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REPORT ON MILLING PLANT FOR MAYO ORES

Supplemental to

PREVIOUS REPORTS

- on the -

MAYO MINING DISTRICT

YUKON TERRITORY, CANADA

- by -

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MILLING PLANT FOR MAYO ORES

Supplemental to
Reports on the

MAYO MINING DISTRICT

The following data is compiled to illustrate an approximate expectable cost and income from milling operations. The milling plant of 200 tons daily capacity to be part of the general plan of operations of the proposed acquisition of four properties together with the installation of a lead stack of moderate capacity and de-silverization plant. Details of these latter units have already been covered in reports submitted.

While such milling plant is not at all necessary in the immediate present for the success of the enterprise as a whole, yet it will ultimately be a most important factor and it has been thought best to provide for the financing of it at the outset.

As pointed out in these previous reports, there has never been but one milling plant in the district and the policy would not allow of treating custom ores. This for the simple reason that the operating company - Treadwell Yukon Co. Ltd. - always has had more ore from its own mines than the plant capacity could handle; in fact plans for enlarging the existing capacity have been considered for some time. This plant, of 100 tons daily capacity, is located at the small camp settlement called Wernecke, and treated the output from some three or four of the company mines on Keno Hill.

I was given access to some of the detailed records of the operation during the period of 1925 to 1931 by the former superintendent of milling operations and much explicit data was therefore available. These show, as might have been expected, very high extractions as the ore is unusually amenable to treatment. The gangue is remarkably low in silica and being composed, in large part, of siderite, the carbonate of iron is readily crushed liberating the galena content of the ore. No attempt was made to recover coarse lead by jigging or tabling and all the incoming material was run through a coarse crusher direct to ball mill, thence to Dorr classifier in closed circuit and then to flotation cells now rather antiquated.

Flotation was followed by two rougher tables taking off a middling product which was then followed by a cleaner table. To all practical intent and purpose the ore may be said to be a coarse grained

galena carrying tetrahedrite, stephanite, freibergite and other silver minerals. About 150,000 tons of ore have been treated in the mill during the period mentioned carrying a probable head value of 60 ozs. silver and 6% lead. It is interesting to note that a rough ratio of mill ore to smelting ore produced has been 5 : 1. Extractions during the last year were consistently from 97.5 to 98.5% of contained silver. During the two or three years prior to the last one of its operations, extractions ranged from 93 to 97%.

Production data on the Shamrock and Brefalt groups - two properties of the four to be included in this general plan - has shown the following :-

	Tons Crude Shipping Ore	Tons Mill Ore	Ratio : Mill To Smelting Ore
Shamrock	2,226	4,000	2 : 1
Brefalt	180	1,000	6 : 1

It is likely that a rough figure of 5 tons of mill ore to one of smelting ore can be counted on as a probable reasonable expectancy of ore which may be produced from the four groups in this proposed plan and at all events that ratio has been assumed. Similarly a content of this mill ore has been assumed for the purpose of giving some idea of profits and costs in milling local ores, both from the viewpoint of production from these four groups as well also as from custom ore milled. This assumed content has been set at 50 ozs. silver and 6% lead. Although this is a more or less arbitrary figure, yet it has more than a casual basis. The Brefalt dump of 1,000 tons was carefully trench sampled by me giving a content of 55 ozs. silver. The Shamrock dumps were not sampled but contain as measured some 4,000 tons and the reputed content, based on pipe sampling by the owners, was said to be 70 ozs. silver per ton.

On the assumed ratio of 5 tons milling ore to 1 ton smelting ore, the four groups mentioned, all of which may be said to be on production basis (in fact two of them, the Brefalt and Formo groups, are now mining and sacking high grade ore respectively of grade of 450 ozs. and 250 ozs.) will probably produce 125 tons daily with an assumed content as stated, of 50 ozs. silver and 6% lead. This, in my opinion, is a reasonable expectancy. Results of milling, etc. are shown in the tabulations following :-

Milling Plant - Cont'd.

