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CONSULTING SERVICES IN MINERAL PROCESSING

January 31, 1974

TO: Mr. R. L. Haffner
FROM: H. Lyall Ames
SUBJECT: Anvil Corporation Mill
C. C.: Messrs. P. J. Brown, N. G. Cornish, H. H. Cox,
J. F. Olk, P. Taggart and R. E. Thurmond.

This report covers my visit to the Anvil mill January 14 to 19, 1974.

The new section comprising the lead and zinc rougher and scavenger circuits is operating satisfactorily. The full import of these new units on the overall metallurgy will not be known until the enlarged cleaner circuits in the old flotation section are in operation.

Extensive experimental work which has been carried out using ammonia instead of soda ash as an alkaline modifier was discussed with the mill metallurgical staff. Several more laboratory tests were run while I was there and ammonia was substituted entirely for soda ash in a two day mill test, January 17 and 18. This test demonstrated that

at least physically the circuits could be operated with ammonia, an important point at this stage of the investigation. The metallurgy was only fair. Zinc concentrate grade was better than average but the recovery on a grade basis was apparently at least 10% too low. This low zinc recovery is contrary to laboratory tests with ammonia and therefore I think that it can be very materially improved with further mill experience.

General observations made during my visit and recommendations for further testing and improvements are as follows:

1. FLOTATION CELLS

Although the old Denver Sub A cells were never my personal choice for rougher or scavenger circuits the large new type D-R 200 C.F. Denver units certainly operated satisfactorily most of the time. The air control feature is a definite advantage over other cells which do not have it. I suspect that impeller wear and clearances are just as important to cell efficiency as they were on the old Sub A cells. Therefore frequent inspection and good preventative maintenance is essential.

2. NEW AND OLD CIRCUITS

The temporary tie-in between the new and old flotation circuits has been accomplished very satisfactorily. The ultimate

relatively large (from an appearance standpoint) cleaner circuits arrangements should prove definitely helpful in maintaining concentrate grades. Also of importance is the fact that hopefully the lead first cleaner or retreatment tailing will be sufficiently low in lead that it can be routed to the zinc circuit instead of being returned to the head of the lead rougher cells. Launder improvements are planned for most cell banks prior to conversion to the new flowsheet. This is more important than is probably appreciated as it is essential to satisfactory metallurgy for the circuits to be completely free of large circulating loads of refractory spillage material.

3. GRINDING CIRCUITS

The new large tertiary ballmill is operating satisfactorily except for occasional outages due to clutch failures. Some of these appear to be due to inadequate air pressure. In any case the condition should be corrected before excessive clutch wear occurs. The cyclones are not giving any operating difficulties and the discharge densities looked good. I did not see any sizing analyses but presume they will be done in due time and the cyclone controls adjusted to give optimum classification.

4. MAINTENANCE

As with the new flotation cells it is essential to set up an adequate inspection and a good preventative maintenance schedule for the

cyclones and such other things as tightening liner bolts. I emphasize the importance of maintenance work now as it is an opportune time when starting up new equipment to establish new guide lines. It is the responsibility of all levels of administration to ensure that labour forces are adequate and authorities properly delegated so that in a few months time maintenance and housekeeping will be really good.

5. pH METERS

The mill is still suffering from poor experience with pH metering. This is serious. There are so many factors involved in a complex flotation circuit that cannot be measured in definitive numbers it is unfortunate not to have readily available something so vital to the operation as accurate pH indicators and recorders. Controlling equipment for pH is much more complicated but should be kept in mind for the future. I appreciate that some are installed in the mill but I do not think that they are functioning too well at this time.

It might be worthwhile experimenting with new locations for the indicators such as the tailing boxes of the scavenger cells instead of the head end. The electrodes would be more accessible for inspection and cleaning. Before doing this tests would have to be run to determine whether or not there would be too much lag in time for satisfactory control.

It might be a good idea to contract regular instrument maintenance to assist the present instrument staff so they would then have more time to take care of all emergency requirements. In any case some way or other all the pH meters should be made accurate and completely dependable at all times.

6. REAGENT CONTROL

The new control reagent distribution set-up should contribute considerably to the smoothness and efficiency of the flotation circuits. It is disappointing however that trouble is still being encountered with red jacket valves and electric timers on some reagents, particularly the lime. If for some reason any of the reagent systems do not function essentially 100% of the time they should be given a reasonable period of trial and then completely discarded if they are not satisfactory.

7. AMMONIA

The short sodium carbonate (soda ash) supply is particularly critical to Anvil at this time because, (1) a higher milling rate is planned for 1974 which will require a corresponding increase in total soda ash requirements and (2) it is desirable to treat some stockpile ore which will require a higher per ton consumption of soda ash. A major effort to find a substitute chemical has been underway for several months.

Ammonia appears to offer the best possibility and its use at Geco Mines (fairly high sulphide copper-zinc ore with some lead) was studied by N. G. Cornish and P. J. Brown some time ago.

Recently many tests with varying amounts of ammonia alone and in combination with other alkaline modifiers have been reported in detail by the Anvil testing department. In general the laboratory results have been fairly encouraging, but not yet as good as with soda ash. Some zinc grades have been particularly good with fair recoveries. The lead recoveries have probably suffered the most. This did not hold true in the mill test where the lead tailing was fair but the zinc tailing was much too high. Because of the wide variation in data from different laboratory tests and between them and mill tests a comparison of metal recoveries with soda ash and ammonia would be misleading at this time.

H. L. Ames