INTERIM FEASIBILITY STUDY
COSTS ESTIMATES AND ECONOMICS
MOUNT NANSEN MINE
MOUNT NANSEN MINES LIMITED

Vancouver, British Columbia
10 April, 1970

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SUMMARY & CONCLUSIONS

When Mount Nansen began milling operations in September 1968, insufficient exploration, development, research and planning had been done to warrent or supply feed for a 200 ton per day mill. Production was subsequently terminated in April of the following year and difficulties in securing working capital have curtailed further work. If and when funds are available it is recommended that an active program of exploration and research be carried out to establish the feasibility of reopening the mine. Metal prices will bear substantial weight in this decision however it is felt that a limited exploration program is justified at this time as reserve and grade potential must be known before any long range plans can be finalized. The suggested program would consist of diamond drilling followed by exploratory underground work and metallurgical testing.

Approximately 600,000 tons of production at inventory grade and metal prices would be required to liquidate present debts and the 1.5 million dollars needed to bring the mine to full production. This tonnage is relative to metal prices as each 10¢ increase in silver price would cut the required tonnage by 30,000 tons. It is suggested that a minimum of 500,000 tons should be set as the target. This tonnage would include all classifications other than potential or speculative.

If the preliminary exploration program proves encouraging, metallurgical test work should be initiated with 87% Au, 92% Ag and a ratio of concentration of 15-1 as minimal targets.

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Should the results of the exploration program be disappointing, the mine may be highgraded. In this case operating costs are estimated at $29.20 per ton, somewhat lower than normal as exploration development, engineering, repair and replacement costs would be virtually eliminated. Assuming that a conservative estimate of 100,000 tons are available for highgrading, $652,000 could be recovered as profits in addition to the plant's salvage value.

Long range production cost is estimated at $30.55 per ton, excluding Vancouver administration costs. Net ore value after mill and smelter losses is calculated to be $40.75 at $2.00 silver and $37.50 gold. Costs were based on a mill throughput of 300 tons per day at an operating rate of 13.5 tons per hour.

Please see page 62 for equipment additions and changes required to bring the mine to 300 tons per day output.

RECOMMENDATIONS

It is recommended that a work program be set up and initiated in the summer of 1970. The purpose of this program would be to determine the long range potential of Mount Nansen Mine and the feasibility of re-opening the mine at a full production rate of 300 tons per day. As 600,000 tons of production at present metal prices would be required to liquidate existing debts and pre-production costs, the exploration program should be planned to block this tonnage, at least in the diamond drill indicated category. The program should include limited underground development to correlate drill results with true conditions and permit a higher order of sampling.

If the required tonnage is blocked the mine can then be developed for a 300 ton per day operation. Should the program disprove the possibility of finding sufficient additional reserves the mine should be highgraded.

Exploration and development may be phased as follows:

Phase 1 - Exploratory

10,000 feet diamond drilling	$ 130,000	
Total		$ 130,000

Phase 2 - Exploration and Development

5,000 feet diamond drilling	$ 65,000	
1,000 feet drifting	$ 60,000	
600 feet raising	$ 36,000	
Metallurgical testing	$ 50,000	
Total		$ 211,000

Phase 3 - Development and Exploration

5,000 feet diamond drilling	$ 65,000	
2,000 feet drifting	$ 120,000	
1,000 feet raising	$ 60,000	
Total		$ 245,000

Phase 4 - Preparation for Production

4 months at $200,000	$ 800,000	
Equipment purchases	$ 185,000	
Mill modification	$ 100,000	
Total		$ 1,085,000
Total - For all phases to production		$ 1,671,000

Respectfully submitted

Robert C. McCombe

INTRODUCTION

This interim report was prepared for Mount Nansen Mines as a guide for future feasibility studies by the Company's planning staff. The cost estimates included in this report are in part to be used with caution as final milling practices, recoveries, smelter charges, development waste-ore ratio and catering, to name a few items, could only be approximated.

Ore reserve figures were taken directly from Dr. Bianconi's report and were not confirmed by an impartial consultant or firm.

COMPANY

Mount Nansen Mines Limited was incorporated under the laws of Ontario in 1963, with a share capitalization of 10,000,000. There are 7,653,607 shares issued and outstanding.

The Company is controlled by Peso Silver Mines Limited which is in turn controlled by Charter Oil Company Limited. Canadawide Investments Limited is the owner of approximately 28% of the issued shares of Charter Oil Company Limited and may be deemed to control the Company.

Officers and Directors of the Company are:

D.M. Mercier	- President and Director
R.P. Gibbons	- Secretary
H. Willi	- Chairman of the board
F.M. Bianconi	- Director
R. Saager	- Director

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LOCATION

Mount Nansen Mine lies approximately forty miles west of Carmacks, Yukon Territory, at latitude 62°03' north and longitude 137°08' west.

PROPERTY

The mine is located within a contiguous group of 309 mining claims covering an area of approximately 25 square miles.

Brown-McDade, an affiliated company, adjoins Mount Nansen to the south-east and holds 70 claims covering some 5 square miles.

ACCESS

The property is accessible by road from Carmacks, situated at mile 105 on the Dawson Highway. The forty miles long all weather access road between Carmacks and the property can carry most vehicles, but is narrow and has grades to 15%.

A system of tote roads in the Mount Nansen area permits travel to most of the surrounding countryside by tracked or four wheel drive vehicles.

A 3000 feet landing strip is located four miles from the mine. This strip can accommodate light aircraft during most of the year. Float equiped aircraft can land on nearby lakes.

