Appendix T.2.2

Diamond Drill Holes

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD85001	1543.20	6095479.7200	620842.4600	150.00	OVER	0.00	4.57	0.00	5.00	59.62	67.47
					D1	17.21	18.15	5.00	15.00	59.62	67.47
					D2P	18.15	18.56	15.00	25.00	56.12	67.50
					D2	18.56	19.02	25.00	35.00	56.89	67.58
					D	17.21	19.02	35.00	45.00	56.72	67.32
					D3P	19.02	19.35	45.00	55.00	56.92	67.20
					D3	19.35	19.54	55.00	65.00	55.57	67.37
					D4P	19.54	20.78	65.00	75.00	56.20	67.40
					D4	20.78	21.07	75.00	85.00	58.15	67.52
					E1	45.69	45.89	85.00	95.00	59.05	67.56
					E2P	45.89	46.14	95.00	105.00	55.53	67.55
					E2	46.14	46.54	105.00	115.00	55.14	67.41
					E3P	46.54	46.90	115.00	125.00	54.46	67.19
					E3	46.90	47.84	125.00	135.00	54.98	67.21
					E	45.69	45.89	135.00	145.00	54.94	67.46
					F1	69.58	70.36	145.00	150.00	57.75	67.44
					F2P	70.36	70.83				
					F2	70.83	74.89				
					F	69.58	74.89				
					G1	99.24	100.20				
					G2P	100.20	100.51				
					G2	100.51	101.39				
					G12	99.24	101.39				
					G3P	101.39	101.93				
					G3	101.93	102.87				
					G	99.24	102.87				
					J	116.91	121.43				
					K1P	121.43	122.34				
					K1	122.34	123.43				
					K2P	123.43	124.35				
					K2	124.35	125.23				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD85002	1549.76	6096247.8900	620665.9900	225.00	OVER	0.00	3.70	0.00	15.00	241.63	75.87
					B	37.73	38.74	15.00	25.00	237.75	76.13
					D1	98.98	99.77	25.00	35.00	232.89	76.47
					D2P	99.77	99.90	35.00	45.00	232.28	76.14
					D2	99.90	100.31	45.00	55.00	231.03	75.80
					D	98.98	100.31	55.00	65.00	227.53	76.11
					D3P	100.31	101.13	65.00	75.00	227.28	76.20
					D3	101.13	101.37	75.00	85.00	228.91	76.04
					D3P	101.37	101.74	85.00	95.00	229.54	76.41
					D4	101.74	102.08	95.00	105.00	229.01	76.41
					E1	117.80	118.35	105.00	115.00	229.90	76.24
					E2P	118.35	118.81	115.00	125.00	227.49	76.70
					E2	118.81	119.20	125.00	135.00	225.05	76.41
					E3P	119.20	119.52	135.00	145.00	228.19	75.97
					E3	119.52	120.31	145.00	155.00	228.00	75.10
					E	117.80	120.31	155.00	165.00	222.00	75.50
					E4P	120.31	122.32	165.00	175.00	224.00	75.30
					E4	122.32	122.77	175.00	185.00	226.00	75.00
					F1	144.92	145.49	185.00	195.00	224.00	75.10
					F2P	145.49	146.08	195.00	205.00	223.00	75.30
					F2	146.08	149.15	205.00	215.00	224.00	75.00
					F	144.92	149.15	215.00	225.00	222.00	75.00
					G1	172.60	173.50				
					G2P	173.50	173.68				
					G2	173.68	174.54				
					G12	172.60	174.54				
					G3P	174.54	175.07				
					G3	175.07	176.01				
					G	172.60	176.01				
					J	191.28	195.88				
					K1P	195.88	196.87				
					K1	196.87	198.06				
					K2P	198.06	198.80				
					K2	198.80	200.12				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHDB6003	1532.05	6096400.2400	619865.6300	225.86	D1	52.45	53.03	0.00	5.00	327.56	88.67
					D2P	53.03	53.16	5.00	15.00	269.88	88.81
					D2	53.16	53.52	15.00	25.00	194.57	89.07
					D	52.45	53.52	25.00	35.00	189.41	89.04
					E1	84.00	84.78	35.00	45.00	202.28	89.04
					E2P	84.78	85.34	45.00	55.00	191.85	89.01
					E2	85.34	85.91	55.00	65.00	166.90	88.83
					E3P	85.91	86.06	65.00	75.00	148.36	89.01
					E3	86.06	87.08	75.00	85.00	155.95	89.41
					E	84.00	87.08	85.00	95.00	156.49	89.63
					E4	88.18	89.98	95.00	105.00	151.26	89.63
					F1	130.66	130.66	105.00	115.00	167.21	89.56
					F2P	130.66	131.27	115.00	125.00	177.26	89.48
					F2	131.27	135.58	125.00	135.00	165.73	89.33
					F	130.66	135.58	135.00	145.00	196.00	88.92
					G1	153.74	154.70	145.00	155.00	176.39	89.08
					FAULT	154.70	154.70	155.00	165.00	140.30	89.48
					G1	163.28	163.73	165.00	175.00	155.68	89.48
					G2P	163.73	163.89	175.00	185.00	135.17	89.37
					G2	163.89	165.07	185.00	195.00	118.57	89.08
					G12	163.28	165.07	195.00	205.00	122.38	89.08
					G3P	165.07	165.41	205.00	215.00	117.78	89.26
					G3	165.41	166.16	215.00	225.86	93.93	89.11
					G	163.28	166.16				
					J	183.90	188.68				
					K1P	188.68	189.48				
					K1	189.48	190.47				
					K2P	190.47	192.00				
					K2	192.00	193.14				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD86004	1328.95	6095039.7100	621025.4900	63.70	OVER	0.00	6.10	0.00	63.70	0.00	90.00
					B	12.50	12.50				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD86005	1329.25	6095040.5100	621025.8900	178.31	OVER	0.00	6.10	0.00	5.00	53.00	67.27
					D1	14.00	16.01	5.00	15.00	53.00	67.60
					D	14.00	16.01	15.00	25.00	52.20	67.85
					D2P	16.01	16.44	25.00	35.00	52.73	67.94
					D2	16.44	17.21	35.00	45.00	52.28	68.13
					D3P	17.21	17.65	45.00	55.00	52.44	68.14
					D3	17.65	18.07	55.00	65.00	52.26	68.27
					D4P	18.07	18.36	65.00	75.00	51.24	68.42
					D4	18.36	18.91	75.00	85.00	51.80	68.75
					E	33.40	36.50	85.00	95.00	51.83	68.73
					F	78.64	82.00	95.00	105.00	51.39	68.63
					FAULT	82.00	83.83	105.00	115.00	50.81	68.78
					F	83.83	88.08	115.00	125.00	50.29	68.63
					G1	116.40	117.58	125.00	135.00	51.60	68.80
					G2P	117.58	117.80	135.00	145.00	52.18	69.06
					G2	117.80	119.14	145.00	155.00	51.67	68.77
					G12	116.40	119.14	155.00	165.00	51.64	68.70
					G3P	119.14	119.77	165.00	178.31	52.03	68.92
					G3	119.77	121.04				
					G	116.40	121.04				
					J	146.80	151.38				
					K1P	151.38	152.67				
					K1	152.67	153.52				
					K2P	153.52	154.67				
					K2	154.67	155.88				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHDB6006	1325.06	6095648.4600	621710.5900	99.06	OVER	0.00	3.20	0.00	7.50	218.30	63.20
					F1	11.16	12.05	7.50	12.50	218.30	63.40
					F2P	12.05	12.49	12.50	17.50	218.30	60.70
					F2	12.49	15.35	17.50	22.50	217.60	61.30
					F	11.16	15.35	22.50	27.50	215.70	61.60
					G1	41.76	42.66	27.50	32.50	218.00	61.60
					G2P	42.66	42.86	32.50	37.50	219.20	61.50
					G2	42.86	43.91	37.50	42.50	219.70	61.90
					G12	41.76	43.91	42.50	47.50	223.00	62.50
					G3P	43.91	44.30	47.50	52.50	220.10	60.80
					G3	44.30	45.73	52.50	57.50	217.70	61.10
					G	41.76	45.73	57.50	62.50	220.30	61.20
					J	65.50	70.46	62.50	67.50	220.20	61.30
					K1P	70.46	71.59	67.50	72.50	217.30	61.50
					K1	71.59	72.61	72.50	77.50	215.00	61.50
					K2P	72.61	73.88	77.50	82.50	217.90	61.50
					K2	73.88	75.10	82.50	87.50	216.30	61.60
								87.50	92.50	221.80	61.30
								92.50	97.50	219.50	61.40
								97.50	99.06	217.00	61.80

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GHD86007	1292.95	6095276.7300	622427.3300	138.68	OVER	0.00	3.00	0.00	5.00	207.00	66.10
					F	42.83	43.91	5.00	15.00	211.00	65.90
					FAULT	43.91	43.91	15.00	25.00	212.00	66.10
					F	43.91	47.43	25.00	35.00	212.00	66.60
					FAULT	47.43	47.43	35.00	45.00	212.00	66.80
					F	47.43	49.01	45.00	55.00	209.00	67.30
					G1	72.59	73.39	55.00	65.00	210.00	67.00
					G2P	73.39	73.56	65.00	75.00	211.00	66.70
					G2	73.56	74.69	75.00	85.00	210.00	66.80
					G12	72.59	74.69	85.00	95.00	210.00	66.60
					G3P	74.69	75.04	95.00	105.00	209.00	66.80
					G3	75.04	76.34	105.00	115.00	211.00	66.90
					G	72.59	76.34	115.00	125.00	213.00	66.10
					J	98.46	104.57	125.00	135.00	212.00	66.40
					K1P	104.57	105.49	135.00	138.68	210.00	66.30
					K1	105.49	106.81				
					K2P	106.81	110.17				
					K2	110.17	111.32				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD86008	1413.39	6095971.6100	621225.6800	169.50	D1	27.07	27.79	0.00	5.00	77.51	87.79
					D2P	27.79	28.04	5.00	15.00	65.53	88.37
					D2	28.04	28.43	15.00	25.00	58.67	88.81
					D3P	28.43	28.59	25.00	35.00	152.71	89.07
					D3	28.59	28.80	35.00	45.00	180.07	89.07
					D4P	28.80	29.08	45.00	55.00	129.85	88.91
					D4	29.08	29.62	55.00	65.00	122.95	88.75
					D	27.07	28.43	65.00	75.00	102.28	88.38
					E3	56.80	59.19	75.00	85.00	95.29	88.55
					F1	79.40	80.45	85.00	95.00	88.87	88.55
					F2P	80.45	80.89	95.00	105.00	93.90	88.43
					F2	80.89	84.40	105.00	115.00	69.75	88.96
					F	79.40	84.40	115.00	125.00	71.78	89.08
					G1	125.05	126.34	125.00	135.00	103.65	88.67
					G2P	126.34	126.48	135.00	145.00	135.95	88.95
					G2	126.48	127.75	145.00	155.00	110.58	89.08
					G12	125.05	127.75	155.00	169.50	110.58	89.08
					G3P	127.75	128.38				
					G3	128.38	129.88				
					G	125.05	129.88				
					J	152.67	159.75				
					K1P	159.75	160.74				
					K1	160.74	162.34				
					K2P	162.34	165.37				
					K2	165.37	166.70				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD84004	875.76	6095357.4400	624377.1800	109.62	OVER	0.00	8.58	0.00	109.62	68.80	77.80
					COAL	5.38	5.98				
					COAL	6.42	8.57				
					F1	31.30	31.65				
					F2P	31.65	31.93				
					F2	31.93	35.27				
					F	31.30	35.27				
					G1	55.46	55.73				
					G2P	55.73	55.95				
					G2	55.95	57.36				
					G12	55.46	57.36				
					G3P	57.36	57.93				
					G3	57.93	58.89				
					G	55.46	58.89				
					J	80.40	85.37				
					K1P	85.37	86.58				
					K1	86.58	87.63				
					K2P	87.63	91.37				
					K2	91.37	92.06				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD86001	953.93	6096557.3300	623975.7500	147.00	OVER	0.00	7.01	0.00	26.00	209.00	63.00
					E1	27.17	28.12	26.00	35.00	207.00	63.10
					E2P	28.12	28.80	35.00	45.00	207.00	62.70
					E2	28.80	29.01	45.00	55.00	207.00	63.00
					E3P	29.01	29.20	55.00	65.00	208.00	62.90
					E3	29.20	29.35	65.00	75.00	207.00	62.50
					E	27.17	29.35	75.00	85.00	208.00	62.90
					F1	51.65	52.38	85.00	95.00	208.00	62.60
					F2P	52.38	52.70	95.00	105.00	209.00	62.40
					F2	52.70	55.78	105.00	115.00	209.00	62.40
					F	51.65	55.78	115.00	125.00	209.00	61.90
					G1	90.47	90.73	125.00	135.00	210.00	61.90
					G2P	90.73	91.08	135.00	145.00	210.00	62.30
					G2	91.08	92.03	145.00	147.00	209.00	62.10
					G12	90.47	92.03				
					G3P	92.03	92.96				
					G3	92.96	94.28				
					G	90.47	94.28				
					J	115.86	120.56				
					K1P	120.56	121.00				
					K1	121.00	122.60				
					K2P	122.60	127.25				
					K2	127.25	127.85				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD86002	1095.53	6096236.9800	623500.7600	120.40	OVER	0.00	3.66	0.00	6.00	41.00	63.70
					F1	38.31	38.96	6.00	15.00	41.00	64.10
					F2P	38.96	39.37	15.00	25.00	41.00	64.00
					F2	39.37	42.03	25.00	35.00	42.00	64.20
					F	38.31	42.03	35.00	45.00	41.00	63.90
					G1	77.60	77.73	45.00	55.00	42.00	64.10
					G2P	77.73	77.82	55.00	65.00	41.00	64.00
					G2	77.82	78.63	65.00	75.00	40.00	63.90
					G12	77.60	78.63	75.00	85.00	41.00	64.10
					G3P	78.63	79.14	85.00	95.00	40.00	63.90
					G3	79.14	80.90	95.00	105.00	40.00	63.90
					G	77.60	80.90	105.00	115.00	39.00	63.80
					J	95.56	100.49	115.00	120.40	38.00	63.50
					K1P	100.49	101.06				
					K1	101.06	102.34				
					K2P	102.34	105.60				
					K2	105.60	106.34				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87001	1021.15	6096689.5500	623610.5900	160.79	OVER	0.00	8.96	0.00	10.00	256.48	67.35
					D	44.08	45.03	10.00	20.00	237.95	67.11
					F1	67.94	68.91	20.00	30.00	218.28	66.85
					F2P	68.91	69.15	30.00	40.00	216.33	66.91
					F2	69.15	73.61	40.00	50.00	215.58	66.93
					F	67.96	73.61	50.00	60.00	215.64	66.88
					GCGL	81.55	117.96	60.00	70.00	214.81	66.97
					G1	118.04	118.46	70.00	80.00	213.99	67.17
					G2P	118.46	118.82	80.00	90.00	214.16	67.16
					G2	118.82	119.88	90.00	100.00	213.10	67.17
					G3P	119.88	120.79	100.00	110.00	213.66	67.33
					G3	120.79	122.16	110.00	120.00	215.58	67.17
					G	118.04	122.16	120.00	130.00	215.22	67.17
					J	141.76	147.69	130.00	140.00	215.91	67.16
					K1P	147.69	149.07	140.00	150.00	215.62	67.12
					K1	149.07	150.52	150.00	160.79	215.62	67.12
					K2P	150.52	154.58				
					K2	154.58	155.50				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GHD87002	1081.36	6096678.4500	623250.5100	99.12	OVER	0.00	4.65	0.00	10.00	242.94	87.87
					F1	17.14	17.71	10.00	20.00	249.35	87.87
					F2P	17.71	18.00	20.00	30.00	326.62	88.61
					F2	18.00	20.87	30.00	40.00	87.71	88.98
					F	17.14	20.87	40.00	50.00	144.77	88.45
					GCGL	28.15	61.72	50.00	60.00	154.87	88.21
					G1	61.85	62.06	60.00	70.00	158.99	88.13
					G2P	62.06	62.44	70.00	80.00	173.54	87.89
					G2	62.44	63.57	80.00	90.00	170.99	87.96
					G3P	63.57	63.77	90.00	99.12	170.99	87.96
					G3	63.77	66.43				
					G	61.85	66.43				
					J	82.25	87.45				
					K1P	87.45	88.21				
					K1	88.21	89.83				
					K2P	89.83	92.68				
					K2	92.68	93.48				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GHD87003	996.29	6095802.9300	623915.7200	177.52	OVER	0.00	3.50	0.00	10.00	31.66	67.22
					D1	24.17	24.80	10.00	20.00	31.09	66.44
					D2P	24.80	25.24	20.00	30.00	30.49	66.01
					D2	25.24	25.98	30.00	40.00	31.53	65.85
					D	24.17	25.98	40.00	50.00	32.23	66.23
					E2	54.50	55.38	50.00	60.00	32.06	66.22
					E3P	55.38	55.94	60.00	70.00	32.56	66.21
					E3	55.94	56.66	70.00	80.00	32.80	66.03
					E	54.50	55.38	80.00	90.00	33.54	65.85
					F1	82.64	83.17	90.00	100.00	34.16	65.65
					F2P	83.17	83.53	100.00	110.00	34.31	65.27
					F2	83.53	87.22	110.00	120.00	35.42	64.88
					F	82.64	87.22	120.00	130.00	35.00	64.75
					FL	87.57	87.79	130.00	140.00	34.46	64.53
					GCGL	104.14	108.75	140.00	150.00	34.55	64.31
					G1	108.78	109.38	150.00	160.00	34.61	64.37
					G2P	109.38	109.89	160.00	170.00	34.79	64.70
					G2	109.89	110.69	170.00	177.52	34.79	64.70
					G3P	110.69	111.33				
					G3	111.33	112.09				
					G	108.78	112.09				
					J	129.08	133.22				
					K1P	133.22	134.40				
					K1	134.40	135.41				
					K2P	135.41	139.48				
					K2	139.48	140.37				
					COAL	140.22	140.37				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87004	1589.74	6095885.1500	620622.5400	151.10	OVER	0.00	8.25	0.00	5.00	327.52	88.41
					D1	8.51	9.69	5.00	10.00	234.10	89.14
					D2P	9.69	10.57	10.00	20.00	85.67	88.73
					D2	10.57	10.77	20.00	30.00	343.13	88.82
					D3P	10.77	11.29	30.00	40.00	327.52	88.41
					D3	11.29	11.92	40.00	50.00	348.26	88.23
					D	8.51	9.69	50.00	60.00	338.86	88.40
					E1	25.60	25.99	60.00	70.00	344.00	88.49
					E2P	25.99	26.62	70.00	80.00	20.62	88.65
					E2	26.62	27.16	80.00	90.00	19.47	88.19
					E3P	27.16	28.00	90.00	100.00	8.93	87.66
					E3	28.00	28.12	100.00	110.00	26.63	87.37
					E4	33.40	34.05	110.00	120.00	35.82	87.44
					F1	52.36	53.07	120.00	130.00	42.23	87.73
					F2P	53.07	53.34	130.00	140.00	42.02	87.52
					F2	53.34	58.40	140.00	150.00	32.30	87.08
					F	52.36	58.40	150.00	151.10	32.30	87.08
					G101	85.14	85.56				
					FAULT	86.56	86.57				
					G1	86.79	87.78				
					G2P	87.78	87.98				
					G2	87.98	88.84				
					G3P	88.84	89.56				
					G3	89.56	90.48				
					G	86.79	90.48				
					J	104.60	108.60				
					K1P	108.60	109.62				
					K1	109.62	110.52				
					K2P	110.52	111.28				
					K2	111.28	112.53				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87005	1573.26	6096045.6800	620230.2800	185.78	OVER	0.00	6.71	0.00	10.00	179.04	88.14
					B	15.47	18.63	10.00	20.00	182.74	88.32
					C	32.60	36.50	20.00	30.00	224.82	88.58
					D1	80.71	81.45	30.00	40.00	219.49	88.77
					E1	100.02	100.65	40.00	50.00	201.29	88.61
					E2P	100.65	100.96	50.00	60.00	237.64	88.37
					E2	100.96	102.50	60.00	70.00	230.07	88.41
					E3P	102.50	103.64	70.00	80.00	239.98	88.37
					E3	103.64	105.02	80.00	90.00	247.67	88.64
					E	100.02	105.02	90.00	100.00	228.26	88.94
					F1	123.48	124.09	100.00	110.00	271.39	89.05
					F2P	124.09	124.55	110.00	120.00	287.32	89.17
					F2	124.55	127.44	120.00	130.00	303.53	89.06
					F	123.48	127.44	130.00	140.00	19.52	88.94
					G1	157.47	158.21	140.00	150.00	356.38	89.06
					G2P	158.21	158.35	150.00	160.00	354.84	88.91
					G2	158.35	159.61	160.00	170.00	77.82	88.53
					G3P	159.61	160.18	170.00	185.78	113.75	88.61
					G3	160.18	161.33				
					G	157.47	161.33				
					J	175.50	180.40				
					K1P	180.40	181.31				
					K1	181.31	182.88				
					K2P	182.88	183.85				
					K2	183.85	184.96				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GHD87006	1486.07	6096478.6700	620295.8400	202.44	OVER	0.00	13.72	0.00	10.00	322.37	87.50
					B	15.43	16.58	10.00	20.00	274.12	88.03
					C1	31.50	31.85	20.00	30.00	137.16	88.30
					C2P	31.85	34.38	30.00	40.00	113.23	88.49
					C2	34.38	35.14	40.00	50.00	130.09	88.81
					C	31.50	35.14	50.00	60.00	27.32	88.28
					D1	83.08	83.82	60.00	70.00	268.86	88.43
					D2P	83.82	83.99	70.00	80.00	232.99	88.75
					D2	83.99	84.30	80.00	90.00	230.89	88.64
					D	83.08	84.30	90.00	100.00	122.06	88.54
					E1	105.93	106.46	100.00	110.00	92.53	88.56
					E2P	106.46	106.89	110.00	120.00	177.04	88.74
					E2	106.89	108.25	120.00	130.00	172.91	88.69
					E3P	108.25	109.32	130.00	140.00	171.68	88.59
					E3	109.32	110.03	140.00	150.00	197.28	88.59
					E	105.93	110.03	150.00	160.00	108.34	88.56
					F1	135.74	136.37	160.00	170.00	303.09	88.46
					F2P	136.37	136.94	170.00	180.00	156.15	88.49
					F2	136.94	140.41	180.00	190.00	181.22	88.55
					F	137.74	140.41	190.00	202.44	345.64	88.57
					G1	161.71	162.78				
					G2P	162.78	163.18				
					G2	163.18	164.03				
					G3P	164.03	164.65				
					G3	164.65	166.02				
					G	161.71	166.02				
					J	186.83	192.19				
					K1P	192.19	193.05				
					K1	193.05	194.26				
					K2P	194.26	195.39				
					K2	195.39	196.41				
					K3P	196.41	196.79				
					K3	196.79	197.17				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87007	1329.15	6095442.3900	622018.4300	120.63	OVER	0.00	4.88	0.00	1.00	80.44	88.48
					F1	32.22	33.40	1.00	10.00	90.50	88.98
					F2P	33.40	33.95	10.00	20.00	154.98	89.56
					F2	33.95	38.68	20.00	30.00	128.39	89.41
					F	32.22	38.68	30.00	40.00	77.77	88.92
					G1	72.66	73.93	40.00	50.00	106.56	88.67
					G2P	73.93	74.15	50.00	60.00	115.58	89.08
					G2	74.15	75.62	60.00	70.00	129.93	89.22
					G3P	75.62	76.00	70.00	80.00	131.74	88.96
					G3	76.00	78.47	80.00	90.00	134.79	88.56
					G	72.66	78.47	90.00	100.00	152.60	88.41
					J	103.12	109.99	100.00	120.63	171.73	88.81
					K1P	109.99	111.76				
					K1	111.76	113.28				
					K2P	113.28	116.54				
					K2	116.54	118.16				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87008	1167.00	6094538.8300	621727.1900	138.62	OVER	0.00	17.37	0.00	10.00	41.89	67.19
					F1	37.22	37.87	10.00	20.00	41.20	67.19
					F2P	37.87	38.12	20.00	30.00	41.14	67.30
					F2	38.12	40.26	30.00	40.00	41.18	67.39
					F	37.22	40.26	40.00	50.00	40.35	67.25
					FL	40.26	41.27	50.00	60.00	39.67	67.10
					G1	58.87	59.78	60.00	70.00	39.48	67.32
					G2P	59.78	59.86	70.00	80.00	40.29	67.58
					G2	59.86	62.41	80.00	90.00	39.89	67.41
					G3P	62.41	62.94	90.00	100.00	39.20	67.46
					G3	62.94	64.75	100.00	110.00	39.42	67.65
					G	58.87	64.75	110.00	120.00	39.63	67.86
					J	84.51	90.06	120.00	138.62	39.15	67.92
					K1P	90.06	91.98				
					K1	91.98	93.42				
					K2P	93.42	98.49				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87009	1108.43	6095088.7000	622957.5000	105.14	OVER	0.00	6.70	0.00	10.00	196.00	65.80
					F1	24.70	25.34	10.00	20.00	198.00	65.40
					F2P	25.34	25.71	20.00	30.00	197.00	66.70
					F2	25.71	27.56	30.00	40.00	200.00	65.50
					F	24.70	27.56	40.00	50.00	199.00	65.50
					G1	61.08	61.93	50.00	60.00	198.00	65.60
					G2P	61.93	62.10	60.00	70.00	200.00	65.40
					G2	62.10	63.23	70.00	80.00	200.00	65.00
					G3P	63.23	63.65	80.00	90.00	200.00	64.80
					G3	63.65	65.20	90.00	100.00	199.00	65.20
					G	61.08	65.20	100.00	105.14	198.00	65.10
					J	88.12	93.94				
					K1P	93.94	95.40				
					K1	95.40	96.62				
					K2P	96.62	100.29				
					K2	100.29	101.27				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87010	894.89	6094879.6700	623642.3500	158.55	OVER	0.00	3.05	0.00	5.00	204.00	64.60
					E3	22.18	23.40	5.00	10.00	207.00	64.60
					FAULT	48.09	48.10	10.00	20.00	207.00	64.90
					F	48.09	49.40	20.00	30.00	208.00	64.90
					G1	89.91	90.82	30.00	40.00	209.00	64.50
					G2P	90.82	91.03	40.00	50.00	210.00	64.50
					G2	91.03	92.01	50.00	60.00	206.00	64.20
					G3P	92.01	92.40	60.00	70.00	207.00	64.20
					G3	92.40	94.50	70.00	80.00	209.00	64.40
					G	89.91	94.50	80.00	90.00	207.00	64.40
					J	114.68	117.62	90.00	100.00	210.00	64.40
					K1P	117.62	118.78	100.00	110.00	208.00	64.20
					K1	118.78	119.81	110.00	120.00	207.00	64.00
					K2P	119.81	128.06	120.00	130.00	207.00	64.00
					K2	128.06	129.77	130.00	140.00	207.00	64.50
					K2L	130.03	131.11	140.00	150.00	210.00	64.40
								150.00	158.55	207.00	64.50

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87011	877.77	6095267.5500	623875.1700	189.12	OVER	0.00	7.62	0.00	5.00	175.90	88.65
					D1	61.40	62.22	5.00	10.00	218.89	88.91
					D1P	62.22	62.64	10.00	20.00	254.92	88.81
					D2	62.64	63.47	20.00	30.00	248.70	88.56
					D	61.40	63.47	30.00	40.00	251.63	88.57
					E3	97.80	99.50	40.00	50.00	245.26	88.30
					F1	121.53	121.92	50.00	60.00	239.56	88.46
					F2P	121.92	122.08	60.00	70.00	244.72	88.57
					F2	122.08	125.93	70.00	80.00	241.54	88.41
					F	121.53	125.93	80.00	90.00	234.34	88.30
					G1	146.22	147.27	90.00	100.00	231.56	88.38
					G2P	147.27	147.59	100.00	110.00	235.80	88.39
					G2	147.59	148.41	110.00	120.00	234.87	87.91
					G3P	148.41	148.88	120.00	130.00	227.19	87.84
					G3	148.88	150.42	130.00	140.00	229.69	87.66
					G	146.22	150.42	140.00	150.00	231.39	87.21
					J	170.19	175.22	150.00	160.00	225.59	87.07
					K1P	175.22	176.36	160.00	170.00	226.19	86.95
					K1	176.36	177.43	170.00	189.12	230.38	86.64
					K2P	177.43	183.82				
					K2	183.82	184.66				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD87012	818.91	6096170.5700	624826.0200	155.24	OVER	0.00	8.53	0.00	10.00	207.00	66.30
					D1	24.66	26.41	10.00	20.00	208.00	66.40
					D2P	26.41	26.74	20.00	30.00	207.00	66.20
					D2	26.74	27.64	30.00	40.00	207.00	66.00
					D	24.66	27.64	40.00	50.00	207.00	65.90
					E1	43.12	43.41	50.00	60.00	207.00	65.60
					E2P	43.41	44.68	60.00	70.00	209.00	65.80
					E2	44.68	46.02	70.00	80.00	209.00	65.90
					E3P	46.02	46.80	80.00	90.00	207.00	65.50
					E3	46.80	49.36	90.00	100.00	208.00	65.70
					F1	71.44	72.10	100.00	110.00	208.00	65.40
					F2P	72.10	72.43	110.00	120.00	211.00	65.70
					F2	72.43	76.35	120.00	130.00	208.00	65.10
					F	71.44	76.35	130.00	140.00	209.00	65.40
					G1	118.83	119.16	140.00	150.00	210.00	65.10
					G2P	119.16	119.27	150.00	155.24	209.00	65.10
					G2	119.27	120.73				
					G3P	120.73	121.96				
					G3	121.96	123.22				
					G	118.83	123.22				
					J	141.94	148.00				
					K1P	148.00	149.21				
					K1	149.21	150.90				
					K2P	150.90	155.24				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHDB8002	1464.97	6095006.2250	620510.6657	247.50	OVER	0.00	1.00	0.00	15.00	228.90	59.40
					E1	11.38	11.80	15.00	25.00	229.20	59.80
					E2P	11.80	12.44	25.00	30.00	215.00	62.40
					E2	12.44	13.92	30.00	35.00	213.60	62.50
					E3P	13.92	16.78	35.00	40.00	212.90	62.50
					E3	16.78	18.02	40.00	45.00	214.10	62.60
					F1	35.76	36.56	45.00	50.00	213.40	62.70
					F2P	36.56	37.22	50.00	55.00	214.20	62.70
					F2U	37.22	38.92	55.00	60.00	213.90	62.70
					F2PTG	38.92	39.23	60.00	65.00	213.80	62.80
					F2L	39.23	40.96	65.00	70.00	214.20	62.80
					F	35.76	40.96	70.00	75.00	214.30	62.70
					COAL	43.07	43.58	75.00	80.00	213.70	62.80
					G1	56.58	57.60	80.00	85.00	213.00	62.90
					G2P	57.60	57.78	85.00	90.00	215.40	62.80
					G2	57.78	58.78	90.00	95.00	215.50	62.60
					G3P	58.78	59.13	95.00	100.00	225.00	61.60
					G3	59.13	62.18	100.00	105.00	229.20	61.00
					G	56.58	62.18	105.00	247.50	226.10	61.30
					J	74.95	77.97				
					K1P	77.97	78.52				
					K1	78.52	79.10				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHDB8003	1171.43	6094667.8070	621309.9376	120.42	OVER	0.00	17.60	0.00	120.42	0.00	90.00
					COAL	25.14	26.12				
					G1	41.05	43.84				
					G2P	43.84	44.20				
					G2	44.20	46.80				
					G3P	46.80	47.54				
					G3	47.54	52.62				
					G	41.05	52.62				
					J	80.24	86.43				
					K1P	86.43	86.85				
					K1	86.85	87.41				
					K2P	87.41	89.04				
					K2	89.04	90.82				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88004	814.20	6094804.7750	624224.6630	115.60	OVER	0.00	78.80	0.00	2.00	134.70	88.90
					K2	81.50	82.51	2.00	4.00	116.80	89.10
					K3P	82.51	83.24	4.00	6.00	43.80	88.90
					K3	83.24	83.56	6.00	8.00	117.20	89.90
								8.00	10.00	260.60	88.80
								10.00	12.00	133.70	89.00
								12.00	14.00	115.90	89.80
								14.00	16.00	133.20	89.10
								16.00	18.00	253.60	89.90
								18.00	20.00	284.30	89.40
								20.00	22.00	348.50	89.90
								22.00	24.00	147.40	89.00
								24.00	26.00	293.90	89.00
								26.00	28.00	26.70	89.00
								28.00	30.00	31.40	89.60
								30.00	32.00	149.40	89.70
								32.00	34.00	190.90	89.30
								34.00	36.00	59.20	89.60
								36.00	38.00	167.30	89.70
								38.00	40.00	34.10	89.40
								40.00	42.00	136.70	89.80
								42.00	44.00	187.30	89.80
								44.00	115.60	80.20	89.50

