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COPY

J.K. Carrington

W.M. Sirola

VANGORDA MINERAL RESERVE CALCULATIONS

April 25, 1977

I asked Jim Paxton to do a quick estimate on the higher grade sections of the Vangorda deposit because I felt that this would be useful both from your standpoint and mine.

These calculations were based on cross sections drawn in 1966 at this office by Clyde Smith and were considered more likely to be representative of the shape of the structure than the horizontal rectangular forms used by Prospectors Airways. Jim's estimate of the higher grade mineralization is 7.66 million tons at 8.67% combined lead-zinc. The estimate made by Prospectors Airways was 9.4 million tons of 8.16% combined lead-zinc.

None of the sections we have on hand show the assay values of the lower grade mineralization, but Jim has assumed a grade of 3% (presumably by looking over a clutch of assays in the drill log file). He estimates that there are 10.45 million tons with an assumed grade of 3% Pb and Zn, making a grand total of 18.11 million tons of 5.39% combined lead-zinc.

It would be a relatively simple matter to plot the lower grade intersections on Clyde Smith's structural sections and do a better estimate of the lower grade portions of the deposit, but I think this should only be done after we have made our own set of cross sections, many of which have already been completed. In other words, it is a low priority item.

If indeed serious consideration is being given to the Vangorda property as a possible source of early mill feed, then we are certainly justified in producing at least a pencilled set of cross sections oriented in the manner of the Grum cross sections and drawn to the same scale. As I mentioned over the phone, this procedure had already been started by Jim when I returned from a week off.

To summarise then, our next order of business will be to draw these sections which will show both structure and grade for at least as much of the Vangorda deposit as might be considered mineable as a source of early mill feed. The Vangorda deposit has been drilled over a total length of 6,000 ft. and, consequently, there are in excess of 30 cross sections to be drawn. Despite the despatch with which both Jim and Alex produce these sections, I can appreciate that it could take two months to come up with a reliable mineral reserve estimate and, hopefully, a meaningful structural concept.

W.M. Sirola

Encl.: Check Calculation - Vangorda Ore Zone
April 22, 1977

WMS:meb

CHECK CALCULATION

VANGORDA ORE ZONE

APRIL 22, 1977

VANGORDA ORE ZONE - SUMMARY

SECTION	LOW GRADE	HIGH GRADE		
	TONS	TONS	GRADE	G x T (000)
4W	80,000	—		
2W	568,000	96,000	8.4	806.4
0	188,000	864,000	8.3	7171.2
2E	1,328,000	880,000	8.9	7832.0
4E	1,160,000	1,424,000	8.0	11392.0
6E	1,184,000	744,000	9.2	6844.8
8E	968,000	848,000	9.6	8140.8
10E	664,000	384,000	8.0	3072.0
12E	368,000	168,000	6.7	1125.6
14E	432,000	344,000	9.3	3199.2
16E	400,000	232,000	6.2	1438.4
18E	376,000	280,000	9.3	2604.0
20E	208,000	256,000	9.3	2380.8
22E	72,000	440,000	8.8	3872.0
24E	640,000	488,000	9.8	4782.4
26E	1,128,000	176,000	8.0	1408.0
28E	392,000	32,000	9.4	300.8
30E	296,000	8,000	9.0	72.0
	10,452,000	7,664,000		66442.4

$$\frac{66,442,400}{7,664,000} = 8.67\%$$

7.66 million tons @ 8.67 % Pb+Zn

10.45 million tons @ assumed grade 3.0% Pb+Zn

18.11 million tons @ 5.39% Pb+Zn

Notes on Calculations

1. Sections and geological interpretations used were those made by C.L. Smith Jan 25 1966.

2. Scale of sections was 1" = 200'

3. Areas were calculated by laying a sheet of 10 x 10 inch cross section tracing paper over each sections and counting squares Each square = 400 ft^2

4. High grade intersections only were shown on the sections. No check was made on the method of calculating these intersection grades.

5. It was assumed that the deposit would be mined by open pit. Ore zones that were obviously small, deep, low grade etc. were excluded.

