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093307.

1994 FINAL REPORT
DIVISION MOUNTAIN COAL PROJECT
SOUTHERN YUKON TERRITORY

for

CASH RESOURCES LTD.

Coal Licences Y441, Y442, Y452, Y453, Y457 to Y459 and Y464 to Y478

Located on Map Sheet 115H/8

Whitehorse Mining District



Work conducted June 10 to 28 and August 21 to December 9, 1994

R.F. Gish, B.Sc.

March 1995

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SUMMARY

The Division Mountain coal deposit is located 90 km north-northwest of Whitehorse, Yukon Territory. Access is by a 31 km, four-wheel drive road leaving the Klondike Highway at Braeburn. The main area of exploration interest lies 20 km west of the Klondike Highway and the Yukon electrical transmission grid which follows the highway. Territorial Coal Exploration Licences encompassing the Division Mountain area were acquired by Cash Resources Ltd. in October 1992.

Exploration to date has focussed on outlining sufficient reserves suitable for a fifty megawatt thermal power generation plant. In all, 45 diamond drill holes totalling 6119.5 m have been drilled. An excavator trenching/diamond drill program during the 1994 field season explored a 3100 m long southeasterly extension of previously known coal-bearing strata along the east limb of the northerly-plunging Cairnes Syncline. The intersections through the east limb yielded an average aggregate, raw coal, true thickness of 19.6 m in the southern part narrowing to 11.3 m in the north. Approximately 1500 m of strike length along the west limb of the syncline were later traced yielding an average aggregate, raw coal, true thickness of 17.1 m. Coal-bearing strata in both limbs of the syncline are open to the north. Hole 94-37 drilled 600 m west of the Cairnes Syncline across the axis of an anticline intersected 16.9 m (true thickness) of coal in the westerly-dipping limb of the Division Mountain Syncline.

Results of coal quality analyses suggest Division Mountain coal is ideally suited for thermal power generation with characteristics comparable to Alberta High Volatile Bituminous coals used to generate over 90% of the power needs of that province. Calculated weighted averages for the

1994 analyses are 2.38% residual moisture, 28.59% ash content, 25.85% volatile matter, 43.01% fixed carbon and 0.43% sulphur with a calorific value of 5205 cal/g (9301 Btu/lb). Drill indicated undiluted mineable reserves to date total 31.7 million tonnes with a stripping ratio of 3.36 bank m³/tonne to a depth of 150 m. This would be sufficient coal to feed a 50 megawatt thermal power generation plant for about 160 years.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

A handwritten signature in black ink, appearing to be 'R.F. Gish', written over the company name.

R.F. Gish, B.Sc.

INTRODUCTION

The 1994 exploration program was funded by Cash Resources Ltd. and managed by Archer, Cathro & Associates (1981) Limited. The work was carried out during the period June 10 to 28 and August 21 to December 9, 1994 and consisted of geological mapping, excavator trenching, linecutting, VLF-EM and seismic geophysical surveys, hydrological and environmental surveys and 4054 m of diamond drilling in 23 holes. The Author's Statement of Qualifications is given in Appendix I while a Chronology of Significant Events appears as Appendix II. A list of contractors and dates worked is included in Appendix III.

The exploration camp is located approximately 200 m southeast of the Nordenskiöld River. The camp was winterized in the fall of 1994 and has accommodation and dining facilities for up to 35 people. The winter watchman started December 10 with duties including camp maintenance and keeping regular meteorological and wildlife records.

PROPERTY, LOCATION AND ACCESS

The Division Mountain coal occurrence is held under Territorial Coal Exploration Licences by Archer Cathro on behalf of Cash Resources. In addition to four original licences acquired in October 1992, Cash Resources was granted three more licences in 1993 and an additional fifteen in 1994. These licences total 314,856 hectares and encompass Whitehorse Trough coal-bearing stratigraphy including a number of previously known coal occurrences. Figure 1 outlines the general location of the coal licences while Table 1 lists the expiry date of each licence.

The Division Mountain area is located on NTS map sheet 115 H/8, 90 km north-northwest of Whitehorse and 275 km from tidewater at Skagway, Alaska (Figure 2). The Whitehorse-Aishihik-Faro electrical transmission line lies along the Klondike Highway, 20 km east of the main coal reserves. Access is by 85 km of paved highway from Whitehorse to Braeburn and a 31 km all-season four-wheel drive road from Braeburn. Rerouting of the access road from Braeburn is recommended as it would alleviate encroachment of Braeburn Lake residential and recreational lots and provide more direct access to the property.

Table 1

<u>Licence No.</u>	<u>District</u>	<u>Expiry Date</u>
Y441-Y442	Whitehorse	September 23, 1995
Y452-Y453	Whitehorse	April 17, 1996
Y457-Y459	Whitehorse	November 17, 1996
Y464-Y478	Whitehorse	September 6, 1995

Figure 1

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

LOCATION

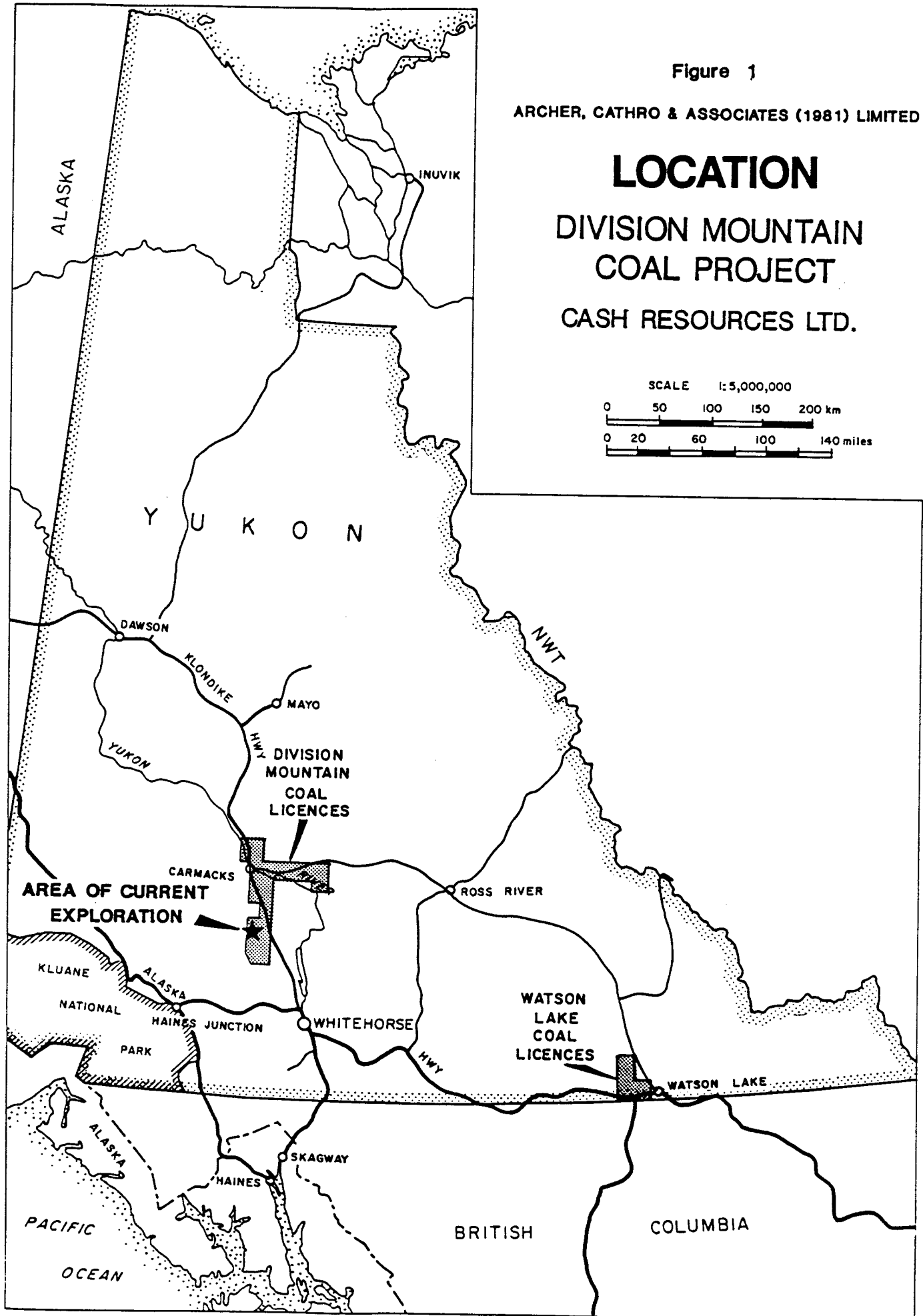
DIVISION MOUNTAIN COAL PROJECT

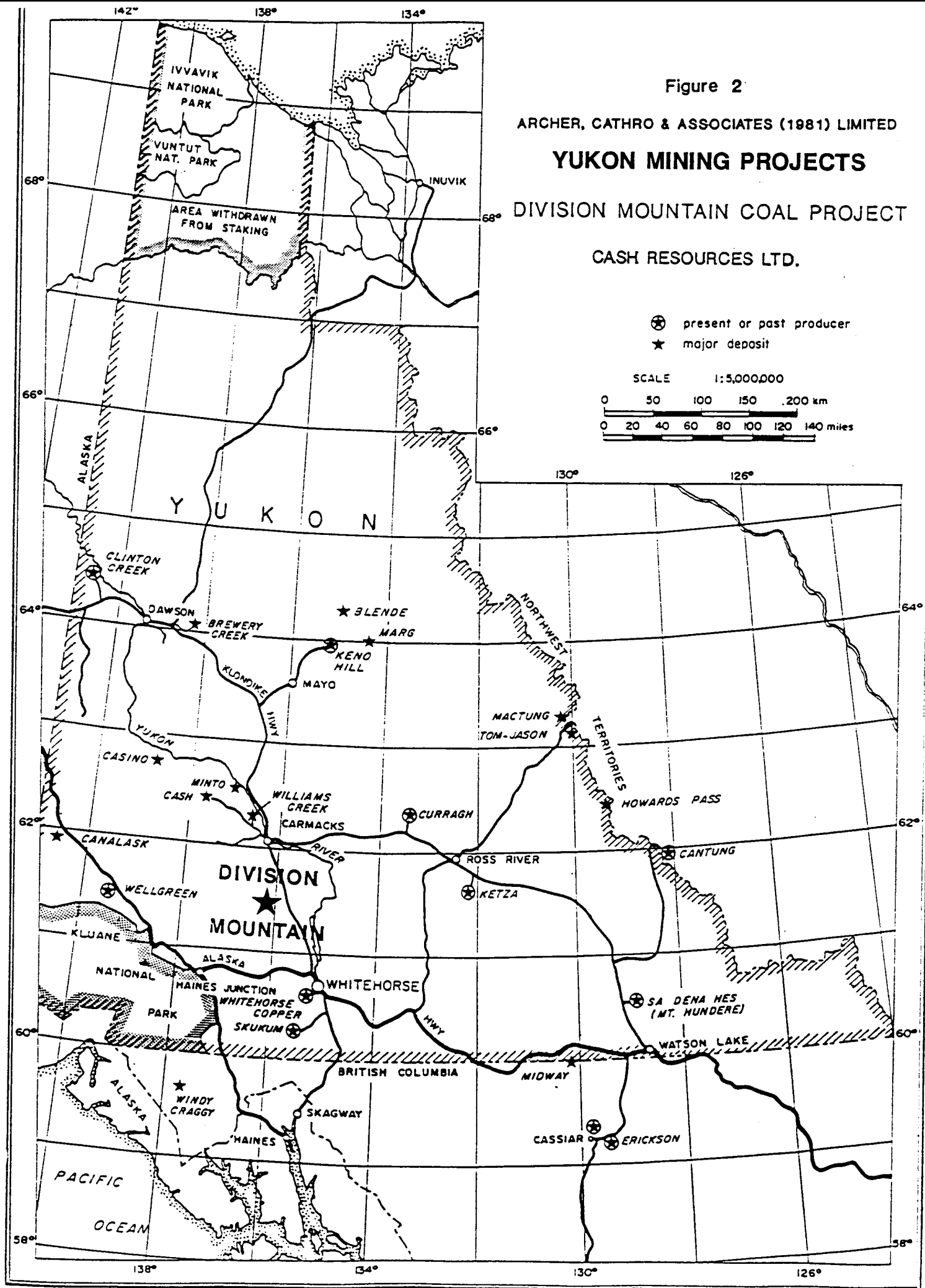
CASH RESOURCES LTD.

SCALE 1:5,000,000

0 50 100 150 200 km

0 20 60 100 140 miles





HISTORY AND PREVIOUS WORK

In 1907 D. Cairnes of the Geological Survey of Canada mapped and sampled three coal seams within a Lower Cretaceous fluvial-deltaic sequence in Teslin Creek Canyon, 2 km north of Division Mountain. An additional coal occurrence was located by Cairnes near the base of Red Ridge approximately 5 km northwest of the Teslin Creek showings.

No exploration was carried out on the showings until 1970 when Arjay Kirker Resources Ltd. excavated seven bulldozer pits in the vicinity of the Teslin Creek coal outcrop. Eight seams were exposed ranging in thickness from 60 cm to 4.4 m. Analyses classified the coal as low sulphur, High Volatile Bituminous "B". A 1047 m, six hole diamond drill program conducted in 1972 in the Teslin Creek area by Arjay Kirker outlined a geological reserve of 2.5 million tonnes.

In October 1992 Cash Resources purchased the Territorial Coal Exploration Licences enclosing the Division Mountain coal occurrences. During the 1993 field season 16 holes totalling 1018.5 m were drilled to test the Teslin Creek area. This diamond drilling program defined four seams with an average aggregate thickness of 10 m of raw coal over a 1 km strike length. Measured open pittable reserves totalled 2.6 million tonnes to a depth of 200 m. Hand trenches of the Red Ridge occurrence exposed a total thickness of 11.4 m of raw coal in three seams.

GEOMORPHOLOGY

The Division Mountain coal project lies within the Yukon Plateau physiographic region of the Yukon. Topography in the area is characterized by rolling hills and broad river valleys with local regions of moderate to steep relief. The main area of exploration to date is bordered on the west by the Nordenskiöld River and on the east by the Klusha Creek drainage. Elevations range between 670 and 1676 m. Most of the area is covered by glacial till and outwash up to 60 m thick that is overlain by a veneer of volcanic ash. Much of the vegetation in this area is restricted to second growth poplar with an understorey of dwarf birch, willows, moss and alpine grass growing among windfall and burn stand from the Braeburn fire in the 1960's, although some regions of large (>30 cm) diameter spruce lie to the southeast of the Teslin Creek area. Permafrost is generally localized to areas of moderate to dense vegetation on north-facing slopes.

