

To G.B. Halverson
Copies To B.C. Cross
From T.R. Raponi
Subject CYANIDATION TESTWORK ON FEED MATERIAL FOR THE T.R.P. PILOT PLANT

Date 04/21/87
Ref. METTEST

Summary

Drill core samples of the material excavated for feed material to the tails retreatment plant (T.R.P.) pilot plant were retained for standard cyanidation testwork to provide preliminary recovery estimates for the pilot plant operation. Average recovery for the samples 43424 to 43426 was 36.16% Au with a calculated head grade of 0.107 oz/ton Au; for samples 43427 to 43431 the average recovery was 37.45% Au with a calculated head grade of 0.058 oz/ton Au; and for samples 43432 to 43436 the average recovery was 38.43% Au with a calculated head grade of 0.087 oz/ton Au. The average NaCN consumption for all the tests was 1.28 lb/ton and the CaO consumption was 4.17 lb/ton. Not included in these results is an erratic sample with a calculated head grade of 0.201 oz/ton Au from the first set of samples which had a recovery of 78.01% Au. The results of this testwork correlate well with other tailings testwork.

Purpose

To determine the cyanidation recovery of samples from the material which will be used for the start-up of the T.R.P. pilot plant.

Procedure

A total of 13 samples from 3 drill holes were received for this testwork. The samples from each drill hole were combined and rolled to ensure that the composite was well mixed. Duplicate 200 g grab samples were taken from each of the 3 composite samples for cyanidation testwork. The test procedure used for each of the six tests is as follows. The sample was placed in a Winchester acid bottle and pulped with tap water to 33% solids. Lime (CaO) and sodium cyanide (NaCN) were added to raise the pH to 10.5 and to give a free NaCN strength of 1.5 lb/ton. The sample was then placed on the rolls and rolled for 17.5 hours. A sample was then withdrawn to check the pH and NaCN levels. CaO and NaCN were added to restore pH and NaCN to desired levels. The sample was rolled for a further 6.5 hours. A sample was then withdrawn to check pH and NaCN levels and for a Au assay. Reagents were added as after the first hour and the sample was rolled for only 9.5 hours further due to a mechanical problem with the rolls. The entire sample was then filtered to separate the pregnant solution. The filter cake was then washed with tap water and a separate wash sample was obtained. Both solution samples and the solid residue were assayed for Au. The NaCN strength and pH were also determined on the pregnant solution. The Winchester bottle was rolled uncapped for the entire 33.5 hour test.

Results

Test and assay results for each test are attached. Duplicate tests from each of the hole composite samples were run to verify the test results. The leaching time for the tests was reduced to 33.5 hours from 48 hours due to mechanical problems with the rolls. A summary of the test results is shown in Figure 1.

Conclusions

1. The average recovery of the first set of samples was 36.16% Au with a calculated head grade of 0.107 oz/ton Au. The second test for this set of samples was excluded from this average. Reagent consumptions were calculated at 1.70 lb/ton NaCN and 2.5 lb/ton CaO.
2. The average recovery for the second set of samples was 37.45% Au with an average calculated head grade of 0.058 oz/ton Au. Reagent consumptions were calculated at 1.10 lb/ton NaCN and 5.5 lb/ton CaO.
3. The average recovery for the third set of samples was 38.43% Au with an average calculated head grade of 0.087 oz/ton Au. Reagent consumptions were calculated at 1.27 lb/ton NaCN and 4.0 lb/ton CaO.

Discussion

The results of this testwork were in agreement with past tailings testwork, with the exception of test No.1. The higher grade and recovery of this sample is anomalously high in relation to the other samples. The calculated head grade for test No.1A corresponded exactly with the average head grade for that hole. For this reason the results of test No.1 were excluded.

