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FEASIBILITY REPORT OF  
RUTH VERMONT MINE LTD. (N.P.L.)

MARCH 15, 1982

BY H.D. FORMAN, P. ENG.

March 15/82

### Introduction

The following report is an update of the writer's report of April 18, 1979. Mining costs have been revised upward to bring them into line with present day labour, supply, and smelting costs.

Vein ore deposits have been increased since the 1981 operation indicated their increased potential as an ore source.

### Ore Reserves

Replacement Ore		<u>Ag.</u>	<u>Pb.</u>	<u>Zn.</u>
Tons Diamond Drill Indicated	101,000	5.0	3.6	4.9
Probable Ore	<u>57,000</u>	<u>4.9</u>	<u>3.5</u>	<u>4.9</u>
Sub-total	158,000	4.9	3.5	4.9

### Vein Deposits

Tons Diamond Drill Indicated	44,000	9.0	6.3	6.1
Probable Ore	<u>100,000</u>	<u>9.0</u>	<u>6.3</u>	<u>6.1</u>
Sub-total	144,000	9.0	6.3	6.1
Total	302,000	6.8	4.8	5.4

Mining costs, inclusive of interest, and head office are estimated at \$68.00 per ton on a production rate of 7,000 tons monthly. Head values based on a Silver price of \$8.00 U.S. per ounce, Lead price of 38¢ per pound Canadian and Zinc price of 46¢ per pound Canadian at Trail, B.C. are calculated at \$81.60 Cdn. per ton after allowing for recovery, trucking, and smelting costs. This figure represents the value of one ton of ore in the mine.

Earnings per month are estimated at  $7,000 \times (\$84 - \$68) = \$112,000.00$   
Annual profit at  $(12 \times 112,000.00) = \$1,344,000.00$

Each increase or decrease of \$1.00 U.S. in the price of silver represents a change of \$6.50 per ton in earnings or \$548,000.00 per year.

Exploration of the vein deposits on the 5750 level have added one new vein system to the ore potential and other parallel vein structures are indicated to the East.

The mine in 1981 was equipped with a new 2250 KVA power plant, two new 750 CFM compressors, fourteen jacklegs and six stopers. In addition all mill equipment, mining equipment, and surface equipment were overhauled. The camp buildings, office, dry and warehouse were serviced and repaired. The mine can therefore be placed in production within one month of start-up preparations.

Funds necessary to get the mine into production are \$450,000.00 to meet existing creditors, \$150,000.00 for move-in expenses and \$1,200,000.00 operating capital for a total of \$1,800,000.00.

The 1981 operation failed to reach economic production levels for the following reasons. Delivery of equipment and repair parts was from two to four months late in arriving at the property and set the start-up operation three months behind schedule. The mine was never able to secure experienced staff and the absence of a competent resident manager was a costly error.

The selection of a mine manager, and through him the balance of the staff members, is the key to the mine's success and no attempt to reopen the mine should be made until this problem is resolved.

Claims

The Vancouver office has the recorders receipts for the following claims in good standing:

	<u>Crown Grants</u>	<u>Record No.</u>
	Charlotte	405
	Ruth	418
	Minnie	419
<u>Located Units</u>	Cleopatra	8122
MP - 1	Vermont	8123
MP - 2	Sheba	8124
MP - 3	Ruth Fr.	8125

Location & Climate

The mine lies approximately 23 miles south of Golden, B.C. and is reached by thirty-five miles of good logging road from Parsons, B.C. It lies within a cirqued valley at an elevation of some 6,000 feet. The claims straddle Vermont Creek which drains the rugged area. Mountain peaks rise to elevations of 8,000 to 8,500 feet and the steep-sided valley is plagued by heavy snows and avalanches throughout five months of the year.

Ore Reserves

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Notes On Tonnages

Twenty-six thousand tons of replacement ore left in the backs and floors of the present stopes is still recoverable. The stope survey completed by Mr. J. Start on March 22nd, 1977 shows this on the diamond drill sections. This survey indicates that some 58,000 tons of ore should remain in the stoped area. A large part of this tonnage was left in the roof and floor of the old stopes and can be mined at today's metal prices.

Replacement ore between sections 1650 and 1975 is estimated at 99,672 tons based on diamond drill sections after an allowance of 10% for dilution. Diamond drilling in the 1975 section is not sufficient to allow accurate ore calculations and this tonnage has been reduced to 75,000 tons until further development has been done.

