

An Investigation of
THE RECOVERY OF GOLD AND SILVER
from a mill tailing sample
submitted by
CYPRUS ANVIL MINING CORPORATION
Progress Report No. 1

Project NO. L.R. 2366

NOTE:

This report refers to the samples as received.

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LAKEFIELD RESEARCH OF CANADA LIMITED
Lakefield, Ontario
February 10, 1981

I N T R O D U C T I O N

In a letter dated October 29, 1980, Mr. A.B. Cron of Cyprus Anvil Mining Corporation requested that we conduct some preliminary cyanidation and flotation tests on a sample of mill tailing to investigate the recovery of gold and silver.

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S U M M A R Y

1. Head Sample Assays

A sample of the tailing assayed:

Gold	(Au)	g/t	-	0.12
Silver	(Ag)	g/t	-	10.1
Lead	(Pb)	%	-	0.44
Zinc	(Zn)	%	-	1.04
Copper	(Cu)	%	-	0.12
Iron	(Fe)	%	-	33.8
Sulphur	(S)	%	-	35.3

The average calculated head from the test results was:

Gold	(Au)	g/t	-	0.18
Silver	(Ag)	g/t	-	10.2

2. Cyanidation Testwork

Cyanidation tests were conducted on the "as received" sample and after a regrind. The results and conditions of the cyanidation test are summarized in Table No. 1.

Table No. 1

Test	Grind % -200	NaCN gpL	Leach Time h	Reagent Cons. kg/t		% Recovery		Residue Assay g/t		Head Calc. g/t	
				CaO	NaCN	Au	Ag	Au	Ag	Au	Ag
1	49.4	0.5	48	3.88	0.82	67.4	28.1	0.03	7.75	0.09	10.8
2	49.4	1.0	48	3.88	2.52	50.8	28.5	0.06	8.00	0.12	11.2
3	49.4	0.5	72	5.02	2.40	29.7	32.5	0.14	7.00	0.20	10.4
4	96.4	0.5	48	4.26	1.82	70.0	40.8	0.08	6.00	0.27	10.1

Summary - Continued

Increasing cyanide level or leach time did not result in any increase in Ag recovery. NaCN consumption did increase. Au recoveries were somewhat erratic with analytical variations at these levels probably masking effects of changes in the cyanidation conditions.

Grinding the tailing to 96.4 percent passing 200 mesh prior to cyanidation resulted in an increase in Ag recovery of about 10 percent but there was also an increase in NaCN consumption of 1 kg/t.

3. Flotation

One flotation test was conducted on the tailing sample to attempt to concentrate the Au and Ag by flotation. The results showed little or no concentration of Au and Ag:

<u>Weight % Recovery</u>	<u>% Recovery</u>	
	<u>Au</u>	<u>Ag</u>
3.30	3.9	6.6
32.38	35.9	28.4

SAMPLE PREPARATION

Approximately 45 kg of tailings were received at Lakefield on November 18, 1980 and given our Reference No. 8022539.

After determining the moisture content 500 g samples were prepared for testwork and a sample was prepared for head analysis.

DETAILS OF TESTS

Test No. 1

Purpose: To investigate the response of cyanidation.

Procedure: The sample was pulped with water in a 2.5 liter bottle. NaCN and lime were added and the cyanidation was carried out on rolls for one 48 hour stage.

Feed: 500 g of tailing sample.

Solution Volume: 1000 mL Pulp Density 33 % solids

Solution Composition: 0.50 gpL NaCN

pH Range: 10.5 - 11.0 with Ca(OH)₂

Reagent Balance:

Time Hours	Added, grams				Residual		Consumed		pH	R.P.*
	Actual		Equivalent		Grams		Grams			
	NaCN	Ca(OH) ₂	NaCN	CaO	NaCN	CaO	NaCN	CaO		
0-6	0.53	1.50	0.50	1.14	0.20	0	0.30	1.14	11.1- 9.7	-
6-23 ¹ / ₂	0.32	1.05	0.30	0.80	0.50	0.04	0	0.76	11.7-11.4	-
23 ¹ / ₂ -48	0	0	0	0	0.39	trace	0.11	0.04	11.4-10.6	330
Total	0.85	2.55	0.80	1.94	0.39	0	0.41	1.94	-	-

