.50	70.0	15,295	3,010	84.0	Operator	55.00	4,620				
								1.0	ADT	156.00	70.0	10,920	1,680	84.0	Teamster	50.00	4,200				
														168.0	Labourer (2)	37.00	6,216				
	Allowance for test plot materials																	1.0	Materials	25,000	25,000

Total Cost ----->	26,215	Equipment	Subtotal ----->	26,215	Subtotal ----->	15,036	Subtotal ----->	25,000
	15,036	Labour						
	25,000	Other						
	66,251							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	4,690	Camp Days ----->	28		

Estimator Notes -----> No specific information available. Allowed some equipment and labour to assist with the consulting engineers in this task (engineering costs covered elsewhere).

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Activity 140 -> Begin Mill Demolition (mostly inside stripping)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Building demolition	Allowance for stripping of buildings							1.0		30,000		30,000	5,000	1.0		105,000	105,000	1.0	ls	15,000	15,000

Total Cost ----->	30,000	Equipment										Subtotal ----->	30,000				Subtotal ----->	105,000			Subtotal ----->	15,000
	105,000	Labour																				
	15,000	Other										Fuel Consumption (litres) ----->	5,000				Camp Days ----->	175				
	150,000																					
Direct Unit Cost ----->	n/a																					

Estimator Notes -----> Assumed that 20% of the total estimated building demolition costs of \$750,000 will be incurred in Season #1.
\$550,000 -> Demolition cost of mill buildings
\$100,000 -> Removal of tanks from mill buildings
\$ 50,000 -> Demolition cost of misc smaller buildings
\$ 50,000 -> Allowance for extras

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Activity 145 -> Construct / Commission Water Treatment Plant								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Water Treatment Plant	Allowance for constructing & commissioning WTP							1.0		750,000		750,000	5,000	1.0		1,000,000	1,000,000	1.0	ls	3,250,000	3,250,000

Total Cost ----->	750,000	Equipment	Subtotal ----->		750,000	Subtotal ----->		1,000,000	Subtotal ----->		3,250,000
	1,000,000	Labour									
	3,250,000	Other	Fuel Consumption (litres) ----->		125,000	Camp Days ----->		1,667			
	5,000,000										
Direct Unit Cost ----->	n/a										

Estimator Notes -----> Allowance based on a factored estimate by the water treatment specialists.
WTP operating costs while treating the pit water are included with Activity 150.
The WTP is assumed to be shut down during the winter months. Winterizing costs are included with the demobilization costs (Activities 155, 270, and 380).
Will likely need to double-shift most or all of this work to meet schedule and allow pit water to be pumped from the pit before the onset of winter. Removal of pit water is on the project critical path.

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Activity 150 -> Set Up & Pump Water From Pit Through Water Treatment Plant								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Set up pumps and water lines							Set Up	1.0	Hiab	93.00	30.0	2,790	360	36.0	Teamster	50.00	1,800				
								1.0	Pickup	34.50	30.0	1,035	270	36.0	Labour F/M	58.00	2,088				
														72.0	Labourer (2)	37.00	2,664				
Pump water from pit to WTP & treat	9,000 cm 25 cm/hr 360.0 15.0						Pump	1.0	4" pump	32.50	360.0	11,700	2,520								
								1.0	4" pump (standby)	22.00	360.0	7,920	0								
		WTP operating costs (during initial pit dewatering only)												1080.0				1.0	ls	200,000	200,000

Total Cost ----->	23,445	Equipment	Subtotal ----->	23,445	Subtotal ----->	6,552	Subtotal ----->	200,000
	6,552	Labour						
	200,000	Other	Fuel Consumption (litres) ----->	3,150	Camp Days ----->	102		
	<u>229,997</u>							
Direct Unit Cost ----->	25.56	\$/cm						

Estimator Notes -----> Allowed 3 days to set up the pump and water lines to the WTP. This should also cover pump tending needs during the 2 weeks of pumping time.
Assumed water pumped out at the same rate as the WTP throughput capacity of 600 m3/day. There will likely be little pre-treatment holding capacity at the WTP.
Pumping pit water to the TSF first (so it is not dependent on the commissioning of the WTP), then to the WTP with the TSF pond water, does not benefit the overall schedule and adds unnecessary cost.
Operating cost allowance is loosely based on an estimate by the water treatment specialists.
A standby pump is included in the costs due to the critical nature of the work.

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Activity 155 -> Contractor Demobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Demobilization	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	50.0	4,650	600	60.0	Teamster	50.00	3,000				
														120.0	Labourer (2)	37.00	4,440				
														60.0	Labour F/M	58.00	3,480				
	Crane rental for heavier lifts																	1.0	ls	5,000	5,000
Lowbed loads from site																		5.0	ea	2,500	12,500
Hiboy loads from site																		5.0	ea	1,000	5,000
Site Winterizing	Allowance for winterizing the WTP																	1.0	ls	75,000	75,000
	Allowance for winterizing the camp																	1.0	ls	25,000	25,000

Total Cost ----->	4,650	Equipment	Subtotal ----->	4,650	Subtotal ----->	10,920	Subtotal ----->	122,500
	10,920	Labour						
	122,500	Other						
	138,070							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	600	Camp Days ----->	20		

Estimator Notes -----> Allowance included to winterize both the camp and the WTP between Seasons #1 and #2.

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SEASON #1 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Field Staff Expenses	Salaries and benefits																				
							Project manager							15.0	week	6,000	90,000				
							General superintendent							13.0	week	5,500	71,500				
							Project engineer							12.0	week	4,750	57,000				
							Field engineer							12.0	week	3,750	45,000				
							Office administrator							15.0	week	3,750	56,250				
							Survey crew (2-men)							4.0	week	6,000	24,000				
	Rotations, terminal travel																				
							Terminal travel (7 men x 2 ways)											14.0	trips	750	10,500
							Rotations (every 4 weeks x 2 ways)											23.5	trips	750	17,625
	Vehicles																				
							Pickup trucks (assumed 50% utilization for fuel use estimate)	6.0	3/4-ton pickup	34.50	4,970.0	171,465	22,365								
Field expenses							Trailer rentals											15.0	week	750	11,250
							Office equipment, computers											75.0	man-week	75	5,625
							Office/safety/enviro/survey supplies											75.0	man-week	100	7,500
							Radios, phones, communications											75.0	man-week	50	3,750
							Outside consultants, lab tests											1.0	ls	10,000	10,000
							Small tools											36,858	hrs	2.00	73,715
Field Labour Expenses	Equipment fueling/maintenance (assume 1 mechanic for 8 weeks)																				
							Mechanic w/ fuel/lube truck	1.0	Fuel/lube truck	92.50	560.0	51,800	14,000	672.0	Mechanic	55.00	36,960				
	General bullgang crew (assume 8 weeks not already in direct costs)																				
							Hiab w/ teamster	1.0	Hiab	93.00	560.0	52,080	6,720	672.0	Teamster	50.00	33,600				
							Labourers							672.0	Labourer	37.00	24,864				
	Haul road maintenance (assume 50% time for grader, 25% for water)																				
							Grader	0.5	Grader	178.00	1,050.0	93,450	16,800	630.0	Operator	51.00	32,130				
							Water truck	0.25	Water truck	93.00	1,050.0	24,413	5,775	315.0	Teamster	50.00	15,750				
	Float services (assume nominal amount)																				

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	Mac truck		1.0	Tractor	92.50	50.0	4,625	1,250	60.0	Teamster	50.00	3,000				
	Lowboy		1.0	Trailer	75.00	50.0	3,750	0								
Other project costs													1.0	Home office	18,998	18,998
	Home office overhead (say 0.25% of direct costs)												1.0	Insurance	56,994	56,994
	Bonds & insurance (say 0.75% of direct costs)												1.0	Is	750,000	750,000
	Profit (target ~35% of labour and ~8% of total cost)															
Camp													3,686	days	75.00	276,431
	Catering & housekeeping															

Total Cost ----->	401,583	Equipment	Subtotal ----->	401,583	Subtotal ----->	490,054	Subtotal ----->	1,242,388
	490,054	Labour						
	1,242,388	Other	Fuel Consumption (litres) ----->	66,910	Camp Days ----->	777		
	2,134,025							
Direct Unit Cost ----->	n/a							

Estimator Notes -----> This sheet covers general contractor overhead field and home office costs during Season #1.
A team of 5 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them.
Other contractor indirect costs include a mechanic with fuel/lube truck, a small bulgang crew for odd jobs around the site, a road maintenance crew, and float services.
Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here.
The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #1 worksheets.
The small tools allowance also draws on the total camp days from the Cost Summary worksheet.

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Activity 210 -> Contractor Mobilization								EQUIPMENT						LABOUR				OTHER									
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost						
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000										
														360.0	Labourer (3)	37.00	13,320										
														120.0	Labour F/M	58.00	6,960										
	Crane rental for heavier lifts																	2.0	ls	5,000	10,000						
	Lowbed loads to site																										
	Hiboy loads to site																										
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000										
														360.0	Labourer (3)	37.00	13,320										
														120.0	Labour F/M	58.00	6,960										
Camp & WTP Unwinterizing	Allowance for unwinterizing the WTP																	1.0	ls	50,000	50,000						
																						Allowance for unwinterizing the camp					

Total Cost ----->		18,600	Equipment	Subtotal ----->		18,600	Subtotal ----->		52,560	Subtotal ----->		162,500
		52,560	Labour									
		162,500	Other									
		233,660										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
Mobilization of the wellpoint dewatering system is included with Activity 240.

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Activity 215 -> Haul NAG Rock From South Pile To Pit Bottom (for rock platform)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	38,750 cm	110 cm/hr	352.3	35.2			Load	1.0	35-ton excavator	218.50	352.3	76,972	15,148	422.7	Operator	55.00	23,250				
							Haul	3.0	40-ton ADT	210.50	1056.8	222,460	36,989	1268.2	Teamster	50.00	63,409				
							Spread	1.0	D7 dozer	189.50	352.3	66,756	12,330	422.7	Operator	51.00	21,559				

Total Cost ----->	366,188	Equipment	Subtotal ----->	366,188	Subtotal ----->	108,218	Subtotal ----->	0
	108,218	Labour						
	0	Other						
	474,406							
Direct Unit Cost ----->	12.24	\$/cm	Fuel Consumption (litres) ----->	64,466	Camp Days ----->	176		

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.6 km haul distance, 1.2 km round trip.
Assume an average haul speed in both directions of 5 kph, or 15 minutes per round trip.
Add 6 minutes for loading and dumping times, plus another 5 minutes for congestion at pit bottom, for a total round trip of 26 minutes
Number of round trips per hour per truck = 2.3
Assume an average of 6 truck loads per hour can be accommodated at the bottom of the pit (1 every 10 minutes)
Number of trucks required to maintain 6 loads per hour rate = 6/2.3 = 3
Assume truck payload = 18 cm ----> Hourly rate = 6 x 18 = 108 cm/hr (use 110 cm/hr)

Allow a D7 dozer in the pit bottom for dozing dumped loads. No extra compaction required.
Area at pit bottom is quite narrow. Much of the material will be end dumped in relatively thick lifts until higher elevations are attained and more operating room becomes available.

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Activity 220 -> Haul Processed Filters To Pit Bottom (placed over top of NAG platform)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Crush/screen subcontractor	11,375 tonnes			100 tonnes/hr	113.8	11.4	Crush	1.0	Crush/screen plant					136.5	Plant operator	included -->		11,375	tonnes	15.00	170,625
Load, haul, dump, spread	4,550 cm			110 cm/hr	41.4	4.1	Load	1.0	980 front end loader	198.00	41.4	8,190	1,572	49.6	Operator	55.00	2,730				
							Haul	3.0	40-ton ADT	210.50	124.1	26,121	4,343	148.9	Teamster	50.00	7,445				
							Spread	1.0	D7 dozer	189.50	41.4	7,838	1,448	49.6	Operator	51.00	2,531				

Total Cost ----->	42,150	Equipment	Subtotal ----->	42,150	Subtotal ----->	12,707	Subtotal ----->	170,625
	12,707	Labour						
	170,625	Other						
	225,481							
			Fuel Consumption (litres) ----->	7,363	Camp Days ----->	32		
Direct Unit Cost ----->	49.56	\$/cm						

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 6 minutes for loading and dumping times, plus another 5 minutes for congestion at pit bottom, for a total round trip of 27 minutes
Number of round trips per hour per truck = 2.2
Assume an average of 6 truck loads per hour can be accommodated at the bottom of the pit (1 every 10 minutes)
Number of trucks required to maintain 6 loads per hour rate = 6/2.2 = 3
Assume truck payload = 18 cm ----> Hourly rate = 6 x 18 = 108 cm/hr (use 110 cm/hr)

Allow a D7 dozer in the pit bottom for dozing dumped loads. No extra compaction required.
Crushing/screening operations will need to start about 1 week ahead of material placement.
Tonnage for crushing = cm volume x 2 tonnes/cm + plus a 25% waste factor.

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Activity 225 -> Reshape Pit Entrance (relocate ore to pit bottom, bring in additional NAG for ramp flattening)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rip, load, haul, dump, spread (ore)	8,000 cm	110 cm/hr	72.7	7.3			Rip	1.0	D9 dozer w/ ripper	390.00	72.7	28,364	4,364	87.3	Operator	55.00	4,800				
							Load	3.0	35-ton excavator	218.50	218.2	47,673	9,382	261.8	Operator	55.00	14,400				
							Haul	2.0	40-ton ADT	210.50	145.5	30,618	5,091	174.5	Teamster	50.00	8,727				
							Spread	1.0	D7 dozer	189.50	72.7	13,782	2,545	87.3	Operator	51.00	4,451				
Load, haul, dump, spread (new NAG)	5,000 cm	110 cm/hr	45.5	4.5			Load	1.0	35-ton excavator	218.50	45.5	9,932	1,955	54.5	Operator	55.00	3,000				
							Haul	3.0	40-ton ADT	210.50	136.4	28,705	4,773	163.6	Teamster	50.00	8,182				
							Spread	1.0	D7 dozer	189.50	45.5	8,614	1,591	54.5	Operator	51.00	2,782				

Total Cost ----->		167,686	Equipment	Subtotal ----->		167,686	Subtotal ----->		46,342	Subtotal ----->		0
		46,342	Labour									
		0	Other									
		214,028										
Direct Unit Cost ----->		16.46	\$/cm									

Estimator Notes -----> This is the last activity in the pit area before the start of tailings relocation from the TSF. This work will flatten the haul road grade at the pit entrance.

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Activity 230 -> Set Up & Pump Water From TSF Through Water Treatment Plant								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Set up pumps and water lines							Set Up	1.0	Hiab	93.00	30.0	2,790	360	36.0	Teamster	50.00	1,800				
								1.0	Pickup	34.50	30.0	1,035	270	36.0	Labour F/M	58.00	2,088				
														72.0	Labourer (2)	37.00	2,664				
Pump water from TSF to WTP & treat	12,000 cm 25 cm/hr 480.0 20.0						Pump	1.0	4" pump	32.50	480.0	15,600	3,360								
								1.0	4" pump (standby)	22.00	480.0	10,560	0								
		WTP operating costs (during TSF dewatering only)													1,440.0				1.0	ls	250,000

Total Cost ----->	29,985	Equipment	Subtotal ----->	29,985	Subtotal ----->	6,552	Subtotal ----->	250,000
	6,552	Labour						
	250,000	Other						
	286,537							
Fuel Consumption (litres) ----->	3,990	Camp Days ----->	132					
Direct Unit Cost ----->	23.88	\$/cm						

Estimator Notes -----> Allowed 3 days to set up the pump and water lines to the WTP. This should also cover pump tending needs during the 2 weeks of pumping time.
Assumed water pumped out at the same rate as the WTP throughput capacity of 600 m3/day. There will likely be little pre-treatment holding capacity at the WTP.
Operating cost allowance is loosely based on an estimate by the water treatment specialists.
A standby pump is included in the costs due to the critical nature of the work.
Quantity includes the TSF water (10,000 m3) and the seepage pond water (2,000 m3)

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Activity 235 -> Haul PAG Rock From SW Lower Pile To TSF (for first rock platform in wetter central area of TSF)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	46,500 cm			160 cm/hr	290.6	29.1	Load	1.0	35-ton excavator	218.50	290.6	63,502	12,497	348.8	Operator	55.00	19,181				
							Haul	5.0	40-ton ADT	210.50	1453.1	305,883	50,859	1743.8	Teamster	50.00	87,188				
							Spread	1.0	D7 dozer	189.50	290.6	55,073	10,172	348.8	Operator	51.00	17,786				

Total Cost ----->	424,458	Equipment	Subtotal ----->	424,458	Subtotal ----->	124,155	Subtotal ----->	0
	124,155	Labour						
	0	Other						
	548,613							
Direct Unit Cost ----->	11.80	\$/cm	Fuel Consumption (litres) ----->	73,528	Camp Days ----->	203		

Estimator Notes -----> Assumed production rate and truck requirements:
This is the first rock platform constructed on the surface of the TSF, done as soon as the TSF pond is drained. The wellpoint dewatering system will follow right behind and rest on this rock platform.
This rock layer will later be mixed with and removed with the first 2 m lift of tailings beneath in. New rock brought in from the dumps (starting with Activity 255) is for new working platforms on the exposed tailings areas.

Assume a 2.0 km haul distance, 4.0 km round trip.
Assume an average haul speed in both directions of 9 kph, or 27 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 33 minutes
Number of round trips per hour per truck = 1.8
Assume an average of 9 truck loads per hour can be accommodated at the TSF (1 every 6.6 minutes)
Number of trucks required to maintain 9 loads per hour rate = 9/1.8 = 5
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer at the TSF for dozing dumped loads. No extra compaction required.

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Activity 240 -> Install Wellpoint Headers & Connect To WTP								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mob, field test, initial system setup	Allowance for mobilizing dewatering system							1.0		25,000		25,000	5,000	1.0		25,000	25,000	1.0	ls	200,000	200,000
	Allowance for installing & commissioning the system							1.0		45,000		45,000	5,000	1.0		90,000	90,000	1.0	ls	15,000	15,000

Total Cost ----->	70,000	Equipment	Subtotal ----->	70,000	Subtotal ----->	115,000	Subtotal ----->	215,000
	115,000	Labour						
	215,000	Other						
	<u>400,000</u>							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	11,667	Camp Days ----->	192		

Estimator Notes -----> Based on widely different conceptual responses from two dewatering vendors. Costs carried in the estimate were between the two responses, weighted towards the more expensive one.

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Activity 245 -> Move Wellpoint System During Tailings Excavation								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Wellpoint operations	52 days		1.00 day/day		1248.0	52.0	Dewater	1.0	Dewatering system	1,250	1248.0	1,560,000	124,800								
								2.0	Pickup trucks	34.50	2496.0	86,112	22,464	1497.6	F/M	58.00	86,861				
														5990.4	Labourers (4)	45.00	269,568				
			1.00 day/day		1248.0	52.0	Support	1.0	35-ton excavator	218.50	1248.0	272,688	53,664	1497.6	Operator	55.00	82,368				
	WTP operating costs (for dewatered tailings in season 2)						Treat							1248.0				1.0	ls	150,000	150,000

Total Cost ----->	1,918,800	Equipment																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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Estimator Notes -----> Based on widely different conceptual responses from two dewatering vendors. Costs carried in the estimate were between the two responses, weighted towards the more expensive one.

Managing the well point system during tailings removal from the TSF will be a full time job. This worksheet assumes a 6-man crew with an excavator 24 hrs per day for the duration of the Season #2 work.

It will be challenging to coordinate the tailings removal operation with the well point dewatering operation. The wellpoints need to stay far enough ahead to dewater the tailings before the truck & shovel operation gets there and also not be in the way.

The operating costs for the WTP during Season #2 tailings removal is an allowance only since the amount of water that will need treatment is not known with any certainty.

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Activity 250 -> Haul Tailings/Rock Mixture from TSF To Pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	83,250 cm			160 cm/hr	520.3	52.0	Load	2.0	35-ton excavator	218.50	1040.6	227,377	44,747	1248.8	Operator	55.00	68,681				
							Haul	6.0	40-ton ADT	210.50	3121.9	657,155	109,266	3746.3	Teamster	50.00	187,313				
							Spread	1.0	D7 dozer	189.50	520.3	98,599	18,211	624.4	Operator	51.00	31,843				

Total Cost ----->		983,130	Equipment	Subtotal ----->		983,130	Subtotal ----->		287,837	Subtotal ----->		0
		287,837	Labour				Fuel Consumption (litres) ----->		172,223	Camp Days ----->		468
		0	Other									
		1,270,967										
Direct Unit Cost ----->		15.27	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 9 kph, or 34 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 40 minutes
Number of round trips per hour per truck = 1.5
Assume an average of 9 truck loads per hour can be accommodated at the pit (1 every 6.6 minutes)
Number of trucks required to maintain 9 loads per hour rate = 9/1.5 = 6
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer in the pit for dozing dumped loads. No extra compaction required.
Allow an extra excavator at the TSF to assist with rock mixing at the work front and perform any other duties to maintain production (i.e., helping the dozer with new rock platforms or assisting the dewatering crew).
On accasion, these trucks will return to the TSF with a backhaul of waste rock. See Activity 255 for information on how those costs are reflected in the estimate

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Activity 255 -> Haul PAG Rock From West Mid Pile to TSF								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	29,000 cm			160 cm/hr	181.3	18.1	Load	1.0	35-ton excavator	218.50	181.3	39,603	7,794	217.5	Operator	55.00	11,963				
							Haul	2.0	40-ton ADT	210.50	362.5	76,306	12,688	435.0	Teamster	50.00	21,750				
							Spread	1.0	D7 dozer	189.50	181.3	34,347	6,344	217.5	Operator	51.00	11,093				

Total Cost ----->		150,256	Equipment	Subtotal ----->		150,256	Subtotal ----->		44,805	Subtotal ----->		0
		44,805	Labour									
		0	Other									
		195,061										
Direct Unit Cost ----->		6.73	\$/cm									

Estimator Notes -----> This rock will generally serve as the new working surfaces in the TSF area. It will later be mixed with and removed with the next 2m lift of tailings.

This activity is intermittent during the course of tailings removal from the TSF to the pit. To keep up with the tails/rock removal, a much lower production rate than 160 cm/hr shown would be required.

Assumed that all rockfill brought to the TSF, after the initial platform (Activity 235), is by trucks returning from the pit after dumping their tails/rock mixtures.

This means that most truck costs are already accounted for in the tails/rock relocation costs (Activities 250 and 325).

However, to account for the inefficiencies a backhaul operation would impose on the regular truck cycling operations, a nonimal two trucks are included on this worksheet to add money in the estimate for that.

Allow a D7 dozer at the TSF for dozing dumped loads. No extra compaction required.

See Activity 235 for derivation of the160 cm/hr production rate.

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Activity 260 -> Haul PAG Rock From Dumps To Pit (for horizontal layers)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	40,800 cm	160 cm/hr	255.0	25.5			Load	1.0	35-ton excavator	218.50	255.0	55,718	10,965	306.0	Operator	55.00	16,830				
							Haul	5.0	40-ton ADT	210.50	1275.0	268,388	44,625	1530.0	Teamster	50.00	76,500				
							Spread	1.0	D7 dozer	189.50	255.0	48,323	8,925	306.0	Operator	51.00	15,606				

Total Cost ----->	372,428	Equipment	Subtotal ----->	372,428	Subtotal ----->	108,936	Subtotal ----->	0
	108,936	Labour						
	0	Other						
	481,364							
Direct Unit Cost ----->	11.80	\$/cm	Fuel Consumption (litres) ----->	64,515	Camp Days ----->	179		

Estimator Notes -----> **Assumed production rate and truck requirements:**
PAG rock will be relocated from the NW, W.Mid, and E waste dump piles and placed in sandwich-like layers with the tails/rock material brought in from the TSF.
Haul distances from each waste dump area will vary. In addition, haul distances will change as the pit is backfilled and starts to extend up over the pit rim.
This worksheet assumes that the pit ramp at the south end of the pit is still required (a longer haul). The same work in Season #3 (Activity 355) assumes shorter hauls.