J. Paxton P. Eng

April 22 1977

VANGUARDA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 4W

HIGH GRADE AREAS			LOW GRADE AREAS			
Nº	SQ	AREA Ft.²	Nº	SQ	AREA Ft.²	HIGH GRADE AREA
			1	7	2800	HIGH GRADE VOLUME
			2	3	1200	HIGH GRADE =
						HIGH GRADE TONS =
						LOW GRADE AREA 4000
						LOW GRADE VOLUME 800,000
						LOW GRADE (ASSUMED) =
					4000	LOW GRADE TONS = 80,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.3)
TOTALS								

VANGORDA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 2W

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	SQ	AREA Ft.²	Nº	SQ	AREA Ft.²
1	12	4800	1	63	25200
2	2	Too small	2	8	3200
					28400

HIGH GRADE AREA 4800
HIGH GRADE VOLUME 9600000
HIGH GRADE = 8.4%
HIGH GRADE TONS = 96,000
LOW GRADE AREA 28400
LOW GRADE VOLUME 5680000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 568,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.³
1	30	40	8.4					
2	36	Too Small - Not included						
TOTALS								

VANGUARDA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 0

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	108	43,200	1	7	1400
			2	38	7600
			3	2	400
					9400

HIGH GRADE AREA 43200
HIGH GRADE VOLUME 864000
HIGH GRADE = 8.34%
HIGH GRADE TONS = 864,000
LOW GRADE AREA 9400
LOW GRADE VOLUME 188000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 188,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft)
1	4	18	15	270.0				
	1	74	6.8	503.2				
	1	14	10	140.0				
	26	66	8.1	534.6				
	27	46.7	8.29	387.1				
	27	15	7.88	118.2				
	143	10	8.0	80.0				
		243.7		2033.1				
			2033.1 / 243.7 =	8.34				
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 2E

HIGH GRADE AREAS			LOW GRADE AREAS		
No	Sq	AREA Ft.²	No	Sq	AREA Ft.²
1	1	Not incl.	1	55	22000
2	1	Not incl.	2	2	800
3	110	44000	3	109	43600
					66400

HIGH GRADE AREA 44000
HIGH GRADE VOLUME 8800000
HIGH GRADE = 8.88%
HIGH GRADE TONS = 880,000
LOW GRADE AREA 66,400
LOW GRADE VOLUME 1328 0000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 1,328,000

AREA No	HOLE No	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.3
3	1	78	8.5	663				
	119	63	8.7	548				
	15	100	6.9	690				
	115	93	11.4	1060				
	133	30	9.0	270				
		364		3231				
			3231 / 364 =	8.88				
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 4E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	29	11600	1	46	18400
2	49	19600	2	28	11200
3	27	10800	3	68	27200
4	73	29200	4	3	1200
		71200			58000

HIGH GRADE AREA 71200

HIGH GRADE VOLUME 1,424,000

HIGH GRADE = 8.05 %

HIGH GRADE TONS = 1,424,000

LOW GRADE AREA 29000

LOW GRADE VOLUME 1,160,000

LOW GRADE (ASSUMED) =

LOW GRADE TONS = 1,160,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.
1	21	15	6.4	96.0				
	48	23	6.2	142.6				
	10	18.5	12.6	233.1				
2	10	68.1	6.6	449.5				
	33	20	9.4	188.0				
3	10	28	4.9	137.2				
	33	5	6.8	34.0				
	?	15	8.4	126.0				
	16	25	8.7	217.5				
4	10	3	16.3	48.9				
	33	120	9.08	1089.6				
	?	68	8.5	578.0				
	16	16	5.0	80.0				
		424.6		3420.4				
			3420.4 / 424.6	= 8.05				
TOTALS								

VANGUARDA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 6E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	57	22800	1	51	20400
2	29	11600	2	97	38800
3	2	800	3	Too	small
4	5	2000	4	Too	Small
		37200			59200

HIGH GRADE AREA 37200
HIGH GRADE VOLUME 7440000
HIGH GRADE = 9.17
HIGH GRADE TONS = 744,000
LOW GRADE AREA 59200
LOW GRADE VOLUME 11840000
LOW GRADE (ASSUMED) = ___
LOW GRADE TONS = 1,184,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.
1	20	18	16.4	295				
	95	65	12.8	838				
	47	95	8.0	760				
	94	40	8.4	336				
2	96	15	6.5	97				
	95	20	8.8	176				
	47	15	7.4	111				
	94	40	8.4	336				
	35	10	6.1	61				
	126	15	10.5	158				
3	47	15	8.6	129				
4	96	15	6.5	97				
	20	15	5.0	75				
		378		3469				
			3469/378 =	9.17				
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 8E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	2	800	1	3	1200
2	56	22400	2	29	11600
3	46	18400	3	57	22800
4	2	800	4	32	12800
		42400			48400

HIGH GRADE AREA 42400
HIGH GRADE VOLUME 8480000
HIGH GRADE = 9.56
HIGH GRADE TONS = 848,000
LOW GRADE AREA 48400
LOW GRADE VOLUME 9680000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 968,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.
1	53	5	30.7	153.5				
2	53	3.3	6.9	22.8				
	45	70	10.4	728.0				
	18	10	11.3	113.0				
3	53	25	9.6	240.0				
	45	40	7.1	284.0				
	18	20	5.8	116.0				
		173.3		1657.3				
				1657.3	= 9.56			
				173.3				
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 10E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	21	8400	1	83	33200
2	10	4000			
3	7	2800			
4	10	4000			
		19200			

