

Curragh Resources Inc.

Inter-Office Memorandum

TO: Dave Tenny, Bill Dunn, Eric Beaumont, Gordon Wilson
FROM: Godfrey McDonald
SUBJECT: **Vangorda Footwall Sample** DATE: November 12, 1990
Gold Mineralogy

A Laboratory testwork programme was initiated to determine if the gold content in the Vangorda pit footwall could be processed in the mill with its gold content being the major economic factor. The test programme was designed to isolate the gold in the "sink" product of a 3.0 g/cc sink/float separation. This test was not successful as 80% of the gold reported to the "sink" product and it was 87% of the sample weight; gold upgrading was not achieved. There was not a sufficient concentration of gold and its associations in either the "sink" or the "float" product, so the gold mineralogical investigation was cancelled.

Next, the Vangorda footwall sample was ground and flotation concentrates produced to try and isolate and concentrate the gold values. This process was successful with 65% of the gold recovered in 5.5% of the feed weight. The gold was recovered in the 2nd Cu/Pb Cleaner concentrate which assayed 12.35 g/t gold. Other constituents in the 2nd Cu/Pb Cleaner concentrate were 2.7% Cu, 18.5% Pb, 0.6% Zn and 149 g/t Ag. The 2nd Cu/Pb Cleaner concentrate was subjected to further reagent conditioning and flotation to separate the Cu/Pb concentrate into a "copper rich" concentrate and a "reduced copper" concentrate. This procedure increased the gold content in the "copper rich" concentrate to 79.75 g/t gold with an overall gold recovery of 47%, suggesting a very strong copper-gold association. This concentrate was subjected to a reflected Light microscopic evaluation. No gold values were identified. The sample should be analyzed with a microprobe, which is a more sensitive mineralogical tool.

The attached Lakefield Laboratory reports are "draft" copies. The formal report will follow.



Godfrey McDonald

GM/rb

**CURRAGH RESOURCES
(Vangord)**

Project 4042 - MINERALOGY

Three test products were received in the Mineralogy laboratory for examination for identification and determination of the gold and silver minerals. The products were identified as:

- (1) Test No. 5 Cu Ro Tail
- (2) Test No. 5 Cu Ro Concentrate
- (3) Test No. 5 Cu Pb 2nd Cleaner Scavenger Concentrate.

A portion of each sample was briquetted and polished for reflected light microscopy.

Gold was not identified in any one of the samples, but silver was identified in both the Cu Rougher Concentrate and the Cu Rougher Tails. Two particles of silver were identified in the tailing product and six in the concentrate. Four of the silver grains exhibited partial to total coating by a mineral assumed to be a secondary silver mineral. This mineral coating is estimated to represent five to ten percent of the total silver in the Cu Rougher Concentrate. The grain sizes of the silver grains were:

Cu Ro Tail

1. 35 x 17 micrometers
2. 30 x 17 micrometers

Cu Ro Cono

1. 49 x 18 micrometers
2. 25 x 18 micrometers
3. 31 x 22 micrometers
4. 24 x 18 micrometers
5. 108 x 9 micrometers
6. 90 x 14 micrometers

Apart from the attached "alteration" product the silver was free of other mineral associations.

Discrete gold may have been present as fine-grained (smaller than 5 micrometers in section) but was not identified. Some, if not all, of the gold may have been present in solid solution with silver.

LAKEFIELD RESEARCH

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TO: **GODFREY MCDONALD** Company: **CURRAGH**
FROM: **Doug Newman** Fax No.: **403-994-2664**
Date: **Nov. 6th, 1990** Reference: **4042**

No. of pages 10 including this cover page.

Dear Godfrey:

Please find attached the results from Tests 1 to 5 inclusive from our Project #4042.

Also note that the mineralogist took a quick look at the samples today to get an idea what is there and will hopefully have some results for you by this Friday or next Monday.

If you have any further questions, please do not hesitate to contact me.

Sincerely,

Doug

If there is any problem involving this transmission, please contact Development Group secretary at Ext. #245.

LAKEFIELD RESEARCH

Test No.: 1 Project No.: 4042 Date: Sept 20, 1990 Operator: JN
 Purpose: Initial test to determine gold occurrence.

Procedure: Similar to Test No. 82, 3458B on Composite 5
Vanguard ore. (Pb Ro + Scav, 1st cleaner and cleaner
scavenger, plus Zn Ro + Scav flotation only).