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GHD88005	987.16	6094924.7700	623402.7900	147.06	OVER	0.00	1.50	0.00	5.00	186.10	89.10
					E3U	6.34	7.85	5.00	10.00	222.90	89.00
					E3PTG	7.85	8.08	10.00	15.00	172.70	88.50
					E3L	8.08	8.28	15.00	20.00	186.70	89.10
					E	6.34	8.28	20.00	25.00	200.00	88.40
					F1	32.57	33.26	25.00	30.00	193.00	88.20
					F2P	33.26	33.47	30.00	35.00	187.40	88.10
					F2U	33.47	35.61	35.00	40.00	195.90	88.40
					F2PTG	35.61	36.72	40.00	45.00	190.40	88.50
					F2L	36.72	38.30	45.00	50.00	191.60	88.40
					F	32.57	38.30	50.00	55.00	195.50	88.20
					G1	81.39	83.82	55.00	60.00	197.40	87.70
					G2P	83.82	84.11	60.00	65.00	198.10	87.50
					G2	84.11	85.71	65.00	70.00	194.10	87.40
					G3P	85.71	86.22	70.00	75.00	191.60	87.40
					G3	86.22	86.98	75.00	80.00	192.50	87.40
					G	81.39	86.98	80.00	85.00	185.20	87.40
					J	115.41	122.51	85.00	90.00	191.90	87.40
					K1P	122.51	125.34	90.00	95.00	193.20	87.30
					K1	123.85	125.34	95.00	100.00	194.10	87.40
					K2P	125.34	137.36	100.00	105.00	183.80	87.20
					K2	137.36	138.44	105.00	110.00	189.60	87.20
								110.00	115.00	186.90	87.10
								115.00	120.00	185.10	87.00
								120.00	125.00	183.20	86.90
								125.00	130.00	183.80	86.90
								130.00	135.00	187.50	86.90
								135.00	140.00	184.40	86.70
								140.00	147.06	185.50	86.80

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHR88006	1168.49	6094505.4500	621847.8700	73.76	OVER	0.00	1.50	0.00	5.00	43.90	63.30
					E3	6.37	7.90	5.00	10.00	42.00	63.10
					F1U	15.60	15.80	10.00	15.00	42.10	63.20
					F1	15.80	16.61	15.00	20.00	42.30	63.40
					F2P	16.61	17.05	20.00	25.00	40.30	62.00
					F2U	17.05	18.37	25.00	30.00	43.60	63.60
					F2PTG	18.37	19.31	30.00	35.00	43.60	64.30
					F2L	19.31	20.97	35.00	40.00	39.40	63.80
					F	15.66	20.97	40.00	45.00	40.80	63.50
					G1	34.11	34.92	45.00	50.00	41.10	63.70
					G2P	34.92	35.26	50.00	55.00	42.30	63.80
					G2	35.26	36.44	55.00	60.00	42.30	64.00
					G3P	36.44	36.78	60.00	65.00	41.50	64.00
					G3	36.78	38.25	65.00	73.76	40.50	63.80
					G	34.11	38.25				
					PTG	38.25	39.17				
					FLT	39.17	39.17				
					G3	39.17	40.90				
					J	65.29	69.95				
					K1P	69.95	71.04				
					K1	71.04	72.22				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88007	778.71	6094857.3700	624457.1400	129.42	OVER	0.00	52.12	0.00	50.00	100.00	88.80
					F1	63.36	63.76	50.00	55.00	98.00	87.10
					F2P	63.76	63.94	55.00	65.00	95.60	87.50
					F2	63.94	67.76	65.00	75.00	114.10	88.00
					F	63.36	67.76	75.00	85.00	106.80	87.10
					G1	87.14	87.86	85.00	95.00	107.90	87.70
					G2P	87.86	88.18	95.00	105.00	122.10	88.20
					G2	88.18	88.91	105.00	115.00	134.10	87.80
					G3P	88.91	89.55	115.00	129.42	139.90	87.70
					G3	89.55	90.69				
					G	87.14	90.69				
					J	111.39	116.13				
					K1P	116.13	117.09				
					K1	117.09	119.61				
					K2P	119.61	123.51				
					K2	123.51	124.13				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHDB800B	826.64	6095046.2900	624356.1000	195.80	OVER	0.00	36.27	0.00	195.80	0.00	90.00
					D1	64.34	65.20				
					D2P	65.20	65.54				
					D2	65.54	66.26				
					D	64.34	66.26				
					E3U	95.72	97.15				
					E3PTG	97.15	97.67				
					E3L	97.67	97.95				
					E3	95.72	97.95				
					E	95.72	97.95				
					F1U	120.44	120.63				
					F1	120.63	121.08				
					F2P	121.08	121.24				
					F2	121.24	124.42				
					F	120.63	124.42				
					G1	142.74	143.54				
					G2P	143.54	143.80				
					G2	143.80	144.66				
					G3P	144.66	145.00				
					G3	145.00	146.30				
					G	142.74	146.30				
					FAULT	159.10	159.78				
					J	175.86	159.78				
					K1P	159.78	181.16				
					K1	181.16	182.58				
					K2P	182.58	187.32				
					K2	187.32	187.96				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88009	828.72	6094925.7600	624248.9800	153.80	OVER	0.00	57.61	0.00	153.80	0.00	90.00
					E	62.16	62.52				
					F1	82.79	83.31				
					F2P	83.31	83.46				
					F2	83.46	87.47				
					F	82.79	87.47				
					G1	108.04	108.96				
					G2P	108.96	109.22				
					G2	109.22	109.87				
					G3P	109.87	110.15				
					G3	110.15	111.56				
					G	108.04	111.56				
					J	132.98	138.25				
					K1P	138.25	139.70				
					K1	139.70	140.92				
					K2P	140.92	145.90				
					K2	145.90	146.63				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth des	Dip des
QHD88010	827.92	6094638.0500	623985.6100	91.74	OVER	0.00	59.44	0.00	91.74	0.00	90.00

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88011	779.57	6094780.6400	624397.6100	100.90	OVER	0.00	60.40	0.00	100.90	0.00	90.00
					J	80.96	86.16				
					K1P	86.16	87.07				
					K1	87.07	88.64				
					K2P	88.64	93.50				
					K2	93.50	94.21				
					COAL	96.10	96.28				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88012	776.48	6094785.2000	624763.9100	107.59	OVER	0.00	53.64	0.00	107.59	0.00	90.00
					G1	65.20	66.06				
					G2P	66.06	66.32				
					G2	66.32	67.40				
					G3P	67.40	67.99				
					G3	67.99	69.25				
					G	65.20	69.25				
					J	94.92	99.66				
					K1P	99.66	100.96				
					K1	100.96	102.17				
					K2P	102.17	107.25				
					K2	107.25	107.83				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QJD7643	1641.49	6095755.8200	619441.1000	264.50	OVER	0.00	2.00	0.00	264.50	0.00	90.00
					KcH/KcG	72.00	72.10				
					B	122.35	123.05				
					D1/D2	211.05	212.40				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHDB4001	1302.92	6097258.4100	618097.9520	215.30	C	48.24	49.58	0.00	215.30	221.00	75.60
					E1	105.68	111.02				
					E2P	111.02	111.83				
					E2	111.83	114.62				
					E3P	114.62	114.84				
					E3	114.84	117.16				
					E	105.68	117.16				
					F	123.50	124.55				
					G	142.69	145.38				
					J	169.35	177.14				
					J1	169.35	170.42				
					J2P	170.42	170.68				
					J2	170.68	177.14				
					K3	192.26	193.75				
					K4	195.56	195.90				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD84002	1390.14	6097064.0300	618204.5470	204.70	C1	20.87	22.84	0.00	204.70	0.00	90.00
					C2P	22.84	23.75				
					C2	23.75	24.63				
					D3	52.10	52.50				
					E1U	96.34	97.50				
					E2UP	97.50	97.73				
					E1M	97.73	99.83				
					E1MP	99.83	100.33				
					E1L	100.33	102.86				
					E2P	102.86	103.74				
					E2	103.74	107.72				
					E3P	107.72	108.26				
					E3	108.26	110.58				
					E	96.34	110.58				
					E3L	110.58	112.72				
					F	118.28	119.59				
					G1	138.90	139.87				
					G2P	139.87	140.40				
					G3	140.40	141.93				
					G	138.90	141.93				
					J1	163.96	164.28				
					J2P	164.28	164.87				
					J2	164.87	171.53				
					J	163.96	171.53				
					K2	189.30	189.61				
					K3	192.12	193.34				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD84003	1388.48	6096706.5900	618493.2100	153.29	E1U	26.66	27.51	0.00	153.29	0.00	90.00
					E1UP	27.51	27.76				
					E1	27.76	31.79				
					E2P	31.79	32.80				
					E2U	32.80	33.60				
					E2	33.60	35.48				
					E3P	35.48	35.92				
					E3	35.92	38.22				
					E	26.66	27.51				
					E3L	38.22	39.15				
					F	51.18	52.08				
					G1	61.62	62.48				
					G2P	62.48	63.04				
					G2	63.04	64.12				
					G	61.62	64.12				
					J1	80.68	81.12				
					J2	81.86	87.60				
					J	80.68	87.60				
					K1	99.20	99.56				
					K2	100.96	101.61				
					K3	102.85	104.08				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GHD88001	1556.25	6096312.3030	619063.4351	232.21	OVER	0.00	2.00	0.00	10.00	211.10	61.60
					B	29.02	29.84	10.00	20.00	211.70	61.50
					COAL	36.42	36.56	20.00	30.00	218.50	60.20
					C	50.56	50.82	30.00	40.00	219.70	60.30
					D1	89.21	89.64	40.00	50.00	219.40	60.50
					D2P	89.64	90.11	50.00	60.00	219.40	60.70
					D2	90.11	90.34	60.00	70.00	220.10	61.00
					D	89.21	90.34	70.00	80.00	220.80	61.10
					E1	140.28	140.88	80.00	90.00	220.10	61.30
					E2P	140.88	141.16	90.00	100.00	220.60	61.60
					E2	141.16	142.41	100.00	110.00	220.90	61.70
					E3P	142.41	142.91	110.00	120.00	221.40	61.90
					E3	142.91	143.48	120.00	130.00	221.40	62.00
					E4P	143.48	143.74	130.00	140.00	221.50	62.10
					E4	143.74	144.49	140.00	150.00	222.40	62.30
					E	140.28	144.49	150.00	160.00	221.40	62.60
					F1	147.76	148.16	160.00	170.00	222.20	62.60
					F2P	148.16	148.50	170.00	180.00	222.10	62.70
					F2U	148.50	150.22	180.00	232.21	220.20	63.00
					F2PTG	150.22	150.54				
					F2L	150.54	152.68				
					F	147.76	153.68				
					FLT	152.86	152.86				
					F2L	152.86	153.62				
					G1	171.44	172.41				
					G2P	172.41	173.23				
					G2	173.23	174.20				
					G3P	174.20	174.56				
					G3	174.56	175.35				
					G	171.44	175.35				
					COAL	180.38	180.77				
					J	192.93	197.63				
					K1P	197.63	206.01				
					K1	206.01	207.20				
					K2P	207.20	208.42				
					K2	208.42	209.36				
					K3P	209.36	211.60				
					K3	211.60	212.69				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QMD88002	1360.90	6097936.5000	617183.7900	80.94	OVER	0.00	41.20	0.00	80.94	217.00	60.00
					J1	63.39	69.58				
					J2P	69.58	71.89				
					J2	71.89	72.69				
					J3P	72.69	73.33				
					J3	73.33	73.93				
					J	63.39	73.93				

ELEVATION metres	NORTHING UTM	EASTING UTM	DEPTH metres	SEAM.ID	FROM metres	TO metres	DEV. FROM	DEV TO	AZIMUTH deg	DIP deg
953.50	6104019.5200	611495.6700	230.00							

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GWD7112	872.60	6104933.1800	612623.8900	308.40	OVER	0.00	3.00	0.00	308.40	0.00	90.00
					GT1	151.94	152.70				
					GT2	158.65	160.63				
					GT3U	167.79	169.77				
					GT3P	169.77	170.29				
					GT3L	170.29	170.60				
					GT3	167.77	170.60				
					COAL	253.59	254.20				
					COAL	259.69	260.82				
					COAL	271.70	272.49				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GWD7115	1286.10	6106026.7500	610406.5000	444.10	OVER	0.00	2.00	0.00	444.10	0.00	90.00
					D3	59.74	62.18				
					D4P	62.18	63.40				
					D4	63.40	64.31				
					E0	66.29	67.06				
					E1	73.00	73.33				
					E2U	75.38	76.81				
					E2L	84.67	85.34				
					E3U	91.44	93.36				
					E3PTG	93.36	93.88				
					E3L	93.88	94.43				
					E3	91.44	94.43				
					E4	97.99	99.97				
					G	130.06	131.02				
					J1	135.53	137.18				
					J2U	151.85	154.81				
					J2PTG	154.81	155.67				
					J2L	155.67	156.56				
					J2	151.85	156.56				
					J3P	156.56	160.69				
					J3	160.69	163.00				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QWD7117	1286.40	6106740.3600	609627.1300	397.00	OVER	0.00	2.00	0.00	397.00	0.00	90.00
					E3	35.84	36.33				
					E4P	36.33	37.12				
					E4	37.12	38.40				
					G	63.40	64.01				
					J1	64.83	66.02				
					J2U	107.69	108.51				
					J2MPTG	108.51	109.27				
					J2M	109.27	110.03				
					J2LPTG	110.03	111.62				
					J2L	111.62	113.15				
					J2	107.69	113.15				
					J3	119.79	121.98				
					BIRD	347.62	348.45				
					COAL	351.74	352.41				
					COAL	369.23	369.65				
					SKEETER	374.39	377.39				
					CHAMBERL	382.88	384.94				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QWD7118	1181.50	6106780.3700	610356.2800	175.87	E1	47.12	47.46	0.00	175.87	0.00	90.00
					E2P	47.46	49.41				
					E2U	49.41	49.76				
					E2PTG	49.76	50.20				
					E2L	50.20	50.87				
					E2	49.41	50.87				
					E3U	69.86	70.98				
					E3PTG	70.98	71.34				
					E3L	71.34	71.87				
					E3	69.86	71.87				
					E4P	71.87	72.76				
					E4	72.76	74.36				
					G	97.39	97.85				
					J1	102.36	103.33				
					J2U	140.82	142.62				
					J2PTG	142.62	144.72				
					J2L	144.72	145.66				
					J2	140.82	145.66				
					J3P	145.66	150.25				
					J3	150.25	152.58				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QWD7119	1212.50	6105587.8400	611041.3000	197.21	COAL	27.10	27.98	0.00	197.21	0.00	90.00
					D3U	66.38	67.57				
					D3PTG	67.57	68.55				
					D3L	68.55	69.04				
					D3	66.38	69.04				
					D4P	69.04	71.32				
					D4	71.32	72.09				
					E2U	102.99	103.39				
					PTG	103.39	103.81				
					E2M	103.81	104.85				
					PTG	104.85	114.21				
					E2L	114.21	114.91				
					E3P	114.91	119.05				
					E3U	119.05	120.15				
					E3PTG	120.15	121.07				
					E3L	121.07	121.71				
					E3	119.00	121.71				
					E4P	121.71	127.09				
					E4	127.09	128.68				
					G	159.18	160.10				
					COAL	162.03	162.35				
					J1	168.25	169.35				
					J2P	169.35	169.76				
					J2	169.76	173.33				
					J3P	173.33	175.21				
					J3	175.21	177.46				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
GWD7120	1206.30	6107129.0600	610082.3900	191.11	OVER	0.00	40.23	0.00	++++++	0.00	90.00
					D3	61.33	62.18				
					D4	62.18	62.85				
					E0	65.53	66.29				
					E1	71.11	71.49				
					E2P	71.49	73.27				
					E2	73.27	75.79				
					E3	87.40	88.93				
					E4P	88.93	89.18				
					E4	89.18	90.56				
					G	115.99	116.52				
					J1	119.67	120.86				
					J2U	161.54	161.94				
					J2PTG	161.94	164.59				
					J2L	164.59	165.26				
					J2	164.59	165.26				
					J3P	165.26	173.34				
					J3	173.34	176.02				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QWD7121	1219.20	6107121.0000	610296.0000	169.77	OVER	0.00	9.45	0.00	60.00	0.00	90.00
					J2U	41.52	42.51				
					J2PTG	42.51	45.42				
					J2L	45.42	46.77				
					J2	41.45	46.77				
					J3P	46.77	52.73				
					J3	52.73	54.82				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QWD7401	1134.00	6108028.0000	612523.0000	235.29	OVER	0.00	5.00	0.00	235.29	0.00	90.00
					E2	59.10	59.65				
					E3	75.01	75.74				
					E4	78.33	79.79				
					G	110.33	110.64				
					J1	117.89	118.10				
					J3	178.73	180.31				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QWD7402	982.00	6103221.0000	611336.0000	124.00	OVER	0.00	3.00	0.00	124.00	0.00	90.00
					E1	7.32	10.64				
					E2	14.17	14.33				
					E3	30.81	31.70				
					E4P	31.70	34.75				
					E4	34.75	35.66				
					G	65.80	66.63				
					J1	84.15	85.34				
					J2P	85.34	85.86				
					J2	85.86	89.61				
					J3P	89.61	89.91				
					J3	89.91	93.26				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QPD88001	1071.32	6106067.9900	611877.0700	171.00	OVER	0.00	2.45	0.00	10.00	282.40	89.80
					COAL	10.36	10.56	10.00	20.00	15.00	89.20
					E1	49.60	49.90	20.00	30.00	17.80	89.50
					E2	62.05	62.65	30.00	40.00	313.00	89.90
					E3P	62.65	64.32	40.00	50.00	3.70	89.60
					E3U	64.32	64.65	50.00	60.00	358.40	89.00
					PTG	64.65	64.87	60.00	70.00	3447.30	88.90
					E3M	64.87	65.32	70.00	80.00	15.70	88.60
					PTG	65.32	65.84	80.00	90.00	25.30	88.10
					E3L	65.84	66.24	90.00	100.00	25.50	87.90
					E3	64.32	66.24	100.00	110.00	24.00	87.90
					E4P	66.24	69.68	110.00	120.00	25.00	88.10
					E4	69.68	70.52	120.00	130.00	24.90	88.00
					G	98.80	99.48	130.00	140.00	25.60	88.10
					J1	105.74	106.92	140.00	150.00	25.70	88.20
					J2	145.70	149.18	150.00	160.00	19.90	88.10
					J3P	149.18	151.32	160.00	171.00	17.00	87.80
					J3	151.32	154.23				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
BPD88002	1099.31	6105650.9400	611562.3000	194.15	OVER	0.00	9.08	0.00	10.00	201.60	89.40
					COAL	11.02	11.18	10.00	20.00	207.10	89.30
					PTG	11.18	12.02	20.00	30.00	233.70	88.60
					COAL	12.02	12.30	30.00	40.00	251.20	88.60
					C1	22.27	23.34	40.00	50.00	249.70	88.50
					C2P	23.34	23.59	50.00	60.00	246.20	88.30
					C2	23.59	23.82	60.00	70.00	243.40	88.20
					C	22.27	23.82	70.00	80.00	243.20	88.10
					R3	59.46	60.00	80.00	90.00	261.90	87.80
					D	59.46	60.00	90.00	100.00	254.10	87.80
					E1	103.56	103.78	100.00	110.00	167.50	87.60
					E2	111.48	112.39	110.00	120.00	169.70	87.50
					E3P	112.39	114.07	120.00	130.00	169.10	87.40
					E3	114.07	115.16	130.00	140.00	166.50	87.40
					COAL	115.89	116.46	140.00	150.00	165.30	87.40
					E4U	122.41	123.16	150.00	160.00	166.30	87.30
					E4PTG	123.16	123.40	160.00	170.00	172.00	87.30
					E4L	123.40	124.03	170.00	180.00	170.10	87.40
					E4	122.41	124.03	180.00	190.00	174.20	87.30
					G	152.84	153.64	190.00	194.15	172.90	87.30
					J1	168.92	170.33				
					J2P	170.33	170.95				
					J2	170.95	174.68				
					J3P	174.68	176.60				
					J3	176.60	178.87				

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88003	1302.30	6100962.8000	613524.6000	232.20	OVER	0.00	3.00	0.00	232.20	217.00	60.00
					B	69.69	70.38				
					D3	178.68	180.21				
					D4	181.57	182.64				
					E0	185.38	190.38				
					E1	195.74	196.84				
					FLT	200.00	200.10				
					E1	205.86	207.66				
					E2U	210.38	213.28				
					E2L	213.47	215.25				
					E2	210.38	215.25				
					E3U	215.39	218.56				
					E	205.86	218.56				
					E3L	222.04	223.14				
					E4	225.00	225.35				

								265.00	270.00	258.70	60.40
								270.00	275.00	256.90	60.40
								275.00	280.00	261.90	59.80
								280.00	285.00	259.80	59.40
								285.00	290.00	263.20	58.40
								290.00	297.16	254.30	59.20

Hole	Elevation metres	Northing UTM	Easting UTM	Depth metres	Seam	From metres	To metres	Dev. From	Dev To	Azimuth deg	Dip deg
QHD88004	1430.19	6100180.4500	614340.1920	212.50	?	16.40	16.40	0.00	10.00	276.50	88.10
					CPRK	38.50	66.20	10.00	20.00	276.50	88.10
					D3	66.20	68.40	20.00	30.00	291.20	88.40
					D4	70.50	71.60	30.00	40.00	304.80	88.70
					Eo	73.50	74.70	40.00	50.00	263.40	88.30
					E1	76.70	79.90	50.00	60.00	258.90	88.30
					E2	80.80	85.80	60.00	70.00	256.00	88.30
					FA	86.40	86.40	70.00	80.00	254.00	88.40
					E2	86.40	88.10	80.00	90.00	271.90	88.60
					E3	88.70	90.70	90.00	100.00	318.60	88.20
					E3L	94.40	95.70	100.00	110.00	303.10	89.00
					E4	98.70	100.30	110.00	120.00	300.20	88.40
					G	114.40	116.20	120.00	130.00	321.40	88.60
					J1	167.10	177.20	130.00	140.00	273.70	88.80
					J2	177.50	179.40	140.00	150.00	332.50	86.90
					J3	180.40	181.70	150.00	160.00	341.60	86.40
					J	167.10	181.70	160.00	170.00	343.20	86.40
					COAL?	184.80	185.30	170.00	180.00	344.20	86.40
					COAL?	188.60	189.00	180.00	190.00	346.90	86.60
								190.00	200.00	354.30	87.00
								200.00	210.00	356.70	87.60
								210.00	212.00	2.90	87.70

Appendix T.2.3

Geotechnical Drill Hole Summaries

Quintette Coal Limited

DRILL HOLE SUMMARY SHEET

PROJECT _____

PAGE _____ OF _____

HOLE NUMBER	HOLE ANGLE	COLLAR BEARING	TOTAL DEPTH	CORE SIZE	MAP / SECTION NUMBER
QHR88101	90°		16.5 m.	3"	

U. T. M. COORDINATES			DATE (from / to)	
COLLAR ELEVATION	NORTH	EAST	DRILLED	CORE LOGGED
778.42	4855.04	624454.22	88/08/21	

GEOPHYSICAL DATA

SCALE	DEN	BRD	LSD	HRD	GAM	NEUT	FBE	FBS	CAL	DIR	SLANT ∠			

OVERBURDEN

DEPTH	COMPOSITION

MINING SECTION

SEAM	ELEVATION (BASE)	DRILLED INTERVAL	AVG B.C.U.	TRUE THICKNESS	COAL / ROCK	RECOVERY	INTERSEAM THICKNESS	DATE DRILLED	DATE SAMPLED	SAMPLE TAG No	COMP. LAB No	COMMENTS
		16.46 m.										shelby tube sample

Quintette Coal Limited

DRILL HOLE SUMMARY SHEET

PROJECT _____

PAGE _____ OF _____

HOLE NUMBER	HOLE ANGLE	COLLAR BEARING	TOTAL DEPTH	CORE SIZE	MAP / SECTION NUMBER
QHR88702	90°		72.6m	3"	

U. T. M. COORDINATES

COLLAR ELEVATION	NORTH	EAST
793.49	3427.41	623758.10

DATE (from / to)

DRILLED	CORE LOGGED
88/08/16 to 88/08/17	

GEOPHYSICAL DATA

SCALE	DEN	BRD	LSD	HRD	GAM	NEUT	FBE	FBS	CAL	DIP	SLANT ∠			

OVERBURDEN

DEPTH	COMPOSITION

MINING SECTION

SEAM	ELEVATION (BASE)	DRILLED INTERVAL	AVG B.C.U.	TRUE THICKNESS	COAL / ROCK	RECOVERY	INTERSEAM THICKNESS	DATE DRILLED	DATE SAMPLED	SAMPLE TAG No	COMP. LAB No	COMMENTS
		45.72 m										shelby tube sample
		72.54m										"
	NOTE: 2 standpipes installed in this hole, one set to 72.54m, and the 2nd set to 17.37 m.											

Quintette Coal Limited

DRILL HOLE SUMMARY SHEET

PROJECT

PAGE OF

HOLE NUMBER	HOLE ANGLE	COLLAR BEARING	TOTAL DEPTH	CORE SIZE	MAP / SECTION NUMBER
QHR88703	-90°		45.7 m		

U. T. M. COORDINATES			DATE (from / to)	
COLLAR ELEVATION	NORTH	EAST	DRILLED	CORE LOGGED
788.71	3334.23	623190.64	88/08/18 to 88/08/19	

GEOPHYSICAL DATA

SCALE	DEN	BRD	LSD	HRD	GAM	NEUT	FBE	FBS	CAL	DIR	SLANT ∡			

OVERBURDEN

DEPTH	COMPOSITION

MINING SECTION

SEAM	ELEVATION (BASE)	DRILLED INTERVAL	AVG B.C.N	TRUE THICKNESS	COAL / ROCK	RECOVERY	INTERSEAM THICKNESS	DATE DRILLED	DATE SAMPLED	SAMPLE TAG No	COMP LAB No	COMMENTS
		9.14 m										Shelby tube sample
		31.09 m										"

Quintette Coal Limited

DRILL HOLE SUMMARY SHEET

PROJECT _____

PAGE _____ OF _____

HOLE NUMBER	HOLE ANGLE	COLLAR BEARING	TOTAL DEPTH	CORE SIZE	MAP / SECTION NUMBER
QHR88704	90°		50.6m	3"	

U.T.M. COORDINATES			DATE (from / to)	
COLLAR ELEVATION	NORTH	EAST	DRILLED	CORE LOGGED
781.02	- 2645.58	623172.44	88/08/19 c 88/08/20	

GEOPHYSICAL DATA															OVERBURDEN	
SCALE	DEN	BRD	LSD	HRD	GAM	NEUT	FBE	FBS	CAL	DIP	SLANT ∠				DEPTH	COMPOSITION

MINING SECTION

SEAM	ELEVATION (BASE)	DRILLED INTERVAL	AVG B.C.N	TRUE THICKNESS	COAL / ROCK	RECOVERY	INTERSEAM THICKNESS	DATE DRILLED	DATE SAMPLED	SAMPLE TAG No	COMP LAB No	COMMENTS
		11.58 m										shelby tube sample
		31.09 m										"
		50.60 m										"
		* NOTE: 2 standpipes set in this hole, the 1st to 50.60m, and the 2nd to 21.95 m.										

Quintette Coal Limited

DRILL HOLE SUMMARY SHEET

PROJECT _____

PAGE _____ OF _____

HOLE NUMBER	HOLE ANGLE	COLLAR BEARING	TOTAL DEPTH	CORE SIZE	MAP / SECTION NUMBER
QHR88705	90°		31.1 m	3"	

U. T. M. COORDINATES			DATE (from / to)	
COLLAR ELEVATION	NORTH	EAST	DRILLED	CORE LOGGED
775.42m	4819.21	624788.49	88/08/22	

GEOPHYSICAL DATA														OVERBURDEN	
SCALE	DEN	BRD	LSD	HRD	GAM	NEUT	FBE	FBS	CAL	DIR	SLANT ∠			DEPTH	COMPOSITION

MINING SECTION

SEAM	ELEVATION (BASE)	DRILLED INTERVAL	AVG B.C.N	TRUE THICKNESS	COAL / ROCK	RECOVERY	INTERSEAM THICKNESS	DATE DRILLED	DATE SAMPLED	SAMPLE TAG No	COMP. LAB No.	COMMENTS
		No Samples taken of this hole.										

Quintette Coal Limited

DRILL HOLE SUMMARY SHEET

PROJECT _____

PAGE ___ OF ___

HOLE NUMBER	HOLE ANGLE	COLLAR BEARING	TOTAL DEPTH	CORE SIZE	MAP / SECTION NUMBER
QHR88706.	90°		55.5m	3"	

U.T.M. COORDINATES			DATE (from / to)	
COLLAR ELEVATION	NORTH	EAST	DRILLED	CORE LOGGED
775.85	4961.67	624892.89	88/08/22 to 88/08/23	

GEOPHYSICAL DATA															OVERBURDEN	
SCALE	DEN	BRD	LSD	HRD	GAM	NEUT	FBE	FBS	CAL	DIR	SLANT ∠				DEPTH	COMPOSITION

MINING SECTION

SEAM	ELEVATION (BASE)	DRILLED INTERVAL	AVG B.C.N	TRUE THICKNESS	COAL / ROCK	RECOVERY	INTERSEAM THICKNESS	DATE DRILLED	DATE SAMPLED	SAMPLE TAG No	COMP. LAB No.	COMMENTS
		31.08m										shelby tube sample.
		Note: standpipe set to 38.40m.										

FIELD BOREHOLE LOG

Boring Number TG 1 (QHR88701) Depth 0' to 54' Sheet 1 of
Project QUINTETTE COAL Job No. 882-1146 Date 88/08/21
Location TRANSFER GRIZZLY Elevation Datum
Casing 6 5/8" O.D. Casing Hammer, wt drop 16,000 ft lbs
Weather SUNNY, WARM Sampler Hammer, wt drop
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTD

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
0'			0'							- start @ 11:45
2'	soft dark brown organic silt	↑								- dark brown organic silt at ground surface roots moist.
	compact to dense light brown SILT, some fine sand, trace clay	PUSH ↓				CS	1			- light brown fine sandy silt at 2' wet, loose
		↑ PUSH ↓	10'			CS	2			Sa #1 - 0-6' cyclone - loose brown SILT some sand, trace gravel organics damp
										- almost no cuttings from 6'-14'
18"		/ /								Sa #2 - 6'-14' cyclone - few lumps of dense light brown SILT, trace clay, some fine sand wet
	loose SAND, gravel, and cobbles, wet	↑ 60 ↓ ↑ 300 ↓	20'							- granular material @ 18' - few cobbles and small amount of sand and gravel - very little cuttings probably loose since NO returns - difficulty getting hammer firing because material is loose - large cobbles being pushed down ahead of bit w/ cuttings material up the casing
34		hard	30'							Sa # 3 34'-38' cyclone - dense grey SILT some fine sand trace angular gravel, damp, TILL-LIKE
	dense grey SILT some fine sand, trace angular gravel, damp (TILL-LIKE)	310 ↓				CS	3			- hit till-like material @ 39' and penetration resistance increased markedly
		↑	40'							Sa #4 - 42'-46' cyclone - very dense grey fine sandy SILT, trace gravel and angular cobbles and boulders damp
		450 ↓				CS	4			- Pipe jacks and outriggers sinking into soft organic silt soil cover
		/								Sa #5 - 46'-54' cyclone - dense grey SILT some sand, trace gravel damp
		205	=3'			CS	5			- jacks sinking - pulled pipe at 51' bulk
		230								
		273	=4'							

SAMPLE CONDITION: DISTURBED, FAIR, GOOD, LOST

SAMPLE TYPES: A.S. - Auger sample; C.S. - Chunk sample; D.O. - Drive open; R.C. - Rock core; S.T - Slotted tube; [illegible]

ABBREVIATIONS: wh - Weight, hammer; Ph - Pressure, hydraulic; Pm - Pressure, manual; [illegible]

SPECIAL NOTES: (water conditions etc.)

