

Mining District File Summary Sheet

DISTRICT	Rosebud
DIST_NO	4010
COUNTY	Pershing
If different from written on document	
TITLE	Report to LAC minerals on the Rosebud
If not obvious	Pre-Feasibility, Pershing County, Nevada, July 1992
AUTHOR	Bharti Engineering Associates, Inc.
DATE OF DOC(S)	1992
MULTI_DIST Y / N?	
Additional Dist_Nos:	
QUAD_NAME	Sulphur 7½'
P_M_C_NAME	Rosebud Mine; Lac Minerals (USA), Inc.
(mine, claim & company names)	Bharti Engineering Associates, Inc.
	South Zone, East Zone, North Zone
COMMODITY	gold, silver
If not obvious	
NOTES	Property report; geology; reserves; cost analysis
	NOTE: Scan dividers
	160p

Keep docs at about 250 pages if no oversized maps attached
(for every 1 oversized page (>11x17) with text reduce
the amount of pages by ~25)

SS: DP 2/29/08
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BEA**DRAFT****REPORT****TO****LAC MINERALS****ON****THE**

**ROSEBUD PRE-FEASIBILITY
PERSHING COUNTY, NEVADA**

JULY 1992***Bharti Engineering Associates Inc.***

A BLMI Company

**REPORT
TO
LAC MINERALS

ON THE

ROSEBUD PRE-FEASIBILITY
PERSHING COUNTY, NEVADA**



July 1992

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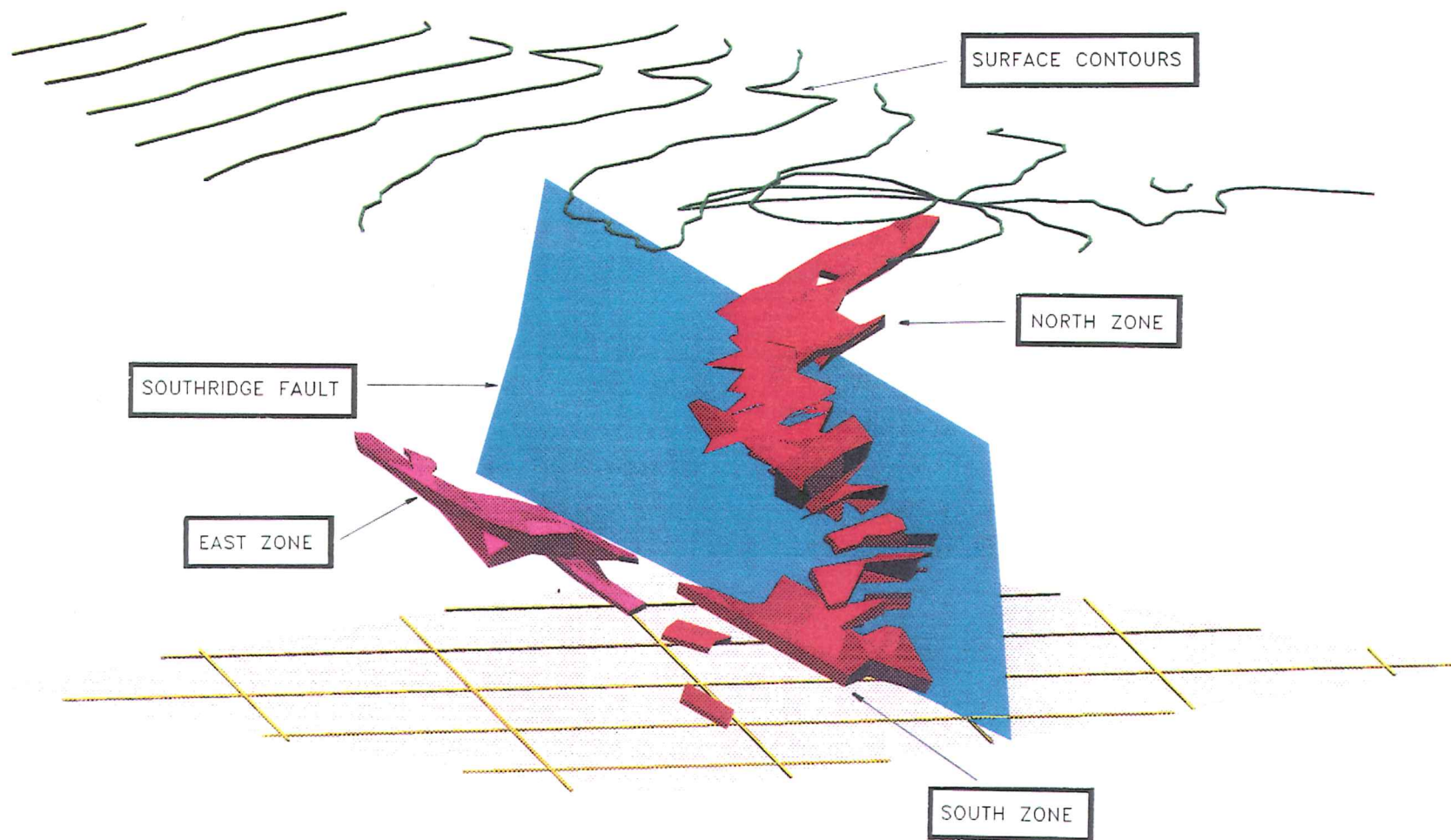
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EXECUTIVE SUMMARY

The Rosebud project is located in an old mining district in Pershing County, Nevada. Following an encouraging reconnaissance program, Lac acquired control of a large package of land in 1988 and identified a gold and silver bearing zone through diamond drilling. The primary ore zone has a strike length of 2000 ft., an average width of 300 ft. and a mean thickness of 40 ft. and lies between elevations of 4400 ft. to 4800 ft. (depths of 800 to 400 ft. below surface). The main ore zone has been divided into three separate zones called the North, South and East.

A number of studies have been carried out on the Rosebud project over the last few years. With the recently completed diamond drilling and reevaluation of the ore reserves, Bharti Engineering Associates Inc. (BEA) were retained to carry out a prefeasibility study on the project.

The terms of reference for the study included a review of the previous information and data with emphasis on geotechnical aspects and mine design, establishing the mineable ore reserves using appropriate dilution and recoveries and preparing an overall production schedule, operating and capital costs and, on this basis, carrying out a financial evaluation for Rosebud. No additional work was carried out on the design of the surface infrastructure or milling at this time and the information used in this report is based on data obtained from previous studies and supplied by Lac personnel.

All costs are in constant 1992 U.S. dollars, unless indicated otherwise.

Geotechnical Assessment

The geotechnical assessment consisted of a site visit to log diamond drill core, examine previous geotechnical reports and information and the underground exposures at an old, abandoned mine near Rosebud which was still accessible for inspection. The ground conditions at Rosebud depend on the degree of alteration, which varies throughout the three main zones. Unsupported spans of up to 40 ft. are possible in the unaltered East Zone while stope spans as narrow as 15 ft. will have to be maintained in the altered sections in some areas in the South Zone. Ground support will be required as mining progresses.

The overall conclusion of the geotechnical evaluation is that, although ground conditions will vary, proven methods such as cut-and-fill and blasthole can be employed with the proper ground support and an optimum mining sequence.

Mineable Reserves

The mineable reserves were calculated at a 0.10 and 0.15 oz/t cut-off. The mineable reserves are based on the original geological reserves supplied by Lac's Reno offices. Mineable outlines were identified at a minimum mining width of 10 ft. The undiluted mineable reserves were then calculated by Lac's Reno office with BEA finalizing the mineable reserves by incorporating dilution and recoveries.

ZONE	DILUTION	@ 0.10 OZ/T CUT-OFF		@ 0.15 OZ/T CUT-OFF	
		MINEABLE TONS	GRADE OZ/T	MINEABLE TONS	GRADE OZ/T
South	28%	950,000	0.212	774,000	0.239
East	23%	460,000	0.284	388,000	0.298
North	31%	194,000	0.158	168,000	0.221
TOTAL		1,603,000	0.226	1,330,100	0.247

The project cut-off grade was established at 0.10 oz/t. For mine design and project economics, the base case evaluated was at a mineable reserve of 1.6 million tons @ 0.226 oz/t.

Mine Design

Several mining methods were examined including drift and fill, cut and fill and blasthole. The cut and fill mining method with high density full stream tailings backfill was selected as the most appropriate method. This method has the flexibility to adjust stope dimensions and the mining configuration to suit the relatively complex geometry of the different zones at Rosebud.

The basic approach would be to use transverse cut-and-fill mining with primary and secondary stopes with stope widths varying from 10 ft. in the Upper South Zone to as wide as 30 ft. in the Lower South Zone. Typical cut heights would be 15 ft. The stopes would be accessed using ramp entry and slash with backfill being placed within 3 ft. of the stope backs.

High density hydraulic fill has been selected because it permits full stream tailings to be placed at close to 80% density and, therefore, reduces the need for fill fences and drain towers. In addition, over 50% of the waste rock from stoping would be placed back in the mined out stopes. This approach is considered better than the previous concept of using a slinger truck with waste rock, which is more expensive and also requires careful scheduling and crushing of the waste rock. Conventional hydraulic fill cannot be used because the classified portion of the fines is not adequate to replace the mined out ore.

The orebody would be accessed by a ramp from surface with the ore hauled in 15 ton trucks and delivered to the mill on surface. An economic comparison of the ramp vs. shaft option indicates that the ramp provides more flexibility and requires less time at comparable cost.

The optimum production rate is considered 1000 tpd on two shifts, 5 days/week with the mill operating at 750 tpd, 350 days/year. The limited mineable reserve precludes a higher production rate that can realistically be sustained. This is based on a mineable reserve of 1.6 million tons at a 0.10 oz/t cut-off. The option of mining at 750 tpd at a higher cut-off of \$0.15 oz/t (mineable reserves 1.3 million tons) on 2 shifts, 5 days a week was also evaluated.

Mill and Surface Infrastructure

The mill design would be identical to that used in previous studies and was discussed with George Hope of Lac Minerals. The estimated capital costs for the mill are \$9.5 million with recoveries of between 84.5% in the North Zone to 91.0% in the South and East Zones. The current mill design calls for extraction using a carbon and leach plant with gravity separation. The operating costs are estimated at \$13.50/ton.

The surface infrastructure is similar to that proposed by Dynatec in a February 1992 study. Tailings disposal will take place southwest of the plant and mine portal with an estimated storage capacity of about one million tons. A three pond configuration will be used for the tailings dam.

Manpower, Costs and Productivities

The total estimated mine workforce is as follows:

<i>Department</i>	<i>Number</i>
<i>Mining</i>	<i>78</i>
<i>Maintenance</i>	<i>17</i>
<i>Milling</i>	<i>25</i>
<i>Administration</i>	<i>12</i>
GRAND TOTAL	132

The overall mining productivity (tons/manshift delivered to the mill) is slightly over 11. This compares well to existing experience at small Canadian operations.

The mine operating costs were estimated from basic principles using an in-house BEA program. The labour rates and material costs used were obtained from Lac's Bullfrog mine. Operating costs for the mill and tailings were obtained from George Hope of Lac and previous studies. The estimated capital costs were based on current equipment costs and estimates previously used for the mill and surface infrastructure. All costs are in constant 1992 U.S. dollars. The capital and operating costs are summarized below:

OPERATING COST SUMMARY

MINING COSTS

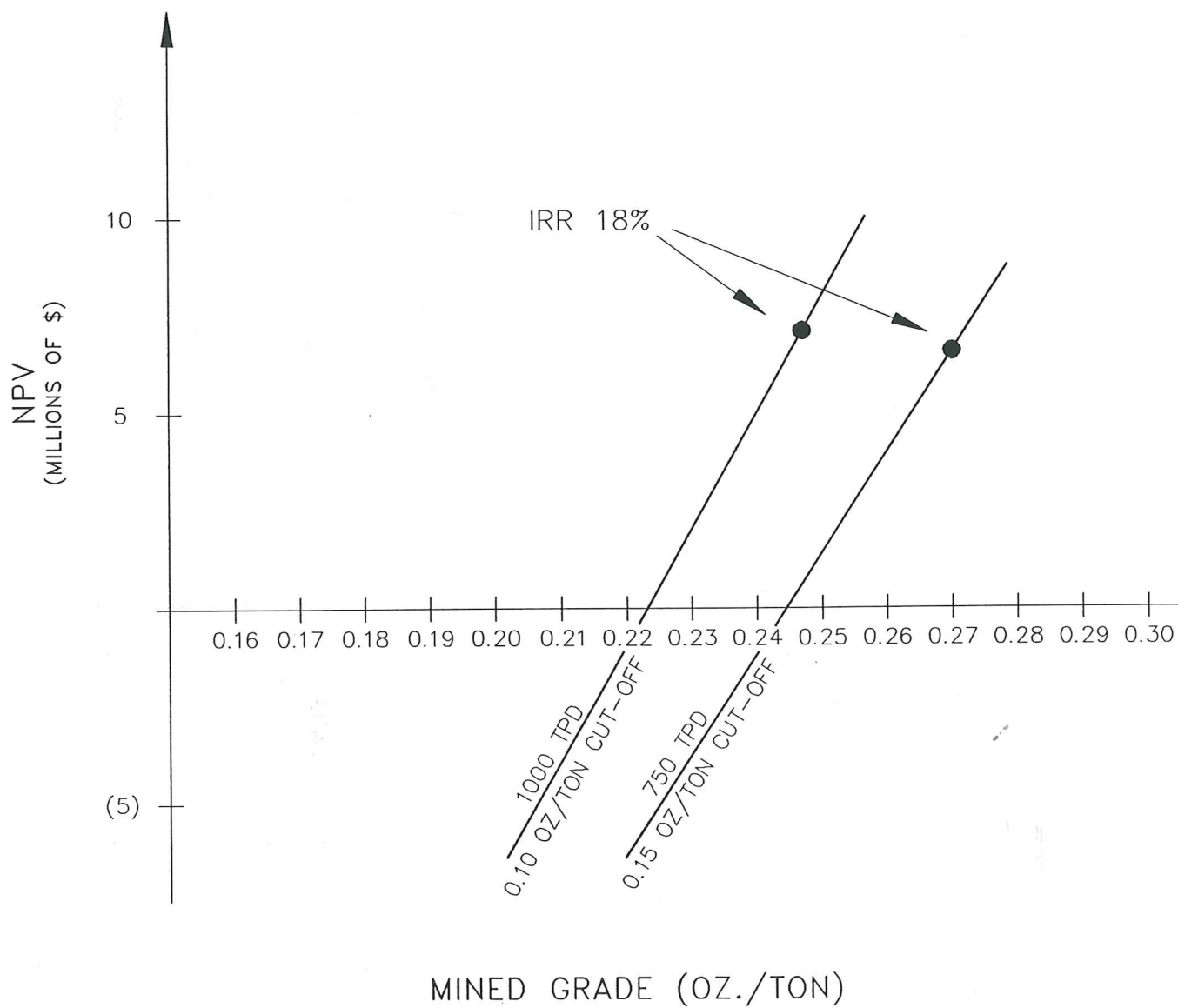
<i>Item</i>	<i>Pre- Production</i>	<i>Production</i>	
	<i>Cost</i>	<i>Cost</i>	<i>Cost/Ton</i>
<i>Labour</i>	\$6,539,000	\$26,596,000	\$15.20
<i>Materials</i>	\$2,780,000	\$7,464,000	\$4.27
<i>Equipment</i>	\$1,550,000	\$11,886,000	\$6.79
<i>Other Charges</i>	\$2,775,000	\$16,464,000	\$9.40
<i>Total</i>	\$13,644,000	\$62,410,000	\$35.66

TOTAL SITE COSTS

	<i>Cost/t</i>
<i>Mining</i>	\$35.66
<i>Milling</i>	\$13.50
<i>Tailings</i>	\$0.40
<i>Administration</i>	\$1.80
<i>TOTAL</i>	\$51.36/ton

Although the mine operating costs for Rosebud were calculated independently, they are similar to current operating costs at Bullfrog's underground mine (\$38.16/ton).

NPV vs. Mined Grade



CAPITAL COSTS (TOTAL COST \$000's)

	<i>Capital Cost \$000's</i>	<i>Total Life \$000'S</i>
<i>Development Pre-production (9000 ft. ramp, 1,000 ft. raise)</i>	5,084	8,171
<i>Mining Equipment</i>	7,218	7,218
<i>Plant (Mill)</i>	9,500	9,500
<i>Tailings Dam</i>	2,500	2,500
<i>Infrastructure and Surface Equipment</i>	2,958	2,958
<i>Diamond Drilling</i>	1,000	1,000
<i>Environmental and Permitting</i>	500	500
<i>EPCM 10%</i>	3,100	3,100
<i>Closure</i>	-	500
TOTAL	\$31,860	\$35,447

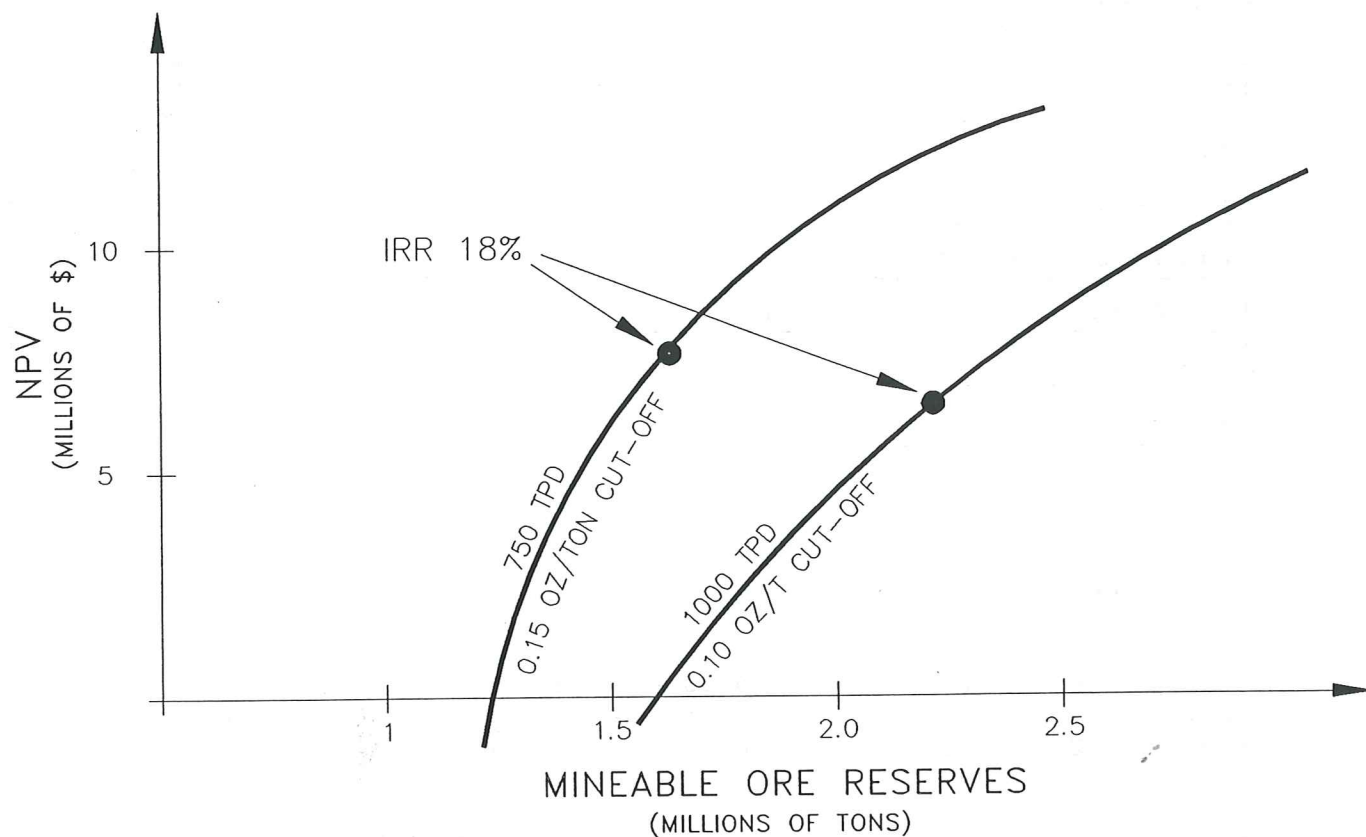
Financial Evaluation

A total of 24 different options were evaluated for the Rosebud project. All alternatives were carried out at a base case gold price of \$360/oz at a 10% discount rate. All costs and analyses are in constant 1992 U.S. dollars. Depreciation and taxes were not included. The following alternatives were examined:

- ◆ Base case options of 1,000 tpd (250,000 tpy) and 750 tpd (187,500 tpy) at cut-off grades of 0.10 and 0.15 oz/t respectively. Both these options are considered realistic and achievable using current mineable reserves at the two cut-off grades.
- ◆ Sensitivities were carried out to cut-off grades, gold price and total mineable tonnage.
- ◆ Sensitivities were also carried out on the 750 tpd option to project capital and operating costs.
- ◆ An evaluation of the impact of the maximum possible production rate (350,000 tpy at 0.10 oz/t cut-off and 262,000 tpy at 0.15 oz/t cut-off) was also conducted although these production rates may be difficult to achieve and sustain at the current level of mineable reserves.

The complete economic analyses are presented in Section 10.0 of the report and backup spreadsheets are included in Appendix V. The main conclusions of the financial evaluation and sensitivities are as follows:

NPV vs. Mineable Reserves



MINIMUM MINEABLE ORE RESERVE FOR 18% IRR
1.6 MILLION TONS @ 0.15 OZ/T CUT-OFF
2.2 MILLION TONS @ 0.10 OZ/T CUT-OFF

1. Sensitivities to changes in grade, gold price and ore reserves are shown on the attached figures for production rates of 1000 tpd and 750 tpd at cut-off grades of 0.10 and 0.15 oz./ton, respectively. Project economics are significantly enhanced by increasing the ore reserves by between 300,000 to 600,000 tons and improve dramatically when the ore reserves are increased by an additional one million tons at the current mineable grades.

Grade changes and gold price also affect the NPV and can change it from \$7 million to a negative NPV of over \$6 million.

2. The base case options of 750 tpd and 1000 tpd at the two cut-off grades are marginal and have an NPV of less than \$1 million and an internal rate of return (IRR) of 11%. These options therefore cannot form the basis on which to proceed at Rosebud.

Split Between Lac and Equinox

The split on capital and gold produced between Lac and Equinox, based on the 1000 tpd option at the 0.10 oz/t cut-off, is as follows:

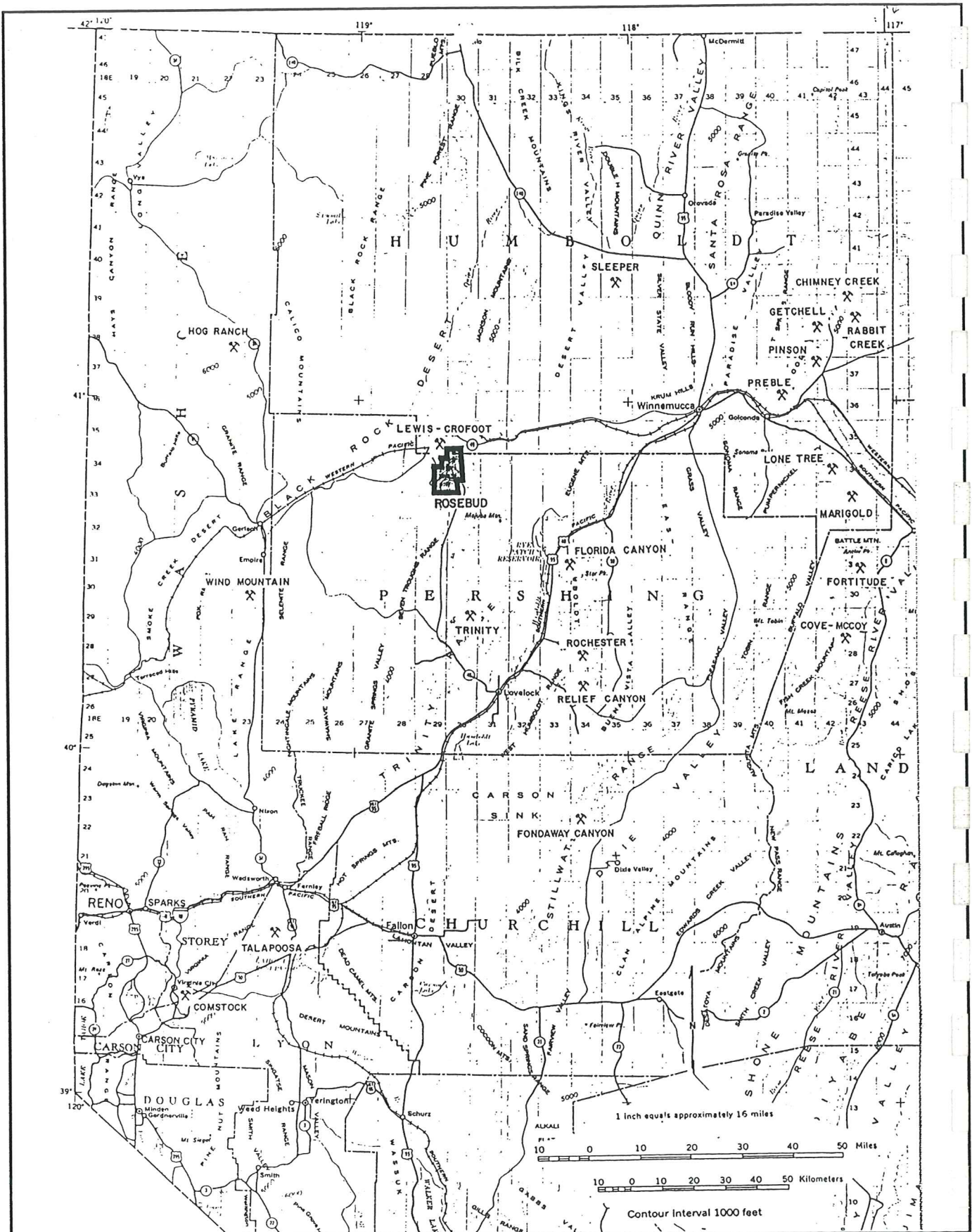
SPLIT BETWEEN EQUINOX AND LAC @ 1000 tpd (250,000 tpy), 0.10 oz/t cut-off			
	LAC	EQUINOX	TOTAL
Pre-production Capital (Millions of \$)	20.7	11.2	31.9
Gold Produced			
- total over mine life	233,815	128,279	362,094
- avg. oz/year	29,227	16,034	45,262
Mineable Reserves			1,603,000

Conclusions and Recommendations

The main conclusion of the prefeasibility study is that the Rosebud project does have potential, but requires increased ore reserves and/or higher mineable grades. Lac geologists have a high degree of confidence in the estimated mineable grade. BEA believes the grade may be somewhat conservative because of the dilution used and opportunities may exist to further enhance the ore grade as mining progresses. Both the capital and operating costs have been estimated from basic principles and are considered reliable and accurate to a range narrower than the +/- 25% level generally used for prefeasibility studies.

In order to obtain an acceptable rate of return of at least 18%, the terms of reference for any follow-up work at Rosebud should be based on:

- ◆ *A production rate of 1000 tpd and 250,000 tpy at a 0.10 oz/t cut-off.*
- ◆ *A mineable reserve base of between 2-3 million tons (an increase of about one million tons over the current mineable reserves).*
- ◆ *The price of gold being maintained at least in the \$350 to \$360/oz range and preferably being in the \$400/oz range.*



SCALE:	N.T.S.	DATE
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LAC MINERALS ROSEBUD PROJECT

LOCATION MAP
STATE OF NEVADA

BHARTI ENGINEERING ASSOCIATES INC.
SUDBURY, ONTARIO CANAD
DWG. NO. REV.

1.0 INTRODUCTION

The Rosebud prospect is situated in an old mining district in Pershing County, Nevada. Various periods of mining activity have been experienced in the area, mainly during the 1910's and the 1930's. However, the output of gold was limited to no more than a few thousand ounces which were extracted from narrow high grade veins.

Lac Minerals (USA) Inc. following an encouraging reconnaissance program, acquired control of a large package of land in 1988 through both negotiation with various claim holders and placing claim stakes. Subsequent exploration work involving both reverse circulation boreholes and diamond drill boreholes has identified a gold and silver bearing resource known as the Rosebud Property. The primary ore zone has a strike length of 2,000 ft., an average width of 300 ft. and a mean thickness of 40 ft. and lies between the elevations of 4,400 ft. and 4,800 ft., corresponding to depths of 800 ft. and 400 ft. respectively. Gold has been intersected in other parts of the property (Figure 1).

A number of studies have been carried out in the intervening years covering hydrological, geotechnical, metallurgical and financial aspects of the prospect. With the recently completed diamond drilling from surface, Lac Minerals Limited wish to establish whether the resource, as currently defined, can be profitably extracted through the development of an underground mine. Bharti Engineering Associates Inc. (BEA) have been engaged to perform a pre-feasibility study of the Rosebud project.

1.1 STUDY PURPOSE AND SCOPE

The specific terms of reference and scope for the study were defined by Mr. Bill Quesnel of Lac Minerals, as outlined below.

1. Review previous information and studies carried out on the Rosebud project with particular emphasis on the geotechnical aspects.
2. Examine the previous geotechnical work completed by Lac personnel and consultants and supplement it with additional analyses, as appropriate.
3. Review the existing geological ore reserves, establish appropriate dilution and recoveries based on the proposed mine plan and ground conditions and establish a mineable reserve at different cut-off grades.
4. Prepare a mine plan and overall approach for recovery of the Rosebud resource including the optimum production rate, cutoff grade, mining methods, manpower and equipment requirements and operating and capital costs.

5. Summarize the surface infrastructure, milling and other site property costs based on previous studies carried out by Lac Minerals and consultants after discussions with appropriate Lac personnel.
6. Based on the above data, establish total site operating and capital costs and conduct economic analyses to determine project economies, including sensitivities and define the framework required for Rosebud to be a viable project.
7. Recommend a follow-up program for Rosebud.

The work performed by BEA included a site visit during the week of May 21 by Stan Bharti and Dave West (BEA) with Bill Quesnel and Richard Hong (Lac Minerals) and to Lac's Reno offices to review the geological and ore reserve information, examine the available diamond drill core, analyze the previous geotechnical work carried out and obtain a general appreciation of the minesite. Messrs Bharti and Quesnel also visited Lac's Rosebud Mine in Nevada. The purpose of the visit was to obtain current labour rates and material costs applicable to Rosebud and to examine the ground conditions at Bullfrog. Dave West and Richard Hong also conducted additional geotechnical analyses and core logging at Lovelock, Nevada on the Rosebud project at this time.

1.2 LOCATION AND TOPOGRAPHY

The Rosebud property is located at the base of Rosebud Peak, at 5,000 ft. to 5,500 ft. above sea level, with limited scrub vegetation, some 55 miles north of the town of Lovelock, Pershing County, Nevada. The topography of the site is characterised by medium relief terrain. The Rosebud deposit is situated on Bureau of Land Management land within the claim boundaries of Lac Minerals (USA) Inc., Equinox Resources Limited and Degerstrom. Gold mining has been carried out only sporadically since the early part of the century. Access to the project site is gained via a gravel road from Lovelock. The main Western Pacific rail line lies adjacent to the Hicroft mine, positioned approximately 10 miles to the north of the Rosebud property. The Southern Pacific rail line services the town of Lovelock in the south.

1.3 PREVIOUS STUDIES

Several previous studies dating back to 1990 have been carried out on the Rosebud project. A list of the documents supplied by Lac Minerals is attached at the end of this report (Section 10.0). A summary of the previous documentation, which was reviewed by BEA, is attached in Appendix I and briefly discussed below.

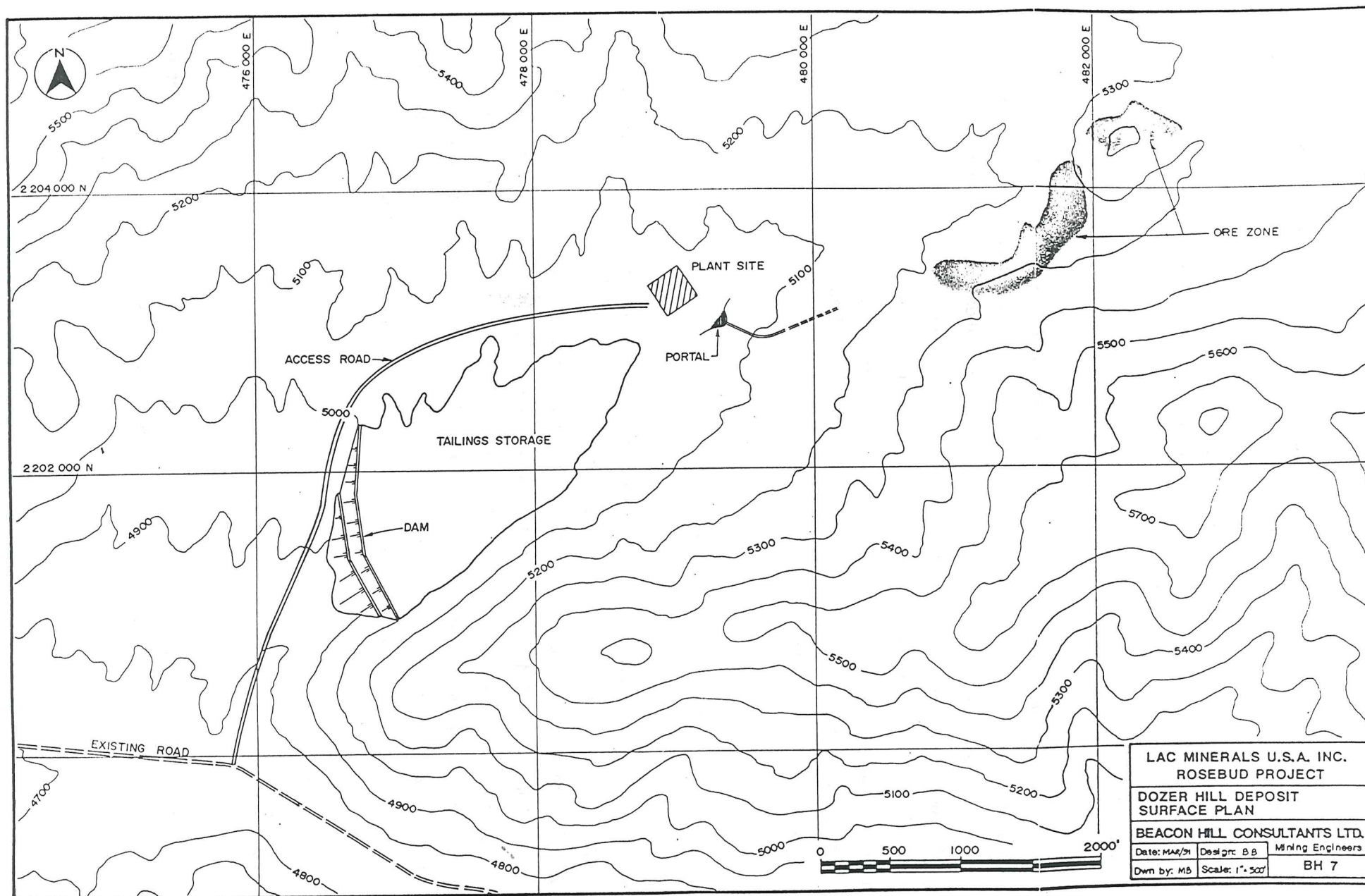


Figure 1

ENVIRONMENTAL STUDIES

Hallam Knight Piesold Limited have reviewed the environmental work and believe that project permitting should be approached on the basis of a full Environmental Impact Statement (EIS) for both the state and federal requirements. A Plan of Operations for underground exploration activities has already been submitted by Lac to the U.S. Department of the Interior (Bureau of Land Management). No major difficulties with environmental permitting are anticipated.