Feed: 2000 grams of -10 mesh Composite 1 ore
 Grind: 40 minutes at 65% solids in a laboratory ball mill (2)

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE					TIME, MINUTES			
	Na ₂ CO ₃	NaCN	A3/P 34/18A	MIBC	Na ₂ SO ₄	GRIND	COND.	FROTH	pH
Grind	2000	200				40			9.2
Pb Rougher			5	15			1	3	
Pb Scav.			5	10			1	3	
			2.5	10			1	3.5	
Pb Re-grind		75	20			.30			
Pb 1st Cl.		20		2.5	100		1	3.5	8.9
			1	2.5			1	3	
Pb 1st Cl: Scav			5	5			1	2	
Feed: Pb Scavenger + Pb 1st Cleaner Scavenger Tailings									
Zn Circuit:									
	Ca(OH) ₂	CuSO ₄	A350	DF 1012					
Condition	2500						5		11.5
		800					5		11.3
Zn Rougher			20	10			2	3	
Zn Scav			15	7.5			1	2	

Stage	Pb Ro + Scav	Pb 1st Cl / Clsc	Zn Ro + Sc	Pb 1st Cl Conc 75 wt
Flotation Cell	1000g D1	500g D1	1000g D1	Clsc Conc 9
Speed: r.p.m.	1700	1500	1700	Zn Ro C 113
% Solids				Sc.C 64
% - mesh				

Test No.1

Product	Weight		Assays, % g/t					% Distribution				
	g	%	Cu	Pb	Zn	Ag	Au	Cu	Pb	Zn	Ag	Au
1 Pb Cl. Conc	65.0	3.24	6.47	20.1	0.94	209	18.2	61.0	73.7	6.1	36.8	59.8
2 Pb 1st Cl Scav Conc	7.2	0.36	3.7	3.46	1.85	70.2	2.78	3.9	1.4	1.3	1.4	1.0
3 Zn Ro Conc	87.2	4.85	0.92	0.93	6.69	38	1	13.0	5.1	64.9	10.0	4.9
4 Zn Scav Conc	51.4	2.57	0.4	0.8	0.55	25.3	1.08	3.0	1.7	2.8	3.5	2.8
5 Zn Scav Tail	1782.3	88.98	0.074	0.18	0.14	19	0.35	18.1	18.1	24.9	48.3	31.5
Head Calc.	2003.1	100.00	0.34	0.89	0.50	18.4	0.99	100.0	100.0	100.0	100.0	100.0

Combined Products

1-2 (Pb 1st Cl+Cl Scav Concs)	3.50	6.19	18.44	1.03	195	18.66	64.90	75.1	7.4	38.2	60.8
3-4 (Zn Ro+Scav Concs)	7.42	0.74	0.82	4.57	34	1.02	15.88	6.8	87.7	13.5	7.7

Test No. 2Heavy Liquid Separation

Purpose: To determine if gold is concentrated in the > 3 g/cc ore fraction.

Feed: Approximately 510 g of Composite (ore = 10 mesh)

Procedure: Methylene iodide was adjusted to a specific gravity of 3.0 g/cc with acetone.

The ore and ^{125 mL of} methylene iodide were combined in a flask, shaken, and allowed to separate for about 3 hours. The sink and float were separately filtered, washed, and assayed for gold.

Results

Test No	Product	Weight		Assay, g/t	% Distribution
		g	%		
2	Sink	445.8	86.8	0.94	80.1
	Float	67.7	13.2	1.54	19.9
	Head (calc)	513.5	100.0	1.02	100.0

Gold was not concentrated in the sink fraction.

Mineralogical examination of the sink was therefore not performed.

LAKEFIELD RESEARCH

Test No.: 3 Project No.: 4042 Date: Oct 2 1990 Operator: RSW

Purpose: - test 50.100 in grind and SPART as an auxiliary collector

Procedure: - 20 - day, low grade froth - 2nd P₂ saved some C⁺
- 1st clar froth quite dark and low grade
- 2nd clar froth also quite dark
- 3rd clar aborted - elevated froth

Feed: 2000 grams of -10 mesh concentrate

Grind: 40 minutes at 65% solids in laboratory No. 2 ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE						TIME, MINUTES			
	Na ₂ CO ₃	NaCN SD100	ASIZ	SPART	Na ₂ S ₂ O ₈ "Hetsa"	NIBC	GRIND	COND.	FROTH	pH
Grind	2000	150					40			
Pb P ₂			3	10		12		1	3	8.5
Pb scow 1			5	10		6		1	3	8.1
2			2.5	5				1	3.5	8.0
Pb Regrind		50	5	10			20			9.0
Pb 1st clar. 1		1.5			100	9		1	3	8.7
2			5	10				1	4	8.4
Pb 1st clar. scow.			5	10				1	4	-
Pb 2nd clar.		50	5	10		6		1	2.5	9.1

