

An Investigation of
THE RECOVERY OF GOLD

from samples
submitted by

680896

LARAMIDE RESOURCES LIMITED

Progress Report No. 1

SADIM GROUP 924/10E

Project No. LR 3251

NOTE:

This report refers to the samples as received.

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LAKEFIELD RESEARCH
A Division of Falconbridge Limited
Lakefield, Ontario
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INTRODUCTION

This report contains the results of preliminary testwork conducted on assay rejects from Sadim project samples as outlined in a letter dated November 28, 1986 from Mr. A.F. Reeve, Laramide Resources Limited. The purpose of the testwork was to characterize the sample and to investigate the recovery of gold by flotation and cyanidation.

LAKEFIELD RESEARCH



Robert S. Salter

General Manager



Irene Jackman

Project Engineer

Experimental Work By: C. Caza

SUMMARY

1. Head Analysis

A representative sample of the composite of assay rejects was removed for quantitative analysis.

Gold	:	1.38 g/t Au
Silver	:	10.2 g/t Ag
Copper	:	0.014 % Cu
Lead	:	0.024 % Pb

In addition, a semi-quantitative spectrographic analysis was performed on the head sample.

Qualitative Spectrographic Analysis

	<u>Comp. 1 Head</u>
10 - 100 %	Si
3 - 30 %	
1 - 10 %	Fe
0.3 - 3 %	Mg, Al, Na
0.1 - 1 %	K, Ca
0.03 - 0.3 %	
0.01 - 0.1 %	Pb, Ti
0.003 - 0.03 %	As, Mn, Ga, V, Cu, Zn, Zr
0.001 - 0.01 %	Mo, Ni, Co, Cr
0.0003 - 0.003 %	Ag
0.0001 - 0.001 %	
<0.0003 %	
I	
S	

I = Interference prevents positive identification
S = Strong spectral lines, unable to estimate amount

Unless specified above, the following were not detected at the approximate ppm lower limits of 0.5 Cu, Ag; 1 Mn; 5 Mg, Cr; 10 Be, Bi, Ca, Co, Ni, V; 25 Ge, Fe, Pb, Mo, Si, Sr, Sn, Ti, Zr, Tl, Pd, U, Th; 50 Al, Sb, B, Cd, Ga, Li, Zn; 100 As, Au, Ba, In, Na; 200 Nb, Ta, W, Rb, Pt; 300 Te, Y, Ce.

Summary - Continued

2. Mineralogy

A mineralogical examination was carried out on a head sample and a flotation concentrate to identify the metallic constituents. Pyrite and goethite were present. The goethite occurred as a product of alteration of pyrite. No gold was identified in either sample.

2. Flotation Testwork

Flotation tests were conducted to investigate the recovery of gold in a sulphide concentrate. A rougher concentrate was recovered with stage additions of potassium amyl xanthate and a dithiophosphate (Aerofloat 208). In the first test, the rougher concentrate was cleaned twice to produce a higher grade product for mineralogical examination.

The results are summarized in Table 1.

TABLE NO. 1 - FLOTATION RESULTS

Test No.	% -200 mesh	Product	Weight %	Assays %,g/t		% Distribution	
				Au	S	Au	S
1	73	Cleaner Conc.	2.7	18.2	10.6	40.1	76.8
		Rougher Conc.	41.9	2.19	0.80	75.3	90.6
		Rougher Tail.	58.1	0.52	0.06	24.7	9.4
		Head (Calc.)		1.22	0.37		
2	95	Rougher Conc.	18.5	4.78	NA	65.6	
		Rougher Tail.	81.5	0.57	NA	34.4	
		Head (Calc.)		1.35			

Gold losses in the cleaning stages were high. The difference in gold and sulphur recoveries in Test 1 indicates that a considerable amount of gold is not associated with the pyrite.

Summary - Continued

4. Cyanidation Testwork

The flotation products from Test 2 were leached in a cyanide solution to determine the extraction of gold. The tests were performed in bottles on rolls at 33 % solids maintaining a pH of 10.5-11. The results are presented in Table 2.

TABLE NO. 2 - CYANIDATION RESULTS

Test No.	Feed	NaCN g/L	Reag. Cons. kg/t*		% Extraction Au	% Rec'y O'all	Residue g/t Au	Head g/t Au
			NaCN	CaO				
3	flot'n conc	1.0	0.88	2.67	93.3	61.2	0.32	4.78
4	flot'n tail	0.5	0.10	1.79	85.9	29.5	0.08	0.57

*kg/t of cyanide feed

By leaching the flotation products under these conditions, an overall gold recovery of 90.7 % was achieved. Further testwork should be directed towards optimizing cyanidation conditions for direct treatment of the ore.

SAMPLE PREPARATION

On December 2, 1986, a box of Sadim project assay rejects was received at Lakefield Research and given our Reference Number 8627049. Each of the 22 samples was roll-crushed and a fraction of each was retained individually. The remaining portions were composited and crushed to minus 10 mesh. A head sample and test charges were prepared.

DETAILS OF TESTS

TEST NO. 1

Purpose: To float sulphides from the sample Comp. 1.

Procedure: As outlined below.

Feed: 1000 g -10 mesh Composite 1

Grind: 15 minutes at 50 % solids in a lab ball mill.

