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November 23, 1971

TO: Mr. R. E. Thurmond

FROM: H. Lyall Ames

SUBJECT: Visit to the Anvil Corporation Mill at Faro, November 1-4, 1971.

C.C.: Mr. R. Haffner, Mr. N. G. Cornish, and Mr. Herbert H. Cox

This report covers my visit to the Anvil mill on the above dates. I discussed with Peter Brown his recent Metallurgical Reports, several special reports including "Proposed Zinc Current Modifications", September 3, 1971, and other laboratory test reports by Peter Dyas and Mr. Bodden. Regular mill operating reports and mill problems such as zinc conditioning were discussed in particular with Peter Taggart and Bill Wallinger.

I had one discussion with Mr. Haffner and several with Mr. Cornish regarding progress being made in the metallurgical test programs now in process.

Particular comments and recommendations are summarized below.

1. Zinc Conditioners

Shortly before my visit, in another in a long series of attempts to make the three conditioners operational, a large 6-inch air lift had been installed in each conditioner with all three lifts discharging into the regrinding unit of the zinc retreatment circuit. Although this procedure may have kept the conditioners running it greatly overloaded the retreatment circuit and had to be discontinued. I didn't like the idea anyway as the zinc retreatment circuit is always overloaded and the inclusion of a large quantity of the zinc roughing circuit feed could not but make the situation worse.

On November 1 the air lifts in No. 2 and No. 3 conditioners were altered so that they would circulate within their own tanks. No. 1 was left discharging into the regrinding circuit. These changes together with shortening of the stand pipes, which had been done some time ago, were partly successful. However after a few days operation it appeared that the tanks were beginning to sand up. They became sluggish and obviously would become inoperative in a few days.

It has been proposed that one additional lift be installed in No. 2 tank and that the overflow pipe in No. 3 be lowered several feet to reduce the pulp super-elevation required in the preceding tanks. These

changes and any others required to make the conditioners work satisfactorily should be done as soon as possible as the operators are commenting that they are of no benefit anyway. If this is the case it is contrary to all zinc flotation technique and in all probability is not correct. One reason for not considering them beneficial may be that they have never been sufficiently active to be more than holding tanks and did not really condition the pulp in the true sense. Admittedly the type of conditioners and their installation leave much to be desired but they must be made operational if for no other reason than to establish definitely whether or not they are required. More laboratory tests are being conducted in an attempt to determine the effect of conditioning on zinc flotation. This may be difficult, however, as laboratory conditioning tests are often inconclusive as pulp handling in laboratory size equipment does accomplish a fair amount of aeration and conditioning in itself.

2. Soda Ash - Lime Tests

Although I have been reluctant to revert to lime testing during the past few months while the technique of using soda ash was being established and requirements determined, I now concur with the operators that it is a good idea to try lime again on the lead roughing

circuit. I do not agree with any periods of less than one week on and off. We also agreed that after one week with lime and one with soda ash the third week could be taken for one of several other circuit tests discussed. The conditioning reagent tests would then be continued intermittently for as long as necessary to establish the relative merits of these two alkaline reagents.

3. Fourth Zinc Cleaner

This new unit was operated during most of October on one-half of the regular third cleaner concentrate. Although assays indicate an upgrading from 49.4% zinc in the third cleaner concentrate to 51.3% zinc in the fourth cleaner concentrate (with approximately 85% recovery) it was not reflected in the load-out assays.

Although we know that one 4-cell bank of No. 30 Denver cells is overloaded it should show up in the load-out samples and likely will this month. During my visit we changed the operation to treating all the third cleaner concentrate and sending one-half of the tailing to the bulk thickener and recycling the balance to the third cleaner. I hope that by this month's end there will be sufficient evidence available to warrant ordering the second bank of cells which were approved when the first bank was ordered.

4. Automatic pH Controllers

I understand that finally a Honeywell pH recorder-controller has been shipped to Anvil. I hope that this unit can be installed soon in the zinc first cleaners and that it will work satisfactorily so that three or four more units will be ordered for the lead roughers, lead first cleaners, zinc roughers and the zinc 3rd and 4th cleaners. I concur with the operators that a steady pH control on these circuits would go a long way to stabalizing the operations thus improving both recoveries and grades. This has been my experience ever since reliable controllers were first placed on the market a few years ago.

