

825118

PRELIMINARY EVALUATION - GOLDSTREAM PROPERTY

JACK McCOY
November 17, 1988

OPERATING PLAN - ASSUMPTIONS - START-UP - PREPARATION TO MINING

Open-Pit 2 wks	\$ 8,800
Concentrator 6 wks	125,000
Underground 3 mo.	330,000
Rehab. - other 4 wks	16,800
Recruiting/Equip. search/ Contractor Bidding Period 2 mo.	32,000

TOTAL (one-time expense)	\$512,600

Strip/Mine open pit -	1st 2 months
Phase in underground -	3rd month
Start Concentrator -	1st month
Complete open pit mining -	5th month
Underground rate to 1440 T/D -	5th month

Operate mill at 1200 T/D from start-up.

No zinc credit from open-pit/underground mix.

Copper recovery - open-pit 85% recovery at 22.5% Cu in concentrate.

Copper recovery - u. ground 90% recovery at 25.0% Cu in concentrate.

Silver credit to concentrate = 2.15 oz/T of concentrates.

Zinc recovery from u. ground (8 mo. 1st yr) 10.9% recovery at 49% Zn concentrate.

Zinc recovery from u. ground (after 1st yr) 30.0% recovery at 49% Zn concentrates.

Mine/Process developed ore - 1st 18 months.

Develop underground (undeveloped section) +-3rd year.

Explore new ore sources available.

DEVELOPED ORE RESERVE - (Adjusted to Mill-Head Data)

	Short Tons	% Cu	% Zn
Open-Pit (Surface-860m elev.)	110,231	3.23	1.84
830 (860 - 830m. [incl. sill])	198,149	3.89	1.93
770 (830 - 770m. Panel)	367,867	3.64	2.29
715 (770 - 715m. Panel)	315,150	4.39	3.87
655 (715 - 655m. Panel)	295,085	3.93	3.00
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Surface to 655m.	1,286,482	3.89	2.75
Open-Pit (from above)	110,231	3.23	1.84
Underground (from above)	1,176,251	3.95	2.84
Undeveloped Section: Drill indicated -adjusted to mill data-655 to 400m.elev.	2,212,653	3.12	2.28
Total Inventory (all categories)	3,499,135	3.40	2.57

PROJECTED OPERATING COSTS -

\$/SHORT TON

Open-Pit (direct)	5.56 - 5 months
(Stripping/Mining/transport - incl. maintenance/Supervision Underground (Direct) - Stope Development/Mining/Maint. Supervision/etc.	12.30 - 1st yr 10.83 - 2nd yr

Milling -

Operating/Maintenance/Super.	7.46 - 1st yr
Process control/Assay/Load out	6.80 - 2nd yr
Electrical/Maintenance(gnl)	2.25 - 1st yr
Engineering/Labor/Supply/Tools	1.93 - 2nd yr

Administration -

Management	
Accounting/Payroll/Clerical	
Purchasing/w.housing	
Engineering/Geological	5.60 - 1st yr
Employee relations	5.20 - 2nd yr
Insurance/Taxes/Permitts	
Security/Safety/First Aid Training	
Telephone/Telex/Communications	
Oper. Training/Seminars/Etc.	
Transport - Site to Revel Stoke	

Revenue - (from Net Smelter Return Graph)

- I. Open-Pit Ore at \$1.30/lb Cu (market)
 (from Copper) \$532.37/Ton of concentrate - \$1.18/lb Cu contained.
 Underground ore at \$1.30/lb Cu; \$.45/lb Zinc
 (from Copper) \$594.37/Ton of concentrate = \$1.19/lb Cu contained.
 (from Zinc) \$368.78/Ton of concentrate = \$.376/lb Zn contained.
 - Apply \$49.50/ton to Copper concentrates (transport)
 - Apply \$10.00/ton to Zinc concentrates (transport).
- II. Underground Ore at \$.70/lb Cu; \$.45/lb Zinc.
 (from Copper) \$312.00/ton of concentrate = \$.63/lb Cu contained
 (from Zinc) \$368.78/ton of concentrate = \$.376/lb Zn contained.
 - Apply same transport costs.

EXPENSE vs. REVENUE - 1st 12 months.