TECTONIC SETTING AND REGIONAL GEOLOGY

The Division Mountain coal property lies within the north-central section of the Intermontane Belt of the Canadian Cordillera, encompassing rocks of the Yukon Crystalline Terrane to the southeast and the Stikine Terrane to the northeast. These terranes are bounded by the Braeburn Fault on the north and the Miners Fault on the south (Figure 3). Yukon Crystalline Terrane comprises Paleozoic igneous and sedimentary rocks as well as their metamorphosed equivalents. Whitehorse Trough, which is part of the Stikine Terrane, contains the coal-bearing strata currently under exploration. Whitehorse Trough formed as a fore-arc basin between the Lewes River volcanic arc assemblages and the northeasterly accreting Yukon Crystalline Terrane. During the Late Triassic the Lewes River Group, a 7000 m thick sequence of andesite, conglomerate, wacke, limestone and shale, was deposited within the trough. Overlying this is the Laberge Group consisting of 3000 m of fore-arc basin, deep marine conglomerate, sandstone and shale. The Laberge Group is overlain by alluvial chert pebble conglomerate of the Tantalus Formation. There are significant variations in thickness of the stratigraphic assemblages across the depositional basin.

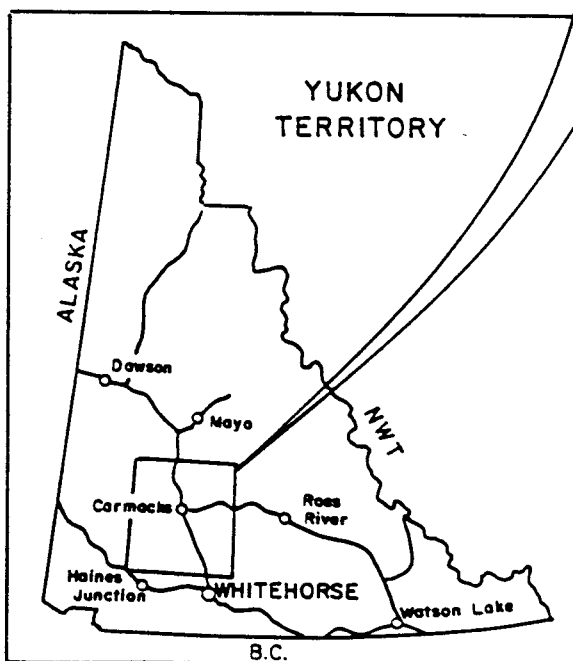
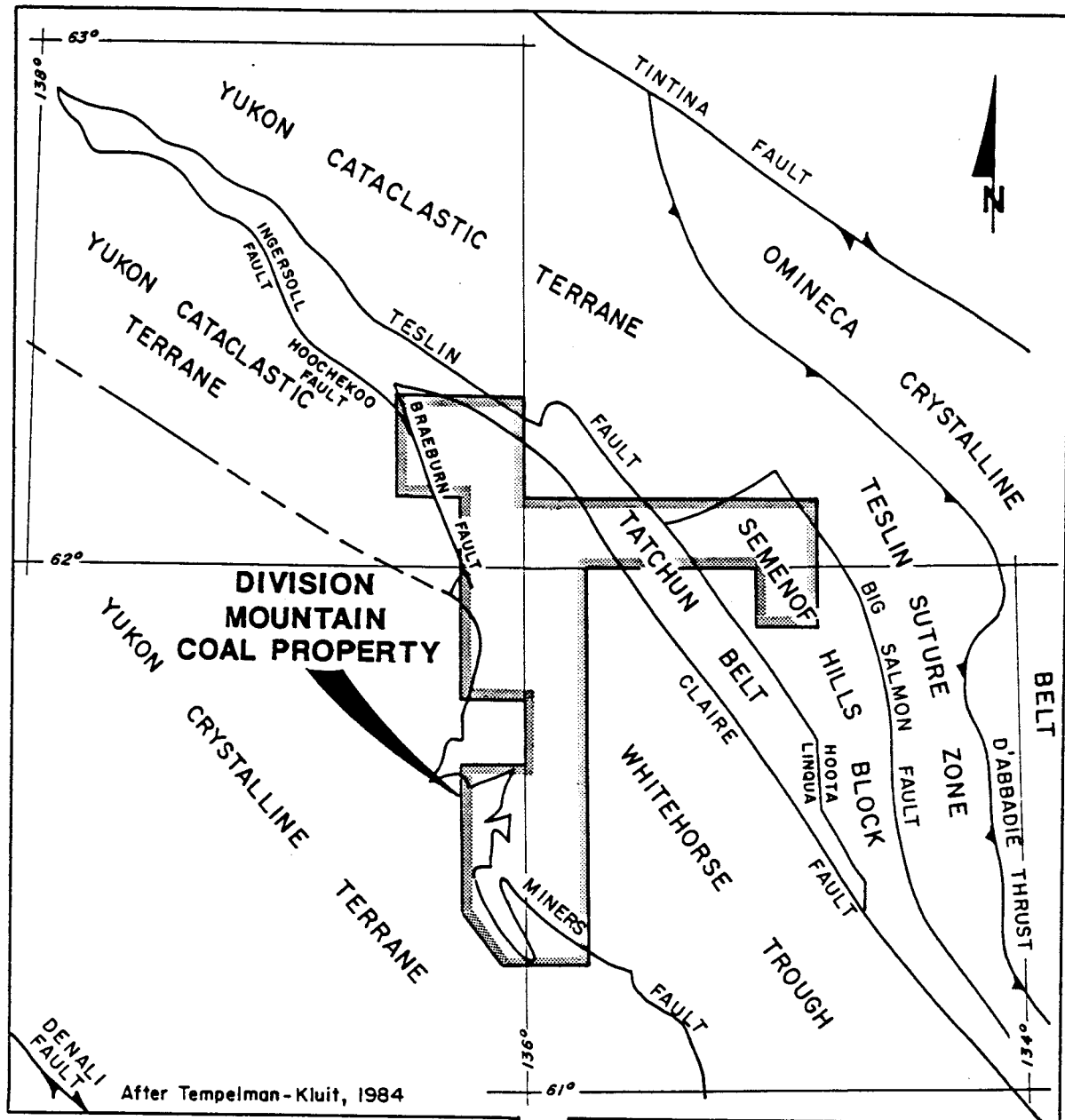


Figure 3

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

TECTONIC SETTING AND REGIONAL GEOLOGY

DIVISION MOUNTAIN COAL PROJECT

CASH RESOURCES LTD.

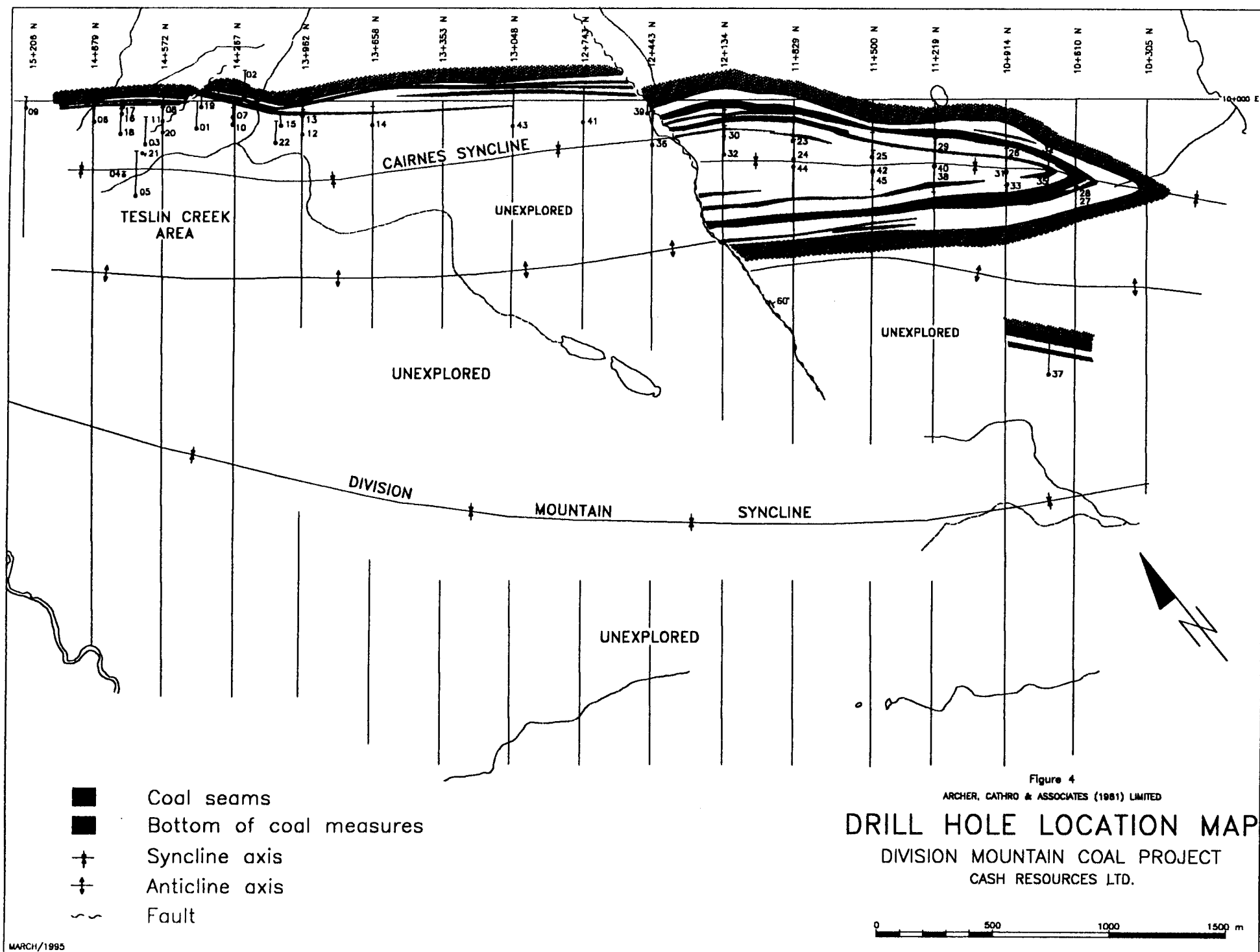
PROPERTY GEOLOGY

Geology of the main area of exploration is given on Figure 4, with cross sections through the coal measures on Figures 5 to 23, a longitudinal section with level plan on Figure 24. Whitehorse Trough stratigraphy can be divided using major bounding disconformities between distinct sedimentary sequences deposited along the basin margins. These sequences are the Lewes River Group shallow marine carbonate and clastic rocks; Laberge Group conglomerate and sandstone turbidites; and, the Tantalus Formation, a largely alluvial package of chert pebble conglomerate, sandstone, shale and coal.

Lewes River Group represents the oldest stratigraphy within the trough consisting of Upper Triassic to Jurassic volcanoclastic conglomerates overlain by alternating lenses of greywacke and limestone.

Laberge Group is subdivided into the following formations: (1) Conglomerate Formation, consisting of Hettangian to Bajocian polymitic cobble-boulder conglomerates dominated by granitic to granodioritic clasts; (2) Hettangian to Bajocian Richtofen Formation interlaminated black shale and wispy silt to fine sandstone laminae in the form of low amplitude cross-stratification and faded ripples; and, (3) Sinemurian to Toarcian Nordenskiöld Dacite, thick epiclastic and primary dacite tuffs and flows.

Tanglefoot Formation, the main coal-bearing unit on the property, consists of arkosic sandstone and quartz pebble conglomerate with associated minor shale and coal. The alluvial-deltaic depositional environment of the Tanglefoot Formation is considered to be a transitional sequence between the older shallow marine sedimentary rocks of the Laberge Group and the younger alluvial flood plain chert pebble conglomerate, sandstone, shale and coal of the Tantalus Formation.



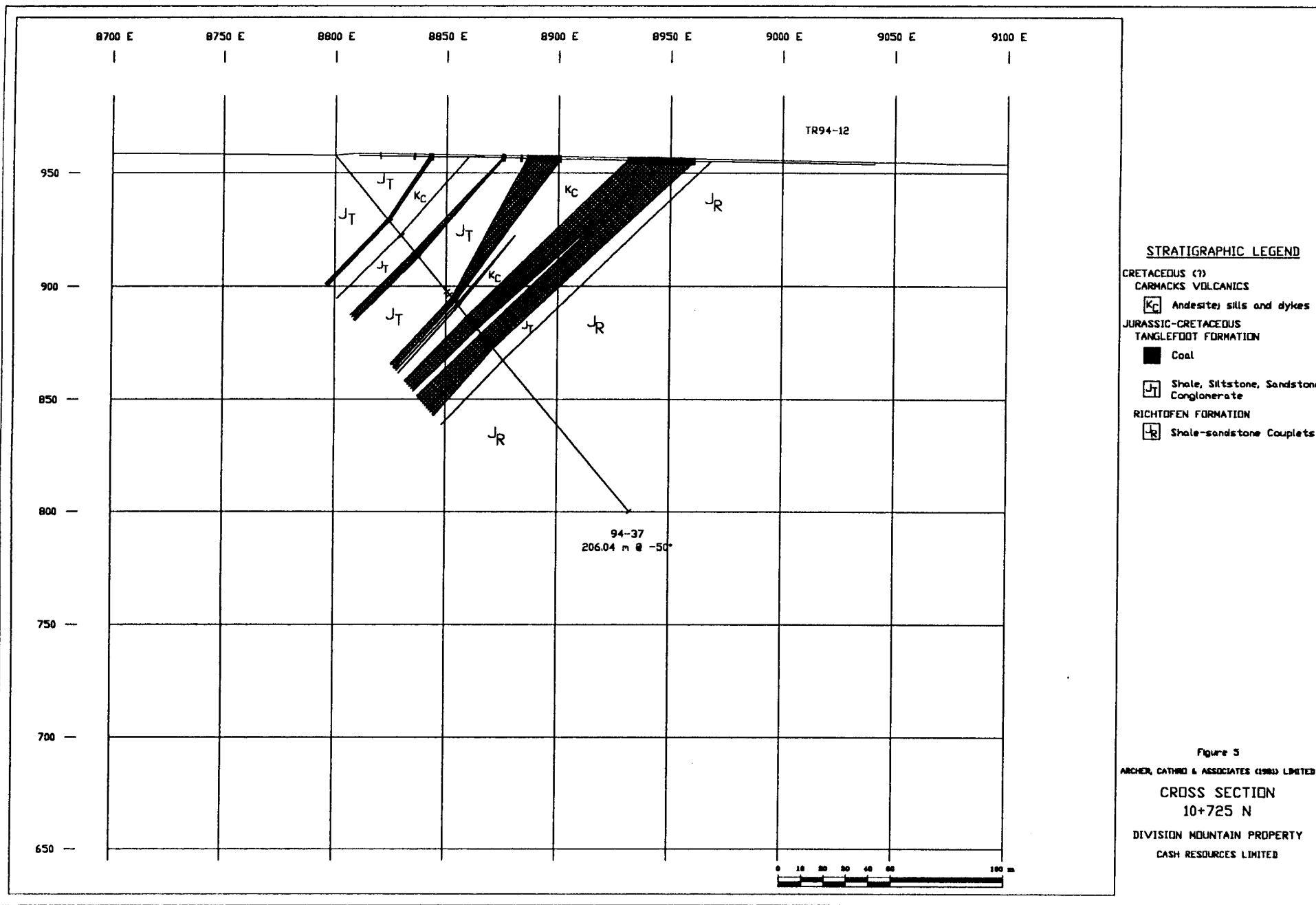


Figure 3
 ARCHER, CATHRO & ASSOCIATES (1983) LIMITED
CROSS SECTION
 10+725 N
 DIVISION MOUNTAIN PROPERTY
 CASH RESOURCES LIMITED

