

LABORATORY TESTWORK

006530

OREBODY: VANGORDA

①

DATE: JULY, 1979

LABORATORY: KAMLOOPS RESEARCH

BATCH TEST

	%wt	ASSAYS		RECOVERY	
		Pb %	Zn %	Pb %	Zn %
LEAD CONC.	9.7	55.0	11.0	87.0	13.0
ZINC CONC	9.5	1.0	55.0	3.0	76.0
HEADS (CALL)		4.89	6.91		

②

DATE: JAN. 1982

LABORATORY: KAMLOOPS RESEARCH

BATCH TEST

	%wt	ASSAYS		RECOVERIES	
		Pb %	Zn %	Pb %	Zn %
LEAD CONC	9.4	43.3	8.6	86.1	14.9
ZINC CONC	8.5	1.9	46.4	3.4	72.7
HEADS (CALL)		4.72	5.43		

③

DATE: 1984

LABORATORY: LAKEFIELD RESEARCH

BATCH	%wt	ASSAYS				RECOVERIES (%)			
		Pb %	Zn %	Ag %	Au %	Pb	Zn	Ag	Au
LEAD CONC	6.1	63.0	9.6			79.3			
ZINC CONC	6.5	1.1	55.3				63.2		
HEAD (CALL)		4.88	5.51						
LOCKED-CYCLE									
LEAD CONC	6.1	64.9	8.9	70.5	11.32	80.6		70.0	65.0
ZINC CONC	6.7	0.8	56.5	56	0.75		69.1		
HEADS (CALL)		4.88	5.51	63.4	1.0				

VANGUARD TESTWORK - LAKEFIELD

LOCKED-CYCLE TEST - COMPO 2 [20%]

CYCLE NO.	WEIGHT*
A	1765
B	1800.8
C	1902.5
D	1954.0
E	1900.3
F	1942.3

$64.9\% \text{ Pb @ } \left( \frac{12.8+12.2+13.7}{3} \right) \times 6 = 77.4 + 4.3 = 81.7\%$   
 (wt average)  
 $54.0\% \text{ Zn @ } \left( \frac{12.1+9.7+9.4}{3} \right) \times 6 = 63.4 + 3.8 + 1.6 = 68.9\%$   
 (wt average)

1/3 of the assay preserved to cone

\* Pb Conc + Zn Conc + 15 Zn Conc Scan Tdy + Final Tdy

D, E, F	Pb Conc	64.9% Pb @ 81.7% Rec	74.6% Au @ (63.6+1.0) = 64.6%	700 g/t Ag @ (66.6+2.0) = 68.6%	9.0% Zn @ (9.4+1.5) = 10.9%	Zn Conc	54.0% Zn @ 68.9% Rec
							Hd (Calc) = 4.88% Pb 5.51% Zn 7.0 g/t Au 63.4 g/t Ag

LOCKED-CYCLE TEST - COMPO 3 [40%]

CYCLE NO.	WEIGHT*
A	1861.3
B	1917.6
C	1927.0
D	1950.0
E	1966.4
F	1898.9

Pb Conc 66.0% Pb @ (78.2 + 2.4) = 80.6%  
 7.1% Zn @ (6.1 + 1.0) = 7.1%  
 8.45 g/t Au @ (57.5 + 0.7) = 58.2%  
 835 g/t Ag @ (67.9 + 1.9) = 69.8%  
 Zn Conc 54.2% Zn @ (79.0 + 1.3) = 80.3%

Hd (Calc) = 4.14% Pb  
 5.19% Zn  
 0.73 g/t Au  
 59.7 g/t Ag

LOCKED CYCLE TEST - COMPO 1A 7%

<u>CYCLE NO.</u>	<u>WEIGHT</u>
A	1798.7
B	1761.7
C	1932.2
D	1937.3
E	1924.8
F	1972.8

$$\begin{aligned}
 \text{Pb Conc} &= 43.7\% \text{ Pb @ } (49.8 + 4.4) = 54.2\% \\
 &= 12.6\% \text{ Zn @ } (13.7 + 2.6) = 16.3\% \\
 &= 10.06\% \text{ Au @ } (61.2 + 1.5) = 62.7\% \\
 &= 460\% \text{ Ag @ } (2115 + 3.1) = 44.6\% \\
 \text{Zn Conc} &= 52.2\% \text{ Zn @ } (56.1 + 1.2 + 2.7) = 60\%
 \end{aligned}$$