5. Copper Sulphate

The dosage of copper sulphate to the zinc roughing flotation circuit is critical from the standpoint of good froth condition. For this reason we can never use as much as I feel should be used with zinc heads as high as Anvil's. In order to compensate for this we tried adding some to the zinc first cleaners. In quantities of 1000 cc - 2000 cc per minute the froth became much too tight. They are now trying small amounts in the order of 250 cc per minute. At the same time laboratory tests are being run to check the idea.

6. Lead Circuit Testing

During the past year testing the zinc circuit operation has quite rightly taken precedence over the lead circuit. However lead grade is becoming more critical. Apparently an average of 70% would be welcome although on many ores of this type 65% would be very acceptable. In any case it was decided to make several tests in the circuit over the next few months. The first and easiest to try is recycling the scavenger concentrate to the head of the circuit as was done some time ago in the zinc circuit. This might make it possible to remove more froth from the scavenger section without jeopardizing concentrate grade.

The second test would be to by-pass the grinding unit in the retreatment circuit. There is a feeling among the operators that this regrinding is not required. I am a little doubtful about this but I think that it is necessary we find out so we will know whether or not this ball mill could be made available to operate in parallel with the spare mill to regrind the lead scavenger tailing. At a milling rate of 8000 TPD and a primary grind of only 61% - 200 M there is little doubt but that a finer feed would be beneficial to zinc recovery but mill testing is the only certain way to determine the economies of such a step. Several other ideas for lead circuit testing were discussed but can be left to a later date.

7. Agitair Cells

For several months the installation of a large No. 120 Agitair flotation machine as a unit cell at the head of the lead or zinc roughing circuit has been under consideration. An engineering study however, showed that there was not sufficient structural steel to support such a cell on the flotation floor. The only alternative at the head of the mill appeared to be on the bottom floor at one end of the grinding bay. None of us considered this satisfactory. It was then decided to consider installing two aerators on the existing concrete pad behind the zinc conditioners and follow these with two or three large flotation units. However this was too large a project to decide quickly as it would require routing the primary cyclones backwards and across the grinding bay to the aerators and then to the new cells and finally pumping all the pulp up to the lead circuit distributor.

Mr. Dawson of Galigher Company and Mr. de Boer of Gordon Russell Limited were at the plant site on November 4 and at a meeting with them we agreed to consider their tentative proposal to supply Anvil with six Agitair mechanisms for a trial installation in the first six cells of one zinc rougher row. Such an installation would give the

operators an opportunity to study the merits of these air cells compared with the Fagergrens. Moreover with six units it should be possible also to determine whether or not the Agitairs with their closer froth control would produce a better concentrate grade. Further action on this proposal will come from the Galigher Company.

Personally I do not consider there is any difference in the metallurgy possible with these two different types of cells if they are operating satisfactorily. However it is important to find out whether or not the Agitairs will sand up as badly as the Fagergrens do occasionally, and also how much benefit is derived from the air control feature.

8. Regrinding Concentrate

Even though microscopic work indicates very little mineral interlocking in the flotation products I recommend that a few laboratory upgrading tests be tried on both the lead and zinc final concentrates following different amounts of regrinding.

9. Sand Flotation

Another idea which should be tried in the laboratory is to try floating both lead and zinc from the sand portions only of their

respective scavenger tailings without regrinding. Several stages of deliming may be necessary and sodium siliate might help as an auxiliary reagent to small amounts of regular collectors.

10. Guartec

I suggested that some very active dispersing reagents such as Jaguar 703, Guar Gunn (Guartec), Dextrin, and H 31 (107, Guar Gunn 902 Dextrin) be tried as auxiliary reagents in the lead circuits. In some mills these reagents definitely help to depress pyrite.

11. Sodium Sulphite

I strongly recommend further laboratory testing of sodium sulphite (1.0 - 2.0 lb./ton) along with soda ash in the primary grinding. I also think that a mill test should be made with this reagent as my experience has almost always been that it or SO_2 improves lead grade by depressing zinc.

11. Zinc Circuits Assay Gradients

Although I know that high circulating loads are the rule in practically all heavy sulphide mills the assay gradient at Anvil down the row of almost all the circuits seems unusually low. I advised

Peter Brown that I would get some comparative Mattagami Lakes figures and see if there was not some technique which would speed up the rate of zinc flotation.

13. Dryers

Peter Brown's comprehensive dryer report shows why the dryers are not operating at their peak capacity and the proposed corrective actions should help improve dryer rates. I inspected the new dryer installation and, admittedly without specific reasons, I doubt if it can be placed in operation before Feburary sometime.