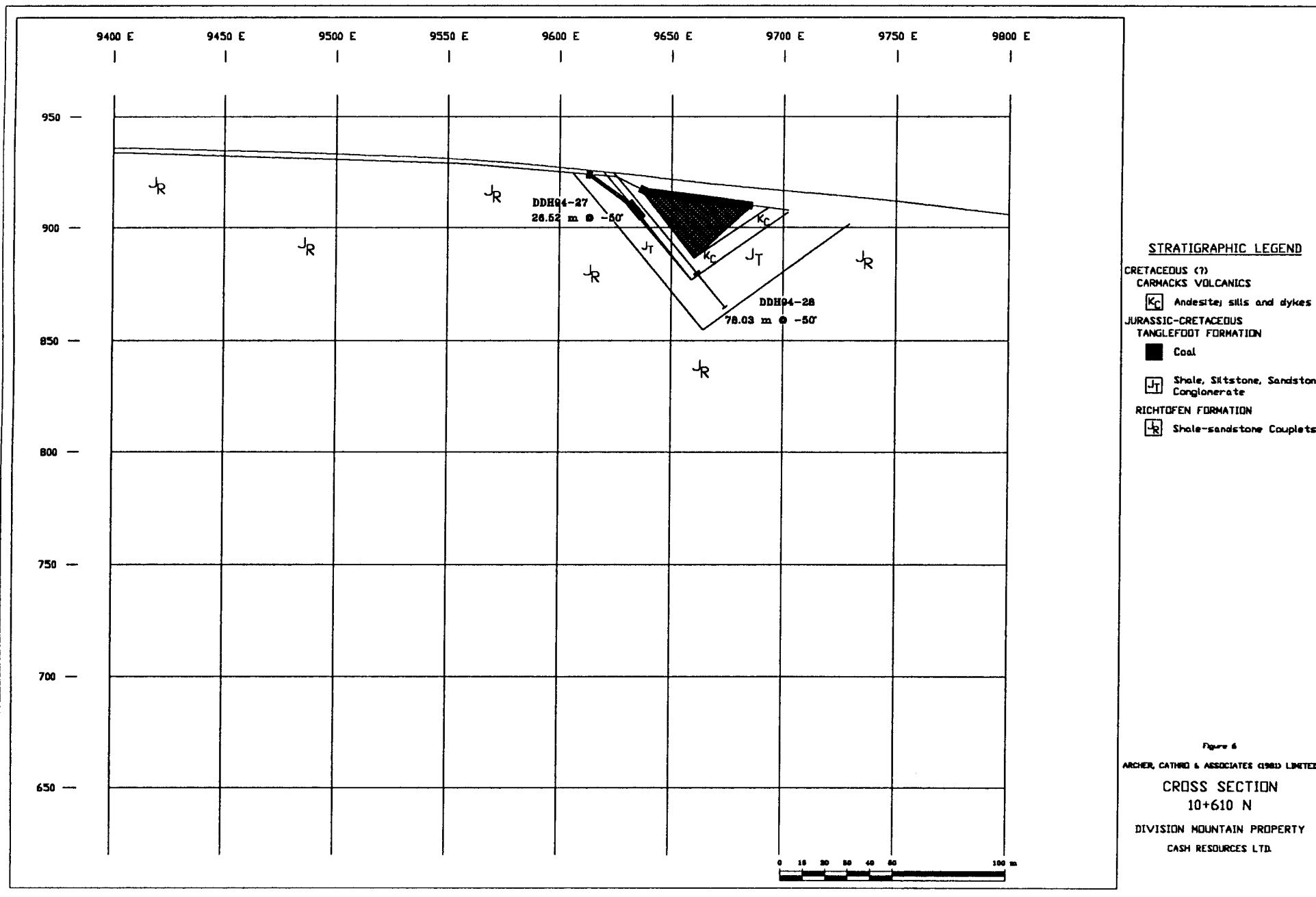
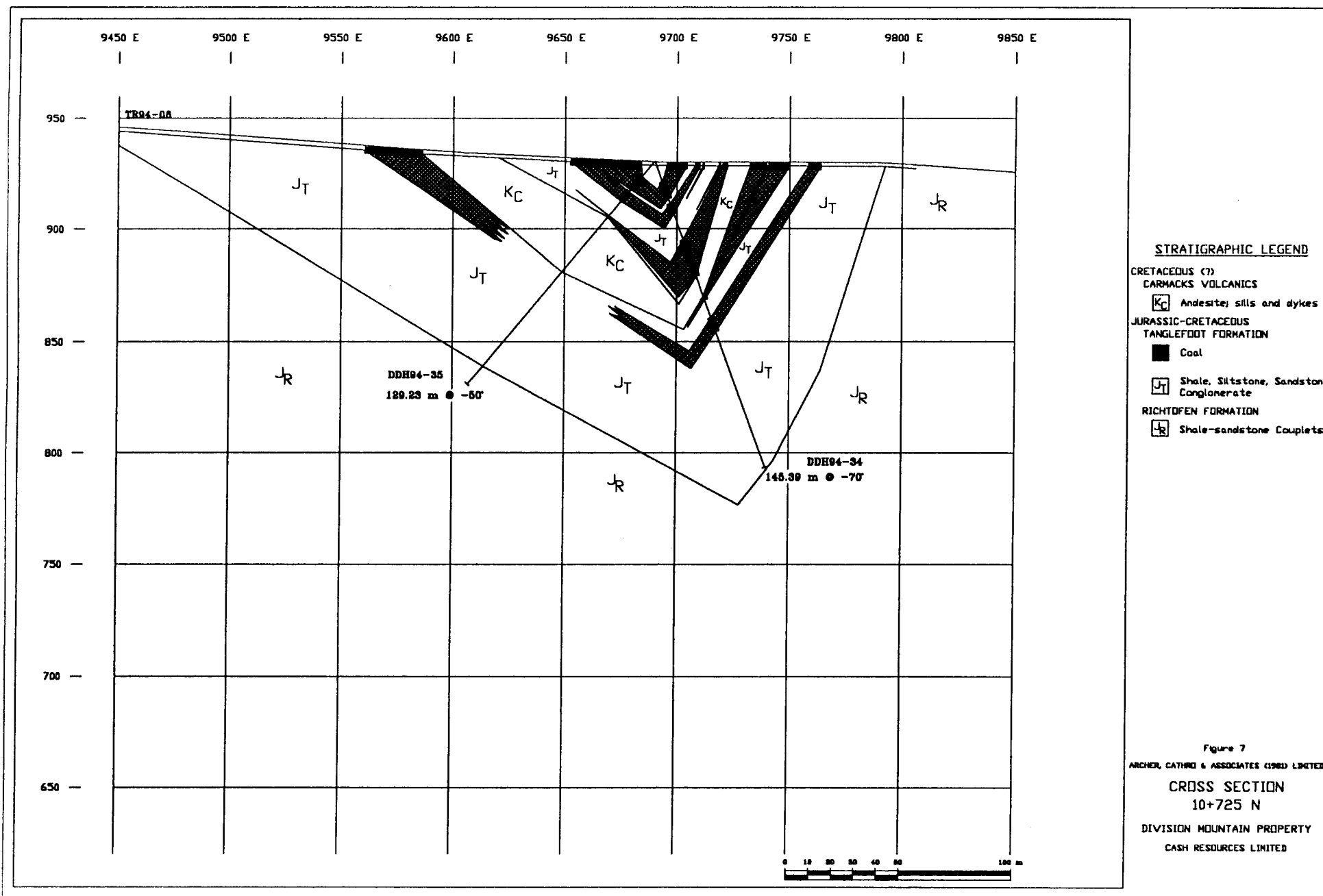


