Curragh Resources Inc.

VANGORDA PLATEAU DEVELOPMENT

WATER LICENCE APPLICATION

VOLUME II - APPENDICES

DECEMBER 1989

VANGORDA PLATEAU

DEVELOPMENT

WATER LICENCE APPLICATION

VOLUME II - APPENDICES

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December 1989

CURRAGH RESOURCES INC.

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TEST HOLE LOG

TEST HOLE 87-V-24

SHEET 1 of 1

DEPTH (m) | DESCRIPTION OF MATERIALS AND OBSERVATIONS | SYMBOL | GRAPH | SAMPLES TYPE | SAMPLES COLLAR ELEV. | W_p W(%) W_l 20 40 60 80

CO-ORDINATES NORTH 6903 286.14
EAST 594 253.65

COLLAR ELEV. 1162.68 m

Overburden

10

19.5 m of NQ casing left in hole

20

30

40

Bedrock @ 39.3 m

50

60

70

Bentonite Seal

Silica Sand

Slotted PVC Pipe ½" dia.

80

Depth of Hole 84.7 m.

90

PROJECT No.

PROJECT

PIEZOMETER NO. VPH-1

LOCATION Vangorda Plateau

DATE January 1989

DRAWN BY

PLATE No. A-1

TEST HOLE LOG

TEST HOLE 87-V-28

SHEET 1 of 1

DEPTH (m) | DESCRIPTION OF MATERIALS AND OBSERVATIONS | SYMBOL | GRAPH | SAMPLES TYPE | SAMPLES

CO-ORDINATES NORTH 6903 627.76
EAST 594 003.26

COLLAR ELEV. 1174.47 m

W_p — W(%) — W_l

20 40 60 80

10

Overburden

Bedrock @ 9.1 m

20

30

40

Slotted pipe
2" dia.

50

Depth of Hole 46.3 m.

PROJECT No.

PROJECT

PIEZOMETER NO. VPH-2

LOCATION Vangorda Plateau

DATE	DRAWN BY	PLATE No.
January 1989		A-2

TEST HOLE LOG

TEST HOLE 87-V-26

SHEET 1 of 1

DEPTH (m) | DESCRIPTION OF MATERIALS AND OBSERVATIONS | SYMBOL | GRAPH | SAMPLES TYPE | SAMPLES COLLAR ELEV. | W_p — W(%) — W_l (20, 40, 60, 80)

CO-ORDINATES NORTH 6 903 161.96
EAST 593 937.99

COLLAR ELEV. 1146.68

Overburden

10

20

30

Bentonite Seal

Slotted pipe 2" dia.

40

Silica sand

Bedrock @ 46.3 m

50

Depth of Hole - 49.4 m

PROJECT No.

PROJECT

LOCATION Vangorda Plateau

PIEZOMETER NO. VPH-4

DATE	DRAWN BY	PLATE No.
January 1989		A-4

TEST HOLE LOG

TEST HOLE 87-V-27

SHEET 1 of 1

DEPTH (m)	DESCRIPTION OF MATERIALS AND OBSERVATIONS	SYMBOL	GRAPH	SAMPLES TYPE	SAMPLES COLLAR ELEV.
	CO-ORDINATES NORTH 6 903 444.04 EAST 593 945.63				1142.30
10	Overburden				
	Bedrock @ 11.9 m.				
20	Bentonite Seal				
30	Slotted PVC pipe ½" dia.				
	Silica Sand				
40					
50					
60					
70					
80					
90					
	Depth of Hole - 91.9 m.				

W_p W(%) W_l

20 40 60 80

PROJECT No.

PROJECT

PIEZOMETER NO. VPH-5

LOCATION Vangorda Plateau

DATE	DRAWN BY	PLATE No.
January 1989		A-5

TEST HOLE LOG

TEST HOLE 87-G-17

SHEET 1 of 1

DEPTH (m) | DESCRIPTION OF MATERIALS AND OBSERVATIONS | SYMBOL | GRAPH | SAMPLES TYPE | SAMPLES COLLAR ELEV.

CO-ORDINATES NORTH 6 904 465.58
EAST 592 558.67

COLLAR ELEV. 1260.08

W_p W(%) W_l

20 40 60 80

Overburden

20

40

Bedrock @ 48.2 m.

60

Bentonite seal

80

Slotted PVC pipe ½" dia.

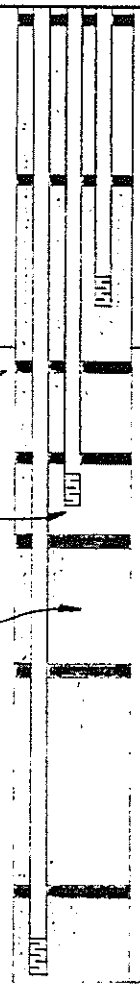
Silica sand

100

120

140

Depth of Hole - 135.9 m.



PROJECT No.

PROJECT

PIEZOMETER NO. GPH-3

LOCATION Vangorda Plateau

DATE	DRAWN BY	PLATE No.
January 1989		A-10

TEST HOLE LOG

TEST HOLE 87-G-18

SHEET 1 of 1

DEPTH (m)	DESCRIPTION OF MATERIALS AND OBSERVATIONS	SYMBOL	GRAPH	SAMPLES TYPE	SAMPLES COLLAR ELEV.	W_p — W(%) — W_l (20 40 60 80)
	CO-ORDINATES NORTH 6 904 836.9 EAST 592 834.0				1286.97	
	Overburden					
10						
20						
30						
40	Slotted Pipe 2" dia.					
50						
	Depth of Hole - 53.3 m.					
60						

PROJECT No.

PROJECT

LOCATION Vangorda Plateau

PIEZOMETER NO. GPH-4

DATE	DRAWN BY	PLATE No.
January 1989		A-11

TEST HOLE LOG

TEST HOLE 87-G-16

SHEET 1 of 1

DEPTH (m) | DESCRIPTION OF MATERIALS AND OBSERVATIONS | SYMBOL | GRAPH | SAMPLES TYPE | SAMPLES

CO-ORDINATES NORTH 6 904 817.34
EAST 592 471.00

COLLAR ELEV. 1269.85

W_p — W(%) — W_l

20 40 60 80

10

Overburden

20

30

Bentonite Seal

Slotted PVC Pipe ½" dia.

40

Bedrock @ 37.2 m.

Silica Sand

50

60

70

80

Depth of Hole - 82.3 m.

90

PROJECT No.

PROJECT

LOCATION Vangorda Plateau

PIEZOMETER NO. GPH-5

DATE	DRAWN BY	PLATE No.
January 1989		A-12

TEST HOLE LOG

TEST HOLE 87-G-9

SHEET 1 of 1

DEPTH (m) | DESCRIPTION OF MATERIALS AND OBSERVATIONS | SYMBOL | GRAPH | SAMPLES TYPE | SAMPLES COLLAR ELEV. 1301.57

CO-ORDINATES NORTH 6 905 092.77
EAST 592 393.22

W_p — W(%) — W_l

20 40 60 80

20

Overburden

30.5 m. of NQ Casing

40

Bedrock @ 36.6 m

Bentonite Seal

60

Slotted PVC Pipe ½" dia.

80

Silica Sand

100

Depth of Hole - 106.7 m.

120

PROJECT No.

PROJECT

PIEZOMETER NO. GPH-6

LOCATION Vangorda Plateau

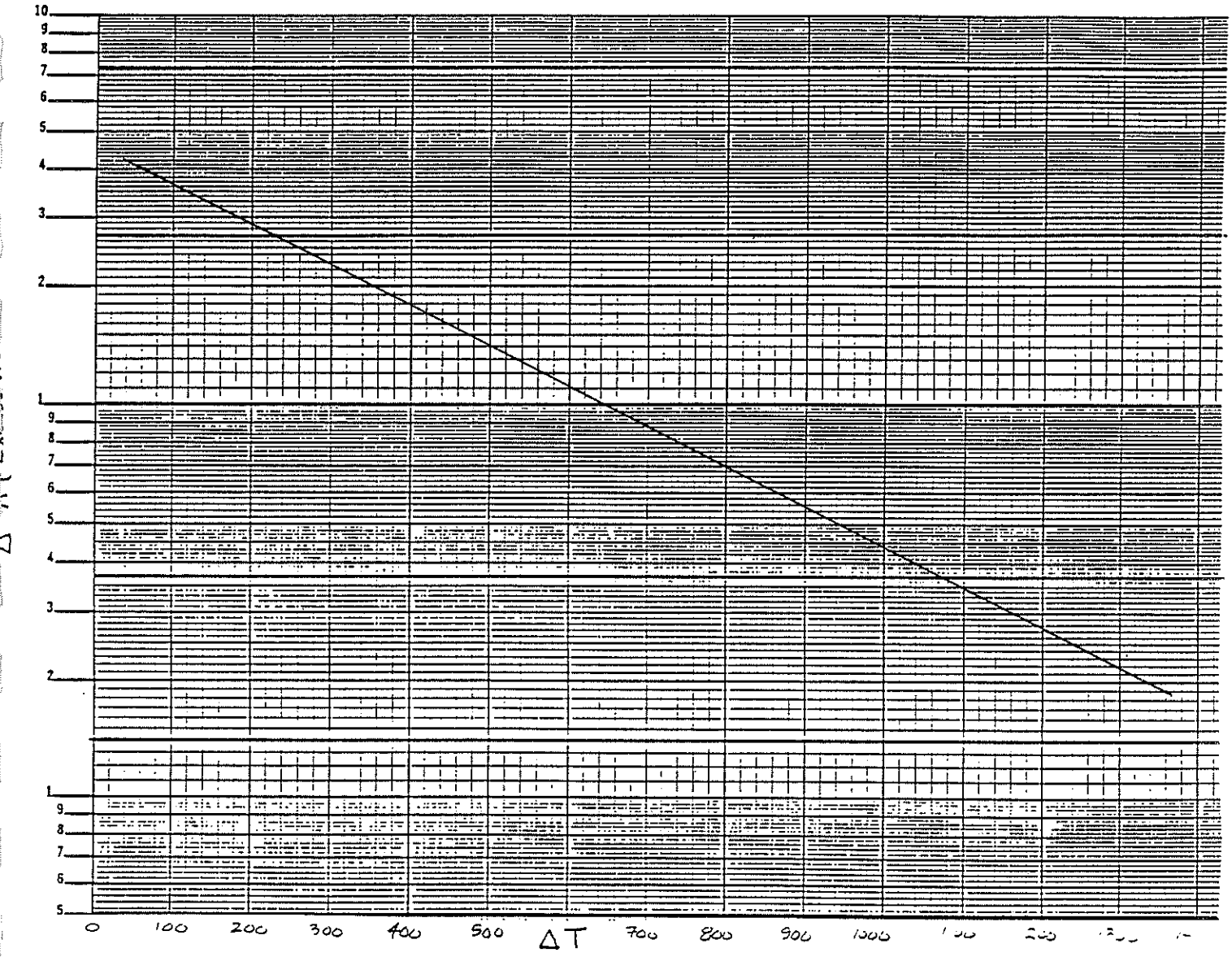
DATE	DRAWN BY	PLATE No.
January 1989		A-13

Test Interval _____ to _____ (metres)

_____ to _____ (feet)

PERMEABILITY TEST

FOR PIEZOMETER No. VP11-4



CALCULATIONS: $K = \frac{d^2}{8LTi} \; Ln \left(\frac{2\sqrt{M}}{D} \times L \right)$

$K = \frac{5.25^2}{8 \times 304.8 \times 420} \times Ln\left(\frac{2\sqrt{1}}{7.57} \times 304.8\right)$

$K = 1.18 \times 10^{-4}$ cm/sec

where: D = Hole diameter 7.57cm (2.98 in)

d = Tube diameter 5.25cm (2.07 in)

M = K_H/K_V = ANISOTROPY = 1

K = Hydraulic Conductivity

L = Test Length 304.8cm (120 in)

Ti = Time Interval for Excess Head (h) to Decay by 63%

= Time for Excess to Drop from One Bold Line to the Next Bold Line

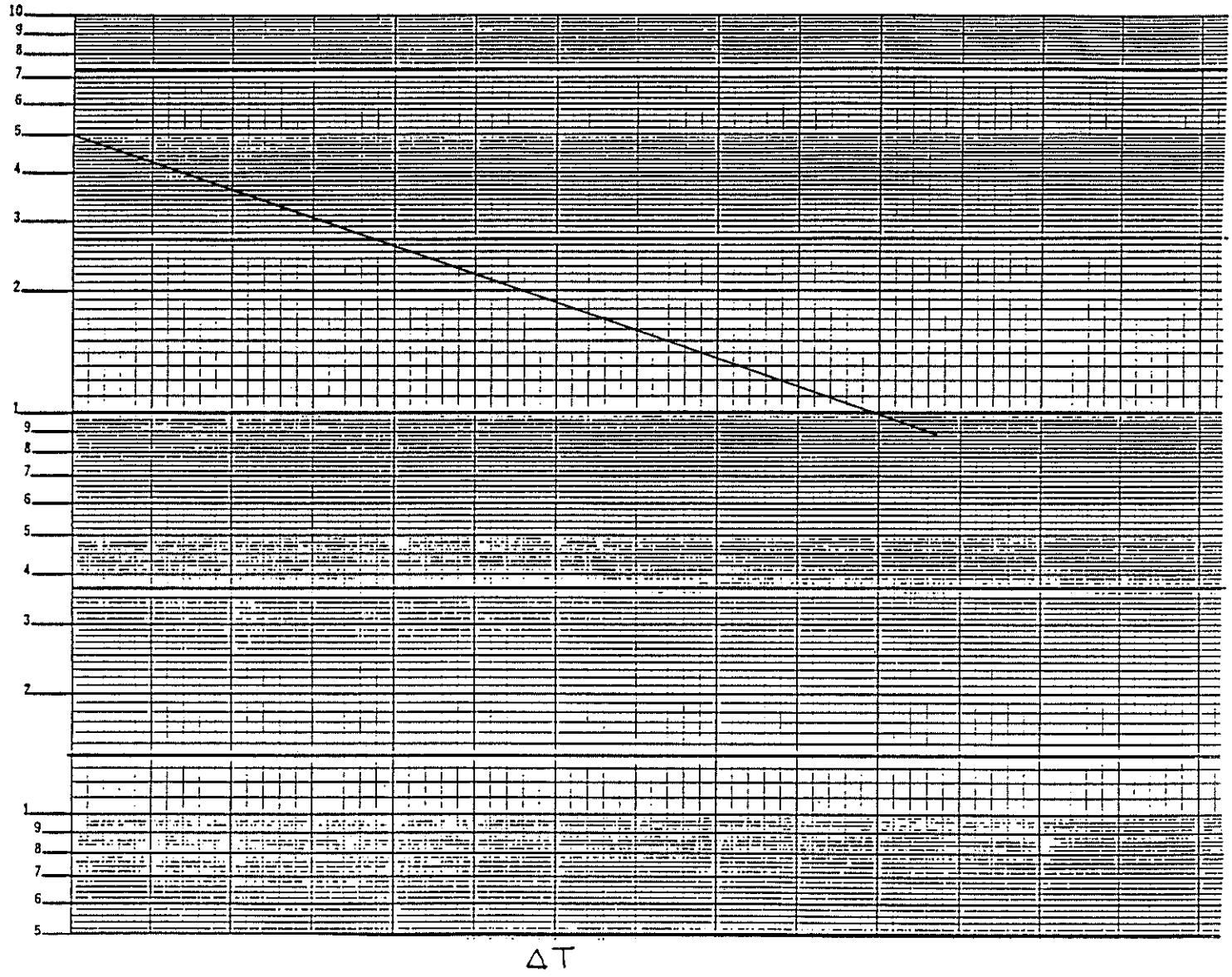
= 420 seconds

FIGURE A-14

Test Interval _____ to _____ ___(metres)

_____ to _____(feet)

PERMEABILITY TEST FOR PIEZOMETER No. VPH-6



CALCULATIONS: $K = \frac{d^2}{8LTi} \; Ln \left(\frac{2\sqrt{M}}{D} \times L \right)$

$$K = \frac{(1.58)^2}{8 \times 305 \times 335} \times Ln\left(\frac{2\sqrt{1}}{7.57} \times 305\right)$$

$$K = 1.34 \times 10^{-5} \text{ cm/sec}$$

where: D = Hole diameter 7.57cm (2.98in)

d = Tube diameter 1.58cm (0.62in)

M = K_H/K_V = ANISOTROPY = 1

K = Hydraulic Conductivity

L = Test Length 305 cm (120 in)

Ti = Time Interval for Excess Head (h) to Decay by 63%

= Time for Excess to Drop from One Bold Line to the Next Bold Line

= 335 seconds

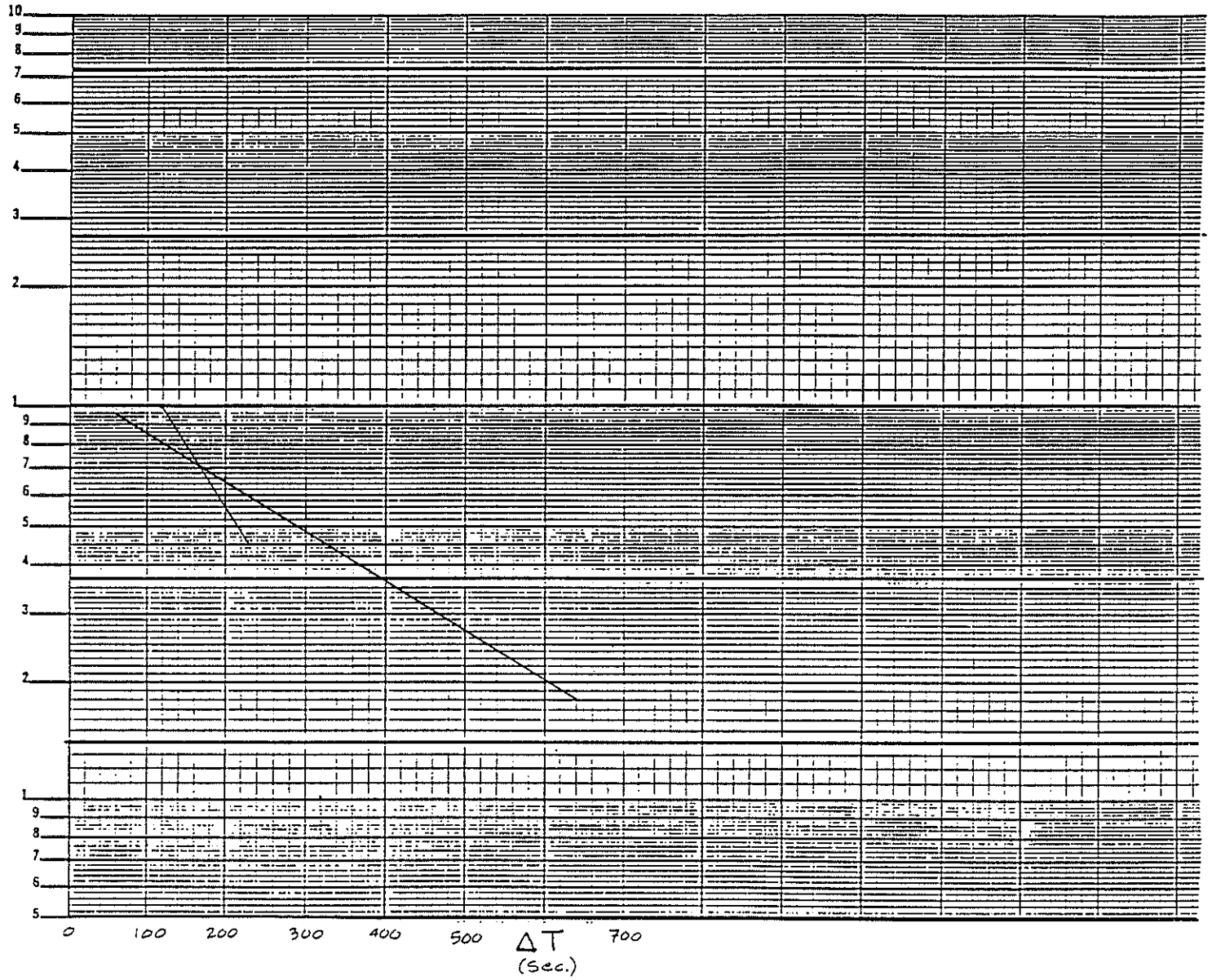
FIGURE A-15

Test Interval _____ to _____ (metres)

_____ to _____ (feet)

PERMEABILITY TEST

FOR PIEZOMETER No. VPH-7 (#2)



CALCULATIONS: $K = \frac{d^2}{8LTi} \; Ln \left(\frac{2\sqrt{M}}{D} \times L \right)$

$K = \frac{(1.58)^2}{8 \times 182.9 \times 355} \times Ln \left(\frac{2\sqrt{1}}{7.57} \times 182.9 \right)$

$K = 1.86 \times 10^{-5}$ cm/sec

where: D = Hole diameter 7.57cm (2.98in)

d = Tube diameter 1.58 cm (0.62 in)

M = K_H/K_V = ANISOTROPY = 1

K = Hydraulic Conductivity

L = Test Length 182.9 cm (72 in)

Ti = Time Interval for Excess Head (h) to Decay by 63%

= Time for Excess to Drop from One Bold Line to the Next Bold Line

= 355 seconds

FIGURE A-16

montreal engineering company, limited

BOREHOLE LOG

SHEET 1 OF 4

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-1 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START 12th July '77 — GROUND ELEV. .....

FINISH 16th July '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ☒ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N' (BLOWS/30cm)
⊟△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
0															
			Till: Greenish-grey silt and sand with traces of gravel and cobbles.			☒	1	SS	85	N=22	⊙				
2			Some oxidized gravel observed throughout the soil. Thin layers of oxidized till noted in SS sample #4.			☒	2	SS	90	N=22	⊙	18	33	43	6
					▽	☒	3	SS	75	N=53	⊙				
4			Compact to very dense material, well graded, sub-angular to sub-rounded particles.			☒	4	SS	100	N=102	⊙				
6			Till: Dark grey silty and gravelly sand with traces of clay. Very dense material of low plasticity. Cobbles and boulders noted.			☒	5	SS	45	N=147	⊙				
8						☒	6	SS	0	N=145/3 cm					
						☒	7	SS	100	N=111	⊙				
10						☒	8	SS	100	N=165	⊙	18	26	34	22

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FIGURE A-17A

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BOREHOLE LOG

SHEET 2 OF 4

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-1 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START 12th July '77 — GROUND ELEV. .....

FINISH 16th July '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ■ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊢▲ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
40	12														
						⊠	9	SS	90	N=137	⊙				
46	14														
			Till: Dark grey sandy silt and gravel with some clay. Medium plasticity.			⊠	10	SS	0	N=121/9 cm					
						■	11	SS	100	N=115	⊙				
60	18														
			Till: Dark grey clayey silt and gravel with some sand. Medium plasticity.			⊠	12	SS	100	N=109/18 cm	⊙				
66	20														
			Till: Olive green sandy silt and gravel with some												

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FIGURE A-17B

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BOREHOLE LOG

SHEET 3 OF 4

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-1 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START 12th July '77 — GROUND ELEV. .....

FINISH 16th July '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊢▲ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			clay. A few cobbles and boulders. Some oxidized and altered gravel. Slightly plastic.			⊠	13	SS	100	N=247/ 21 cm					
						⊘	14	SS	0	N=75/ 0 cm					
24			Till: Dark grey sandy silt and gravel with some clay. A few cobbles and boulders.			▮	15	DC	62						
						▮	16	DC	42						
26						⊠	17	SS	18	N=75/ 3 cm					
28			Till: Olive green gravelly and silty sand with traces of clay. Cobbles and boulders in traces. Low plasticity, well graded, sub-angular particles.			⊠	18	SS	83	N=187	⊕				
30												14	22	39	25
32						⊠	19	SS	75	N=256	⊕				

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FIGURE A-17C

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BOREHOLE LOG

SHEET 4 OF 4

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-1 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START 12th July '77 — GROUND ELEV. .....

FINISH 16th July '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ◪ — NOT RECOVERED ☐

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊡—△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	SAMPLES Nº	SAMPLES TYPE	SAMPLES REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			Approximate bedrock surface.												
34	10.4		Phyllite: Soft, highly altered, decomposed and fractured. Dark toned rock with brownish red rust zones.				20	SS	100	N=214/9 cm					
36	11.0						21	SS	100	N=230/15 cm	⊙				
38	11.6		Bleached phyllite; Buff to yellow-grey earthy lustre in spots. Fine to medium grained, foliation~45°. Microfolding, extremely altered by oxidation. Chlorite in stringers with disseminated calcite throughout rock. Highly sheared from 37.38-37.56 m, probable fault gouge from 40.3-40.7 m.				22	DC	81		⊙				
							23	DC	86						
40	12.2						24	DC	60						
							25	DC	74						
42	12.8		Massive sulphide: Reddish hued rock, fine grained foliation~50° to 70° but not well developed. Sphalerite and galena are the major constituants of the ore.				26	DC	78						
			END OF HOLE AT 42.10 m												

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FIGURE A-17D

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BOREHOLE LOG

SHEET 1 OF 5

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0
HOLE Nº BH-77-12 — EQUIPMENT Longyear 34
LOCATION Faro, Yukon.
DATUM Ground — COORDINATES: N ..... E .....
DATE: START 10th Sept. '77 — GROUND ELEV. .....
FINISH 18th Sept. '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ⊠ UNDISTURBED ◪ NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N' (BLOWS/30 cm)
⊢△⊣ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & % LARGER
0															
			Sand, brown with some silt and some gravel. Slight oxidation proven to a depth of 1.28m. Sub-angular to sub-rounded particles. Compact.			⊠	1	SS	55	N=24	⊙	7	9	68	16
2						◪	2	SS	0	N=11					
			Till: Brownish green sandy gravel with some silt and some clay. Well graded, good plasticity, sub-angular to sub-rounded particles.			⊠	3	SS	60		⊢△⊣ ⊙	8	17	27	48
4						⊠	4	SS	10	N=46					
			Till: Olive green gravelly and silty clay with some sand. Highly plastic, dense.			⊠	5	SS	47		⊙				
6						⊠	6	SS	55	N=147	⊙	9	24	43	24
			Till: Olive green gravelly and silty sand. Some cobbles and traces of boulders. Very dense.			⊠	7	SS	45	N=88	⊙				
8															
			Till: Olive green to dark grey silty clay with some sand and traces of gravel. Plastic, black streaks of organic material in traces.			◪	8	SS	0						
10						⊠	9	SS	75	N=90	⊢△⊣ ⊙				

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FIGURE A-18A

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BOREHOLE LOG

SHEET 2 OF 5

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0
HOLE Nº BH-77-12 — EQUIPMENT Longyear 34
LOCATION Faro, Yukon.
DATUM Ground — COORDINATES: N ... E ...
DATE: START 10th Sept. '77 — GROUND ELEV. ...
FINISH 18th Sept. '77 — DIP 90° — BEARING ...

SAMPLE CONDITIONS

DISTURBED ☒ UNDISTURBED ◢ NOT RECOVERED ◹

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊢▲ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS (10 20 30 40 50 60 70 80 N W)	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			Some cobbles and boulders up to a depth of 9.8 m.		▽										
												29	40	25	6
12			Till: Dark grey sandy silt with some clay and some gravel. Slight plasticity, very dense.			☒	10	SS	100	N=67	⊙				
14			Till of a higher clay content, high plasticity, sandy silt partings.			◹	11	SS	0	N=351/24 cm					
16						☒	12	SS	94	N=138	⊙				
18						☒	13	SS	71	N=156	⊙				
												25	52	18	5
20			Sandy silt: Dark grey colour, uniform with a trace of gravel. Sandy partings, thinly laminated structure.			☒	14	SS	77	N=204	⊙				
22			Clayey silt with some sand and traces												

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FIGURE A-18B

montreal engineering company, limited

BOREHOLE LOG

SHEET 3 OF 5

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0
HOLE Nº BH-77-12 — EQUIPMENT Longyear 34
LOCATION Faro, Yukon,
DATUM Ground — COORDINATES: N E
DATE: START 10th Sept. '77 — GROUND ELEV.
FINISH 18th Sept. '77 — DIP 90° BEARING

SAMPLE CONDITIONS

DISTURBED ☒ UNDISTURBED ◪ NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N' (BLOWS/m)
PLASTIC & LIQUID LIMITS
WATER CONTENT (w%)
WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			of gravel, interlayered with a sand and silt. Dark grey colour.			☒	15	SS	73	N=218					
24			Till: Dark grey gravelly and sandy silt. Well graded, very dense, subangular to subrounded particles. Traces of cobbles and boulders.				16	SS	0	N=101/3 cm					
26						☒	17	SS	14	N=116					
28			Till: Olive green gravelly and silty sand with some clay. Very dense, well graded, low plasticity, subangular to subrounded particles. Traces of cobbles and boulders.				18	SS	0	N=125/3 cm					
						◪	19	SS	0	N=286					
30						☒	20	SS	75	N=345 γ=2.34					
							21	SS	0	N=201/9 cm					
32						☒	22	SS	45	N=158					

1327 4020

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FIGURE A-18C

montreal engineering company, limited

BOREHOLE LOG

SHEET 4 OF 5

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH 77-12 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ... E ...

DATE: START 10th Sept. '77 — GROUND ELEV. ...

FINISH 18th Sept. '77 — DIP 90° — BEARING ...

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊢△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
34							23	SS	70	N=65					
36			Till: Olive green silty and clayey sand with some gravel, high plasticity.				24	SS	100	N=63		15	31	41	13
38							25	SS	0	N=200/6 cm					
							26	SS	0	N=130/6 cm					
40							27	SS	0						
							28	DC	57						
			Till: Olive green to dark grey gravelly silt and sand. Some cobbles and traces of boulders. Very dense, well graded, sub-angular to sub-rounded particles with a preponderance of altered phyllite.				29	SS	100	N=110		16	27	36	21
							30	DC	38						
42							31	SS	33						
							32	DC	29						
			Bedrock at 42.29 m				33	DC	11						
44															

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FIGURE A-18D

montreal engineering company, limited

BOREHOLE LOG

SHEET 5 OF 5

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH 77-12 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START 10th Sept. '77 — GROUND ELEV. .....

FINISH 18th Sept. '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ☒ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D. — γ BULK DENSITY (t/m³) — X PENETRATION 'N'

DC DIAMOND CORE BQ SIZE — K PERMEABILITY (cm/sec) — ⊢▲ PLASTIC & LIQUID LIMITS

ST SHELBY TUBE ..... mm O.D. — V IN-SITU VANE (kg/cm²) — ⊙ WATER CONTENT (w%)

AS AUGER SAMPLE — q_u UNCONFINED COMPRESSION (kg/cm²) — ▽ WATER LEVEL

WS WASH SAMPLE — PP POCKET PENETROMETER (kg/cm²)

DO DRIVE OPEN — C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			Quartz sericite phyllite: grey, fine grained. Silvery sheen on cleavage planes, some white quartz present in bands up to a thickness of 5cm. Foliation ≈65° to 75°, microfolding noted, alterations not prominent although slight epidotisation. Fault gouge from 53.3 to 54.6m. Most of the fractures in the recovered core are due to foliation.			☒	34	SS	56	N=295/27 cm					
46						☒	35	SS	75	N=167/24 cm					
							36	DC	10						
48							37	DC	18						
							38	DC	19						
50							39	DC	50						
							40	DC	29						
							41	DC	55						
52							42	DC	80						
							43	DC	81						
							44	DC	69						
54			END OF HOLE AT 54.57 m				45	DC	53						

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FIGURE A-18E

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BOREHOLE LOG

SHEET 1 OF 6

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-13 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START Sept. 19th '77 — GROUND ELEV. .....

FINISH Oct. 4th '77 — DIP 90 — BEARING .....

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N' (BLOWS/30 cm)
⊟—△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS (N: 10 20 30 40 50 60 70 80 W)	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
0															
			Sand, brown, gravelly with some silt. Compact, sub-angular to sub-rounded particles.			⊠	1	SS	40	N=60	⊙	5	15	49	31
2			Till: Brown silt and sand with some clay and some gravel. Traces of cobbles and boulders. Well graded, sub-angular to sub-rounded particles, compact.			⊠	2	SS	50	N=21	⊟—△ ⊙	20	31	37	12
4						⊠	3	SS	65	N=27	⊙				
6			Till: Grey silty and clayey sand with some gravel. Highly plastic, angular to sub-rounded particles, dense. Traces of cobbles.		▽	◪	4	SS	0	N=30					
						◪	5	SS	0	N=31					
8						⊠	6	SS	60		⊙	17	29	40	14
			Till: Olive green sandy clay with some gravel. Slightly plastic, very dense. Traces of cobbles.			⊠	7	SS	80		⊙				
10															

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FIGURE A-19A

montreal engineering company, limited

BOREHOLE LOG

SHEET 2 OF 6

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT No. KAM 6163-0

HOLE No BH-77-13 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N E

DATE: START Sept. 19th '77 — GROUND ELEV.

FINISH Oct. 4th '77 — DIP 90° — BEARING

SAMPLE CONDITIONS

DISTURBED ⊠ UNDISTURBED ◪ NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊢△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	SAMPLES No.	SAMPLES TYPE	SAMPLES REC. %	TESTS	TEST RESULTS (N; 10 20 30 40 50 60 70 80 W)	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
						⊠	8	SS	80	γ=2.32		22	30	32	16
12															
						⊠	9	SS	50	N=106					
14															
						⊠	10	SS	50	N=119					
16															
						⊠	11	SS	75	N=96		22	27	37	14
18															
						⊠	12	SS	75	N=85					
20															
						◪	13	SS	0	N=163					
22															

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FIGURE A-19B

montreal engineering company, limited

BOREHOLE LOG

SHEET 3 OF 6

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-13 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ____ E ____

DATE: START Sept. 19th '77 — GROUND ELEV. ____

FINISH Oct. 4th '77 — DIP 90° — BEARING ____

SAMPLE CONDITIONS

DISTURBED ☒ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ____ mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊢△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS (N: 10 20 30 40 50 60 70 80 W)	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			More significant gravel content.												
							14	SS	0	N=271					
24							15	SS	100	γ=2.44					
												23	21	31	25
26							16	SS	100						
28							17	SS	100						
30							18	SS	100						
32							19	SS	100						

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FIGURE A-19C

montreal engineering company, limited

BOREHOLE LOG

SHEET 4 OF 6

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0
HOLE Nº BH-77-13 — EQUIPMENT Longyear 34
LOCATION Faro, Yukon.
DATUM Ground — COORDINATES: N ... E ...
DATE: START Sept. 19th '77 — GROUND ELEV. ...
FINISH Oct. 4th '77 — DIP 90° — BEARING ...

SAMPLE CONDITIONS

DISTURBED ⊠ UNDISTURBED ◢ NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OREN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊡—△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

GEOLOGIC PROFILE				GROUND WATER	SAMPLES				TESTS	TEST RESULTS	% CLAY	% SILT	% SAND	% GRAVEL & % LARGER
DEPTH ft m	ELEV. m	DESCRIPTION	STRAT.		COND.	Nº	TYPE	REC. %		10 20 30 40 50 60 70 80 N W				
34					⊠	20	SS	100	γ=2.36	⊙				
											22	20	36	22
36					⊠	21	SS	100		⊙				
38														
					⊠	22	SS	83	N=406/18 cm	⊕				
40														
		Predominantly silt and sand sizes with some clay and some gravel.												
42					⊠	23	SS	100	N=251	⊕				
44					⊠	24	SS	100	N=152		25	25	36	14

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FIGURE A-19D

montreal engineering company, limited

BOREHOLE LOG

SHEET 5 OF 6

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH 77-13 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ..... E .....

DATE: START Sept.19th '77 — GROUND ELEV. .....

FINISH Oct. 4th '77 — DIP 90° — BEARING .....

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ◪ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ..... mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
q_u UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
C_u UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊕—△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
						⊠					⊕				
46						⊠	25	SS	65	N=243	⊙				
48						⊠	26	SS	100	N=312/15 cm	⊙				
50			Variable clay content, slight to medium plasticity.			⊠	27	SS	100	N=250/6 cm					
52							28	SS	0	N=150/6 cm					
							29	DC	24						
						⊠	30	SS	25	N=269/24 cm					
54						⊠	31	SS	83	N=226/18 cm	⊙				
			Till: Greyish green gravelly silt with				32	DC	28						

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FIGURE A-19E

montreal engineering company, limited

BOREHOLE LOG

SHEET 6 OF 6

PROJECT Kerr-CNRL Grum Joint Venture — PROJECT Nº KAM 6163-0

HOLE Nº BH-77-13 — EQUIPMENT Longyear 34

LOCATION Faro, Yukon.

DATUM Ground — COORDINATES: N ____ E ____

DATE: START Setp. 19th '77 — GROUND ELEV. ____

FINISH Oct. 4th '77 — DIP 90° — BEARING ____

SAMPLE CONDITIONS

DISTURBED ⊠ — UNDISTURBED ◢ — NOT RECOVERED ⊘

SS SPLIT SPOON 51 mm O.D.
DC DIAMOND CORE BQ SIZE
ST SHELBY TUBE ____ mm O.D.
AS AUGER SAMPLE
WS WASH SAMPLE
DO DRIVE OPEN

γ BULK DENSITY (t/m³)
K PERMEABILITY (cm/sec)
V IN-SITU VANE (kg/cm²)
qu UNCONFINED COMPRESSION (kg/cm²)
PP POCKET PENETROMETER (kg/cm²)
Cu UNDRAINED SHEAR STRENGTH (kg/cm²)

X PENETRATION 'N'
⊞—△ PLASTIC & LIQUID LIMITS
⊙ WATER CONTENT (w%)
▽ WATER LEVEL

DEPTH ft	DEPTH m	ELEV. m	GEOLOGIC PROFILE DESCRIPTION	STRAT.	GROUND WATER	SAMPLES COND.	Nº	TYPE	REC. %	TESTS	TEST RESULTS 10 20 30 40 50 60 70 80 N W	% CLAY	% SILT	% SAND	% GRAVEL & LARGER
			some sand and some clay. Slightly plastic. Some cobbles.				33	SS	94	N=224	⊕				
56							34	DC	13						
			Predominantly silt and sand with some gravel and traces of clay.				35	SS	85	N=268 γ=2.35	⊕				
58							36	DC	9			16	27	37	20
							37	SS	80	N=286	⊕				
60															
			END OF HOLE AT 61.34 m				38	SS	0						

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FIGURE A-19F

eba

SUMMARY OF LABORATORY TEST RESULTS

PROJECT: Vangorda Plateau PROJECT No.: 0201-4655.15 DATE: 87-09-21

BOREHOLE	DEPTH	MOISTURE CONTENT (%)	ATTERBERG LIMITS			GRAIN SIZE DISTRIBUTION				DESCRIPTION
			LL (%)	PL (%)	PI (%)	Clay (%)	Silt (%)	Sand (%)	Gravel (%)	
1.3		12.4	27	16.5	10.5	13	34	40	13	SAND - silty, some clay, some gravel
2.3		9.2	22	18.5	3.5	7	28	52	13	SAND - silty, some gravel, trace of clay
3.2		10.7	25	17.5	7.5	14	28	46	12	SAND - silty, some clay, some gravel
4.2		11.7	25	17.5	7.5	13	30	42	8	SAND - silty, some clay, trace of gravel
5.3		14.5	23.5	18.0	6.0	9	26	46	19	SAND - silty, some gravel, trace of clay
6.4		11.2	26.0	17.5	8.5	17	34	40	9	SAND - silty, some clay, trace of gravel

FIGURE A-20

'87 09/23 15:22 ☎ 403 668 6518 Curragh Res WH 03

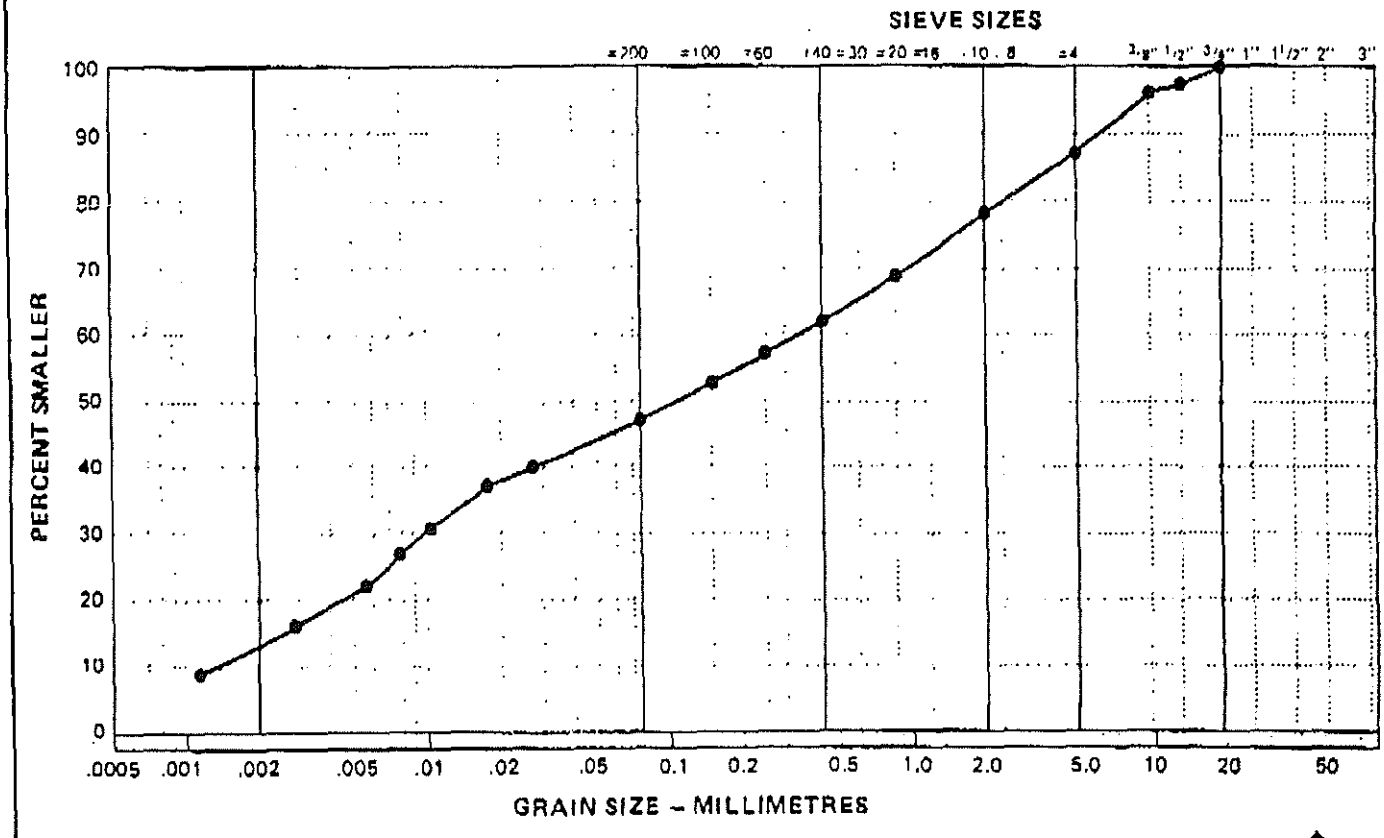
EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Vangorda Plateau
Curragh Resources, Faro, Yukon
Project Number: 0201-4655.15
Date Tested: 1987-09-18
Borehole Number:
Depth:
Soil Description: Glacial Till
Cu:
Cc:
Natural Moisture Content: 12.4 %
Remarks: SAMPLE 1.3

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	97
3/8"	96
No. 4	87
No. 10	78
No. 20	69
No. 40	62
No. 80	57
No. 100	53
No. 200	47

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

FIGURE A-21

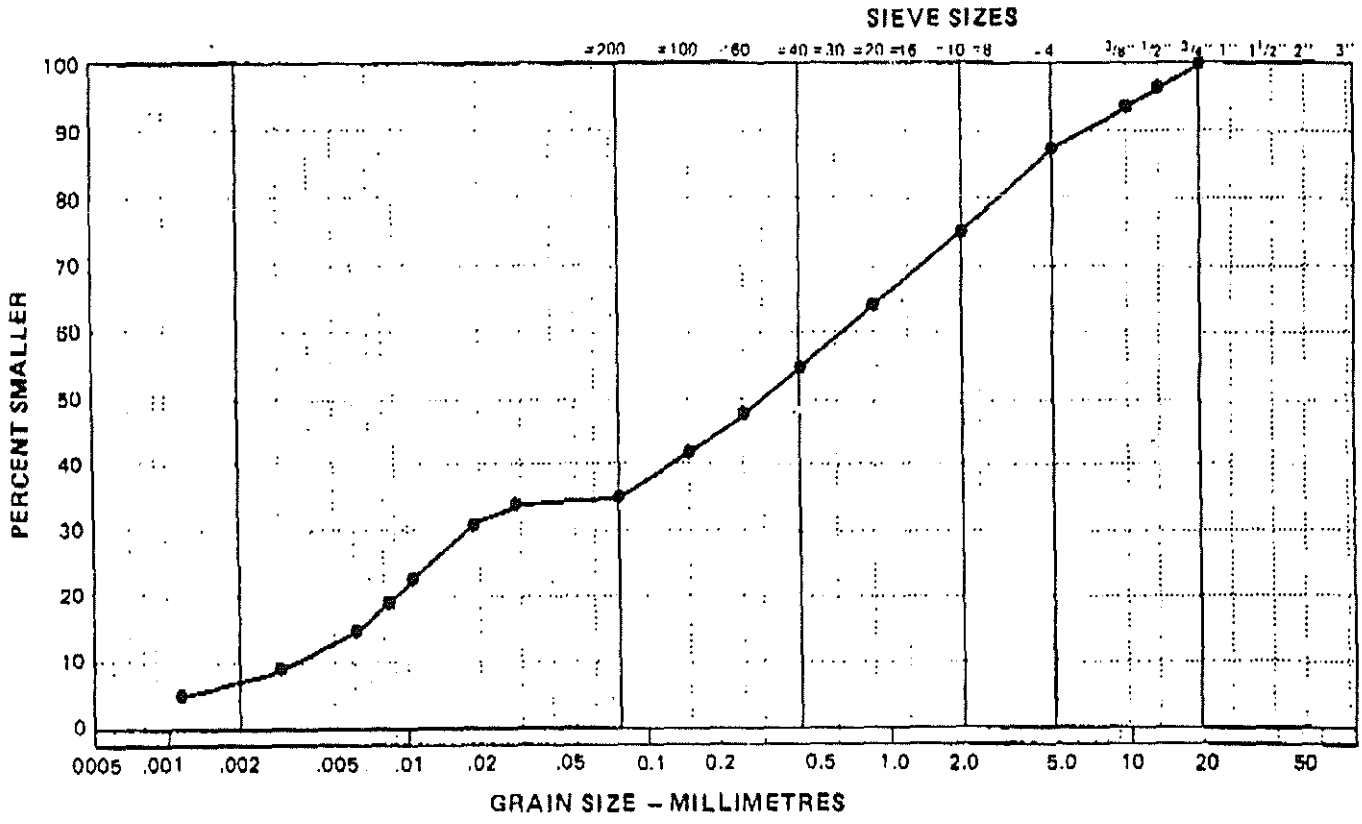
EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Vangorda Plateau
Curragh Resources, Faro, Yukon
Project Number: 0201-4655.15
Date Tested: 1987-09-18
Borehole Number:
Depth:
Soil Description: Glacial Till
Cu:
Cc:
Natural Moisture Content: 9.2 %
Remarks: SAMPLE 2.3

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	96
3/8"	94
No. 4	87
No. 10	75
No. 20	64
No. 40	55
No. 60	48
No. 100	42
No. 200	35

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

FIGURE A-22

EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Vangorda Plateau
Curragh Resources, Faro, Yukon

Project Number: 0201-4655.15

Date Tested: 1987-09-18

Borehole Number:

Depth:

Soil Description: Glacial Till

Cu:

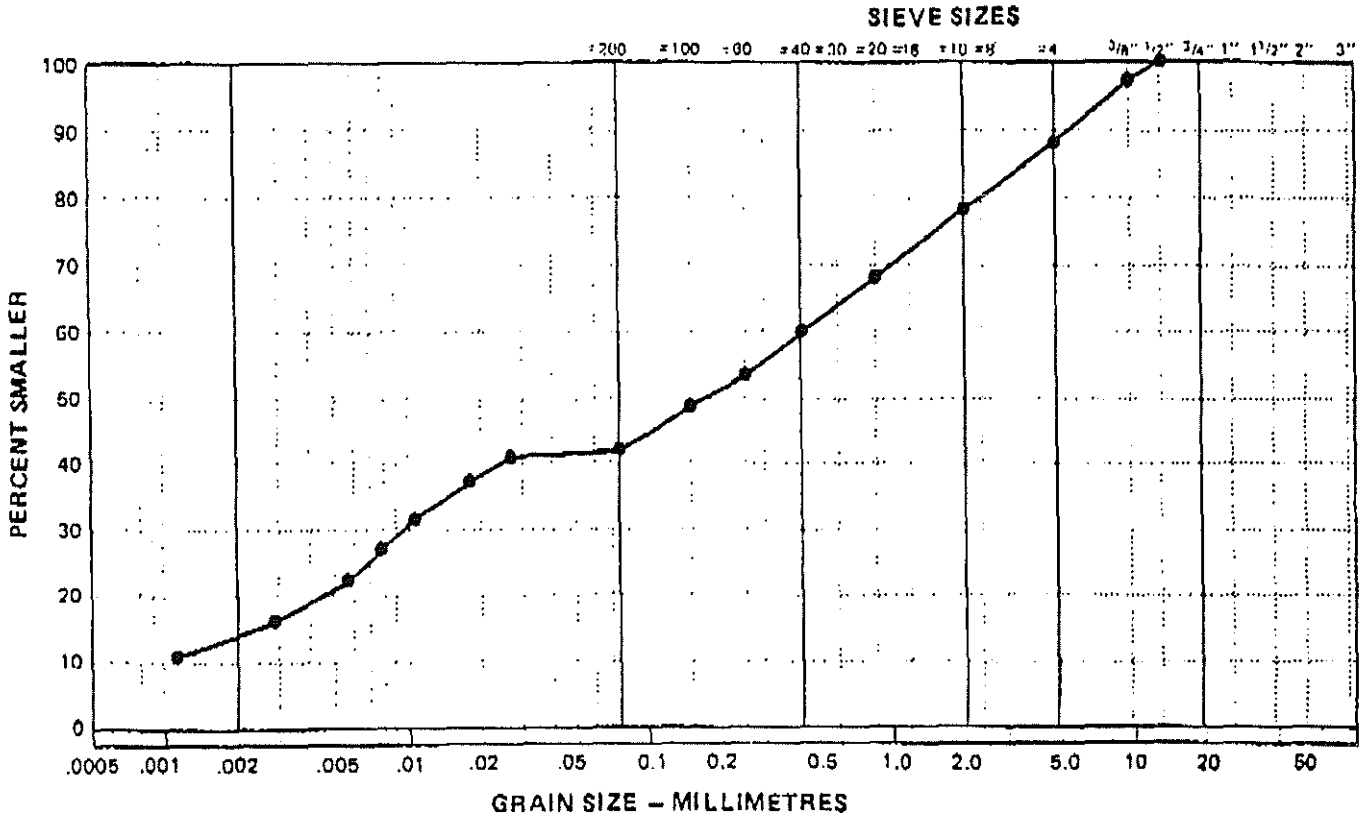
Cc:

Natural Moisture Content: 10.7 %

Remarks: SAMPLE 3.2

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	
1/2"	100
3/8"	97
No. 4	88
No. 10	78
No. 20	68
No. 40	60
No. 60	54
No. 100	49
No. 200	42

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

FIGURE A-23

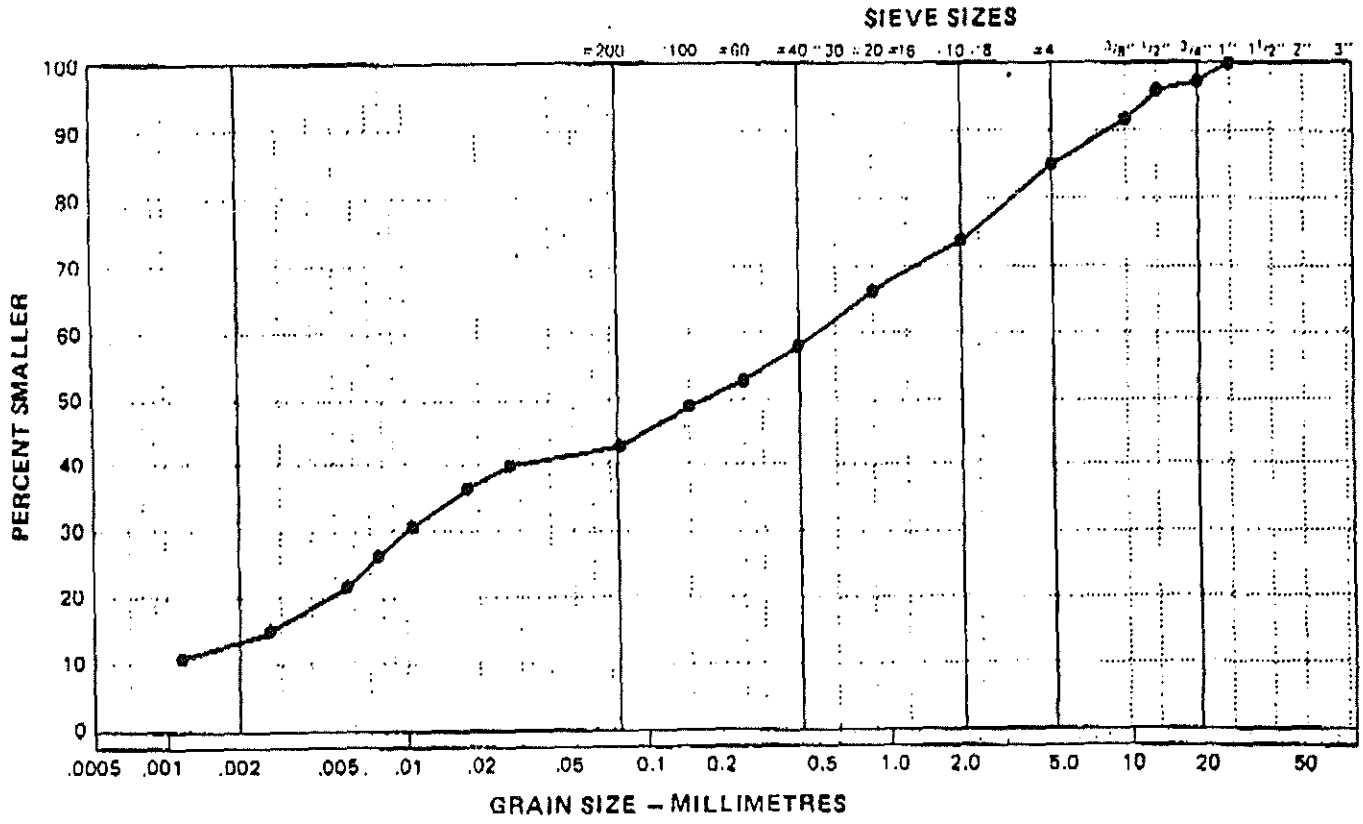
EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Vangorda Plateau
Curragh Resources, Faro, Yukon
Project Number: 0201-4655.15
Date Tested: 1987-09-18
Borehole Number:
Depth:
Soil Description: Glacial Till
Cu:
Cc:
Natural Moisture Content: 11.7 %
Remarks: SAMPLE 4.2

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	100
3/4"	97
1/2"	96
3/8"	92
No. 4	85
No. 10	74
No. 20	66
No. 40	58
No. 60	53
No. 100	49
No. 200	43

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

FIGURE A-24

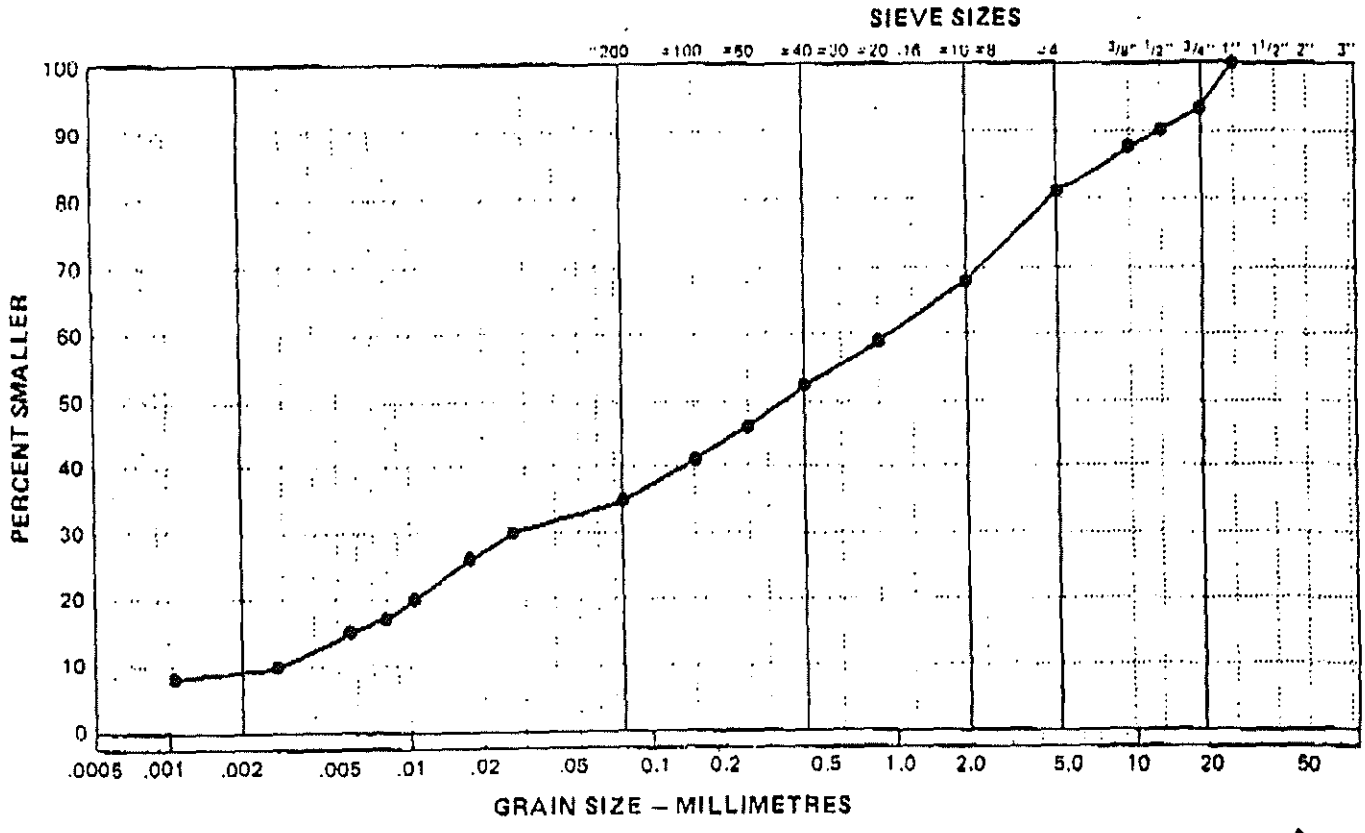
EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Vangorda Plateau
Curragh Resources, Faro, Yukon
Project Number: 0201-4655.15
Date Tested: 1987-09-18
Borehole Number:
Depth:
Soil Description: Glacial Till
Cu:
Cc:
Natural Moisture Content: 14.3 %
Remarks: SAMPLE 5.3

SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	100
3/4"	94
1/2"	90
3/8"	88
No. 4	81
No. 10	68
No. 20	59
No. 40	53
No. 60	46
No. 100	41
No. 200	35

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

FIGURE A-25

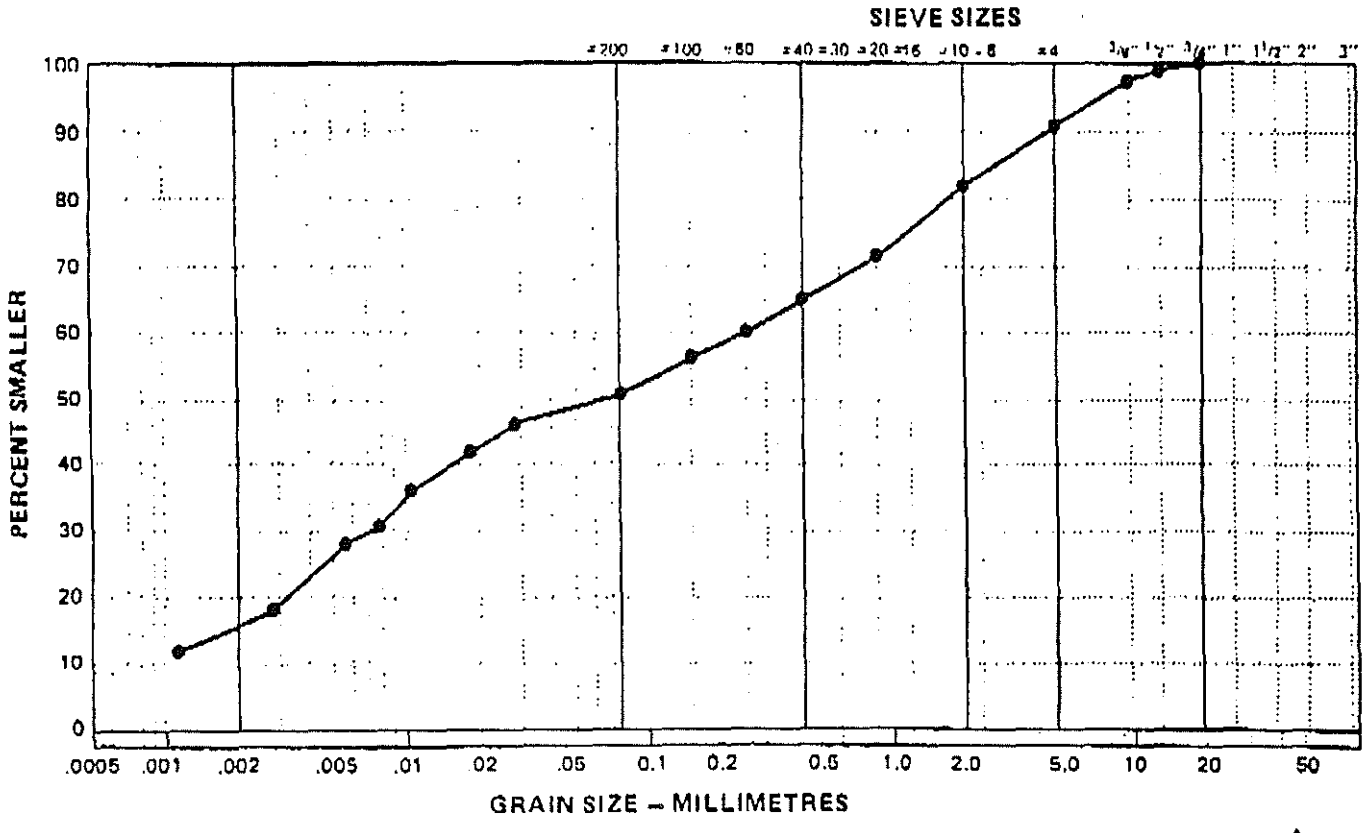
EBA Engineering Consultants Ltd.

PARTICLE - SIZE ANALYSIS OF SOILS

Project: Vangorda Plateau
Curragh Resources, Faro, Yukon
Project Number: 0201-4655.15
Date Tested: 1987-09-18
Borehole Number:
Depth:
Soil Description: Glacial Till
Cu:
Cc:
Natural Moisture Content: 11.2 %
Remarks: SAMPLE 6.4

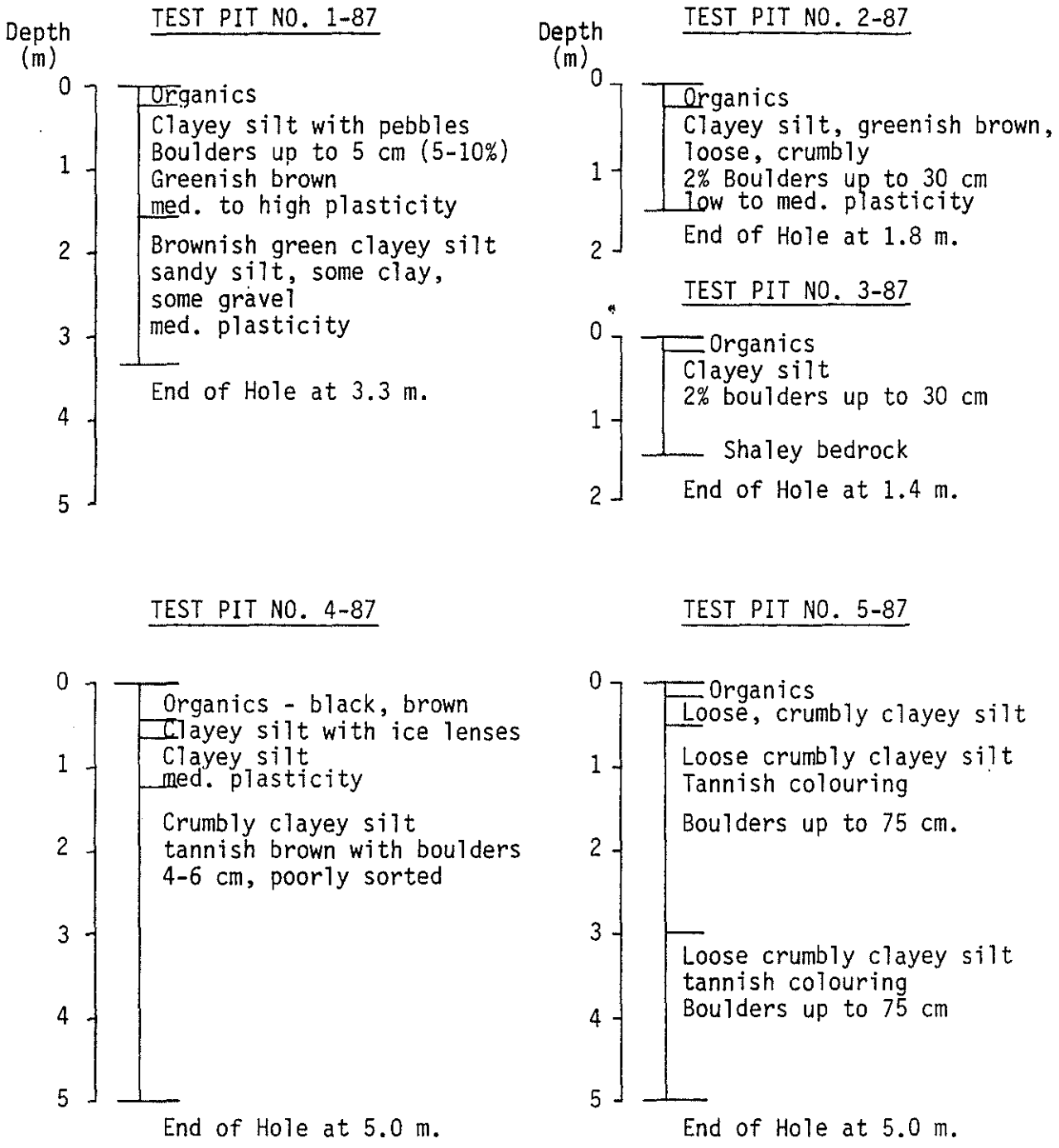
SIEVE	PERCENTAGE PASSING
3"	
1 1/2"	
1"	
3/4"	100
1/2"	99
3/8"	97
No. 4	91
No. 10	82
No. 20	72
No. 40	65
No. 60	60
No. 100	56
No. 200	51

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



Tested in accordance with ASTM D422 unless otherwise noted.

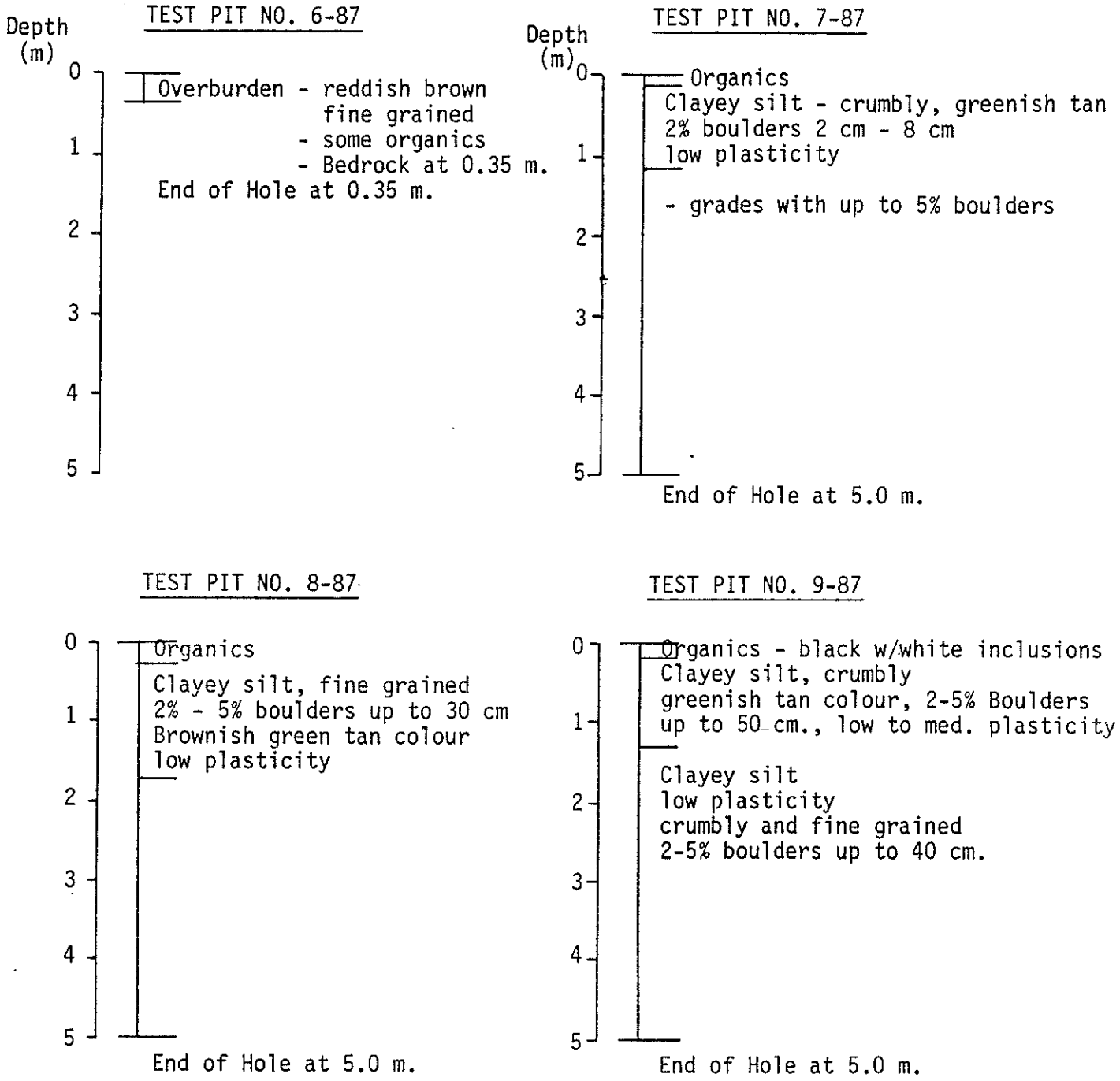
FIGURE A-26



VANGORDA WASTE DUMP TEST PITS

September 3, 1987

FIGURE A-27



VANGORDA WASTE DUMP TEST PITS

September 3, 1987

FIGURE A-28

TABLE A-1

VANGORDA PIEZOMETERS

PIEZO. DESIG.	DRILL HOLE	NORTHINGS (m)	EASTINGS (m)	COLLAR ELEV.(m)	PIEZO. SETTINGS(m)	PIEZOMETRIC LEVEL (m)
VPH-1	87-V-24	6 903 286.1	594 253.7	1 162.68	1 077.95	1 163.3
VPH-2	87-V-28	6 903 627.8	594 003.3	1 174.47	1 124.49	1 169.9
VPH-3	87-V-29	6 903 522.2	593 830.3	1 151.82	1 068.00 1 137.19 1 145.72	1 140.2 1 138.9 1 147.5
VPH-4	87-V-26	6 903 162.0	593 938.0	1 146.68	1 097.30	1 125.7
VPH-5	87-V-27	6 903 444.0	593 945.6	1 142.30	1 055.13 1 124.01	1 129.8 FROZEN
VPH-6	87-V-23	6 902 965.1	594 412.9	1 155.99	1 126.43	1 153
VPH-7	87-V-25	6 903 200.0	594 166.0	1 160.13	1 086.98 1 114.26 1 136.81	1 135.7 1 135.7 1 138.4
	V33R	6 903 349.0	594 007.0	1 134.9		1 134.8
	V307	6 903 309.5	594 064.5	1 135.7		1 135.7

TABLE A-2

GRUM PIEZOMETERS

PIEZO. DESIG.	DRILL HOLE	NORTHINGS (m)	EASTINGS (m)	COLLAR ELEV. (m)	PIEZO. SETTINGS (m)	PIEZOMETRIC LEVEL (m)
GPH-1	87-G-20	6 905 271.4	592 875.7	1 301.89	1 271.41	1 302.4
GPH-2	87-G-19	6 905 032.5	592 812.3	1 299.93	1 238.41	1 301.0
GPH-3	87-G-17	6 904 465.6	592 558.7	1 260.08	1 124.09 1 189.98 1 214.30	1 255.5
GPH-4	87-G-18	6 904 836.9	592 834.0	1 286.97		1 287.0
GPH-5	87-G-16	6 904 817.3	592 471.0	1 301.50	1 219.21 1 275.59	1 257.0
GPH-6	87-G-9	6 905 092.7	592 393.2	1 301.5	1 194.83 1 235.97	1 265.5
DL-1		6 905 061.5	592 714.5	1 304.00		1 304.5
DL-2		6 905 261.0	592 138.5	1 309.8	1 298.00	1 298.0
DL-3		6 904 922.0	592 025.0	1 301.0	1 291.50	1 291.5
DL-4		6 904 472.0	592 420.0	1 259.2	1 254.3	1 254.3
WATER WELL		6 904 448.6	592 168.3	1 275.8		1 276

TABLE A-3 :RESULTS OF SEVERE SLAKING TEST

Freeze Thaw Test Sample Number	Drill Hole	Depth (feet)	Rock Type	Pit	Type of Core	Estimated % Weight Loss	OBSERVATIONS Elapsed Minutes: 1 / Hours: 0 / Minutes: 1	3 0 3	10 0 10	30 0 30	60 1 0	180 3 0	600 10 0	1440 24 0	2880 48 0	Comments
1A	V30R	170	6A	Vang.	split	< 1				small flakes						
2A	V307	155	4E	Vang.	split	0										
3A	V126R	140	6A	Vang.	split	0										
4A	V27R	215	6A	Vang.	split	0										
5A	V133R	130	5B6	Vang.	whole?	0										
6A	V310	90	5B6	Vang.	whole	< 1					small flakes					
7A	V143	150	4L6	Vang.	whole	0										
8A	V1R	160	5A	Vang.	whole	< 1					cracks slaking	furthur crack slaking	furthur crack slaking	more flakes falling off		surface pitted in areas, flakes rub off
9A	V319	100	4L,4L6	Vang.	whole	< 1										
10A	V30R	140	4L	Vang.	whole	< 1								small flakes		
11A	V28R	150	5A	Vang.	whole	< 1				small flakes	cracks slaking	gradual furthur widening of cracks	gradual furthur widening of cracks	gradual furthur widening of cracks	gradual furthur widening of cracks	cracks widened, black dust comes off when surface rubbed
12A	V318	140	4C	Vang.	split	0										
13A	V60R	140	4A[4]	Vang.	split	0										
14A	V117R	150	4E	Vang.	split?	0										
15A	V63R	150	4C7	Vang.	whole?	< 1			one small flake							
16A	V318R	190	4L0	Vang.	whole	0										
17A	V321	160	4L7	Vang.	whole	0		small amount rock bits washed off, oxidized	orange water	orange water		precipitate formed				water tested for metals
18A	U140	15	3G0+/-9	Grum	whole	0										oxidized areas already present
19A	U152	15	3G0$2	Grum	whole	< 1				few bits slaked of						
20A	U49	138	3G0	Grum	whole	0										
21A	A67	173	5B0+/-2	Grum	whole	< 1	small bits started to flake off	flaked bits settling to bottom								
22A	A215	193	5B02	Grum	whole	< 1	small bits started to flake off	flaked bits settling to bottom								
23A	A117	80	5A0	Grum	whole	< 1	small bits started to flake off	flaked bits settling to bottom		air bubbles escaping	stopped bubbling					
24A	A62	201	4L0	Grum	whole	< 1	small bits started to flake off	flaked bits settling to bottom	air bubbles escaping from	still bubbling	stopped bubbling					
25A	A208	107	5B0	Grum	whole	< 1	small bits started to flake off, water has become murky	water very murkey		water still very murky	water still murky			water clear, has settled		this rock type is very susceptible to slaking, soft
26A	A10	303	5D0	Grum	whole	0										
27A	V71	92	5A6+/-9	Grum	whole	0				couple of bits slaked off						

TABLE A-4: ACID/BASE ACCOUNTING TEST RESULTS - VANGORDA

WASTE ROCK TYPE		DRILL HOLE	SELECTED INTERVAL Midpoint (m)	SAMPLED INTERVAL Upper (m)	Lower (m)	pH	% S	MAX ACIDITY POTENT.*	NEUTRAL. POTENT.*	EFFECT. NEUTRAL.*
Ribbon banded graphitic	4A0	V26R	40.0	39.6	40.2	5.4	5.770	180.0	2.53	-177.5
quartzite	4A0	V313	35.0	34.1	35.1	6.2	11.100	347.0	5.23	-341.8
Pyritic quartzite	4C9	V94R	68.0	68.0	68.6	6.2	18.700	584.0	13.68	-570.3
	4C8	V35R	55.0	54.1	54.7	5.7	28.800	900.0	5.86	-894.1
Pyritic massive sulphide	4E0	V95R	68.0	68.3	68.9	7.6	38.500	1200.0	208.55	-991.5
					AVERAGE	6.2	20.574	642.2	47.17	-595.0
					STANDARD DEVIATION	0.8	11.844	369.3	80.78	311.7
Altered	4L0	V312	52.0	53.3	53.9	6.6	7.490	234.0	8.30	-225.7
phyllite	4L0	V312	60.0	60.0	60.7	7.4	4.740	148.0	10.47	-137.5
	4L3	V143R	20.0	20.4	21.0	6.6	1.580	49.4	5.11	-44.3
	4L6	V143R	50.0	50.0	50.6	8.3	0.527	16.5	14.30	-2.2
	4L6	V35R	30.0	29.7	30.3	7.7	0.460	14.4	4.87	-9.5
	4L7	V95R	35.0	35.1	35.7	6.9	2.740	85.6	7.60	-78.0
					AVERAGE	7.3	2.923	91.3	8.44	-82.9
					STANDARD DEVIATION	0.6	2.510	78.4	3.24	78.3
Carbonaceous phyllite	5A0	V1R	45.0	44.8	45.4	8.0	1.730	54.1	41.02	-13.1
	5A3	V28R	45.0	45.1	45.7	7.8	2.090	65.3	33.50	-31.8
	5A6	V28R	50.0	48.8	49.4	7.8	1.790	55.9	30.56	-25.3
					AVERAGE	7.9	1.870	58.4	35.03	-23.4
					STANDARD DEVIATION	0.1	0.157	4.9	4.40	7.8
Phyllite	5B05	V27R	40.0	39.0	39.6	8.1	1.230	38.4	13.92	-24.5
Some weakly calcareous	5B6	V96R	60.0	59.7	60.4	7.5	0.836	26.1	6.42	-19.7
and some not.	5B6	V26R	20.0	20.0	20.6	7.1	0.728	22.8	4.51	-18.3
Equivocal as to what	5B62	V20R	50.0	49.4	50.0	4.4	0.586	18.3	2.20	-16.1
formation	5B62	V319	20.0	19.8	20.4	7.3	0.482	15.1	8.30	-6.8
	5B7	V95R	40.0	40.2	40.7	7.8	0.302	9.4	9.44	0.0
	5B7	V27R	55.0	53.6	54.3	7.9	0.619	19.3	13.60	-5.7
	5B70	V96R	40.0	39.6	40.2	7.2	0.515	16.1	6.88	-9.2
	5D0	V96R	57.0	56.7	57.3	8.4	0.058	1.8	169.10	167.3
					AVERAGE	7.3	0.595	18.6	26.04	7.5
					STANDARD DEVIATION	1.1	0.311	9.7	50.71	57.0

* kg of Calcium Carbonate Equiv./tonne of Material

TABLE A-5A: ACID/BASE ACCOUNTING TEST RESULTS - GRUM

WASTE ROCK TYPE		DRILL HOLE	SELECTED INTERVAL Upper (m)	SELECTED INTERVAL Lower (m)	SAMPLED INTERVAL Upper (m)	SAMPLED INTERVAL Lower (m)	pH	% S	MAX ACIDITY POTENT.*	NEUTRAL. POTENT.*	EFFECT. NEUTRAL.*
Ribbon banded graphitic quartzite	4A0	A225	59.5	60.2	59.5	60.3	7.6	0.817	25.5	28.82	3.3
	4A0	A201	132.9	141.9	139.2	139.8	7.6	6.720	210.0	68.68	-141.3
	4A0	A207	126.2	130.3	127.8	128.6	6.9	9.890	309.0	37.02	-272.0
	4A0	A203	112.4	126.4	114.5	115.2	6.3	15.600	488.0	33.18	-454.8
	4A0	A204	142.9	150.1	146.6	147.2	6.0	2.180	68.1	10.73	-57.4
	4A0	A211	96.3	113.0	104.6	105.4	4.9	16.900	528.0	0.48	-527.5
						AVERAGE	6.6	8.685	271.4	29.82	-241.6
						STANDARD DEVIATION	1.0	6.122	191.4	21.60	196.7
Pyritic massive sulphide	4E0	A211	125.7	128.0	128.3	129.2	5.9	44.900	1400.0	40.61	-1359.4
	4E0	A211	129.7	134.3	131.0	131.6	5.8	47.700	1490.0	38.92	-1451.1
	4E0#	A202	173.6	174.7	173.6	174.2	6.6	36.900	1150.0	76.58	-1073.4
	4E0	A212	147.2	149.2	147.2	147.7	5.4	47.500	1480.0	4.85	-1475.2
	4E0	A212	153.2	154.7	153.2	154.0	5.7	47.400	1480.0	4.03	-1476.0
						AVERAGE	5.9	44.880	1400.0	33.00	-1367.0
						STANDARD DEVIATION	0.4	4.119	129.2	26.92	152.9
Altered phyllite	4L0	A201	164.7	171.7	167.0	167.5	8.0	1.550	48.4	18.26	-30.1
	4L0	A201	174.6	186.0	181.5	182.0	7.8	1.670	52.2	25.76	-26.4
	4L0(4L6,4L2)	A075	323.4	347.8	326.1	326.7	8.2	0.316	9.9	15.36	5.5
	4L0	A087	380.7	394.0	384.7	385.3	8.3	1.210	37.8	16.59	-21.2
	4L07	A054	76.5	84.8	77.1	77.7	8.5	0.154	4.8	45.88	41.1
	4L2	A203	133.5	137.3	133.5	134.5	6.9	8.710	272.0	16.33	-255.7
	4L6 WEAK	A050	80.7	90.5	87.5	88.1	7.8	0.778	24.3	26.82	2.5
	4L67	A054	71.4	76.5	74.4	75.0	7.9	1.880	58.8	35.92	-22.9
	4L67 9	A085	403.3	418.9	404.8	396.2	8.4	0.596	18.6	10.75	-7.9
						AVERAGE	8.0	1.874	58.5	23.52	-35.0
						STANDARD DEVIATION	0.5	2.484	77.6	10.68	30.3
Carbonaceous phyllite	5A0$	A085	313.2	321.0	311.8	312.4	7.5	1.390	43.4	35.92	-7.5
	5A1 9 MINOR	A039	15.3	30.2	17.7	18.3	7.3	1.410	44.1	29.23	-14.9
	5A6	A221	175.3	204.9	183.0	183.8	7.7	2.060	64.4	17.25	-47.2
	5A6+-1	A039	143.8	173.1	146.9	147.5	7.4	0.997	31.2	27.11	-4.1
	5A6(5A19)	A214	15.8	23.7	17.3	17.7	7.4	2.370	74.1	33.25	-40.8
	5A61	A218	164.4	175.3	166.0	166.8	8.4	0.477	14.9	12.21	-2.7
						AVERAGE	7.6	1.451	45.4	25.83	-19.5
						STANDARD DEVIATION	0.4	0.629	19.7	8.46	17.8

TABLE A-5B: ACID/BASE ACCOUNTING TEST RESULTS - GRUM

WASTE ROCK TYPE		DRILL HOLE	SELECTED INTERVAL Upper (m)	SELECTED INTERVAL Lower	SAMPLED INTERVAL Upper (m)	SAMPLED INTERVAL Lower (m)	pH	% S	MAX ACIDITY POTENT.*	NEUTRAL. POTENT.*	EFFECT. NEUTRAL.*
Vangorda formation	5BO	A123	29.6	37.3	29.6	30.7	8.0	0.207	6.5	125.98	119.5
calcareous phyllite	5BO	A125	39.6	55.2	44.8	45.3	8.2	0.239	7.5	123.33	115.8
	5BO	A227	20.3	27.7	22.2	23.0	7.8	0.539	16.8	26.85	10.1
	5BO	A024	10.0	40.8	16.2	16.8	8.8	0.146	4.6	126.94	122.3
	5BO(5DO)	A059	96.1	109.2	96.9	97.5	8.5	0.331	10.3	62.19	51.9
	5BO2MINOR(5B	A059	128.6	136.1	128.9	129.5	7.9	0.072	2.3	224.23	221.9
	5BO 8 MINOR	A061	113.0	125.6	116.9	117.5	8.4	0.392	12.3	156.70	144.4
	5B3+-8	A087	104.0	114.5	104.2	104.9	8.3	0.058	1.8	234.89	233.1
	5B3+-8	A214	111.2	117.6	114.3	114.9	8.2	0.018	0.6	86.84	86.2
						AVERAGE	8.2	0.2	7.0	129.8	122.8
						STANDARD DEVIATION	0.3	0.2	5.1	64.8	68.0
Mt Mye and Vangorda	3GO	A222	98.2	115.0	98.5	99.5	8.1	0.184	5.8	53.74	47.9
formations	3GO	A039	118.6	143.8	120.1	120.7	7.7	0.741	23.2	16.48	-6.7
Non-calcareous phyllite	3GO	A235	113.1	117.5	115.0	115.8	7.9	0.368	11.5	11.02	-0.5
	3GO+-$MINOR	A033	111.9	134.2	115.8	116.4	7.9	0.016	0.5	29.71	29.2
	3GO+-9	A087	257.9	273.3	259.1	259.7	8.4	0.434	13.6	14.69	1.1
	3GO(3G3)(4LO	A079	192.0	201.9	200.9	201.5	8.2	0.373	11.7	54.58	42.9
	5A6	A224	78.3	88.0	82.3	83.0	7.4	0.515	16.1	37.15	21.0
	3G9(5A6)	A227	79.2	90.2	79.5	80.2	7.8	0.410	12.8	12.90	0.1
	5B62	A214	228.6	238.1	229.0	229.5	8.3	1.020	31.9	7.09	-24.8
	5B6$2 MINOR	A059	145.6	152.7	146.9	147.5	8.0	0.479	15.0	171.54	156.5
	5B6 $ MINOR	A039	75.2	88.3	75.6	78.3	8.3	0.345	10.8	16.72	5.9
						AVERAGE	8.0	0.4	13.9	38.7	24.8
						STANDARD DEVIATION	0.3	0.3	7.9	44.9	46.6

* kg of Calcium Carbonate Equiv./tonne of Material

TABLE A-6 : RESULTS OF WET DRY CYCLE TESTING

Sample Number	Drill Hole	Depth (ft)	Rock Type	Pit	Type of Core	Start wt. (gm)	End wt. (gm)	% Wt. Loss	Number of Days with Breakage Cracks or Flaking Noted	Number of Days with Oxidation noted	Elapsed days:	0	2	4	7	9	15	15	17	21	23	25	31	35	37	39	43	45	50	56	59	65	70	72	75	77	81	87	93	95	106	108	112	114	116	119	121	123	128	130	133	135	137	140	142	144	147	149	151	154
											Month:	9	9	9	10	10	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	12	12	12	12	12	12	12	12	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
											Date:	26	28	30	3	5	11	11	13	17	19	21	27	31	2	4	8	10	15	21	24	30	5	7	10	12	16	22	28	30	10	12	16	18	20	23	25	27	1	3	6	8	10	13	15	17	20	22	24	27
												88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	85	88	88	88	88	88	88	88	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
1A	V30R	170	4A	Vangorda	split	NA	236.0	ERR	0	0																																																	
2A	V307	155	4E	Vangorda	split	NA	310.0	ERR	0	2		oxfr							ox																																						
3A	V126R	140	4A	Vangorda	split	NA	227.4	ERR	0	2		ox							ox																																					
4A	V27R	215	4A	Vangorda	split	229.4	226.8	1.1%	3	1			ox										cr	br									br																							
5A	V133R	130	5B6	Vangorda	whole?	415.0	415.0	0.0%	0	2		oxfr							ox																																						
6A	V310	90	5B6	Vangorda	whole	464.5	463.8	0.2%	1	3		ox	stox							ox													cr																							
7A	V143	150	4L6	Vangorda	whole	503.8	503.3	0.1%	2	2		oxfr								ox			fl					cr																											
8A	V1R	160	5A	Vangorda	whole	290.5	290.0	0.2%	0	1		ox								ox																																			
9A	V319	100	4L,4L	Vangorda	whole	518.4	514.3	0.8%	3	1			ox		br					br																									br												
10A	V30R	140	4L	Vangorda	whole	497.2	490.3	1.4%	3	2				ox					ox			cr				cr	br																												
11A	V28R	150	5A	Vangorda	whole	480.1	479.9	0.0%	4	0		cr												cr			cr									cr																			
12A	V318	140	4C	Vangorda	split	269.1	269.0	0.0%	0	1				ox																																									
13A	V60R	140	4A*	Vangorda	split	244.1	243.5	0.2%	0	2		ox							ox																																					
14A	V117R	150	4E	Vangorda	split?	294.3	294.3	0.0%	0	0																																													
15A	V63R	150	4C7	Vangorda	whole?	184.4	183.8	0.3%	0	4		stox	stox						ox	ox																																				
16A	V318R	190	4L0	Vangorda	whole	468.6	468.2	0.1%	1	0													fl																																
17A	V321	160	4L7	Vangorda	whole	276.1	275.2	0.3%	1	2		ox		ox														cr																											
18A	U140	15	3G0+/	Grum	whole	307.6	306.6	0.3%	0	0																																												
19A	U152	15	3G0$2	Grum	whole	415.9	415.7	0.0%	0	1									ox																																				
20A	U49	138	3G0	Grum	whole	201.1	200.6	0.2%	1	0													fl																															
21A	A67	173	5B0+/	Grum	whole	350.9	349.6	0.4%	2	0												br		br																														
22A	A215	193	5B02	Grum	whole	310.0	308.9	0.4%	1	1				ox						br																																			
23A	A117	80	5A0	Grum	whole	209.5	204.9	2.2%	4	1		oxfr									br		br	br																					br											
24A	A62	201	4L0	Grum	whole	335.0	333.5	0.4%	1	1				ox									fl																																
25A	A208	107	5B0	Grum	whole	351.2	350.5	0.2%	0	0																																												
26A	A10	303	5D0	Grum	whole	249.7	249.1	0.2%	0	0																																												
27A	V71	92	5A6+/	Grum	whole	289.7	287.4	0.8%	1	4		ox			ox				ox	ox			fl																																

LEGEND

stox	strong oxidation noted
ox	oxidation or increase in oxidation noted
oxfr	oxidation along fractures noted
cr	development or widinrng of a crack noted, but core not yet broken
br	breakage of core into two or more separate pieces noted
fl	flaking of core along micaceous foliation noted

TABLE A-7: RESULTS OF FREEZE THAW CYCLE TESTING

Sample Number	Drill Hole	Depth (feet)	Rock Type	Pit	Type of Core	Initial Weight (gm)	Final Weight (gm)	% Weight Loss	Number of Days with Breakage or Flaking Noted	Number of Days with Cracks or Oxidation Noted	Daily Record: Elapsed Days:	1	3	7	9	11	15	18	21	23	25	32	37	39	43	45	50	56	59	65	70	72	75	77	81	87	93	95	106	108	112	114	116	119	121	123	128	130	133	135	137	140	142	144	147	149	151
											Month:	9	9	10	10	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	12	12	12	12	12	12	12	12	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
											Date:	27	29	3	5	7	11	14	17	19	21	28	2	4	8	10	15	21	24	30	5	7	10	12	16	22	28	30	10	12	16	18	20	23	25	27	1	3	6	8	10	13	15	17	20	22	24
											Year:	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
1B	V30R	170	4A	Vang.	split	127.4	125.9	1.2%	0	1				ox																																													
2B	V307	155	4E	Vang.	split	297.4	297.3	0.0%	0	1								ox																																						
3B	V126R	140	4A	Vang.	split	277.8	277.4	0.1%	0	1		ox																																											
4B	V27R	215	4A	Vang.	split	240.2	239.9	0.1%	0	0																																												
5B	V133R	130	5B6	Vang.	whole?	415.8	415.0	0.2%	0	1									ox				cr																																
6B	V310	90	5B6	Vang.	whole	398.1	394.8	0.8%	1	1		ox									cr																																		
7B	V143	150	4L6	Vang.	whole	558.2	557.0	0.2%	0	1									cr	ox				cr	br,cr	br	br		br	br	br	cr								br		f1													
8B	V1R	160	5A	Vang.	whole	502.0	494.0	1.6%	12	1									cr	ox	f1																																			
9B	V319	100	4L,4L	Vang.	whole	414.9	406.5	2.0%	5	3		ox,br	ox					ox	ox			br	cr				cr																													
10B	V30R	140	4L	Vang.	whole	344.3	343.6	0.2%	3	2				br				ox		ox		f1	br																																
11B	V28R	150	5A	Vang.	whole	487.9	485.5	0.5%	3	1			cr					ox				br																br																
12B	V318	140	4C	Vang.	split	236.8	236.3	0.2%	0	0																																												
13B	V60R	140	4A*	Vang.	split	190.7	190.9	-0.1%	0	1								ox																																				
14B	V117R	150	4E	Vang.	split?	248.3	248.2	0.0%	0	0																																											
15B	V63R	150	4C7	Vang.	whole?	136.6	136.5	0.1%	0	1								ox																																				
16B	V318R	190	4L0	Vang.	whole	515.6	515.3	0.1%	0	1								ox																																				
17B	V321	160	4L7	Vang.	whole	319.7	319.0	0.2%	2	3		ox			ox			cr	ox				cr																																
18B	U140	15	3G0+/	Grum	whole	471.1	470.0	0.2%	0	1		ox																																										
19B	U152	15	3G0$2	Grum	whole	395.6	394.9	0.2%	0	2		ox						ox																																				
20B	U49	138	3G0	Grum	whole	125.7	125.8	-0.1%	0	0																																											
21B	A67	173	5B0+/	Grum	whole	379.7	379.4	0.1%	1	1										ox																																		
22B	A215	193	5B02	Grum	whole	290.9	291.5	-0.2%	0	3		ox						ox		ox																																		
23B	A117	80	5A0	Grum	whole	145.9	140.0	4.0%	4	1		ox		br								f1		f1			f1																											
24B	A62	201	4L0	Grum	whole	587.7	575.0	2.2%	11	2		ox	br,c						ox	br	br,cr	cr,br	4cr,br		cr		cr						br								cr	br		br										
25B	A208	107	5B0	Grum	whole	393.9	392.3	0.4%	1	1			ox						f1																																		
26B	A10	303	5D0	Grum	whole	166.4	166.2	0.1%	2	3			ox		ox				ox			f1		f1																												
27B	V71	92	5A6+/	Grum	whole	449.6	445.0	1.0%	4	9		ox	ox	ox	ox	ox		ox	ox	ox	cr			f1,c			cr											br,c																

Legend

ox	oxidized or an increase in oxidation noted
bf	broken into two or more separate pieces
cr	cracked but not broken into separate pieces
fl	flaking along the micaceous foliation
Ncr	cracked in N places

TABLE A-8

ROBINSON SRK - CURRAGH

HUMIDITY CELL TEST

SULPHIDE COMPOSITE

CYCLE	DAYS	pH	REDOX (mV SCE)	CONDUCTIVITY (mS/cm3)	ALKALINITY (mg/L CaCO3)	ACIDITY (pH 4.5) --(mg/L	ACIDITY (pH 8.3) CaCO3)--	CUM. ACIDITY (pH 8.3) (mg CaCO3/100g)	SULPHATE (mg/L)	CUMULATIVE SULPHATE (mg/100g)
1	7	6.41	321	730	9.5	0.0	30.6	1.4	360	16.0
2	14	4.20	396	668	0.0	NA	55.2	3.7	350	30.8
3	21	5.22	461	661	9.5	0.0	64.4	6.4	300	43.3
4	28	6.05	253	467	4.2	0.2	37.8	8.2	220	53.6
5	35	5.37	507	556	9.1	0.0	48.0	10.3	210	63.2
6	42	5.61	343	726	3.0	0.0	87.6	13.9	315	75.8
7	49	4.20	375	556	0.0	2.4	43.8	16.1	150	83.4
8	56	5.44	213	511	4.0	0.0	45.1	17.9	260	94.0
9	63	4.67	281	380	0.6	0.0	18.9	18.8	170	102.0
10	70	5.63	197	356	4.2	0.0	34.6	20.4	160	109.5
11	77	5.54	236	449	2.1	0.0	40.2	22.6	200	120.4
12	84	5.25	354	557	1.7	0.0	66.0	26.8	240	135.5
13	91	4.64	209	499	0.6	0.0	61.6	29.5	240	146.0
14	98	5.32	242	346	1.6	0.0	24.0	30.6	160	153.6
15	105	5.40	364	408	2.1	0.0	37.6	32.6	215	165.0
16	112	5.37	197	470	2.1	0.0	39.5	34.5	180	173.8
17	119	5.32	215	452	2.1	0.0	49.0	36.8	260	186.1
18	126	5.29	149	473	2.0	0.0	45.6	39.0	250	198.1
19	133	5.01	178	475	2.2	0.0	56.8	41.8	260	210.6
20	140	5.24	216	625	2.0	0.0	63.2	45.0	310	226.5
21	147	4.61	187	758	0.0	0.0	111.3	49.7	380	242.5
22	154	4.92	175	801	4.2	0.0	107.6	55.5	410	264.8
23	161	4.86	210	700	4.2	0.0	86.4	61.0	400	290.0
24	168	4.78	375	506	2.1	0.0	60.2	64.5	250	304.8
25	175	4.49	416	370	0.0	0.5	38.8	66.4	180	313.6
26	182	4.60	443	358	2.0	0.0	40.0	68.6	200	324.2
27	189	4.60	249	879	3.9	0.0	129.5	73.5	400	339.5
28	196	4.48	281	328	0.0	0.5	52.0	76.5	155	348.4
29	203	4.59	331	433	1.9	0.0	47.9	78.6	210	357.6
30	210	4.55	351	391	2.0	0.0	36.5	80.4	185	366.4
31	217	4.18	296	323	0.0	1.5	40.7	82.3	160	374.2
32	224	4.29	295	387	0.0	1.0	51.0	84.6	165	381.6