Assume a 1.0 km haul distance, 2.0 km round trip
Assume an average haul speed in both directions of 5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 9 truck loads per hour can be accommodated at the pit (1 every 6.6 minutes)
Number of trucks required to maintain 9 loads per hour rate = 9/2 = 5
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer at the pit for dozing dumped loads. No extra compaction required.

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Activity 265 -> Complete Mill And Site Infrastructure Demolition								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Building demolition	Allowance for balance of site demolitions							1.0		120,000		120,000	5,000	1.0		420,000	420,000	1.0	ls	60,000	60,000

Total Cost ----->	120,000	Equipment	Subtotal ----->	120,000	Subtotal ----->	420,000	Subtotal ----->	60,000
	420,000	Labour						
	60,000	Other	Fuel Consumption (litres) ----->	20,000	Camp Days ----->	700		
	<u>600,000</u>							
Direct Unit Cost ----->	n/a							

Estimator Notes -----> Assumed that 80% of the total estimated building demolition costs of \$750,000 will be incurred in Season #2.
\$550,000 -> Demolition cost of mill buildings
\$100,000 -> Removal of tanks from mill buildings
\$ 50,000 -> Demolition cost of misc smaller buildings
\$ 50,000 -> Allowance for extras

It is expected that most demolition debris will be salvaged and removed from site. The rest will be buried in the pit area under the engineered cover.

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Activity 270 -> Contractor Demobilization And Site Winterizing								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Demobilization	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														240.0	Labourer (2)	37.00	8,880				
														120.0	Labour F/M	58.00	6,960				
	Crane rental for heavier lifts																	2.0	ls	5,000	10,000
	Lowbed loads from site																	25.0	ea	2,500	62,500
	Hiboy loads from site																	25.0	ea	1,000	25,000
Site Winterizing	Allowance for winterizing the WTP																	1.0	ls	75,000	75,000
	Allowance for winterizing the camp																	1.0	ls	25,000	25,000

Total Cost ----->		9,300	Equipment	Subtotal ----->		9,300	Subtotal ----->		21,840	Subtotal ----->		197,500
		21,840	Labour									
		197,500	Other									
		228,640										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Allowance included to winterize both the camp and the WTP between Seasons #2 and #3.

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SEASON #2 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Field Staff Expenses	Salaries and benefits																				
							Project manager							19.0	week	6,000	114,000				
							General superintendent							17.0	week	5,500	93,500				
							Project engineer							17.0	week	4,750	80,750				
							Field engineer							17.0	week	3,750	63,750				
							Office administrator							17.0	week	3,750	63,750				
							Survey crew (2-men)							8.0	week	6,000	48,000				
	Rotations, terminal travel																				
							Terminal travel (7 men x 2 ways)											14.0	trips	750	10,500
							Rotations (every 4 weeks x 2 ways)											37.5	trips	750	28,125
	Vehicles																				
							Pickup trucks (assumed 50% utilization for fuel use estimate)	6.0	3/4-ton pickup	34.50	6,650.0	229,425	29,925								
Field expenses	Trailer rentals																	19.0	week	750	14,250
	Office equipment, computers																	103.0	man-week	75	7,725
	Office/safety/enviro/survey supplies																	103.0	man-week	100	10,300
	Radios, phones, communications																	103.0	man-week	50	5,150
	Outside consultants, lab tests																	2.0	ls	10,000	20,000
	Small tools																	46,340	hrs	2.00	92,680
Field Labour Expenses	Equipment fueling/maintenance (assume 3 mechanics for 16 weeks)																				
							Mechanic w/ fuel/lube truck	3.0	Fuel/lube truck	92.50	1,120.0	310,800	84,000	4032.0	Mechanic	55.00	221,760				
	General bullgang crew (assume 12 weeks not already in direct costs)																				
							Hiab w/ teamster	1.0	Hiab	93.00	840.0	78,120	10,080	1008.0	Teamster	50.00	50,400				
							Labourers							1008.0	Labourer	37.00	37,296				
	Haul road maintenance (assume full time for grader, 50% for water)																				
							Grader	1.0	Grader	178.00	1,120.0	199,360	35,840	1344.0	Operator	51.00	68,544				
							Water truck	0.5	Water truck	93.00	1,120.0	52,080	12,320	672.0	Teamster	50.00	33,600				
	Float services (assume nominal amount)																				

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	Mac truck		1.0	Tractor	92.50	200.0	18,500	5,000	240.0	Teamster	50.00	12,000				
	Lowboy		1.0	Trailer	75.00	200.0	15,000	0								
Other project costs													1.0	Home office	19,166	19,166
	Home office overhead (say 0.25% of direct costs)												1.0	Insurance	57,498	57,498
	Bonds & insurance (say 0.75% of direct costs)												1.0	Is	900,000	900,000
	Profit (target ~35% of labour and ~8% of total cost)															
Camp													4,634	days	75.00	347,551
	Catering & housekeeping															

Total Cost ----->	903,285	Equipment	Subtotal ----->	903,285	Subtotal ----->	887,350	Subtotal ----->	1,512,945
	887,350	Labour						
	1,512,945	Other	Fuel Consumption (litres) ----->	177,165	Camp Days ----->	1,413		
	3,303,580							
Direct Unit Cost ----->	n/a							

Estimator Notes -----> This sheet covers general contractor overhead field and home office costs during Season #2.
A team of 5 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them.
Other contractor indirect costs include a mechanic with fuel/lube truck, a small bulgang crew for odd jobs around the site, a road maintenance crew, and float services.
Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here.
The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #2 worksheets.
The small tools allowance also draws on the total camp days from the Cost Summary worksheet.

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Activity 310 -> Contractor Mobilization								EQUIPMENT						LABOUR				OTHER									
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost						
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	200.0	18,600	2,400	240.0	Teamster	50.00	12,000										
														720.0	Labourer (3)	37.00	26,640										
														240.0	Labour F/M	58.00	13,920										
	Crane rental for heavier lifts																3.0	ls	5,000	15,000							
	Lowbed loads to site																										
	Hiboy loads to site																										
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000										
														360.0	Labourer (3)	37.00	13,320										
														120.0	Labour F/M	58.00	6,960										
Camp Expansion & Unwinterizing	Allowance for camp expansion to 100 beds							1.0		25,000		25,000	4,167	1.0	ls	37,500	37,500	1.0	ls	187,500	187,500						
																		Allowance for unwinterizing the WTP						1.0	ls	50,000	50,000
																		Allowance for unwinterizing the camp						1.0	ls	15,000	15,000

Total Cost ----->	52,900	Equipment	Subtotal ----->	52,900	Subtotal ----->	116,340	Subtotal ----->	442,500
	116,340	Labour						
	442,500	Other						
	<u>611,740</u>							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	7,767	Camp Days ----->	213		

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
The 75-bed camp is expanded to 100 beds in order to accommodate the increased intensity of earthworks in Season #3.

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Activity 315 -> Move Wellpoint System During Tailings Excavation								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Wellpoint operations	110 days		1.00 day/day		2640.0	110.0	Dewater	1.0	Dewatering system	1,250.00	2640.0	3,300,000	264,000								
								2.0	Pickup trucks	34.50	5280.0	182,160	47,520	3168.0	F/M	58.00	183,744				
														12672.0	Labourers (4)	45.00	570,240				
			1.00 day/day		2640.0	110.0	Support	1.0	35-ton excavator	218.50	2640.0	576,840	113,520	3168.0	Operator	55.00	174,240				
					WTP operating costs (for dewatered tailings in season 3)			Treat						2640.0				1.0	ls	300,000	300,000

Total Cost ----->	4,059,000	Equipment	Subtotal ----->	4,059,000	Subtotal ----->	928,224	Subtotal ----->	300,000
	928,224	Labour						
	300,000	Other						
	5,287,224							
Direct Unit Cost ----->	48,066	\$/day	Fuel Consumption (litres) ----->	425,040	Camp Days ----->	1,804		

Estimator Notes -----> Based on widely different conceptual responses from two dewatering vendors. Costs carried in the estimate were between the two responses, weighted towards the more expensive one.

Managing the well point system during tailings removal from the TSF will be a full time job. This worksheet assumes a 6-man crew with an excavator 24 hrs per day for the duration of the Season #3 work.

It will be challenging to coordinate the tailings removal operation with the well point dewatering operation. The wellpoints need to stay far enough ahead to dewater the tailings before the truck & shovel operation gets there and also not be in the way.

The operating costs for the WTP during Season #3 tailings removal is an allowance only since the amount of water that will need treatment is not known with any certainty.

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Activity 320 -> Haul PAG Rock From West Mid Pile to TSF								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	68,050 cm			160 cm/hr	425.3	42.5	Load	1.0	35-ton excavator	218.50	425.3	92,931	18,288	510.4	Operator	55.00	28,071				
							Haul	2.0	40-ton ADT	210.50	850.6	179,057	29,772	1020.8	Teamster	50.00	51,038				
							Spread	1.0	D7 dozer	189.50	425.3	80,597	14,886	510.4	Operator	51.00	26,029				

Total Cost ----->	352,584	Equipment	Subtotal ----->	352,584	Subtotal ----->	105,137	Subtotal ----->	0
	105,137	Labour						
	0	Other						
	457,721							
Direct Unit Cost ----->	6.73	\$/cm	Fuel Consumption (litres) ----->	62,946	Camp Days ----->	170		

Estimator Notes -----> This rock will generally serve as the new working surfaces in the TSF area. It will later be mixed with and removed with the next 2m lift of tailings.

This activity is intermittent during the course of tailings removal from the TSF to the pit. To keep up with the tails/rock removal, a much lower production rate than 160 cm/hr shown would be required.

Assumed that all rockfill brought to the TSF, after the initial platform (Activity 235), is by trucks returning from the pit after dumping their tails/rock mixtures.

This means that most truck costs are already accounted for in the tails/rock relocation costs (Activities 250 and 325).

However, to account for the inefficiencies a backhaul operation would impose on the regular truck cycling operations, a nonimal two trucks are included on this worksheet to add money in the estimate for that.

Allow a D7 dozer at the TSF for dozing dumped loads. No extra compaction required.

See Activity 235 for derivation of the160 cm/hr production rate.

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Activity 325 -> Haul Tailings/Rock/Subexcavation Mixture from TSF To Pit (double shift operation)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	353,200 cm			160 cm/hr	2207.5	110.4	Load	2.0	35-ton excavator	218.50	4415.0	964,678	189,845	5298.0	Operator	55.00	291,390				
							Haul	6.0	40-ton ADT	210.50	13245.0	2,788,073	463,575	15894.0	Teamster	50.00	794,700				
							Spread	1.0	D7 dozer	189.50	2207.5	418,321	77,263	2649.0	Operator	51.00	135,099				
							Lighting	8.0	Light towers (night shift only)	15.50	8830.0	136,865	44,150								

Total Cost ----->	4,307,936	Equipment	Subtotal ----->	4,307,936	Subtotal ----->	1,221,189	Subtotal ----->	0
	1,221,189	Labour						
	0	Other						
	5,529,125							
Direct Unit Cost ----->	15.65	\$/cm	Fuel Consumption (litres) ----->	774,833	Camp Days ----->	1,987		

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 9 kph, or 34 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 40 minutes
Number of round trips per hour per truck = 1.5
Assume an average of 9 truck loads per hour can be accommodated at the pit (1 every 6.6 minutes)
Number of trucks required to maintain 9 loads per hour rate = 9/1.5 = 6
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer in the pit for dozing dumped loads. No extra compaction required. Light plants are included for the afternoon shift.
Allow an extra excavator at the TSF to assist with rock mixing at the work front and perform any other duties to maintain production (i.e., helping the dozer with new rock platforms or assisting the dewatering crew).
On accasion, these trucks will return to the TSF with a backhaul of waste rock. See Activity 255 for information on how those costs are reflected in the estimate

The camp days are over a 110 day period at 18 beds per day (9 men/shift x 2 shift/day).

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Activity 330 -> Haul Sand From Dam To Exposed TSF Surfaces								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	34,325 cm		145 cm/hr		236.7	23.7	Load	1.0	35-ton excavator	218.50	236.7	51,724	10,179	284.1	Operator	55.00	15,624				
					236.7	23.7	Haul	2.0	40-ton ADT	210.50	473.4	99,661	16,571	568.1	Teamster	50.00	28,407				
					236.7	23.7	Spread	1.0	D7 dozer	189.50	236.7	44,859	8,285	284.1	Operator	51.00	14,488				

Total Cost ----->		196,244	Equipment	Subtotal ----->		196,244	Subtotal ----->		58,518	Subtotal ----->		0
		58,518	Labour									
		0	Other									
		254,763										
Direct Unit Cost ----->		7.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.4 km haul distance, 0.8 km round trip.
Assume an average haul speed in both directions of 5 kph, or 10 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 15 minutes
Number of round trips per hour per truck = 4
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the TSF.
Number of trucks required to maintain 8 loads per hour rate = 8/4 = 2
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)

Allow a D7 dozer for spreading dumped loads. No extra compaction required.
Some of this sand will be hauled to stockpile and used the following year to finish rehabilitating the dam and seepage pond areas.

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Activity 335 -> Haul NAG Rock From Mill And W.Lower Pile to TSF (overlain over sand bedding)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread (from mill area)	79,800 cm	145 cm/hr	550.3	55.0			Load	1.0	35-ton excavator	218.50	550.3	120,250	23,665	660.4	Operator	55.00	36,323				
							Haul	4.0	40-ton ADT	210.50	2201.4	463,390	77,048	2641.7	Teamster	50.00	132,083				
							Spread	1.0	D7 dozer	189.50	550.3	104,290	19,262	660.4	Operator	51.00	33,681				
Load, haul, dump, spread (from W. Lower pile)	57,450 cm	145 cm/hr	396.2	39.6			Load	1.0	35-ton excavator	218.50	396.2	86,571	17,037	475.4	Operator	55.00	26,150				
							Haul	4.0	40-ton ADT	210.50	1584.8	333,606	55,469	1901.8	Teamster	50.00	95,090				
							Spread	1.0	D7 dozer	189.50	396.2	75,081	13,867	475.4	Operator	51.00	24,248				

Total Cost ----->			1,183,190	Equipment	Subtotal ----->			1,183,190	Subtotal ----->			347,574	Subtotal ----->			0
			347,574	Labour												
			0	Other												
			1,530,763													
Direct Unit Cost ----->			11.15	\$/cm												

Estimator Notes -----> Assumed production rate and truck requirements:

For mill area rock:

Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the TSF.
Number of trucks required to maintain 8 loads per hour rate = 8/2 = 4
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

For W. Lower pile rock:

Assume a 2.0 km haul distance, 4.0 km round trip.
Assume an average haul speed in both directions of 10 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the TSF.
Number of trucks required to maintain 8 loads per hour rate = 8/2 = 4
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

Haulage of mill NAG is assumed to take place along the refurbished road from the mill direct to the TSF. Costs for road refurbishment included with Activity 120.
Some of this rock will be hauled to stockpile and used the following year to finish rehabilitating the dam and seepage pond areas.

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Activity 340 -> Reconstruct Dome Creek And Its Riparian Zone Through The TSF Area								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Grizzly/screen work for cobbles	5,000 tonnes			50 tonnes/hr	100.0	10.0	Screen	1.0						120.0	Operator	included -->		5,000	tonnes	5.00	25,000
Load at screen, haul, dump, place	2,000 cm			18 cm/hr	111.1	11.1	Load	1.0	Front end loader	198.00	111.1	22,000	4,222	133.3	Operator	55.00	7,333				
				18 cm/hr	111.1	11.1	Haul	2.0	40-ton ADT	210.50	222.2	46,778	7,778	266.7	Teamster	50.00	13,333				
				18 cm/hr	111.1	11.1	Place	1.0	Excavator	218.50	111.1	24,278	4,778	133.3	Operator	55.00	7,333				

Total Cost ----->	93,056	Equipment	Subtotal ----->	93,056	Subtotal ----->	28,000	Subtotal ----->	25,000
	28,000	Labour						
	25,000	Other	Fuel Consumption (litres) ----->	16,778	Camp Days ----->	54		
	<u>146,056</u>							
Direct Unit Cost ----->	73.03	\$/cm						

Estimator Notes -----> Very little information available, including where to source the cobbles.
Assume a screening operation 5 km away, with cobbles delivered to the TSF where an excavator places the cobbles in the trench incorporated previously in the TSF cover.
Assume excavator places one 18 cm ADT load an hour.

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Activity 345 -> Haul NAG Rock From S and SW Upper piles to buttress at south end of pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	63,200 cm		160 cm/hr		395.0	39.5	Load	1.0	35-ton excavator	218.50	395.0	86,308	16,985	474.0	Operator	55.00	26,070				
							Haul	4.0	40-ton ADT	210.50	1580.0	332,590	55,300	1896.0	Teamster	50.00	94,800				
							Spread	1.0	D7 dozer	189.50	395.0	74,853	13,825	474.0	Operator	51.00	24,174				
							Compact	1.0	Compactor	87.00	395.0	34,365	5,530	474.0	Operator	51.00	24,174				

Total Cost ----->	528,115	Equipment	Subtotal ----->	528,115	Subtotal ----->	169,218	Subtotal ----->	0
	169,218	Labour						
	0	Other	Fuel Consumption (litres) ----->	91,640	Camp Days ----->	277		
	697,333							
Direct Unit Cost ----->	11.03	\$/cm						

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.5 km haul distance from both waste dump areas, 1.0 km round trip.
Assume an average haul speed in both directions of 5 kph, or 12 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 18 minutes
Number of round trips per hour per truck = 3.33
Assume an average of 9 truck loads per hour are delivered to the buttress area.
Number of trucks required to maintain 9 loads per hour rate = 9/3.3 = 3
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer for spreading dumped loads. Light compaction is also assumed for this important component of the pit backfill.

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Activity 350 -> Haul PAG Rock, Hydrocarbon Soils, And Tails From Misc Areas Around Site To The Pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread (from mill/camp areas)	30,823 cm	110 cm/hr	280.2	28.0			Load	1.0	35-ton excavator	218.50	280.2	61,226	12,049	336.3	Operator	55.00	18,494				
							Haul	3.0	40-ton ADT	210.50	840.6	176,952	29,422	1008.8	Teamster	50.00	50,438				
							Spread	1.0	D7 dozer	189.50	280.2	53,100	9,807	336.3	Operator	51.00	17,149				
Load, haul, dump, spread (from other areas)	13,683 cm	75 cm/hr	182.4	18.2			Load	1.0	35-ton excavator	218.50	182.4	39,863	7,845	218.9	Operator	55.00	12,041				
							Haul	2.0	40-ton ADT	210.50	364.9	76,807	12,771	437.9	Teamster	50.00	21,893				
							Spread	1.0	D7 dozer	189.50	182.4	34,572	6,385	218.9	Operator	51.00	11,165				
Access to difficult areas (imported NAG rock for roads)	20,000 cm	110 cm/hr	181.8	18.2			Load	1.0	35-ton excavator	218.50	181.8	39,727	7,818	218.2	Operator	55.00	12,000				
							Haul	2.0	40-ton ADT	210.50	363.6	76,545	12,727	436.4	Teamster	50.00	21,818				
							Spread	1.0	D7 dozer	189.50	181.8	34,455	6,364	218.2	Operator	51.00	11,127				
Total Cost ----->		593,247	Equipment					Subtotal ----->		593,247				Subtotal ----->		176,125		Subtotal ----->		0	
		176,125	Labour																		
		0	Other																		
		769,372																			
Direct Unit Cost ----->		17.29	\$/cm									Fuel Consumption (litres) ----->		105,188		Camp Days ----->		286			

Estimator Notes -----> Assumed production rate and truck requirements:

For mill area rock:
Assume a 2.0 km haul distance, 4.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 19 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 25 minutes
Number of round trips per hour per truck = 2.4
Assume an average of 6 truck loads per hour are delivered to the pit.
Number of trucks required to maintain 6 loads per hour rate = 6/2.4 = 3
Assume truck payload = 18 cm ---> Hourly rate = 6 x 18 = 108 cm/hr (use 110 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

A few areas might be difficult to get to, including the tailings pockets downstream of the sed pond and the tailings ponds near the mill.
Assume 10,000 m3 of NAG rock will be required to develop access to various difficult areas, handled twice (once in, once out).
Assume NAG material can be sourced within a distance of 1 km.

For other areas (Ketza, roads, sed pond area):
Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 22 minutes
Number of round trips per hour per truck = 2.7
Assume an average of 4 truck loads per hour are delivered to the pit.
Number of trucks required to maintain 4 loads per hour rate = 4/2.7 = 2
Assume truck payload = 18 cm ---> Hourly rate = 4 x 18 = 72 cm/hr (use 75 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

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Activity 355 -> Haul PAG Rock From Dumps To Pit (for horizontal layers)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	170,280 cm	160 cm/hr	1064.3	106.4			Load	1.0	35-ton excavator	218.50	1064.3	232,539	45,763	1277.1	Operator	55.00	70,241				
							Haul	3.0	40-ton ADT	210.50	3192.8	672,074	111,746	3831.3	Teamster	50.00	191,565				
							Spread	1.0	D7 dozer	189.50	1064.3	201,675	37,249	1277.1	Operator	51.00	65,132				

Total Cost ----->	1,106,288	Equipment	Subtotal ----->		1,106,288	Subtotal ----->		326,938	Subtotal ----->		0
	326,938	Labour	Fuel Consumption (litres) ----->		194,758	Camp Days ----->		532			
	0	Other									
	1,433,225										
Direct Unit Cost ----->	8.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
PAG rock will be relocated from the NW, W.Mid, and E waste dump piles and placed in sandwich-like layers with the tails/rock material brought in from the TSF.
Haul distances from each waste dump area will vary. In addition, haul distances will change as the pit is backfilled and starts to extend up over the pit rim.
This worksheet assumes that the pit ramp at the south end of the pit is no longer required.

Assume a 0.5 km haul distance, 1.0 km round trip (see additional notes below).
Assume an average haul speed in both directions of 5 kph, or 12 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 18 minutes
Number of round trips per hour per truck = 3.3
Assume an average of 9 truck loads per hour can be accommodated at the pit.
Number of trucks required to maintain 9 loads per hour rate = 9/3.3 = 3
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer at the pit for dozing dumped loads. No extra compaction required.

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Activity 360 -> Remove Special Waste For Disposal Off Site								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Off-Site Special Waste Removal	Allowance for chemicals removal																	1.0	ls	400,000	400,000
	Allowance for waste removal (2,076 m3)																	1.0	ls	2,100,000	2,100,000

Total Cost ----->		0	Equipment	Subtotal ----->		0	Subtotal ----->		0	Subtotal ----->		2,500,000
		0	Labour									
		2,500,000	Other	Fuel Consumption (litres) ----->		0	Camp Days ----->		0			
		<u>2,500,000</u>										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Waste assumed trucked to Fort Nelson.

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Activity 365 -> Rough Grade Remaining Waste Rock Dump Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rough landforming	5 ha		0.05 ha/hr		100.0	10.0	Grading	2.0	D9 dozer w/ ripper	390.00	200.0	78,000	12,000	240.0	Operator	55.00	13,200				

Total Cost ----->	78,000	Equipment										Subtotal ----->	78,000				Subtotal ----->	13,200			Subtotal ----->	0
	13,200	Labour																				
	0	Other										Fuel Consumption (litres) ----->	12,000				Camp Days ----->	20				
	91,200																					
Direct Unit Cost ----->	18,240.00	\$/ha																				

Estimator Notes -----> Scope of work is not known at this time. Used a nominal production rate to generate dozer hours.

