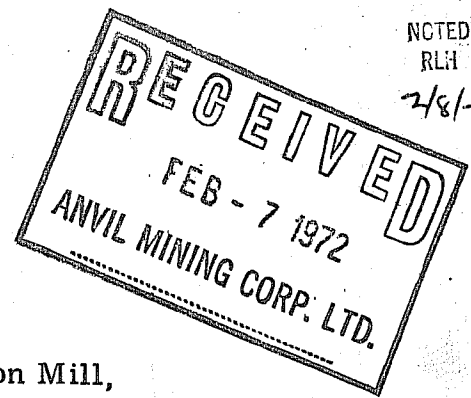


T. Brown

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TO Mr. R. E. Thurmond
FROM: H. Lyall Ames
SUBJECT: Visit to the Anvil Mining Corporation Mill,
January 17-19, 1972
C. C.: Mr. R. L. Haffner, Mr. N. G. Cornish and
Mr. Herbert H. Cox

This report covers my visit to the Anvil mill on the above dates. I was accompanied by George Neumann, Mill Superintendent, Brunswick Mining and Smelting Company, Bathurst, N. B.

The appearance of the flotation circuits was the best I have seen since I began visiting the mill in October 1970. The new dryer was in service and unlike last winter the operators were not holding back concentrates in the thickeners and running the flotation circuits unsatisfactorily just to accommodate the de-watering sections of the plant. It was a little disconcerting that sufficient mechanical force could not be maintained to make circuit changes which have been planned. The new Testing Programme Charts were discussed.

1. Metallurgy for December, 1971

The following table gives the grades and recoveries in the different concentrates for December 1971. Also included for comparison are similar data for the years 1970 and 1971, and the forecast recently

compiled by Anvil for 1972. Lead metallurgy is acceptable but some further improvement can be expected. Zinc metallurgy is not satisfactory but it is my opinion, based largely on laboratory data, that in time the objectives for this circuit can also be achieved.

	<u>Dec.</u> <u>1971</u>	<u>Year</u> <u>1971</u>	<u>Year</u> <u>1970</u>	<u>1971</u> <u>Objectives</u>	<u>1972</u> <u>Forecast</u>
Recovery Selective Circuits %					
Lead	77.2	76.0	74.8	70.6	71.4
Zinc	65.1	61.8	65.3	63.9	64.5
Recovery Bulk Circuit %					
Lead	8.8	8.8	1.2	15.5	14.8
Zinc	9.1	9.5	1.0	16.4	14.9
Recovery Overall %					
Lead	86.0	84.8	75.0	86.1	86.2
Zinc	74.2	71.3	66.3	80.3	79.4
Selective Concentrates					
Lead Con. % Pb	70.22	67.18	66.2	65	68
Zinc Con. % Zn	51.14	49.84	49.3	51	52
Bulk Concentrate					
% Pb	20.04	18.37	22.1	19	19
% Zn	29.16	27.65	27.8	30	30

2. Zinc Conditioners

It would appear that under the existing operating conditions (fineness, density, flowsheet, etc.) the zinc conditioners are inoperative and that it is in the interest of smoother circuit operation to leave them down. However plans are being made to remove the coarse sands from

the first conditioner with air lifts and, after regrinding in the spare re-grinding mill, route them back to the head of the zinc roughing circuit. This is a better approach to the problem than sending them to the retreatment flotation bank as tried on previous occasions. Only testing will show whether or not the proposed change will be beneficial or will overload the roughing circuit.

Another method of obtaining the coarse sands for regrinding was discussed. This was to isolate the sands from the sand relief holes in the tail gates of the zinc scavenger cells and take them directly to the spare grinding unit. Of course any of these regrinding ideas hopefully presumes that ultimately one or both of the other retreatment mills may be released and make the proposed regrinding really worthwhile. ✓

3. Soda Ash

There seems no doubt now as to the merit of soda ash for alkali conditioning in the primary grinding section. I am surprised but pleased that as little as 1.8 - 2.2 pounds per ton is sufficient most of the time. The operators practice of adding more soda ash whenever the lead flotation condition appears unsatisfactory is standard in other mills where soda ash is used.

George Neumann advanced a theory as to why soda ash added to the lead circuit, is also beneficial (and sometimes even more so) to the zinc circuit. He says that the calcium ion is precipitated and the sodium hydroxide which is formed favours zinc flotation. Some calcium ion is necessary of course for pyrite depression. There may therefore exist a rather complicated optimum relationship between the amount of soda ash added in the lead circuit and the lime added in the zinc circuit, another reason for pH controllers.

New soda ash handling and bulk storage facilities are being investigated and when installed will alleviate somewhat the higher cost of this chemical as compared to that of lime.