TOPOGRAPHY

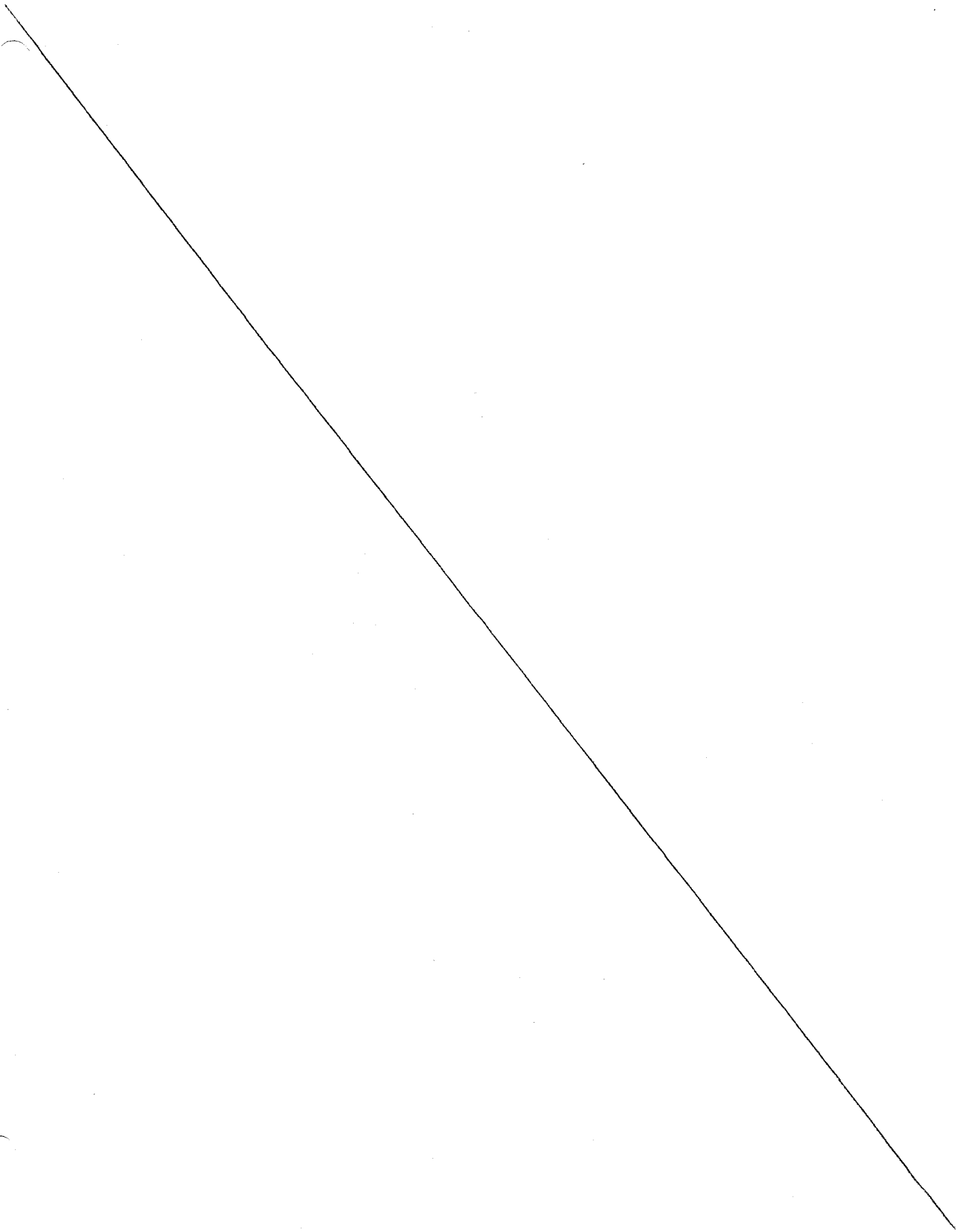
The property lies in the Dawson Range of the Rocky Mountains and the relief is moderate. Valley floors in the vicinity of the mine have

an elevation of about 3,500 feet while the peaks rise to 6,000 feet. Mount Victoria, the highest peak in the area, has an elevation of 6,136 feet.

Valley walls rise gently form the stream beds to about 4,400 feet. from which point peaks rise abruptly and precipitously.

GEOLOGY & MINERALOGY

Geology and mineralogy have been adequately covered in other reports and consequently will not be covered here.



ORE RESERVES

Numerous conflicting ore reserve estimates have been prepared for Mount Nansen Mine and associated properties since exploration and development were initiated. (A reference list of these reports may be found on page 66). The most recent of these estimates, from which the applicable data used in this report was derived, was compiled by Dr. F. Bianconi. Tonnages and grades were calculated on a minimum stoping width of four feet, or vein width when wider than four feet. Only minable reserves are given.

A summary of reserves is as follows:

1. **Huestis Mine**

Classification	Tons	Oz.Au	Oz.Ag
Proven	12,970	0.437	11.06
Probable	37,400	0.431	11.84
Possible	13,630	0.371	13.65
Total	64,000	0.42	12.06

2. Webber Mine

Classification	Tons	Oz.Au	Oz.Ag
Proven	16,057	0.390	26.05
Probable	23,418	0.314	17.82
Possible	5,380	0.310	13.80
Total	44,855	0.34	20.28

3. Total, accessible and minable ore, Huestis and Webber Mines.

Classification	Tons	Oz.Au	Oz.Ag
Proven	29,027	0.41	19.35
Probable	60,818	0.39	14.14
Possible	19,010	0.35	13.67
Total	108,555	0.386	15.45

ORE VALUE

Gross value of Mount Nansen ore, assuming Au at $37.50 per oz and Ag at $2.00 per oz is $45.38 per ton. Net value when mill losses and smelter deductions are accounted for is $39.33 per ton. This is based on an assumed recovery of 87% Au and 92% Ag in the mill, and the smelter paying for 96.75% of the contained Au and 96% of the Ag [less 1¢ per fine oz].

Lead contained in Mount Nansen must also be considered. Very little test work has been done on lead revovery but past mill performance indicates that a conservative 10% Pb may be expected in future concentrates. A typical smelter contract would pay for contained lead less 1.5 units at market price less 2.5¢ per pound. Considering lead at 15¢ and a ratio of concentration of 15-1, net ore value is increased by $1.52 per ton.

Net value of the ore is therefore $40.75 per ton [Au $37.50/oz, Ag $2.00/oz, Pb 15¢/lb].

Price changes would affect net values as follows:

Metal	Change in Price	Change in Net Value
Au	$1.00	$0.32
Ag	$0.10	$1.36
Pb	$0.01	$0.13

ECONOMICS

Income

Annual income and profits are estimated as follows, assuming ore value remains at inventory value. Production at 300 tons per day would be 109,500 tons per year.

Gross revenue - 109,500 x 40.75	= $4,462,125
Less operating costs - 109,500 x 30.55	= $3,345,225
Gross profit	$1,116,900
Less Vancouver costs @ $15,000 / month	180,000
Net profit	$ 936,900

Liabilities

Liabilities at 31 July, 1969, amounted to $2,669,530. This figure represents loans and debentures and does not include outstanding current trade accounts.

Metall	- $1,650,539 @ 7.647%
Canadian Imperial Bank of Commerce	- 250,000 @ 8.000%
Charter Oil	- 768,991 @ 8.500%
Total	- $2,669,530 @ 7.926%

Applying net profits to clear the above liabilities would require 3.4 years at 109,500 tons per year production.

The required time was calculated using the folowing formula:

$$1 - \frac{Ai}{R} = [\,1 + i\,]^{-n}$$

Where: n = years required

A = Liability = $2,669,530

R = Payments = $936,900 per year

i = Interest rate = 7.926%

ECONOMICS - HIGHGRADING

If it is decided to highgrade the mine, costs can be cut by eliminating such items as engineering, diamond drilling, exploration, development and equipment replacement. Costs in some categories will increase due to a lower tonnage factor. Mill throughout is estimated at 200 tons per day for 100,000 tons. Mine life is therefore 1.4 years. No mill modifications have been provided for and recoveries are estimated at 78% for Au and 88% for Ag. A ratio of concentration of 1:10 is assumed.

Gross ore value taking Au at $37.50 and Ag at $2.00 is $45.38 per ton. Net value after mill losses and smelter deductions is $37.40 considering lead payments as equivalent to $0.50 per ton of ore.