Assume \$1.30/lb Cu - Market, \$.45/lb Zn - Market

Open-Pit 96,000 tons Ore producing 11,714 tons (22.5% Cu concentrates).
 Underground 336,000 tons ore producing 47,779 tons (25.0% Cu concentrates).
 Underground 336,000 tons ore producing 2,223 tons (49.0% Zn concentrates).

	Costs	Revenue (NSR)	Net
Open-pit (direct)	\$ 533,760}	\$ 6,236,182 (Cu)	\$
Underground (direct)	4,132,800}	28,398,404 (Cu)	
Milling (direct)	3,222,720}	819,798 (Zn)	
Admin./Etc.	3,391,200		
Transport concentrates to market	2,944,904 Cu		
Transport concentrates to market	22,230 Zn		
	-----	-----	-----
Total (Opr)	\$14,247,614	\$35,454,384	\$21,206,770
Capital Return	1,892,160	--	
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GRAND TOTAL	\$16,139,774	\$35,454,384	\$19,314,610

EXPENSE vs. REVENUE - 2nd 12 months

Assume \$.70/lb Cu - Market, \$.45/lb Zn - Market

Underground - 432,000 tons ore = 61,430 tons (25.0% Cu concentrates).

Underground - 432,000 tons ore = 7,512 tons (49.0% Zn concentrates).

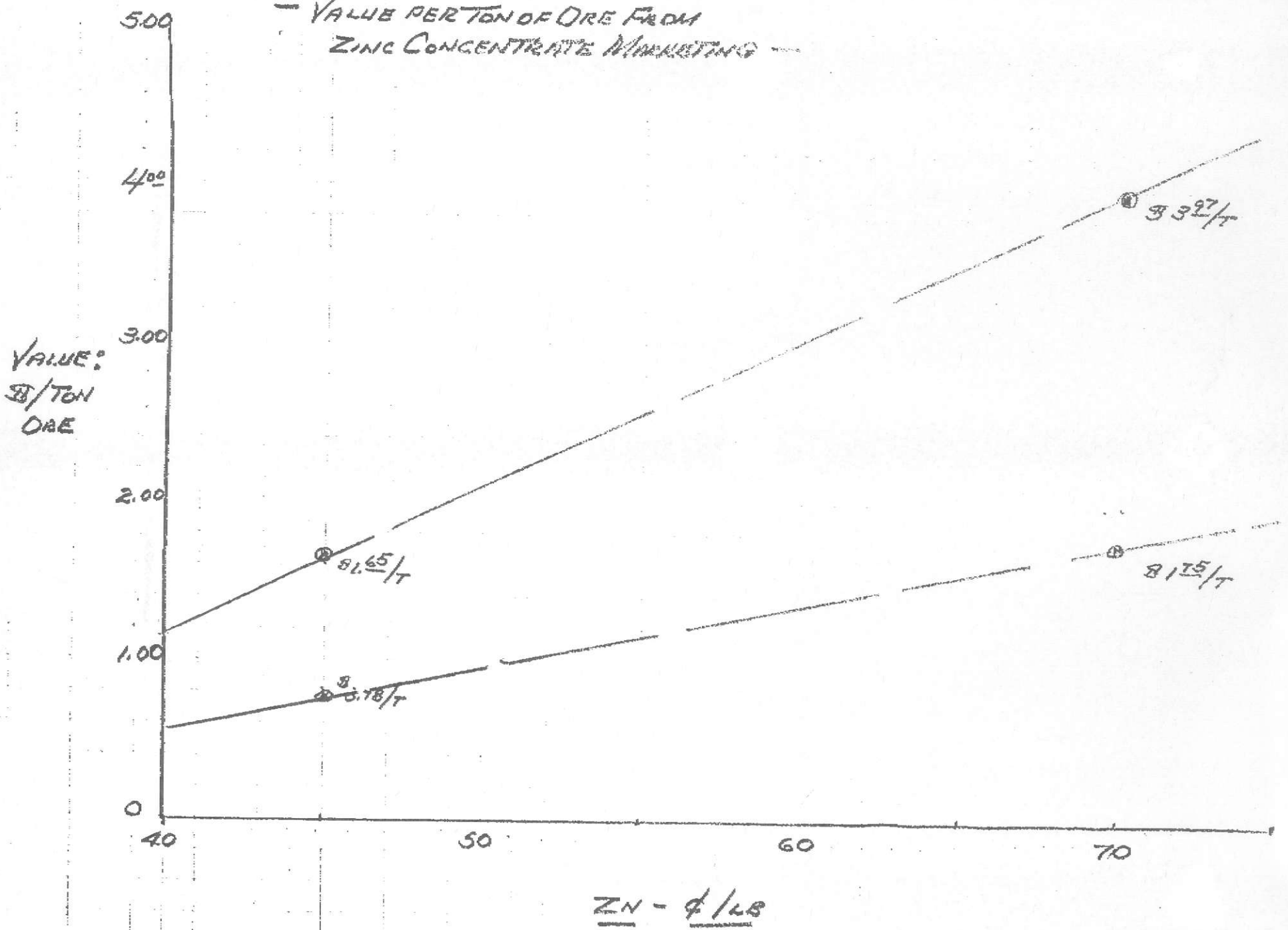
	Costs	Revenue	Net
Underground (direct)	\$ 4,678,560	\$19,166,160 Cu	\$
Milling (direct)	2,937,600	2,770,275 Zn	
Admin./Etc.	3,088,800		
Transport concentrates	3,115,905		
	-----	-----	-----
Capital Return	\$13,820,865	\$21,936,435	\$8,115,570
	1,892,160	--	
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GRAND TOTAL	\$15,713,025	\$21,936,435	\$6,223,410

