

Section 6

Plant Versus Laboratory Cyanidation

The enclosed report by Dan Kivari of Kilborn Engineering documents a daily laboratory program conducted on samples of fresh TRP feed and tailings slurry. Compared to previous laboratory programs on dried samples or stored moist samples, this current work has increased credibility. The slurry samples were taken directly from the routine plant sample points to the laboratory bottle rolls.

The key performance trends, that will be evaluated using these data are:

- o Effect of increased processing (residence) time.
Justification for more TRP vessels?
- o Effect of increased cyanide addition to the circuit (see Section 10).

The study will allow plant performance to be compared directly against laboratory results on equivalent TRP feed. Thus the effect of any plant operating inefficiencies can be highlighted. The laboratory evaluation technique (bottle rolls) was the same one used to generate the plant design parameters and thus the performance reference is valid.

The analysis of Dan's data has not yet been completed. Routine plant operating data for the period in question are being integrated with the laboratory results to calculate overall gold extractions as per TRP metallurgical accounting practice.

D.R. Bartlett
November 7, 1988

KILBORN

REPORT TO: Don Cooper
FROM: Dan Kivari
DATE: November 3, 1988
SUBJECT: Cyanidation Testwork for Giant Yellowknife Mines Limited
- Tailings Retreatment Plant

1.0 INTRODUCTION

- 1.1 The following is the report on the cyanidation testwork that was performed on the TRP feed and tailing samples.

2.0 SUMMARY

- 2.1 The bottle roll tests demonstrated that the Tailing Retreatment Plant performed as well as could be expected for the testwork time period. The recoveries for the TRP and bottle roll tests were in the same range. However, the bottle roll tests were performed on the slurry that was pumped from the storage tank therefore the effect of the leaching in the storage tank was not added to the bottle roll tests.
- 2.2 The addition of hydrogen peroxide to the slurry had no effect on the gold dissolution.
- 2.3 The addition of calcium peroxide to the slurry samples had little or no effect on the gold dissolution.
- 2.4 Drying the samples at 425°F for one hour did not affect the gold dissolution.

3.0 DISCUSSION

Testwork that was performed by GYML on Polishing Pond material in May and June 1988 produced similar results as the results that are presented in this report. However, one test on June 27, 1988 produced a gold recovery of 67.1% when the material was roasted a 1500°F for a short period of time (approximately 1/2 hour). This would indicate that most of the gold is associated with un-reacted sulphide minerals.

Because of the significant increase in the gold recovery with roasting, the following testwork should be done:

- (1) Produce a flotation concentrate for roasting. Leach the combined roasted concentrate and flotation tailings in the CIL plant.
- (2) Produce a flotation concentrate and pressure leach the concentrate. Leach the flotation tailing in the CIL plant.
- (3) Add strong oxidizing chemicals to a thickened slurry, then leach in CIL plant.
- (4) Produce a magnetic concentrate, roast or pressure leach the concentrate. Leach the tailing from the magnetic separator in the CIL plant.

4.0 CYANIDATION

4.1 Test Purpose.

4.2 The purpose of the testwork was to determine the gold recovery for the CIL feed and tailing at the tailings retreatment plant with bottle roll tests.

4.3 Test Procedure.

4.3.1 Sufficient samples of the CIL feed slurry and tailing slurry were taken to perform five 24 hour bottle roll tests on the feed sample and two 16 hour bottle roll tests on the tailing sample. The reagent additions for each test is summarized on the attached data sheets.

On October 15 and October 16, one additional feed sample was included in the test work. The feed sample was filtered and dried in an oven for one hour at 425°F prior to the bottle roll cyanidation.

4.3.2 On October 17, sufficient CIL feed sample was taken to perform bottle roll tests on slurry samples that had been reacted with varying amounts of hydrogen peroxide. The reagent additions are summarized on Data Sheet (4).

- 4.3.3 Bottle roll tests were performed on four dried weekly CIL feed and tailing composites for a 24 hour period. Since no assays are available for the bottle roll test feed samples, no recoveries were calculated.
- 4.3.4 For pH control in the above tests, lime was added to each sample. The slurry pH after the 24 hour bottle roll tests ranged from 10.5 to 10.8.