The results of tests No.2 and No.2A showed good duplication. The calculated head grades though were about 25% lower than the average grade for this hole. Four of the five samples from this hole assayed from 0.030 to 0.070 oz/ton Au with the bottom sample assaying 0.180 oz/ton Au. The calculated head grade then would be more indicative of the grade of this hole. Tests No.3 and No.3A showed similar trends with the calculated head grade from these tests being 15% lower than the average grade of the drill hole. In this case the sample assays ranged from 0.050 to 0.200 oz/ton Au. The good duplication of the test results would indicate that the calculated head grades are more indicative of the grade of this material. As stated the recoveries obtained in this testwork correlate well with other testwork and should be expected with the operation of the T.R.P. pilot plant.



T.R. Raponi
Metallurgical Engineer

Figure 1: Summary of Test Results

Sample No.	Test No.	Calc. Head Assay (oz/ton)	Ave. Head Assay (oz/ton)	Residue Assay (oz/ton)	Calc. Au Recovery (%)	NaCN Consumed (lb/ton)	CaO Consumed (lb/ton)
43424 to 43426	1 1A	0.201 0.107	0.107 0.107	0.044 0.068	78.09 36.16	1.25 1.70	3.5 2.5
43427 to 43431	2 2A	0.058 0.057	0.080 0.080	0.036 0.036	38.40 36.50	0.97 1.23	7.5 3.5
43432 to 43436	3 3A	0.085 0.089	0.102 0.102	0.053 0.054	37.31 39.54	1.18 1.35	4.0 4.0

CYANIDATION TESTSDate of test: Mar. 25/87Sample: T.R.P. Feed Material No. 43424 to 43426Sample Code#: TRP-1

Initial	Reagents	Prior to Roll	After 24 Hrs.	After 33.5 Hrs.
Size = <u>200 g</u>	NaCN = <u>0.15 g</u>	pH = <u>10.3</u>	pH = <u>11.1</u>	pH = <u>10.35</u>
pH = <u>9.6</u>	CaO = <u> </u> g	CN ⁻ = <u>0.5</u> #/t	CN ⁻ = <u>1.5</u> #/t	CN ⁻ = <u>1.25</u> #/t
%-200 = <u> </u>	Others = <u> </u>	Tit = <u>10</u> ml	Tit = <u>60</u> ml	Tit = <u> </u> ml
H ₂ O = <u>400</u> ml		Other = <u> </u>	Other = <u> </u>	Other = <u> </u>
Other = <u>5 mL CaO to 11.25</u>		add 1.0 mL NaCN add 2.0 mL CaO pH to 10.6		

Sample Calculations

	Units	Assay	Distribution	Recovery
Feed				
Preg	335 mL	2.534 mg/L	0.849 mg	61.79 %
Wash	545 mL	0.411 mg/L	0.224 mg	16.30 %
Total	880 mL	1.219 mg/L	1.073 mg	78.09 %
Residue	200 g	1.507 g/t	0.301 mg	21.91 %
Calc Head	200 g	6.87 g/t	1.374 mg	100.00 %

Note: $P_{reg}(ml) = Preg + Tit.$ Sample Test Outlines

CYANIDATION TESTSDate of test: Mar. 25/87Sample: T.R.P. Feed Mat. bal. No. 43424 to 43426Sample Code#: TRP - 1A

Initial				Final
Size = <u>200 g</u>	Reagents	Prior to Roll	After <u>24</u> Hrs.	After <u>33.5</u> Hrs.
pH = <u>9.48</u>	NaCN = <u>0.15 g</u>	pH = <u>10.46</u>	pH = <u>10.2</u>	pH = <u>10.0</u>
%-200 = _____	CaO = _____ g	CN ⁻ = <u>0.95</u> #/t	CN ⁻ = <u>1.15</u> #/t	CN ⁻ = <u>0.6</u> #/t
H ₂ O = <u>400 ml</u>	Others = _____	Tit = <u>10</u> ml	Tit = <u>60</u> ml	Tit = _____ ml
Other = _____	5ml CaO to pH <u>11.25</u>	Other = _____	Other = _____	Other = _____
		- add 0.55 ml NaCN	- add 0.35 ml NaCN	