Hld (Calc)  
 3.74% Pb  
 3.95% Zn  
 0.76 3/4 Au  
 47.1 3/4 Ag

LOCKED CYCLE TEST - COMPO 1B 7%

<u>CYCLE NO.</u>	<u>WEIGHT</u>
A	1742.7
B	1889.3
C	1909.3
D	1931.8
E	1914.8
F	1928.0

$$\begin{aligned}
 \text{Pb Conc} &= 63.5\% \text{ Pb @ } (74.4 + 4.4) = 78.8\% \\
 &= 7.3\% \text{ Zn @ } (7.5 + 1.4) = 8.9\% \\
 &= 6.17\% \text{ Au @ } (57.3 + 1.4) = 58.7\% \\
 &= 696\% \text{ Ag @ } (63.8 + 2.9) = 66.7\% \\
 \text{Zn Conc} &= 57.7\% \text{ Zn @ } (68.4 + 4.7 + 1.2) = 74.3\%
 \end{aligned}$$

Hld (Calc)  
 5.85% Pb  
 6.61% Zn  
 0.79 3/4 Au  
 75.6 3/4 Ag

LOCKED-CYCLE TEST - COND 4

16%

<u>CYCLE No.</u>	<u>WEIGHT</u>
A	1775.3
B	1854.4
C	1917.1
D	1940.9
E	1999.8
F	1963.8

$$\left. \begin{array}{l} \text{Pb conc} = 59.3\% \text{ Pb } (74.2 + 3.1) = 77.3\% \\ 5.1\% \text{ Zn } (3.6 + 1.0) = 4.6\% \\ 5.41\% \text{ Au } (30.8 + 1.9) = 32.7\% \\ 6.71\% \text{ Ag } (57.2 + 8) = 60.2\% \\ \text{Zn conc } 53.6\% \text{ Zn } (2.6 + 2.1 + 1) = 56.7\% \end{array} \right\}$$

Hd (Calc) 2.07% Pb  
3.80% Zn  
0.43% Au  
29.4% Ag

	Pb Conc.	Comps	ASSAYS				RECOVERIES			
			Pb	Zn	Au	Ag	Pb	Zn	Au	Ag
7		1A	48.7	12.6	10.06	460	54.2	16.3	62.7	44.6
7		1B	63.5	7.3	6.17	696	78.8	8.9	58.7	66.7
20		2	64.9	9.0	11.33	720	81.7	10.9	64.6	68.6
40		3	66.0	7.1	8.45	835	80.6	7.1	58.2	69.8
6		4	59.3	5.1	5.41	671	77.3	4.6	32.7	60.2
<u>80</u>										

WT-Average                      63.0    7.9    8.88    744    78.2    8.8    58.3    66.3

	Z Conc.	Comps	ASSAY	Rec.
			Zn %	Zn %
7		1A	52.2	60
7		1B	57.1	74.3
20		2	54.0	68.9
40		3	54.2	80.3
6		4	53.6	88.7
<u>80</u>				

WT-Average                      54.1            75.8



# Vangorda Ore

General:

① Finer grind

Grind - 90% liberation @ 40µm. (<sup>pyrrhotite</sup> Marcasite)

Required total Pb & Zn conc.  $\begin{cases} \rightarrow \text{Pb } 90\% - 25\mu \\ \rightarrow \text{Zn } 80\% - 25\mu \end{cases}$

Composites 2, 3, 4, 1B and 1A - Locked cycle.

Work index 7.9 to 11.6 kWh/t (Ball Mill)

Composite 1A  $\rightarrow$  most refractory - carbonaceous pyrite  
 $\rightarrow$  secondary Cu minerals.  
 $\rightarrow$  70% of Zn reported to the Pb float also high in pyrrhotite

Composite 1B  $\rightarrow$  high pyrrhotite, low carbonaceous pyrite } fine grind  
 $\rightarrow$  good metallurgy

Composites 2  $\rightarrow$  some secondary Cu present } requires a fine grind  
 $\rightarrow$  30% of Cu reports to the Pb } - Needs to Pb circuit requires  
 $\rightarrow$  } - Requires for Zn = improvement

Composite 3  $\rightarrow$  largest part of orebody. } - high depressants need pH  
 $\rightarrow$  } - different collectors  
 $\rightarrow$  good metallurgy.

Composite 4  $\rightarrow$  graphitic quartz  $\approx$  carbon and carbonaceous pyrite }  
 $\rightarrow$  good metallurgy }  
 $\rightarrow$  } Lead to add a different depressant to remove carbon and carbonaceous pyrite

Composite 5  $\rightarrow$  low grade.  
 $\rightarrow$  20% of orebody  
 $\rightarrow$  good metallurgy.