Time: Depth of Hole:
Hrs. Productive: Depth of Casing:
Hrs. Delayed: Depth to Water:

Golder Associates

FIELD BOREHOLE LOG

Boring Number TG 1 | Depth 54' to 55.6' | Sheet 2 of 2
Project QUINTETTE COAL | Job No. 882-1146 | Date 88/08/21
Location TRANSPER GRIZZLY | Elevation | Datum
Casing 6 5/8" O.D | Casing Hammer, wt | drop 18,000 ft. lbs
Weather SUNNY, WARM | Sampler Hammer, wt | drop
Drill Rig SDS BEHLER | Driller M. GREENLY | Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
54'			54'							-
55.6'							6	17/21		- thick walled Shelby tube taken at 54'
	EOH									Sa # 6 - 54'-55.6' thick walled Shelby tube - very dense sandy SILT, some gravel, damp
			60'							- load on rods for 15 minutes with SPT automatic hammer to penetrate 17"
										- quit for the day @ 4:15 pm - pulled rods 88/08/22
			70'							EOH @ 55.6'

PLE CONDITION
DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES
A.S. - Auger sample S.T. - Slotted tube
C.S. - Chunk sample T.O. - Thin walled, open
D.O. - Drive open T.P. - Thin walled, piston
R.C. - Rock core W.S. - wash sample

ABBREVIATIONS
wh - Weight, hammer
ph - Pressure, hydraulic
pm - Pressure, manual
v - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time: Depth of drilling
Hrs. Productive: Depth at end of shift
Hrs. Delayed: Depth at night

FIELD BOREHOLE LOG

Boring Number TG 2 (QHR88702) | Depth 0 to 54' | Sheet 1 of
Project QUINTETTE COAL | Job No. 882-1146 | Date 88/08/16
Location TRANSFER / GRIZZLY | Elevation | Datum
Casing 6 5/8" O.D. | Casing Hammer, wt | drop 16,000 ft-lbs
Weather OVERCAST, RAIN, COOL | Sampler Hammer, wt | drop
Drill Rig SDS BECKER | Driller M. GREENLY | Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
0'			0'						-	- start drilling @ 1:20 pm
	Compact SAND, GRAVEL, COBBLES, trace silt, layered, interlayers of sand and gravel, not rounded - full gravel, poorly damp				X	CS	1			Sa # 1 - 0-6' - compact brown SAND and GRAVEL numerous cobbles, trace silt, damp
		63								- cuttings 6'-14' loose to compact SAND and GRAVEL and COBBLES trace silt, damp
		68	10'							
		35								- cuttings 14'-22' layers of sand and gravel; sand, cobbles and gravel; and rounded gravel with trace silt and sand
		35								
		36								- hit firm grey clayey SILT, moist in wet at 23 ft.
		85								
		50	20'							Sa # 2 - 30'-31.8' shelby (2:30) - firm grey clayey SILT, moist PP = 1 kg/cm²
23'		24								
		26								Sa # 3 - 36'-38' cyclone - at bottom - PP < 0.5 kg/cm² saturated
	soft to firm grey clayey SILT, moist									
			30'							Sa # 4 - 44'-46' cyclone - soft grey clayey SILT, moist
						TO	2			
										Sa # 5 - 52'-54' cyclone - soft grey clayey SILT, moist to wet
					X	CS	3			- last 2 samples soft like toothpaste
			40'							- drill rod advancing mostly under weight of hammer
					X	CS	4			
			50'							
			54'		X	CS	5			

SAMPLE CONDITION: DISTURBED | FAIR | GOOD | LOST

SAMPLE TYPES: A.S. - Auger sample; C.S. - Chunk sample; D.O. - Drive open; R.C. - Rock core; S.T. - Slotted tube; T.O. - Thin walled, open; T.P. - Thin walled, piston; W.S. - Wash sample

ABBREVIATIONS: Wh - Weight, hammer; Ph - Pressure, hydraulic; Pm - Pressure, manual; V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time: Depth of Hole:
Hrs. Productive: Depth of Casing:
Hrs. Delayed: Depth to Water:

FIELD BOREHOLE LOG

Boring Number: TG2 | Depth: 54' to 108' | Sheet: 2 of ___
Project: QUINTETTE COAL | Job No.: 882-1146 | Date: 88/08/16
Location: TRANSFER GRIZZLY | Elevation: ___ | Datum: ___
Casing: 6 5/8" O.D. | Casing Hammer, wt: ___ | drop: 16 000 ft·lbs
Weather: OVERCAST RAIN, COOL | Sampler Hammer, wt: ___ | drop: ___
Drill Rig: SDS BECKER | Driller: M. GREENLY | Engineer: MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
54'			54'							
	soft to firm grey clayey SILT, moist									- drill advancing largely under its own weight, however not free [illegible] [illegible]
			60'		X (disturbed)	CS	6			Sa #6 - 60-62 cyclone - soft grey clayey SILT, moist
										- very soft like toothpaste
										Sa #7 - 68'-70' - firm grey clayey SILT, moist
	becoming firm grey clayey SILT, moist				X (disturbed)	CS	7			- slightly stiffer than above
			70'							Sa #8 - 76-78 cyclone - as above
										Sa #9 - 86'-87.7' shelby (9:05) - firm grey clayey SILT, moist
					X (disturbed)	CS	8			- PP = 1.25 kg/cm²
			80'							- no visible signs of stratification in samples to this depth
										Sa #10 - 100'-102' - as above
					(good)	TO	9			
			90'							
			100'		X (disturbed)	CS	10			
			108'							

SAMPLE CONDITION
- DISTURBED
- FAIR
- GOOD
- LOST

SAMPLE TYPES
- A.S. - Auger sample
- C.S. - Chunk sample
- D.O. - Drive open
- R.C. - Rock core
- S.T. - Slotted tube
- T.O. - Thin walled, open
- T.P. - Thin walled, piston
- W.S. - Wash sample

ABBREVIATIONS
- Wh - Weight, hammer
- Ph - Pressure, hydraulic
- Pm - Pressure, manual
- V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)

Time: ______ Depth of Hole: ______
Hrs. Productive: ______ Depth of Casing: ______
Hrs. Delayed: ______ Depth to Water: ______

FIELD BOREHOLE LOG

Boring Number: TG2	Depth: 108' to 162'	Sheet: 3 of	
Project: QUINTETTE COAL	Job No.: 892-1146	Date: 88/02/16-17	
Location: TRANSFER GRIZZLY	Elevation:	Datum:	
Casing: 6 5/8" O.D.	Casing Hammer, wt:	drop: 16,000 ft-lbs	
Weather: OVERCAST, RAIN, COOL	Sampler Hammer, wt:	drop:	
Drill Rig: SDS BECKER	Driller: M. GREENLY	Engineer: MTB	

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force
108'			108'						
	firm grey clayey SILT, moist		110'		Disturbed	CS	11		
					Disturbed	CS	12		
			120'						
					Disturbed	CS	13		
			130'						
					Disturbed	CS	14		
			140'						
					Disturbed	CS	15		
					Disturbed	CS	16		
		↑	150'		Good	TO	17	20/21	
		180							
		↓			Disturbed	CS	18		
			160'						
			162'						

SAMPLE DESCRIPTION & BORING NOTES

Sa #11 - 108-110'
- firm grey clayey SILT, moist

Sa #12 - 116'-118'
- as above

Sa #13 - 124'-126'
- as above
- PP ≈ 1.0 kg/cm²

Sa #14 - 132'-134'
- as above
- material stiffening slightly with depth

Sa #15 - 140'-142'
- as above

Sa #16 - 148'-150'
- as above

- material definitely stiffening up - hammer starting to work a bit more
- quit for the day at 150' @ 6:00 pm
- infrequent separations in strips of clayey silt cuttings indicates subhorizontal laminations in material with possible silt layers - none observed but something causes separations
- material definitely more clayey than encountered on Shikano side, even at 150' depth
- start up delayed by rain - started @ 11am

Sa #17 - 150'-151.7' shelby
- firm grey clayey SILT, moist
- sample appears to have pulled apart at bottom on silty lamination black colour - colour change only indication of silt lens
- PP = 1.0 kg/cm²

Sa #18 - 156'-158' cyclone
- firm grey clayey SILT moist
- definitely more hammer resistance although cuttings still quite soft

SAMPLE CONDITION	SAMPLE TYPES		ABBREVIATIONS	SPECIAL NOTES (water conditions etc.)
DISTURBED	A.S. - Auger sample	S.T. - Slotted tube	Wh - Weight, hammer	Time:
FAIR	C.S. - Chunk sample	T.O. - Thin walled, open	Ph - Pressure, hydraulic	Hrs. Productive:
GOOD	D.O. - Drive open	T.P. - Thin walled, piston	Pm - Pressure, manual	Hrs. Delayed:
LOST	R.C. - Rock core	W.S. - Wash sample	V - In-situ vane shear test	Depth of Hole: / Depth of Casing: / Depth to Water:

FIELD BOREHOLE LOG

Boring Number TGZ | Depth 162' to ____ | Sheet 4 of ____
Project QUINTETTE COAL | Job No. 882-1146 | Date 88/08/17
Location TRANSFER GRIZZLY | Elevation ____ | Datum ____
Casing 6 5/8" O.D. | Casing Hammer, wt ____ drop 16,000 ft. lbs
Weather OVERCAST MILD | Sampler Hammer, wt ____ drop ____
Drill Rig SDS BECKER | Driller M. GREENLY | Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
162'		138'	162'							
	firm grey clayey SILT, moist	152								Sa #19 - 164'-166' cyclone - firm grey clayey SILT, moist PP = 0.75 kg/cm² remolded
					X	CS	19			
		73								- hammer started to fire fully at a 150' intervals noticed stiffening but not reflected in PP results
		40	170'							
		36			X	CS	20			Sa #20 - 172'-174' cyclone - firm grey SILT, some clay, moist PP = 1.0 kg/cm²
										- material appears to be decreasing in clay content and increasing stiffness
		190								- material still coming up like large salmon right from top to 174'
			180'		X	CS	21			Sa #21 - 180'-182' cyclone - firm grey clayey SILT darker grey silt laminations, moist PP = 1.0 kg/cm²
		145								Sa #22 - 182'-190' cyclone - firm grey silt, some clay to clayey moist PP = 1.0 kg/cm²
					X	CS	22			
		190	190'							Sa #23 - 196'-198' cyclone - firm grey SILT, some clay moist PP = 1.25 kg/cm²
	becoming SILT, some clay									Sa #24 - 204'-206' - firm grey SILT some clay to clayey moist, occasional silt laminations
					X	CS	23			
	not full power	225	200'							Sa #25 - 212'-214' - stiff grey SILT trace clay, damp - PP = 2.25 kg/cm²
					X	CS	24			
210'		280	210'							
	stiff grey SILT, some clay, moist				X	CS	25			
		250	216'							
		222'								

SAMPLE CONDITION: DISTURBED, FAIR, GOOD, LOST

SAMPLE TYPES: A.S. - Auger sample; C.S. - Chunk sample; D.O. - Drive open; R.C. - Rock core; S.T. - Slotted tube; T.O. - Thin walled, open; T.P. - Thin walled, piston; W.S. - Wash sample

ABBREVIATIONS: Wh - Weight, hammer; Ph - Pressure, hydraulic; Pm - Pressure, manual; V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time: ____ Depth of Hole: ____
Hrs. Productive: ____ Depth of Casing: ____
Hrs. Delayed: ____ Depth to Water: ____

FIELD BOREHOLE LOG

Boring Number TG2 Depth 216' to _____ Sheet 5 of 5
Project QUINTETTE COAL Job No. 882-1146 Date 88/08/17-18
Location TRANSFER GRIZZLY Elevation _____ Datum _____
Casing 6 5/8" O.D. Casing Hammer, wt _____ drop 16,000 ft. lbs
Weather SUNNY WARM Sampler Hammer, wt _____ drop _____
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
216		214'	216'							
	stiff grey SILT, trace clay to clayey SILT, damp to moist	250	220'			CS	26			Sa #26 - 220'-222' cyclone - stiff grey SILT, some clay, damp PP = 1.5 kg/cm²
		280				CS	27			Sa #27 - 228'-230' cyclone - stiff grey SILT, some clay to clayey, moist - PP = 1.75 kg/cm²
	becoming stiffer with depth	310	230'			CS	28			Sa #28 - 236'-238' cyclone - stiff grey SILT, some clay to clayey, moist
39.8'						TO	29	21/22		Sa #29 - 238'-239.8' Shelby - very stiff grey SILT, trace clay, moist PP = 4.0 kg/cm²
	EOH		240'							- out of drill pipe EOH @ 239.8' @ 4:00 pm - installed piezo to 238' - 5' slotted pipe wrapped with filter cloth - backfilled with gravel up to 232' - pulled casing and left open hole - installed second piezo at 68' - poured in miscellaneous gravel and sand - placed 1' bentonite seal from 27' to 27' - backfilled hole with sand and gravel to surface - poured in bucket of bentonite pellets at 15' - packed top of hole with bags and clayey silt to seal at surface - finished @ 12:00 noon and moved to next sh. TG3
			250'							

SAMPLE CONDITION: DISTURBED, FAIR, GOOD, LOST

SAMPLE TYPES: A.S. - Auger sample; C.S. - Chunk sample; D.O. - Drive open; R.C. - Rock core; S.T. - Slotted tube; T.O. - Thin walled, open; T.P. - Thin walled, piston; W.S. - Wash sample

ABBREVIATIONS: Wh - Weight, hammer; Ph - Pressure, hydraulic; Pm - Pressure, manual; V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)

Time: _____ Depth of Hole: _____
Hrs. Productive: _____ Depth of Casing: _____
Hrs. Delayed: _____ Depth to Water: _____

Golder Associates

FIELD BOREHOLE LOG

Boring Number: TG3 (QHR88703) | Depth: 0 to 54' | Sheet: 1 of 3
Project: QUINTETTE COAL | Job No.: 882-1146 | Date: 88/08/18
Location: TRANSFER GRIZZLY | Elevation: | Datum:
Casing: 6 5/8" O.D. | Casing Hammer, wt: | drop: 16,000 ft. lbs
Weather: OVERCAST, MILD | Sampler Hammer, wt: | drop:
Drill Rig: SDS BECKER | Driller: M. GREENLY | Engineer: MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
0'			0'						-	- started drilling @ 2:20 pm
	compact grey and brown SAND, trace to some silt, slightly water bearing	/			DISTURBED	CS	1			- grey and brown fine SAND, compact trace to some silt at ground surface Sa#1 - 0-2' - as above with trace organics - penetrated to 18' with air circulation only - some fine SAND trace silt to some - small amount of gravel coming up at 18' to 20' - hit grey SILT trace to some clay at 20' Sa#2 - 20'-22' cyclone - firm grey SILT, trace to some clay, wet
		/	10'							
18'		/								- cuttings soft grey clayey SILT to 30'
20	SAND and angular GRAVEL	/								
	laminated stiff grey SILT, trace to some clay with interbeds of firm clayey SILT and dense sandy SILT	/	20'		DISTURBED	CS	2			Sa#3 - 30'-31.5' shelby - soft grey clayey SILT, moist PP < 0.5 Kg/cm² Sa#4 36-38' cyclone - material varies from soft clayey silt to stiff silt trace clay
		PUSH								
		"	30'			TO	3	18/18		- material becoming stiffer Sa#5 - 42-46' - variable material from stiff grey SILT some clay with silt laminations to stiff sandy SILT, some clay, sand and silt laminations - seen a few pieces of fine gravel PP = 1.5 Kg/cm²
		"			DISTURBED	CS	4			
			40'		DISTURBED	CS	5			Sa#6 50'-54' - firm grey clayey silt trace sand moist
			50'		DISTURBED	CS	6			
			54'							

SAMPLE CONDITION: DISTURBED, FAIR, GOOD, LOST

SAMPLE TYPES: A.S. - Auger sample; C.S. - Chunk sample; D.O. - Drive open; R.C. - Rock core; S.T. - Slotted tube; T.O. - Thin walled, open; T.P. - Thin walled, piston; W.S. - Wash sample

ABBREVIATIONS: Wh - Weight, hammer; Ph - Pressure, hydraulic; Pm - Pressure, manual; V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time: ______ Depth of Hole: ______
Hrs. Productive: ______ Depth of Casing: ______
Hrs. Delayed: ______ Depth to Water: ______

FIELD BOREHOLE LOG

Boring Number: TG3 — Depth: 54' to 108' — Sheet 2 of 3
Project: QUINTETTE COAL — Job No.: 882-1146 — Date: 88/04/18
Location: TRANSFER GRIZZLY — Elevation: — Datum:
Casing: 6 5/8" O.D. — Casing Hammer, wt: — drop: 16 000 ft. lbs
Weather: OVERCAST, MILD — Sampler Hammer, wt: — drop:
Drill Rig: SDS BECKER — Driller: M. GREENLY — Engineer: MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
54'			54'							
	soft grey clayey SILT with occasional black silt and silty sand laminations	PUSH								Sa #7 - 58'-62' - soft grey clayey SILT with occasional thin black silt partings and black flecks PP < 0.5 Kg/cm²
		"	60'		X (disturbed)	CS	7			- hit sand pocket ~ 2' thick @ 62'
		"			X (disturbed)	CS	8			Sa #8 - 62' - dark grey black sand, trace silt
		"			X (disturbed)	CS	9			Sa #9 - 66'-70' - soft grey clayey silt with dark thin silt laminations, moist, trace sand PP < 0.5 kg/cm²
		"	70'							
78'		"			X (disturbed)	CS	10			Sa #10 - 74'-78' - soft grey clayey silt with dark silt laminations, moist, trace sand
80'	fine grey SAND, trace silt, highly water bearing	"	80'							78'-80' fine sand trace silt, highly water bearing
	soft grey clayey SILT, moist, with frequent fine sandy silt laminations	"								82'-86' - soft grey clayey SILT, trace sand, moist
		"			X (disturbed)	CS	11			Sa #11 - 84'-86' - as above
		"	90'							- cannot tell how thick sand layers are - no blow counts
		"								96'-01' - same soft grey clayey silt, moist
		"	100'							94-102' - [illegible] as above - [illegible] yet on [illegible] hammer and rod [illegible] PP < 0.5 Kg/cm² all the way - driller [illegible] hole yet
					Good	TO	12	21/21		Sa #12 - 102'-103.8' Shelby - soft grey clayey SILT with frequent sandy silt [illegible] laminations, moist
										- [illegible] 103.9' @ 5 UPM

SAMPLE CONDITION	SAMPLE TYPES		ABBREVIATIONS	SPECIAL NOTES: (water conditions etc.)	
DISTURBED	A.S. - Auger sample	S.T. - Slotted tube	Wh - Weight, hammer	Time:	Depth of Hole:
FAIR	C.S. - Chunk sample	T.O. - Thin walled, open	Ph - Pressure, hydraulic	Hrs. Productive:	Depth of Casing:
GOOD	D.O. - Drive open	T.P. - Thin walled, piston	Pm - Pressure, manual	Hrs. Delayed:	Depth to Water:
LOST	R.C. - Rock core	W.S. - Wash sample	V - In-situ vane shear test		

FIELD BOREHOLE LOG

Boring Number: TG3 | Depth: 108' to 150' | Sheet 3 of 3
Project: QUINTETTE WAL | Job No.: 882-1146 | Date: 80/08/19
Location: TRANSFER GRIZZLY | Elevation: | Datum:
Casing: 6 5/8" O.D. | Casing Hammer, wt: | drop: 16,000 ft·lbs
Weather: OVERCAST, RAIN, COOL | Sampler Hammer, wt: | drop:
Drill Rig: # SDS BECKER | Driller: M GREENLY | Engineer: MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
108'			108'							Start up 7:00 am @ 108'
	Soft grey clayey silt, moist, occasional dark grey silt lenses or laminations	pipe sinking under its own weight with air circulation	110'		Disturbed	CS	13			- water coming up beside casing from sand and running over ground surface - hammer still sinking under its own weight with air circulation Sa #13 108'-110' cyclone - firm grey clayey SILT, moist PP ≈ 1.0 kg/cm²
					Disturbed	CS	14			- pipe sinking under its own weight Sa #14 - 116-118' cyclone - soft grey clayey SILT, moist PP < 0.5 kg/cm²
			120'		Disturbed	CS	15			Sa #15 - 124'-126' cyclone - Soft grey clayey SILT, moist PP ≈ 0.5 kg/cm² - trace sand in wash water - may have been very small sand lens
	Note: material is so soft that air is blowing up along outside of casing to ground surface rather than blowing cuttings to surface inside casing ∴ casing plugged with cuttings		130'		Disturbed	CS	16			Sa #16 - 132'-134' cyclone - Soft grey clayey SILT damp to moist - appears to be less clayey than before (slightly) PP ≈ 0.75 kg/cm²
			140'		Disturbed	CS	17			- pipe sinking slowly under its own weight - difficult to add pipe - lost circulation - no more clayey silt coming up - instead silty fine sand slurry coming up
					Black silty fine SAND that washed into casing - probably not a natural material but something washed down from outside casing to bit during pipe addition					- 144 ft of pipe + 1 ft bit = 145' - sounded to 126 ft - ∴ 19 ft of clayey silt in pipe - pounded down another joint with hammer and tried to regain circulation but no good
150'	EOH casing plugged		150'							- called it quits at 150' @ 9:20 am - air blowing out bit and up alongside outside of casing to ground surface rather than making sticky cuttings rise inside pipe - silty fine sand washing from and coming up into cyclone - last 19' of casing plugged with clayey silt when casing pulled clayey silt in bit
			160'							
			162'							Sa #18 - 134'-142' removed from plugged pipe - soft grey clayey SILT with occasional fine sandy silt laminations

SAMPLE CONDITION
- DISTURBED
- FAIR
- GOOD
- LOST

SAMPLE TYPES
- A.S. - Auger sample
- C.S. - Chunk sample
- O.D. - Drive open
- R.C. - Rock core
- S.T. - Slotted tube
- T.O. - Thin walled, open
- T.P. - Thin walled, piston
- W.S. - Wash sample

ABBREVIATIONS
- Wh - Weight, hammer
- Ph - Pressure, hydraulic
- Pm - Pressure, manual
- V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)

Time: ______ Depth of Hole: ______
Hrs. Productive: ______ Depth of Casing: ______
Hrs. Delayed: ______ Depth to Water: ______

FIELD BOREHOLE LOG

Boring Number TG4 (QHR88704) Depth 0' to 54' Sheet 1 of ____
Project QUINTETTE COAL Job No. 882-1146 Date 88/08/19-20
Location TRANSFER GIZZLY Elevation ____ Datum ____
Casing 6.5/8" O.D. Casing Hammer, wt ____ drop 16,000 ft.lbs
Weather OVERCAST, MILD Sampler Hammer, wt ____ drop ____
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
0'			0'							- start drilling @ 4:30 pm
3'	compact to dense light brown sandy SILT, some gravel, roots and organics, damp	↑ 50 ↓			X	CS	1			- light brown fine sandy SILT, some gravel, roots and organics at ground surface, dry
					X	CS	2			Sa#1 - 0-3' - compact to dense light brown sandy SILT, trace gravel, roots and organics, damp
	compact to dense dark brown SAND and GRAVEL, trace silt, occasional cobbles, damp, layered with sandy, gravelly and cobbly layers	30 70 100 75 45 43 54 50 65 72 85	10'		X	CS	3			- dark brown fine silty sand coming out of cyclone from 3'-6', dam Sa#2 @ 3'-6' - cuttings 6'-14' damp dense brown SAND and GRAVEL, occasional cobbles, trace silt Sa#3 - 6'-14' - as noted above - no water in returns (none injected) - cobbly layers, gravelly layers, sand and gravel layers to 22', trace silt, damp to moist
28'			20'							- hit grey SILT, some clay @ 28' - stopped for day @ 30' @ 5:15 pm
	firm grey SILT, trace to some clay, damp to moist, with clayey SILT layers and sandy SILT lenses	40 / / / / ↑ 80 ↓ ↑ 36 ↓	30' 40' 50'			TO	4	16/16		- restart @ 9:15 am 88/08/20 Sa#4 - 38'-39.4' shelby - laminated soft grey clayey SILT, fine sandy SILT and stiff grey SILT, trace clay PP = 1.75 kg/cm² for silt, trace clay PP = 0.5 kg/cm² for clayey silt
					X	CS	5			Sa#5 - 44'-46' cyclone - firm grey SILT, trace to some clay, damp PP = 1.0 kg/cm²
52'										Sa#6 - 52'-54' cyclone - soft grey SILT, some clay moist
	see next page	↓	54'		X	CS	6			

AMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES
A.S. - Auger sample S.T. - Slotted tube
C.S. - Chunk sample T.O. - Thin walled, open
D.O. - Drive open T.P. - Thin walled, piston
R.C. - Rock core W.S. - Wash sample

ABBREVIATIONS
Wh - Weight, hammer
Ph - Pressure, hydraulic
Pm - Pressure, manual
V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time:____ Depth of Hole:____
Hrs. Productive:____ Depth of Casing:____
Hrs. Delayed:____ Depth to Water:____

FIELD BOREHOLE LOG

Boring Number TG4 Depth 54' to 108' Sheet 2 of
Project COQUITLITE COAL Job No. 882-1146 Date 88108120
Location TRANSFER GRIZZLY Elevation Datum
Casing 5 5/8" O.D Casing Hammer, wt drop 16.000 Ft. lbs
Weather OVERCAST . MILD Sampler Hammer, wt drop
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
54'			54'							
	Soft grey SILT; some clay to clayey SILT, moist	light blows ≈150	60'			CS	7			Sa #7 - 60'-62' cyclone - firm grey SILT; trace to some clay; damp to moist
		87								Sa #8 - 68'-70' cyclone - soft grey clayey SILT, moist - PP < 0.5 kg/cm²
			70'			CS	8			Sa #9 - 76'-78' cyclone - soft grey clayey SILT, moist PP < 0.5 kg/cm²
		light blows 134								Sa #10 - 84'-86' cyclone - soft grey clayey SILT, moist - softest sample yet in hole
						CS	9			Sa #11 - 92'-94' cyclone - soft grey clayey SILT, moist - PP = 0.75 Kg/cm²
		120	80'							Sa #12 - 102'-103.9' Shelby - soft to firm grey SILT, some clay, moist PP = 1.0 kg/cm²
		light blows				CS	10			
		116	90'							
		light				CS	11			
		111								
		light	100'							
						TO	12	21/21		
			108'							

SAMPLE CONDITION: DISTURBED, FAIR, GOOD, LOST

SAMPLE TYPES: A.S. - Auger sample; C.S. - Chunk sample; D.O. - Drive open; R.C. - Rock core; S.T. - Slotted tube; T.O. - Thin walled, open; T.P. - Thin walled, piston; W.S. - Wash sample

ABBREVIATIONS: Wh - Weight, hammer; Ph - Pressure, hydraulic; Pm - Pressure, manual; V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)

Time: Depth of Hole:
Hrs. Productive: Depth of Casing:
Hrs. Delayed: Depth to Water:

Golder Associates

FIELD BOREHOLE LOG

Boring Number TG4 | Depth 108' to 162' | Sheet 3 of ____
Project QUINTETTE COAL | Job No. 882-1146 | Date 88/03/20
Location TRANSFER GRIZZLY | Elevation ____ | Datum ____
Casing 6 5/8" O.D. | Casing Hammer, wt ____ drop 18,000 ft-lbs
Weather OVERCAST, MILD | Sampler Hammer, wt ____ drop ____
Drill Rig SDS BECKER | Driller M. GREENLY | Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
108'			108'							
	Soft grey clayey SILT, moist, occasional dark grey silt laminations below 116 ft.	soft blows	110'		X	CS	13			Sa # 13 - 108' - 110' cyclone - soft to firm grey SILT, some clay & clayey moist PP = 1.0 kg/cm²
					X	CS	14			Sa # 14 - 116' - 118' cyclone - soft grey clayey SILT, moist dark grey silt laminations PP = 0.75 kg/cm²
			120'							118' - 126' - as above
		85 soft	130'							Sa # 15 - 132' - 134' cyclone - soft grey clayey SILT moist occasional dark grey silt laminations 134' - 142' as above with occasional firm seams - material coming up like fat salmon for entire hole
					X	CS	15			
		120 soft	140'							Sa # 16 - 148' - 150' cyclone - soft grey clayey silt moist PP = 0.75 kg/cm² 150' - 158' as above
		60								
			150'		X	CS	16			
		solid								
			160'							
			162'							

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES
A.S. - Auger sample S.T. - Slotted tube
C.S. - Chunk sample T.O. - Thin walled, open
D.O. - Drive open T.P. - Thin walled, piston
R.C. - Rock core W.S. - Wash sample

ABBREVIATIONS
Wh - Weight, hammer
Ph - Pressure, hydraulic
Pm - Pressure, manual
V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time:____ Depth of Hole:____
Hrs. Productive:____ Depth of Casing:____
Hrs. Delayed:____ Depth to Water:____

FIELD BOREHOLE LOG

Boring Number TG4 | Depth 162' to 16 | Sheet 4 of 4
Project QUINTETTE COAL | Job No 882-1146 | Date 88/08/20
Location TRANSFER GRIZZLY | Elevation | Datum
Casing 6 5/8" O.D. | Casing Hammer, wt | drop 18,000 ft. lbs
Weather OVERCAST MILD | Sampler Hammer, wt | drop
Drill Rig SDS BECKER | Driller M. GREENLY | Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
162'		1 5/8 ↑	162'							
	see prevous page	150 ↓								158' - 166' cyclone material - soft grey clayey SILT occasional dark grey silt laminations, moist
167.8'						TO	17	21/21		PP = 0.75 ÷ 1.0 kg/cm²
	EOH		170'							Sa # 17 - 166' - 167.8' Shelby - firm grey SILT some clay, occasional ll laminations
			190'							- blew water out of hole thoroughly - TIP # 1 @ 166.5' below surface - perforated to 163.5' " " - backfilled with medium SAND to 160 ft below ground surface - 1 bucket of 3/8" pellets to put 6 ft seal in hole ∴ pellets to 154 ft - pulled casing to 62' - set TIP # 2 at 70' - tried to fill with sand but hole staying open and sand falling past TIP # 2 - pulled casing to 70' - jammed down some bags filled with paper towling - poured in a bucket of bentonite pellets to form a seal to 38 ft below ground surface (in clayey silt) - pulled casing and backfilled hole to ground surface with miscellaneous fill - water entering hole from sand and gravel layers - orange cap on 70' installation - finished for the day at 6:45 pm - left approx 2 ft sticking

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES
A.S. - Auger sample
C.S. - Chunk sample
D.O. - Drive open
R.C. - Rock core
S.T. - Slotted tube
T.O. - Thin walled, open
T.P. - Thin walled, piston
W.S. - Wash sample

ABBREVIATIONS
Wh - Weight, hammer
Ph - Pressure, hydraulic
Pm - Pressure, manual
V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time: Depth of Hole:
Hrs. Productive: Depth of Casing:
Hrs. Delayed: Depth to Water:

Golder Associates

FIELD BOREHOLE LOG

Boring Number QHR88705 (T65) Depth 0 to 103.3 ft Sheet 1 of 1
Project QUINTETTE COAL Job No. 882-1146 Date 88/08/22
Location TRANSPER GRIZZLY Elevation _____ Datum _____
Casing 6 5/8" O.D. Casing Hammer, wt _____ drop 18,000 ft·lbs
Weather SUNNY, MILD Sampler Hammer, wt _____ drop _____
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE (Ft)	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
0 ft			0'							
	compact to dense brown SAND and rounded GRAVEL, trace silt, layers of sand, gravel and cobbles, dry to damp, occasional boulders		5		X	CS	1			
			10							
			15							
			20							
			25							
			30							
			35							
			40							
46 ft			45							
14m	loose GRAVEL and COBBLES, some sand		50							
			55							
76 ft			60							
23.1m	stiff grey SILT, trace to some clay, moist, non-plastic, occasional fine gravel sizes, black streaks		65		X	CS	2			
			70							
			75		X	CS	3			
			80							
			85		X	CS	4			
			90							
			95		X	CS	5			
			100							
102 ft					X	CS	6			
103.3 ft	dense grey fine sandy SILT, water bearing		105			TO	7			
31.5m	END OF HOLE @ 103.3 ft.									