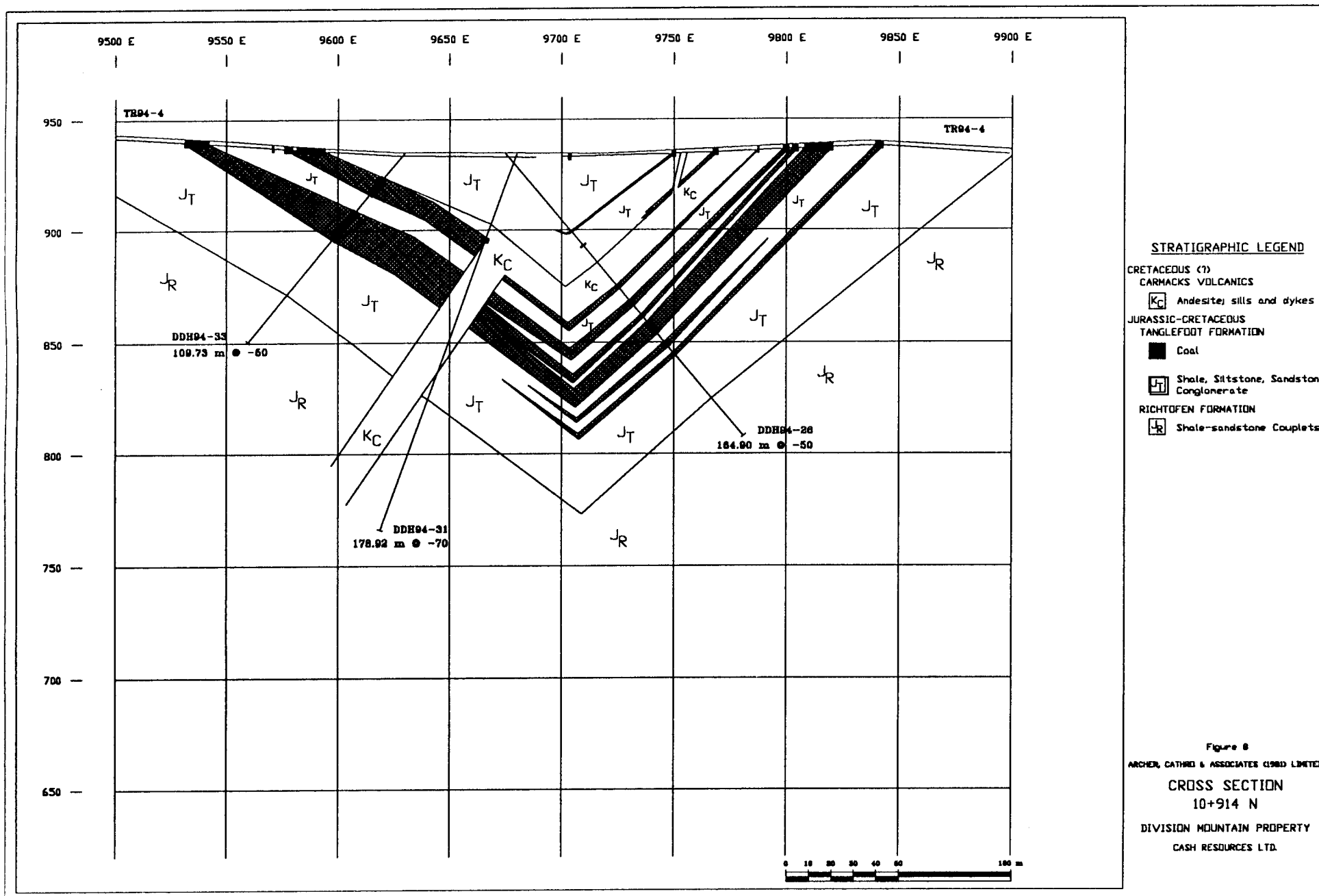
Figure 6

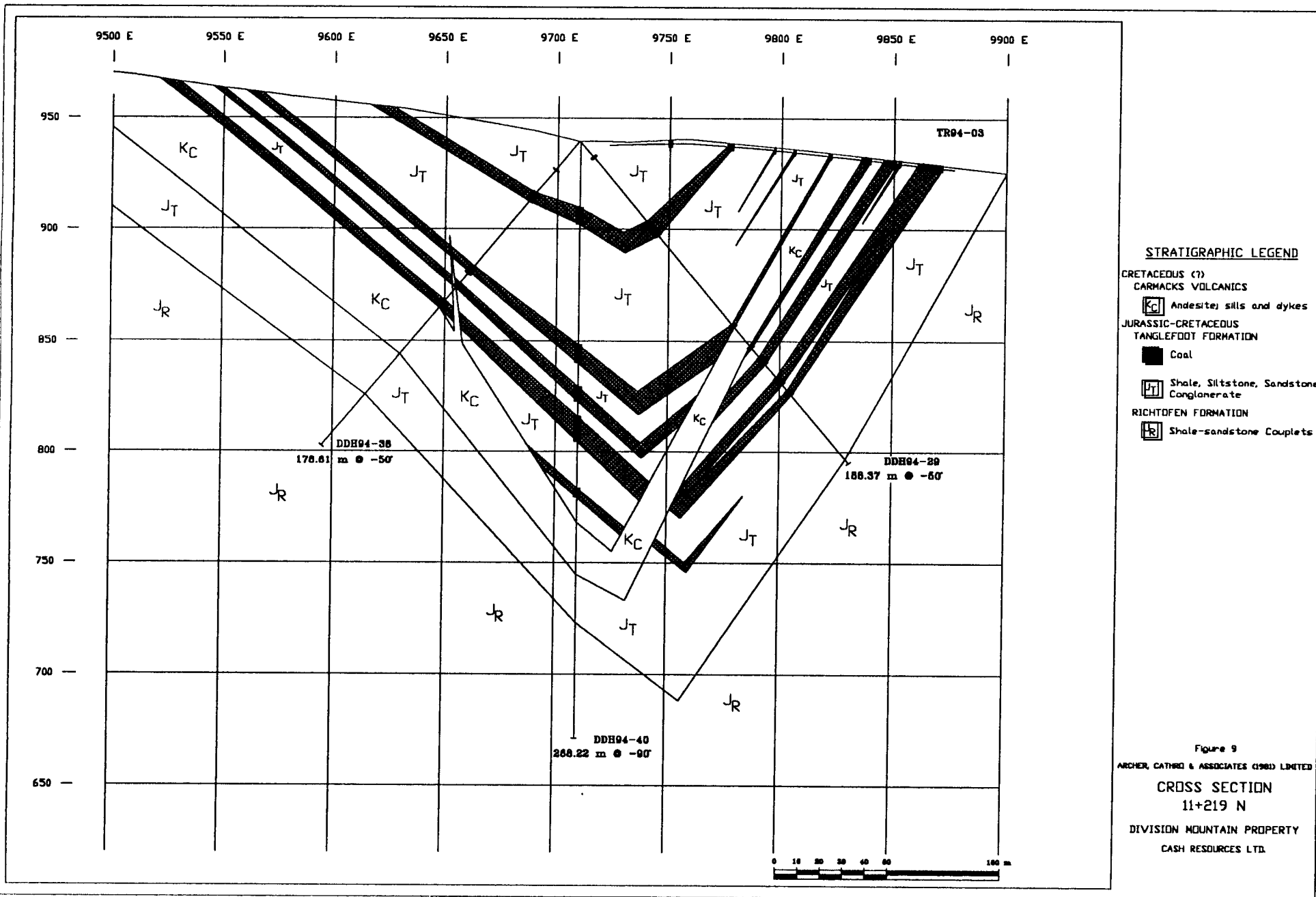
ARCHER, CATMO & ASSOCIATES (1981) LIMITED

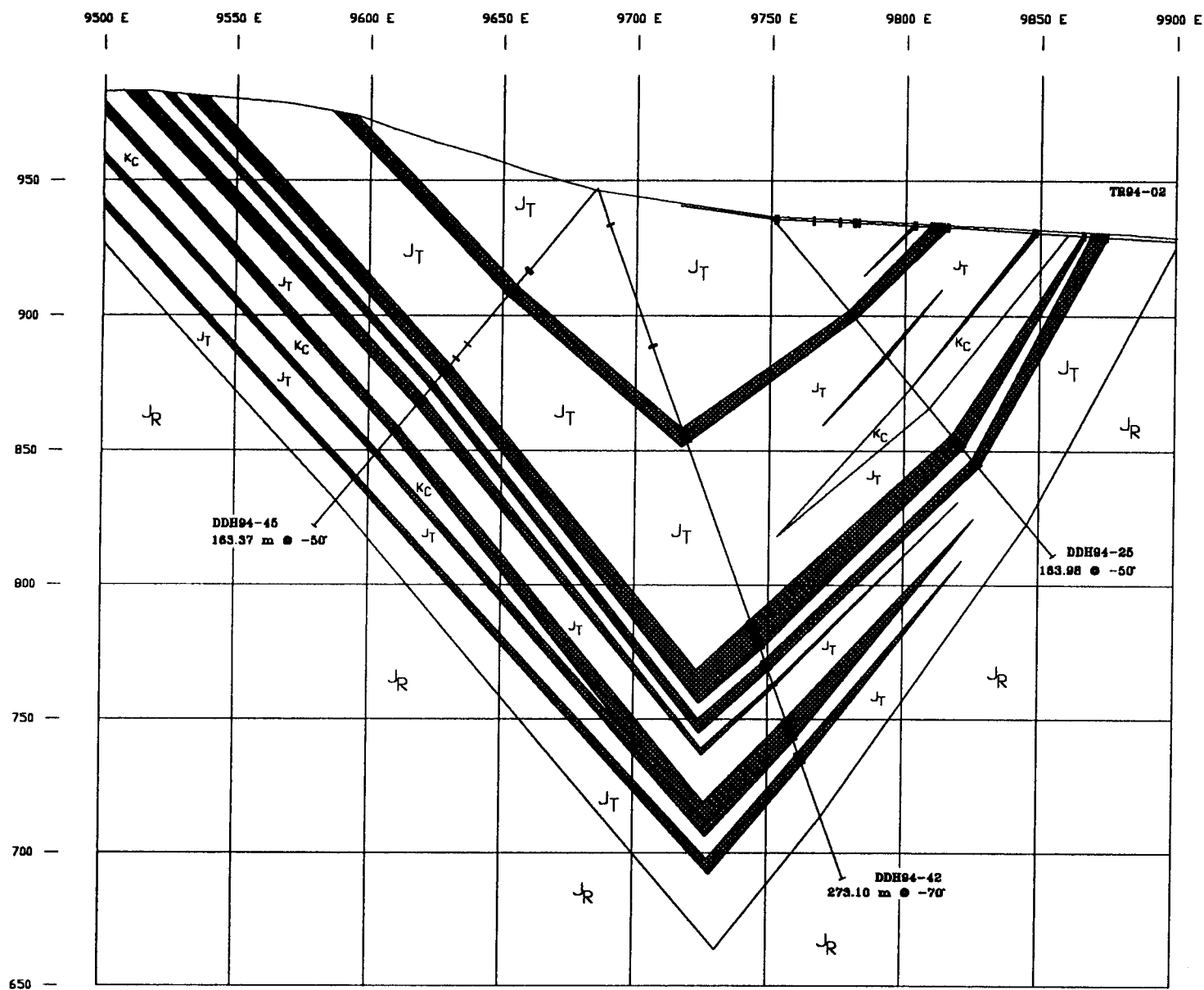
CROSS SECTION
10+610 N

DIVISION MOUNTAIN PROPERTY
CASH RESOURCES LTD.





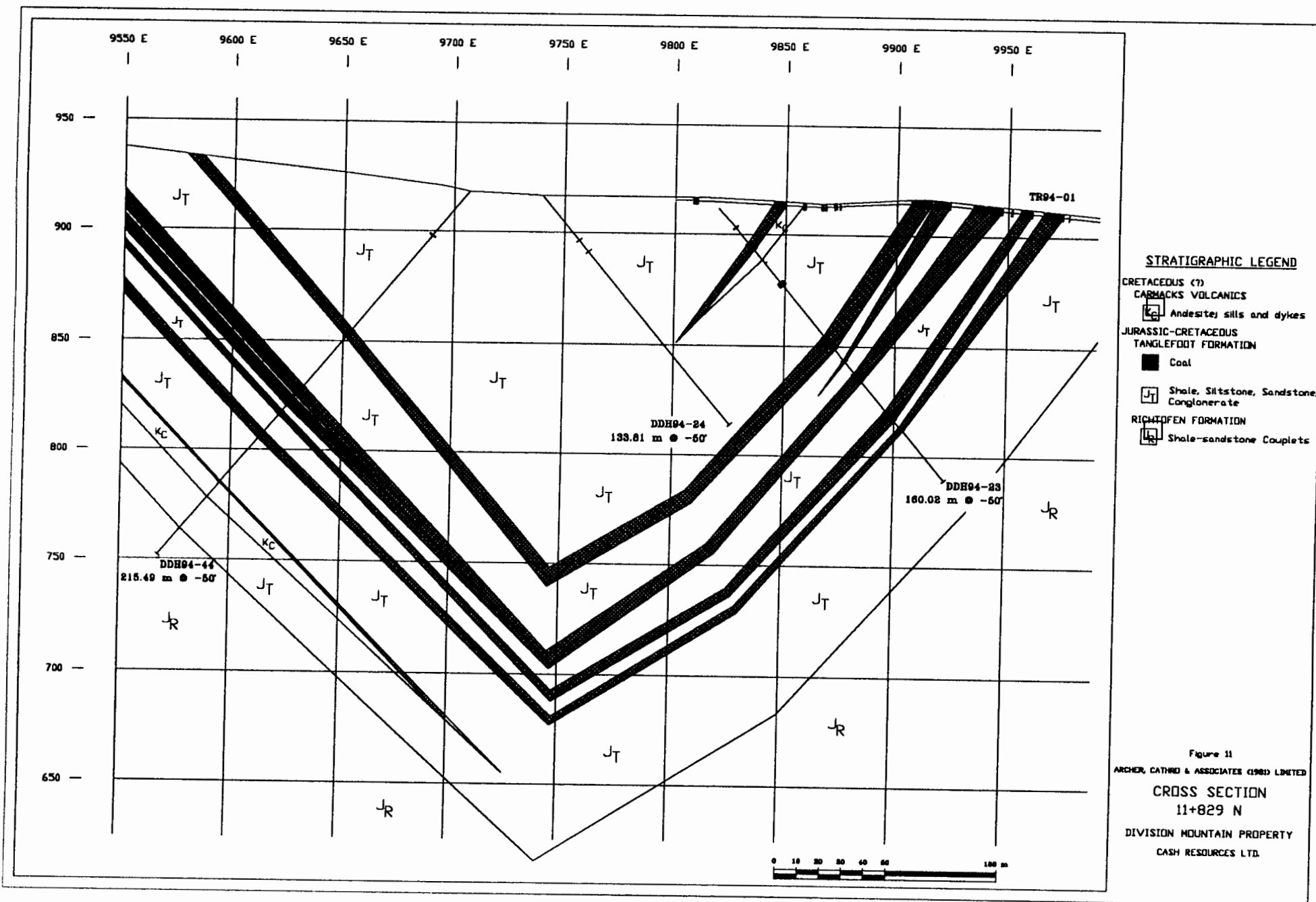


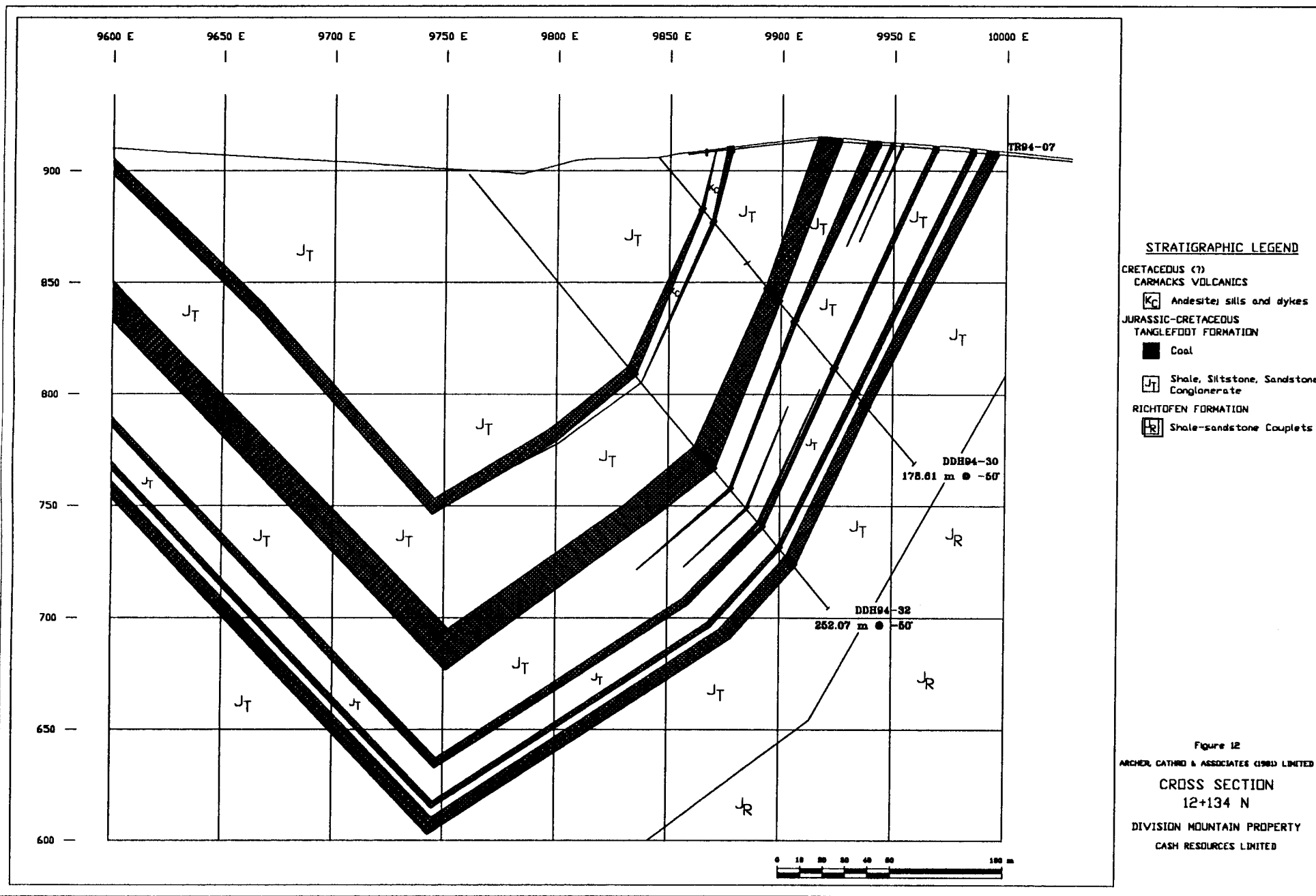


STRATIGRAPHIC LEGEND

- CRETACEOUS (?)
- CARMACKS VOLCANICS
 - Andesite; sills and dykes
- JURASSIC-CRETACEOUS
- TANGLEFOOT FORMATION
 - Coal
 - Shale, Siltstone, Sandstone, Conglomerate
- RICHTOFEN FORMATION
 - Shale-sandstone Couplets

Figure 10
 ARCHER, CATHRO & ASSOCIATES (1983) LIMITED
 CROSS SECTION
 11+500 N
 DIVISION MOUNTAIN PROPERTY
 CASH RESOURCES LTD.