HIGH GRADE AREA 19200
HIGH GRADE VOLUME 3840000
HIGH GRADE = 8.01
HIGH GRADE TONS = 384,000
LOW GRADE AREA 33200
LOW GRADE VOLUME 6640000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 664,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 T/Ft.³)
1	50	76	9.0	684.0				
2	50	15	6.3	94.5				
3	50	29	6.8	197.2				
4	60	14	7.0	98.0				
		134		1073.7				
			1073.7 / 134 =	8.01				
TOTALS								

VANGORDA CREEK ZONE

Based on sections by Clyde Smith 1966

SECTION 12E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	Area Ft.²	Nº	Sq	Area Ft.²
1	3	1200	1	46	18400
2	18	7200	2	5	Not Recov.
3	2	Not Recoverable	3	15	Not Recov
4	3	Not Recoverable	4	16	Not Recov.
		8400.			

HIGH GRADE AREA 8400
HIGH GRADE VOLUME 1680000
HIGH GRADE = 6.73
HIGH GRADE TONS = 168,000
LOW GRADE AREA 18400
LOW GRADE VOLUME 3680000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 368,000

Area Nº	Hole Nº	Width (Ft.)	Grade (Pb+Zn)	W x G	Weighted Grade	Area Ft 2	Volume Ft. 3	Tons (10.0 T/Ft.³)
1	57	10	6.5	65				
2	63	35	6.8	238				
		45		303				
			303/45	= 6.73				
Totals								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 14E

HIGH GRADE AREAS			LOW GRADE AREAS		
No	Sq	AREA Ft.²	No	Sq	AREA Ft.²
1	4	1600	1	16	6400
2	35	14000	2	38	15200
3	4	1600	3	14	Not Recoverable
		17206	4	2	"
			5	2	"
			6	2	"
			7	4	"
					21,600

HIGH GRADE AREA 17200
HIGH GRADE VOLUME 3440000
HIGH GRADE = 9.30
HIGH GRADE TONS = 344000
LOW GRADE AREA 21600
LOW GRADE VOLUME 43200000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 432,000

AREA No	HOLE No	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 Ft³/T)
1	40	9	19.0	171				
2	98	12	12.0	144				
	52	50	7.2	360				
	97	20	10.3	206				
	56	19	8.4	159				
3	98	9	7.5	67				
		119		1107				
			1107 / 119 =	9.30				
TOTALS								

VANGORDA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 16E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	19	7600	1	50	20000
2	10	4000	2	4	Not Recov.
		11,600	3	20	"
			4	15	"
					20000

HIGH GRADE AREA 11,600
HIGH GRADE VOLUME 2320000
HIGH GRADE = 6.18 %
HIGH GRADE TONS = 232,000
LOW GRADE AREA 20,000
LOW GRADE VOLUME 4000000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 400,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft2	VOLUME Ft.3	TONS (10.0 Ft3/1
1	44	20	5.0%	100				
	68	10	7.7	77				
2	43	13	5-7	74				
	44	8	8.0	64				
		51		315				
			315/51 =	6.18				
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 18E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	SQ	AREA Ft.²	Nº	SQ	AREA Ft²
1	2	800	1	47	18800
2	22	8800	2		Not Recov.
3	11	4400	3		"
		14000	4		"
			5		"

HIGH GRADE AREA 14 000
HIGH GRADE VOLUME 2800000
HIGH GRADE = 9.28
HIGH GRADE TONS = 280,000
LOW GRADE AREA 18,800
LOW GRADE VOLUME 3760000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 376000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 Ft³/T)
1	109	15	10.5	157				
2	109	20	10.5	210				
	72	15	8.0	120				
	12	33	8.0	264				
	11	12	9.9	119				
	14	5	7.0	35				
3	11	14	10.7	150				
	14	4	10.1	40				
		118		1095				
			1095 / 118	= 9.28				
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 20E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	SQ	AREA Ft.²	Nº	SQ	AREA Ft.²
1	20	8000	1	3	1200
2	2	800	2	15	6000
3	10	4000	3	8	3200
		12800	4	10	Not Recov.
					10,400