TABLE A-9A

HUMIDITY CELL TESTING

METAL EXTRACTION

SULPHIDE COMPOSITE

	CUMULATIVE WATER EXTRACT ICP ANALYSIS (mg/100 g sample)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	340 *	na	271	2.0	0.7	210	4.1	19.6	232	>15%	460	180	169	0.1	3.5	597
1	0.01	0.01	0.01	0.00	0.01	4.94	0.00	0.02	0.00	0.00	0.02	0.87	1.55	0.00	0.01	0.00
2	0.02	0.02	0.02	0.01	0.01	9.36	0.00	0.02	0.00	0.02	0.11	1.50	2.76	0.00	0.02	1.08
3	0.03	0.03	0.03	0.01	0.02	12.32	0.00	0.02	0.00	0.04	0.20	2.27	4.25	0.00	0.03	2.57
4	0.04	0.04	0.04	0.01	0.03	14.96	0.00	0.02	0.00	0.05	0.29	2.68	5.06	0.01	0.04	3.67
5	0.04	0.04	0.04	0.02	0.03	17.58	0.00	0.02	0.01	0.07	0.39	3.09	5.86	0.01	0.05	5.04
6	0.05	0.05	0.05	0.02	0.04	19.89	0.00	0.03	0.01	0.12	0.54	3.91	7.42	0.01	0.06	7.09
7	0.06	0.06	0.06	0.02	0.05	22.12	0.00	0.02	0.01	0.13	0.63	4.51	8.50	0.01	0.07	8.33
8	0.07	0.07	0.07	0.03	0.06	24.12	0.01	0.02	0.01	0.17	0.74	5.07	9.55	0.01	0.08	9.70
9	0.08	0.08	0.08	0.03	0.06	25.73	0.01	0.01	0.01	0.21	0.86	5.56	10.46	0.01	0.08	10.85
10	0.09	0.09	0.09	0.03	0.07	27.28	0.01	0.01	0.01	0.25	0.98	5.98	11.19	0.01	0.09	11.78
11	0.10	0.10	0.10	0.04	0.07	29.39	0.01	0.02	0.02	0.29	1.13	6.62	12.30	0.02	0.10	12.97
12	0.11	0.11	0.11	0.04	0.08	32.21	0.01	0.03	0.02	0.31	1.26	7.84	14.45	0.02	0.11	14.76
13	0.12	0.12	0.12	0.04	0.09	33.86	0.01	0.02	0.02	0.43	1.39	8.43	15.60	0.02	0.12	16.17
14	0.13	0.13	0.13	0.04	0.10	35.47	0.01	0.01	0.02	0.46	1.56	8.77	16.17	0.02	0.12	16.96
15	0.14	0.14	0.14	0.05	0.10	37.60	0.01	0.02	0.02	0.52	1.73	9.37	17.18	0.02	0.13	18.05
16	0.15	0.15	0.15	0.05	0.11	39.58	0.01	0.02	0.02	0.55	1.88	10.00	18.24	0.02	0.14	19.16
17	0.16	0.16	0.16	0.05	0.11	41.39	0.01	0.02	0.03	0.66	2.08	10.59	19.28	0.02	0.14	20.43
18	0.17	0.17	0.17	0.05	0.12	43.43	0.01	0.02	0.03	0.81	2.29	11.23	20.40	0.03	0.15	21.65
19	0.18	0.18	0.18	0.05	0.12	45.39	0.01	0.02	0.03	1.02	2.52	11.89	21.66	0.03	0.15	22.96
20	0.19	0.19	0.19	0.05	0.13	47.45	0.01	0.03	0.03	1.18	2.74	13.02	23.86	0.03	0.16	25.06
21	0.20	0.20	0.20	0.06	0.14	49.77	0.01	0.02	0.04	1.86	2.96	14.03	25.93	0.03	0.17	27.22
22	0.21	0.21	0.21	0.06	0.14	52.33	0.02	0.03	0.04	2.18	3.15	15.59	29.32	0.03	0.19	30.89
23	0.22	0.22	0.22	0.06	0.15	55.47	0.02	0.03	0.04	2.33	3.36	17.03	32.44	0.03	0.21	34.02
24	0.23	0.23	0.23	0.06	0.16	57.61	0.02	0.02	0.04	2.69	3.63	17.43	33.26	0.04	0.21	35.02
25	0.24	0.24	0.24	0.06	0.16	59.11	0.02	0.02	0.05	2.93	3.82	17.84	34.09	0.04	0.22	35.89
26	0.25	0.25	0.25	0.07	0.17	61.41	0.02	0.04	0.06	3.31	4.05	19.71	37.83	0.04	0.24	39.60
27	0.26	0.26	0.26	0.07	0.17	62.35	0.02	0.02	0.06	3.70	4.21	19.87	38.26	0.04	0.24	40.23
28	0.27	0.27	0.27	0.07	0.17	64.13	0.02	0.03	0.07	3.97	4.37	20.51	39.50	0.04	0.25	41.45
29	0.28	0.28	0.28	0.07	0.17	65.59	0.02	0.02	0.07	4.10	4.49	20.92	40.29	0.04	0.26	42.20

TABLE A-9A (cont'd)

HUMIDITY CELL TESTING

METAL EXTRACTION

SULPHIDE COMPOSITE

	CUMULATIVE WATER EXTRACT ICP ANALYSIS (mg/100 g sample)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	340 *	na	271	2.0	0.7	210	4.1	19.6	232	>15%	460	180	169	0.1	3.5	597
30	0.28	0.28	0.28	0.07	0.17	65.59	0.02	0.02	0.07	4.10	4.49	20.92	40.29	0.04	0.26	42.20
31	0.29	0.29	0.29	0.07	0.18	66.61	0.02	0.03	0.08	4.34	4.63	21.34	41.08	0.04	0.26	42.96
32	0.30	0.30	0.30	0.07	0.18	67.62	0.02	0.03	0.09	4.82	4.79	21.79	42.03	0.05	0.27	43.94

* assay in mg/100g unless otherwise indicated

TABLE A-9B

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

SULPHIDE COMPOSITE

CYCLE	WATER EXTRACT ICP ANALYSIS (mg/L)															
	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	<0.20 *	<0.20	<0.20	<0.010	<0.010	<0.050	<0.015	<0.015	<0.010	<0.015	<0.050	<0.010	<0.005	<0.030	<0.025	<0.005
1	< 0.20	< 0.20	< 0.20	0.089	0.130	111.0	<0.015	0.400	0.012	0.066	0.490	19.50	34.90	<0.030	0.210	17.70
2	< 0.20	< 0.20	< 0.20	0.053	0.160	105.0	<0.015	0.380	0.025	0.370	2.100	15.00	28.60	<0.030	0.220	25.60
3	< 0.20	< 0.20	< 0.20	0.120	0.190	71.1	<0.015	0.510	0.044	0.510	2.200	18.40	35.70	<0.030	0.300	35.80
4	< 0.20	< 0.20	< 0.20	0.080	0.140	55.9	<0.015	0.300	0.032	0.220	1.800	8.69	17.20	<0.030	0.140	23.20
5	< 0.20	< 0.20	< 0.20	0.072	0.160	57.3	<0.015	0.340	0.023	0.370	2.280	9.11	17.50	<0.030	0.200	29.90
6	< 0.20	< 0.20	< 0.20	0.047	0.240	57.7	<0.015	0.590	0.075	1.350	3.700	20.30	39.00	<0.030	0.360	51.30
7	< 0.20	< 0.20	< 0.20	0.072	0.130	44.4	<0.015	0.260	0.045	0.210	1.720	12.10	21.50	<0.030	0.170	24.70
8	< 0.20	< 0.20	< 0.20	0.064	0.160	48.7	<0.015	0.350	0.031	0.980	2.840	13.70	25.80	<0.030	0.190	33.50
9	< 0.20	< 0.20	< 0.20	0.062	0.130	34.6	<0.015	0.200	0.029	0.730	2.470	10.30	19.40	<0.030	0.140	24.50
10	< 0.20	< 0.20	< 0.20	0.055	0.110	32.9	<0.015	0.160	0.022	1.010	2.600	8.94	15.50	<0.030	0.120	19.90
11	< 0.20	< 0.20	< 0.20	0.078	0.120	38.9	<0.015	0.180	0.017	0.760	2.780	11.80	20.50	<0.030	0.140	21.80
12	< 0.20	< 0.20	< 0.20	0.062	0.140	44.6	<0.015	0.290	0.020	0.300	2.030	19.30	34.00	<0.030	0.190	28.30
13	< 0.20	< 0.20	< 0.20	0.033	0.180	37.6	<0.015	0.270	0.060	2.590	3.090	13.50	26.20	<0.030	0.190	32.40
14	< 0.20	< 0.20	< 0.20	0.061	0.093	34.2	<0.015	0.099	0.033	0.770	3.500	7.18	12.10	<0.030	0.086	16.60
15	< 0.20	< 0.20	< 0.20	0.050	0.098	40.3	<0.015	0.140	0.023	1.000	3.270	11.50	19.10	<0.030	0.130	20.60
16	< 0.20	< 0.20	< 0.20	0.046	0.110	40.1	<0.015	0.160	0.024	0.780	2.990	12.60	21.40	<0.030	0.130	22.50
17	< 0.20	< 0.20	< 0.20	0.035	0.110	38.3	<0.015	0.160	0.045	2.260	4.190	12.60	22.10	<0.030	0.130	27.10
18	< 0.20	< 0.20	< 0.20	0.030	0.100	42.6	<0.015	0.140	0.041	3.010	4.490	13.30	23.50	<0.030	0.120	25.40
19	< 0.20	< 0.20	< 0.20	0.025	0.100	40.8	<0.015	0.150	0.052	4.540	4.670	13.70	26.10	<0.030	0.120	27.20
20	< 0.20	< 0.20	< 0.20	0.028	0.140	40.2	<0.015	0.240	0.039	3.040	4.380	22.20	43.00	<0.030	0.230	41.00
21	< 0.20	< 0.20	< 0.20	<0.010	0.170	55.1	<0.015	0.250	0.100	16.100	5.190	24.00	49.20	<0.030	0.230	51.30
22	< 0.20	< 0.20	< 0.20	0.029	0.160	47.0	<0.015	0.350	0.041	5.910	3.530	28.60	62.30	<0.030	0.340	67.50
23	< 0.20	< 0.20	< 0.20	0.042	0.120	49.8	<0.015	0.270	0.036	2.330	3.350	22.90	49.40	<0.030	0.270	49.60
24	< 0.20	< 0.20	< 0.20	0.031	0.054	36.3	<0.015	0.077	0.065	6.140	4.460	6.72	13.90	<0.030	0.069	16.90
25	< 0.20	< 0.20	< 0.20	0.042	0.054	30.7	<0.015	0.079	0.072	4.870	4.020	8.35	17.00	<0.030	0.078	17.90
26	< 0.20	< 0.20	< 0.20	0.031	0.180	43.3	<0.015	0.390	0.170	7.300	4.230	35.30	70.60	<0.030	0.380	70.00
27	< 0.20	< 0.20	< 0.20	0.034	0.044	24.5	<0.015	0.090	0.120	10.100	4.320	4.23	11.10	<0.030	0.120	16.30
28	< 0.20	< 0.20	< 0.20	0.019	0.052	30.9	<0.015	0.120	0.094	4.580	2.670	11.00	21.60	<0.030	0.160	21.30

TABLE A-9B (cont'd)

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

SULPHIDE COMPOSITE

	WATER EXTRACT ICP ANALYSIS (mg/L)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	<0.20 *	<0.20	<0.20	<0.010	<0.010	<0.050	<0.015	<0.015	<0.010	<0.015	<0.050	<0.010	<0.005	<0.030	<0.025	<0.005
29	< 0.20	< 0.20	< 0.20	0.021	0.054	33.5	<0.015	0.100	0.120	3.140	2.780	9.53	18.10	<0.030	0.110	17.20
30																
31	< 0.20	< 0.20	< 0.20	0.031	0.046	21.3	<0.015	0.082	0.120	4.980	3.040	8.64	16.30	<0.030	0.090	15.60
32	< 0.20	< 0.20	< 0.20	0.027	0.065	22.5	<0.015	0.100	0.150	10.700	3.370	10.20	21.20	<0.030	0.100	21.90

* detection limit in mg/L

TABLE A-10

ROBINSON SRK - CURRAGH

HUMIDITY CELL TEST

SULPHIDE COMPOSITE II (Inoculated)

CYCLE	DAYS	pH	REDOX	CONDUCTIVITY	ALKALINITY	ACIDITY (pH 4.5)	ACIDITY (pH 8.3)	CUM. ACIDITY (pH 8.3)	SULPHATE	CUMULATIVE SULPHATE
			(mV SCE)	(mS/cm3)	(mg/L CaCO3)	--(mg/L CaCO3)--		(mg CaCO3/100g)	(mg/L)	(mg/100g)
1	7	4.43	292	4980	0.0	1.2	1075.2	33.8	3400	106.8
2	14	3.92	275	4320	0.0	11.3	1086.6	65.5	500	121.4
3	21	3.56	338	4140	0.0	21.6	1596.2	114.3	3750	236.1
4	28	3.45	332	3660	0.0	32.4	1972.1	181.4	3200	344.9
5	35	3.21	328	4910	0.0	52.4	2664.0	274.4	5000	519.4
6	42	3.16	355	3620	0.0	71.6	1944.8	379.8	3100	687.4
7	49	2.57	349	4470	0.0	97.0	2616.0	495.9	3950	862.8
8	56	2.87	361	4570	0.0	108.6	2898.1	619.4	3600	1016.2
9	63	2.72	376	5370	0.0	445.2	3862.6	772.3	5200	1222.1
10	70	2.66	366	7000	0.0	554.0	3946.0	953.1	6800	1533.5
11	77	2.48	388	7500	0.0	1479.0	5621.4	1162.2	11000	1942.7
12	84	2.48	386	6350	0.0	826.8	4181.3	1334.4	10000	2354.7
13	91	2.22	514	6260	0.0	1151.5	5304.2	1508.4	6000	2551.5
14	98	2.51	385	5010	0.0	520.6	3338.1	1653.0	4500	2746.4
15	105	2.53	373	4940	0.0	650.0	3612.5	1808.3	4800	2952.8
16	112	2.63	379	7690	0.0	468.0	3055.0	1911.0	3600	3073.7
17	119	2.42	402	5090	0.0	837.0	4455.0	2059.8	4900	3237.4
18	126	2.68	395	3030	0.0	445.5	2146.5	2137.9	2700	3335.7
19	133	2.76	398	2010	0.0	452.6	2065.5	2198.6	2600	3412.1
20	140	2.98	407	1210	0.0	300.0	1462.5	2268.2	1900	3502.6
21	147	2.77	382	1310	0.0	237.5	1362.5	2326.8	1800	3580.0
22	154	2.95	387	1934	0.0	204.0	994.5	2375.3	1250	3641.0
23	161	2.88	394	1020	0.0	178.5	1300.5	2435.4	1500	3710.3
24	168	2.78	421	1420	0.0	362.5	1812.5	2511.2	2050	3796.0
25	175	2.85	405	1863	0.0	477.8	2082.5	2584.9	1550	3850.8
26	182	2.61	412	1590	0.0	514.5	2793.0	2687.1	3000	3960.6
27	216	2.80	409	1630	0.0	425.5	2449.5	2801.3	2690	4086.0
28	223	2.62	409	2250	0.0	846.0	4650.0	2941.7	5542	4253.3
29	230	2.75	401	3500	0.0	318.0	1512.0	2992.5	1635	4308.3
30	237	2.81	363	2730	0.0	192.0	1848.0	3084.9	2029	4409.7
31	244	2.53	411	3540	0.0	516.0	2146.2	3152.3	2765	4496.5
32	251	2.66	410	2240	0.0	281.7	1114.8	3190.7	1180	4537.1
33	258	2.75	398	2350	0.0	263.4	1384.3	3254.6	1486	4605.8
34	265	3.00	411	1530	0.0	120.1	788.9	3301.6	1350	4686.3
35	272	2.94	404	1410	0.0	146.9	628.6	3326.4	950	4723.7
36	279	3.00			0.0				345	4736.9
37	286	3.06			0.0				495	4760.7
38	293	2.87			0.0				445	4776.7
39	300	2.91	435	886	0.0	85.1	341.7		250	4780.9

TABLE A-IIA

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

SULPHIDE COMPOSITE II (Inoculated)

	CUMULATIVE WATER EXTRACT ICP ANALYSIS (mg/100 g sample)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	340 *	2.5	271	2	0.7	210	4.1	19.6	232	>15000	460	180	169.5	1.0	3.5	597
1	0.1	0.06	0.06	0.00	0.03	11.0	0.00	0.18	0.0	2.3	0.02	5.2	9.4	0.01	0.08	22.1
2	0.1	0.07	0.08	0.00	0.06	22.0	0.01	0.33	0.4	4.1	0.03	10.6	18.5	0.01	0.15	42.5
3	0.4	0.07	0.08	0.00	0.09	34.2	0.01	0.46	1.6	9.6	0.03	14.8	26.0	0.01	0.22	68.4
4	1.1	0.08	0.09	0.00	0.13	45.3	0.01	0.59	3.9	20.2	0.04	18.2	32.1	0.01	0.27	99.1
5	2.2	0.15	0.16	0.01	0.17	59.6	0.02	0.70	8.0	41.3	0.05	21.5	38.0	0.02	0.33	133.3
6	3.4	0.16	0.17	0.01	0.20	73.2	0.02	0.80	17.0	64.2	0.06	24.9	44.5	0.02	0.37	165.4
7	5.4	0.17	0.18	0.01	0.22	87.0	0.02	0.90	23.7	103.0	0.07	27.6	49.4	0.03	0.41	186.9
8	7.4	0.18	0.19	0.01	0.24	95.4	0.02	0.99	31.8	143.6	0.07	30.9	55.5	0.03	0.43	208.0
9	10.3	0.19	0.20	0.01	0.26	105.5	0.02	1.10	41.4	200.0	0.08	34.0	61.5	0.03	0.46	225.8
10	14.3	0.20	0.21	0.01	0.27	116.0	0.03	1.20	49.8	300.0	0.09	37.8	68.0	0.03	0.48	240.8
11	19.0	0.20	0.23	0.01	0.28	127.0	0.04	1.29	57.0	390.4	0.09	41.0	73.3	0.03	0.50	251.9
12	23.9	0.21	0.24	0.01	0.28	133.5	0.05	1.38	62.0	477.4	0.09	43.9	78.0	0.03	0.51	261.4
13	27.4	0.22	0.28	0.01	0.28	139.5	0.05	1.47	65.5	540.1	0.09	46.2	81.1	0.03	0.53	267.8
14	29.9	0.23	0.29	0.01	0.29	146.2	0.06	1.55	67.9	599.3	0.10	48.2	84.1	0.03	0.54	274.0
15	32.6	0.24	0.31	0.01	0.29	153.0	0.07	1.63	69.9	664.2	0.10	50.2	86.7	0.04	0.56	278.9
16	34.8	0.24	0.34	0.01	0.29	160.4	0.07	1.69	71.4	711.5	0.10	51.7	88.8	0.04	0.56	282.7
17	37.1	0.25	0.38	0.01	0.29	166.7	0.08	1.77	73.2	760.9	0.11	53.5	91.2	0.04	0.58	287.5
18	38.2	0.26	0.40	0.02	0.29	173.8	0.08	1.82	74.0	790.8	0.11	54.4	92.6	0.04	0.59	289.9
19	38.6	0.26	0.41	0.02	0.29	175.9	0.08	1.84	74.2	805.4	0.11	55.0	93.5	0.04	0.59	291.5
20	39.3	0.27	0.42	0.02	0.29	181.1	0.08	1.87	74.9	825.6	0.11	55.8	94.7	0.04	0.60	294.0
21	39.9	0.28	0.43	0.02	0.30	183.9	0.08	1.90	75.5	840.3	0.12	56.4	95.6	0.04	0.60	296.0
22	40.7	0.29	0.44	0.02	0.30	186.2	0.08	1.94	76.4	862.3	0.12	57.3	97.0	0.05	0.61	299.3
23	42.0	0.30	0.46	0.02	0.30	189.6	0.08	1.99	78.1	894.1	0.12	58.6	98.8	0.05	0.62	304.5

* assay in mg/100g unless othewrwise stated

TABLE A-IIB

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

SULPHIDE COMPOSITE II (Inoculated)

CYCLE	WATER EXTRACT ICP ANALYSIS (mg/L)															
	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	<0.20 *	<0.20	<0.20	<0.010	<0.010	<0.050	<0.015	<0.015	<0.010	<0.015	<0.050	<0.010	<0.005	<0.030	<0.025	<0.005
1	< 2.0	< 2.00	< 2.00	<0.100	0.990	349.0	<0.150	5.650	1.100	72	0.750	167	300	<0.300	2.52	703.0
2	2.1	< 0.20	0.46	0.012	0.930	379.0	<0.150	5.110	12.4	64	<0.050	185	310	<0.030	2.28	700.0
3	9.0	< 0.20	< 0.20	0.013	1.180	397.0	<0.015	4.470	37.8	180	0.160	135	246	<0.030	2.49	845.0
4	19.6	< 0.20	< 0.20	0.014	0.930	327.0	<0.015	3.630	69.8	312	0.170	101	180	<0.030	1.56	905.0
5	31.7	< 2.00	< 2.00	<0.100	1.150	409.0	<0.150	3.290	117.0	602	<0.500	93.9	168	<0.300	1.57	978.0
6	23.5	< 0.20	< 0.20	<0.010	0.610	251.0	<0.015	1.880	166.0	424	0.190	63.2	120	<0.030	0.81	592.0
7	44.4	< 0.20	< 0.20	0.014	0.500	311.0	<0.015	2.120	151.0	874	0.170	61.2	111	<0.030	0.74	486.0
8	47.5	< 0.20	< 0.20	0.020	0.440	197.0	<0.015	2.160	190.0	952	0.088	75.7	144	<0.030	0.59	494.0
9	72.3	< 0.20	0.24	0.020	0.400	257.0	0.036	2.710	243.0	1424	0.086	78.3	151	<0.030	0.65	450.0
10	86.2	< 0.20	0.29	0.018	0.340	228.0	0.140	2.320	183.0	2183	0.190	84.4	141	<0.030	0.48	328.0
11	127.0	< 0.20	0.60	<0.010	0.160	295.0	0.290	2.360	192.0	2431	0.084	85.2	143	<0.030	0.43	298.0
12	120.0	< 0.20	0.27	0.022	0.073	158.0	0.260	2.240	122.0	2112	<0.050	70.9	115	<0.030	0.38	231.0
13	105.0	< 0.20	1.03	<0.010	0.110	183.0	0.230	2.610	106.0	1912	0.084	69.2	92.6	<0.030	0.49	194.0
14	58.7	< 0.20	0.34	0.015	0.028	155.0	0.110	1.860	56.8	1366	0.057	47.7	69.3	<0.030	0.32	144.0
15	63.1	< 0.20	0.41	<0.010	0.089	159.0	0.180	1.910	45.9	1510	0.065	45.0	61.0	<0.030	0.33	114.0
16	63.6	< 0.20	0.96	0.011	0.037	220.0	0.140	1.800	44.0	1406	0.130	46.0	61.9	0.043	0.28	111.0
17	70.3	< 0.20	1.15	0.012	0.066	189.0	0.160	2.430	54.6	1480	0.066	52.2	73.5	0.065	0.45	145.0
18	29.1	< 0.20	0.52	<0.010	0.022	194.0	0.073	1.190	21.1	822	0.095	24.7	36.6	<0.030	0.24	65.6
19	13.7	< 0.20	< 0.20	<0.010	<0.010	71.6	<0.015	0.680	8.8	497	<0.050	21.2	32.6	0.034	0.14	53.5
20	15.5	< 0.20	0.28	<0.010	0.015	110.0	0.031	0.710	14.3	423	<0.050	17.4	25.6	<0.030	0.15	52.6
21	13.7	< 0.20	< 0.20	<0.010	0.019	65.4	0.026	0.610	14.1	344	<0.050	14.6	20.0	<0.030	0.11	46.8
22	16.4	< 0.20	< 0.20	<0.010	0.052	45.3	<0.015	0.79	19.2	450	<0.050	18.1	27.9	<0.030	0.15	68.2
23	27.4	< 0.20	0.54	0.013	0.082	74.9	0.035	1.19	36.4	688	<0.050	27.0	39.6	<0.030	0.26	113.0
24																
25	15.9	< 0.20	< 0.20	0.022	<0.010	54.3	0.016	0.64	19.6	369	<0.050	14.0	20.8	<0.030	0.14	58.5
26	40.3	< 0.20	0.50	0.022	0.050	57.7	0.080	1.45	39.0	876	<0.050	21.0	38.1	<0.030	0.26	105.0
27	38.4	< 0.20	1.50	0.020	0.140	68.6	0.044	1.79	46.3	808	<0.050	36.4	48.1	0.068	0.33	168.0
28	72.2	< 0.20	3.64	<0.010	0.270	97.4	0.110	3.31	87.0	1430	<0.050	69.2	89.1	0.080	0.64	292.0

TABLE A-IIB (cont'd)

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

SULPHIDE COMPOSITE II (Inoculated)

CYCLE	WATER EXTRACT ICP ANALYSIS (mg/L)															
	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	<0.20 *	<0.20	<0.20	<0.010	<0.010	<0.050	<0.015	<0.015	<0.010	<0.015	<0.050	<0.010	<0.005	<0.030	<0.025	<0.005
29																
30																
31	40.4	< 0.20	0.84	0.011	<0.010	72.4	0.064	1.08	21.4	936	<0.050	33.8	43.5	0.066	0.23	93.4
32																
33																
34																
35	9.9	< 0.20	< 0.20	<0.010	0.028	33.1	<0.015		5.7	237	<0.050	9.39	12.4	<0.030	0.10	27.4
36																
37																
38																
39	4.7	< 0.20	< 0.20	0.016	0.019	4.6	<0.015	0.22	2.5	101	0.19	3.97	4.5	<0.030	< 0.03	10.1

* detection limit in mg/L

TABLE A-12

ROBINSON SRK - CURRAGH

HUMIDITY CELL TEST

PHYLLITE COMPOSITE

CYCLE	DAYS	pH	REDOX (mV SCE)	CONDUCTIVITY (mS/cm3)	ALKALINITY (mg/L CaCO3)	ACIDITY (pH 4.5) --(mg/L CaCO3)--	ACIDITY (pH 8.3) --(mg/L CaCO3)--	CUM. ACIDITY (pH 8.3) (mg CaCO3/100g)	SULPHATE (mg/L)	CUMULATIVE SULPHATE (mg/100g)
1	7	7.31	329	750	6.3	0.0	1.8	0.1	360	18.0
2	14	5.24	350	879	6.3	0.0	33.6	1.3	500	36.4
3	21	5.57	434	640	13.7	0.0	22.6	2.3	325	50.0
4	28	5.47	244	560	3.2	0.2	19.8	3.1	275	61.5
5	35	6.13	479	696	17.4	0.0	16.0	3.7	305	73.7
6	42	4.06	286	728	0.0	5.4	36.6	5.1	325	85.7
7	49	4.77	280	591	0.5	0.0	10.1	5.6	270	98.1
8	56	5.86	198	745	4.0	0.0	17.9	6.2	410	113.1
9	63	3.82	370	579	0.0	8.6	28.1	7.4	310	126.3
10	70	6.07	132	497	4.2	0.0	13.0	7.9	245	136.7
11	77	6.19	191	531	3.8	0.0	11.5	8.5	240	148.4
12	84	5.71	316	457	2.1	0.0	10.4	9.1	210	159.9
13	91	5.46	177	606	1.6	0.0	13.6	9.7	280	172.1
14	98	5.37	224	686	3.5	0.0	9.8	10.1	320	186.5
15	105	5.60	351	661	3.2	0.0	11.9	10.7	340	202.2
16	112	6.95	167	715	4.2	0.0	5.3	10.9	340	218.8
17	119	5.35	212	834	2.7	0.0	19.4	11.7	400	235.5
18	126	4.59	164	772	1.2	0.0	28.8	13.0	430	254.3
19	133	4.48	201	689	0.0	0.0	28.9	14.2	360	269.5
20	140	4.64	227	657	0.6	0.0	19.6	15.1	330	284.9
21	147	4.58	210	592	0.0	0.0	13.5	15.7	330	299.9
22	154	4.32	221	778	0.0	1.0	26.0	16.8	380	316.1
23	161	4.59	232	701	2.1	0.0	14.0	17.5	440	337.4
24	168	4.46	369	464	0.0	0.5	15.1	18.2	220	347.6
25	175	4.38	411	577	0.0	1.0	21.4	19.2	300	361.0
26	182	4.83	445	446	2.0	0.0	9.0	19.6	200	370.3
27	189	5.20	239	424	2.0	0.0	9.5	20.0	210	379.3
28	196	5.14	250	262	1.9	0.0	10.2	20.5	120	385.6
29	203	6.23	259	315	3.8	0.0	5.1	20.8	150	392.7
30	210	6.17	295	418	3.9	0.0	6.5	21.1	180	401.4
31	217	4.72	239	317	2.0	0.0	9.8	21.5	155	408.2
32	224	4.49	299	430	0.0	0.5	27.4	22.7	200	416.6

TABLE A-13A

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

PHYLLITE COMPOSITE

	WATER EXTRACT ICP ANALYSIS (mg/L)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
1	< 0.20	< 0.20	< 0.20	0.054	<0.010	128.0	<0.015	0.040	<0.010	< 0.015	<0.050	31.30	6.38	<0.030	0.030	0.99
2	< 0.20	< 0.20	< 0.20	0.037	0.078	124.0	<0.015	0.230	0.058	1.030	0.320	49.50	10.10	<0.030	0.110	15.70
3	< 0.20	< 0.20	< 0.20	0.064	0.039	81.8	<0.015	0.130	0.250	0.670	0.250	26.80	1.52	<0.030	0.100	12.40
4	< 0.20	< 0.20	< 0.20	0.043	0.017	75.6	<0.015	0.110	0.280	2.670	0.410	21.30	5.27	<0.030	0.070	6.56
5	< 0.20	< 0.20	< 0.20	0.047	0.021	87.8	<0.015	0.120	0.260	2.530	0.310	22.20	5.96	<0.030	0.086	6.69
6	< 0.20	< 0.20	< 0.20	0.044	0.015	77.4	<0.015	0.120	0.360	6.490	0.570	33.00	7.53	<0.030	0.094	5.62
7	< 0.20	< 0.20	< 0.20	0.050	<0.010	76.9	<0.015	0.065	0.038	0.370	0.220	17.00	6.60	<0.030	0.059	4.25
8	< 0.20	< 0.20	< 0.20	0.044	<0.010	97.0	<0.015	0.110	0.032	4.280	0.570	35.20	8.46	<0.030	0.089	4.87
9	< 0.20	< 0.20	< 0.20	0.036	<0.010	80.1	<0.015	0.084	0.026	1.620	0.220	26.30	7.65	<0.030	0.077	4.14
10	< 0.20	< 0.20	< 0.20	0.030	<0.010	69.0	<0.015	0.069	0.032	1.600	0.230	20.80	6.05	<0.030	0.071	3.45
11	< 0.20	< 0.20	< 0.20	0.045	<0.010	64.1	<0.015	0.072	0.029	1.190	0.530	21.50	6.04	<0.030	0.065	3.25
12	< 0.20	< 0.20	< 0.20	0.032	<0.010	50.9	<0.015	0.053	0.050	0.260	0.520	19.60	4.00	<0.030	0.044	1.78
13	< 0.20	< 0.20	< 0.20	0.032	<0.010	68.3	<0.015	0.076	0.014	2.560	0.450	26.40	6.39	<0.030	0.088	2.93
14	< 0.20	< 0.20	< 0.20	0.034	<0.010	56.9	<0.015	0.049	0.050	0.600	0.590	52.30	6.35	<0.030	0.034	2.47
15	< 0.20	< 0.20	< 0.20	0.037	<0.010	75.3	<0.015	0.058	0.028	1.230	0.420	38.10	6.13	<0.030	0.057	2.38
16	< 0.20	< 0.20	< 0.20	0.030	<0.010	54.7	<0.015	0.034	<0.010	0.073	0.099	57.10	4.72	<0.030	0.041	1.21
17	< 0.20	< 0.20	< 0.20	0.037	<0.010	90.0	<0.015	0.100	0.066	3.620	0.460	54.40	7.18	<0.030	0.071	3.23
18	< 0.20	< 0.20	< 0.20	0.025	<0.010	83.7	<0.015	0.095	0.094	7.710	0.710	49.50	7.75	<0.030	0.066	3.78
19	0.23	< 0.20	< 0.20	0.034	<0.010	71.6	<0.015	0.091	0.130	6.860	0.660	42.70	7.23	<0.030	0.075	3.45
20	0.21	< 0.20	< 0.20	0.030	<0.010	65.1	<0.015	0.051	0.120	4.350	0.630	41.80	5.39	<0.030	0.055	1.98
21	0.21	< 0.20	< 0.20	0.038	<0.010	56.9	<0.015	0.045	0.110	5.750	0.440	34.30	5.00	<0.030	0.062	2.09
22	0.46	< 0.20	< 0.20	0.033	<0.010	79.0	<0.015	0.079	0.190	7.370	0.940	41.30	6.82	<0.030	0.065	3.03
23	0.36	< 0.20	< 0.20	0.019	<0.010	59.5	<0.015	0.042	0.150	2.370	0.610	54.10	5.03	<0.030	0.032	1.15
24	0.42	< 0.20	< 0.20	0.034	<0.010	54.8	<0.015	0.032	0.200	5.360	0.730	37.30	3.46	<0.030	<0.025	1.55
25	0.25	< 0.20	< 0.20	0.017	<0.010	34.8	<0.015	0.028	0.140	1.280	0.560	34.00	2.23	<0.030	<0.025	0.82
26	0.22	< 0.20	< 0.20	0.018	<0.010	35.2	<0.015	0.019	0.170	0.930	0.390	28.80	1.81	<0.030	<0.025	1.10
27	0.33	< 0.20	< 0.20	0.021	<0.010	18.0	<0.015	<0.015	0.220	2.160	0.550	14.50	0.68	<0.030	<0.025	0.66
28	< 0.20	< 0.20	< 0.20	0.013	<0.010	23.4	<0.015	<0.015	0.018	0.170	0.077	19.80	0.73	<0.030	<0.025	0.45

TABLE A-13A (cont'd)

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

PHYLLITE COMPOSITE

CYCLE	WATER EXTRACT ICP ANALYSIS (mg/L)															
	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
29	< 0.20	< 0.20	< 0.20	0.015	<0.010	35.1	<0.015	0.016	0.110	1.520	0.340	27.10	0.75	<0.030	0.027	0.46
30																
31	< 0.20	< 0.20	< 0.20	0.024	<0.010	24.2	<0.015	<0.015	0.100	1.950	0.180	20.40	0.56	<0.030	<0.025	0.50
32	0.60	< 0.20	< 0.20	0.035	<0.010	33.0	<0.015	0.029	0.140	5.540	0.420	27.50	1.31	<0.030	<0.025	1.08

* detection limit in mg/L

TABLE A-13B

HUMIDITY CELL TESTING

METAL EXTRACTION

PHYLLITE COMPOSITE

CYCLE	CUMULATIVE WATER EXTRACT ICP ANALYSIS (mg/100 g sample)															
	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	1080 *	<0.5	22.5	24	0.1	460	3.5	4.3	29.3	6110	77	720	132.5	0.3	4.1	182
1	0.01	0.01	0.01	0.00	0.00	6.41	0.00	0.00	0.00	0.00	0.00	1.57	0.32	0.00	0.00	0.05
2	0.02	0.02	0.02	0.00	0.00	10.98	0.00	0.01	0.00	0.04	0.01	3.39	0.69	0.00	0.01	0.63
3	0.03	0.03	0.03	0.01	0.01	14.40	0.00	0.02	0.01	0.07	0.02	4.51	0.75	0.00	0.01	1.15
4	0.03	0.03	0.03	0.01	0.01	17.56	0.00	0.02	0.02	0.18	0.04	5.40	0.98	0.01	0.01	1.42
5	0.04	0.04	0.04	0.01	0.01	21.05	0.00	0.03	0.04	0.28	0.05	6.28	1.21	0.01	0.02	1.69
6	0.05	0.05	0.05	0.01	0.01	23.91	0.00	0.03	0.05	0.52	0.08	7.50	1.49	0.01	0.02	1.89
7	0.06	0.06	0.06	0.01	0.01	27.45	0.00	0.03	0.05	0.54	0.09	8.29	1.79	0.01	0.02	2.09
8	0.07	0.07	0.07	0.02	0.01	31.01	0.00	0.04	0.05	0.69	0.11	9.58	2.11	0.01	0.03	2.27
9	0.08	0.08	0.08	0.02	0.01	34.40	0.01	0.04	0.05	0.76	0.12	10.69	2.43	0.01	0.03	2.44
10	0.08	0.08	0.08	0.02	0.01	37.34	0.01	0.04	0.05	0.83	0.13	11.58	2.69	0.01	0.03	2.59
11	0.09	0.09	0.09	0.02	0.01	40.47	0.01	0.05	0.06	0.89	0.15	12.63	2.98	0.01	0.03	2.75
12	0.10	0.10	0.10	0.02	0.01	43.25	0.01	0.05	0.06	0.90	0.18	13.70	3.20	0.02	0.04	2.85
13	0.11	0.11	0.11	0.02	0.01	46.22	0.01	0.05	0.06	1.01	0.20	14.85	3.48	0.02	0.04	2.97
14	0.12	0.12	0.12	0.03	0.01	48.79	0.01	0.06	0.06	1.04	0.23	17.21	3.76	0.02	0.04	3.09
15	0.13	0.13	0.13	0.03	0.01	52.25	0.01	0.06	0.06	1.10	0.25	18.96	4.05	0.02	0.05	3.19
16	0.14	0.14	0.14	0.03	0.01	54.93	0.01	0.06	0.06	1.10	0.25	21.76	4.28	0.02	0.05	3.25
17	0.15	0.15	0.15	0.03	0.01	58.68	0.01	0.06	0.07	1.25	0.27	24.02	4.58	0.02	0.05	3.39
18	0.16	0.16	0.16	0.03	0.01	62.34	0.01	0.07	0.07	1.59	0.30	26.19	4.92	0.02	0.05	3.55
19	0.17	0.17	0.17	0.03	0.01	65.36	0.01	0.07	0.07	1.88	0.33	27.99	5.22	0.02	0.06	3.70
20	0.18	0.18	0.18	0.03	0.01	68.41	0.01	0.07	0.08	2.08	0.36	29.94	5.47	0.03	0.06	3.79
21	0.19	0.18	0.18	0.04	0.01	71.00	0.01	0.08	0.09	2.34	0.38	31.51	5.70	0.03	0.06	3.89
22	0.21	0.19	0.19	0.04	0.01	74.37	0.01	0.08	0.09	2.66	0.42	33.27	5.99	0.03	0.06	4.02
23	0.22	0.20	0.20	0.04	0.01	77.24	0.02	0.08	0.10	2.77	0.45	35.89	6.23	0.03	0.07	4.07
24	0.24	0.21	0.21	0.04	0.02	79.79	0.02	0.08	0.11	3.02	0.48	37.62	6.40	0.03	0.07	4.14
25	0.25	0.22	0.22	0.04	0.02	81.34	0.02	0.08	0.12	3.08	0.51	39.13	6.49	0.03	0.07	4.18
26	0.26	0.23	0.23	0.04	0.02	82.97	0.02	0.09	0.12	3.12	0.52	40.47	6.58	0.03	0.07	4.23
27	0.28	0.24	0.24	0.04	0.02	83.74	0.02	0.09	0.13	3.21	0.55	41.09	6.61	0.04	0.07	4.26
28	0.29	0.25	0.25	0.04	0.02	84.98	0.02	0.09	0.13	3.22	0.55	42.14	6.65	0.04	0.07	4.28
29	0.30	0.26	0.26	0.04	0.02	86.64	0.02	0.09	0.14	3.29	0.57	43.42	6.68	0.04	0.07	4.31

TABLE A-13B (cont'd)

HUMIDITY CELL TESTING

METAL EXTRACTION

PHYLLITE COMPOSITE

	CUMULATIVE WATER EXTRACT ICP ANALYSIS (mg/100 g sample)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	1080 *	<0.5	22.5	24	0.1	460	3.5	4.3	29.3	6110	77	720	132.5	0.3	4.1	182
30	0.30	0.26	0.26	0.04	0.02	86.64	0.02	0.09	0.14	3.29	0.57	43.42	6.68	0.04	0.07	4.31
31	0.31	0.27	0.27	0.04	0.02	87.71	0.02	0.09	0.14	3.38	0.58	44.32	6.71	0.04	0.07	4.33
32	0.33	0.28	0.28	0.05	0.02	89.10	0.02	0.09	0.15	3.61	0.59	45.48	6.76	0.04	0.08	4.37

* assay in mg/100g unless otherwise stated

TABLE A-14

ROBINSON SRK - CURRAGH

HUMIDITY CELL TEST

PHYLLITE COMPOSITE II (Inoculated)

CYCLE	DAYS	pH	REDOX	CONDUCTIVITY	ALKALINITY	ACIDITY (pH 4.5)	ACIDITY (pH 8.3)	CUM. ACIDITY (pH 8.3)	SULPHATE	CUMULATIVE SULPHATE
			(mV SCE)	(mS/cm3)	(mg/L CaCO3)	--(mg/L CaCO3)--		(mg CaCO3/100g)	(mg/L)	(mg/100g)
1	7	5.92	268	4690	4.3	0.0	273.6	4.9	3250	58.5
2	14	5.30	230	2080	4.0	0.0	229.4	9.1	1600	87.9
3	21	5.36	284	2110	3.4	0.0	290.5	15.9	1100	113.5
4	28	5.51	255	3990	2.1	0.0	388.8	28.1	2900	204.8
5	35	5.06	255	3100	2.7	0.0	193.0	37.0	2250	308.1
6	42	4.91	276	2780	1.7	0.0	221.5	48.1	2000	408.5
7	49	4.23	275	2640	0.0	1.7	136.3	50.7	2100	449.0
8	56	4.50	283	2020	0.0	0.0	150.0	56.7	1500	508.9
9	63	4.67	357	1580	1.3	0.0	75.3	59.6	1300	558.5
10	70	4.51	272	1508	0.0	0.0	72.0	62.9	1508	628.0
11	77	4.73	327	2240	3.4	0.0	135.7	68.1	1600	688.8
12	84	4.82	341	1150	1.2	0.0	31.6	69.6	1300	751.0
13	91	4.59	335	989	0.0	0.0	28.9	71.0	1100	803.2
14	98	4.72	305	1780	1.0	0.0	58.3	72.6	2900	883.9
15	105	4.35	314	1172	0.0	2.5	36.5	74.3	1400	950.8
16	112	4.30	309	994	0.0	1.0	26.5	75.2	900	979.9
17	119	4.22	289	684	0.0	1.6	23.8	76.4	800	1020.9
18	126	4.24	378	565	0.0	1.6	19.4	77.1	400	1036.1
19	133	4.22	401	810	0.0	1.5	18.4	78.0	450	1057.3
20	140	3.98	431	483	0.0	4.5	25.0	78.8	210	1064.4
21	147	4.17	320	765	0.0	2.0	28.0	80.3	350	1082.9
22	154	4.15	343	499	0.0	2.0	22.4	81.5	225	1094.3
23	161	3.98	387	562	0.0	5.1	31.6	83.0	225	1105.6
24	168	4.06	391	645	0.0	4.0	20.0	83.9	275	1117.0
25	175	3.84	417	464	0.0	7.4	18.6	84.6	180	1123.5
26	182	3.78	402	569	0.0	7.4	34.8	85.6	205	1130.0
27	216	3.72	437	637	0.0	12.4	42.8	87.5	637	1157.5
28	223	3.62	445	580	0.0	13.4	38.4	89.1	226	1166.8
29	230	3.31	376	2030	0.0	40.8	195.6	94.4	780	1187.9
30	237	3.46	406	657	0.0	25.2	79.2	98.2	266	1200.7
31	244	3.36	404	1060	0.0	27.7	72.6	100.1	568	1215.8
32	251	3.35	394	1155	0.0	33.6	97.2	102.7	517	1229.6
33	258	3.46	407	632	0.0	19.6	52.7	104.5	245	1238.1
34	265	3.44	410	886	0.0	25.9	120.5	110.8	410	1259.5
35	272	3.46	396	1049	0.0	23.5	97.5	113.7	425	1272.1
36	279	3.48							230	1279.1
37	286	3.84							230	1284.5
38	293	3.55							280	1292.1
39	300	3.57	420	752	0.0	35.3	155.1		245	1301.0

TABLE A-15A

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

PHYLLITE COMPOSITE II (Inoculated)

	CUMULATIVE WATER EXTRACT ICP ANALYSIS (mg/100 g sample)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	1080 *	<0.5	22.5	24	0.1	460	3.5	4.3	29.3	6110	77	720	132.5	0.3	4.1	182
1	0.04	0.04	0.04	0.00	0.00	9.1	0.00	0.06	0.00	0.04	0.01	6.6	2.3	0.01	0.08	0.0
2	0.04	0.04	0.04	0.00	0.00	13.2	0.00	0.08	0.00	0.05	0.01	9.1	3.1	0.01	0.10	0.9
3	0.04	0.04	0.04	0.00	0.00	18.4	0.00	0.11	0.00	0.06	0.01	12.8	4.4	0.01	0.13	2.2
4	0.05	0.05	0.05	0.00	0.01	33.7	0.00	0.23	0.01	0.11	0.01	26.7	9.6	0.01	0.27	6.8
5	0.14	0.14	0.14	0.01	0.01	55.3	0.01	0.32	0.01	1.67	0.04	36.4	13.6	0.02	0.36	10.4
6	0.15	0.15	0.15	0.01	0.01	83.6	0.01	0.36	0.01	4.55	0.04	41.3	15.8	0.02	0.40	12.4
7	0.16	0.16	0.16	0.01	0.01	94.3	0.01	0.38	0.01	4.95	0.04	43.3	16.9	0.02	0.43	13.3
8	0.16	0.16	0.16	0.01	0.01	108.2	0.01	0.41	0.01	5.59	0.04	47.2	18.6	0.03	0.47	15.0
9	0.17	0.17	0.17	0.01	0.02	117.3	0.01	0.43	0.02	5.93	0.05	50.7	20.2	0.03	0.50	16.1
10	0.18	0.18	0.18	0.02	0.02	124.3	0.01	0.45	0.02	6.38	0.05	55.7	22.3	0.03	0.52	17.1
11	0.19	0.19	0.19	0.02	0.02	132.9	0.01	0.48	0.02	6.44	0.05	63.4	25.6	0.03	0.56	18.3
12	0.20	0.20	0.20	0.02	0.02	137.8	0.01	0.50	0.02	6.64	0.05	67.8	27.3	0.03	0.57	18.8
13	0.21	0.21	0.21	0.02	0.02	141.4	0.02	0.51	0.02	6.66	0.05	71.4	28.7	0.03	0.58	19.2
14	0.21	0.21	0.21	0.03	0.02	156.2	0.02	0.55	0.02	6.69	0.06	80.5	32.7	0.03	0.63	20.5
15	0.22	0.22	0.22	0.03	0.02	161.7	0.02	0.56	0.03	6.96	0.06	84.0	34.1	0.03	0.64	20.9
16	0.23	0.23	0.23	0.03	0.02	165.7	0.02	0.57	0.03	7.03	0.06	85.8	34.8	0.03	0.65	21.2
17	0.24	0.24	0.24	0.03	0.02	168.6	0.02	0.58	0.03	7.12	0.06	88.2	35.7	0.04	0.66	21.4
18	0.25	0.25	0.25	0.04	0.02	172.1	0.02	0.58	0.03	7.17	0.06	89.8	36.4	0.04	0.66	21.6
19	0.27	0.26	0.26	0.04	0.02	173.8	0.02	0.59	0.04	7.26	0.07	91.0	36.9	0.04	0.67	21.8
20	0.28	0.26	0.26	0.04	0.02	176.4	0.02	0.59	0.04	7.36	0.07	92.4	37.4	0.04	0.67	22.0
21	0.33	0.27	0.27	0.05	0.02	178.3	0.02	0.60	0.04	7.46	0.07	93.7	37.9	0.04	0.68	22.1
22	0.40	0.28	0.28	0.05	0.02	180.2	0.02	0.61	0.05	7.59	0.07	95.2	38.5	0.04	0.69	22.4
23	0.42	0.29	0.29	0.05	0.02	183.7	0.02	0.61	0.05	7.63	0.08	96.3	38.9	0.04	0.69	22.6

* assay in mg/100g unless otherwise stated

TABLE A-15B

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

PHYLLITE COMPOSITE II (Inoculated)