Gross Revenues - 100,000 x 37.40	= $	3,740,000
Less operating costs - 100,000 x 29.20	= $	2,920,000
Gross Profit	$	820,000
Less Vancouver costs - 1.4 yrs @ 120,000	= $	168,000
Net Profit for 100,000 tons	$	652,000

MINING METHODS- RECOMMENDED PROCEDURES

All underground workings were examined and conditions observed, especially in the stopes, implied that shrinkage stoping is practicable, provided appropriate mining practices are adhered to. Holes have to be drilled parallel to the vein and to each other. Outer holes should be drilled about four inches inside the desired break line and loaded with a low strength explosive such as Xactex. Center holes should be loaded with a high strength explosive (example - Cigel B) to do the majority of the breaking. Drilling, loading and blasting must be carefully supervised.

Pillars should be left as ground conditions dictate, preferably in lower grade sections of the stope, both to support the ground and to increase the milling grade. These pillars should be domed, to prevent hang-ups when pulling.

To reduce dilution to a minimum the contract or bonus system has to be designed to penalize overbreak. This might be done by assigning each stope a minimal width and adjusting contract prices to include a bonus for breaking less than this assigned width and a penalty for overbreaking.

Every working stope requires at least one raise for safety, ventilation as well as mining and geological control. These raises can generally be driven bald and should be kept as narrow as possible. Replacement stopes can work off manways left open in previously completed stopes.

The "Mount Nansen" type chute adopted as a standard in the mine is of extremely poor design. A more efficient chute has to be designed and installed in all new stopes.

Development should be kept at least one year ahead of production for close grade control, to allow precise short range planning, and to prevent the confusion prevelant when development crews are working in close proximity to the mining areas.

COSTS

Mining, Milling and smelter costs have been calculated in cost per ton while administration and support costs were done on a 31 day month basis. Cost per ton for administration and support are as follows:

A. Yearly tonnage @ 300 tons per day = 109,500 Tons

B. Costs - Administration

Monthly costs	= $ 29,680
Yearly costs	= $356,160
Cost per ton	= $ 3.25 per ton

C. Costs - Support

Monthly costs	= $ 58,580
Yearly costs	= $702,960
Cost per ton	= $ 6.42 per ton

COSTS

Summary

A.	Administration	= $ 3.25 / Ton
B.	Mining	= $11.53 / Ton
C.	Milling	= $ 2.49 / Ton
D.	Support	= $ 6.42 / Ton
E.	Smelting	= $ 4.75 / Ton
F.	Sub Total	$28.44 / Ton
G.	5% Contingencies	= $ 1.42 / Ton
H.	Equipment Replacement	= $ 0.69 / Ton
I.	TOTAL	$30.55 / Ton

OPERATING COSTS - HIGHGRADING

Estimated costs for highgrading 100,000 tons at 200 tons per day are as follows:

Administration	$ 2.90 / Ton
Mining	$ 7.60 / Ton
Milling	$ 2.90 / Ton
Support	$ 7.00 / Ton
Smelting	$ 7.40 / Ton
Sub Total	$27.80 / Ton
5% Contingencies	$ 1.40 / Ton
TOTAL	$29.20 / Ton

ADMINISTRATION COSTS

Summary

-A-	Whitehorse Office	= $ 3570
-B-	Mount Nansen Office	= $ 5590
-C-	Mine Office	= $ 3600
-D-	Mill Office	= $ 1310
-E-	Catering	= $13630
-F-	Housing and Accommodation	= $ 1980
-G-	TOTAL	$29680

ADMINISTRATION COSTS

Whitehorse office

-A-	Personnel	
	Manager @ $1500	= $1500
	Purchasing agent [part time] @ $300	= 300
	Secretary [part time] @ $200	= 200
	Additional cost of labour @ 10%	= 200
	Total	$2200
-B-	Office supplies and materials	= $ 100
-C-	Telephone, telegraph and radio	= $ 300
-D-	Office rental	= $ 200
-E-	Housing allowance - manager	= $ 270
-F-	Legal fees, mining recorder etc.	= $ 500
-G-	TOTAL	$3570

ADMINISTRATION COSTS

Mount Nansen office

-A-	Personnel	
	Manager @ $1300	= $1300
	Accountant @ $800	= 800
	Additional cost of labour @ 10%	= 210
	Total	$2310
-B-	Office supplies and equipment	= $ 100
-C-	Telephone, telegraph and radio	= $ 300
-D-	Office equipment - repair and replacement	= $ 200
-E-	Housing allowance - manager	= $ 270
-F-	Travel and expences	= $ 100
-G-	TOTAL	$5590

ADMINISTRATION COSTS

Mine office

A.	Personnel	
	Mine Captain @ $1150	= $1150
	2 Shift Bosses @950	= 1900
	Additional cost of labour @ 10%	= 300
	Total	$3350
B.	Office supplies - Est.	= $ 100
C.	Engineering supplies - Est.	= $ 50
D.	Travelling & Expences	= $ 100
E.	TOTAL	$3600

ADMINISTRATION COSTS

Mill office

A.	Personnel	
	Mill superintendent @ $1100	= $1100
	Additional cost of labour @ 10%	= $ 110
	Total	$1210
B.	Office supplies and equipment	= $ 50
C.	Travel and expences	= $ 50
D.	TOTAL	$13.10

ADMINISTRATION COSTS

Catering

Staff personnel receive room and board without cost while hourly pay employees are charged $2.25 per day. Samplers, engineering assistants etc. have been included as staff as it costs less to hire under this category than as hourly pay.

For purpose of this estimate consider two full time visitors at the mine.

A. 31 day month

B. Catering at $7.00 per man per day

C. Staff - 14 employees

31 X 14 X 7.00 = $3040

D. Hourly pay - 66 employees

31 X 66 X 4.75 = $9720

E. Visitors - 2

31 X 2 X 7.00 = $ 430

F. Contractors - diamond drill - 3

31 X 3 X 4.75 = $ 440

G. TOTAL $13630

ADMINISTRATION COSTS

Housing and accommodation

A. Consider that 10 employees have trailers at Carmacks. Allow $75.00 per month fuel and power allowance.

B. Cost of camp building maintenance (paint, fittings etc.) is $100.00 per building per month.

C. Cost of replacing and maintaining bedding, dining room supplies etc. is $5.00 per man per month.

D. Carmacks - Fuel and power allowance

10 X 75 = $ 750

E. Building maintenance

8 X 100 = $ 800

F. Bedding and crockery replacement

86 X 5 = $ 430

G. TOTAL $1980

MINING COSTS

Summary

A.	Stoping	= $ 4.32 / Ton
B.	Stope Preparation	= $ 0.97 / Ton
C.	Tramming	= $ 1.34 / Ton
D.	Auxiliary Mining	= $ 0.96 / Ton
E.	Development - 480 feet	= $ 2.14 / Ton
F.	Exploration - 150 feet	= $ 0.73 / Ton
G.	Diamond Drilling - 900 feet	= $ 1.07 / Ton
H.	TOTAL	$11.53 / Ton