HIGH GRADE AREA 12,800
HIGH GRADE VOLUME 2560000
HIGH GRADE = 9.34
HIGH GRADE TONS = 256000
LOW GRADE AREA 10,400
LOW GRADE VOLUME 2080000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 208,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 Ft³/t)
1	8	10	7.8	78				
	5	16	13.0	208				
	75	20	6.8	136				
2		5	9	45				
3	5	14	10	140				
		65		607				
			607/65	9.34				
TOTALS								

Based on sections by Clyde Smith 1966

SECTION 22 E

HIGH GRADE AREAS		
Nº	Sq	AREA Ft.²
1	55	22000

LOW GRADE AREAS		
Nº	Sq	AREA Ft.²
1	9	3600
2	5	Not Recovered
3	2	"
4	8	"

HIGH GRADE AREA 22000
HIGH GRADE VOLUME 4400000
HIGH GRADE = 8.80
HIGH GRADE TONS = 440,000
LOW GRADE AREA 3600
LOW GRADE VOLUME 720000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 72,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft2	VOLUME Ft.3	TONS (10.0 Ft.3/T)
1	58	45	9.28	417				
	9	31	9.5	294				
	78	16	8.4	134				
	99	15	6.2	93				
	77	20	9.0	180				
		127		1118				
			1118/127 =	8.80				
TOTALS								

VANBURA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 24E

HIGH GRADE AREAS		
Nº	Sq	Area Ft.²
1	61	24400

LOW GRADE AREAS		
Nº	Sq	Area Ft.²
1	6	2400
2	25	10000
3	49	19600
4	74	Not Recov.
		32000

HIGH GRADE AREA 24400
HIGH GRADE VOLUME 4880000
HIGH GRADE = 9.81
HIGH GRADE TONS = 488,000
LOW GRADE AREA 32000
LOW GRADE VOLUME 6400000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 640,000

Area Nº	Hole Nº	Width (Ft.)	Grade (Pb+Zn)	W x G	Weighted Grade	Area Ft.2	Volume Ft.3	Tons (10.0 Ft.3/T)
1	54	11	8.7	95.7				
	93	12	8.3	99.6				
	91	40	8.8	352.0				
	81	33	8.9	293.7				
	81	30	12.9	387.0				
	80	22	10.2	224.4				
		148		1452				
			1452	9.81				
			148					
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 26E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	SQ	AREA Ft.²	Nº	SQ	AREA Ft.²
1	1	400	1	105	42000
2	1	400			
3	2	800	2	36	14400
4	2	800			
5	7	2800	3	38	Not Recov.
6	9	3600			
		8800			56400

HIGH GRADE AREA 8800
HIGH GRADE VOLUME 1760000
HIGH GRADE = 7.97
HIGH GRADE TONS = 176,000
LOW GRADE AREA 56400
LOW GRADE VOLUME 11280000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 1,128,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 Ft³/T)
1	102	4	25.0	100				
2	120	3	7.8	23				
3	112	25	10.8	270				
4	112	25	4.9	122				
5	55	38	7.7	293				
6	55	40	6.7	268				
		135		1076				
			1076	7.97				
			135					
TOTALS								

VANGUARD ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 28E

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	Sq	AREA Ft.²	Nº	Sq	AREA Ft.²
1	2	800	1	49	19600
2	2	800	2	15	Not Recov
		1600	3	2	" "
			4	4	" "

HIGH GRADE AREA 1600
HIGH GRADE VOLUME 320000
HIGH GRADE = 9.42
HIGH GRADE TONS = 32,000
LOW GRADE AREA 19600
LOW GRADE VOLUME 3920000
LOW GRADE (ASSUMED) =
LOW GRADE TONS = 392,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 Ft³/T)
1	86	14	10.5	147				
2	86	12	8.2	98				
		26		245				
			245/26 =	9.42				
TOTALS								

VANGORDA ORE ZONE

Based on sections by Clyde Smith 1966

SECTION 30W

HIGH GRADE AREAS			LOW GRADE AREAS		
Nº	SQ	AREA Ft.²	Nº	SQ	AREA Ft.²
1	1	400	1	3	1200
			2	34	13600
			3	12	Not Recov.
			4	1	"
			5	7	"
					14800

HIGH GRADE AREA 400

HIGH GRADE VOLUME 80000

HIGH GRADE = 9.0%

HIGH GRADE TONS = 8000

LOW GRADE AREA 14800

LOW GRADE VOLUME 2960000

LOW GRADE (ASSUMED) =

LOW GRADE TONS = 296,000

AREA Nº	HOLE Nº	WIDTH (Ft.)	GRADE (Pb+Zn)	W X G	WEIGHTED GRADE	AREA Ft 2	VOLUME Ft. 3	TONS (10.0 Ft³/T.)
1	121	5	9.0					
TOTALS								