	WATER EXTRACT ICP ANALYSIS (mg/L)															
CYCLE	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	<0.20 *	<0.20	<0.20	<0.010	<0.010	<0.050	<0.015	<0.015	<0.010	<0.015	<0.050	<0.010	<0.005	<0.030	<0.025	<0.005
1	< 2.00	< 2.00	< 2.00	0.100	<0.100	503	<0.150	3.290	<0.100	2.14	<0.500	365.0	125.0	<0.300	4.37	182.0
2	< 0.20	< 0.20	< 0.20	0.040	<0.100	223	<0.015	1.160	0.018	0.49	<0.050	137.0	46.2	<0.030	1.16	48.1
3	< 0.20	< 0.20	< 0.20	0.031	0.033	224	<0.015	1.260	0.046	0.66	<0.050	161.0	57.9	<0.030	1.49	58.0
4	< 0.20	< 0.20	< 0.20	0.025	0.099	486	<0.015	3.910	0.080	1.59	<0.050	440.0	164.0	0.045	4.27	144.0
5	< 2.00	< 2.00	< 2.00	<0.100	<0.100	471	<0.150	1.880	<0.100	33.90	<0.500	212.0	86.9	<0.300	2.02	79.2
6	< 0.20	< 0.20	< 0.20	0.016	<0.010	565	<0.015	0.790	<0.010	57.40	<0.050	97.0	44.8	<0.030	0.83	38.7
7	< 0.20	< 0.20	< 0.20	0.044	0.049	553	<0.015	1.000	0.080	20.70	<0.050	106.0	52.4	<0.030	1.30	50.3
8	< 0.20	< 0.20	< 0.20	0.034	0.031	349	<0.015	0.790	0.036	16.00	0.110	98.0	44.7	<0.030	0.99	41.1
9	< 0.20	< 0.20	< 0.20	0.047	0.017	237	<0.015	0.580	0.032	9.03	<0.050	91.2	41.8	<0.030	0.73	30.4
10	< 0.20	< 0.20	< 0.20	0.052	0.013	151	<0.015	0.460	0.041	9.61	<0.050	108.0	45.2	<0.030	0.56	21.1
11	< 0.20	< 0.20	< 0.20	0.110	0.015	227	<0.015	0.830	0.041	1.59	<0.050	203.0	85.1	<0.030	0.91	32.3
12	< 0.20	< 0.20	< 0.20	0.052	<0.010	102	<0.015	0.220	0.030	4.15	<0.050	91.0	36.3	<0.030	0.29	9.1
13	< 0.20	< 0.20	< 0.20	0.042	<0.010	76	<0.015	0.260	0.022	0.47	<0.050	77.0	30.7	<0.030	0.30	8.3
14	< 0.20	< 0.20	< 0.20	0.022	0.021	532	<0.015	1.500	0.120	1.31	<0.050	327.0	142.0	<0.030	1.52	46.4
15	< 0.20	< 0.20	< 0.20	0.038	<0.010	115	<0.015	0.300	0.038	5.63	<0.050	73.2	29.8	<0.030	0.30	9.9
16	< 0.20	< 0.20	< 0.20	0.087	<0.010	125	<0.015	0.230	0.063	2.22	<0.050	56.5	22.1	<0.030	0.25	7.4
17	< 0.20	< 0.20	< 0.20	0.079	<0.010	56	<0.015	0.140	0.040	1.69	<0.050	45.5	17.3	<0.030	0.14	4.7
18	< 0.20	< 0.20	< 0.20	0.054	<0.010	92	<0.015	0.150	0.050	1.26	<0.050	43.3	17.8	<0.030	0.16	5.3
19	0.55	< 0.20	< 0.20	0.140	<0.010	36	<0.015	0.100	0.084	2.01	<0.050	25.1	9.7	<0.030	0.11	3.5
20	0.32	< 0.20	< 0.20	0.039	<0.010	78	<0.015	0.170	0.068	2.99	<0.050	40.3	16.0	<0.030	0.19	5.8
21	0.91	< 0.20	< 0.20	0.087	<0.010	36	<0.015	0.098	0.079	1.77	<0.050	24.6	9.6	<0.030	0.12	3.3
22	1.32	< 0.20	< 0.20	0.027	<0.010	36	<0.015	0.130	0.140	2.50	<0.050	29.4	11.3	<0.030	0.14	4.8
23	0.41	< 0.20	< 0.20	0.083	<0.010	71	<0.015	0.087	0.065	0.79	<0.050	22.6	9.1	<0.030	0.12	3.4
24																
25	0.48	< 0.20	< 0.20	0.130	<0.010	56	<0.015	0.045	0.074	0.78	<0.050	9.5	3.8	<0.030	0.04	2.0
26	0.99	< 0.20	< 0.20	0.100	<0.010	42	<0.015	0.130	0.200	3.60	<0.050	12.2	9.9	<0.030	0.12	5.2
27	2.33	< 0.20	< 0.20	0.130	<0.010	57	<0.015	0.130	0.190	1.77	<0.050	18.3	7.2	<0.030	0.14	6.1
28	1.52	< 0.20	< 0.20	0.110	<0.010	66	<0.015	0.100	0.160	1.71	<0.050	14.0	5.4	<0.030	0.15	5.1

TABLE A-15B (cont'd)

HUMIDITY CELL TESTING

LEACHATE ANALYSIS

PHYLLITE COMPOSITE II (Inoculated)

CYCLE	WATER EXTRACT ICP ANALYSIS (mg/L)															
	Al	Sb	As	Ba	Cd	Ca	Cr	Co	Cu	Fe	Pb	Mg	Mn	Mo	Ni	Zn
	<0.20 *	<0.20	<0.20	<0.010	<0.010	<0.050	<0.015	<0.015	<0.010	<0.015	<0.050	<0.010	<0.005	<0.030	<0.025	<0.005
29																
30																
31	3.47	< 0.20	< 0.20	0.031	<0.010	143	<0.015	0.240	0.290	5.33	<0.050	29.3	12.8	<0.030	0.29	14.0
32																
33																
34																
35	4.60	< 0.20	< 0.20	0.033	0.019	106	<0.015		0.340	7.40	<0.050	37.7	16.2	<0.030	0.42	23.1
36																
37																
38																
39	1.89	< 0.20	< 0.20	0.091	0.016	76	0.020	0.270	0.110	0.61	<0.050	11.0		<0.030	0.33	15.2

* detection limit in mg/L

TABLE A-16

VANGORDA CREEK UPSTREAM FROM EXISTING BLIND CREEK ROAD CROSSING

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V01	03-Jun-87	1.0			0.5	3.0	0.07	0.002	0.001	0.003	0.004	
V01	08-Jul-87	4.0	7.42		0.5	4.0	0.37	0.022	0.001	0.008	0.002	
V01	06-Aug-87	6.0	7.48		0.5	3.0	0.32	0.007	0.002	0.036	0.008	
V01	20-Aug-87	4.0	7.43		0.5	6.0	0.37	0.013	0.002	0.072	0.004	
V01	22-Sep-87	0.0	7.54		0.5	7.0		0.005	0.001	0.007	0.003	
V01	07-Oct-87				0.5							
V01	14-Oct-87	0.0	7.60		0.5	11.0		0.011	0.003	0.007	0.004	
V01	20-Oct-87				0.5							
V01	28-Oct-87				0.5							
V01	05-Nov-87				0.5							
V01	12-Nov-87	0.0	7.73		0.5	11.0		0.001	0.001	0.003	0.001	
V01	18-Dec-87		7.70			4.0		0.030	0.001	0.003	0.010	
V01	18-Feb-88	0.0	8.20		0.5	9.0		0.004	0.001	0.003	0.001	
V01	06-Apr-88	0.9	7.51		3.0	8.0	0.03	0.008	0.001	0.003	0.001	
V01	14-Apr-88	2.7	7.95		2.0	11.0	0.16	0.006	0.001	0.003	0.002	
V01	02-May-88	1.4	7.94		0.5	9.0	0.81	0.004	0.001	0.003	0.001	
V01	11-May-88	4.5	7.27	11.80	10.0	5.0	0.49	0.003	0.001	0.003	0.036	0.525
V01	18-May-88				2.0	6.0						
V01	26-May-88	6.7	7.42	18.90	2.0			0.021	0.001			0.128
V01	07-Jun-88	4.6	7.47	13.65	2.0	0.5		0.011	0.001	0.003	0.005	0.180
V01	06-Jul-88	7.7	7.62	15.80	0.5	3.0	0.10	0.100	0.001	0.003	0.003	0.075
V01	02-Aug-88	9.9	7.64	23.10	0.5	4.0	0.14	0.011	0.001	0.003	0.002	0.040
V01	19-Sep-88	2.7	7.62	28.40	0.5	4.0	0.07	0.028	0.005	0.003	0.001	0.030
V01	19-Oct-88		7.63	28.00	0.5	1.0		0.012	0.001	0.003	0.001	0.040
V01	29-Nov-88		7.64	39.00	0.5	7.0	0.33	0.012	0.001	0.003	0.001	0.030
V01	03-Jan-89	1.0	7.68	40.00	0.5	9.0	0.05	0.005	0.001	0.003	0.001	0.003
V01	30-Jan-89		7.96	46.00	0.5	7.0	0.13	0.010	0.001	0.003	0.002	0.035
V01	28-Feb-89		7.54	46.00	2.0	5.0	0.66	0.016	0.001	0.003	0.001	0.015
V01	28-Mar-89		7.68	81.00	1.0	3.0	0.13	0.004	0.001	0.003	0.001	
N		22	23	12	28	24	16	24	24	23	23	11
AVERAGE			7.6	32.64	1.2	5.8	0.26	0.014	0.001	0.008	0.004	0.100
STANDARD DEVIATION			0.2	18.68	1.8	3.0	0.22	0.019	0.001	0.015	0.007	0.143
MAXIMUM VALUE					10.0	11.0	0.81	0.100	0.005	0.072	0.036	0.525

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-17

GRUM CREEK JUST UPSTREAM FROM CONFLUENCE WITH VANGORDA CREEK

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V02	03-Jun-87	2.0			0.5	9.0	0.45	0.003	0.002	0.003	0.001	
V02	08-Jul-87	5.0	8.00		0.5	19.0	0.33	0.008	0.002	0.005	0.002	
V02	06-Aug-87	5.0	8.13		0.5	20.0	0.31	0.009	0.003	0.037	0.008	
V02	22-Sep-87	2.0	7.56		1.0	23.0		0.009	0.001	0.006	0.003	
V02	07-Oct-87				0.5							
V02	14-Oct-87	1.0	8.21		0.5	28.0		0.010	0.002	0.005	0.010	
V02	16-Oct-87				0.5							
V02	20-Oct-87				5.1							
V02	28-Oct-87				0.5							
V02	05-Nov-87				0.5							
V02	12-Nov-87				0.5							
V02	13-Nov-87	0.0	7.97		0.5	28.0		0.008	0.001	0.003	0.001	
V02	18-Dec-87		7.95			40.0		0.040	0.001	0.003	0.010	
V02	19-Feb-88	0.0	7.65		0.5	29.0		0.070	0.002	0.003	0.002	
V02	06-May-88		7.60		3.0			0.004	0.002			0.220
V02	12-May-88	2.8	7.42	46.00	42.0	21.0	0.65	0.025	0.011	0.003	0.047	4.450
V02	16-May-88				0.5							
V02	26-May-88	4.6	8.12	80.85	1.0			0.025	0.002			0.090
V02	08-Jun-88	6.7	8.12	75.60	2.0	13.0		0.005	0.001	0.003	0.001	0.094
V02	07-Jul-88	9.2	8.25	102.90	0.5	18.0	0.13	0.003	0.002	0.003	0.002	0.010
V02	03-Aug-88	9.8	8.26	101.90	0.5	20.0	0.23	0.003	0.001	0.003	0.001	0.020
V02	20-Sep-88		8.31	114.50	0.5	26.0	0.36	0.005	0.002	0.003	0.001	0.010
V02	19-Oct-88		7.87	31.00	0.5	2.0		0.018	0.001	0.006	0.001	0.030
V02	29-Nov-88	1.0	7.52	103.00	1.0	32.0	0.13	0.005	0.001	0.003	0.001	0.030
V02	03-Jan-89	1.0	7.88	120.00	0.5	28.0	0.07	0.002	0.001	0.003	0.002	0.025
V02	30-Jan-89		7.99	124.00	1.0	31.0	0.01	0.032	0.002	0.003	0.002	0.065
V02	28-Feb-89		7.62	131.00	0.5	24.0	0.25	0.025	0.001	0.003	0.001	0.020
V02	28-Mar-89		7.69	143.00	0.5	32.0	0.18	0.009	0.001	0.003	0.001	
N		17	20	12	27	19	12	21	21	19	19	12
AVERAGE			7.9	97.81	2.4	23.3	0.26	0.015	0.002	0.005	0.005	0.422
STANDARD DEVIATION			0.3	32.40	7.8	8.7	0.17	0.016	0.002	0.008	0.010	1.216
MAXIMUM VALUE					42.0	40.0	0.65	0.070	0.011	0.037	0.047	4.450

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-18

VANGORDA CREEK 5 M DOWNSTEAM FROM CONFLUENCE WITH GRUM CREEK

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V03	03-Jun-87	2.0			1.0	3.0	0.04	0.012	0.002	0.003	0.004	
V03	08-Jul-87	5.0	7.47		0.5	6.0	0.25	0.013	0.003	0.008	0.003	
V03	06-Aug-87	6.0	7.82		1.0	4.0	0.44	0.017	0.003	0.037	0.009	
V03	20-Aug-87	5.0	7.85		0.5	7.0	0.35	0.032	0.002	0.037	0.003	
V03	22-Sep-87	2.0	7.36		0.5	10.0		0.021	0.001	0.005	0.003	
V03	07-Oct-87				0.5							
V03	14-Oct-87	0.0	8.14		0.5	11.0		0.032	0.002	0.006	0.001	
V03	16-Oct-87				0.5							
V03	20-Oct-87				1.0							
V03	28-Oct-87				0.5							
V03	05-Nov-87				0.5							
V03	12-Nov-87				0.5							
V03	13-Nov-87	0.0	7.79		0.5	19.0		0.030	0.001	0.003	0.001	
V03	18-Dec-87		7.84			21.0		0.050	0.001	0.003	0.010	
V03	18-Feb-88	0.0	7.57		0.5	21.0		0.044	0.002	0.003	0.001	
V03	12-May-88	2.9	7.08	25.00	18.0	10.0	0.61	0.021	0.006	0.003	0.034	1.850
V03	18-May-88				0.5							
V03	26-May-88	6.0	7.97	36.75	2.0			0.032	0.003			0.143
V03	08-Jun-88			15.75	4.0	1.0		0.012	0.002	0.003	0.007	0.280
V03	07-Jul-88	10.4	8.20	88.20	1.0	15.0	0.15	0.006	0.002	0.003	0.002	0.035
V03	03-Aug-88	10.6	8.10	55.70	0.5	8.0	0.19	0.011	0.002	0.003	0.001	0.025
V03	20-Sep-88		7.02	47.30	0.5	14.0	0.04	0.021	0.002	0.003	0.001	0.025
V03	19-Oct-88		7.81	103.00	1.0	30.0		0.005	0.002	0.005	0.001	0.030
V03	29-Nov-88	1.0	7.00	46.00	1.0	13.0	0.08	0.028	0.001	0.003	0.001	0.025
V03	03-Jan-89		7.69	54.00	0.5	10.0	0.01	0.037	0.001	0.003	0.002	0.020
V03	30-Jan-89		7.87	66.00	0.5	16.0	0.01	0.053	0.002	0.003	0.002	0.030
V03	28-Feb-89		7.58	68.00	1.0	14.0	0.17	0.053	0.001	0.003	0.001	0.030
V03	28-Mar-89		7.73	69.00	1.0	15.0	0.15	0.042	0.001	0.003	0.001	
N		17	19	12	27	20	13	21	21	20	20	11
AVERAGE			7.7	56.23	1.5	12.4	0.19	0.027	0.002	0.007	0.004	0.227
STANDARD DEVIATION			0.3	23.79	3.3	6.8	0.17	0.015	0.001	0.010	0.007	0.519
MAXIMUM VALUE					18.0	30.0	0.61	0.053	0.006	0.037	0.034	1.850

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-19

DIXON CREEK 500 M UPSTREAM FROM CONFLUENCE WITH VANGORDA CREEK

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V04	26-Aug-87	7.0	8.41		3.0	28.0		0.004	0.002	0.005	0.045	
V04	22-Sep-87	0.0	8.03		2.0	33.0		0.006	0.002	0.003	0.035	
V04	14-Oct-87	1.0	8.52			36.0		0.010	0.002	0.005	0.042	
V04	18-Dec-87		8.15		1.5	56.0		0.040	0.001	0.050	0.060	
V04	18-Feb-88	0.0	7.62		3.0	62.0		0.004	0.002	0.003	0.033	
V04	14-Apr-88	2.4	7.93		3.0	73.0	0.12	0.002	0.001	0.003	0.018	
V04	13-May-88		7.79	88.00	23.0	16.0	0.31	0.010	0.004	0.003	0.051	1.200
V04	08-Jun-88	5.2	8.10	201.60	5.0	28.0		0.005	0.002	0.003	0.012	0.145
V04	07-Jul-88		8.42	245.70	2.0	30.0	0.40	0.010	0.003	0.003	0.022	0.205
V04	03-Aug-88		8.32	254.10	3.0	35.0	0.21	0.003	0.002	0.003	0.027	0.170
V04	20-Sep-88		7.98	264.60	1.0	40.0	0.23	0.004	0.002	0.003	0.026	0.215
V04	19-Oct-88		7.68	258.00								
V04	29-Nov-88		7.42	274.00	6.0	51.0	0.20	0.003	0.001	0.003	0.048	0.280
V04	03-Jan-89	1.0	7.49	265.00	5.0	52.0	0.11	0.006	0.003	0.003	0.060	0.460
V04	28-Feb-89		7.67	290.00	18.0	65.0	0.19	0.023	0.003	0.003	0.017	0.140
V04	28-Mar-89		7.75	303.00	12.0	60.0	0.26	0.023	0.004	0.010	0.013	
N		10	16	10	14	15	9	15	15	15	15	8
AVERAGE			8.0	244.40	6.3	44.3	0.23	0.010	0.002	0.007	0.034	0.352
STANDARD DEVIATION			0.3	58.13	6.5	16.1	0.09	0.010	0.001	0.012	0.016	0.335
MAXIMUM VALUE					23.0	73.0	0.40	0.040	0.004	0.050	0.060	1.200

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-20

WEST FORK AT VANGORDA CREEK 200 M UPSTREAM FROM MINE ROAD CULVERT

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V05	03-Jun-87	3.0			15.0	21.0	0.10	0.003	0.003	0.006	0.026	
V05	09-Jul-87	5.0	7.85		18.0	36.0	0.45	0.010	0.004	0.008	0.023	
V05	05-Aug-87	6.0	8.32		6.0	48.0	0.46	0.008	0.003	0.031	0.017	
V05	20-Aug-87	6.0	8.33		130.0	51.0	0.48	0.048	0.006	0.040	0.046	
V05	25-Sep-87	1.0	8.24		3.0	48.0		0.004	0.002	0.003	0.018	
V05	14-Oct-87	0.0	8.62		2.0	56.0		0.010	0.002	0.009	0.018	
V05	12-Nov-87	0.0	8.20		1.0	65.0		0.008	0.002	0.009	0.015	
V05	18-Dec-87		8.17		2.7	98.0		0.030	0.001	0.050	0.030	
V05	18-Feb-88	0.0	8.10		2.0	133.0		0.008	0.003	0.008	0.020	
V05	06-Apr-88	1.1	7.66		2.0	142.0	0.03	0.006	0.003	0.003	0.015	
V05	14-Apr-88	2.3	7.91		3.0	125.0	0.07	0.005	0.002	0.003	0.015	
V05	02-May-88	1.9	8.07		11.0	50.0		0.004	0.004	0.003	0.035	
V05	04-May-88						0.09					
V05	11-May-88	5.4	7.61	78.20	52.0	23.0	0.91	0.023	0.011	0.003	0.124	2.600
V05	18-May-88				13.0	33.0						
V05	07-Jun-88			65.10	25.0	23.0		0.012	0.005	0.003	0.054	1.560
V05	06-Jul-88	7.8	8.43	161.70	7.0	43.0	0.40	0.005	0.003	0.003	0.030	0.460
V05	02-Aug-88	10.5	8.44	170.10	11.0	32.0	0.16	0.007	0.003	0.003	0.026	1.030
V05	05-Aug-88				60.0			0.016	0.008	0.003	0.060	3.750
V05	19-Sep-88	3.5	8.40	202.70	4.0	60.0	0.29	0.010	0.003	0.003	0.024	0.250
V05	19-Oct-88		8.03	195.00	4.0	57.0		0.007	0.004	0.003	0.019	0.240
V05	29-Nov-88		8.12	244.00	19.0	85.0	0.05	0.013	0.003	0.008	0.049	0.740
V05	03-Jan-89	1.0	7.68	247.00	2.0	108.0	0.03	0.002	0.002	0.003	0.012	0.130
V05	30-Jan-89		7.80	244.00	7.0	131.0	0.02	0.101	0.002	0.008	0.021	0.230
V05	28-Feb-89		7.66	304.00	4.0	159.0	0.14	0.020	0.002	0.003	0.015	0.095
V05	28-Mar-89		7.81	289.00	2.0	159.0	0.12	0.009	0.003	0.003	0.120	
N		21	21	11	25	24	16	24	24	24	24	11
AVERAGE			8.1	200.07	16.2	74.4	0.24	0.015	0.004	0.009	0.035	1.008
STANDARD DEVIATION			0.3	74.01	27.4	44.5	0.24	0.020	0.002	0.012	0.029	1.132
MAXIMUM VALUE					130.0	159.0	0.91	0.101	0.011	0.050	0.124	3.750

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-21

WEST FORK OF VANGORDA CREEK 50 M UPSTREAM OF BLIND CREEK ROAD

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V06	03-Jun-87	2.0			2.0	2.0	0.31	0.002	0.002	0.003	0.004	
V06	08-Jul-87	4.0	7.67		1.0	2.0	0.21	0.008	0.002	0.007	0.003	
V06	05-Aug-87	6.0	7.81		0.5	4.0	0.36	0.008	0.030	0.034	0.009	
V06	20-Aug-87	6.0	7.87		1.0	11.0	0.56	0.014	0.002	0.047	0.006	
V06	26-Aug-87	6.0			2.0	5.0		0.002	0.001	0.007	0.002	
V06	18-Dec-87	0.0	8.03		1.3	7.0		0.040	0.001	0.050	0.010	
V06	06-Apr-88	0.8	7.50		4.0	10.0	0.06	0.070	0.003	0.028	0.015	
V06	14-Apr-88	0.8	7.40		15.0	15.0	0.17	0.056	0.003	0.028	0.019	
V06	02-May-88	7.9	1.60		2.0	10.0	0.78	0.005	0.002	0.003	0.009	
V06	18-May-88				2.0	6.0						
V06	06-Jul-88	6.0	7.70	22.10	0.5	2.0	0.19	0.002	0.001	0.003	0.003	0.020
V06	02-Aug-88	9.1	7.48	25.20	550.0	15.0	0.57	0.182	0.039	0.074	0.455	11.300
V06	19-Sep-88	2.9	7.86	65.10	66.0	7.0	0.21	0.035	0.008	0.009	0.054	3.700
V06	19-Oct-88		7.35	28.00	43.0	4.0		0.023	0.003	0.005	0.039	1.850
V06	29-Nov-88		7.32	32.00	11.0	4.0	0.14	0.024	0.001	0.003	0.012	0.250
V06	03-Jan-89	1.0	7.74	90.00	29.0	4.0	0.03	0.004	0.001	0.003	0.009	0.220
N		14	13	6	16	16	12	15	15	15	15	6
AVERAGE			7.2	43.73	45.6	6.8	0.30	0.032	0.007	0.020	0.043	2.890
STANDARD DEVIATION			1.6	25.15	131.5	4.2	0.22	0.045	0.011	0.022	0.111	3.975
MAXIMUM VALUE					550.0	15.0	0.78	0.182	0.039	0.074	0.455	11.300

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-22

SMALL CREEK IMMEDIATELY UPSTREAM FROM CONFLUENCE WITH WEST FORK OF VANGORDA CREEK

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V06A	06-Aug-87				1.0	2.0		0.012	0.001	0.011	0.008	
V06A	22-Sep-87	2.0	7.62		0.5	7.0		0.006	0.001	0.003	0.002	
V06A	15-Oct-87	1.0	7.81		0.5	8.0		0.006	0.001	0.005	0.002	
V06A	13-Nov-87	0.0	7.90		0.5	13.0		0.001	0.001	0.003	0.002	
V06A	11-May-88	2.8	7.61	29.90	13.0	7.0		0.011	0.005	0.003	0.034	0.700
V06A	07-Jun-88			30.45	3.0	1.0		0.003	0.001	0.003	0.001	0.084
V06A	06-Jul-88	6.5	8.04	54.60	0.5	1.0	0.16	0.004	0.001	0.003	0.002	0.040
V06A	02-Aug-88	9.2	7.97	59.90	17.0	3.0		0.015	0.002	0.003	0.017	0.720
V06A	19-Sep-88	2.6	8.00	29.40	1.0	12.0	0.09	0.005	0.002	0.003	0.007	0.145
V06A	19-Oct-88		7.47	60.00	9.0	4.0		0.008	0.002	0.003	0.018	0.460
V06A	29-Nov-88		7.81	76.00	5.0	4.0	0.14	0.004	0.001	0.003	0.008	0.180
V06A	03-Jan-89	1.0	7.78	93.00	11.0	6.0	0.01	0.003	0.001	0.003	0.008	0.205
N		9	10	8	12	12	4	12	12	12	12	8
AVERAGE			7.8	54.16	5.2	5.7	0.10	0.007	0.002	0.003	0.009	0.317
STANDARD DEVIATION			0.2	21.84	5.6	3.8	0.06	0.004	0.001	0.002	0.009	0.255
MAXIMUM VALUE					17.0	13.0	0.16	0.015	0.005	0.011	0.034	0.720

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-23
WEST FORK VANGORDA CREEK 10 M DOWNSTREAM FROM BLIND CREEK ROAD CULVERT

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V06B	22-Sep-87	2.0	7.62		1.0	5.0		0.006	0.001	0.003	0.002	
V06B	15-Oct-87	1.0	7.63		1.0	6.0		0.005	0.001	0.003	0.003	
V06B	13-Nov-87	0.0	7.73		0.5	8.0		0.003	0.001	0.003	0.003	
V06B	11-May-88	2.6	7.19	15.20	7.0	7.0	0.72	0.012	0.003	0.003	0.018	0.450
V06B	07-Jun-88			57.75	3.0	1.0		0.003	0.002	0.003	0.002	0.068
N		4	4	2	5	5	1	5	5	5	5	2
AVERAGE			7.5	36.48	2.5	5.4	0.72	0.006	0.002	0.003	0.006	0.269
STANDARD DEVIATION			0.2	21.28	2.4	2.4	0.00	0.003	0.001		0.006	0.181
MAXIMUM VALUE					7.0	8.0	0.72	0.012	0.003	0.003	0.018	0.450

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-24

VANGORDA CREEK UPSTREAM OF WESTFORK AND TOWN (DISCONTINUED SEPTEMBER 1987)

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V07	03-Jun-87	2.0			3.0	8.0	0.05	0.007	0.003	0.003	0.006	
V07	09-Jul-87	5.0	7.97		16.0	16.0	0.16	0.014	0.003	0.009	0.008	
V07	05-Aug-87	8.0	8.19		7.0	19.0	0.36	0.011	0.003	0.023	0.011	
V07	20-Aug-87	6.0	8.23		10.0	26.0	0.42	0.018	0.004	0.025	0.004	
V07	25-Sep-87	1.0	8.14		1.0	21.0		0.015	0.001	0.003	0.003	
N		5	4	0	5	5	4	5	5	5	5	0
AVERAGE			8.1		7.4	18.0	0.25	0.013	0.003	0.012	0.006	
STANDARD DEVIATION			0.1		5.3	6.0	0.15	0.004	0.001	0.010	0.003	
MAXIMUM VALUE					16.0	26.0	0.42	0.018	0.004	0.025	0.011	

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-25
VANGORDA CREEK AT BRIDGE CROSSING JUST UPSTREAM OF CONFLUENCE WITH PELLY RIVER

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V08	03-Jun-87	3.0			5.0	15.0	0.08	0.007	0.004	0.003	0.012	
V08	08-Jul-87	8.0	7.82		8.0	23.0	0.57	0.010	0.003	0.008	0.009	
V08	05-Aug-87	8.0	8.31		4.0	26.0	0.33	0.011	0.003	0.016	0.009	
V08	20-Aug-87	6.0			59.0	33.0	0.56	0.052	0.005	0.043	0.037	
V08	25-Sep-87	1.0	8.26		0.5	33.0		0.009	0.001	0.003	0.006	
V08	07-Oct-87				0.5							
V08	14-Oct-87	0.0	8.66		0.5	45.0		0.015	0.002	0.005	0.008	
V08	20-Oct-87				1.1							
V08	28-Oct-87				0.5							
V08	12-Nov-87	0.0	8.39		0.5	40.0		0.010	0.001	0.005	0.007	
V08	20-Nov-87				0.5							
V08	18-Dec-87	0.0	8.34		0.7	71.0		0.040	0.001	0.003	0.020	
V08	18-Feb-88	0.0	8.10		0.5	97.0		0.018	0.030	0.050	0.014	
V08	06-Apr-88	1.4	7.55		1.0	84.0	0.10	0.006	0.002	0.003	0.103	
V08	14-Apr-88	2.0	7.89		1.0	82.0	0.15	0.009	0.002	0.003	0.054	
V08	02-May-88	2.2	8.25		6.0	48.0		0.010	0.004	0.003	0.023	
V08	04-May-88						0.21					
V08	11-May-88	8.0	7.66	60.40	71.0	27.0	0.65	0.034	0.008	0.008	0.088	2.750
V08	18-May-88				10.0	21.0						
V08	27-May-88	5.4	8.16	79.80								
V08	07-Jun-88	6.4	8.17	57.75	23.0	14.0		0.015	0.004	0.003	0.024	1.150
V08	06-Jul-88	9.5	8.49	93.50	2.0	18.0	0.15	0.010	0.002	0.003	0.010	0.190
V08	05-Aug-88	10.4	8.35	137.60	4.0	28.0	0.29	0.009	0.002	0.003	0.011	0.240
V08	22-Sep-88	2.5	7.83	147.00	2.0	42.0	0.14	0.008	0.002	0.005	0.008	0.035
V08	19-Oct-88		7.52	148.00	1.0	46.0		0.009	0.002	0.003	0.007	0.065
V08	29-Nov-88		8.06	178.00	2.0	70.0		0.011	0.001	0.003	0.008	0.060
V08	03-Jan-89	1.0	7.52	211.00	0.5	81.0	0.14	0.015	0.002	0.003	0.007	0.010
V08	28-Feb-89		7.80	254.00	3.0	132.0	0.13	0.050	0.002	0.003	0.012	0.055
V08	28-Mar-89		7.97	220.00	2.0	120.0	0.21	0.023	0.002	0.003	0.013	
N		22	21	11	27	23	14	22	22	22	22	9
AVERAGE			8.1	144.28	7.8	52.0	0.27	0.017	0.004	0.008	0.022	0.506
STANDARD DEVIATION			0.3	63.74	16.9	33.1	0.18	0.013	0.006	0.013	0.026	0.862
MAXIMUM VALUE					71.0	132.0	0.65	0.052	0.030	0.050	0.103	2.750

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-26
VANGORDA CREEK 100 M DOWNSTREAM FROM CONFLUENCE WITH DIXON CREEK

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V10	14-Oct-87	0.0	8.49		0.5	23.0		0.031	0.002	0.006	0.013	
V10	18-Dec-87		8.28			33.0		0.040	0.001	0.003	0.010	
V10	18-Feb-88	0.0	7.70		0.5	33.0		0.020	0.002	0.003	0.005	
V10	14-Apr-88	2.2	8.00		1.0	37.0	0.15	0.013	0.001	0.003	0.005	
V10	13-May-88		7.86	46.00	18.0	9.0	0.28	0.013	0.005	0.003	0.039	1.140
V10	08-Jun-88	5.3	8.00	59.85	3.0	6.0		0.013	0.002	0.003	0.009	0.360
V10	07-Jul-88		8.40	110.30	1.0	14.0	0.24	0.008	0.002	0.003	0.008	0.075
V10	03-Aug-88		8.36	143.90	0.5		0.38	0.011	0.002	0.003	0.011	0.085
V10	20-Sep-88		7.86	130.20	0.5	20.0	0.28	0.014	0.003	0.003	0.011	0.100
V10	19-Oct-88		7.64	152.00	1.0	23.0		0.029	0.002	0.003	0.015	0.110
V10	29-Nov-88		7.69	153.00	5.0	27.0		0.015	0.001	0.003	0.023	0.140
V10	03-Jan-89	1.0	7.63	192.00	2.0	38.0	0.13	0.006	0.001	0.003	0.023	0.150
V10	28-Feb-89		7.60	161.00	2.0	31.0	0.07	0.030	0.001	0.003	0.006	0.015
V10	28-Mar-89		7.83	131.00	0.5	23.0	0.12	0.023	0.001	0.003	0.030	
N		8	14	10	13	13	8	14	14	14	14	9
AVERAGE			8.0	127.93	2.7	24.4	0.21	0.019	0.002	0.003	0.015	0.242
STANDARD DEVIATION			0.3	42.82	4.6	9.8	0.10	0.010	0.001	0.001	0.010	0.330
MAXIMUM VALUE					18.0	38.0	0.38	0.040	0.005	0.006	0.039	1.140

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-27

VANGORDA CREEK 50 M UPSTREAM OF GRUM CREEK

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SDL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V11	12-May-88	3.0	7.08	14.00	9.0	10.0	0.46	0.016	0.002	0.003	0.026	0.610
V11	18-May-88				0.5							
V11	26-May-88		7.62	28.35	8.0			0.030	0.003			0.515
V11	08-Jun-88			14.70	2.0	0.5		0.015	0.002	0.003	0.008	0.330
V11	07-Jul-88	11.2	7.70	19.90	0.5	5.0	0.16	0.011	0.001	0.003	0.003	0.040
V11	03-Aug-88	10.5	7.78	29.40	0.5	3.0	0.23	0.015	0.001	0.003	0.001	0.020
V11	20-Sep-88		6.77	33.60	0.5	8.0	0.41	0.022	0.002	0.003	0.001	0.010
V11	19-Oct-88		7.61	53.00	0.5	15.0		0.020	0.001	0.003	0.001	0.030
V11	29-Nov-88	1.0	7.01	46.00	0.5	13.0	0.06	0.010	0.001	0.003	0.001	0.003
V11	03-Jan-89	1.0	7.72	71.00	2.0	15.0	0.10	0.010	0.001	0.003	0.022	0.155
V11	30-Jan-89		8.05	56.00	0.5	15.0	0.01	0.052	0.001	0.003	0.001	0.040
V11	28-Feb-89		7.73	59.00	3.0	11.0	0.10	0.058	0.001	0.003	0.001	0.015
V11	28-Mar-89		7.74	62.00	1.0	9.0	0.17	0.051	0.001	0.003	0.001	
N		8	11	12	13	11	9	12	12	11	11	11
AVERAGE			7.5	40.58	2.2	9.5	0.19	0.026	0.001	0.003	0.006	0.161
STANDARD DEVIATION			0.4	18.87	2.8	4.8	0.15	0.017	0.001	0.000	0.009	0.211
MAXIMUM VALUE					9.0	15.0	0.46	0.058	0.003	0.003	0.026	0.610

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-28
SOUTH FORK ROSE CREEK JUST UPSTEAM FROM MINE ROAD CULVERT CROSSING

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
V14	03-Jun-87	3.0			2.0	4.0	0.62	0.001	0.001	0.003	0.008	
V14	09-Jul-87	8.0	7.56		2.0	2.0	0.18	0.026	0.003	0.008	0.003	
V14	06-Aug-87	14.0	7.60		1.0	2.0	0.24	0.007	0.002	0.036	0.009	
V14	25-Sep-87	1.0	7.68		0.5	5.0		0.005	0.001	0.003	0.003	
V14	11-May-88	4.5	7.01	10.50	37.0	9.0	0.49	0.008	0.002	0.003	0.135	1.620
V14	07-Jun-88			9.45	5.0	0.5		0.004	0.001	0.003	0.004	0.135
V14	06-Jul-88	10.8	7.63	16.80	1.0	0.5	0.35	0.002	0.002	0.003	0.006	0.070
V14	02-Aug-88	12.8	7.80	20.00	1.0	1.0	0.18	0.003	0.001	0.003	0.002	0.055
V14	19-Sep-88	3.2	7.82	21.00	2.0	2.0	0.15	0.001	0.001	0.003	0.001	0.060
V14	19-Oct-88		7.09	89.00	1.0	6.0		0.021	0.002	0.003	0.066	0.200
V14	29-Nov-88		7.40	103.00	1.0	9.0	0.03	0.022	0.001	0.003	0.052	0.150
V14	03-Jan-89	1.0	7.74	116.00	0.5	12.0	0.11	0.022	0.003	0.003	0.054	0.100
V14	30-Jan-89		7.68	104.00	1.0	12.0	0.01	0.036	0.001	0.003	0.081	0.145
V14	28-Feb-89		7.18	131.00	3.0	8.0	0.18	0.050	0.001	0.003	0.099	0.165
V14	28-Mar-89		7.20	135.00	1.0	8.0	0.15	0.041	0.001	0.003	0.116	
N		13	13	11	15	15	12	15	15	15	15	10
AVERAGE			7.5	68.70	3.9	5.4	0.22	0.017	0.002	0.005	0.043	0.270
STANDARD DEVIATION			0.3	50.08	8.9	3.9	0.17	0.015	0.001	0.008	0.045	0.452
MAXIMUM VALUE					37.0	12.0	0.62	0.050	0.003	0.036	0.135	1.620

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-29

ARTESIAN DRILL HOLE ON SECTION 12E OF VANGORDA DEPOSIT DRILL GRID (HOLE HIT 109 FT GLACIAL TILL 60 FT SULPHIDES (4CE_& 4C) AND 200' ALTERED PHYLLITE (4L))

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
DDH-322	26-Aug-87	3.0	8.01		0.5	23.0		0.002	0.001	0.005	0.015	
DDH-322	22-Sep-87	3.0	7.57			23.0		0.006	0.001	0.003	0.015	
DDH-322	14-Oct-87	3.0	8.42			25.0		0.003	0.003	0.003	0.015	
DDH-322	13-Nov-87	3.0	8.07		2.0	20.0		0.002	0.001	0.003	0.017	
DDH-322	18-Dec-87		8.21			30.0		0.030	0.001	0.050	0.030	
DDH-322	18-Feb-88	3.0	7.59		1.0	23.0		0.002	0.002	0.003	0.020	
DDH-322	14-Apr-88	3.8	7.82		1.0	28.0	0.35	0.002	0.003	0.003	0.018	
DDH-322	12-May-88		7.57	153.00		29.0		0.002	0.001	0.003	0.014	0.540
DDH-322	27-May-88	4.5	8.06	84.00								
DDH-322	07-Jun-88	5.2	8.07		1.0	23.0		0.005	0.001	0.003	0.015	0.610
DDH-322	07-Jul-88	6.0	8.02	178.50	1.0	24.0	0.16	0.003	0.002	0.003	0.016	0.555
DDH-322	03-Aug-88	5.0	8.00		1.0	23.0		0.001	0.001	0.003	0.013	0.495
DDH-322	20-Sep-88	3.5	7.35	172.40	0.5	21.0	0.18	0.001	0.002	0.003	0.014	0.610
N		11	13	4	8	12	3	12	12	12	12	5
AVERAGE			7.9	146.98	1.0	24.3	0.23	0.005	0.002	0.007	0.017	0.562
STANDARD DEVIATION			0.3	37.56	0.4	3.0	0.09	0.008	0.001	0.013	0.004	0.044
MAXIMUM VALUE					2.0	30.0	0.35	0.030	0.003	0.050	0.030	0.610

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-30

GRUM ADIT FROM FLOW OUT OF PORTAL CULVERT

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
GA	03-Jun-87	5.0			8.0	92.0		2.320	0.001	0.003	0.187	
GA	29-Jun-87				98.0	98.0		2.160	0.002	0.005	0.182	
GA	08-Jul-87	5.0	8.01		9.0	99.0	0.50	2.120	0.002	0.012	0.174	
GA	06-Aug-87	5.0	8.13		8.0	95.0	0.41	2.130	0.002	0.029	0.180	
GA	22-Sep-87	4.0	7.51			84.0		2.170	0.001	0.003	0.172	
GA	14-Oct-87	3.0	8.19			89.0		2.185	0.001	0.005	0.173	
GA	13-Nov-87	3.0	7.73		11.0	72.0		2.670	0.002	0.009	0.176	
GA	20-Nov-87					93.0		2.250	0.001			
GA	18-Dec-87	3.0	7.96		9.5	98.0		2.070	0.001	0.050	0.170	
GA	18-Feb-88	0.0	7.90		13.0	97.0		2.050	0.002	0.009	0.175	
GA	06-Apr-88	3.1	7.43		14.0	88.0	0.13	2.020	0.005	0.007	0.197	
GA	14-Apr-88	3.3	7.30		15.0	92.0	0.19	2.070	0.002	0.019	0.179	
GA	11-May-88	5.7	7.31	231.80		102.0	1.02	1.690	0.001	0.003	0.159	4.600
GA	07-Jun-88			280.35	15.0	90.0		1.780	0.001	0.005	0.159	5.900
GA	07-Jul-88	5.8	7.76	277.20	13.0	82.0	0.35	1.700	0.002	0.005	0.161	5.250
GA	03-Aug-88	5.7	7.75	281.40	17.0	85.0	0.20	1.580	0.001	0.003	0.153	4.500
GA	19-Sep-88	4.1	7.74	277.20	8.0	80.0	0.10	1.540	0.002	0.003	0.155	3.550
GA	19-Oct-88		7.00	249.00	9.0	93.0		1.520	0.001	0.003	0.165	3.950
GA	29-Nov-88	1.0	7.30	248.00	41.0	90.0	0.17	1.850	0.001	0.013	0.163	6.800
GA	03-Jan-89	1.0	7.57	227.00	9.0	85.0	0.21	1.650	0.001	0.007	0.145	4.650
GA	30-Jan-89	1.0	7.92	349.00	12.0	80.0	0.44	1.550	0.003	0.007	0.140	5.350
GA	28-Feb-89	1.0	7.41	246.00	12.0	77.0	0.23	1.900	0.003	0.037	0.140	7.500
GA	28-Mar-89	1.0	7.31	262.00	29.0	81.0	0.33	2.800	0.060	0.220	0.170	
N		19	19	11	19	23	13	23	23	22	22	10
AVERAGE			7.6	266.27	18.4	88.8	0.33	1.990	0.004	0.021	0.167	5.205
STANDARD DEVIATION			0.3	32.05	20.3	7.7	0.23	0.336	0.012	0.045	0.014	1.175
MAXIMUM VALUE					98.0	102.0	1.02	2.800	0.060	0.220	0.197	7.500

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-31

ARTESIAN PIEZOMETER HOLE AT GRUM PIT AREA (DESTROYED AS OF NOVEMBER 1988)

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CD * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
GRUM-PH4	12-May-88		7.00	81.00		11.0		0.003	0.001	0.003	0.166	0.020
GRUM-PH4	27-May-88	5.7	7.33									
GRUM-PH4	08-Jun-88			93.45	0.5	4.0		0.002	0.001	0.003	0.144	0.011
GRUM-PH4	07-Jul-88	6.3	7.50		0.5	3.0		0.002	0.001	0.003	0.156	0.003
GRUM-PH4	03-Aug-88	4.7	7.39		0.5	1.0		0.001	0.001	0.003	0.148	0.003
GRUM-PH4	20-Sep-88	3.4	7.37		0.5	7.0		0.001	0.001	0.003	0.155	0.005
GRUM-PH4	19-Oct-88		7.29	85.00	0.5	2.0		0.007	0.001	0.003	0.155	0.035
N		4	6	3	5	6	0	6	6	6	6	6
AVERAGE			7.3	86.48	0.5	4.7		0.003	0.001	0.003	0.154	0.013
STANDARD DEVIATION			0.2	5.19	0.0	3.4		0.002			0.007	0.012
MAXIMUM VALUE					0.5	11.0		0.007	0.001	0.003	0.166	0.035

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-32

RED SPRING, NATURAL SEE PAGE WATERS INTERACTED WITH VANGORDA DEPOSIT SULPHIDES

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
RS	26-Aug-87	6.0	7.34		6.0	42.0		0.850	0.016	0.153	0.012	
RS	22-Sep-87	2.0	6.84			35.0		0.780	0.031	0.141	0.014	
RS	14-Oct-87	2.0	7.55			49.0		0.840	0.039	0.158	0.013	
RS	12-Nov-87	2.0	7.50		3.0	35.0		0.735	0.041	0.168	0.015	
RS	18-Dec-87		7.42		6.7	42.0		0.350	0.001	0.150	0.030	
RS	18-Feb-88	1.0	6.82		0.5	28.0		0.360	0.005	0.040	0.011	
RS	12-May-88	5.6	6.24	52.50		55.0		1.060	0.054	0.106	0.017	5.000
RS	08-Jun-88			111.30	0.5	30.0		0.485	0.006	0.076	0.004	0.235
RS	07-Jul-88	7.3	6.94		50.0	43.0		1.060	0.008	0.095	0.005	1.990
RS	03-Aug-88	5.8	7.02	113.40	5.0	35.0	0.14	0.760	0.007	0.110	0.004	2.550
RS	20-Sep-88	6.8	8.09	105.00	5.0	44.0	0.05	0.415	0.010	0.210	0.004	1.200
RS	19-Oct-88		6.69	98.00	20.0	32.0		1.000	0.072	1.200	0.024	25.500
RS	29-Nov-88	1.0	6.51	90.00	3.0	19.0	0.07	0.060	0.007	0.335	0.001	0.485
RS	03-Jan-89	1.0	7.11	91.00	13.0	33.0		0.520	0.023	0.280	0.021	6.300
RS	30-Jan-89	1.0	7.47	87.00	42.0	36.0	0.12	0.490	0.044	0.500	0.021	12.300
RS	28-Feb-89	1.0	7.13	88.00	18.0	29.0	0.17	0.395	0.008	0.115	0.021	3.300
RS	28-Mar-89	1.0	6.97	86.00	23.0	19.0	0.22	0.540	0.033	0.330	0.028	
N		14	16	10	14	17	6	17	17	17	17	10
AVERAGE			7.1	92.22	14.9	35.6	0.13	0.629	0.024	0.245	0.014	5.886
STANDARD DEVIATION			0.4	16.36	14.9	9.3	0.06	0.275	0.020	0.264	0.009	7.368
MAXIMUM VALUE					50.0	55.0	0.22	1.060	0.072	1.200	0.030	25.500

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-33
DITCH FLOWING OUT OF DOAL LAKE ACROSS BLIND CREEK PAD, NOW DESTROYED.

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
DOAL DITCH BELO	06-May-88		7.30		305.0							
DOAL DITCH BELO	12-May-88				7900.0							
DOAL DITCH BELO	27-May-88	5.5	7.62		104.0	43.0		0.180	0.008			5.700
DOAL DITCH BELO	07-Jun-88				435.0	17.0		0.073	0.036	0.015	0.335	27.500
N		1	2	0	4	2	0	2	2	1	1	2
AVERAGE			7.5		2186.0	30.0		0.127	0.022	0.015	0.335	16.600
STANDARD DEVIATION			0.2		3301.1	13.0		0.053	0.014	0.000	0.000	10.900
MAXIMUM VALUE					7900.0	43.0		0.180	0.036	0.015	0.335	27.500

* Extractable metals before May 10, 1988; Total metals after that date.

TABLE A-34

VANGORDA INTERCEPTOR DITCH NORTHEAST OF PIT

SITE	DATE	TEMP deg C	pH	ALK'TY mg/L	SUS SOL mg/L	SO4 mg/L	AMMONIA mg/L	ZN * mg/L	CU * mg/L	PB * mg/L	MN * mg/L	FE * mg/L
VG DITCH AT ROA	06-May-88		6.44		415.0	52.0		0.285	0.163			51.500
VG DITCH AT ROA	13-May-88	4.7	7.07	31.50	18.0	11.0		0.011	0.007	0.003	0.022	2.150
VG DITCH AT ROA	27-May-88		7.76		8.0	33.0		0.007	0.003			0.825
VG DITCH AT ROA	07-Jun-88		8.01		14.0	9.0		0.011	0.006	0.005	0.028	2.300
VG DITCH AT ROA	07-Jul-88	16.2	8.05		10.0							
N		2	5	1	5	4	0	4	4	2	2	4
AVERAGE			7.5	31.50	93.0	26.3		0.079	0.045	0.004	0.025	14.194
STANDARD DEVIATION			0.6	0.00	161.0	17.6		0.119	0.068	0.001	0.003	21.546
MAXIMUM VALUE					415.0	52.0		0.285	0.163	0.005	0.028	51.500

* Extractable metals before May 10, 1988; Total metals after that date.