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES
A.S. - Auger sample
C.S. - Chunk sample
D.O. - Drive open
R.C. - Rock core
S.T. - Slotted tube
T.O. - Thin walled, open
T.P. - Thin walled, piston
W.S. - Wash sample

ABBREVIATIONS
Wh - Weight, hammer
Ph - Pressure, hydraulic
Pm - Pressure, manual
V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time:_____ Depth of Hole:_____
Hrs. Productive:_____ Depth of Casing:_____
Hrs. Delayed:_____ Depth to Water:_____

Golder Associates

FIELD BOREHOLE LOG

Boring Number QSR 88706 (TG6) Depth 0 to 182 ft Sheet 1 of 2
Project QUINTETTE COAL Job No. 882-1146 Date 88/08/22-23
Location TRANSFER / GRIZZLY Elevation _____ Datum _____
Casing 6 5/8" O.D. Casing Hammer, wt _____ drop 18.000 ft. lbs
Weather SUNNY, MILD Sampler Hammer, wt _____ drop _____
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
0 ft			0 ft							
	compact to dense brown SAND and GRAVEL, some cobbles, trace silt, damp, layers of sand, rounded gravel and cobbles		10 20 30 40			CS	1			TYPICAL
	- gravel now rounded and angular		50			CS	2			
	- highly water bearing below 74 ft		60 70 80 90 100 110 120 130							
35 ft 1.15m	CONTINUED ON PAGE 2		135							

SAMPLE CONDITION: DISTURBED, FAIR, GOOD, LOST

SAMPLE TYPES
A.S. - Auger sample S.T. - Slotted tube
C.S. - Chunk sample T.O. - Thin walled, open
D.O. - Drive open T.P. - Thin walled, piston
R.C. - Rock core W.S. - Wash sample

ABBREVIATIONS
Wh - Weight, hammer
Ph - Pressure, hydraulic
Pm - Pressure, manual
V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time:_____ Depth of Hole:___
Hrs. Productive:_____ Depth of Casing:___
Hrs. Delayed:_____ Depth to Water:___

Golder Associates

FIELD BOREHOLE LOG

Boring Number QSR 88706 (TG6) Depth 0 to 182 ft Sheet 2 of 2
Project QUINTETTE COAL Job No. 882-1146 Date 88/08/22-23
Location TRANSFER / GRIZZLY Elevation Datum
Casing 6 5/8" O.D. Casing Hammer, wt drop 18,000 ft · lbs
Weather SUNNY, MILD Sampler Hammer, wt drop
Drill Rig SDS BECKER Driller M. GREENLY Engineer MTB

DEPTH ELEV.	SOIL STRATIGRAPHY	BLOWS PER FOOT	DEPTH SCALE	% WATER RETURN	SAMPLES Cond.	Type	No.	Recov	Force	SAMPLE DESCRIPTION & BORING NOTES
35 ft	CONTINUED		135'							
1.15M	compact to dense SAND, angular and rounded GRAVEL and COBBLES, layered, highly water bearing		140							Note: standpipe installed in borehole to depth 118 ft below ground surface (40m).
			150							
54 ft					X	CS	3			
.95M			160		X	CS	4			
	stiff grey SILT, trace to some fine sand, trace to some clay, moist, laminated				X	CS	5			
14 ft			170							
0M					X	CS	6			
52 ft			180							
.5M	compact to dense grey silty fine SAND with clayey silt laminations, water bearing									
			190							
	END OF HOLE @ 182 ft		200							

SAMPLE CONDITION
DISTURBED
FAIR
GOOD
LOST

SAMPLE TYPES
A.S. - Auger sample S.T. - Slotted tube
C.S. - Chunk sample T.O. - Thin walled, open
D.O. - Drive open T.P. - Thin walled, piston
R.C. - Rock core W.S. - Wash sample

ABBREVIATIONS
Wh - Weight, hammer
Ph - Pressure, hydraulic
Pm - Pressure, manual
V - In-situ vane shear test

SPECIAL NOTES: (water conditions etc.)
Time: Depth of Hole:
Hrs. Productive: Depth of Casing:
Hrs. Delayed: Depth to Water:

Appendix T.3

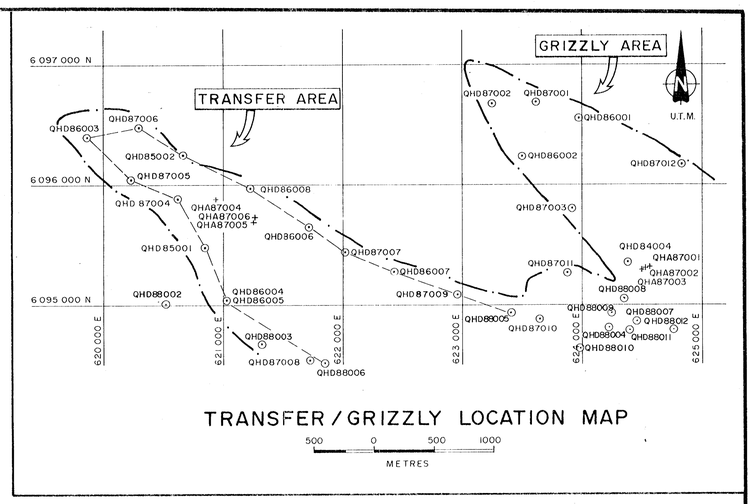
1988 Geological Report

Correlation Charts

Appendix T.3.1

Transfer Stratigraphic Correlation

TRANSFER AREA



TRANSFER / GRIZZLY LOCATION MAP

QHD 85002

QHD 87005

QHD 87006

Hulcross

Gates

QHD 86003

B SEAM

QHD 86008

QHD 85001

QHD 86005

QHD 87004

QHD 86007

D SEAM

QHD 88005

QHD 87007

QHD 87009

QHD 86006

E3 SEAM

QHD 88006

F SEAM

G SEAM

J SEAM

KI SEAM

K2 SEAM

FAULT

LITHOLOGIC SYMBOLS

CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE	DKSH (50 - 60 % ASH)
COALY SHALE	CSH (40 - 50 % ASH)
COAL / ROCK	CD (30 - 40 % ASH)
COAL	CC (20 - 30 % ASH)
COAL	CB (10 - 20 % ASH)
COAL	CA (<10 % ASH)

LEGEND

COAL THICKNESS (m)

0.99 / 1.14

TOTAL SEAM THICKNESS (m)

5 0 5 10

METRES (VERTICAL)

746

Rev	D	M	Y	Revision Description	Drn.	Des.	App.
1	28	02	89	UPDATED	DKL	NH	DJ
0	17	03	88	ORIGINAL DRAFT	KJV	NH	DJ

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area TRANSFER | Category CORRELATION

Drawing Title

TRANSFER AREA

GATES CORRELATION

Scale	Drawing No.	Rev.
1:200	88 - 903 - 26 - 001	1

Appendix T.3.2

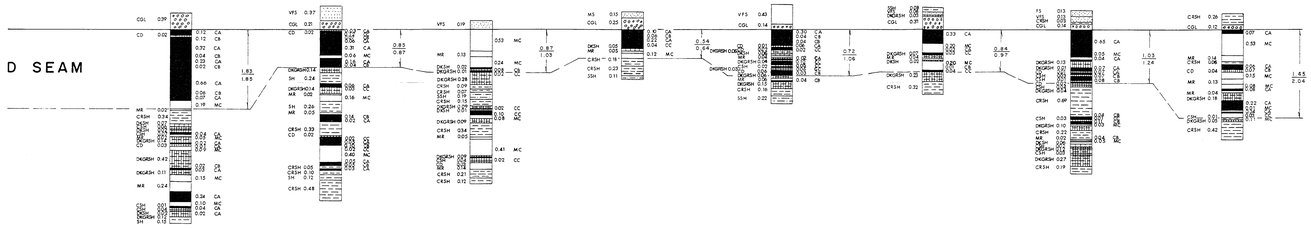
Transfer Seam Correlation

(2 sheets)

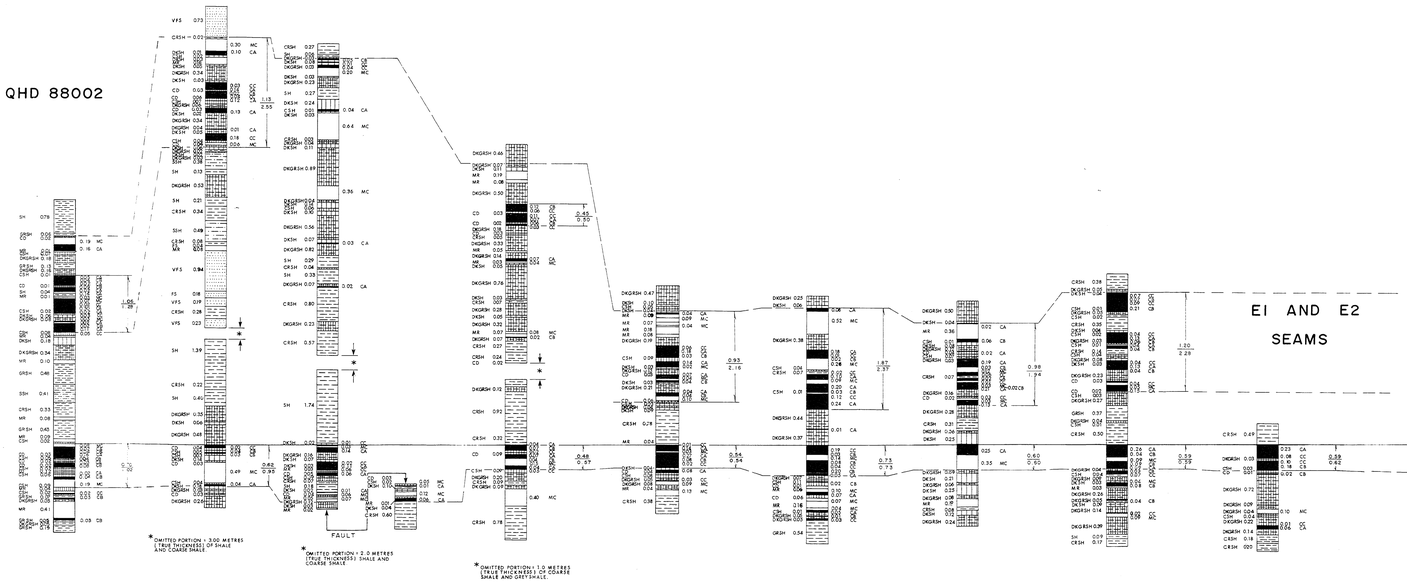
TRANSFER AREA

QHD86005 QHD85001 QHD 87004 QHD87005 QHD86003 QHD87006 QHD85002 QHD86008

D SEAM

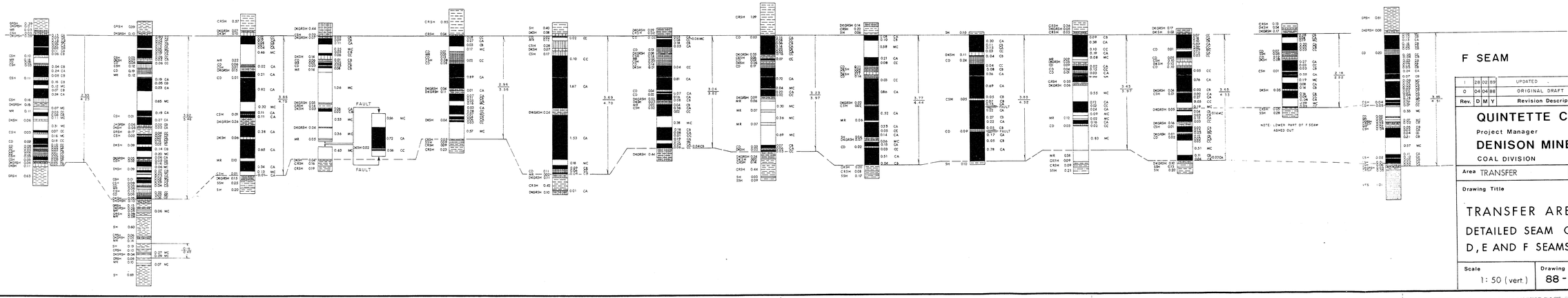


QHD 88002

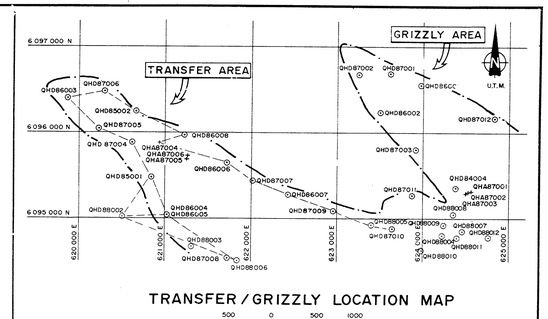


QHD 88005 QHD87010

QHD 88006 QHD 88002 QHD85001 QHD87004 QHD87005 QHD86003 QHD 87006 QHD85002 QHD 86008 QHA87004 (ADIT) QHD86006 QHD 87007 QHD 87009 QHD 88005



F SEAM



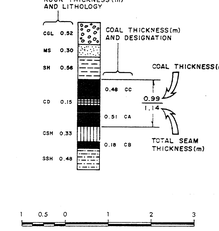
TRANSFER / GRIZZLY LOCATION MAP

500 0 500 1000
METRES

LITHOLOGIC SYMBOLS

MISSING ROCK	MR
CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > 80% ASH)
DARK SHALE	DKSH (50 - 60% ASH)
COALY SHALE	CSH (40 - 50% ASH)
COAL / ROCK	CD (30 - 40% ASH)
COAL	CC (20 - 30% ASH)
COAL	CB (10 - 20% ASH)
COAL	CA (< 10% ASH)
MISSING COAL	MC

LEGEND



Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
1	28	02	89	UPDATED	DKL	NH	DJ
0	04	04	88	ORIGINAL DRAFT	E T	NH	DJ

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area TRANSFER | Category CORRELATION

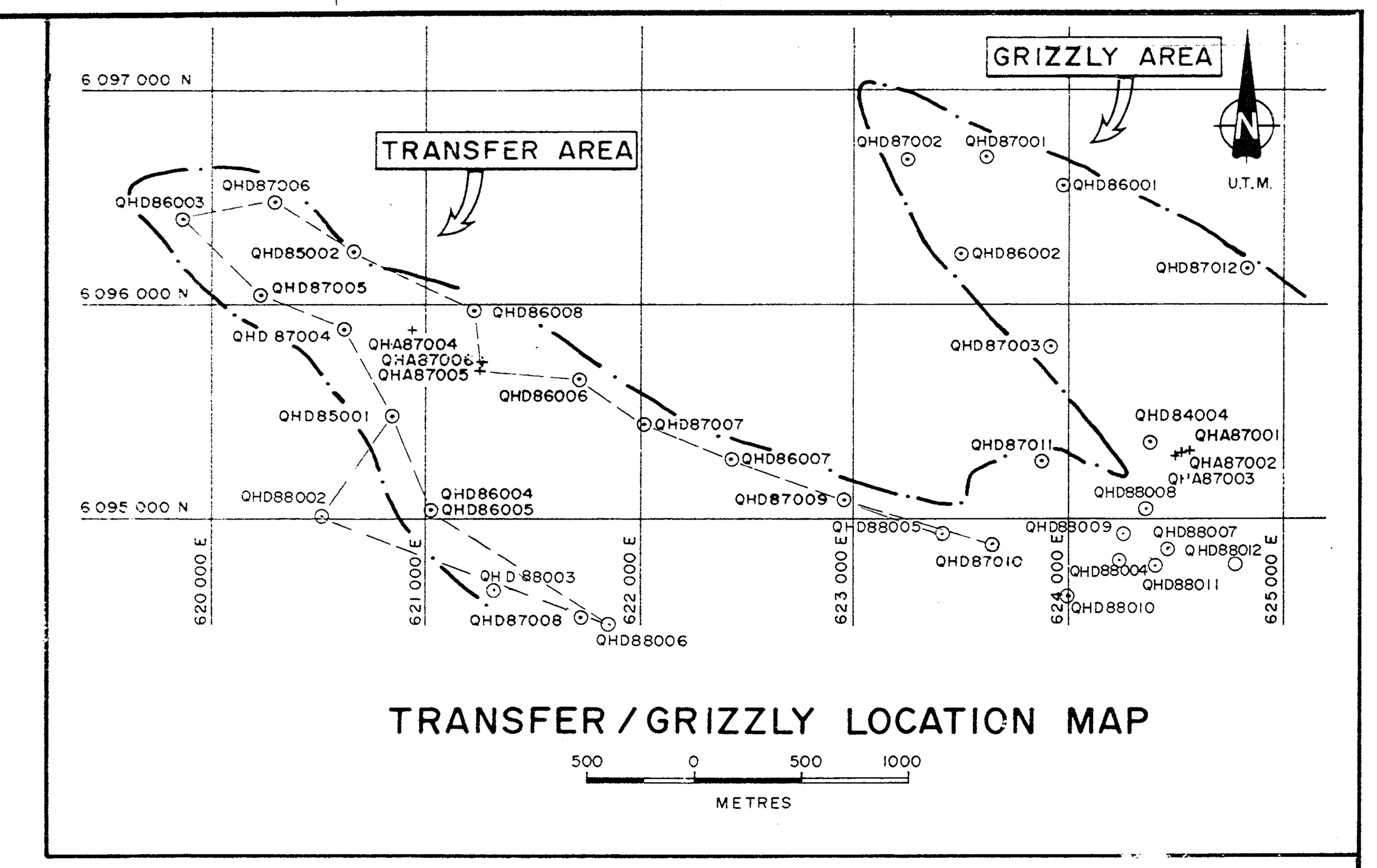
Drawing Title

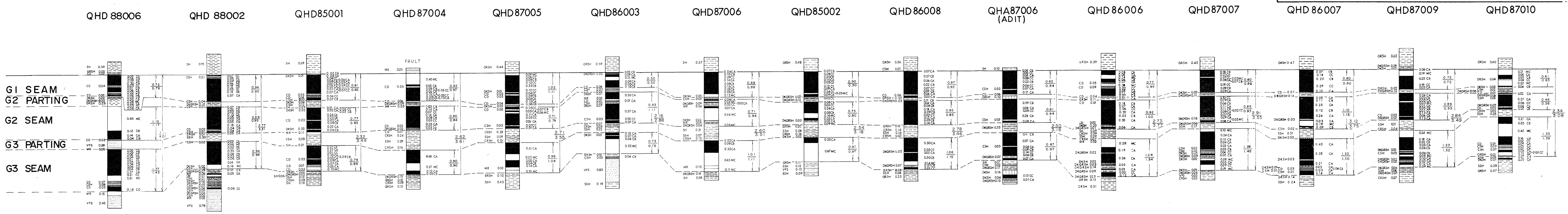
TRANSFER AREA DETAILED SEAM CORRELATION D, E AND F SEAMS

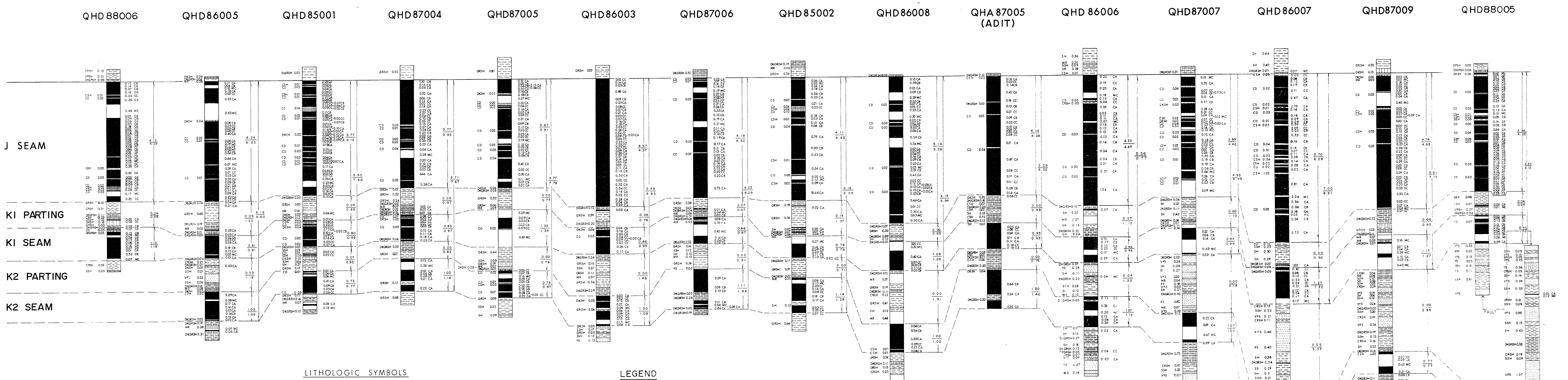
746

Scale	Drawing No.	Rev.
1 : 50 (vert.)	88-903-26-002	1

TRANSFER AREA



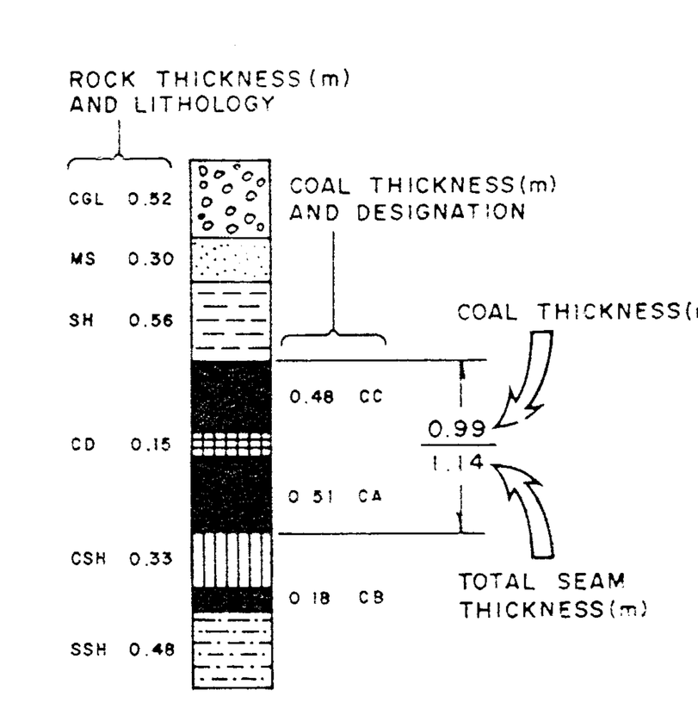




LITHOLOGIC SYMBOLS

MISSING ROCK	MR
CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE	DKSH (50 - 60% ASH)
COALY SHALE	CSH (40 - 50% ASH)
COAL / ROCK	CD (30 - 40% ASH)
COAL	CC (20 - 30% ASH)
COAL	CB (10 - 20% ASH)
COAL	CA (<10% ASH)
MISSING COAL	MC

LEGEND



1 0 1 2
METRES (VERTICAL)

746

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
1	28	02	89	UPDATED	DKL	NH	DJ
0	24	03	88	ORIGINAL DRAFT	ET	DJ	DJ

QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION

Area TRANSFER
Category CORRELATION

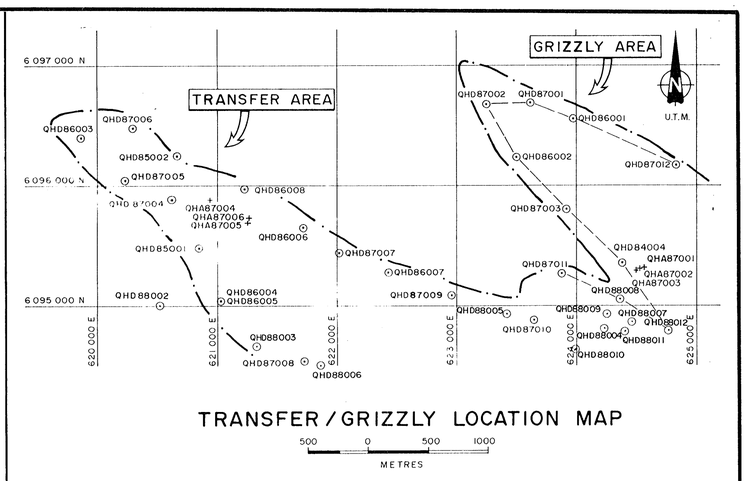
Drawing Title
TRANSFER AREA
DETAILED SEAM CORRELATION
G, J AND K SEAMS

Scale 1:50 (vert.)
Drawing No. 88-903-26-003
Rev. 1

Appendix T.3.3

Grizzly Stratigraphic Correlation

GRIZZLY AREA



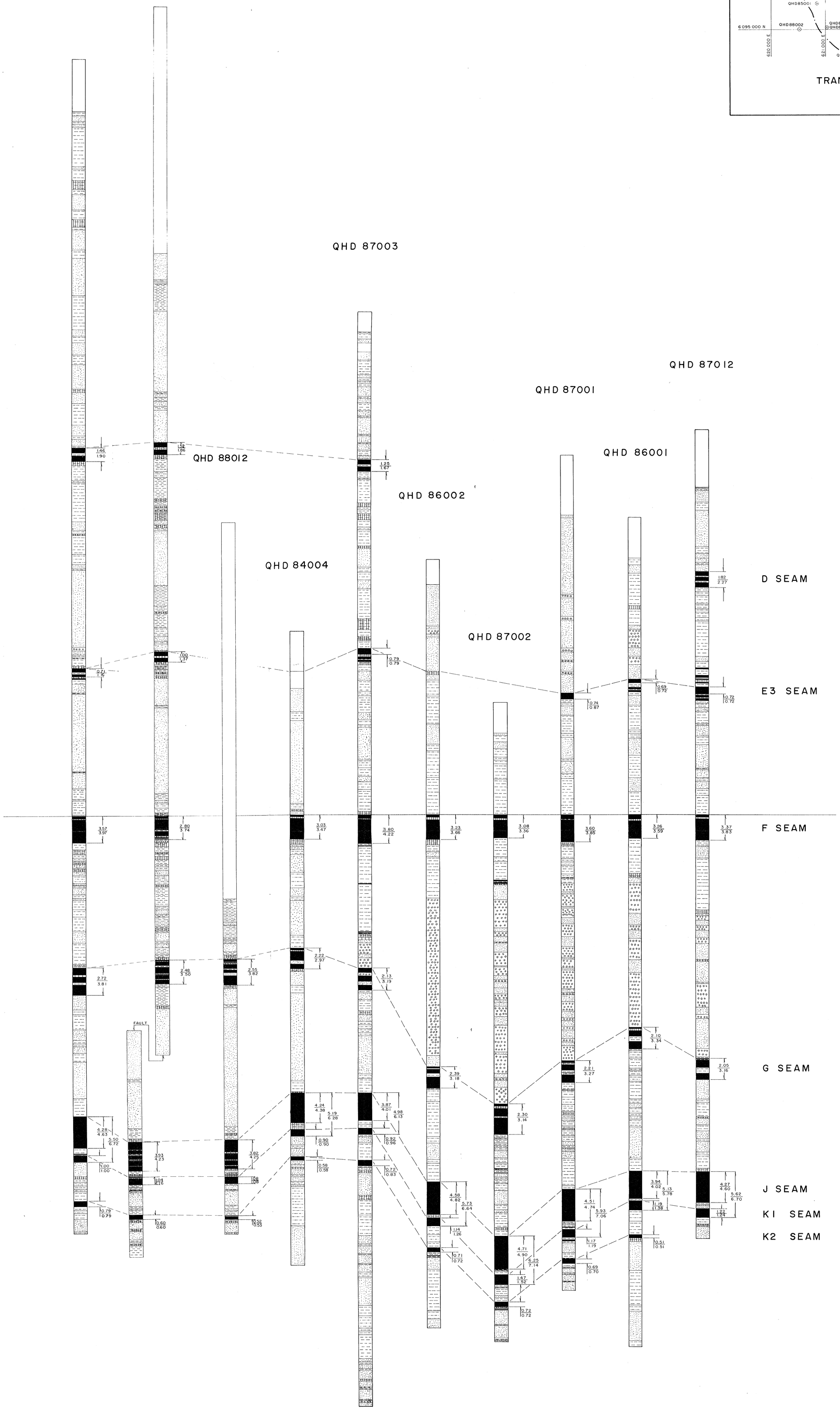
TRANSFER / GRIZZLY LOCATION MAP

500 0 500 1000

METRES

LITHOLOGIC SYMBOLS

CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE	DKSH (50 - 60 % ASH)
COALY SHALE	CSH (40 - 50 % ASH)
COAL / ROCK	CD (30 - 40 % ASH)
COAL	CC (20 - 30 % ASH)
COAL	CB (10 - 20 % ASH)
COAL	CA (<10 % ASH)



LEGEND

5 0 5 10

METRES (VERTICAL)

Rev	D	M	Y	Revision Description	Drn.	Des.	App.
1	28	02	89	UPDATED	DKL	NH	DJ
0	18	03	88	ORIGINAL DRAFT	KJV	NH	DJ

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DENISON MINES LIMITED

COAL DIVISION

Area GRIZZLY | Category CORRELATION

Drawing Title

GRIZZLY AREA 746

GATES CORRELATION

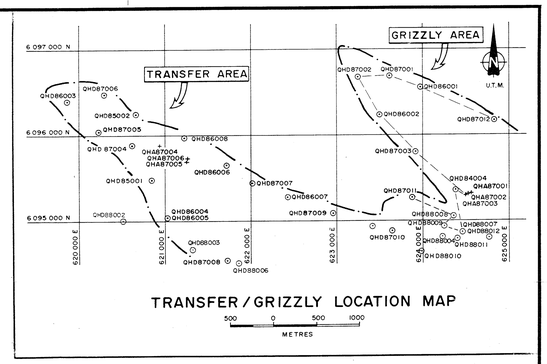
Scale	Drawing No.	Rev.
1:200	88-905-26-001	1

Appendix T.3.4

Grizzly Seam Correlation

(2 sheets)

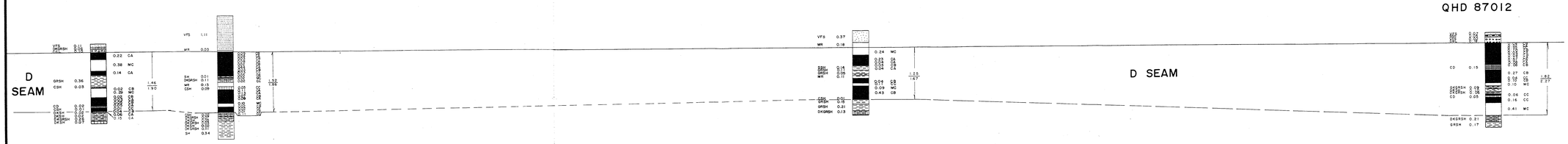
GRIZZLY AREA



TRANSFER / GRIZZLY LOCATION MAP

500 0 500 1000
METRES

QHD 87011 QHD 88008 QHD 87003 QHD 87012



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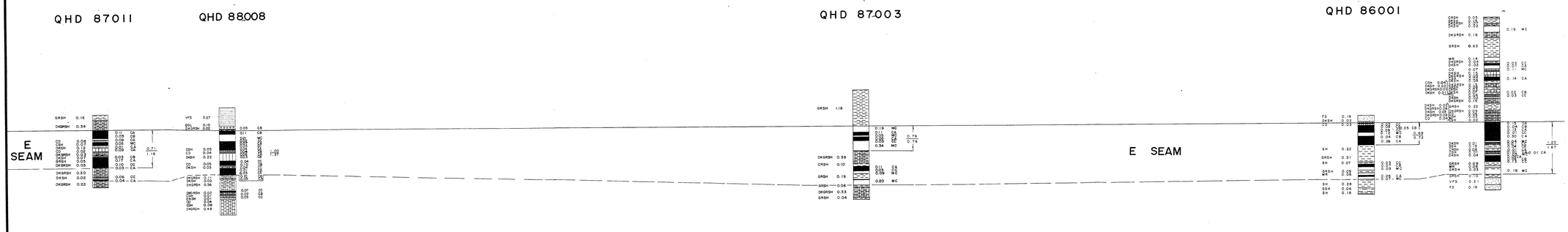