Muster Composite	7%	Composite 1A	7 1/2%	Muster Composite
	7%	Composite 1B	7 1/2%	
	20%	Composite 5	20%	
	40%	Composite 3	65%	
	20%	Composite 2		
	<u>6%</u>	<u>Composite 4</u>		

Hundred

Ken Johnson - used equip.  
Kellie - ✓

Mid-October - finished

Aug '79

(5)

Stima Owl

	% wet	Pb	Zn		Pb	Zn
Pb conc	6.9	49.6	10.5	(51)	73.0	8.0
Zn conc	11.4	0.59	51.8		1.4	66.0 (74)
		4.98	9.13			

Cypress Aerial

Pb Conc	3.5	78.1	3.38	(90)	86.3	2.8
Zn Conc	6.8	0.5	49.10		1.2	85.4 (91)
		3.15	4.43			

Stem / Cypress

Pb Conc	4.7	68.6	4.57	(88)	85.1	3.2
Zn Conc	8.3	0.5	52.5		1.1	65.9 (80)

Aug '78

Faro #3 One

	%	Pb	Zn		Pb	Zn
Pb Conc	8.5	61.5	5.41		91.2	5.2
Zn Conc	9.6	0.5	52.0		1.3	87.9
Lead		3.21	5.69			

June '77

Master Composite - Batch Test

	ANALYSIS		RECOVERY	
	Pb %	Zn %	Pb %	Zn %
Pb Conc	58.0	9.46	(86.0 + 2.0)	88% Rec.
Zn Conc	1.34	52.8		(58.4 + 7.7 + 3.5) = 69.5% Rec

Tleg

Test 62 Composite 2 Batch Test

	Pb	Zn	Pb Rec	Zn
Pb Conc	60.6	9.88	(65.6 + 11.4) = 77	(60.8 + 5.75 + 2.1) = 68.7
Zn Conc	1.22	55.0		

Test 63

Pb Conc	65.4	9.4	(73.3 + 8.2) = 81.5	(40.6 + 14.8 + 2.2) = 57.6
Zn Conc	0.91	55.5		

Test 69 Composite 2 Locked Cycle

2406.4

Wt	A	2406.4 (Tst)	1765 (Pb conc, Zn conc, 1st Clus Scan Tleg, Tleg)
B	2522.2	1880.8	
C	2543.9	1902.5	
D	2545.4	1954.0	
E	2541.7	1900.3	
F	2583.7	1942.3	

	Pb Conc	Zn Conc	Rec
Pb	64.9 %		{ 77.4 + 4.6 = 82.0 % }
Zn	56.5 %		{ 74.6 + 4.2 = 78.8 % }
			{ 63.4 + 6.3 + 1.4 = 71.1 % }
			{ 59.4 + 6.3 + 1.4 = 67.1 % }

Batch

Locked Cycle

Pb Conc	Pb 63.4 %	@ 79.3 % Rec	Pb 64.9 % @ 80.6 %
Zn Conc	Zn 55.3 %	@ 63.2 % Rec	Zn 56.5 % @ 69.1 %

→ Au @ 11.32 g/t Au @ (63.6 + 2.0) = 65.6 % (65%)

705 g/t Ag @ (66.6 + 5) = 71.6 % (70%)

end

VANGORWA ORE - COMPOSITE Z

HEAD GRADE - Pb 4.88%  
 Zn 5.51%  
 Au 1.20 g/t  
 Ag 63.4 g/t

a) BATCH TEST (4 stages of cleaning)

	ASSAYS		CALL. RECOVERY	
	Pb %	Zn %	Pb %	Zn %
Pb CONC	63.0	9.6	79.3	
Zn CONC	1.1	55.3		63.2

b) LOCKED CYCLE (CYCLE 4, 5, 6)

	ASSAYS				CALL. RECOVERY			
	Pb %	Zn %	Au g/t	Ag g/t	Pb %	Zn %	Au %	Ag %
Pb CONC	64.9	8.9	11.32	705	80.6		65.0	70.0
Zn CONC	0.8	56.5	0.75	56		69.1		
Hd (Lode)								

c) LOCKED CYCLE

## VANGORBA DRE - METALLURGICAL TESTWORK

1.0 COMPOSITES TESTED:  
1A, 1B, 2, 3, 4, 5

### 2.0 METALLURGICAL RESPONSES

HEADGRADE RANGE - Pb 0.7 to 5.8%  
Zn 0.9 to 6.7%  
Ag 12 to 70 g/t  
Au 0.4 to 1.6 g/t

Pb FINAL CONCL. RANGE - Pb generally 58 to 65% — @ 80 to 88% Rec.  
although COMPOSITE 1A  
had a Pb Conc of 43% — @ 60% Rec.  
- Ag 400 to 800 g/t — @ 50 to 74% Rec.  
- Au 5 to 11 g/t — @ 34 to 74% Rec.