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Activity 370 -> Rough Grade Remaining Mill And Camp Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rough landforming	10	ha	0.05	ha/hr	200.0	20.0	Grading	2.0	D9 dozer w/ ripper	390.00	400.0	156,000	24,000	480.0	Operator	55.00	26,400				

Total Cost ----->	156,000	Equipment	Subtotal ----->	156,000	Subtotal ----->	26,400	Subtotal ----->	0
	26,400	Labour						
	0	Other						
	182,400							
Direct Unit Cost ----->	18,240.00	\$/ha	Fuel Consumption (litres) ----->	24,000	Camp Days ----->	40		

Estimator Notes -----> Scope of work is not known at this time. Used a nominal production rate to generate dozer hours.

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Activity 375 -> Place Interim Pit Cover

Activity 375 -> Place Interim Pit Cover								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Crush/screen subcontractor	55,200 tonnes			150 tonnes/hr	368.0	36.8	Crush	1.0	Jaw crusher					441.6	Operator	included -->		55,200	tonnes	10.00	552,000
Load, haul, dump, spread (300 mm crushed from W. Lower pile area)	24,000 cm			160 cm/hr	150.0	15.0	Load	1.0	980 front end loader	198.00	150.0	29,700	5,700	180.0	Operator	55.00	9,900				
							Haul	3.0	40-ton ADT	210.50	450.0	94,725	15,750	540.0	Teamster	50.00	27,000				
							Spread	1.0	D7 dozer	189.50	150.0	28,425	5,250	180.0	Operator	51.00	9,180				
Load, haul, dump, spread (1000 mm silty sand from Victoria Creek)	80,000 cm			160 cm/hr	500.0	50.0	Load	1.0	35-ton excavator	218.50	500.0	109,250	21,500	600.0	Operator	55.00	33,000				
							Haul	7.0	40-ton ADT	210.50	3500.0	736,750	122,500	4200.0	Teamster	50.00	210,000				
				160 cm/hr	500.0	50.0	Spread	1.0	D7 dozer	189.50	500.0	94,750	17,500	600.0	Operator	51.00	30,600				

Total Cost ----->	1,093,600	Equipment	Subtotal ----->	1,093,600	Subtotal ----->	364,080	Subtotal ----->	552,000
	364,080	Labour						
	552,000	Other	Fuel Consumption (litres) ----->	188,200	Camp Days ----->	662		
	2,009,680							
Direct Unit Cost ----->	19.32	\$/cm						

Estimator Notes -----> Assumed production rate and truck requirements:

For crushed rock:

Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 21 minutes
Number of round trips per hour per truck = 2.9
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 6 loads per hour rate = 9/2.9 = 3
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

The interim pit cover is assumed to consist of a 300 mm thick layer of lightly crushed rock, overlain with 1000 mm of silty sand from the Victoria Creek area.
Flag persons have been added to the Victoria Creek work due to haulage along the public road.
It is assumed that no royalties are payable on this off-site borrow material and that borrow pit development and reclamation will be minimal.
Tonnage for crushing = cm volume x 2 tonnes/cm + plus a 15% waste factor.

For Victoria Creek pit run sand:

Assume a 5.0 km haul distance, 10.0 km round trip.
Assume an average haul speed in both directions of 15 kph, or 40 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 45 minutes
Number of round trips per hour per truck = 1.3
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 9 loads per hour rate = 9/1.3 = 7
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

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Activity 380 -> Contractor Demobilization And Site Winterizing								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Demobilization	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	200.0	18,600	2,400	240.0	Teamster	50.00	12,000				
														480.0	Labourer (2)	37.00	17,760				
														240.0	Labour F/M	58.00	13,920				
	Crane rental for heavier lifts																	3.0	ls	5,000	15,000
Lowbed loads from site																		50.0	ea	2,500	125,000
Hiboy loads from site																		50.0	ea	1,000	50,000
Site Winterizing	Allowance for winterizing the WTP																	1.0	ls	75,000	75,000
	Allowance for winterizing the camp																	1.0	ls	25,000	25,000

Total Cost ----->		18,600	Equipment	Subtotal ----->		18,600	Subtotal ----->		43,680	Subtotal ----->		290,000
		43,680	Labour									
		290,000	Other	Fuel Consumption (litres) ----->		2,400	Camp Days ----->		80			
		352,280										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Allowance included to winterize both the camp and the WTP between Seasons #3 and #4.

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SEASON #3 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Field Staff Expenses	Salaries and benefits																				
							Project manager							19.0	week	6,000	114,000				
							General superintendent (day shift)							17.0	week	5,500	93,500				
							General superintendent (night shift)							17.0	week	5,500	93,500				
							Project engineer							17.0	week	4,750	80,750				
							Field engineer (2)							34.0	week	3,750	127,500				
							Office administrator							17.0	week	3,750	63,750				
							Survey crew (2-men)							12.0	week	6,000	72,000				
	Rotations, terminal travel																				
							Terminal travel (9 men x 2 ways)											18.0	trips	750	13,500
							Rotations (every 4 weeks x 2 ways)											49.0	trips	750	36,750
Field expenses	Vehicles																				
							Pickup trucks (assumed 50% utilization for fuel use estimate)	9.0	3/4-ton pickup	34.50	9,310.0	321,195	41,895								
	Trailer rentals																	19.0	week	750	14,250
	Office equipment, computers																	145.0	man-week	75	10,875
	Office/safety/enviro/survey supplies																	145.0	man-week	100	14,500
	Radios, phones, communications																	145.0	man-week	50	7,250
	Outside consultants, lab tests																	2.0	ls	10,000	20,000
	Small tools																	90076.7	hrs	2.00	180,153
Field Labour Expenses	Equipment fueling/maintenance (assume 6 mechanics for 16 weeks)																				
							Mechanic w/ fuel/lube truck	6.0	Fuel/lube truck	92.50	1,120.0	621,600	168,000	8,064.0	Mechanic	55.00	443,520				
	General bullgang crew (assume 12 weeks not already in direct costs)																				
							Hiab w/ teamster	1.0	Hiab	93.00	840.0	78,120	10,080	1,008.0	Teamster	50.00	50,400				
							Labourers							1,008.0	Labourer	37.00	37,296				
	Haul road maintenance (assume 2 full time graders, 1 full time water)																				
							Grader	2.0	Grader	178.00	1,120.0	398,720	71,680	2,688.0	Operator	51.00	137,088				
							Water truck	1.0	Water truck	93.00	1,120.0	104,160	24,640	1,344.0	Teamster	50.00	67,200				

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	Float services (assume nominal amount)															
	Mac truck		1.0	Tractor	92.50	300.0	27,750	7,500	360.0	Teamster	50.00	18,000				
	Lowboy		1.0	Trailer	75.00	300.0	22,500	0								
Other project costs	Home office overhead (say 0.25% of direct costs)												1.0	Home office	54,632	54,632
	Bonds & insurance (say 0.75% of direct costs)												1.0	Insurance	163,897	163,897
	Profit (target ~35% of labour and ~8% of total cost)												1.0	Is	2,000,000	2,000,000
Camp	Catering & housekeeping												9,008	days	75.00	675,575

Total Cost ----->	1,574,045	Equipment	Subtotal ----->	1,574,045	Subtotal ----->	1,398,504	Subtotal ----->	3,191,383
	1,398,504	Labour						
	3,191,383	Other						
	6,163,932							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	323,795	Camp Days ----->	2,221		

Estimator Notes -----> This sheet covers general contractor overhead field and home office costs during Season #3.
A team of 7 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them.
Other contractor indirect costs include a mechanic with fuel/lube truck, a small bullgang crew for odd jobs around the site, a road maintenance crew, and float services.
Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here.
The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #3 worksheets.
The small tools allowance also draws on the total camp days from the Cost Summary worksheet.

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Activity 410 -> Contractor Mobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	75.0	6,975	900	90.0	Teamster	50.00	4,500				
														270.0	Labourer (3)	37.00	9,990				
														90.0	Labour F/M	58.00	5,220				
	Crane rental for heavier lifts Lowbed loads to site Hiboy loads to site																	1.0	ls	5,000	5,000
																		15.0	ea	2,500	37,500
																		15.0	ea	1,000	15,000
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														360.0	Labourer (3)	37.00	13,320				
														120.0	Labour F/M	58.00	6,960				
Camp	Allowance for unwinterizing the camp																	1.0	ls	15,000	15,000

Total Cost ----->		16,275	Equipment	Subtotal ----->		16,275	Subtotal ----->		45,990	Subtotal ----->		72,500
		45,990	Labour									
		72,500	Other									
		<u>134,765</u>										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
Only the camp needs to be unwinterized. The WTP will be mothballed this season, in the event it is required in later years for water treatment.

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Activity 415 -> Stockpile Balance Of Sand From Dams To Pit/Cover Area								EQUIPMENT						LABOUR				OTHER				
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost	
Load, haul, dump, spread	69,890 cm				160 cm/hr	436.8	43.7	Load	1.0	35-ton excavator	218.50	436.8	95,444	18,783	524.2	Operator	55.00	28,830				
								Haul	5.0	40-ton ADT	210.50	2,184.1	459,745	76,442	2,620.9	Teamster	50.00	131,044				
								Spread	1.0	D7 dozer	189.50	436.8	82,776	15,288	524.2	Operator	51.00	26,733				

Total Cost ----->		637,965	Equipment	Subtotal ----->		637,965	Subtotal ----->		186,606	Subtotal ----->		0
		186,606	Labour									
		0	Other									
		824,571										
Direct Unit Cost ----->		11.80	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 9 truck loads per hour are delivered to stockpile.
Number of trucks required to maintain 9 loads per hour rate = 9/2 = 5
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer for spreading dumped loads.
This sand will be stockpiled close to the pit area and available for repairs to the interim cover or for incorporation into the final cover.

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Activity 420 -> Haul Sand & Rock From Stockpile And Place Over Exposed Dam Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	35,000 cm	145 cm/hr	241.4	24.1			Load	1.0	35-ton excavator	218.50	241.4	52,741	10,379	289.7	Operator	55.00	15,931				
							Haul	2.0	40-ton ADT	210.50	482.8	101,621	16,897	579.3	Teamster	50.00	28,966				
							Spread	1.0	D7 dozer	189.50	241.4	45,741	8,448	289.7	Operator	51.00	14,772				

Total Cost ----->		200,103	Equipment	Subtotal ----->		200,103	Subtotal ----->		59,669	Subtotal ----->		0
		59,669	Labour									
		0	Other									
		259,772										
Direct Unit Cost ----->		7.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.4 km haul distance, 0.8 km round trip.
Assume an average haul speed in both directions of 5 kph, or 10 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 15 minutes
Number of round trips per hour per truck = 4
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the dams.
Number of trucks required to maintain 8 loads per hour rate = 8/4 = 2
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)

Allow a D7 dozer for spreading dumped loads. No extra compaction required.

The cost of winning the material (sand bedding and rock cover) and stockpiling it near the dam areas is included with Activities 330 and 335.
The total volume of sand and rock assumed stockpiled is (34,325 + 137,250) * 20% = 34,315 cm -> used 35,000

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Activity 425 -> Reconstruct Dome Creek And Its Riparian Zone Through The Dam Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Grizzly/screen work for cobbles	1,250 tonnes			50 tonnes/hr	25.0	2.5	Screen	1.0						30.0	Operator	included -->		1,250	tonnes	5.00	6,250
Load at screen, haul, dump, place	500 cm			18 cm/hr	27.8	2.8	Load	1.0	Front end loader	198.0	27.78	5,500	1,194	33.3	Operator	55.00	1,833				
				18 cm/hr	27.8	2.8	Haul	2.0	40-ton ADT	210.5	55.56	11,694	1,944	66.7	Teamster	50.00	3,333				
				18 cm/hr	27.8	2.8	Place	1.0	Excavator	218.5	27.78	6,069	389	33.3	Operator	55.00	1,833				

Total Cost ----->	23,264	Equipment	Subtotal ----->	23,264	Subtotal ----->	7,000	Subtotal ----->	6,250
	7,000	Labour						
	6,250	Other						
	<u>36,514</u>							
Direct Unit Cost ----->	73.03	\$/cm	Fuel Consumption (litres) ----->	3,528	Camp Days ----->	14		

Estimator Notes -----> Very little information available, including where to source the cobbles. Assumed to be one quarter the effort required through the TSF.
Assume a screening operation 5 km away, with cobbles delivered to the TSF where an excavator places the cobbles in the trench incorporated previously in the TSF cover.
Assume excavator places one 18 cm ADT load an hour.

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Activity 430 -> Final Grade & Revegetate TSF & Dam Areas (classed as high priority)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Revegetation crew	2.7 ha	0.01 ha/hr	270.0	27.0	Reveg	1.0	25-ton excavator	131.00	270.0	35,370	6,480	324.0	Operator	51.00	16,524						
						1.0	Backhoe/loader	53.50	270.0	14,445	2,970	324.0	Operator	51.00	16,524						
						1.0	Truck w/ brush saw	55.50	270.0	14,985	4,050	324.0	Teamster	50.00	16,200						
						5.0	Pickup truck	34.50	1,350.0	46,575	12,150										
						1.0					324.0	F/M	58.00	18,792							
						10.0					3,240.0	Labourer (10)	37.00	119,880							
Supplies	Seed w/ native mix																	150	kg	150.00	22,500
	Fertilizer																	650	kg	2.50	1,625
	Mulch																	2	tonnes	2,000	4,000
	Biochar																	4,000	kg	5.00	20,000
	Staked willows																	23,000	ea	7.50	172,500
	Transplants (white spruce & trembling aspen)																	4,000	ea	10.00	40,000
	Coarse woody debris (produced on site)																				

Total Cost ----->	111,375	Equipment	Subtotal ----->		111,375	Subtotal ----->		187,920	Subtotal ----->		260,625
	187,920	Labour									
	260,625	Other	Fuel Consumption (litres) ----->		25,650	Camp Days ----->		378			
	559,920										
Direct Unit Cost ----->	207,377.78	\$/ha									

Estimator Notes -----> Assume an area 30 m x 30 m can, on average, be rehabilitated each day with the crew shown.

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Activity 435 -> Final Grade & Revegetate Mill & Camp Areas (classed as moderate priority)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Revegetation crew	2.0 ha		0.01 ha/hr		200.0	20.0	Reveg	1.0	Small excavator	131.00	200.0	26,200	4,800	240.0	Operator	51.00	12,240				
								1.0	Backhoe/loader	53.50	200.0	10,700	2,200	240.0	Operator	51.00	12,240				
								1.0	Truck w/ brush saw	55.50	200.0	11,100	3,000	240.0	Teamster	50.00	12,000				
								5.0	Pickup truck	34.50	1,000.0	34,500	9,000								
								1.0						240.0	F/M	58.00	13,920				
								10.0						2,400.0	Labourer (10)	37.00	88,800				
Supplies																		100	kg	150.00	15,000
																		500	kg	2.50	1,250
																		1.5	tonnes	2,000	3,000
																		2,750	kg	5.00	13,750
																		17,000	ea	7.50	127,500
																		3,000	ea	10.00	30,000

Total Cost ----->	82,500	Equipment	Subtotal ----->		82,500	Subtotal ----->		139,200	Subtotal ----->		190,500
	139,200	Labour									
	190,500	Other	Fuel Consumption (litres) ----->		19,000	Camp Days ----->		280			
	412,200										
Direct Unit Cost ----->	206,100.00	\$/ha									

Estimator Notes -----> Assume an area 30 m x 30 m can, on average, be rehabilitated each day with the crew shown.

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Activity 435 -> Final Grade & Revegetate Dump & Cover Areas (classed as moderate priority)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Revegetation crew	3.2 ha	0.01 ha/hr	320.0	32.0	Reveg	1.0	Small excavator	131.00	320.0	41,920	7,680	384.0	Operator	51.00	19,584						
						1.0	Backhoe/loader	53.50	320.0	17,120	3,520	384.0	Operator	51.00	19,584						
						1.0	Truck w/ brush saw	55.50	320.0	17,760	4,800	384.0	Teamster	50.00	19,200						
						5.0	Pickup truck	34.50	1,600.0	55,200	14,400										
						1.0					384.0	F/M	58.00	22,272							
						10.0					3,840.0	Labourer (10)	37.00	142,080							
Supplies																					
	Seed w/ native mix																	150	kg	150.00	22,500
	Fertilizer																	800	kg	2.50	2,000
	Mulch																	2.4	tonnes	2,000	4,800
	Biochar																	4,450	kg	5.00	22,250
	Staked willows																	27,200	ea	7.50	204,000
	Transplants (white spruce & trembling aspen)																	4,800	ea	10.00	48,000
Coarse woody debris (produced on site)																					

Total Cost ----->	132,000	Equipment			Subtotal ----->	132,000			Subtotal ----->	222,720			Subtotal ----->	303,550
	222,720	Labour												
	303,550	Other			Fuel Consumption (litres) ----->		30,400		Camp Days ----->		448			
	658,270													
Direct Unit Cost ----->	205,709.38	\$/ha												

Estimator Notes -----> Assume an area 30 m x 30 m can, on average, be rehabilitated each day with the crew shown.

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Activity 445 -> Backfill & Revegetate Exploration Trenches								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Backfill trenches	5,500 m	20 m/r	275.0	27.5	Reveg	1.0	Truck w/ brush saw	55.50	275.0	15,263	4,125	330.0	Teamster	50.00	16,500						
						1.0	35-ton excavator	218.50	275.0	60,088	11,825	330.0	Operator	55.00	18,150						
						1.0	D7 Dozer	189.50	275.0	52,113	9,625	330.0	Operator	51.00	16,830						
						1.0					330.0	F/M	58.00	19,140							
						3.0					990.0	Labourer (3)	37.00	36,630							

Total Cost ----->		127,463	Equipment	Subtotal ----->		127,463	Subtotal ----->		107,250	Subtotal ----->		0
		107,250	Labour									
		0	Other									
		234,713										
Direct Unit Cost ----->		42.68	\$/m									

Estimator Notes -----> Assumed a D7 dozer, an excavator, and a truck w/ brush saw can decommission on average 20 m of trench per 10-hr day.

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Activity 450 -> Decommission Site Roads								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rip, grade, and contour	8,600 m	20 m/r			430.0	43.0	Roads	1.0	D9 dozer w/ ripper	390.00	430.0	167,700	25,800	516.0	Operator	55.00	28,380				
								1.0	35-ton excavator	218.50	430.0	93,955	18,490	516.0	Operator	55.00	28,380				
								1.0	D7 Dozer	189.50	430.0	81,485	15,050	516.0	Operator	51.00	26,316				

Total Cost ----->	343,140	Equipment	Subtotal ----->	343,140	Subtotal ----->	83,076	Subtotal ----->	0
	83,076	Labour						
	0	Other						
	426,216							
Direct Unit Cost ----->	49.56	\$/m	Fuel Consumption (litres) ----->	59,340	Camp Days ----->	129		

Estimator Notes -----> Assumed a dozer w/ ripper, a D7 dozer, and an excavator can decommission on average 200 m of road per 10-hr day.

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Activity 450 -> Final Cleanup And Contractor Demobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Equipment demob	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	75.0	6,975	900	90.0	Teamster	50.00	4,500				
														180.0	Labourer (2)	37.00	6,660				
														90.0	Labour F/M	58.00	5,220				
	Crane rental for heavier lifts																	1.0	ls	5,000	5,000
	Lowbed loads from site																	15.0	ea	2,500	37,500
	Hiboy loads from site																	15.0	ea	1,000	15,000
Camp Removal, WTP Mothballing	Allowance for mothballing WTP													1,000.0				1.0	ls	100,000	100,000
	Allowance for camp removal													500.0				1.0	ls	100,000	100,000

Total Cost ----->		6,975	Equipment	Subtotal ----->		6,975	Subtotal ----->		16,380	Subtotal ----->		257,500
		16,380	Labour									
		257,500	Other	Fuel Consumption (litres) ----->		900	Camp Days ----->		155			
		280,855										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> The WTP will be mothballed in Season #4, available to be put in use if water quality monitoring after closure shows that water needs to be treated.
The camp is assumed removed after the completion of Season #4.

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SEASON #4 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Field Staff Expenses	Salaries and benefits																				
							Project manager							17.0	week	6,000	102,000				
							Project engineer							13.0	week	4,750	61,750				
							Field engineer							13.0	week	3,750	48,750				
							Office administrator							13.0	week	3,750	48,750				
							Survey crew (2-men)							2.0	week	6,000	12,000				
	Rotations, terminal travel																				
							Terminal travel (6 men x 2 ways)											12.0	trips	750	9,000
							Rotations (every 4 weeks x 2 ways)											20.0	trips	750	15,000
	Vehicles																				
							Pickup trucks (assumed 50% utilization for fuel use estimate)	5.0	3/4-ton pickup	34.50	4,060.0	140,070	18,270								
Field expenses	Trailer rentals																	17.0	week	750	12,750
	Office equipment, computers																	60.0	man-week	75	4,500
	Office/safety/enviro/survey supplies																	60.0	man-week	100	6,000
	Radios, phones, communications																	60.0	man-week	50	3,000
	Outside consultants, lab tests																	1.0	ls	10,000	10,000
	Small tools (not including WTP hrs)																	27,769	hrs	2.00	55,539
Field Labour Expenses	Equipment fueling/maintenance (assume 2 mechanics for 8 weeks)																				
							Mechanic w/ fuel/lube truck	2.0	Fuel/lube truck	92.50	560.0	103,600	28,000	1,344.0	Mechanic	55.00	73,920				
	General bullgang crew (assume 8 weeks not already in direct costs)																				
							Hiab w/ teamster	1.0	Hiab	93.00	560.0	52,080	6,720	672.0	Teamster	50.00	33,600				
							Labourers							672.0	Labourer	37.00	24,864				
	Haul road maintenance (assume 50% grader, 25% water, over 8 weeks)																				
							Grader	0.50	Grader	178.00	560.0	49,840	8,960	336.0	Operator	51.00	17,136				
							Water truck	0.25	Water truck	93.00	560.0	13,020	3,080	168.0	Teamster	50.00	8,400				
	Float services (assume nominal amount)																				
							Mac truck	1.0	Tractor	92.50	50.0	4,625	1,250	60.0	Teamster	50.00	3,000				

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	Lowboy		1.0	Trailer	75.00	50.0	3,750	0								
Other project costs													1.0	Home office	9,569	9,569
	Home office overhead (say 0.25% of direct costs)												1.0	Insurance	28,708	28,708
	Bonds & insurance (say 0.75% of direct costs)												1.0	Is	475,000	475,000
	Profit (equals ~35% of labour and ~8% of total cost)															
Camp													2,777	days	75.00	208,270
	Catering & housekeeping															

Total Cost ----->	366,985	Equipment	Subtotal ----->	366,985	Subtotal ----->	434,170	Subtotal ----->	837,336
	434,170	Labour						
	837,336	Other						
	1,638,491							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	66,280	Camp Days ----->	691		

Estimator Notes -----> This sheet covers general contractor overhead field and home office costs during Season #4.
A team of 4 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them.
Other contractor indirect costs include a mechanic with fuel/lube truck, a small bulgang crew for odd jobs around the site, a road maintenance crew, and float services.
Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here.
The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #4 worksheets.
The small tools allowance also draws on the total camp days from the Cost Summary worksheet.