ESTIMATED MILLING OPERATING PROFITS: (125 tons daily Company mill ore)

		Per Ton Crude
Content :		
50 Ozs. silver at 55¢		$ 27.50
Costs and Losses :		
1. Truck haul - mine to mill	1.30	
2. Milling costs per ton (T.Y.costs - 150,000 tons)	3.70	
3. Smelting cost on concentrate (Concentration ratio 8:1 on 6% head and 48% Conct)	2.27	
4. Milling loss - 3% - 1.5 ozs. @ 55¢	.83	
5. Smelting loss - say 5% on 50 ozs. - 2.5 ozs. @ 55¢	1.38	
6. General expense - say	.52	10.00
Total costs and losses	$10.00	
NET OPERATING PROFIT		$17.50
Daily Operating Profit (125 tons)	$2,187.50	
Annual Operating Profit (300 days)	-	$656,250.

A possible additional profit due to lead content is as follows : Based on 6% lead head, 97% extraction by flotation and 125 tons daily, 7.275 tons of lead are produced daily. This smelted with smelting loss of, say, 5% gives 6.91 net tons of lead produced daily - from mill ore alone.

It has been previously shown that with due allowance for all costs, losses and charges that with lead selling at 4¢ per lb. and with transportation down the Yukon to St. Michaels at $12 per ton, a total liquidation charge on pig lead can be set at $35 per ton with resulting profit thereon of $45. per ton. This figure is probable because the costs have not yet been definitely established.

At 6.91 tons pig lead per day and 300 days operation annually a tonnage of 2,073 is produced and at $45. estimated profit per ton an annual possible net operating profit made of - - - $93,285.

With milling capacity of 200 tons daily, 125 tons devoted to company mill ore, under foregoing conditions, for treatment daily, will leave 75 tons capacity for custom milling. The camp

Milling Plant - Cont'd.

is not at present sufficiently developed to say that such tonnage can be counted upon with certainty, but, on the other hand, to my certain knowledge, there are various promising prospects that could almost immediately furnish considerable tonnage, and certainly any milling plant to be considered for these purposes should not be installed with less than 200 tons daily capacity.

On the basis of 75 tons daily custom ore milled, and in the light of the fact that the local producer can at present ship nothing less than 200 oz. ore and still make a profit, some such figure as the following will show what may be reasonably expected as profit to be derived from custom milling.

Basis : Milling charge, including haul from mine to mill, of $18.75 per ton. Head content assumed at 50 ozs. silver and 6% lead. Tonnage treated - 75 tons daily. Silver paid for at current quotation and no payment for lead content.

ESTIMATED MILLING
OPERATING PROFITS : (75 tons Custom Ore daily)

	Per Ton Crude	
Payment to Producer :		
50 ozs. silver at 55¢	$ 27.50	
Less milling charge	18.75	
Net Payment to Producer	$ 8.75	
Income : (Daily from 75 Tons Milled)		
Milling charge - $18.75 X 75 -		$ 1,406.25
Costs :		
As per preceding tabulation including milling and smelting costs and losses of $10.00 per ton - 75 X $10. -		750.00
Estimated Daily Net Operating Profit -		$ 656.25
Estimated Annual Net Operating Profit -		$196,875.

There is a possible additional profit in custom milling due to lead content as follows :

6% lead content on 75 tons treated daily is 4.5 tons lead; corrected for milling and smelting loss - 4.147 tons at a probable net of $45. per ton is $186. daily and annually (300 days) $ 55,985.

Under actual operation conditions a schedule covering varying silver content would obviously be prepared on which the scale of charges could be imposed varying somewhat with the -

Milling Plant - Cont'd.

grade but these figures will at all events show what may be expected under conditions quoted on 50 oz. ore.

SUMMARY OF MILLING
ORE OPERATING PROFITS :

1.	Estimated annual net operating profit (Milling 125 tons daily Company mill ore)	$ 656,250.
2.	Estimated annual net operating profit (Milling 75 tons daily custom mill ore)	196,875.
3.	Possible additional profit from Pig Lead (Recovered from Company mill ore)	93,285.
4.	Possible additional profit from Pig lead (Recovered from Custom mill ore at no cost)	55,985.
	ESTIMATED POSSIBLE ANNUAL NET MILLING OPERATING PROFIT -	$1,002,395.

