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Rexspar
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BIO METALS
CORPORATION LTD. (N.P.L.)
71-553 GRANVILLE ST.
VANCOUVER 1, B.C.
TELEPHONE 681-5851

LABORATORY
1180 W. 15TH STREET
NORTH VANCOUVER, B.C.

April 19th, 1968.

Dear Dr. Joseph:

We have a letter requesting information on the costs of a pilot plant operation at the Birch Island property of Consolidated Rexspar Mineral and Chemical Limited. Mr. John Tosney, our senior engineer, has left our employ and perhaps that is the reason for the delay of the Company in sending the information you request. I have therefore compiled as much information as I can from previous reports and from data gathered at the Skeena Mine and Bio Metals Corporation Limited at Highland Valley, B.C.

Mr. Mayling reports that a solution containing sufficient uranium for recovery in a standard ion-exchange plant can be made by direct bacterial leaching of the ore from the "A" orebody.

Re plant required for this process would include a suitably sited heap of mined ore through which would be circulated, by pumping on top and draining from the bottom, a solution of water containing certain bacterial cultures and nutrients. Re bacteria would propogate in the ore pile and act to oxidize the sulphides present to form soluble sulphates and sulphuric acid. The sulphuric would dissolve the uranium and the solution as drained from the pile would be clarified and passed through ion-exchange equipment to recover the uranium in a concentrated soluble form.

A pilot plant is not considered te be a commercial operation although it might produce enough product to pay the costs of doing the job.

Mr. Mayling's figures show that on the average in his tests, he recovered 0.005 grams of U_3O_8 each week from 1500 grams of ore which contained initially .05% U_3O_8 but produced a much higher rate after the first month. His tests also showed a considerable delay in producing uranium probably because of the reprecipitating effects of fluorides and phosphates in the solutions. Apparently sufficient cycling was needed to eliminate some of these elements before uranium in sufficient quantities remained in solution.

A suitable pilot plant to test the adaptability of Mr. Mayling's report to ground conditions would consist of a heap of about 10,000 tons of ore from the "A" orebody. This should produce about 100 pounds of U_3O_8 per week. A larger pile, say 25,000 tons, would produce about 250 pounds per week. In any event a small pile should be used to begin operations and it could be enlarged after data obtained from it indicated a satisfactory procedure. At Skeena a 3500 ton heap was adequate for the pilot plant.

Re plant would be very simple and the costs would be the same as those at Skeena except for the precipitation equipment.

A list of essential units and an estimated cost for them is given below.

Capital requirement would be about as follows:

Heap site reparation (10,000 tons capacity)	$ 5,000.00
Ore placement on heap at 50¢/ton	5,000.00
Piping system	3,000.00
Pumps	4,000.00
Reservoirs (tankage)	5,000.00
Acid Storage Tank	3,000.00
Culture Tanks	2,000.00
Laboratory	6,000.00
Labour	10,000.00
Engineering and Technical	10,000.00
Building to House Plant	15,000.00
	$68,000.00

It may be desirable to include an ion-exchange unit in the pilot plant. This would be done only if it is desired to produce a soluble product. Re cost of such a plant would depend on the production capability and would be such as to probably double the cost of the leaching system as shown above. This would only be warranted if the leaching produced solutions of a satisfactory nature. For test purposes it is possible that the uranium might be precipitated as an insoluble salt simply to remove it from the circuit as required.

Monthly operating costs of the above plant without an ion-exchange unit would be about as follows:

Labour - 6 men at $500.00/month	$ 3,000.00
Engineering including resident engineer	1,700.00
Power supplies, handling	3,000.00
Acid (initial costs high)	2,000.00
Overhead (allow 20% of above)	2,000.00
	$11,700.00

If production were 100 pounds per week this would be an uneconomical operation. A minimum operation to yield an economic amount would require the production of not less then 2000 pounds per month and from our laboratory figures this would require at least 50,000 tons of ore under leach.

If a large heap is constructed then the extra capital cost of site preparation and ore placement must be added as well as the cost of an ion-exchange unit. The balance of the plant cost would remain approximately unchange. Monthly operating costs on the larger heap would not change except for additional reagent cost as required for the ion-exchange unit.

During the feasibility study it was discovered that relatively large amounts of rare earths were present and that they also dissolved along with the uranium.

It was also noted that uranium bearing rocks extended over a much wider and longer region then had previously been supposed. It is possible that the plant could be sited to test some of the new ore which appears to have much less fluorite or phosphate in it but to contain useful quantities of uranium, rare earths, and sulphide minerals. Re new ore could be upped and loaded onto a heap very cheaply and would thus be bulk sampled in the process.

On the proposed 10,000 ton pile the cost flow sheet would be substantially all loss as represented by the monthly operating costs and most of the capital to build the heap and instal the plant.

On a 50,000 ton pile a cash flow would indicate at least recovery of the operating costs after the first few months.

The heap would have to be increased to at least 100,000 tons to return any substantial amount of the invested capital in a reasonable time.