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Activity 1005 -> Place Final Liner (five years after interim)								EQUIPMENT						LABOUR				OTHER				
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost	
CUSHION LAYER (300 mm)	24,000 cm		160 cm/hr		150.0	15.0	Load	1.0	980 front end loader	198.00	150.0	29,700	5,700	180.0	Operator	55.00	9,900					
Load, haul, dump, spread																						
(Assume straight from stockpile)			160 cm/hr		150.0	15.0	Haul	3.0	40-ton ADT	210.50	450.0	94,725	15,750	540.0	Teamster	50.00	27,000					
			160 cm/hr		150.0	15.0	Spread / Compact	1.0	D7 dozer	189.50	150.0	28,425	5,250	180.0	Operator	51.00	9,180					
								1.0	Roller	87.00	150.0	13,050	2,100	180.0	Operator	51.00	9,180					
SYNTHETIC LINER MATERIALS					GCL secondary barrier													100,000.0	m2	11.50	1,150,000	
					Geomembrane primary barrier													100,000.0	m2	13.00	1,300,000	
DRAINAGE LAYER (300 mm)	60,000 tonnes		50 tonnes/hr		1200.0	120.0																
Load, haul, dump, spread					Screening allowance for drainage layer		Screen	1.0										60,000.00	tonnes	5.00	300,000	
(Assume processed from stockpile)	24,000 cm		160 cm/hr		150.0	15.0	Load	1.0	980 front end loader	198.00	150.0	29,700	5,700	180.0	Operator	55.00	9,900					
			160 cm/hr		150.0	15.0	Haul	3.0	40-ton ADT	210.50	450.0	94,725	15,750	540.0	Teamster	50.00	27,000					
			160 cm/hr		150.0	15.0	Spread	1.0	D7 dozer	189.50	150.0	28,425	5,250	180.0	Operator	51.00	9,180					
SURFICIAL LAYER (300 mm)	Allowance for borrow development & reclaim						Borrow	1.0										1	ls	150,000	150,000	
Load, haul, dump, spread	24,000 cm		160 cm/hr		150.0	15.0	Load	1.0	35-ton excavator	218.50	150.0	32,775	6,450	180.0	Operator	55.00	9,900					
			160 cm/hr		150.0	15.0	Haul	7.0	40-ton ADT	210.50	1050.0	221,025	36,750	1260.0	Teamster	50.00	63,000					
(Assume from Victoria Creek area)					160 cm/hr	150.0	15.0	Spread	1.0	D7 dozer	189.50	150.0	28,425	5,250	180.0	Operator	51.00	9,180				
					Flag persons ---->									360.0	Flag person	37.00	13,320					

Total Cost ----->	600,975	Equipment	Subtotal ----->	600,975	Subtotal ----->	196,740	Subtotal ----->	2,900,000
	196,740	Labour						
	2,900,000	Other						
	3,697,715	Subtotal (direct costs)						
	1,294,200	35% allowance for contractor indirects						
	4,991,915							
Direct Unit Cost ----->	77.04	\$/cm						

Estimator Notes ----> Assumed production rate and truck requirements:

For borrow from nearby stockpile:
Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 21 minutes
Number of round trips per hour per truck = 2.9
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 6 loads per hour rate = 9/2.9 = 3
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

The final pit cover is assumed to consist of a 300 mm sand cushion, overlain with GCL and HDPE liners, overlain by a 300 mm drainage layer, topped with a 300 mm surficial layer.
Flag persons have been added to the Victoria Creek work due to haulage along the public road.
It is assumed that no royalties are payable on this off-site borrow material and that borrow pit development and reclamation will be minimal.
Tonnage for crushing = cm volume x 2 tonnes/cm + plus a 25% waste factor.

For borrow from Victoria Creek area:
Assume a 5.0 km haul distance, 10.0 km round trip.
Assume an average haul speed in both directions of 15 kph, or 40 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 45 minutes
Number of round trips per hour per truck = 1.3
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 9 loads per hour rate = 9/1.3 = 7
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

Appendix D - End Dump Placement Cost Estimate

			Rounded
1	Deleted costs for pit wall support - Activity 130	-268,333	290000
2	Removed dozer from pit backfill operations - Activity 250	-136,690	150000
3	Increased production rate of tails/rock removal from TSF from 9 loads/hr to 15 loads/hr - Activity 250	-327,088	340000
4	Reduce number of trucks from 5 to 3 to reflect shorter haul - Activity 260	-144,179	160000
5	Removed dozer from pit backfill operations - Activity 325	-579,925	600000
6	Increased production rate of tails/rock removal from TSF from 9 loads/hr to 15 loads/hr - Activity 325	-1,445,524	1460000
		-2,901,739	3,000,000

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					DIRECT COST BREAKDOWN			2014 \$ CDN			
Schedule Activity ID	Description of Work	Quantity	Unit	\$/unit	EQUIPMENT	LABOUR	OTHER	DIRECT COSTS	INDIRECT COSTS	TOTAL COSTS	
Detail design, construction documents, support during tender phase									2,250,000	Subtotal	
									2,250,000		
Season #1 (single shift)											
110	Contractor Mobilization & Early Works (camp trailers, office trailers)				96,450	169,420	610,000	875,870	0	875,870	
115	Construct / Install Sitewide Runoff & Sediment Control Measures				218,260	143,136	50,000	411,396	137,388	548,784	
120	Upgrade Haul Roads & Crossing Over TSF Diversion Ditch				221,790	80,808	25,000	327,598	109,403	437,001	
125	Upgrade Tunnel Plug In Pony Creek Adit				30,000	45,000	75,000	150,000	50,093	200,093	
130	Install Safety Measures In Pit				0	0	0	0	0	0	
135	Establish Revegetation Test Plots				26,215	15,036	25,000	66,251	22,125	88,376	
140	Begin Mill Demolition (mostly inside stripping)				30,000	105,000	15,000	150,000	50,093	200,093	
145	Construct / Commission Water Treatment Plant				750,000	1,000,000	3,250,000	5,000,000	1,669,779	6,669,779	
150	Set Up & Pump Water From Pit Through Water Treatment Plant				23,445	6,552	200,000	229,997	76,809	306,806	
155	Constructor Demobilization				4,650	10,920	122,500	138,070	0	138,070	
OH1	Contractor Indirects				401,583	490,054	1,224,055	0	0	0	
					1,802,393	2,065,926	5,596,555	7,349,182	2,115,691	9,464,873	Subtotal
% indirects to directs ----->									28.8		
Engineering QC/QA during Season #1 construction									500,000	Subtotal	
General site maintenance during winter months between Season #1 and Season #2 (currently done by Denison)									700,000		
									1,200,000		
Season #2 (single shift)											
210	Contractor Mobilization And Spring Break Cleanup				18,600	52,560	162,500	233,660	0	233,660	
215	Haul NAG Rock From South Pile To Pit Bottom (for platform to 1190 m)	38,750	cm	18.34	366,188	108,218	0	474,406	236,179	710,585	
220	Haul Processed Filters To Pit Bottom (placed over top of NAG platform)	4,550	cm	74.23	42,150	12,707	170,625	225,481	112,254	337,736	
225	Reshape Pit Entrance (relocate ore to pit bottom, bring in NAG rock to flatten grades)				167,686	46,342	0	214,028	106,552	320,580	
230	Set Up & Pump Water From TSF Through Water Treatment Plant				29,985	6,552	250,000	286,537	142,650	429,187	
235	Haul PAG Rock From SW Lower Pile To TSF (initial rock cover over central wet areas)	46,500	cm	17.67	424,458	124,155	0	548,613	273,123	821,735	
240	Setup Initial Wellpoint Configuration And Connect System To Water Treatment Plant				70,000	115,000	215,000	400,000	199,137	599,137	
245	Move Wellpoint Setup During Tailings Excavation				1,918,800	438,797	150,000	2,507,597	1,248,387	3,755,984	
250	Haul Tailings / Rock Mixture From TSF To The Pit	83,250	cm	14.89	642,085	185,269	0	827,354	411,891	1,239,245	
255	Haul PAG Rock From West Mid Pile To TSF (for equipment support and mixing with tailings)	29,000	cm	10.07	150,256	44,805	0	195,061	97,110	292,171	
260	Haul PAG Rock From Waste Rock Dumps To Pit (forming horizontal layers at 2 m intervals)	40,800	cm	12.61	265,073	78,336	0	343,409	170,963	514,372	
265	Complete All Mill And Site Infrastructure Demolition				120,000	420,000	60,000	600,000	298,705	898,705	
270	Contractor Demobilization And Site Winterizing				9,300	21,840	197,500	228,640	0	228,640	
OH2	Contractor Indirects				903,285	887,350	1,506,317	0	0	0	
					5,127,865	2,541,931	2,711,942	7,084,785	3,296,952	10,381,737	Subtotal
% indirects to directs ----->									46.5		
Engineering QC/QA during Season #2 construction									750,000		
General site maintenance during winter months between Season #2 and Season #3 (currently done by Denison)									700,000		

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					DIRECT COST BREAKDOWN			2014 \$ CDN			CAMP DAYS	FUEL LITRES
Schedule Activity ID	Description of Work	Quantity	Unit	\$/unit	EQUIPMENT	LABOUR	OTHER	DIRECT COSTS	INDIRECT COSTS	TOTAL COSTS		
											1,450,000	Subtotal
Season #3 (double shift for Activity 325)												
310	Contractor Mobilization And Spring Break Cleanup				52,900	116,340	442,500	611,740	0	611,740	213	7,767
315	Move Wellpoint Setup During Tailings Excavation				4,059,000	928,224	300,000	5,287,224	1,966,971	7,254,195	2,244	425,040
320	Haul PAG Rock From West Mid Pile To TSF (for equipment support and mixing with tailings)	68,050	cm	9.23	352,584	105,137	0	457,721	170,283	628,004	170	62,946
325	Haul Tailings / Rock Mixture From TSF To The Pit (incl subexc below tailings & u/s dam berm)	353,200	cm	13.94	2,803,766	786,031	0	3,589,796	1,335,488	4,925,285	1,284	495,764
330	Remove Sand From The TSF Dam And Place Over Exposed Surfaces In The TSF (300 mm)	34,325	cm	10.18	196,244	58,518	0	254,763	94,778	349,540	95	35,035
335	Place NAG Rock From The Mill & The W. Lower Pile Areas Over The TSF Sand Bedding (1.2 m)	137,250	cm	15.30	1,183,190	347,574	0	1,530,763	569,480	2,100,243	568	206,348
340	Reconstruct Dome Creek And Its Riparian Zone Through The TSF Area				93,056	28,000	25,000	146,056	54,336	200,392	54	16,778
345	Haul NAG Rock From Various Waste Dumps To The Pit For Buttress At South End	63,200	cm	15.14	528,115	169,218	0	697,333	259,424	956,757	277	91,640
350	Haul PAG, Tailings, And Hydrocarbons From Various Areas On Site To Pit	44,506	cm	23.72	593,247	176,125	0	769,372	286,224	1,055,597	286	105,188
355	Haul PAG Rock From Waste Rock Dumps To Pit (forming horizontal layers at 2 m intervals)	170,280	cm	11.55	1,106,288	326,938	0	1,433,225	533,193	1,966,419	532	194,758
360	Remove Special Waste For Disposal Off Site				0	0	2,500,000	2,500,000		2,500,000	0	0
365	Rough Grade Remaining Waste Rock Dump Areas				78,000	13,200	0	91,200	33,929	125,129	20	12,000
370	Rough Grade Mill And Camp Areas				156,000	26,400	0	182,400	67,857	250,257	40	24,000
375	Place Interim Cover Over Pit (0.3 m crushed NAG, 1.0 m of Victoria Creek S&G)	104,000	cm	26.51	1,093,600	364,080	552,000	2,009,680	747,648	2,757,328	662	188,200
380	Contractor Demobilization And Site Winterizing				18,600	43,680	290,000	352,280	0	352,280	80	2,400
OH3	Contractor Indirects				1,574,045	1,398,504	3,147,063	0	0	0	2,221	323,795
					13,888,635	4,887,968	7,256,563	19,913,554	6,119,612	26,033,166	8,745	2,191,660
									% indirects to directs ---->		30.7	

Engineering QC/QA during Season #3 construction	1,500,000	Subtotal
General site maintenance during winter months between Season #3 and Season #4 (currently done by Denison)	700,000	
	2,200,000	

Season #4 (single shift)												
410	Contractor Mobilization And Spring Break Cleanup				16,275	45,990	72,500	134,765	0	134,765	88	2,100
415	Remove Balance Of TSF and Seepage Pond Dams And Stockpile In Area of Pit Cover	69,890	cm	17.71	637,965	186,606	0	824,571	413,210	1,237,781	306	110,514
420	Haul Sand & Rock From Stockpile And Place Over Exposed Dam Areas	35,000	cm	11.14	200,103	59,669	0	259,772	130,177	389,950	97	35,724
425	Reconstruct Dome Creek And Its Riparian Zone Through The Dam Areas				23,264	7,000	6,250	36,514	18,298	54,812	14	3,528
430	Final Grade And Revegetate The TSF And Dam Areas				111,375	187,920	209,750	509,045	255,093	764,138	378	25,650
435	Final Grade And Revegetate The Mill And Camp Areas				82,500	139,200	153,500	375,200	188,021	563,221	280	19,000
440	Final Grade And Revegetate The Waste Dump & Pit Cover Areas				132,000	222,720	246,000	600,720	301,033	901,753	448	30,400
445	Backfill And Revegetate The Exploration Trenches				127,463	107,250	0	234,713	117,619	352,332	193	25,575
450	Decommission All Site Roads (unless required for long term care & maintenance)				343,140	83,076	0	426,216	213,586	639,802	129	59,340
455	Final Site Cleanup And Contractor Demobilization				6,975	16,380	257,500	280,855	0	280,855	155	900
OH4	Contractor Indirects				366,985	434,170	835,882	0	0	0	691	66,280
					2,048,044	1,489,981	1,781,382	3,682,371	1,637,037	5,319,408	2,777	379,010
									% indirects to directs ---->		44.5	

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Schedule Activity ID	Description of Work	Quantity	Unit	\$/unit	DIRECT COST BREAKDOWN			2014 \$ CDN			CAMP DAYS	FUEL LITRES
					EQUIPMENT	LABOUR	OTHER	DIRECT COSTS	INDIRECT COSTS	TOTAL COSTS		
								Engineering QC/QA during Season #4 construction		250,000		
										250,000	Subtotal	
								Final Cover in Season #90 (granular materials, synthetic liners, borrow development & reclaim)		4,991,915		
										4,991,915	Subtotal	
								All costs in Q1 2014 \$Cdn		63,541,099	Total	

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RESOURCE COSTS Q1 2014

[illegible]

Marked diesel (\$/litre)	1.50
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LABOUR	Total Labour Rate	Base Hourly Rate	Fringe Costs
Operator foreman	65.00	46.00	19.00
Labour foreman	58.00	42.00	16.00
Small equip operator	51.00	36.00	15.00
Large equip operator	55.00	38.00	17.00
Teamster	50.00	36.00	14.00
Skilled labourer	45.00	31.00	14.00
Unskilled labourer	37.00	25.00	12.00
Skilled tradesman	62.00	45.00	17.00
Mechanic	55.00	38.00	17.00
	(per week)		
Project manager	6,000		
General superintendent	5,500		
Project engineer	4,750		
Project controller	4,000		
Office administrator	3,750		
Field engineer	3,750		
Survey crew (2-man)	6,000		

Markup on labour (for overtime & rotations)	20	%
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Hours/day (single shift)	10
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Hours/day (double shift)	20
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MATERIALS, SUPPLIES, SUBCONTRACTA, LUMP SUMS, ALLOWANCES	Rate	UOM
Crushing/screening	15.00	tonne
Light jaw crushing	10.00	tonne
Screening for cobbles	5.00	tonne
Camp charges	75.00	day
Small tools	2.00	hr
Lowbed loads	2,500	ea
Hiboy loads	1,000	ea
Crane rental	5,000	ls
Camp allowance (initial)	750,000	ls
Camp allowance (expansion)	250,000	ls
Water line allowance	50,000	ls
Sediment control material allowance	50,000	ls
Culvert crossing allowance	25,000	ls
Tunnel plug allowance	150,000	ls
Pit wall support allowance	0	ls
Test plot material allowance	25,000	ls
Demolition allowance (strip only)	150,000	ls
Demolition allowance (bulk)	600,000	ls
WTP allowance	5,000,000	ls
WTP operating costs (pit)	200,000	ls
WTP operating costs (TSF)	250,000	ls
WTP operating costs (season 2 dewatering)	150,000	ls
WTP operating costs (season 3 dewatering)	300,000	ls
Camp winterizing	25,000	ls
Camp unwinterizing	15,000	ls
Camp removal	100,000	ls
WTP winterizing	75,000	ls
WTP unwinterizing	50,000	ls
WTP mothballing	100,000	ls
Terminal travel allowance	750	trip
Rotation allowance	750	trip
Trailer rentals	750.00	week
Office & other supplies	100.00	man-week
Office equipment & computers	75.00	man-week
Radios, phones	50.00	man-week
Consultant/lab allowance	10,000	ls
Dewatering system mob	250,000	ls
Dewatering system setup	150,000	ls
Chemical waste removal allowance	400,000	ls
Special waste removal allowance	2,100,000	ls
Seed w/ native mix	10.00	kg
Fertilizer	5.00	kg
Mulch	5,000	tonnes
Biochar	10	kg
Staked willows	5.00	ea
Transplants (white spruce & trembling aspen)	10.00	ea

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Activity 110 -> Contractor Mobilization & Early Works (camp trailers, office trailers)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	50.0	4,650	600	60.0	Teamster	50.00	3,000				
														180.0	Labourer (3)	37.00	6,660				
														60.0	Labour F/M	58.00	3,480				
	Crane rental for heavier lifts Lowbed loads to site Hiboy loads to site																	1.0	ls	5,000	5,000
																		5.0	ea	2,500	12,500
																		5.0	ea	1,000	5,000
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers (assist with camp construction, set up contractor/engineer trailers, fuel storage, etc)							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														360.0	Labourer (3)	37.00	13,320				
														120.0	Labour F/M	58.00	6,960				
New Camp	Allowance for new 75-man camp Allowance for extending water line from Victoria creek to new camp							1.0		75,000		75,000	12,500	1.0	ls	112,500	112,500	1.0	ls	562,500	562,500
														1.0	ls	17,500	17,500	1.0	ls	25,000	25,000

Total Cost ----->	96,450	Equipment	Subtotal ----->		96,450	Subtotal ----->		169,420	Subtotal ----->		610,000
	169,420	Labour	Fuel Consumption (litres) ----->		15,550	Camp Days ----->		292			
	610,000	Other									
	875,870										
Direct Unit Cost ----->	n/a										

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
Mobilization of the water treatment plant is included with Activity 145.
A 75-bed camp is assumed constructed in Season #1, followed by an expansion to 100 beds in Season #3. It is torn down at the end of Season #4 and removed from site.
The camp is assumed to be shut down during the winter months. Winterizing costs are included with the demobilization costs (Activities 155, 270, and 380).
Mobilization assumed to start on July 14, 2016 to match an available AAM project schedule. There are important benefits if the start date for Season #1 can be moved forward.

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Activity 115 -> Construct / Install Sitewide Runoff & Sediment Control Measures								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Runoff & Sediment Control	Generic crew (equipment & labour)							1.0	Hiab	93.00	280.0	26,040	3,360	336.0	Teamster	50.00	16,800				
								1.0	Excavator	218.50	280.0	61,180	12,040	336.0	Operator	55.00	18,480				
								1.0	Dozer	189.50	280.0	53,060	9,800	336.0	Operator	51.00	17,136				
								1.0	ADT	156.00	280.0	43,680	6,720	336.0	Teamster	50.00	16,800				
								1.0	Backhoe/loader	53.50	280.0	14,980	3,080	336.0	Operator	51.00	17,136				
								2.0	Pickups	34.50	560.0	19,320	5,040	336.0	Labour F/M	58.00	19,488				
													1008.0	Labourer (3)	37.00	37,296					
	Allowance for silt fencing, hay bales, plastic liners, stakes, other materials																	1.0	ls	50,000	50,000

Total Cost ----->	218,260	Equipment	Subtotal ----->	218,260	Subtotal ----->	143,136	Subtotal ----->	50,000	
	143,136	Labour							
	50,000	Other		Fuel Consumption (litres) ----->		40,040		Camp Days ----->	252
	411,396								
Direct Unit Cost ----->	n/a								

Estimator Notes -----> Assumed the above work requires 4 weeks, over a total period of about 1.5 months.
The specific scope of work is not known. This sheet is intended to cover works required at the front end of the project to manage site water at the macro level (new ditches, ponds, culverts, silt fences, hay bales, etc).

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Activity 120 -> Upgrade Haul Roads & Crossing Over TSF Diversion Ditch								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Haul road upgrades	Generic crew (equipment & labour)							1.0	Excavator	218.50	280.0	61,180	12,040	336.0	Operator	55.00	18,480				
								2.0	Dozer	189.50	560.0	106,120	19,600	672.0	Operator	51.00	34,272				
								1.0	Grader	178.00	280.0	49,840	8,960	336.0	Operator	51.00	17,136				
New culvert crossing at TSF	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	50.0	4,650	600	60.0	Teamster	50.00	3,000				
														120.0	Labourer (2)	37.00	4,440				
														60.0	Labourer F/M	58.00	3,480				
	Allowance for culvert materials at new diversion ditch crossing																	1.0	ls	25,000	25,000

Total Cost ----->		221,790	Equipment	Subtotal ----->		221,790	Subtotal ----->		80,808	Subtotal ----->		25,000
		80,808	Labour									
		25,000	Other	Fuel Consumption (litres) ----->		41,200	Camp Days ----->		132			
		327,598										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Assumed the above work requires 4 weeks, over a total period of about 1.5 months.
No specific details on the scope of work. Haul road near TSF will be realigned and twinned and existing overgrown roads around the pit area (for sure) and from mill area to TSF (maybe) upgraded for haul trucks.
Allowed for a crew w/ hiab to help with the culvert installation across the TSF diversion ditch. The crew may also need to do a bit of tree/shrub clearing as well in other locations.

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Activity 125 -> Upgrade Tunnel Plug In Poney Creek Adit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Tunnel plug	Allowance for tunnel plug work							1.0		30,000		30,000	5,000	1.0		45,000	45,000	1.0	ls	75,000	75,000

Total Cost ----->	30,000	Equipment	Subtotal ----->	30,000	Subtotal ----->	45,000	Subtotal ----->	75,000
	45,000	Labour						
	75,000	Other	Fuel Consumption (litres) ----->	5,000	Camp Days ----->	75		
	150,000							
Direct Unit Cost ----->	n/a							

Estimator Notes -----> There is no as-built information available on the existing "plug" constructed years ago in the adit. Allowance assumes fairly robust upgrades, including some possible pressure grouting.

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Activity 130 -> Install Safety Measures In Pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Pit wall safety support	Allowance for safety measures in pit							1.0		0		0		1.0		0	0	1.0	ls	0	0

Total Cost ----->	0	Equipment																			
	0	Labour																			
	0	Other																			
	0																				
Direct Unit Cost ----->	n/a																				

Estimator Notes -----> A study undertaken a few years ago by another consultant prescribed various measures for the pit walls depending on assessed conditions.
Allowance used in the estimate is of the same order-of-magnitude as the amount suggested by the other consultant.

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Activity 135 -> Establish Revegetation Test Plots								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Revegetation test plots								1.0	Excavator	218.50	70.0	15,295	3,010	84.0	Operator	55.00	4,620				
								1.0	ADT	156.00	70.0	10,920	1,680	84.0	Teamster	50.00	4,200				
													168.0	Labourer (2)	37.00	6,216					
	Allowance for test plot materials																	1.0	Materials	25,000	25,000

Total Cost ----->	26,215	Equipment	Subtotal ----->	26,215	Subtotal ----->	15,036	Subtotal ----->	25,000
	15,036	Labour						
	25,000	Other						
	66,251							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	4,690	Camp Days ----->	28		

Estimator Notes -----> No specific information available. Allowed some equipment and labour to assist with the consulting engineers in this task (engineering costs covered elsewhere).