CYANIDATION TESTWORK FOR
GIANT YELLOWKNIFE MINES LIMITED
TAILINGS RETREATMENT PLANT

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DATA SHEET (1)

DATE	SAMPLE	SAMPLE WEIGHT (gm)	ASSAY (oz/T)	CYANIDE (lb/T)	FREE CYANIDE (ppm)	H ₂ O ₂ (lb/T)	CaO ₂ (lb/T)	RECOV. (%)
12 Oct	FEED COMP		0.044					
	RES. 1	230	0.034	1	240	NIL	NIL	22.7
	RES. 2	258	0.033	1	200	NIL	NIL	25.0
	RES. 3	233	0.033	2	450	NIL	NIL	25.0
	RES. 4	237	0.034	2	145	2	NIL	22.7
	RES. 5	241	0.034	2	345	NIL	2	22.7
	TAILING COMP		0.043					
	RES. 1	250	0.040	0	170	NIL	NIL	7.0
	RES. 2	266	0.040	0.5	300	NIL	NIL	7.0
13 Oct	FEED COMP		0.056					
	RES. 1	275	0.045	1	120	NIL	NIL	19.6
	RES. 2	301	0.043	1	170	NIL	NIL	23.2
	RES. 3	301	0.043	2	450	NIL	NIL	23.2
	RES. 4	285	0.044	2	200	5	NIL	21.4
	RES. 5	285	0.041	2	305	NIL	5	26.8
	TAILING COMP		0.041					
	RES. 1	280	0.037	0.	185	NIL	NIL	9.7
	RES. 2	265	0.036	0.5	210	NIL	NIL	12.2

CYANIDATION TESTWORK FOR
GIANT YELLOWKNIFE MINES LIMITED
TAILINGS RETREATMENT PLANT

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DATA SHEET (2)

DATE	SAMPLE	SAMPLE WEIGHT (gm)	ASSAY (oz/T)	CYANIDE (lb/T)	FREE CYANIDE (ppm)	H ₂ O ₂ (lb/T)	CaO ₂ (lb/T)	RECOV. (%)
14 Oct	FEED COMP		0.057					
	RES. 1	222	0.044	1	230	NIL	NIL	22.8
	RES. 2	207	0.044	1	200	NIL	NIL	22.8
	RES. 3	212	0.044	2	495	NIL	NIL	22.8
	RES. 4	206	0.045	2	300	5	NIL	21.1
	RES. 5	197	0.040	2	495	NIL	5	29.8
	TAILING COMP		0.041					
	RES. 1	283	0.039	0	100	NIL	NIL	5.1
	RES. 2	276	0.040	0.5	155	NIL	NIL	2.4
15 Oct	FEED COMP		0.044					
	FEED COMP"B"		0.051					
	RES. 1	255	0.034	1	190	NIL	NIL	22.7
	RES. 2	250	0.033	1	130	NIL	NIL	25.0
	RES. 3	260	0.033	2	485	NIL	NIL	25.0
	RES. 4	258	0.034	2	20	15	NIL	22.7
	RES. 5	265	0.033	2	470	NIL	15	25.0
	RES. 6	265	0.037	2	595	NIL	NIL	27.4
	TAILING COMP		0.033					
	RES. 1	221	0.033	0	135	NIL	NIL	0.0
	RES. 2	234.7	0.033	* 0.0 0.5	190	NIL	NIL	0.0

* Typing error, changed per handwritten report.

CYANIDATION TESTWORK FOR
GIANT YELLOWKNIFE MINES LIMITED
TAILINGS RETREATMENT PLANT

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DATA SHEET (3)

DATE	SAMPLE	SAMPLE WEIGHT (gm)	ASSAY (oz/T)	CYANIDE (lb/T)	FREE CYANIDE (ppm)	H ₂ O ₂ (lb/T)	CaO ₂ (lb/T)	RECOV. (%)
16 Oct	FEED COMP		0.064					
	RES. 1	271	0.056	1	225	NIL	NIL	12.5
	RES. 2	263	0.057	1	255	NIL	NIL	10.9
	RES. 3	247	0.057	2	505	NIL	NIL	10.9
	RES. 4	267	0.056	2	130	15	NIL	12.5
	RES. 5	270	0.054	2	450	NIL	15	15.6
	RES. 6	269	0.056	2	515	NIL	NIL	12.5
	TAIL COMP		0.039					
	RES. 1	237	0.038	0	155	NIL	NIL	2.6
	RES. 2	234	0.038	0.5	265	NIL	NIL	2.6

CYANIDATION TESTWORK FOR
GIANT YELLOWKNIFE MINES LIMITED
TAILINGS RETREATMENT PLANT

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DATA SHEET (4)