GEOTECHNICAL STUDIES

Several geotechnical and hydrogeological studies have been carried out by Piteau, Golder Associates, Hydro-Geo Consultants and in-house by Lac personnel.

These studies show that the ground varies from unaltered competent ground (fair to good condition) to very poor with an average fracture count of up to 2 per ft. and as high as 4 fractures per ft. in heavily altered zones. Selective methods are likely to be used with extensive ground support.

RESERVES AND EXPLORATION

Several estimates on the geological and mineable reserves have been carried out. The most recent work was completed by Lac Minerals (USA) Inc. from their Reno offices. The reserves are based on the ground jointly owned by Lac and Equinox. The estimated reserves are as follows:

- ◆ 5.2 million tons @ 0.11 oz/ton @ a 0.02 oz/ton cutoff
- ◆ 2.2 million tons @ 0.21 oz/ton @ a 0.05 oz/ton cutoff

These estimates do not include any dilution or ore losses.

Beacon Hill Consultants of Vancouver estimated the probable mining reserves in March 1991, with an allowance for 15% dilution, at 1.15 million tons at a grade of 0.24 oz/ton. The most recent calculations of the Rosebud reserves (January 3, 1992) indicate an in-situ resource of approximately 2 million tons at 0.25 oz./ton.

Previous studies have also recommended that an exploration program be carried out by developing a ramp and two drifts. This would permit diamond drilling and obtaining a bulk sample from the underground workings.

MINING

Beacon Hill Consultants (March 1991) selected drift and fill mining as the most appropriate technique given the assessment of rock quality and the configuration of the orebody. Drift and fill is highly selective and provides the most effective ground support for the stopes with widths of 13 feet. The stopes would be filled using a Slingerbelt truck with minus 2 inches crushed rock with 5% cement content. The general mine layout would incorporate both a ramp for haulage and a shaft for hoisting once truck haulage becomes uneconomic. A production level of 500 tons/day would need 4 or 5 active faces.

Two production scenarios have been evaluated by Beacon Hill:

DEPARTMENT	SCENARIO 1	SCENARIO 2	SHIFT SYSTEM
Mining	700 tpd	1,400 tpd	2 shifts per day 5 days per week
Milling	500 tpd	1,000 tpd	3 shifts per day 7 days per week

The report concluded that viability of the Rosebud project would depend on:

1. Control of dilution to maintain ore grade.
2. Choice of selective mining methods to cater for changes in width of orebody.
3. Installation of appropriate ground support, coupled with a well engineered mine extraction sequence to manage the changing ground conditions.

MILLING

Limited metallurgical testwork carried out by Lac indicates that gold can be successfully extracted with a Carbon-in-Leach plant with gravity separation. Metallurgical recovery is expected to range between 85% and 90%.

Initial tests indicate that the ore is very amenable to cyanidation with good recovery and low cyanide consumption. Subsequent work pointed towards leaching problems, possibly brought about, in part,

by the presence of gold encapsulated in sulphides. Antimony may also create difficulties with recovery of gold.

A SAG mill would be needed for the 1,000 tons/day milling operation. Water requirements are gauged to be 200 gpm.

Tailings disposal would take place southwest of the plant and mine portal with storage of 3 million tons (related to a mill throughput of 350,000 tons/year), demanding an area of 1,530 acre-ft., incorporating a three pond configuration.

CAPITAL AND OPERATING COSTS

Operating costs have been estimated from \$70/ton to \$57/ton for the 500 tpd option and 1,000 tpd option, respectively, in 1991 \$ (Beacon Hill). The capital costs range from \$27.2 million to \$35.2 million for the 500 tpd option and the 1,000 tpd option, respectively (1991 \$).

DISCOUNTED CASHFLOW

Beacon Hill Consultants found the project to be:

- most sensitive to grade and gold price
- less sensitive to operating costs
- least sensitive to capital expenditure.

The Beacon Hill Consultants alternative cases for evaluation were based upon a gold price of \$375 per oz. and metallurgical recovery of 89%.

The 500 tpd option would be uneconomic, and to be viable would require a:

- 10% increase in grade
- 10% reduction in capital expenditure, and
- 20% decrease in operating costs.

The 1,000 tpd option would be economic, but is based upon a doubling of the reserves.

Beacon Hill Consultants assessed the value of the property by two methods which indicated a range of \$6 million to \$10 million. The market value method (accurate to $\pm 25\%$), assumes gold at \$10/oz. of gold and land at \$500/acre.

A recent evaluation (January 17, 1992, Hans De Ruiter - Lac), using an uncut high grade (0.31 oz. Au per ton) and assuming a metallurgical recovery of 92% indicates a significant improvement in the financial return of the project, given the 50% increase in grade (from the cut grade of 0.226 oz. Au per ton), at a gold price of \$350/oz. and a 15% discount rate. The economics are summarized below:

High Grade: 26% IRR and \$7 million NPV

Cut Grade: (4%) IRR and (\$13 million) NPV

1.4 BASIS FOR THE STUDY

The basis for the present study is to review and evaluate the geotechnical and mining aspects of Rosebud on the following basis:

1. Lac Minerals (USA) Inc. (Reno office) would provide the undiluted ore reserves and calculate the mineable ore reserves based on BEA mining outlines.
2. Only cut grades would be used in the analysis. The uncut grades could significantly bias the results, since one portion of Rosebud contains an exceptionally high component of the ounces.
3. The milling information (operating and capital costs and recoveries) would be provided by George Hope of Lac Minerals.
4. The cost of the surface facilities and the general layout would be based on previous studies by Beacon Hill and Dynatec.
5. The labour rates and material costs would be based on Lac's Bullfrog mine.
6. All costs are in constant 1992 \$. Metal prices to be used were obtained from Paul Martin of Lac and are \$360/oz for gold and \$4/oz for silver.
7. All costs shown are in U.S. dollars.

2.0 GEOLOGY

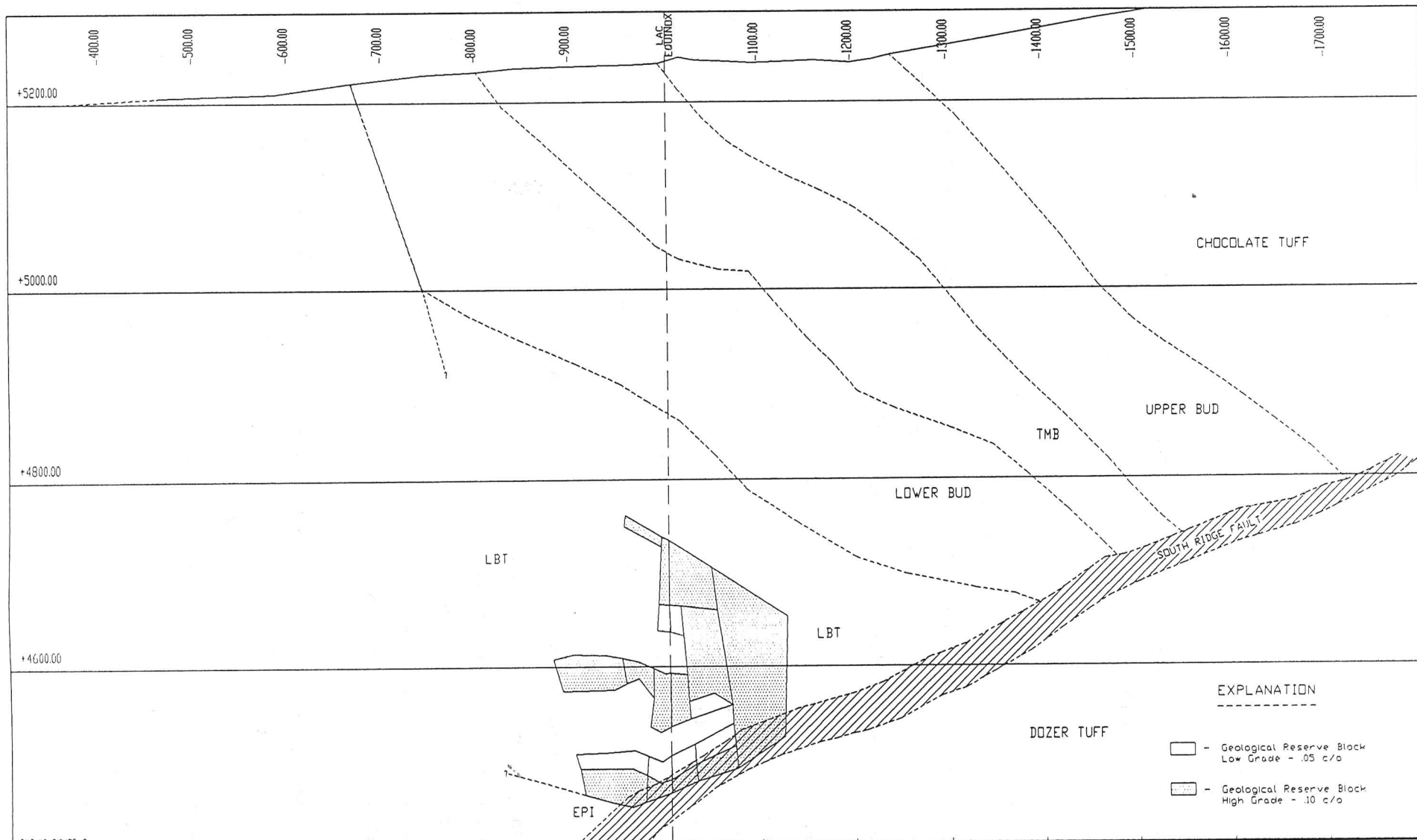
2.1 GEOLOGICAL SETTING

The predominant rocks in the Rosebud area, the Kamma Mountain Group, are of Tertiary age and consist of a thick sequence of rhyolite and latite flows, tuffs, and pyroclastic rocks. The Kamma Mount Group has been informally divided into seven units.


The basal unit, the Dozer Tuff, consists of a pale green to grey fine-grained densely welded rhyodacitic tuff or flow which is in excess of 1,000 ft. thick. The Dozer Tuff is present in the subsurface throughout the project area in the immediate footwall of the South Ridge Fault. Some mineralization of this unit occurs in the East Zone, approximately 50 ft. below the South Ridge Fault. The unit is generally massive, bleached and pervasively silicified.

The Lower Bud Tuff (LBT) overlies the Dozer Tuff and comprises dense red-brown to tan-grey volcanoclastic rocks and fine-grained to banded tuffs and flows, and locally, is as thick as 900 ft. The LBT is the primary host for mineralization in the South and North Zones. Clay and sericitic alteration is widespread in the South Zone, but less prominent elsewhere. The principle alteration product is thought to be kaolinite. Bleaching and clay alteration are frequently present in the zone of mineralization, but vary substantially in intensity. Subparallel waxy green clay seams, typically 1/4-inch in thickness and spaced at intervals of several inches, occur as alteration products infilling fractures locally within the LBT, and may be indicative of fault zones. These seams constitute low strength zones within the LBT and are locally referred to as "duck butter". Their preferred orientation is unknown. The distribution of duck butter zones to mineralized zones is poorly defined, but they constitute a relatively small percentage of the LBT. Duck butter zones typically occur over intervals of 10 feet. Natural fracture surfaces observed elsewhere in the unit do not generally contain clay alteration products or low strength materials.

The Bud Volcanoclastic unit is composed of a bedded lithic Lapilli Tuff, rich in green celadonic clay and interbedded epiclastic tuff. This unit ranges from less than 100 ft. to 600 ft. thick and is of limited lateral extent across the project area. Upper and lower members of the Bud Volcanoclastic unit are separated by a Tuff Marker Bed (TMB). The TMB is a grey fine-grained porphyritic tuff that has a higher strength than the Bud. The TMB unit ranges in thickness from 50 ft. to 250 ft. A lack of mineralization is interpreted to result from a plastic response to hydrothermal alteration which prevented fracturing and pathways for mineralizing solutions.



FILE 1.D, FIGURE-2

				SCALE: N.T.S.	DATE		LAC MINERALS ROSEBUD PROJECT TYPICAL GEOLOGICAL SECTION (900 N)	BHARTI ENGINEERING ASSOCIATES INC. SLOBOUR, ONTARIO CANADA DWG. NO. FIGURE 2 REV.	
				DESIGNED:					
				DRAWN: S.McG.	JULY/92				
				CHECKED:					
				APPROVED:					
DWG. NO.	REFERENCE DRAWING	NO.	DESCRIPTION OF REVISION	DATE	BY				

The Chocolate Tuff overlies the Bud and is a maroon to grey, moderately to densely welded, latitic to rhyolitic flow-banded tuff with interbedded volcanic breccia. This unit ranges in thickness from 500 ft. to 800 ft. in the project area. It is generally distinguished from the LBT only by its stratigraphic location, its geological and mechanical characteristics are essentially identical to the LBT.

The Badger Formation unconformably overlies the Chocolate Tuff, and represents the waning stages of Kamma volcanism. It consists of a series of volcanic conglomerates, sandstones, and some intermediate flows.

Quaternary sediments occur as alluvial fan deposits surrounding Dozer Hill and flanking the Kamma Mountain volcanic sequence. Alluvial deposits occur along the axis of the Rosebud Canyon. The alluvial deposits are typically less than 50 ft. thick.

The lenticular orebodies at Rosebud occur primarily within a sequence of Miocene volcanic and pyroclastic rocks (Lower Bud Tuff), which have variable strength, degree of alteration and fracturing. Alteration by silicification and by bleaching and argillicification have both strengthened and weakened the rock mass. A shallow dipping thrust fault, the South Ridge Fault, defines the bottom of the Lower Bud Tuff. The South Ridge Fault is characterized by a zone of intensely sheared and altered rock of low quality, ranging in thickness from 5 feet to 60 feet. The Dozer Tuff zone, generally less altered and more competent than the Lower Bud Tuff, lies below the fault. The Bud Tuff overlies the Lower Bud Tuff, and like the Dozer Tuff, is more competent than the Lower Bud Tuff.

There appears to be no clear relationship between the ore zones and rock mass quality. No structural information is available within the mine area. The water table lies 200 feet below surface. Otherwise groundwater conditions within the rock mass or along faults are unknown.

For exploration purposes, the mineralogical lenses have been subdivided into the South Zone, North Zone and East Zone. The extent of each lens has been clearly defined by surface drilling, however, additional mineralization may lie to the east of the East Zone (Figure 2).

2.2 MINERALIZATION

Gold concentrations occur at the nearby Dreamland and the Hycroft properties, in large, irregular, very non-homogeneous areas of gold mineralisation, each comprising several tens of millions of tons with gold content averaging from 0.01 oz Au/t to 0.03 oz Au/t. Higher grade pods exist within these areas with resources ranging from a few thousand tons to a few million tons with gold grades from 0.1 oz

Au/t to 0.4 oz Au/t, similar to the Aurora, Rawhide, Borealis and Bodie deposits.

Mineralization in the Rosebud deposit is characterized by up to four stages of discontinuous stockwork veins of quartz, calcite and clay. Sulphide content ranges from three to five percent as pyrite, marcasite, and trace amounts of chalcopyrite and sphalerite. Such levels of sulphides will require treatment with lime in the surface recovery process. Gold and silver minerals include electrum, aurian silver, naumannite, and argentite. These veins crosscut bleached, clay-altered and sericitized flows and tuffs.

2.3 MAJOR STRUCTURE

The regional structure of the area is dominated by north to northeast trending normal faults that are down-thrown to the west. Also, extensional tectonism has created a complex series of significant structures which consist of northeast to east trending, high and low angle faults, including the Rosebud Shear Zone and the South Ridge Fault. The Rosebud Shear Zone trends in an eastnortheast direction. This steeply dipping fault system is up to 300 ft. wide. The South Ridge Fault is a complex eastnortheast trending (N 60 E) zone that ranges in thickness from 5 ft. to 60 ft. The zone dips northward at less than 45 degrees and exhibits apparent left lateral, oblique slip movement. This fault has been mapped throughout the project area; however, its length and extent of displacement are still under investigation.

In the vicinity of the South Zone, the South Ridge Fault (SRF) consists of 10 ft. to 20 ft. of weak green clay gouge containing clastic fragments of calcite. Rubble zones are described over 20 to 80 percent of the diamond drill intersections of the fault zone at this location. Mineralization in the South Zone lies predominantly within the hangingwall of the fault, any limited mineralization that occurs within the fault zone is generally of low grade.

Towards the north of the South Zone, clay and silica alteration replace calcite in the fault zone. The fault thickness increases to a total thickness in the order of 40 to 50 ft. and is characterized by interlayered silicified breccia and gouge. Two separate fault zones are commonly identified, with each zone comprising a silicified (hydrothermal) breccia overlying a gouge zone. Hydrothermal breccia constitutes a massive, competent, high strength component of the fault unit. Again, mineralization occurs predominantly within the hangingwall of the fault within the LBT, with only sparse, low grade mineralization occurring within the South Ridge Fault.

The South Ridge Fault is typically about 20 ft. wide in the North ore zone, and is characterized by a

predominance of very competent hydrothermal breccia (typically about 70 percent of the fault zone) interlayered with soft clay gouge and rubble contained within a clay matrix. Mineralization occurs predominantly within the hangingwall of the fault, with little mineralization within the fault zone at this location.

In the East Zone, the South Ridge Fault thickens to approximately 60 vertical feet. The fault zone consists of competent hydrothermal breccia. Mineralization occurs within the fault zone and in the footwall Dozer Tuff.

A number of northwest-southeast trending structures have been inferred from diamond drill interpretation resulting from sharp changes in the elevation of marker beds throughout the stratigraphic sequence. To date no borehole has clearly defined any of these cross-cutting structures as the holes have been drilled either to the southeast or vertically. However it is believed that these structures have influenced the distribution of ore and may provide active conduits for groundwater flow. Additional drilling is required to adequately define and locate these structures.

A limited number of rubble and gouge zones have been observed from the geological and geotechnical logs. These zones occur sporadically throughout all the lithologic units, and possibly represent former local centres of brittle and plastic deformation in response to hydrothermal alteration. Both the rubble and gouge zones form discontinuous areas of weakness within the rock mass. Both types are of limited thickness, typically one to two feet, the orientation and continuity of these zones are poorly defined.

3.0 GEOTECHNICAL ASSESSMENT

An in-depth geotechnical assessment of the Rosebud project was carried out to ensure that the subsequent mine design could be optimized and the selected mining method, ground support requirements and overall sequencing were realistic enough to be able to produce a reliable production schedule and operating costs. The geotechnical work involved the following:

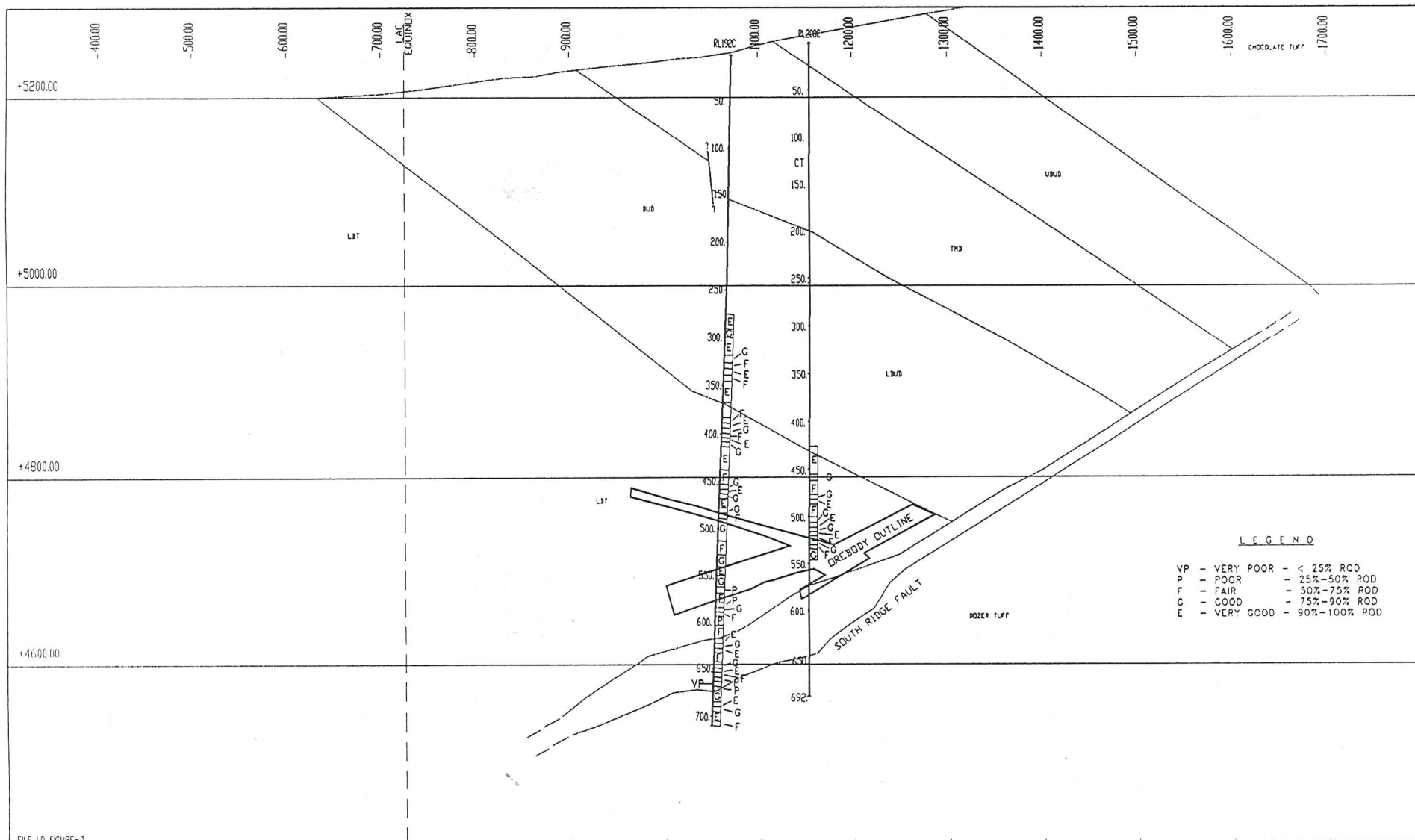
1. A review of all the previous documents and studies carried out by several consultants on both the hydrology and rock mechanics.
2. A review of the work completed by Lac Minerals personnel from the Kirkland Lake office on geotechnical logging and analysis of the data.
3. A site visit by the BEA geotechnical engineer, together with Lac personnel, to examine the available core and carry out additional geotechnical logging, as necessary, for the follow-up analysis.
4. A site visit to Dreamland Mine, located several thousand feet west of Rosebud that had been mined several years ago but was still available for inspection.
5. Previous tests on intact rock strengths were reviewed and summarized and additional testwork recommended. The additional testwork is currently in progress at the MacKay School of Mines in Reno.

The above information was used to prepare detailed geotechnical sections of the ground conditions jointly with Lac personnel at their Kirkland Lake offices. The information used in preparing this data was based on the previous work done by Lac and the additional work carried out for this prefeasibility. The detailed geotechnical evaluation is attached in Appendix II, together with the geotechnical sections showing ground conditions and logs of the Rock Quality Designation (RQD). A typical example is shown on Figure 3.


A summary of the rock mechanics factors affecting ground conditions and the recommended guidelines for mine design are presented below.

Hydrology

The hydrogeological characteristics of the project area have been examined by Hydro-Geo Consultants of Lakewood, Colorado. The work involved field testing of three monitoring wells and one borehole for permeability and falling head and pumping tests on designated holes. No additional work was carried out by BEA.



FILE ID: FIGURE-3

DWG. NO.		REFERENCE DRAWING	NO.	DESCRIPTION OF REVISION	DATE	BY	APPROVED:	SCALE: N.T.S.	DATE		LAC MINERALS ROSEBUD PROJECT TYPICAL GEOTECHNICAL SECTION (700 N)	BHARTI ENGINEERING ASSOCIATES INC. SUDBURY, ONTARIO CANADA		DWG. NO. FIGURE 3 REV.
								DESIGNED: N.T.S.						
								DRAWN: S.McG.	JULY/92					
								CHECKED:						

The hydrogeology study concludes that the total mine inflow is estimated to range from 100 to 500 gpm. Complete drainage of the orebody hangingwall may not be possible using drainholes drilled for the deep line and a second dewatering system of vertical wells drilled from surface may be required. High inflows can be anticipated when intersecting the South Ridge Fault. Two additional test boreholes were recommended for further evaluation of the potential high inflow areas in the South Zone and the East Zone.

BEA believes that groundwater in most underground mines does not present serious stability problems as long as adequate pumping capacity is provided. The underground development at Rosebud will provide adequate opportunities to carry out drainage, with drainholes if required, to ensure that overall stability is not jeopardized.

Ground Conditions

The anticipated ground conditions are based on visual observations of exposures at Dreamland Mine, geotechnical core logging and experience with underground operations at Bullfrog, where ground conditions are expected to be somewhat similar to those at Rosebud.

Exposures at Dreamland indicate that stope spans of up to 60 ft. in area can be sustained without significant ground problems. The stopes had been open for over 50 years without any indications of major instability.

The Dozer Hill drift is an approximately 6 x 5 ft. unsupported drift through the Bud unit into the LBT. It is located within Dozer Hill, which directly overlies the North mineralized zone. The Bud is predominantly unmineralized, low strength geotechnical unit, while the LBT is the primary host for mineralization in some ore zones. There is no significant instability throughout the several hundred feet of drift length. The drift is dry.

A visual classification of the rock quality in both areas is generally fair to poor - based on the amount of fracturing evident in the excavation walls. It appears to be more fractured than the typical competent LBT inspected in drill cores and core photographs pertaining to the Rosebud/Dozer Hill project.

Point load test results indicate that the rock strengths at Rosebud typically range from 2000 to 15,000 psi with the unaltered or solified rocks having the higher strength values.



EXPOSURE AT DREAMLAND MINE



DOZER HILL DRIFT

The estimated rockmass quality for the Rosebud project is summarized below.

TABLE 3.1

ROCK MASS QUALITY, ROSEBUD PROPERTY	
GEOLOGICAL SEQUENCE	ROCK MASS QUALITY
Bud Tuff	Good to very good
Lower Bud Tuff	
Upper Section	Good to fair
Lower Section	Section 00 to 600 • Poor to very poor Sections 600 to 1600 • Fair to good (some poor zones) • Poor within 50 ft to 75 ft. of fault
Dozer Tuff	Fair to good

Based on the NGI classification, which has been modified to reflect any areas which contain reduced rock strength, it is suggested that:

- ◆ Very poor to poor ground conditions apply to the South Ridge Fault and the South ore zone between section 00 and section 600. The hangingwall conditions in this area would be classified as good to fair.
- ◆ Ground conditions in the mineralized Lower Bud Tuff between sections 600 to 1600 are classified as fair to good, with poor ground within 50 - 75 ft. of the South Ridge Fault. The hangingwall conditions in this area would be classified as good to fair.
- ◆ Fair to good ground conditions exist throughout the East Zone.
- ◆ The condition of the Dozer Tuff can be described as fair to good throughout the project area.

3.1 GUIDELINES FOR MINE DESIGN

It is envisaged that cut-and-fill is applicable to the South Zone ore between section 00 and section 600. The geological reserve indicates that the thickness of the ore in this area ranges from 10 ft. to 50 ft. vertically. Consequently, the thicker areas of the mineralization could be recovered with

approximately four mining cuts.

From section 00 to section 300, the thinner portions of the orebody, averaging 15 ft. to 20 ft. thick could also be recovered by tight cut-and-fill with breasting. In this area poor to very poor ground conditions are anticipated, therefore, panel widths should not exceed 15 ft. Ground support should generally consist of 8 ft. long mechanical rockbolts installed on an approximate 4 ft. x 4 ft. pattern, using weldmesh as a surface restraint between the rockbolts. A contingency to install friction support (ie. Swellex) and shotcrete will be required in highly kaolinized areas and through the South Ridge Fault.

Dilution in secondary pillar recovery between the primary panels is of concern, particularly in highly kaolinized areas, ie. drainage of groundwater and backfill placed in the primary panels may leach the rock mass. Narrower secondary panels may be required. External dilution in the order of 20 percent may be anticipated.

From section 600 to section 1600 the ground conditions improve and may be described as fair. The provisional extraction widths may be increased to 20 - 25 ft. Short cablebolts will be required as supplementary ground support at the intersections of access development. Poor ground is indicated within 50 ft. to 75 ft. in the hangingwall of the South Ridge Fault. A reduced panel width of 15 ft. may be required for the first two to three cuts where applicable. External dilution of approximately 15 percent is anticipated.

Fair to good ground conditions are indicated in the East Zone between sections NW8 and NW13. The South Ridge Fault consists of a silicified hydrothermal breccia, more competent ground than the clay gouge shear zone below the South and North zones. A provisional extraction width in the order of 30 ft. to 60 ft. may be applied depending on the degree of alteration. External dilution of approximately 15 percent is anticipated.

General guidelines on spans are provided below:

TABLE 3.2

Rock Mass Quality		Unsupported Span (ft)	Span With Rock Bolts, Mesh & Shotcrete (ft)
Excellent	Unaltered	40 to 45	80
Good	Unaltered	40	70 - 80
	Altered	13 to 20	26 - 33
Fair	Unaltered	16 - 25	30 - 40
	Altered	8 - 9	20 - 26
Poor	Altered	5 - 6	20
Very Poor	Altered	5	10

As an attempt to minimize external dilution, it is recommended that controlled blasting will be required throughout the development and ore zones.

It should be pointed out that the guidelines presented above are based on geotechnical core logging and limited analysis of the data. Additional work should be carried out for any future feasibility studies which should include identification of clay and friability zones, laboratory testing and appropriate numerical modelling to optimize the mine design.

4.0 ORE RESERVES

4.1 GEOLOGICAL RESERVES

Lac Minerals (USA) Inc. have estimated geological reserves, by the method of sections utilising grade cut offs of 0.02 oz Au per ton and 0.05 oz per ton (nominal open pit cut offs). The resources estimated by Lac Minerals (USA), Inc, are located both on jointly owned ground, 55 %, (Lac Minerals & Equinox), and 45 % on claims owned solely by Lac Minerals (USA), Inc.

TABLE 4.1
ESTIMATED GEOLOGICAL RESOURCES, LAC MINERALS (USA) INC.

Reserves Category	Tons	Grade oz Au per ton	Gold ounces
Cutoff 0.02 oz Au per ton			
Probable	4,088,107	0.105	429,631
Possible	1,102,786	0.133	146,563
Totals	5,190,803	0.111	576,194
Cutoff 0.05 oz Au per ton			
Probable	1,591,720	0.210	333,942
Possible	676,659	0.194	131,250
TOTALS	2,268,379	0.206	465,192

The resource is still open in a several areas where encouraging intercepts have been made. This includes one intercept of 170 ft. @ 0.559 oz/t.

The most recent calculations of the Rosebud resource (January 3, 1992) indicate an in situ geological resource of approximately 2 million tons at grades of 0.25 oz Au per ton and 2.92 oz Ag per ton, using a 0.1 oz/t cut-off.

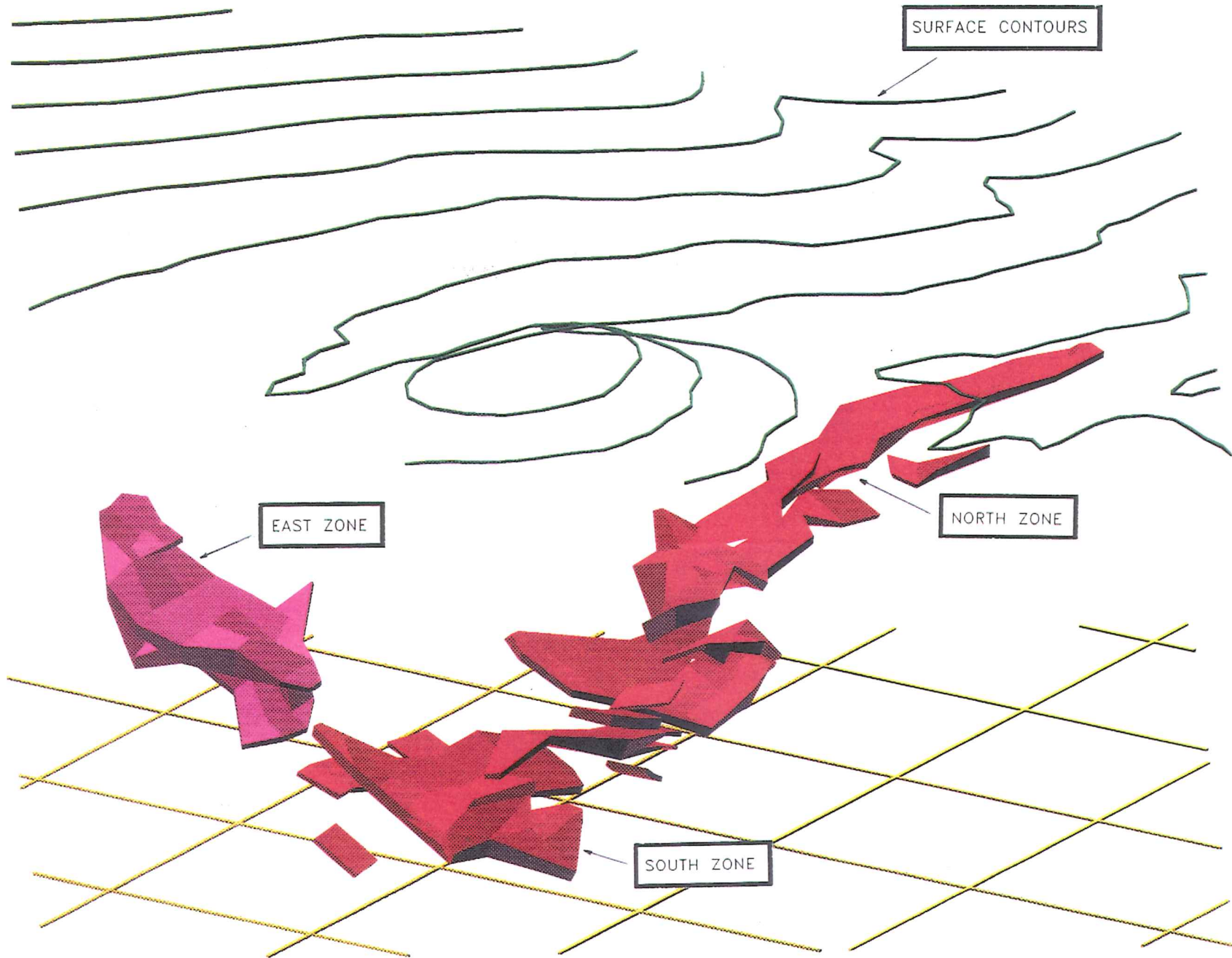
The geological reserve is considered accurate and reasonable within the constraints of the existing data, but insufficient for carrying out a definitive feasibility study. Important questions remain concerning the viability of samples and the impact of sampling procedures and analytical errors.

SURFACE CONTOURS

EAST ZONE

NORTH ZONE

SOUTH ZONE



Potential resources within the Rosebud property are estimated to range from the current reserve of 275,000 ounces of gold to 1,500,000 ounces of gold.