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Activity 140 -> Begin Mill Demolition (mostly inside stripping)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Building demolition	Allowance for stripping of buildings							1.0		30,000		30,000	5,000	1.0		105,000	105,000	1.0	ls	15,000	15,000

Total Cost ----->	30,000	Equipment										Subtotal ----->	30,000				Subtotal ----->	105,000			Subtotal ----->	15,000
	105,000	Labour																				
	15,000	Other										Fuel Consumption (litres) ----->	5,000				Camp Days ----->	175				
	150,000																					
Direct Unit Cost ----->	n/a																					

Estimator Notes -----> Assumed that 20% of the total estimated building demolition costs of \$750,000 will be incurred in Season #1.
\$550,000 -> Demolition cost of mill buildings
\$100,000 -> Removal of tanks from mill buildings
\$ 50,000 -> Demolition cost of misc smaller buildings
\$ 50,000 -> Allowance for extras

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Activity 145 -> Construct / Commission Water Treatment Plant								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Water Treatment Plant	Allowance for constructing & commissioning WTP							1.0		750,000		750,000	5,000	1.0		1,000,000	1,000,000	1.0	ls	3,250,000	3,250,000

Total Cost ----->	750,000	Equipment	Subtotal ----->	750,000	Subtotal ----->	1,000,000	Subtotal ----->	3,250,000
	1,000,000	Labour						
	3,250,000	Other						
	<u>5,000,000</u>							
Fuel Consumption (litres) ----->		125,000	Camp Days ----->		1,667			
Direct Unit Cost ----->	n/a							

Estimator Notes -----> Allowance based on a factored estimate by the water treatment specialists.
WTP operating costs while treating the pit water are included with Activity 150.
The WTP is assumed to be shut down during the winter months. Winterizing costs are included with the demobilization costs (Activities 155, 270, and 380).
Will likely need to double-shift most or all of this work to meet schedule and allow pit water to be pumped from the pit before the onset of winter. Removal of pit water is on the project critical path.

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Activity 150 -> Set Up & Pump Water From Pit Through Water Treatment Plant								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Set up pumps and water lines							Set Up	1.0	Hiab	93.00	30.0	2,790	360	36.0	Teamster	50.00	1,800				
								1.0	Pickup	34.50	30.0	1,035	270	36.0	Labour F/M	58.00	2,088				
														72.0	Labourer (2)	37.00	2,664				
Pump water from pit to WTP & treat	9,000 cm25 cm/hr360.015.0						Pump	1.0	4" pump	32.50	360.0	11,700	2,520								
								1.0	4" pump (standby)	22.00	360.0	7,920	0								
		WTP operating costs (during initial pit dewatering only)												1080.0				1.0	ls	200,000	200,000

Total Cost ----->	23,445	Equipment	Subtotal ----->	23,445	Subtotal ----->	6,552	Subtotal ----->	200,000
	6,552	Labour						
	200,000	Other	Fuel Consumption (litres) ----->	3,150	Camp Days ----->	102		
	229,997							
Direct Unit Cost ----->	25.56	\$/cm						

Estimator Notes -----> Allowed 3 days to set up the pump and water lines to the WTP. This should also cover pump tending needs during the 2 weeks of pumping time.
Assumed water pumped out at the same rate as the WTP throughput capacity of 600 m3/day. There will likely be little pre-treatment holding capacity at the WTP.
Pumping pit water to the TSF first (so it is not dependent on the commissioning of the WTP), then to the WTP with the TSF pond water, does not benefit the overall schedule and adds unnecessary cost.
Operating cost allowance is loosely based on an estimate by the water treatment specialists.
A standby pump is included in the costs due to the critical nature of the work.

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Activity 155 -> Contractor Demobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Demobilization	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	50.0	4,650	600	60.0	Teamster	50.00	3,000				
														120.0	Labourer (2)	37.00	4,440				
														60.0	Labour F/M	58.00	3,480				
	Crane rental for heavier lifts																	1.0	ls	5,000	5,000
Lowbed loads from site																		5.0	ea	2,500	12,500
Hiboy loads from site																		5.0	ea	1,000	5,000
Site Winterizing	Allowance for winterizing the WTP																	1.0	ls	75,000	75,000
	Allowance for winterizing the camp																	1.0	ls	25,000	25,000

Total Cost ----->		4,650	Equipment	Subtotal ----->		4,650	Subtotal ----->		10,920	Subtotal ----->		122,500
		10,920	Labour									
		122,500	Other	Fuel Consumption (litres) ----->		600	Camp Days ----->		20			
		138,070										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Allowance included to winterize both the camp and the WTP between Seasons #1 and #2.

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SEASON #1 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER																																								
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost																																					
Field Staff Expenses	Salaries and benefits																																																									
							Project manager							15.0	week	6,000	90,000																																									
							General superintendent							13.0	week	5,500	71,500																																									
							Project engineer							12.0	week	4,750	57,000																																									
							Field engineer							12.0	week	3,750	45,000																																									
							Office administrator							15.0	week	3,750	56,250																																									
							Survey crew (2-men)							4.0	week	6,000	24,000																																									
	Rotations, terminal travel																																																									
							Terminal travel (7 men x 2 ways)											14.0	trips	750	10,500																																					
							Rotations (every 4 weeks x 2 ways)											23.5	trips	750	17,625																																					
Vehicles																																																										
						Pickup trucks (assumed 50% utilization for fuel use estimate)	6.0	3/4-ton pickup	34.50	4,970.0	171,465	22,365																																														
Field expenses							Trailer rentals											15.0	week	750	11,250																																					
							Office equipment, computers											75.0	man-week	75	5,625																																					
							Office/safety/enviro/survey supplies											75.0	man-week	100	7,500																																					
							Radios, phones, communications											75.0	man-week	50	3,750																																					
							Outside consultants, lab tests											1.0	ls	10,000	10,000																																					
							Small tools											35,191	hrs	2.00	70,382																																					
Field Labour Expenses	Equipment fueling/maintenance (assume 1 mechanic for 8 weeks)																																																									
							Mechanic w/ fuel/lube truck	1.0	Fuel/lube truck	92.50	560.0	51,800	14,000	672.0	Mechanic	55.00	36,960																																									
	General bullgang crew (assume 8 weeks not already in direct costs)																																																									
							Hiab w/ teamster	1.0	Hiab	93.00	560.0	52,080	6,720	672.0	Teamster	50.00	33,600																																									
							Labourers							672.0	Labourer	37.00	24,864																																									
	Haul road maintenance (assume 50% time for grader, 25% for water)																																																									
							Grader	0.5	Grader	178.00	1,050.0	93,450	16,800	630.0	Operator	51.00	32,130																																									
							Water truck	0.25	Water truck	93.00	1,050.0	24,413	5,775	315.0	Teamster	50.00	15,750																																									
Float services (assume nominal amount)																																																										
						Mac truck	1.0	Tractor	92.50	50.0	4,625	1,250	60.0	Teamster	50.00	3,000																																										
						Lowboy	1.0	Trailer	75.00	50.0	3,750	0																																														
Other project costs							Home office overhead (say 0.25% of direct costs)											1.0	Home office	18,373	18,373																																					
							Bonds & insurance (say 0.75% of direct costs)											1.0	Insurance	55,119	55,119																																					
							Profit (target ~35% of labour and ~8% of total cost)											1.0	ls	750,000	750,000																																					
Camp							Catering & housekeeping											3,519	days	75.00	263,931																																					
Total Cost ----->																																																										
		401,583	Equipment											Subtotal ----->		401,583	Subtotal ----->		490,054	Subtotal ----->		1,224,055																																				
		490,054	Labour											Fuel Consumption (litres) ----->		66,910	Camp Days ----->		777																																							
		1,224,055	Other																																																							
		2,115,691																																																								
Direct Unit Cost ----->		n/a																																																								
Estimator Notes ----->																																																										
This sheet covers general contractor overhead field and home office costs during Season #1.																																																										
A team of 5 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them.																																																										
Other contractor indirect costs include a mechanic with fuel/lube truck, a small bullgang crew for odd jobs around the site, a road maintenance crew, and float services.																																																										
Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here.																																																										
The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #1 worksheets.																																																										
The small tools allowance also draws on the total camp days from the Cost Summary worksheet.																																																										

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Activity 210 -> Contractor Mobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														360.0	Labourer (3)	37.00	13,320				
														120.0	Labour F/M	58.00	6,960				
	Crane rental for heavier lifts																	2.0	ls	5,000	10,000
	Lowbed loads to site																				
	Hiboy loads to site																				
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														360.0	Labourer (3)	37.00	13,320				
														120.0	Labour F/M	58.00	6,960				
Camp & WTP Unwinterizing	Allowance for unwinterizing the WTP																	1.0	ls	50,000	50,000

Total Cost ----->	18,600	Equipment
	52,560	Labour
	162,500	Other
	233,660	
Direct Unit Cost ----->	n/a	

Subtotal ----->	18,600	Subtotal ----->	52,560	Subtotal ----->	162,500
Fuel Consumption (litres) ----->	2,400	Camp Days ----->	100		

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
Mobilization of the wellpoint dewatering system is included with Activity 240.

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Activity 215 -> Haul NAG Rock From South Pile To Pit Bottom (for rock platform)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	38,750 cm	110 cm/hr	352.3	35.2			Load	1.0	35-ton excavator	218.50	352.3	76,972	15,148	422.7	Operator	55.00	23,250				
							Haul	3.0	40-ton ADT	210.50	1056.8	222,460	36,989	1268.2	Teamster	50.00	63,409				
							Spread	1.0	D7 dozer	189.50	352.3	66,756	12,330	422.7	Operator	51.00	21,559				

Total Cost ----->		366,188	Equipment	Subtotal ----->		366,188	Subtotal ----->		108,218	Subtotal ----->		0
		108,218	Labour									
		0	Other									
		474,406										
Direct Unit Cost ----->		12.24	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.6 km haul distance, 1.2 km round trip.
Assume an average haul speed in both directions of 5 kph, or 15 minutes per round trip.
Add 6 minutes for loading and dumping times, plus another 5 minutes for congestion at pit bottom, for a total round trip of 26 minutes
Number of round trips per hour per truck = 2.3
Assume an average of 6 truck loads per hour can be accommodated at the bottom of the pit (1 every 10 minutes)
Number of trucks required to maintain 6 loads per hour rate = 6/2.3 = 3
Assume truck payload = 18 cm ----> Hourly rate = 6 x 18 = 108 cm/hr (use 110 cm/hr)

Allow a D7 dozer in the pit bottom for dozing dumped loads. No extra compaction required.
Area at pit bottom is quite narrow. Much of the material will be end dumped in relatively thick lifts until higher elevations are attained and more operating room becomes available.

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Activity 220 -> Haul Processed Filters To Pit Bottom (placed over top of NAG platform)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Crush/screen subcontractor	11,375 tonnes	100 tonnes/hr	113.8		11.4		Crush	1.0	Crush/screen plant					136.5	Plant operator	included -->		11,375	tonnes	15.00	170,625
Load, haul, dump, spread	4,550 cm	110 cm/hr	41.4		4.1		Load	1.0	980 front end loader	198.00	41.4	8,190	1,572	49.6	Operator	55.00	2,730				
							Haul	3.0	40-ton ADT	210.50	124.1	26,121	4,343	148.9	Teamster	50.00	7,445				
							Spread	1.0	D7 dozer	189.50	41.4	7,838	1,448	49.6	Operator	51.00	2,531				

Total Cost ----->	42,150	Equipment	Subtotal ----->	42,150	Subtotal ----->	12,707	Subtotal ----->	170,625
	12,707	Labour						
	170,625	Other						
	225,481							
			Fuel Consumption (litres) ----->	7,363	Camp Days ----->	32		
Direct Unit Cost ----->	49.56	\$/cm						

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 6 minutes for loading and dumping times, plus another 5 minutes for congestion at pit bottom, for a total round trip of 27 minutes
Number of round trips per hour per truck = 2.2
Assume an average of 6 truck loads per hour can be accommodated at the bottom of the pit (1 every 10 minutes)
Number of trucks required to maintain 6 loads per hour rate = 6/2.2 = 3
Assume truck payload = 18 cm ----> Hourly rate = 6 x 18 = 108 cm/hr (use 110 cm/hr)

Allow a D7 dozer in the pit bottom for dozing dumped loads. No extra compaction required.
Crushing/screening operations will need to start about 1 week ahead of material placement.
Tonnage for crushing = cm volume x 2 tonnes/cm + plus a 25% waste factor.

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Activity 225 -> Reshape Pit Entrance (relocate ore to pit bottom, bring in additional NAG for ramp flattening)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rip, load, haul, dump, spread (ore)	8,000 cm	110 cm/hr	72.7	7.3			Rip	1.0	D9 dozer w/ ripper	390.00	72.7	28,364	4,364	87.3	Operator	55.00	4,800				
							Load	3.0	35-ton excavator	218.50	218.2	47,673	9,382	261.8	Operator	55.00	14,400				
							Haul	2.0	40-ton ADT	210.50	145.5	30,618	5,091	174.5	Teamster	50.00	8,727				
							Spread	1.0	D7 dozer	189.50	72.7	13,782	2,545	87.3	Operator	51.00	4,451				
Load, haul, dump, spread (new NAG)	5,000 cm	110 cm/hr	45.5	4.5			Load	1.0	35-ton excavator	218.50	45.5	9,932	1,955	54.5	Operator	55.00	3,000				
							Haul	3.0	40-ton ADT	210.50	136.4	28,705	4,773	163.6	Teamster	50.00	8,182				
							Spread	1.0	D7 dozer	189.50	45.5	8,614	1,591	54.5	Operator	51.00	2,782				

Total Cost ----->		167,686	Equipment	Subtotal ----->		167,686	Subtotal ----->		46,342	Subtotal ----->		0
		46,342	Labour									
		0	Other									
		214,028										
Direct Unit Cost ----->		16.46	\$/cm									

Estimator Notes -----> This is the last activity in the pit area before the start of tailings relocation from the TSF. This work will flatten the haul road grade at the pit entrance.

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Activity 230 -> Set Up & Pump Water From TSF Through Water Treatment Plant								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Set up pumps and water lines							Set Up	1.0	Hiab	93.00	30.0	2,790	360	36.0	Teamster	50.00	1,800				
								1.0	Pickup	34.50	30.0	1,035	270	36.0	Labour F/M	58.00	2,088				
														72.0	Labourer (2)	37.00	2,664				
Pump water from TSF to WTP & treat	12,000 cm25 cm/hr480.020.0						Pump	1.0	4" pump	32.50	480.0	15,600	3,360								
								1.0	4" pump (standby)	22.00	480.0	10,560	0								
		WTP operating costs (during TSF dewatering only)												1,440.0				1.0	ls	250,000	250,000

Total Cost ----->	29,985	Equipment	Subtotal ----->	29,985	Subtotal ----->	6,552	Subtotal ----->	250,000
	6,552	Labour						
	250,000	Other						
	286,537							
Direct Unit Cost ----->	23.88	\$/cm	Fuel Consumption (litres) ----->	3,990	Camp Days ----->	132		

Estimator Notes -----> Allowed 3 days to set up the pump and water lines to the WTP. This should also cover pump tending needs during the 2 weeks of pumping time.
Assumed water pumped out at the same rate as the WTP throughput capacity of 600 m3/day. There will likely be little pre-treatment holding capacity at the WTP.
Operating cost allowance is loosely based on an estimate by the water treatment specialists.
A standby pump is included in the costs due to the critical nature of the work.
Quantity includes the TSF water (10,000 m3) and the seepage pond water (2,000 m3)

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Activity 235 -> Haul PAG Rock From SW Lower Pile To TSF (for first rock platform in wetter central area of TSF)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	46,500 cm			160 cm/hr	290.6	29.1	Load	1.0	35-ton excavator	218.50	290.6	63,502	12,497	348.8	Operator	55.00	19,181				
							Haul	5.0	40-ton ADT	210.50	1453.1	305,883	50,859	1743.8	Teamster	50.00	87,188				
							Spread	1.0	D7 dozer	189.50	290.6	55,073	10,172	348.8	Operator	51.00	17,786				

Total Cost ----->	424,458	Equipment	Subtotal ----->	424,458	Subtotal ----->	124,155	Subtotal ----->	0
	124,155	Labour						
	0	Other						
	548,613							
Direct Unit Cost ----->	11.80	\$/cm	Fuel Consumption (litres) ----->	73,528	Camp Days ----->	203		

Estimator Notes -----> Assumed production rate and truck requirements:
This is the first rock platform constructed on the surface of the TSF, done as soon as the TSF pond is drained. The wellpoint dewatering system will follow right behind and rest on this rock platform.
This rock layer will later be mixed with and removed with the first 2 m lift of tailings beneath in. New rock brought in from the dumps (starting with Activity 255) is for new working platforms on the exposed tailings areas.

Assume a 2.0 km haul distance, 4.0 km round trip.
Assume an average haul speed in both directions of 9 kph, or 27 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 33 minutes
Number of round trips per hour per truck = 1.8
Assume an average of 9 truck loads per hour can be accommodated at the TSF (1 every 6.6 minutes)
Number of trucks required to maintain 9 loads per hour rate = 9/1.8 = 5
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer at the TSF for dozing dumped loads. No extra compaction required.

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Activity 240 -> Install Wellpoint Headers & Connect To WTP								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mob, field test, initial system setup	Allowance for mobilizing dewatering system							1.0		25,000		25,000	5,000	1.0		25,000	25,000	1.0	ls	200,000	200,000
	Allowance for installing & commissioning the system							1.0		45,000		45,000	5,000	1.0		90,000	90,000	1.0	ls	15,000	15,000

Total Cost ----->	70,000	Equipment	Subtotal ----->	70,000	Subtotal ----->	115,000	Subtotal ----->	215,000
	115,000	Labour						
	215,000	Other						
	<u>400,000</u>							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	11,667	Camp Days ----->	192		

Estimator Notes -----> Based on widely different conceptual responses from two dewatering vendors. Costs carried in the estimate were between the two responses, weighted towards the more expensive one.

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Activity 245 -> Move Wellpoint System During Tailings Excavation								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Wellpoint operations	52 days		1.00 day/day		1248.0	52.0	Dewater	1.0	Dewatering system	1,250	1248.0	1,560,000	124,800								
								2.0	Pickup trucks	34.50	2496.0	86,112	22,464	1497.6	F/M	58.00	86,861				
														5990.4	Labourers (4)	45.00	269,568				
			1.00 day/day		1248.0	52.0	Support	1.0	35-ton excavator	218.50	1248.0	272,688	53,664	1497.6	Operator	55.00	82,368				
					WTP operating costs (for dewatered tailings in season 2)			Treat						3744.0				1.0	ls	150,000	150,000

Total Cost ----->	1,918,800	Equipment	Subtotal ----->	1,918,800	Subtotal ----->	438,797	Subtotal ----->	150,000	
	438,797	Labour							
	150,000	Other		Fuel Consumption (litres) ----->		200,928		Camp Days ----->	1,061
	2,507,597								
Direct Unit Cost ----->	48,223	\$/day							

Estimator Notes -----> Based on widely different conceptual responses from two dewatering vendors. Costs carried in the estimate were between the two responses, weighted towards the more expensive one.

Managing the well point system during tailings removal from the TSF will be a full time job. This worksheet assumes a 6-man crew with an excavator 24 hrs per day for the duration of the Season #2 work.

It will be challenging to coordinate the tailings removal operation with the well point dewatering operation. The wellpoints need to stay far enough ahead to dewater the tailings before the truck & shovel operation gets there and also not be in the way.

The operating costs for the WTP during Season #2 tailings removal is an allowance only since the amount of water that will need treatment is not known with any certainty.

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Activity 250 -> Haul Tailings/Rock Mixture from TSF To Pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	83,250 cm		275 cm/hr		302.7	30.3	Load	2.0	35-ton excavator	218.50	605.5	132,292	26,035	726.5	Operator	55.00	39,960				
			275 cm/hr		302.7	30.3	Haul	8.0	40-ton ADT	210.50	2421.8	509,793	84,764	2906.2	Teamster	50.00	145,309				
			275 cm/hr		302.7	30.3	Spread	0.0	D7 dozer	189.50	0.0	0	0	0.0	Operator	51.00	0				

Total Cost ----->	642,085	Equipment	Subtotal ----->	642,085	Subtotal ----->	185,269	Subtotal ----->	0
	185,269	Labour						
	0	Other						
	827,354							
Direct Unit Cost ----->	9.94	\$/cm	Fuel Consumption (litres) ----->	110,798	Camp Days ----->	303		

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 15 truck loads per hour can be accommodated at the pit (constraints at the TSF are actually more important in the end dump case)
Number of trucks required to maintain 15 loads per hour rate = 15/2 = 8
Assume truck payload = 18 cm ----> Hourly rate = 15 x 18 = 270 cm/hr (use 275 cm/hr)

Allow a D7 dozer in the pit for dozing dumped loads. No extra compaction required.
Allow an extra excavator at the TSF to assist with rock mixing at the work front and perform any other duties to maintain production (i.e., helping the dozer with new rock platforms or assisting the dewatering crew).
On accasion, these trucks will return to the TSF with a backhaul of waste rock. See Activity 255 for information on how those costs are reflected in the estimate

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Activity 255 -> Haul PAG Rock From West Mid Pile to TSF								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	29,000 cm			160 cm/hr	181.3	18.1	Load	1.0	35-ton excavator	218.50	181.3	39,603	7,794	217.5	Operator	55.00	11,963				
							Haul	2.0	40-ton ADT	210.50	362.5	76,306	12,688	435.0	Teamster	50.00	21,750				
							Spread	1.0	D7 dozer	189.50	181.3	34,347	6,344	217.5	Operator	51.00	11,093				

Total Cost ----->		150,256	Equipment	Subtotal ----->		150,256	Subtotal ----->		44,805	Subtotal ----->		0
		44,805	Labour									
		0	Other									
		195,061										
Direct Unit Cost ----->		6.73	\$/cm									

Estimator Notes -----> This rock will generally serve as the new working surfaces in the TSF area. It will later be mixed with and removed with the next 2m lift of tailings.

This activity is intermittent during the course of tailings removal from the TSF to the pit. To keep up with the tails/rock removal, a much lower production rate than 160 cm/hr shown would be required.

Assumed that all rockfill brought to the TSF, after the initial platform (Activity 235), is by trucks returning from the pit after dumping their tails/rock mixtures.

This means that most truck costs are already accounted for in the tails/rock relocation costs (Activities 250 and 325).

However, to account for the inefficiencies a backhaul operation would impose on the regular truck cycling operations, a nonimal two trucks are included on this worksheet to add money in the estimate for that.

Allow a D7 dozer at the TSF for dozing dumped loads. No extra compaction required.

See Activity 235 for derivation of the160 cm/hr production rate.

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Activity 260 -> Haul PAG Rock From Dumps To Pit (for horizontal layers)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	40,800 cm	160 cm/hr	255.0	25.5			Load	1.0	35-ton excavator	218.50	255.0	55,718	10,965	306.0	Operator	55.00	16,830				
							Haul	3.0	40-ton ADT	210.50	765.0	161,033	26,775	918.0	Teamster	50.00	45,900				
							Spread	1.0	D7 dozer	189.50	255.0	48,323	8,925	306.0	Operator	51.00	15,606				

Total Cost ----->		265,073	Equipment	Subtotal ----->		265,073	Subtotal ----->		78,336	Subtotal ----->		0
		78,336	Labour									
		0	Other									
		343,409										
Direct Unit Cost ----->		8.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
PAG rock will be relocated from the NW, W.Mid, and E waste dump piles and placed in sandwich-like layers with the tails/rock material brought in from the TSF.
Haul distances from each waste dump area will vary. In addition, haul distances will change as the pit is backfilled and starts to extend up over the pit rim.
This worksheet assumes that the pit ramp at the south end of the pit is still required (a longer haul). The same work in Season #3 (Activity 355) assumes shorter hauls.

Assume a 1.0 km haul distance, 2.0 km round trip
Assume an average haul speed in both directions of 5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 9 truck loads per hour can be accommodated at the pit (1 every 6.6 minutes)
Number of trucks required to maintain 9 loads per hour rate = 9/2 = 5
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer at the pit for dozing dumped loads. No extra compaction required.