Reagent Consumption (kg/t of cyanide feed) NaCN: 0.82 CaO: 3.88

*Reducing Power: mL 0.1 N KMnO₄/L pregnant solution

Metallurgical Results

Product	Amount	Assays, g/t,mg/L		% Distribution	
		Au	Ag	Au	Ag
48 h Cy. Solution	1920 mL	0.016	0.78	67.4	28.1
48 h Cy. Residue	493.8 g	0.03	7.75	32.6	71.9
Head (Calc.)	493.8 g	0.09	10.78	100.0	100.0

Test No. 1 - Continued

Screen Analysis - Leach Residue

Mesh Size (Tyler)	% Retained		% Passing Cumulative
	Individual	Cumulative	
+ 65	9.4	9.4	90.6
100	7.2	16.6	83.4
150	12.0	28.6	71.4
200	22.0	50.6	49.4
270	17.1	67.7	32.3
400	5.5	73.2	26.8
- 400	26.8	100.0	-
Total	100.0	-	-

Test No. 2

Purpose: To repeat Test No. 1, but cyanide at a higher NaCN level.

Procedure: The sample was pulped with water in a 2.5 liter bottle. NaCN and lime were added and the cyanidation was carried out on rolls in one 48 hour stage.

Feed: 500 g of tailing sample.

Solution Volume: 1000 mL Pulp Density 33 % solids

Solution Composition: 1.0 gpL NaCN

pH Range: 10.5 - 11.0 with Ca(OH)₂

Reagent Balance:

Time Hours	Added, grams				Residual		Consumed		pH	R.P.*
	Actual		Equivalent		Grams		Grams			
	NaCN	Ca(OH) ₂	NaCN	CaO	NaCN	CaO	NaCN	CaO		
0-6	1.05	1.50	1.00	1.14	0.27	0	0.73	1.14	11.1- 9.7	-
6-23½	0.77	1.05	0.73	0.80	0.81	0.03	0.19	0.77	11.7-11.5	-
23½-48	0.20	0	0.19	0	0.66	trace	0.34	0.03	11.5-11.0	451
Total	2.02	2.55	1.92	1.94	0.66	0	1.26	1.94	-	-

*Reducing Power: mL 0.1 N KMnO₄/L pregnant solution

Reagent Consumption (kg/t of cyanide feed) NaCN: 2.52 CaO: 3.88

Metallurgical Results

Product	Amount	Assays, mg/L,g/t		% Distribution	
		Au	Ag	Au	Ag
48 h Cy. Solution	2050 mL	0.015	0.77	50.8	28.5
48 h Cy. Residue	494.6 g	0.06	8.00	49.2	71.5
Head (Calc.)	494.6 g	0.12	11.19	100.0	100.0

Test No. 3

Purpose: To repeat Test No. 1, but cyanide for 72 hours.

Procedure: As for Test No. 1.

Feed: 500 g of tailing sample.

Solution Volume: 1000 mL Pulp Density 33 % solids

Solution Composition: 0.50 gpL NaCN

pH Range: 10.5 - 11.0 with Ca(OH)₂

Reagent Balance:

Time Hours	Added, grams				Residual		Consumed		pH	R.P.*
	Actual		Equivalent		Grams		Grams			
	NaCN	Ca(OH) ₂	NaCN	CaO	NaCN	CaO	NaCN	CaO		
0-5	0.53	1.50	0.50	1.14	0.06	0	0.44	1.14	11.7- 8.0	-
5-24	0.46	1.00	0.44	0.76	0.02	0.01	0.48	0.75	11.2- 9.9	-
24-48	0.44	0.80	0.42	0.61	-	0.01	-	0.61	11.4-11.2	-
48-72	0.47	0	0.45	0	0.61	0	0.28	0.01	11.2-10.8	186
Total	1.90	3.30	1.81	2.51	0.61	0	1.20	2.51	-	-

