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TOURNIGAN MINING EXPLORATIONS LTD.

VANCOUVER B.C.

ATAN LAKE BARITE DEPOSITS

A CAPITAL COST ESTIMATE OF THE PRODUCTION OF ATAN LAKE BARITE.

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WRIGHT ENGINEERS LIMITED
Vancouver Canada

PREFACE

This report is a preliminary feasibility study to determine the economics of producing a bagged barite product from barite deposits occurring in and around Atan Lake in the Cassiar District of Northern British Columbia. Bulldozer trenching has indicated extensive coarse-grained barite mineralization in pods and lenses, occurring within a few feet of the surface. The deposit is apparently of high purity and suited to selective mining (Reference:- Report on the Atan Lake Property by D. R. Cochrane, P. Eng.)

GENERAL

Mining Methods

It is anticipated that excavation of the barite can be performed with a backhoe and that the nature of the deposit adapts it to selective mining.

Mill Location

Assuming that the prospective customers are prepared to purchase the product on an F.O.B. mill basis, the mill site must be chosen to be convenient to normal trucking routes and, preferably, to a community where established accommodation facilities are available. The shortest haul distance from the mine site to the Alaskan Highway is 86 miles, to the Watson Lake settlement. This location affords access to Canadian drilling operations and also to a potential market in Alaska, through Skagway. Should the proposed railway extension to Lower Post materialize, a Watson Lake location would still be favoured. In this event, handling costs (exclusive of haulage) from the mill to the railway loading yard would be identical, whether the mill is at Watson Lake or Lower Post. The haulage cost from Watson Lake to Lower Post need then only be assumed by the producer, if the railway becomes a reality.

Milling Requirements

The finished product must have a minimum specific gravity of 4.20 g/cc and contain less than 250 ppm of soluble alkaline earth metals as calcium. The data available to date indicates that selective mining will ensure these specifications. The proposed mill circuit is intended to reduce the mill feed to 95% passing 325 mesh (U.S. sieve No.) and to pack it into 100-lb bags for shipping.

Mill Capacity

The basis for all milling calculations/costs is that an initial production of 20,000 tons per year is required with a possible future expansion of facilities to increase production to 40,000 tons per year. Because operating labour costs contribute appreciably to total milling costs, an eight-hour day, five-day week, is proposed. On this basis, an operating year of 251 days is assumed, which, at 98% available mill time, will give 246 operating days. Initially, then, the plant must be capable of processing 82 tons per day, and later, 164 tons per day. A proposed flowsheet and preliminary equipment layout drawings are enclosed in the appendix.

Ore Haulage and Stockpiling

Because of the haulage distance from mine to mill, and the varying production rates anticipated, provision has been made for the construction of a 175-ton stockpile at the mill site. The pile would be enclosed to prevent precipitation from increasing the moisture content of the mined barite. Ore shipments are expected in 35-ton lots. They would be received at a dumping bin, passed through an 8-inch grizzly and transported to the enclosed stockpile. From there, material would be drawn, on demand, into the primary crushing circuit.

Primary Crushing

Initial size reduction is to be performed in a Hazemag impact crusher, sized to handle up to 30 tons per hour. Normal throughput would be 20.4 tons per hour for, at the lower capacity, four hours per day and, at the higher capacity, eight hours per day. Product would be 100% passing 3/8" material.

Fine Ore Storage

Minimal storage capacity (50 tons) has been provided to allow surge capacity between the crushing and grinding stages.

Grinding, Classification and Drying

Size reduction from 100% passing 3/8" material to 95% passing 325 mesh material is performed in a Raymond roller mill/ double whizzer classifier combination. The machine is air-swept to convey finished product to the cyclone separator. The unit is sized to process 20.4 tons per hour and will be required to run for four hours per day at the lower production rates. A hot air furnace has been included to maintain the product at less than 1% moisture and would be operated if the mined material contained a moisture content above this value. The cost of operation of the dryer has been included in Table B. Operation of the dryer would necessitate venting above normal volumes of wet air from the grinding circuit and a dust collector is provided to reclaim the carry-over of fine solids.

Product Storage and Bagging

Because of the high handling charges involved in storing bagged product, only minimal bag storage has been provided. It is anticipated that at the lower production rate, the mill operator would be available for three hours each day to assist one other operator in the bagging and storing of small amounts of product.

Other storage facilities include two 600-ton hoppers which, at 20,000 tons per year, would be adequate for storing 14 days' production and, at 40,000 tons per year, for 7 days' production. With the machinery provided, up to 20 bags per minute may be packed and, under normal conditions, packing operations would begin when a dispatch truck arrives, the bags being loaded directly onto the truck.

Power Requirements

Provision has been made in the capital and construction cost estimates for a generating plant capable of producing 800 kw, together with a small generator, of 15 kw capacity, for supplying power to lights and packaging equipment. The small generator would be used during periods when only those pieces of equipment fed by it, are required to operate.

Road Improvements

Stewart Construction Ltd. of Cassiar supplied a preliminary estimate of upgrading the road from Good Hope Lake cut-off to Atan Lake at $234,780. This would provide a 24-foot wide road, with screened gravel top, and includes cutting brush and installing culverts. A future feasibility study would include recommendations for maximum road width which might provide a lower estimate than that obtained.

Equipment and Construction Costs

Table A includes estimated equipment and construction costs inclusive of road improvements and power generating plant installation, but exclusive of land costs and mining equipment costs.

(78)

Estimated Operating Costs

Estimated operating costs to produce 20,000 tons per year and 40,000 tons per year of bagged barite are presented in Table B. The basis for the figures is as follows:

Item 1: One backhoe plus one operator at $15/hour with a one-cubic yard bucket.