Zn FINAL CONCL. RANGE - Zn 52 to 55% — @ 75 to 85% Rec.  
COMPOSITE 1A — @ 59% Rec.

3.0 GRIND — WORK INDEX of 7.9 to 11.6 kWh/t (Ball Mill)  
PRIMARY / SECONDARY GRIND 90% passing 40 microns.  
REGRIND - Pb REGR / SEAV CONC 90% passing 25 microns.  
- Zn REGR / SEAV CONC 90% passing 25 microns.

VANDERBILT METEOROLOGICAL SAMPLES

Oct 31/90

DIAMOND DRILL CORE - 70-V-12

SAMPLE No.	DEPTH	Rock TYPE	DESCRIPTION
60045	20.0 - 26.2	4 G.O	very fine rubble only
60046	26.2 - 30.4	"	✓ ✓ ✓ ✓
60045	30.4 - 34.6	"	✓ ✓ ✓ ✓
60048	34.6 - 38.8	"	✓ ✓ ✓ ✓
60047	38.8 - 43.0	"	✓ ✓ ✓ ✓
60048	43.0 - 46.9	"	✓ ✓ ✓ ✓ and some coarse
60049	46.9 - 50.8	"	very little rubble
60050	50.8 - 54.7	"	competent
60051 good	54.7 - 58.5	"	✓
60052 good	58.5 - 62.2	"	✓
60053	62.2 - 65	"	✓

DIAMOND DRILL CORE - 70-V-79

SAMPLE No.	DEPTH	Rock TYPE	DESCRIPTION
60418	57.2 - 60.7	74 G.O	competent (discoloured)
60419	60.7 - 64.2	"	✓ ( ✓ )
60420	64.2 - 67.7	"	competent
60421	67.7 - 71.2	"	✓
60422 good	71.2 - 74.7	"	✓
60423	74.7 - 78.2	"	✓

\* None met been run as of Nov 3/91.

Pb

~~31580.2 kg~~

Pb  
• 19055 x 58.82 = 11208 t

32,163 x 48.29 = 15,531 t

26,739 t

16625 x .6081 = 10,097 t

= 17,373 t

27,470 t

34396 x .5052 = 17,373 t

26,739 t

731 t

= 17,165 t  
35,976  
52,142

1.5 kg/m

## Impurity Analyses of Lead and Zinc Concentrates

Element %, g/t	Pb Concentrate		Zn Concentrate	
	Comp.2	Comp.3	Comp.2	Comp.3
Iron (Fe)	4.90	4.12	7.44	6.72
Copper (Cu)	0.40	—	0.89	—
Nickel (Ni)	< 0.002	0.002	< 0.002	< 0.002
Lead (Pb)	63.5	66.2	1.15	1.03
Zinc (Zn)	8.97	7.20	54.2	54.9
Bismuth (Bi)	< 0.002	0.002	< 0.002	< 0.002
Cadmium (Cd)	0.014	0.011	0.071	0.069
Chromium (Cr)	0.003	0.022	0.002	0.036
Cobalt (Co)	< 0.002	< 0.002	< 0.002	< 0.002
Manganese (Mn)	0.082	0.10	0.22	0.33
Uranium (U)	< 0.001	0	< 0.001	—
Arsenic (As)	0.032	< 0.001	0.004	0.007
Antimony (Sb)	0.14	0.23	0.003	0.006
Tin (Sn)	< 0.001	0.002	< 0.001	< 0.001
Fluorine (F)	0.053	0.093	0.030	0.11
Chlorine (Cl)	< 0.005	—	0.045	—
Sulphur (S)	18.4	17.8	31.3	33.3
Carbon Total	0.20	—	0.31	—
Silica (SiO <sub>2</sub> )	0.76	2.36	0.30	0.25
Alumina (Al <sub>2</sub> O <sub>3</sub> )	0.06	0.085	0.07	0.034
Magnesia (MgO)	—	0.92	0.13	0.14
Lime (CaO)	—	0.12	0.34	0.40
Sodium (Na <sub>2</sub> O)	0.002	—	< 0.002	—
Potassium (K <sub>2</sub> O)	0.003	—	0.004	—
Insol	2.79	5.79	1.89	2.00
Mercury (Hg)	0.0067	0.0050	0.046	0.028
Gold (Au)	14.0	8.60	0.59	0.28
Silver (Ag)	684.	813.	40.1	48.5