A possible cash flow sheet for an 18 month period is tabulated here based on the supposition that field experience confirms laboratory tests and that the heap is expanded at a reasonable rate per month after the first 4 months. A rate of 30,000 tons per month is assumed.

Expansion and mining costs are added starting at that time.

No capital costs are included in the cash flow chart.

Initial capital costs will be about as shown for the 10,000 ton heap and plant. In the fourth month there will be an additional cost for ion-exchange equipment and thereafter there will be a cost related to heap expansion in preparing the heap base for each size increase.

This will depend on the kind of base and the experience gained in the first three months as the orebody. In situ leaching could require very little incidental cost for base construction.

Assuming that the base construction must be increased as each 30,000 tons of ore is added the base cost will increase by about $3,000.00. Therefore a capital allowance for this would amout to about $42,000.00 over the 18 month period.

This and the plant could be written off after the tax free period is over or at some reasonable amount during the first three years.

After two years the first section of the heap placed under leach would be leached out and removed thus making way for the regular monthly increase thereafter. At this time production should be at the rate of about 30,000 pounds per month.

Re gross operating cost per pound of uranium would stabilize at about $1.80 per pound including mining provided that open pit mining is feasible.

This letter is based on data from the laboratory and the costs of the pilot plant are reasonably reliable. The cash flow is based on the supposition that lab production figures are born out in pilot practice. Expansion costs are extrapolated from our Skeena expansion costs.

For your information Bio Metals is now being operated by a new group of financial personnel and Mr. G.E. Sklar, who is in charge, has authorized me to express the interest of the group in the Rexspar operation.

Re extent to which they might be able to proceed could be determined by meeting with you and representatives of your company to establish any possible basis for such co-operation. Mr. Sklar could come to Montreal for this purpose.

I hope this letter finds you with improved health. Best wishes

Yours truly,

C.L. Emery

Dr. C.L. Emery.

/bc

POSSIBLE OPERATING CASH FLOW

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9
Labour, Power Supplies	8,000.00	8,000.00	8,000.00	8,000.00	10,000.00	10,000.00	10,000.00	11,000.00	11,000.00
Engineering	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00
Overhead	2,000.00	2,000.00	2,000.00	2,000.00	2,500.00	2,500.00	2,500.00	3,000.00	3,000.00
Expansion	nil	nil	nil	nil	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00
Contingencies	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Total Cost	12,700.00	12,700.00	12,700.00	12,700.00	21,200.00	21,200.00	21,200.00	22,700.00	22,700.00
Cumulative Total	12,700.00	25,400.00	38,100.00	50,800.00	72,000.00	93,200.00	114,400.00	137,100.00	159,800.00
Production U_3O_8 (lbs)	nil	nil	nil	nil	500.00	1,500.00	2,500.00	4,000.00	6,000.00
Value at $7.00/lb.					3,500.00	10,500.00	17,500.00	28,000.00	42,000.00
Cumulative Value					3,500.00	14,000.00	31,500.00	59,500.00	101,500.00
Cumulative gain or loss	-12,700.00	-25,400.00	-38,100.00	-50,800.00	-68,500.00	-79,200.00	-80,900.00	-77,600.00	-58,300.00

POSSIBLE OPERATING CASH FLOW (con't)

	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18
Labour, Power Supplies	12,000.00	12,000.00	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00	14,000.00
Engineering	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00	1,700.00
Overhead	3,000.00	3,000.00	3,300.00	3,300.00	3,300.00	3,300.00	3,300.00	3,300.00	3,300.00
Expansion	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.00	6,000.
Contingencies	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	2,000.00	2,000.00	2,000.00	2,000
Total Cost	23,700.00	23,700.00	26,000.00	26,000.00	26,000.00	27,000.00	27,000.00	27,000.00	27,000.00
Cumulative Total	183,500.00	207,200.00	233,200.00	259,200.00	285,200.00	312,200.00	339,200.00	366,200.00	393,200.00
Production U_3O_8 (lbs)	7,500.00	9,000.00	10,000.00	11,500.00	13,000.00	14,000.00	15,000.00	16,000.00	17,000.00
Value at $7.00/lb	52,500.00	63,000.00	70,000.00	80,500.00	91,000.00	98,000.00	105,000.00	112,000.00	119,000.00
Cumulative Value	154,000.00	217,000.00	287,000.00	367,500.00	458,500.00	556,500.00	661,500.00	773,500.00	892,500.00
Cumulative gain or loss	-29,500.00	+9,800.00	+54,800.00	+108,300.00	+173,300.00	244,500.00	322,300.00	407,300.00	499,300.00

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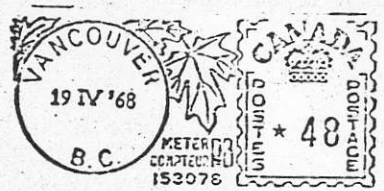

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AIR MAIL SPECIAL DELIVERY