Assume \$.60/lb Cu - Market, \$.45/lb Zn - Market

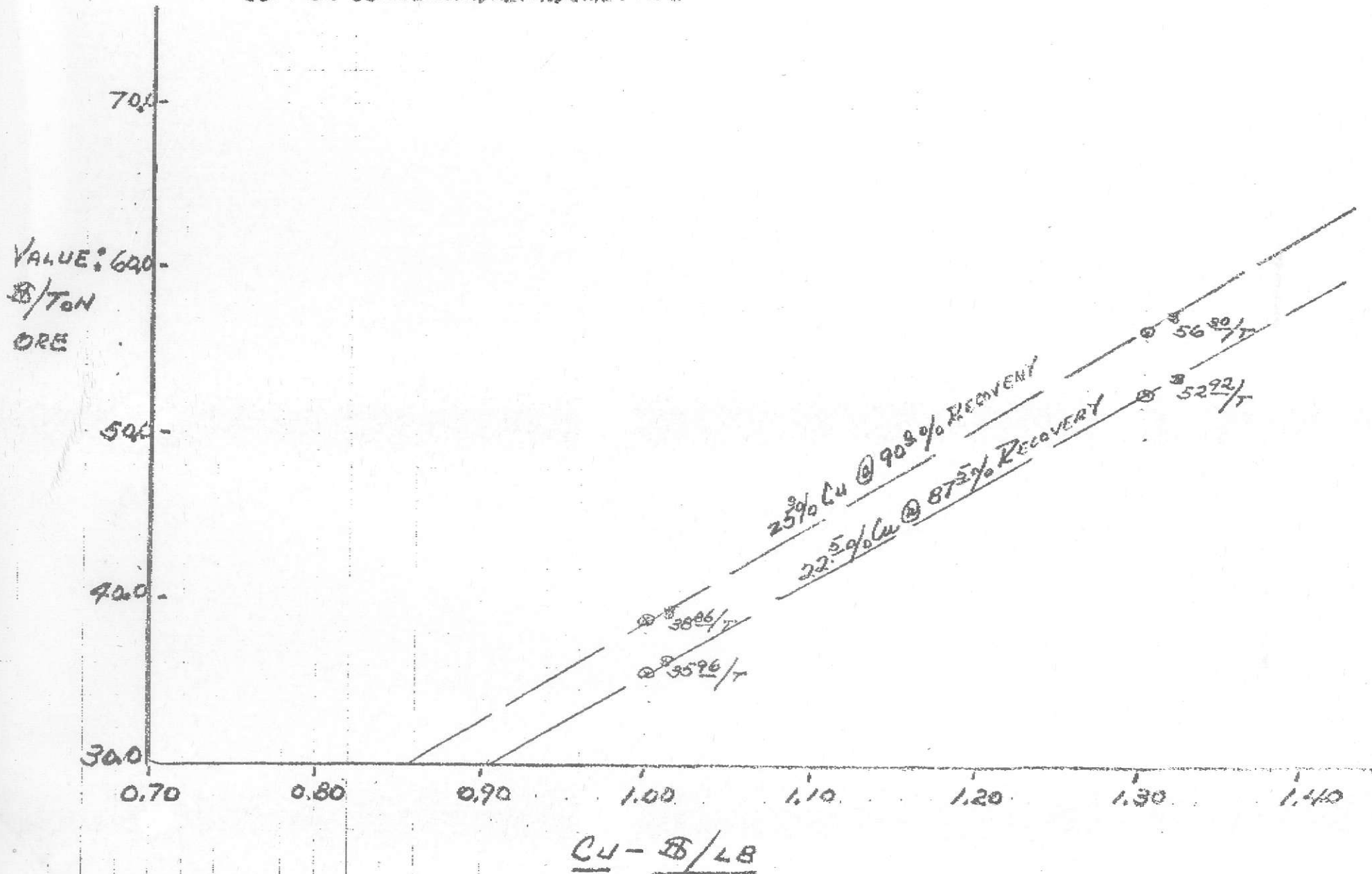
	Costs	Revenue	
Costs as above:			
Oper.	\$13,820,865	\$10,793,865 (\$175.71/T.Cu)	
		2,770,275 (Zn conc. NSR)	
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	\$13,820,865	\$13,564,140	