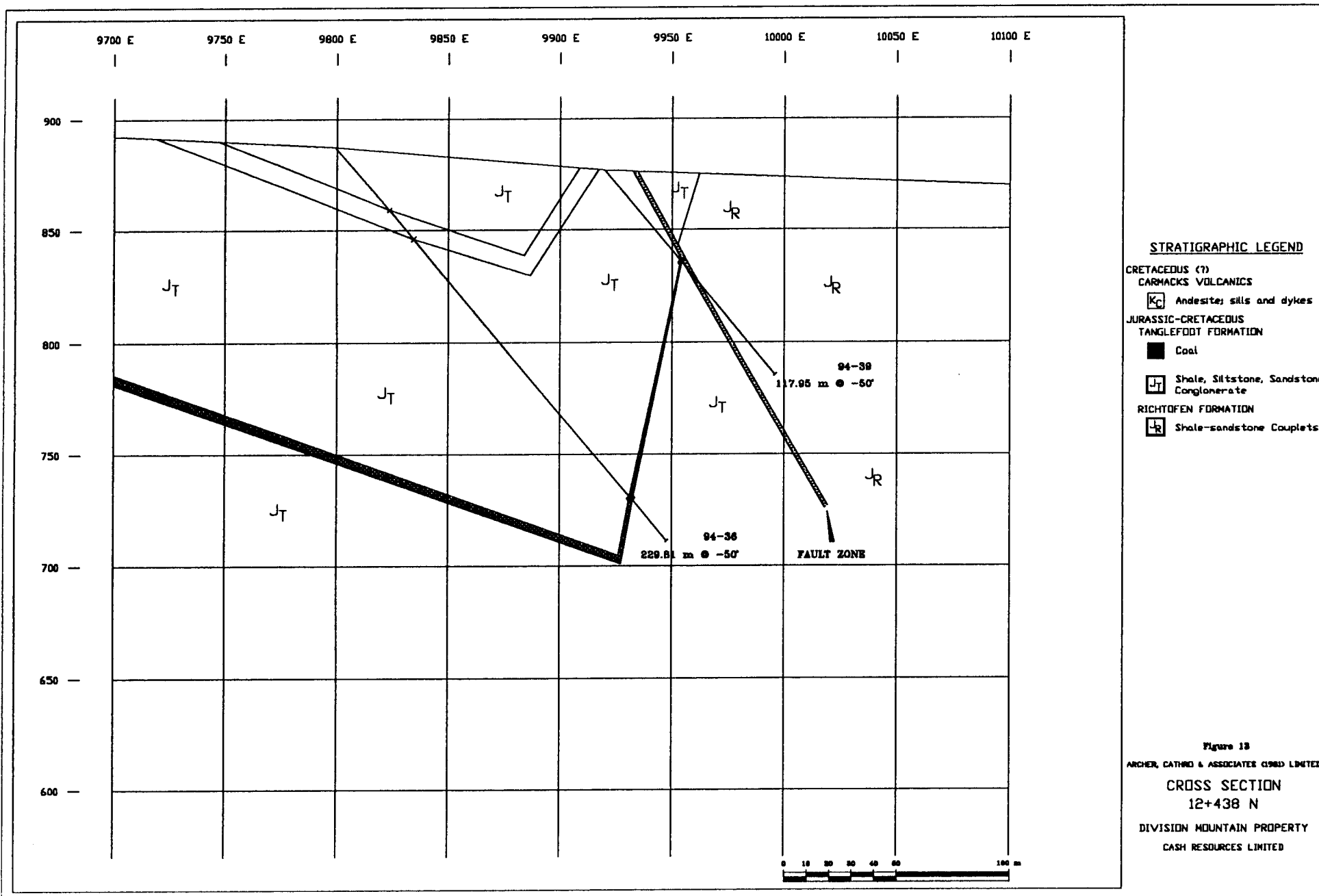
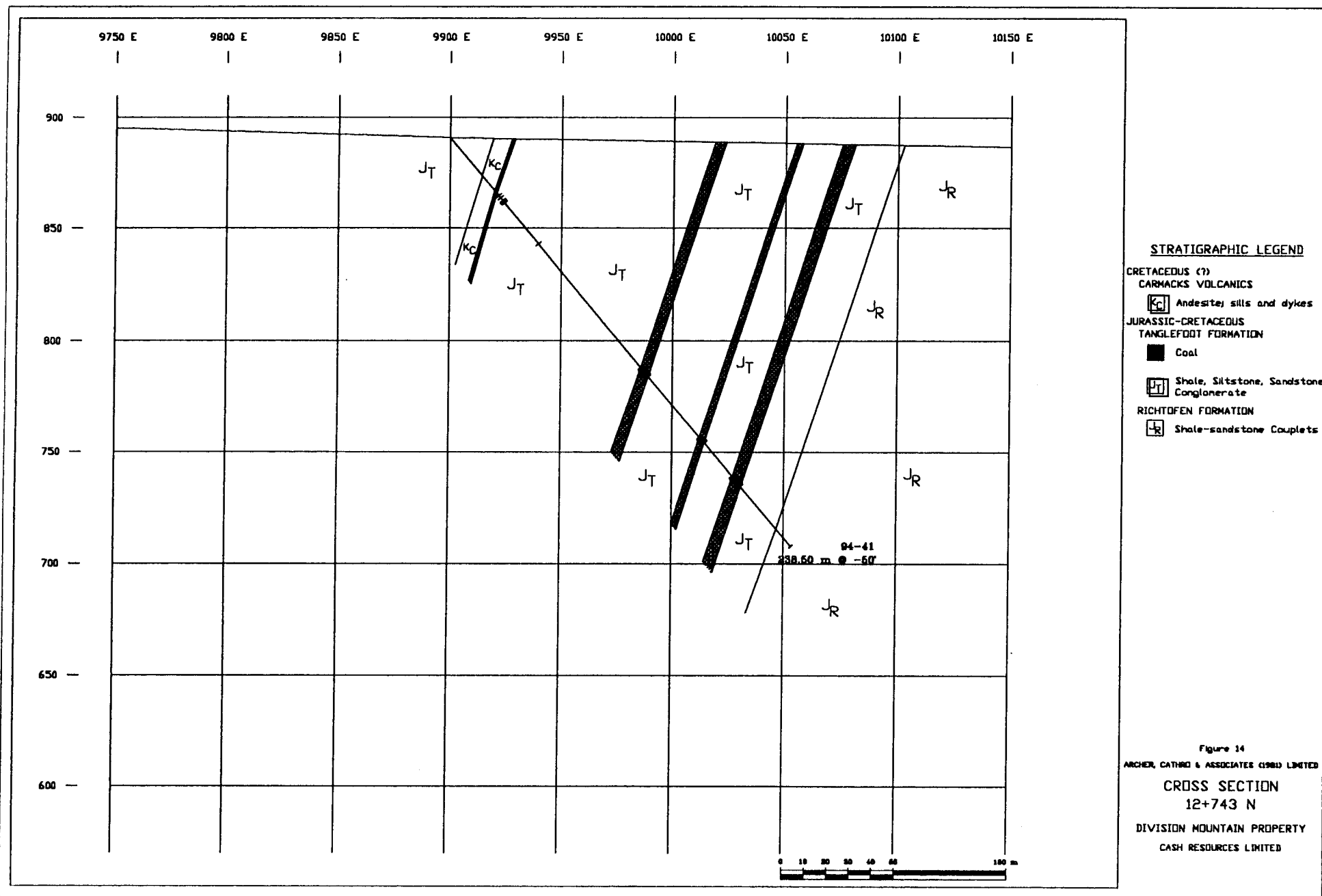
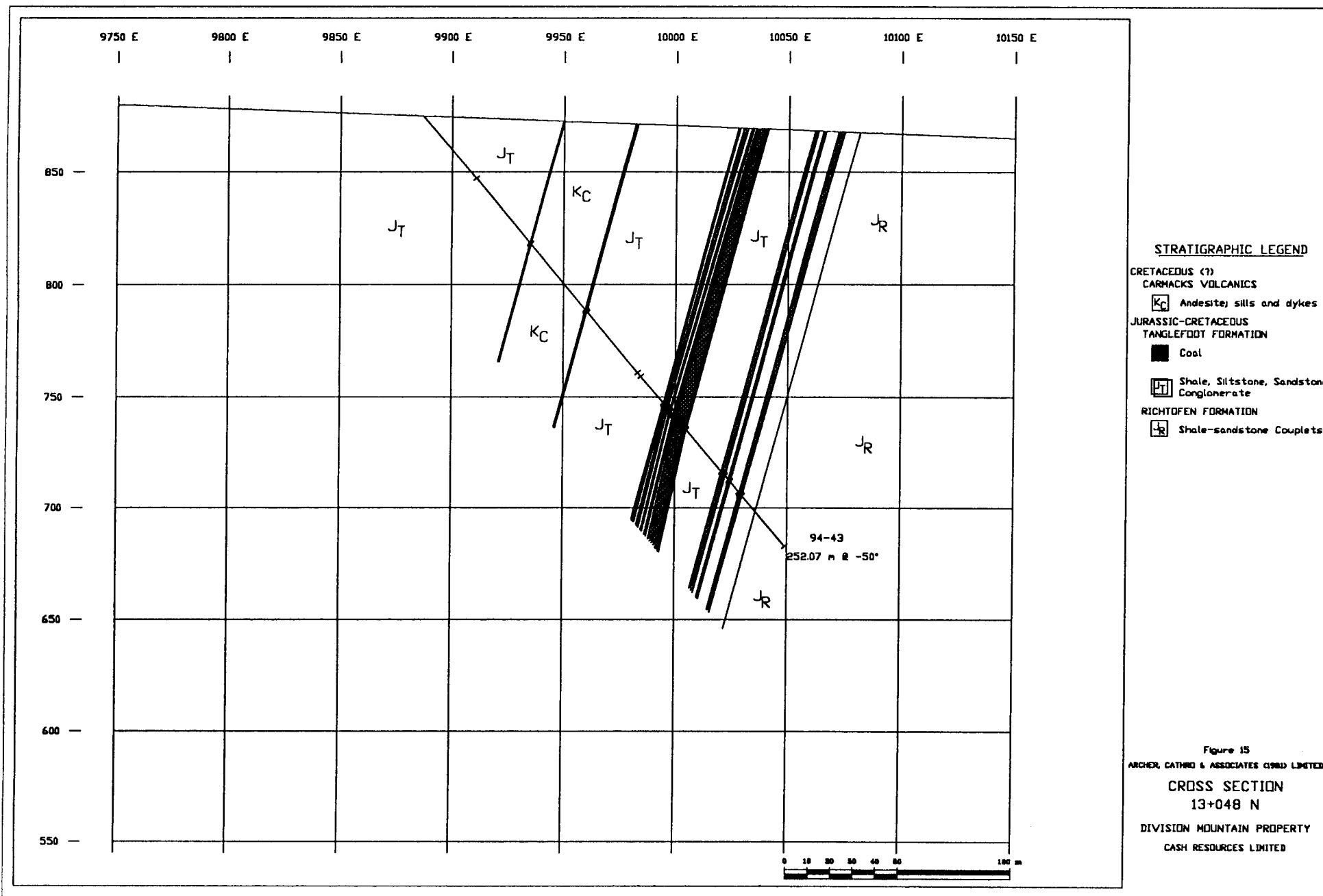
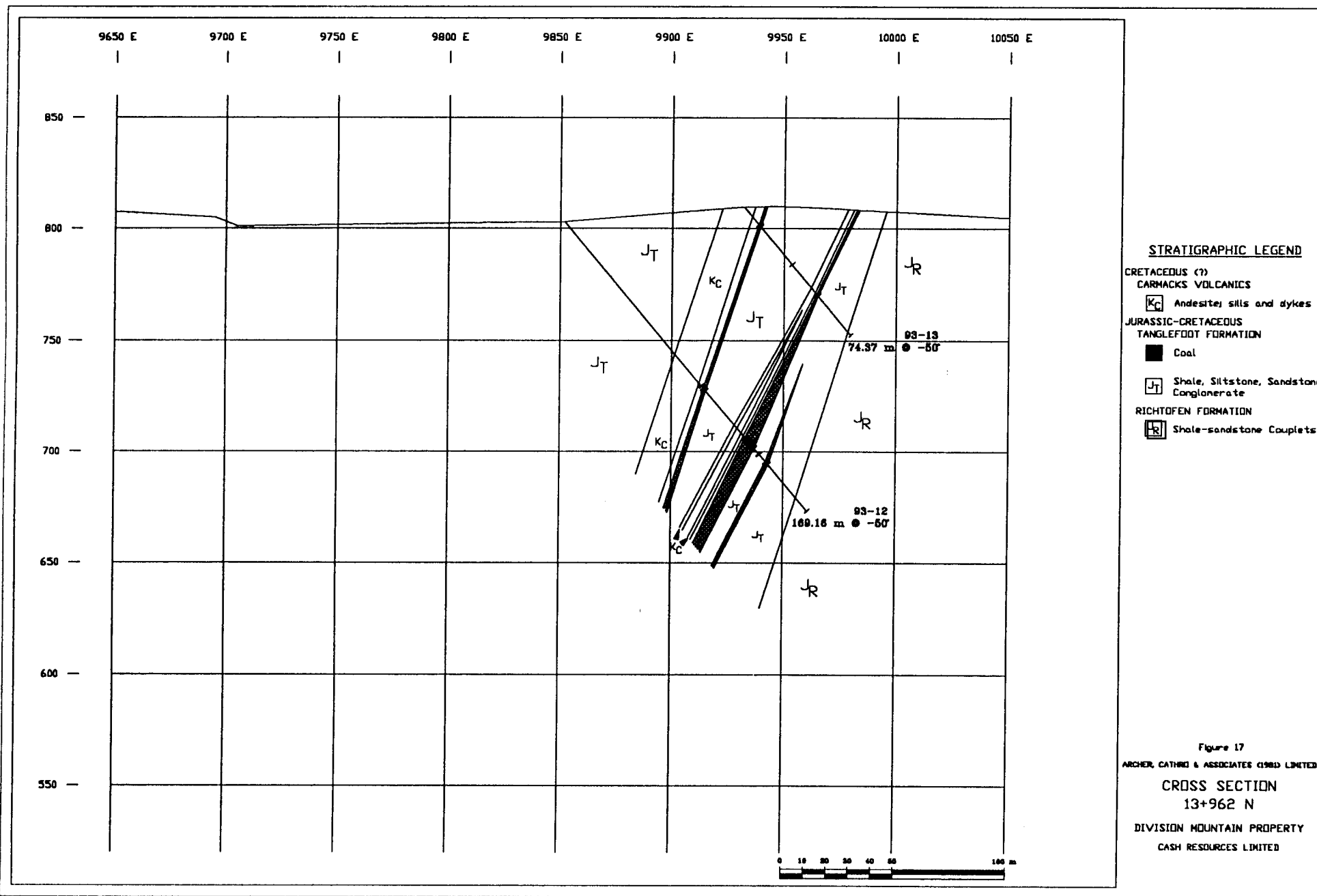