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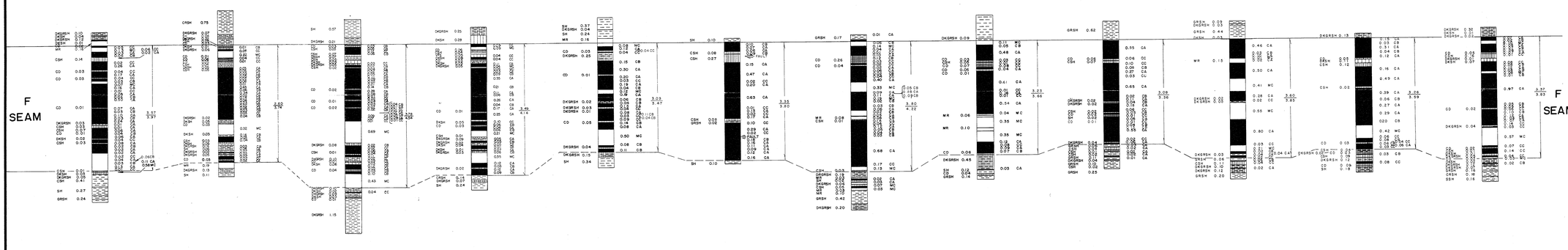
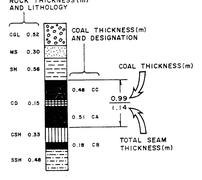


LITHOLOGIC SYMBOLS

CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE	DKSH (50 - 60 % ASH)
COALY SHALE	CSH (40 - 50 % ASH)
COAL / ROCK	CD (30 - 40 % ASH)
COAL	CC (20 - 30 % ASH)
COAL	CB (10 - 20 % ASH)
COAL	CA (<10 % ASH)
MISSING COAL/ROCK	MC/MR

LEGEND



0 1 2
METRES (VERTICAL)

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
1	29	02	89	UPDATED	DKL	NH	DJ
0	29	03	88	ORIGINAL DRAFT	RLR	NH	DJ

QUINTETTE COAL LIMITED

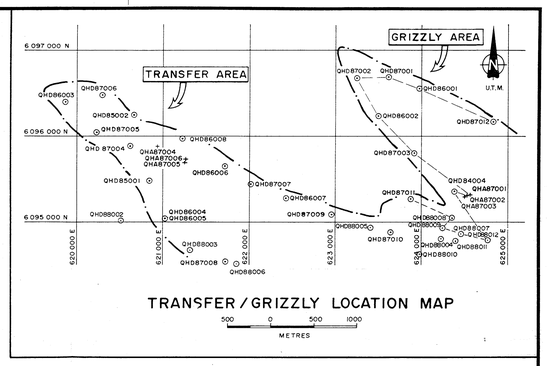
Project Manager
DENISON MINES LIMITED
COAL DIVISION

Area GRIZZLY | Category CORRELATION

Drawing Title
GRIZZLY AREA 746
DETAILED SEAM CORRELATION
D, E AND F SEAMS

Scale	Drawing No.	Rev.
1:50 (vert.)	88-905-26-002	1

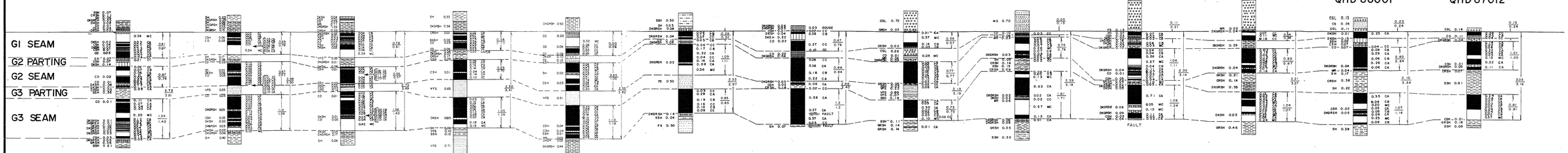
GRIZZLY AREA



TRANSFER / GRIZZLY LOCATION MAP

QHD 87011 | QHD 88008 | QHD 88009 | QHD 88007 | QHD 88012 | QHD 84004 | QHA 87002 (ADIT) | QHD 87003 | QHD 86002 | QHD 87002 | QHD 87001 | QHD 86001 | QHD 87012

G1 SEAM
G2 PARTING
G2 SEAM
G3 PARTING
G3 SEAM



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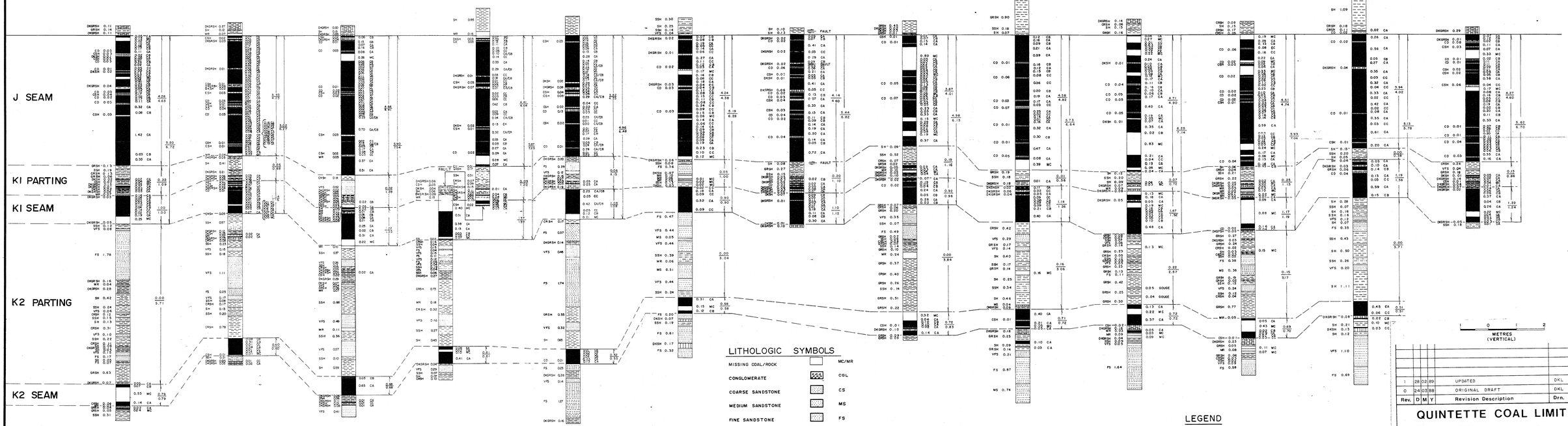
J SEAM
K1 PARTING
K1 SEAM
K2 PARTING
K2 SEAM

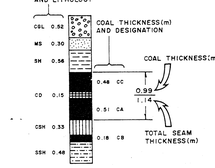


METRES (VERTICAL)

LITHOLOGIC SYMBOLS

MISSING COAL/ROCK		MC/MR	
CONGLOMERATE		CGL	
COARSE SANDSTONE		CS	
MEDIUM SANDSTONE		MS	
FINE SANDSTONE		FS	
VERY FINE SANDSTONE		VFS	
SANDY SHALE		SSH (SILTSTONE)	
COARSE SHALE		CRSH (SILTY CLAYSTONE)	
SHALE		SH (CLAYSTONE)	
DARK GREY SHALE		DKGRSH (CARBONACEOUS > 60% ASH)	
DARK SHALE		DKSH (50 - 60 % ASH)	
COALY SHALE		CSH (40 - 50 % ASH)	
COAL / ROCK		CD (30 - 40 % ASH)	
COAL		CC (20 - 30 % ASH)	
COAL		CB (10 - 20 % ASH)	
COAL		CA (<10 % ASH)	

LEGEND



Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
1	28	02	89	UPDATED	DKL	NH	DJ
0	24	03	88	ORIGINAL DRAFT	DKL	NH	DJ

QUINTETTE COAL LIMITED

Project Manager
DENISON MINES LIMITED
COAL DIVISION

Area GRIZZLY | Category CORRELATION

Drawing Title

GRIZZLY AREA 746

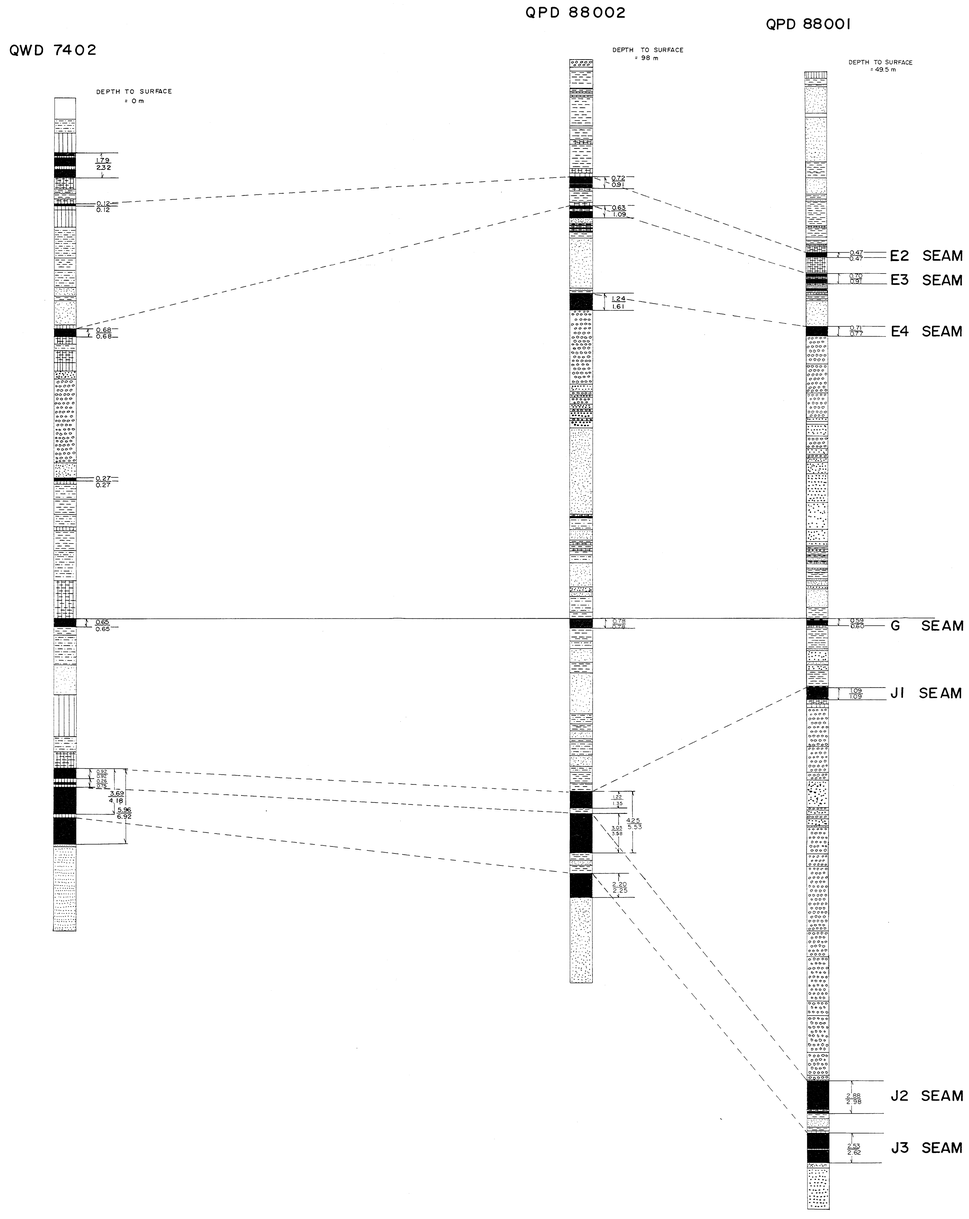
DETAILED SEAM CORRELATION G, J AND K SEAMS

Scale	Drawing No.	Rev.
1:50 (vert.)	88 - 905 - 26 - 003	1

Appendix T.3.5

Perry Creek Stratigraphic Correlation

LINE A



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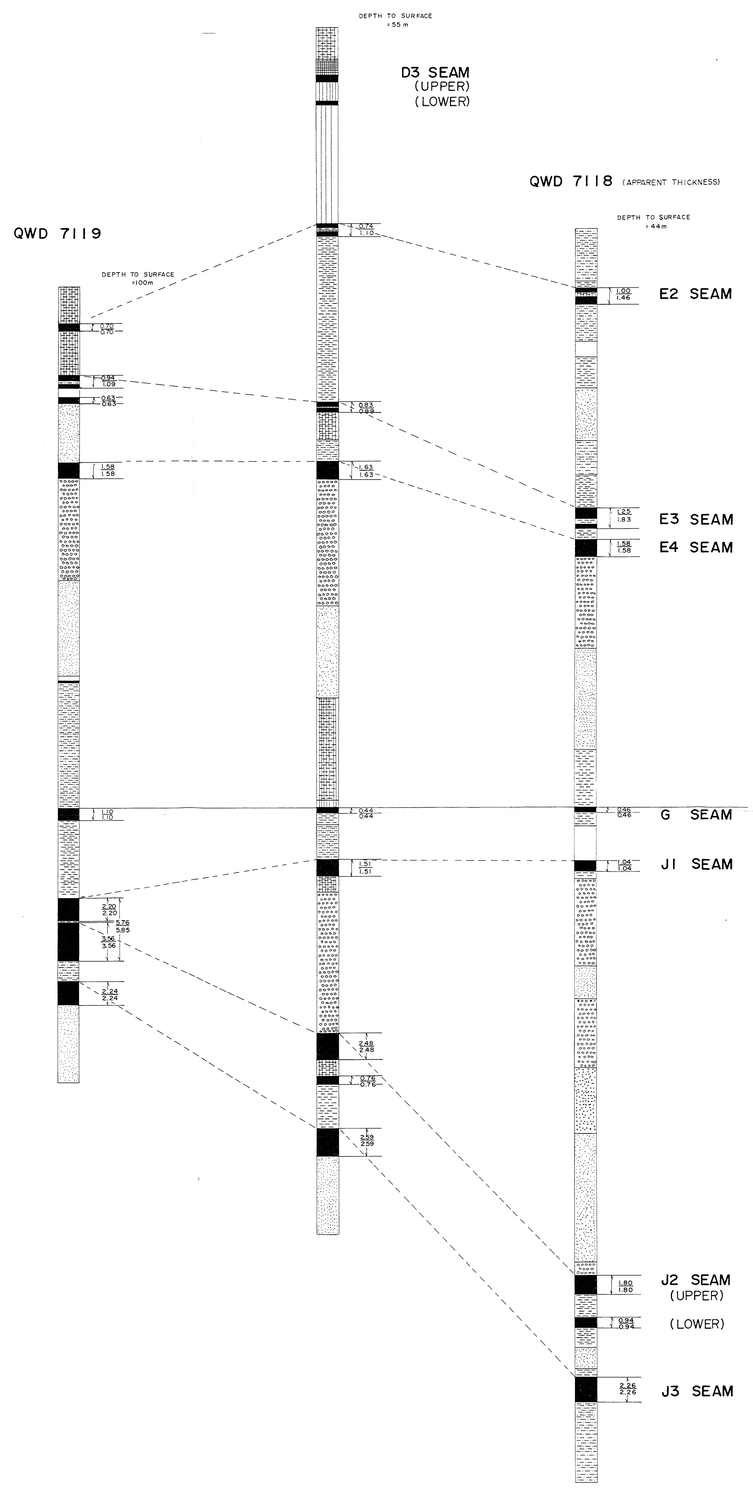
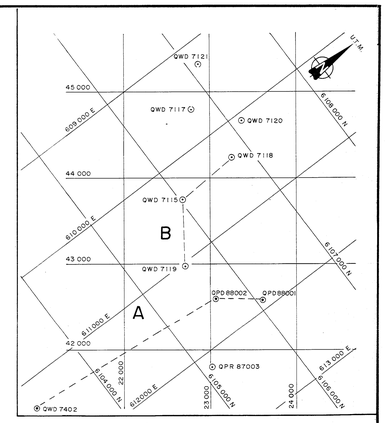




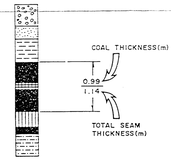
PERRY CREEK LOCATION MAP

500 0 500 1000
METRES
1:25,000

LITHOLOGIC SYMBOLS

CONGLOMERATE		CGL
COARSE SANDSTONE		CS
MEDIUM SANDSTONE		MS
FINE SANDSTONE		FS
VERY FINE SANDSTONE		VFS
SANDY SHALE		SSH (SILTSTONE)
COARSE SHALE		CRSH (SILTY CLAYSTONE)
SHALE		SH (CLAYSTONE)
DARK GREY SHALE		DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE		DKSH (50 - 60 % ASH)
COALY SHALE		CSH (40 - 50 % ASH)
COAL / ROCK		CD (30 - 40 % ASH)
COAL		CC (20 - 30 % ASH)
COAL		CB (10 - 20 % ASH)
COAL		CA (<10 % ASH)
MISSING		

LEGEND



0 5 10 15 20
METRES
(VERTICAL SCALE ONLY)

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	02	03	89	ORIGINAL DRAFT	DKL	TW	DJ

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area PERRY CREEK | Category CORRELATION

Drawing Title

PERRY CREEK AREA 746

MIDDLE GATES

STRATIGRAPHIC CORRELATION

Scale	Drawing No.	Rev.
1:200 (VERT.)	89-906-26-001	0

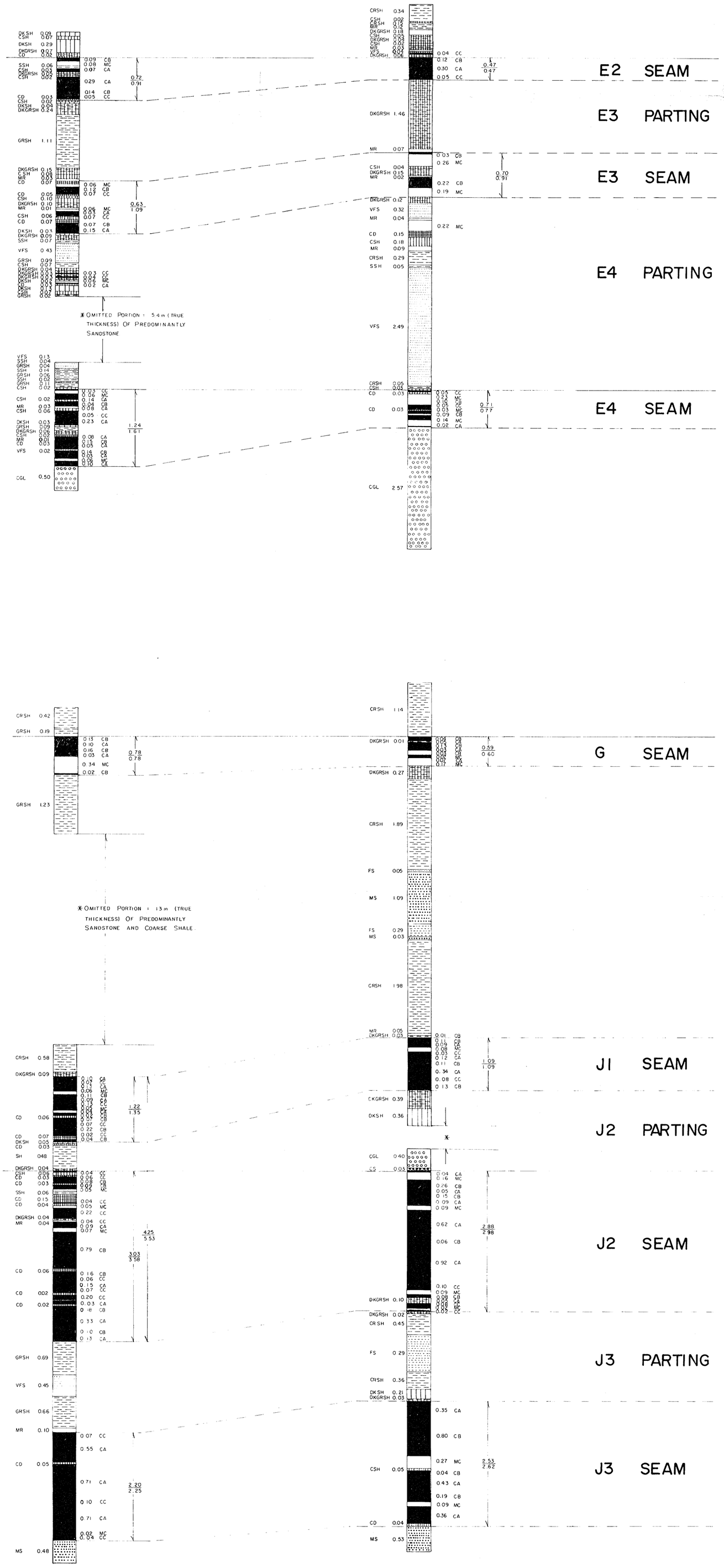
Appendix T.3.6

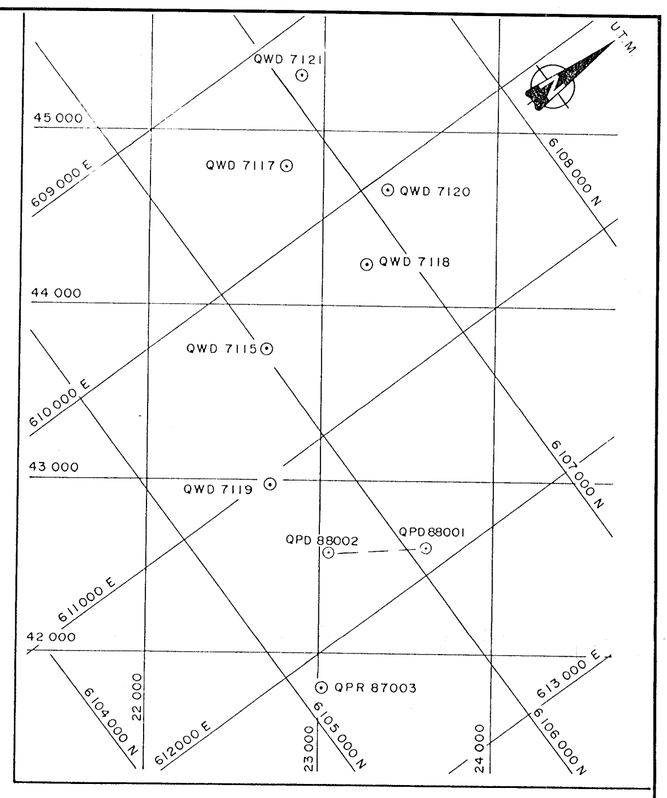
Perry Creek Seam Correlation

PERRY CREEK AREA

QPD 88002

QPD 88001





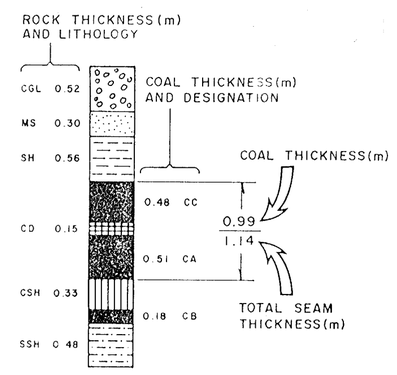
PERRY CREEK LOCATION MAP

500 0 500 1000
METRES

LITHOLOGIC SYMBOLS

MISSING ROCK	MP
CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > , AS·
DARK SHALE	DKSH (50 - 60 % ASH)
COALY SHALE	CSH (40 - 50 % ASH)
COAL / ROCK	CD (30 - 40 % ASH)
COAL	CC (20 - 30 % ASH)
COAL	CB (10 - 20 % ASH)
COAL	CA (<10 % ASH)
MISSING COAL	MC

LEGEND



1 0 1 2
METRES
(VERTICAL)

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
C	05	04	89	ORIGINAL DRAFT	DKL		

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Area PERRY CREEK | Category Correlation Chart

Drawing Title

PERRY CREEK AREA 746

DETAILED SEAM CORRELATION

E, G2 AND J SEAMS

Scale	Drawing No.	Rev.
1: 50 (Vert.)	89 - 906 - 26 - 002	0

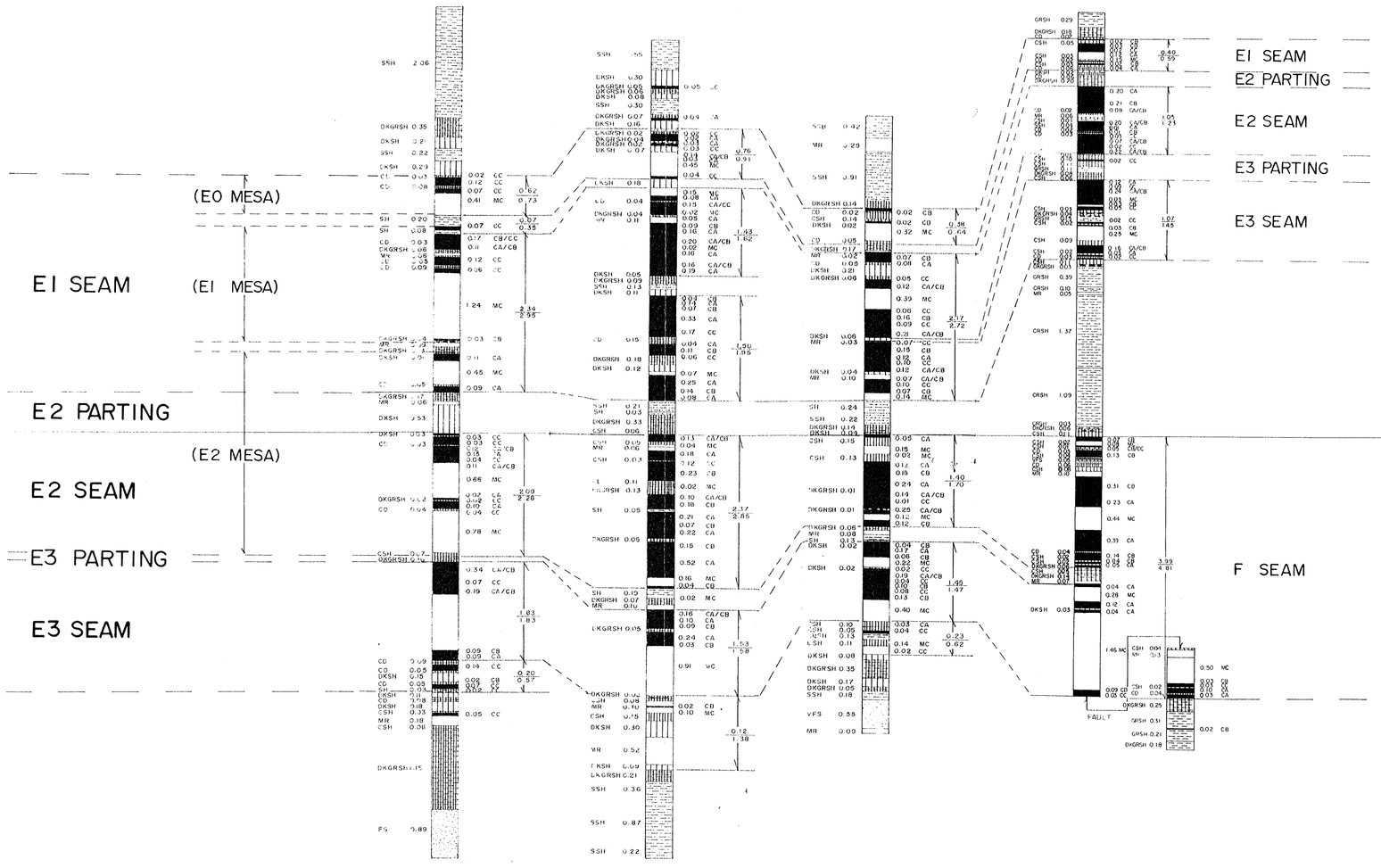
Appendix T.3.7

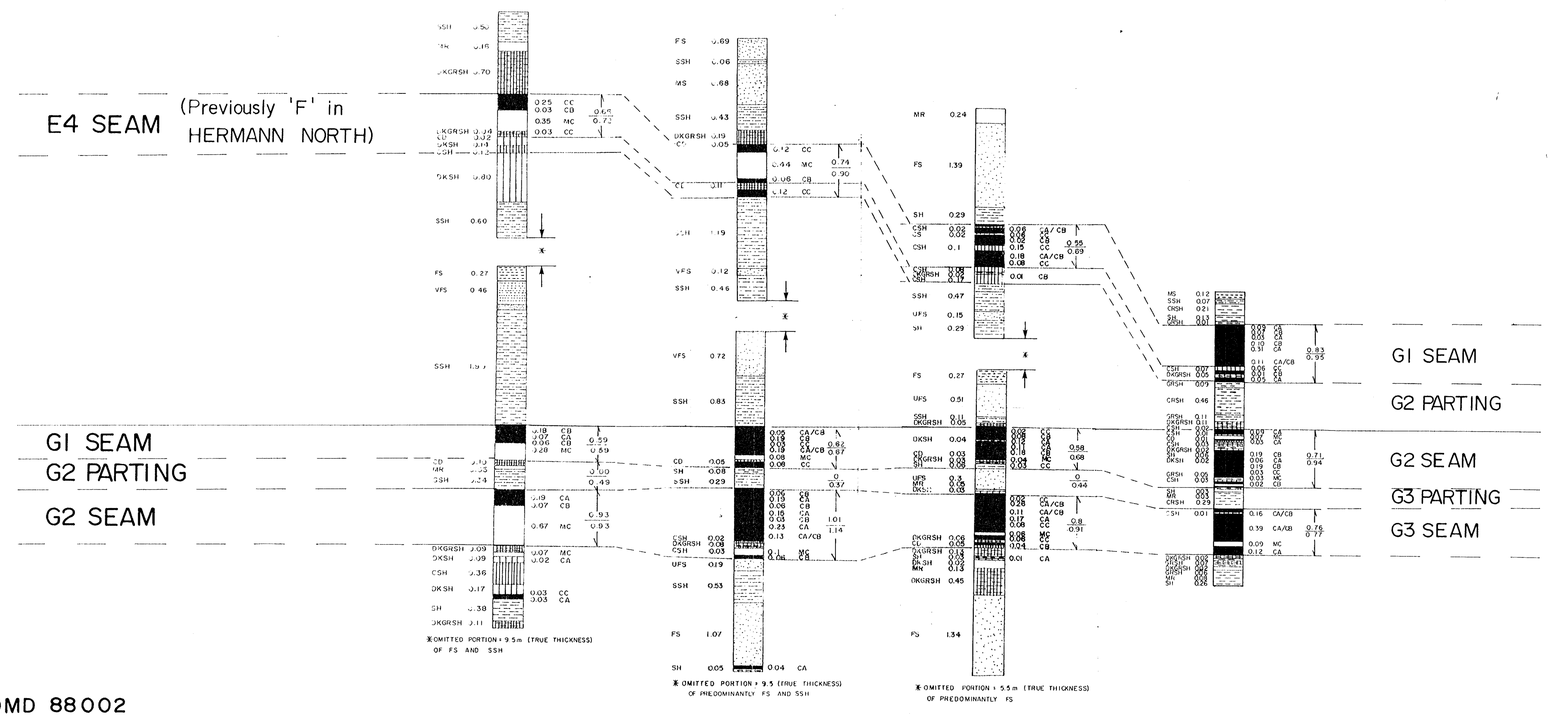
Marmot Stratigraphic Correlation

MARMOT AREA CORRELATION

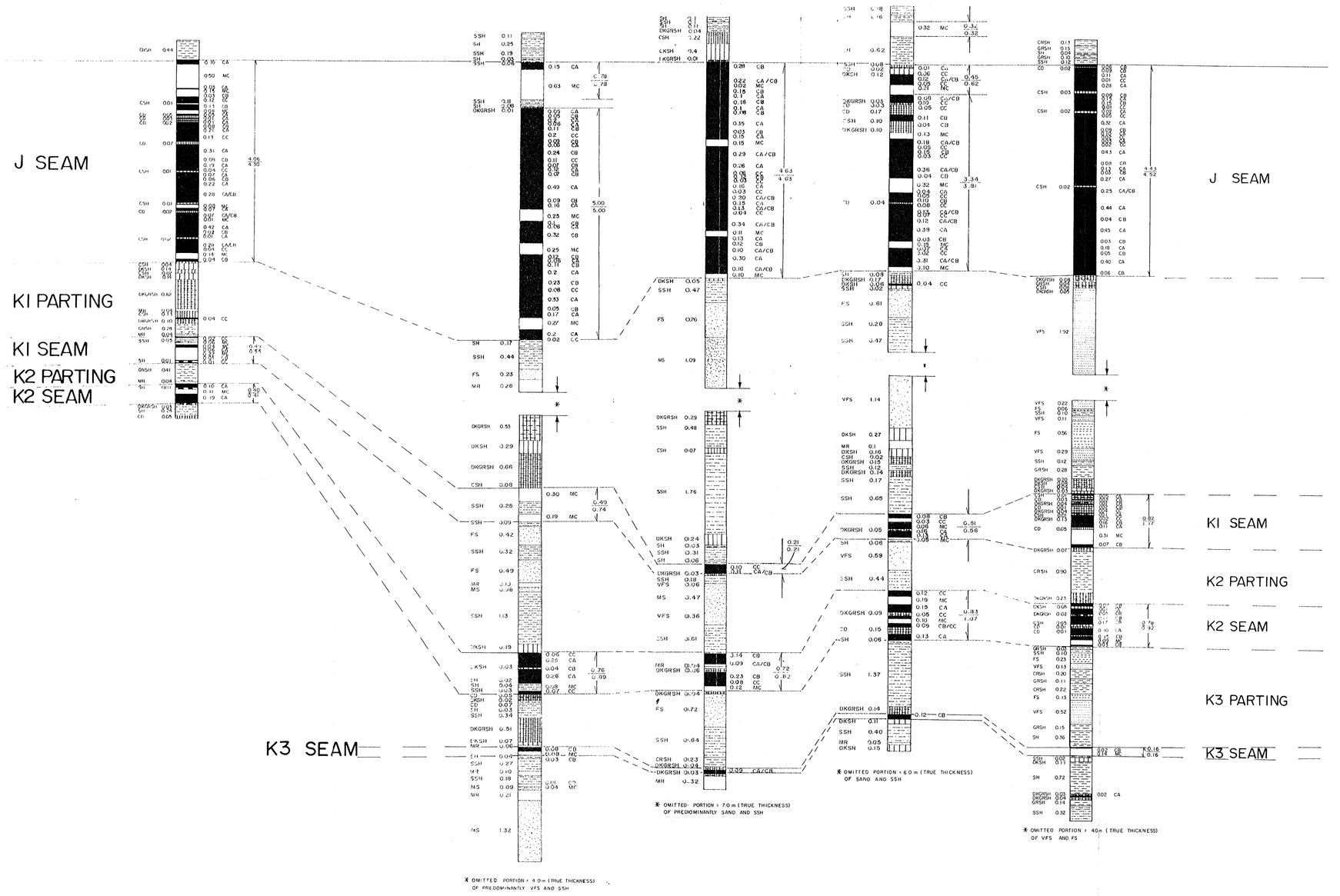
TRANSFER AREA CORRELATION

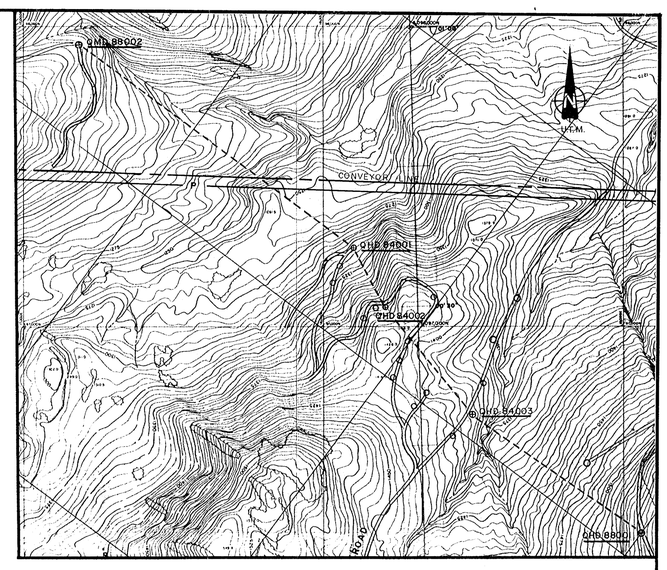
QHD 84001 | QHD 84002 | QHD 84003 | QHD 88001