At \$.60/lb Copper price it is likely that smelting terms might improve giving an increased net smelting value to the concentrate.

— VALUE PER TON OF ORE FROM
ZINC CONCENTRATE MARKETING —



- VALUE PER TON OF ORE FROM
COPPER CONCENTRATE MARKETING -



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Born- 8/25/23
 U.S. Citizen
 Married
 Navy Veteran

Recap of Job Experience

- 1982-Present Self-Employed, Minerals Consultant
 Application of basic and innovative processes to present-day mineral dressing problems for a variety of clients. During this period-(2/83- 5/84), served as President and Manager of the Mineral Research Center at Butte, Mt.
- 1972-1982 Anaconda Copper Company, Anaconda, Montana
 Plant Metallurgist, Special Projects Consultant
 Responsible for process control, product quality and pyrometallurgical planning.
- 1969-1972 Anaconda Copper Company, Anaconda, Montana
 Research Engineer-Hydrometallurgy
 Assistant Superintendent of Copper Concentrator-15,000 ton per day operation.
- 1954-1969 The Taylor-Knapp Company, Philipsburg, Montana
 Geologist, Mining Engineer, Mine Superintendent, Assistant General Manager
 Mining, Milling and marketing of manganese, silver, gold, zinc and lead products.
- 1952-1953 General Services Administration, Seattle, Washington
 Purchasing Agent in Charge-Butte, Philipsburg Depot
 Inspection, sampling, and evaluation of manganese products, chrome and tungsten concentrates and copper, zinc and cadmium metals.
- 1948-1951 Anaconda Copper Company, Anaconda, Montana
 Research Engineer
 Development of ore-dressing techniques from laboratory thru pilot plant and into full-scale operations.

Relevant Education and Training

- | | |
|--|------|
| B. S. Mining Engineering, Montana College of Mineral Science & Technology | 1948 |
| Graduate Research Asst, Montana College of Mineral Science & Technology | 1951 |
| Product Marketing Development- Rayovac Company, Madison, Wisconsin | 1960 |
| Bio-Extractive Mining, AIME, Denver, Colorado | 1970 |
| Cost Accounting-Mineral Projects, NWMA, Spokane, Washington | 1977 |
| Gold-Silver Recovery Operations, Short Course, University of Idaho | 1980 |
| Sampling/Assaying of Precious Metals, IPMI, San Francisco, California | 1980 |
| Contracts, Taxation and Business Organization, Short Course, University of Nevada at Reno, Nevada | 1981 |
| Design, Economics, Mining and Metallurgy of Small-Scale Gold and Silver Operations, Short Course, University of Idaho, Moscow, Idaho | 1982 |
| Gold and Silver for Experienced Miners, Short Course, Colorado School of Mines, Golden, Colorado | 1983 |

Membership

Colorado Mining Association
 Montana Mining Association

Northwest Mining Association
 MT. Tech Alumni Association

**PRELIMINARY MINE EVALUATION
GOLDSTREAM MINE
Revelstoke, B.C.**

By
J. Stacey, PE

November 11, 1988

PRELIMINARY MINE EVALUATION
GOLDSTREAM MINE
Revelstoke, B.C.