TABLE 4.2
POTENTIAL RESOURCES, ROSEBUD PROJECT

Category	Total Oz.	Probability %	Source
Current Reserve	275,000	90-95	BHC (Uneconomic)
High Probability Reserve	500,000	70-80	BHC
Good Probability Reserve	1,500,000	30-40	Consensus Estimate

4.2 MINING RESERVES

The mining reserves for this pre-feasibility study have been estimated as follows:

1. Preliminary mine planning and layouts were carried out using cut-and-fill stoping on geological sections and plans at a 0.10 oz/ton cut-off. Actual mineable outlines were identified.
2. This information was sent to Lac Minerals (USA) Inc. at the Reno offices where the mineable ore reserves were calculated at a minimum mining width of 10 ft. The reserves were calculated based on the mineable outline at cut-off grades of 0.10 oz/ton and 0.15 oz/ton.
3. The mineable reserves calculated were based on the drill indicated and drill inferred reserves and included the internal dilution, but did not include any external dilution. The reserves were calculated for the South Zone, East Zone and North Zone. Detailed backup on the reserve estimation is attached in Appendix III.
4. BEA estimated the mining dilution based on breaking waste at the end of each stope, backfill scoop from the mucking cycle, waste dilution from the backup of stope in the final cut and waste wall dilution from end panels. In addition, dilution was estimated in secondary stopes from backfill. The detailed calculation used to estimate the mining dilution is also included in Appendix III.

In addition to the dilution due to mining, estimates of the dilution due to ground conditions were obtained from the geotechnical analysis presented in Section 3.0. The total estimated dilution for the different zones was based on the mining dilution and the geotechnical estimate of dilution due to ground condition and is summarized below.

Cut-off Grade Optimization

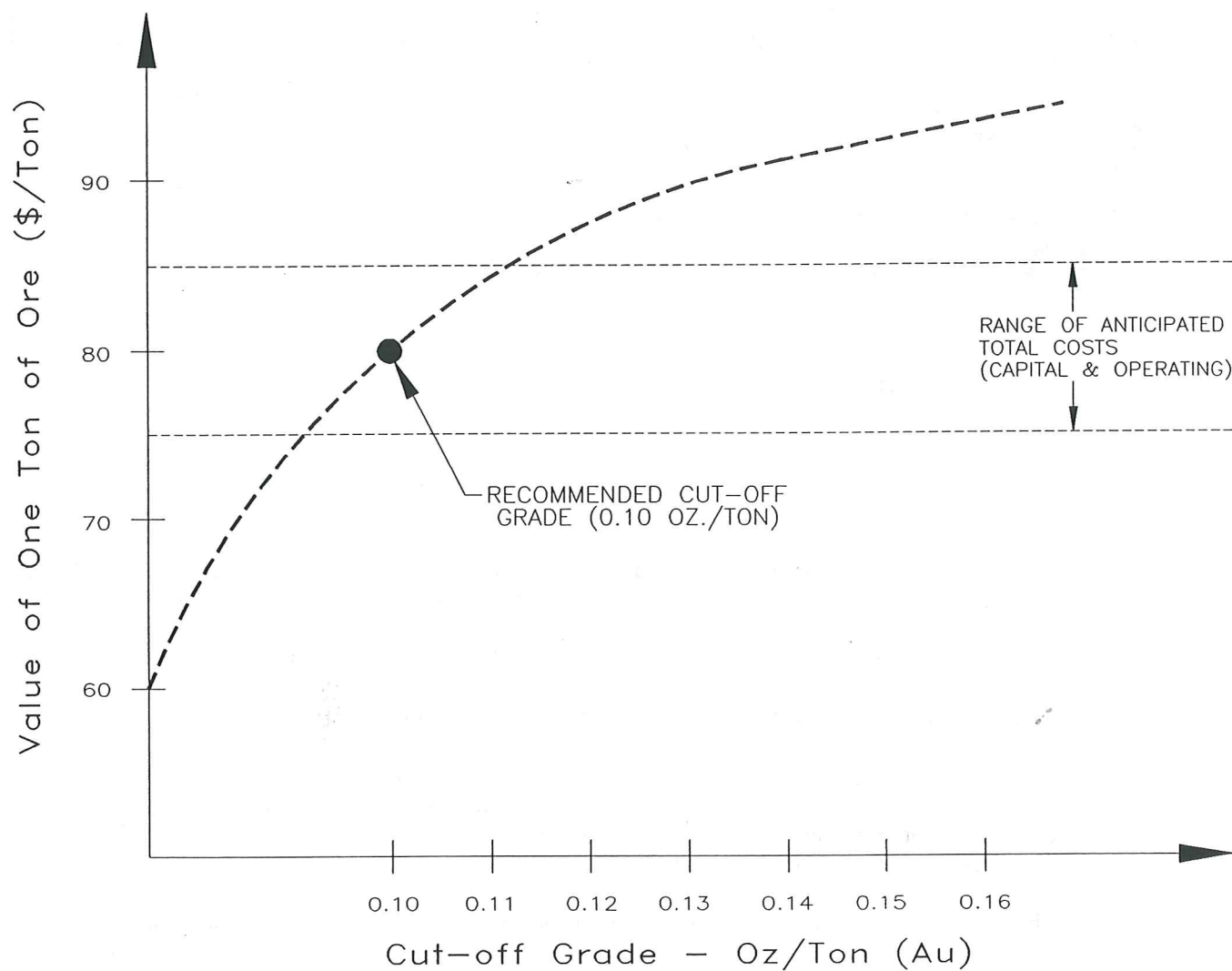


TABLE 4.3

MINING AREA	MINE PANEL WIDTH (ft)		MINING DILUTION %			DILUTION DUE TO GROUND CONDITIONS	TOTAL DILUTION
	PRIMARY	SECONDARY	PRIMARY	SECONDARY	COMBINED		
SOUTH ZONE							
A UPPER	15	10	11	22	15	15	30
B LOWER SW	15	15	11	17	14	15	29
B LOWER NE	25	25	8	12	10	15	25
NORTH ZONE	20-25	20-25	9	13	11	20	31
EAST ZONE	30	30	6	10	8	15	23

The total estimated mineable reserves range from 1.6 million tons at a 0.1 cut-off to 1.2 million tons at a 0.15 cut-off with an average grade of 0.226 oz/ton and 0.247 oz/ton respectively, as shown below.

TABLE 4.4

MINEABLE RESERVES @ 0.10 OZ./T CUT-OFF					
	Tons	Cut Au Ozs.	Ag Ozs.	Avg. Grade Au	Avg. Grade Ag
South Zone	741,800				
Dilution %	28				
Tons	949,500	200,917	2,279,473	0.212	2.40
East Zone	373,700				
Dilution %	23				
Tons	460,000	130,630	1,111,455	0.284	2.42
North Zone	147,800	30,547	1,018,779	0.207	
Dilution %	31				
Tons	193,500	30,573		0.158	5.27
TOTAL	1,603,000	362,094	4,409,707	0.226	2.75

TABLE 4.5

MINEABLE RESERVES @ 0.15 OZ./T CUT-OFF					
	Tons	Cut Au Ozs.	Ag Ozs.	Avg. Grade Au	Avg. Grade Ag
South Zone	604,700	185,002 .306	2,019,402		
Dilution %	28				
Tons	774,000				
East Zone	315,100	115,786 .367	1,046,291		
Dilution %	23				
Tons	387,900				
North Zone	128,500	28,385 .221	917,318		
Dilution %	31				
Tons	168,200				
TOTAL	1,330,100	329,173	3,983,000	0.247	2.99

undiluted 1,040,300
 .314 cut to
 .403 Fro. uncut

4.3 CUT-OFF GRADES

An evaluation of the cut-off grade for Rosebud was carried out using an estimated value of the ton of ore at various cut-off grades as shown on Figure 4. The method for estimating the cut-off grade is as follows:

1. The estimation of mining costs is largely based on local labour rates and material costs and gives rise to a best estimate, downside estimate and upside estimate as shown in the table below.

TABLE 4.6
ESTIMATED MINING OPERATING COSTS \$ PER TON OF ORE

Cost & Stopping Factors	Downside	Best Estimate	Upside
Rate of Production tpd	1000		
Productivity t/mshift	35	40	50
Manpower	29	25	20
Labour Cost \$/manshift	180.00	160.00	155.00
Direct Stopping Costs	Unit Costs \$/t		
Labour	5.22	4.00	3.10
Explosives	1.50	1.00	0.90
Backfill	3.00	2.25	2.00
Ground Support	2.00	1.00	0.80
Other Supplies	6.50	5.75	5.50
Total	18.22	14.00	12.30
Underground Mining Costs			
Direct Production			
Development	5.00	3.60	3.00
Stopping	18.22	14.00	12.30
Total	23.22	17.60	15.30
Indirect Services			
% age of Direct Costs	100%	100%	95%
Services	23.22	17.60	14.54
Total Costs	46.44	35.20	29.84

2. The overall mine operating cost for a typical 1,000 tpd mining operation was then assessed using milling, tailings and administration costs previously used in the Rosebud studies. The table below shows the best estimate for the overall mining cost is approximately \$51.00 per ton of ore, with an appropriate upside and downside.

TABLE 4.7
OVERALL ESTIMATE OPERATING COST US\$ PER TON OF ORE

Cost Centre	Downside	Best Estimate	Upside
Mining	46.44	35.20	29.84
Mill	15.00	13.50	13.00
Tailings	0.50	0.40	0.38
Administration	2.00	1.80	1.75
TOTAL	63.94	50.90	44.97

3. Previous studies have estimated the capital costs to be in the range of \$25 - \$35 million which results in a cost of approximately \$30/ton of ore based on the current mineable reserves.
4. The breakeven cut-off grade can roughly therefore be defined as the cut-off grade at which the average value of the ton of ore is equal to the total property cost including operating and the capital costs. At Rosebud, this estimate is approximately \$80/ton.
5. As Figure 4 indicates, a cut-off of 0.10 oz/ton is considered reasonable using the \$80/ton value of ore.

BEA recognizes that this method of estimation of cut-off grades is somewhat approximate. Typically, cut-off grades are estimated through a series of interactions between mine planning and geology with different mining methods and mining geometries continually optimized and re-estimated by geological personnel. Time constraints at Rosebud and the fact that this is a pre-feasibility with an accuracy of +/- 25% does not warrant this detailed analysis. The main objective of the cut-off grade at Rosebud is to ensure that the reserve base being used is reasonable and will provide a sound base for the follow-up economic analysis. The approach used above is therefore considered justified.

4.4 GRADE CONTROL

Given the manner of the occurrence of the higher grade gold mineralization within structural features, a good standard of grade control would have to be practised within the underground mine. Thus chip samples would be taken from the advancing heading of each transverse stope panel. Sufficient stope panels would have to be opened to allow time for samples to be assayed.

Longitudinal stopes would be sampled by both chip samples from heading faces and by test holes drilled into the footwall and hangingwall of the stope.

Grade control would also be enhanced by the addition of 8% cement to the last section of each pour of fill.

4.5 EXPLORATION PROGRAM

An exploration program has been proposed which would develop a 2,300 feet long ramp and 2 drifts a total length of 2,500 feet. Drilling would be carried out underground, producing some 60,000 feet of core, from 200 feet sections directed through the ramp and drifts.

Development would produce approximately 135,000 tons of waste rock and up to 15,000 tons of ore from selected bulk sample locations in the underground workings.

The proposed underground exploration program is critical to the viability of the project and is necessary to obtain the following data:

1. geological data;
2. evaluation of mining methods;
3. hydrogeological and dewatering requirements; and
4. metallurgical characteristics of the ore.

An estimate of the tonnage of ore required to recover the costs of the exploration program indicate that 25,000 to 45,000 tons of 1.0 oz Au per ton would be needed, shipped either to Pinson or Bullfrog respectively for treatment. Such material is available in either the 159 or East zones.

5.0 MINING PLAN

Various aspects of the mining plan are outlined in this chapter and encompass the selected mining method, a general mine layout, mine extraction sequence, service operations and equipment selection and fleet size.

5.1 MINING METHODS

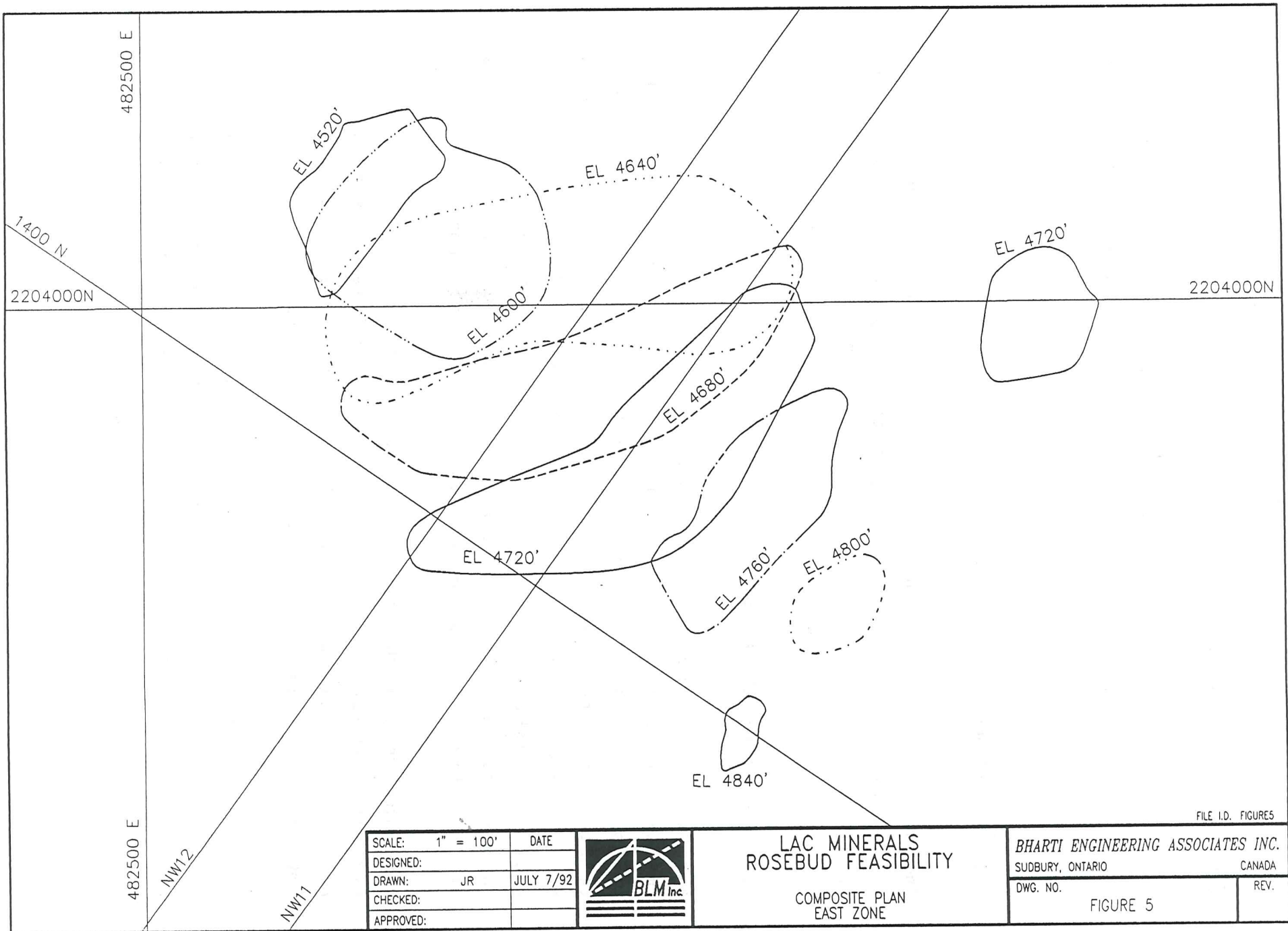
The factors considered in selecting the recommended method of cut & fill are summarised in this section, together with a description of the conceptual design for applying the method to extract the Rosebud deposit.

5.1.1 FACTORS AFFECTING SELECTION

Many factors influence the choice of a mining system such as the location of a deposit, its physical dimensions, configuration in space, distribution and value of grades and metallurgical treatment processes. The major parameters considered in the selection of a mining method are the size, shape, dip and plunge of an orebody. The width of an orebody can place physical limitations on the size of equipment that can be used and can therefore determine the mining method and the degree of mechanisation possible. The dip of an orebody determines the method of moving broken ore for gravity methods. This is usually only possible with dips greater than 40°. Shallow dipping structures almost invariably demand the use of either conveyors or trucks for the conveyance of ore.

The strength of an orebody, the overlying rocks and the importance of maintaining the ground surface intact, influence the choice between caving and non-caving methods. There are currently (June 1992), no constraints on preserving the surface above the Rosebud deposit. The quantities of groundwater that exist in the rock mass will not affect the choice of mining method.

The grade and spatial distribution of mineral values also influence the selection of mining methods, in that low grade ore demand the use of low cost, high productivity methods. Gradational and erratic boundaries of mineral deposits require the adoption of selective methods to ensure that waste dilution is minimised.



From a consideration of various factors in relation to the Rosebud deposit, it is evident that cut & fill mining is more appropriate to the extraction of the Rosebud deposit than blasthole stoping, Table 5.1.

TABLE 5.1 COMPARISON OF STOPING METHODS

Mining Method	Advantages	Disadvantages
Cut & Fill	<ol style="list-style-type: none"> 1. Highly Selective 2. High Recovery 3. Minimizes Unsupported Span 4. Low Dilution 5. Good Productivity 	<ol style="list-style-type: none"> 1. High Mining Costs 2. Labour Intensive 3. Labour Exposed in Stope 4. Each Lift Supported 5. High Development Quantity
Blasthole Stopping	<ol style="list-style-type: none"> 1. Good Safety 2. High Productivity 3. Low Development Quantity 4. Lower Support Costs 	<ol style="list-style-type: none"> 1. High Dilution 2. Lower Ore Recovery 3. Low Selectivity 4. Requires Remote Mucking

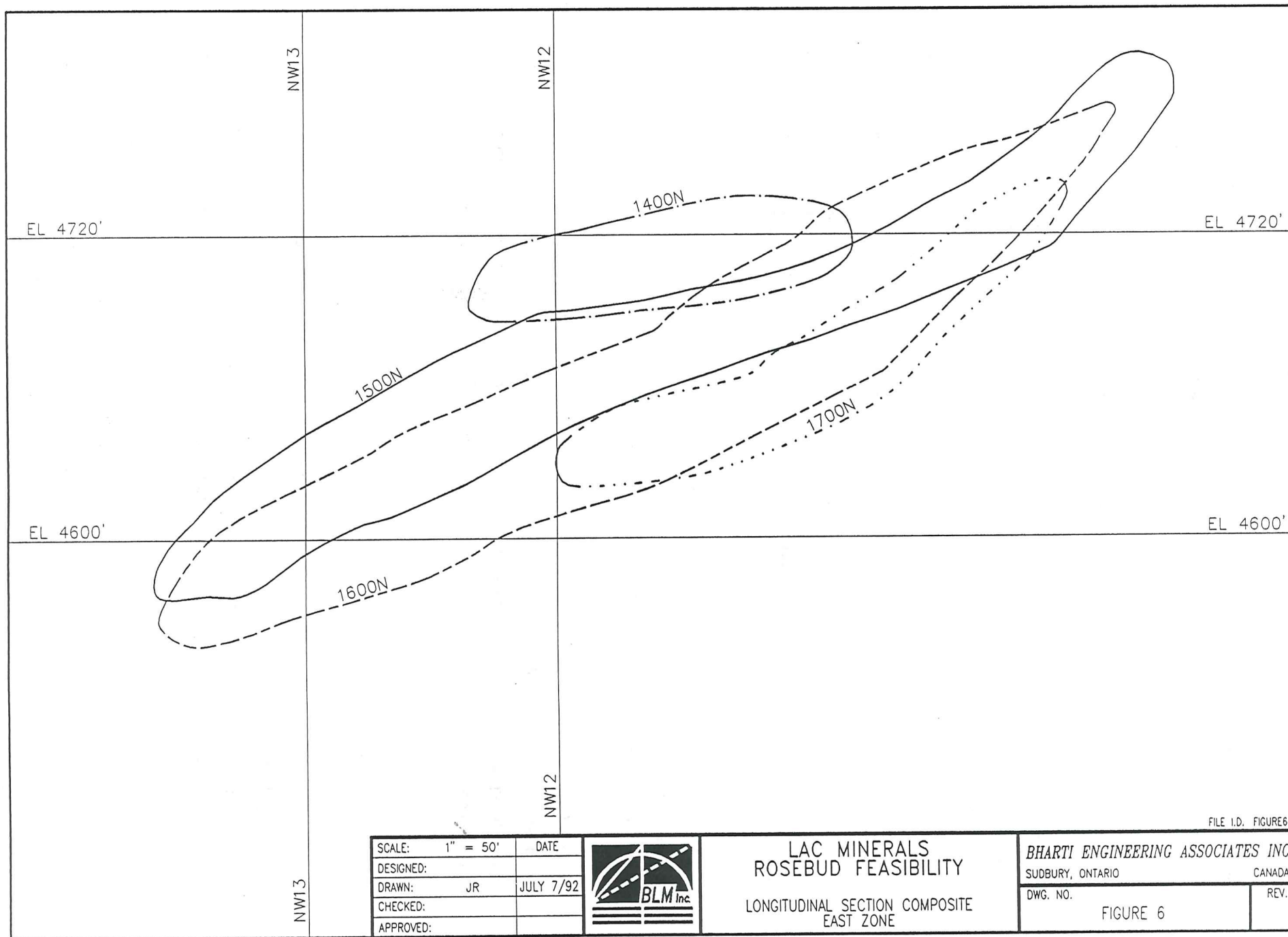
The main disadvantages of blasthole stoping are the higher dilution and lower recovery factors in comparison to the cut & fill technique recommended. It is essential that the grade is maintained and that recovery of ore is maximised, given the low ore grade and low tonnage available.

A detailed examination of the zones from a 3-D AutoCAD drawing using a number of viewing percepts revealed that blasthole mining would not be appropriate largely because of the shallow plunge and dip of the orebody, the lack of continuity as well as the limited width and vertical height. Figures 5 and 6 show longitudinal and cross-sectional views of the East Zone as examples.

5.1.2 DESIGN CONSIDERATIONS

The proposed mining method recommended for the Rosebud deposit is based upon criteria developed from the scope of work and data provided from the exploration programme and laboratory tests. The design and layout of the cut & fill technique, as conceived herein, is, at this stage, preliminary in nature and subject to modification during subsequent studies and the initial mining trials in the preproduction development period.

Depth will not be a limiting factor with respect to the mining design for the maximum depth below surface will be approximately 800 feet. The stresses induced by the overlying rock mass will not therefore generate loads high enough to bring about failure of the orebody rock mass, other than in



FILE I.D. FIGURE6

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LAC MINERALS
ROSEBUD FEASIBILITY
LONGITUDINAL SECTION COMPOSITE
EAST ZONE

BHARTI ENGINEERING ASSOCIATES INC.
SUDBURY, ONTARIO CANADA

DWG. NO.	FIGURE 6	REV.
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atypical areas where the rock mass may be intersected by zones of multiple discontinuities. The width of panels is a major factor related to both stability and productivity. Wide panels result in increased productivity, giving greater output per development and production round which in turn reduces the number of equipment moves.

In summary, cut & fill mining has been selected for the extraction of the Rosebud deposit for it has the following advantages:

- flexibility and ease of modification;
- ideal application for an orebody with wide variations in quality, width, roof and floor rock mass conditions;
- good selectivity and productivity; and
- low dilution;

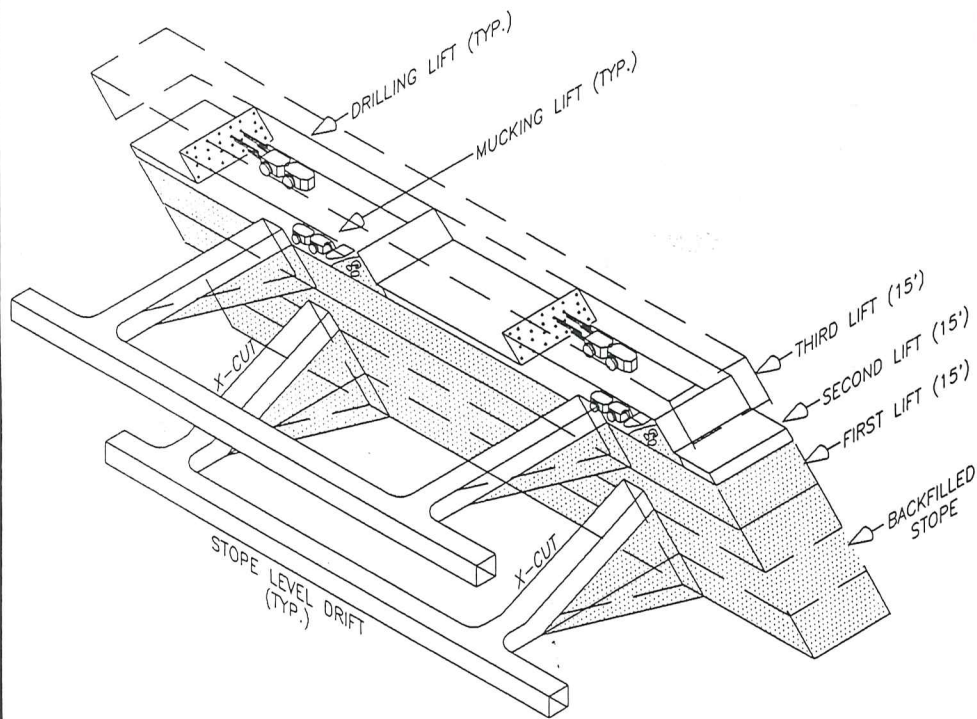
However, it is acknowledged that a disadvantage of cut & fill mining is the need to produce from multiple work places which demands:

- supplying many development ends; and
- moving machinery and constantly extending services.

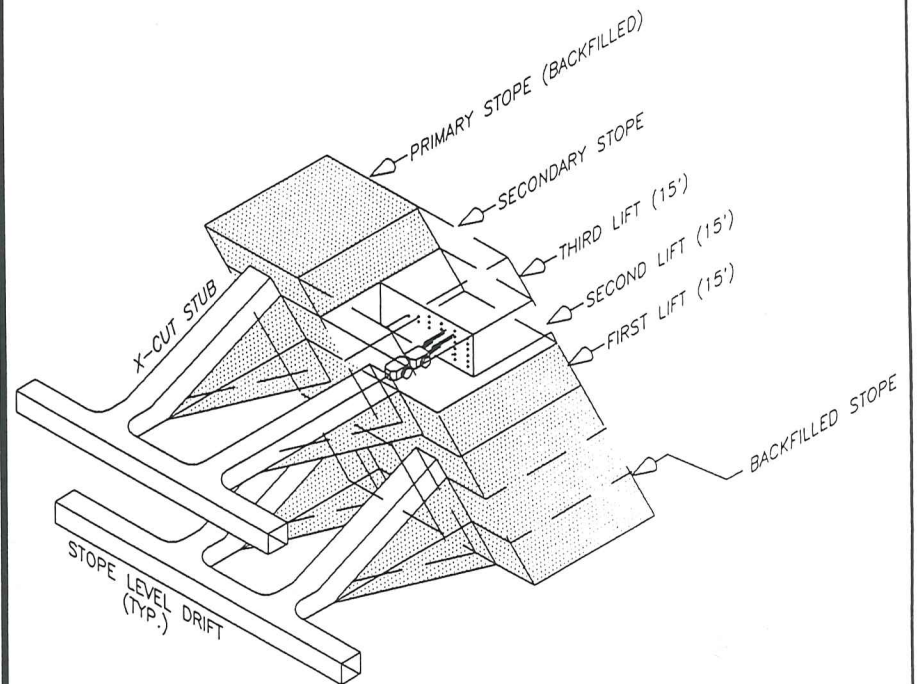
A high standard of supervision and organisation will be vital in order to produce from many workplaces.

5.2 CUT & FILL

The layout, development configuration and stoping sequence proposed for transverse primary-secondary stope cut-and-fill mining are outlined in this section. Level drawings are shown in Figures 7 to 11.



LONGITUDINAL CUT AND FILL MINING STOPES



TRANSVERSE CUT AND FILL MINING STOPES

FILE I.D. FIGURE-7

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LAC MINERALS
ROSEBUD PROJECT

TRANSVERSE AND LONGITUDINAL
CUT AND FILL STOPING METHODS

BHARTI ENGINEERING ASSOCIATES INC.
SUDBURY, ONTARIO CANADA

DWG. NO.

FIGURE 7

REV.

5.2.1 STOPE LAYOUT

The transverse cut & fill mining method consists of a series of parallel primary - secondary stope panels, oriented across the dip of the ore zones. Stope spans vary for the various zones as indicated in Table 5.2

TABLE 5.2 TRANSVERSE CUT-AND-FILL STOPE SPANS

Zone	Stope Type	Stope Span (ft.)
Upper South	Primary	15
	Secondary	10
Lower NE South	Primary	30
	Secondary	30
East	Primary	25
	Secondary	25

Cut and fill lifts have been selected to be 15 feet, a height effectively used in numerous operations.

5.2.2 STOPE ACCESS

Mining will begin from four horizons, namely the 4800, 4600, 4440 and 4320 elevations. The initial lift on each of these horizons will be accessed via an access ramp driven at +3% to provide positive drainage. The second lift will be accessed by backslashing the attack ramp at 15% and using the broken muck as a floor.

Starting from the third lift, stopes will be accessed from an attack ramp emanating from a spiral ramp would be used to access three lifts, with the first of the three being accessed by ramping at -15%, and the next two lifts accessed by backslashing the access ramp as required, ensuring a maximum inclination of +15%.

Each lift will consist of primary and secondary stopes. When a particular lift is reached by the attack ramp, a strike drift is driven along the entire length of the ore zones in order to access the primary and secondary stopes.

TOPPING METHOD

ill mining method involves the following elements of the stoping cycle:

- drill
- blast
- support ground
- muck/haul
- backfill

t will require drift type rounds. Subsequent lifts will have an open brow, therefore asting would be used.

done with electric-hydraulic two-boom, rubber-tired jumbos. The flat breast holes will 5 to 1.75 inches in diameter and 12 feet long. Drill hole burden and spacing is expected 1 feet.

blasting agent is ANFO (low cost) detonated with NONELS. ANFO would be loaded from D loaders, either from a scissor lift truck or from an LHD with staging platform.

a mucked with 3.5 yd³ LHD dumping directly into trucks. A productivity of 30 - 35 een estimated for the 3.5 yd³ LHD despite the very short hauls in stope panels since it at truck drivers load their own trucks. Given the 8 hour shifts proposed for the Rosebud effective operating time of 5.4 hours per shift, such machines should produce between tons per shift or 320 to 380 tons per day. A production rate of 1,000 tons per day 4 machines for stope mucking at 66% availability.

an calls for trucks to be loaded by their drivers, as opposed to the development ore e installation of chutes. An average 2-way hauling distance of say 12,000 feet and an

5.2.3 STOPING METHOD

The cut-and-fill mining method involves the following elements of the stoping cycle:

- drill
- blast
- support ground
- muck/haul
- backfill

Drilling:

The initial cut will require drift type rounds. Subsequent lifts will have an open brow, therefore horizontal breasting would be used.

Drilling will be done with electric-hydraulic two-boom, rubber-tired jumbos. The flat breast holes will typically be 1.5 to 1.75 inches in diameter and 12 feet long. Drill hole burden and spacing is expected to be 2.5 to 3 feet.

Blasting:

The preferred blasting agent is ANFO (low cost) detonated with NONELS. ANFO would be loaded from portable ANFO loaders, either from a scissor lift truck or from an LHD with staging platform.

Mucking:

Stopes will be mucked with 3.5 yd³ LHD dumping directly into trucks. A productivity of 30 - 35 tons/hr. has been estimated for the 3.5 yd³ LHD despite the very short hauls in stope panels since it is proposed that truck drivers load their own trucks. Given the 8 hour shifts proposed for the Rosebud Project and an effective operating time of 5.4 hours per shift, such machines should produce between 160 and 190 tons per shift or 320 to 380 tons per day. A production rate of 1,000 tons per day would require 4 machines for stope mucking at 66% availability.

Haulage:

The mining plan calls for trucks to be loaded by their drivers, as opposed to the development ore passes and the installation of chutes. An average 2-way hauling distance of say 12,000 feet and an

average hauling speed of 33,000 feet per hour (6.25 mph) would result in 2.75 round trips per truck per hour. Given a truck factor of 12 tons, each truck would haul approx. 30 - 35 tons per hour taking loading into account, which translates into a daily capacity of approx. 300 - 375 tons.

Thus, a daily output requirement of 1,000 tons would demand 5 trucks for stoping. These trucks would also be used initially for hauling development waste to surface.

Backfilling:

Backfilling will consist of high density, full stream tailings placed underground at approximately 80% pulp density. The application of high density backfill permits Rosebud to use tailings rather than rockfill. Conventional hydraulic fill, classified and placed underground at 60 - 65% density, cannot be used at Rosebud because after classification the tailings available for hydraulic fill would be less than 20%. High density fill on the other hand, permits fill to be placed using full stream tailings but at a higher density so that drainage is not required and, therefore, the tailings do not have to be classified.

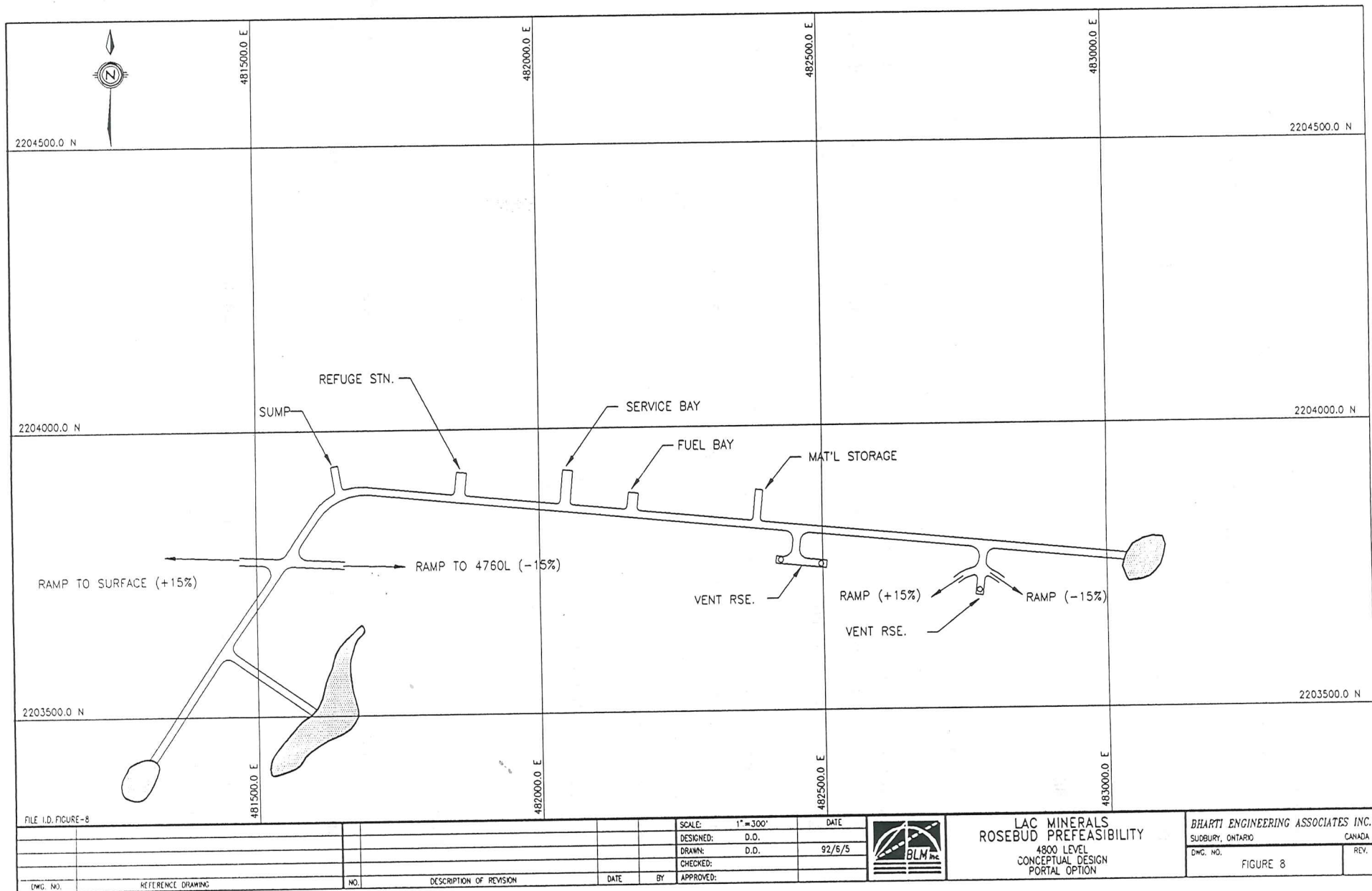
The primary stopes will be consolidated with hydraulic fill at 1:30 cement:tailings ratio (3% cement) with a 1 ft. thick cap of 1:10 cement:tailings to ensure a good mucking floor and minimize dilution. All stopes will be filled within 3 ft. of the back (brow of the subsequent lift). The secondary stopes will also use consolidated fill, but with a 1:40 cement:tailings ratio and a 1:10 floor.