MINING COSTS

Summary - Exploration and Development

A.	9300 tons per month, 31 day month, 27 working days	
B.	Development - $19,900. for 480 feet	= $ 2.14 / Ton
C.	Exploration - $6830 for 150 feet	= $ 0.73 / Ton
D.	Diamond Drilling - $9950 for 900 feet	= $ 1.07 / Ton
E.	TOTAL	$ 3.94 / Ton

MINING COSTS

Direct Mining Costs - Total

Stoping	- $ 4.32 / Ton
Stope Preparation	- $ 0.97
Tramming	- $ 1.34
Auxiliary Mining	- $ 0.96
TOTAL	- $ 7.59 / Ton

Broken down as follows:

Labour	- $ 3.27 / Ton
additional Cost of Labour @ 16%	- 0.52
Bonus	- 1.84
Explosives	- 0.91
Timber	- 0.28
Small Tools	- 0.09
Mine Lamps	0.03
Mucking Machines	- 0.01
Cars and Locomotives	- 0.13
Drill Steel and Bits	- 0.21
Drill Repair	- 0.17
Pipe and Track	- 0.05
Machinery Maintenance	- 0.06
Ventilation	- 0.02
TOTAL	- $ 7.59 / Ton

MINING COSTS

Stoping Costs

Labour	- $ 1.77 / Ton
Additional Cost of Labour @ 16%	- 0.28
Bonus, @ 60% of labour	- 1.06
Explosives	- 0.70
Timber	- 0.09
Small Tools	- 0.04
Mine Lamps	- 0.02
Drill Steel and Bits	- 0.17
Drill Repair	- 0.14
Ventilation	- 0.02
Machinery Maintenance (tuggers	- 0.03
TOTAL	- $ 4.32 / Ton

MINING COSTS

Stope Preparation

Labour	- $ 0.35 / Ton
Additional Cost of Labour @ 16%	- $ 0.06
Bonus, at 60% of Labour	- 0.21
Explosives	- 0.09
Timber	- 0.12
Mucking Machines	- 0.01
Cars and Locomotives	- 0.01
Small Tools	- 0.01
Mine Lamps	- 0.01
Drill Steel and Bits	- 0.04
Drill Repair	- 0.03
Machinery Maintenance	- 0.03
TOTAL	- $ 0.97 / Ton

MINING COSTS

Tramming

Labour	- $ 0.71 / Ton
Additional Cost of Labour @ 16%	- 0.11
Bonus, at 50% of Labour	- 0.35
Explosives	- 0.04
Cars and Locomotives	- 0.12
Small Tools	- 0.01
TOTAL	- $ 1.34 / Ton

MINING COSTS

Auxiliary mining

Labour	- $ 0.44 / Ton
Additional Cost of Labour @ 16%	- 0.07
Bonus, at 50% of Labour	- 0.22
Explosives	- 0.08
Timber	- 0.07
Small Tools	- 0.03
Pipe and Track	- 0.05
TOTAL	- $ 0.96 / Ton

MINING COSTS

Exploration and development - Drifting and raising

A. Assuming past ore to waste ratio holds, two feet of lateral development are required to develop one foot of ore on vein.

B. Assuming mining widths of four feet, production at 9,300 tons per month, a 200 ft level interval and a specific gravity of 12 cu ft per ton, then 140 feet of drifting on vein are required to replace mined ore.

C. At a 2-1 ratio, 280 feet of drifting are required to develop replacement stopes.

D. One 200 ft raise will be required per month.

F. Costs - Exploration and development:

140 ft Timbered drift - Development - 140 X 53.21	= $7,450
140 ft Bald drift - Development - 140 X 41.72	= $5,841
200 ft Raise - Development - 200 X 33.05	= $6,610
50 ft Timbered drift - Exploration - 50 X 53.21	= $2,660
100 ft Bald drift - Exploration - 100 X 41.72	= $4,172

G. Costs - Summary

280 ft Drifting - Development	= $13,291	= $47.47/ft
200 ft Raising - Development	= $ 6,610	= $33.05/ft
150 ft Drifting - Exploration	= $ 6,832	= $45.55/ft

MINING COSTS

Exploration and Development - Diamond drilling

A. Assume that one drill rig will be working full time.

B. Past performance indicats that about 900 feet per month may be expected per drill.

C. Assume that drilling is contracted.

D. Assume 6 days per month are lost on moves, testing, casing etc. Company time.

E. Drilling costs:

900 ft NQ @ $8.00/ft	= $7,200
Company time - 192 hrs @ $12.00	= $2,304
Core boxes, test mat'l etc @ 50¢/ft	= 450
TOTAL	$9,954

Drilling cost = 9954/900 = $11.06/ft.

MINING COSTS

Stoping - Cost details

A. 31 day month, 27 working days

B. Tonnage - 300 tons per day = 9,300 tons per month

C. Shifts worked - Assume 22 tons per man shift

Shifts = 9300 / 22 = 423

Say 420

Manpower = 420 / 27 = 15.6

Say 16 men

Add 4 men for finishing stopes, repair etc.

Total manpower = 20 men

D. Cost of labour @ $30.50 / shift = 20 X 27 X 30.50

= $16,470 = $ 1.77 / ton

E. Additional cost of labour @ 16% = $2,635 = $ 0.28 / ton

F. Bonus at 60% of labour = $9,880 = $ 1.06 / ton

G. Timber

2000 bd ft 6" round @ 10¢ = $200

5000 bd ft planking @ 13¢ = $650

Total = $850 = $ 0.09 / ton

H. Small tools, materials etc. @ $350 = $0.04 / ton

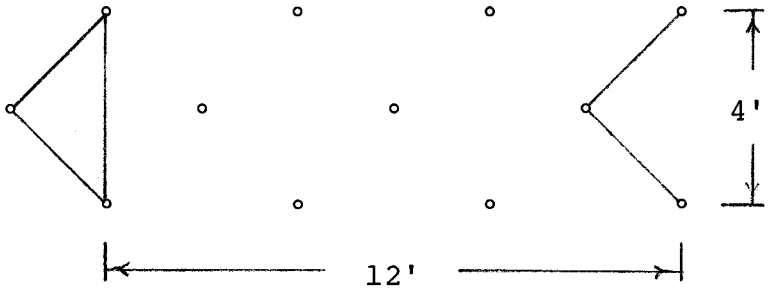
I. Mine lamps @ $200 = $ 0.02 / ton

J. Ventilation @ $200 = $ 0.02 / ton

K. Machinery maintenance @ $300 = $ 0.03 / ton

MINING COSTS

Drilling and explosives costs - STOPING



Assume that a 8' round breaks 7'

Then 12 holes break 12X4X7/12 = 28 tons

Drilling required = 12X8 = 96'

Ft / ton = 96/28 = 3.43

Powder factor taken as 1.5 lbs per ton

Powder cost $18.00 per case

Caps, fuse, connectors etc @ 30% of powder cost

Cost per pound; explosives = 1.3[18/50] = 46.8¢

From the above:

-a-	Drill repair @ 4¢ / ft = 3.43X4	= 13.7¢ / Ton
-b-	Drill steel & bits @ 5¢ / ft = 3.43X5	= 17.2¢ / Ton
-c-	Cost of explosives = 46.8X1.5	= 70.2¢ / Ton