QMD 88002





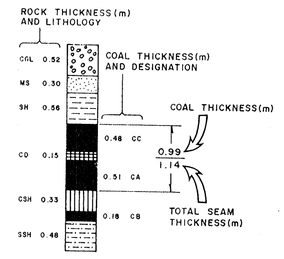
MARMOT AREA
LOCATION MAP

0 1 2 3 4 5 10
KILOMETRES
SCALE 1:10,000

LITHOLOGIC SYMBOLS

CONGLOMERATE		CGL
COARSE SANDSTONE		CS
MEDIUM SANDSTONE		MS
FINE SANDSTONE		FS
VERY FINE SANDSTONE		VFS
SANDY SHALE		SSH (SILTSTONE)
COARSE SHALE		CRSH (SILTY CLAYSTONE)
SHALE		SH (CLAYSTONE)
DARK GREY SHALE		DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE		DKSH (50 - 60 % ASH)
COALY SHALE		CSH (40 - 50 % ASH)
COAL / ROCK		CD (30 - 40 % ASH)
COAL		CC (20 - 30 % ASH)
COAL		CB (10 - 20 % ASH)
COAL		CA (<10 % ASH)
MISSING COAL / ROCK		MC / MR

LEGEND



1.0 0 1.0 2.0 4.0
METRES
(VERTICAL SCALE ONLY)

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	01	03	89	ORIGINAL DRAFT	DKL	NH	DJ

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area: HERMANN NORTH | Category: CORRELATION

Drawing Title:

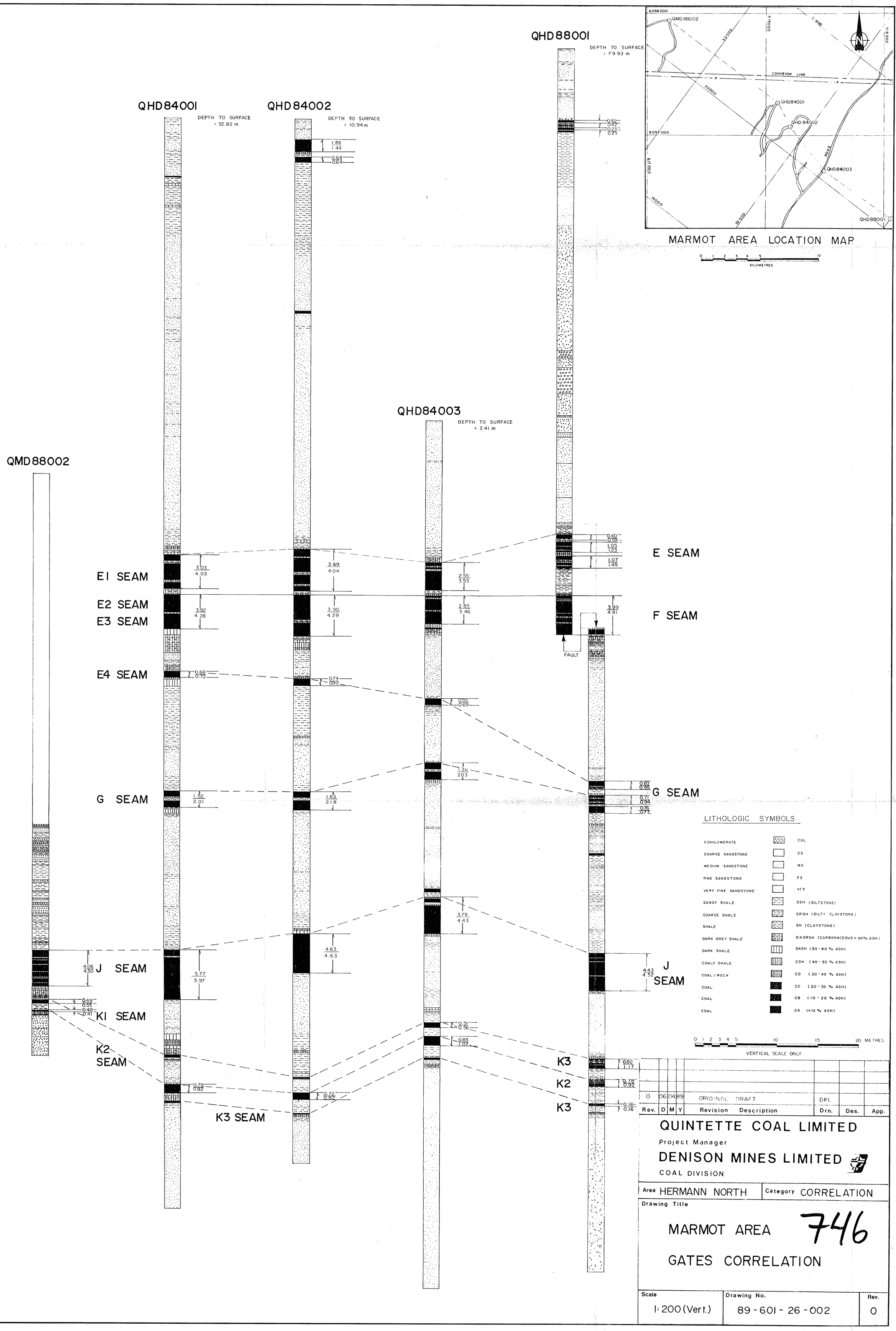
MARMOT AREA DETAILED SEAM CORRELATION

746

Scale	Drawing No.	Rev.
1:50 (VERT.)	89-601-26-001	0

Appendix T.3.8

Marmot Seam Correlation



Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	06	04	89	ORIGINAL DRAFT	DKL		

QUINTETTE COAL LIMITED

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DENISON MINES LIMITED

COAL DIVISION

Area HERMANN NORTH | Category CORRELATION

Drawing Title

MARMOT AREA 746

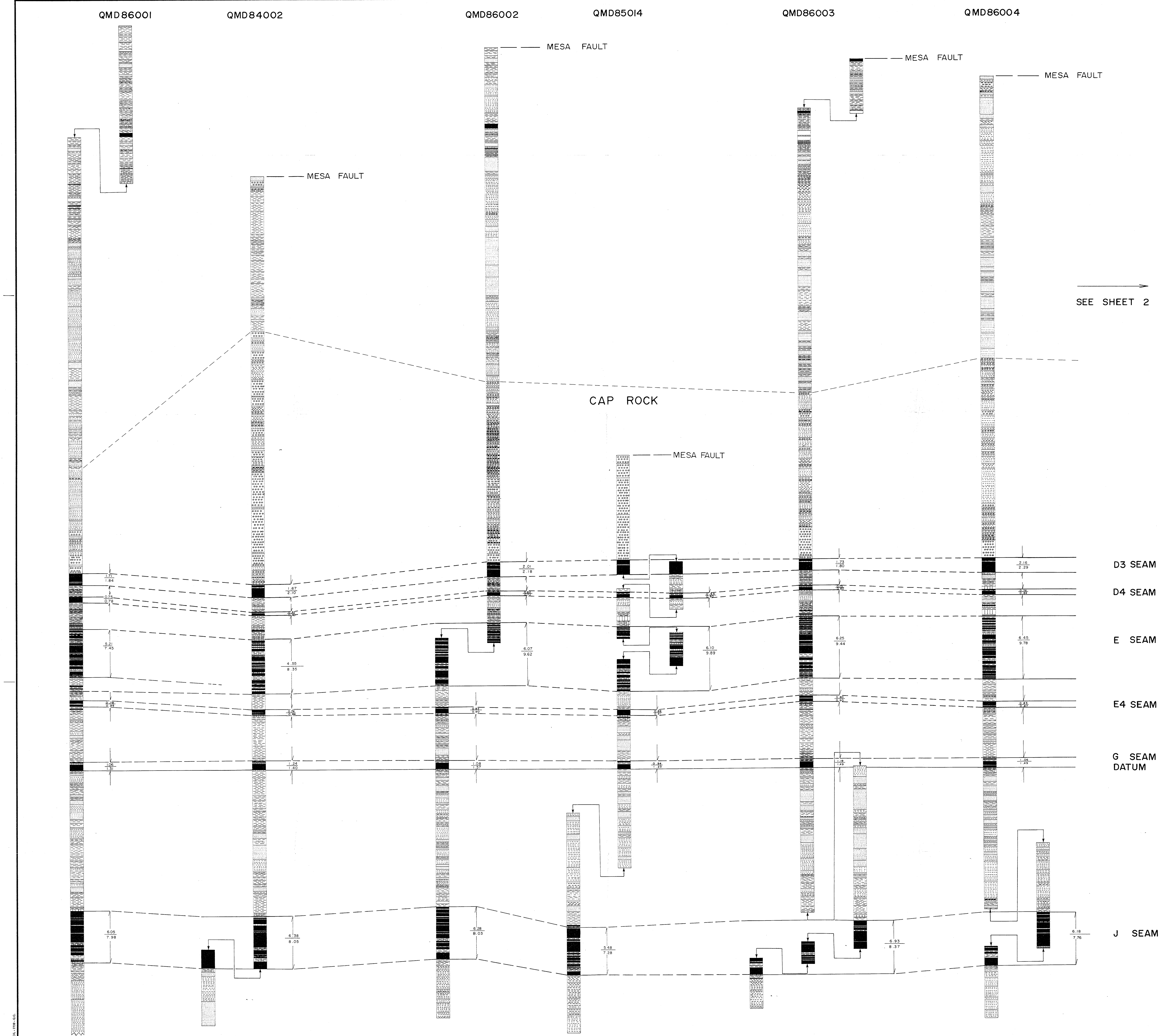
GATES CORRELATION

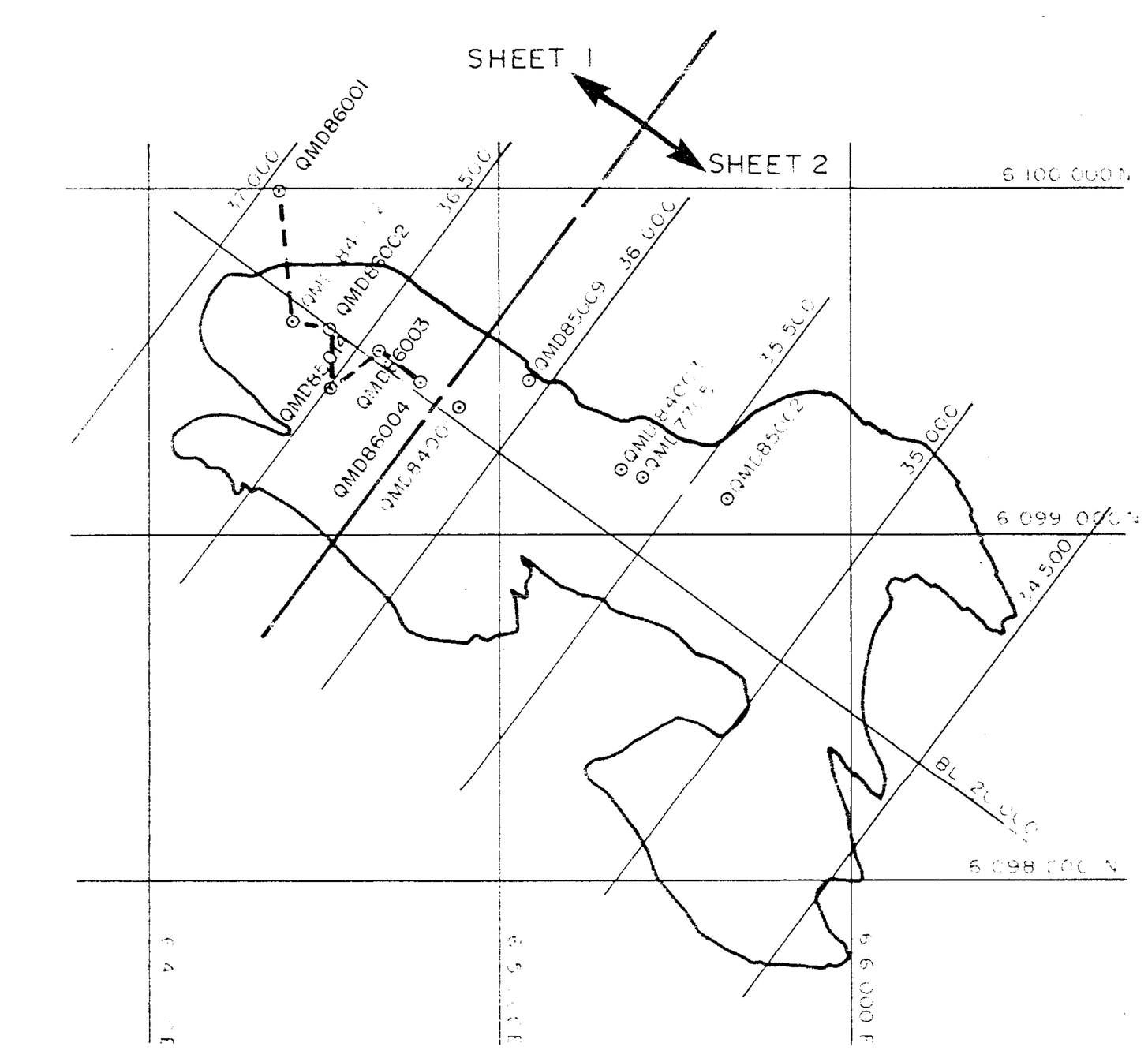
Scale	Drawing No.	Rev.
1:200 (Vert.)	89 - 601 - 26 - 002	0

Appendix T.3.9

Mesa Extension Stratigraphic Correlation

(sheet 1 of 2)



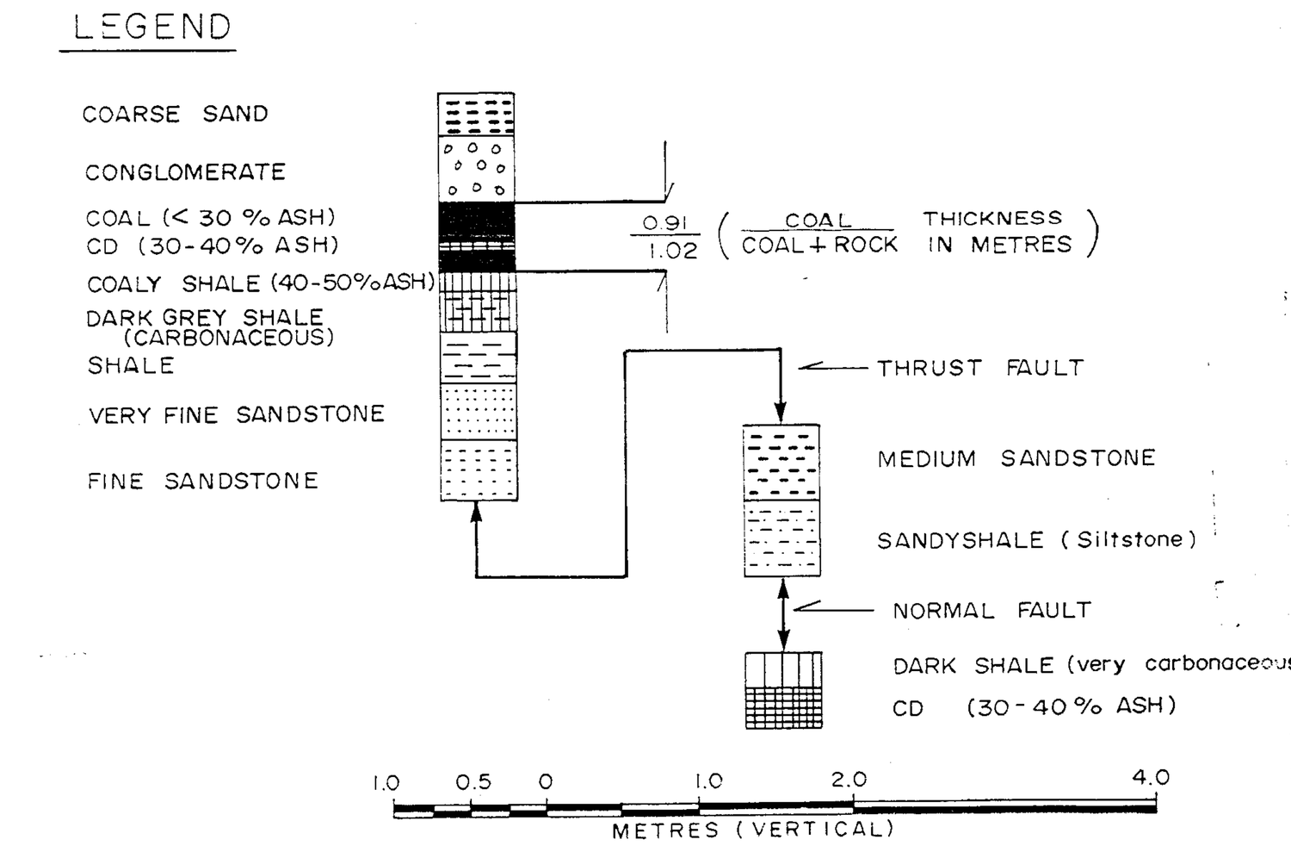


KEY MAP
1:20,000

LITHOLOGIC SYMBOLS

CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS > 60% ASH)
DARK SHALE	DKSH (50 - 60 % ASH)
COALY SHALE	CSH (40 - 50 % ASH)
COAL / ROCK	CD (30 - 40 % ASH)
COAL	CC (20 - 30 % ASH)
COAL	CB (10 - 20 % ASH)
COAL	CA (<10 % ASH)

LEGEND



Rev.	Y	M	D	Revision Description	Drn.	Des.	App.
0	87	04	15	ORIGINAL DRAFT	DKL	DJ	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area MESA EXTENSION | Category CORRELATION

Drawing Title

STRATIGRAPHIC
CORRELATION CHART
MESA EXTENSION
SHEET 1 of 2

Scale	Drawing No.	Rev.
1:200 (VERTICAL)	87-106-26-001	0

746

Appendix T.4

1988 Geological Report

Transfer and Grizzly Seismic Refraction Survey

Refraction Seismic Survey
Transfer/Grizzly Area
Quintette Coal Mine

GEO-PHYSI-CON

REFRACTION SEISMIC SURVEY
TRANSFER/GRIZZLY AREA
QUINTETTE COAL MINE

Prepared For

QUINTETTE COAL LTD.
TUMBLER RIDGE, BRITISH COLUMBIA

Prepared By

GEO-PHYSI-CON CO. LTD.
CALGARY, ALBERTA

AUGUST 1988
C88-34

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the results of a refraction seismic survey in the Transfer/Grizzly area at the Quintette coal mine, near Tumbler Ridge, British Columbia (Figure 1). The purpose of the survey was to determine depth to bedrock. The seismic survey was carried out under Quintette Coal Ltd, purchase order R88121846-00-SV.

2.0 LOGISTICS AND DATA ACQUISITION

The field work was undertaken during the period of June 8 to June 13, 1988. The seismic survey was conducted by a four person crew from Geo-Physi-Con Co. Ltd. The crew lodged at commercial facilities in Tumbler Ridge, British Columbia and travelled daily to the site by truck.

The refraction seismic survey was carried out along 5 lines for a total length of 4.42 km (Figure 2). The seismic lines were located and slashed by Quintette Coal Ltd. personnel. Relative

elevation changes along each line were determined using a hand inclinometer. Relative elevations were tied in at selected survey locations to determine true elevations.

Explosives and temporary storage magazines were supplied by Explosives Ltd., Grande Prairie, Alberta.

The seismic data was recorded with a GeoMetrics ES1210F, 12 channel signal enhancement seismograph. Manufacturer's specifications for this equipment are included in Appendix A.

Figure 3 illustrates the geophone and shot arrangement employed along two consecutive spreads of 12 geophones each. A geophone spacing of 20 metres was used. Shots were located 20 metres and up to 280 metres past the end geophones of each spread and at the one third points (interior shots) along each spread. The interior shots were placed to determine the velocity distribution in the shallow subsurface. End shots and shots located 280 metres beyond the end geophones were placed in order to record the arrival time of compression energy refracted along the competent bedrock surface at as may geophone stations as possible.

Explosives were detonated at the surface to produce compression type seismic energy. Generally, 1 to 5 sticks (.2 to .8 kilogram) of Forcite (75%) were used for this purpose. All explosives were detonated with instantaneous electrical blasting caps. The detonating device also controlled the turn-on of the timing function of the recording seismograph. Geophones sensitive to vertical velocity and with a natural frequency of 14 hertz were used to detect the onset and passage of seismic energy.

Figure 4 illustrates typical records obtained for an end and an offset shot, along line 3. The direct or critically refracted compression wave arrive first at each geophone location. The first arrivals of compression type seismic energy are clearly visible on these records.

3.0 INTERPRETATION

The first break times were plotted against source offset distance to derive travel time graphs for direct and critically refracted compression wave seismic energy. The graphs were then analyzed using well established methods to derive the velocity and

thickness of distinctive strata within the subsurface. Notes describing the physical principles and methods of interpretation are included in Appendix B.

The primary factors influencing the accuracy of the interpreted depth to bedrock are:

i) the delay time to bedrock, and
ii) the velocity within overlying materials.

The delay time can be predicted with good accuracy due to the observed large contrast in compression wave velocity between the bedrock and overlying unconsolidated materials. The conversion of delay time into the depth to bedrock depends on the velocity within the overburden.

4.0 RESULTS

The thickness and associated seismic velocities for subsurface strata observed from the refraction seismic survey along Line 1 to Line 5 are shown in Figures 5 to 9 respectively.

The travel time graphs over most of the survey area indicate the presence of three layers. The upper layer is characterized by a compression wave velocity of 400 m/sec. This velocity is typical of unconsolidated and unsaturated material. The intermediate layer is characterized by a compression wave velocity of between 1160 and 2000 m/sec. These velocities are typical of overburden type materials. This range of velocities is most likely due to the degree of consolidated and/or saturation of the materials. The compression wave velocity in water is about 1500 m/sec. The lower layer is characterized by a compression wave velocity of between 3600 and 4800 m/sec. These velocities are typical of bedrock. In some areas an additional intermediate layer is present. The velocity of this layer is approximately 800 m/sec and would represent unconsolidated and unsaturated materials.

The interpreted sections show that the depth to bedrock is quite variable at the site. The greatest depth to bedrock occurs along the south half of Line 1 between Station 7+50 and the end of the line. In this area, depth to bedrock is in the order of 90 to 100 metres. The shallowest depth to bedrock occurs at the east ends of Lines 3 and 4 where the depth to bedrock is less than 10 metres.

Two drill holes occur in the vicinity of the seismic lines. Drill hole QHR87045 occurs along Line 3, Station 7+40. Bedrock was reported at 9 metres in the drill hole. The seismic interpretation is in good agreement with the drilling information. The other drill hole QHD88004 is offset approximately 100 metres from Line 4, Station 4+50. The drilling results show bedrock to occur at 79 metres. The seismic interpretation predicts bedrock at 72 metres. Considering the topographic relief and distance from the drill hole, the seismic interpretation is in good agreement with the drill hole data.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Seismic refraction techniques can be used to locate the bedrock surface at this site due to the large contrast in compression wave velocity observed between bedrock and unconsolidated overburden. The predicted depths to bedrock agree with the known depth at two drill holes in the area.

It is recommended that further drill hole control be established in the study area. At least one drill hole should be located in an area having larger predicted depths to bedrock and one at the base

of the slope along line 2. A review of the analysis of seismic data should be conducted once additional drill hole information becomes available.

Respectfully submitted

Geo-Physi-Con Co. Ltd.

Per: Michael Pesowski

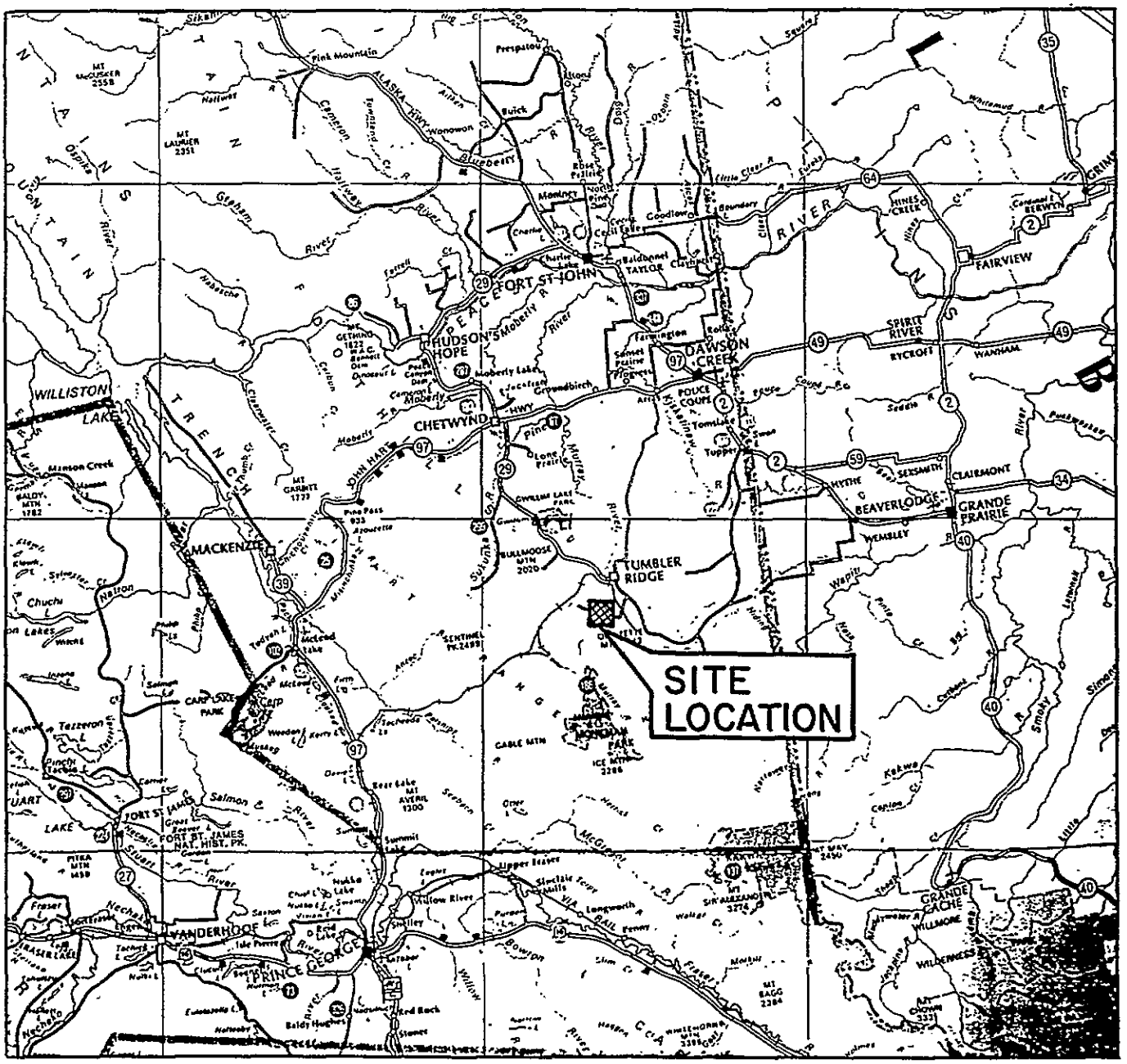
Michael Pesowski, P.Geoph.
Project Geophysicist

Reviewed by: Michael Pesowski for.