DATE	SAMPLE	SAMPLE WEIGHT (gm)	ASSAY (oz/T)	CYANIDE (lb/T)	H ₂ O ₂ (lb/T)	FREE CYANIDE (PPM)	RECOV. (%)
	FEED COMP		0.054				
	FO #1 RESIDUE	235	0.042	2	0	415	22.2
	FO #2 RESIDUE	240	0.044	2	5	390	18.5
	FO #3 RESIDUE	237	0.043	2	10	380	20.4
	FO #4 RESIDUE	236	0.042	2	15	240	22.2
	FO #5 RESIDUE	243	0.042	2	20	300	22.2
	TAILING TRP #1 <u>RESIDUE</u>	250	0.044	0.5	NIL	135	
DRB COMP	TAILING TRP #2 <u>RESIDUE</u>	250	0.043	1.0	NIL	355	
	FEED TRP #3 <u>RESIDUE</u>	250	0.041	1.0	NIL	300	
	FEED TRP #4 <u>RESIDUE</u>	250	0.047	2.0	NIL	750	

DATE	SAMPLE	SAMPLE WEIGHT (gm)	ASSAY (oz/t)	CYANIDE (lb/t)	FREE CYANIDE (ppm)	H ₂ O ₂ (lb/t)	CaO ₂ (lb/t)	RECOVER (%)
12 OCT	FEED COMP		0.044					
	Res. 1	220	0.034	1	210		NIL	22.7
			0.0347					
	Res. 2	255	0.022	1	211		NIL	25.0
	Res. 3	222	0.020	2	450		NIL	25.0
	Res. 4		0.020	2	200		NIL	22.7
	Res. 5		0.017		212		NIL	
	TRANSITION		0.017					
	Res. 1						NIL	7.0
	Res. 2						NIL	7.0
13 OCT	FEED COMP		0.017					
	Res. 1							7.0
	Res. 2							23.2
	Res. 3							23.2
	Res. 4							21.4
	Res. 5	265	0.017		210		NIL	26.8
	RE TRANSITION		0.017					
	Res. 1	280	0.017	0	185		NIL	9.7
	Res. 2	265	0.036	0.5	210 210		NIL	12.2

DATE	SAMPLE	SAMPLE WEIGHT(gm)	ASSAY (oz/t)	CYANIDE (1/t)	FREE CYANIDE(ppm)	H ₂ O ₂ (1/t)	CaO ₂ (1/t)	RECOVER (%)
4 Oct	FEED COMP		0.057					
	Res 1	222	0.044	1	230	NIL	NIL	22.8
	Res 2	207	0.044	1	200	NIL	NIL	22.8
	Res 3	212	0.044	2	495	NIL	NIL	22.8
	Res 4	206	0.045	2	300	5	NIL	21.1
	Res 5	197	0.040	2	495	NIL	5	
	TAILINGS COMP		0.041					
	Res. 1	283	0.027	0	0		NIL	5.1
	Res. 2	276	0.040	0.5	155	NIL	NIL	2.4
15 Oct	FEED COMP		0.044					
	FEED COMP "B"		0.051					
	Res. 1	255	0.027	1	170	NIL	NIL	22.7
	Res. 2	250	0.027	1	130	NIL	NIL	25.0
	Res 3	220	0.033	2	485	NIL	NIL	25.0
	Res 4	268	0.034	2	20	15	NIL	22.7
	Res 5	265	0.033	2	470	NIL	15	25.0
	Res 6	265	0.037	2	595	NIL	NIL	27.4
	TAILINGS COMP		0.033					
	Res. 1	221	0.033	0	135	NIL	NIL	0.0
	Res. 2	234.7	0.033	0.5	190	NIL	NIL	0.0

DATE	SAMPLE	SAMPLE (WEIGHT(gm))	ASSAY (oz/t)	CYANIDE (lb/t)	FREE CYANIDE(ppm)	H ₂ O ₂ (lb/t)	CaO ₂ (lb/t)	Loss (%)
1/6/54	FEED COMP		0.064					
	Res 1	271	0.056	1	225	NIL	NIL	12.5
	Res 2	263	0.057	1	255	NIL	NIL	10.9
	Res 3	247	0.057	2	505	NIL	NIL	10.9
	Res 4	267	0.058	2	130	15	NIL	12.5
	Res 5	270	0.059	2	450	NIL		15.6
	Res 6	269	0.056	2	515	NIL	NIL	12.5
	TAIL (wtd)		0.059					
	Res 1	257	0.058	0	155 245	NIL		2.6
	Res 2	231	0.058	0.5	245	NIL		2.6

* Res #6 - Cyanidation temp: About 160°C to 75
425°F.