Figure 13
 ARCHER, CATHRO & ASSOCIATES (1980) LIMITED
CROSS SECTION
 12+438 N
 DIVISION MOUNTAIN PROPERTY
 CASH RESOURCES LIMITED







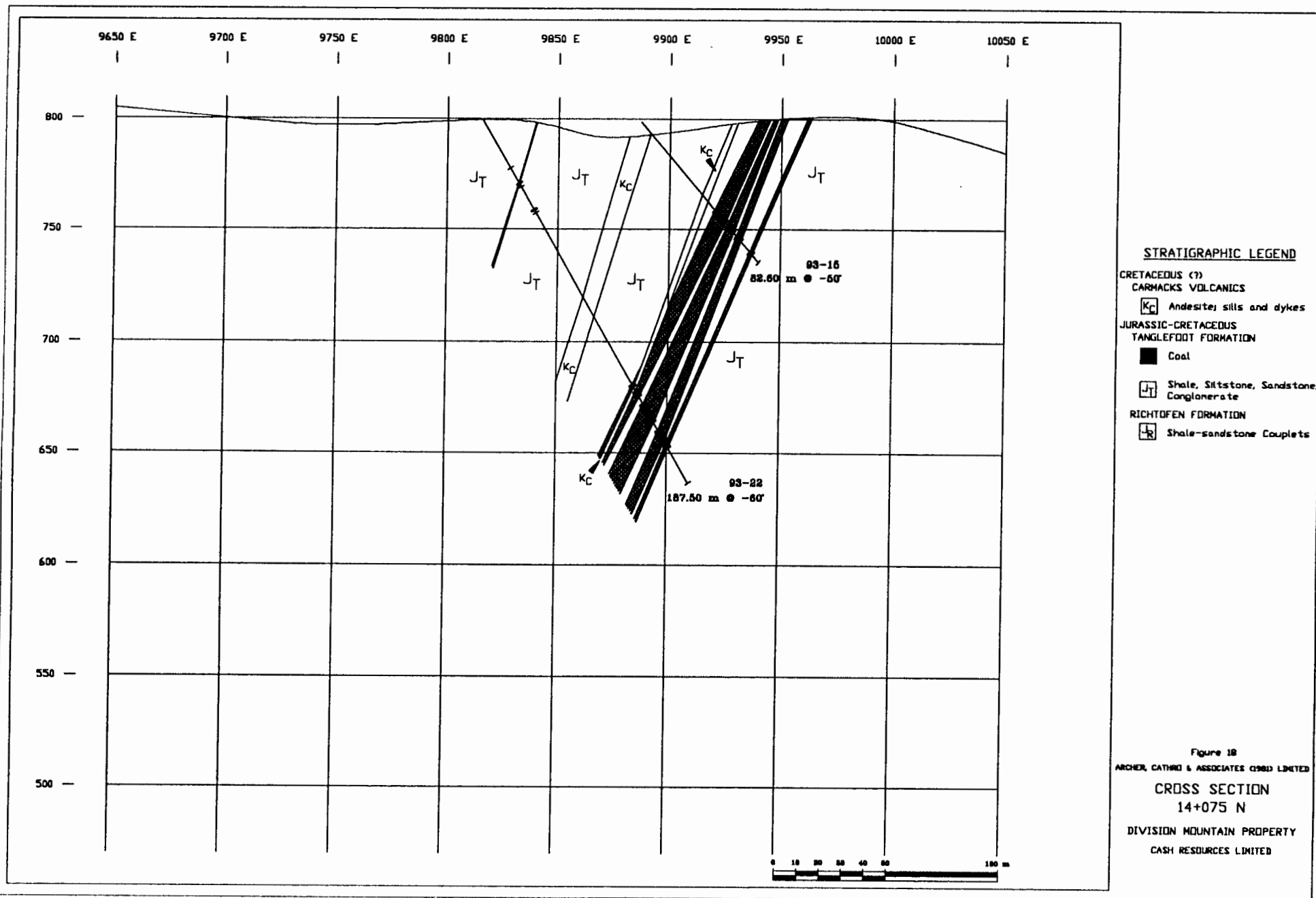
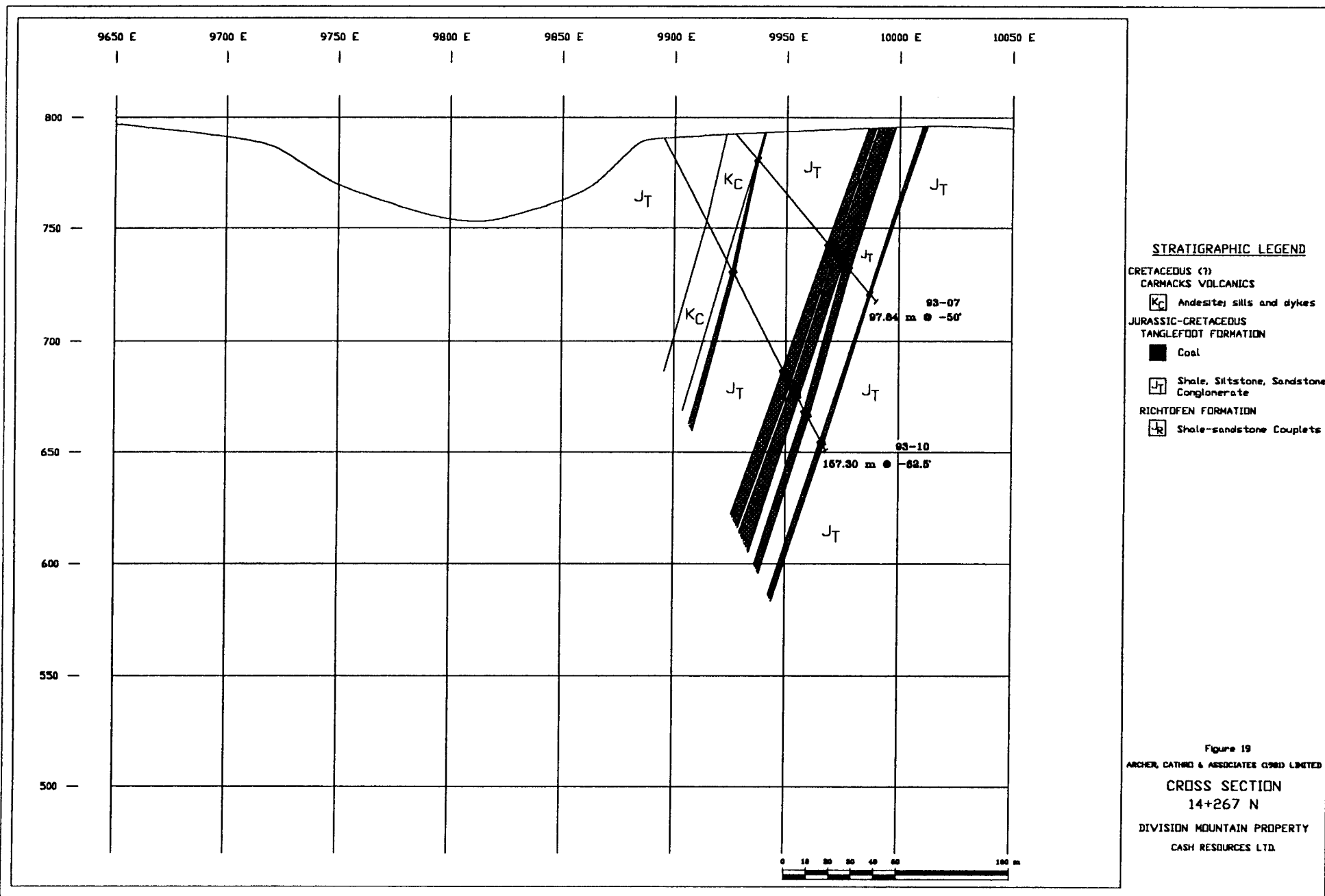
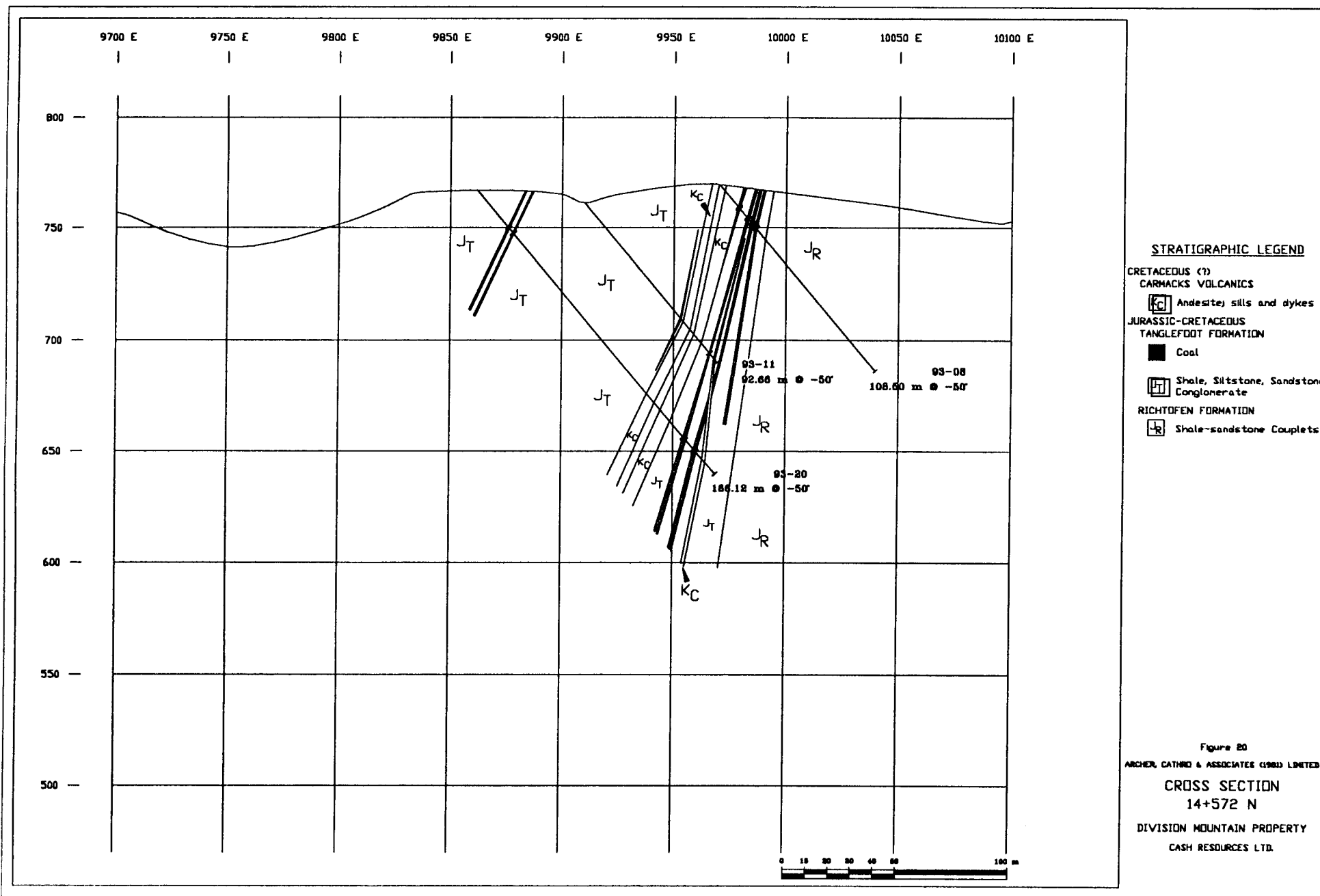
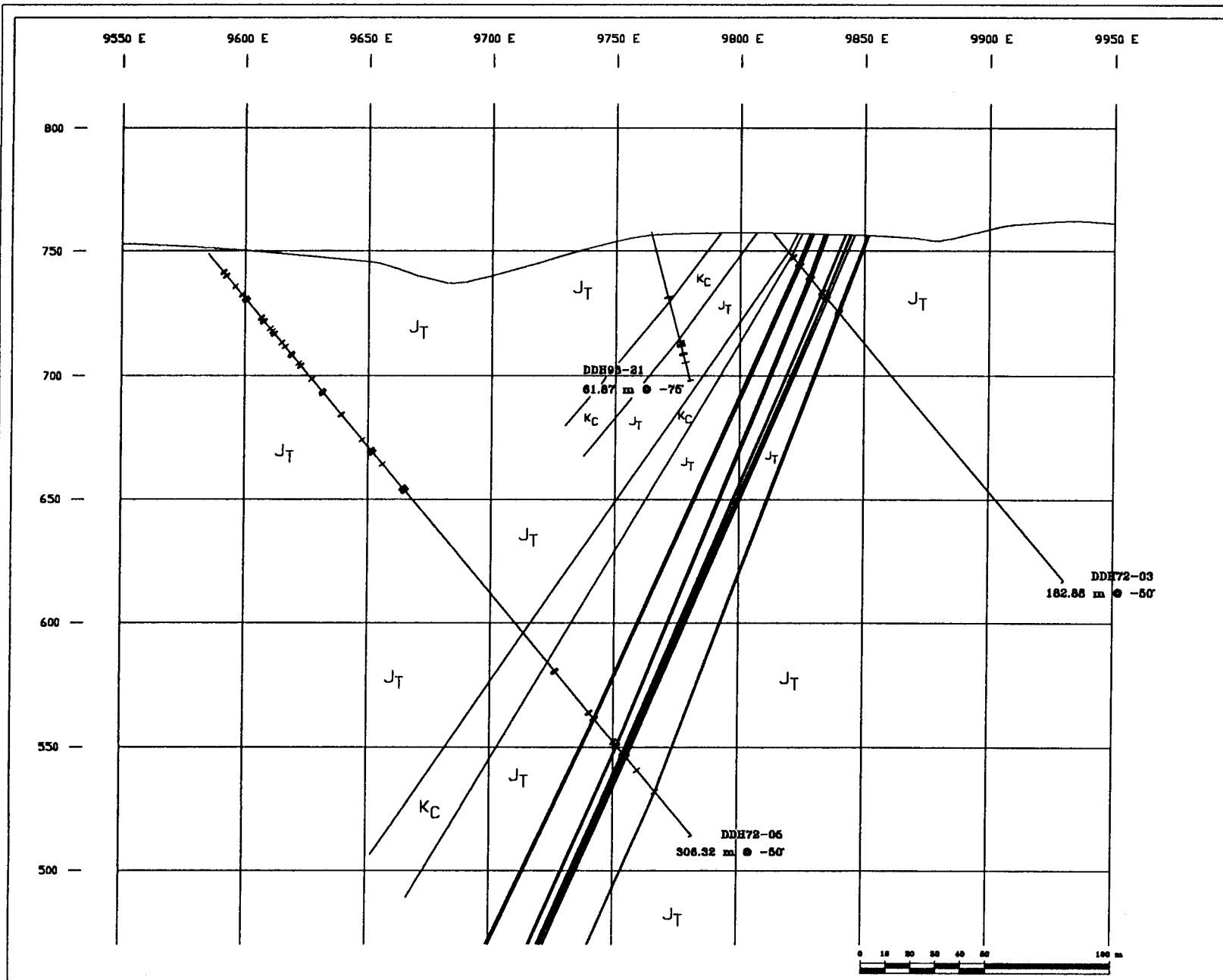