J. D. Henderson
President

PERMIT TO PRACTICE
GEO-PHYSI-CON CO. LTD.
Signature Michael Pesowski
Date Aug 18 1988
PERMIT NUMBER: P 2802
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

Calgary, Alberta
August 1988
C88-34

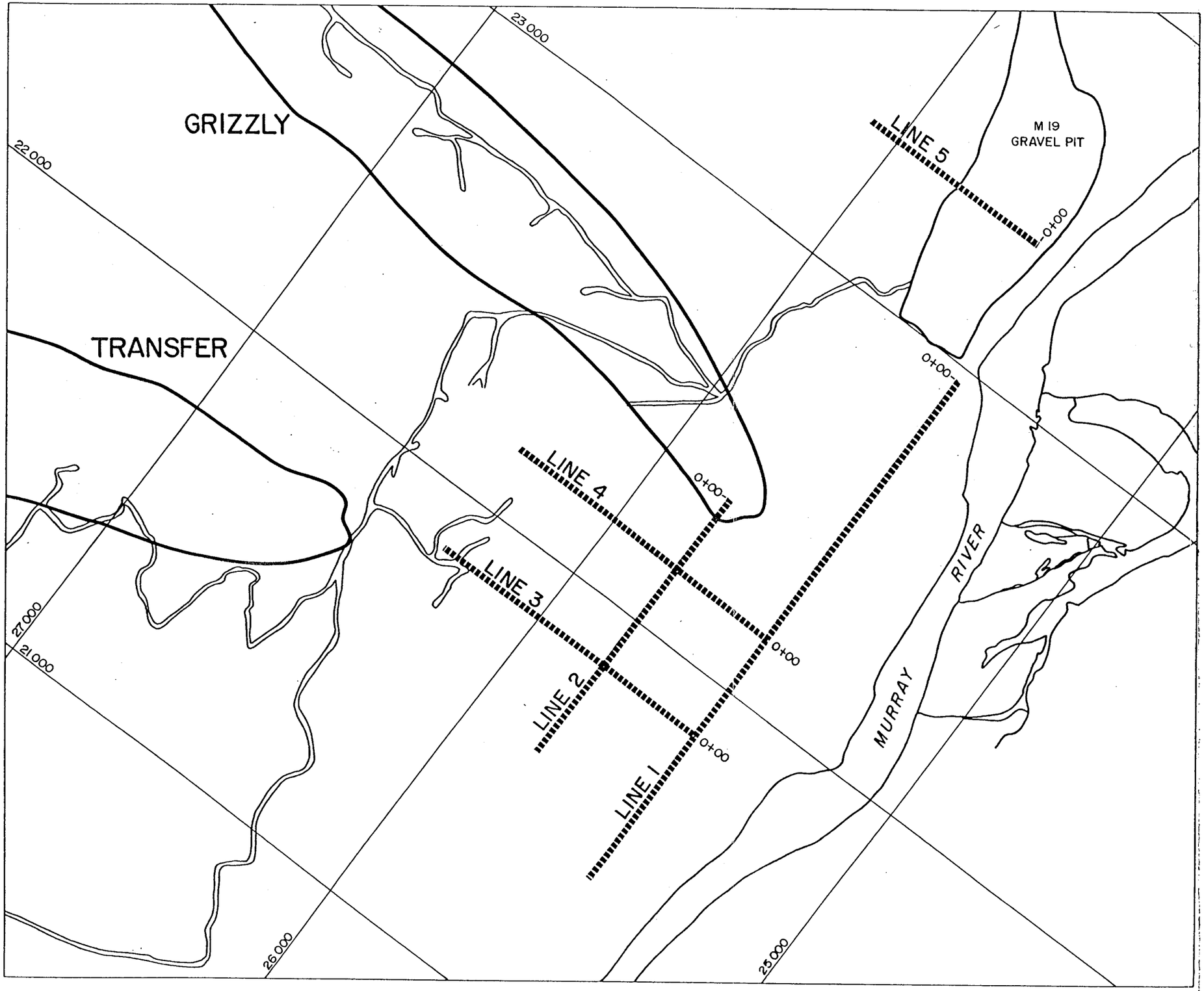


Quintette Coal Limited

TRANSFER/GRIZZLY AREA

SITE LOCATION MAP

	SCALE	DRAWN BY	DATE
GEO-PHYSI-CON	N.T.S.	BB	Aug., 198
		PROJECT NO. C 88-34	FIGURE 1



N

LEGEND

Geophysical Survey Line

0 200 400 metres

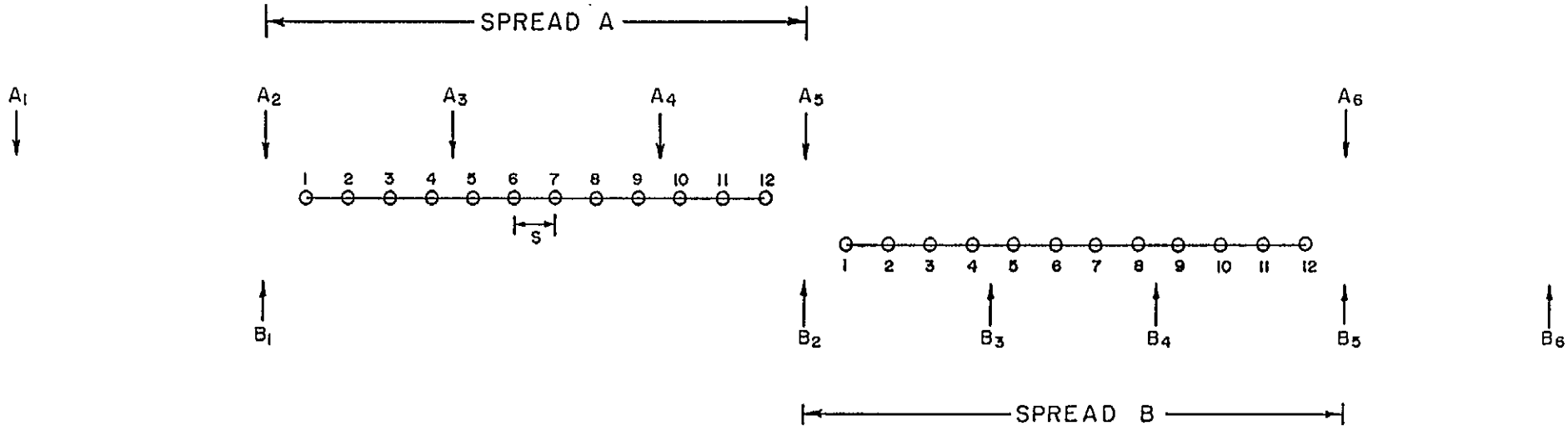
SCALE

Quintette Coal Limited

TRANSFER/GRIZZLY AREA

LINE LOCATION MAP

GEO-PHYSI-CON	SCALE 1:10000	DRAWN BY BB	DATE Aug., 1988
	N.T.S.	PROJECT NO C 88-34	FIGURE 2



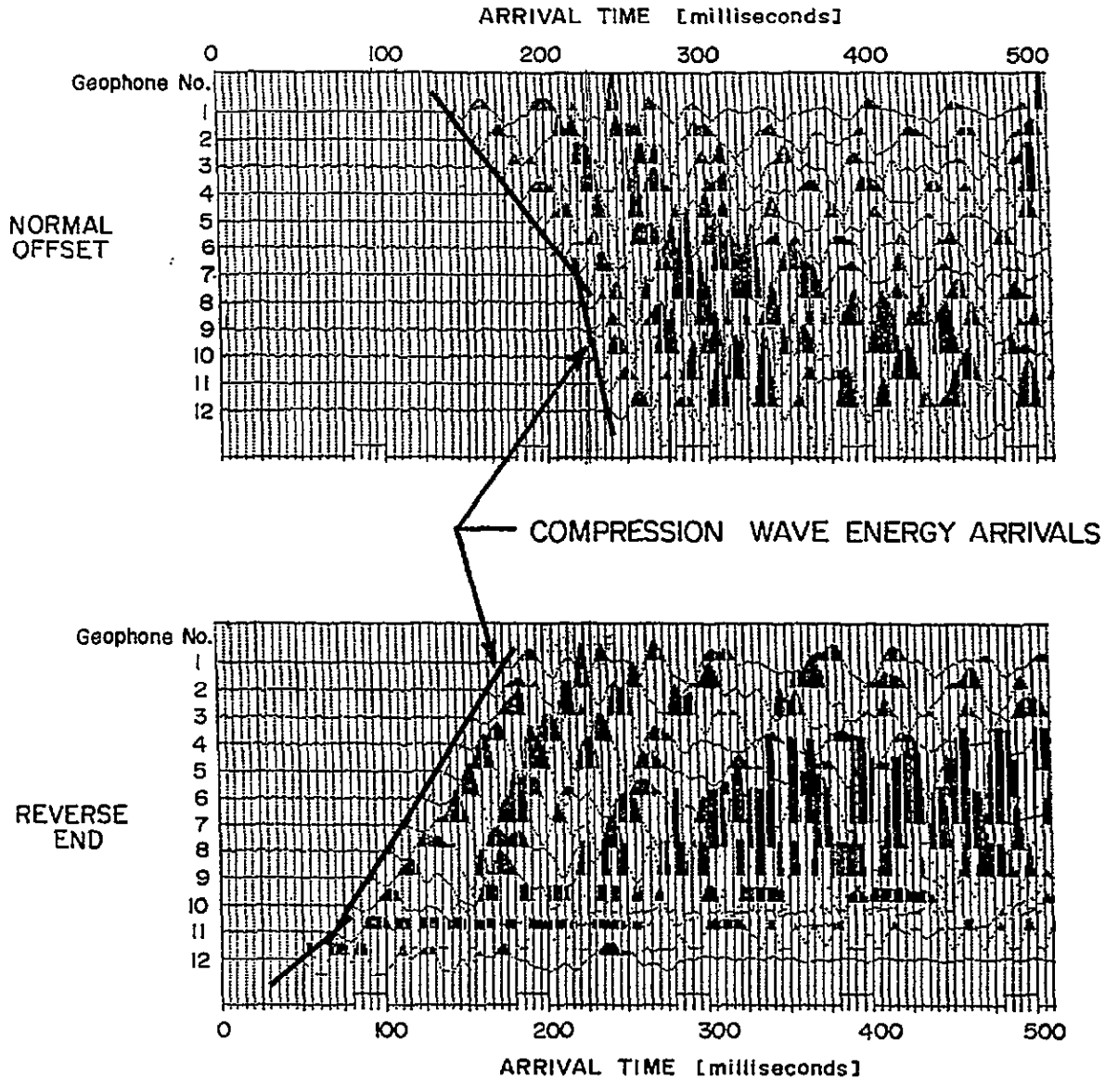
LEGEND

O	Geophone Location
A_1, A_6, B_1, B_6	Far Shot Locations (280m offset), Spread A, Spread B
A_2, A_5, B_2, B_5	End Shot Locations, Spread A, Spread B
A_3, A_4, B_3, B_4	Interior Shot Locations, Spread A, Spread B
s	Geophone Spacing at 20 metres

GEO-PHYSI-CON

QUINTETTE COAL LIMITED
TRANSFER/GRIZZLY AREA
SHOT AND GEOPHONE LAYOUT
ALONG TWO ADJACENT SPREADS

C 88-34 Figure 3

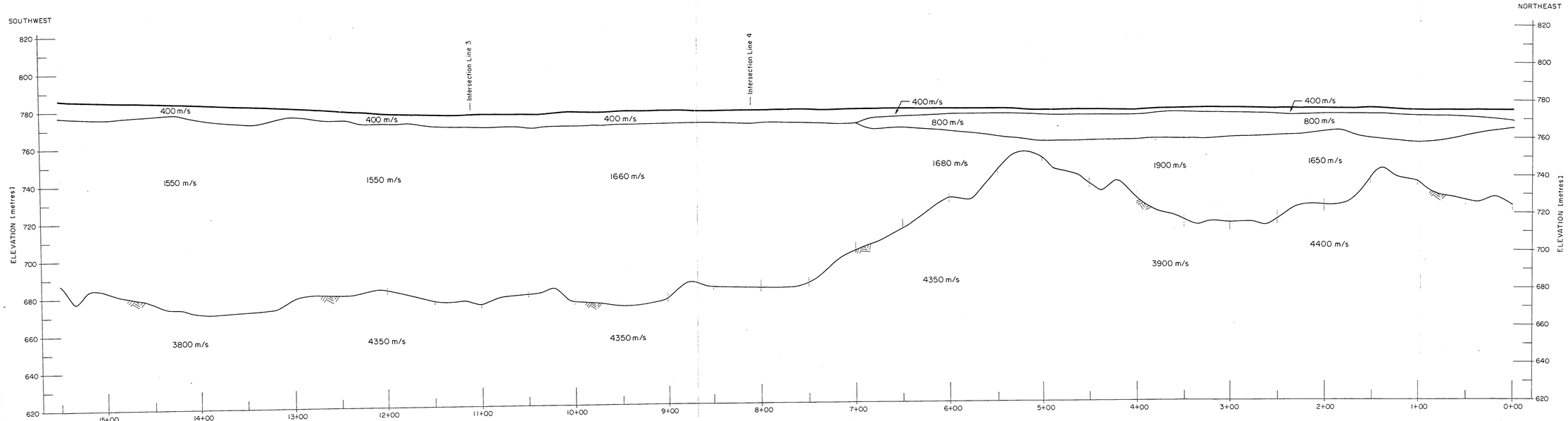


Quintette Coal Limited

TRANSFER/GRIZZLY AREA

TYPICAL REFRACTION SEISMIC RECORDS LINE 1

GEO-PHYSI-CON	SCALE	DRAWN BY: BB	DATE: Aug., 1988
	N.T.S.	PROJECT NO.: C 88-34	FIGURE: 4



LEGEND

- Ground Surface
- Intermediate Refracting Layer
- Bedrock Surface
- 400 m/s Velocity in Metres per Second
- Edge of Lateral Velocity Change

SCALES

Horizontal 1 cm. = 20 m.

Vertical 1 cm. = 10 m.

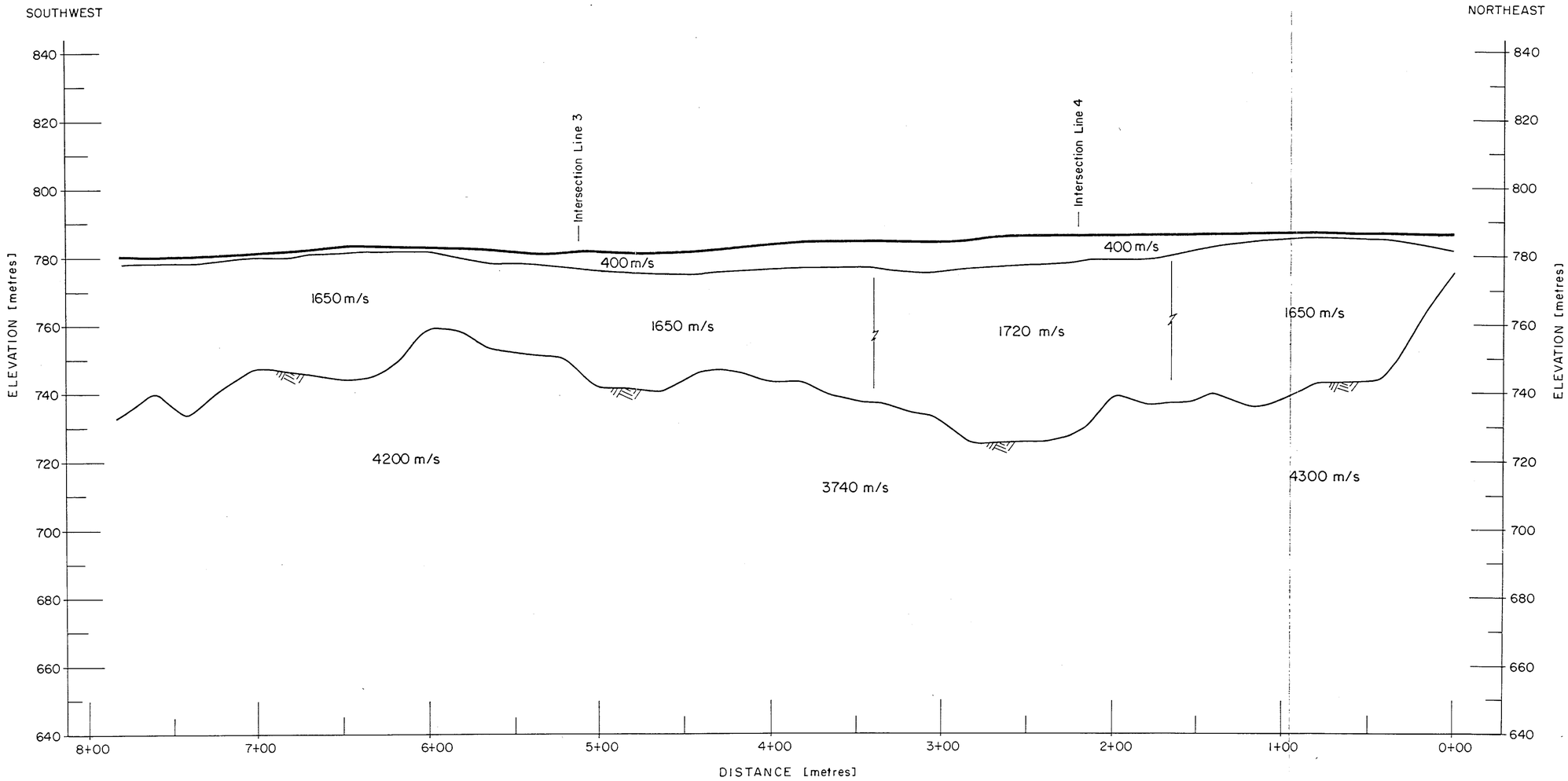
Quintette Coal Limited

TRANSFER/GRIZZLY AREA

REFRACTION SEISMIC PROFILE

LINE 1

GEOPHYSICON	SCALE	DRAWN BY	DATE
	N.T.S.	BB	Aug., 1988
		PROJECT NO.	FIGURE
		C 86-34	5



LEGEND

- Ground Surface
- Intermediate Refracting Layer
- Bedrock Surface
- 400 m/s — Velocity in Metres per Second
- Edge of Lateral Velocity Change

SCALES

Horizontal 1 cm. = 20 m.

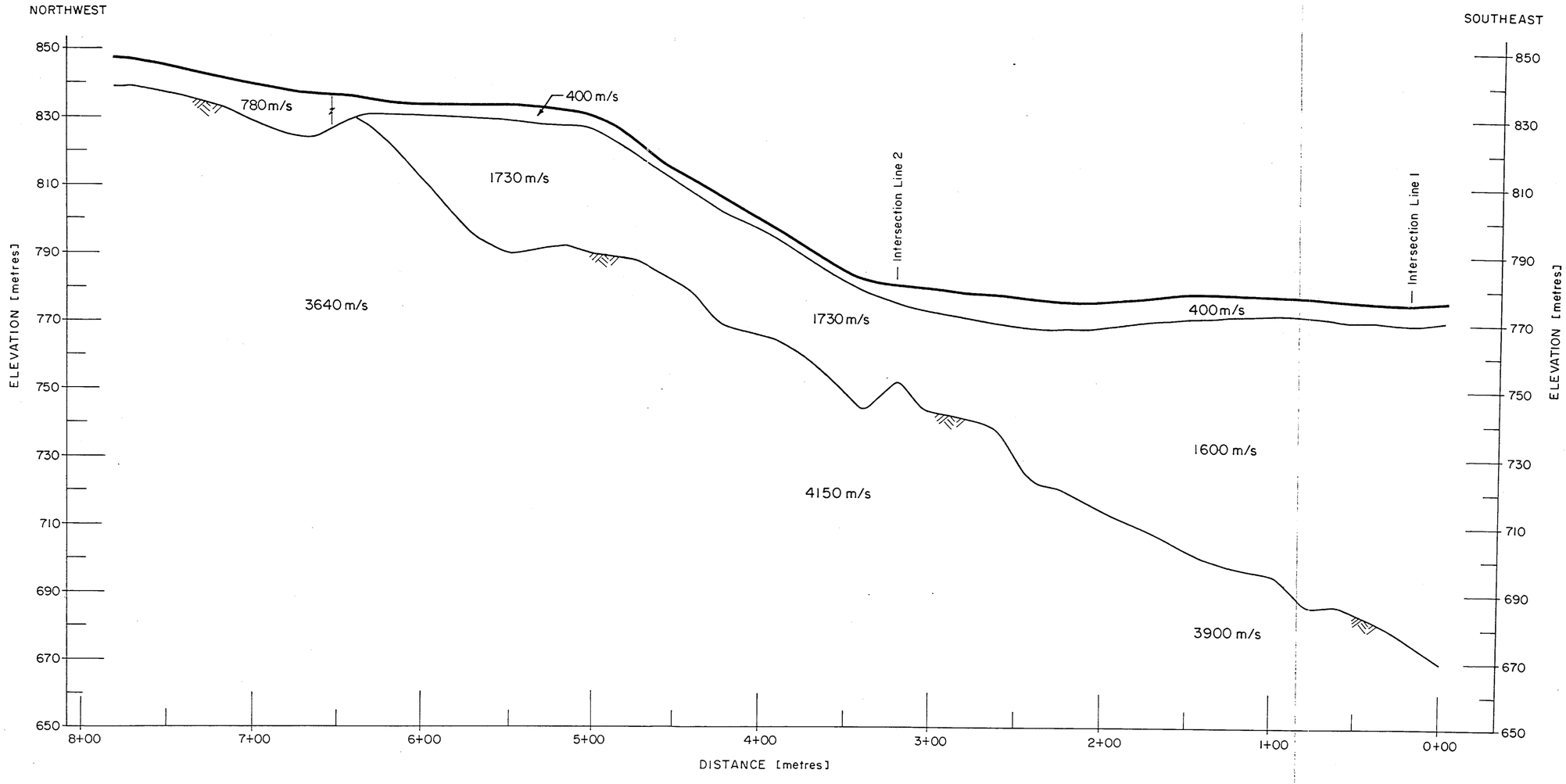
Vertical 1 cm. = 10 m.

Quintette Coal Limited

TRANSFER/GRIZZLY AREA

REFRACTION SEISMIC PROFILE LINE 2

GEOPHYSICON	SCALE	DRAWN BY	DATE
	N.T.S.	BB	Aug., 1988
		PROJECT NO. C 88-34	FIGURE 6



LEGEND

- Ground Surface
- Intermediate Refracting Layer
- Bedrock Surface
- 400 m/s — Velocity in Metres per Second
- Edge of Lateral Velocity Change

SCALES

Horizontal 1 cm. = 20 m.

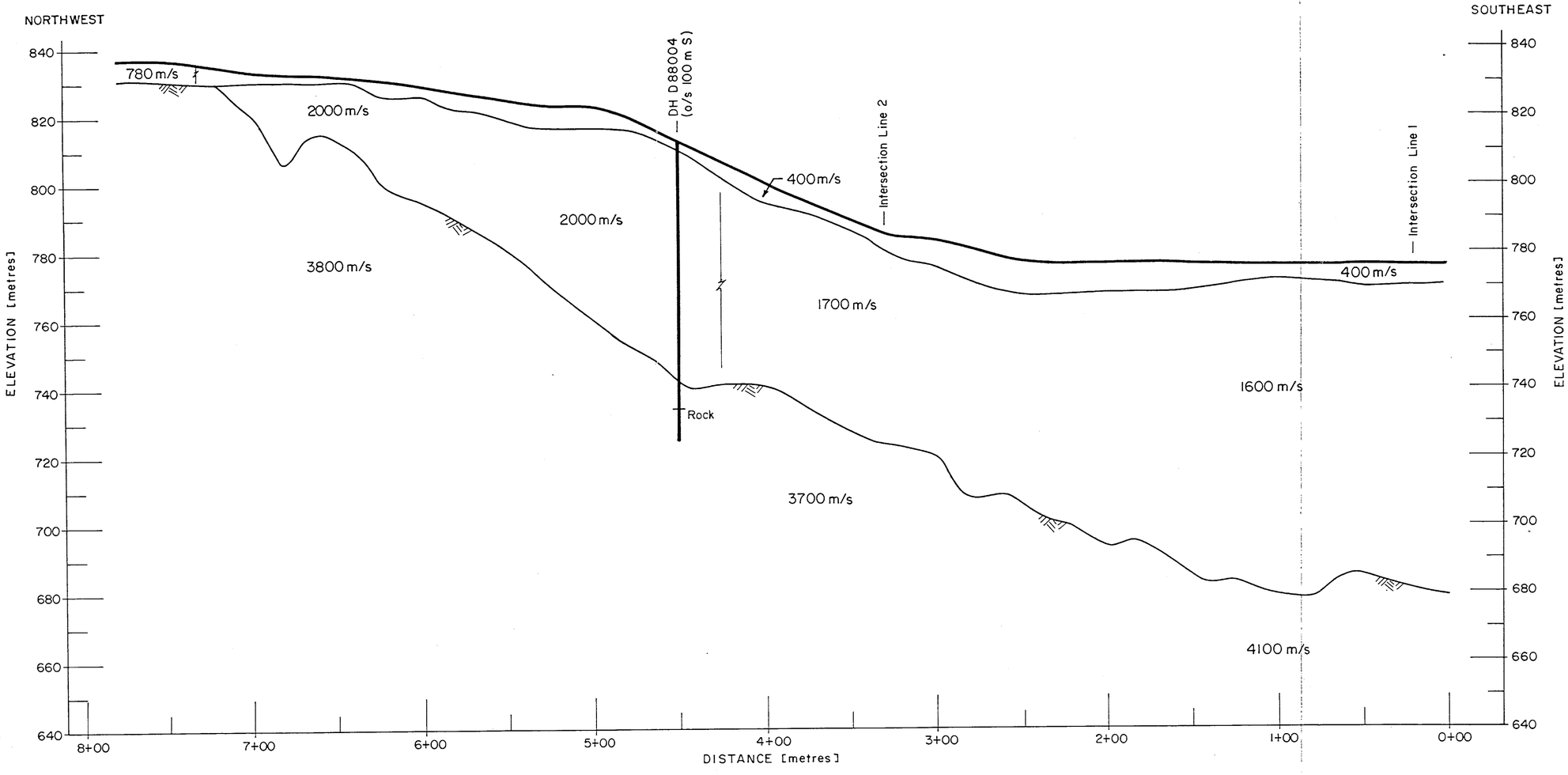
Vertical 1 cm. = 10 m.

Quintette Coal Limited

TRANSFER/GRIZZLY AREA

REFRACTION SEISMIC PROFILE LINE 3

GEOPHYSICON	SCALE	DRAWN BY	DATE
	N.T.S.	BB	Aug., 1988
		PROJECT NO. C 88-34	FIGURE 7



LEGEND

- Ground Surface
- Intermediate Refracting Layer
- Bedrock Surface
- 400 m/s — Velocity in Metres per Second
- Edge of Lateral Velocity Change

SCALES

Horizontal 1 cm. = 20 m.

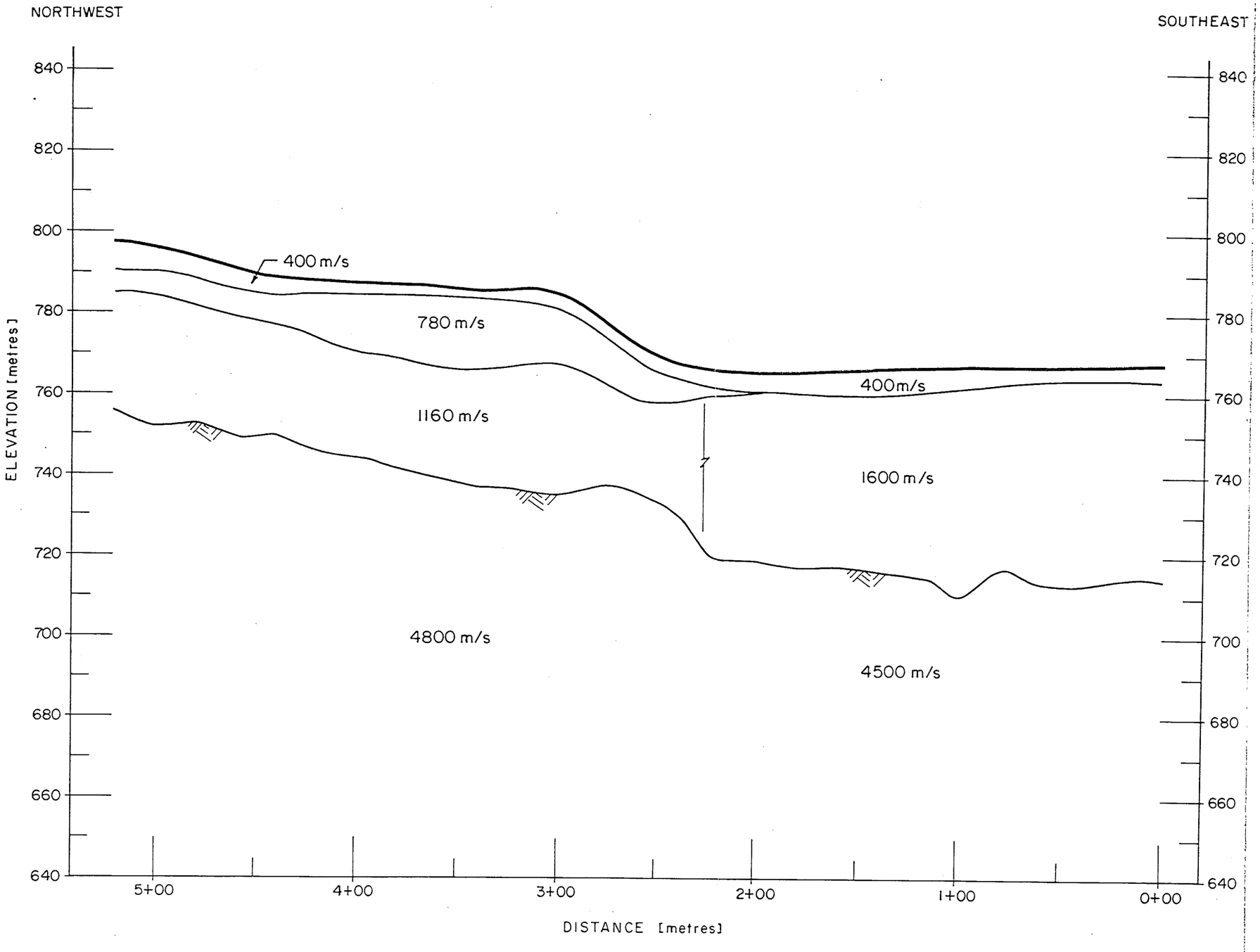
Vertical 1 cm. = 10 m.

Quintette Coal Limited

TRANSFER/GRIZZLY AREA

REFRACTION SEISMIC PROFILE
LINE 4

GEOPHYSICON	SCALE	DRAWN BY	DATE
	N.T.S.	BB	Aug., 1988
		PROJECT NO. C 88-34	FIGURE 8



LEGEND

- Ground Surface
- Intermediate Refracting Layer
- Bedrock Surface
- 400 m/s — Velocity in Metres per Second
- Edge of Lateral Velocity Change

SCALES

Horizontal 1 cm.=20 m.

Vertical 1 cm.=10 m.

Quintette Coal Limited

TRANSFER/GRIZZLY AREA

REFRACTION SEISMIC PROFILE

LINE 5

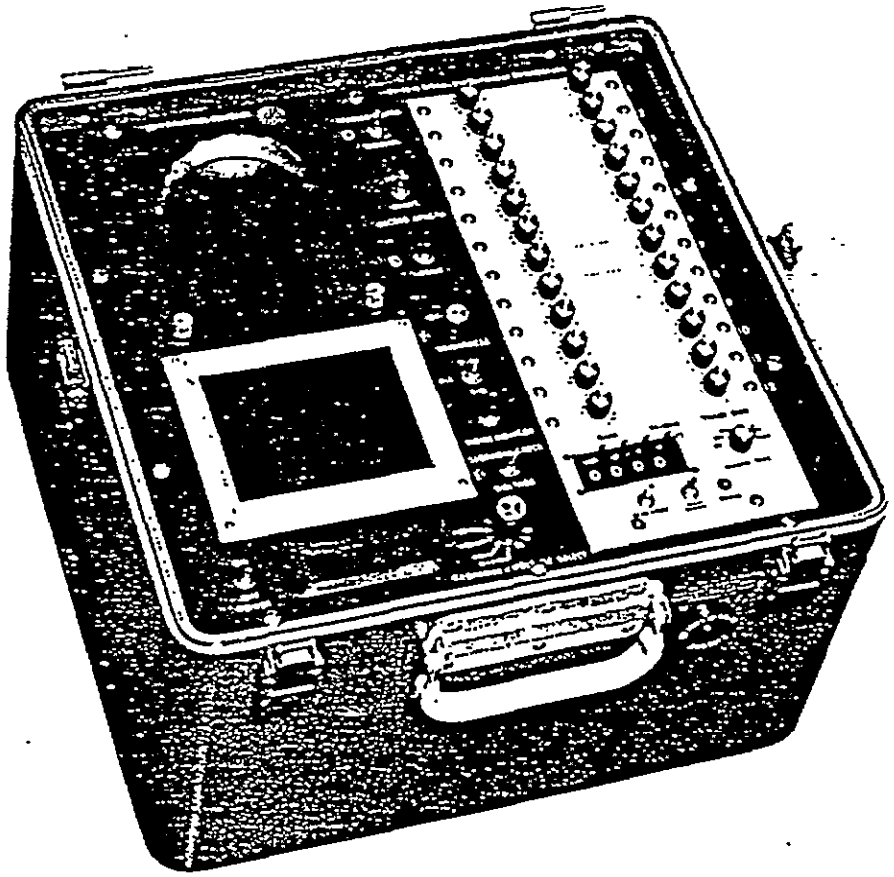
GEOPHYSICON	SCALE N.T.S.	DRAWN BY BB	DATE Aug., 1988
		PROJECT NO. C 88-34	FIGURE 9

Refraction Seismic Survey
Transfer/Grizzly Area
Quintette Coal Mine
Appendix A

geometrics/nimbus

MULTICHANNEL SIGNAL
ENHANCEMENT SEISMOGRAPH
MODEL ES-1210

Preliminary Data Sheet



* *Signal enhancement* for greater sensitivity, improved waveform definition, and more accurate time measurements. Operates under high noise conditions and surveys to greater depths without explosives.