Stage	Pb P ₂ + scow.	Pb clar's			
Flotation Cell	1000g D-1	500g D-1			
Speed: r.p.m.	1800	1320			
% Solids					
% - mesh					

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Test No.: 3

Project No.: 4042

March 5 1950

Metallurgical Results

	PRODUCT	WEIGHT		ASSAYS, % g/t					% DISTRIBUTION				
		g	%	Cu	Pb	Zn	Pb	Ag	Cu	Pb	Zn	Pb	Ag
1	Pb conc	11.9	0.6	2.27	16.8	0.87	9.09	150.8	4.0	12.1	1.0	3.0	5.8
2	Pb 2nd class tails	56.2	2.8	2.43	11.0	0.80	16.60	117.8	20.5	37.1	4.3	25.0	21.8
3	Hd 1st class conc	20.4	1.0	6.60	13.7	0.89	5.57	142.4	19.9	16.5	1.7	3.0	9.2
4	Pb 1st class bl's	130.0	6.6	1.17	1.5	0.68	1.03	29.8	23.3	11.9	8.5	3.6	12.8
5	Pb conc bl's	1767.8	89.0	0.12	0.21	0.50	1.26	8.8	32.3	22.4	84.5	65.4	50.9
6													
7													
8													
9													
10													
11													
12													
	Head (calc.)	1986.1	100	0.33	0.83	0.53	1.85	154	100	100	100	100	100

Calculated Grades and Recoveries

	%	Cu	Pb	Zn	Pb	Ag	Cu	Pb	Zn	Pb	Ag
1st class conc	3.4	2.40	12.0	0.81	15.3	124	24.5	49.2	5.3	28.0	27.1
1st class bl's	7.6	1.89	3.11	0.71	1.62	44.6	42.2	28.4	10.2	6.6	22.0
Pb conc	11.0	2.05	5.86	0.74	5.86	69.2	67.7	77.6	15.5	34.6	49.1

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 4042

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Test No.: 4 Project No.: 4042 Date: Oct 2 1990 Operator: PSN

Purpose: - test collector CASSO

Observations Procedure: - Pb DO - stronger soln than Test 5, low grade Earth.

- Pb scav - Pb 2nd class

- 1st class Earth higher grade than T-3

- 2nd class Earth high grade - 7 conc. approx. the same weight

Feed: 1000 grams of -10 mesh composite

Grind: 40 minutes at 65% solids in laboratory No 2 ball mill

Conditions:

	REAGENTS ADDED, GRAMS PER TONNE						TIME, MINUTES			
	Na ₂ CO ₃	NaCN	ASIF	CASSO	Na ₂ S ₂ O ₈	H ₂ O ₂	GRIND	COND.	FROTH	pH
Grind	8000	150					40			
Pb DO			5	10		9		1	3	9.1
Pb scav 1			5	10				1	3	
2			2.5	5				1	4	9.0
Pb regrind		50	5	10			20			
Pb 1st class 1		15			100	6		1	3	9.2
2			5	10				1	3.5	9.1
Pb 1st class scav.			5	10				1	2	9.0
Pb 2nd class		50	5	10				1	2	-

Stage	Pb DO + scav	Pb class's			
Flotation Cell	1000g	500g			
Speed: r.p.m.	1800	1320			
% Solids					
% - mesh					

Test No. 4

Product	Weight		Assays, % g/t					% Distribution				
	g	%	Cu	Pb	Zn	Ag	Au	Cu	Pb	Zn	Ag	Au
1 Pb Cl Conc	22.8	1.18	1.3	29.0	0.84	220	20.5	6.0	44.7	1.9	17.1	29.5
2 Pb 2nd Cl Tail	48.3	2.47	1.55	7.39	0.91	66.5	5.7	15.2	24.4	4.5	14.4	17.6
3 Pb 1st Cl Scav Conc	4.2	0.22	3.8	3.23	1.01	145	8.55	3.2	0.9	0.4	2.1	2.3
4 Pb 1st Cl Scav Tail	124.6	6.38	1.29	0.42	0.77	21.8	0.74	32.7	3.6	9.7	9.2	5.9
5 Pb Scav Tail	1753.0	89.77	0.12	0.22	0.47	9.8	0.4	42.8	29.4	63.5	57.2	44.7
Head Calc.	1952.7	100.00	0.25	0.75	0.51	14.9	0.60	100.0	100.0	100.0	100.0	100.0