*Reducing Power: mL of 0.1 N KMnO₄/L pregnant solution

Reagent Consumption (kg/t of cyanide feed) NaCN: 2.40 CaO: 5.02

Metallurgical Results

Product	Amount	Assays, mg/L, g/t		% Distribution	
		Au	Ag	Au	Ag
72 h Cy. Solution	1940 mL	0.015	0.86	29.7	32.5
72 h Cy. Residue	495.9 g	0.14	7.00	70.3	67.5
Head (Calc.)	495.9 g	0.20	10.4	100.0	100.0

Test No. 4

Purpose: To repeat Test No. 1, but grind for 30 minutes in the pebble mill prior to cyanidation.

Procedure: The sample was pulped with water in a 2.5 liter bottle. NaCN and lime were added and the cyanidation was carried out on rolls in one 48 hour stage.

Feed: 500 g of tailing sample.

Solution Volume: 1000 mL Pulp Density 33 % solids

Solution Composition: 0.50 gpL NaCN

pH Range: 10.5 - 11.0 with Ca(OH)₂

Grind: 30 min/500 g in the pebble mill at 50 percent solids.

Reagent Balance:

Time Hours	Added, grams				Residual		Consumed		pH	R.P.*
	Actual		Equivalent		Grams		Grams			
	NaCN	Ca(OH) ₂	NaCN	CaO	NaCN	CaO	NaCN	CaO		
0-5½	0.53	1.50	0.50	1.14	0.09	0	0.41	1.14	11.5- 8.9	-
5½-21	0.43	1.00	0.41	0.76	0.21	0	0.29	0.76	11.8-10.5	-
21-48	0.31	0.30	0.29	0.23	0.29	0	0.21	0.23	11.5-10.5	-
Total	1.27	2.80	1.20	2.13	0.29	0	0.91	2.13	-	-

*Reducing Power: mL 0.1 N KMnO₄/L pregnant solution

Reagent Consumption (kg/t of cyanide feed) NaCN: 1.82 CaO: 4.26

Metallurgical Results

Product	Amount	Assays, mg/L,g/t		% Distribution	
		Au	Ag	Au	Ag
48 h Cy. Solution	1820 mL	0.051	1.13	70.0	40.8
48 h Cy. Residue	497.2 g	0.08	6.00	30.0	59.2
Head (Calc.)	497.2 g	0.27	10.1	100.0	100.0

Test No. 4 - Continued

Screen Analysis - Leach Residue

Wash Size (Tyler)	% Retained		% Passing Cumulative
	Individual	Cumulative	
* 65	0.1	0.1	99.9
100	0.1	0.2	99.8
150	0.4	0.6	99.4
200	3.0	3.6	96.4
270	10.7	14.3	85.7
400	17.2	31.5	68.5
- 400	68.5	100.0	-
Total	100.0	-	-

Test No. F1

Purpose: To investigate flotation of precious metals from the sample as received.

Procedure: As outlined below.

Feed: 500 grams tailing sample.

Conditions:

Stage	Reagents Added, g/t		Time, minutes			pH
	MIBC	R208	Grind	Cond.	Froth	
Rougher 1	20	-	-	1	1	4.5
2	-	10	-	1	2.5	-

Metallurgical Results

Product	Weight %	Assays %, g/t		% Distribution	
		Au	Ag	Au	Ag
1. Ro. Conc. 1	3.30	0.24	18.7	3.9	6.6
2. Ro. Conc. 2	29.08	0.22	7.00	32.0	21.8
3. Ro. Tailing	67.62	0.19	9.88	64.1	71.6
Head (Calc.)	100.00	0.20	9.33	100.0	100.0

Calculated Grades and Recoveries

Products 1 + 2	32.38	0.22	8.19	35.9	28.4
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 Lakefield, Ontario
 February 10, 1981 / sem