VANGORDA BACKGROUND DATA
1975-1980

Current Site	Recorded Site	Date	Sampling Agency	pH (field)	Zn (mg/l)	SO4	Cu (mg/l)	Suspended Solids	Alkalinity Total
** V1									
V1	V7	75.04.23	ME	9.00	0.0050	4.0000	0.0010	NA	46.0
V1	V7	75.06.05	ME	8.70	0.0070	5.0000	0.0030	NA	13.0
V1	9BCT6	75.06.17	DINA	NA	0.0050	3.6000	0.0010	NA	19.0
V1	9BCT6	75.07.09	DINA	NA	0.0040	3.4000	-0.0010	1.60	16.6
V1	9BCT6	75.08.06	DINA	NA	-0.0010	4.2000	-0.0010	NA	17.1
V1	V7	75.08.13	ME	NA	0.0210	-1.0000	0.0070	-1.00	14.4
V1	9BCT6	75.08.27	DINA	NA	0.0030	4.2000	-0.0010	NA	19.2
V1	9BCT6	76.03.10	DINA	NA	0.0040	9.3000	0.0010	-1.00	47.5
V1	V7	76.06.07	ME	NA	0.0060	-0.1000	-0.0100	2.60	5.6
V1	9BCT6	76.06.10	DINA	7.90	0.0050	1.6000	-0.0010	6.30	6.4
V1	9BCT6	76.08.03	DINA	7.50	0.0050	4.5000	-0.0010	-1.00	21.0
V1	V7	76.08.11	ME	NA	0.0050	5.2000	-0.0100	0.40	14.0
V1	9BCT6	76.09.22	DINA	7.80	0.0060	5.3000	-0.0010	-1.00	23.6
V1	V7	76.12.01	ME	NA	NA	NA	NA	NA	NA
V1	9BCT6	77.02.22	DINA	7.70	0.0240	9.1000	0.0040	2.40	44.1
V1	9BCT6	77.05.26	DINA	6.00	0.0040	4.7000	0.0040	1.20	16.2
V1	V7	77.08.17	ME	NA	0.0070	6.2000	-0.0100	0.20	22.0
V1	V7	79.07.26	CAMC	NA	0.0100	3.0000	0.0020	1.00	NA
V1	V7	79.10.02	CAMC	NA	0.0050	4.0000	0.0020	-1.00	NA
V1	V7	80.05.30	CAMC	NA	0.0280	1.0000	0.0040	4.00	NA
V1	V7	80.07.02	CAMC	NA	0.0030	4.0000	0.0030	-1.00	14.0
V1	V7	80.08.16	WEAGLE	NA	0.1700	NA	0.0200	NA	-999.9
V1	V7	80.09.26	CAMC	NA	0.0060	-2.0000	0.0020	-1.00	19.0
** V13									
V13	9BCT10	75.06.17	DINA	NA	0.0020	4.6000	0.0010	NA	20.6
V13	9BCT10	75.07.09	DINA	NA	0.0040	7.4000	-0.0010	4.00	39.5
V13	9BCT10	75.08.06	DINA	NA	0.0200	11.1000	0.0020	49.50	52.1
V13	9BCT10	75.08.27	DINA	NA	-0.0060	9.0000	-0.0010	NA	53.2
V13	9BCT10	76.06.10	DINA	6.90	0.0100	3.9000	0.0030	62.50	22.8
V13	9BCT10	76.09.22	DINA	8.10	0.0070	13.7000	0.0010	5.50	66.7
V13	9BCT10	77.02.22	DINA	7.50	0.0800	17.6000	0.0030	2.40	87.7
V13	9BCT10	77.05.26	DINA	6.90	0.0050	5.7000	0.0060	85.00	31.7

VANGORDA BACKGROUND DATA
1975-1980

Current Site	Recorded Site	Date	Sampling Agency	pH (field)	Zn (mg/l)	SO4	Cu (mg/l)	Suspended Solids	Alkalinity Total
** V2									
V2	ME2	75.04.23	ME	9.10	0.0010	11.0000	0.0030	NA	130.0
V2	ME2	75.06.05	ME	8.20	0.0060	5.0000	0.0050	NA	40.0
V2	ME2	75.08.13	ME	NA	0.0150	9.5000	0.0100	-1.00	81.0
V2	ME2	76.06.07	ME	NA	0.0150	18.0000	-0.0100	0.60	58.0
V2	ME2	76.08.11	ME	NA	0.0140	86.0000	-0.0100	4.80	137.0
V2	ME2	76.12.01	ME	NA	0.1690	96.0000	0.0260	33.00	184.0
V2	me2	77.08.17	ME	NA	0.0760	68.0000	-0.0100	0.40	183.0
** V3									
V3	ME3	75.04.23	ME	9.00	0.0360	17.5000	0.0010	NA	66.0
V3	ME3	75.06.05	ME	8.20	0.0550	6.0000	0.0070	NA	23.0
V3	ME3	75.08.13	ME	NA	0.0290	7.8000	0.0020	NA	31.0
V3	ME3	76.06.07	ME	NA	0.0450	3.9000	-0.0100	7.60	19.0
V3	ME3	76.08.11	ME	NA	0.0010	37.0000	-0.0100	4.20	229.0
V3	me3	77.08.16	ME	NA	0.0160	14.6000	-0.0100	0.20	52.0
** V4									
V4	V5	75.06.05	ME	8.10	0.0090	10.0000	0.0060	NA	108.0
V4	V5	75.08.13	ME	NA	0.0260	31.0000	0.0100	-1.00	205.0
V4	V5	76.06.07	ME	NA	0.0110	21.6000	-0.0100	3.40	143.0
V4	V5	76.08.11	ME	NA	0.0080	13.8000	-0.0100	0.60	46.0
V4	V5	77.08.16	ME	NA	0.0080	45.0000	-0.0100	0.20	271.0
V4	V5	79.07.26	CAMC	NA	0.0070	33.0000	0.0030	-1.00	NA
V4	V5	79.10.03	CAMC	NA	0.0050	56.0000	0.0020	-1.00	NA
V4	V5	80.05.30	CAMC	NA	0.0860	32.0000	0.0040	2.00	NA
V4	V5	80.05.30	CAMC	NA	0.0200	8.0000	0.0050	2.00	NA
V4	V5	80.07.02	CAMC	NA	0.0160	60.0000	0.0030	-1.00	260.0
V4	V5	80.09.26	CAMC	NA	0.0020	49.0000	0.0030	NA	252.0
** V5									
V5	V2	75.04.23	ME	9.70	0.0030	112.0000	0.0020	NA	250.0
V5	V2	75.06.05	ME	9.10	0.0410	13.0000	0.0130	482.00	75.0
V5	9BCT2	75.06.17	DINA	NA	0.1200	330.0000	0.0280	495.00	304.0
V5	9BCT2	75.07.09	DINA	NA	0.0030	42.0000	0.0020	10.70	127.0

VANGORDA BACKGROUND DATA
1975-1980

Current Site	Recorded Site	Date	Sampling Agency	pH (field)	Zn (mg/l)	SO4	Cu (mg/l)	Suspended Solids	Alkalinity Total
V5	9BCT2	75.08.06	DINA	NA	0.0270	46.0000	0.0020	NA	138.0
V5	V2	75.08.13	ME	NA	0.0200	35.0000	0.0100	-1.00	8.3
V5	V2	76.06.07	ME	NA	0.0200	20.7000	-0.0100	256.00	80.0
V5	9BCT2	76.06.10	DINA	8.00	0.0300	19.7000	0.0200	392.00	70.7
V5	9BCT2	76.08.03	DINA	8.10	0.0090	50.5000	0.0020	20.00	164.0
V5	V2	76.08.11	ME	NA	0.0060	53.0000	-0.0100	11.00	166.0
V5	9BCT2	76.09.23	DINA	8.00	0.0110	57.0000	0.0020	5.00	197.0
V5	9BCT2	76.12.01	DINA	7.60	0.0050	89.0000	0.0010	4.50	225.0
V5	V2	76.12.01	ME	NA	0.0160	86.0000	0.0160	3.60	235.0
V5	9BCT2	77.05.26	DINA	7.50	0.0070	34.0000	0.0060	104.00	93.5
V5	V2	77.08.17	ME	NA	0.0080	55.0000	-0.0100	2.80	188.0
V5	V2	79.07.26	CAMC	NA	0.0060	34.0000	0.0020	5.00	-999.9
V5	V2	79.10.13	CAMC	NA	0.0030	65.0000	0.0020	-1.00	-999.9
V5	V2	80.05.30	CAMC	NA	0.0130	38.0000	0.0040	13.00	-999.9
V5	V2	80.07.04	CAMC	NA	0.0070	54.0000	0.0030	3.00	143.0
V5	V2	80.09.26	CAMC	NA	0.0150	53.0000	0.0030	7.00	155.0
** V6									
V6	V3	75.06.05	ME	9.10	0.0110	11.0000	0.0030	NA	27.0
V6	9BCT4	75.07.08	DINA	NA	0.0150	4.1000	-0.0010	0.60	27.7
V6	9BCT4	75.08.06	DINA	NA	0.0010	4.3000	-0.0010	NA	37.4
V6	V3	75.08.13	ME	NA	0.0200	2.1000	0.0030	-0.10	39.0
V6	9BCT4	75.08.27	DINA	NA	0.0040	4.5000	-0.0010	NA	40.2
V6	V3	76.06.07	ME	NA	0.0240	2.0000	-0.0100	42.00	28.0
V6	9BCT4	76.06.10	DINA	7.30	0.0200	2.4000	0.0020	17.80	16.0
V6	9BCT4	76.08.03	DINA	7.70	0.0100	4.4000	0.0020	11.30	40.1
V6	V3	76.08.11	ME	NA	0.0010	8.4000	-0.0100	0.60	53.0
V6	9BCT4	76.09.22	DINA	7.90	0.0100	5.6000	-0.0010	3.00	56.2
V6	9BCT4	76.12.01	DINA	7.60	0.0040	8.5000	-0.0010	-1.00	64.1
V6	V3	76.12.01	ME	NA	0.0260	6.5000	-0.0100	1.60	68.0
V6	9BCT4	77.05.24	DINA	7.00	0.0040	4.4000	0.0030	6.00	33.0
V6	V3	77.08.17	ME	NA	0.0050	8.7000	-0.0100	0.80	66.0
V6		79.07.26	CAMC	NA	0.0260	9.0000	0.0040	6.00	NA
V6	V3	79.08.01	CAMC	NA	0.0050	6.0000	0.0010	1.00	NA
V6	V3	79.10.02	CAMC	NA	0.0080	4.0000	0.0020	-1.00	NA

VANGORDA BACKGROUND DATA
1975-1980

Current Site	Recorded Site	Date	Sampling Agency	pH (field)	Zn (mg/l)	SO4	Cu (mg/l)	Suspended Solids	Alkalinity Total
V6		79.10.03	CAMC	NA	0.0340	11.0000	0.0050	-1.00	NA
V6		80.05.30	CAMC	NA	0.0230	3.0000	0.0030	8.00	NA
V6	V3	80.05.30	CAMC	NA	0.0530	2.0000	0.0030	8.00	NA
V6		80.07.02	CAMC	NA	0.0530	10.0000	0.0060	1.00	33.0
V6	V3	80.07.02	CAMC	NA	0.0080	6.0000	0.0030	-1.00	49.0
V6		80.08.16	CAMC	NA	0.2000	NA	0.0200	NA	NA
V6		80.09.26	CAMC	NA	0.0330	13.0000	0.0030	-1.00	45.0
V6	V3	80.09.26	CAMC	NA	0.0090	4.0000	0.0040	2.00	53.0
** V7									
V7	V4	75.04.23	ME	9.50	0.0100	81.0000	0.0010	NA	164.0
V7	V4	75.06.05	ME	9.10	0.0180	11.0000	0.0050	NA	56.0
V7	V4	76.06.07	ME	NA	0.0140	11.1000	-0.0100	6.80	50.0
V7	V4	76.08.11	ME	NA	0.0040	28.0000	-0.0100	4.60	95.0
V7	V4	77.08.17	ME	NA	0.0120	30.0000	-0.0100	0.04	99.0
V7	V4	79.07.26	CAMC	NA	0.0260	16.0000	0.0030	1.00	NA
V7	V4	79.10.03	CAMC	NA	0.0200	33.0000	0.0040	-1.00	NA
V7	V4	80.07.04	CAMC	NA	0.0150	21.0000	0.0040	1.00	66.0
V7	V4	80.08.16	WEAGLE	NA	0.2400	NA	0.0100	NA	NA
V7	V4	80.09.26	CAMC	NA	0.0190	30.0000	0.0020	2.00	92.0
** V8									
V8	V1	75.04.23	ME	9.40	0.0070	101.0000	0.0010	NA	212.0
V8	V1	75.06.05	ME	8.50	0.0250	11.0000	0.0090	146.00	NA
V8	9BCT1	75.06.17	DINA	NA	0.0110	14.2000	0.0030	36.30	47.9
V8	9BCT1	75.07.09	DINA	NA	0.0130	24.0000	-0.0010	3.00	78.3
V8	9BCT1	75.08.06	DINA	NA	0.0060	25.0000	0.0020	NA	91.8
V8	9BCT1	75.08.27	DINA	NA	0.0090	25.0000	-0.0010	NA	97.1
V8	V1	76.06.07	ME	NA	0.0190	12.3000	-0.0100	61.00	62.0
V8	9BCT1	76.06.10	DINA	7.90	0.0200	11.8000	0.0060	154.00	51.0
V8	9BCT1	76.08.03	DINA	8.10	0.0070	38.0000	0.0010	4.00	121.0
V8	V1	76.08.11	ME	NA	0.0040	39.0000	-0.0100	2.20	123.0
V8	9BCT1	76.09.22	DINA	8.30	0.0110	50.0000	0.0030	-1.00	143.0
V8	9BCT1	76.12.01	DINA	7.60	0.0300	75.0000	0.0020	180.00	183.0
V8	V1	76.12.01	ME	NA	0.0280	71.0000	0.1300	189.00	188.0

VANGORDA BACKGROUND DATA
1975-1980

Current Site	Recorded Site	Date	Sampling Agency	pH (field)	Zn (mg/l)	SO4	Cu (mg/l)	Suspended Solids	Alkalinity Total
V8	XXX	77.02.22	DINA	6.90	0.0150	85.0000	0.0090	2.40	186.0
V8	XXX	77.04.15	DINA	6.90	0.1400	88.0000	0.0120	2.40	182.0
V8	9BCT1	77.05.26	DINA	7.30	0.0060	22.0000	0.0040	24.00	80.7
V8	XXX	77.05.26	DINA	7.00	0.0070	79.0000	0.0080	-1.00	179.0
V8	V1	77.08.17	ME	NA	0.0120	40.0000	-0.0100	2.20	134.0
V8	V1	79.07.26	CAMC	NA	0.0140	0.5000	0.0050	1.00	0.2
V8	V1	79.10.03	CAMC	NA	0.0090	1.1000	0.0020	-1.00	0.1
V8	V1	80.05.30	CAMC	NA	0.0280	13.0000	0.0120	3.00	NA
V8		80.05.31	CAMC	NA	0.0050	24.0000	0.0020	1.00	NA
V8	V1	80.07.04	CAMC	NA	0.0230	34.0000	0.0030	4.00	89.0
V8	V1	80.09.26	CAMC	NA	0.0050	42.0000	0.0030	5.00	125.0

TABLE A-36

CURRAGH RESOURCES INC.

VANGORDA CREEK SEDIMENT MONITORING PROGRAM

Date	Time	Location	Wedge Reading	Susp. Seds	Comments
Mon Oct 5	6:30 PM	Vangorda Culvert - Tunnel	CLEAR		
Tues Oct 6	6:00 PM	"	CLEAR		
Wed Oct 7	5:45 PM	"	CLEAR		
Thurs Oct 8	5:30 PM	"	CLEAR		
Fri Oct 9	6:00 PM	"	CLEAR		
Sat Oct 10	6:00 PM	"	CLEAR		
Sun Oct 11	6:15 PM	"	CLEAR		
Mon Oct 12	6:00 PM	"	CLEAR		
Tues Oct 13	6:15 PM	"	CLEAR		
Wed Oct 14	5:45 PM	"	CLEAR		
Thurs Oct 15	5:45 PM	"	CLEAR		
Fri Oct 16	5:25 PM	"	CLEAR		
Sat Oct 17	5:45	"	CLEAR		
Sun Oct 18	5:30	"	CLEAR		

TABLE A-37

CURRAGH RESOURCES INC.

VANGORDA CREEK SEDIMENT MONITORING PROGRAM

Date	Time	Location	Wedge Reading	Susp. Seds	Comments
MON OCT. 19	6:00 PM	Vangorda Culvert-Tennant	CLEAR		

TABLE A-38

CURRAGH RESOURCES INC.

VANGORDA CREEK SEDIMENT MONITORING PROGRAM

Date	Time	Location	Wedge Reading	Susp. Seds	Comments
OCT 24	5:30 P.M.	VANGORDA CREEK X-ing TOWN SITE	CLEAR	NIC	
OCT 25	5 00 PM	"	CLEAR	NIL	
OCT 26	5:10 P.M.	"	CLEAR	NIL	
OCT 27	5:45	"			TOO DARK TO TAKE READING. WATER LOOKED CLEAR.
OCT 28	6:00 P.M.				WATER LOOKED CLEAR
OCT 29	Missed				
OCT 30	Missed.				
OCT 31	4:30 P.M.	"	CLEAR	NIL	
NOV 1	1 00 PM	"	CLEAR	NIL	
NOV 2	5:45	"			TOO DARK TO TAKE WEDGE READING. WATER FROM CULVERT IS CLEAR.
NOV 3	5:30 P.M.				WATER LOOKED CLEAR
NOV 4	4:35 P.M.	"	CLEAR	NIL	
NOV 5	5:30 PM	"	CLEAR	NIL	
NOV 6	6:15 PM	"	CLEAR	NIL	
NOV 7	8:30 A.M.	"	CLEAR		

TABLE A-39
CURRAGH RESOURCES INC.

VANGORDA CREEK SEDIMENT MONITORING PROGRAM

Date	Time	Location	Wedge Reading	Susp. Seds	Comments
Nov 8	7:00 P.M	VANGORDA CREEK X-ING TOWN SITE	CLEAR	NIL	
Nov 9	11:00 A.M	"	CLEAR	NIL	
Nov 10	7:00 P.M	LYON'S PARK BRIDGE : FARO	CLEAR	NIL	
Nov 11	6:00 P.M	VANGORDA CREEK X-ING TOWN SITE	CLEAR	NIL	
Nov 12	5:45 PM	LYON'S PARK BRIDGE FARO	CLEAR	NIL	
Nov 13	6:00 PM	"	CLEAR	NIL	
Nov 14	6:15 PM	"	CLEAR	NIL	Creek almost frozen over!!!
Nov 15	5:00 PM	X-ing Town Site	CLEAR	NIL	
Nov 16	5:45				Missed
Nov 17	6:30	LYON'S PARK BRIDGE	CLEAR	NIL	Had to break ice
Nov 18	6:30	"	CLEAR	NIL	"
Nov 19	5:30	"	CLEAR	NIL	"
Nov 20	6:30	"	CLEAR	NIL	"
Nov 21	10:00 A.M	X-ing Town Site	CLEAR	Nil	Frozen except for flow from culvert.

TABLE A-40
CURRAGH RESOURCES INC.
VANGORDA CREEK SEDIMENT MONITORING PROGRAM

Date	Time	Location	Wedge Reading	Susp. Seds	Comments
Nov 22	12:00	Lyon's Park	CLEAR	NIL	
Nov 23	5:30pm	"	CLEAR	"	
Nov 24	6:10	"	CLEAR	"	
Nov 25	5 40	"	CLEAR	"	
Nov 26	6 05	"	CLEAR	"	

TABLE : A-41

PREDICTED WATER QUALITY FROM THE GRUM WASTE DUMPS DURING OPERATIONS (EXCL. SULPHIDE CELL AND CATCHMENT) WITH WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	28.90	29.53	35.60	37.34	59.14	64.56	112.27	91.66	48.18	54.54	25.47	27.04	51.18	614.21	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.86	8.98	56.69	112.27	77.06	28.57	8.71	0.00	0.00	24.43	293.14	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	28.90	29.53	35.60	36.48	50.16	7.87	0.00	14.59	19.61	45.83	25.47	27.04	26.76	321.07	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.43	1.53	9.03	28.17	62.29	55.77	103.87	72.11	39.09	10.60	1.41	0.09	32.03	384.40	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	3.42	3.42	4.56	5.70	41.04	57.00	34.20	28.50	22.80	18.24	5.70	5.70	19.19	230.28	37.49
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0.34	0.34	0.46	2.85	12.31	22.80	6.84	5.70	4.56	1.82	0.57	0.57	4.93	59.17	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.34	0.34	0.46	0.46	0.46	0.46	0.46	0.57	0.57	0.57	0.46	0.46	0.47	5.59	0.91
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.20		
	Zn kg	0.03	0.03	0.05	0.23	0.14	0.18	0.09	0.11	0.11	0.06	0.05	0.05	0.09	1.13	
Total Infiltration	dam^3	3.76	3.76	5.02	6.16	41.50	57.46	34.66	29.07	23.37	18.81	6.16	6.16	19.66	235.87	
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0	0	1	3	12	23	7	6	5	2	1	1	5	60	

TABLE : A-42

PREDICTED WATER QUALITY FROM THE GRUM SULPHIDE CELL DURING OPERATIONS WITH WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	1.32	1.35	1.62	1.70	2.70	2.94	5.12	4.18	2.20	2.49	1.16	1.23	2.33	28.02	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.04	0.41	2.59	5.12	3.52	1.30	0.40	0.00	0.00	1.11	13.37	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	1.32	1.35	1.62	1.66	2.29	0.36	0.00	0.67	0.89	2.09	1.16	1.23	1.22	14.65	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.02	0.07	0.41	1.28	2.84	2.54	4.74	3.29	1.78	0.48	0.06	0.00	1.46	17.53	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	0.16	0.16	0.21	0.26	1.87	2.60	1.56	1.30	1.04	0.83	0.26	0.26	0.88	10.50	37.49
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.34		
	Zn kg	1.25	1.87	5.20	13.00	74.88	78.00	39.00	32.50	26.00	20.80	3.12	2.08	24.81	297.70	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.25	0.91
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	24.39		
	Zn kg	0.12	0.19	0.52	1.04	0.83	0.62	0.52	0.65	0.65	0.65	0.25	0.17	0.52	6.21	
Total Infiltration	dam^3	0.17	0.17	0.23	0.28	1.89	2.62	1.58	1.33	1.07	0.86	0.28	0.28	0.90	10.76	
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.25		
	Zn kg	1	2	6	14	76	79	40	33	27	21	3	2	25	304	

TABLE A-43

PREDICTED WATER QUALITY FROM THE GRUM PIT DURING OPERATIONS WITH WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	24.08	24.61	29.67	31.11	49.29	53.80	93.56	76.38	40.15	45.45	21.22	22.53	42.65	511.84	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.71	7.49	47.24	93.56	64.22	23.81	7.26	0.00	0.00	20.36	244.28	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	24.08	24.61	29.67	30.40	41.80	6.56	0.00	12.16	16.34	38.19	21.22	22.53	22.30	267.56	52.27
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.29	9.30	1.24	0.08	24.55	294.56	
	dam^3	0.36	1.28	7.53	21.85	53.20	44.65	54.15	54.15	32.58	8.84	1.18	0.08	23.32	279.83	54.67
Runoff into	mm	3.03	2.73	3.03	2.93	51.45	64.43	34.80	28.75	23.43	16.65	7.32	6.05	20.38	244.60	
Grum Pit	dam^3	2.88	2.60	2.88	2.78	48.88	61.21	33.06	27.31	22.26	15.81	6.96	5.75	19.36	232.37	45.40
	Zn mg/l	19.00	19.00	37.00	74.00	56.00	37.00	37.00	37.00	37.00	37.00	19.00	19.00	40.03		
	Zn kg	55	49	106	206	2737	2265	1223	1011	824	585	132	109	775.19	9302.26	
Seepage	l/s	4.00	4.00	5.00	9.00	32.00	24.00	18.00	17.00	13.00	7.00	1.00	1.00	11.25	135.00	
	dam^3	10.71	9.68	13.39	23.33	85.71	62.21	48.21	45.53	33.70	18.75	2.59	2.68	29.71	356.49	
	Zn mg/l	3.00	3.00	5.00	12.00	12.00	11.00	9.00	10.00	10.00	7.00	5.00	2.00	9.81		
	Zn kg	32.14	29.03	66.96	279.94	1028.51	684.29	433.90	455.33	336.96	131.24	12.96	5.36	291.38	3496.61	
Total Inflow	dam^3	13.59	12.27	16.27	26.11	134.59	123.42	81.28	72.85	55.95	34.56	9.55	8.43	49.07	588.86	
	Zn mg/l	6.39	6.39	10.66	18.61	27.98	23.90	20.39	20.12	20.74	20.73	15.20	13.60	21.73		
	Zn kg	87	78	173	486	3,766	2,949	1,657	1,466	1,161	716	145	115	1,067	12,799	

TABLE : A-44

PREDICTED WATER QUALITY FROM THE VANGORDA SULPHIDE CELL DURING OPERATIONS WITH WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	5.26	5.37	6.48	6.80	10.77	11.75	20.43	16.68	8.77	9.93	4.64	4.92	9.32	111.80	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.16	1.64	10.32	20.43	14.03	5.20	1.59	0.00	0.00	4.45	53.36	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	5.26	5.37	6.48	6.64	9.13	1.43	0.00	2.66	3.57	8.34	4.64	4.92	4.87	58.44	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.08	0.28	1.64	5.13	11.34	10.15	18.91	13.12	7.12	1.93	0.26	0.02	5.83	69.97	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	0.62	0.62	0.83	1.04	7.47	10.38	6.23	5.19	4.15	3.32	1.04	1.04	3.49	41.92	37.49
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.34		
	Zn kg	4.98	7.47	20.75	51.88	298.80	311.25	155.63	129.69	103.75	83.00	12.45	8.30	98.99	1187.94	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.10	0.10	0.10	0.08	0.08	0.08	1.02	0.91
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	24.39		
	Zn kg	0.50	0.75	2.08	4.15	3.32	2.49	2.08	2.59	2.59	2.59	1.00	0.66	2.07	24.80	
Total Infiltration	dam^3	0.68	0.68	0.91	1.12	7.55	10.46	6.31	5.29	4.25	3.42	1.12	1.12	3.58	42.93	
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.25		
	Zn kg	5	8	23	56	302	314	158	132	106	86	13	9	101	1,213	

TABLE : A-45

PREDICTED WATER QUALITY FROM THE VANGORDA PHYLLITE CELL DURING OPERATIONS WITH WTER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.	
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78		
	dam^3	5.70	5.83	7.03	7.37	11.67	12.74	22.16	18.09	9.51	10.76	5.03	5.34	10.10	121.23	100.0	
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14		
	dam^3	0.00	0.00	0.00	0.17	1.77	11.19	22.16	15.21	5.64	1.72	0.00	0.00	4.82	57.86	47.73	
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64		
	dam^3	5.70	5.83	7.03	7.20	9.90	1.55	0.00	2.88	3.87	9.05	5.03	5.34	5.28	63.37	52.27	
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19		
	dam^3	0.09	0.30	1.78	5.56	12.29	11.01	20.50	14.23	7.72	2.09	0.28	0.02	6.32	75.87	62.58	
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00		
Base of Dump	dam^3	0.68	0.68	0.90	1.13	8.10	11.25	6.75	5.63	4.50	3.60	1.13	1.13	3.79	45.45	37.49	
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	15.24			
	Zn kg	2.03	5.40	10.80	40.50	186.30	157.50	94.50	78.75	54.00	50.40	9.00	3.38	57.71	692.55		
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90		
Base of Dump	dam^3	0.07	0.07	0.09	0.09	0.09	0.09	0.09	0.11	0.11	0.11	0.09	0.09	0.09	1.10	0.91	
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	13.73			
	Zn kg	0.20	0.54	1.08	3.24	2.07	1.26	1.26	1.58	1.35	1.58	0.72	0.27	1.26	15.14		100.99
Total Infiltration	dam^3	0.74	0.74	0.99	1.22	8.19	11.34	6.84	5.74	4.61	3.71	1.22	1.22	3.88	46.55		
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	15.20			
	Zn kg	2	6	12	44	188	159	96	80	55	52	10	4	59	708		

TABLE A-46

PREDICTED WATER QUALITY FROM THE VANGORDA PIT DURING OPERATIONS WITH WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	12.17	12.43	14.99	15.72	24.90	27.18	47.27	38.59	20.28	22.96	10.72	11.39	21.55	258.61	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.36	3.78	23.87	47.27	32.45	12.03	3.67	0.00	0.00	10.29	123.43	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	12.17	12.43	14.99	15.36	21.12	3.31	0.00	6.14	8.26	19.30	10.72	11.39	11.27	135.19	52.27
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.29	9.30	1.24	0.08	24.55	294.56	
	dam^3	0.18	0.65	3.80	11.04	26.88	22.56	27.36	27.36	16.46	4.46	0.60	0.04	11.78	141.39	54.67
Runoff into	mm	3.03	2.73	3.03	2.93	51.45	64.43	34.80	28.75	23.43	16.65	7.32	6.05	20.38	244.60	
Vangorda Pit	dam^3	1.45	1.31	1.45	1.41	24.70	30.93	16.71	13.80	11.25	7.99	3.51	2.91	9.78	117.41	45.40
	Zn mg/l	19.00	19.00	37.00	74.00	56.00	37.00	37.00	37.00	37.00	37.00	19.00	19.00	40.03		
	Zn kg	28	25	54	104	1383	1144	618	511	416	296	67	55	392	4700	
Seepage from	l/s	0.71	0.71	0.89	1.60	5.69	4.27	3.20	3.02	2.31	1.24	0.18	0.18	2.00	24.00	
North East Wall	dam^3	1.90	1.72	2.38	4.15	15.24	11.06	8.57	8.09	5.99	3.33	0.46	0.48	5.28	63.38	
(Area 1)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.28		
	Zn kg	6.67	6.02	11.90	51.84	190.46	127.18	98.57	76.90	56.91	21.67	2.30	0.95	54.28	651.37	
Seepage from	l/s	0.36	0.36	0.44	0.80	2.84	2.13	1.60	1.51	1.16	0.62	0.09	0.09	1.00	12.00	
South West Wall	dam^3	0.95	0.95	1.19	2.14	7.62	5.71	4.29	4.05	3.10	1.67	0.24	0.24	2.68	32.14	
(Area 2)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.27		
	Zn kg	3.33	3.33	5.95	26.78	95.23	65.71	49.28	38.45	29.40	10.83	1.19	0.48	27.50	329.98	
Seepage from	l/s	2.49	2.49	3.11	5.60	19.91	14.93	11.20	10.58	8.09	4.36	0.62	0.62	7.00	84.00	
North Wall	dam^3	6.67	6.67	8.33	15.00	53.33	40.00	30.00	28.33	21.67	11.67	1.67	1.67	18.75	224.99	
(Area 3)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.27		
	Zn kg	23.33	23.33	41.66	187.49	666.62	459.97	344.98	269.15	205.82	75.83	8.33	3.33	192.49	2309.85	
Total Inflow	dam^3	10.98	10.65	13.36	22.69	100.88	87.70	59.56	54.27	42.00	24.66	5.88	5.29	36.49	437.91	
	Zn mg/l	5.55	5.41	8.48	16.31	23.15	20.49	18.65	16.49	16.86	16.38	13.37	11.34	18.25		
	Zn kg	61	58	113	370	2,335	1,797	1,111	895	708	404	79	60	666	7,991	

TABLE : A-47

PREDICTED WATER QUALITY FROM THE GRUM WASTE DUMPS DURING OPERATIONS (EXCL. SULPHIDE CELL) WITHOUT WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	32.90	33.62	40.54	42.51	67.34	73.51	127.83	104.36	54.85	62.10	29.00	30.79	58.28	699.34	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.97	10.23	64.55	127.83	87.74	32.53	9.92	0.00	0.00	27.81	333.77	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	32.90	33.62	40.54	41.54	57.11	8.96	0.00	16.61	22.33	52.18	29.00	30.79	30.46	365.57	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.49	1.75	10.29	32.07	70.92	63.50	118.26	82.10	44.51	12.07	1.61	0.10	36.47	437.68	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	3.89	3.89	5.19	6.49	46.73	64.90	38.94	32.45	25.96	20.77	6.49	6.49	21.85	262.20	37.49
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0.39	0.39	0.52	3.25	14.02	25.96	7.79	6.49	5.19	2.08	0.65	0.65	5.61	67.37	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.39	0.39	0.52	0.52	0.52	0.52	0.52	0.65	0.65	0.65	0.52	0.52	0.53	6.36	0.91
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.20		
	Zn kg	0.04	0.04	0.05	0.26	0.16	0.21	0.10	0.13	0.13	0.06	0.05	0.05	0.11	1.29	100
Total Infiltration	dam^3	4.28	4.28	5.71	7.01	47.25	65.42	39.46	33.10	26.61	21.42	7.01	7.01	22.38	268.56	
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0	0	1	4	14	26	8	7	5	2	1	1	6	69	

TABLE : A-48

PREDICTED WATER QUALITY FROM THE GRUM SULPHIDE CELL DURING OPERATIONS WITHOUT WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	1.32	1.35	1.62	1.70	2.70	2.94	5.12	4.18	2.20	2.49	1.16	1.23	2.33	28.02	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.04	0.41	2.59	5.12	3.52	1.30	0.40	0.00	0.00	1.11	13.37	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	1.32	1.35	1.62	1.66	2.29	0.36	0.00	0.67	0.89	2.09	1.16	1.23	1.22	14.65	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.02	0.07	0.41	1.28	2.84	2.54	4.74	3.29	1.78	0.48	0.06	0.00	1.46	17.53	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	0.16	0.16	0.21	0.26	1.87	2.60	1.56	1.30	1.04	0.83	0.26	0.26	0.88	10.50	37.49
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.34		
	Zn kg	1.25	1.87	5.20	13.00	74.88	78.00	39.00	32.50	26.00	20.80	3.12	2.08	24.81	297.70	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.25	0.91
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	24.39		
	Zn kg	0.12	0.19	0.52	1.04	0.83	0.62	0.52	0.65	0.65	0.65	0.25	0.17	0.52	6.21	
Total Infiltration	dam^3	0.17	0.17	0.23	0.28	1.89	2.62	1.58	1.33	1.07	0.86	0.28	0.28	0.90	10.76	
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.25		
	Zn kg	1	2	6	14	76	79	40	33	27	21	3	2	25	304	

TABLE : A-49

PREDICTED WATER QUALITY FROM THE GRUM PIT DURING OPERATIONS WITHOUT WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	24.08	24.61	29.67	31.11	49.29	53.80	93.56	76.38	40.15	45.45	21.22	22.53	42.65	511.84	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.71	7.49	47.24	93.56	64.22	23.81	7.26	0.00	0.00	20.36	244.28	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	24.08	24.61	29.67	30.40	41.80	6.56	0.00	12.16	16.34	38.19	21.22	22.53	22.30	267.56	52.27
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.29	9.30	1.24	0.08	24.55	294.56	
	dam^3	0.36	1.28	7.53	21.85	53.20	44.65	54.15	54.15	32.58	8.84	1.18	0.08	23.32	279.83	54.67
Runoff into	mm	3.03	2.73	3.03	2.93	51.45	64.43	34.80	28.75	23.43	16.65	7.32	6.05	20.38	244.60	
Grum Pit	dam^3	2.88	2.60	2.88	2.78	48.88	61.21	33.06	27.31	22.26	15.81	6.96	5.75	19.36	232.37	45.40
	Zn mg/l	19.00	19.00	37.00	74.00	56.00	37.00	37.00	37.00	37.00	37.00	19.00	19.00	40.03		
	Zn kg	55	49	106	206	2737	2265	1223	1011	824	585	132	109	775	9302	
Seepage	l/s	4.00	4.00	5.00	9.00	32.00	24.00	18.00	17.00	13.00	7.00	1.00	1.00	11.25	135.00	
	dam^3	10.71	9.68	13.39	23.33	85.71	62.21	48.21	45.53	33.70	18.75	2.59	2.68	29.71	356.49	
	Zn mg/l	3.00	3.00	5.00	12.00	12.00	11.00	9.00	10.00	10.00	7.00	5.00	2.00	9.81		
	Zn kg	32.14	29.03	66.96	279.94	1028.51	684.29	433.90	455.33	336.96	131.24	12.96	5.36	291.38	3496.61	
Total Inflow	dam^3	13.59	12.27	16.27	26.11	134.59	123.42	81.28	72.85	55.95	34.56	9.55	8.43	49.07	588.86	
	Zn mg/l	6.39	6.39	10.66	18.61	27.98	23.90	20.39	20.12	20.74	20.73	15.20	13.60	21.73		
	Zn kg	87	78	173	486	3,766	2,949	1,657	1,466	1,161	716	145	115	1,067	12,799	

TABLE : A-50

PREDICTED WATER QUALITY FROM THE VANGORDA SULPHIDE CELL DURING OPERATIONS WITHOUT WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	5.26	5.37	6.48	6.80	10.77	11.75	20.43	16.68	8.77	9.93	4.64	4.92	9.32	111.80	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.16	1.64	10.32	20.43	14.03	5.20	1.59	0.00	0.00	4.45	53.36	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	5.26	5.37	6.48	6.64	9.13	1.43	0.00	2.66	3.57	8.34	4.64	4.92	4.87	58.44	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.08	0.28	1.64	5.13	11.34	10.15	18.91	13.12	7.12	1.93	0.26	0.02	5.83	69.97	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	0.62	0.62	0.83	1.04	7.47	10.38	6.23	5.19	4.15	3.32	1.04	1.04	3.49	41.92	37.49
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.34		
	Zn kg	4.98	7.47	20.75	51.88	298.80	311.25	155.63	129.69	103.75	83.00	12.45	8.30	98.99	1187.94	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.10	0.10	0.10	0.08	0.08	0.08	1.02	0.91
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	24.39		
	Zn kg	0.50	0.75	2.08	4.15	3.32	2.49	2.08	2.59	2.59	2.59	1.00	0.66	2.07	24.80	
Total Infiltration	dam^3	0.68	0.68	0.91	1.12	7.55	10.46	6.31	5.29	4.25	3.42	1.12	1.12	3.58	42.93	
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25,00	25.00	12.00	8.00	28.25		
	Zn kg	5	8	23	56	302	314	158	132	106	86	13	9	101	1,213	

TABLE : A-51

PREDICTED WATER QUALITY FROM THE VANGORDA PHYLLITE CELL DURING OPERATIONS WITHOUT WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.	
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78		
	dam^3	5.70	5.83	7.03	7.37	11.67	12.74	22.16	18.09	9.51	10.76	5.03	5.34	10.10	121.23	100.0	
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14		
	dam^3	0.00	0.00	0.00	0.17	1.77	11.19	22.16	15.21	5.64	1.72	0.00	0.00	4.82	57.86	47.73	
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64		
	dam^3	5.70	5.83	7.03	7.20	9.90	1.55	0.00	2.88	3.87	9.05	5.03	5.34	5.28	63.37	52.27	
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19		
	dam^3	0.09	0.30	1.78	5.56	12.29	11.01	20.50	14.23	7.72	2.09	0.28	0.02	6.32	75.87	62.58	
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00		
Base of Dump	dam^3	0.68	0.68	0.90	1.13	8.10	11.25	6.75	5.63	4.50	3.60	1.13	1.13	3.79	45.45	37.49	
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	15.24			
	Zn kg	2.03	5.40	10.80	40.50	186.30	157.50	94.50	78.75	54.00	50.40	9.00	3.38	57.71	692.55		
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90		
Base of Dump	dam^3	0.07	0.07	0.09	0.09	0.09	0.09	0.09	0.11	0.11	0.11	0.09	0.09	0.09	1.10	0.91	
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	13.73			
	Zn kg	0.20	0.54	1.08	3.24	2.07	1.26	1.26	1.58	1.35	1.58	0.72	0.27	1.26	15.14		100.9
Total Infiltration	dam^3	0.74	0.74	0.99	1.22	8.19	11.34	6.84	5.74	4.61	3.71	1.22	1.22	3.88	46.55		
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	15.20			
	Zn kg	2	6	12	44	188	159	96	80	55	52	10	4	59	708		

TABLE : A-52

PREDICTED WATER QUALITY FROM THE VANGORDA PIT DURING OPERATIONS WITHOUT WATER TREATMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	12.17	12.43	14.99	15.72	24.90	27.18	47.27	38.59	20.28	22.96	10.72	11.39	21.55	258.61	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.36	3.78	23.87	47.27	32.45	12.03	3.67	0.00	0.00	10.29	123.43	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	12.17	12.43	14.99	15.36	21.12	3.31	0.00	6.14	8.26	19.30	10.72	11.39	11.27	135.19	52.27
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.29	9.30	1.24	0.08	24.55	294.56	
	dam^3	0.18	0.65	3.80	11.04	26.88	22.56	27.36	27.36	16.46	4.46	0.60	0.04	11.78	141.39	54.67
Runoff into	mm	3.03	2.73	3.03	2.93	51.45	64.43	34.80	28.75	23.43	16.65	7.32	6.05	20.38	244.60	
Vangorda Pit	dam^3	1.45	1.31	1.45	1.41	24.70	30.93	16.71	13.80	11.25	7.99	3.51	2.91	9.78	117.41	45.40
	Zn mg/l	19.00	19.00	37.00	74.00	56.00	37.00	37.00	37.00	37.00	37.00	19.00	19.00	40.03		
	Zn kg	28	25	54	104	1383	1144	618	511	416	296	67	55	392	4700	
Seepage from	l/s	0.71	0.71	0.89	1.60	5.69	4.27	3.20	3.02	2.31	1.24	0.18	0.18	2.00	24.00	
North East Wall	dam^3	1.90	1.72	2.38	4.15	15.24	11.06	8.57	8.09	5.99	3.33	0.46	0.48	5.28	63.38	
(Area 1)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.28		
	Zn kg	6.67	6.02	11.90	51.84	190.46	127.18	98.57	76.90	56.91	21.67	2.30	0.95	54.28	651.37	
Seepage from	l/s	0.36	0.36	0.44	0.80	2.84	2.13	1.60	1.51	1.16	0.62	0.09	0.09	1.00	12.00	
South West Wall	dam^3	0.95	0.95	1.19	2.14	7.62	5.71	4.29	4.05	3.10	1.67	0.24	0.24	2.68	32.14	
(Area 2)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.27		
	Zn kg	3.33	3.33	5.95	26.78	95.23	65.71	49.28	38.45	29.40	10.83	1.19	0.48	27.50	329.98	
Seepage from	l/s	2.49	2.49	3.11	5.60	19.91	14.93	11.20	10.58	8.09	4.36	0.62	0.62	7.00	84.00	
North Wall	dam^3	6.67	6.67	8.33	15.00	53.33	40.00	30.00	28.33	21.67	11.67	1.67	1.67	18.75	224.99	
(Area 3)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.27		
	Zn kg	23.33	23.33	41.66	187.49	666.62	459.97	344.98	269.15	205.82	75.83	8.33	3.33	192.49	2309.85	
Total Inflow	dam^3	10.98	10.65	13.36	22.69	100.88	87.70	59.56	54.27	42.00	24.66	5.88	5.29	36.49	437.91	
	Zn mg/l	5.55	5.41	8.48	16.31	23.15	20.49	18.65	16.49	16.86	16.38	13.37	11.34	18.25		
	Zn kg	61	58	113	370	2,335	1,797	1,111	895	708	404	79	60	666	7,991	

TABLE : A-53

PREDICTED WATER QUALITY FROM THE GRUM WASTE DUMPS AFTER ABANDONMENT(excl. Sulphide Cell)

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	32.70	33.41	40.29	42.25	66.93	73.05	127.04	103.72	54.52	61.71	28.82	30.60	57.92	695.03	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.97	10.17	64.15	127.04	87.20	32.33	9.86	0.00	0.00	27.64	331.71	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	32.70	33.41	40.29	41.28	56.76	8.90	0.00	16.51	22.19	51.86	28.82	30.60	30.28	363.32	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.49	1.74	10.22	31.88	70.49	63.11	117.53	81.59	44.23	12.00	1.60	0.10	36.25	434.98	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	3.87	3.87	5.16	6.45	46.44	64.50	38.70	32.25	25.80	20.64	6.45	6.45	21.72	260.58	37.49
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0.39	0.39	0.52	3.23	13.93	25.80	7.74	6.45	5.16	2.06	0.65	0.65	5.58	66.95	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.39	0.39	0.52	0.52	0.52	0.52	0.52	0.65	0.65	0.65	0.52	0.52	0.53	6.32	0.91
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.20		
	Zn kg	0.04	0.04	0.05	0.26	0.15	0.21	0.10	0.13	0.13	0.06	0.05	0.05	0.11	1.28	
Total Infiltration	dam^3	4.26	4.26	5.68	6.97	46.96	65.02	39.22	32.90	26.45	21.29	6.97	6.97	22.24	266.90	
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0.4	0.4	0.6	3.5	14.1	26.0	7.8	6.6	5.3	2.1	0.7	0.7	5.7	68.2	

TABLE : A-54

PREDICTED WATER QUALITY FROM THE GRUM SULPHIDE CELL AFTER ABANDONMENT WITH TILL COVER

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	1.52	1.55	1.87	1.97	3.11	3.40	5.91	4.82	2.54	2.87	1.34	1.42	2.69	32.33	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.05	0.47	2.98	5.91	4.06	1.50	0.46	0.00	0.00	1.29	15.43	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	1.52	1.55	1.87	1.92	2.64	0.41	0.00	0.77	1.03	2.41	1.34	1.42	1.41	16.90	52.27
Runoff	mm	2.35	2.12	2.35	10.00	32.19	49.99	27.00	22.31	18.18	12.92	5.68	4.69	15.81	189.77	
	dam^3	0.14	0.13	0.14	0.60	1.93	3.00	1.62	1.34	1.09	0.78	0.34	0.28	0.95	11.39	35.22
	Zn mg/l	0.01	0.01	0.01	0.05	0.03	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.03		
	Zn kg	0.00	0.00	0.00	0.03	0.06	0.12	0.03	0.03	0.02	0.01	0.00	0.00	0.03	0.31	
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.39	9.30	1.24	0.08	24.56	294.66	
	dam^3	0.02	0.08	0.48	1.38	3.36	2.82	3.42	3.42	2.06	0.56	0.07	0.00	1.47	17.68	54.69
Lateral Drainage	mm	1.00	1.00	1.00	3.00	10.00	12.00	7.00	6.00	5.00	4.00	2.00	1.00	4.42	53.00	
Base of Dump	dam^3	0.06	0.06	0.06	0.18	0.60	0.72	0.42	0.36	0.30	0.24	0.12	0.06	0.27	3.18	9.84
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	29.00		
	Zn kg	0.48	0.72	1.50	9.00	24.00	21.60	10.50	9.00	7.50	6.00	1.44	0.48	7.69	92.22	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.29	0.91
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	24.39		
	Zn kg	0.14	0.22	0.60	1.20	0.96	0.72	0.60	0.75	0.75	0.75	0.29	0.19	0.60	7.17	
Total Infiltration	dam^3	0.08	0.08	0.08	0.20	0.62	0.74	0.44	0.39	0.33	0.27	0.14	0.08	0.29	3.47	
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.61		
	Zn kg	1	1	2	10	25	22	11	10	8	7	2	1	8	99	

TABLE : A-55

PREDICTED WATER QUALITY FROM THE GRUM LAKE AFTER ABANDONMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	74.78	76.41	92.13	96.61	153.05	167.06	290.52	237.18	124.67	141.13	65.90	69.97	132.45	1589.40	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	2.21	23.25	146.70	290.52	199.42	73.93	22.54	0.00	0.00	63.21	758.56	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	74.78	76.41	92.13	94.40	129.80	20.36	0.00	37.76	50.74	118.59	65.90	69.97	69.24	830.84	52.27
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.29	9.30	1.24	0.08	24.55	294.56	
	dam^3	1.12	3.97	23.38	67.85	165.20	138.65	168.15	168.15	101.16	27.44	3.66	0.24	72.41	868.96	54.67
Runoff	mm	3.03	2.73	3.03	2.93	51.45	64.43	34.80	28.75	23.43	16.65	7.32	6.05	20.38	244.60	
	dam^3	8.94	8.05	8.94	8.64	151.78	190.07	102.66	84.81	69.12	49.12	21.59	17.85	60.13	721.57	45.40
	Zn mg/l	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02		
	Zn kg	0.13	0.12	0.13	0.13	2.28	2.85	1.54	1.27	1.04	0.74	0.32	0.27	0.90	10.82	
Seepage	l/s	4.00	4.00	5.00	10.00	33.00	25.00	19.00	18.00	14.00	8.00	2.00	2.00	12.00	144.00	
	dam^3	10.71	9.68	13.39	25.92	88.39	64.80	50.89	48.21	36.29	21.43	5.18	5.36	31.69	380.25	
	Zn mg/l	0.02	0.03	0.02	0.05	0.06	0.05	0.02	0.03	0.06	0.02	0.02	0.02	0.04		
	Zn kg	0.21	0.29	0.27	1.30	5.30	3.24	1.02	1.45	2.18	0.43	0.10	0.11	1.32	15.89	
Total Inflow	dam^3	19.65	17.73	22.33	34.56	240.16	254.87	153.55	133.02	105.41	70.54	26.78	23.20	91.82	1101.82	
	Zn mg/l	0.02	0.02	0.02	0.04	0.03	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02		
	Zn kg	0.35	0.41	0.40	1.43	7.58	6.09	2.56	2.72	3.21	1.17	0.43	0.37	2.23	26.72	

TABLE : A-56

PREDICTED WATER QUALITY FROM THE VANGORDA SULPHIDE CELL AFTER ABANDONMENT WITH TILL COVER

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	5.26	5.37	6.48	6.80	10.77	11.75	20.43	16.68	8.77	9.93	4.64	4.92	9.32	111.80	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.16	1.64	10.32	20.43	14.03	5.20	1.59	0.00	0.00	4.45	53.36	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	5.26	5.37	6.48	6.64	9.13	1.43	0.00	2.66	3.57	8.34	4.64	4.92	4.87	58.44	52.27
Runoff	mm	2.35	2.12	2.35	10.00	32.19	49.99	27.00	22.31	18.18	12.92	5.68	4.69	15.81	189.77	
	dam^3	0.49	0.44	0.49	2.08	6.68	10.37	5.60	4.63	3.77	2.68	1.18	0.97	3.28	39.38	35.22
	Zn mg/l	0.01	0.01	0.01	0.05	0.03	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.03		
	Zn kg	0.00	0.00	0.00	0.10	0.20	0.41	0.11	0.09	0.08	0.03	0.01	0.01	0.09	1.06	
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.39	9.30	1.24	0.08	24.56	294.66	
	dam^3	0.08	0.28	1.64	4.77	11.62	9.75	11.83	11.83	7.14	1.93	0.26	0.02	5.10	61.14	54.69
Lateral Drainage	mm	1.00	1.00	1.00	3.00	10.00	12.00	7.00	6.00	5.00	4.00	2.00	1.00	4.42	53.00	
Base of Dump	dam^3	0.21	0.21	0.21	0.62	2.08	2.49	1.45	1.25	1.04	0.83	0.42	0.21	0.92	11.00	9.84
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	29.00		
	Zn kg	1.66	2.49	5.19	31.13	83.00	74.70	36.31	31.13	25.94	20.75	4.98	1.66	26.58	318.93	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.10	0.10	0.10	0.08	0.08	0.08	1.02	0.91
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	24.39		
	Zn kg	0.50	0.75	2.08	4.15	3.32	2.49	2.08	2.59	2.59	2.59	1.00	0.66	2.07	24.80	
Total Infiltration	dam^3	0.27	0.27	0.29	0.71	2.16	2.57	1.54	1.35	1.14	0.93	0.50	0.29	1.00	12.01	
	Zn mg/l	8.00	12.00	25.00	50.00	40.00	30.00	25.00	25.00	25.00	25.00	12.00	8.00	28.61		
	Zn kg	2	3	7	35	86	77	38	34	29	23	6	2	29	344	