INTRODUCTION

On October 31, 1988, this writer visited the Goldstream Mine located approximately 65 miles north of Revelstoke, B.C. A tour of the property was given to Messrs. Bryon Marler, Mark Marler, Jack McCoy, and myself by the General Manager for Noranda, Mr. John Kalmet. The mine is presently owned by Maclaren Forest Products Inc., a subsidiary of Noranda Mines, Ltd. The mine has principally been a base metal producer of copper, zinc, and a small credit given to silver.

The Goldstream ore deposit is a bedded massive sulphide vein hosted by sedimentary and metasedimentary rocks. Generally dipping to the north at 30 to 35 degrees and striking east-west. The orebody itself rakes across this dip at a 45 degree plunge to the east along the strike. The length of the deposit varies from 340 meters (1115 ft.) at the outcrop to 180 meters (590 ft.) at depth. The average width of the vein is 3 meters (9.8 ft.). The explored depth of the deposit is 1050 meters (3,444 ft.). This geometry does tend to complicate the mining methods for development and stoping.

Noranda explored the Goldstream ore deposit through the latter 1970s and placed the mine into production in the early 1980s. Production has been from 3 principle areas; stockpiled ore from the development headings, open pit mining from the outcrop of the vein, and actual production from developed stopes.

Access to the underground workings is by 4 service adits and by one conveyor adit. A system of raises, ramps, and declines connect the different levels and provides continuity to the forced draft ventilation system. Trackless mining has been used for development and production. The mine has been developed from the outcrop at the 920 meter elevation to the 655 meter elevation for a total vertical distance of 265 meters (869 ft.). The top 60 meters of the outcrop has been open pit mined to the 860 meter elevation.

The present mining method is called a "Step room and fill". This is a variation on a "Contour mining" method with an option to fill the exhausted stope with mill wastes for ground control and/or pillar recovery. Production from the stopes and the open pit areas of the mine is handled through a system of ore passes and haulage levels to the underground crusher. Crushed ore is then conveyed to the surface and concentrated in a differential flotation mill. A copper and a zinc concentrate are produced.

Concentrate produced at the mine is shipped by truck to a loading terminal located at Revelstoke. At this point, the concentrate is loaded out on the railroad for shipment to a smelter.

CONCLUSIONS

With well structured core management, coupled with an aggressive and resourceful operating doctrine, this property should be a successful venture for the investor who acquires it. There are a few problems that are apparent from this brief study that will have to be addressed and solved before full production can be attained. However, this writer believes these can all be overcome.

The most apparent problem that will have to be confronted is a practical and economic balance of mine and mill production tonnages. It is felt that Noranda overbuilt the mill with a higher tonnage capacity than can be supplied without seriously stressing the mine's physical capabilities. Figures published in Maclaren Forest Product's report of January, 1988 indicate that only 32% of the total mill feed came from underground production during the first quarter of 1984. The balance of the production came from the open pit (44%) and from previously stockpiled development ore (23%).

The mine and mill plants are very well constructed and this writer is impressed with the general condition of the buildings, equipment, and underground structures. It is apparent that Noranda spared little expense to capitalize this property.

The mining method seems to be well suited to the general ground conditions. There may be room for improvement to the method in future development work, but for the developed mining areas, the present method is committed and little can be done to improve upon it.

The pit has now reached it's maximum stripping ratio of an estimated 12 to 1 and should be less with each new bench cut below the present level. Estimated remaining pit reserves are at 110,000 tons. Production from the pit should last another 183 mining days at 600 tpd (tons per day) or 8.3 months.

To provide the maximum ore feed of 1,500 tpd to the mill 7 days a week, the mine will have to provide a sustained production of 2,100 tpd 5 days a week. At this rate, a new stope will have to be brought into service every 12.5 days.

The underground mobile equipment and ventilation fans have all been removed from the property and will have to be replaced at an estimated cost of \$2.0 to 2.2 million. These figures are based on used, reconditioned equipment at U.S. costs and are spread to indicate different levels of tonnage production.

The following table is for estimated costs and does not reflect any future development costs, direct milling costs, taxes, or cost of insurance.