Wherever possible, development waste should be placed into unfilled stopes. It is anticipated that at least 50% of the development waste will be placed underground.

Ground Support:

A geotechnical assessment of the various zones indicates a relatively broad range of ground conditions which are expected to be encountered. Accordingly, stope spans vary for specific zones (Table 4.2) dependent on the local conditions.

Additional ground support would include rockbolts to be installed where necessary, including accessories such as washers and steel straps.



5.3 GENERAL MINE LAYOUT

The general mine layout of the Rosebud project is constrained by a number of factors:

- configuration, tonnage and grade distribution of the ore zones;
- rock mass characteristics of the ore and country rock;
- surface topography;
- infrastructure; and
- position of the treatment plant.

Access to the mine workings, configuration of the underground haulage, ventilation system and primary development is discussed in this section in the light of the above mentioned factors.

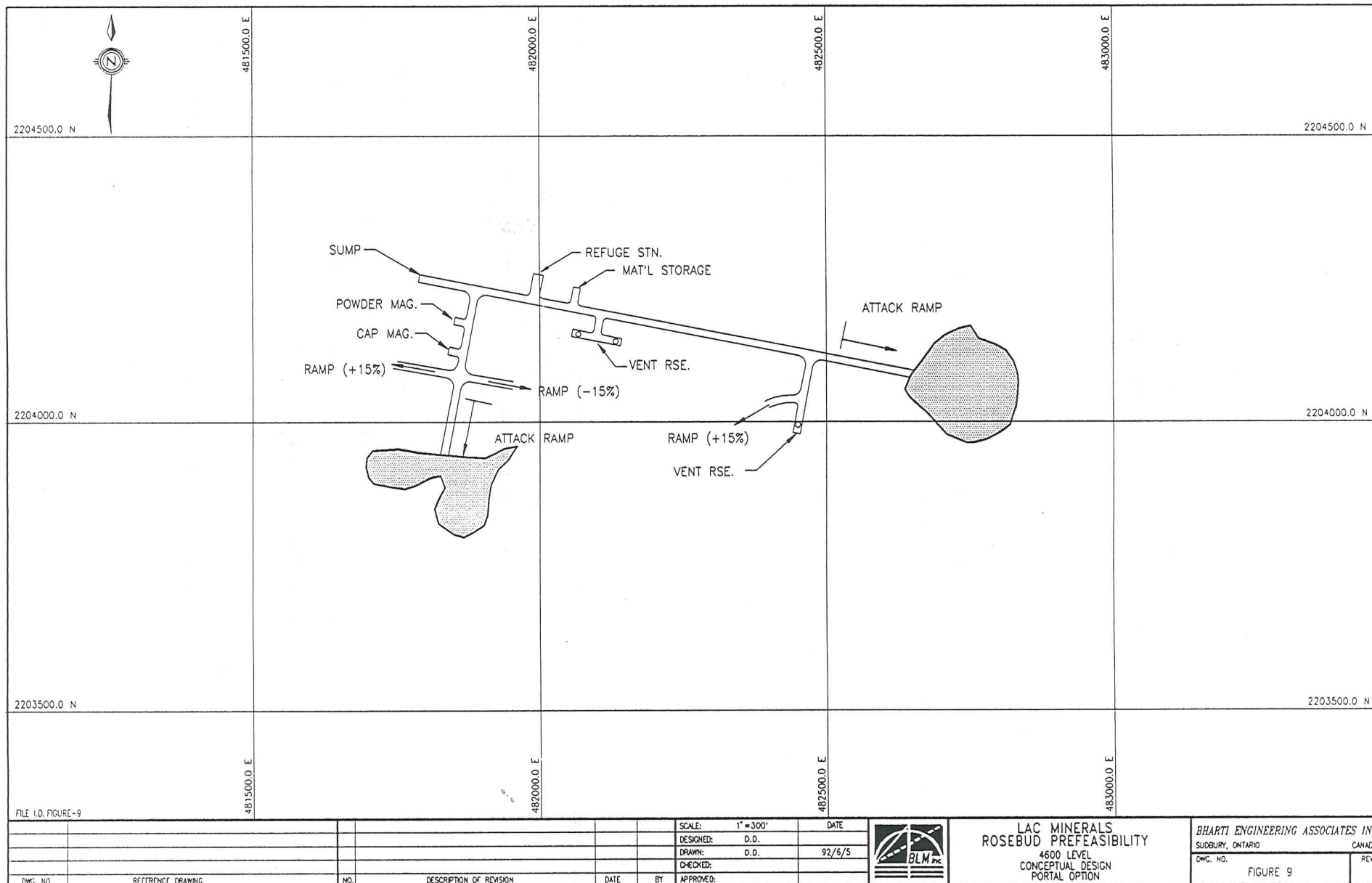
The areal extent of the proposed Rosebud mine requires a single entrance to the mine to provide adequate access for men and equipment in terms of safety and travelling time to the work place that could be either by a portal or a service shaft. Both alternatives were considered for Rosebud.

Portal Option

A portal would be established at the 5050' elevation and a decline haulage ramp driven to the east at a maximum gradient of 15 %. The cross section dimensions of the ramp would be 13' in width and 12' in height. The selected position of the decline should be verified by geotechnical exploration boreholes.

The length of the main ramp, inclusive of access cross cuts and other development, has been estimated as approximately 12,500'. Excavations cut on each level incorporate powder magazines, cap magazines and material storage excavations. Service and fuel bays would be cut on the 4800 and 4440 sublevels with the main sump on the lowermost 4320 level.

In addition to the horizontal development, an escapeway, 10 ft. diameter must be excavated from 4800 level to surface. The raise would be developed in four legs and is required in both options.



Shaft Option

This option would involve sinking a shaft to a depth of about 1030 ft. As the shaft is being sunk, stations will be cut at the 4800, 4700, 4400 and 4300 elevations for ramp takeoffs to the mining zones. The haulage ramps will have a maximum $\pm 15\%$ grade with a nominal profile of 13 ft. wide and 12 ft. high. An orepass raise with loading pocket will be established on completion of the shaft, at which point level ramp development can commence using the orepass used as a waste dump. Fresh air ducting, air and water lines will be carried in the shaft with take-offs at each level for development. All water will be pumped and drained back to the shaft sump for pumping to surface.

The length of the main ramp and access developed from the shaft inclusive of crosscuts, cap and material storage is estimated at 8000 ft.

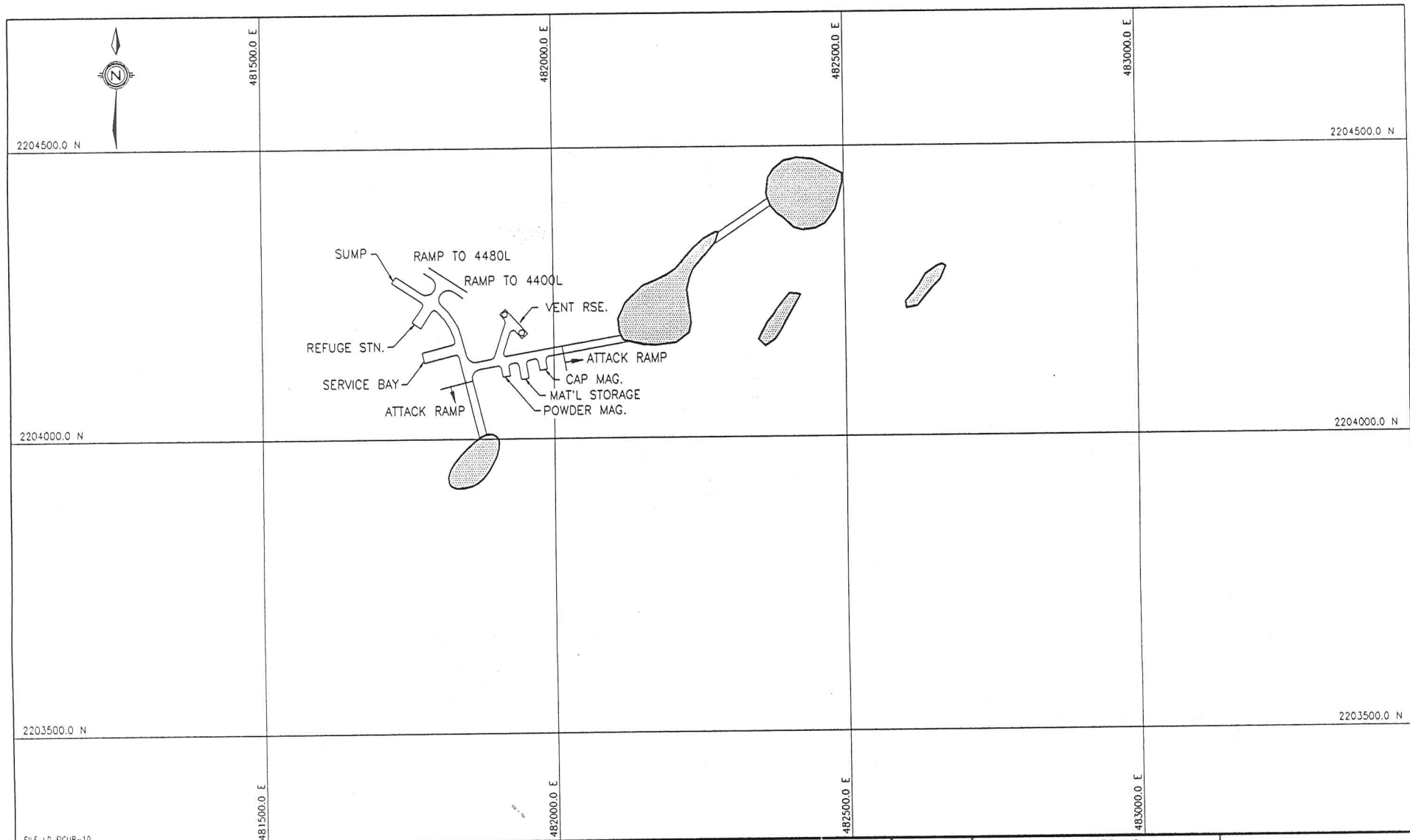
The comparative costs are as follows:

TABLE 5.3.
SHAFT VS. RAMP

(\$000s)		
ITEM	PORTAL	SHAFT
Main Ramp Shaft	3,609	3,396
Internal Ramp	4,958	3,456
Ore Pass		199
TOTAL	8,567	7,051

The disadvantage of the shaft is that production is delayed by 6 months during sinking, and a further 4 months until the ore zone is dewatered.

The portal option is used in this prefeasibility study.



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LAC MINERALS
ROSEBUD PREFEASIBILITY
4440 LEVEL
CONCEPTUAL DESIGN
PORTAL OPTION

BHARTI ENGINEERING ASSOCIATES INC.
SUDBURY, ONTARIO CANADA
DWG. NO. FIGURE 10 REV.

5.3.1 UNDERGROUND HAULAGE

The removal of ore and waste rock from the mine would be carried out with diesel powered trucks, 13 ton to 15 ton, utilising the main access ramp. 15 ton trucks with 3.5 yd.³ LHD units were selected over the 26 ton truck/5 yd.³ LHD combination due to cost, in order to maintain a small drift size and to optimize ventilation requirements.

The gradient of 15 % proposed for the ramp would cater for the movement of all vehicles both into and out of the underground mine.

5.4 MINE EXTRACTION SEQUENCE

Operational needs with respect to the mine extraction sequence, dictate that:

- mine stability is maintained;
- unmined ore is preserved in a mineable condition;
- major service openings are protected; and
- secure access to safe working places is provided.

The planned sequence to extract the three ore zones, which is based upon both geotechnical and practical considerations, requires that the:

- lower section (Block B) of the South Zone (4550' to 4730') is mined first;
- followed by the North Zone (Block D) and the East Zone (blocks E1 and E2); and finally
- the upper section (Block A) of the South Zone (4800' to 4900').

5.5 PRODUCTION RATE

Several alternative production rates were examined to suit the orebody geometry and layout with alternative mining approaches and methods that would maximize production and minimize dilution. The selective production rate is 1,000 tpd on 2 shifts, five days per week basis, with the mill operating on seven days, 3 shifts a day at 750 tpd. This alternative was selected for several reasons:

1. The mine has a relatively limited reserve of approximately 1.6 million tons. A maximum production rate of 250,000 tpy would exhaust these reserves in just over six years. This is a relatively rapid extraction rate, and while it is achievable, it does deplete the ore reserves rapidly.
2. Cut-and-fill mining was selected because it provides several faces in the East, South and North Zones simultaneously. Mining can therefore progress in several stopes. Assuming typical stope productivities of 40 tons per manshift and 2 men per stope, only 6 active headings are necessary to achieve the desired production rate per shift of 500 tpd. In blasthole stoping, for example, achieving this production rate would be much more difficult because the geometries are firm and significant development and sequencing has to be carried out to obtain the initial production.
3. An extremely high production rate would put unnecessary pressure on the materials handling system which is dependent on the one ramp accessing all the ore to surface.

Overall, it is concluded that 1,000 tpd production rate (250,000 tpy) is the optimum (maximum) achievable production rate using cut-and-fill mining. The layout of the mining method provides the flexibility to obtain this production rate from the three zones. It should be emphasized that the limited reserve base precludes the potential for a higher tonnage rate from Rosebud.

In order to mine at a rate of 1,000 tons per day, a sufficient number of stope headings must be available at all times. The flexibility of ramp access, cut-and-fill stoping together with the mobility of the equipment effectively means a mining face must be available for drilling or mucking constantly. The availability and system to place backfill in the stopes is critical to attaining the production target and maintaining it for the earlier years in the mine life.

Stope panel sequencing, access development and fill scheduling for each zone must be in place before production commences. This is to ensure access ramps are completed in time to provide stope panel availability and that fill is placed before pillars are scheduled for production.

Production is from stoping panels of 10 ft., 15 ft., 20 ft., 25 ft., 30 ft. and + 30 ft. widths. After the initial cut is taken and filled, breasting off consolidated fill commences using elec/hyd. 2 boom jumbo, to a cut height of 15 ft. Tons for each panel breast of 12 ft. depth per stoping crew is:

TABLE 5.4
ESTIMATE OF PRODUCTION RATE VS. PANEL WIDTH

Panel Width	10 ft.	15 ft.	20 ft.	25 ft.	30 ft.
Tons/blast	180	270	360	450	540
Shifts Drill and Blast	0.5	0.5	0.75	1.0	1.0
Shifts Muck-Bolt-Scale	0.5	0.75	0.75	1.0	1.0
Total Shifts	1.0	1.25	1.5	2.0	2.0
Tons/Crew Shift	180	216	240	225	270
66% Equip. Availability	119	143	158	149	178
8 Stope Crews tons per day	952	1144	1264	1192	1428
Average/day All Panels	1196				

A stoping schedule should be drawn up based on production from panel sizes stated. A fill schedule should then be made to ensure panels can be filled in sufficient time to allow pillars to be mined. Separate fill crews have been allowed for in the manpower.

A mining rate of 750 tons per day (187,500 tpy) has been calculated as the optimum (maximum) rate for the cut-off option at 0.15 oz Au. This scenario will probably reduce the effective parameters of stoping areas and require more geological control. It is, however, considered a realistic production target that can be attained earlier and sustained. A higher production rate at the 0.15 oz. cut-off may be difficult to sustain.

5.6 CONSTRUCTION AND SERVICES

The following main construction times would be necessary underground:

- ◆ refuge stations (all levels)
- ◆ service bays (4800 and 4440 levels)
- ◆ fuel bays (4800 and 4440 levels)
- ◆ sumps (all levels)

- ◆ ventilation doors (all levels)
- ◆ powder magazines (all levels)
- ◆ cap magazines (all levels)

Mine services would include:

- ◆ 4" air lines
- ◆ 2" water lines
- ◆ 6" drainage lines
- ◆ electrical power lines

all of the above would advance with development from the portal.

5.7 VENTILATION SYSTEM

It is proposed to utilise the main haulage decline as the main fresh air tunnel. Intake air would be drawn down the ramp and would flow to the stoping areas via the access cross cuts. Auxiliary fans would force air into stoping panels and development sections. The ventilation circuit would be completed with the extraction of return air via the ventilation raise situated near the East Zone. The main exhaust fan would be located at surface connected to the collar of the 10 ft. diameter exhaust raise.

5.8 MAINTENANCE & POWER

The major services that would be provided by the Maintenance Section would encompass mobile and static equipment, and the supply of power and installation of the substations.

As the mine is accessed to surface via a ramp system, the majority of repairs mobile equipment could be done in the surface shops. In addition, underground service bays on the 4800 and 4440 levels could provide additional servicing.

Power would be taken underground by means of high voltage cables hung in the haulage decline. An electrical sub station would be established in the mine close to the entrance to the bottom of the exhaust ventilation raise. A suitable position would be in a cross cut connecting the fuel and service bays on 4320 sub level. Such a location would offer some protection against flooding in the mine.

However, should fires occur in a sub station the noxious gases would pass directly into the exhaust stream.

Power would be distributed underground via a substation tied into portable power centres which would serve each section independently.

5.9 MINE DRAINAGE

Pumping arrangements from underground would be based upon the removal of both service water and excess water from the placement of hydraulic fill. A simple reticulation system would be setup based upon the flow of service drilling water from production sections along drains positioned in the access cross cuts. Thereafter, water would be directed to the main sump via drain holes connected to the footwall haulages.

The main pumps would deliver waste water to surface through a 4" diameter rising main hung in the ramp.

5.10 EQUIPMENT

Table 5.5 identifies the major mobile equipment during production based on 66% availability (Bullfrog estimate).

TABLE 5.5

NO.	ITEM
6	2 Boom E/H jumbo
6	15 Ton diesel trucks
6	3.5 cu. yd. Diesel LHD
1	Anfo Truck
6	Anfo Loaders
1	Grader w/Blade
1	1 Personnel Carrier
2	Personnel Vehicles
1	Diamond drill & rods
1	Fuel tanker
6	Scissor truck

6.0 MILL AND SURFACE INFRASTRUCTURE

A detailed evaluation of the mill and surface infrastructure is beyond the scope of this study. The information used to estimate the capital and operating costs for both the mill and the infrastructure on surface has been obtained from Lac Minerals and previous studies carried out on Rosebud.

6.1 MILL

George Hope of Lac Minerals has provided the capital and operating costs for the mill and the recoveries that should be used for the Rosebud project. At a milling rate of 750 tpd on 7 days/3 shifts per week basis, the costs are as follows:

Capital Cost	\$9.5 million
Operating Cost	\$13.50/ton

The recoveries used in the follow-up economic analyses are as follows:

TABLE 6.1

	Gold	Silver
South and East Zones	91%	62%
North Zone	84.5%	61%

As mentioned earlier, limited metallurgical testwork carried out by Lac, indicate that the gold can successfully be extracted with a carbon and leach plant with gravity separation. A sag mill will likely be required with water requirements at approx. 200 gpm. Further testing, particularly towards identifying and solving any leaching problems, brought about in part by the presence of gold encapsulated by sulphides and the presence of antimony should also be carried out.

6.2 SURFACE INFRASTRUCTURE

A study on the minesite layout for the Rosebud project was carried out by Dynatec on February 6, 1992. In addition, the tailings disposal and related environmental work was completed by Hallam

Piesald Knight and is incorporated in the Beacon Hill Consultant's report.

The primary surface structure would include the following:

- Changehouse, which would be a 15 ft. x 60 ft. trailer
- Contractor's office, also a 15 ft. x 60 ft. trailer
- Owner's office, a 15 ft. x 45 ft. trailer
- Compressor and electrical station, on a 20 ft. by 20 ft. concrete pad with 2 750 cfm compressors and electrical transformers and switchgear
- Generator station on an 8 ft. x 20 ft. - trailer housing generators with a capacity of 800 kilowatts
- Water storage - a 6 ft. dia. x 10 ft. high water tank with a capacity of over 2,000 gallons
- Fuel and lube storage - a 40 ft. x 20 ft. dirt pad with a 3 ft. high berm would be used.
- Maintenance structure - a 60 ft. x 20 ft. concrete pad with trailer facilities and a sheltered area with a built-in grease trough
- Explosives storage - clear dirt pad that houses an ANFO trailer, an detonator magazine and a high explosive magazine.
- Septic tank - a 10 ft. x 5 ft. x 6 ft. deep nominal 1500 gallon buried septic tank would be employed.
- Leach field - a 40 ft. x 80 ft. leach field and distribution box
- Portal structure - a 16 ft. wide timber portal with winged walls extending out for 10 ft. at 45°.
- Security fence - a 6 ft. high chain link fence would be used.
- Settling pond for mine water discharge - settling pond has been designed with overall dimensions of 180 ft. x 125 ft. with side embankments on a 3-1 slope. The pond has a nominal capacity of over 324,000 gallons and a maximum capacity of almost 389,000 gallons.
- Catch basin for surface water runoff from disturbed areas. Site drainage will be diverted into the catch basin. The impoundment will allow for skimming of oil slicks from water surfaces for containment in sealed containers and transport to an approved disposal site.
- Land Application System - this will be located west of the minesite and north of the country road.
- Road construction - a new road will either be constructed or the existing road improved from the country road to the minesite. This will require approximately 0.875 miles of road.
- Reclamation of site - all surface structures, equipment and surplus materials and supplies will be removed from the site by the contractor when he demobilizes.

6.3 TAILINGS DISPOSAL

Tailings disposal will take place southwest of the plant and mine portal. The original estimate of storage capacity was 3 million tons. Since the present reserves stand at 1.6 million tons and approximately 50% of the tailings will be used underground for backfill, it is estimated that the tailings storage could be reduced to 1 million tons, significantly reducing the total capital costs. A 3 pond configuration will be used for the tailings dam design.

7.0 MANPOWER RESOURCES

The organisational structure of the Rosebud mine would comprise four main departments reporting directly to a Mine Manager. It is estimated that a total workforce of 132 would be required to produce at an output of 250 000 tons per annum, Table 7.1.

TABLE 7.1 MINE WORKFORCE

Department	Number
Mining	78
Maintenance	17
Milling	25
Administration	12
Grand Total	132

The Project plan incorporates a 2 shifts per day, 5 days per week operation for the mining, maintenance and administration workforce, associated with a daily output of 1 000 tons. Milling staff and hourly personnel would be required to work a 3 shifts per day, 7 days per week system for a daily throughput of 750 tons.

7.1 MINING

It is estimated that a total of 58 hourly paid employees would be needed to perform the direct and indirect activities for the underground mine (underground and surface), Table 6.2. The stoping crew structure would comprise:

- 1 jumbo operator;
- 1 man blasting crew; and
- 1 LHD operator.

Similarly, development crews would consist of:

- 1 jumbo operator; and
- 1 man blasting crew; and

TABLE 7.2 MINING DEPARTMENT WORKFORCE

Description	Day Shift	Back Shift
Direct Mining		
Stoping	12	12
Development	3	3
Support	2	2
Backfill	2	2
Subtotal	15	15
Services U/G		
Haulage	4	4
Grader & Cleanup	1	1
Labour	6	6
Subtotal	5	5
Services Surface		
Haulage	2	2
Dry and Lamproom	1	1
Labour	2	2
Subtotal	5	5
GRAND TOTAL	29	29

A total of 20 staff has been estimated for the provision of supervision and engineering and geological services, Table 7.3.

TABLE 7.3 SUPERVISION AND TECHNICAL STAFF

Description	Day Shift	Back Shift
Supervision		
Mine Manager	1	
Mine Foreman	1	1
Safety	1	
Clerk/Secretary	1	
Engineering		
Mine Engineer	1	
Draftsman	1	
Surveyor	1	
Assistant Surveyor	1	
Geology		
Mine Geologist	1	
Geologist	1	1
Technician	1	1
Assayer	1	1
D/Drill Operator	4	
Total	16	4

7.2 MAINTENANCE DEPARTMENT

A Foreman would be responsible for the maintenance department which would comprise 16 mechanics and electricians working in both underground and surface areas, Table 7.4.

TABLE 7.4 MAINTENANCE DEPARTMENT MANPOWER

Description	Day Shift	Back Shift
Foreman	1	
Underground		
Mechanic	6	2
Electrician	2	1
Surface		
Mechanic	3	1
Drill Shop	1	
Total	12	4

In addition, an allowance has been made for labour on day shift for the repair of drill steels and hand held drills, Table 7.4.

7.3 MILL

A total manpower estimate for the 3 shifts per day, 7 days per week mill operation has been estimated as 25 staff and workforce, Table 7.5.

TABLE 7.5 MILL MANPOWER

Description	Shift	Total
Supervision Superintendent	1	1
	1	4
Operators	3	12
Electrician	1	4
Labour	1	4
Total		25

Four crews would be needed to operate the mill round the clock.

7.4 ADMINISTRATION

An accountant would head up the Administration Department which would service the mine, on a largely single shift 5 day per week basis, with respect to warehousing, pay, accounting, secretarial services and security, Table 7.5.

TABLE 6.5 ADMINISTRATION DEPARTMENT STAFF

Description	Number
Accountant	1
Warehouse	2
Pay & Accounts Clerk	2
Purchasing Clerk	1
Secretary	2
Security	4
Total	12

7.5 PRODUCTIVITY

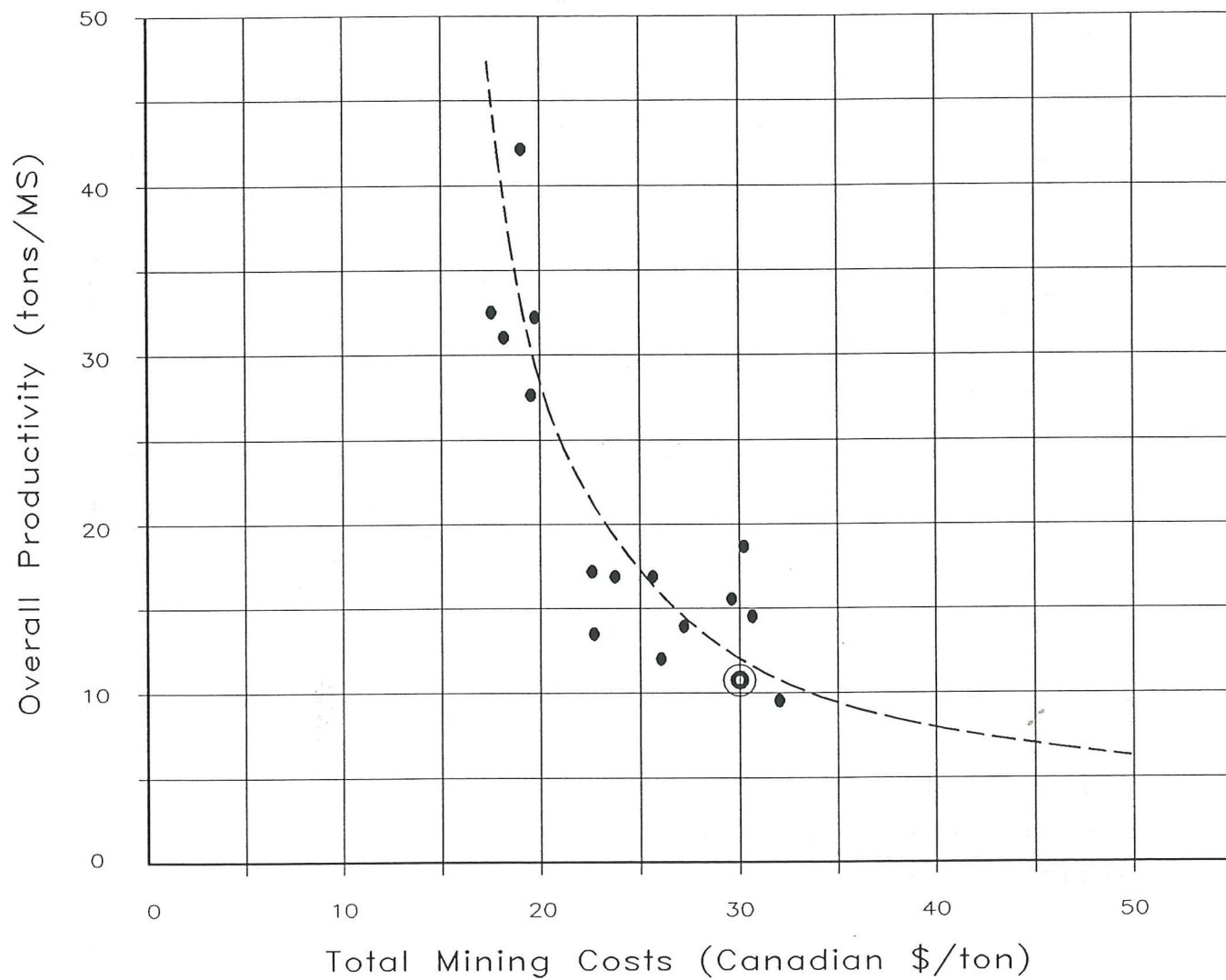
The productivity of the underground mine as conceived in this study is comparable to the productivity achieved in similar mines in both Canada and the United States which extract gold ore bodies by cut and fill mining methods.

The manpower base for the calculation of the productivities achieved for the various activities in underground mines are as follows.

Stoping

Includes all mining and maintenance daily paid workers involved in the core development and stoping activities.

Productivity & Mining Cost Comparison



- ⊙ — ROSEBUD PROJECT
- — Operating Mines

Underground

Incorporates all the mining and maintenance employees working in all the activities underground, supervisors and senior staff in charge of underground mining, and Technical Services staff associated with the underground mine.

Mine

All employees of the mining, milling, smelter and administration departments.

To calculate the various productivities, the daily output, expressed in tons is divided by the total number of employees working each day, as defined above. Thus the cut and fill stoping productivity of the Rosebud mine as currently planned would be 29 tons per manshift, inclusive of backfill operations.

The estimated productivity for the underground mine would be approximately 11.3 tons per manshift which would reduce to 8 tons per manshift if the entire mine workforce are taken into account. Figure 12 shows the range of productivities in several mines in Eastern Canada. A productivity of 11.3 t/ms for a relatively small mine in Canada is considered excellent. It is also interesting to note that a typical mine in Canada would have a mining cost of between \$35-\$40/ton at these productivity levels.

TABLE 7.6 ESTIMATED MINE PRODUCTIVITY FACTORS

Manpower	Number	Productivity tons/manshift
Daily Production tons	1000	
Stoping		
Mining	30	
Maintenance	5	
TOTAL STOPING	35	29
Mining		
Mining	58	
Mine Maintenance	10	
Staff	20	
TOTAL MINE	88	11.3
SITE		
Mining	78	
Maintenance	17	
Mill	25	
Administration	12	
TOTAL SITE	132	8

8.0 PROJECT SCHEDULE

8.1 RATE OF PRODUCTION AND RESOURCE DEVELOPMENT

The ore production rate has been calculated to be 1,000 tons per day (250,000 tons/yr.) coming from a combination of the East, South and North Zones. The mine life production schedule is shown in Table 8.1.

The planned sequence to extract the three zones was based upon both geotechnical and practical considerations and is as such:

- ◆ lower section (Block B) of the south Zone (4550 to 4730 ft) is mined first
- ◆ followed by the North Zone (Block D) and the East Zone (Blocks E1 and #2);
- ◆ and finally, the upper section (Block A) of the South Zone (4800 ft. to 4900 ft.)

8.2 DEVELOPMENT PROGRAM

Initial development would be performed by a contractor, advancing at a rate of 650 ft. per month. The pre-production development schedule for this work is shown in Figure 13. As production stoping is phased in, the contractor would be phased out (Year 2) and ongoing development maintained by operating crews.

The Mine Life Development schedule is shown in Table 8.2 indicating a total of 29,700 feet of development.

8.3 OTHER SCHEDULE

Production and development schedules were also prepared for:

- ◆ 350,000 tpy (1000 tpd @ 7 days/wk) @ 0.10 oz/t cut-off
- ◆ 187,500 tpy (750 tpd @ 5 days/wk) @ 0.15 oz/t cut-off
- ◆ 262,000 tpy (750 tpd @ 7 days/wk) @ 0.15 oz/t cut-off

These schedules were used in subsequent economic analyses and are included in Appendix III.

