

006962

TO: Mr. R. E. Thurmond  
FROM: H. Lyall Ames  
SUBJECT: VISIT TO ANVIL CORPORATION MILL AUGUST 9 & 10, 1972  
  
C. C.: Mr. R. L. Haffner, Mr. N. G. Cornish, Mr. H. H. Cox,  
Mr. P. Taggart and Mr. P. J. Brown

This report summarizes discussions with Peter Brown and Peter Taggart concerning the mill expansion and current metallurgical problems being encountered in the mill. Mr. Haffner and Mr. Cornish were advised of our main decisions regarding the extension drawings submitted by Wright Engineers Limited and the tests planned in the mill to improve zinc metallurgy which has been deteriorating over the past four months.

(1) Milling Rates and Metallurgical Forecast

Excessive sanding of the lead flotation cells in particular has occurred on numerous occasions during the last month or more and has necessitated a drastic reduction of milling rates. This sanding has occurred at lower than normal rates and is attributed to a higher pyritic content of the ore. If this trend is expected to prevail over extended periods in the future it would seem advisable for economic studies to reduce the expected milling rate of the present mill when treating lower

grade ore in the future from 9500 T.P.D. to 8700 T.P.D. exclusive of down time. At this lower rate Peter Taggart, Peter Brown and I think that the overall metal recoveries predicted of 83% for lead and 72% for zinc should be obtainable. It may be difficult to maintain over 51% zinc concentrate grade.

At the same time, on the basis of the metallurgy on current ore we recommend that the previously estimated overall recoveries for the expanded mill be reduced by 1% for both the lead and the zinc, i.e. 87% for the lead and 76.9% for the zinc unless lower grade concentrates than 70% lead and 52% zinc are acceptable. With excessively high pyritic ore these recoveries could be lower.

The above estimated data for future operation together with estimated operating costs and yearly concentrate production are summarized in the following table. All these data will be studied further by the Anvil staff for errors or omissions and corrected if necessary.

The total present milling cost includes \$0.32 for power based on an estimated power consumption of 18.4 Kwh per ton at 1.75¢ per Kwh. The future power consumption is estimated at 21.8 Kwh per ton which is \$0.38 per ton. This latter consumption is subject to revision when the W-E study is complete. No material price or wage escalation is included in cost figures.

Comparative Mill Data  
(Availability 95%)

	<u>Present Mill</u>	<u>Expanded Mill</u>
Nominal Milling Rate	8700 T. P. D.	10,500 T. P. D.
Ore Analysis (future lower grade)	Pb 3.31% Zn 5.65%	Pb 3.31% Zn 5.65%
Mill Operating Costs (1)	\$2.30	\$2.33
Lead Recovery - Selective	66.7%	73.5%
- Bulk	16.3%	13.5%
- Total	83.0%	87.0%
Zinc Recovery - Selective	56.8%	64.3%
- Bulk	15.2%	12.6%
- Total	72.0%	76.9%
Concentrate Production		
- Selective Lead	95,000 T. P. Y.	126,500 T. P. Y.
- Selective Zinc	190,000 T. P. Y.	254,000 T. P. Y.
- Bulk	86,700 T. P. Y.	86,700 T. P. Y.
Concentrate Grades		
- Selective Lead	70% Pb	70% Pb
- Selective Zinc	51% Zn	52% Zn
- Bulk	- 18.9% Pb and 29.8% Zn	

Note (1): Operating cost breakdown is as follows:

	<u>Current Cost/ton</u>	<u>Factor</u>	<u>Expanded Mill Cost/Ton</u>
Operating Labour	\$.41	.85	\$.35
Operating Supplies (less extra steel)	1.15	1.0	1.15
Repair Labour	.18	.95	.17
Repair Supplies	.24	1.0	.24
Power	.32		.38
Increase Grinding Steel	-		.04
Total	<u>\$2.30</u>		<u>\$2.33</u>

(2) Mill Project Schedule

Although I appreciate the urgency of the project I think that it will be mid-September before all the necessary data will be assembled for making a realistic economic evaluation for an A.E.F. Because the Anvil staff is so occupied with the current mill operation they do not have much time available to work on the mill expansion project and it will likely be the end of August before their estimates are complete. Mueller of W. E. advised that their work also will take until about the end of August. In order to avoid future misunderstandings regarding production rates, plant metallurgy and operating costs I think that all departments concerned at Vancouver office and mine site should study carefully the data that are being presented at this time and then should participate in the preparation of the final justification analysis.

(3) Plant Metallurgy

1. The flotation differential in the zinc circuit remains unsatisfactory. I have recommended that at least the third zinc conditioner be cut into the circuit between the regrind cyclones and the zinc circuit feed pumps and that it be made operative. As much air as possible should be introduced into the pulp as it has been de-oxygenated

in the regrinding mills and this may be partially responsible for the lack of differential between the sphalerite and the gangue iron sulphides.

2. I also suggested as an experiment adding all the copper sulphate to the pump box following the regrinding (or to the conditioner when it becomes operative) rather than in part to the mills themselves and part later in the flow.

3. The lead flotation cells are prone to sanding up particularly with high milling rates or high pyrite. I suggested that for a week or so the practice of air lancing the cells in the morning should be extended to a routine around the clock procedure.

4. The launders in the zinc retreatment circuit have been altered to permit any portion of the concentrate being returned to the head of the rougher circuit or sent to the first cleaner. This flexibility should help in maintaining a more stable operation under varying ore or circuit conditions.

#### (4) Barium

A bank of new flotation cells will be ordered in the near future to treat the fourth zinc cleaner tailing for the removal of barium. Laboratory tests and a mill test have shown that the barium content of this

product (the zinc portion of the bulk concentrate) can be depressed quite effectively in such a circuit. The cells will be installed to permit a further cleaning cell bank being added if necessary.

The new barium penalties are serious. I understand that they are as follows:

1. A fixed penalty of \$1.50 per ton for over 0.20% BaO.
2. A further penalty of 25¢ for each 0.10% BaO over 0.20% and up to 0.70%.
3. Over 0.70% BaO the additional penalty is 75¢ for each additional 0.10% BaO.

(5) Particle Size Monitor

In accordance with further inquiries from the Anvil staff I have discussed the P. S. M. of Autometrics Company with Bruce Wallace. He advises that the trial unit at Brenda is working quite well and showing a moderate improvement in through-put, unofficially a little over <sup>0.47%</sup>~~47%~~. Placer have had one on trial at either Craigmont or Endako and we understand that they have purchased it. Its application, of course, on a high-tonnage low-grade ore is much more easy to justify than on an ore like Anvil's where metallurgy is most important. However, I concur that it would be a good idea to obtain one on trial providing the regular hourly

sizing test programme that I suggested is conducted for at least a week and the sizing figures have a sufficiently wide swing to make them usable for control monitoring.

(6) Ore Mineralogical Analysis

It would be a good idea if monthly composite samples of mill feed could be analysed for pyrite and pyrrhotite. An analytical method was developed at Noranda for their high mixed sulphide ores in the 1930's when a pyrite-pyrrhotite separation circuit was started. The method is based on the different solubilities of the two minerals in a particular strength and temperature acid. I think that it could be developed for Anvil ore and I have asked Mike Bennett of Noranda to forward a copy of the method to Peter Brown.

Toronto, Ontario  
August 14, 1972