

GIANT YELLOWKNIFE MINES LIMITED
TIMMINS DIVISION

November 12, 1988

MEMO TO: S. McAlpine

FROM: J. Bartrum

SUBJECT: Your Memorandum Dated November 8, 1988, Titled "Increased Revenue Required for Increased Cyanide Addition"

1. In the light cast by my previous memorandum - please leave the metallurgy to me, for the sake of Pamour Inc. and in turn Giant Resources.
2. Your calculation and therefore conclusion is grossly incorrect:
 - ° Reference 1 - Section 2 of the "Report" - no page number but Item 19. "1.0 pounds of sodium cyanide per ton of dry tons of tailings treated is the budget number for 1989."
 - ° Reference 2 - Section 3 of the "Report" this of course has a page number - page 3 Item 2.3.3, second sentence "The average cyanide addition was 2.01 lbs/s.t."
3. Therefore, $2.01 \text{ lbs/s.t.} - 1.00 \text{ lbs/s.t.} = 1.01 \text{ lbs/t}$
 $1.01/2.2046 = 0.4581 \text{ kgs.}$ There is no need for an "if" statement, the increase required is 0.4581 kgs/s.t.
4. The increased cost, therefore, assuming the rest of your calculation is correct is $0.4581 \times \$3.213 \text{ M}$ which I believe is \$1.4719 M.
5. Reference 3 - Section 3 of the "Report" Page 2, Section 2.1 first sentence "The average gold recovery for the Pilot Plant test programme was 35%, which resulted from 38.9% gold dissolution, and 89.7% gold adsorption from solution onto carbon".
6. As the adsorption figure is abysmally low by world standards, the actual recovery achievable is 38.8%.
7. So in reality if \$1.4719 M were spent on bringing the cyanide up to where it should, the recovery increase would be 32% (your base) to 38.8% an additional 6.8 percentage points.
8. On the basis of your own calculations if $5\% = \$3.213 \text{ M}$ then $6.8\% = \$4.3697 \text{ M}$.

9. However, your base is not 32% is it? Reference 4, Section 2 last paragraph "In closing4774.265 ozs lost through poor adsorption efficiency lowered the overall gold recovery from 29.44% to the 23.18% for the year.
10. So I have to assume that your base is 29.44% equally assuming that the gold is being adsorped on carbon.
11. Therefore, the potential increase is 29.44% to 38.8% which is 9.36 percentage units. $(9.36/5) \times \$3.213 \text{ M} = \6.0147 M .
12. Therefore, the return on expenditure is $6.0147 - 1.4719/1.4719 = 312.23\%$.
13. On this basis it would seem sensible to set the 1989 budget at 2.01 lbs/s.t. However, some additional work has to be done to get the maximum effect of cyanide.
14. Reference 5 - Section 4, no page number, B Point 2: "Graph 7 shows that decreasing tonnage is associated with increasing gold extraction to solution".

Reference 6 - Section 3, Page 1, 1.1.2 second line "Recovery improved slightly for longer dissolution times".

Reference 7 - Section 3, no page number, Figure 2.4 - recovery is still climbing at 36 hours.

Summary - These 3 items are saying all the same thing that is retention time control is critical to achieving optimum metallurgy.

So this means both feed rate and feed density have to be tightly controlled.

15. Reference 8 - Section 2, no page number, Item 9(d) "Tank #1 at 26% solids at surface had an increase to 55% when bottom material from Tank #6 which had 23% solids surface slurry was transferred".

Summary - This means the agitation efficiency despite increased air is atrocious and has to be upgraded over winter.

16. Reference 9 - Section 2, no page number, Item 20 "Optimize retention time".

Summary - 8 out of 10 samples (or 80%) showed increased dissolution of T.R.P. tailings. This means more cyanide, more retention time or better agitation in the Plant.

Reference 10 - Section 8, no page number, second last sentence "TRP tailings Re - Cyanidation showed further extraction but that was only on a few tests".

Summary - This means more cyanide, more retention time or better agitation in the Plant.

17. Leaching efficiency is directly related oxygen saturation, agitation efficiency, retention time in the circuit, cyanide solution strengths, feed density and lime addition.
18. We know the following are deficient:
 - (a) Agitation is hopeless, adverse effects are short circuiting, poor distribution of solids and carbon, poor contact between solids and air and cyanide.
 - (b) Cyanide levels are far too low, adverse effect - poor extraction efficiencies.
 - (c) Retention times in the Plant were all over the place due to tonnage variation and erratic and low feed density control. Adverse effect - effects contact time in a poor environment of poor agitation efficiency and low cyanide additions.
 - (d) Erratic and low density control since start up. Adverse effect - doesn't help agitation, deflates retention time, dilutes cyanide.
 - (e) Oxygen - still not enough evidence.
 - (f) pH level - looks okay.
 - (g) We still know nothing about organics or inorganics in solution.
19. So far the "reader" has absorbed this information from your "Report" using clearly defined references throughout from this report and this achieved in less than one hour. There are also many other references!
20. Also, the "reader" has "participated" in "the spirit of this information sharing" by spending valuable time away from the E.R.G. Project.
21. Now the "reader" will "contribute" to a "sound" operating strategy for 1989, since no one listened in 1988.
 - (a) You need more cyanide (Stated August 22, 1988).
 - (b) You need to improve agitation efficiency (August 22, 1988).
 - (c) You need to do competent retention time studies in the laboratory to be able to set a figure for 1989. (Aug. 22/88)
 - (d) You need to address the problems of erratic and low feed densities (August 22, 1988 + 4 days).

- (e) You need to be able to control cyanide better than 1988 (August 22, 1988 \pm 2 days).
 - (f) You need to establish methods to maximize oxygen saturation in each tank including the surge tank. (August 22, 1988)
 - (g) You need to find out if there are soluble sulphide ions in the pulp (August 22, 1988).
 - (h) You need to understand the pulp chemistry and learn what you are dealing with (August 22, 1988).
23. Having now "participated" and "contributed" I now direct you and your "metallurgical team" to attend to what was clearly obvious in August 1988, \$9.0 Million dollars ago!

John Bartrum

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