Combined Products

1-2 Pb 1st Cl Conc	6.63	1.47	14.25	0.89	129	10.42	21.218	69.1	6.4	31.4	47.1
1-3 Pb 1st Cl + Cl Scav Concs	3.85	1.60	19.63	0.89	130	10.31	24.47	70.0	6.8	33.5	49.4
1-4 Pb Rougher Conc	10.23	1.41	5.89	0.82	62	4.34	57.18	73.9	16.5	42.8	55.3

5714/3m 2.51%

LAKEFIELD RESEARCH

Test No.: 5 Project No.: 4042 Date: OCT. 12/90 Operator: D.L
 Purpose: To duplicate the conditions of Test 1 and do Cu, Pb, Au separation.
 Procedure: Same as Test 1 but no separation stages as shown below.

Feed: 3 x 2000 grams of -10 mesh Composite ore.
 Grind: 40 minutes at 65% solids in the lab ballmill for each stage.
 Conditions: Cu, Pb required to be separated for total Pb. Cover. Change

	REAGENTS ADDED, GRAMS PER TONNE					TIME, MINUTES			
	Na ₂ CO ₃	MuCN	A317 3418A	MIBC	Na ₂ S ₂ O ₈ Reg B. #1030	GRIND	COND.	FROTH	pH
Grind	2000	100				40.			
Cu, Pb Roughed			30.	10			3	6	8.9
Cu, Pb Scummed			5	2			1	5	
Cu, Pb Roughed		75	20.		5	60.			
Cu, Pb 1st Cell				2.5	100		1	8	9.0
			5		5		1	5	
Cu, Pb 1st Cell Scum.			5	2.5	5		1	4	
			5		5		1	2.5	
Cu, Pb 2nd Cell	100.	50.					2	6	9.4
			5		2.5		1	2	
Add Activated Carbon 100g/14 to 2nd Cell Conc. & Conditions 2 min									
					Ag B. 502.				
Condition					330.		10		9.7
Condition					330		10		6.9.
Condition	225								11.5
Cu Roughed 1		2						5	
2.		2						3.	

Stage	3 x 2000 gram charges were floated in the 8L cell		
Flotation Cell	using the D-2		
Speed: r.p.m.			
% Solids			
% — mesh			

Test No. 5

Product	Weight		Assays, % g/t					% Distribution				
	g	%	Cu	Pb	Zn	Au	Ag	Cu	Pb	Zn	Au	Ag
1. Cu Ro. Conc.	36.6	0.61	8.67	16.7	0.63	79.75	307.5	13.9	11.6	1.0	46.7	10.2
2. Cu Ro. Tail	221.2	3.70	1.9	16.7	0.66	1.28	149	22.2	69.4	4.9	4.5	29.9
3. Cu Pb 2nd Cl. Sess. Conc.	72.1	1.21	3.04	1.24	0.55	12.15	69.5	11.6	1.7	1.3	14.0	4.6
4. Cu Pb 2nd Cl. Tail	887.3	14.50	0.65	0.27	0.36	0.64	19.5	39.0	4.4	10.5	8.9	15.4
5. Cu Pb 1st Cl. Tail	421.6	7.06	0.064	0.2	0.81	0.32	13.2	1.4	1.6	11.5	2.2	5.1
6. Cu Pb Ro. Tail	4362.0	72.93	0.054	0.14	0.48	0.34	8.9	12.5	11.8	70.7	23.7	34.9
Head Galv.	5980.6	100.00	0.82	0.89	0.50	1.04	18.41	100.0	100.0	100.0	100.0	100.0

Combined Products

Products 1+2	4.61	2.61	16.70	0.69	12.40	171.50	35.5	80.9	6.0	51.2	40.2
Products 1-3	5.52	2.70	18.92	0.65	12.35	149.21	47.1	82.5	7.9	65.2	44.7
Products 1-4	20.02	1.36	3.27	0.44	3.67	33.24	86.1	86.9	17.8	74.1	60.1
Products 1-5	27.07	1.02	2.91	0.54	2.64	44.29	67.8	88.5	29.3	76.3	65.1
Products 1-6	100.00	0.32	0.89	0.50	1.04	18.41	100.0	100.0	100.0	100.0	100.0