Figure 18
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED
CROSS SECTION
14+075 N
DIVISION MOUNTAIN PROPERTY
CASH RESOURCES LIMITED



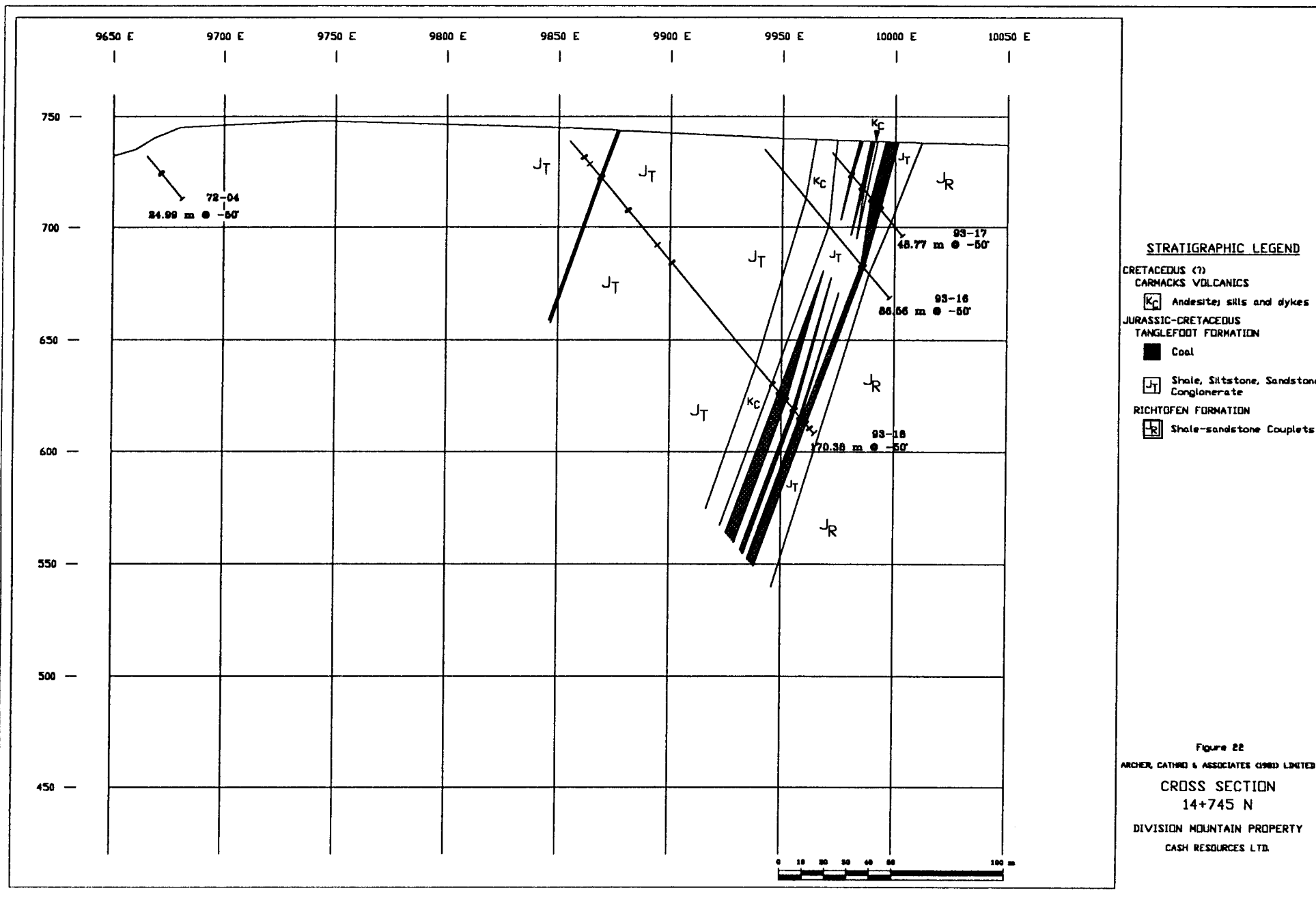


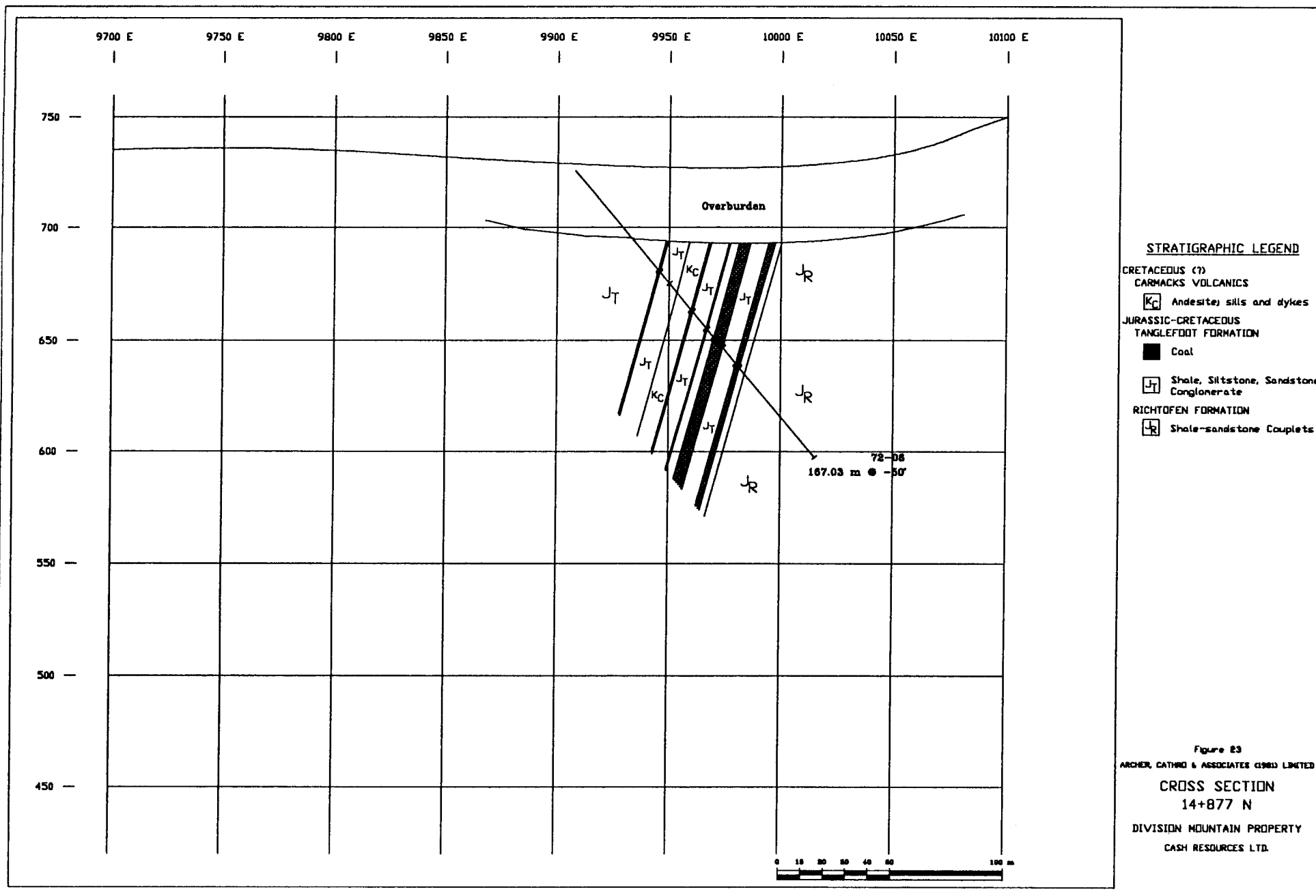


STRATIGRAPHIC LEGEND

- CRETACEOUS (?)
CARMACKS VOLCANICS
- K_C Andesite; sills and dykes
- JURASSIC-CRETACEOUS
TANGLEFOOT FORMATION
- Coal
- J_T Shale, Siltstone, Sandstone,
Conglomerate
- RICHTOFEN FORMATION
- R_T Shale-sandstone Couplets

Figure 21
 ARCHER, CATHRO & ASSOCIATES (1980) LIMITED
CROSS SECTION
14+650 N
 DIVISION MOUNTAIN PROPERTY
 CASH RESOURCES LTD.





COAL MEASURE STRATIGRAPHY

Stratigraphy encountered within the coal measure is comprised of three distinctive lithologies: coal-bearing strata within Tanglefoot Formation; the underlying Richtofen Formation; and, intrusive andesite bodies.

Tanglefoot Formation

Tanglefoot Formation, the main coal-bearing unit on the property, occurs as fining upward cycles of subrounded, clast-supported quartz granule conglomerate; brown coarse-grained sandstone and chocolate brown siltstone that often contains plant fossils; and, black shale, coaly shale, shaly coal and coal. Contacts vary from gradational over several metres to sharp. Thicknesses of all the constituents of an individual cycle and the number of cycles encountered per drill section vary greatly. Often a unit of grey arkosic sandstone with 2 to 8 mm angular rip-up clasts of coaly shale and or shale lies between the lower contact of the earliest coal-bearing cycle and the Richtofen Formation.

Richtofen Formation

Lithologically distinctive Richtofen Formation serves as an easily recognized base for the overlying coal-bearing strata. It consists of interlaminated black shale and wispy siltstone to fine-grained, often calcareous sandstone laminae. Silt to sand intervals are characterized by cross stratification with faded ripple features often present. Fossil gastropods were found in the Richtofen Formation in diamond drill hole 94-38. Unfortunately these are not considered index fossils and cannot therefore be used for accurate dating.

Andesite

This intermediate to mafic, altered andesite/basalt of likely intrusive origin appears, for the most part, to be sill-like bodies conformable with the Tanglefoot and Richtofen stratigraphy although it does on occasion crosscut these formations. Textures range from cryptocrystalline to porphyritic with carbonate-filled amygdules. Colours vary from pale green to dark green. Carbonate veins, veinlets and stringers are common throughout. Composition is primarily cryptocrystalline clay and or plagioclase, carbonate, augite and quartz. Petrographic thin section descriptions of eight samples of andesite from drill core are described in Appendix IV.

STRUCTURE

Folds

Deformation in the Whitehorse Trough occurred primarily as flexural slip folding during the Mid-Cretaceous. Synclinal and anticlinal axes trend north-northwest, parallel to the trough axis. Folds on the property also trend northwest, are generally southeast water plunging and are open to isoclinal. Fold wavelengths are generally between 500 m and 2 km although complex tight folds with wavelengths less than 3 m have been noted. The coal-bearing Cairnes Syncline outlined by current exploration trends 310° and plunges 9° to the northwest. The east limb dips between 50 and 75° to the southwest while the west limb dips between 25 and 45° to the northeast. Trenching, geophysics and one diamond drill hole appear to have defined the same coal-bearing strata in the southwest-dipping limb of the Division Mountain Syncline less than 600 m to the southwest (Figure 4).

Faults

Large-scale, northwest-trending strike-slip faults with evidence of a dip-slip component are prominent at a regional scale. The Braeburn Fault is a right lateral strike-slip fault similar to many other basin parallel faults. These likely represent Triassic to Cretaceous zones of crustal weakness caused by Triassic oblique subduction being resolved into subduction and strike-slip in the fore-arc.

Trenching, diamond drilling, preliminary surficial mapping and airphoto interpretation have defined two faults in the main area of interest. The first, a right lateral structure, strikes north and offsets the coal seams approximately 120 m. This fault crosses the baseline at 12+438N. The second fault, 2 km to the northwest, is left lateral, strikes west, offsets the coal seams 50 m and crosses the baseline at 14+410N.

1994 DRILL PROGRAM

The 1994 drill program consisted of 23 HQ- and NQ-sized diamond drill holes totalling 4054 m. Drill production averaged 22.6 m per 12 hour shift (including moves). Diamond drilling was completed in two phases, with one drill from September 19 to October 19 and with two drills from November 6 to December 7. Survey data for the drill hole collars is given in Appendix V.

All physical work on the property was performed under the provisions of a Territorial Land Use Permit. This includes the use of sumps at all drill sites to collect return water from the drills. Inspections were carried out by land use officers on a regular basis. No outstanding deficiencies remain from the 1994 field program.

Diamond drilling and bulldozer support were contracted to E. Caron Diamond Drilling of Whitehorse. This was completed utilizing two skid-mounted Longyear 38 wireline-equipped drills and a D7 bulldozer for drill pad construction and drill moves.

The drills were operated on a seven day per week, 24 hour per day basis using two, two-man crews per drill. A drill foreman supervised the work when two drills were used. A small lake approximately 800 m northeast of the main area of interest was used to supply water during the first phase of drilling. To avoid long water lines during the winter months, a 16,000 litre water truck was used to supply the drills. Diamond drill hole collars were surveyed by Underhill Engineering of Whitehorse from permanent survey hubs installed at various locations on the property. UTM coordinates of drill hole collars with elevations are listed in Appendix VI.

All 1993 and 1994 drill holes are marked with a 1.5 m wooden plug bearing an aluminum tag inscribed with hole number, date drilled, azimuth, dip and total depth. Surface inclination of the holes was determined using a Brunton compass with downhole surveys consisting of acid tests. A list of corrected dips is given in Appendix V. Of the 23 holes, five showed no change from collar inclinations, six steepened slightly (average 2°) and 12 flattened slightly (average 2°).

