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PRELIMINARY METALLURGICAL EVALUATION  
OF A BULK ORE SAMPLE  
FROM THE ALPINE PROJECT

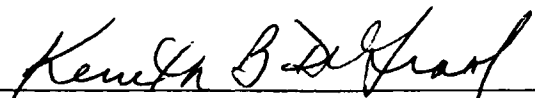
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Attention: Mr. George Zbitnoff

File No.: 8006

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## 1.0 SUMMARY

The metallurgical testwork completed on the bulk sample of ore from the Alpine property successfully demonstrated that the ore is highly responsive to gravity concentration of gold. Jigging and tabling alone achieved a gold recovery of 83.8%. The jig concentrate produced contained 17.124 oz/ton gold while tabling of the jig tails produced a table concentrate grading 1.104 oz/ton gold. These results were achieved from a nominal grind of 20% -200 mesh.

Using the same grind, overall recovery of gold was increased to 96.6% by treating jig tails with a flotation procedure as opposed to tabling. The jig concentrate graded 18.033 oz/ton gold with the flotation cleaner concentrate reporting as 1.423 oz/ton gold.

The calculated ore head grades averaged 0.087 oz/ton gold and 0.065 oz/ton silver. The gold assays ranged between 0.106 and 0.069 oz/ton, while the silver assays varied between 0.048 and 0.081 oz/ton.



## 2.0 INTRODUCTION

A 4-ton bulk ore sample was received from the Alpine property near Nelson, B.C. for metallurgical testwork.

The material was crushed and ground to a nominal grind of 30% passing 150 mesh. The material was then split to provide samples for bench scale tests and assaying.

The following is a report of results obtained from the subsequent metallurgical testwork.

### 3.0 RESULTS

#### Grind/Jig/Flotation Tests

After the 4-ton bulk sample was crushed and ground samples were split out for a series of 2 kg grind/jig/flotation tests.

The purpose of these tests was to examine the effect of grind on gold recovery. The results are summarized in the following table. The detailed gold balances and flotation test conditions are appended.

The results indicate that overall recovery is not significantly affected by grind. However, a coarser grind improved recovery and grade in the jig giving 68.9% gold recovery for a 4.364 oz/ton jig concentrate using a grind of 21.9% -200 mesh. The coarse grind resulted in a higher grade flotation concentrate at 1.141 oz/ton gold.

Based on these favourable results all subsequent tests were performed using a nominal grind of 20% -200 mesh.

2 kg - Grind/Jig/Flotation

Test	Grind % -200 mesh	Calc Head Au (oz/ton)	Tail Assay Au(oz/ton)	% Jig Rec	% Overall Rec (Jig/Float)	Jig Conc (Au oz/ton)	Flot Conc (Au oz/ton)
F1	21.9	0.104	0.004	68.9	96.3	4.364	1.141
F3	27.5	0.092	0.004	68.4	95.9	2.024	0.672
F2	46.9	0.069	0.003	53.0	96.0	0.900	0.699

## 12 kg - Jig/Flotation Test

Based on the 2-kg tests it was found that the rougher flotation concentrate only graded 1.141 oz/ton gold and represented 2.5% by weight percent of the feed. To improve the grade of the flotation concentrate it was proposed that the rougher concentrate be further treated in a cleaning flotation step.

For the cleaner flotation test a 12 kg sample of ore was ground (20% -200 mesh), jigged and floated to produce a rougher flotation concentrate as it was done in the 2 kg. tests. The rougher flotation concentrate was then floated in three successive cleaning stages. The results are summarized below with the detailed balances appended.

The results indicate that additional cleaning of the rougher concentrate does not improve the grade significantly.

## 12-kg. Jig/Tabling Test

Using the same nominal 20% -200 mesh grind a gravity concentration test was performed on the jig tailings as opposed to treating them by flotation.

The jig/table results are summarized below with the detailed balances appended.

<u>Jig/Table Result</u>		
<u>Product</u>	<u>% Rec Au</u>	<u>Grade (oz/ton Au)</u>
Jig Conc	44.6	17.124
Table Conc	39.2	1.104
Tails		0.016

The ore responded well to jigging followed by tabling of the jig tails. The overall gold recovery is 83.8%.