* *Multichannel oscillograph* provides permanent records on high-contrast, sunlight proof, reproducible paper with wiggle trace or variable area format.

* *Daylight-visible CRT monitor* displays the signal stored in memory.

* Compact, lightweight and portable. Ruggedly packaged in weatherproof case.

* Optional digital magnetic tape recorder for computer compatible data storage.

The Nimbus ES-1210 Multichannel Signal Enhancement Seismograph is unique in its combination of CRT display, signal enhancement and oscillograph recording in a single small field instrument. Simple to use yet powerful in performance, this new instrument is ideally suited for all shallow geologic investigations for mining, construction and geologic exploration.

Nimbus ES-1210

SPECIFICATIONS

Basic refraction and reflection system includes: 12-channel exploration seismograph, 12-volt battery pack, 110/220 volt charger, power cord, hammer switch, and instruction manual.

Signal Enhancement:	samples, digitizes, and stores signal in a random access memory. Repeated signals are added while random noise is cancelled or limited.
Memory Size:	10 bits by 1024 words on each channel.
Sample Interval:	switch selectable 50, 100, 200, 500, 1000, or 2000 microsecc
Record Length:	switch selectable 50, 100, 200, 500, 1000, or 2000 millisecc
CRT Display:	5" diagonal measurement CRT, daylight visible without hoods. switch selectable time lines, camera compatible, and displays wiggle trace or variable area record display.
Oscillograph:	permanent record of all 12 channels simultaneously on 4" wide electrosensitive paper. Record will not fade in light and reproduces on copying machines.
Noise Monitor:	ambient vibrations displayed on CRT allowing timing of energy source during quiescent periods and the optimization of gain adjustments.
Timing:	crystal controlled, .01% accurate, time lines are switch selectable on CRT and high or low resolution on oscillographic record.
Precision Delay:	postpones start of record up to 9.999 seconds in one millisecond increments.
Digital Meter:	indicates battery voltage, geophone resistance on each chan power supply voltages.
Digital Output:	a panel connector to allow digital recording of signal stor in memory on optional digital recorder Model G-724S.
Record Initiation:	by contact closure, saturated NPN transistor, or negative 5-volt pulse.
Standard Size/Weight: (seismograph)	14 X 15 X 15 inches (36 X 38 X 40 cm) lid closed 38 pounds (17 kg)
Power Requirements:	12 volts, 3.5 amperes
Seismograph Case:	Heavy duty aluminum with lid and water tight seal.

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Refraction Seismic Survey
Transfer/Grizzly Area
Quintette Coal Mine
Appendix B

APPENDIX B

REFRACTION SEISMIC PROFILING

The refraction seismic method makes use of the contrast in seismic velocity between materials above and below a seismic boundary. The lower material is required to have a greater seismic velocity than the upper material. Figure B1 is a schematic of the paths along which seismic energy may be propagated between an energy source and receiving geophone for a two layer section. It is evident from the figure that only the critically refracted wave path carries information about both the thickness of overlying material and the refractor velocity.

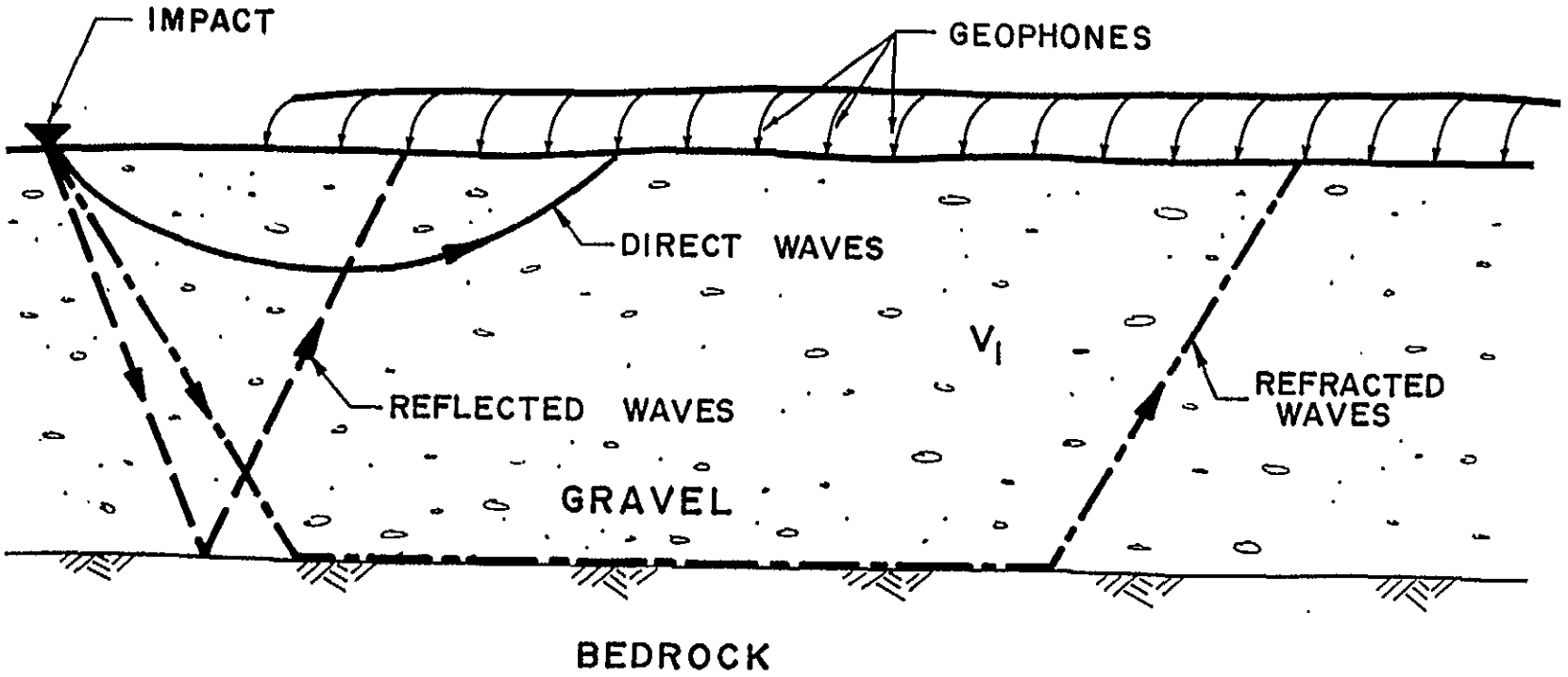
The method of data processing for refraction seismic requires that the times of the wave arrival be measured at a number of geophones for locations of the source offset from both sides of the geophones. For any particular geophone recording arriving energy that travels a refracted path from sources offset from each side of the geophone, the difference in the arrival times is related to the thickness of material above the refracting surface. This method is often referred to as the

plus-minus or delay time method. Its use for a simple two layer structure is shown in Figure B2 and is described briefly below.

The first arrival times are plotted as a function of distance (Figure B2a). The difference in arrival times at each geophone from shots offset to either side of the geophone are also plotted as a function of distance (b). On this plot, the difference in arrival times for geophones recording refractions from each direction fall on a straight line. The slope of this line is $2/V_2$, where V_2 is the compressional velocity characteristic for the lower material. It is assumed that the velocity determined along the surface of the refractor is identical to the velocity within the refractor, i.e. the materials are isotropic. For each geophone that recorded arrivals refracted from the lower material, the delay time (defined and plotted in Figure B2d) is computed. The depth to the lower material is related to the delay time by the function shown in Figure B2c.

Critical to the accurate determination of depth to refractors are the delay time, the values of overburden velocity, and the travel time between the source locations (reciprocal travel time). These parameters are derived from the time distance plot (Figure B2a).

Control of overburden velocity is maintained through recording of two interior shots along each seismic spread. There are then at least four estimates of surface material velocity for each such spread. With the shot arrangement used, each seismic spread is composed of six sub-spreads. When refractors occur at shallow depths, it is possible to determine at least three delay times to the refractor at each geophone location using data from the different shot locations.



$V_2 > V_1$

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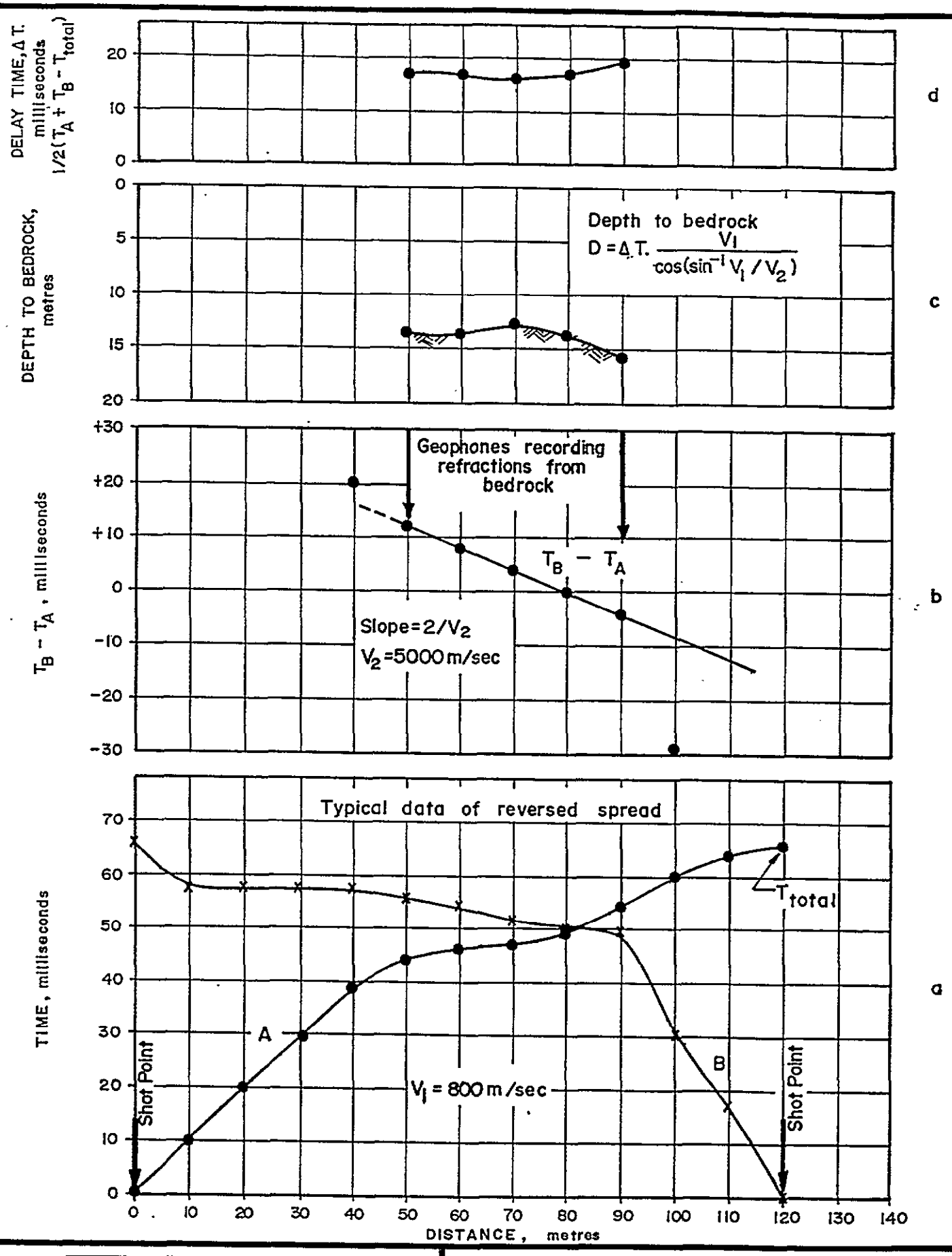
PATHS OF SEISMIC WAVES

Figure B-1



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TYPICAL REVERSE SEISMIC REFRACTION DATA AND ANALYSIS

Figure B-2

QUINTETTE COAL LIMITED
1988 GEOLOGICAL REPORT
TRANSFER, GRIZZLY, PERRY CREEK , MARMOT AND WOLVERINE VALLEY SOUTH AREAS
APPENDIX 1

Prepared by Technical Services Department
Quintette Coal Limited

746

1988 GEOLOGICAL REPORT
TRANSFER, GRIZZLY, PERRY CREEK, MARMOT AND WOLVERINE VALLEY SOUTH AREAS

INDEX - APPENDIX 1

Appendix 1.1

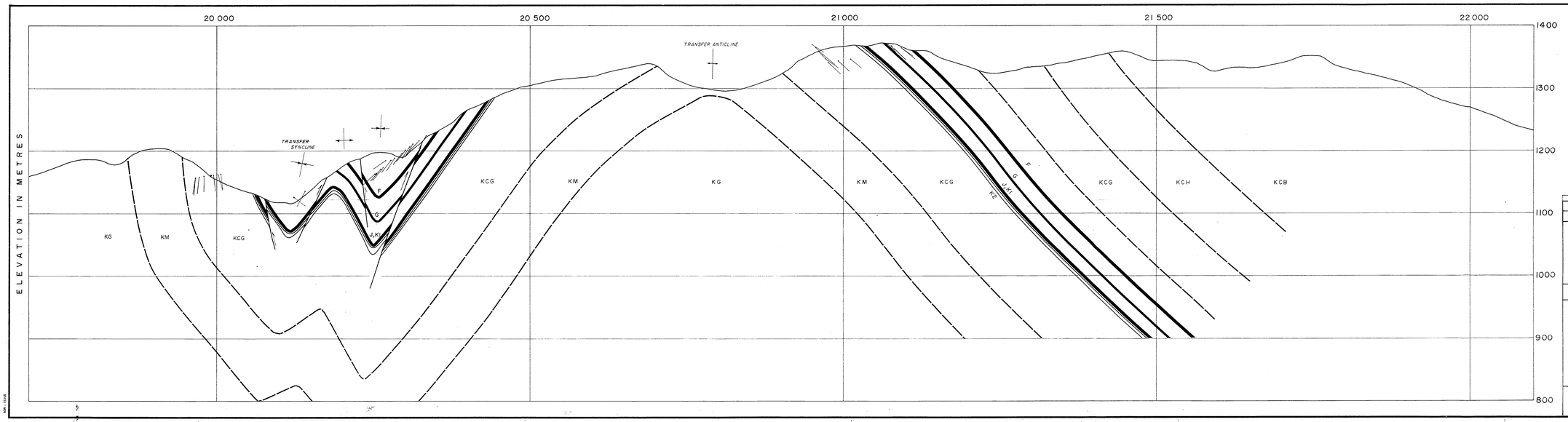
1988 Geological Report

Cross Sections

Appendix 1.1.1

Transfer (500 m Intervals)

Sections 27000 - 31000



KS Shaftsbury Formation
KCB Boulder Creek Formation
KCH Hulcross Formation
KCG Gates Formation
K M Moosebar Formation
KG Gething Formation

COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINE
ANTICLINE
QHDB6007 DRILL HOLE

0 50 100 200
METRES

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
1	17	03	89	REVISE TRANSFER WEST LIMB	DKL	DJ	DJ
0	23	03	88	ORIGINAL DRAFT	RJ	DJ	DJ

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Area TRANSFER | Category CROSS-SECTIONS

Drawing Title

CROSS-SECTION
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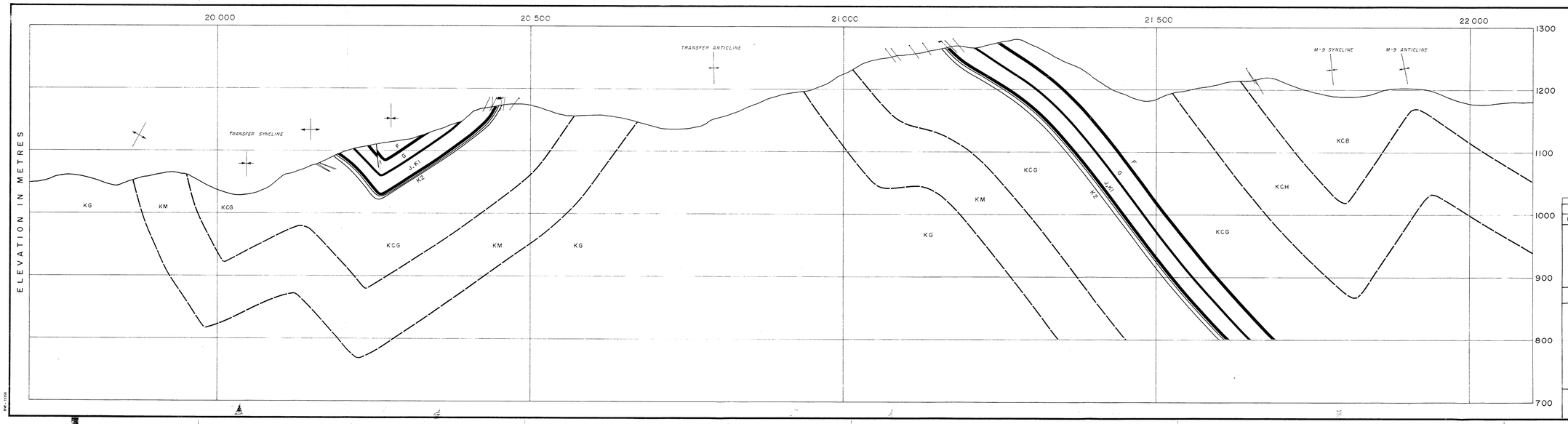

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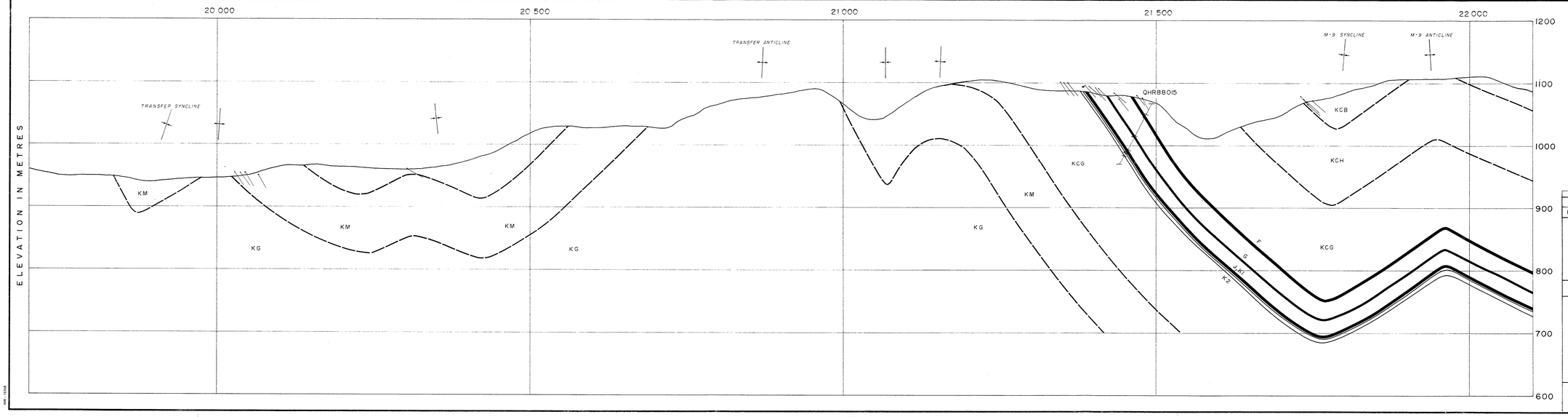

KS Shaftsbury Formation
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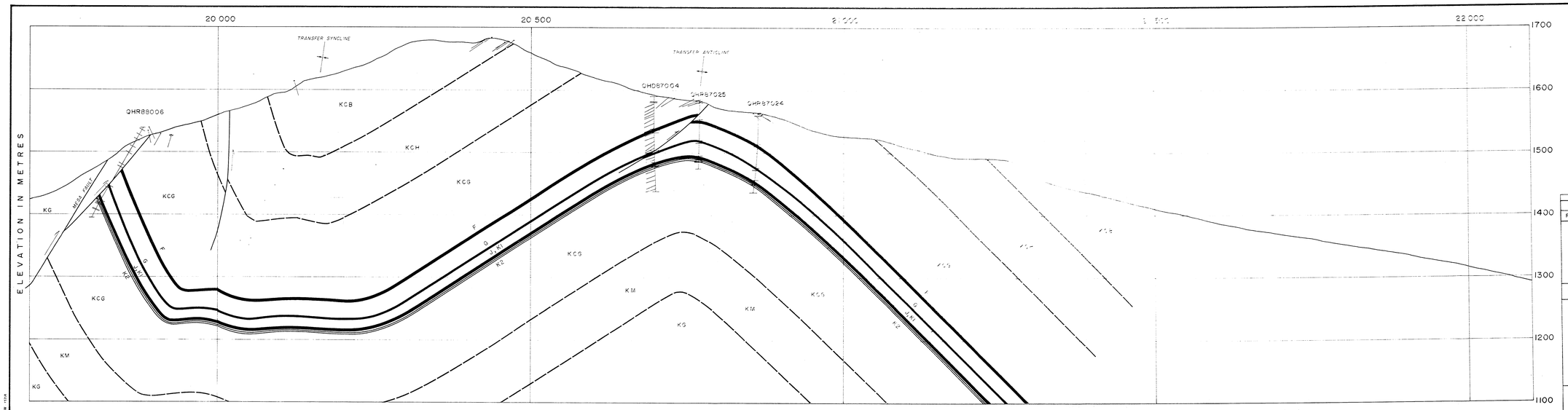

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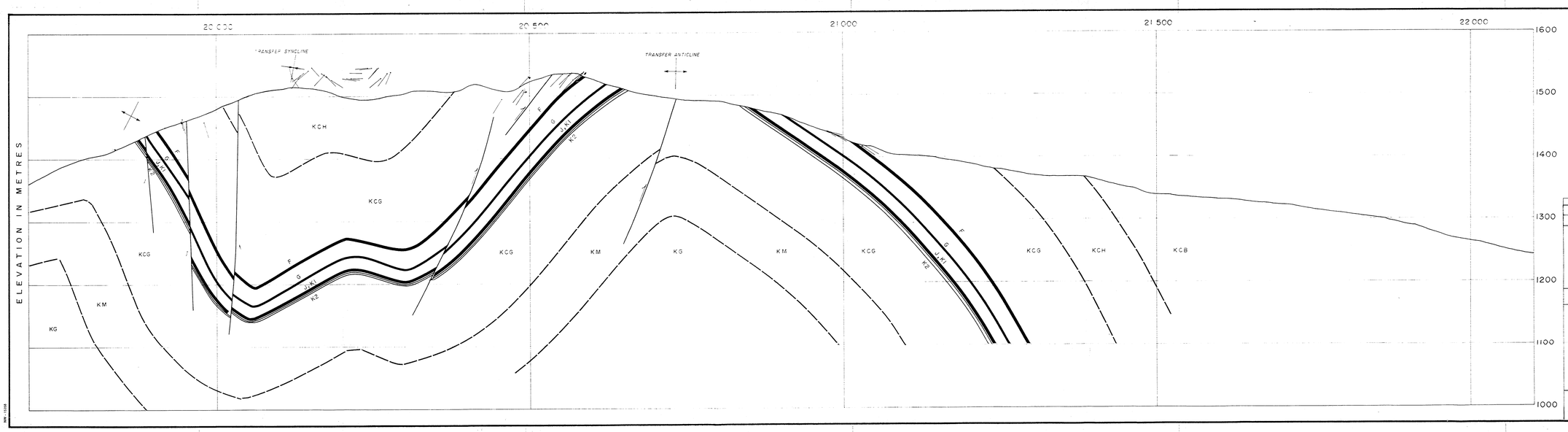

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Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

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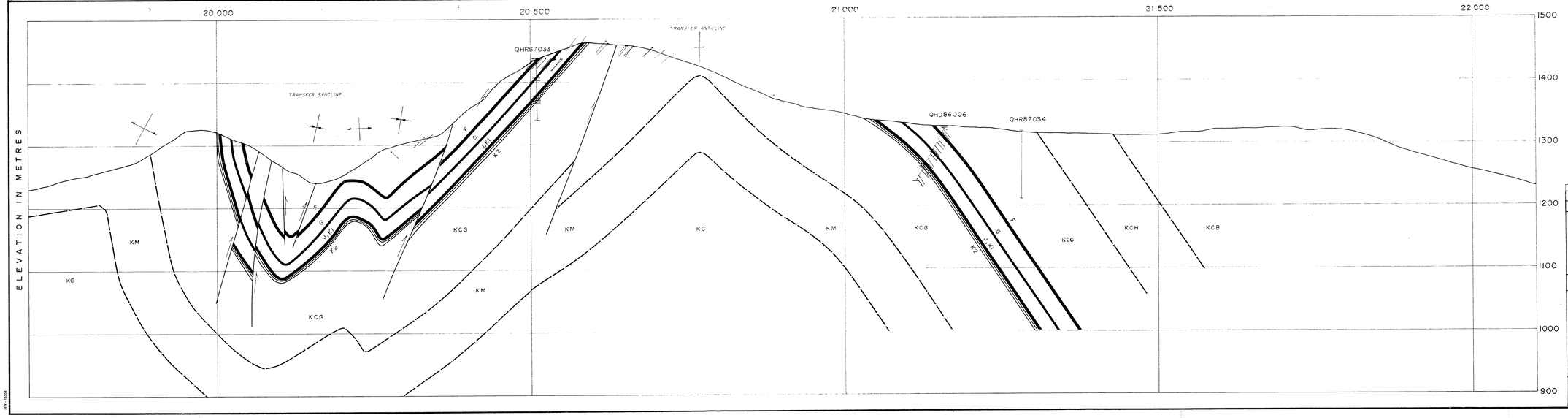

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Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

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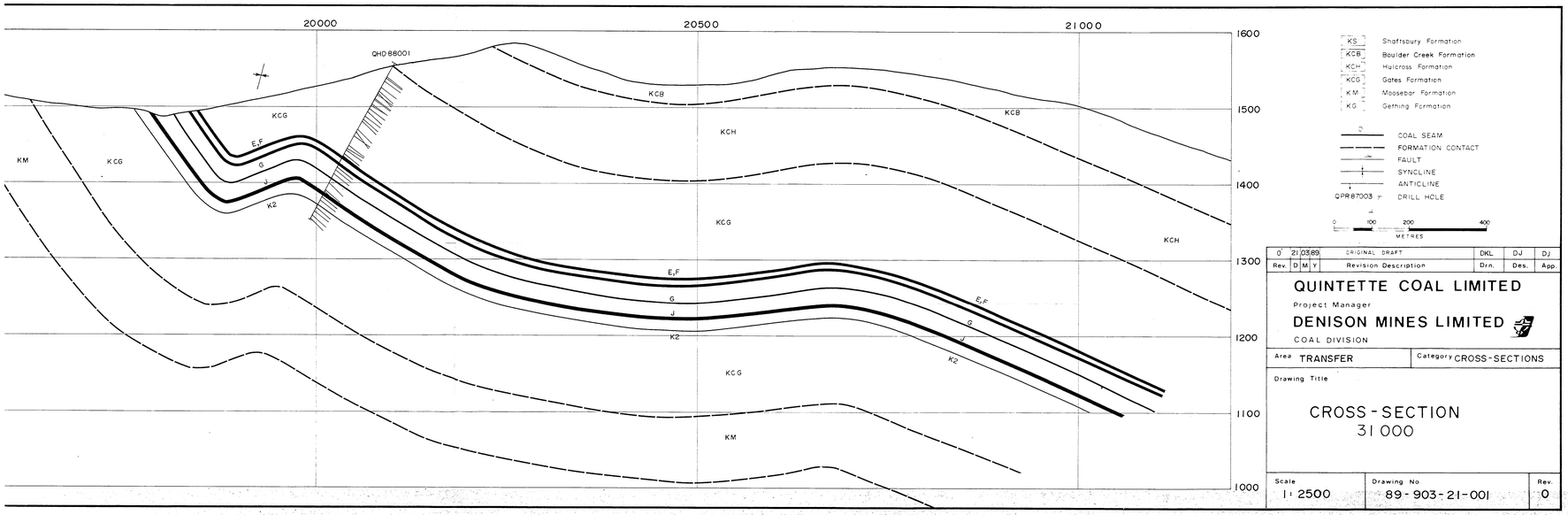

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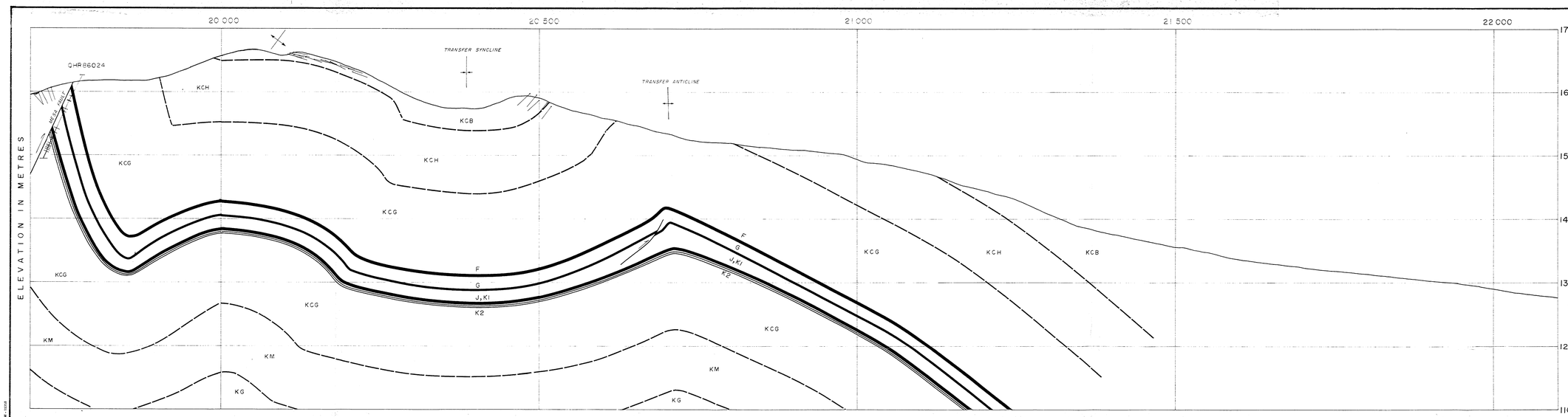

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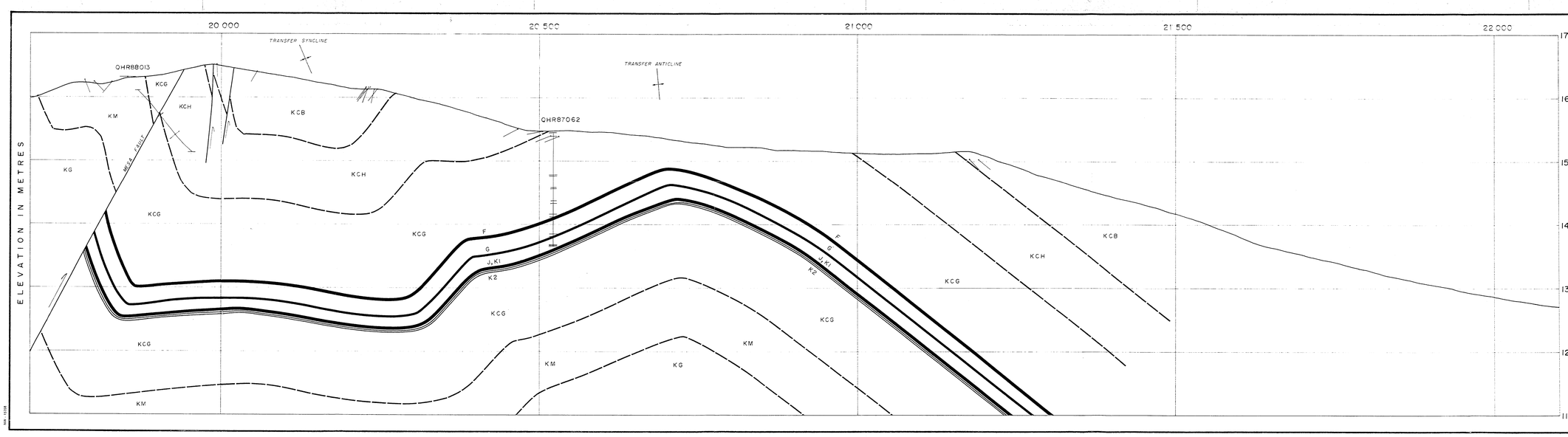

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