Exploration on the vein deposits is limited to a few hundred feet of drifting and a series of diamond drill holes put in from the 6,000 foot level. Since the drill holes were largely oriented to prove up the replacement ore tonnage, only a few holes shed light on continuity of the vein deposit.

Four vein systems have been found in the exploration to date, namely the Blacksmith, Pinetree, North vein and South vein. They have a combined strike length of 2700 feet and two have a vertical range of from 200 feet to 500 feet within the confines of the present workings. Taken over an average five foot mining width and a specific gravity of eleven cubic feet to the ton, they have an ore potential of 429,545 tons. Since exploration to date is too limited to estimate the distribution of ore shoots within the vein a conservative estimate of one ton of ore in each three tons of ore potential has been used. Possible ore is therefore 142,512 tons, of which 44,000 tons within the Pinetree vein are diamond drill indicated, leaving possible ore as 98,512 tons. The figure of 100,000 tons has been used in calculating ore reserves.

#### Ore Grades

Replacement ore grade has been based on the mill heads secured in the milling of 93,389 tons by Copperline in 1970-71 and the milling of 41,057 tons in 1976. This grade is below the estimate made from diamond drilling and indicates poor grade control in mining. Until mining control has been improved the former mill heads are believed to be the best indicator of ore grade.

All vein ore grade calculations were made over a five foot vein width although practice has shown that mining is quite possible over a four foot width. The silver content of vein ore has been reduced by one ounce since the grade of the large tonnage of possible estimated ore remains to be proven.

#### Mill Recoveries

The best record of metallurgical performance was that kept by Copperline Mining Company in the milling of 93,389 tons of ore in 1970-71. These show Lead concentrates contained 76.4% of the Silver, 81.3% of the Lead, and 3.8% of the Zinc. Zinc concentrates contained 14.6% of the Silver, 76.4% of the Zinc and 7.4 pounds of Cadmium.

Concentrate grades were as follows:

Lead Concentrates	72.23 oz. Ag., 59.8% Pb. and 3.02% Zn.
Zinc Concentrates	Silver 9.12 oz., Zinc 48.6%, Lead not recorded and Cadmium 7.42 pounds

Test work done on Columbia's ores shows only slight improvement on the above results. A small percentage of graphite in the ore is given as the cause of the poor recoveries. Consolidated Columbia River Mines milled 41,057 tons in 1976 but neither tonnage milled nor assays were accurate. Smelter returns from this tonnage shows concentrate grades of 58.8% for Lead and 50.1% for Zinc.

The milling in 1976 suffered an 18% time loss through power plant failures, inexperienced operators and the lack of a cleanup sump to recover spillages. If these factors are improved there is every reason to expect that both recoveries and concentrate grades will be upgraded.

The metallurgical results are, however, not satisfactory and every attempt should be made to upgrade them. If new test work is undertaken it would be advisable to make the first test on replacement ore, the second on vein ore and a third using three parts replacement and one part vein ore.

The following results are believed readily attainable and have been used in calculating head values.

Lead - 81% recovered in the Lead concentrate, 77% of the Silver content and 78 pounds of Zinc.

Zinc - 78% of the Zinc in the Zinc concentrate, 16% of the Silver, 60 pounds of Lead and 7.4 pounds of Cadmium.

1981 concentrates ran from 90 to 120 ounces in Silver and it is believed this resulted from the milling of a much higher percentage of vein ore. The vein deposits have a higher ratio of Silver to Lead content.

### Head Values

Head values calculated directly from smelter returns are \$8.00 Cdn. per ounce for Silver, 14¢ per pound for Lead and 15¢ per pound for Zinc. When metal prices were \$8.00 U.S. per ounce for Silver, 38¢ Cdn. per pound for Lead and 46¢ Cdn. per pound for Zinc, deductions for mill recoveries, trucking, and smelting were made and the price represents the value of the metal in the mine.

### Geology

The geology of the mine area is briefly covered in Mr. T.S. Tough's report, a copy of which is appended.

The writer notes one important factor which appears to have been overlooked. The Pinetree vein and North vein have been responsible for providing the solutions which resulted in the replacement ore body within the limestone at the 6,000 foot elevation. These veins, however, are not paralalled in either strike or dip.