Sample Calculations

	Units	Assay	Distribution	Recovery
Feed				
Preg	335 mL	0.596 mg/L	0.200 mg	27.40%
Wash	365 mL	0.175 mg/L	0.064 mg	8.78%
Total	700 mL	0.377 mg/L	0.264 mg	36.16%
Residue	200 g	2.329 g/t	0.466 mg	63.84%
Calc Head	200 g	3.65 g/t	0.730	100.00%

Note: $P_{reg}(ml) = Preg + Tit.$ Sample Test Outlines

CYANIDATION TESTSDate of test: Mar. 25 /87Sample: T.R.P. Feed Material : No. 43427 to 43431Sample Code#: TRP-2

Initial				Final
Size = <u>200 g</u>	Reagents	Prior to Roll	After <u>24</u> Hrs.	After <u>33.5</u> Hrs.
pH = <u>9.70</u>	NaCN = <u>0.15</u> g	pH = <u>9.92</u>	pH = <u>11.75</u>	pH = <u>11.28</u>
%-200 = <u> </u>	CaO = <u> </u> g	CN ⁻ = <u>1.5</u> #/T	CN ⁻ = <u>1.3</u> #/t	CN ⁻ = <u>0.73</u> #/t
H ₂ O = <u>400</u> ml	Others =	Tit = <u>10</u> ml	Tit = <u>60</u> ml	Tit = <u> </u> ml
Other =	5ml CaO to pH 11.25	Other =	Other =	Other =
		-add 10ml CaO pH to 11.10	-add 0.2 ml NaCN	

Sample Calculations

	Units	Assay	Distribution	Recovery
Feed				
Preg	<u>350</u> mL	<u>0.349</u> mg/L	<u>0.122</u> mg	<u>30.42</u> %
Wash	<u>360</u> mL	<u>0.089</u> mg/L	<u>0.032</u> mg	<u>7.98</u> %
Total	<u>710</u> mL	<u>0.217</u> mg/L	<u>0.154</u> mg	<u>38.40</u> %
Residue	<u>200</u> g	<u>1.233</u> g/t	<u>0.247</u> mg	<u>61.60</u> %
Calc Head	<u>200</u> g	<u>2.00</u> g/t	<u>0.401</u> mg	<u>100.00</u> %

Note: $P_{reg}(ml) = Preg + Tit.$ Sample Test Outlines

CYANIDATION TESTSDate of test: Mar. 25 / 87Sample: T.R.P. Feed Material : No. 43427 to 43431Sample Code#: TRP- 2A

Initial				Final
Size = <u>200 g</u>	Reagents	Prior to Roll	After <u>24 Hrs.</u>	After <u>33.5 Hrs.</u>
pH = <u>9.70</u>	NaCN = <u>0.15 g</u>	pH = <u>10.36</u>	pH = <u>11.1</u>	pH = <u>10.23</u>
%-200 = _____	CaO = _____ g	CN ⁻ = <u>1.0</u> #/T	CN ⁻ = <u>1.4</u> #/t	CN ⁻ = <u>0.87</u> #/t
H ₂ O = <u>400 ml</u>	Others = _____	Tit = <u>10</u> ml	Tit = <u>60</u> ml	Tit = _____ ml
Other = _____	5 mL CaO to pH 11.30	Other = _____ - add 0.5 mL NaCN - add 2.0 mL CaO pH 10.9	Other = _____ - add 0.1 mL NaCN	Other = _____

Sample Calculations

	Units	Assay	Distribution	Recovery
Feed				
Preg	<u>345 mL</u>	<u>0.329 mg/L</u>	<u>0.114 mg</u>	<u>29.30%</u>
Wash	<u>488 mL</u>	<u>0.058 mg/L</u>	<u>0.028 mg</u>	<u>7.20%</u>
Total	<u>833 mL</u>	<u>0.170 mg/L</u>	<u>0.142 mg</u>	<u>36.50%</u>
Residue	<u>200 g</u>	<u>1.233 g/t</u>	<u>0.247 mg</u>	<u>63.50%</u>
Calc Head	<u>200 g</u>	<u>1.95 g/t</u>	<u>0.389 mg</u>	<u>100.00%</u>

Note: Preg(ml) = Preg + Tit.