PROJECT: ROSEBUD

CURRENT DATE: 04/27/92

ROSEBUD - PREPRODUCTION

AS OF DATE: 11/27/91

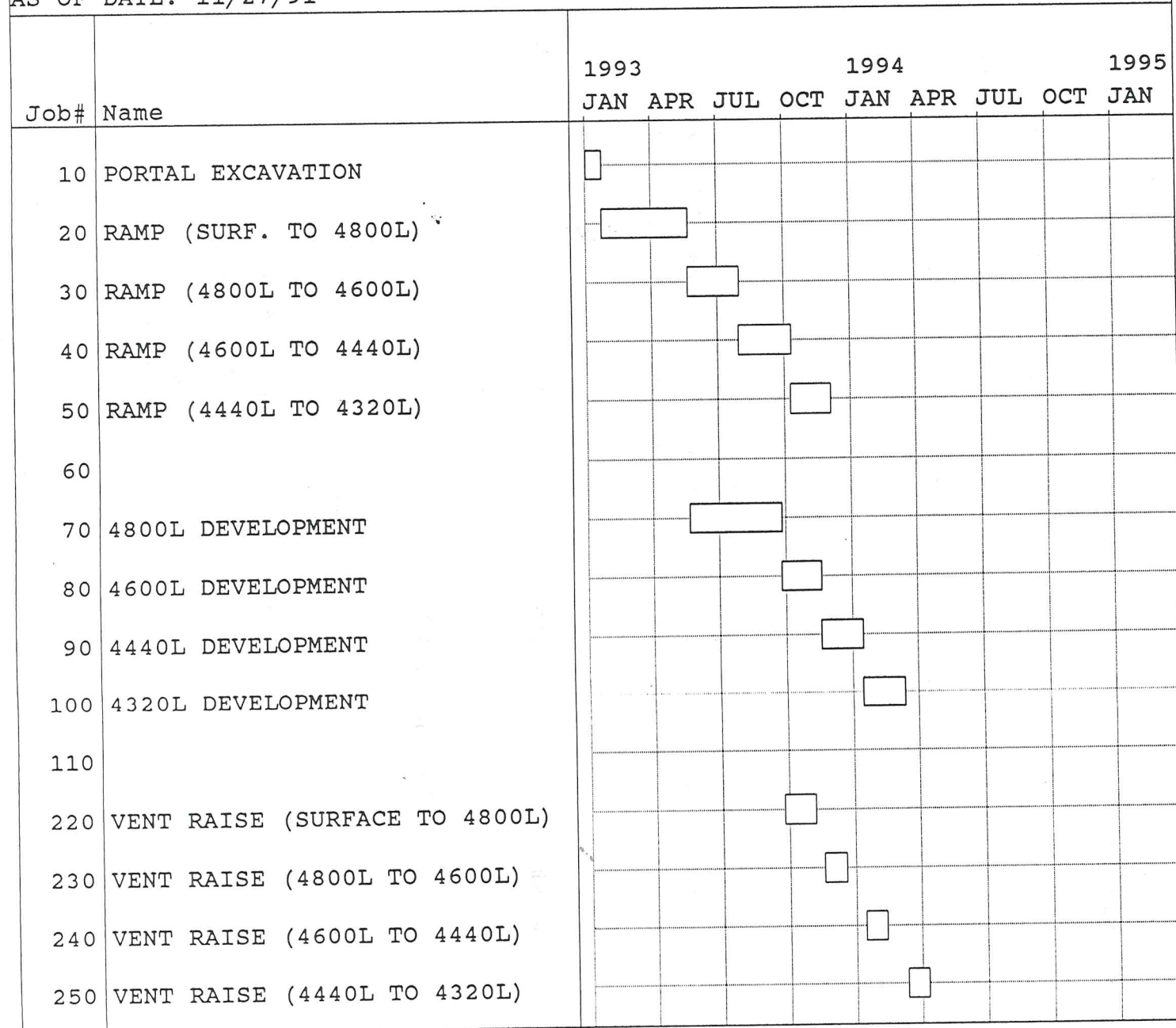


Figure 13

TABLE 8.1

MINE LIFE PRODUCTION SCHEDULE

CUT-OFF GRADE = 0.10 OZ./TON (AU), 1000 TPD, 5 DAYS/WEEK

ZONE		GRADE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	TOTAL
EAST	Tons			125,000	150,000	75,000	50,000	40,000	20,000				460,000
	Au oz.	0.284		35,497	42,597	21,298	14,199	11,359	5,680	0	0	0	130,630
	Ag oz.	2.416		302,026	362,431	181,215	120,810	96,648	48,324	0	0	0	1,111,455
SOUTH	Tons			75,000	100,000	175,000	200,000	175,000	125,000	65,000	34,500		949,500
	Au oz.	0.212		15,870	21,160	37,031	42,321	37,031	26,450	13,754	7,300	0	200,917
	Ag oz.	2.401		180,053	240,071	420,124	480,142	420,124	300,089	156,046	82,824	0	2,279,473
NORTH (C & D)	Tons					0	0	35,000	60,000	60,000	38,500		193,500
	Au oz.	0.158		0	0	0	0	5,525	9,472	9,472	6,078	0	30,547
	Ag oz.	5.265		0	0	0	0	184,275	315,900	315,900	202,703	0	1,018,779
TOTAL	Tons		0	200,000	250,000	250,000	250,000	250,000	205,000	125,000	73,000	0	1,603,000
	Au oz.	0.226	0	51,368	63,757	58,329	56,520	53,915	41,602	23,226	13,378	0	362,094
	Ag oz.	2.751	0	482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	0	4,409,707

TABLE 8.2

MINE LIFE PRODUCTION SCHEDULE

CUT-OFF GRADE = 0.10 OZ/TON (AU), 1000 TPD, 5 DAYS/WEEK

[illegible]

9.0 OPERATING AND CAPITAL COSTS

9.1 OPERATING COSTS

The mine operating costs prepared by BEA have been generated from basic principles using a sophisticated spreadsheet program developed by BEA inhouse. This program inputs labour rates and material costs together with the equipment to be used and the performance of the different types of equipment and expected labour productivities and generates operating costs from basic principles. A summary of the operating costs for Rosebud is presented below. (Table 8.1) A complete breakdown of the operating costs is provided in Appendix IV.

Rosebud Mine Operating Cost Assumptions

1. \$500,000/yr allocated for diamond drilling.
2. Materials/supplies and labour rates based on prices at Bullfrog Mine.
3. 5% absenteeism included in manpower.
4. Last year of mining (year 10) lasts only half a year, i.e. 40,000 tons mined in first 6 months of year 10.
5. No equipment replacement capital included, but \$100,000/yr for ongoing spare parts included.
6. \$1.00/ton to handle surface waste included, some waste assumed to be placed in stopes underground.
7. \$30,000/yr for backfill boreholes included.

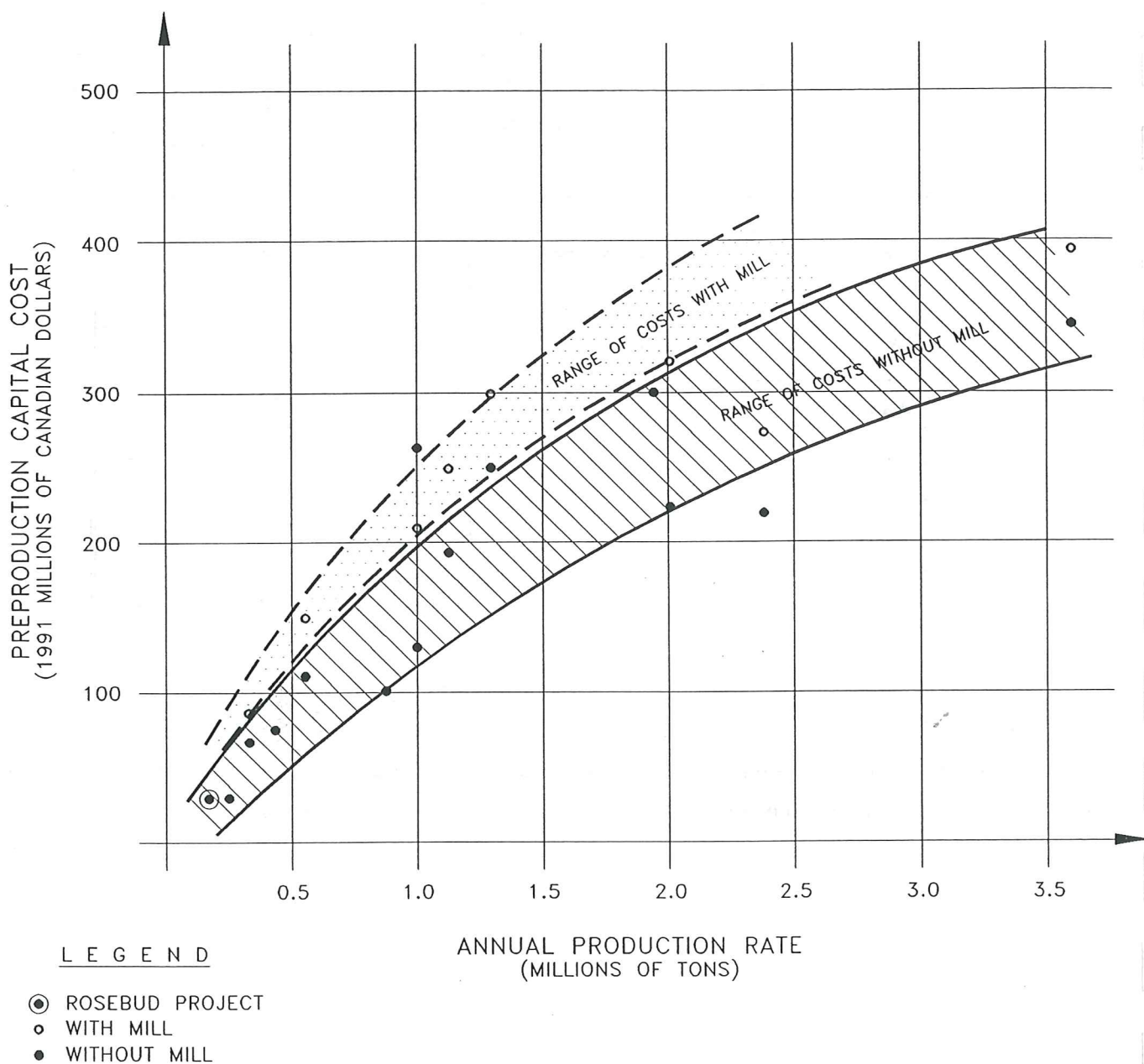
TABLE 9.1
MINE OPERATING COST SUMMARY

Item	Pre-Production	Production	
	Cost	Cost	Cost/Ton
General Mine Expenses	\$5,441,000	\$29,409,000	\$16.80
Direct Mining Costs	\$8,203,000	\$33,001,000	\$18.86
Total	\$13,644,000	\$62,410,000	\$35.66

Item	Pre-Production	Production	
	Cost	Cost	Cost/Ton
Labour	\$6,539,000	\$26,596,000	\$15.20
Materials	\$2,780,000	\$7,464,000	\$4.27
Equipment	\$1,550,000	\$11,886,000	\$6.79
Other Charges	\$2,775,000	\$16,464,000	\$9.40
Total	\$13,644,000	\$62,410,000	\$35.66

It should be noted that the labour rates and material costs used in Rosebud have been obtained from Lac's Bullfrog Mine and are therefore consistent with current practices in Nevada at a similar Lac operation. Although the mine operating costs for Rosebud were calculated independently, they are similar to current operating costs at Bullfrog's underground mine (\$38.16/ton).

APPROXIMATE COMPARISON OF PREPRODUCTION CAPITAL COSTS
VS. ANNUAL PRODUCTION RATES AT SELECTED UNDERGROUND HARDROCK MINES



The total site costs include milling, administration and tailings disposal and are summarized below:

	Cost/t
Mining	\$35.66
Mill	\$13.50
Tailings	\$0.40
Administration	\$1.80
TOTAL	\$51.36

9.2 CAPITAL COSTS

The total capital costs include mining equipment and related stationary equipment and surface and underground infrastructure. A breakdown is provided below. Table 9.2 provides the total capital for the mine including mine development and mining equipment and also includes the mill, surface infrastructure, tailings dam and related capital costs. The costs have been divided into pre-production and during minelife. A complete breakdown is shown in Appendix IV.

9.3 COMPARISON OF ROSEBUD COSTS WITH OTHER OPERATIONS

Figure 12 and Figure 14 are graphs showing the relationship between operating costs and productivities and between production rate and pre-production capital required. The information used to generate these graphs is based on cost data base within BEA from several mines primarily in Eastern Canada. The results indicate that the capital and operating costs and the productivities generated at Rosebud are generally consistent with typical underground mines in Eastern Canada, particularly when the exchange rate is taken into consideration.

TABLE 9.2
CAPITAL COSTS

	Pre-Production Capital Cost \$000's	Total Life \$000'S
Development	5,084	8,171
Mining Equipment	7,218	7,218
Plant (Mill)	9,500	9,500
Tailings Dam	2,500	2,500
Infrastructure and Surface Equipment	2,958	2,958
Diamond Drilling	1,000	1,000
Environmental and Permitting	500	500
EPCM 10%	3,100	3,100
Closure	-	500
TOTAL	\$31,860	\$35,447

10.0 ECONOMIC ANALYSES

Several economic analyses have been carried out using production rates of 1,000 tpd and 750 tpd at cut-off grades of 0.10 oz/t and 0.15 oz/t and assuming a mine operation of 5 days, 2 shifts per day and 7 days, 3 shifts per day. An initial review of the different alternatives indicate that the two realistic scenarios are as follows:

1. A production rate of 750 tpd at a 0.15 oz/t cut-off. A higher daily production rate cannot be sustained from Rosebud at this cut-off grade because the total mineable reserves are approx. 1.3 million tons.
2. A production rate of 1,000 tpd at a 0.10 oz/t cut-off. This rate can only be sustained at the lower cut-off because the reserves have now increased to approx. 1.6 million tons.

In both cases a 7 day and a 5 day mining option were evaluated. This permits the annual production rate to be increased substantially. BEA feels that a 5 day, 2 shift per day option for mining with the mill operating on a 7 day per week basis is the most realistic and practicable. This permits backfilling and mucking and services to be carried out during the graveyard shift and weekends for the mine and ensures that the extraction rate from the relatively small reserve can be sustained.

The economic analyses for the different cases are shown in Table 10.1. All options are in constant 1992 U.S. dollars at \$360/oz gold and \$4/oz silver. A 10% discount rate was used. The backup spreadsheets for all the options are presented in Appendix V.

The options shown on Table 10.1 do not include depreciation or taxes.

TABLE 10.1

ECONOMIC ANALYSES - BASE CASE						
Option	Production Rate		Cut-Off (oz/t)	NPV (millions \$)	IRR %	Comments
	Daily	Annual				
1	1,000	250,000	0.10	0.77	11	-
2	1,000	350,000	0.10	2.78	15	Production rate high at current mineable reserves
3	750	187,500	0.15	0.70	11	-
4	750	262,000	0.15	2.83	14	Production rate high at current mineable reserves
A. Capital and operating costs same in all above base case scenarios. B. Mine runs at 5 days, 2 shifts or 7 days, 3 shifts						
MODIFICATIONS TO BASE CASE (CHANGES IN CAPITAL & OPERATING COSTS)						
Option	Production Rate		Cut-off oz/t	NPV Millions \$	IRR %	Comments
	Daily	Annual				
5	750	187,500	0.15	2.6	13	Capital reduced to reflect lower tonnage
6	750	187,500	0.15	(1.13)	8	As above, but operating costs increased by 10%
7	750	262,000	0.15	4.33	17	Capital reduced to reflect lower tonnage, operating costs as in base case.
8	750	262,000	0.15	0.25	10	Capital reduced as above & operating costs increased 10%
IMPACT OF GOLD PRICE ON OPTIONS 7 & 8						
9	750	187,000	0.15	(3.42)	5	Gold price reduced by 10%, capital reduced, operating costs constant
10	750	187,000	0.15	8.65	21	As above, but with gold increased to 10% above base case.
11	750	262,000	0.15	(2.23)	6	Same as Option 9
12	750	262,000	0.15	10.90	27	Same as Option 10

SENSITIVITIES ON 1000 TPD (250,000 tpy) OPTION @ 0.10 oz/t CUT-OFF GRADE						
13	1000	250,000	0.10	7.7	21	Grade increased by 10%
14	1000	250,000	0.10	(6.2)	0	Grade decreased by 10%
15	1000	250,000	0.10	6.7	17	Ore reserves increased by 600,000 tons
16	1000	250,000	0.10	10.2	19	Ore reserves increased by 1.1 million tons
SENSITIVITIES ON 750 tpd (187,500 tpy) @ 0.15 oz/ton CUT-OFF						
17	750	187,500	0.15	6.7	18	Grade increased by 10%
18	750	187,500	0.15	(5.3)	3	Grade decreased by 10%
19	750	187,500	0.15	8.3	18	Ore reserves increased by 300,000 tons
20	750	187,500	0.15	12.9	20	Ore reserves increased by 900,000 tons
SENSITIVITIES TO GOLD PRICE						
21	1000	250,000	0.10	7.7	21	Gold price increased 10%
22	1000	250,000	0.10	(6.2)	0	Gold price decreased 10%
23	750	187,500	0.15	6.7	18	Gold price increased 10%
24	750	187,500	0.15	(5.3)	3	Gold price decreased 10%

The following comments are made to put this table into perspective:

1. Within the base case, the two most attractive options are 1,000 tpd at 7 days per week or 750 tpd at 7 days per week at cut-offs of 0.10 and 0.15 oz/t respectively. The options of operating on 5 days per week basis with both the 750 tpd and 1,000 tpd alternatives at the different cut-off grades are marginal.

It should be noted that at current mineable ore reserves, a production rate based on mining at 7 days/week (350,000 tpy) is not considered realistic and sustainable.
2. It is interesting to note that the established cut-off grade in Section 4.0 of the report of 0.10 oz/t is confirmed by the economic evaluations and is, therefore, a valid cut-off grade.
3. Alternatives examined included modifying the 750 tpd option by reducing the capital slightly (to reflect the lower production rate) and increasing the operating costs by approximately 10%. It is obvious that small changes to the operating cost make these alternatives marginal.
4. Sensitivities to gold price at +/- 10% from the base (\$360/oz) are shown in Options 9 - 12 and again indicate that a 10% drop in gold price would make these alternatives uneconomic.
5. The project does not seem to be sensitive to the cut-off grade because the ore reserves do not change dramatically when cut-off grades are adjusted. The three most sensitive areas for this project are the total reserve (relatively small to justify the capital

expenditure), the metal price and the mineable grade.

6. Sensitivities to changes in grade and ore reserves are shown on options 13 through to 20 for production rates of 1000 tpd and 750 tpd at cut-off grades of 0.10 and 0.15 oz./ton, respectively. Project economics are significantly enhanced by increasing the ore reserves by between 300,000 to 600,000 tons and improve dramatically when the ore reserves are increased by an additional one million tons at the current mineable grades.

Grade changes also affect the NPV and can change it from \$7 million cost surplus to a cash deficiency of over \$6 million.

The above discussion indicates that the Rosebud project does appear to have potential but requires increased ore reserves and/or higher mineable grades. Lac geologists have a high degree of confidence in the estimated mineable grade, which may be somewhat conservative because of the dilution used. Opportunities may exist to further enhance the grade as mining progresses. Both the capital and operating costs have been estimated from basic principles and are considered reliable and accurate to a narrower range than the $\pm 25\%$ level generally used for prefeasibility studies.

In order to obtain an acceptable rate of return of about 18%, the follow-up and program for Rosebud should focus on:

- A production rate of 1000 tpd and 250,000 tpy at a 0.10 oz./t cut-off.
- A mineable reserve base of between 2-3 million tons (an increase of about one million tons over the current mineable reserves).
- The price of gold being maintained at least in the \$350 to \$360/oz. range or higher and preferably being in the \$400/oz range.



11.0 LIST OF DOCUMENTS REVIEWED

A list of documents reviewed and reported in this summary is given below in chronological order.

1. Rosebud Exploration Project. Internal Company Memorandum from John F. Cook, Lac Minerals to Peter Allen, Lac Minerals. September 7, 1990
2. Rosebud Project 1991 Resource Calculations. Tim Kuhl, Lac Minerals (USA) Inc. January 3, 1991.
3. Rosebud Project - Preliminary Rock Mechanics Assessments. Dennis C. Martin, Piteau Associates Engineering Limited. February 15, 1991.
4. Meeting Rosebud with Beacon Hill. Memorandum to File. Hans de Ruiter, Lac Minerals. March 8, 1991.
5. Reserve Audit & Conceptual Mine Plan - Rosebud Property, Dozer Hill Deposit, Pershing County, Nevada. Beacon Hill Consultants Limited. March 1991.
6. 1990 Annual Progress Report, Rosebud Project, Pershing County, Nevada. N.H. Brewer, Lac Minerals (USA) Inc. March 1991.
7. Rosebud Project - Metallurgical Review. Internal Company Memorandum from George Hope, Lac Minerals to Bob Thomas and Tim Kuhl, Lac Minerals (USA) Inc. June 12, 1991.
8. Comments: Hydrologic Study, Rosebud. Internal Company Memorandum from W. Quesnel, Lac Minerals to Tim Kuhl, Lac Minerals (USA) Inc. September 1991
9. Cost Recovery Money Models for Rosebud Decline. Internal Company Memorandum from Tim Kuhl, Lac Minerals (USA) Inc. to Craig Nelsen, Lac Minerals. December 4, 1991.
10. Rosebud Evaluation High Grade Case. Internal Company Memorandum from Hans de Ruiter, Lac Minerals to Craig Nelsen, Lac Minerals. January 17, 1992.
11. Rosebud - Preliminary Geotechnical Evaluation of Diamond Drill Core. Internal Company Memorandum from W. Quesnel, Lac Minerals to Bob Thomas, Lac Minerals. February 25, 1992.
12. Plan of Operations for Underground Exploration Activities, Rosebud Project, Pershing County, Nevada. Debra W. Struhsacker, Consultant. March 1992.



APPENDIX I

**ROSEBUD STUDY
LAC MINERALS
PREFEASIBILITY DOCUMENTATION SUMMARY**

The Rosebud property, located some 40 miles north of Lovelock, Pershing County, Nevada, comprises an 8,400 acre claim block covering numerous volcanic hosted epithermal gold-silver prospects, and is jointly owned by Lac Minerals (USA), Inc and Equinox Resources Limited. Surface drilling of the Dozer Hill area has outlined a mineralized zone (generally tabular in nature), over a strike length of approximately 2,000 feet, with an average width of 300 feet and mean thickness of 40 feet.. Gold mineralisation has also been intersected in other parts of the property.

Various reports and memorandum concerning the Rosebud property have been reviewed and are summarised herewith.

SUMMARY

Resource

The resource, classified as probable and possible reserves, is estimated as:

1,400,000 tonnes at a grade of 0.25 oz Au per ton.

Mining

The deposit is suitable for extraction by drift and fill underground mining methods. Access by decline is likely, given the shallow depth.

Mineral Processing

Run-of-mine ore would be amenable to cyanidation with recoveries of 95 % indicated at a cyanidation consumption less than 0.5 lb/t.

Environment & Infrastructure

The property lies more than 5 000 feet above sea level in scrubby vegetation, situated relatively close to Lovelock, (1.5 hours by gravel road), and the main Western Pacific rail line. Another mine, Hicroft, lies about 10 miles to the north which is supplied with power. Water requirements are likely to be met from underground sources.

The issue of environmental permits should proceed in a straightforward manner.

Project Schedule

Production Scenario

Rates of production considered to date range from 250,000 tpa to 500,00 tpa, giving rise to a mine life ranging from 6 to 3 years.

Estimated Capital & Operating Costs

Rate of Production		Operating Costs		Capital Cost			Total		DCF	
tpa	oz/annum	\$/t	\$/oz	\$/t	\$/oz	\$	\$/t	\$/oz	IRR %	P/Back
										years
250,000	59,375	55.00	232.00	20.00	80.00	30,000,000	70.00	312.00	20	3.3
500,000	118,750	47.00	198.00	15.00	63.00	45,000,000	63.00	261.00	45	2.0

Exploitation Philosophy

Provided a resource of 1.5 million tonnes at a grade of 0.25 oz/t exists the project should be exploited.

Future Action

Continue with exploration.

Study north side of the South Equinox area.

Check power supply to Hicroft mine.

Start an hydrological scoping study.

Carry out heterogeneity tests on samples to determine cutting policy.

Keep Pershing County informed of progress.

A properly designed verification and validation program is critical to the ability to upgrade the reserves.

GEOTECHNICAL ASPECTS

The geotechnical database should be expanded and a detailed rock mechanics assessment should be conducted during the feasibility and detailed design studies. Detailed assessments of rock cores or rock testing were not conducted for the Piteau report.

Rock Mass Characteristics

The orebodies occur primarily within a sequence of Miocene volcanic and pyroclastic rocks (Lower Bud Tuff), which have variable strength, degree of alteration and fracturing. Alteration by silicification and by bleaching and argillification have both strengthened and weakened respectively, the rock mass. A thrust fault, the South Ridge Fault, shallow dipping, defines the bottom of the Lower Bud Tuff. The South Ridge Fault is characterised by a zone of intensely sheared and altered rock of low quality, ranging in thickness from 2 feet to 30 feet. The Dozer Tuff zone, generally less altered and more competent than the Lower Bud Tuff sequence rocks, lies below the fault. The Bud Tuff overlies the Lower Bud Tuff, and like the Dozer Tuff, is more competent than the Lower Bud Tuff.

Rock mass quality varies throughout the deposit, Table 1.

Table 1 Rock Mass Quality, Rosebud Property

Geological Sequence		Rock Mass Quality
Bud Tuff		Good to Very Good
Lower Bud Tuff		
	Upper Section	Good to Fair
	Lower Section	Section 00
		Poor to Very Poor
		Sections 600 to 1600
		Fair to Good (some poor zones)
		Poor within 50 feet to 75 feet of fault
Dozer Tuff		Fair to Good

There appears to be no clear relationship between the ore zones and rock mass quality.

The water table lies 200 feet below surface. Otherwise groundwater conditions within the rock mass or along faults are unknown.

In Situ Stresses

The Piteau report offers no comments with respect to in situ stress levels or direction.

Engineering Design

Piteau report suggests working spans based upon use of the NGI classification system, Table 2.

Table 2 Excavation Spans, Temporary Mine Openings, (NGI Classification)

Rock Mass Quality	Unsupported Span (m)	Rock Bolts, Mesh & Shotcrete
Excellent		
Unaltered	12.0 to 14.0	24.0
Good		
Unaltered	12.0	8.0 to 10
Altered	4.0 to 6.0	21.0 to 24.0
Fair		
Unaltered	5.0 to 7.5	6.0 to 8.0
Altered	2.4 to 2.7	9.0 to 12.0
Poor		
Altered	1.5 to 1.8	6.0
Very Poor		
Altered	1.5	3.0

The span of permanent mine openings would be about one half the width estimated for temporary excavations.

No structural information is available within the mine area.

Piteau suggests a variety of stoping methods:

- room & pillar;
- longitudinal stopes; and
- drift & fill.

Owing to limited availability of data little mining design is offered. However, Piteau suggests a field and laboratory programme to enable mine planning work to be carried out in relation to a geotechnical assessment.

A recent appraisal by Lac Minerals (Kirkland Lake) indicates that, in general, the ground is very poor with an average fracture count of up to 2 per foot, and as high as 4 fractures per foot in heavily altered zones. Consequently, it is estimated that dilution from bulk from mining methods would range from 10 % to 30 %, and controlled blasting and extensive pre-support measures would be required.

Thus, selective mining methods, such as longitudinal and panel cut and fill would be demanded for most of the orebodies. Given extensive ground support, dilution might average 15 %.

The degree of rock mass alteration suggests that ingress of groundwater could adversely affect ground conditions.

GEOLOGY, & RESERVES

Gold concentrations occur at the nearby Dreamland and the Hycroft properties, in large, irregular, very non-homogeneous areas of gold mineralisation, each comprising several tens of millions of tons with gold content averaging from 0.01 oz Au/t to 0.03 oz Au/t. Higher grade pods exist within these areas with resources ranging from a few thousand tons to a few million tons with gold grades from 0.1 oz Au/t to 0.4 oz Au/t, similar to the Aurora, Rawhide, Borealis and Bodie deposits.

The geological reserve is considered accurate and reasonable within the constraints of the existing data, but insufficient for carrying out a definitive feasibility study. Important questions remain concerning the viability of samples and the impact of sampling procedures and analytical errors.

The resource estimate (BCH), classified as probable minable reserves, is estimated as:

1,146,000 tonnes at a grade of 0.24 oz Au per ton.

Estimated gold content of this resource is approximately, 275,000 ounces. A cut off of grade of 0.12 oz Au per ton applies to these probable minable reserves, with all grades above 1.00 oz Au per ton cut to 1.00 oz Au per ton.

A properly designed verification and validation program is critical to the ability to upgrade the reserves.

Beacon Hill Consultants Estimated Probable Mining Reserves, March 1991

Zone	Geological		Dilution		Production		Total
	tonnes	oz	tonnes	Au	tonnes	Au	Au oz
		Au/tonne		oz/tonne		oz/tonne	
A	213120	0.197	42700	0.032	255820	0.169	43351
B	280022	0.437	38700	0.023	318722	0.387	123260
C	63087	0.270	13300	0.041	76387	0.230	17579
D	132971	0.205	15200	0.089	148171	0.193	28612
E	308534	0.198	38400	0.025	346934	0.179	62050

TOTAL	997734	0.270	148300	0.034	1146034	0.240	274851
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The reserve also includes silver at a grade of 2.00 oz Ag per ton. A mining dilution equivalent to 15 % of the in situ minable tonnage was assumed in consideration of the mining method, and stope height and width.

Drilling programme suggested by BHC would involve two phases to upgrade reserves to probable category based upon 100 feet centres (41,500 feet RC & 4,900 feet d/drill) and subsequently to a proven category related to 50 feet centres drill sections (15,300 feet RC & 38,900 feet d/drill). There is good potential for expanding the reserves at Dozer Hill.

Potential resources within the Rosebud property are estimated to range from the current reserve of 275,000 ounces of gold to 1,500,000 ounces of gold.

Table 1. Potential Resources, Rosebud Project

Category	Total Oz	Probability %	Source
Current Reserve	275,000	90-95	BHC (Uneconomic)
High Probability Reserve	500,000	70-80	BHC
Good Probability Reserve	1,500,000	30-40	Consensus Estimate

Lac Minerals (USA) Inc have estimated geological reserves, by the method of sections utilising grade cut offs of 0.02 oz Au per ton and 0.05 oz per ton (nominal open pit cut offs), Table 2.

Table 2 Estimated Geological Resources, Lac Minerals (USA) Inc

Reserves Category	Tons	Grade oz Au per ton	Gold Ounces
Cut Off 0.02 oz Au per ton			
Probable	4,088,017	0.105	429,631
Possible	1,102,786	0.133	146,563
Totals	5,190,803	0.111	576,194
Cut Off 0.05 oz Au per ton			
Probable	1,591,720	0.210	333,942
Possible	676,659	0.194	131,250
Totals	2,268,379	0.206	465,192

The resources estimated by Lac Minerals (USA), Inc, are located both on jointly owned ground, 55 %, (Lac Minerals & Equinox), and 45 % on claims owned solely by Lac Minerals (USA), Inc.

An undiluted reserve estimate using a higher cut off grade, for extraction by underground methods, gives rise to a resource of:

1,245,350 tons at 0.248 oz Au per ton and a silver grade of 3.20 oz per ton.

The resource is still open in a several areas where encouraging intercepts have been made. For example:

170 feet at 0.559 oz Au per ton; and
45 feet at 0.202 oz Au per ton.

The most recent calculations of the Rosebud resource (January 3, 1992) indicate an in situ geological resource of approximately 2 million tons at grades of 0.25 oz Au per ton and 2.92 oz Ag per ton.

Exploration Programme

The proposed exploration programme would develop a 2,300 feet long ramp and 2 drifts a total length of 2,500 feet. Drilling would be carried out underground, producing some 60,000 feet of core, from 200 feet sections directed through the ramp and drifts.

Development would produce approximately 135,000 tons of waste rock and up to 15,000 tons of ore from selected bulk sample locations in the underground workings.

The proposed underground exploration program is critical to the viability of the project and is necessary to obtain the following data:

1. geological data;
2. evaluation of mining methods;
3. hydrogeological and dewatering requirements; and
4. metallurgical characteristics of the ore.

An estimate of the tonnage of ore required to recover the costs of the exploration program indicate that 25,000 to 45,000 tons of 1.0 oz Au per ton would be needed, shipped either to Pinson or Bullfrog respectively for treatment. Such material is available in either the 159 or East zones.

MINING

The drift & fill mining method has been selected as the most appropriate technique given the assessment of rock quality and the configuration of the orebody. Drift & Fill is highly selective and provides the most effective ground support for the stopes with widths of 13 feet.

Mechanized mining has been assumed with electro-hydraulic jumbos (2), diesel powered LHDs (2), haulage trucks (1), Slingerbelt fill truck (1) and various service vehicles.

General mine layout incorporates both a ramp for haulage and a shaft for hoisting once the truck haulage becomes uneconomic.

A production level of 500 tons per day would need 4 or 5 active faces. Manpower estimated for the 3 shifts per day underground operation by Beacon Hill Consultants is 88, which compares with the Lac Minerals estimate of 63 for a 2 shifts per day setup, (Hans De Ruiter). Fill material demanded for use with the Slingerbelt truck would be minus 2 inches crushed rock with 5 % cement content.

Preproduction development of 4,000 feet of drifts and 800 feet of cross cuts. Mining would commence in two high grade zones, A & B.

Two production scenarios have been evaluated.

Department	Scenario 1	Scenario 2	Shift System
Mining	700 tpd	1,400 tpd	2 shifts per day 5 days per week
Milling	500 tpd	1,000 tpd	3 shifts per day 7 days per week

The viability of the Rosebud project will be dependent upon:

1. control of dilution to maintain ore grade;
2. choice of selective mining methods to cater for changes in width of orebody; and
3. installation of appropriate ground support coupled with a well engineered mine extraction sequence to manage very poor to fair ground conditions.

MILLING

Limited metallurgical testwork indicates that gold can be successfully extracted with a Carbon-in-Leach plant with gravity separation. Metallurgical recovery is expected to range between 85 % and 90 %.

Tailings disposal would take place southwest of the plant and mine portal with storage of 3 million tons, (related to a mill throughput of 350,000 tons per year), demanding an area of 1,530 acre-feet, incorporating a 3 pond configuration.

George Hope reported that initial tests indicated that the ore was very amenable to cyanidation with good recovery and low cyanide consumption. Subsequent, work pointed towards leaching problems, possibly brought about, in part, by the presence of gold encapsulated in sulphides. Antimony may also create difficulties with recovery of gold. Hope established a test program requiring:

- scoping leach tests on available ore sections;
- 2 additional leach tests; and
- process optimisation encompassing gravity concentration and leaching.

A SAG mill would be needed for the 1,000 tons per day milling operation.

Water requirements are gauged to be 200 gpm.

Manpower for the mill is estimated as:

- 18 hourly paid;
- 12 maintenance crew; and
- 8 supervisors.

INFRASTRUCTURE & ENVIRONMENT

Hallam Knight Piesold Limited have reviewed environmental work done to date and have made the following comments and recommendations.

1. Project permitting should be approached on the basis of a full Environmental Impact Statement (EIS).
2. A single comprehensive EIS document covering both federal and state requirements should be prepared.
3. Baseline studies should be expanded to include the installation of on-site meteorological and hydrological monitoring facilities.
4. Environmental work done to date has omitted a contingency for fatal flaws involving cultural resources, endangered species and the potential for acid generating waste.
5. The estimated costs for environmental work are fair. The upper limit of the estimate should be used for feasibility studies.

The property lies more than 5 000 feet above sea level in scrubby vegetation, situated relatively close to Lovelock, (1.5 hours by gravel road), and the main Western Pacific rail line. Another mine, Hicroft, lies about 10 miles to the north which is supplied with power. Water requirements are likely to be met from underground sources.

A "Plan of Operations for Underground Exploration Activities" has been submitted by Lac Minerals (USA), Inc to the US Department of Interior, Bureau of Land Management, Winnemucca, Nevada. The Plan describes the proposed underground exploration activities, reclamation for the proposed project, planned environmental controls, and environmental baseline data collected to date for the project area.

CAPITAL & OPERATING COSTS

Operating costs have been estimated from \$70 per ton to \$57 per ton for the 500 tpd option and the 1,000 tpd option respectively.

Similarly, capital costs range from \$27.2 million to \$35.2 million for the 500 tpd option and the 1,000 tpd option respectively.

Labour rates have been based upon the nearby Gooseberry mine and include 38 % overheads.