They come together on the 6,000 foot level at section 1175 and diverge going east, and are 50 to 60 feet apart at section 1650. The result is the replacement zone between 1150 and 1400 sections is a single ore body but east of this becomes two ore bodies separated by a horse of non-commercial mineralization. A second feature as yet to be defined is the extent and movement of a major fault obliquely cutting the ore zone beyond section 2000. This fault has never been mapped but is clearly indicated in the diamond drill holes.

Mining Costs Estimate - 1982

<u>Item</u>	<u>Cost Per Ton</u>
Labour	\$23.00
Powder	3.50
Steel and bits	1.70
Roof bolts and timber	.40
Repairs - Underground equipment	1.50
Diamond drilling	.30
Rental Purchases	3.50
Power	5.50
General (Including camp)	4.50
Mill repairs, surface, and road	4.00
Chemicals	3.00
Balls, liners, etc.	.90
Head Office, etc.	3.20
Interest and bank charges	10.00
Contingencies	<u>3.00</u>
Total	<u><u>\$68.00</u></u>

Economics

Head Values	\$84.00
Mining Costs	<u>68.00</u>
Profit before taxes	\$16.00 per ton
Monthly 7,000 x 16.00 =	\$112,000.00
Annually 84,000 x 16.00 =	\$1,344,000.00

Each \$1.00 U.S. change in Silver prices changes the Head Values by \$6.50 per ton.



Labour Requirements

Staff -	Manager		
	Mine Superintendant/Engineer		
	Mill Superintendant		
	Geologist/Surveyor		
	Assayer		
	Accountant		
	Warehouse/First Aid		
	Two Shiftbosses		
	Master Mechanic/Surface Foreman	- 10 Men	
Underground -	Miners	12	
	Trammers	2	
	Timberman	1	
	Mechanical	1	
	Others	6	- 22 Men
Mill -	Operators	3	
	Ball Mill/P House	3	
	Helpers	2	
	Mechanic	1	- 9 Men
Surface -	Mechanics	2	
	Cat/Loader Op.	1	
	Grader Operator	1	
	Road	1	
	Power Plant	1	
	Others	2	
	Transport	1	
	Carpenter	1	
	Electrician	1	- 11 Men

Total crew not including cookhouse and camp, which will be set up on a contract basis, amounts to 52 men.

Ten days on and four days off is the most economical schedule for all departments.

### Mine Program

The present mine program should be continued until such time as exploration and development programs have provided a better knowledge of the ore shoots, at which time stoping operations may require revision. The immediate need underground is an 1100 foot diamond drill program to definitely establish the location of the Pinetree vein on the 5750 foot level. It would also provide information on the exact location of the major fault at the 2000 section. This program could be completed in two weeks and would cost \$38,500.00.

There are immediately available for mining two down ramp faces size 15' x 10' in ore and capable of providing 13 tons of ore to the foot of advance.

On the vein deposits eight faces size 5' x 7' are all equipped for mining and can produce 120 tons of ore per day. Production can be commenced at a rate of 120 tons of replacement ore with an overall grade of 6.6 ounces of Silver, 4.68% Lead and 5.3% Zinc. Following the opening up of the Pinetree vein on the 5750 foot level mill tonnage can be balanced at 150 tons daily of replacement ore and 150 tons of vein ore.

### 1981 Program

Rehabilitation of the mine commenced in April of 1981 and consisted of the installation of a new power plant with three 750 KVA Detroit 149T diesel engines. Mine air was supplied by two new Atlas Copco 750 CFM electric compressors and one former 750 CFM Gardner Denver electric compressors. Underground the two boom Gardner Denver jumbo and Wagner ST5 scooptram were overhauled and fourteen new jacklegs plus six new stopers were added to the existing equipment. Several thousand feet of underground water and airline were renewed and 600 feet of cross-cutting and drifting completed on the 5750 foot level. On the surface the concentrator was overhauled and repaired from the coarse ore binns. The cookhouse, bunkhouses, office, dry, warehouse, and pumphouse were all repaired, equipped and readied for production.

The delivery of the power plant machinery was two months behind its promised date and put the whole operation two months behind schedule, and the ball mill was not ready until mid August. The mine, due to a shortage of miners, was not in a position to supply ore other than that mined in development and exploration headings. This situation continued throughout September and into October at which time adequate mine crews became available but the underground was now four months behind its schedule.