Sample Test Outlines

CYANIDATION TESTSDate of test: Mar. 25/87Sample: T.R.P. Feed Material : No. 43432 - 43436Sample Code#: TRP-3

Initial				Final
Size = <u>200 g</u>	Reagents	Prior to Roll	After <u>24</u> Hrs.	After <u>33.5</u> Hrs.
pH = <u>9.58</u>	NaCN = <u>0.15 g</u>	pH = <u>10.12</u>	pH = <u>11.0</u>	pH = <u>10.22</u>
%-200 = <u> </u>	CaO = <u> </u> g	CN ⁻ = <u>1.0</u> #/t	CN ⁻ = <u>1.5</u> #/t	CN ⁻ = <u>.82</u> #/t
H ₂ O = <u>400 ml</u>	Others = <u> </u>	Tit = <u>10</u> ml	Tit = <u>60</u> ml	Tit = <u> </u> ml
Other = <u> </u>	5mL CaO to pH 11.20	Other = <u> </u> add 0.5 mL NaCN add 30 mL CaO pH 11.39	Other = <u> </u>	Other = <u> </u>

Sample Calculations

	Units	Assay	Distribution	Recovery
Feed				
Preg	<u>348 mL</u>	<u>0.569 mg/L</u>	<u>0.198 mg</u>	<u>34.20 %</u>
Wash	<u>395 mL</u>	<u>0.045 mg/L</u>	<u>0.018 mg</u>	<u>3.11 %</u>
Total	<u>743 mL</u>	<u>0.290 mg/L</u>	<u>0.216 mg</u>	<u>37.31 %</u>
Residue	<u>200 g</u>	<u>1.815 g/t</u>	<u>0.363 mg</u>	<u>62.69 %</u>
Calc Head	<u>200 g</u>	<u>2.90 g/t</u>	<u>0.579 mg</u>	<u>100.00 %</u>

Note: Preg(ml) = Preg + Tit.

Sample Test Outlines

CYANIDATION TESTSDate of test: Mon. 25/87Sample: T.R.P. Feed Material : No. 43432 - 43436Sample Code#: TRP-3A

Initial				Final
Size = <u>200 g</u>	Reagents	Prior to Roll ^{17.5h}	After <u>24</u> Hrs.	After <u>33.5</u> Hrs.
pH = <u>9.40</u>	NaCN = <u>0.15 g</u>	pH = <u>10.25</u>	pH = <u>11.1</u>	pH = <u>10.46</u>
%-200 = <u> </u>	CaO = <u> </u> g	CN ⁻ = <u>0.6</u> #/T	CN ⁻ = <u>1.5</u> #/t	CN ⁻ = <u>1.05</u> #/t
H ₂ O = <u>400 ml</u>	Others =	Tit = <u>10</u> ml	Tit = <u>60</u> ml	Tit = <u> </u> ml
Other =	5ml CaO to pH 11.20	Other =	Other =	Other =
		-add 0.9ml NaCN -add 3.0 ml CaO -pH 11.45		

Sample Calculations

	Units	Assay	Distribution	Recovery
Feed				
Preg	365 mL	0.586 mg/L	0.214 mg	34.98 %
Wash	360 mL	0.079 mg/L	0.028 mg	4.58 %
Total	725 mL	0.334 m	0.242 mg	39.54 %
Residue	200g	1.849 g/t	0.370 mg	60.46 %
Calc Head	200 g	3.06 g/t	0.612 mg	100.00 %

Note: Preg(ml) = Preg + Tit.Sample Test Outlines