From this, admittedly, rough outline it is, nevertheless, obvious that milling facilities added to the proposed smelting and de-silverization plant will add largely to prospective profits.

A summary of the estimated operating profits, outlined in reports previously compiled, covering those derived from mining and treating company ores together with those from treating custom ores follow :

	GENERAL SUMMARY OPERATING PROFITS : (Estimated)	Net Annually
1.	Net profit from Smelting Company Crude (silver only) (25 tons daily from four mines)	$ 913,875.
2.	Net profit from Milling Company mill ore " "	656,250.
3.	Net Profit from smelting Custom crude (Treat.charge) (25 tons daily from local producers)	163,875.
4.	Net Profit from milling & smelting Custom Mill ore (Treat. charge on 75 tons daily)	196,875
	TOTAL ESTIMATED NET OPERATING PROFIT.	$1,930,875.

Milling Plant O Cont'd.

	Brought forward - - -	$1,930,875.

Possible Additional Profit:

5.	Net profit due to Pig Lead (Company crude smelted)	128,250.
6.	Net profit due to pig lead (Custom crude smelted)	128,250
7.	Net profit due to pig lead (Company Mill ore)	95,285.
8.	Net profit due to pig lead (Custom mill ore)	55,985.
	TOTAL ESTIMATED POSSIBLE NET OPERATING PROFIT.	$2,336,645.

It will be noted that the estimated profits derived from milling clearly show the ultimate importance of this adjunct to the general plan.

In my original summary I was inclined to defer the consideration of the milling plant until a later date particularly in order to not obscure the great importance of the mines proper. However, I am firmly of the belief that such milling facilities will inevitably be very greatly needed at an early date and it is for this reason that I have incorporated this data on milling together with the earlier estimated profits from mining and smelting.

Without going into details here, I can say that with such simple milling as is here required that a plant of 200 tons daily capacity can be installed at some central place in the district, preferably at the smelter site, for a cost of $175,000, which will also allow for increasing smelter capacity to take care of the concentrate coming daily from the mill at small original additional cost. The original plan of custom smelter lead de silverization plant and campaign of mine development is estimated (see detailed reports) at $600,000. To include the mill, as stated, will require an additional $175,000, thus making a total for all operations, in round figures, of $800,000.

In the last analysis, the mines themselves must, of course, be the governing and determining factor in considerations of this kind. Covering this phase, the shipment and production records of these properties are illuminating and so very favourable that it is indeed difficult for the experienced operator to refrain from indulging in superlatives in the descriptions of these mines, ore bodies and their possibilities.

It isnecessary to emphasize that this district is a large one, covering a width of some 5 miles and a length of 25 or more, only a fraction of which has had even a small amount of scratching around by the usual prospector. Yet some 10 miles of what may be termed the first magnitude has been partially developed and there is every reason to believe that many others will be disclosed in the

Milling Plant - Cont'd.

future. Of particular moment is the fact that none of these mines have had anything whatever in the way of outcrops or geological features (by reason of the fact of the 8 to 20 feet of overburden) to distinguish them from any other nearby claim of equal potentialities. Thus the whole district is in a state of virgin productivity.

While I have made a consistent effort to have selected the four most promising groups of properties in the district, I have no doubt that a more detailed examination would show others with possibly equally attractive possibilities. At least these four comprise among them the largest group in the district with good ore in evidence in at least two places thereon. Two others are now producing high grade ore and are under active development. The fourth has already produced $547,000 net smelter returns from 2,228 tons direct shipping smelting grade ore and has the additional merit of having 4,000 tons of mill ore ready for treatment.

In closing this report I wish again to strongly advise the acquisition of these four properties and the financing of the enterprise along the lines stated in the firm belief that even the large estimated profits, as outlined, are only a small part of what the ultimate possibilities of the enterprise may be.

Respectfully,

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December 21st 1934