Conditions:

Stage	Reagents Added, g/t			Time, minutes			pH
	A350	R208	MIBC	Grind	Cond.	Froth	
Grind	-	-	-	15	-	-	-
Rougher	20	20	20	-	1	5	7.6
	20	20	-	-	1	5	-
	20	20	10	-	1	5	-
1st Cleaner	-	-	-	-	1	3	7.5
	5	5	-	-	1	3	-
2nd Cleaner	-	-	-	-	1	3	7.7
	-	-	-	-	-	2	-

Metallurgical Results

Product	Weight %	Assays %,g/t		% Distribution	
		Au	S	Au	S
1. 2nd Cleaner Conc.	2.69	18.2	10.6	40.1	76.8
2. 2nd Cleaner Tail.	4.60	1.82	0.28	6.9	3.5
3. 1st Cleaner Tail.	34.65	1.00	0.11	28.3	10.3
4. Rougher Tailing	58.06	0.52	0.06	24.7	9.4
Head (Calc.)	100.00	1.22	0.37	100.0	100.0

Calculated Grades and Recoveries

Products 1 and 2	7.29	7.86	4.09	47.0	80.3
Products 1 to 3	41.94	2.19	0.80	75.3	90.6

Test No. 1 - Continued

Screen Analysis - Rougher Tailing

Mesh Size (Tyler)	% Retained		% Passing Cumulative
	Individual	Cumulative	
+ 65	0.9	0.9	99.1
100	2.8	3.7	96.3
150	7.9	11.6	88.4
200	15.1	26.7	73.3
270	15.8	42.5	57.5
400	14.2	56.7	43.3
- 400	43.3	100.0	-
Total	100.0	-	-

TEST NO. 2

Purpose: To float a sulphide concentrate.

Procedure: As outlined below.

Feed: 2000 g -10 mesh Composite 1

Grind: 45 minutes in a lab ball mill at 65 % solids.

Conditions:

Stage	Reagents Added, g/t			Time, minutes		pH
	A350	R208	MIBC	Cond.	Froth	
Rougher	20	20	20	1	5	8.0
	20	20	-	1	5	-
	20	20	10	1	5	-

Metallurgical Results

Product	Weight %	Assays g/t Au	% Distribution Au
1. Rougher Conc.	18.5	4.78	65.6
2. Rougehr Tail.	81.5	0.57	34.4
Head (Calc.)	100.0	1.35	100.0

Screen Analysis - Rougher Tail.

Mesh Size (Tyler)	% Retained		% Passing Cumulative
	Individual	Cumulative	
+ 100	0.4	0.4	99.6
150	0.7	1.1	98.9
200	3.7	4.8	95.2
270	9.3	14.1	85.9
400	11.2	25.3	74.7
- 400	74.7	100.0	-
Total	100.0	-	-

TEST NO. 3

Purpose: To investigate the extraction of gold from a flotation rougher concentrate.

Procedure: The sample was pulped with water in a 2 liter bottle. NaCN and lime were added and the cyanidation was carried out on rolls in one 48 hour stage. The pulp was filtered and the residue washed three times with water.

Feed: 406 g of rougher conc.

Solution Volume: 824 mL Pulp Density 33 % solids

Solution Composition: 1.0 gpL NaCN

pH: 11 with Ca(OH)₂

Reagent Balance:

Time Hours	Added, grams				Residual		Consumed		pH
	Actual		Equivalent		Grams		Grams		
	NaCN	Ca(OH) ₂	NaCN	CaO	NaCN	CaO	NaCN	CaO	
0-2	0.87	0.80	0.82	0.61	0.66	0	0.16	0.61	10.8-10.4
2-18	0.17	0.30	0.16	0.23	0.66	0	0.16	0.23	11.0-10.5
18-27	0.17	0.19	0.16	0.14	0.82	0.01	0	0.13	11.0-10.8
27-48	0	0	0	0	0.82	0.01	0	0	10.8-10.6
Total	1.21	1.29	1.14	0.98	0.82	0.01	0.32	0.97	-

Reagent Consumption (kg/t of cyanide feed) NaCN : 0.88
CaO : 2.67

Metallurgical Results

Product	Amount	Assays mg/L, g/t Au	% Au Dist.	
			Ind.	O'all
36 h Preg + Wash Sol'n	1635 mL	0.99	93.3	61.2
36 h Cyanide Residue	363.0 g	0.32	6.7	4.4
Head (Calc.)	363.0 g	4.78	100.0	65.6

TEST NO. 4

Purpose: To investigate the gold extraction from a rougher tailing sample.

Procedure: The sample was pulped with water in a 2 L bottle. NaCN and lime were added and the cyanidation was carried out on rolls in one 48 hour stage. The pulp was filtered and the residue washed three times with water.

Feed: 500 g of rougher tail

Solution Volume: 1000 mL Pulp Density 33 % solids

Solution Composition: 0.5 gpL NaCN

pH Range: 10.5-11 with Ca(OH)₂

Reagent Balance:

Time Hours	Added, grams				Residual		Consumed		pH
	Actual NaCN	Ca(OH) ₂	Equivalent NaCN	CaO	Grams NaCN	CaO	Grams NaCN	CaO	
0-2	0.53	1.0	0.50	0.76	0.50	0.03	0	0.73	11.2-11.0
2-18	0	0	0	0	0.45	0.03	0.05	0	11.0-10.6
18-27	0.05	0.20	0.05	0.15	0.50	0.04	0	0.14	11.0-11.0
27-48	0	0	0	0	0.50	0.04	0	0	11.0-10.8
Total	0.58	1.20	0.55	0.91	0.50	0.04	0.05	0.87	-

Reagent Consumption (kg/t of cyanide feed) NaCN : 0.10
CaO : 1.79

Metallurgical Results

Product	Amount	Assays mg/L, g/t Au	% Au Dist.	
			Ind.	O'all
48 h Preg + Wash	1985 mL	0.12	85.9	29.5
48 h Cyanide Residue	485.4 g	0.08	14.1	4.9
Head (Calc.)	485.4 g	0.57	100.0	34.4