12 kg - Cleaner Flotation Results

Calc Head (oz/ton Au)	% Jig Rec	Addition Flotation Recovery					
		1st Cl Stg		2nd Cl Stg		3rd Cl Stg	
		% Rec	Au (oz/ton)	% Rec	Au (oz/ton)	% Rec	Au (oz/ton)
0.081	68.6	28.7	1.267	28.4	1.423	27.9	1.448



#### 4.0 CONCLUSIONS

It appears that the Alpine ore would suitably and economically be treated with a jig table circuit. A recovery of up to 83.8% of the gold has been achieved at a nominal grind of 20% -200 mesh.

The only apparent advantage of the flotation step is an increase of recovery to 96%. The grade of table concentrate does not differ greatly from the flotation concentrate with both being in the range of 1.1 to 1.4 oz/ton gold.

The use of only a jig/tabling circuit following the crushing/grinding stage is a significant economical saving over the use of a flotation circuit.



## APPENDIX

### Detailed Metallurgical Test Balances

TEST NUMBER: 8006-F1 5 MIN GRIND

PRODUCT	WEIGHT	WEIGHT	Au	Ag	ASSAYS	% DIS	
	GMS	%				Au	Ag
JIG CONC	32.0	1.64	4.364	2.338		68.86	47.50
ROUGHER CONC	44.9	2.30	1.208	1.478		26.78	42.17
SCAVENGER CONC	3.8	0.19	0.350	0.831		0.66	2.01
TOTAL FLOAT CONC	48.7	2.50	1.141	1.428		27.43	44.18
TAIL	1869.3	95.86	0.004	0.007		3.69	8.32
CALC HEAD	1950.0	100.0	0.104	0.081		100.00	100.00

TEST NUMBER: 8006-F 3 10 MIN GRIND

PRODUCT	WEIGHT GMS	WEIGHT %	Au		ASSAYS	Ag		% DIST
			oz/ton	oz/ton		Au	Ag	
JIG CONC	60.4	3.10	2.024	1.140		68.38	45.71	
ROUGHER CONC	38.3	1.96	1.266	1.694		27.12	43.07	
SCAVENGER CONC	35.0	1.79	0.022	0.068		0.43	1.58	
TOTAL FLOAT CONC	73.3	3.76	0.672	0.918		27.55	44.65	
TAIL	1816.3	93.14	0.004	0.008		4.06	9.65	
CALC HEAD	1950.0	100.0	0.092	0.077		100.00	100.00	

TEST NUMBER: 8006-F2 20 MIN GRIND						
PRODUCT	WEIGHT	WEIGHT	Au	Ag	ASSAYS	% DIST
	GMS	%	oz/ton	oz/ton		Au
JIG CONC	79.5	4.08	0.900	0.472		53.05 30.15
ROUGHER CONC	60.2	3.09	0.932	1.144		41.60 55.34
SCAVENGER CONC	22.7	1.16	0.082	0.244		1.38 4.45
TOTAL FLOAT CONC	82.9	4.25	0.699	0.898		42.98 59.79
TAIL	1787.6	91.67	0.003	0.007		3.98 10.06
CALC HEAD	1950.0	100.0	0.069	0.064		100.00 100.00

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TEST NUMBER: 8006-F4

PRODUCT	WEIGHT GMS	WEIGHT %	Au oz/ton	Ag oz/ton	ASSAYS	% DIST
Jig Pan Conc	36.2	0.31	18.033	8.397		58.27 43.89
Jig Pan Tail	64.6	0.55	0.042	0.046		0.28 0.43
TOTAL JIG CONC	100.8	0.86	6.505	3.046		68.55 44.32
3rd Cleaner Conc	184.0	1.57	1.448	1.622		27.85 43.07
3rd Cleaner Tail	6.7	0.06	0.729	1.277		0.51 1.23
2nd CLEANER CONC	190.7	1.62	1.422	1.610		28.36 44.30
2nd cleaner tail	25.8	0.22	0.114	0.512		0.31 1.91
1ST CLEANER CONC	216.5	1.84	1.257	1.479		28.67 45.21
1st Cleaner Tail	124.0	1.05	0.032	0.073		0.41 1.31
ROUGHER CONC	340.5	2.90	0.917	0.967		29.08 47.52
Tail	11313.1	96.25	0.002	0.005		2.56 9.16
TOALC HEAD	11754.4	100.0	0.081	0.059		100.00 100.00