MINING COSTS

Stope preparation - Major costs for 9,300 tons replacement

1. Raises		
Labour	-	$ 1,220
Add'l Cost of Labour @ 16%	-	195
Bonus, at 60% of Labour	-	732
Explosives	-	501
Drill Steel and Bits	-	240
Drill Repair	-	192
2. Slashing		
Labour	-	427
Add'l Cost of Labour	-	68
Bonus, at 60% of Labour	-	257
Explosives	-	368
Drill Steel and Bits	-	89
Drill Repair	-	74
3. Chutes		
Labour	-	1,220
Add'l Cost of Labour @ 16%	-	195
Bonus, at 60% of Labour	-	732
Timber	-	1,080
4. Clean up etc.		
Labour	-	427
Add'l Cost of Labour @ 16%	-	68
Bonus, at 60% of Labour	-	256

MINING COSTS

Stope preparation - Major costs for 9,300 tons replacement

-5- Total

Labour		
Add'l Cost of Labour @ 16%	- $ 3,294	- $ 0.35 / Ton
Bonus, at 60% of Labour	- 526	- 0.06
Explosives	- 1,976	- 0.21
Timber	- 869	- 0.09
Mucking Machines	- 1,080	- 0.12
Cars and Locomotives	- 125	- 0.01
Small Tools	- 100	- 0.01
Mine Lamps	- 125	- 0.01
Drill Steel and Bits	- 20	- 0.01
Drill Repair	- 329	- 0.04
Machinery Maintenance	- 266	- 0.03
	- 300	- 0.03
TOTAL	$ 9,010	$ 0.97 / Ton

Please note that the above estimate does not include indirect costs such as supervision, compressed air, power, room and board losses etc.

MINING COSTS

Stope preparation - Costing details

-A- 31 day month; 27 working days; 9,300 tons per month.

-B- Four foot vein. 200' levels

-C- Feet preparation req'd per month - To replace mined ore.

Feet req'd = $\frac{9,300 \text{ X } 12}{200 \text{ X } 4}$ = 139.5', Say 140 feet

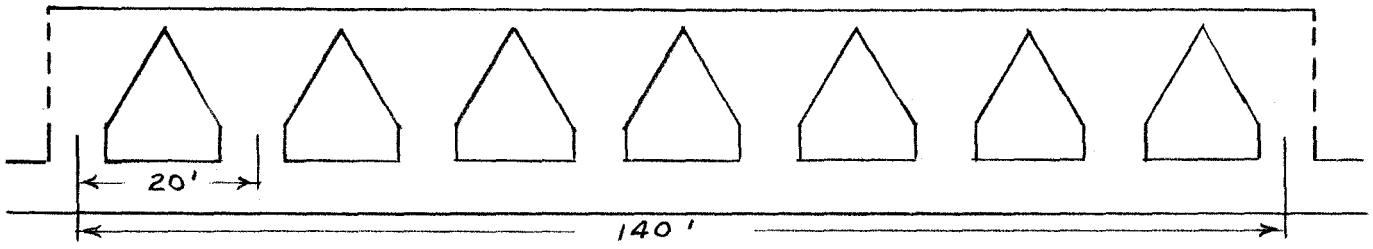
-D- 140' replacement stope requires 8 chutes at 20' ctrs.

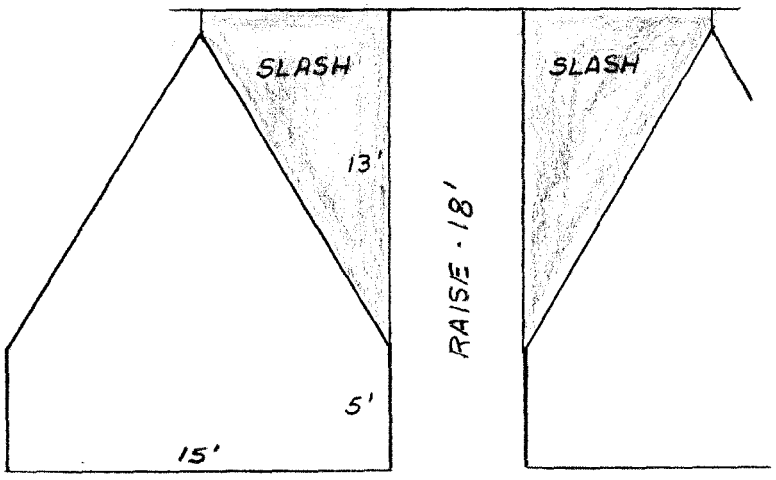
-E- Raising required = 8 X 18 = 144', Say 150 feet.

-F- Slashing req'd = 8 X 7.5 X 13 X 4 = 3,120 cu ft

Add 33% for chute throat, hitch etc = 1040 cu ft

Total slash = 4,160 cu ft = 350 Tons





MINING COSTS

Stope preparation - Costing details

G. Manpower req'd; 4 miners

2 men 20 days raising

2 men 7 days slash

2 men 20 days chutes

2 men 7 days clean up etc.

H. Raising - Costs the same as general raising except for labour

Labour - 40 shifts @ $30.50 = $1,220

Explosives - 150 ft @ $ 3.34 = $501

Drill Steel & Bits - 150 ft @ $1.60 = $240

Drill Repair - 150 ft @ $1.28 = $192

I. Slashing - Assume costs at 150% of stoping costs per ton

Labour - 14 shifts @ $30.50 = $427

Explosives - 350 tons @ $1.05 = $368

Drill Steel and Bits - 350 tons @ $0.255 = $89

Drill Repair - 350 tons @ 0.21 = $74

J. Chutes

Labour - 40 shifts @ $30.50 = $1,220

Timber per chute; 50 running ft 8X8

120 running ft 3X6

120 running ft 6" round

= 735 bd ft; Add 10% = 810 bd ft

810 bd ft @ 13¢ = $105 per chute

Chute gate - Est at $30.00

Total "Timber Cost" = 105 + 80 = $135/chute

Total timber cost = $135 X 8 = $1080

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MINING COSTS

Tramming - Costing details

A. Wages - 4 - 2 man crews = 8 men. 8 x 27 = 216 shifts

216 shifts @ $30.50 = $6,588 = 6,588/9,300 = $0.71/ton

Add'l cost labour @ 16% = $1,054 = $0.11/ton

Bonus @ 50% of labour = $3,294 = $0.35/ton

B. Car and Locomotive Repair;

Locomotive parts @ $200/unit = $800

Car rebuild @ $175 (2/month) = $350

Total = $ 1,150 = $0.12/ton

C. Explosives - 15 cases @ $18.00 + 30% = $351 = $0.04/ton.

MINING COSTS

Auxiliary mining - Costing details

A. Wages - 4 miners/timbermen - 20 days main level repair

- 7 days moving completed stopes

- 1 pipefitter

Wages - 5 men x 27 days = 135 shifts

135 shifts @ $30.50 = $4,118 = $0.44/ton

Add'l cost labour @ 16% = $658 = $0.07/ton

bonus, at 50% of labour = $2,095 = $0.22/ton

B. Explosives - 30 cases @ $18.00 + 30% = $702 = $0.08/ton

C. Timber - 5,000 bd ft [Est.] @ 13¢ = $650 = $0.07/ton

D. Pipe and Track - Estimate $500 for replacement = $0.05/ton.

MINING COSTS

Drifting costs - Without timber

Labour	- $ 8.71 / Ft
Additional cost of labour @ 16%	- 1.39
Bonus, @ 60% of labour	- 5.23
Explosives	- 5.85
Pipe	- 5.30
Track	- 9.04
Mucking Machines	- 0.83
Cars and Locomotives	- 0.67
Timber	- 0.50
Small Tools	- 0.15
Mine Lamps	- 0.05
Drill Steel and Bits	- 1.83
Drill Repair	- 1.42
Ventilation	- 0.75
TOTAL	- $41.72 / Ft