<u>Description</u>	<u>Mill Production (tpd)</u>			
	<u>800</u>	<u>1,000</u>	<u>1,200</u>	<u>1,500</u>
Management	3.76	3.00	2.50	2.00
Labor	11.21	8.97	8.02	6.84
Mine Supply	1.75	1.75	1.75	1.75
Mine Energy	1.08	1.08	1.08	1.08
Plant Capital	5.02	4.63	4.38	4.15
Total	22.82	19.43	17.73	15.82

Table 1. Mining Costs (\$ U.S. per ton)

The table below is for a mine/mill production comparison to the mine life. Although it is an ideal model, some feeling for projections can be made from it. Reserves are given as tonnages now developed and tonnages that remain to be developed below the 655 meter level.

<u>Tons of Reserve</u>	<u>Mill (tpd)</u>	<u>Mine (tpd)</u>	<u>Mine Life (years)</u>
1,286,482	800	1,120	3.3
1,286,482	1,000	1,400	2.6
1,286,482	1,200	1,680	2.2
1,286,482	1,500	2,100	1.8
3,499,135	800	1,120	9.0
3,499,135	1,000	1,400	7.2
3,499,135	1,200	1,680	6.0
3,499,135	1,500	2,100	4.8

Table 2. Mine Production Rates & Mine Life

The following table is for illustrating the net mine, pre-mill revenues based on the above from Tables 1 and 2. Only the 800, 1,000, and 1,200 tpd mill tonnages have been considered because of what this writer feels are the optimum practical outputs the mine can sustain. Also, only the upper developed reserves are shown because of the unknown amount of additional capital that is needed to finance the development of the lower reserves at this time. For the calculation of revenues, the underground reserve estimates were discounted 25% for mine pillars left intact and the 110,000 tons to be mined from the open pit.

<u>Tons of Reserve</u>	<u>Mill (tpd)</u>	<u>Cost (\$ U.S.)</u>	<u>Net Mine (\$ U.S.)</u>
1,176,482	800	21,478,000	78,107,000
1,176,482	1,000	17,346,000	82,239,000
1,176,482	1,200	16,687,000	82,898,000

Table 3. Net Mine Revenues (Underground)

Ore reserves in the open pit are going to be a very important resource for restarting the mine. It would be to the advantage of the operating company to contract out the mining in the pit to defer any capital expense in equipping that part of the operation. An estimated cost to

mine the open pit by a contractor is approximately \$25.00 per ton of ore based on a starting strip ratio of 12:1 and a finish ratio of 1:1.

<u>Tons of Reserve</u>	<u>Mine (tpd)</u>	<u>Cost (\$ U.S.)</u>	<u>Net Mine (U.S.)</u>
110,000	600	2,750,000	8,128,000

Table 4. Net Mine Revenues (Open Pit)

The following is an estimated capital expenditure list that would be required to restart the mine and bring it to production over a total of 14 weeks. These costs would of course be off-set by production from the stopes and the open pit.

Underground equipment (Minimum required)	\$2,076,000
Underground equipment (Optimum required)	2,214,000
Start up costs (14 weeks negative cash flow)	1,430,000

Table 5. Itemized Capital Expenditures

An estimated time to bring the mine to a optimum production level of 1,000 tpd (Mill) is approximately 14 weeks. As previously stated, the open pit will play a very important part in this production schedule. Therefore, stripping for the next production bench should start on day one and continue for the next 2 to 3 weeks before ore will be exposed for mining. Mining from the underground stopes should start and come up to a level of approximately 400 tpd (Mill) on or about the 14th week of this scenario.