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Activity 265 -> Complete Mill And Site Infrastructure Demolition								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Building demolition	Allowance for balance of site demolitions							1.0		120,000		120,000	5,000	1.0		420,000	420,000	1.0	ls	60,000	60,000

Total Cost ----->	120,000	Equipment										Subtotal ----->	120,000				Subtotal ----->	420,000			Subtotal ----->	60,000
	420,000	Labour																				
	60,000	Other										Fuel Consumption (litres) ----->	20,000				Camp Days ----->	700				
	600,000																					
Direct Unit Cost ----->	n/a																					

Estimator Notes -----> Assumed that 80% of the total estimated building demolition costs of \$750,000 will be incurred in Season #2.
\$550,000 -> Demolition cost of mill buildings
\$100,000 -> Removal of tanks from mill buildings
\$ 50,000 -> Demolition cost of misc smaller buildings
\$ 50,000 -> Allowance for extras

It is expected that most demolition debris will be salvaged and removed from site. The rest will be buried in the pit area under the engineered cover.

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Activity 270 -> Contractor Demobilization And Site Winterizing								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Demobilization	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														240.0	Labourer (2)	37.00	8,880				
														120.0	Labour F/M	58.00	6,960				
	Crane rental for heavier lifts																	2.0	ls	5,000	10,000
	Lowbed loads from site																	25.0	ea	2,500	62,500
	Hiboy loads from site																	25.0	ea	1,000	25,000
Site Winterizing	Allowance for winterizing the WTP																	1.0	ls	75,000	75,000
	Allowance for winterizing the camp																	1.0	ls	25,000	25,000

Total Cost ----->		9,300	Equipment	Subtotal ----->		9,300	Subtotal ----->		21,840	Subtotal ----->		197,500
		21,840	Labour									
		197,500	Other	Fuel Consumption (litres) ----->		1,200	Camp Days ----->		40			
		228,640										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Allowance included to winterize both the camp and the WTP between Seasons #2 and #3.

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SEASON #2 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Field Staff Expenses	Salaries and benefits																				
							Project manager							19.0	week	6,000	114,000				
							General superintendent							17.0	week	5,500	93,500				
							Project engineer							17.0	week	4,750	80,750				
							Field engineer							17.0	week	3,750	63,750				
							Office administrator							17.0	week	3,750	63,750				
							Survey crew (2-men)							8.0	week	6,000	48,000				
	Rotations, terminal travel																				
							Terminal travel (7 men x 2 ways)											14.0	trips	750	10,500
							Rotations (every 4 weeks x 2 ways)											37.5	trips	750	28,125
Vehicles																					
						Pickup trucks (assumed 50% utilization for fuel use estimate)	6.0	3/4-ton pickup	34.50	6,650.0	229,425	29,925									
Field expenses							Trailer rentals											19.0	week	750	14,250
							Office equipment, computers											103.0	man-week	75	7,725
							Office/safety/enviro/survey supplies											103.0	man-week	100	10,300
							Radios, phones, communications											103.0	man-week	50	5,150
							Outside consultants, lab tests											2.0	ls	10,000	20,000
							Small tools											46,255	hrs	2.00	92,509
Field Labour Expenses	Equipment fueling/maintenance (assume 3 mechanics for 16 weeks)																				
							Mechanic w/ fuel/lube truck	3.0	Fuel/lube truck	92.50	1,120.0	310,800	84,000	4032.0	Mechanic	55.00	221,760				
	General bullgang crew (assume 12 weeks not already in direct costs)																				
							Hiab w/ teamster	1.0	Hiab	93.00	840.0	78,120	10,080	1008.0	Teamster	50.00	50,400				
							Labourers							1008.0	Labourer	37.00	37,296				
	Haul road maintenance (assume full time for grader, 50% for water)																				
							Grader	1.0	Grader	178.00	1,120.0	199,360	35,840	1344.0	Operator	51.00	68,544				
							Water truck	0.5	Water truck	93.00	1,120.0	52,080	12,320	672.0	Teamster	50.00	33,600				
Float services (assume nominal amount)																					
						Mac truck	1.0	Tractor	92.50	200.0	18,500	5,000	240.0	Teamster	50.00	12,000					
						Lowboy	1.0	Trailer	75.00	200.0	15,000	0									
Other project costs							Home office overhead (say 0.25% of direct costs)											1.0	Home office	17,712	17,712
							Bonds & insurance (say 0.75% of direct costs)											1.0	Insurance	53,136	53,136
							Profit (target ~35% of labour and ~8% of total cost)											1.0	ls	900,000	900,000
Camp							Catering & housekeeping											4,625	days	75.00	346,910
Total Cost ----->								Subtotal ----->						Subtotal ----->				Subtotal ----->			
903,285 Equipment								903,285						Subtotal ----->				887,350			
887,350 Labour																		Subtotal ----->			
1,506,317 Other								Fuel Consumption (litres) ----->						Camp Days ----->				1,506,317			
3,296,952								177,165						1,413							
n/a																					
Direct Unit Cost ----->																					

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Activity 310 -> Contractor Mobilization								EQUIPMENT						LABOUR				OTHER									
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost						
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	200.0	18,600	2,400	240.0	Teamster	50.00	12,000										
														720.0	Labourer (3)	37.00	26,640										
														240.0	Labour F/M	58.00	13,920										
	Crane rental for heavier lifts																3.0	ls	5,000	15,000							
	Lowbed loads to site																										
	Hiboy loads to site																										
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000										
														360.0	Labourer (3)	37.00	13,320										
														120.0	Labour F/M	58.00	6,960										
Camp Expansion & Unwinterizing	Allowance for camp expansion to 100 beds							1.0		25,000		25,000	4,167	1.0	ls	37,500	37,500	1.0	ls	187,500	187,500						
																		Allowance for unwinterizing the WTP						1.0	ls	50,000	50,000
																		Allowance for unwinterizing the camp						1.0	ls	15,000	15,000

Total Cost ----->	52,900	Equipment	Subtotal ----->	52,900		Subtotal ----->	116,340	Subtotal ----->	442,500
	116,340	Labour							
	442,500	Other							
	<u>611,740</u>								
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	7,767		Camp Days ----->	213		

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
The 75-bed camp is expanded to 100 beds in order to accommodate the increased intensity of earthworks in Season #3.

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Activity 315 -> Move Wellpoint System During Tailings Excavation								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Wellpoint operations	110 days		1.00 day/day		2640.0	110.0	Dewater	1.0	Dewatering system	1,250.00	2640.0	3,300,000	264,000								
								2.0	Pickup trucks	34.50	5280.0	182,160	47,520	3168.0	F/M	58.00	183,744				
														12672.0	Labourers (4)	45.00	570,240				
			1.00 day/day		2640.0	110.0	Support	1.0	35-ton excavator	218.50	2640.0	576,840	113,520	3168.0	Operator	55.00	174,240				
	WTP operating costs (for dewatered tailings in season 3)						Treat							7920.0				1.0	ls	300,000	300,000

Total Cost ----->	4,059,000	Equipment	Subtotal ----->	4,059,000	Subtotal ----->	928,224	Subtotal ----->	300,000
	928,224	Labour						
	300,000	Other						
	5,287,224							
Direct Unit Cost ----->	48,066	\$/day	Fuel Consumption (litres) ----->	425,040	Camp Days ----->	2,244		

Estimator Notes -----> Based on widely different conceptual responses from two dewatering vendors. Costs carried in the estimate were between the two responses, weighted towards the more expensive one.

Managing the well point system during tailings removal from the TSF will be a full time job. This worksheet assumes a 6-man crew with an excavator 24 hrs per day for the duration of the Season #3 work.

It will be challenging to coordinate the tailings removal operation with the well point dewatering operation. The wellpoints need to stay far enough ahead to dewater the tailings before the truck & shovel operation gets there and also not be in the way.

The operating costs for the WTP during Season #3 tailings removal is an allowance only since the amount of water that will need treatment is not known with any certainty.

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Activity 320 -> Haul PAG Rock From West Mid Pile to TSF								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	68,050 cm			160 cm/hr	425.3	42.5	Load	1.0	35-ton excavator	218.50	425.3	92,931	18,288	510.4	Operator	55.00	28,071				
							Haul	2.0	40-ton ADT	210.50	850.6	179,057	29,772	1020.8	Teamster	50.00	51,038				
							Spread	1.0	D7 dozer	189.50	425.3	80,597	14,886	510.4	Operator	51.00	26,029				

Total Cost ----->		352,584	Equipment	Subtotal ----->		352,584	Subtotal ----->		105,137	Subtotal ----->		0
		105,137	Labour									
		0	Other									
		457,721										
Direct Unit Cost ----->		6.73	\$/cm									

Estimator Notes -----> This rock will generally serve as the new working surfaces in the TSF area. It will later be mixed with and removed with the next 2m lift of tailings.

This activity is intermittent during the course of tailings removal from the TSF to the pit. To keep up with the tails/rock removal, a much lower production rate than 160 cm/hr shown would be required.

Assumed that all rockfill brought to the TSF, after the initial platform (Activity 235), is by trucks returning from the pit after dumping their tails/rock mixtures.

This means that most truck costs are already accounted for in the tails/rock relocation costs (Activities 250 and 325).

However, to account for the inefficiencies a backhaul operation would impose on the regular truck cycling operations, a nonimal two trucks are included on this worksheet to add money in the estimate for that.

Allow a D7 dozer at the TSF for dozing dumped loads. No extra compaction required.

See Activity 235 for derivation of the160 cm/hr production rate.

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Activity 325 -> Haul Tailings/Rock/Subexcavation Mixture from TSF To Pit (double shift operation)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	353,200	cm	275	cm/hr	1284.4	64.2	Load	2.0	35-ton excavator	218.50	2568.7	561,267	110,455	3082.5	Operator	55.00	169,536				
			275	cm/hr	1284.4	64.2	Haul	8.0	40-ton ADT	210.50	10274.9	2,162,868	359,622	12329.9	Teamster	50.00	616,495				
			275	cm/hr	1284.4	64.2	Spread	0.0	D7 dozer	189.50	0.0	0	0	0.0	Operator	51.00	0				
			275	cm/hr	1284.4	64.2	Lighting	8.0	Light towers (night shift only)	15.50	5137.5	79,631	25,687								

Total Cost ----->		2,803,766	Equipment	Subtotal ----->		2,803,766	Subtotal ----->		786,031	Subtotal ----->		0
		786,031	Labour									
		0	Other									
		3,589,796										
Direct Unit Cost ----->		10.16	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 15 truck loads per hour can be accommodated at the pit (constraints at the TSF are actually more important in the end dump case)
Number of trucks required to maintain 15 loads per hour rate = 15/2 = 8
Assume truck payload = 18 cm ----> Hourly rate = 15 x 18 = 270 cm/hr (use 275 cm/hr)

Allow a D7 dozer in the pit for dozing dumped loads. No extra compaction required. Light plants are included for the afternoon shift.
Allow an extra excavator at the TSF to assist with rock mixing at the work front and perform any other duties to maintain production (i.e., helping the dozer with new rock platforms or assisting the dewatering crew).
On accasion, these trucks will return to the TSF with a backhaul of waste rock. See Activity 255 for information on how those costs are reflected in the estimate

The camp days are over a 110 day period at 18 beds per day (9 men/shift x 2 shift/day).

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Activity 330 -> Haul Sand From Dam To Exposed TSF Surfaces								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	34,325 cm		145 cm/hr		236.7	23.7	Load	1.0	35-ton excavator	218.50	236.7	51,724	10,179	284.1	Operator	55.00	15,624				
					236.7	23.7	Haul	2.0	40-ton ADT	210.50	473.4	99,661	16,571	568.1	Teamster	50.00	28,407				
					236.7	23.7	Spread	1.0	D7 dozer	189.50	236.7	44,859	8,285	284.1	Operator	51.00	14,488				

Total Cost ----->		196,244	Equipment	Subtotal ----->		196,244	Subtotal ----->		58,518	Subtotal ----->		0
		58,518	Labour									
		0	Other									
		254,763										
Direct Unit Cost ----->		7.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.4 km haul distance, 0.8 km round trip.
Assume an average haul speed in both directions of 5 kph, or 10 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 15 minutes
Number of round trips per hour per truck = 4
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the TSF.
Number of trucks required to maintain 8 loads per hour rate = 8/4 = 2
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)

Allow a D7 dozer for spreading dumped loads. No extra compaction required.
Some of this sand will be hauled to stockpile and used the following year to finish rehabilitating the dam and seepage pond areas.

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Activity 335 -> Haul NAG Rock From Mill And W.Lower Pile to TSF (overlain over sand bedding)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread (from mill area)	79,800 cm	145 cm/hr	550.3	55.0			Load	1.0	35-ton excavator	218.50	550.3	120,250	23,665	660.4	Operator	55.00	36,323				
							Haul	4.0	40-ton ADT	210.50	2201.4	463,390	77,048	2641.7	Teamster	50.00	132,083				
							Spread	1.0	D7 dozer	189.50	550.3	104,290	19,262	660.4	Operator	51.00	33,681				
Load, haul, dump, spread (from W. Lower pile)	57,450 cm	145 cm/hr	396.2	39.6			Load	1.0	35-ton excavator	218.50	396.2	86,571	17,037	475.4	Operator	55.00	26,150				
							Haul	4.0	40-ton ADT	210.50	1584.8	333,606	55,469	1901.8	Teamster	50.00	95,090				
							Spread	1.0	D7 dozer	189.50	396.2	75,081	13,867	475.4	Operator	51.00	24,248				

Total Cost ----->			1,183,190	Equipment	Subtotal ----->			1,183,190	Subtotal ----->			347,574	Subtotal ----->			0
			347,574	Labour												
			0	Other												
			1,530,763													
Direct Unit Cost ----->			11.15	\$/cm					Fuel Consumption (litres) ----->			206,348	Camp Days ----->			568

Estimator Notes -----> Assumed production rate and truck requirements:

For mill area rock:

Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the TSF.
Number of trucks required to maintain 8 loads per hour rate = 8/2 = 4
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

For W. Lower pile rock:

Assume a 2.0 km haul distance, 4.0 km round trip.
Assume an average haul speed in both directions of 10 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the TSF.
Number of trucks required to maintain 8 loads per hour rate = 8/2 = 4
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

Haulage of mill NAG is assumed to take place along the refurbished road from the mill direct to the TSF. Costs for road refurbishment included with Activity 120.
Some of this rock will be hauled to stockpile and used the following year to finish rehabilitating the dam and seepage pond areas.

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Activity 340 -> Reconstruct Dome Creek And Its Riparian Zone Through The TSF Area								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Grizzly/screen work for cobbles	5,000 tonnes			50 tonnes/hr	100.0	10.0	Screen	1.0						120.0	Operator	included -->		5,000	tonnes	5.00	25,000
Load at screen, haul, dump, place	2,000 cm			18 cm/hr	111.1	11.1	Load	1.0	Front end loader	198.00	111.1	22,000	4,222	133.3	Operator	55.00	7,333				
				18 cm/hr	111.1	11.1	Haul	2.0	40-ton ADT	210.50	222.2	46,778	7,778	266.7	Teamster	50.00	13,333				
				18 cm/hr	111.1	11.1	Place	1.0	Excavator	218.50	111.1	24,278	4,778	133.3	Operator	55.00	7,333				

Total Cost ----->	93,056	Equipment	Subtotal ----->	93,056	Subtotal ----->	28,000	Subtotal ----->	25,000
	28,000	Labour						
	25,000	Other	Fuel Consumption (litres) ----->	16,778	Camp Days ----->	54		
	<u>146,056</u>							
Direct Unit Cost ----->	73.03	\$/cm						

Estimator Notes -----> Very little information available, including where to source the cobbles.
Assume a screening operation 5 km away, with cobbles delivered to the TSF where an excavator places the cobbles in the trench incorporated previously in the TSF cover.
Assume excavator places one 18 cm ADT load an hour.

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Activity 345 -> Haul NAG Rock From S and SW Upper piles to buttress at south end of pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	63,200 cm		160 cm/hr		395.0	39.5	Load	1.0	35-ton excavator	218.50	395.0	86,308	16,985	474.0	Operator	55.00	26,070				
							Haul	4.0	40-ton ADT	210.50	1580.0	332,590	55,300	1896.0	Teamster	50.00	94,800				
							Spread	1.0	D7 dozer	189.50	395.0	74,853	13,825	474.0	Operator	51.00	24,174				
							Compact	1.0	Compactor	87.00	395.0	34,365	5,530	474.0	Operator	51.00	24,174				

Total Cost ----->	528,115	Equipment	Subtotal ----->	528,115	Subtotal ----->	169,218	Subtotal ----->	0
	169,218	Labour						
	0	Other	Fuel Consumption (litres) ----->	91,640	Camp Days ----->	277		
	697,333							
Direct Unit Cost ----->	11.03	\$/cm						

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.5 km haul distance from both waste dump areas, 1.0 km round trip.
Assume an average haul speed in both directions of 5 kph, or 12 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 18 minutes
Number of round trips per hour per truck = 3.33
Assume an average of 9 truck loads per hour are delivered to the buttress area.
Number of trucks required to maintain 9 loads per hour rate = 9/3.3 = 3
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer for spreading dumped loads. Light compaction is also assumed for this important component of the pit backfill.

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Activity 350 -> Haul PAG Rock, Hydrocarbon Soils, And Tails From Misc Areas Around Site To The Pit								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread (from mill/camp areas)	30,823 cm	110 cm/hr	280.2	28.0			Load	1.0	35-ton excavator	218.50	280.2	61,226	12,049	336.3	Operator	55.00	18,494				
							Haul	3.0	40-ton ADT	210.50	840.6	176,952	29,422	1008.8	Teamster	50.00	50,438				
							Spread	1.0	D7 dozer	189.50	280.2	53,100	9,807	336.3	Operator	51.00	17,149				
Load, haul, dump, spread (from other areas)	13,683 cm	75 cm/hr	182.4	18.2			Load	1.0	35-ton excavator	218.50	182.4	39,863	7,845	218.9	Operator	55.00	12,041				
							Haul	2.0	40-ton ADT	210.50	364.9	76,807	12,771	437.9	Teamster	50.00	21,893				
							Spread	1.0	D7 dozer	189.50	182.4	34,572	6,385	218.9	Operator	51.00	11,165				
Access to difficult areas (imported NAG rock for roads)	20,000 cm	110 cm/hr	181.8	18.2			Load	1.0	35-ton excavator	218.50	181.8	39,727	7,818	218.2	Operator	55.00	12,000				
							Haul	2.0	40-ton ADT	210.50	363.6	76,545	12,727	436.4	Teamster	50.00	21,818				
							Spread	1.0	D7 dozer	189.50	181.8	34,455	6,364	218.2	Operator	51.00	11,127				
Total Cost ----->		593,247	Equipment					Subtotal ----->		593,247		Subtotal ----->		176,125		Subtotal ----->		0			
		176,125	Labour																		
		0	Other																		
		769,372																			
Direct Unit Cost ----->		17.29	\$/cm									Fuel Consumption (litres) ----->		105,188		Camp Days ----->		286			

Estimator Notes -----> Assumed production rate and truck requirements:

For mill area rock:
Assume a 2.0 km haul distance, 4.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 19 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 25 minutes
Number of round trips per hour per truck = 2.4
Assume an average of 6 truck loads per hour are delivered to the pit.
Number of trucks required to maintain 6 loads per hour rate = 6/2.4 = 3
Assume truck payload = 18 cm ---> Hourly rate = 6 x 18 = 108 cm/hr (use 110 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

A few areas might be difficult to get to, including the tailings pockets downstream of the sed pond and the tailings ponds near the mill.
Assume 10,000 m3 of NAG rock will be required to develop access to various difficult areas, handled twice (once in, once out).
Assume NAG material can be sourced within a distance of 1 km.

For other areas (Ketza, roads, sed pond area):
Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 22 minutes
Number of round trips per hour per truck = 2.7
Assume an average of 4 truck loads per hour are delivered to the pit.
Number of trucks required to maintain 4 loads per hour rate = 4/2.7 = 2
Assume truck payload = 18 cm ---> Hourly rate = 4 x 18 = 72 cm/hr (use 75 cm/hr)
Allow a D7 dozer for spreading dumped loads. No extra compaction required.

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Activity 355 -> Haul PAG Rock From Dumps To Pit (for horizontal layers)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	170,280 cm	160 cm/hr	1064.3	106.4			Load	1.0	35-ton excavator	218.50	1064.3	232,539	45,763	1277.1	Operator	55.00	70,241				
							Haul	3.0	40-ton ADT	210.50	3192.8	672,074	111,746	3831.3	Teamster	50.00	191,565				
							Spread	1.0	D7 dozer	189.50	1064.3	201,675	37,249	1277.1	Operator	51.00	65,132				

Total Cost ----->		1,106,288	Equipment	Subtotal ----->		1,106,288	Subtotal ----->		326,938	Subtotal ----->		0
		326,938	Labour				Fuel Consumption (litres) ----->		194,758	Camp Days ----->		532
		0	Other									
		1,433,225										
Direct Unit Cost ----->		8.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
PAG rock will be relocated from the NW, W.Mid, and E waste dump piles and placed in sandwich-like layers with the tails/rock material brought in from the TSF.
Haul distances from each waste dump area will vary. In addition, haul distances will change as the pit is backfilled and starts to extend up over the pit rim.
This worksheet assumes that the pit ramp at the south end of the pit is no longer required.

Assume a 0.5 km haul distance, 1.0 km round trip (see additional notes below).
Assume an average haul speed in both directions of 5 kph, or 12 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 18 minutes
Number of round trips per hour per truck = 3.3
Assume an average of 9 truck loads per hour can be accommodated at the pit.
Number of trucks required to maintain 9 loads per hour rate = 9/3.3 = 3
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer at the pit for dozing dumped loads. No extra compaction required.

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Activity 360 -> Remove Special Waste For Disposal Off Site								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Off-Site Special Waste Removal	Allowance for chemicals removal																	1.0	ls	400,000	400,000
	Allowance for waste removal (2,076 m3)																	1.0	ls	2,100,000	2,100,000

Total Cost ----->	0	Equipment	Subtotal ----->	0	Subtotal ----->	0	Subtotal ----->	2,500,000
	0	Labour						
	2,500,000	Other						
	2,500,000							
Direct Unit Cost ----->	n/a		Fuel Consumption (litres) ----->	0	Camp Days ----->	0		

Estimator Notes -----> Waste assumed trucked to Fort Nelson.

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Activity 365 -> Rough Grade Remaining Waste Rock Dump Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rough landforming	5 ha		0.05 ha/hr		100.0	10.0	Grading	2.0	D9 dozer w/ ripper	390.00	200.0	78,000	12,000	240.0	Operator	55.00	13,200				

Total Cost ----->	78,000	Equipment										Subtotal ----->	78,000				Subtotal ----->	13,200			Subtotal ----->	0
	13,200	Labour																				
	0	Other																				
	91,200																					
Direct Unit Cost ----->	18,240.00	\$/ha																				

Estimator Notes -----> Scope of work is not known at this time. Used a nominal production rate to generate dozer hours.

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Activity 370 -> Rough Grade Remaining Mill And Camp Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rough landforming	10 ha		0.05 ha/hr		200.0	20.0	Grading	2.0	D9 dozer w/ ripper	390.00	400.0	156,000	24,000	480.0	Operator	55.00	26,400				

Total Cost ----->	156,000	Equipment										Subtotal ----->	156,000				Subtotal ----->	26,400			Subtotal ----->	0
	26,400	Labour																				
	0	Other																				
	182,400																					
Direct Unit Cost ----->	18,240.00	\$/ha																				

Estimator Notes -----> Scope of work is not known at this time. Used a nominal production rate to generate dozer hours.