Please note that the above estimate does not include indirect costs such as supervision, compressed air, power, room and board losses etc.

MINING COSTS

Drifting costs - Timbered drifts

Labour	- $11.73 / Ft
Additional cost of labour @ 16%	- 1.88
Bonus, @ 60% of labour	- 7.04
Explosives	- 5.85
Pipe	- 5.30
Track	- 9.04
Mucking Machines	- 0.83
Cars and Locomotives	- 0.67
Timber	- 6.50
Small Tools	- 0.30
Mine Lamps	- 0.07
Drill Steel and Bits	- 1.83
Drill Repair	- 1.42
Ventilation	- 0.75
TOTAL	- $53.21/Ft

Please note that the above estimate does not include indirect costs such as supervision, compressed air, power, room and board losses etc.

MINING COSTS

Raising costs - without timber

Labour	- $ 9.84 / Ft
Additional Cost of Labour @ 16%	- 1.57
Bonus, @ 60% of labour	- 5.90
Explosives	- 3.34
Pipe	- 2.80
Cars and Locomotives (Est.)	- 0.35
Timber	- 3.90
Small Tools	- 0.25
Mine Lamps	- 0.07
Drill Steel and Bits	- 1.60
Drill Repair	- 1.28
Ventilation	- 0.40
Preparation (chute, slash etc)	- 1.75
TOTAL	$33.05 / Ft

Please note that the above estimate does not include indirect costs such as supervision, compressed air, power, room and board losses etc.

MINING COSTS

Drifting Costs - Without timber - Detail

Labour - At 3.5 ft/man shift = 30.50/3.5 = $8.71/ft

Track; 2' @ $4.00/ft + 8 bd ft ties @ 13¢ = $9.04/ft

Pipe; 1 ft of 4" @ $3.50 + 1 ft of 2" @ $1.80 = $5.30/ft

Mucking Machines - $250/month, 300' advance = 250/300 = $0.87/ft

Cars and Locos - $200/month, 300' advance = 200/300 = $0.67/ft

Drifting costs - Timbered drift - Detail

Labour - At 2.6 ft/man shift = 30.50/2.6 = $11.73 ft

Track, pipe, mucking machines, cars and locomotives as above.

Timber - Assume sets at 5' centers, 10 x 10 timber.

Bd ft = 24 x 10 x 10 x 12/144 = 200 bd ft/set

+ 50 bd ft lagging = 50 bd ft

Total = 250 bd ft

250 bd ft @ 13¢ = $32.50 per 5' advance

Cost per ft = 32.50/5 = $6.50/ft

Raising costs - Without timber - Detail

Labour - At 3.1 ft/man shift = 30.50/3.1 = $9.84/ft

Pipe; 1 ft of 2" @ 1.80 + 1 ft of 1" @ $1.00 = $2.80/ft

Timber; 30 bd ft @ 13¢ = $3.90/ft

MINING COSTS

Drilling and explosives costs - DRIFTING

Assume that a 8' round breaks 7'

Assume 32 holes per round = 32 x 8 = 256' drilled

1.75 cases of powder required for round = 1.75 x 18 = $31.50

Caps, fuse, connectors etc @ 30% powder cost = $9.45

Total cost of explosives = $40.95

Cost drill repair @ 4¢ / ft = 4 x 256 = $10.24

Cost steel & bits @ 5¢ / ft = 5 x 256 + $12.80

From the above:

-a- Drill repair = 10.24/7 = $1.42 / Ft

-b- Drill steel & bits = 12.80/7 = $1.83 / Ft

-c- Cost of explosives = 40.95/7 = $5.85 / Ft

Drilling and explosives costs - RAISING

Raising; 1 case powder for 8' round, break 7'

Assume 28 holes / round = 28 x 8 = 224' drilled

Cost of explosives = 1.3 x 18 = 23.40

Cost drill repair @ 4¢ / ft = 4 x 224 = $8.96

Cost drill steel & bits @ 5¢ / ft = 5 x 224 = $11.20

From the above:

-a- Drill repair = 8.96/7 = $1.28 / Ft

-b- Drill steel & bits = 11.20/7 = $1.60 / Ft

-c- Cost of explosives = 23.40/7 = $3.34 / Ft

MILLING COSTS

Summary

A.	Conveying	= $ 0.14 / Ton
B.	Crushing	= $ 0.28 / Ton
C.	Grinding	= $ 0.60 / Ton
D.	Flotation	= $ 0.48 / Ton
E.	Filters, thickeners	= $ 0.15 / Ton
F.	Cyanidation	= $ 0.47 / Ton
G.	Plant maintenance	= $ 0.37 / Ton
H.	TOTAL	$ 2.49 / Ton

MILLING COSTS

General

Milling costs must be considered as rough estimates as final milling procedures have not as yet been determined.

Allow a 9 men mill crew, 2 men per shift plus 3 extra men to cover Sundays and clean up. Distribute (for costs) as follows:

Conveying	1
Crushing	2
Grinding	2
Flotation	2
Filters, thickeners	1
Cyanidation	1
TOTAL	9

In addition to the above, one mechanic and one helper are required for plant maintenance.

Assume 31 days month, 27 working days, 9300 tons production.