DISCOUNTED CASH FLOW

BHC alternative cases for evaluation were based upon:

gold price of \$375 per oz; and
metallurgical recovery of 89 %.

The project is:

most sensitive to grade and gold price;
less sensitive to operating costs; and
least sensitive to capital expenditure.

1. The 500 tpd option is uneconomic, and to be viable requires a:

10 % increase in grade;
10 % reduction in capital expenditure; and
20 % decrease in operating costs.

2. The 1,000 tpd option is economic, but is based upon a doubling of the reserves.

The value of the property has been assessed by two methods which indicate a range of \$6 million to \$10 million. The market value method (accurate to +/- 25 %), assumes gold at \$10 per oz of gold and land at \$500 per acre.

A recent evaluation (January 17, 1992, Hans De Ruiter), using an uncut high grade (0.31 oz Au per ton) and assuming a metallurgical recovery of 92 % indicates a significant improvement in the financial return of the project, given the 50 % increase in grade (cut grade of 0.226 oz Au per ton), at a gold price of \$350 per oz and a 15 % discount rate.

High Grade: 26 % IRR & \$7 million NPV

Cut Grade: (4 %) IRR & (\$13 million) NPV

LIST OF DOCUMENTS REVIEWED

A list of the documents reviewed and reported in this summary is given below in chronological order.

1. Rosebud Exploration Project. Internal Company Memorandum from John F Cook, Lac Minerals, to Peter Allen, Lac Minerals. September 7, 1990.
2. Rosebud Project 1991 Resource Calculations. Tim Kuhl, Lac Minerals (USA) Inc. January 3, 1991.
3. Rosebud Project - Preliminary Rock Mechanics Assessments. Dennis C Martin, Piteau Associates Engineering Limited. February 15, 1991.
4. Meeting Rosebud with Beacon Hill. Memorandum to File. Hans de Ruiter, Lac Minerals. March 8, 1991.
5. Reserve Audit & Conceptual Mine Plan - Rosebud Property, Dozer Hill Deposit, Pershing County, Nevada. Beacon Hill Consultants Limited. March 1991.
6. 1990 Annual Progress Report, Rosbud Project, Pershing County, Nevada. N H Brewer, Lac Minerals (USA), Inc. March 1991.
7. Rosebud Project - Metallurgical Review. Internal Company Memorandum from George Hope, Lac Minerals, to Bob Thomas & Tim Kuhl, Lac Minerals (USA) Inc. June 12, 1991.
8. Comments: Hydrologic Study, Rosebud. Internal Company Memorandum from W Quesnel, Lac Minerals, to Tim Kuhl, Lac Minerals (USA) Inc. September 1991.
9. Cost Recovery Money Models for Rosebud Decline. Internal Company Memorandum from Tim Kuhl, Lac Minerals (USA) Inc to Craig Nelsen, Lac Minerals. December 4, 1991.
10. Rosebud Evaluation High Grade Case. Internal Company Memorandum from Hans de Ruiter, Lac Minerals to Craig Nelsen, Lac Minerals. January 17, 1992.

11. Rosebud - Preliminary Geotechnical Evaluation of Diamond Drill Core. Internal Company Memorandum from W Quesnel, Lac Minerals to Bob Thomas, Lac Minerals. February 25, 1992.
12. Plan of Operations for Underground Exploration Activities, Rosebud Project, Pershing County, Nevada. Debra W Struhsacker, Consultant. March 1992.

APPENDIX II

GEOTECHNICAL DATA

HYDROLOGY

The hydrogeological characteristics of the project area have been examined by Hydro-Geo Consultants of Lakewood, Colorado. Three monitoring wells and one borehole (RL-24F) were field-tested for permeability. Falling head and pumping tests were performed on the designated holes. The findings of Hydro-Geo Consultants may be summarized as follows:

- ◆ Local groundwater levels vary across the project area from approximately 50 ft. below the ground surface in the axis of drainage to 250 ft. below the ground surface on the hillsides.
- ◆ Groundwater is present in the volcanic breccia and tuff rocks which form the ore deposits and in the hangingwall of the project area.
- ◆ Recharge to the water table originates primarily from direct infiltration from precipitation. The Rosebud Canyon is the main source of recharge.
- ◆ The prevalent permeability and porosity of the ground are of secondary (fracture) character. The directional permeability is affected by northeast - southwest orientated, sub-vertical faults.
- ◆ Significant quantities of groundwater inflow are possible during phases of mine development in vicinity of the South Ridge Fault.
- ◆ Typical ground water chemistry sampled from the site exceeds the State and Federal drinking water standards.
- ◆ The pre-mining water table is at 4950 ft. elevation in the vicinity of the proposed decline portal. During the decline development, groundwater in the general area can be expected to flow toward the decline from the northeast. The majority of inflow will be associated with faulting.
- ◆ It is anticipated that maximum inflow into the decline will not exceed 300 gpm at any time during mining.
- ◆ Increased inflows are expected between 1700 ft. and 2600 ft. elevations where the proposed decline crosses a number of faults in the Dozer Tuff and Lower Bud Tuff.
- ◆ High inflows are anticipated when intersecting the South Ridge Fault at 2000 ft. to 2100 ft. elevation, and at 3300 ft. to 3400 ft. elevation where fracture zones are present.
- ◆ The total mine inflow, including active drainage, inflow into the decline, development drifts and ramps, was estimated in a range of 100 to 500 gpm.
- ◆ Mine dewatering must be ongoing through all the active phases of mine development and mining. Eight to twelve months of active drainage is anticipated prior to any ore recovery to reduce the residual water content in the drained stratas.

- ◆ A complete drainage of the orebody hangingwall is not possible using drainholes drilled off the proposed decline. A second dewatering system of vertical wells drilled from the surface may be required. The efficiency of the drainage program will be dependent on the clay content and type of clay present within the orebody. A high content of montmorillonitic clay would hamper the drainage effort.
- ◆ Two additional test boreholes were recommended to further evaluate potential high inflow areas in the South Zone and Far East Ore Zone.

MINING HISTORY

The Rosebud/Dozer Hill area has been previously mined in adjacent near surface workings. The Dreamland mine is located approximately one mile north west of Rosebud. A recent description of the workings by Golder Associates is as follows:

Dreamland Mine is located several thousand feet west of the surface exploration at Rosebud. It consists of extensive shallow workings developed in sericitic and argillically altered Chocolate unit, which is considered to have similar mechanical characteristics to moderately clay-altered LBT. The workings are less than 100 feet below ground surface and are dry.

Workings generally dip between 20 and 30 degrees, and appear to follow a persistent flat-dipping structure. The main workings consist of an irregularly shaped stope with maximum dimensions of approximately 150 feet in each direction, ranging from a few feet up to 40 feet in height. Several small rock pillars are located at irregular positions throughout the workings, while timber posts have been used to support large spans of limited height. The largest totally unsupported span is near the updip stope entrance, and is estimated to be approximately 60 feet square. It is understood that active mining ceased in the 1930's. There are no extensive rockfalls or other indications of significant instability within the stope or an adjacent unsupported drift.

The Dozer Hill drift is an approximately 6 x 5 ft. unsupported drift through the Bud unit into the LBT. It is located within Dozer Hill, which directly overlies the North mineralized zone. The Bud is predominantly unmineralized, low strength geotechnical unit, while the LBT is the primary host for mineralization in some ore zones. There is no significant instability throughout the several hundred feet of drift length. The drift is dry.

A visual classification of the rock quality in both areas is generally fair to poor - based on the amount of fracturing evident in the excavation walls. It appears to be more fractured than the typical

competent LBT inspected in drill cores and core photographs pertaining to the Rosebud/Dozer Hill project.

ROCK MASS CHARACTERISTICS

DISCONTINUITIES

As indicated previously, the mineralization of the Rosebud deposit is characterized by discontinuous stockwork, dissemination and hydrothermal alteration. As a result, any jointing which may have been formerly present in the host rocks, is not evident in the diamond drill core.

As a general rule, the mineralization observed in the drill cores appeared to be disseminated within the upper elevations of all the ore zones. Stockwork mineralization characterized the central portions, which in turn graded to dissemination towards the footwall. Up to two phases of vein stockwork were observed, resulting in two random orientations of lightly infilled veins. Each stockwork episode could be infilled primarily with either quartz, calcite or clay, with occasional barytes or pyrite. The stockwork "sets" could contain either the same or different infilling material. Clay infill resulted in a more highly broken drill core.

More regional hydrothermal alterations overprint the disseminated and stockwork mineralization. Depending on the ore zone, these overprints may have been either progressive where silicification has welded the rock texture, or regressive where kaolinization has reduced the rock strength. Drill core recovered from higher areas of kaolinization, such as the South Zone, would typically be more broken.

RQD has been measured in a number of recently drilled diamond drill holes which have been geotechnically logged. Observations of the split core, geotechnical logs and core photographs indicate that the RQD's recorded are inclusive of drilling induced breaks and represent low values. It is felt that the drilling induced fractures are a reflection of rock strength and represent either clay infill within the stockwork or friable zones resulting from kaolinization. Consequently, the RQD does not truly represent the rock mass quality which is dependent upon the degree and nature of the hydrothermal alteration.

INTACT ROCK STRENGTH

As described in the previous section, the rock strengths throughout the project area vary and are dependent on the degree of hydrothermal alteration.

To date no laboratory tests for intact rock strengths have been conducted. However, samples have been prepared and forwarded to McKay School of Mines, Reno, for unconfined compressive strength testing. The results are expected in the immediate future.

Visual estimation of intact rock strengths were made during examination of the drill core. These estimates were later confirmed following the calculation of point-load index tests which had been performed on core from the most recent drill holes located in the far East Zone. The range of strengths are summarized as follows:

POINT, LOAD INDEX HOLES RL263, RL26 4, RL265 - EAST ZONE				
ROCK TYPE	POINT-LOAD INDEX (psi)		EQUIVALENT UCS* (psi)	
	Diametral	Axial	Diametral	Axial
1. Chocolate Tuff	461	387	11,000	9,300
2. Bud Tuff	617	330	14,800	7,900
3. Altered Bud Tuff	140	87	3,300	2,000
4. LBT	659	583	15,800	14,000
5. Altered LBT	198	174	4,700	4,100
6. Dozer Tuff	640	505	15,300	12,000
7. Altered Dozer Tuff	311	277	7,400	6,600
8. SRF/Silicified LBT	499	355	11,900	6,100
* The equivalent UCS has been obtained from the point-load index, (Is_{50}) where: $UCS = 24 Is_{50}$				

From these results, it can be seen that:

- ◆ Unaltered or silicified rock types have strengths in excess of 10,000 psi.
- ◆ Generally, regressive hydrothermal alteration has resulted in a strength reduction of approximately 50 percent.
- ◆ The diametral strengths are consistently up to 50 percent higher than the axial strengths. This indicates a strength anisotropy with the weaker direction in the vertical plane for a vertical borehole.

ROCK MASS QUALITY

Previous estimates of the rock mass quality for the Rosebud project have been made by Piteau Associates using the NGI rock mass classification system. Following examination of the drill core, drill logs are core slides, BEA has confirmed these values which are reproduced as follows:

ROCK QUALITY (RQD)	DEGREE OF ALTERATION	Q VALUE	ALLOWABLE TEMPORARY MINE OPENING SPANS (m) ¹		
			Unsupported	Rockbolts and Mesh	Rockbolts, Mesh and Shotcrete ²
Very Poor (0 to 25)	Altered	0.02	1.5	-	3
Poor (25 to 50)	Altered	0.02 to 0.04	1.5 to 1.8	-	6
Fair (50 to 75)	Altered	0.08 to 0.12	2.4 to 2.7	-	6 to 8
	Unaltered	0.5 to 1.5	5.0 to 7.5	9 to 12 ²	9 to 12 ²
Good (75 to 90)	Altered	0.6 to 0.7	4 to 6	-	8 to 10 ²
	Unaltered	4.5 to 5.4	12	21 to 24 ²	21 to 24 ²
Excellent (90 to 100)	Unaltered	5.4 to 6.3	12 to 14	24	24 ²

Note:

¹ Spans of permanent mine openings should be approximately one-half of the spans indicated for temporary mine openings.

² Shotcrete may not be required for openings in unaltered ground depending on the strength and orientation of the fractures.

It should be noted that the NGI rock mass classification was developed for application in jointed rock masses. This case does not strictly apply to the Rosebud project area where hydrothermal alteration of the rock strength governs the rock mass quality. The rock mass quality is seen to vary throughout the deposit in the following general manner:

ROCK MASS QUALITY, ROSEBUD PROPERTY	
GEOLOGICAL SEQUENCE	ROCK MASS QUALITY
Bud Tuff	Good to very good
Lower Bud Tuff	
Upper Section	Good to fair
Lower Section	Section 00 to 600 • Poor to very poor Sections 600 to 1600 • Fair to good (some poor zones) • Poor within 50 ft to 75 ft. of fault
Dozer Tuff	Fair to good

Based on the NGI classification, which has been modified to reflect any areas which contain reduced rock strength, it is suggested that:

- ◆ Very poor to poor ground conditions apply to the South Ridge Fault and the South ore zone between section 00 and section 600. The hangingwall conditions in this area would be classified as good to fair.
- ◆ Ground conditions in the mineralized Lower Bud Tuff between sections 600 to 1600 are classified as fair to good, with poor ground within 50 - 75 ft. of the South Ridge Fault. The hangingwall conditions in this area would be classified as good to fair.
- ◆ Fair to good ground conditions exist throughout the East Zone.
- ◆ The condition of the Dozer Tuff can be described as fair to good throughout the project area.

INSITU STRESS

The magnitude and direction of insitu stress have not been measured in the Rosebud project area. Measurements have been made at the Nevada Nuclear Test Site, from which a direct comparison is considered reasonable for a prefeasibility level of analysis. The results from the test site for volcanic tuffs at depths of 1,158 ft. show the vertical stress is roughly equal to the overburden pressure and the horizontal to vertical in-situ stress ratio is 0.9.

This would result in a corresponding vertical in-situ stress for Rosebud at the maximum proposed mining depth of 800 ft. of \pm 700 psi. The orientation of the stress field is unknown. It may be assumed that a near uniform stress distribution exists. Locally, buckling or bulging of soft, friable kaolinized areas may occur due to stress concentration effects resulting from the shape of the underground openings. Otherwise the effect of stress is not considered to be a problem area for mining.

DESIGN PROCEDURE

A preliminary assessment of allowable mining spans and possible ground support requirements for the different rock qualities encountered at the Rosebud project has been conducted by Piteau Associates using the NGI System. BEA has examined the drill core, reviewed the geotechnical logs and core slides and find that this approach is adequate for the pre-feasibility level of mine analysis.

The NGI System of rock mass classification determines a rock mass quality, Q , based on a number of parameters including RQD, the number of joint sets, joint roughness, alteration, ground stress and groundwater conditions.

NGI ROCKMASS CLASSIFICATION		
1.	Rock Quality Designation (RQD)	
	a) Very Poor	0 - 25 (use nominal value of 10 where $RQD \leq 10$)
	b) Poor	35 - 50
	c) Fair	50 - 75
	d) Good	75 - 90
	e) Excellent	90 - 100
2.	Joint Set Number	(Jn)
	a) Massive, no or few joints	0.5 - 1.0
	b) One joint set	2
	c) One joint set plus random	3
	d) Two joint sets	4
	e) Two joint sets plus random	6
	f) Three joint sets	9
	g) Three joint sets plus random	12
	h) Four or more joint sets	15
	i) Crushed rock, earth-like	20
3.	Joint Roughness Number	(Jr)
	a) Discontinuous joints	4
	b) Rough or irregular, undulating	3
	c) Smooth, undulating	2
	d) Slickensided, undulating	1.5
	e) Rough and irregular, planar	1.5
	f) Smooth planar	1.0
	g) Slickensided, planar	0.5
	h) No rock wall contact when sheared	1.0
4.	Joint Alteration Number	Ja
	a) Tightly healed, hard, non-softening, impermeable filling	0.75 (25 - 35 degrees)
	b) Unaltered, surface staining only	1.0 (25 - 30 degrees)
	c) Slightly altered joint walls	2.0 (20 - 25 degrees)
	d) Silty or sandy clay coatings	3.0
	e) Low friction clay coating	4.0
	f) Sand or clay free crushed rock	4.0
	g) Non-softening clay < 5 mm	6.0

For application to the rock types present in the Rosebud/Dozer Hill project area, the strict definition of each parameter which determines Q has been loosely applied. This has resulted from the conclusion that RQD and breaks/ft. are not truly reflective of the rock mass quality, which corresponds more closely to the degree of clay alteration and friability. Each parameter has been interpreted as follows:

- ◆ A joint set number, J_n , of 3.0 corresponding to one joint set plus random joints has been applied, except where two phases of stockwork are encountered when a J_n of 4.0 has been used.
- ◆ The joint water reduction factor, J_w , has been assumed to be 1.0 to reflect that adequate drainage of the rock mass should occur during the underground development and prior to mining.
- ◆ The stress reduction factor, SRF, has been assumed as 1.0 corresponding to a relatively tight rock mass at moderate stress levels which are not anticipated to result in problems.

The relationship between Q and the support requirements of an underground excavation is determined through calculation of the equivalent dimension, D_e , of the excavation. This dimension is obtained by dividing the span, diameter or wall height of the excavation by a quantity called the excavation support ratio, ESR. Hence:

$$D_e = \frac{\text{Excavation span, diameter or height (m)}}{\text{Excavation Support Ratio}}$$

The excavation support ratio is related to the use for which the excavation is intended and the extent to which some degree of instability is acceptable. The following values are suggested for ESR:

EXCAVATION CATEGORY		ESR
a)	Temporary mine openings	3 - 5
b)	Permanent mine openings	1.6
c)	Storage rooms, water treatment plants, minor road and railway tunnels	1.3
d)	Power stations, major road and railway tunnels, portals	1.0
e)	Underground nuclear power stations, railway stations, sports and public facilities	0.8

The relationship between rock mass quality, Q , and the equivalent dimension, D_e , which will stand unsupported is shown in Figure 2

MINING DESIGN

Beacon Hill Consultants selected drift and fill mining as the most appropriate mining method given the assessment of rock quality and the configuration of the orebody. Drift and fill is highly selective and provides the most effective ground support for stopes with widths of 13 ft.

It is envisaged that drift and fill is applicable to the South Zone ore between section 00 and section 600. The geological reserve indicates that the thickness of the ore in this area ranges from 10 ft. to 50 ft. vertically. Consequently, the thicker areas of the mineralization could be recovered with approximately four mining cuts.

From section 00 to section 300, the thinner portions of the orebody, averaging 15 ft. to 20 ft. thick could be recovered by drifting, taking down the backs, then filling. In this area poor to very poor ground conditions are anticipated, therefore, panel widths should not exceed 15 ft. Ground support should generally consist of 8 ft. long mechanical rockbolts installed on an approximate 4 ft. x 4 ft. pattern, using weldmesh as a surface restraint between the rockbolts. A contingency to install friction support (ie. Swellex) and shotcrete will be required in highly kaolinized areas and through the South Ridge Fault.

Dilution in secondary pillar recovery between the primary panels is of concern, particularly in highly kaolinized areas, ie. drainage of groundwater and backfill placed in the primary panels may leach the rock mass. Narrower secondary panels may be required. External dilution in the order of 20 percent may be anticipated.

From section 600 to section 1600 the ground conditions improve and may be described as fair. The provisional extraction widths may be increased to 20 - 25 ft. Short cablebolts will be required as supplementary ground support at the intersections of access development. Poor ground is indicated within 50 ft. to 75 ft. in the hangingwall of the South Ridge Fault. A reduced panel width of 15 ft. may be required for the first two to three cuts where applicable. External dilution of approximately 15 percent is anticipated.

Fair to good ground conditions are indicated in the East Zone between sections NW8 and NW13. The South Ridge Fault consists of a silicified hydrothermal breccia, more competent ground than the clay gouge shear zone below the South and North zones. A provisional extraction width in the order of 30 ft. to 60 ft. may be applied depending on the degree of alteration. External dilution of approximately

15 percent is anticipated.

Rock Mass Quality	Unsupported Span (FT)	Rock Bolts, Mesh & Shotcrete
Excellent Unaltered	39 to 46	24.0
Good Unaltered Altered	39 13 to 20	21.0 to 24.0 8.0 to 10
Fair Unaltered Altered	16 to 25 8 to 9	9.0 to 12.0 6.0 to 8.0
Poor Altered	5 to 6	6.0
Very Poor Altered	5	3.0

As an attempt to minimize external dilution, it is recommended that controlled blasting will be required throughout the development and ore zones.

FURTHER WORK

The current level of data acquisition pertinent to the Rosebud property is considered satisfactory for a pre-feasibility level of economic analysis.

To continue the project through to feasibility level and beyond, the confidence level in the database has to be improved. A number of areas where additional detail may be provided are recommended as follows:

◆ Investigate the cross-cutting structure

The characteristics of the cross-cutting structures which have been interpreted, trending northwest to southeast should be investigated. To date no drillhole intersections have identified the nature, i.e., gouge-filled shear zone, the thickness or the presence of groundwater associated with these structures. An exploration hole oriented northeast - southwest should be allocated to examine these features.

◆ Written logging procedures

To preserve continuity the current logging procedures should be documented with a standardized nomenclature and symbols. For geotechnical logs this should include a clay alteration and friability index as explained below. The estimation of RQD and fractures per foot for each geotechnical domain should be continued.

◆ Friability and Clay Content of the Ore Zone

The previous discussion has highlighted the need to identify the extent of clay and the friability of the rockmass because of its variability in the ore and surrounding rocks. Several detailed descriptions have been provided on the extent of clay around the ore zone and how it is likely to impact on stability. Most of these descriptions have been qualitative and subjective and have not developed any specific guidelines for subsequent mine design. Rosebud is a relatively shallow deposit where the ore zones have quantities of clay and can be extremely friable. It is essential that the extent of clay/friability be quantified so that areas with possible problems can be identified and location of development, etc. optimized.

It is suggested that in addition to the current geotechnical information, drill core is also logged for clay content and friability based on simple qualitative criteria as follows:

◆ Clay Alteration/Stockwork Infill Rating

- C1 10% clay content in rock
- C2 10 - 30% clay content
- C3 > 30% clay content

◆ Friability/Hardness Rating

- F1 Very friable, soft, easily crumbled by hand
- F2 Friable, moderately hard, individual grains rub off when rubbing surface, can be snapped into two easily
- F3 Competent, hard, cannot be snapped into two easily or without a hammer (may be brittle).

The orebody outline can be superimposed onto the clay and friability zones. Contours may enable the relationship of high grade zones to clay content and/or friability. The primary objectives are:

- ◆ Identify any relationship between friability, clay content and the ore zone
- ◆ Determine areas within which a halo of weak friable ground exists. This may result in the relocation of access development or higher dilution allocated to a portion of the reserve.
- ◆ Identify areas where additional ground support will be required

◆ Point-Load Testing

Point-load testing of diamond drill core is an excellent index of rock strength. It is recommended that the testing continues as part of all the future drilling and logging procedures. Processing and reduction of all the data should be undertaken on site.

◆ Laboratory Testing

The results from unconfined compressive strength tests on samples of the Rosebud rocktypes should be available in the near future. These results should be compared to the point-load strengths and a correlation established.

Slaking tests conducted on highly kaolinized stockwork from the South Zone ore, Section 00 to Section 300, are necessary to more accurately estimate the external dilution.

Triaxial testing is only seen as a requirement for the estimation of rock mass strengths at some stage beyond the feasibility level of analysis.

◆ Monitoring

Dewatering holes drilled during the stages of ramp access development should be monitored with respect to water take and change in water pressure. It is recommended that a provisional monitoring program be established for the feasibility level of analysis. The clay chemistry for clay gouge and clay alteration zones should be examined to determine whether swelling clays such as montmorillonite are present. The presence of montmorillonite will adversely affect the drainage program and the stability of the excavations.

◆ Analysis

Two dimensional numerical modelling and empirical support design estimations are recommended for the feasibility level of analysis.

atypical areas where the rock mass may be intersected by zones of multiple discontinuities. The width of panels is a major factor related to both stability and productivity. Wide panels result in increased productivity, giving greater output per development and production round which in turn reduces the number of equipment moves.

The necessity for ground control in stopes is a function of rock mass strength and excavation dimensions. The stope layout suggested for Rosebud is based upon an empirical approach utilising the NGI classification Q value.

In summary, cut & fill mining has been selected for the extraction of the Rosebud deposit for it has the following advantages:

- flexibility and ease of modification;
- ideal application for an orebody with wide variations in quality, width, roof and floor rock mass conditions;
- good selectivity and productivity; and
- low dilution;.

However, it is acknowledged that a disadvantage of cut & fill mining is the need to produce from multiple work places which demands:

- supplying many development ends; and
- moving machinery and constantly extending services.

A high standard of supervision and organisation will be vital in order to produce from many workplaces.

5.2 CUT & FILL

The layout, development configuration and stoping sequence proposed for transverse primary-secondary stope cut-and-fill mining are outlined in this section. Level drawings are shown in Figures 7 to 11.

APPENDIX III

SUMMARY OF 'MINABLE' RESOURCE, ROSEBUD PROJECT, PERSHING COUNTY, NEVADA.
 FILENAME TOTAL150.WK3
 CUTOFF = 10 FEET OF 0.150 OPT AU.

	TONS	AU OZ'S	CUT AU OZ'S	AG OZ'S	AU GRADE	CUT AU GRADE	AG GRADE
SOUTH ZONE (Northeast Sect. Orientation)							
DRILL INDICATED	499,700	237,653	175,291	1,929,291	0.476	0.351	3.66
DRILL INFERRED	9,700	6,889	5,415	23,736	0.710	0.559	2.45
INTERNAL DILUTION	95,300	4,296	4,296	66,735	0.045	0.045	0.70
SUBTOTAL	604,700	248,838	185,002	2,019,763	0.412	0.306	3.34
EAST ZONE (Northwest Sect. Orientation)							
DRILL INDICATED	232,100	115,060	91,342	865,019	0.496	0.394	3.73
DRILL INFERRED	83,000	24,444	24,444	181,271	0.295	0.295	2.18
SUBTOTAL	315,100	139,504	115,786	1,046,290	0.443	0.367	3.32
NORTH ZONE (Northeast Sect. Orientation)							
DRILL INDICATED	128,500	33,968	28,385	917,318	0.264	0.221	7.14
DRILL INFERRED							
SUBTOTAL	128,500	33,968	28,385	917,318	0.264	0.221	7.14
TOTAL DRILL INDICATED	860,300	366,661	295,018	3,711,828	0.449	0.343	4.31
TOTAL DRILL INFERRED	92,700	31,333	29,859	205,007	0.338	0.322	2.21
TOTAL INTERNAL DILUTION	95,300	4,296	4,296	66,735	0.045	0.045	0.70
TOTAL RESOURCE	1,048,300	422,310	329,173	3,983,370	0.403	0.314	3.80
SOUTH ZONE (Northeast Sect. Orientation)							
LAC ONLY GROUND	121,600	42,420	33,096	70,596	0.349	0.272	0.58
LAC INT DILUTION	10,500	242	242	693	0.023	0.023	0.09
EQUINOX JV GROUND	367,800	202,122	147,610	1,682,432	0.521	0.381	4.95
EQUINOX JV INT DILUTION	84,800	4,054	4,054	65,842	0.048	0.048	0.78
SUBTOTAL	604,700	248,838	185,002	2,019,763	0.412	0.306	3.34
EAST ZONE (Northwest Sect. Orientation)							
LAC ONLY GROUND	82,600	30,379	30,379	296,334	0.368	0.368	3.59
EQUINOX JV GROUND	232,500	109,125	85,407	749,956	0.469	0.367	3.23
SUBTOTAL	315,100	139,504	115,786	1,046,290	0.443	0.367	3.32
NORTH ZONE (Northeast Sect. Orientation)							
LAC ONLY GROUND	128,500	33,968	28,385	917,317	0.264	0.221	7.14
EQUINOX JV GROUND							
SUBTOTAL	128,500	33,968	28,385	917,317	0.264	0.221	7.14
TOTAL RESOURCE	1,048,300	422,310	329,173	3,983,370	0.403	0.314	3.80
SUBTOTAL LAC ONLY GROUND	343,200	107,009	92,102	1,285,140	0.312	0.268	3.74
SUBTOTAL EQUINOX JV GROUND	705,100	315,301	237,071	2,698,230	0.447	0.336	3.83
TOTAL RESOURCE	1,048,300	422,310	329,173	3,983,370	0.403	0.314	3.80
LAC SHARE OF OUNCES		267,813	213,008	2,661,237			
EQUINOX SHARE OF OUNCES		154,497	116,165	1,322,133			
TOTAL OUNCES		422,310	329,173	3,983,370			

Ok.
 Final
 June 30/92

SUMMARY OF 'MINABLE' RESOURCE, ROSEBUD PROJECT, PERSHING COUNTY, NEVADA.
 FILENAME TOTAL100.WK3
 CUTOFF = 10 FEET OF 0.100 OPT AU.

	TONS	AU OZ'S	CUT AU OZ'S	AG OZ'S	AU GRADE	CUT AU GRADE	AG GRADE
SOUTH ZONE (Northeast Sect. Orientation)							
DRILL INDICATED	643,000	256,710	195,804	2,249,813	0.402	0.305	3.50
DRILL INFERRED	9,900	6,592	5,113	29,660	0.666	0.516	3.00
INTERNAL DILUTION	88,900						
SUBTOTAL	741,800	265,302	200,917	2,279,473	0.358	0.271	3.07
EAST ZONE (Northwest Sect. Orientation)							
DRILL INDICATED	290,700	128,905	106,186	930,183	0.443	0.365	3.20
DRILL INFERRED	83,000	24,444	24,444	181,272	0.295	0.295	2.16
SUBTOTAL	373,700	153,349	130,630	1,111,455	0.410	0.350	2.97
NORTH ZONE (Northeast Sect. Orientation)							
DRILL INDICATED	147,800	35,808	30,547	1,018,779	0.242	0.207	6.89
DRILL INFERRED							
SUBTOTAL	147,800	35,808	30,547	1,018,779	0.242	0.207	6.89
TOTAL DRILL INDICATED	1,081,500	423,423	332,537	4,198,775	0.392	0.307	3.88
TOTAL DRILL INFERRED	92,900	31,036	29,557	210,932	0.334	0.318	2.27
TOTAL INTERNAL DILUTION	88,900						
TOTAL RESOURCE	1,263,300	454,459	362,094	4,409,707	0.360	0.287	3.49
SOUTH ZONE (Northeast Sect. Orientation)							
LAC ONLY GROUND	141,200	43,963	34,639	76,370	0.311	0.245	0.54
LAC INTERNAL DILUTION							
EQUINOX JV GROUND	511,700	221,339	166,278	2,203,103	0.433	0.325	4.31
EQUINOX INTERNAL DILUTION	88,900						
SUBTOTAL	741,800	265,302	200,917	2,279,473	0.358	0.271	3.07
EAST ZONE (Northwest Sect. Orientation)							
LAC ONLY GROUND	113,900	35,114	35,114	334,240	0.308	0.308	2.93
EQUINOX JV GROUND	259,800	118,235	95,516	777,216	0.455	0.368	2.99
SUBTOTAL	373,700	153,349	130,630	1,111,456	0.410	0.350	2.97
NORTH ZONE (Northeast Sect. Orientation)							
LAC ONLY GROUND	147,800	35,808	30,547	1,018,779	0.242	0.207	6.89
EQUINOX JV GROUND							
SUBTOTAL	147,800	35,808	30,547	1,018,779	0.242	0.207	6.89
TOTAL RESOURCE	1,263,300	454,459	362,094	4,409,708	0.360	0.287	3.49
SUBTOTAL LAC ONLY GROUND	402,900	114,885	100,300	1,429,389	0.285	0.249	3.55
SUBTOTAL EQUINOX JV GROUND	860,400	339,574	261,794	2,980,319	0.395	0.304	3.46
TOTAL RESOURCE	1,263,300	454,459	362,094	4,409,708	0.360	0.287	3.49
LAC SHARE OF OUNCES		288,068	233,815	2,949,352			
EQUINOX SHARE OF OUNCES		166,391	128,279	1,460,356			
TOTAL OUNCES		454,459	362,094	4,409,708			

OK.
 FINAL
 June 30/92

MINING DILUTION AND ORE LOSSES

DISCUSSION

All ore recovery is by C & F - breasting off fill tight to back.

All zones are blocked out into mining panels, primary and secondary.

PRIMARY STOPES

Dilution will be the result of:

Dilution - breaking waste at the end of the stope on each cut.

Ore Loss - fines compacted in the fill floor.

Dilution - backfill scooped during the mucking cycle.

Ore Loss - Ore left along the walls of the stope that cannot be mucked with a scoop.

Dilution - Waste dilution from the back of the stope in the final cut.

Dilution - Waste wall dilution from end panel.

SECONDARY STOPES

Dilution in addition to the above will be the result of fill from the adjacent primary stopes.

CALCULATION OF MINING DILUTION

Primary 15 Ft. Panel (Per cut) (Avg. length 60 ft.)

Waste at end of stope 3 ft.	=	68 tons	
6" backfill taken - Eq. tons	=	23 tons	
Final cut - back dilution 90 tons (avg. 4 cus)	=	23 tons	
End panel wall dilution (avg. 6 panels - 180 tons)	=	<u>30 tons</u>	
Total		144 tons	10.7%
Tons/cut	=	1350	

Secondary 15 Ft. Pnael (Avg. length 60 ft.)

Primary panel tons dilution	=	144 tons	
Fill from wall sloughing Eq. tons	=	90	
Total dilution	=	<u>234</u>	17.3%
Tons/cut	=	1350	

Secondary 10 Ft. Panel (Avg. length 60 ft.)

Waste at end of stope 3 ft.	=	45 tons	
6" backfill taken - Eq. tons	=	15	
Final cut dilution 60 tons (Avg. 4 cuts)	=	15	
Fill from wall sloughing Eq tons	=	90	
End panels	=	<u>30</u>	
Total	=	195	21.7%
Tons/cut	=	900	

Primary 30 Ft. Panel (Avg. length 100 ft.)

Waste at end of stope 3 ft.	=	135 tons	
6" backfill - Eq. tons	=	75	
Final cut dilution (Avg. 6 cuts)	=	50	
End panels 10 panels	=	<u>30</u>	
Total	=	290	
Tons/cut	=	4500	6.4%

Secondary 30 Ft. Panel (Avg. length 100 ft.)

Primary panel dilution	=	290 tons	
Fill from wall sloughing Eq. tons	=	<u>150</u>	
Total	=	440	
Tons/cut	=	4500	9.8%

Primary 25 Ft. Panel (Avg. length 75 ft.)

Waste at end of stope 3 ft.	=	112 tons	
6" backfill Eq. tons	=	47	
Final cut back dilution (Avg. 5 cuts)	=	38	
End panel wall 8 panels	=	<u>28</u>	
Total tons	=	225	
Tons/cut	=	2813	8.0%

Secondary 25 Ft. Panel (Avg. length 75 ft.)

Primary dilution	=	225	
Fill from wall slough Eq. tons	=	<u>113</u>	
Total tons	=	338	12.0%
Tons/cut	=	2813	

Primary 20 ft. Panel (Avg. length 65 ft.)

Waste at end of slope 3 ft.	=	90	
6" backfill Eq. tons	=	38	
Final cut back dilution (Avg. 4 cuts)	=	33	
End wall panel 6 panels	=	<u>33</u>	
Total	=	194	8.7%
Tons/cut	=	2241	

Secondary 20 Ft. Panel (Avg. length 65 ft.)