TABLE : A-57

PREDICTED WATER QUALITY FROM THE VANGORDA PHYLLITE CELL AFTER ABANDONMENT WITH TILL COVERS

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF PRECIP.	
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78		
	dam^3	5.70	5.83	7.03	7.37	11.67	12.74	22.16	18.09	9.51	10.76	5.03	5.34	10.10	121.23	100.0	
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14		
	dam^3	0.00	0.00	0.00	0.17	1.77	11.19	22.16	15.21	5.64	1.72	0.00	0.00	4.82	57.86	47.73	
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64		
	dam^3	5.70	5.83	7.03	7.20	9.90	1.55	0.00	2.88	3.87	9.05	5.03	5.34	5.28	63.37	52.27	
Runoff	mm	2.35	2.12	2.35	10.00	32.19	49.99	27.00	22.31	18.18	12.92	5.68	4.69	15.81	189.77		
	dam^3	0.53	0.48	0.53	2.25	7.24	11.25	6.07	5.02	4.09	2.91	1.28	1.06	3.56	42.70	35.22	
	Zn mg/l	0.01	0.01	0.01	0.05	0.03	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.03			
	Zn kg	0.01	0.00	0.01	0.11	0.22	0.45	0.12	0.10	0.08	0.03	0.01	0.01	0.10	1.15		
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.39	9.30	1.24	0.08	24.56	294.66		
	dam^3	0.09	0.30	1.78	5.18	12.60	10.58	12.83	12.83	7.74	2.09	0.28	0.02	5.52	66.30	54.69	
Lateral Drainage	mm	1.00	1.00	1.00	3.00	10.00	12.00	7.00	6.00	5.00	4.00	2.00	1.00	4.42	53.00		
Base of Dump	dam^3	0.23	0.23	0.23	0.68	2.25	2.70	1.58	1.35	1.13	0.90	0.45	0.23	0.99	11.93	9.84	
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	15.96			
	Zn kg	0.68	1.80	2.70	24.30	51.75	37.80	22.05	18.90	13.50	12.60	3.60	0.68	15.86	190.35		
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90		
Base of Dump	dam^3	0.07	0.07	0.09	0.09	0.09	0.09	0.09	0.11	0.11	0.11	0.09	0.09	0.09	1.10	0.91	
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	13.42			
	Zn kg	0.20	0.54	1.08	3.24	2.07	1.26	1.26	1.58	1.35	1.58	0.72	0.27	1.26	15.14		100.66
Total Infiltration	dam^3	0.29	0.29	0.32	0.77	2.34	2.79	1.67	1.46	1.24	1.01	0.54	0.32	1.09	13.03		
	Zn mg/l	3.00	8.00	12.00	36.00	23.00	14.00	14.00	14.00	12.00	14.00	8.00	3.00	15.77			
	Zn kg	1	2	4	28	54	39	23	20	15	14	4	1	17	205		

TABLE : A-58

PREDICTED WATER QUALITY FROM THE VANGORDA LAKE AFTER ABANDONMENT

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	37.52	38.33	46.22	48.47	76.78	83.81	145.75	118.99	62.54	70.80	33.06	35.11	66.45	797.39	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	1.11	11.66	73.60	145.75	100.05	37.09	11.31	0.00	0.00	31.71	380.57	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	37.52	38.33	46.22	47.36	65.12	10.21	0.00	18.94	25.46	59.50	33.06	35.11	34.74	416.83	52.27
Evapotranspiration	mm	0.38	1.35	7.92	23.00	56.00	47.00	57.00	57.00	34.29	9.30	1.24	0.08	24.55	294.56	
	dam^3	0.56	1.99	11.73	34.04	82.88	69.56	84.36	84.36	50.75	13.76	1.84	0.12	36.33	435.95	54.67
Runoff into	mm	3.03	2.73	3.03	2.93	51.45	64.43	34.80	28.75	23.43	16.65	7.32	6.05	20.38	244.60	
Vangorda Lake	dam^3	4.48	4.04	4.48	4.34	76.15	95.36	51.50	42.55	34.68	24.64	10.83	8.95	30.17	362.01	45.40
	Zn mg/l	0.10	0.10	0.20	0.40	0.40	0.30	0.30	0.20	0.20	0.20	0.10	0.10	0.28		
	Zn kg	0.45	0.40	0.90	1.73	30.46	28.61	15.45	8.51	6.94	4.93	1.08	0.90	8.36	100.35	
Seepage from	l/s	0.43	0.43	0.43	0.83	3.60	2.61	2.01	1.89	1.47	0.86	0.20	0.20	1.25	14.96	
North East Wall	dam^3	1.16	1.04	1.16	2.15	9.64	6.76	5.37	5.07	3.82	2.29	0.52	0.54	3.29	39.52	
(Area 1)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.21		
	Zn kg	4.04	3.65	5.78	26.89	120.53	77.69	61.80	48.19	36.32	14.91	2.59	1.07	33.62	403.45	
Seepage from	l/s	0.17	0.17	0.17	0.34	1.44	1.04	0.80	0.76	0.59	0.34	0.08	0.08	0.50	5.99	
South West Wall	dam^3	0.46	0.42	0.46	0.88	3.86	2.70	2.15	2.03	1.53	0.92	0.21	0.21	1.32	15.83	
(Area 2)	Zn mg/l	3.50	3.50	5.00	12.50	12.50	11.50	11.50	9.50	9.50	6.50	5.00	2.00	10.21		
	Zn kg	1.62	1.46	2.31	11.02	48.21	31.07	24.72	19.27	14.53	5.96	1.04	0.43	13.47	161.64	
Seepage from	l/s	0.86	0.86	0.86	1.70	7.20	5.21	4.01	3.79	2.95	1.71	0.40	0.40	2.50	29.96	
North Wall	dam^3	2.31	2.09	2.31	4.41	19.28	13.51	10.75	10.14	7.65	4.59	1.04	1.07	6.60	79.14	
(Area 3)	Zn mg/l	0.50	0.50	0.70	2.00	2.00	1.80	1.80	1.50	1.40	1.00	0.75	0.20	1.60		
	Zn kg	1.16	1.04	1.62	8.81	38.57	24.32	19.34	15.22	10.70	4.59	0.78	0.21	10.53	126.36	
Total Inflow	dam^3	8.41	7.59	8.41	11.78	108.93	118.32	69.77	59.80	47.68	32.44	12.60	10.78	41.37	496.50	
	Zn mg/l	0.86	0.86	1.26	4.11	2.18	1.37	1.74	1.52	1.44	0.94	0.44	0.24	1.59		
	Zn kg	7	7	11	48	238	162	121	91	68	30	5	3	66	792	

TABLE : A-59

PREDICTED WATER QUALITY FROM THE GRUM WASTE DUMPS AFTER ABANDONMENT(excl. Sulphide Cell)

SOURCE	UNITS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN	TOTAL	% OF P
Total Precip.	mm	25.35	25.90	31.23	32.75	51.88	56.63	98.48	80.40	42.26	47.84	22.34	23.72	44.90	538.78	
	dam^3	32.90	33.62	40.54	42.51	67.34	73.51	127.83	104.36	54.85	62.10	29.00	30.79	58.28	699.34	100.0
Total Rainfall	mm	0.00	0.00	0.00	0.75	7.88	49.73	98.48	67.60	25.06	7.64	0.00	0.00	21.43	257.14	
	dam^3	0.00	0.00	0.00	0.97	10.23	64.55	127.83	87.74	32.53	9.92	0.00	0.00	27.81	333.77	47.73
Total Snowfall	mm	25.35	25.90	31.23	32.00	44.00	6.90	0.00	12.80	17.20	40.20	22.34	23.72	23.47	281.64	
	dam^3	32.90	33.62	40.54	41.54	57.11	8.96	0.00	16.61	22.33	52.18	29.00	30.79	30.46	365.57	52.27
Runoff	mm	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	dam^3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Evapotranspiration	mm	0.38	1.35	7.92	24.71	54.64	48.92	91.11	63.25	34.29	9.30	1.24	0.08	28.10	337.19	
	dam^3	0.49	1.75	10.29	32.07	70.92	63.50	118.26	82.10	44.51	12.07	1.61	0.10	36.47	437.68	62.58
Lateral Drainage	mm	3.00	3.00	4.00	5.00	36.00	50.00	30.00	25.00	20.00	16.00	5.00	5.00	16.83	202.00	
Base of Dump	dam^3	3.89	3.89	5.19	6.49	46.73	64.90	38.94	32.45	25.96	20.77	6.49	6.49	21.85	262.20	37.49
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0.39	0.39	0.52	3.25	14.02	25.96	7.79	6.49	5.19	2.08	0.65	0.65	5.61	67.37	
Percolation from	mm	0.30	0.30	0.40	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.40	0.40	0.41	4.90	
Base of Dump	dam^3	0.39	0.39	0.52	0.52	0.52	0.52	0.52	0.65	0.65	0.65	0.52	0.52	0.53	6.36	0.91
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.20		
	Zn kg	0.04	0.04	0.05	0.26	0.16	0.21	0.10	0.13	0.13	0.06	0.05	0.05	0.11	1.29	
Total Infiltration	dam^3	4.28	4.28	5.71	7.01	47.25	65.42	39.46	33.10	26.61	21.42	7.01	7.01	22.38	268.56	
	Zn mg/l	0.10	0.10	0.10	0.50	0.30	0.40	0.20	0.20	0.20	0.10	0.10	0.10	0.26		
	Zn kg	0.4	0.4	0.6	3.5	14.2	26.2	7.9	6.6	5.3	2.1	0.7	0.7	5.7	68.7	

E A

COMPARISON OF TOTAL AND DISSOLVED METALS WHERE DATA AVAILABLE

SAMPLESITE	SAMPLEDATE	TEMP	PH	ALKTY	MFR	SO4	NH3	CU	CU-DISS	PB	PB-DISS	ZN	ZN-DISS	MN	MN-DISS	FE	FE-DIS
DOAL DITCH ABOVE	06-May-88		7.31		3050.0			0.280	0.090			0.560	0.013			220.000	0.080
DOAL DITCH BELOW	27-May-88	5.5	7.62		104.0	43		0.008	0.004			0.180	0.120			5.700	0.043
GA	07-Jul-88	5.8	7.76	277.2	13.0	82.0	0.35	0.002	0.001	0.005	0.003	1.700	1.410	0.161	0.170	5.250	2.850
GA	03-Aug-88	5.7	7.75	281.4	17.0	85.0	0.20	0.001	0.001	0.003	0.003	1.580	1.490	0.153	0.151	4.500	4.350
GA	19-Sep-88	4.1	7.74	277.2	8.0	80.0	0.10	0.002	0.001	0.003	0.003	1.540	1.420	0.155	0.160	3.550	0.980
GA POND	07-Jul-88	11.8	8.58	262.5	1.0	93.0		0.001	0.001	0.006	0.003	0.575	0.365	0.119	0.115	0.870	0.025
GRUM DUMP POND	07-Jul-88	14.7	7.35	23.1	5.0	775.0		0.022	0.014	0.043	0.030	181.000	172.000	5.500	5.150	0.100	0.020
RS	07-Jul-88	7.3	6.94		50.0	43.0		0.008	0.008	0.095	0.087	1.060	1.200	0.005	0.010	1.990	2.000
RS	03-Aug-88	5.8	7.02	113.4	5.0	35.0	0.14	0.007	0.008	0.110	0.070	0.760	1.080	0.004	0.007	2.550	3.500
RS	20-Sep-88	6.8	8.09	105.0	5.0	44.0	0.05	0.010	0.006	0.210	0.100	0.415	0.410	0.004	0.003	1.200	0.470
V01	11-May-88	4.5	7.27	11.80	10.0	5	0.49	0.001	0.004	0.003	0.003	0.003	0.013	0.036	0.008	0.525	0.065
V02	06-May-88		7.60		3.0			0.002	0.004			0.004	0.045			0.220	0.035
V02	12-May-88	2.8	7.42	46.00	42.0	21	0.65	0.011	0.003	0.003	0.003	0.025	0.043	0.047	0.008	4.450	0.045
V03	12-May-88	2.9	7.08	25.00	18.0	10	0.61	0.006	0.011	0.003	0.003	0.021	0.030	0.034	0.005	1.850	0.060
V04	13-May-88		7.79	88.00	23.0	16	0.31	0.004	0.004	0.003	0.003	0.010	0.005	0.051	0.012	1.200	0.070
V05	11-May-88	5.4	7.61	78.20	52.0	23	0.91	0.011	0.012	0.003	0.003	0.023	0.010	0.124	0.009	2.600	0.080
V05	02-Aug-88	10.5	8.44	170.1	11.0	32.0	0.16	0.003	0.002	0.003	0.003	0.007	0.007	0.026	0.011	1.030	0.020
V06	19-Sep-88	2.9	7.86	65.1	66.0	7.0	0.21	0.008	0.002	0.009	0.003	0.035	0.021	0.054	0.013	3.700	0.055
V06A	11-May-88	2.8	7.61	29.90	13.0	7		0.005	0.007	0.003	0.003	0.011	0.014	0.034	0.001	0.700	0.050
V06B	11-May-88	2.6	7.19	15.20	7.0	7	0.72	0.003	0.013	0.003	0.003	0.012	0.013	0.018	0.001	0.450	0.045
V08	11-May-88	8.0	7.66	60.40	71.0	27	0.65	0.008	0.005	0.008	0.003	0.034	0.013	0.088	0.001	2.750	0.055
V08	06-Jul-88	9.5	8.49	93.5	2.0	18.0	0.15	0.002	0.002	0.003	0.003	0.010	0.018	0.010	0.004	0.190	0.020
V08	05-Aug-88	10.4	8.35	137.6	4.0	28.0	0.29	0.002	0.003	0.003	0.003	0.009	0.007	0.011	0.005	0.240	0.010
V10	13-May-88		7.86	46.00	18.0	9	0.28	0.005	0.009	0.003	0.003	0.013	0.037	0.039	0.009	1.140	0.070
V11	12-May-88	3.0	7.08	14.00	9.0	10	0.46	0.002	0.008	0.003	0.003	0.016	0.040	0.026	0.008	0.610	0.045
V13	13-May-88	2.8	7.80	22.00	41.0	6	0.37	0.005	0.002	0.003	0.003	0.008	0.004	0.091	0.005	1.880	0.135
V14	11-May-88	4.5	7.01	10.50	37.0	9	0.49	0.002	0.011	0.003	0.003	0.008	0.014	0.135	0.008	1.620	0.110
VG DITCH AT ROAD	06-May-88		6.44		415.0	52		0.163	0.013			0.285	0.037			51.500	0.485
VG DITCH AT ROAD	13-May-88	4.7	7.07	31.50	18.0	11		0.007	0.004	0.003	0.003	0.011	0.008	0.022	0.002	2.150	0.045
VG DITCH AT ROAD	27-May-88		7.76		8.0	33		0.003	0.003			0.007	0.017			0.825	0.033
VG FINGER DITCH	06-May-88		6.29		270.0	27		0.041	0.005			0.375	0.128			11.200	0.128

APPENDIX B

DESCRIPTION OF THE HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) COMPUTER PROGRAM

The Hydrologic Evaluation of Landfill Performance (HELP) program was developed to assist landfill designers and regulators by providing a tool to allow rapid, economical screening of alternative designs. Specifically, the program may be used to estimate the magnitudes of various components of the water budget, including the volume of leachate produced and the thickness of water saturated soil (head) above barrier layers. The results may be used to compare the leachate production potential of alternative designs, select and size appropriate drainage and collection systems, and size leachate treatment facilities.

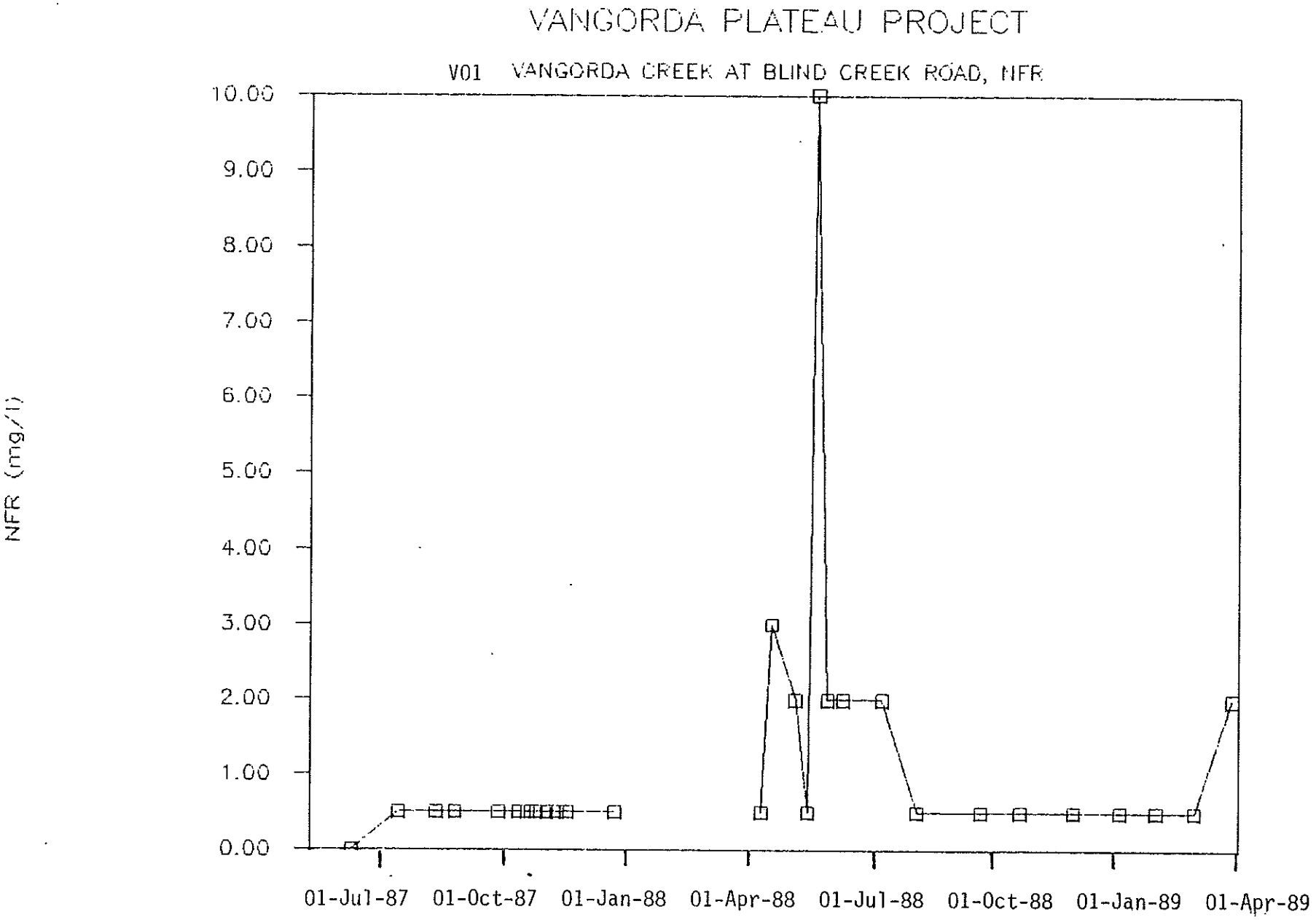
The model uses climatologic, soil, and design data to produce daily estimates of water movement across, into, through, and out of landfills. To accomplish this, daily precipitation is partitioned into surface storage (snow), runoff, infiltration, surface evaporation, evapotranspiration, percolation, stored soil moisture, and subsurface lateral drainage to maintain a water budget. Surface runon and subsurface lateral inflow are not considered.

As noted above, the HELP program models a number of hydrologic processes. Runoff is computed using the Soil Conservation Service Runoff Curve Number method. When the program is run for a closed landfill using the default soil data option, a default runoff curve number is selected automatically. However, the program gives the user an opportunity to override the default value. When soil data are entered manually, and when an open landfill is being modeled, the user must estimate an appropriate runoff curve number. A complete discussion of the curve number technique is available from the Soil Conservation Service.

Factors such as surface slope and roughness are not considered directly in estimating runoff, and hence infiltration. However, they may be taken into account in the manual selection of a curve number. This approach to runoff estimation is made possible by considering only daily precipitation totals, and not the intensity, duration and distribution of individual rainfall events (storms).

Percolation and vertical water routing are modeled using Darcy's Law for saturated flow with modifications for unsaturated conditions. Lateral drainage is computed analytically from a linearized Boussinesq equation corrected to agree with numerical solutions of the nonlinearized form for the range of design specifications used in hazardous waste landfills. Evapotranspiration is estimated by a modified Penman method adjusted for limiting soil moisture conditions.

APPENDIX C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V01 VANGORDA CREEK AT BLIND CREEK ROAD, NFR
NFR (mg/l)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
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01-Jul-88
01-Oct-88
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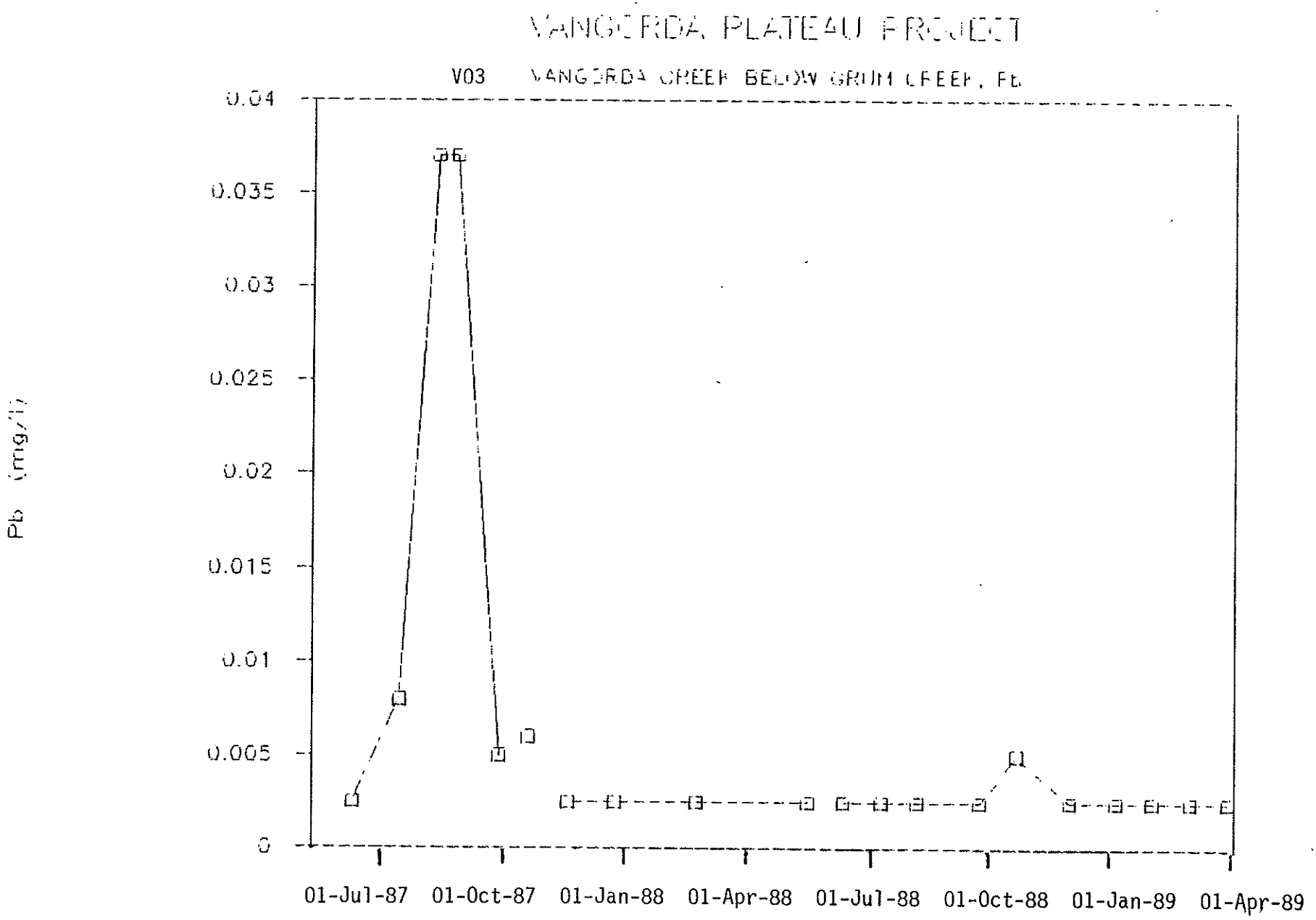
01-Apr-89


VANGORDA PLATEAU PROJECT
V03 VANGORDA CREEK BELOW GRUM CREEK, Ft.
Pb (mg/l)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
01-Jul-87
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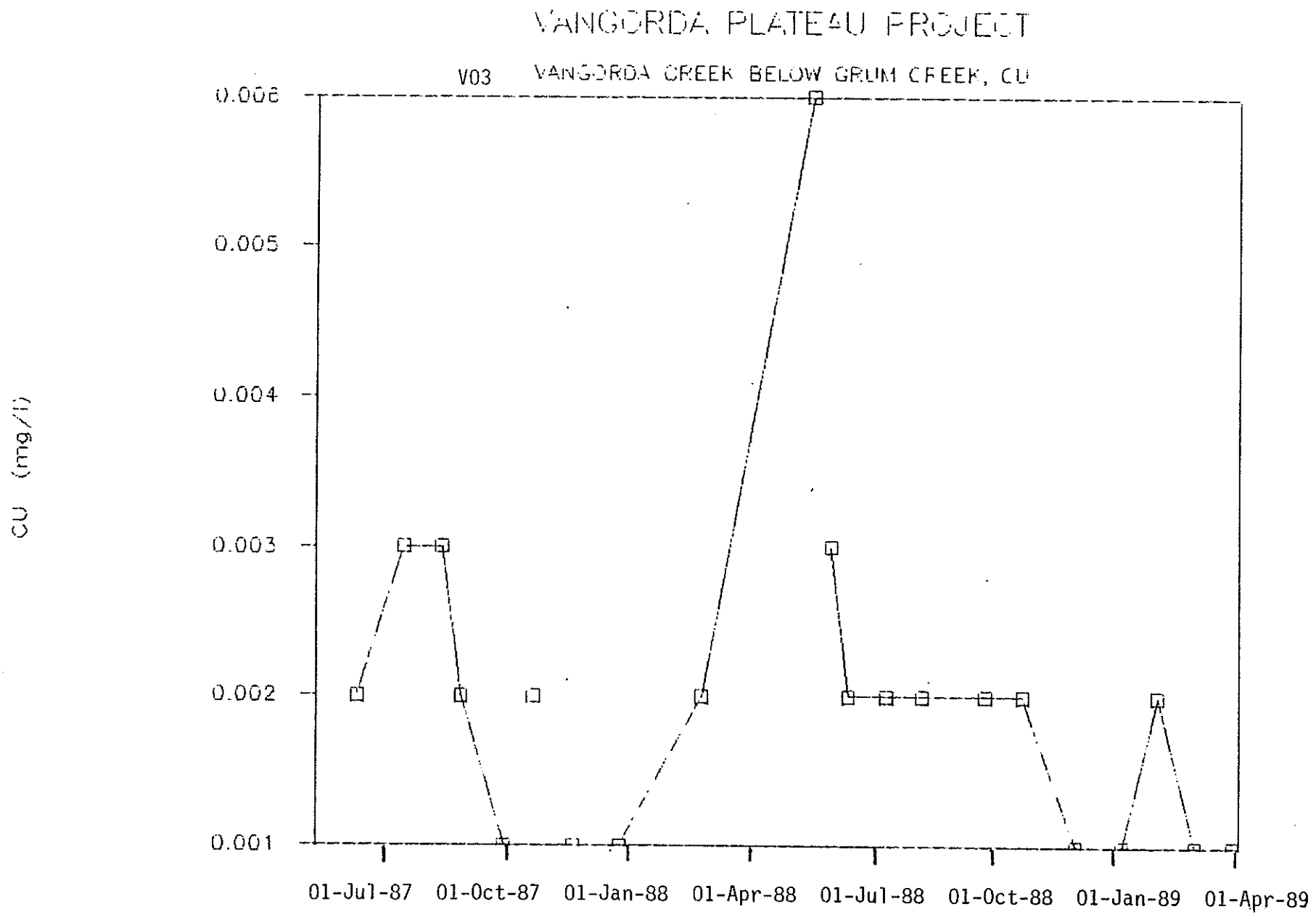
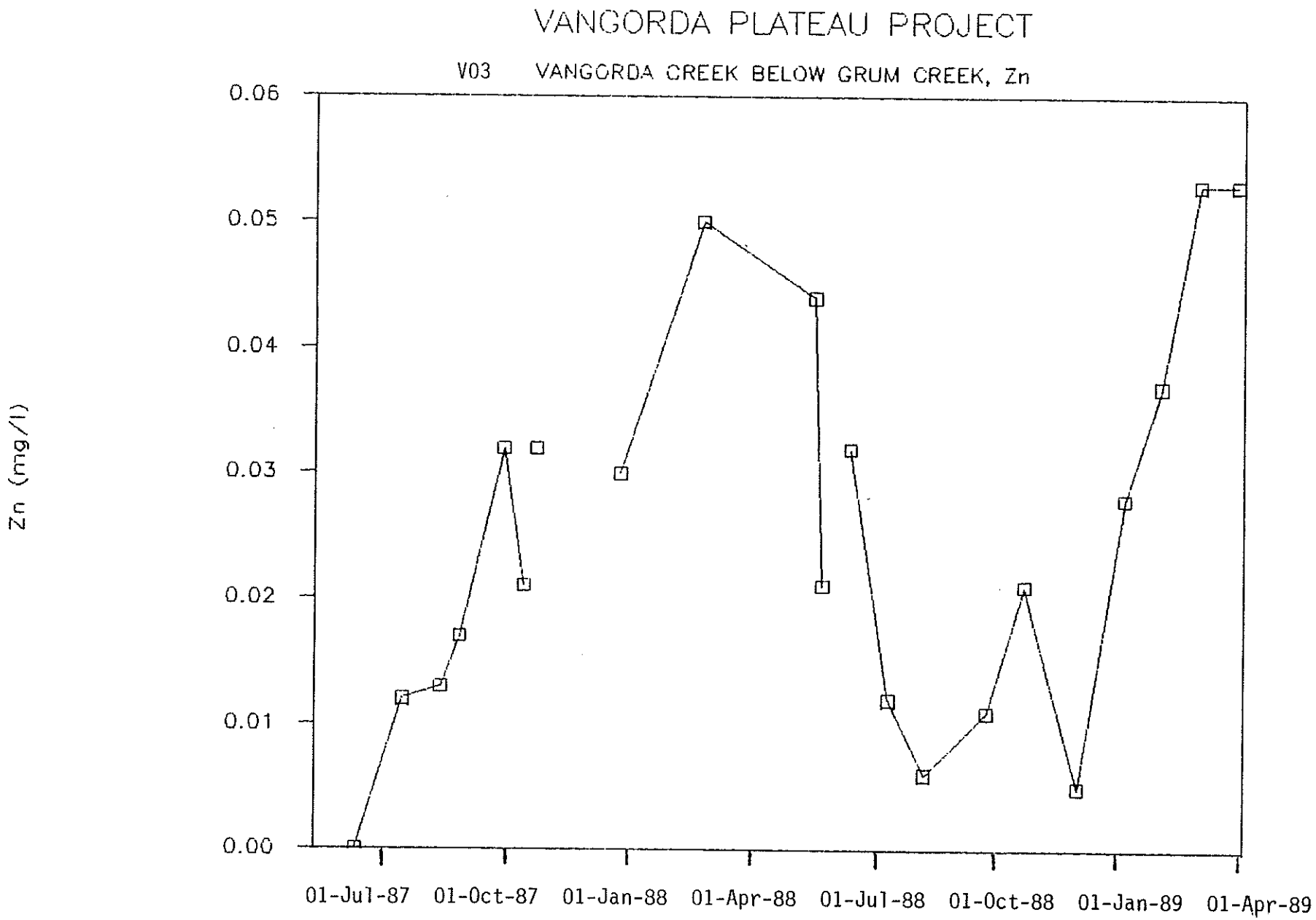
01-Apr-89