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Activity 375 -> Place Interim Pit Cover

								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Crush/screen subcontractor	55,200 tonnes			150 tonnes/hr	368.0	36.8	Crush	1.0	Jaw crusher					441.6	Operator	included -->		55,200	tonnes	10.00	552,000
Load, haul, dump, spread (300 mm crushed from W. Lower pile area)	24,000 cm			160 cm/hr	150.0	15.0	Load	1.0	980 front end loader	198.00	150.0	29,700	5,700	180.0	Operator	55.00	9,900				
				160 cm/hr	150.0	15.0	Haul	3.0	40-ton ADT	210.50	450.0	94,725	15,750	540.0	Teamster	50.00	27,000				
				160 cm/hr	150.0	15.0	Spread	1.0	D7 dozer	189.50	150.0	28,425	5,250	180.0	Operator	51.00	9,180				
Load, haul, dump, spread (1000 mm silty sand from Victoria Creek)	80,000 cm			160 cm/hr	500.0	50.0	Load	1.0	35-ton excavator	218.50	500.0	109,250	21,500	600.0	Operator	55.00	33,000				
				160 cm/hr	500.0	50.0	Haul	7.0	40-ton ADT	210.50	3500.0	736,750	122,500	4200.0	Teamster	50.00	210,000				
														1200.0	Flag person	37.00	44,400				
				160 cm/hr	500.0	50.0	Spread	1.0	D7 dozer	189.50	500.0	94,750	17,500	600.0	Operator	51.00	30,600				

Total Cost ----->	1,093,600	Equipment	Subtotal ----->	1,093,600	Subtotal ----->	364,080	Subtotal ----->	552,000
	364,080	Labour						
	552,000	Other						
	2,009,680							
Direct Unit Cost ----->	19.32	\$/cm	Fuel Consumption (litres) ----->	188,200	Camp Days ----->	662		

Estimator Notes -----> Assumed production rate and truck requirements:

For crushed rock:

Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 21 minutes
Number of round trips per hour per truck = 2.9
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 6 loads per hour rate = 9/2.9 = 3
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

The interim pit cover is assumed to consist of a 300 mm thick layer of lightly crushed rock, overlain with 1000 mm of silty sand from the Victoria Creek area.
Flag persons have been added to the Victoria Creek work due to haulage along the public road.
It is assumed that no royalties are payable on this off-site borrow material and that borrow pit development and reclamation will be minimal.
Tonnage for crushing = cm volume x 2 tonnes/cm + plus a 15% waste factor.

For Victoria Creek pit run sand:

Assume a 5.0 km haul distance, 10.0 km round trip.
Assume an average haul speed in both directions of 15 kph, or 40 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 45 minutes
Number of round trips per hour per truck = 1.3
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 9 loads per hour rate = 9/1.3 = 7
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

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Activity 380 -> Contractor Demobilization And Site Winterizing								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Demobilization	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	200.0	18,600	2,400	240.0	Teamster	50.00	12,000				
														480.0	Labourer (2)	37.00	17,760				
														240.0	Labour F/M	58.00	13,920				
	Crane rental for heavier lifts																	3.0	ls	5,000	15,000
Lowbed loads from site																		50.0	ea	2,500	125,000
Hiboy loads from site																		50.0	ea	1,000	50,000
Site Winterizing	Allowance for winterizing the WTP																	1.0	ls	75,000	75,000
	Allowance for winterizing the camp																	1.0	ls	25,000	25,000

Total Cost ----->		18,600	Equipment	Subtotal ----->		18,600	Subtotal ----->		43,680	Subtotal ----->		290,000
		43,680	Labour									
		290,000	Other	Fuel Consumption (litres) ----->		2,400	Camp Days ----->		80			
		352,280										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> Allowance included to winterize both the camp and the WTP between Seasons #3 and #4.

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SEASON #3 CONTRACTOR INDIRECTS

								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Field Staff Expenses	Salaries and benefits																				
							Project manager							19.0	week	6,000	114,000				
							General superintendent (day shift)							17.0	week	5,500	93,500				
							General superintendent (night shift)							17.0	week	5,500	93,500				
							Project engineer							17.0	week	4,750	80,750				
							Field engineer (2)							34.0	week	3,750	127,500				
							Office administrator							17.0	week	3,750	63,750				
							Survey crew (2-men)							12.0	week	6,000	72,000				
	Rotations, terminal travel																				
							Terminal travel (9 men x 2 ways)											18.0	trips	750	13,500
Field expenses							Rotations (every 4 weeks x 2 ways)											49.0	trips	750	36,750
	Vehicles																				
							Pickup trucks (assumed 50% utilization for fuel use estimate)	9.0	3/4-ton pickup	34.50	9,310.0	321,195	41,895								
	Trailer rentals																	19.0	week	750	14,250
							Office equipment, computers											145.0	man-week	75	10,875
							Office/safety/enviro/survey supplies											145.0	man-week	100	14,500
							Radios, phones, communications											145.0	man-week	50	7,250
							Outside consultants, lab tests											2.0	ls	10,000	20,000
							Small tools											87452.9	hrs	2.00	174,906
Field Labour Expenses	Equipment fueling/maintenance (assume 6 mechanics for 16 weeks)																				
							Mechanic w/ fuel/lube truck	6.0	Fuel/lube truck	92.50	1,120.0	621,600	168,000	8,064.0	Mechanic	55.00	443,520				
	General bullgang crew (assume 12 weeks not already in direct costs)																				
							Hiab w/ teamster	1.0	Hiab	93.00	840.0	78,120	10,080	1,008.0	Teamster	50.00	50,400				
							Labourers							1,008.0	Labourer	37.00	37,296				
	Haul road maintenance (assume 2 full time graders, 1 full time water)																				
							Grader	2.0	Grader	178.00	1,120.0	398,720	71,680	2,688.0	Operator	51.00	137,088				
							Water truck	1.0	Water truck	93.00	1,120.0	104,160	24,640	1,344.0	Teamster	50.00	67,200				
	Float services (assume nominal amount)																				
							Mac truck	1.0	Tractor	92.50	300.0	27,750	7,500	360.0	Teamster	50.00	18,000				
Other project costs							Lowboy	1.0	Trailer	75.00	300.0	22,500	0								
	Home office overhead (say 0.25% of direct costs)																	1.0	Home office	49,784	49,784
							Bonds & insurance (say 0.75% of direct costs)											1.0	Insurance	149,352	149,352
							Profit (target -35% of labour and -8% of total cost)											1.0	ls	2,000,000	2,000,000
Camp	Catering & housekeeping																	8,745	days	75.00	655,896

Total Cost ----->	1,574,045	Equipment	Subtotal ----->	1,574,045	Subtotal ----->	1,398,504	Subtotal ----->	3,147,063
	1,398,504	Labour						
	3,147,063	Other	Fuel Consumption (litres) ----->	323,795	Camp Days ----->	2,221		
	6,119,612							
Direct Unit Cost ----->	n/a							

Estimator Notes -----> This sheet covers general contractor overhead field and home office costs during Season #3. A team of 7 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them. Other contractor indirect costs include a mechanic with fuel/lube truck, a small bullgang crew for odd jobs around the site, a road maintenance crew, and float services. Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here. The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #3 worksheets. The small tools allowance also draws on the total camp days from the Cost Summary worksheet.

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Activity 410 -> Contractor Mobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Mobilization	Hiab truck w/ teamster & 3 labourers (unloading equipment)							1.0	Hiab	93.00	75.0	6,975	900	90.0	Teamster	50.00	4,500				
														270.0	Labourer (3)	37.00	9,990				
														90.0	Labour F/M	58.00	5,220				
	Crane rental for heavier lifts Lowbed loads to site Hiboy loads to site																	1.0	ls	5,000	5,000
																		15.0	ea	2,500	37,500
																		15.0	ea	1,000	15,000
Set Up Field Operations	Hiab truck w/ teamster & 3 labourers							1.0	Hiab	93.00	100.0	9,300	1,200	120.0	Teamster	50.00	6,000				
														360.0	Labourer (3)	37.00	13,320				
														120.0	Labour F/M	58.00	6,960				
Camp	Allowance for unwinterizing the camp																1.0	ls	15,000	15,000	

Total Cost ----->		16,275	Equipment	Subtotal ----->		16,275	Subtotal ----->		45,990	Subtotal ----->		72,500
		45,990	Labour									
		72,500	Other									
		134,765										
Direct Unit Cost ----->		n/a										

Estimator Notes -----> The above work is assumed to take place prior to the mobilization of the main work force.
Only the camp needs to be unwinterized. The WTP will be mothballed this season, in the event it is required in later years for water treatment.

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Activity 415 -> Stockpile Balance Of Sand From Dams To Pit/Cover Area								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	69,890 cm			160 cm/hr	436.8	43.7	Load	1.0	35-ton excavator	218.50	436.8	95,444	18,783	524.2	Operator	55.00	28,830				
							Haul	5.0	40-ton ADT	210.50	2,184.1	459,745	76,442	2,620.9	Teamster	50.00	131,044				
							Spread	1.0	D7 dozer	189.50	436.8	82,776	15,288	524.2	Operator	51.00	26,733				

Total Cost ----->		637,965	Equipment	Subtotal ----->		637,965	Subtotal ----->		186,606	Subtotal ----->		0
		186,606	Labour				Fuel Consumption (litres) ----->		110,514	Camp Days ----->		306
		0	Other									
		824,571										
Direct Unit Cost ----->		11.80	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 2.5 km haul distance, 5.0 km round trip.
Assume an average haul speed in both directions of 12.5 kph, or 24 minutes per round trip.
Add 6 minutes for loading and dumping times, for a total round trip of 30 minutes
Number of round trips per hour per truck = 2
Assume an average of 9 truck loads per hour are delivered to stockpile.
Number of trucks required to maintain 9 loads per hour rate = 9/2 = 5
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)

Allow a D7 dozer for spreading dumped loads.
This sand will be stockpiled close to the pit area and available for repairs to the interim cover or for incorporation into the final cover.

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Activity 420 -> Haul Sand & Rock From Stockpile And Place Over Exposed Dam Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Load, haul, dump, spread	35,000 cm			145 cm/hr	241.4	24.1	Load	1.0	35-ton excavator	218.50	241.4	52,741	10,379	289.7	Operator	55.00	15,931				
				145 cm/hr	241.4	24.1	Haul	2.0	40-ton ADT	210.50	482.8	101,621	16,897	579.3	Teamster	50.00	28,966				
				145 cm/hr	241.4	24.1	Spread	1.0	D7 dozer	189.50	241.4	45,741	8,448	289.7	Operator	51.00	14,772				

Total Cost ----->		200,103	Equipment	Subtotal ----->		200,103	Subtotal ----->		59,669	Subtotal ----->		0
		59,669	Labour									
		0	Other									
		259,772										
Direct Unit Cost ----->		7.42	\$/cm									

Estimator Notes -----> **Assumed production rate and truck requirements:**
Assume a 0.4 km haul distance, 0.8 km round trip.
Assume an average haul speed in both directions of 5 kph, or 10 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 15 minutes
Number of round trips per hour per truck = 4
Assume an average of 8 truck loads per hour are delivered to the newly exposed areas of the dams.
Number of trucks required to maintain 8 loads per hour rate = 8/4 = 2
Assume truck payload = 18 cm ----> Hourly rate = 8 x 18 = 144 cm/hr (use 145 cm/hr)

Allow a D7 dozer for spreading dumped loads. No extra compaction required.

The cost of winning the material (sand bedding and rock cover) and stockpiling it near the dam areas is included with Activities 330 and 335.
The total volume of sand and rock assumed stockpiled is (34,325 + 137,250) * 20% = 34,315 cm -> used 35,000

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Activity 425 -> Reconstruct Dome Creek And Its Riparian Zone Through The Dam Areas								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Grizzly/screen work for cobbles	1,250 tonnes			50 tonnes/hr	25.0	2.5	Screen	1.0						30.0	Operator	included -->		1,250	tonnes	5.00	6,250
Load at screen, haul, dump, place	500 cm			18 cm/hr	27.8	2.8	Load	1.0	Front end loader	198.0	27.78	5,500	1,194	33.3	Operator	55.00	1,833				
				18 cm/hr	27.8	2.8	Haul	2.0	40-ton ADT	210.5	55.56	11,694	1,944	66.7	Teamster	50.00	3,333				
				18 cm/hr	27.8	2.8	Place	1.0	Excavator	218.5	27.78	6,069	389	33.3	Operator	55.00	1,833				

Total Cost ----->	23,264	Equipment	Subtotal ----->	23,264	Subtotal ----->	7,000	Subtotal ----->	6,250
	7,000	Labour						
	6,250	Other	Fuel Consumption (litres) ----->	3,528	Camp Days ----->	14		
	<u>36,514</u>							
Direct Unit Cost ----->	73.03	\$/cm						

Estimator Notes -----> Very little information available, including where to source the cobbles. Assumed to be one quarter the effort required through the TSF.
Assume a screening operation 5 km away, with cobbles delivered to the TSF where an excavator places the cobbles in the trench incorporated previously in the TSF cover.
Assume excavator places one 18 cm ADT load an hour.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 430 -> Final Grade & Revegetate TSF & Dam Areas (classed as high priority)								EQUIPMENT						LABOUR				OTHER											
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost								
Revegetation crew	2.7 ha		0.01 ha/hr		270.0	27.0	Reveg	1.0	25-ton excavator	131.00	270.0	35,370	6,480	324.0	Operator	51.00	16,524												
								1.0	Backhoe/loader	53.50	270.0	14,445	2,970	324.0	Operator	51.00	16,524												
								1.0	Truck w/ brush saw	55.50	270.0	14,985	4,050	324.0	Teamster	50.00	16,200												
								5.0	Pickup truck	34.50	1,350.0	46,575	12,150	324.0	F/M	58.00	18,792												
								1.0																					
								10.0																					
Supplies																		150	kg	10.00	1,500								
																										650	kg	5.00	3,250
																										2	tonnes	5,000	10,000
																										4,000	kg	10.00	40,000
																										23,000	ea	5.00	115,000
																										4,000	ea	10.00	40,000

Total Cost ----->	111,375	Equipment	Subtotal ----->	111,375	Subtotal ----->	187,920	Subtotal ----->	209,750
	187,920	Labour						
	209,750	Other						
	509,045							
Fuel Consumption (litres) ----->	25,650		Camp Days ----->	378				
Direct Unit Cost ----->	188,535.19	\$/ha						

Estimator Notes -----> Assume an area 30 m x 30 m can, on average, be rehabilitated each day with the crew shown.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 435 -> Final Grade & Revegetate Mill & Camp Areas (classed as moderate priority)								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Revegetation crew	2.0 ha		0.01 ha/hr		200.0	20.0	Reveg	1.0	Small excavator	131.00	200.0	26,200	4,800	240.0	Operator	51.00	12,240				
								1.0	Backhoe/loader	53.50	200.0	10,700	2,200	240.0	Operator	51.00	12,240				
								1.0	Truck w/ brush saw	55.50	200.0	11,100	3,000	240.0	Teamster	50.00	12,000				
								5.0	Pickup truck	34.50	1,000.0	34,500	9,000								
								1.0						240.0	F/M	58.00	13,920				
								10.0						2,400.0	Labourer (10)	37.00	88,800				
Supplies																		100	kg	10.00	1,000
																		500	kg	5.00	2,500
																		1.5	tonnes	5,000	7,500
																		2,750	kg	10.00	27,500
																		17,000	ea	5.00	85,000
																		3,000	ea	10.00	30,000

Total Cost ----->	82,500	Equipment	Subtotal ----->	82,500	Subtotal ----->	139,200	Subtotal ----->	153,500
	139,200	Labour						
	153,500	Other						
	375,200							
Fuel Consumption (litres) ----->	19,000		Camp Days ----->	280				
Direct Unit Cost ----->	187,600.00	\$/ha						

Estimator Notes -----> Assume an area 30 m x 30 m can, on average, be rehabilitated each day with the crew shown.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 435 -> Final Grade & Revegetate Dump & Cover Areas (classed as moderate priority)								EQUIPMENT						LABOUR				OTHER														
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost											
Revegetation crew	3.2 ha	0.01 ha/hr	320.0	32.0	Reveg	1.0	Small excavator	131.00	320.0	41,920	7,680	384.0	Operator	51.00	19,584																	
						1.0	Backhoe/loader	53.50	320.0	17,120	3,520	384.0	Operator	51.00	19,584																	
						1.0	Truck w/ brush saw	55.50	320.0	17,760	4,800	384.0	Teamster	50.00	19,200																	
						5.0	Pickup truck	34.50	1,600.0	55,200	14,400																					
						1.0					384.0	F/M	58.00	22,272																		
						10.0					3,840.0	Labourer (10)	37.00	142,080																		
Supplies	Seed w/ native mix																	150	kg	10.00	1,500											
	Fertilizer																	800	kg	5.00	4,000											
	Mulch																	2.4	tonnes	5,000	12,000											
	Biochar																	4,450	kg	10.00	44,500											
	Staked willows																	27,200	ea	5.00	136,000											
	Transplants (white spruce & trembling aspen)																	4,800	ea	10.00	48,000											
	Coarse woody debris (produced on site)																															
Total Cost ----->		132,000	Equipment							Subtotal ----->		132,000					Subtotal ----->		222,720	Subtotal ----->		246,000										
		222,720	Labour																													
		246,000	Other							Fuel Consumption (litres) ----->		30,400					Camp Days ----->		448													
		600,720																														
Direct Unit Cost ----->		187,725.00	\$/ha																													

Estimator Notes -----> Assume an area 30 m x 30 m can, on average, be rehabilitated each day with the crew shown.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 445 -> Backfill & Revegetate Exploration Trenches								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Backfill trenches	5,500 m	20 m/r	275.0	27.5			Reveg	1.0	Truck w/ brush saw	55.50	275.0	15,263	4,125	330.0	Teamster	50.00	16,500				
								1.0	35-ton excavator	218.50	275.0	60,088	11,825	330.0	Operator	55.00	18,150				
								1.0	D7 Dozer	189.50	275.0	52,113	9,625	330.0	Operator	51.00	16,830				
								1.0						330.0	F/M	58.00	19,140				
								3.0						990.0	Labourer (3)	37.00	36,630				

Total Cost ----->		127,463	Equipment	Subtotal ----->		127,463	Subtotal ----->		107,250	Subtotal ----->		0
		107,250	Labour									
		0	Other									
		234,713										
Direct Unit Cost ----->		42.68	\$/m									

Estimator Notes -----> Assumed a D7 dozer, an excavator, and a truck w/ brush saw can decommission on average 20 m of trench per 10-hr day.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 450 -> Decommission Site Roads								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Rip, grade, and contour	8,600 m	20 m/r			430.0	43.0	Roads	1.0	D9 dozer w/ ripper	390.00	430.0	167,700	25,800	516.0	Operator	55.00	28,380				
								1.0	35-ton excavator	218.50	430.0	93,955	18,490	516.0	Operator	55.00	28,380				
								1.0	D7 Dozer	189.50	430.0	81,485	15,050	516.0	Operator	51.00	26,316				

Total Cost ----->	343,140	Equipment	Subtotal ----->	343,140	Subtotal ----->	83,076	Subtotal ----->	0
	83,076	Labour						
	0	Other						
	<u>426,216</u>							
Fuel Consumption (litres) ----->	59,340	Camp Days ----->	129					
Direct Unit Cost ----->	49.56	\$/m						

Estimator Notes -----> Assumed a dozer w/ ripper, a D7 dozer, and an excavator can decommission on average 200 m of road per 10-hr day.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity 450 -> Final Cleanup And Contractor Demobilization								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Equipment demob	Hiab truck w/ teamster & 3 labourers (loading equipment)							1.0	Hiab	93.00	75.0	6,975	900	90.0	Teamster	50.00	4,500				
														180.0	Labourer (2)	37.00	6,660				
														90.0	Labour F/M	58.00	5,220				
	Crane rental for heavier lifts																	1.0	ls	5,000	5,000
Lowbed loads from site																		15.0	ea	2,500	37,500
Hiboy loads from site																		15.0	ea	1,000	15,000
Camp Removal, WTP Mothballing	Allowance for mothballing WTP													1,000.0				1.0	ls	100,000	100,000
	Allowance for camp removal													500.0				1.0	ls	100,000	100,000

Total Cost ----->	6,975	Equipment	Subtotal ----->	6,975	Subtotal ----->	16,380	Subtotal ----->	257,500
	16,380	Labour						
	257,500	Other						
	280,855							
			Fuel Consumption (litres) ----->	900		Camp Days ----->	155	
Direct Unit Cost ----->	n/a							

Estimator Notes -----> The WTP will be mothballed in Season #4, available to be put in use if water quality monitoring after closure shows that water needs to be treated.
The camp is assumed removed after the completion of Season #4.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

SEASON #4 CONTRACTOR INDIRECTS								EQUIPMENT						LABOUR				OTHER																																				
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost																																	
Field Staff Expenses	Salaries and benefits																																																					
							Project manager							17.0	week	6,000	102,000																																					
							Project engineer							13.0	week	4,750	61,750																																					
							Field engineer							13.0	week	3,750	48,750																																					
							Office administrator							13.0	week	3,750	48,750																																					
							Survey crew (2-men)							2.0	week	6,000	12,000																																					
	Rotations, terminal travel																																																					
							Terminal travel (6 men x 2 ways)											12.0	trips	750	9,000																																	
							Rotations (every 4 weeks x 2 ways)											20.0	trips	750	15,000																																	
	Vehicles																																																					
						Pickup trucks (assumed 50% utilization for fuel use estimate)		5.0	3/4-ton pickup	34.50	4,060.0	140,070	18,270																																									
Field expenses	Trailer rentals																		17.0	week	750	12,750																																
	Office equipment, computers																	60.0	man-week	75	4,500																																	
	Office/safety/enviro/survey supplies																	60.0	man-week	100	6,000																																	
	Radios, phones, communications																	60.0	man-week	50	3,000																																	
	Outside consultants, lab tests																	1.0	ls	10,000	10,000																																	
	Small tools (not including WTP hrs)																	27,769	hrs	2.00	55,539																																	
Field Labour Expenses	Equipment fueling/maintenance (assume 2 mechanics for 8 weeks)																																																					
	Mechanic w/ fuel/lube truck								2.0	Fuel/lube truck	92.50	560.0	103,600	28,000	1,344.0	Mechanic	55.00	73,920																																				
	General bulgang crew (assume 8 weeks not already in direct costs)																																																					
	Hiab w/ teamster								1.0	Hiab	93.00	560.0	52,080	6,720	672.0	Teamster	50.00	33,600																																				
	Labourers														672.0	Labourer	37.00	24,864																																				
	Haul road maintenance (assume 50% grader, 25% water, over 8 weeks)																																																					
	Grader								0.50	Grader	178.00	560.0	49,840	8,960	336.0	Operator	51.00	17,136																																				
	Water truck								0.25	Water truck	93.00	560.0	13,020	3,080	168.0	Teamster	50.00	8,400																																				
	Float services (assume nominal amount)																																																					
	Mac truck								1.0	Tractor	92.50	50.0	4,625	1,250	60.0	Teamster	50.00	3,000																																				
Lowboy								1.0	Trailer	75.00	50.0	3,750	0																																									
Other project costs	Home office overhead (say 0.25% of direct costs)																	1.0	Home office	9,206	9,206																																	
	Bonds & insurance (say 0.75% of direct costs)																	1.0	Insurance	27,618	27,618																																	
	Profit (equals ~35% of labour and ~8% of total cost)																	1.0	Is	475,000	475,000																																	
Camp	Catering & housekeeping																	2,777	days	75.00	208,270																																	
Total Cost ----->		366,985	Equipment	Subtotal ----->										366,985	Subtotal ----->		434,170	Subtotal ----->		835,882																																		
		434,170	Labour																																																			
		835,882	Other																																																			
		1,637,037																																																				
Direct Unit Cost ----->		n/a																																																				
Estimator Notes -----> This sheet covers general contractor overhead field and home office costs during Season #4.																																																						
A team of 4 field staff with pickups, and a part-time survey crew, was assumed. This sheet also covers the field expenses required to support them.																																																						
Other contractor indirect costs include a mechanic with fuel/lube truck, a small bulgang crew for odd jobs around the site, a road maintenance crew, and float services.																																																						
Contractor bonds (such as L&M or performance), insurance, home office overheads, and profit are also included here.																																																						
The total camp days are drawn from the Cost Summary worksheet, which itself has collected the information from all the individual Season #4 worksheets.																																																						
The small tools allowance also draws on the total camp days from the Cost Summary worksheet.																																																						