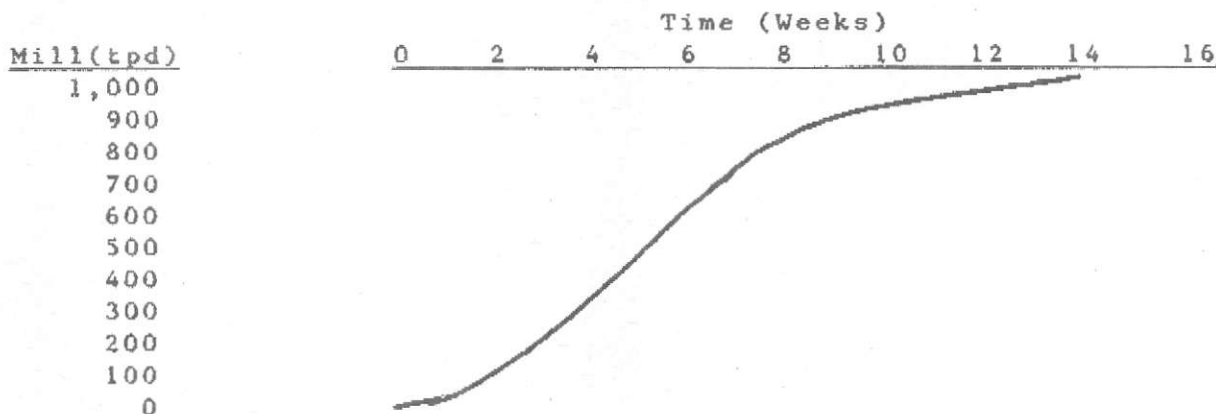


Chart 1. Approximate Production Startup Time

GENERAL DISCUSSION

Economic and timeline projections have been made from following data;
 a) 110,000 tons of reserve at 3.23% Cu and 1.84% Zn in the open pit.
 b) 1,286,482 tons of total reserve at 3.89% Cu and 2.75% Zn from the surface to the 655 meter elevation.

- c) 2,212,653 tons of total reserve at 3.29% Cu and 2.35% Zn from the 655 meter elevation to the 400 meter elevation.
- d) 3,499,135 tons of total reserve from the surface to the 400 meter elevation.
- e) 75% stope extraction without backfill.
- f) Mill recoveries at 85% Cu and 50% Zn.
- g) No credits given for Ag.
- h) Pre smelter value of metals (U.S.), \$1.30/lb for Cu and \$0.60/lb for Zn.
- i) No consideration has been given to direct milling costs.
- j) No consideration has been given to cost of insurance, taxes, freight, and smelting.
- k) All dollar calculations are in U.S. currency.
- l) Capital recovery calculated at 12% compounded interest.
- m) All data has been supplied by Noranda.

Manpower requirements seem to be very high as Noranda listed them. The staff people made up for most of this discrepancy. The following list of positions and personnel is an estimated manpower level that should enable the mine to operate efficiently. Mill personnel other than the Mill Superintendent, have not been accounted for on this list. For computation of wages into the mining costs, all salaries and wages were multiplied by a factor of 35% for payroll benefits.

<u>Position</u>	<u>Number</u>	<u>Salary/Wage (\$ U.S.)</u>
General Manager	1	65,000/yr
Mine Superintendent	1	50,000/yr
Mill Superintendent	1	50,000/yr
Chief Engineer	1	50,000/yr
Maintenance Super.	1	45,000/yr
Chief Clerk	1	45,000/yr
General Mine Foreman	1	45,000/yr
Mine Engineer	2	40,000/yr
Geologist	1	36,000/yr
Mine Shift Foreman	2	36,000/yr
Surface Foreman	1	36,000/yr
Purchasing Agent	1	30,000/yr
Accountant	1	30,000/yr
Safety Engineer	1	30,000/yr
Miners	36	15/hr
Mechanics	11	11/hr
Operators	2	11/hr
Electricians	6	11/hr
Surveyors	2	11/hr
Geologist Helpers	2	11/hr
Warehouseman	2	10/hr
Bookkeeper	1	9.50/hr
Payroll Clerk	1	9.50/hr
Secretary	3	9.50/hr
Janitor	2	9.50/hr
Laborer	4	9.50/hr
Total	88	

Much more time could be sent on a more proper mine evaluation, mine planning, and design work on the stopes. But for the expediency of the present project, this breif review should be an adequate measure of the mine's potential, plus or mius 15%.



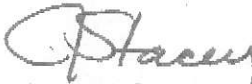
Jerry Stacey, PE
Mining Engineer

Disclaimer

I, Jerry Stacey, PE, of Spokane, Washington, do hereby certify that I am a registered, Professional Engineer certified by the State of Washington, License Number 20428, and that I am a Graduate Mining Engineer with a B.S. degree from the Montana College of Mineral Science and Technology.

I also hereby certify that I have not directly or indirectly recieved nor do I expect to recieve any interest, directly or indirectly from U.S. Investments, Inc. or any affiliate, and I do not beneficially own, directly or indirectly, any securities in any such company.

Dated in Spokane, Washington, this 11th day of November, 1988.



Jerry Stacey, PE
Mining Engineer