TEST NUMBER: 8006-J2

PRODUCT	WEIGHT GMS	WEIGHT %	Au oz/ton	Ag oz/ton	ASSAYS	% DIST
Jig Pan Conc	35.8	0.28	17.124	6.949		44.61 33.09
Table Conc	488.2	3.77	1.104	0.714		39.23 46.38
Table Middlings	162.9	1.26	0.159	0.120		1.89 2.60
Table Tails	12248.0	94.69	0.016	0.011		14.27 17.93
Jig Pan Tails were blended with Jig Tails to produce table feed.						
CALC HEAD	12934.9	100.0	0.106	0.058		100.00 100.00

SIZE DISTRIBUTION  
TEST NO. 8006 F1  
Ground 5 min at 65% solids

Size Fraction (mesh)	Individual Percentage Retained %	Cumulative Percentage Passing %
+ 65	19.3	80.7
- 65 + 100	17.8	63.0
- 100 + 150	14.6	48.4
- 150 + 200	12.0	36.4
- 200 + 325	14.5	21.9
- 325 + 400	3.4	18.5
- 400	18.5	

# SIZE DISTRIBUTION

TEST NO. 8006 F2

Ground 20 min at 65% solids

Size Fraction (mesh)	Individual Percentage Retained %	Cumulative Percentage Passing %
+ 65	0.4	99.6
- 65 + 100	1.7	92.9
- 100 + 150	8.7	89.2
- 150 + 200	18.2	71.1
- 200 + 325	24.2	46.9
- 325 + 400	6.1	40.7
- 400	40.7	



SIZE DISTRIBUTION

TEST NO. 8006 F3

Ground 10 min at 65% solids

Size Fraction (mesh)	Individual Percentage Retained %	Cumulative Percentage Passing %
+ 65	2.6	97.4
- 65 + 100	13.6	83.8
- 100 + 150	20.2	63.6
- 150 + 200	17.6	46.0
- 200 + 325	18.5	27.5
- 325 + 400	14.8	12.7
- 400	12.7	

# SIZE DISTRIBUTION

TEST NO. 8006 F4

Ground 5 min at 65% solids

Size Fraction (mesh)	Individual Percentage Retained %	Cumulative Percentage Passing %
+ 65	22.8	77.2
- 65 + 100	17.2	60.0
- 100 + 150	14.3	45.7
- 150 + 200	11.8	33.9
- 200 + 325	13.4	20.5
- 325 + 400	3.0	17.5
- 400	17.5	

# TESTWORK PROCEDURE

Test No. 8006 - F1

STAGE	TIME (min)	ADDITIONS	
		lb/ton	REAGENT
Grind Jig	5		65% solids
Condition	2	0.10 0.05	Aero 350 AF 208 pH = 6.9
Rougher	6	0.75	DF 250
Scavenger	2	0.05 0.025 0.010	Aero 350 AF 208 DF 250

# TESTWORK PROCEDURE

Test No. 8006 - F2

STAGE	TIME (min)	ADDITIONS	
		lb/ton	REAGENT
Grind Jig	20		65% solids
Condition	2	0.10 0.05	Aero 350 AF 208 pH = 6.8
Rougher	6	0.020	DF 250
Scavenger	3	0.05 0.025 0.010	Aero 350 AF 208 DF 250

# TESTWORK PROCEDURE

Test No. 8006 - F3

STAGE	TIME (min)	ADDITIONS	
		lb/ton	REAGENT
Grind Jig	10		65% solids
Condition	2	0.10 0.05	Aero 350 AF 208 pH = 7.9
Rougher	6	0.020	DF 250
Scavenger	3	0.05 0.025 0.010	Aero 350 AF 208 DF 250

# TESTWORK PROCEDURE

Test No. 8006 - F4

STAGE	TIME (min)	ADDITIONS	
		lb/ton	REAGENT
Grind Jig	5		65% solids
Condition	3	0.10 0.05	Aero 350 AF 208 pH = 8.2
Rougher	6	0.020	DF 250
Scavenger	3	0.05 0.025 0.010	Aero 350 AF 208 DF 250
1st Cleaner	8		No reagents
2nd Cleaner	6		No reagents
3rd Cleaner	4		No reagents