VANGORDA PLATEAU PROJECT
V03 VANGORDA CREEK BELOW GRUM CREEK, CU
CU (mg/l)
0.006
0.005
0.004
0.003
0.002
0.001
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V03 VANGORDA CREEK BELOW GRUM CREEK, Zn
Zn (mg/l)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
01-Jul-87
01-Oct-87
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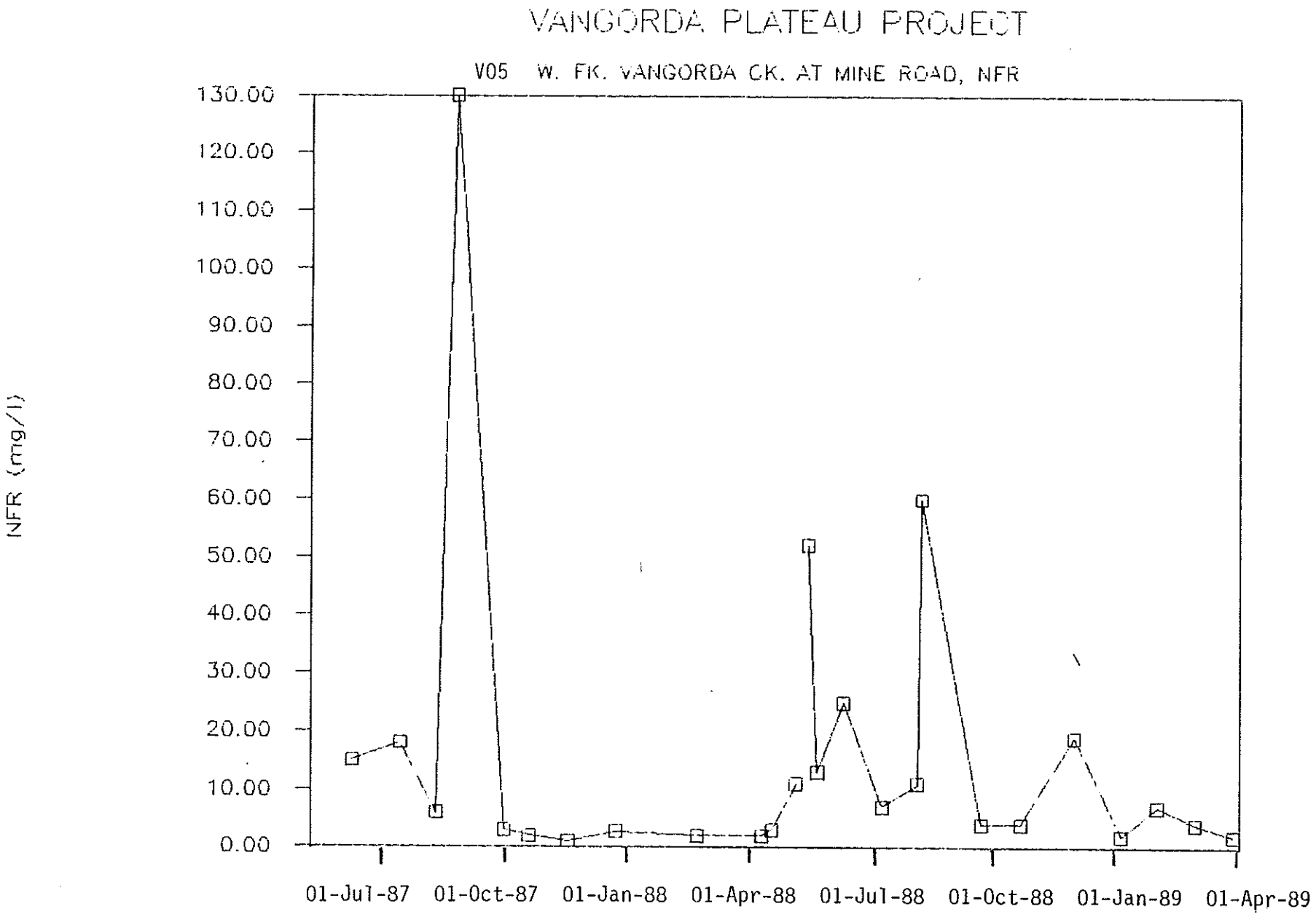
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V05 W. FK. VANGORDA CK. AT MINE ROAD, NFR
NFR (mg/l)
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
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01-Oct-87
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01-Apr-88
01-Jul-88
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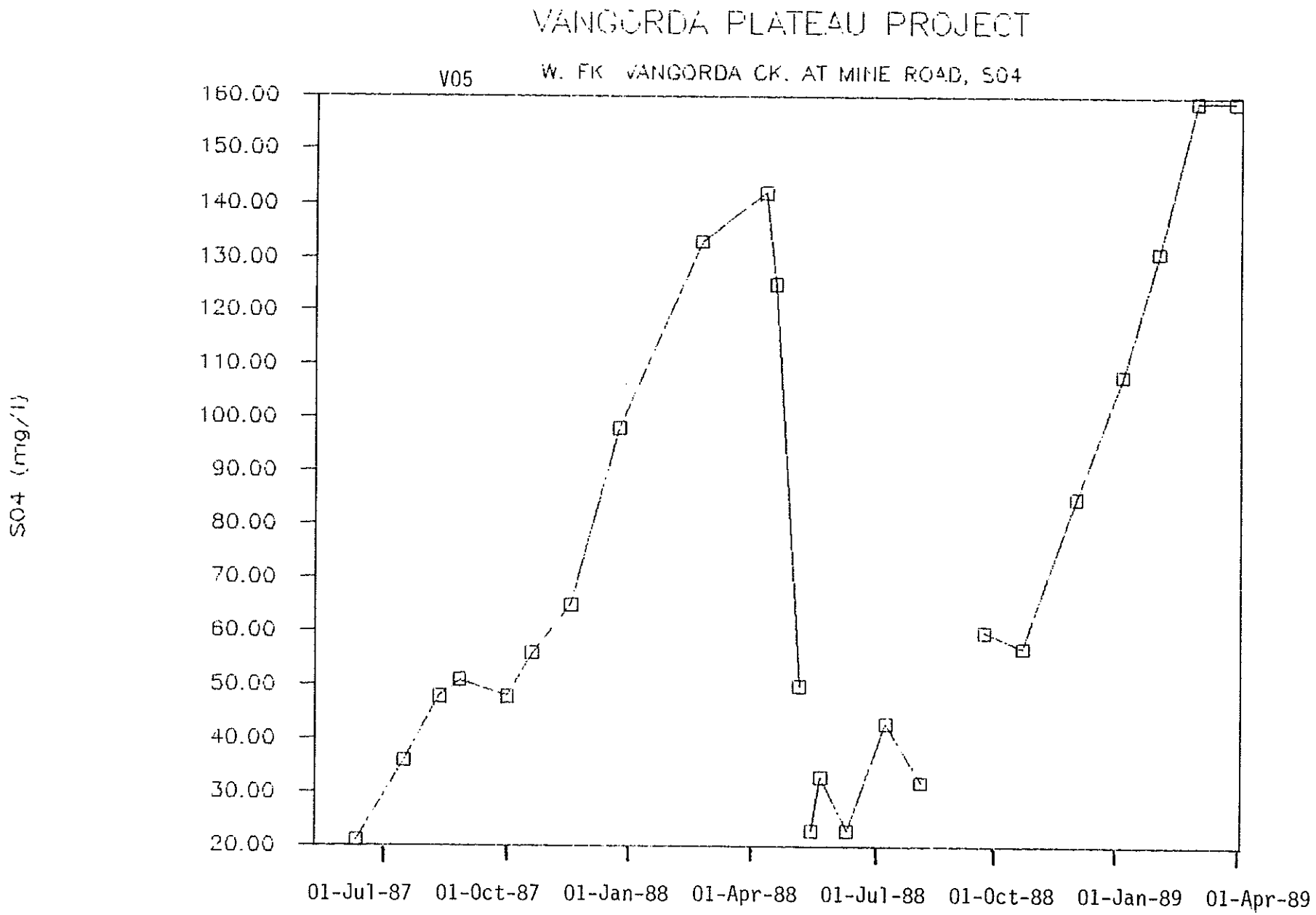
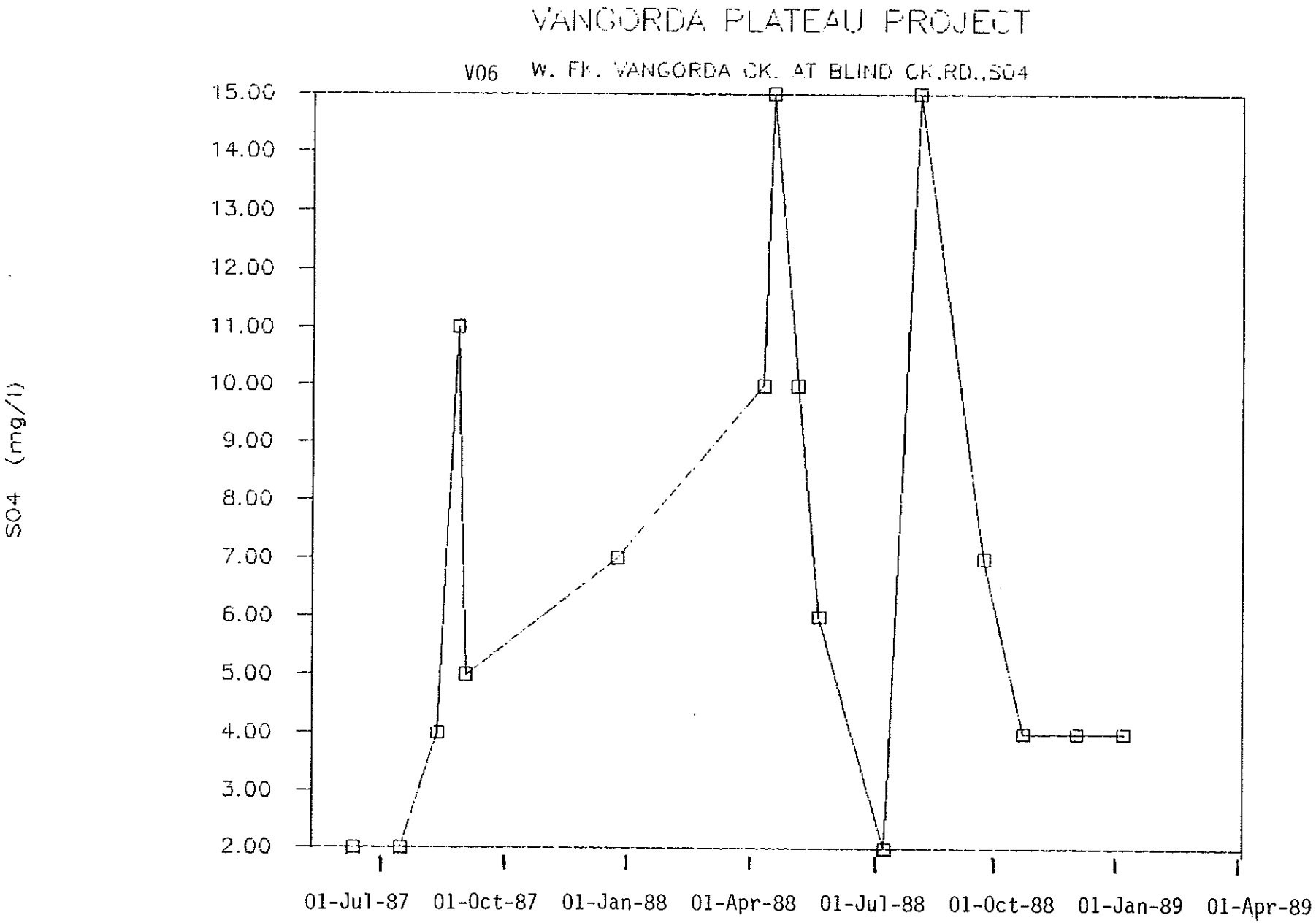
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V05
W. FK VANGORDA CK. AT MINE ROAD, S04
SO4 (mg/l)
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V06 W. FK. VANGORDA CK. AT BLIND CK.RD.,SO4
SO4 (mg/l)
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
01-Jul-87
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01-Jul-88
01-Oct-88
01-Jan-89
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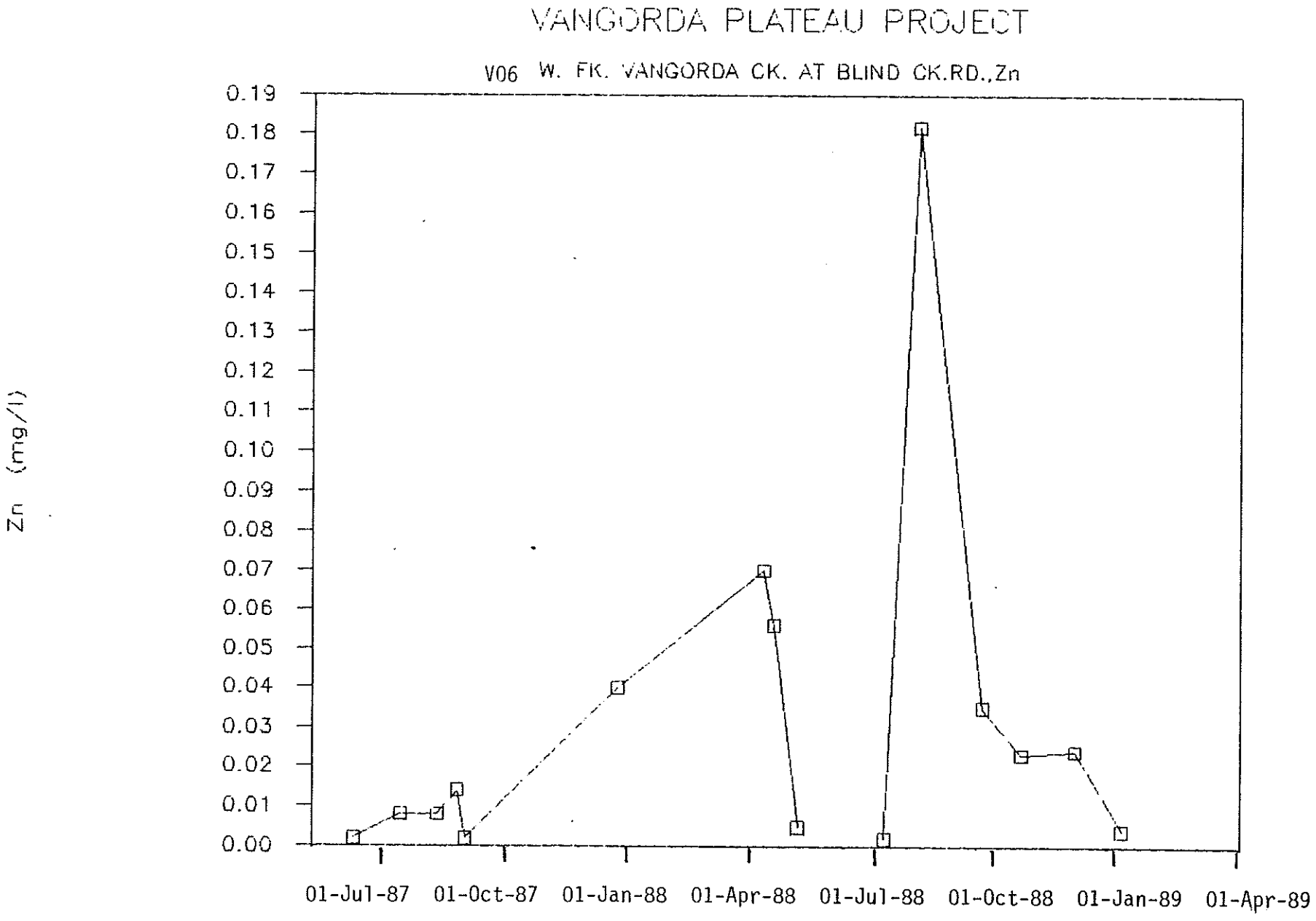
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V06 W. FK. VANGORDA CK. AT BLIND CK.RD.,Zn
Zn (mg/l)
0.19
0.18
0.17
0.16
0.15
0.14
0.13
0.12
0.11
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
01-Jul-87
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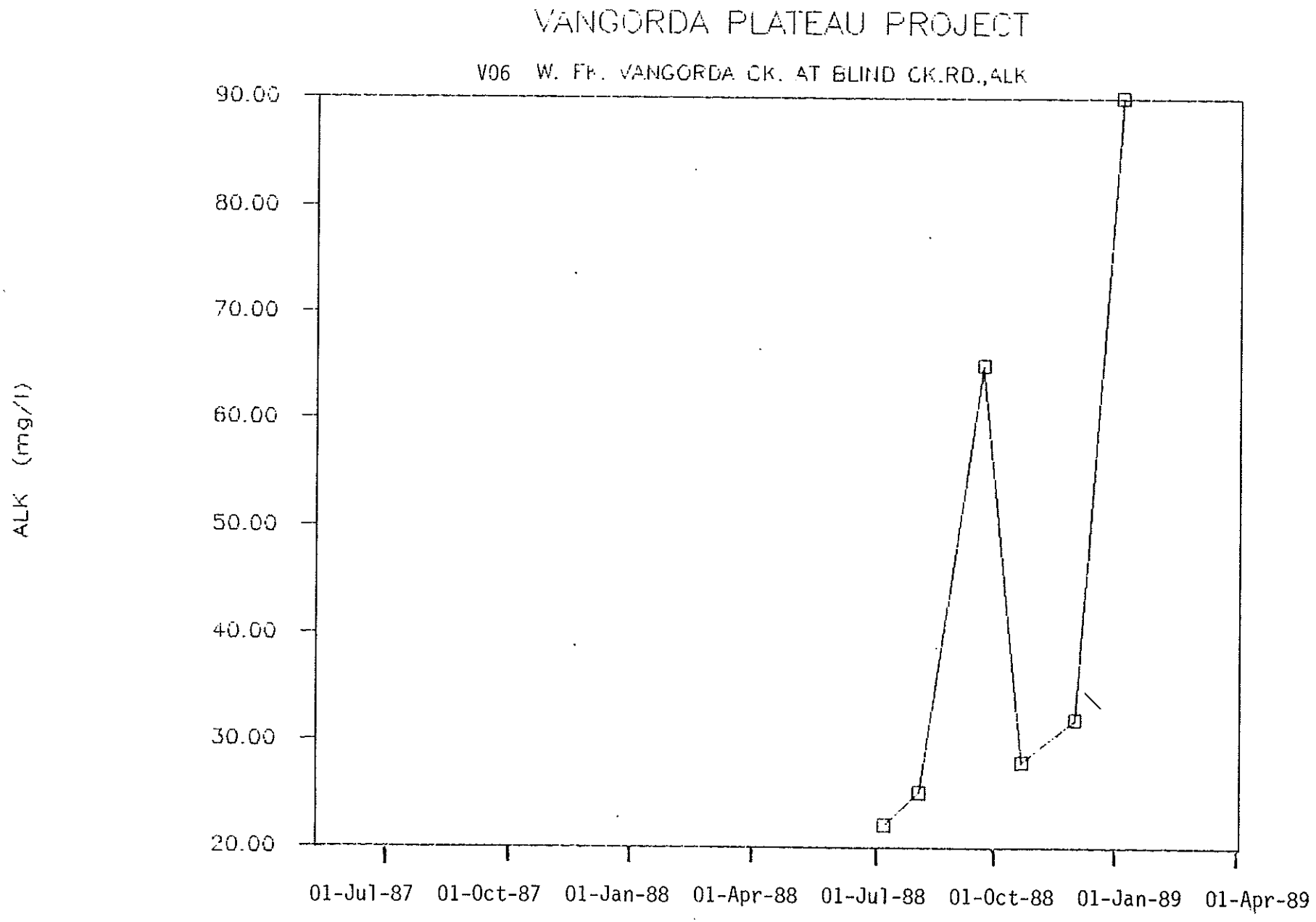
VANGORDA PLATEAU PROJECT
V06 W. FK. VANGORDA CK. AT BLIND CK.RD.,ALK
ALK (mg/l)
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
01-Jul-87
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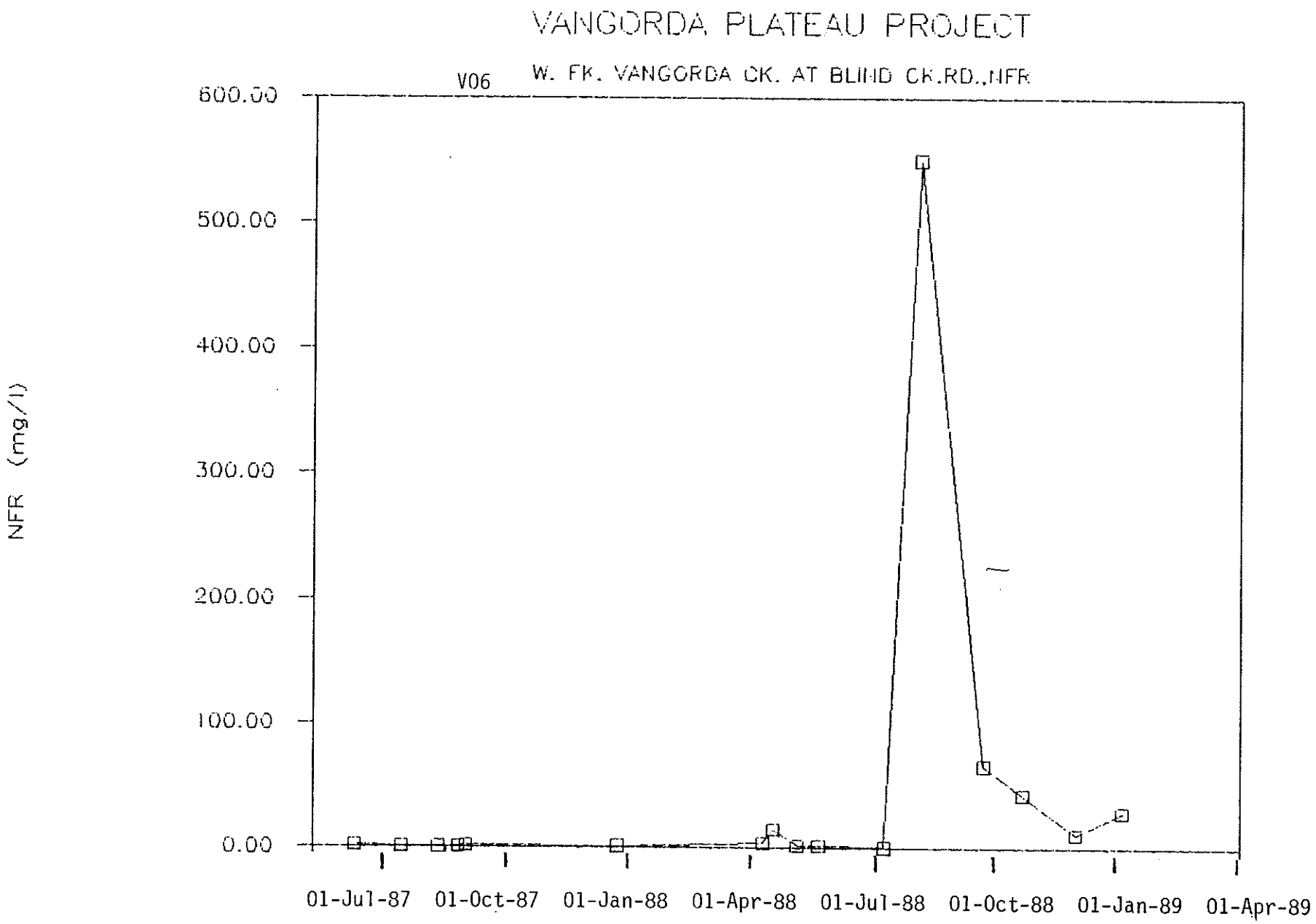
VANGORDA PLATEAU PROJECT
V06
W. FK. VANGORDA CK. AT BLIND CK.RD.,NFR
NFR (mg/l)
600.00
500.00
400.00
300.00
200.00
100.00
0.00
01-Jul-87
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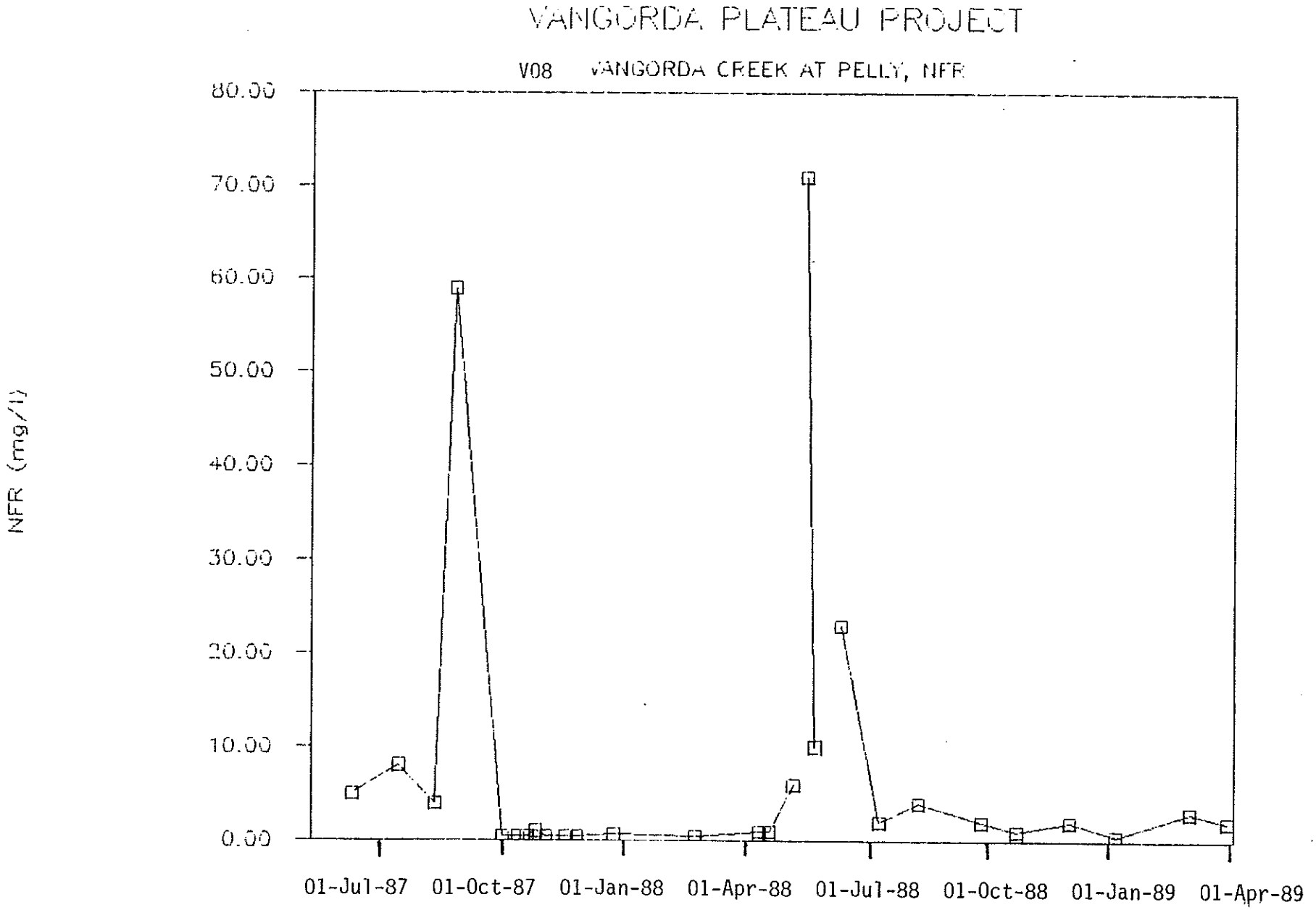
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V08 VANGORDA CREEK AT PELLY, NFR
NFR (mg/l)
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
01-Jul-87
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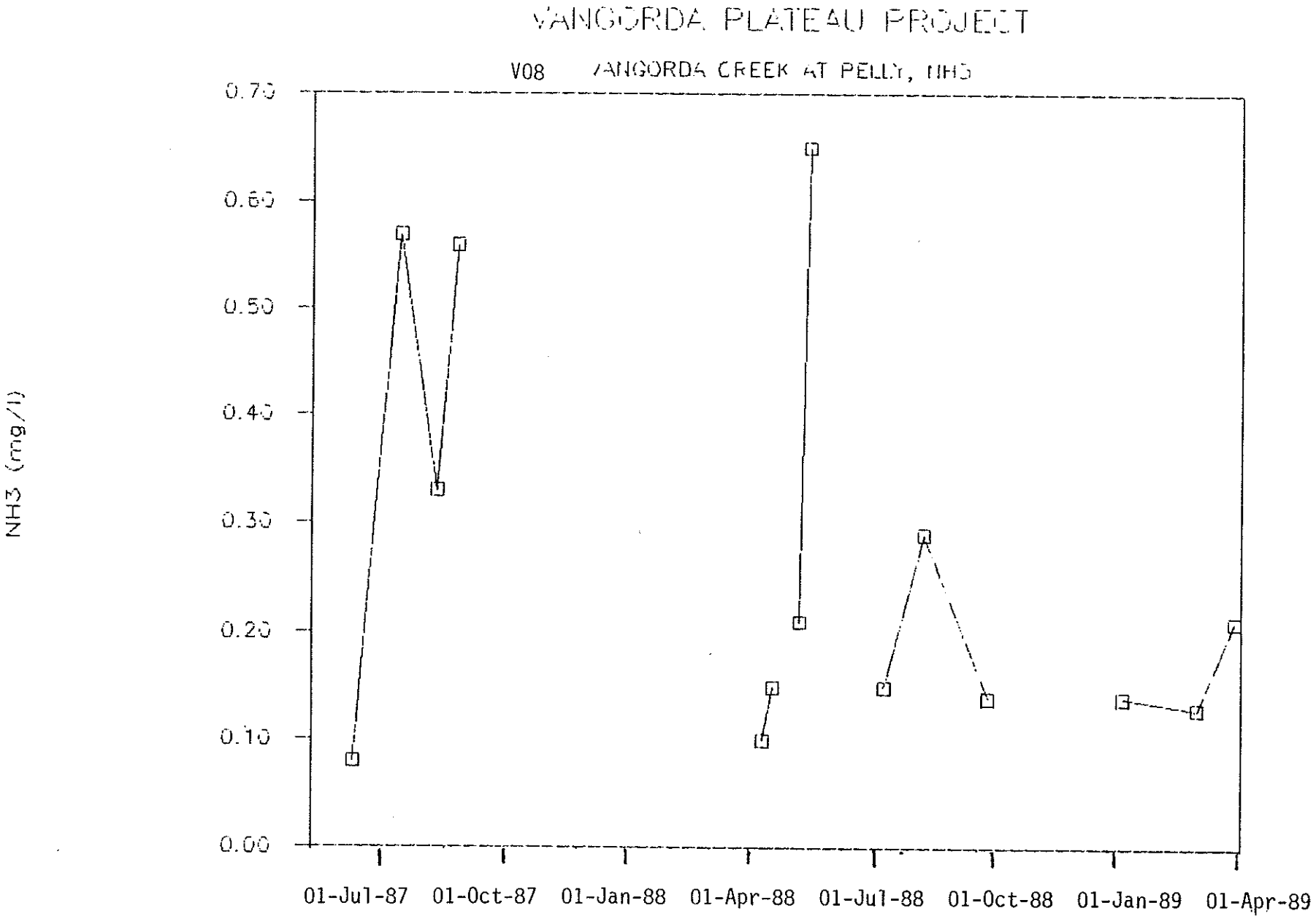
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V08 VANGORDA CREEK AT PELLY, NWT
NH3 (mg/l)
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
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01-Oct-87
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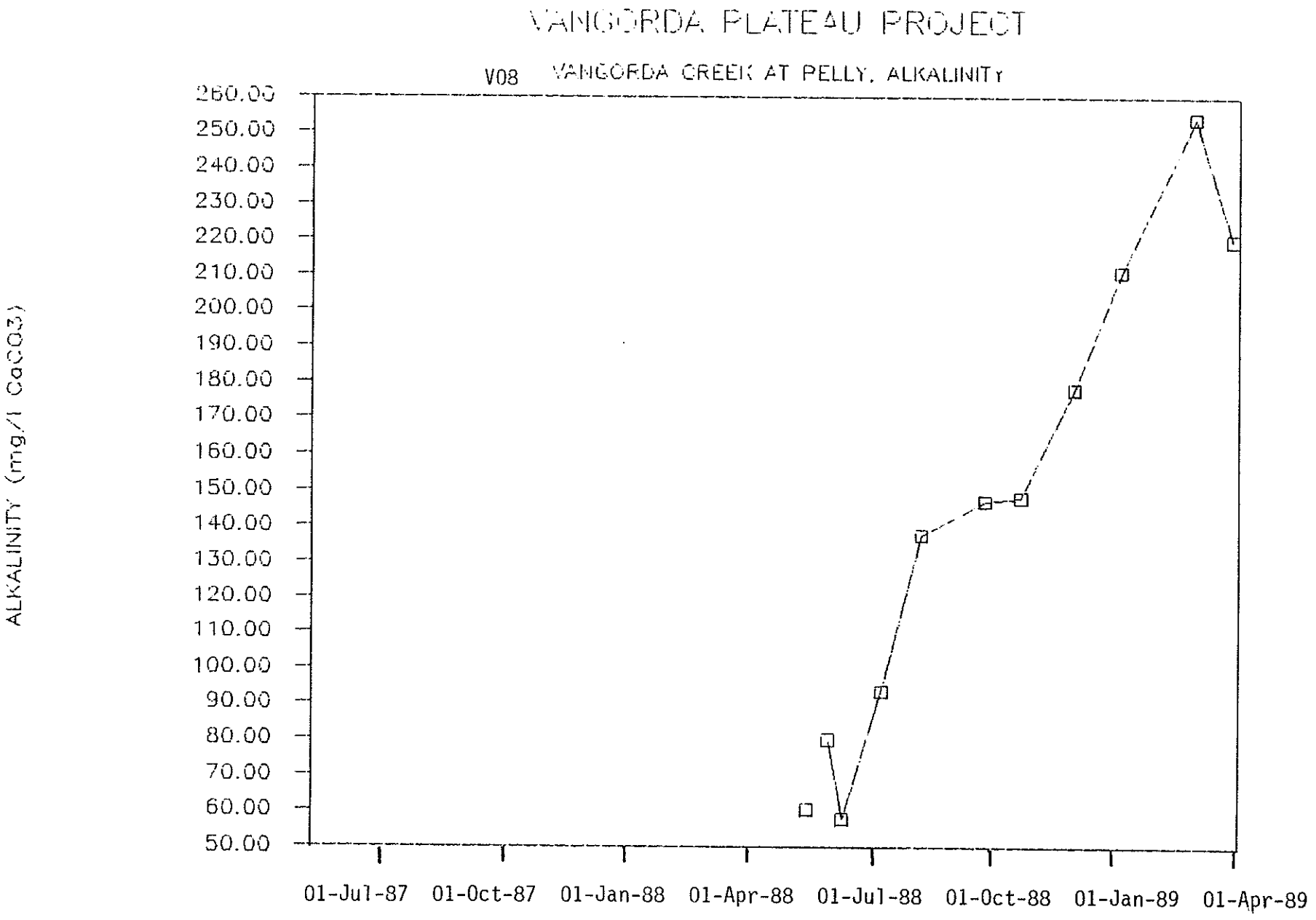
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89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V08 VANGORDA CREEK AT PELLY, ALKALINITY
ALKALINITY (mg/l CaCO3)
260.00
250.00
240.00
230.00
220.00
210.00
200.00
190.00
180.00
170.00
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
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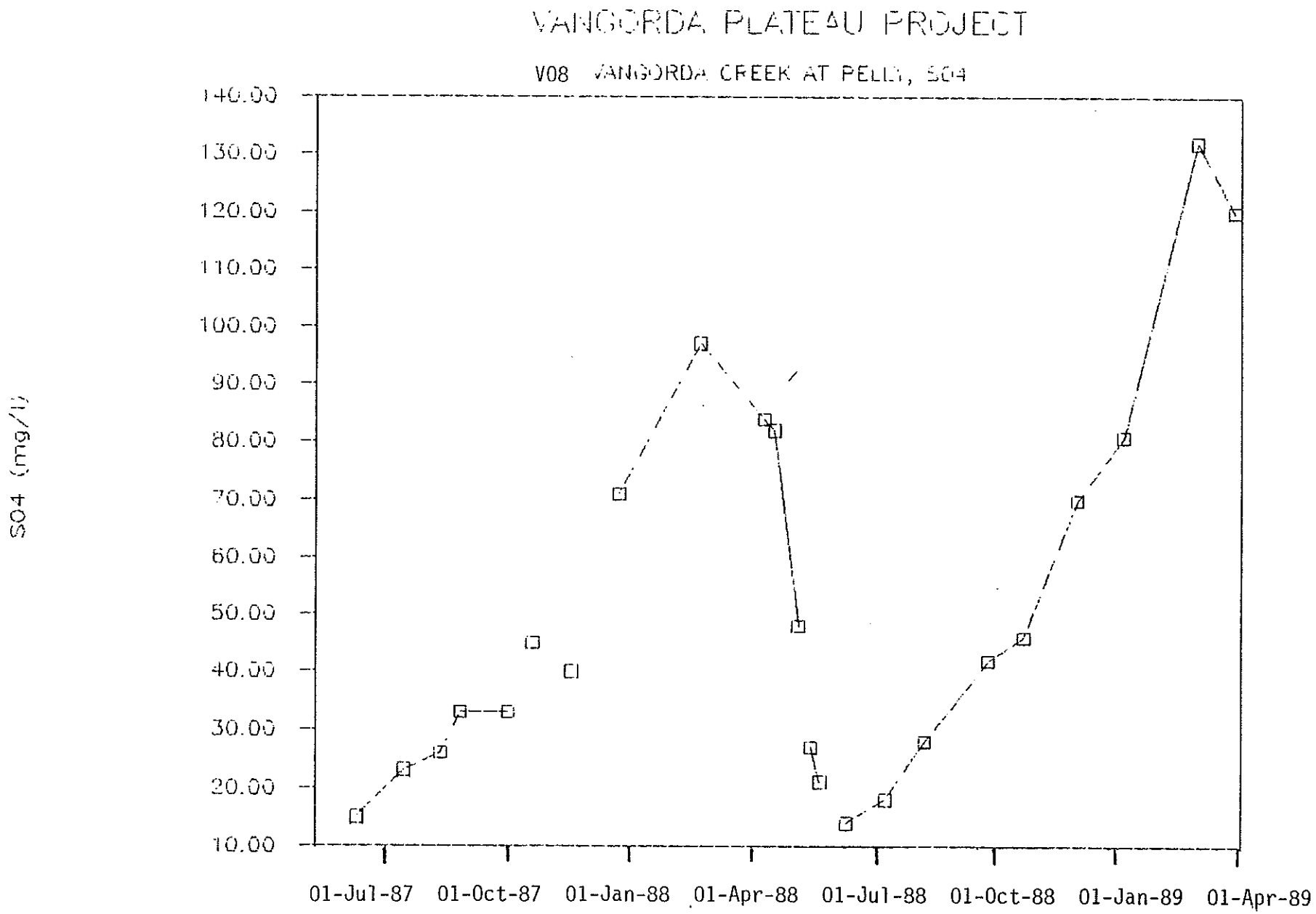
VANGORDA PLATEAU PROJECT
V08 VANGORDA CREEK AT PELLY, SO4
SO4 (mg/l)
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
01-Jul-87
01-Oct-87
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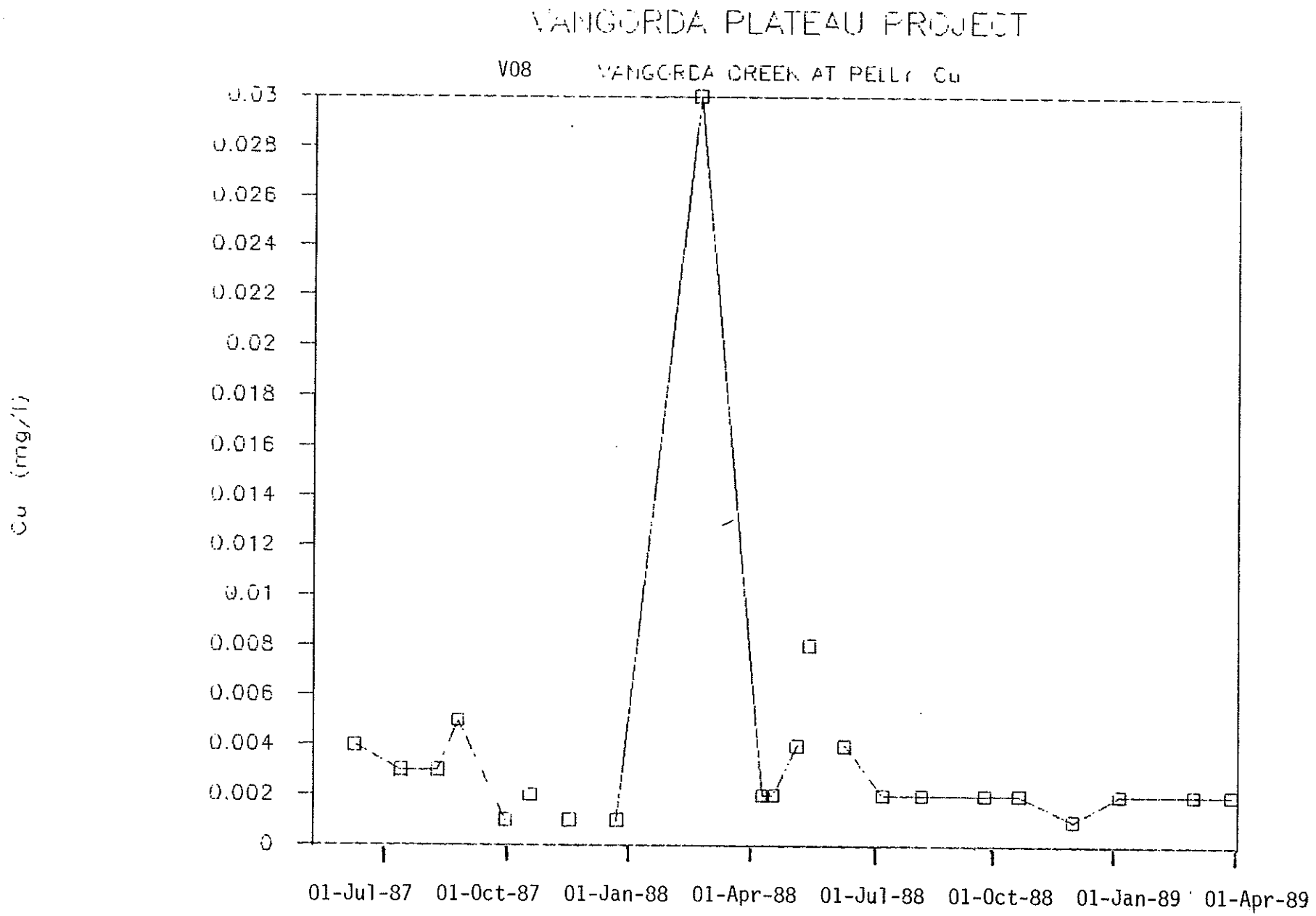
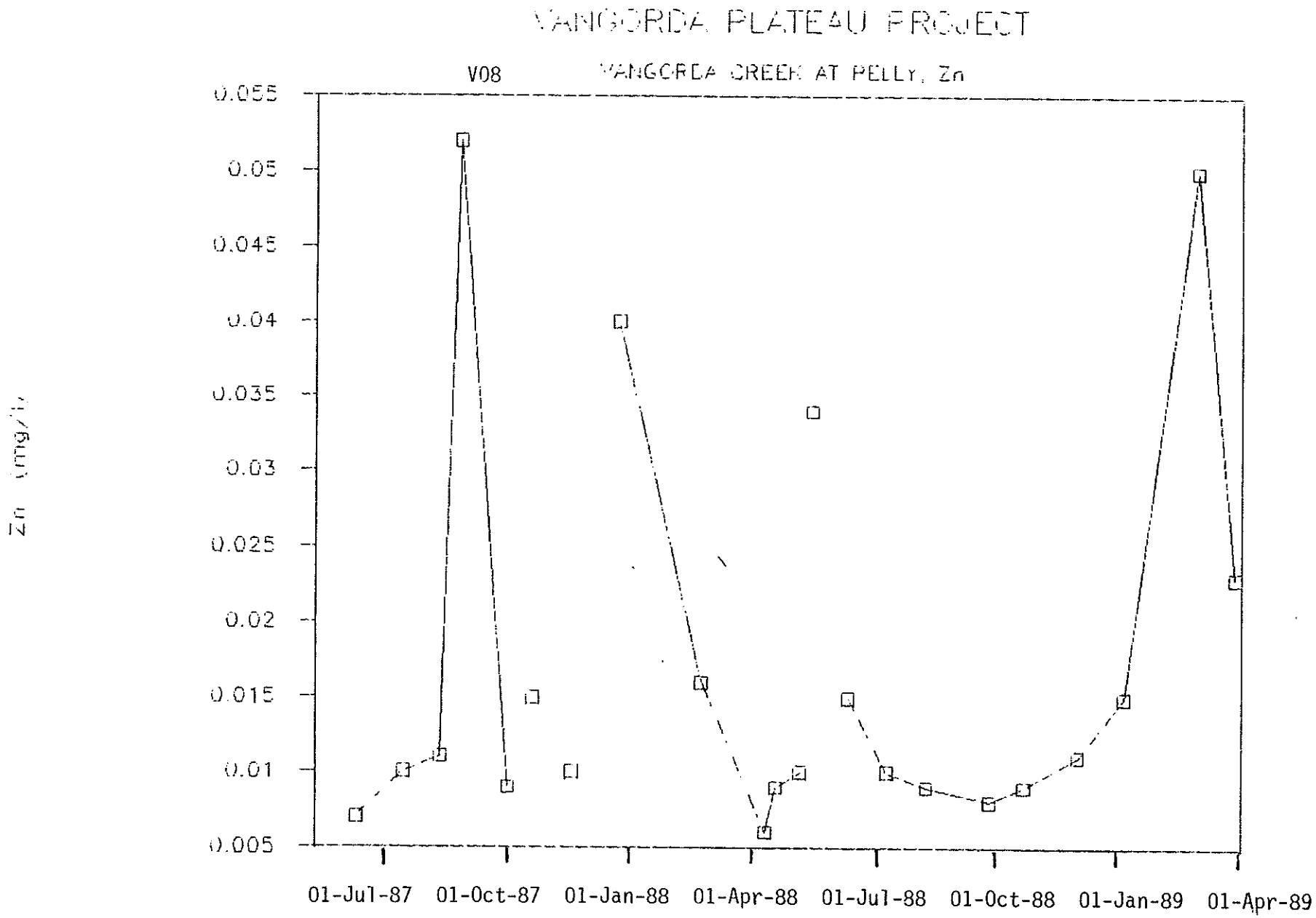
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V08 VANGORDA CREEK AT PELLY Cu
Cu (mg/l)
0.03
0.028
0.026
0.024
0.022
0.02
0.018
0.016
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89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V08
VANGORDA CREEK AT PELLY, Zn
Zn (mg/l)
0.055
0.05
0.045
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
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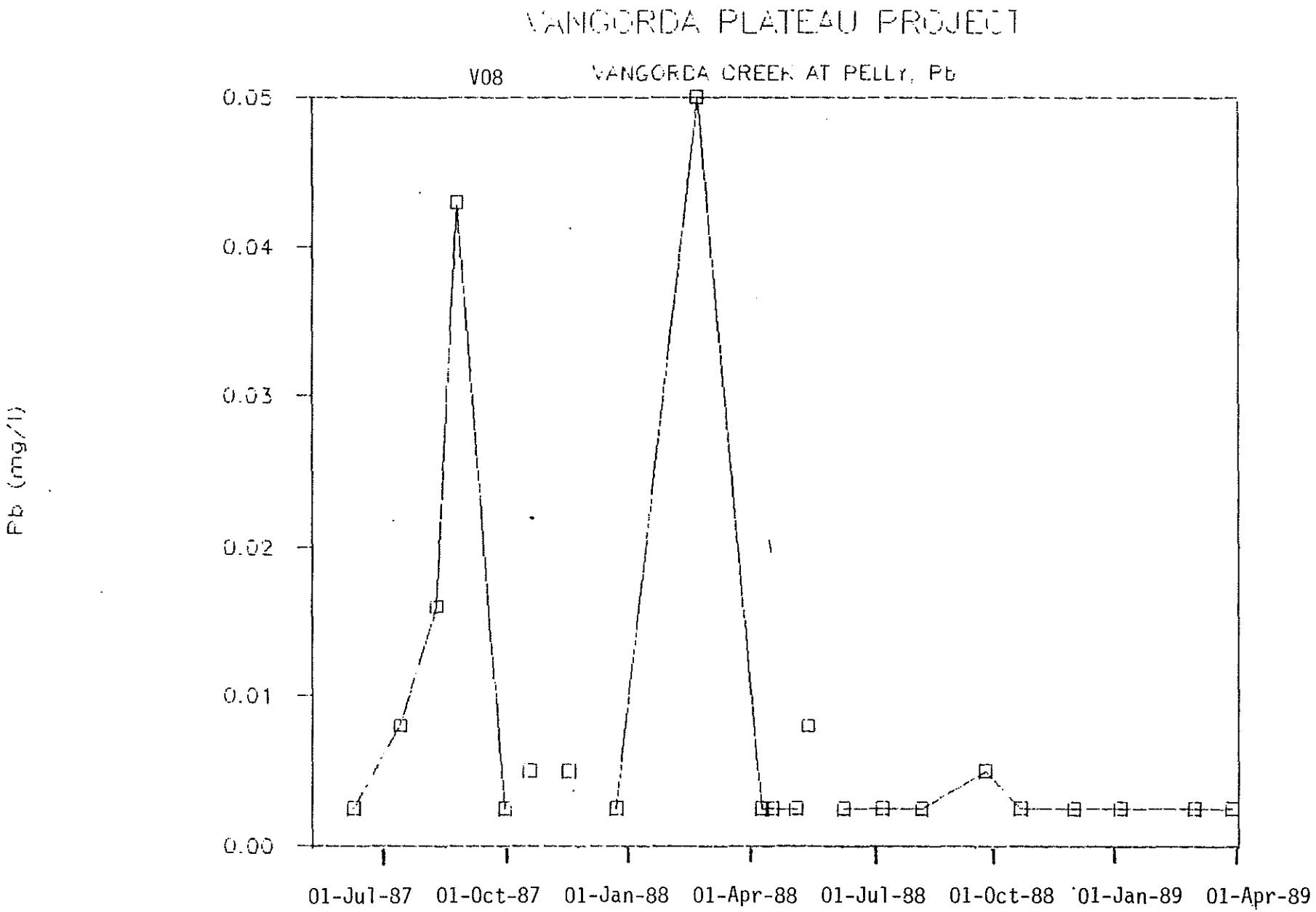
01-Oct-88
01-Jan-89
01-Apr-89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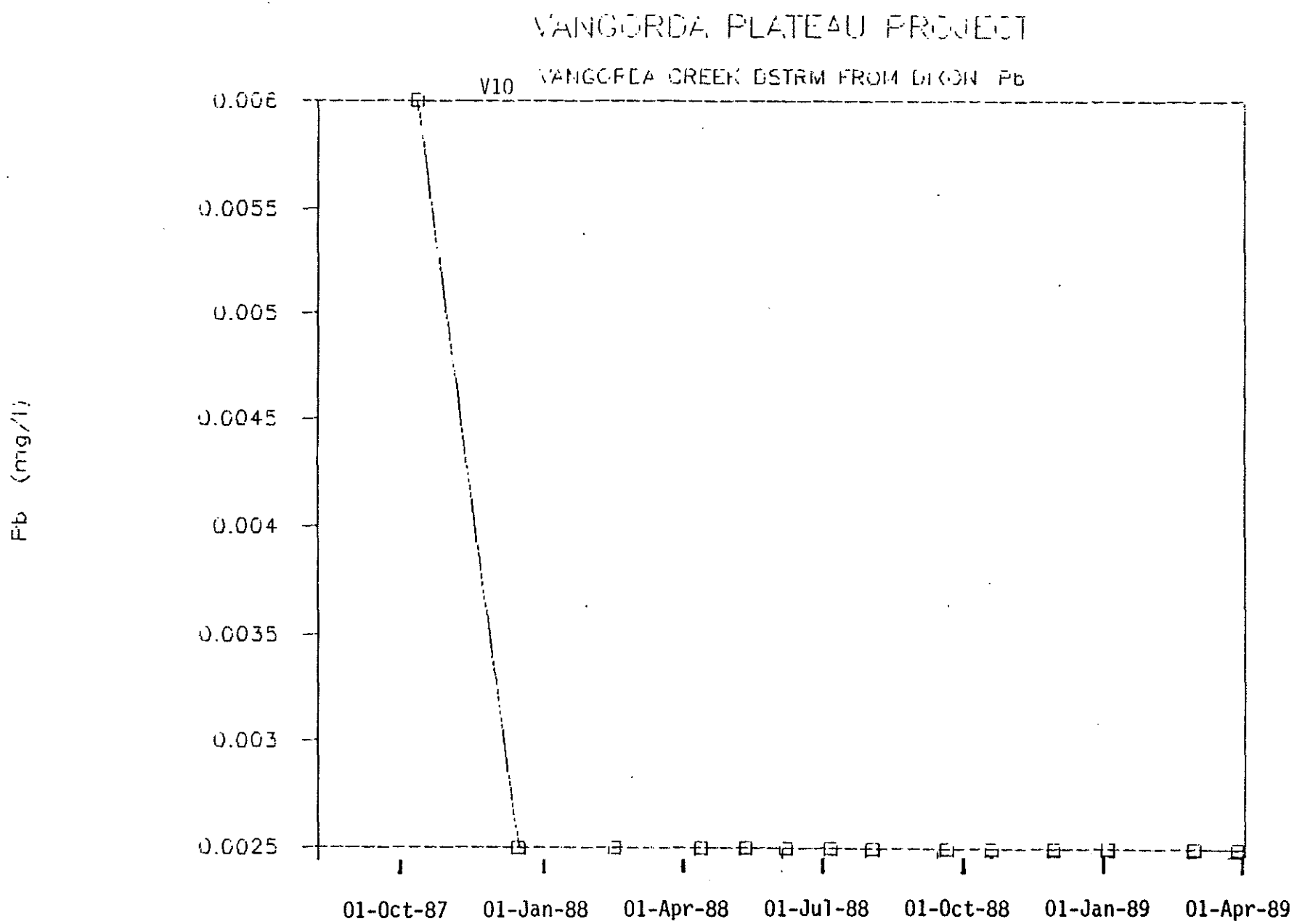
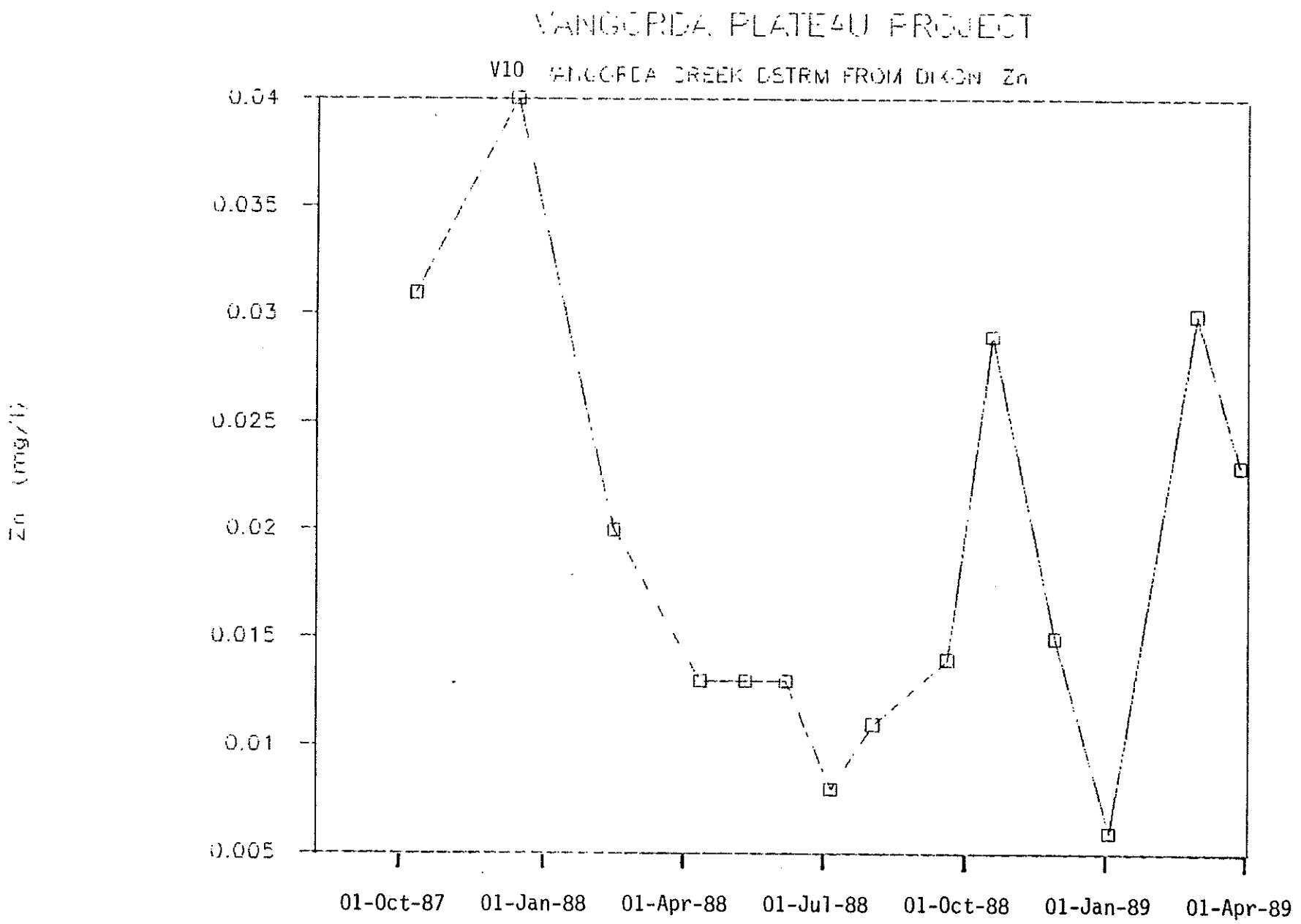
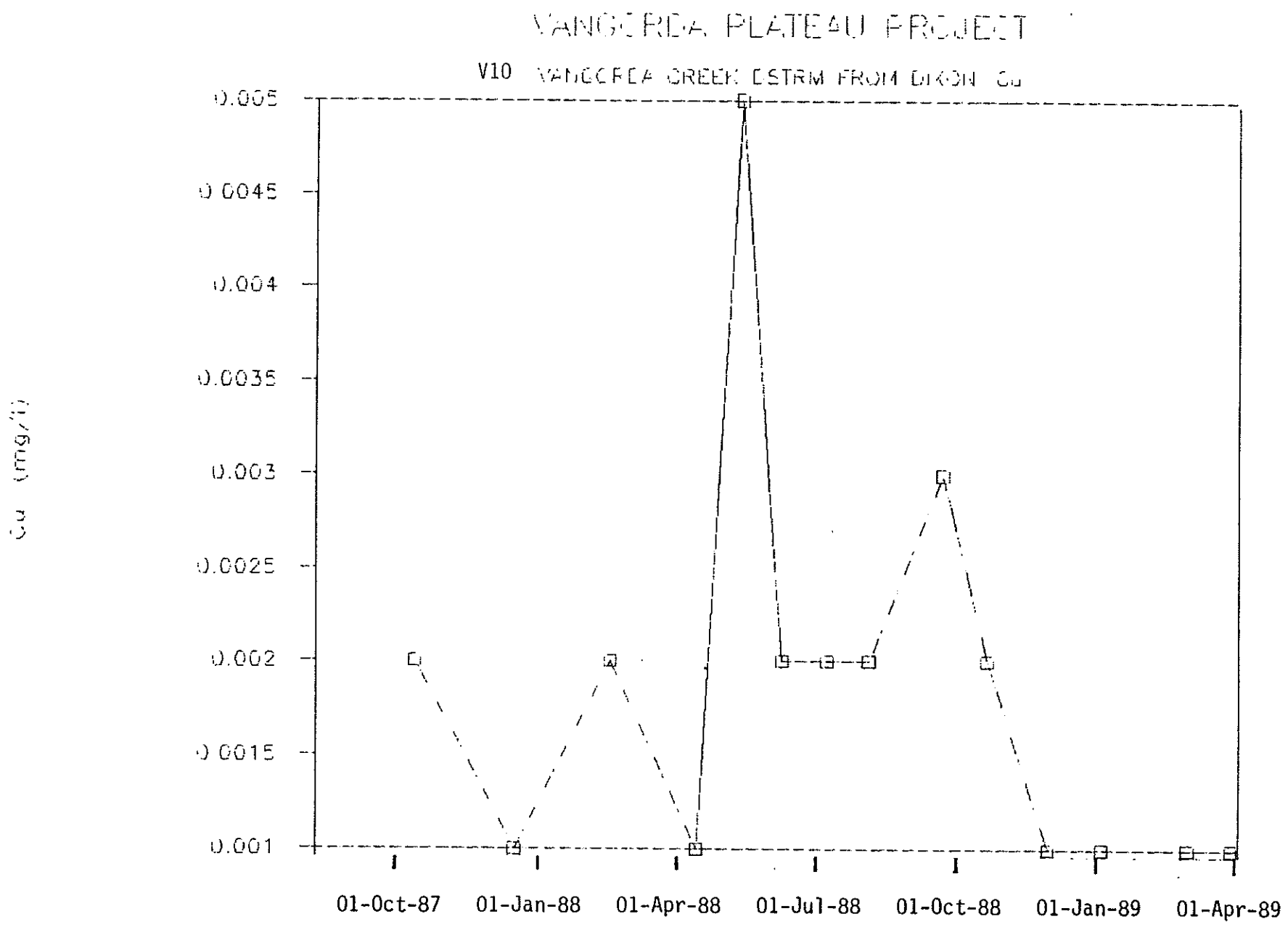
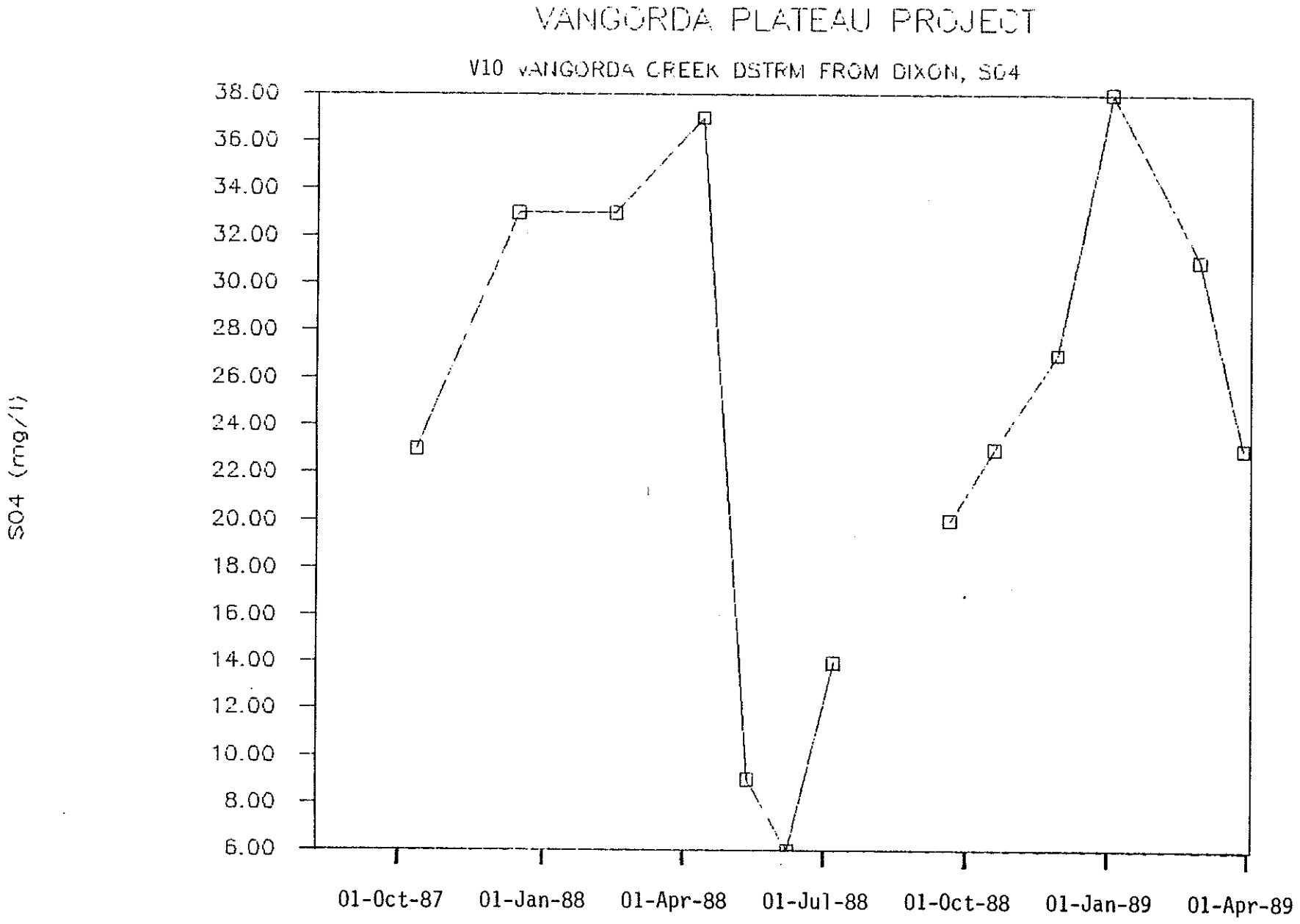
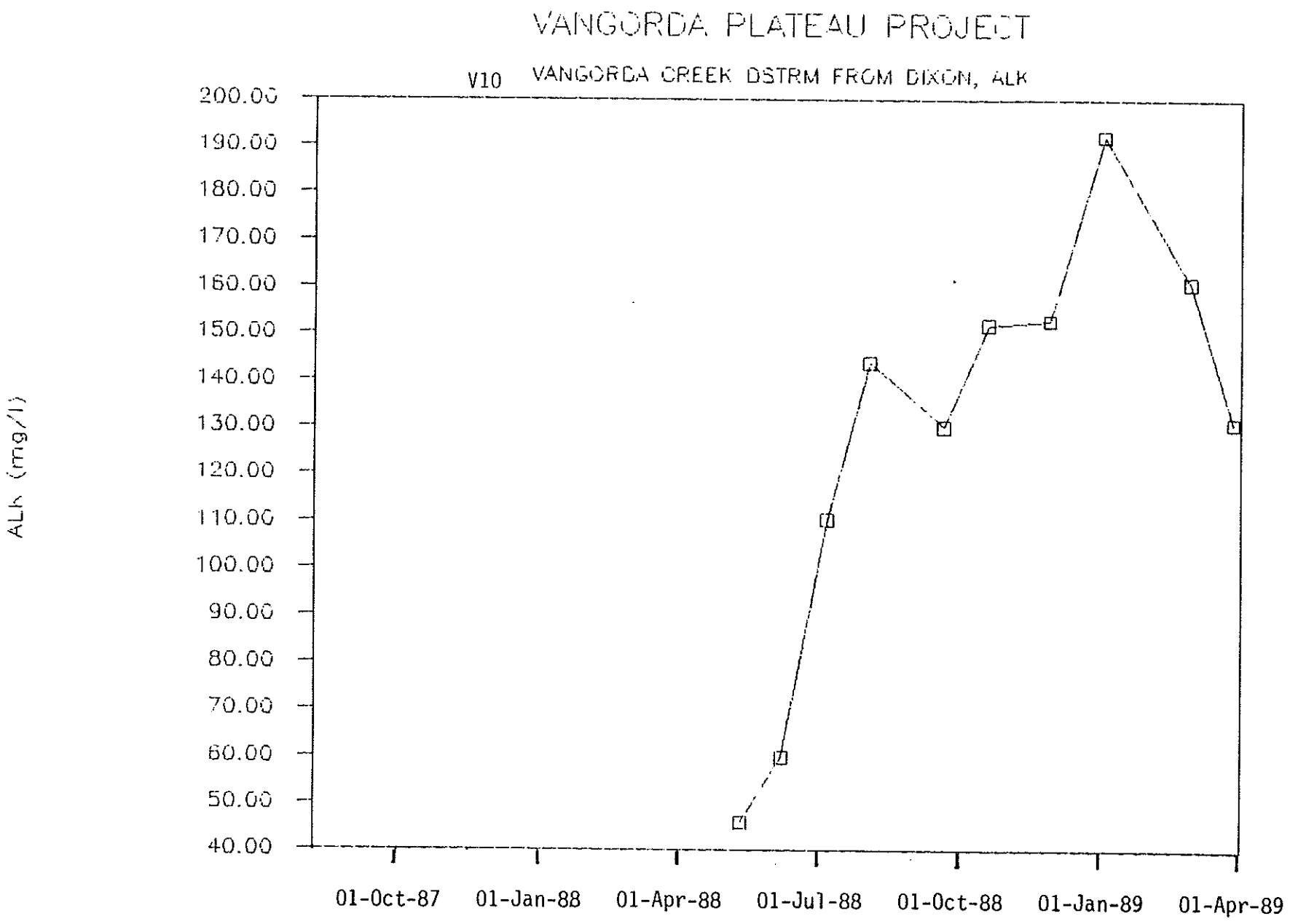
V08
VANGORDA CREEK AT PELLY, Pb
Pb (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