4. Zinc Cleaning

2nd bank due end of Feb '72

The new 4th cleaner Denver cell bank appears to be effective in upgrading the zinc concentrate. I think that the grade was the highest for any operating month and this should improve still further when the second bank of cells is installed in parallel. If it does we can then place more emphasis on zinc recovery experimentation such as extensive tests on both the concentrate and tailing from the last zinc scavenging cells.

5. Lead Circuit Test

A flowsheet change is being planned which I think should be tried as soon as practical as it is very simple and has a better than 50 : 50 possibility of improving lead recovery. This change will permit recycling the lead scavenger concentrate along with the retreatment tailing which is already returning to the primary cyclone feeding system.

6. Copper Sulphate

Mill tests with additional copper sulphate to the 1st zinc cleaner are continuing. I suggested that the test duration should be weekly instead of daily and that larger doses should be tried.

7. Regrinding Circuits

Elimination of one or both of the regrinding circuits is still being planned for a test. Only operation will show whether or not it is feasible but I concur that it should be tried.

8. Reverse Flotation on Zinc Concentrate

Peter Brown is enthusiastic (and with considerable justification) about recent laboratory tests in which the zinc concentrate has been upgraded by floating some of the copper and pyrite out of it.

Although they have been using essentially the same system as in operation at B. M. and S. there may be minor differences in technique. Anyway this was discussed at length with George Neumann and it will be interesting to see whether or not the extra relatively high costs and slightly lower metal recovery will be more than offset by the improved zinc concentrate grade and probably permitting sufficient copper to report in the bulk concentrate to receive payment for it. (The float material would go to bulk production.)

9. Automatic pH Controllers

The one controller mentioned in my last report has ultimately been installed in the lead circuit but due to other more critical work such as the new dryer installation it is really not actively on line as yet. My comments in that report are still valid and concurred with by George Neumann.

10. Davera Flotation Cell

Because of previous experience with so many so-called better flotation cells I am admittedly prejudiced against almost any new type. Although I cannot become enthusiastic about the Davera cell it does incorporate aeration and therefore should be investigated a little further. I do not recommend any monetary expenditures without more evidence of merit than I see at this time.

11. Experimental Programming

I was asked to comment on the proposed Experimental Programme Charts. Although connected with experimental work for many years I have never seen such a formal approach to test programmes as that proposed by the Anvil Management. This approach is intriguing and undoubtedly very useful as are most techniques of organization. At the same time it has some dangerous features. I think that these can be reduced by further consideration, adding a few rules and/or making some alterations to the charts themselves.

First, there is no question but that they are excellent from the following standpoints.

- (1) Record of work to date
- (2) Planning immediate future work
- (3) Communication both up and down levels of authority
- (4) Cross referencing of reports
- (5) Objectives are clearly defined
- (6) Points are specific where the project can be reviewed and its value re-assessed.

I have the following comments and suggestions.

(1) In considering different types of formal programmes I think that we can classify them into degrees of suitability or practicability. For example a construction project Critical Path programme can be based (but not always is) on facts. It can therefore be almost completely valid, say 95%. The 5% is due to such things as strikes and catastrophies.

In a mill testing programme such as a dryer investigation here again most of the variables can be measured accurately in specific terms of temperature, air velocities and volumes, b.t.u. content of fuel. The chart for this programme can be approximately 90% valid. Similarly the data for a grinding investigation can be fairly accurately measured. I would rate this at 80% valid.

I consider a flotation testing programme such as improving zinc recovery to be at the other end of the scale, say 50% valid. In some way I think that the researcher should be given freedom from adhering to the programme schedule roughly in the order of the above percentage examples.

(2) Even though a study has been theoretically completed or closed there should be some mechanism in the system whereby it can be re-opened providing some new evidence arises from testing at Anvil

or from other sources. This new evidence may suggest only another technique and not necessarily anything basically new. I have seen numerous cases where difficult metallurgical investigations have been re-opened many times before a solution has finally been discovered. If some restraint on re-opening projects is desired probably several signatures on a formal request could be required.

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(3) Ample room should be made on the charts for branching out into new approaches. I appreciate that a really new idea like a new project would be covered by a new chart but I still think that it would be a good idea to insert extra blank boxes for this purpose wherever permissible in the original chart.

(4) Time limits should be used sparingly and only in exceptional cases. They are not applicable for long range complex programmes. There is always a great danger of proceeding on inaccurate data resulting from too hasty tests or conclusions. I realize that some time schedule is required for manpower and cost estimates in the first place to determine whether or not the project is worth attempting.

In conclusion I do not think that it is sufficient for the limitations suggested above to be merely understood by those involved. I suggest that they should be formally incorporated into the charts. Under these conditions I would concur with the entire "decision tree" idea.

Toronto, Ontario
February 1, 1972