Item 2: Haulage cost of 7.5¢/ton mile based on estimated figure supplied by the White Pass & Yukon Route Trucking Company for haulage of 35-ton loads in rear dump trucks. Haulage distance from Atan Lake to Watson Lake is 86 miles.

Item 3: Mill operating costs include one lead hand at $7/hour and one operator at $5/hour.

Item 4: Total power costs computed from the oil, diesel fuel and maintenance requirements of an 800 kw D-399 caterpillar diesel generator running, at the lower capacities, for four hours per 8-hour shift and, at the higher capacities, for eight hours per 8-hour shift. At the lower capacity, allowance has been made for operating a 15 kw generating plant during the remaining four hours of the shift. The figures are inclusive of lighting and heating of the plant. All fuel prices used were supplied by Pacific Petroleums Ltd., as F.O.B. Watson Lake.

(78)

TABLE A

ITEMIZED EQUIPMENT AND CONSTRUCTION COSTS

	Item	Equipment Cost $	Installed Cost $
1.	Building Requirements		
	- Truck Dump		9,880
	- Ore Storage		60,550
	- Process Building		392,000
2.	Ore Conveyors and Galleries	10,000	22,878
3.	Bins		
	- Truck Dump Bin	5,000	7,500
	- Fine Ore Bin	4,550	6,825
	- Product Storage Bin	27,000	40,500
4.	Hazemag Impact Crusher	12,000	15,000
5.	Bucket Elevator	5,000	6,250
6.	Roller Mill and Ancillary Equipment	172,000	215,000
7.	Air Heater	22,000	27,000
8.	Electric Motors plus Switchgear and Wiring	43,768	67,243
9.	Bag Filter	19,000	22,800
10.	Packaging Machinery	7,000	9,100
11.	Product Conveyors and Miscellaneous Chutes	19,800	25,300
12.	Bag Conveyors	3,100	3,600
13.	Fork-lift Truck (3,000 lb capacity)		9,000
14.	Electricity generating costs @ $150/kw, installed at 800 kw capacity		120,000
15.	15 kw Generator Plant for lighting and packaging equipment	6,400	8,000
16.	Road Improvements to forestry specifications - 24 feet wide		234,780
17.	100 scfm Compressor	3,000	4,500
	Sub-Total	359,618	1,307,706
18.	Engineering, Construction Management and Company Overhead at 12.5% of total less Item 16		134,116
19.	Contingency at 10% of total		130,771
	TOTAL		1,572,593

Item 5: Bag prices supplied by Bonar & Bemis Ltd., at $136.10/1,000 bags, F.O.B. Vancouver.

Item 6: This cost has been assumed to allow for a permanent millwright who would perform preventive maintenance and emergency repairs to mining and milling equipment.

Item 7: Charge based on replacement and wear of equipment components.

Item 8: Supervision is allowed for one overseer for the supervision of the mining, milling and marketing operations.

Item 9: This cost is included as a contingency to cover the extra fuel costs incurred in processing mined material containing over 1% moisture.

TABLE B

ITEMIZED OPERATING COSTS

	Item	20,000 tons/year $/ton	20,000 tons/year %	40,000 tons/year $/ton	40,000 tons/year %
1.	Mining costs	1.47	9.9	0.73	5.7
2.	Haulage cost @ 7.5¢/ton mile	6.45	43.1	6.45	50.2
3.	Mill operating costs	1.17	7.8	0.59	4.6
4.	Total power costs	1.18	7.9	1.16	9.1
5.	Bagging costs @ 14.6¢/bag	2.92	19.5	2.92	22.8
6.	Maintenance costs for mining and milling operations - one millwright @ $7/hour	0.69	4.6	0.34	2.6
7.	Maintenance supplies	0.20	1.3	0.20	1.6
8.	Supervision - one foreman @ $9/hour	0.88	5.9	0.44	3.4
		14.96	100.0	12.83	100.0
9.	Contingency cost for drying each per cent of water over 1% per ton of feed	0.09		0.09	

RECOMMENDATIONS FOR A FUTURE FEASIBILITY STUDY

In order to provide a more detailed feasibility study, the following work is indicated:

1. Initiation of a mining study to include the optimization of mining methods, trucking procedures and schedules, and the feasibility of selective mining.

2. Architectural investigations of available sites in and around Watson Lake. This would allow plant layout to be determined using natural contours and soil loading properties to advantage. The production of detailed site and building drawings would enable a precise estimate to be prepared.

3. Electrical engineering studies would include an economic analysis of power generating equipment available, together with operating costs.

4. Engineering and drafting work would include the preparation of detailed layout drawings, cost estimates and equipment selection.

5. Any testwork which would be necessary to establish the amenability of the deposit for treatment as proposed.

The following times and charges are allotted for this work:

Mining Engineering Studies	250 hours
Architectural Studies	50 hours
Structural Studies	50 hours
Mechanical Processing	150 hours
Electrical Engineering	50 hours
Project Engineering	150 hours
	700 hours

700 Engineering Hours, at $20/hour	$14,000
Communications	200
Site Trips	500
Report Preparation	800
	$15,500
Contingency	1,500
TOTAL	$17,000

CONCLUSIONS

Preliminary studies indicate that the cost of constructing a mill capable of reducing a maximum of 40,000 tons of barite per year to a saleable size, and packaging it in 100-lb bags will be $1,572,593.

The estimated cost of producing this product is $14.96 per ton at 20,000 tons per year, and $12.83 per ton at 40,000 tons per year. These figures are inclusive of mining, trucking, milling and packaging costs, and represent an estimated F.O.B. Watson Lake price.

The economic feasibility of this project depends wholly on the assumption that the product is saleable on an F.O.B. Watson Lake basis. Any additional product transportation charges incurred by the producer would have to be considered as a major factor in evaluating the information contained in this report.