Primary dilution	=	194	
Fill from wall slough	=	<u>98</u>	
Total	=	292	13.0%
Tons/cut	=	2241	

0.10% CUT-OFF

1000 TPD

7 DAY/WEEK

ROSEBUD\PROD10B.WK1

TABLE 8.1: Mine Life Production Schedule

Cut-off Grade = 0.10 oz/ton (Au); 1000 tpd; 7 days/wk.

Zone	Grade	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
East:	Tons		175,000	210,000	75,000							460,000
	Au oz	0.284	49,696	59,635	21,298	0	0	0	0	0	0	130,630
	Ag oz	2.416	422,836	507,403	181,215	0	0	0	0	0	0	1,111,455
South:												0
	Tons		105,000	140,000	245,000	245,000	180,000	34,500				949,500
	Au oz	0.212	22,218	29,624	51,843	51,843	38,089	7,300	0	0	0	200,917
North (C & D):	Ag oz	2.401	252,074	336,099	588,174	588,174	432,128	82,824	0	0	0	2,279,473
												0
	Tons				30,000	90,000	73,500					193,500
TOTAL:	Au oz	0.158	0	0	4,736	14,208	11,603	0	0	0	0	30,547
	Ag oz	5.265	0	0	157,950	473,851	386,978	0	0	0	0	1,018,779
												0
TOTAL:	Tons		0	280,000	350,000	350,000	253,500	34,500	0	0	0	1,603,000
	Au oz	0.226	0	71,915	89,260	77,877	66,051	49,692	0	0	0	362,094
	Ag oz	2.751	0	674,911	843,503	927,339	1,062,024	819,106	82,824	0	0	4,409,707

ROSEBUD\DEVT10B.WK1

TABLE 8.2 MINE LIFE DEVELOPMENT SCHEDULE

Cut-off Grade = 0.10 oz/ton (Au); 1000 tpd; 7 days/week

[illegible]

0.15% CUT-OFF

750 TPD

5 DAY/WEEK

ROSEBUD\PROD15.WK1

TABLE 8.1: Mine Life Production Schedule

Cut-off Grade = 0.15 oz/ton (Au); 750 tpd; 5 days/wk

Zone	Grade	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
East:	Tons		75,000	100,000	100,000	75,000	37,900					387,900
	Au oz		22,387	29,849	29,849	22,387	11,313	0	0	0	0	115,786
	Ag oz		202,299	269,732	269,732	202,299	102,228	0	0	0	0	1,046,290
South: Lower;	Tons		50,000	87,500	87,500	112,500	112,500	112,500	112,500	75,000	24,000	774,000
	Au oz		11,951	20,914	20,914	26,890	26,890	26,890	26,890	17,927	5,736	185,002
	Ag oz		130,452	228,292	228,292	293,518	293,518	293,518	293,518	195,678	62,617	2,019,402
North (C & D):	Tons						37,100	50,000	50,000	31,100		168,200
	Au oz		0	0	0	0	6,261	8,438	8,438	5,248	0	28,385
	Ag oz		0	0	0	0	202,333	272,686	272,686	169,611	0	917,317
TOTAL:	Tons	0	125,000	187,500	187,500	187,500	187,500	162,500	162,500	106,100	24,000	1,330,100
	Au oz	0	34,338	50,764	50,764	49,277	44,464	35,328	35,328	23,175	5,736	329,173
	Ag oz	0	332,751	498,023	498,023	495,817	598,079	566,204	566,204	365,289	62,617	3,983,009

ROSEBUD\DEVT15.WK1

TABLE 8.2 MINE LIFE DEVELOPMENT SCHEDULE

Cut-off Grade = 0.15 oz/ton (Au)

[illegible]

0.15% CUT-OFF

750 TPD

7 DAY/WEEK

ROSEBUD\DEVT15B.WK1

TABLE 8.2 MINE LIFE DEVELOPMENT SCHEDULE

Cut-off Grade = 0.15 oz/ton (Au); 750 tpd; 7 days/week

[illegible]

ROSEBUD\PROD15B.WK1

TABLE 8.1: Mine Life Production Schedule

Cut-off Grade = 0.15 oz/ton (Au); 750 tpd; 7 days/wk

Zone	Grade	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTAL
East:	Tons		105,000	140,000	110,000	32,900						387,900
	Au oz	0.298	31,342	41,789	32,834	9,820	0	0	0	0	0	115,786
	Ag oz	2.697	283,218	377,625	296,705	88,742	0	0	0	0	0	1,046,290
South: Lower;	Tons		70,000	122,500	152,500	152,500	152,500	100,000	24,000			774,000
	Au oz		16,731	29,280	36,451	36,451	36,451	23,902	5,736	0	0	185,002
	Ag oz		182,633	319,608	397,880	397,880	397,880	260,905	62,617	0	0	2,019,402
North (C & D):	Tons					77,100	77,100	14,000				168,200
	Au oz		0	0	0	13,011	13,011	2,363	0	0	0	28,385
	Ag oz		0	0	0	420,482	420,482	76,352	0	0	0	917,317
TOTAL:	Tons	0	175,000	262,500	262,500	262,500	229,600	114,000	24,000	0	0	1,330,100
	Au oz	0	48,073	71,069	69,285	59,282	49,462	26,265	5,736	0	0	329,173
	Ag oz	0	465,852	697,233	694,585	907,104	818,362	337,257	62,617	0	0	3,983,009

APPENDIX IV

Year	0	1	Subtotal Preproduction	2	3	4	5	6	7	8	9	10	Total Production
						Operating Cost	\$US						
MILLFEED tons	0	0	0	200,000	250,000	250,000	250,000	250,000	245,000	175,000	90,000	40,000	1,750,000
GENERAL MINE EXPENSES													
301 Mine Supervision	\$207,000	\$286,000	\$493,000	\$351,000	\$352,000	\$352,000	\$352,000	\$352,000	\$352,000	\$248,000	\$130,000	\$55,000	2,544,000
302 Engineering	\$171,000	\$273,000	\$444,000	\$308,000	\$317,000	\$317,000	\$317,000	\$317,000	\$316,000	\$215,000	\$113,000	\$48,000	2,268,000
303 Mine Geology	\$161,000	\$264,000	\$425,000	\$301,000	\$303,000	\$303,000	\$303,000	\$303,000	\$303,000	\$215,000	\$116,000	\$47,000	2,194,000
312 Mine Ventilation System Maint	\$40,000	\$58,000	\$98,000	\$64,000	\$69,000	\$69,000	\$69,000	\$69,000	\$69,000	\$56,000	\$34,000	\$17,000	516,000
313 Mine Pumping	\$31,000	\$46,000	\$77,000	\$84,000	\$94,000	\$94,000	\$94,000	\$94,000	\$93,000	\$72,000	\$43,000	\$20,000	688,000
314 Mine Services	\$691,000	\$1,227,000	\$1,918,000	\$1,495,000	\$1,504,000	\$1,504,000	\$1,504,000	\$1,504,000	\$1,502,000	\$1,486,000	\$1,002,000	\$502,000	12,003,000
315 Compressed Air Generation	\$32,000	\$53,000	\$85,000	\$65,000	\$71,000	\$71,000	\$71,000	\$71,000	\$70,000	\$56,000	\$34,000	\$16,000	525,000
316 Roadbed Maintenance	\$194,000	\$275,000	\$469,000	\$299,000	\$331,000	\$331,000	\$331,000	\$331,000	\$328,000	\$259,000	\$180,000	\$87,000	2,477,000
317 Bit Sharpening	\$21,000	\$34,000	\$55,000	\$34,000	\$37,000	\$37,000	\$37,000	\$37,000	\$37,000	\$29,000	\$17,000	\$6,000	271,000
318 Small Tools	\$34,000	\$51,000	\$85,000	\$51,000	\$59,000	\$59,000	\$59,000	\$59,000	\$59,000	\$45,000	\$25,000	\$12,000	428,000
319 Nipping, Sanitation, etc.	\$65,000	\$97,000	\$162,000	\$112,000	\$114,000	\$114,000	\$114,000	\$114,000	\$114,000	\$96,000	\$77,000	\$38,000	893,000
332 Surface Ore & Waste Handling	\$114,000	\$193,000	\$307,000	\$25,000	\$22,000	\$20,000	\$17,000	\$17,000	\$17,000	\$14,000	\$10,000	\$4,000	146,000
333 Surface Operations	\$184,000	\$282,000	\$466,000	\$348,000	\$350,000	\$350,000	\$350,000	\$350,000	\$350,000	\$286,000	\$188,000	\$54,000	2,626,000
335 Fuel & Lubricants Account	\$30,000	\$40,000	\$70,000	\$40,000	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$35,000	\$18,000	\$8,000	351,000
340 Allowance For Absenteeism	\$113,000	\$174,000	\$287,000	\$174,000	\$174,000	\$174,000	\$174,000	\$174,000	\$174,000	\$174,000	\$174,000	\$87,000	1,479,000
Subtotal	\$2,088,000	\$3,353,000	\$5,441,000	\$3,751,000	\$3,847,000	\$3,845,000	\$3,842,000	\$3,842,000	\$3,834,000	\$3,286,000	\$2,161,000	\$1,001,000	\$29,409,000
\$/Ton Ore				\$18.76	\$15.39	\$15.38	\$15.37	\$15.37	\$15.65	\$18.78	\$24.01	\$25.03	\$16.81
DIRECT MINING COSTS													
340 Underground DDH	\$0	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$500,000	\$400,000	\$200,000	\$100,000	\$0	3,200,000
351 Decline Development	\$2,858,000	\$2,488,000	\$5,346,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$80,000	\$40,000	680,000
352 Remuck Stations	\$61,000	\$61,000	\$122,000	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	0
353 Level Development	\$0	\$2,063,000	\$2,063,000	\$538,000	\$538,000	\$538,000	\$538,000	\$538,000	\$538,000	\$448,000	\$359,000	\$149,000	4,184,000
354 Slashing Waste	\$0	\$172,000	\$172,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$37,000	\$30,000	\$12,000	349,000
358 H/W Cablebolt Drilling	\$0	\$0	\$0	\$199,000	\$248,000	\$248,000	\$248,000	\$248,000	\$243,000	\$174,000	\$89,000	\$40,000	1,737,000
359 H/W Cablebolt Install	\$0	\$0	\$0	\$316,000	\$395,000	\$395,000	\$395,000	\$395,000	\$387,000	\$277,000	\$142,000	\$63,000	2,765,000
363 Longhole Stope Drilling	\$0	\$0	\$0	\$302,000	\$378,000	\$378,000	\$378,000	\$378,000	\$370,000	\$264,000	\$136,000	\$60,000	2,644,000
364 Longhole Stope Blasting	\$0	\$0	\$0	\$739,000	\$925,000	\$925,000	\$925,000	\$925,000	\$906,000	\$647,000	\$333,000	\$148,000	6,473,000
365 Longhole Stope Mucking	\$0	\$0	\$0	\$574,000	\$717,000	\$717,000	\$717,000	\$717,000	\$703,000	\$502,000	\$258,000	\$116,000	5,021,000
380 High Density Backfill	\$0	\$0	\$0	\$577,000	\$721,000	\$721,000	\$721,000	\$721,000	\$707,000	\$505,000	\$260,000	\$115,000	5,048,000
390 Misc Devel, Equip Replace	\$0	\$0	\$0	\$30,000	\$30,000	\$130,000	\$130,000	\$130,000	\$230,000	\$120,000	\$50,000	\$50,000	900,000
Subtotal	\$2,919,000	\$5,284,000	\$8,203,000	\$3,900,000	\$4,577,000	\$4,677,000	\$4,677,000	\$4,677,000	\$4,609,000	\$3,254,000	\$1,837,000	\$793,000	\$33,001,000
\$/Ton Ore				\$19.50	\$18.31	\$18.71	\$18.71	\$18.71	\$18.81	\$18.59	\$20.41	\$19.83	\$18.86
TOTAL	\$5,007,000	\$8,637,000	\$13,644,000	\$7,651,000	\$8,424,000	\$8,522,000	\$8,519,000	\$8,519,000	\$8,443,000	\$6,540,000	\$3,998,000	\$1,794,000	\$62,410,000
\$/TON ORE				\$38.26	\$33.70	\$34.09	\$34.08	\$34.08	\$34.46	\$37.37	\$44.42	\$44.85	\$35.66

CAPITAL COST BREAKDOWN

NO.	ITEM	UNIT COST	TOTAL (\$000s)
6	2 Boom E/H jumbo	337,150	2,023
6	15 Ton diesel truck	146,240	877
6	3.5 cu. yd. Diesel LHD	173,000	1,038
10	Stopes (air)	3,180	32
10	Jackleg (air)	3,180	32
1	Portable refuge station	10,000	10
3	Service vehicles elec/mech/lube	71,000	213
1	Anfo Truck	100,008	100
6	Anfo Loaders	1,000	6
1	Grader w/Blade	7,500	75
1	1 Personnel Carrier	21,000	21
2	Personnel Vehicles	20,000	40
1	Diamond drill & rods	70,000	70
1	Fuel tanker	86,000	86
6	Scissor truck	297,500	1,785
6	Pumps 58 HP	15,699	94
12	Pumps 13 HP	4,372	52
1	Traffic signals/communication		100
	U.G Electrician		309
2	Service Shop - outfit ?? tools	72,056 40,000	112
2	Outfit Refuge Station	28,000	56
1 lot	Misc. Tools	200,000	200
2	Main pumps & install.		500
12	Auxiliary fans	5000	60
4	Mine Johns	3000	12
1	2 Motor Alimak raise climber and rail	149	149
2	Surface Fans W/ cooling system	175	350
2	Surface trucks	130	260

1	Surface loader/forklift	129	129
2	Compressor	80	160
TOTAL			8,951
SURFACE INFRASTRUCTURE			
1	Backfill plant & boreholes		415
1	Portal (set-up, excavate and const. dump)		640
	Electrical - Generator/Powerline		594
	Surface Shop	32,000	410
	Dry	209,000	
	Office	9,000	
	Safety Supplier	160,000	
TOTAL			2,059

APPENDIX V

OPTION 1

CASH01A.WK1 BASE 3

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus \$770,406
IRR % 11

RESERVES SUMMARY											METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	US\$/oz		
Indicated						0.91						
Inferred						0.91						
Total	0	0		0	0.22	0.91	0		RECOVERY (Au) 0.906 (Ag) 0.620			
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			200,000	250,000	250,000	250,000	250,000	205,000	125,000	73,000		1,603,000
Au oz/t			0.26	0.26	0.23	0.23	0.22	0.20	0.19	0.18		0.22
Gold oz (mined)			51,368	63,757	58,329	56,520	53,915	41,602	23,226	13,378	0	362,095
Silver oz (mined)			482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	0	4,409,708
Gold oz (poured)			46539.408	57763.842	52846.074	51207.120	48846.990	37691.412	21042.756	12120.468	0.000	
Silver oz (poured)			298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	0.000	
REVENUES												
Gold			16,754,187	20,794,983	19,024,587	18,434,563	17,584,916	13,568,908	7,575,392	4,363,368	0	118,100,905
Silver			1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	0	10,936,076
Gross			17,949,743	22,289,188	20,515,910	19,924,924	19,323,515	15,216,405	8,745,821	5,071,475	0	129,036,981
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	10,434,500	6,362,500	3,715,700	0	81,592,700
CAPITAL COSTS												
Development	2,286,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	63,500		8,170,800
Mining Equipment	70,000		7,148,000									7,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	2,000,000									2,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500,000	500000.000										1,000,000
Environmental & Permitting	250,000	250000.000										500,000
Closure										250,000	250,000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	313,500	250,000	35,446,800
TOTAL CASH COST	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	10,815,500	6,565,700	4,029,200	250,000	117,039,500
CASH SURPLUS	(3,106,000)	(17,124,800)	(3,660,157)	8,840,288	7,219,410	6,628,424	6,027,015	4,400,905	2,180,121	1,042,275	(250,000)	11,997,481

OPTION 2

CASHO1B.WK1 BASE 4

CASE: Tax Free
 Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 7 days/week

NPV Cash Surplus
 IRR %

2,777,418
 15

Category	RESERVES SUMMARY										METAL PRICES		
	In Situ	Available	Grade	Diluted	Diluted	Recovery	Troy	Gold	380 US\$/oz		4.00 US\$/oz		
	tons	tons	Au oz/t	tons	Au oz/t	%	ounces	Silver	RECOVERY (Au)		0.91		0.91
Indicated						0.92			0.92		0.92		0.92
Inferred						0.92			0.92		0.92		0.92
Total	0	0		0	0.22	0.92	0						
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
PRODUCTION													
Tons			280,000	350,000	350,000	335,000	253,500	34,500				1,603,000	
Au oz/t			0.26	0.26	0.22	0.20	0.21	0.21				0.23	
Gold oz (mined)			71,915	88,260	77,877	66,051	49,692	7,300				362,095	
Silver oz (mined)			674,911	843,503	627,336	1,092,024	819,108	82,924				4,409,707	
Gold oz (poured)			65155	80870	70557	59842	45021	6914	0	0	0		
Silver oz (poured)			418445	522972	574950	658455	507848	51351	0	0	0		
REVENUES													
Gold			23,456,798	28,113,042	25,400,362	21,543,194	16,207,543	2,390,998	0	0	0	118,100,905	
Silver			1,673,779	2,091,887	2,269,801	2,633,620	2,031,363	205,404	0	0	0	10,900,073	
Gross			25,129,578	31,204,929	27,700,163	24,177,014	18,238,926	2,596,372	0	0	0	129,000,979	
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			14,252,000	17,815,000	17,815,000	17,051,500	12,903,150	1,758,050	0	0	0	81,592,700	
CAPITAL COSTS													
Development	2290000	2,074,800	853,800	853,800	812,800	812,800	391,000	76,200				8,170,800	
Mining Equipment	70,000		7148000									7,218,000	
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2000000	969000									2,969,000	
Diamond Drilling	500000	500000										1,000,000	
Environmental & Permitting	250,000	250,000										500,000	
Closure												3,100,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,759,600	853,800	812,800	812,800	391,000	326,200	250,000	0	0	35,446,600	
TOTAL CASH COST	3,106,000	17,124,800	26,021,600	18,678,800	18,827,800	17,864,300	13,294,150	2,082,250	250,000	0	0	117,038,500	
CASH SURPLUS	(3,106,000)	(17,124,800)	(892,024)	12,526,329	9,072,363	6,312,714	4,954,778	504,122	(250,000)	0	0	11,997,479	

OPTION 3

CASHO15.WK1 BASE 1

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus
IRR %

\$697,744
11%

RESERVES SUMMARY											METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces		Gold Silver	360 US\$/oz 4.00 US\$/oz		
Indicated						0.92						
Inferred						0.92						
Total	0	0		0	0.22	0.92	0			RECOVERY (Au) (Ag)	0.906 0.620	
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			125,000	187,500	187,500	187,500	187,500	162,500	162,500	106,100	24,000	1,330,100
Au oz/t			0.27	0.27	0.27	0.26	0.24	0.22	0.22	0.22	0.24	0.25
Gold oz (mined)			34,338	50,764	50,764	49,277	44,464	35,328	35,328	23,175	5,736	329,174
Silver oz (mined)			332,751	498,023	498,023	495,817	598,079	566,204	566,204	365,289	62,617	3,983,007
Gold oz (poured)			31110.228	45992.184	45992.184	44644.962	40284.384	32007.168	32007.168	20996.550	5196.816	298,232
Silver oz (poured)	0.000		206305.620	308774.260	308774.260	307406.540	370808.980	351046.480	351046.480	226479.180	38822.540	2,469,464
REVENUES												
Gold			11,199,682	16,557,186	16,557,186	16,072,186	14,502,378	11,522,580	11,522,580	7,558,758	1,870,854	107,363,392
Silver			825,222	1,235,097	1,235,097	1,229,626	1,483,236	1,404,186	1,404,186	905,917	155,290	9,877,857
Gross			12,024,905	17,792,283	17,792,283	17,301,812	15,985,614	12,926,766	12,926,766	8,464,675	2,026,144	117,241,249
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,490	1,221,600	67,702,090
CAPITAL COSTS												
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800
Mining Equipment	70,000		7,148,000									7,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	2,000,000									2,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500000.000	500000.000										1,000,000
Encironmental & Permitting	250000.000	250000.000										500,000
Closure										250000.000	250000.000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	35,446,800
TOTAL CASH COST	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	8,652,250	8,576,050	5,777,490	1,471,600	103,148,890
CASH SURPLUS	(3,106,000)	(17,124,800)	(5,903,995)	7,588,133	7,689,733	7,199,262	5,883,064	4,274,516	4,350,716	2,687,185	554,544	14,092,359

50.90
E

26.65

OPTION 4

CASHO15B.WK1 BASE 2

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 7 days/week

NPV Cash Surplus
IRR %

\$2,831,147
14

RESERVES SUMMARY												METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz 4.00 US\$/oz				
Indicated						0.92							
Inferred						0.92							
Total	0	0		0	0.22	0.92	0					RECOVERY (Ag) (Au)	0.906 0.620
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
PRODUCTION													
Tons			175,000	262,500	262,500	262,500	229,600	114,000	24,000			1,330,100	
Au oz/t			0.27	0.27	0.26	0.23	0.22	0.23	0.24			0.25	
Gold oz (mined)			48,073	71,069	69,285	59,282	49,482	26,265	5,763	0	0	329,199	
Silver oz (mined)			465,852	697,233	694,585	907,104	818,362	337,257	62,617	0	0	3,983,010	
Gold oz (poured)			43,554	64,389	62,772	53,709	44,813	23,796	5,221	0	0	298,254	
Silver oz (poured)			288,828	432,284	430,643	562,404	507,384	209,099	38,823	0	0	2,469,466	
REVENUES													
Gold			15,679,490	23,179,865	22,597,996	19,335,417	16,132,526	8,566,592	1,879,660	0	0	107,371,546	
Silver			1,155,313	1,729,138	1,722,571	2,249,618	2,029,538	836,397	155,290	0	0	9,877,865	
Gross			16,834,803	24,909,003	24,320,566	21,585,035	18,162,064	9,402,990	2,034,950	0	0	117,249,411	
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			8,907,500	13,361,250	13,361,250	13,361,250	11,686,640	5,802,600	1,221,600	0	0	67,702,090	
CAPITAL COSTS													
Development	2,286,000	2,074,800	863,800	863,800	711,200	711,200	508,000	152,000				8,170,800	
Mining Equipment	70,000		7,148,000									7,218,000	
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2,000,000	958,000									2,958,000	
Diamond Drilling	500,000	500,000										1,000,000	
Environmental & Permitting	250,000	250,000										500,000	
Closure								250,000	250,000			500,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,769,800	863,800	711,200	711,200	508,000	402,000	250,000	0	0	35,446,800	
TOTAL CASH COST	3,106,000	17,124,800	20,677,300	14,225,050	14,072,450	14,072,450	12,194,640	6,204,600	1,471,600	0	0	103,148,890	
CASH SURPLUS	(3,106,000)	(17,124,800)	(3,842,497)	10,683,953	10,248,116	7,512,585	5,967,424	3,198,390	563,350	0	0	14,100,521	

OPTION 5

cash015-1 A MOD 1

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week
reduced capital
cost same

NPV Cash Surplus
IRR %

\$2,613,597
13%

Category	RESERVES SUMMARY										METAL PRICES	
	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Tray ounces	Gold Silver			250 US\$/oz	4.00 US\$/oz
	Indicated Inferred Total					0.92 0.92 0.92	0				RECOVERY (Au) (Ag)	0.908 0.620
	0	0										
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			125,000	187,500	187,500	187,500	187,500	182,500	182,500	108,100	24,000	1,333,100
Au oz/t			0.27	0.27	0.27	0.26	0.24	0.22	0.22	0.22	0.24	0.25
Gold oz (mined)			34,338	50,764	50,764	49,277	44,464	35,328	35,328	23,175	5,738	328,174
Silver oz (mined)			332,761	498,023	498,023	495,817	598,079	598,204	598,204	355,269	82,817	3,883,007
Gold oz (poured)			31110.228	45992.184	45992.184	44844.982	40284.384	32007.188	32007.188	20998.560	5198.815	298,232
Silver oz (poured)	0.000		208305.620	308774.260	308774.260	307408.540	370808.980	351048.480	351048.480	220470.180	38822.540	2,498,484
REVENUES												
Gold			11,198,892	16,567,188	16,567,188	16,072,188	14,502,378	11,522,580	11,522,580	7,558,758	1,870,854	107,383,362
Silver			826,222	1,236,097	1,236,097	1,228,628	1,483,238	1,404,188	1,404,188	905,817	155,280	8,877,857
Gross			12,024,905	17,792,283	17,792,283	17,301,812	15,985,614	12,926,768	12,926,768	8,464,575	2,026,144	117,241,249
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			8,382,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,490	1,221,800	87,702,090
CAPITAL COSTS												
Development	2286000.000	2,074,800	893,400	893,400	568,800	568,800	568,800	381,000	304,800	127,000		8,170,800
Mining Equipment	70,000		8,148,000									8,218,000
Plant		8,000,000										8,000,000
Tailings Dam		800,000	1,000,000									1,800,000
Infrastructure		2,000,000	668,000									2,668,000
Diamond Drilling	500000.000	500000.000										1,000,000
Environmental & Permitting	250000.000	250000.000										500,000
Closure										250000.000	250000.000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,108,000	18,824,800	9,598,400	893,400	568,800	568,800	568,800	381,000	304,800	377,000	250,000	32,948,800
TOTAL CASH COST	3,108,000	18,824,800	18,828,800	10,204,150	10,102,550	10,102,550	10,102,550	8,652,250	8,578,050	5,777,490	1,471,800	100,648,890
CASH SURPLUS	(3,108,000)	(18,824,800)	(3,903,905)	7,588,133	7,689,733	7,199,262	6,883,064	4,274,518	4,350,718	2,687,185	554,544	18,592,359

OPTION 6

cash015-1 A MOD 2

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week
reduced capital
increase op

NPV Cash Surplus (\$1,125,005)
RR % 8%

Category	In Situ tons	RESERVES SUMMARY		Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	METAL PRICES		RECOVERY (Au) (Ag)	0.008 US\$/oz 0.020 US\$/oz
		Available tons	Indicated Inferred Total							300 US\$/oz 4.00 US\$/oz			
			0	0	0	0.22	0.92 0.92 0.92	0					
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons			125,000	187,500	187,500	187,500	187,500	182,500	182,500	106,100	24,000	1,330,100	
Au oz/t			0.27	0.27	0.27	0.26	0.24	0.22	0.22	0.22	0.24	0.25	
Gold oz (mined)			34,338	50,764	50,764	48,277	44,484	35,328	35,328	23,175	5,738	329,174	
Silver oz (mined)			332,751	498,023	498,023	465,817	508,079	598,204	598,204	365,289	82,817	3,863,007	2,955
Gold oz (poured)			31110.228	45992.184	45992.184	44844.952	40284.384	32007.188	32007.188	20695.550	5198.818	298,232	
Silver oz (poured)	0.000		208305.620	308774.280	308774.280	307408.540	370808.980	351048.480	351048.480	228479.180	38822.540	2,498,484	
REVENUES													
Gold			11,198,892	16,567,188	16,567,188	16,072,188	14,802,378	11,522,580	11,522,580	7,558,758	1,870,854	107,363,392	
Silver			825,222	1,235,097	1,235,097	1,228,628	1,483,235	1,404,188	1,404,188	905,917	155,280	9,877,857	
Gross			12,024,905	17,792,283	17,792,283	17,301,812	16,985,614	12,926,768	12,926,768	8,464,675	2,026,144	117,241,249	
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	74,472,268	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			6,998,750	10,498,125	10,498,125	10,498,125	10,498,125	8,098,375	8,098,375	5,940,539	1,343,780		
CAPITAL COSTS													
Development	2288000.000	2,074,800	880,400	880,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800	
Mining Equipment	70,000		8,000,000	8,148,000								8,218,000	
Plant		8,000,000										8,000,000	
Tailings Dam		500,000	1,000,000									1,500,000	
Infrastructure		2,000,000	988,000									2,988,000	
Diamond Drilling	500000.000	500000.000										1,000,000	
Environmental & Permitting	250000.000	250000.000										500,000	
Closure										250000.000	250000.000	500,000	
EPCM		2,300,000	800,000	880,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	3,100,000	
Total	3,106,000	16,624,800	9,588,400	880,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	32,948,800	
TOTAL CASH COST	3,106,000	16,624,800	16,595,150	11,158,525	11,058,925	11,058,925	11,058,925	8,479,375	8,403,175	6,317,539	1,583,780	107,419,099	
CASH SURPLUS	(3,106,000)	(16,624,800)	(4,540,245)	8,633,758	6,735,358	8,244,887	4,926,689	3,447,391	3,523,591	2,147,138	432,364	8,822,150	

OPTION 7

CASHO15B.WK1 B MOD 1

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 7 days/week
red cap
ope same

NPV Cash Surplus
IRR %

\$4,333,777
17

RESERVES SUMMARY

METAL PRICES

360 US\$/oz
4.00 US\$/oz

Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz			
									4.00 US\$/oz			
Indicated						0.92						
Inferred						0.92						
Total	0	0		0	0.22	0.92	0			RECOVERY (Ag) (Au)	0.906 0.620	
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			175,000	262,500	262,500	262,500	229,600	114,000	24,000			1,330,100
Au oz/t			0.27	0.27	0.26	0.23	0.22	0.23	0.24			0.25
Gold oz (mined)			48,073	71,069	69,285	59,282	49,462	26,265	5,763	0	0	329,199
Silver oz (mined)			465,852	697,233	694,585	907,104	818,362	337,257	62,617	0	0	3,983,010
Gold oz (poured)			43,554	64,389	62,772	53,709	44,813	23,796	5,221	0	0	298,254
Silver oz (poured)			288,828	432,284	430,643	562,404	507,384	209,099	38,823	0	0	2,489,486
REVENUES												
Gold			15,679,490	23,179,865	22,597,996	19,335,417	16,132,526	8,566,592	1,879,660	0	0	107,371,546
Silver			1,155,313	1,729,138	1,722,571	2,249,618	2,029,538	836,397	155,290	0	0	9,877,865
Gross			16,834,803	24,909,003	24,320,566	21,585,035	18,162,064	9,402,990	2,034,950	0	0	117,249,411
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			8,907,500	13,361,250	13,361,250	13,361,250	11,686,640	5,802,600	1,221,600	0	0	67,702,090
CAPITAL COSTS												
Development	2,286,000	2,074,800	863,800	863,800	711,200	711,200	508,000	152,000				8,170,800
Mining Equipment	70,000		6,148,000									6,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	1,000,000									1,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500,000		500,000									1,000,000
Environmental & Permitting	250,000	250,000										500,000
Closure								250,000	250,000			500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	9,769,800	863,800	711,200	711,200	508,000	402,000	250,000	0	0	33,448,800
TOTAL CASH COST	3,106,000	17,124,800	18,677,300	14,225,050	14,072,450	14,072,450	12,194,640	8,204,600	1,471,600	0	0	101,148,890
CASH SURPLUS	(3,106,000)	(17,124,800)	(1,842,497)	10,683,953	10,248,116	7,512,585	5,967,424	3,198,390	563,350	0	0	16,100,521

OPTION 8

CASHO15B.WK1 B MOD 2

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 7 days/week
red cap
Increase op 10%

NPV Cash Surplus
IRR %

\$245,903
10

RESERVES SUMMARY

METAL PRICES

360 US\$/oz
4.00 US\$/oz

RECOVERY (Ag)
(Au) 0.906
0.620

Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver				
Indicated						0.92						
Inferred						0.92						
Total	0	0		0	0.22	0.92	0					
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			175,000	262,500	262,500	262,500	229,600	114,000	24,000			1,330,100
Au oz/t			0.27	0.27	0.26	0.23	0.22	0.23	0.24			0.25
Gold oz (mined)			48,073	71,069	69,285	59,282	49,462	28,265	5,763	0	0	329,199
Silver oz (mined)			485,852	697,233	694,585	907,104	818,362	337,257	62,617	0	0	3,983,010
Gold oz (poured)			43,554	64,389	62,772	53,709	44,813	23,796	5,221	0	0	298,254
Silver oz (poured)			288,828	432,284	430,643	562,404	507,384	209,099	38,823	0	0	2,469,468
REVENUES												
Gold			15,679,490	23,179,865	22,597,998	19,335,417	16,132,526	8,566,592	1,879,660	0	0	107,371,546
Silver			1,155,313	1,729,138	1,722,571	2,249,618	2,029,538	836,397	155,290	0	0	9,877,865
Gross			16,834,803	24,909,003	24,320,566	21,585,035	18,162,064	9,402,990	2,034,950	0	0	117,249,411
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			9,798,250	14,697,375	14,697,375	14,697,375	12,855,304	6,382,860	1,343,760	0	0	74,472,299
CAPITAL COSTS												
Development	2,286,000	2,074,800	863,800	863,800	711,200	711,200	508,000	152,000				8,170,800
Mining Equipment	70,000		6,148,000									6,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	1,000,000									1,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500,000	500,000										1,000,000
Environmental & Permitting	250,000	250,000										500,000
Closure								250,000	250,000			500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	9,769,800	863,800	711,200	711,200	508,000	402,000	250,000	0	0	33,448,800
TOTAL CASH COST												
	3,106,000	17,124,800	19,568,050	15,561,175	15,408,575	15,408,575	13,363,304	6,784,880	1,593,760	0	0	107,919,099
CASH SURPLUS												
	(3,106,000)	(17,124,800)	(2,733,247)	9,347,828	8,911,991	6,176,460	4,798,760	2,618,130	441,190	0	0	9,330,312

*p +

OPTION 10

cash015-1 A MOD 18

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week
reduced capital
ope same gold +10%

NPV Cash Surplus
FRR %

\$8,648,631
21%

METAL PRICES
396 US\$/oz
4.00 US\$/oz

Category	In Situ tons	Available tons	Grade Au oz/t	Disturbed tons	Disturbed Au oz/t	Recovery %	Troy ounces	Gold Silver	Year 8	Year 9	Year 10	Totals
Indicated						0.92						
Inferred						0.92						
	0	0		0	0.22	0.92	0					
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			125,000	187,500	187,500	187,500	187,500	187,500	187,500	108,100	24,000	1,333,100
Au oz/t			0.27	0.27	0.27	0.26	0.24	0.22	0.22	0.22	0.24	0.25
Gold oz (mined)			34,338	50,784	50,784	49,277	44,464	35,328	35,328	23,175	5,738	328,174
Silver oz (mined)				498,023	498,023	498,017	598,079	598,204	598,204	395,289	62,817	3,983,007
Gold oz (poured)												
Silver oz (poured)												
			31,110,228	45,992,184	45,992,184	44,844,992	40,284,384	32,007,188	32,007,188	20,008,550	5,198,818	298,232
		0.000	209,305,820	308,774,280	308,774,280	307,408,540	370,808,980	351,048,480	351,048,480	228,478,180	38,822,540	2,489,484
REVENUES												
Gold			12,319,950	18,212,905	18,212,905	17,879,405	15,952,818	12,874,839	12,874,839	8,314,634	2,057,839	118,098,731
Silver			825,222	1,235,097	1,235,097	1,229,626	1,483,238	1,404,188	1,404,188	905,917	155,280	9,877,857
Gross			13,144,873	19,448,002	19,448,002	19,108,031	17,435,852	14,279,024	14,279,024	9,220,551	2,213,229	127,977,588
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Mining (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			8,382,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,480	1,221,800	87,702,080
CAPITAL COSTS												
Development	2288000,000	2,074,800	880,400	880,400	558,800	558,800	558,800	391,000	304,800	127,000		8,170,800
Mining Equipment			6,148,000									6,148,000
Plant			9,000,000									9,000,000
Tailings Dam			500,000	1,000,000								1,500,000
Infrastructure			2,000,000	958,000								2,958,000
Diamond Drilling	500000,000	500000,000										1,000,000
Environmental & Permitting	250000,000	250000,000										500,000
Closure										250000,000	250000,000	500,000
EPCM			2,300,000	800,000								3,100,000
TOTAL		3,108,000	18,624,800	9,598,400	880,400	558,800	558,800	391,000	304,800	377,000	250,000	32,948,800
TOTAL CASH COST	*p + 2Y	3,108,000	18,624,800	15,628,900	10,204,180	10,102,550	10,102,550	8,852,250	8,578,050	5,777,480	1,471,800	100,848,880
CASH SURPLUS		(3,108,000)	(18,624,800)	(2,784,027)	9,243,852	9,345,452	8,808,481	7,333,332	5,428,774	5,532,974	741,629	27,328,998