MILLING COSTS

Conveying=

A. Wages

1 man - 27 shifts @ $34.00	= $ 920
Additional cost of labour @ 16%	= 150
Total	$1070

B. Material - 9,300 tons @ 1.5¢ = $ 140

C. Spares - Est.

Eelectrical	= $ 60
Mechanical	= 30
Structural	= 30
Total	$ 120

D. TOTAL $1330

E. Cost per ton = 1330 / 9300 = $0.14

Crushing

A. Wages

2 men - 54 shifts @ $34.00	= $1840
Additional cost of labour @ 16%	= 290
Total	$2130

B. Spare parts - 9300 tons @ 4¢ (wear parts) = $ 370

C. Spare parts - Electrical & mechanical = $ 100

D. TOTAL $2600

E. Cost per ton = 2600 / 9300 = $0.28

MILLING COSTS

Grinding

A. Wages

2 men - 54 shifts @ $34.00	= $1840
Additional cost of labour @ labour @ 16%	= 290
Total	$2130

B. Reagents - 9300 tons @ 12¢ = $1120

C. Grinding balls - 9300 tons @ 13¢ = $1210

D. Liners - 9300 tons @ 10¢ = $ 930

E. Spare parts, lubricants etc. = $ 200

F. TOTAL $5590

G. Cost per ton = 5590 / 9300 = $0.60

Flotation

A. Wages

2 men - 54 shifts @ $34.00	= $1840
Additional cost of labour @ 16%	= 290
Total	$2130

B. Reagents - 9300 tons @ 20¢ = $1860

C. Spare parts. Est. = $ 450

D. TOTAL $4440

E. Cost per ton = 4440 / 9300 = $0.48

MILLING COSTS

Filters and thickeners

A.	Wages	
	1 man - 27 shifts @ $34.00	= $ 920
	Additional cost of labour @ 16%	= 150
	Total	$1070
B.	Spares, filter cloths, etc. @ 4¢ / ton	= $ 370
C.	TOTAL	$1440
D.	Cost per ton = 1440 / 9300 = $0.15	

Cyanidation

A.	Wages	
	1 man - 27 shifts @ $34.40	= $ 920
	Additional cost of labour @ 16%	= 150
	Total	$1070
B.	Reagents - 9300 tons @ 22¢	= $2050
C.	Roasting - 9300 tons @ 10¢	= $ 930
D.	Spare parts - Est.	= $ 300
E.	TOTAL	$4350
F.	Cost per ton = 4350 / 9300 = $0.47	

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MILLING COSTS

Plant maintenance

A. Wages

Mechanic - 27 shifts @ $39.05	= $1050
Helper - 27 shifts @ $28.40	= 770
Additional cost of labour @ 16%	= 290
Total	$2110

B. Tools, materials, lubricants etc. = $ 750

C. Miscellaneous spare parts = $ 600

D. TOTAL $3460

E. Cost per ton = 3460 / 9300 = $0.37

SUPPORT COSTS

Summary

A.	Engineering Office	= $ 1840
B.	Geology Office	= $ 1760
C.	Machine Shop & Garage	= $ 6360
D.	Electric Shop	= $ 2090
E.	Motor Pool	= $ 8080
F.	Warehouse	= $ 1130
G.	Assay Office	= $ 4460
H.	Water Supply	= $ 1960
I.	Road Maintenance	= $ 2470
J.	Heating	= $ 2770
K.	Power & Compressed Air	= $ 17220
L.	General Maintenance	= $ 3870
M.	Portable Compressors	= $ 5070
N.	TOTAL	$ 58580

SUPPORT COSTS

Engineering Office

A.	Personnel	
	Mine engineer @ $850	= $ 850
	Engineering helper @ $550	= $ 550
	Additional cost of labour @ 10%	= $ 140
	Total	$1540
B.	Office Supplies - Est.	= $ 75
C.	Engineering supplies - Est.	= $ 150
D.	Travelling & expences	= $ 75
E.	TOTAL	$1840

Geology Office

A.	Personnel	
	Geologist @ $850	= $ 850
	Helper - Sampler @ $600	= 600
	Additional Cost of Labour @ 10%	= 140
	Total	$1590
B.	Office supplies - Est.	= $ 50
C.	Engineering supplies - Est.	= $ 50
D.	Travelling & expences	= $ 70
E.	TOTAL	$1760

SUPPORT COSTS

Machine shop and garage

A.	Lead mechanic (Inc. o.t.) - 27 shifts @ $39.05	= $1050
	Additional cost of labour @ 16%	= 170
	Total	= $1220
B.	3 mechanics (Inc. o.t.) - 81 shifts @ $37.70	= $3050
	Additional cost of labour @ 16%	= 490
	Total	$3540
C.	Tools, material, lubricants etc.	= $1000
D.	Miscellaneous spare parts	= $ 600
E.	TOTAL	$6360

Electric Shop

A.	Electrician - 27 shifts @ $38.20	= $1030
	Additional cost of labour @ 16%	= 160
	Total	= $1190
B.	Tools, materials, lubricants etc.	= $ 300
C.	Electrical spares	= $ 600
D.	TOTAL	$2090

SUPPORT COSTS

Motor Pool - Operating costs

A. Group equipment and costs.

Light vehicles - 9000 miles/month

Trucks - 9000 miles/month

Heavy equipment - 300 hours/month

B. Light vehicles - 9000 miles @ 12 mpg = 750 glns.

Fuel - 750 glns @ 52¢¢	= $	390
Maintenance - 9000 miles @ 3¢	= $	270
Spare parts - 9000 miles @ 5¢	= $	450
Total	$	1110

C. Trucks - 9000 miles @ 7 mpg = 1290 glns

Fuel - 1290 glns @ 52¢	= $	670
Maintenance - 9000 miles @ 3¢	=	270
Spare parts - 9000 miles @ 8¢	=	720
Total	$	1660

D. Heavy Equipment - 300 hrs @ 6 gln/hr = 1800 glns

Fuel - 1800 glns @ 46¢	= $	830
Maintenance - 300 hrs @ $1.00	=	300
Spare parts - 300 hrs @ $3.00	=	900
Total	$	2030

SUPPORT COSTS

Motor Pool - Operating costs

E. Drivers

1 heavy equipment operator - 27 shifts @ $35.60	= $ 960
2 truck drivers - 54 shifts @ $34.65	= 1870
Additional cost of labour @ 16%	= 450
Total	$3280

F. TOTAL $8080

SUPPORT COSTS

Warehouse

A.	Personnel	
	Storekeeper - first aid man @ $800	= $ 800
	Additional cost of labour @ 10%	= 80
	Total	$ 880
B.	Material and supplies - Est.	= $ 150
C.	Tool crib replacement and repairs - Est.	= $ 100
D.	TOTAL	$1130

Assay Office

A.	Personnel	
	Assayer @ $800	= $ 800
	Assayer's assistant @ $700	= $ 700
	Bucker - sampler @ $600	= $ 600
	Additional cost of labour @ 16%	= $ 210
	Total	= $2310
B.	Material and reagents for 1350 samples @ $1.30	= $1750
C.	Office supplies etc.	= $ 100
D.	Glass and lab equipment	= $ 100
E.	Miscellaneous chemicals etc.	= $ 100
F.	Travel and expences	= $ 100
G.	TOTAL	$4460

SUPPORT COSTS

Water supply

A.	Pumping costs - 680 hrs @ 5 glns/hr = 3400 glns @ 36¢	=	$1224
B.	Pump maintenance - 680 hrs @ 20¢	=	136
C.	Pump and motor spares. Est @ $300/month	=	300
D.	Pipe and pyrotenax spares. Est @ $300/month	=	300
E.	TOTAL		$1960

Road maintenance and repair

A.	Two laborers - 54 shifts @ $29.20	=	$1580
	Additional cost of labour @ 16%	=	250
	Total		$1830
B.	Material - Est @ $100/month	=	$ 100
C.	Fuel - Average 1500 glns @ 36¢	=	$ 540
D.	TOTAL		$2470

SUPPORT COSTS

Heating

A. Two Volcano boilers required

B. Average fuel consumption for these units is 105 gallons per boiler per day. This figure is based on Mount Nansen records.