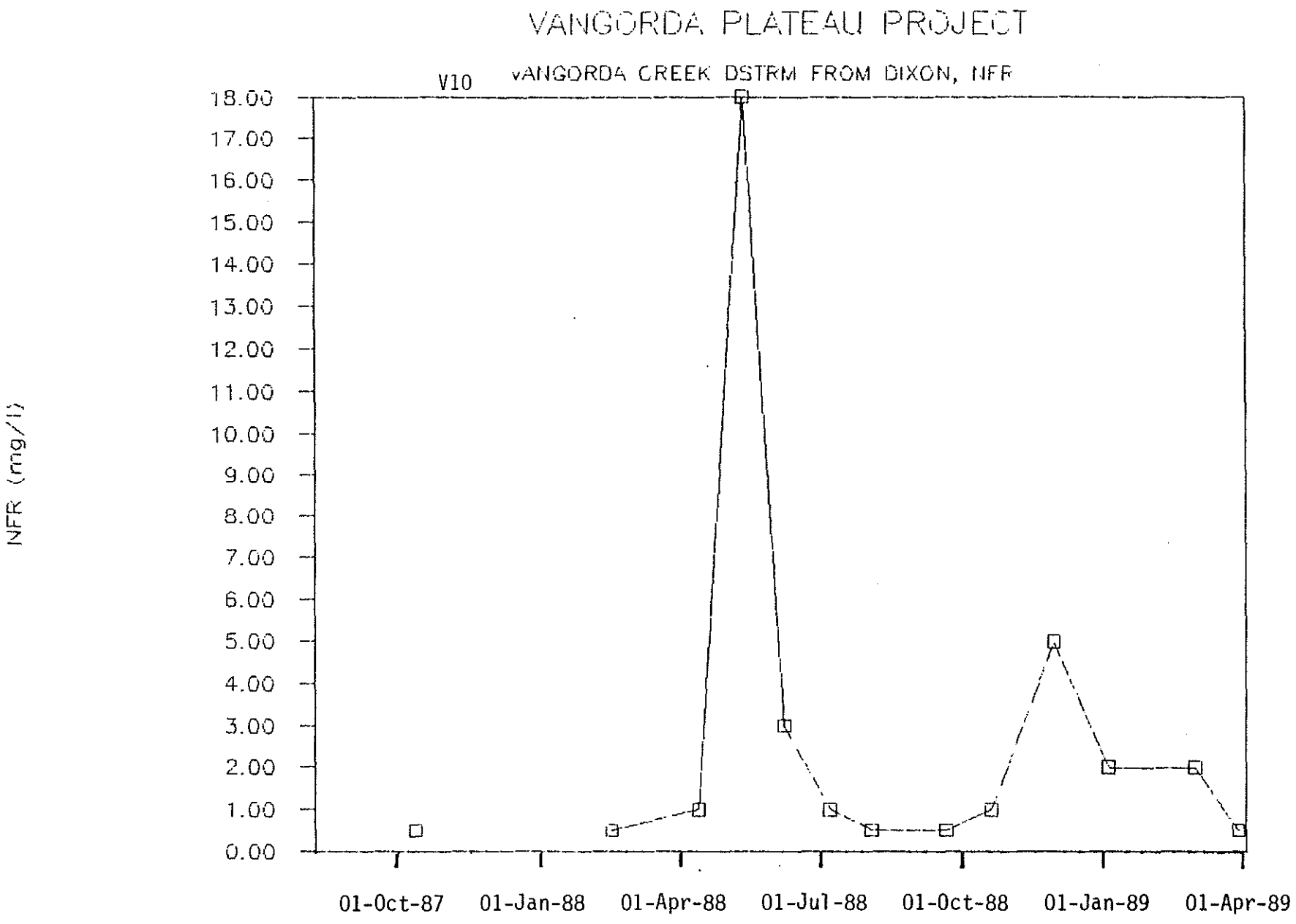

VANGORDA PLATEAU PROJECT
V10 VANGORDA CREEK DSTRM FROM DIXON Pb
Pb (mg/l)
0.006
0.0055
0.005
0.0045
0.004
0.0035
0.003
0.0025
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGCRDA PLATEAU PROJECT
V10 VANGCRDA CREEK DSTRM FROM DIXON Zn
Zn (mg/l)
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

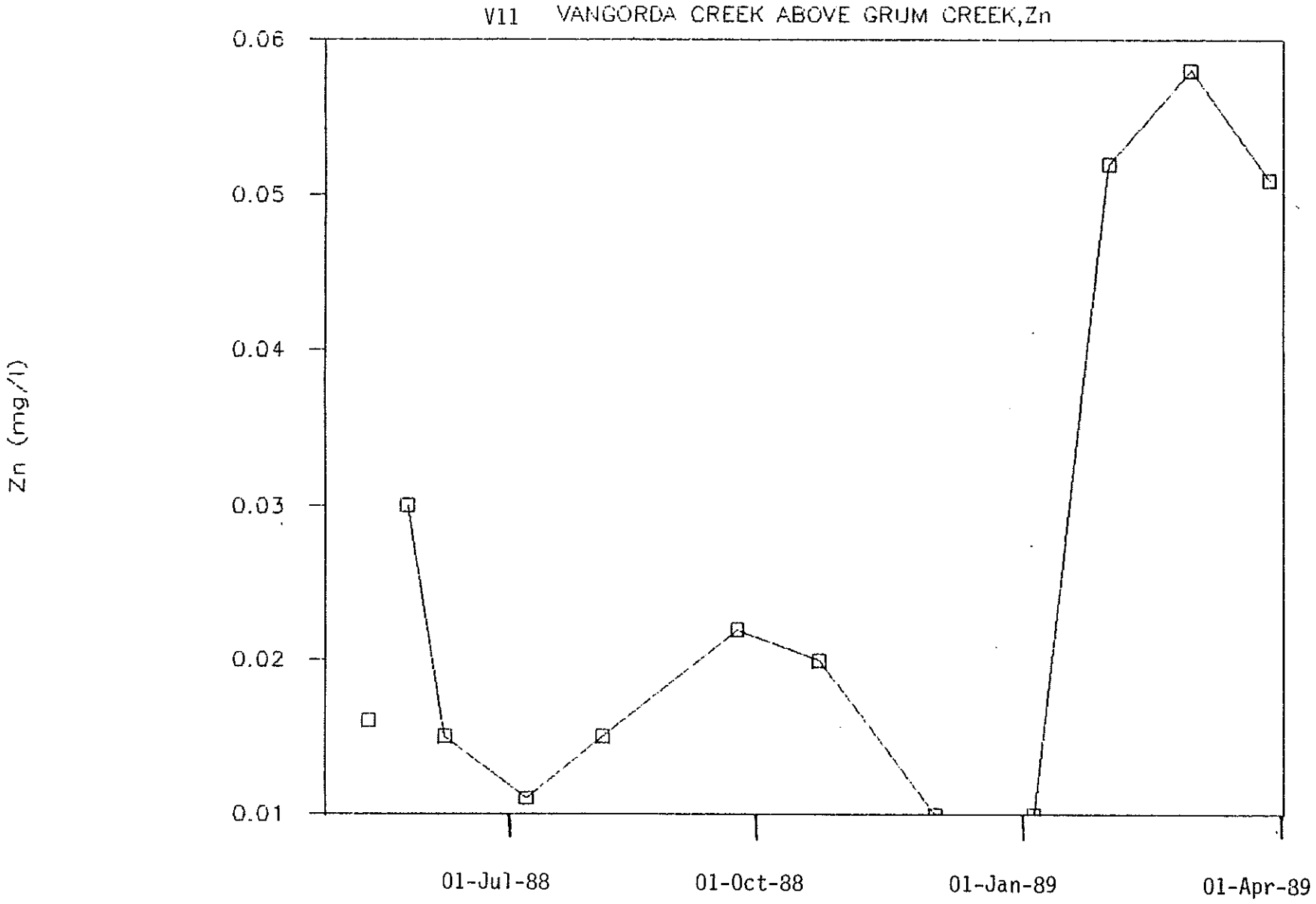

VANGORDA PLATEAU PROJECT
V10 VANGORDA CREEK DSTRM FROM DIXON Cu
Cu (mg/l)
0.005
0.0045
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

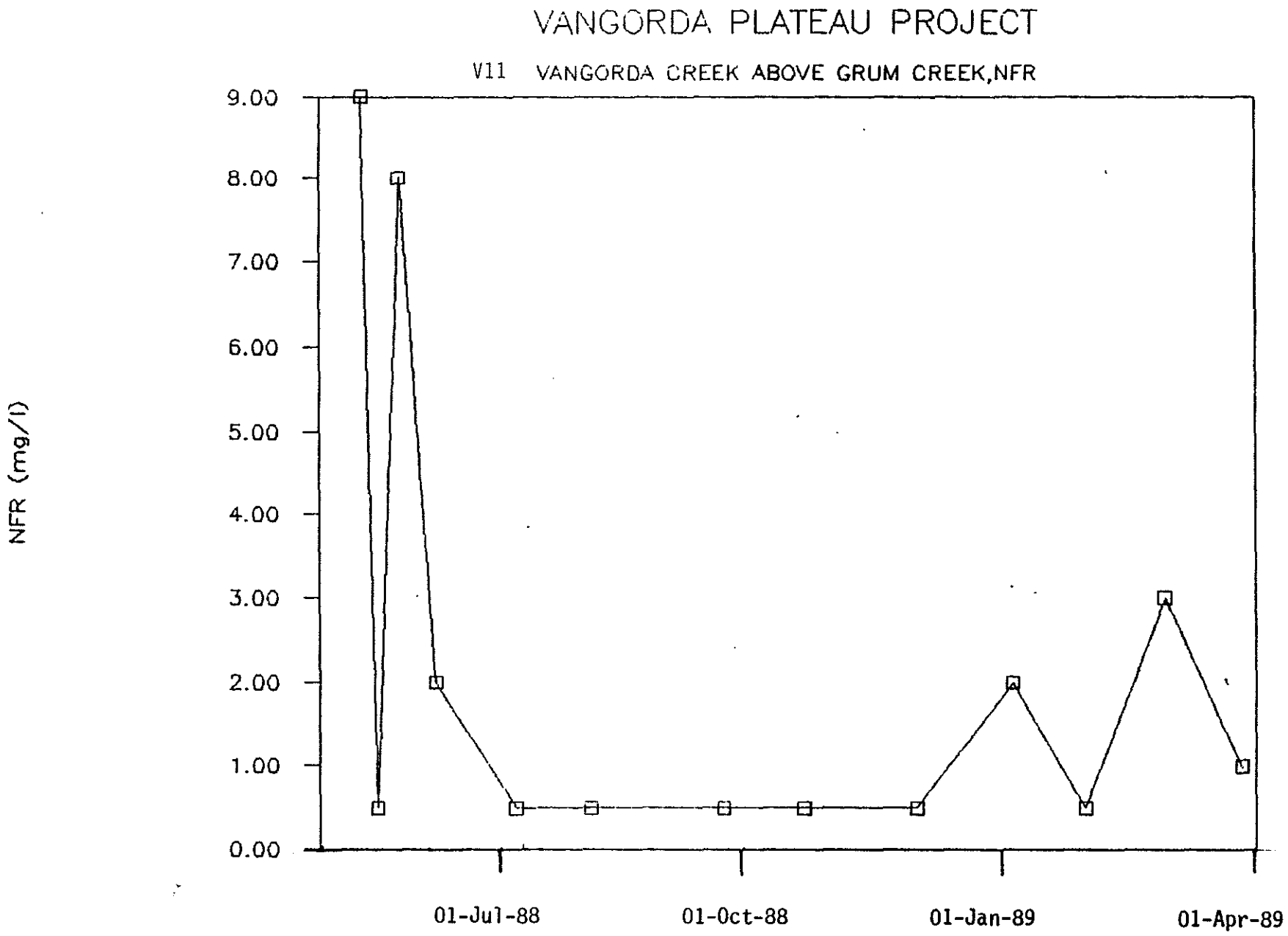

VANGORDA PLATEAU PROJECT
V10 VANGORDA CREEK DSTRM FROM DIXON, SO4
SO4 (mg/l)
38.00
36.00
34.00
32.00
30.00
28.00
26.00
24.00
22.00
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

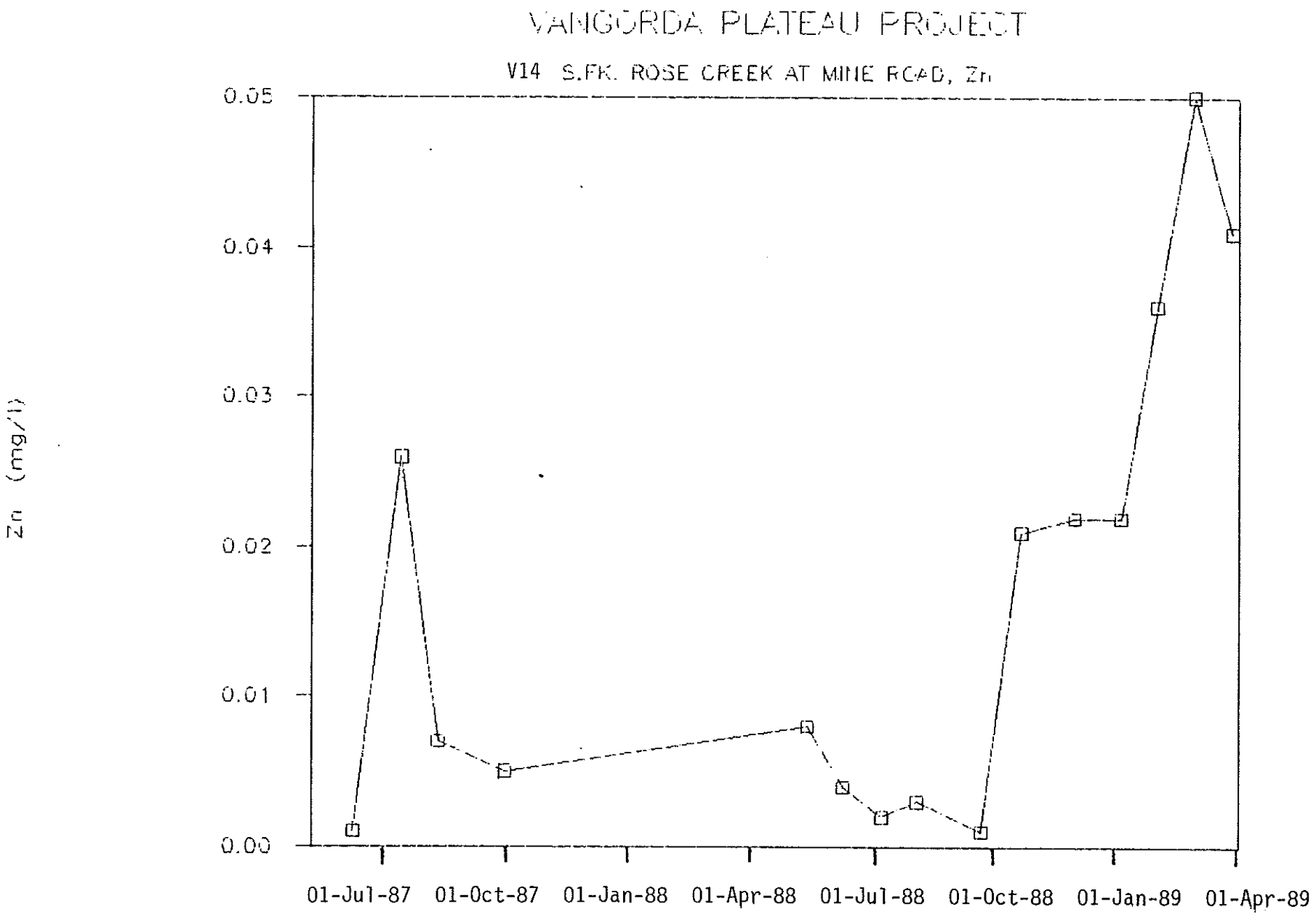

VANGORDA PLATEAU PROJECT
V10 VANGORDA CREEK DSTRM FROM DIXON, ALK
ALK (mg/l)
200.00
190.00
180.00
170.00
160.00
150.00
140.00
130.00
120.00
110.00
100.00
90.00
80.00
70.00
60.00
50.00
40.00
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

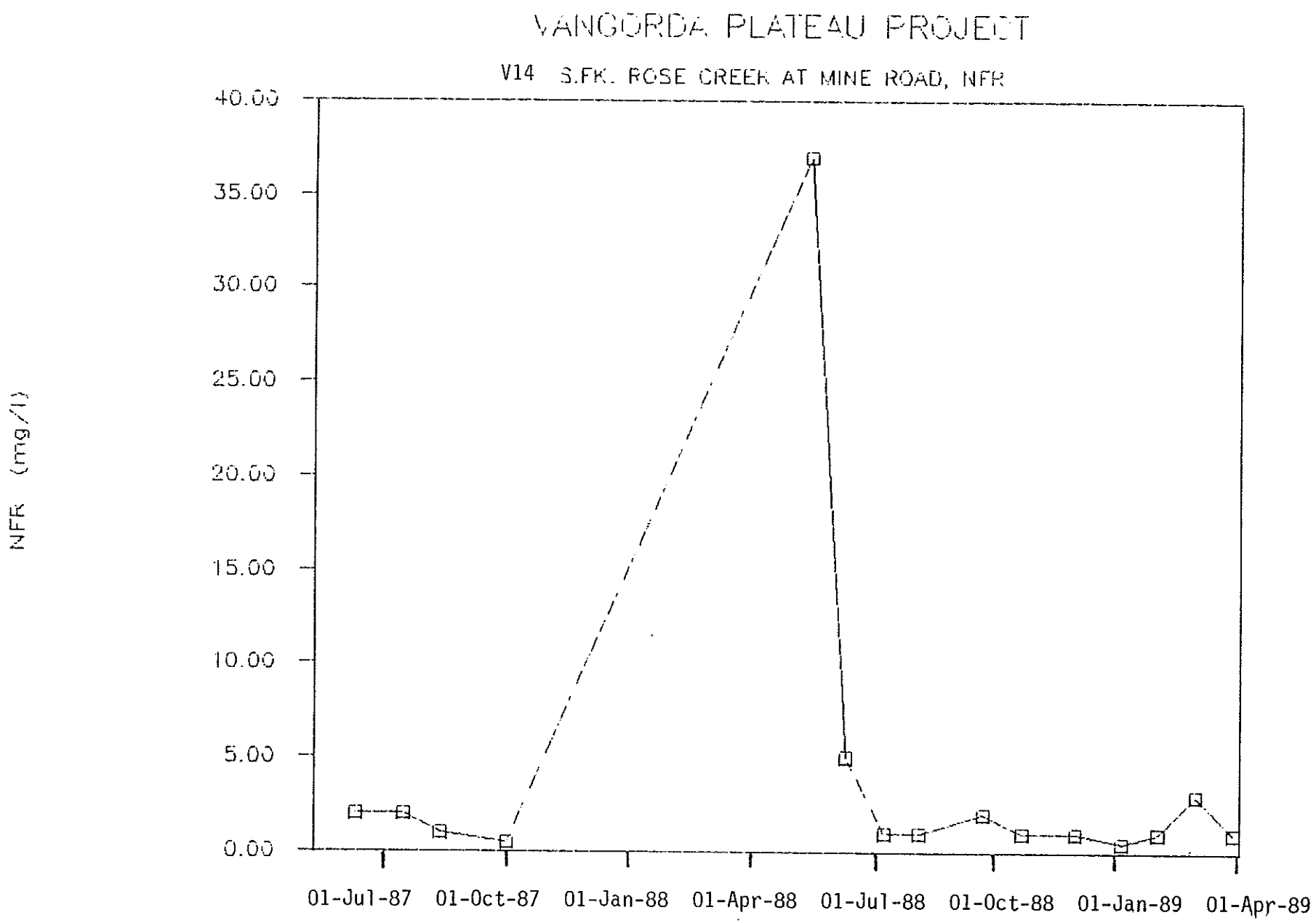

VANGORDA PLATEAU PROJECT
V10 VANGORDA CREEK DSTRM FROM DIXON, NFR
NFR (mg/l)
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

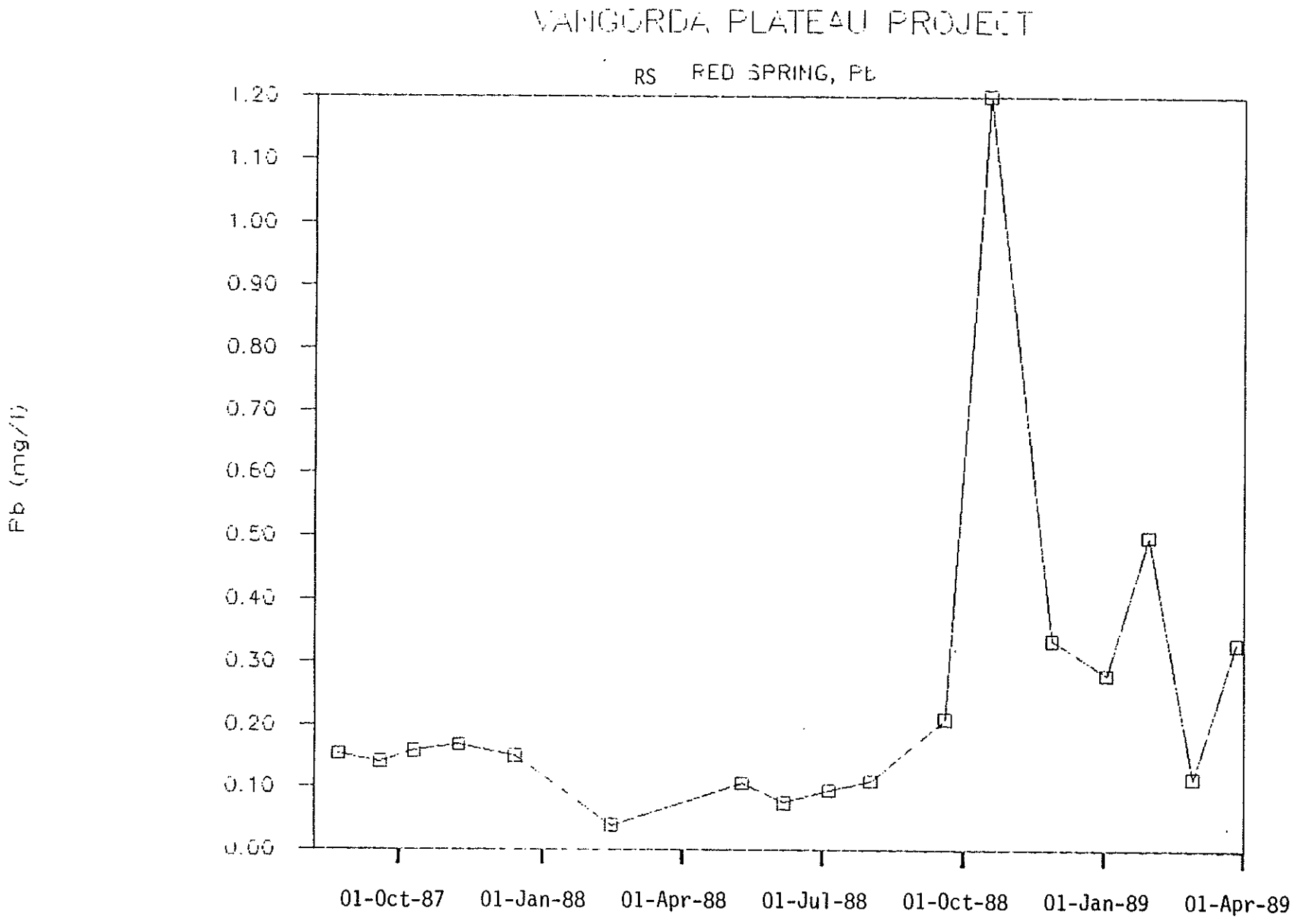
VANGORDA PLATEAU PROJECT




VANGORDA PLATEAU PROJECT
V11 VANGORDA CREEK ABOVE GRUM CREEK,NFR
NFR (mg/l)
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V14 S.FK. ROSE CREEK AT MINE ROAD, Zn
Zn (mg/l)
0.05
0.04
0.03
0.02
0.01
0.00
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
V14 S.FK. ROSE CREEK AT MINE ROAD, NFR
NFR (mg/l)
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
01-Jul-87
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89


VANGORDA PLATEAU PROJECT
RS RED SPRING, Pb
Pb (mg/l)
1.20
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
01-Oct-87
01-Jan-88
01-Apr-88
01-Jul-88
01-Oct-88
01-Jan-89
01-Apr-89

APPENDIX D

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph.D. Geologist
A.L. LITTLEJOHN, M.Sc. Geologist
JEFF HARRIS, Ph.D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
VOX 1JO

PHONE (604) 888-1323

RECEIVED JAN 23 1989

Invoice 7886
January 1989

Report For: Lee C. Pigage
Senior Geologist
Curragh Resources Ltd.
117 Industrial Road
Whitehorse, Yukon Y1A 2T8
Telephone: (403) 668-3578

Samples: 79V046R: 146-156, 177-182.7, 184.9-197.8,
79V046R: 162.5 - 184.3, 202.0-209.6, 215.5-221.0,
79V046R: 216.0-221.6, 256.6-267.0,
79V026R: 114-138,
88V17: 25.2-33.5, 36-42
(11 Polished Thinsections)

Summary:

These specimens represent typical examples of waste phyllites and low grade quartzose "ores" from the Vangorda deposit in the Anvil District, Yukon. Waste dumps from future mining operations will be composed of similar material.

The altered phyllites are all similar in mineral composition and texture. They consist primarily of muscovite and quartz with minor chlorite and carbonate. Accessory minerals are plagioclase, orthoclase and opaque minerals. The opaque (or reflecting) minerals are dominated by pyrrhotite with lesser amounts of pyrite, hematite, sphalerite and magnetite. Traces of chalcopyrite were noted.

Muscovite occurs as large felted lenses up to 6 mm long by 3 mm wide and as thick monominerallic layers up to 8 mm wide. The thick muscovite layers are kinked at close intervals which gives a rough chatoyancy to the sawn surfaces. Chlorite often replaces muscovite and is often associated as envelopes around pyrrhotite grains. The quartz dominant layers are composed mainly of elongated interlocking quartz grains (0.05 mm to 0.2 mm) associated with minor, strongly aligned muscovite needles averaging 0.1 mm in length. Irregular, small chlorite patches (up to 0.15 mm) are common. Differentiating between muscovite and the possibility of talc would require XRD analytical work, but it is my opinion from the handspecimen inspection and mineral association that the vast majority of the layer silicates are muscovite.

Pyrrhotite occurs as large irregular lenses. They have undergone metamorphic stress and conform to the microfolds of the adjacent muscovite layers. Pyrrhotite also forms long, fracture-filling veinlets. In some samples (79V046R 177-182.7) sphalerite is the dominant reflecting mineral. Chalcopyrite is usually present in trace amounts as tiny inclusions in other sulfides.

Some specimens appear to contain both calcite and ferroan dolomite (ankerite) in very small quantities. A definitive determination of the carbonate composition would require detail XRD analytical work. The amount of carbonate is relatively low. However, the attached individual descriptions have indicated a ferroan dolomite (ankerite) composition if the mineral is brown stained, has associated opaques, and low degree of reaction to HCl in handspecimen. Specimen 79V046R 256.6-267.0 contains the highest ferroan dolomite content (15%). A further test is that dolomite effervesces in warm dilute HCl. On heating the iron rich carbonates decompose into magnetic iron oxides plus carbon dioxide gas. Sample 88V-17 36 - 42 contains abundant calcite (22%).

The "low grade quartzose ores" (samples 79V026R 114-138, 88V-17, 25.2-33.5, 88V-17 36-42) are characterized by their abundance of pyrite in massive bands and fracture veinlets. Pyrite forms subrectangular grains up to 1.3 mm wide which commonly coalesce into semi-massive layers and lenses parallel to foliation. In specimen 88V-17 25.2-33.5 the pyrite grains are connected to each other by irregular seams or lenses of pyrrhotite. Sphalerite is abundant in specimen 88V-17 36-42 in irregular lenses up to several millimetres wide. Chalcopyrite occupies small, narrow cracks or fractures in the larger pyrite layers. Chalcopyrite also forms rare large grains (up to 2.1 mm wide) associated with pyrrhotite and sphalerite. Traces of tetrahedrite were noted in 79V026R 114-138. Sample 88V-17 36 - 42 contains delicately laminated penninite (chlorite) lenses associated with the massive pyrite lenses.

An estimate of possible XRD analytical depends mainly on the ease of preparation of sufficient sample material. If sample preparation is simple, costs per determination can be as low as $20 to $50. However, as more time is spent to obtain sufficient sample, the overall cost can be considerably more. The distribution of carbonate in these rocks as thin fracture-filling suggests that preparation of sufficient sample for XRD will be difficult and time consuming.

If you have any questions about the attached descriptions, please contact me at 681-4902. Until I receive your instructions regarding the possible XRD work on the muscovite or carbonate, I will retain samples here in Vancouver.

Respectfully submitted,

J.T. (Joe) Shearer, M.Sc.

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit Environmental Impact Assessment

SPECIMEN NUMBER (XX-1): 79V046R 146 - 156

Handspecimen Description:

Diamond drillcore, light-greenish grey, layered, highly fractured, phyllitic, lusterous (roughly chatoyant) internal structure, very chloritic overall with local intense chlorite lenses, irregular biotite(?) clusters, minor pyrite disseminated throughout, traces of potassium feldspar in grains less than 0.5 mm, moderately magnetic.

Field Rock Name: Altered phyllite

Thinsection Examination:

Estimated Mode:

40%	Muscovite
40%	Quartz
2%	Plagioclase
1%	Sericite
2%	Reflecting minerals (pyrrhotite, minor sphalerite and pyrite)
15%	Chlorite (variable in concentration, refer to handspecimen)
tr	Calcite

Muscovite occurs as large felted lenses up to 6 mm long by 3 mm wide and as thick monominerallic layers up to 8 mm wide. The thick muscovite layers are kinked at close intervals which gives rise to the rough chatoyancy observed in handspecimen. Occasionally the muscovite layers contain folded lenses of small quartz grains.

There is a complete gradation between layers containing virtually only muscovite through muscovite-minor quartz to quartz dominant - minor muscovite. (Biotite was not observed in thinsection).

Chlorite is concentrated around large pyrrhotite grains and also replaces muscovite in irregular lenses. In places, chlorite is a major constituent of the muscovite layers.

The quartz dominant layers are composed mainly of elongated interlocking quartz grains 0.05 mm to 0.2 mm long associated with minor, strongly aligned muscovite needles averaging 0.1 mm in length. Irregular, small chlorite patches (up to 0.15 mm) are common.

Pyrrhotite occurs as large irregular lenses up to 1.6 mm in length by 0.6 mm wide. They have undergone metamorphic stress and conform to the micro-folds of the muscovite layers. Pyrrhotite also forms long, fracture-filling veinlets. Irregular

SPECIMEN NUMBER (XX-3): 79V046R 184.9 - 197.8

The reflecting minerals are dominated by irregular lenses of pyrrhotite with many small gangue inclusions. Minor arsenopyrite in rounded to subparallel grains up to 0.6 mm across is closely associated with the pyrrhotite. Smaller chalcopyrite grains up to 0.2 mm long occur between some arsenopyrite and pyrrhotite lenses.

The pyrrhotite lenses are up to 2.5 mm wide and 4.0 mm long. They are exclusively confined to the quartz dominant layers.

Rock Name: Chloritic muscovite phyllite containing pyrrhotite and traces of arsenopyrite

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-5): 79V046R 202.0 - 209.6

Handspecimen Description:

Diamond drill core, silvery grey, finely laminated parallel to pronounced schistosity, chloritic, slightly magnetic from minor pyrrhotite, one end of handspecimen has sheared interval of nodular quartz, fractured at 65° to laminations, brownish carbonate (ankerite?) disseminated throughout, which is not effervescent in cold dilute HCl, indistinct boudins or stretched pebbles have formed along some layers, section off-cut has cross-cutting shear fracture which contains traces of potassium feldspar.

Field Rock Name: Altered phyllite

Thinsection Examination:

Estimated Mode:

35%	Muscovite
48%	Quartz
6%	Ferroan dolomite (possibly ankerite)
1%	Reflecting minerals (pyrrhotite, traces of magnetite & chalcopyrite)
10%	Chlorite
tr	Orthoclase

The quartz grains are mainly very elongated and aligned parallel to the foliation direction. Many quartz grains have slightly sutured grain boundaries and wavy extinction. The largest quartz grains are now composed of an elongated granulated mosaic, the overall size of these relict larger grains is 0.6 mm wide by 1.4 mm long. They are altered by ferroan dolomite. The quartz dominant layers vary from 0.1 mm to 0.4 mm wide.

Muscovite forms lenticular bundles throughout the quartz dominant portion of the slide and also continuous layers 0.1 to 0.6 mm wide of mainly muscovite.

Ferroan dolomite is found as well defined, sparry veinlets up to 0.15 mm wide within the central cross-cutting shear zone. The granular carbonate also occurs throughout the shear fracture, which is up to 1.8 mm wide. Orthoclase occurs only in the shear fracture as ovoid lenses of small granulated grains. These orthoclase lenses are up to 0.5 mm wide by 1.2 mm long.

Pyrrhotite and pyrite forms small irregular grains, ranging from less than 0.05 mm to 0.4 mm and average about 0.1 mm. They occur mainly between the larger quartz grains (occupying pressure shadows) and within the carbonate lenses.

SPECIMEN NUMBER (XX-5): 79V046R 202.0 - 209.6

Magnetite forms very small (0.005 mm) grains elongated parallel to foliation that are disseminated along the muscovite dominant layers. Traces of chalcopyrite were noted separate but nearby larger pyrrhotite grains.

Rock Name: Chloritic, muscovite phyllite
(possible original rock: pebbly siltstone)

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-6): 79V046R 215.5 - 221.0

Handspecimen Description:

Diamond drill core, light to dark grey, well laminated in lenticular layers, rough chatoyance, silvery grey luster, cut by brown veinlets subparallel to foliation, white calcareous lenses common, fractured, darker grey layers moderately magnetic, due to irregularly disseminated pyrrhotite. Abundant muscovite, quartz-rich layers alternate with muscovite-rich layers. No potassium feldspar present. The brown veinlets do not have any effervescence in dilute, cold HCl.

Field Rock Name: Altered phyllite

Thinsection Examination:

Estimated Mode:

49%	Muscovite	
40%	Quartz	
2%	Reflecting minerals	(Pyrrhotite, minor hematite, magnetite, traces of chalcopyrite and of arsenopyrite)
6%	Chlorite	
2%	Plagioclase	
1%	Ferroan dolomite	(possibly ankerite)

The muscovite dominant layers are composed of large lenses of muscovite in crystal continuity. Extinction is slightly wavy with many close spaced kinks. These large muscovite "sheets" are characterized by twin lamellae which are optically reversed.

Quartz forms layers of interlocking elongate grains associated with chlorite and large pyrrhotite lenses. Many of the quartz grains have sutured inter-grain boundaries and the larger grains have granulated margins. The largest quartz grain is 1.6 mm long but there is a wide variation in grain size. The widest quartz layer is 1.4 mm wide and may be a granulated veinlet.

Chlorite forms irregular lenses around the pyrrhotite patches and irregular networks within the quartz dominant layers. Chlorite is replacing plagioclase. A chlorite - pyrrhotite - minor quartz veinlet occurs on one end of the slide.

Pyrrhotite is distributed as large irregular masses up to 3.1 mm across but also as small 0.01 mm (and smaller) elongated grains disseminated throughout this slide parallel to foliation. Similar sized magnetite and hematite grains having numerous tiny gangue inclusions are also disseminated throughout along foliation planes.

SPECIMEN NUMBER (XX-6): 79V046R 215.5 - 221.0

Traces of chalcopyrite are associated with the small pyrrhotite grains. One of the larger pyrrhotite lenses has a subhedral inclusion of arsenopyrite 0.13 mm long.

The brown fractures are filled with brown carbonate of probably ferroan dolomite composition (possibly ankerite). These fractures are up to 0.2 mm wide and are delicately microlaminated. No effervescence on handspecimen in cold, dilute HCl.

Rock Name: Chloritic, muscovite phyllite containing pyrrhotite

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-7): 79V046R 216.0 - 221.0

Handspecimen Description:

Diamond drill core, sharp fine laminations, mainly dark grey, rough silvery grey chatoyance, white crosscutting veinlet 2 mm wide composed of potassium feldspar, this veinlet cuts the bedding laminations at 90°, other fractures also filled with potassium feldspar, chloritic on fracture surfaces. Abundant muscovite.

Field Rock Name: Altered phyllite

Thinsection Examination:

Estimated Mode:

25%	Muscovite
61%	Quartz
7%	Chlorite
3%	Orthoclase
2%	Reflecting minerals (Pyrrhotite, traces of magnetite and hematite)
2%	Ferroan dolomite

The crosscutting veinlet is up to 2.1 mm wide and consists of an interlocking mosaic of orthoclase in grains up to 0.4 mm with minor quartz and chlorite. The chlorite forms irregular small lenses up to 0.3 mm in diameter plus individual "wormy" aggregates 0.025 mm long. The veinlet walls are irregular and ragged. Traces of sparry calcite were noted in the veinlet.

Chlorite is also relatively uniformly disseminated throughout the slide as 0.1 to 0.35 mm elongated envelopes around small pyrrhotite grains.

Granular carbonate of probable ferroan dolomite composition (possibly ankerite) forms narrow (up to 0.2 mm) wide brown veinlets which are strictly parallel to foliation and other adjacent layers. Brown carbonate and orthoclase fill the thin cross-cutting fractures (up to 0.2 mm wide).

Quartz forms the bulk of the rock as elongate grains 0.05 to 0.4 mm. The distinctly larger grains (0.2 to 0.4 mm) compose approximately 10% of the quartz. Most of these larger grains have been flattened, stretched and some granulated.

The muscovite dominant layers are complexly kinked on a microscale. Muscovite layers average 0.2 mm thick and range up to 1.4 mm thick.

SPECIMEN NUMBER (XX-7): 79V046R 216.0 - 221.0

Pyrrhotite occurs as irregular lenses up to 0.9 mm long which occasionally coalese into thin veinlets up to 3.4 mm in length. Traces of chalcopyrite (grains up to 0.12 mm) were noted as inclusions and small isolated grains associated with pyrrhotite. Often the chlorite-pyrrhotite lenses occur at the "heads" of elongated larger quartz grains.

Rock Name: Chloritic, muscovite phyllite

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-8): 79V046R 256.6 - 267.0

Handspecimen Description:

Diamond drill core, light to dark coloured, finely laminated, lusterous, rough chatoyance on sawn surface, foliated, light brown carbonate, probably ferroan dolomite (ankerite?)-filled shear fractures at 70° to layering, the carbonate does not react to cold dilute HCl, chloritic on foliation surface, traces of potassium feldspar present in fractures, some layers moderately magnetic, sulfides very fine grained, lighter layers have silty appearance, brownish stain on outside of core.

Field Rock Name: Altered phyllite.

Thinsection Examination:

Estimated Mode:

17%	Muscovite
64%	Quartz
15%	Ferroan dolomite (possibly ankerite)
1%	Reflecting minerals (Pyrrhotite, pyrite, minor magnetite, traces of chalcopyrite)
3%	Chlorite

Ferroan dolomite (possibly ankerite) is more abundant in this specimen than any other in the suite. It forms small elongate ragged patterns up to 0.15 mm wide mainly within the quartz dominant layers. Ferroan dolomite occupies a similar interstitial position as muscovite in other specimens of this suite. It also fills shear-fracture veinlets up to 1.1 mm wide as irregular lenses and curved sparry veinlets 0.05 mm wide associated with chlorite and pyrite-pyrrhotite grains. (These are the white cross-cutting veinlets prominent in handspecimen.) Thin layers of ferroan dolomite parallel to schistosity occur throughout the specimen up to 0.4 mm wide. Concentration of a pure carbonate sample suitable for XRD work would be fairly difficult.

Muscovite forms layers up to 2.3 mm wide composed predominantly of muscovite with minor angular, elongated quartz grains up to 0.04 mm long. Considerable muscovite has been replaced by ferroan dolomite.

Pyrrhotite is the main reflecting mineral and forms irregular lenses up to 0.3 mm wide. Minor pyrite occurs as intergrowths with pyrrhotite and as irregular overgrowths on pyrrhotite. Minor pyrite grains have cores of pyrrhotite within the cross-cutting shear-fractures. Traces of chalcopyrite were noted as isolated 0.1 mm grains.

Quartz grains have been granulated. Elongated and flattened quartz relict granules (up to 0.6 mm long) are now composed of mosaic of 0.05 mm. Internal contacts are largely straight with minor slightly sutured boundaries.

Some quartz-muscovite layers are folded on a microscale in contrast to adjacent layers which are not folded.

Rock Name: Dolomitic muscovite phyllite.

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-9): 79V026R 114- 138

Handspecimen Description:

Diamond drill core, finely laminated, wispy dark laminations common, graphite on fracture-foliation surfaces, non-magnetic, abundant (20%) pyrite in bands and fracture veinlets, schistose, well fractured, vuggy, no potassium feldspar present. No effervescence in cold, dilute HCl.

Field Rock Name: Low Grade Quartzose Ore

Thinsection Examination:

Estimated Mode:

66%	Quartz
3%	Ferroan dolomite (possibly ankerite)
4%	Muscovite
26%	Pyrite
tr	Magnetite
1%	Chalcopyrite
tr	Sphalerite
tr	Pyrrhotite
1%	Graphite

Pyrite forms subrectangular (subeuhedral) grains up to 1.3 mm which commonly coalesce in to semi-massive bands and lenses parallel to foliation. Chalcopyrite is occasionally present as irregular lenses up to 1.5 mm across. Traces small rounded inclusions 0.03 mm of tetrahedrite were noted in the chalcopyrite.

Magnetite occurs as rounded inclusions 0.05 mm in diameter within pyrite. Chalcopyrite also forms small 0.015 mm angular inclusions in pyrite which locally are relatively common as fracture filling within the pyrite aggregate.

Sphalerite occurs as rounded grains 0.03 mm in diameter often associated with the chalcopyrite inclusions and lenses. Pyrrhotite forms spongy rims surrounding larger pyrite grains.

Quartz forms an interlocking mosaic characterized by sutured grain boundaries and granulation textures. Some layers are composed of elongated quartz grains averaging less than 0.05 mm long. Muscovite needles are aligned parallel to the direction of quartz elongation.

Ferroan dolomite (possibly ankerite) fills fractures up to 0.25 mm wide in association with pyrite. Traces of brownish carbonate also occupies the interstitial space between euhedral pyrite crystals suggestive of open space filling.

Muscovite is erratically distributed. Rare "secondary" muscovite flakes are up to 0.4 mm long along the edges of pyrite lenses and carbonate. Small muscovite needles also occur throughout the recrystallized quartz-rich host part of the specimen.

Graphite fills narrow (0.02 mm) fracture-foliation lines in association with muscovite, minor carbonate and tiny angular, irregular pyrite grains (0.006 mm long).

Rock Name: Mineralized (pyritic) phyllite

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-10): 88V-17 25.2 - 33.5

Handspecimen Description:

Diamond drill core, abundant pyrite and pyrrhotite (approx. 30%), moderately magnetic, minor chalcopyrite, roughly banded siliceous host rock, minor sphalerite lenses, muscovite on fracture surface. No effervescence on application of cold, dilute HCl.

Field Rock Name: Low Grade Quartzose Ore

Thinsection Examination:

Estimated Mode:

60.5%	Quartz
6%	Muscovite
2%	Ferroan dolomite (possibly ankerite)
17%	Pyrite
12%	Pyrrhotite
1.5%	Chalcopyrite
1%	Sphalerite
tr	Arsenopyrite

Pyrite forms widespaced subhedral, subrectangular grains up to 0.6 mm wide which are connected to each other by irregular seams or lenses of pyrrhotite. The pyrrhotite contains many small gangue inclusions.

The pyrite crystals have traces of subhedral inclusions of arsenopyrite. Irregular chalcopyrite grains up to 0.07 mm occur within the pyrrhotite seams. Minor sphalerite forms irregular grains up to 0.2 mm wide of similar texture to the associated pyrrhotite.

Quartz is relatively coarse grained averaging between 0.15 to 0.2 mm in length and forms an interlocking elongated mosaic.

The ferroan dolomite (possibly ankerite) is associated with the smaller network of pyrrhotite lenses. This carbonate forms envelopes and irregular connections between pyrrhotite grains. Minor carbonate is associated with sphalerite lenses.

Muscovite mainly forms randomly oriented flakes up to 0.2 mm long throughout the quartz-rich sections of the specimen. Muscovite also occurs as thin seams up to 0.8 mm in length along rough fracture lenses.

Rock Name: Mineralized (pyrite & pyrrhotite) phyllite
(low grade quartzose "ore")

--PETROGRAPHIC ANALYSIS-- December, 1988

For: L.C. Pigage, Curragh Resources Inc., Yukon

Project: Vangorda Deposit, Environmental Impact Assessment

SPECIMEN NUMBER (XX-11): 88V-17 36 - 42

Handspecimen Description:

Diamond drill core, semi-massive pyrite and pyrrhotite (approx. 40%), roughly banded, sulfides in part cross-cutting original foliation, white nodular appearance of siliceous host rock, minor chalcopyrite and sphalerite, brecciated texture to parts of sulfide layer, dark micaceous layering, carbonate component highly effervescent and cold, dilute HCl indicating the majority is calcite.

Field Rock Name: Low Grade Quartzose "Ore"

Thinsection Examination:

Estimated Mode:

15%	Quartz
22%	Calcite (possibly minor ankerite)
13%	Chlorite
6%	Muscovite (possibly in part talc)
28%	Pyrite
5%	Pyrrhotite
11%	Sphalerite
<1%	Chalcopyrite (irregularly distributed)

This rock contains very coarse grained quartz relative to other specimens in the suite. Individual quartz grains up to 1.6 mm long are common. All quartz grains have slightly wavy extinction and straight grain boundaries. Most quartz grains have a cloudy appearance due to the abundance of tiny fluid inclusions.

Muscovite forms flakes up to 0.8 mm long which cross-cut adjacent quartz grains and within the pyrite bands. Chlorite has replaced most of the muscovite.

The reflecting minerals have formed irregular bands and layers which have many inclusions and small "interstitial" lenses of finer grained quartz. Much of this internal space is filled with distinctive anomalous blue birefringent chlorite (penninite) which is often delicately laminated. Minor relict muscovite is associated with the chlorite lenses. Occasionally, broad chlorite flakes (0.2 mm by 0.6 mm) form large lenses associated coarsely felted muscovite.

Calcite (possibly minor ankerite) dominates within the more disseminated or semi-massive pyrite sections. Calcite forms a granular mosaic of grains averaging 0.1 mm in diameter. Less common are carbonate grains over 1.0 mm across which occur at the pyrite-quartz interface.

Pyrite is the dominant reflecting mineral. It forms massive bands and irregular heavy disseminations. Large pyrite areas contain brecciated, rounded "pods" of pyrrhotite up to 0.8 mm across. Sometimes the brecciated pyrrhotite "pods" have developed between cleavage faces of adjacent pyrite crystals giving a step pattern. Smaller pyrite grains are often rimmed by a spongy pyrrhotite layer. Sphalerite is common as inclusions, up to 0.4 mm in diameter, within the massive pyrite bands. Many of the very irregular, wispy gangue inclusions in the massive pyrite areas are calcite.

Sphalerite forms irregular lenses up to several millimetres wide which contain many small rounded gangue inclusion. It is usually associated with pyrrhotite and chalcopyrite, but pyrite inclusions are common. The small pyrite grains associated with larger sphalerite lenses are mainly euhedral.

Minor chalcopyrite occupies small narrow cracks or fractures in large pyrite grains. Chalcopyrite also forms rare, large irregular grains (up to 2.1 mm across) associated with pyrrhotite and sphalerite. These large chalcopyrite grains have many small sphalerite inclusions.

Rock Name: Chloritic and calcareous, low grade pyrite - sphalerite mineralization