6

OPTION 11

CASHO15B.WK1 B MOD 1b

CASE:	Tax Free	NPV Cash Surplus (\$2,229,262)										
	Haulage Decline - Cut-of 100 f = 0.15 oz/ton (Au) @ 750 tpd & 7 days/week	IRR % 6										
	red cap											
	ope same gold - 10%											
	Category	RESERVES SUMMARY										
	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces		Gold Silver	METAL PRICES		
										324 US\$/oz		
Indicated						0.92						
Inferred						0.92						
Total	0	0		0	0.22	0.92	0			RECOVERY (Ag)	0.908	
										(Au)	0.620	
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year (100 9	Year 10	Totals
Tons			175,000	262,500	262,500	262,500	229,600	114,000	24,000			1,330,100
Au oz/t			0.27	0.27	0.26	0.23	0.22	0.23	0.24			0.25
Gold oz (mined)			48,073	71,089	69,285	59,282	49,482	28,285	5,783		0	0 329,199
Silver oz (mined)			485,852	697,233	694,585	907,104	818,362	337,257	62,617	0	0	3,983,010
Gold oz (poured)			43,554	64,389	62,772	53,709	44,813	23,796	5,221	0	0	298,254
Silver oz (poured)			288,828		430,643	562,404	507,384	209,099	38,823	0	0	2,469,466
REVENUES												
Gold			14,111,541	20,861,879	20,338,196	17,401,875	14,519,273	7,709,933	1,691,694	0	0	96,634,391
Silver			1,155,313	1,729,138	1,722,571	2,249,618	2,029,538	836,397	155,290	0	0	9,877,865
Gross			15,266,854	22,591,018	22,060,767	19,651,493	16,548,811	8,546,331	1,846,984	0	0	106,512,256
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			8,907,500	13,361,250	13,361,250	13,361,250	11,886,640	5,802,600	1,221,600	0	0	67,702,090
CAPITAL COSTS												
Development	2,286,000	2,074,800	863,800	863,800	711,200	711,200	508,000	152,000				8,170,800
Mining Equipment	70,000		6,148,000									6,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	1,000,000									1,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500,000	500,000										1,000,000
Environmental & Permitting	250,000	250,000										500,000
Closure								250,000	250,000			500,000
EPCM		2,300,000	800,000									3,100,000
Total 2Y p 2Y	3,106,000	17,124,800	9,769,800	863,800	711,200	711,200	508,000	402,000	250,000	0	0	33,446,800
TOTAL CASH COST	3,106,000	17,124,800	18,677,300	14,225,050	14,072,450	14,072,450		6,204,600		0	0	101,148,890
CASH SURPLUS	(3,106,000)	(17,124,800)	(3,410,446)	8,365,966	7,988,317	5,579,043	4,354,171	2,341,731	375,384	0	0	5,363,366

OPTION 12

CASHO15B.WK1 B MOD 1a

CASE:	Tax Free												NPV Cash Surplus	\$10,896,815
	Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 7 days/week												IRR %	27
	red cap													
	ope same gold +10%													
	Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces		Gold Silver	METAL PRICES			
										396 US\$/oz				
										4.00 US\$/oz				
	Indicated													
	Inferred													
	Total	0	0		0	0.22		0.92	0		RECOVERY (Ag)	0.906		
								0.92			(Au)	0.620		
PRODUCTION		Year 0	Year 1	Year 2	Year 3	Year 4	Y (100 ear 5	Year 6		Year 8Year 7	Year 9	Year 10	Totals	
	Tons			175,000	252,500	262,500	262,500	229,600	114,000	24,000			1,330,100	
	Au oz/t			0.27	0.27	0.26	0.23	0.22	0.23	0.24			0.25	
0	Gold oz (mined)			48,073	71,069	69,285	59,282	49,462	26,265	5,763		0	329,199	
	Silver oz (mined)			465,852	697,233	694,585	907,104	818,362	337,257	62,617	0	0	3,983,010	
	Gold oz (poured)			43,554	(100 64,389	62,772	53,709	44,813	23,796	5,221	0	0	298,254	
	Silver oz (poured)			288,828	432,284	430,643	562,404	507,384	209,099	38,823	0	0	2,469,466	
REVENUES														
	Gold			17,247,439	25,497,852	24,857,795	21,268,959	(100 17,745,779	9,423,252	2,067,626	0	0	118,108,700	
	Silver			1,155,313	1,729,138	1,722,571	2,249,618	2,029,538	836,397	155,290	0	0	9,877,865	
Gross				18,402,752	27,226,989	26,580,366	23,518,577	19,775,316	10,259,649	2,222,916	0	0	127,986,565	
OPERATING COST														
	*Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20		35.20	35.20	35.20		
	Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	(100 13.50	13.50	13.50		
	Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
	Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total		1,321,600		8,907,500	13,361,250	13,361,250	13,361,250	11,686,640	5,802,600		0	0	67,702,090	
CAPITAL COSTS														
	Development	2,286,000	2,074,800	863,800	863,800	711,200	711,200	508,000	152,000				8,170,800	
	Mining Equipment	70,000		6,148,000									6,218,000	
	Plant		9,500,000										9,500,000	
	Tailings Dam		500,000	1,000,000									1,500,000	
	Infrastructure		2,000,000	958,000									2,958,000	
	Diamond Drilling	500,000	500,000										1,000,000	
	Environmental & Permitting	250,000	250,000										500,000	
	Closure							250,000	250,000				500,000	
	EPCM		2,300,000	800,000									3,100,000	
Total		3,106,000	17,124,800	9,769,800	863,800	711,200	711,200	508,000	402,000	250,000	0	0		
TOTAL CASH COST		3,106,000	17,124,800	18,677,300	14,225,050	14,072,450	14,072,450	12,194,640	6,204,600	1,471,600	0	0	101,148,890	
CASH SURPLUS		(3,106,000)	(17,124,800)	(274,548)	13,001,939	12,507,916	9,446,127	7,580,676	4,055,049	751,316	0	0	26,837,675	

B

OP 710N B3

CASHO1A.WK1 BASE 3+10%au

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus \$7,696,240
IRR % 21

RESERVES SUMMARY												METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	4.00 US\$/oz			
Indicated						0.91							
Inferred						0.91							
Total	0	0		0	0.22	0.91	0		RECOVERY (Au)		0.906		
									(Ag)		0.620		
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons			200,000	250,000	250,000	250,000	250,000	205,000	125,000	73,000		1,603,000	
Au oz/t			0.28	0.28	0.26	0.25	0.24	0.22	0.20	0.20		0.24	
Gold oz (mined)			56,505	70,133	64,162	62,172	59,307	45,762	25,549	14,716	0	398,305	
Silver oz (mined)			482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	0	4,409,708	
Gold oz (poured)			51193.349	63540.226	58130.681	56327.832	53731.689	41460.553	23147.032	13332.515	0.000		
Silver oz (poured)			298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	0.000		
REVENUES													
Gold			18,429,606	22,874,481	20,927,045	20,278,020	19,343,408	14,925,799	8,332,931	4,799,705	0	129,910,996	
Silver			1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	0	10,936,076	
Gross			19,625,161	24,368,686	22,418,369	21,768,380	21,082,007	16,573,295	9,503,360	5,507,812	0	140,847,072	
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	10,434,500	6,362,500	3,715,700	0	81,592,700	
CAPITAL COSTS													
Development	2,286,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	63,500		8,170,800	
Mining Equipment	70,000		7,148,000										
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2,000,000	958,000									2,958,000	
Diamond Drilling	500,000	500000.000										1,000,000	
Environmental & Permitting	250,000	250000.000										500,000	
Closure										250,000	250,000	500,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	313,500	250,000	35,446,800	
TOTAL CASH COST	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	10,815,500	6,565,700	4,029,200	250,000	117,039,500	
CASH SURPLUS	(3,106,000)	(17,124,800)	(2,184,739)	10,919,786	9,121,869	8,471,880	7,785,507	5,757,795	2,937,660	1,478,612	(250,000)	23,807,572	

OPTION 14

CASHO1A.WK1 BASE 3-10%au

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus (\$6,155,427)
IRR % 0

RESERVES SUMMARY											METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	4.00 US\$/oz		
Indicated						0.91						
Inferred						0.91						
Total	0	0		0	0.22	0.91	0		RECOVERY (Au) 0.906 (Ag) 0.620			
PRODUCTION												
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			200,000	250,000	250,000	250,000	250,000	205,000	125,000	73,000		1,603,000
Au oz/t			0.23	0.23	0.21	0.20	0.19	0.18	0.17	0.16		0.20
Gold oz (mined)			46,231	57,381	52,496	50,868	48,524	37,442	20,903	12,040	0	325,886
Silver oz (mined)			482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	0	4,409,708
Gold oz (poured)			41885.467	51987.458	47561.467	46086.408	43962.291	33922.271	18938.480	10908.421	0.000	
Silver oz (poured)			298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	0.000	
REVENUES												
Gold			15,078,768	18,715,485	17,122,128	16,591,107	15,826,425	12,212,017	6,817,853	3,927,032	0	106,290,815
Silver			1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	0	10,936,076
Gross			16,274,324	20,209,690	18,613,451	18,081,468	17,565,024	13,859,514	7,988,282	4,635,139	0	117,226,891
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	10,434,500	6,362,500	3,715,700	0	81,592,700
CAPITAL COSTS												
Development	2,286,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	63,500		8,170,800
Mining Equipment	70,000		7,148,000									7,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	2,000,000									2,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500,000	500000.000										1,000,000
Environmental & Permitting	250,000	250000.000										500,000
Closure										250,000	250,000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	313,500	250,000	35,446,800
TOTAL CASH COST												
	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	10,815,500	6,565,700	4,029,200	250,000	117,039,500
CASH SURPLUS												
	(3,106,000)	(17,124,800)	(5,535,576)	6,760,790	5,316,951	4,784,968	4,268,524	3,044,014	1,422,582	605,939	(250,000)	187,391

OPTION 15

CASHO1A.WK1 BASE 3+600,000t

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus
IRR %

\$6,729,871
17

RESERVES SUMMARY												METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	4.00 US\$/oz			
Indicated						0.91							
Inferred						0.91							
Total	0	0		0	0.22	0.91	0			RECOVERY (Au) (Ag)	0.906 0.620		
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons			200,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	2,200,000	
Au oz/t			0.26	0.26	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.23	
Gold oz (mined)			51,368	63,757	58,329	56,520	53,915	53,915	53,915	53,915	53,915	499,549	
Silver oz (mined)			482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	322,625	4,732,333	
Gold oz (poured)			46539.408	57763.842	52846.074	51207.120	48846.990	48846.990	48846.990	48846.990	48846.990		
Silver oz (poured)			298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	200027.500		
REVENUES													
Gold			16,754,187	20,794,983	19,024,587	18,434,563	17,584,916	17,584,916	17,584,916	17,584,916	17,584,916	162,932,902	
Silver			1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	800,110	11,736,186	
Gross			17,949,743	22,289,188	20,515,910	19,924,924	19,323,515	19,232,413	18,755,345	18,293,023	18,385,026	174,669,088	
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	111,980,000	
CAPITAL COSTS													
Development	2,286,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	63,500		8,170,800	
Mining Equipment	70,000		7,148,000									7,218,000	
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2,000,000	958,000									2,958,000	
Diamond Drilling	500,000	500000.000										1,000,000	
Environmental & Permitting	250,000	250000.000										500,000	
Closure										250,000	250,000	500,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	313,500	250,000	35,446,800	
TOTAL CASH COST	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	13,106,000	12,928,200	13,038,500	12,975,000	147,426,800	
CASH SURPLUS	(3,106,000)	(17,124,800)	(3,860,157)	8,840,288	7,219,410	6,628,424	6,027,015	6,126,413	5,827,145	5,254,523	5,410,026	27,242,288	

OPTION 16

CASH01A.WK1 BASE 3+1.1Mt

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus
IRR %

\$9,996,554
17

RESERVES SUMMARY										METAL PRICES					US\$/oz
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 4.00	US\$/oz					
Indicated						0.91								0.906	
Inferred						0.91									
Total	0	0		0	0.22	0.91	0			RECOVERY (Au) (Ag)				0.620	
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Totals	
Tons			200,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000	2,700,000	
Au oz/t			0.26	0.26	0.23	0.23	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.23	
Gold oz (mined)			51,368	63,757	58,329	56,520	53,915	53,915	53,915	53,915	53,915	53,915	53,915	607,379	
Silver oz (mined)			482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	322,625	322,625	322,625	5,377,583	
Gold oz (poured)			46539.408	57763.842	52846.074	51207.120	48846.990	48846.990	48846.990	48846.990	48846.990	48846.990	48846.990		
Silver oz (poured)			298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	200027.500	200027.500	200027.500		
REVENUES															
Gold			16,754,187	20,794,983	19,024,587	18,434,563	17,584,916	17,584,916	17,584,916	17,584,916	17,584,916	17,584,916	17,584,916	198,102,735	
Silver			1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	800,110	800,110	800,110	13,336,406	
Gross			17,949,743	22,289,188	20,515,910	19,924,924	19,323,515	19,232,413	18,755,345	18,293,023	18,385,026	18,385,026	18,385,026	211,439,140	
OPERATING COST															
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	12,725,000	137,430,000	
CAPITAL COSTS															
Development	2,288,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	203,200	203,200	203,200	63,500	8,780,400	
Mining Equipment	70,000		7,148,000											7,218,000	
Plant		9,500,000												9,500,000	
Tailings Dam		500,000	2,000,000											2,500,000	
Infrastructure		2,000,000	958,000											2,958,000	
Diamond Drilling	500,000	500000.000												1,000,000	
Environmental & Permitting	250,000	250000.000												500,000	
Closure												250,000	250,000	500,000	
EPCM		2,300,000	800,000											3,100,000	
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	203,200	203,200	453,200	313,500	36,056,400	
TOTAL CASH COST	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	13,106,000	12,928,200	12,928,200	12,928,200	13,178,200	13,038,500	173,486,400	
CASH SURPLUS	(3,106,000)	(17,124,800)	(3,860,157)	8,840,288	7,219,410	6,628,424	6,027,015	6,126,413	5,827,145	5,364,823	5,456,826	5,206,826	5,346,526	37,952,740	

OPTION 17

CASHO15.WK1 BASE 1+10%au

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus \$6,732,778
IRR % 18%

RESERVES SUMMARY												METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold	Silver	360 US\$/oz	4.00 US\$/oz		
Indicated						0.92							
Inferred						0.92							
Total	0	0		0	0.22	0.92	0					RECOVERY (Au)	0.906
												(Ag)	0.620
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons			125,000	187,500	187,500	187,500	187,500	162,500	162,500	108,100	24,000	1,330,100	
Au oz/t			0.30	0.30	0.30	0.29	0.26	0.24	0.24	0.24	0.26	0.27	
Gold oz (mined)			37,772	55,840	55,840	54,205	48,910	38,861	38,861	25,493	6,310	362,091	
Silver oz (mined)			332,751	498,023	498,023	495,817	598,079	566,204	566,204	365,289	62,617	3,983,007	
Gold oz (poured)			34221.251	50591.402	50591.402	49109.458	44312.822	35207.885	35207.885	23096.205	5716.498	328,055	
Silver oz (poured)		0.000	206305.620	308774.260	308774.260	307406.540	370808.980	351046.480	351046.480	226479.180	38822.540	2,469,464	
REVENUES													
Gold			12,319,650	18,212,905	18,212,905	17,679,405	15,952,616	12,674,839	12,674,839	8,314,634	2,057,939	118,099,731	
Silver			825,222	1,235,097	1,235,097	1,229,626	1,483,236	1,404,186	1,404,186	905,917	155,290	9,877,857	
Gross			13,144,873	19,448,002	19,448,002	18,909,031	17,435,852	14,079,024	14,079,024	9,220,551	2,213,229	127,977,588	
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,490	1,221,600	67,702,090	
CAPITAL COSTS													
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800	
Mining Equipment	70,000		7,148,000									7,218,000	
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2,000,000	958,000									2,958,000	
Diamond Drilling	500000.000	500000.000										1,000,000	
Encironmental & Permitting	250000.000	250000.000										500,000	
Closure										250000.000	250000.000	500,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	35,446,800	
TOTAL CASH COST													
	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	8,652,250	8,576,050	5,777,490	1,471,600	103,148,890	
CASH SURPLUS													
	(3,106,000)	(17,124,800)	(4,784,027)	9,243,852	9,345,452	8,806,481	7,333,302	5,426,774	5,502,974	3,443,061	741,629	24,828,698	

OPTION 18

CASHO15.WK1 BASE 1-10%au

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus (\$5,337,290)
IRR % 3%

RESERVES SUMMARY											METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	US\$/oz		
Indicated						0.92						
Inferred						0.92						
Total	0	0		0	0.22	0.92	0		RECOVERY (Au)		0.906	
									(Ag)		0.620	
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			125,000	187,500	187,500	187,500	187,500	162,500	162,500	106,100	24,000	1,330,100
Au oz/t			0.25	0.24	0.24	0.24	0.21	0.20	0.20	0.20	0.22	0.22
Gold oz (mined)			30,904	45,688	45,688	44,349	40,018	31,795	31,795	20,858	5,162	296,257
Silver oz (mined)			332,751	498,023	498,023	495,817	598,079	566,204	566,204	365,289	62,617	3,983,007
Gold oz (poured)			27999.205	41392.966	41392.966	40180.466	36255.946	28806.451	28806.451	18896.895	4677.134	268,408
Silver oz (poured)		0.000	206305.620	308774.260	308774.260	307406.540	370808.980	351046.480	351046.480	226479.180	38822.540	2,469,464
REVENUES												
Gold			10,079,714	14,901,468	14,901,468	14,464,968	13,052,140	10,370,322	10,370,322	6,802,882	1,683,768	96,627,053
Silver			825,222	1,235,097	1,235,097	1,229,626	1,483,236	1,404,186	1,404,186	905,917	155,290	9,877,857
Gross			10,904,936	16,136,565	16,136,565	15,694,594	14,535,376	11,774,508	11,774,508	7,708,799	1,839,059	106,504,910
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,490	1,221,600	67,702,090
CAPITAL COSTS												
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800
Mining Equipment	70,000		7,148,000									7,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	2,000,000									2,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500000.000	500000.000										1,000,000
Encironmental & Permitting	250000.000	250000.000										500,000
Closure										250000.000	250000.000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	35,448,800
TOTAL CASH COST	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	8,652,250	8,576,050	5,777,490	1,471,600	103,148,890
CASH SURPLUS	(3,106,000)	(17,124,800)	(7,023,964)	5,932,415	6,034,015	5,592,044	4,432,826	3,122,258	3,198,458	1,931,309	367,459	3,356,020

OPTION 19

CASHO15.WK1 BASE 1+300

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus \$8,383,164
IRR % 18%

Category	RESERVES SUMMARY							METAL PRICES				
	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	4.00 US\$/oz	RECOVERY (Au) (Ag)	0.906 0.620
Indicated						0.92						
Inferred						0.92						
Total	0	0		0	0.22	0.92	0					
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			125,000	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	1,625,000
Au oz/t			0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.27
Gold oz (mined)			34,338	50,764	50,764	49,277	49,277	49,277	49,277	49,277	49,277	431,528
Silver oz (mined)			332,751	498,023	498,023	495,817	495,817	495,817	495,817	495,817	495,817	4,303,699
Gold oz (poured)			31110.228	45992.184	45992.184	44644.962	44644.962	44644.962	44644.962	44644.962	44644.962	390,964
Silver oz (poured)		0.000	206305.620	308774.260	308774.260	307406.540	307406.540	307406.540	307406.540	307406.540	307406.540	2,668,293
REVENUES												
Gold			11,199,682	16,557,186	16,557,186	16,072,186	16,072,186	16,072,186	16,072,186	16,072,186	16,072,186	140,747,172
Silver			825,222	1,235,097	1,235,097	1,229,626	1,229,626	1,229,626	1,229,626	1,229,626	1,229,626	10,673,174
Gross			12,024,905	17,792,283	17,792,283	17,301,812	17,301,812	17,301,812	17,301,812	17,301,812	17,301,812	151,420,346
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	82,712,500
CAPITAL COSTS												
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800
Mining Equipment	70,000		7,148,000									7,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	2,000,000									2,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500000.000	500000.000										1,000,000
Encironmental & Permitting	250000.000	250000.000										500,000
Closure										250000.000	250000.000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	35,446,800
TOTAL CASH COST	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	9,924,750	9,848,550	9,920,750	9,793,750	118,159,300
CASH SURPLUS	(3,106,000)	(17,124,800)	(5,903,995)	7,588,133	7,689,733	7,199,262	7,199,262	7,377,062	7,453,262	7,381,062	7,508,062	33,261,046

OPTION 28

CASH015.WK1 BASE 1+900

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus \$12,950,282
IRR % 18%

RESERVES SUMMARY												METAL PRICES		US\$/oz
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 4.00	US\$/oz				
Indicated						0.92								
Inferred						0.92								
Total	0	0			0	0.22	0.92	0			RECOVERY (Au) (Ag)			0.906 0.620
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Totals
Tons			125,000	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	2,000,000
Au oz/t			0.27	0.27	0.27	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.27
Gold oz (mined)			34,338	50,764	50,764	49,277	49,277	49,277	49,277	49,277	49,277	49,277	49,277	530,082
Silver oz (mined)			332,751	498,023	498,023	495,817	495,817	495,817	495,817	495,817	495,817	495,817	495,817	5,295,333
Gold oz (poured)			31110.228	45992.184	45992.184	44644.962	44644.962	44644.962	44644.962	44644.962	44644.962	44644.962	44644.962	390,964
Silver oz (poured)	0.000		206305.620	308774.260	308774.260	307406.540	307406.540	307406.540	307406.540	307406.540	307406.540	307406.540	307406.540	2,668,293
REVENUES														
Gold			11,199,682	16,557,186	16,557,186	16,072,186	16,072,186	16,072,186	16,072,186	16,072,186	16,072,186	16,072,186	16,072,186	172,891,545
Silver			825,222	1,235,097	1,235,097	1,229,626	1,229,626	1,229,626	1,229,626	1,229,626	1,229,626	1,229,626	1,229,626	13,132,426
Gross			12,024,905	17,792,283	17,792,283	17,301,812	17,301,812	17,301,812	17,301,812	17,301,812	17,301,812	17,301,812	17,301,812	186,023,971
OPERATING COST														
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	9,543,750	101,800,000
CAPITAL COSTS														
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000				8,170,800
Mining Equipment	70,000		7,148,000											7,218,000
Plant		9,500,000												9,500,000
Tailings Dam		500,000	2,000,000											2,500,000
Infrastructure		2,000,000	958,000											2,958,000
Diamond Drilling	500000.000	500000.000												1,000,000
Environmental & Permitting	250000.000	250000.000												500,000
Closure										250000.000	250000.000	250000.000	250000.000	1,000,000
EPCM		2,300,000	800,000											3,100,000
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	250,000	250,000	35,946,800
TOTAL CASH COST	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	9,924,750	9,848,550	9,920,750	9,793,750	9,793,750	9,793,750	137,746,800
CASH SURPLUS	(3,106,000)	(17,124,800)	(5,903,995)	7,588,133	7,689,733	7,199,262	7,199,262	7,377,062	7,453,262	7,381,062	7,508,062	7,508,062	7,508,062	48,277,171

OPTION 21 base 3 +10%gold price

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus \$7,696,240
IRR % 21

RESERVES SUMMARY											METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	396 4.00	US\$/oz US\$/oz		
Indicated						0.91						
Inferred						0.91						
Total	0	0		0	0.22	0.91	0					
										RECOVERY (Au) (Ag)	0.906 0.620	
PRODUCTION												
Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons		200,000	250,000	250,000	250,000	250,000	205,000	125,000	73,000		1,603,000	
Au oz/t		0.26	0.26	0.23	0.23	0.22	0.20	0.19	0.18		0.22	
Gold oz (mined)		51,368	63,757	58,329	56,520	53,915	41,602	23,226	13,378	0	362,095	
Silver oz (mined)		482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	0	4,409,708	
Gold oz (poured)		46539.408	57763.842	52846.074	51207.120	48846.990	37691.412	21042.756	12120.468	0.000		
Silver oz (poured)		298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	0.000		
REVENUES												
Gold		18,429,606	22,874,481	20,927,045	20,278,020	19,343,408	14,925,799	8,332,931	4,799,705	0	129,910,996	
Silver		1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	0	10,936,076	
Gross		19,625,161	24,368,686	22,418,369	21,768,380	21,082,007	16,573,295	9,503,360	5,507,812	0	140,847,072	
OPERATING COST												
Mining (\$/ton)		35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)		13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)		0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)		1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)		10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	10,434,500	6,362,500	3,715,700	0	81,592,700	
CAPITAL COSTS												
Development	2,286,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	63,500	8,170,800	
Mining Equipment	70,000		7,148,000								7,218,000	
Plant		9,500,000									9,500,000	
Tailings Dam		500,000	2,000,000								2,500,000	
Infrastructure		2,000,000	958,000								2,958,000	
Diamond Drilling	500,000	500000.000									1,000,000	
Environmental & Permitting	250,000	250000.000									500,000	
Closure									250,000	250,000	500,000	
EPCM		2,300,000	800,000								3,100,000	
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	313,500	35,446,800	
TOTAL CASH COST												
	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	10,815,500	6,565,700	4,029,200	117,039,500	
CASH SURPLUS												
	(3,106,000)	(17,124,800)	(2,184,739)	10,919,786	9,121,869	8,471,880	7,785,507	5,757,795	2,937,660	1,478,612	23,807,572	

OPTION22 BASE 3-10%au

CASE: Tax Free
Haulage Decline - Cut-off = 0.10 oz/ton (Au) @ 1000 tpd & 5 days/week

NPV Cash Surplus (\$6,155,427)
IRR % 0

RESERVES SUMMARY											METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	360 US\$/oz	4.00 US\$/oz		
Indicated						0.91						
Inferred						0.91						
Total	0	0		0	0.22	0.91	0		RECOVERY (Au) 0.906 (Ag) 0.620			
PRODUCTION												
	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals
Tons			200,000	250,000	250,000	250,000	250,000	205,000	125,000	73,000		1,803,000
Au oz/t			0.23	0.23	0.21	0.20	0.19	0.18	0.17	0.16		0.20
Gold oz (mined)			46,231	57,381	52,496	50,868	48,524	37,442	20,903	12,040	0	325,886
Silver oz (mined)			482,079	602,502	601,340	600,952	701,048	664,313	471,947	285,527	0	4,409,708
Gold oz (poured)			41885.467	51987.458	47561.467	46086.408	43962.291	33922.271	18938.480	10908.421	0.000	
Silver oz (poured)			298888.980	373551.240	372830.800	372590.240	434649.760	411874.060	292607.140	177026.740	0.000	
REVENUES												
Gold			15,078,768	18,715,485	17,122,128	16,591,107	15,826,425	12,212,017	6,817,853	3,927,032	0	106,290,815
Silver			1,195,556	1,494,205	1,491,323	1,490,361	1,738,599	1,647,496	1,170,429	708,107	0	10,936,076
Gross			16,274,324	20,209,690	18,613,451	18,081,468	17,565,024	13,859,514	7,988,282	4,635,139	0	117,226,891
OPERATING COST												
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	
Total (\$)			10,180,000	12,725,000	12,725,000	12,725,000	12,725,000	10,434,500	6,362,500	3,715,700	0	81,592,700
CAPITAL COSTS												
Development	2,286,000	2,074,800	723,900	723,900	571,500	571,500	571,500	381,000	203,200	63,500		8,170,800
Mining Equipment	70,000		7,148,000									7,218,000
Plant		9,500,000										9,500,000
Tailings Dam		500,000	2,000,000									2,500,000
Infrastructure		2,000,000	958,000									2,958,000
Diamond Drilling	500,000	500000.000										1,000,000
Environmental & Permitting	250,000	250000.000										500,000
Closure										250,000	250,000	500,000
EPCM		2,300,000	800,000									3,100,000
Total	3,106,000	17,124,800	11,629,900	723,900	571,500	571,500	571,500	381,000	203,200	313,500	250,000	35,446,800
TOTAL CASH COST												
	3,106,000	17,124,800	21,809,900	13,448,900	13,296,500	13,296,500	13,296,500	10,815,500	6,565,700	4,029,200	250,000	117,039,500
CASH SURPLUS												
	(3,106,000)	(17,124,800)	(5,535,576)	6,760,790	5,316,951	4,784,968	4,268,524	3,044,014	1,422,582	605,939	(250,000)	187,391

OPTION 23 BASE1 +10%GOLD PRICE

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus \$6,732,778
IRR % 18%

RESERVES SUMMARY												METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	396 US\$/oz	4.00 US\$/oz			
Indicated						0.92							
Inferred						0.92							
Total	0	0		0	0.22	0.92	0					RECOVERY (Au) 0.906	
												(Ag) 0.620	
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons			125,000	187,500	187,500	187,500	187,500	162,500	162,500	108,100	24,000	1,330,100	
Au oz/t			0.27	0.27	0.27	0.26	0.24	0.22	0.22	0.22	0.24	0.25	
Gold oz (mined)			34,338	50,764	50,764	49,277	44,464	35,328	35,328	23,175	5,736	329,174	
Silver oz (mined)			332,751	498,023	498,023	495,817	598,079	566,204	566,204	365,289	62,617	3,983,007	
Gold oz (poured)			31110.228	45992.184	45992.184	44644.962	40284.384	32007.168	32007.168	20996.550	5196.816	298,232	
Silver oz (poured)	0.000		206305.620	308774.260	308774.260	307406.540	370808.980	351048.480	351048.480	226479.180	38822.540	2,469,464	
REVENUES													
Gold			12,319,650	18,212,905	18,212,905	17,679,405	15,952,616	12,674,839	12,674,839	8,314,634	2,057,939	118,099,731	
Silver			825,222	1,235,097	1,235,097	1,229,626	1,483,236	1,404,186	1,404,186	905,917	155,290	9,877,857	
Gross			13,144,873	19,448,002	19,448,002	18,909,031	17,435,852	14,079,024	14,079,024	9,220,551	2,213,229	127,977,588	96.21
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20		
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50		
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,490	1,221,600	67,702,090	
CAPITAL COSTS													
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800	
Mining Equipment	70,000		7,148,000									7,218,000	
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2,000,000	958,000									2,958,000	
Diamond Drilling	500000.000	500000.000										1,000,000	
Encironmental & Permitting	250000.000	250000.000										500,000	
Closure										250000.000	250000.000	500,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	35,446,800	
TOTAL CASH COST	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	8,652,250	8,576,050	5,777,490	1,471,600	103,148,890	
CASH SURPLUS	(3,106,000)	(17,124,800)	(4,784,027)	9,243,852	9,345,452	8,806,481	7,333,302	5,426,774	5,502,974	3,443,061	741,629	24,828,698	

OPTION 24 **BASE1-10%GOLD PRICE**

CASE: Tax Free
Haulage Decline - Cut-off = 0.15 oz/ton (Au) @ 750 tpd & 5 days/week

NPV Cash Surplus (\$5,337,290)
IRR % 3%

RESERVES SUMMARY												METAL PRICES	
Category	In Situ tons	Available tons	Grade Au oz/t	Diluted tons	Diluted Au oz/t	Recovery %	Troy ounces	Gold Silver	324 US\$/oz 4.00 US\$/oz				
Indicated						0.92							
Inferred						0.92							
Total	0	0		0	0.22	0.92	0					RECOVERY (Au) (Ag)	0.906 0.620
PRODUCTION	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Totals	
Tons			125,000	187,500	187,500	187,500	187,500	162,500	162,500	106,100	24,000	1,330,100	
Au oz/t			0.27	0.27	0.27	0.26	0.24	0.22	0.22	0.22	0.24	0.25	
Gold oz (mined)			34,338	50,764	50,764	49,277	44,464	35,328	35,328	23,175	5,736	329,174	
Silver oz (mined)			332,751	498,023	498,023	495,817	598,079	566,204	566,204	365,289	62,617	3,983,007	
Gold oz (poured)			31110.228	45992.184	45992.184	44644.962	40284.384	32007.168	32007.168	20996.550	5196.816	298,232	
Silver oz (poured)		0.000	206305.620	308774.260	308774.260	307406.540	370808.980	351046.480	351046.480	226479.180	38822.540	2,469,464	
REVENUES													
Gold			10,079,714	14,901,468	14,901,468	14,464,968	13,052,140	10,370,322	10,370,322	6,802,882	1,683,768	96,627,053	
Silver			825,222	1,235,097	1,235,097	1,229,626	1,483,236	1,404,186	1,404,186	905,917	155,290	9,877,857	
Gross			10,904,936	16,136,565	16,136,565	15,694,594	14,535,376	11,774,508	11,774,508	7,708,799	1,839,059	106,504,910	80.07
OPERATING COST													
Mining (\$/ton)			35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	35.20	67,702,090	
Milling (\$/ton)			13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	13.50	50.90	
Tailings (\$/ton)			0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40		
Admin (\$/ton)			1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80		
Total (\$)			6,362,500	9,543,750	9,543,750	9,543,750	9,543,750	8,271,250	8,271,250	5,400,490	1,221,600	67,702,090	50.90
CAPITAL COSTS													
Development	2286000.000	2,074,800	660,400	660,400	558,800	558,800	558,800	381,000	304,800	127,000		8,170,800	
Mining Equipment	70,000		7,148,000									7,218,000	
Plant		9,500,000										9,500,000	
Tailings Dam		500,000	2,000,000									2,500,000	
Infrastructure		2,000,000	958,000									2,958,000	
Diamond Drilling	500000.000	500000.000										1,000,000	
Encironmental & Permitting	250000.000	250000.000										500,000	
Closure										250000.000	250000.000	500,000	
EPCM		2,300,000	800,000									3,100,000	
Total	3,106,000	17,124,800	11,566,400	660,400	558,800	558,800	558,800	381,000	304,800	377,000	250,000	35,446,800	26.65
TOTAL CASH COST	3,106,000	17,124,800	17,928,900	10,204,150	10,102,550	10,102,550	10,102,550	8,652,250	8,576,050	5,777,490	1,471,600	103,148,890	
CASH SURPLUS	(3,106,000)	(17,124,800)	(7,023,964)	5,932,415	6,034,015	5,592,044	4,432,826	3,122,258	3,198,458	1,931,309	367,459	3,356,020	