Appendix E - Post Remediation Monitoring Costs

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Site Information

Mount Nansen, Yukon

AMEC Project Manager Information

Name:	Renata Wood
Email Address:	renata.wood@amec.com
Telephone:	604-295-8243
Fax:	

Client Project Manager Information

Name:	Josée Perron
Email Address:	Josee.Perron@gov.yk.ca
Telephone:	(867) 456-6775
Fax:	
Address:	Room 2C, 2nd Floor, Royal Centre
	P.O. Box 2703,
	Whitehorse, Yukon
	Y1A 2C6

AMEC Team Information

Project Manager:	Renata Wood
Senior Design Lead:	Brian Geddes
Project Sponsor:	Brian Ross

AMEC Rate Information

Contract:	#C00014062
Task Authorization Request	6
Rate Sheet:	

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Groundwater Monitoring - Years 1 to 5
Task Description:	Assumed scope as follows: -30 wells sampled twice annually; -each event requires 2 people on-site for 5 days; -each event generates 35 water samples for analysis; -each event generates 40 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	120		\$ 18,480
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	80		\$ 9,360
Total					200	0	\$ 27,840

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 1,949	0.00%	\$ 1,949
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		16	\$ 102	10.00%	\$ 1,786
Truck Rental		8	\$ 400	10.00%	\$ 3,520
Gas		1300	\$0.17	10.00%	\$ 243
Laboratory Analyticals		70	\$ 300	10.00%	\$ 23,100
Total					\$ 30,598

Total Fees and Expenses **\$ 58,438**

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Groundwater Monitoring - Year 6 and following
Task Description:	Assumed scope as follows: -30 wells sampled once annually; -each event requires 2 people on-site for 5 days; -each event generates 35 water samples for analysis; -each event generates 40 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	80		\$ 12,320
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	40		\$ 4,680
Total					120	0	\$ 17,000

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 1,190	0.00%	\$ 1,190
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		8	\$ 102	10.00%	\$ 893
Truck Rental		5	\$ 400	10.00%	\$ 2,200
Gas		700	\$0.17	10.00%	\$ 131
Laboratory Analyticals		35	\$ 300	10.00%	\$ 11,550
Total					\$ 15,964

Total Fees and Expenses **\$ 32,964**

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Surface Water Monitoring - Years 1 to 5
Task Description:	Assumed scope as follows: -30 locations sampled monthly; -each event requires 2 people on-site for 2 days; -each event generates 30 water samples for analysis; -each event generates 10 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	360		\$ 55,440
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	240		\$ 28,080
Total					600	0	\$ 83,520

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 5,846	0.00%	\$ 5,846
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		44	\$ 102	10.00%	\$ 4,913
Truck Rental		24	\$ 400	10.00%	\$ 10,560
Gas		6000	\$0.17	10.00%	\$ 1,122
Laboratory Analyticals		360	\$ 150	10.00%	\$ 59,400
Total					\$ 81,841

Total Fees and Expenses **\$ 165,361**

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Surface Water Monitoring - Years 6 & 7
Task Description:	Assumed scope as follows: -30 locations sampled quarterly; -each event requires 2 people on-site for 2 days; -each event generates 30 water samples for analysis; -each event generates 10 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	120		\$ 18,480
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	80		\$ 9,360
Total					200	0	\$ 27,840

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 1,949	0.00%	\$ 1,949
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		16	\$ 102	10.00%	\$ 1,786
Truck Rental		8	\$ 400	10.00%	\$ 3,520
Gas		1600	\$0.17	10.00%	\$ 299
Laboratory Analyticals		120	\$ 150	10.00%	\$ 19,800
Total					\$ 27,354

Total Fees and Expenses **\$ 55,194**

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Surface Water Monitoring - Years 8 & Following
Task Description:	Assumed scope as follows: -30 locations sampled once per year; -each event requires 2 people on-site for 2 days; -each event generates 30 water samples for analysis; -each event generates 20 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	36		\$ 5,544
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	16		\$ 1,872
Total					52	0	\$ 7,416

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 519	0.00%	\$ 519
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		4	\$ 102	10.00%	\$ 447
Truck Rental		2	\$ 400	10.00%	\$ 880
Gas		500	\$0.17	10.00%	\$ 94
Laboratory Analyticals		30	\$ 150	10.00%	\$ 4,950
Total					\$ 6,889

Total Fees and Expenses **\$ 14,305**

AMEC Environment & Infrastructure - Project Cost Estimate

Project Information

Project Name:	MNRP - O&M Cost Worksheet
Proposal No.:	VM00605F
Client:	Assessment and Abandoned Mines, Energy Mines and Resources, Government of Yukon
Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Interim Cover Monitoring - Years 1 to 7
Task Description:	Assumed scope as follows: -cover is monitored twice per year; -each event requires 2 people on-site for 1 day; -each event generates 20 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	40		\$ 6,160
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	20		\$ 2,340
Total					60	0	\$ 8,500

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 595	0.00%	\$ 595
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		4	\$ 102	10.00%	\$ 447
Truck Rental		2	\$ 400	10.00%	\$ 880
Gas		1200	\$0.17	10.00%	\$ 224
Laboratory Analyticals			\$ 150	10.00%	\$ -
Total					\$ 2,146

Total Fees and Expenses **\$ 10,646**

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Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Permanent Cover Monitoring - Years 8 & Following
Task Description:	Assumed scope as follows: -cover is monitored once per year; -each event requires 2 people on-site for 1 day; -each event generates 20 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	30		\$ 4,620
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	20		\$ 2,340
Total					50	0	\$ 6,960

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 487	0.00%	\$ 487
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		2	\$ 102	10.00%	\$ 223
Truck Rental		1	\$ 400	10.00%	\$ 440
Gas		700	\$0.17	10.00%	\$ 131
Laboratory Analyticals			\$ 150	10.00%	\$ -
Total					\$ 1,281

Total Fees and Expenses **\$ 8,241**

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Task 1

Task Name:	Annual Reclamation Monitoring - Years 1 to 5
Task Description:	Assumed scope as follows: -trails and reclamation sites monitored twice per year; -each event requires 2 people on-site for 2 days; -each event generates 30 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	70		\$ 10,780
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	40		\$ 4,680
Total					110	0	\$ 15,460

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 1,082	0.00%	\$ 1,082
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		4	\$ 102	10.00%	\$ 447
Truck Rental		2	\$ 400	10.00%	\$ 880
Gas		1200	\$0.17	10.00%	\$ 224
Laboratory Analyticals	Soil/Veg testing	10	\$ 150	10.00%	\$ 1,650
Total					\$ 4,283

Total Fees and Expenses **\$ 19,743**

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Date Issued:	March 31, 2014

Task 1

Task Name:	Annual Reclamation Monitoring - Years 6 & Following
Task Description:	Assumed scope as follows: -trails and reclamation sites monitored once per year; -each event requires 2 people on-site for 2 days; -each event generates 30 hours support and reporting requirement.

Fees

Employee Name	Classification	Division	Regular Rate	Overtime Rate	Regular Hours	Overtime Hours	Total
Professional Staff	Professional Level 17	0	\$ 154	\$ 154	50		\$ 7,700
Technical Staff	Technician Level 16	0	\$ 117	\$ 117	20		\$ 2,340
Total					70	0	\$ 10,040

Expenses

Item	Supplier	Quantity	Unit Price	Percent Markup	Total
MISCELLANEOUS EXPENSES – 7% of Fees		1	\$ 703	0.00%	\$ 703
Airfare			\$ 900	10.00%	\$ -
Hotel			\$ 250	10.00%	\$ -
Meals		2	\$ 102	10.00%	\$ 223
Truck Rental		1	\$ 400	10.00%	\$ 440
Gas		700	\$0.17	10.00%	\$ 131
Laboratory Analyticals	Soil/Veg testing	5	\$ 150	10.00%	\$ 825
Total					\$ 2,322

Total Fees and Expenses **\$ 12,362**

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Date Issued:	March 31, 2014

Summary

Task 1

Task Name:	Annual Groundwater Monitoring - Years 1 to 5			
Task Description:	Assumed scope as follows: -30 wells sampled twice annually; -each event requires 2 people on-site for 5 days; -each event generates 35 water samples for analysis; -each event generates 40 hours support and reporting requirement.			
Fees:	\$	27,840	Total Hours (Regular):	200
Expenses:	\$	30,598	Total Hours (Overtime):	0
Total:	\$	58,438	Total:	200

Task 2

Task Name:	Annual Groundwater Monitoring - Year 6 and following			
Task Description:	Assumed scope as follows: -30 wells sampled once annually; -each event requires 2 people on-site for 5 days; -each event generates 35 water samples for analysis; -each event generates 40 hours support and reporting requirement.			
Fees:	\$	17,000	Total Hours (Regular):	120
Expenses:	\$	15,964	Total Hours (Overtime):	0
Total:	\$	32,964	Total:	120

Task 3

Task Name:	Annual Surface Water Monitoring - Years 1 to 5			
Task Description:	Assumed scope as follows: -30 locations sampled monthly; -each event requires 2 people on-site for 2 days; -each event generates 30 water samples for analysis; -each event generates 10 hours support and reporting requirement.			
Fees:	\$	83,520	Total Hours (Regular):	600
Expenses:	\$	81,841	Total Hours (Overtime):	0
Total:	\$	165,361	Total:	600

Task 4

Task Name:	Annual Surface Water Monitoring - Years 6 & 7			
Task Description:	Assumed scope as follows: -30 locations sampled quarterly; -each event requires 2 people on-site for 2 days; -each event generates 30 water samples for analysis; -each event generates 10 hours support and reporting requirement.			
Fees:	\$	27,840	Total Hours (Regular):	200
Expenses:	\$	27,354	Total Hours (Overtime):	0
Total:	\$	55,194	Total:	200

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Summary

Task 5

Task Name:	Annual Surface Water Monitoring - Years 8 & Following		
Task Description:	Assumed scope as follows: -30 locations sampled once per year; -each event requires 2 people on-site for 2 days; -each event generates 30 water samples for analysis; -each event generates 20 hours support and reporting requirement.		
Fees:	\$ 7,416	Total Hours (Regular):	52
Expenses:	\$ 6,889	Total Hours (Overtime):	0
Total:	\$ 14,305	Total:	52

Task 6

Task Name:	Annual Interim Cover Monitoring - Years 1 to 7		
Task Description:	Assumed scope as follows: -cover is monitored twice per year; -each event requires 2 people on-site for 1 day; -each event generates 20 hours support and reporting requirement.		
Fees:	\$ 8,500	Total Hours (Regular):	60
Expenses:	\$ 2,146	Total Hours (Overtime):	0
Total:	\$ 10,646	Total:	60

Task 7

Task Name:	Annual Permanent Cover Monitoring - Years 8 & Following		
Task Description:	Assumed scope as follows: -cover is monitored once per year; -each event requires 2 people on-site for 1 day; -each event generates 20 hours support and reporting requirement.		
Fees:	\$ 6,960	Total Hours (Regular):	50
Expenses:	\$ 1,281	Total Hours (Overtime):	0
Total:	\$ 8,241	Total:	50

Task 8

Task Name:	Annual Reclamation Monitoring - Years 1 to 5		
Task Description:	Assumed scope as follows: -trails and reclamation sites monitored twice per year; -each event requires 2 people on-site for 2 days; -each event generates 30 hours support and reporting requirement.		
Fees:	\$ 15,460	Total Hours (Regular):	110
Expenses:	\$ 4,283	Total Hours (Overtime):	0
Total:	\$ 19,743	Total:	110

Task 9

Task Name:	Annual Reclamation Monitoring - Years 6 & Following		
Task Description:	Assumed scope as follows: -trails and reclamation sites monitored once per year; -each event requires 2 people on-site for 2 days; -each event generates 30 hours support and reporting requirement.		
Fees:	\$ 10,040	Total Hours (Regular):	110
Expenses:	\$ 2,322	Total Hours (Overtime):	0
Total:	\$ 12,362	Total:	110

AMEC Environment & Infrastructure - Project Cost Estimate

Discounted Values of Estimated O&M Tasks

Activity	Years 1 to 5		Years 6 & 7			Years 8 & Following			Total Discounted Cost at Year 1
	Annual Cost	Discounted Activity Cost at Year 1	Annual Cost	Discounted Activity Cost at Year 6	Discounted Activity Cost at Year 1	Annual Cost	Discounted Activity Cost at Year 8	Discounted Activity Cost at Year 1	
Groundwater Monitoring	\$58,438	\$275,446.56	\$32,964	\$64,001.81	\$57,968	\$32,964	\$643,573	\$560,269	\$893,684
Surface Water Monitoring	\$165,361	\$779,422.38	\$55,194	\$107,163.29	\$97,061	\$14,305	\$279,287	\$243,136	\$1,119,620
Cover Monitoring	\$10,646	\$50,179.49	\$10,646	\$20,669.86	\$18,721	\$8,241	\$160,901	\$140,074	\$208,974
Reclamation Monitoring	\$19,743	\$93,058.77	\$12,362	\$24,001.58	\$21,739	\$12,362	\$241,349	\$210,109	\$324,907
Total Present Value of O&M Costs									\$2,547,185

Discount Rate (%) 2
Monitoring Duration (Post Year 8) (years) 25

Appendix F - Summary of Monitoring and Maintenance Cost Estimates

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Total Base Case Estimate (Capital, Monitoring and Maintenance)

		DIRECT COST BREAKDOWN			2014 \$ CDN		
Schedule Activity ID	Description of Work	EQUIPMENT	LABOUR	OTHER	DIRECT COSTS	INDIRECT COSTS	TOTAL COSTS
Base Case Subtotals					40,946,215	13,240,028	
ave % indirects to directs ----->						32	
Base Case Total CAPEX Cost							79,833,789

Monitoring Costs (Discounted Present Value)

M1	Groundwater Monitoring				893,684	0	893,684
M2	Surface Water Monitoring				1,119,620	0	1,119,620
M3	Cover Monitoring				208,974	0	208,974
M4	Reclamation Monitoring				324,907	0	324,907
		0	0	0	2,547,185	0	2,547,185
Subtotal							
% indirects to directs ----->						0.0	

Cover Maintenance (Discounted Present Value)

M5	Interim Cover Rebuild (50% of CAPEX at Year 3)				1,264,278	0	1,264,278
M6	Permananet Cover Rebuild (25% of CAPEX at Year 15)				927,267	0	927,267
		0	0	0	2,191,544	0	2,191,544
Subtotal							
% indirects to directs ----->						0.0	

Total Base Case Estimate (Capital, Monitoring and Maintenance) 84,572,518

Appendix G - Design Contingency and Adaptive Management Cost Estimates

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Total Base Case Estimate (Capital, Monitoring, Maintenance, Design Contingencies & Adaptive Management)

Schedule Activity ID	Description of Work	When Required (years after remedial construction)	Costing Assumptions	DIRECT COST BREAKDOWN				2014 \$ CDN		
				EQUIPMENT	LABOUR	OTHER	Total	DIRECT COSTS (Discounted Present Value)	INDIRECT COSTS	TOTAL COSTS

Base Case Total Cost Estimate

84,572,518

Design Contingencies

DC1	Installation of Waste Rock Liner	0	DC1	28,223	9,540	170,000	207,763	207,763	67,180	274,943
DC2	Construction of Pit Sidewall Drains	0	DC2	244,969	78,150	536,000	859,119	859,119	277,798	1,136,916
				273,191	87,690	706,000	1,066,881	1,066,881	344,978	1,411,859

Subtotal

% indirects to directs (ave for Base Case) ----->

32

Adaptive Management Actions

AM1	Preliminary assessment/confirmation of water quality excursions and downstream impacts	20	Direct Cost is a provision; not a detailed estimate.			200,000	200,000	134,594	43,521	178,116
AM2	Pit cover monitoring and maintenance review	20	Direct Cost is a provision; not a detailed estimate.			50,000	50,000	33,649	10,880	44,529
AM3	Detailed Downstream Impact Assessments	21	Direct Cost is a provision; not a detailed estimate.			300,000	300,000	197,933	64,002	261,935
AM4	Installation of pit water production wells and associated pipelines and storage facilities	22	Assume 2 wells (i.e. TAB AM4 x 2)			170,000	170,000	109,963	35,557	145,519
AM5	Construction of water treatment capability	22	Assume 50% of CAPEX of original project WTP capability			2,500,000	2,500,000	1,617,098	522,891	2,139,989
AM6	Operation of water Treatment capability	22	Assume 50% of annual OPEX of original project WTP capability operated over a period of 20 years			1,226,358	1,226,358	793,256	256,501	1,049,757
				0	0	4,446,358	4,446,358	2,886,492	933,352	3,819,844

Subtotal

% indirects to directs (ave for Base Case) ----->

32

Discount Rate (%)

2.00

Total Base Case Estimate (Capital, Monitoring, Maintenance, Design Contingencies & Adaptive Management)

89,804,221

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity DC1 -> Wate Rock Liner								EQUIPMENT						LABOUR				OTHER				
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost	
Load, haul, dump, spread sand cushion (1000 mm silty sand from Victoria Creek)	2,400 cm		160 cm/hr		15.0	1.5	Load	1.0	35-ton excavator	218.50	15.00	3,278	645	18.00	Operator	55.00	990					
							Flag persons ----->	Haul	7.0	40-ton ADT	210.50	105.00	22,103	3,675	126.00	Teamster	50.00	6,300				
								Spread	1.0	D7 dozer	189.50	15.00	2,843	525	18.00	Operator	51.00	918				
Pit Wall Safety/Stability Measures																		1.00	LS	50000.00	50,000	
Supply & Place HDPE Liner																		8,000.00	m2	15.00	120,000	

Total Cost ----->	28,223	Equipment	Subtotal ----->	28,223	Subtotal ----->	9,540	Subtotal ----->	170,000	
	9,540	Labour							
	170,000	Other		Fuel Consumption (litres) ----->		4,845		Camp Days ----->	17
	207,763								
Direct Unit Cost ----->	NA	\$/cm							

Production Rate -----> For Victoria Creek pit run sand:
Assume a 5.0 km haul distance, 10.0 km round trip.
Assume an average haul speed in both directions of 15 kph, or 40 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 45 minutes
Number of round trips per hour per truck = 1.3
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 8 loads per hour rate = 9/1.3 = 7
Assume truck payload = 18 cm ----> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

Additional Notes -----> Flag persons have been added to the Victoria Creek work due to haulage along the public road.
It is assumed that no royalties are payable on this off-site borrow material.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity DC1 -> Sidewall Drains								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Crush/screen subcontractor	40,000 tonnes			150 tonnes/hr	266.7	26.7	Crush	1.0	Jaw crusher					320.00	Operator	included -->		40,000.00	tonnes	10.00	400,000
Load, haul, dump, place drain rock (300 mm crushed from W. Lower pile area)	20,000 cm			160 cm/hr	125.0	12.5	Load	1.0	980 front end loader	198.00	125.00	24,750	4,750	150.00	Operator	55.00	8,250				
							Haul	3.0	40-ton ADT	210.50	375.00	78,938	13,125	450.00	Teamster	50.00	22,500				
							Spread	1.0	D7 dozer	189.50	125.00	23,688	4,375	150.00	Operator	51.00	7,650				
Load, haul, dump, spread sand filter (1000 mm silty sand from Victoria Creek)	10,000 cm			160 cm/hr	62.5	6.3	Load	1.0	35-ton excavator	218.50	62.50	13,656	2,688	75.00	Operator	55.00	4,125				
							Haul	7.0	40-ton ADT	210.50	437.50	92,094	15,313	525.00	Teamster	50.00	26,250				
														150.00	Flag person	37.00	5,550				
						Flag persons ----->	Spread	1.0	D7 dozer	189.50	62.50	11,844	2,188	75.00	Operator	51.00	3,825				
Supply & Place Geotextile																		34,000.00	m2	4.00	136,000

Total Cost ----->	244,969	Equipment	Subtotal ----->	244,969	Subtotal ----->	78,150	Subtotal ----->	536,000
	78,150	Labour						
	536,000	Other						
	859,119							
			Fuel Consumption (litres) ----->	42,438	Camp Days ----->	158		
Unit Cost ----->	28.64	\$/cm						

Production Rate -----> For crushed rock:

Assume a 1.0 km haul distance, 2.0 km round trip.
Assume an average haul speed in both directions of 7.5 kph, or 16 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 21 minutes
Number of round trips per hour per truck = 2.9
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 6 loads per hour rate = 9/2.9 = 3
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

For Victoria Creek pit run sand:

Assume a 5.0 km haul distance, 10.0 km round trip.
Assume an average haul speed in both directions of 15 kph, or 40 minutes per round trip.
Add 5 minutes for loading and dumping times, for a total round trip of 45 minutes
Number of round trips per hour per truck = 1.3
Assume an average of 9 truck loads per hour can be accommodated at the cover
Number of trucks required to maintain 8 loads per hour rate = 9/1.3 = 7
Assume truck payload = 18 cm ---> Hourly rate = 9 x 18 = 162 cm/hr (use 160 cm/hr)
Allow a D7 dozer for dozing dumped loads. No extra compaction required.

Additional Notes -----> Flag persons have been added to the Victoria Creek work due to haulage along the public road.
It is assumed that no royalties are payable on this off-site borrow material.

Mount Nansen Remediation Project
30% Design Phase Cost Estimate
March 2014

Activity AM4 -> Open Pit Pump Out Wells								EQUIPMENT						LABOUR				OTHER			
Work Activity	Qty	Unit	Prod Rate	Unit	Duration (hours)	Duration (days)	Operation	# of equipment pieces	Equipment Piece	Unit Equip Cost	Equip Hours	Total Equip Cost	Fuel (litres)	Hours Paid	Craft	Unit Labour Cost	Total Labour Cost	Qty	Unit	Unit Cost	Total Other Cost
Drilling & Installation	Preparation, drill rig																	1	lump sum	\$2,500	\$2,500
	Mobilization and demobilization, drill rig											0	0				0	1	lump sum	\$10,000	\$10,000
	Materials delivery, casing, well completion																0	1	lump sum	\$2,500	\$2,500
																	0				
	Drill rig, setup, drilling																	40	hourly	\$350	\$14,000
	Support vehicle, crew misc.																	50	hourly	\$350	\$17,500
	Drill rig, well development time																	10	hourly	\$350	\$3,500
	ODEX drill bit, other consumables																	1	lump sum	\$2,500	\$2,500
	Casing, well completion materials											0	0				0	55	metre	\$250	\$13,750
	Stainless steel well screen																0	1	lump sum	\$2,500	\$2,500
	Submersible pump (leachate type)																0	1	lump sum	\$5,000	\$5,000
	Wellhead piping and power, labour																	25	hourly	\$250	\$6,250
	Wellhead piping and power, materials											0	0				0	1	lump sum	\$5,000	\$5,000

Total Cost ----->	0	Equipment																			
	0	Labour																			
	85,000	Other																			
	85,000																				
Direct Unit Cost ----->	n/a																				

Production Rate ----->

Additional Notes ----->

Costing Basis

Installation wells and a pumping system to produce water from the liner containment system in the pit (concept attached).

Specifications

1. Drilling equipment and method: 8" or 10" ODEX, reverse circulation drilling.

2. 55 m total well depth.

Assumptions

1. Conceptual costing is adequate (local contractor(s) not contacted).

2. All drilling equipment mobilized from Whitehorse.

3. Supplied to well-head: 220 VAC power.

4. Supplied to well-head: discharge line (3" or greater), well-head to treatment plant.