C. Fuel required per month = 31 x 2 x 105 = 6,510 glns

D. Fuel cost = 6510 glns @ 36¢ = $2,340 per month

E. Spare parts estimated at $160 per month

F. Other heating (pump house, tanks etc) - 750 glns @ 36¢ = $270

G. Total costs - 2340 + 160 + 270 = $2,770/month.

SUPPORT COSTS

Power and Compressed Air

A. Horsepower required - Peak

Mill	- 510 HP
Pyrotenax	- 230
Compressed Air	- 475
Lighting and Heating	- 120
Other	- 100
TOTAL	-1,435 HP

B. Fuel costs

1435 HP @ 0.5 lbs/HP/hr = 720 lbs/hr

= 17,280 lbs/day

Assume power @ 75% peak, fuel req'd = 12,960 lbs/day

= 12960/10.27 = 1,260 glns/day

= 1,260x31 = 39,060 glns/month

39,060 glns @ 36¢ = $14,060 / 31 day month

C. Maintenance costs - Diesel generators - 2 units

Filters, Oil etc. - 1488 hrs @ 20¢ = $300

D. Maintenance - Compressors - 3 units

Filters, oil etc - 2232 hrs @ 5¢ = $110

E. Spares - Diesel generators - 2 units

Spare parts - 1488 hrs @ $1.25 = $1,860

F. Spares - Compressors - 3 units

Spare parts - 2232 hrs @ 40¢ = $890

SUPPORT COSTS

Power and Compressed Air

G. Total - Power and compressed air

Fuel	-	$ 14,060
Maintenance - Diesel generators	-	$ 300
Maintenance - Compressors	-	110
Spares - Diesel generators	-	1,860
Spares - Compressors	-	890
TOTAL		$ 17,220

3¢/KWhr

SUPPORT COSTS

General maintenance

A. Personnel

Carpenter - 27 shifts @ $37.70	=	$ 1020
Maintenance engineer - 27 shifts @ $37.70	=	$ 1020
Additional cost of labour @ 16%	=	$ 330
Total		$ 2370

B. Materials and supplies - carpentry shop = $ 600

C. Materials and supplies - maintenance = $ 400

D. TOTAL $ 3370

SUPPORT COSTS

Portable compressors - Webber

A.	Fuel (2 units)	
	1080 hrs @ 6.5 glns /hour = 7020 glns	
	7020 glns @ 46¢	= $ 3230
B.	Maintenance - 1080 hrs @ 20¢	= $ 220
C.	Spare parts - 1080 hrs @ $1.50	= $ 1620
D.	TOTAL	$ 5070

SMELTING AND REFINING COSTS

Transportation, smelting and refining costs - Concentrates

The following data was given by S & N Mine Management Consultants Limited. Costs are in Canadian Dollars. Entry and Clearance charges were based on 300 tons shipments.

A. Freight

Mount Nansen to Vancouver	= $ 25.95
Vancouver to East Helena, Montana	= $ 11.30
Wharfage	= $ 1.95
Entry and Clearance charges	= $ 0.14
Total	$ 39.24

B. Smelting charges

Basic smelter charges	= $ 25.29
Arsenic penalty	= $ 7.95
Antimony penalty	= $ 0.63
Labour adjustment	= $ 1.15
Total	$ 35.02

C. Cost per ton or ore

If clean selective flotation can be perfected then a ratio of concentration of 20-1 is feasable. In this case the arsenic penalty should be in the order of $2.50

Ratio of concentration 10-1 - Cost per ton ore = $7.43

Ratio of concentration 15-1 - Cost per ton ore = $4.75

Ratio of concentration 20-1 - Cost per ton ore = $3.45

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ADDITIONAL EQUIPMENT FOR 300 TPD PRODUCTION

A. Diesel Generators

If the mine is brought to production at 300 tons per day two 750 KW generators must be acquired. An alternative would be to bring power in from Carmacks. The three 250 KW Waukesha diesel generators installed at the mine are inadequate to provide the power demanded at full production.

B. Water Supply System

Industrial water is pumped to the main supply tank above the mine from a well situated on Victoria Creek. The well is three miles distant and 1000 feet below the tank. The pumping arrangement consists of two pumps; one low head electric pump used to feed the suction side of a second pump; a diesel driven high pressure centrifical unit. This system is most unsatisfactory as three miles of water line must be heated in cold weather and the pumps must be tended when operating.

It is recommended that a geological study be initiated to determine the chances of finding water closer to the mill site and drilling a new well. If another source of water can't be found a new pump should be installed at Victoria Creek. This pump must be capable of replacing both pumps and be completely automatic.

C. Front End Loader

The Caterpillar 955 tracked loader operated by Mount Nansen is worn out and ill suited for the job. A Caterpillar 944 wheeled loader, or equivalent, should be purchased to handle stock pile loading, etc.

ADDITIONAL EQUIPMENT FOR 300 TPD PRODUCTION

D. Mine Locomotives

Three additional mine locomotives are required to maintain a production rate of 300 tons per day.

E. Light Vehicles

Most of the light vehicles at Mount Nansen are in extremely poor condition. It is suggested that three of the existing units be replaced with new vehicles.

Heavy Trucks

A study should be made to determine the economics of purchasing trucks to transport the concentrates to the railhead at Whitehorse. These same trucks could be used to haul fuel on the back-haul and cut fuel costs substantially. At least one heavy dump truck may be required to haul ore from the Webber Mine to the mill.

Machine Shop

A lathe, drill press, hydraulic press and miscellaneous small power tools should be purchased for the machine shop. Much of the work previously sent out to Whitehorse or other locations could be done at the mine if facilities were available.

ADDITIONAL EQUIPMENT FOR 300 TPD PRODUCTION

Summary

The following are rough estimates only as no decisions have been made on make, model, size etc.

A.. Diesel Generators	$ 100,000
B. Water Supply System	10,000
C. Front End Loader	35,000
D. Mine Locomotives	25,000
E. Light Vehicles	15,000
F. TOTAL	$ 185,000

Mill Modifications - Dependent on the results of the metallurgical tests.

PERSONNEL

Total permanent personnel for 300 tons per day is estimated as follows:

	Monthly Pay	Hourly Pay
Mine Manager	1	
Mill Superintendent	1	
Mine Captain	1	
Shift Boss	2	
Accountant	1	
Engineer	1	
Geologist	1	
Assayer	1	
Storekeeper	1	
Engineering Helper	2	
Sampler / Assay Assistant	2	
Miner		36
Mill Hand		9
Mechanic		5
Maintenance Engineer		1
Electrician		1
Carpenter		1
Driver		3
Pipefitter		1
Surface Labour		2
Other		1
Driller (Contract)	(1)	(4)
Cook House (Contract)		(4)
Total Company	14	60
TOTAL	15	68

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