Qualified staff were difficult to find and as a result the mine limped along during August, September, October and November with limited management, no geologist, mine superintendent or master mechanic. In addition the assay equipment was late in arriving, then installed improperly and never really operated until December. Also in October and November a series of breakdowns in mine equipment delayed production. The major culprit was the failure of a new ST2D scooptram, which was rented to speed up the underground development. In three months operation, this machine never reached a power output above 40% of its rating, and four teams of experts sent in failed to diagnose its troubles.

To add to the mine's problems, accounting and purchasing were done through the Vancouver office and the result was confusion and the failure to have the accounts up to date.

In short, the mine failed in 1981 due to: No. 1 - the lack of a competent, experienced resident manager and as a result the lack of adequate staff; No. 2 - the failure of suppliers to deliver equipment and repair parts on time; and No. 3 - the lack of an experienced mine accountant located at the mine site.

### Recommendations

It is recommended that the first prerequisite for opening the mine is the securing of a competent manager and supporting staff, including a mine accountant.

It is further recommended that the diamond drill program outlined in January, 1982 be completed as the first step underground.

The mill repairs commenced over the 1981 Christmas holidays should be completed in conjunction with the diamond drilling. Both of these projects should be completed in two weeks.

The trucking contract for hauling concentrates should include a clause that the mine is to be supplied with 18 empty pots so that concentrates go from filter to pot by gravity, thus avoiding a concentrate loss in handling and reducing time lost in loading operations.

The attempt should be made to place most of the underground work on small contracts. Groups of three to four miners would undertake contracts of various sections of the ore body. The Company would provide supplies at cost, as well as maintain all equipment. This would add to the direct mining cost but would prove much more economical in the overall picture since the mill would be assured of the full tonnage and underground labour shortages largely eliminated.

The practice of attempting major overhauls of equipment on the property should be avoided. The shops for such repair jobs are not available at the mine nor is the ability of the mechanical crews up to this type of work. A deal should be made with the repair shops in Cranbrook and all major repairs completed by contract. The machines would be transported by flatbed trucks to Cranbrook. This would speed up repairs and prove much more economical.

Cranbrook has extensive repair and supply centres for mining equipment. It is also served by much more efficient freight lines than Golden. It should therefore be set up as the major supply centre and thus speed up deliveries of equipment and supplies.

The mine must be operated by the resident manager if it is to operate efficiently. Therefore, accounting and purchasing must be done at the mine if the manager is to have control of expenditures. The head office could give assistance in expediting the securing of personnel to a limited degree.

Overall direction of policy, economics along with help in the layout of the mining system, exploration and helpful hints on operating efficiency can be supplied by the managing director or a consultant, but the day-to-day operation is the resident manager's job.

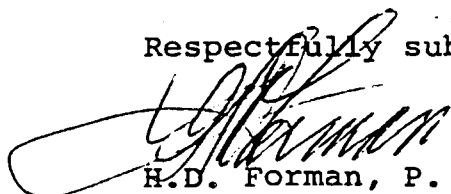
If a monthly inventory of all standard items for repairs and supplies is kept up then it should be possible to place one main order monthly and thereby obtain 95% of the mine's needs. This would assure supplies on hand at all times and eliminate much of the confusion in ordering and warehousing that was evident in 1981. This should be further aided by an improved telecommunications system between the mine and Golden.

### Conclusions

The Ruth Vermont Mine is largely dependent upon its Silver values for an economical operation. When silver prices drop below \$8.00 U.S. per ounce the mine's ore grade quickly becomes marginal. When the Silver price exceeds \$8.00 U.S. per ounce the property has excellent potential to become a profitable long-term producer.

In past operations the mine has always managed to be brought into production after metal prices peaked. It is now in a position to take advantage of rising metal prices and every effort should be made to keep it in good repair; ready to take advantage of rising metal prices later in 1982.

Respectfully submitted,



H.D. Forman, P. ENG.

CERTIFICATE OF QUALIFICATIONS

I, H.D. Forman, of RR 3, Oliver, B.C. certify as follows:

- (1) That I am a graduate of the University of Alberta with a Bachelor of Science degree in Geology;
- (2) That I am a member of the Professional Engineers of British Columbia;
- (3) That I have practiced my profession for over forty years in Canada and abroad;
- (4) That the information contained in this report was gathered during the year 1981 when I was Managing Director of Ruth Vermont Mine Ltd.;
- (5) That I hold an option on 75,000 shares of Ruth Vermont Mine Ltd. stock at a price of \$2.50 per share.

H.D. Forman, P. Eng.