The drill core was logged and sampled on site. Drill logs are located in Appendix VII.

Casing depths averaged 9.4 m and ranged from 3.0 m to 26.2 m. Core recovery of the coal intersections averaged 73%. All holes were drilled with HQ (6.25 cm) diameter core, however badly broken ground necessitated reducing to NQ (4.75 cm) diameter for three holes.

1994 TRENCHING PROGRAM

The 1994 trenching program consisted of two phases: phase 1 from August 25 to September 16; and, phase 2 from October 18 to November 25. In total, 574.5 hours of excavator time was used to complete the 14 trenches totalling 3670 m in length. Locations of the trenches are shown on Figure 25. The Caterpillar 235 tracked excavator was operated under contract by 10983 Yukon Ltd. of Whitehorse. The excavator was transported by truck and trailer to Braeburn where it proceeded under its own power for 30 km to the property. Fuel consumption for the excavator averaged between 34 and 42 litres per hour. Bedrock was not reached in any of the test pits south of line 19+610N where overburden depth exceeds 8 m. Production was very slow due to permafrost in areas that combined thick moss and densely spaced trees exceeding 10 m in height. Very little permafrost was encountered in areas of vegetation removal by the Braeburn fire. Upon completion of the 1994 trenching program all trenches were backfilled and reseeded.

COAL

The Division Mountain coal measure contains five relatively continuous seams labelled from bottom to top: Seam 1, Seam 2, Seam 3, Seam 4 and Seam 5. Seam 3 actually consists of 1 to 5 close spaced seams or splits of one larger seam. Diamond drilling during 1994 defined the five seams along the east limb of the Cairnes Syncline for a total length of 5 km with an average aggregate thickness of 19.6 m in the southern part narrowing to 11.3 m in the north. Trenching and diamond drilling combined to define the west limb of the syncline for a strike length of 1.5 km with an average aggregate thickness of 17.1 m. The coal-bearing strata of the west limb of the syncline is open to the north while the east limb has only been explored to shallow depths.

Coal seams are generally vitreous to dull black in colour, fissile to massive-bedded and brittle. Fissility varies with argillaceous content. Sections of coal with moderate to high amounts of argillaceous matter are also more susceptible to shearing. Pyrite content is low and occurs as flakes or plates along bedding/shear planes. Calcite veinlets (<1 mm) also occur infrequently within the coal seams. Competency of the coal intersected in drill holes is variable but was, for the most part, rated as high.

COAL QUALITY ANALYSES

Whole core samples of coal intersections were sent to Chemex Labs of Ltd. of North Vancouver, B.C. for proximate analyses which includes determination of calorific value and per cent sulphur. A summary of the analyses from 1994 diamond drilling are given in Table 2 with Analytical Certificates located in Appendix VIII.

Calculated weighted averages for the 1994 analyses are 2.38% residual moisture, 28.59% ash content, 25.85% volatile matter, 43.01% fixed carbon and 0.43% sulphur, with a calorific value of 5205 cal/g (9301 Btu/lb). These values equate to an ASTM rank classification of High Volatile Bituminous "B".

TABLE 2
DIVISION MOUNTAIN COAL PROJECT
1994 COAL QUALITY ANALYSES (AIR DRIED)

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>HOLE 94-023</u>	(11+829N)								
9423-1	5	1.60	28.68	22.65	47.07	0.37	5082	9075	4.20
9423-3	4	2.20	18.76	30.73	48.31	0.42	6135	10955	7.92
9423-4	3e	2.11	29.45	26.13	43.80	0.49	5273	9416	1.24
9423-5	3c	2.29	22.46	29.16	46.09	0.49	5854	10454	5.05
9423-6	3b	1.70	41.00	28.69	39.97	0.52	4157	7423	5.86
9423-7	3a	1.71	42.91	25.96	29.42	0.38	3924	7007	1.61
Weighted Average Low Ash (<30%) Avg		1.97	28.14	28.14	44.40	0.45	5283	9433	25.88
		2.08	22.76	28.16	47.11	0.43	5760	10285	18.41
<u>HOLE 94-025</u>	(11+500N)								
9425-1	4	2.98	19.29	30.03	47.70	0.39	5910	10554	3.63
9425-2	3c	3.11	20.90	29.75	46.24	0.41	5856	10457	6.17
9425-3	3b	2.07	28.24	31.24	38.45	0.50	5070	9054	3.81
Low Ash (<30%) Avg		2.78	22.52	30.24	44.45	0.43	5650	10089	13.61

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>HOLE 94-026</u>	(10+914N)								
9426-1	4	2.46	28.16	26.81	42.57	0.73	5344	9543	1.00
9426-3	3d	7.97	35.02	8.11	48.90	0.50	4441	7930	1.94
9426-4	3c	3.42	20.02	28.85	47.71	0.48	6042	10789	3.01
9426-5	3b	3.04	18.57	32.10	46.29	0.64	5989	10695	1.39
9426-6	3a	3.04	18.81	29.84	48.31	0.39	6043	10791	6.98
9426-7	2	2.90	20.32	31.65	45.13	0.60	5924	10579	2.89
9426-8	1	2.02	47.98	23.49	26.51	0.54	3341	5966	1.67
Weighted Average Low Ash (<30%) Avg		3.46	23.96	27.17	45.41	0.50	5580	9964	18.88
		3.05	19.92	29.99	47.03	0.49	5970	10660	15.27
<u>HOLE 94-029</u>	(11+219N)								
9429-1	4	2.99	32.19	26.69	38.13	0.36	4978	8889	7.63
9429-2	3c	4.83	27.44	21.85	45.88	0.30	5175	9241	1.71
9429-3	3c	5.54	23.99	7.63	62.84	0.28	5593	9988	1.23
9429-4	3b	2.23	25.65	28.03	44.09	0.62	5479	9784	3.37
9429-5	3a	2.67	28.15	28.01	41.17	0.36	5225	9330	3.83
9429-6	3a	2.48	20.58	31.40	45.54	0.62	5889	10516	2.90
Weighted Average Low Ash (<30%) Avg		3.04	27.87	26.28	42.82	0.43	5286	9439	20.67
		3.07	25.33	26.04	45.56	0.47	5466	9761	13.04

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>Hole 94-030</u>	(12+134N)								
9430-1	5	2.28	36.60	11.36	49.76	0.30	4305	7688	1.61
9430-2	5	2.31	27.97	10.56	59.16	0.44	5193	9273	1.56
9430-3	4	3.06	16.87	29.71	50.36	0.51	6259	11177	9.44
9430-4	3e	2.62	22.98	28.18	46.22	0.54	5733	10238	1.90
9430-5	3c	2.34	25.13	31.03	41.50	0.59	5620	10036	1.93
9430-6	3b	1.79	52.66	24.97	20.58	0.43	2913	5202	2.50
9430-7	3a	1.99	40.07	26.38	31.56	0.59	4197	7495	4.20
Weighted Average		2.53	25.75	26.01	43.20	0.51	5219	9320	23.14
Low Ash (<30%) Avg		2.83	19.89	27.67	49.60	0.52	5996	10707	14.83
<u>Hole 94-032</u>	(12+134N)								
9432-1	5	2.35	38.99	18.95	39.71	0.31	4421	7895	5.00
9432-2	4	2.60	19.82	29.12	48.46	0.43	6037	10780	11.25
9432-3	3e	1.49	47.53	24.01	26.97	0.38	3605	6438	0.98
9432-4	3c	1.91	23.08	30.32	44.69	0.62	5835	10420	1.03
9432-5	3c	1.80	31.75	28.59	37.86	0.51	4989	8909	1.02
9432-6	3b	1.57	27.00	30.98	40.45	0.54	5504	9829	1.44
9432-7	3a	1.46	46.85	24.44	27.25	0.36	3562	6361	4.97
Weighted Average		2.12	30.84	26.17	40.81	0.41	5071	9056	25.69
Low Ash (<30%) Avg		2.44	20.82	29.41	45.26	0.46	5966	10653	13.72

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>HOLE 94-033</u>	(10+914N)								
9433-1	3d	1.79	18.94	24.86	54.41	0.67	5991	10699	9.00
9433-2	3	2.15	21.36	30.40	46.09	0.58	5491	9805	12.18
Low Ash (<30%) Avg		2.00	20.33	28.05	49.63	0.62	5703	10185	21.18
<u>HOLE 94-034</u>	(10+725N)								
9434-1	4b	2.70	20.47	29.44	47.39	0.40	5694	10168	6.00
9434-2	4a	1.89	40.88	24.01	33.22	0.40	4157	7423	3.80
9434-3	3c	2.95	39.12	17.84	40.09	0.38	4336	7743	12.70
9434-4	3a	1.63	41.27	25.04	32.06	0.68	4075	7277	5.20
Weighted Average Low Ash (<30%) Avg		2.50 2.70	35.73 20.47	22.55 29.44	39.22 47.39	0.44 0.40	4557 5694	8138 10168	27.70 6.00
<u>HOLE 94-035</u>	(10+725N)								
9435-1	4b	2.41	21.58	30.67	45.34	0.55	5796	10350	7.36
9435-2	4a	1.94	44.17	23.96	29.93	0.47	3754	6704	5.06
Weighted Average Low Ash (<30%) Avg		2.22 2.41	30.78 21.58	27.94 30.67	39.06 45.34	0.52 0.55	4964 5796	8971 10350	12.42 7.36
<u>HOLE 94-037</u>	(10+710N)								
9437-3		1.31	38.31	17.91	42.47	0.75	4392	7843	2.08
9437-4		2.23	27.07	23.95	46.75	0.34	5305	9473	6.79
9437-5		2.13	28.52	26.22	43.13	0.74	5172	9236	7.99
Weighted Average Low Ash (<30%) Avg		2.07 2.18	29.14 27.85	24.28 25.18	44.51 44.79	0.58 0.56	5129 5233	9160 9345	16.86 14.78

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>HOLE 94-038</u>	(11+219N)								
9438-1	4	2.65	34.95	26.83	35.57	0.35	4577	8173	4.63
9438-2	3c	1.83	30.45	8.65	59.07	0.35	5554	9918	3.32
9438-3	3b	3.27	47.32	10.52	38.89	0.32	3484	6221	2.90
9438-4	3a	5.24	54.76	10.85	29.15	0.20	2172	3879	4.18
Weighted Average		3.31	41.85	15.22	39.61	0.30	3913	6987	15.03
<u>HOLE 94-040</u>	(11+219N)								
9440-1	4	3.45	21.13	29.84	45.58	0.45	5875	10489	4.27
9440-2	3c	3.33	17.99	30.86	47.82	0.46	6185	11045	6.13
9440-3	3b	3.37	18.68	29.22	48.73	0.48	6074	10857	3.32
9440-4	3b	2.44	43.71	25.12	28.73	0.45	3824	6829	1.68
9440-5	3a	2.62	28.58	27.79	41.01	0.43	5236	9350	8.71
9440-6	2	1.29	25.21	25.95	47.55	0.69	5747	10262	3.04
Weighted Average		2.84	24.43	28.61	44.18	0.48	5623	10042	27.15
Low Ash (<30%) Avg		2.87	23.16	28.84	45.20	0.48	5742	10254	25.47
<u>HOLE 94-041</u>	(12+754N)								
9441-2	4	2.45	32.04	26.93	38.58	0.35	5042	9004	4.55
9441-3	3b	7.02	34.00	7.49	51.49	0.31	4970	8875	2.26
9441-4	3a	2.59	31.99	26.55	38.87	0.72	5005	8938	5.11
Weighted Average		3.38	32.39	23.08	41.15	0.50	5012	8951	11.92

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>HOLE 94-042</u>	(11+500N)								
9442-1	4	3.03	22.17	29.54	45.26	0.42	5902	10539	5.60
9442-3	3c	2.20	25.30	29.39	43.11	0.40	5523	9862	10.80
9442-4	3b	2.29	25.31	27.50	44.90	0.42	5576	9957	3.90
9442-5	2	2.14	25.82	28.93	43.11	0.42	5599	9998	7.70
9442-6	1	1.82	41.74	25.79	30.65	0.39	3999	7141	3.84
Weighted Average Low Ash (<30%) Avg		2.30 2.36	26.86 24.82	28.64 29.03	42.20 43.79	0.41 0.41	5430 5627	9697 10048	31.84 28.00
<u>HOLE 94-043</u>	(13+048N)								
9443-2	3c	1.20	42.75	13.24	42.81	0.30	4069	7266	3.41
9443-3	3c	1.88	25.03	26.61	46.48	0.38	5659	10105	3.03
9443-4	3c	1.46	44.93	23.65	29.96	0.40	3860	6893	2.54
9443-5	3b	1.85	35.44	15.26	47.45	0.42	5060	9089	2.42
9443-6	3a	1.80	27.77	29.94	40.49	0.46	5433	9702	2.03
Weighted Average Low Ash (<30%) Avg		1.61 1.85	35.58 26.13	21.11 27.95	41.69 44.08	0.38 0.41	4773 5568	8533 9943	13.43 5.06

SAMPLE NO.	SEAM	RESIDUAL MOISTURE (%)	ASH (%)	VOLATILE MATTER (%)	FIXED CARBON (%)	SULPHUR (%)	CALORIFIC VALUE (DRY)		True Width (m)
							Cal/g	BTU/lb (Cal/g/.56)	
<u>HOLE 94-044</u>	(11+829N)								
9444-1	4	3.35	29.62	28.22	38.81	0.43	5258	9389	4.68
9444-2	3c	3.35	18.32	31.34	46.99	0.46	6291	11234	5.78
9444-3	3c	3.02	24.80	27.92	44.26	0.47	5621	10038	4.29
9444-4	3b	2.15	25.08	28.62	44.15	0.57	5632	10057	2.62
9444-5	3a	2.56	26.28	28.93	44.23	0.49	5507	9834	4.10
Low Ash (<30%) Avg		2.99	24.42	29.16	43.79	0.45	5702	10182	21.47
<u>Hole 94-045</u>	(11+500N)								
9445-1	4	3.00	31.58	27.85	37.57	0.37	4871	8698	5.01
9445-2	3c	3.43	17.00	30.92	48.65	0.45	6327	11298	4.39
9445-3	3b	3.51	19.65	28.49	48.35	0.50	6039	10784	2.12
9445-4	3a	3.15	23.36	27.26	46.23	0.49	5743	10255	2.50
9445-5	3a	1.28	27.85	28.39	41.22	0.58	5217	9316	1.02
9445-6	2H	0.40	35.37	13.99	50.24	0.16	5268	9407	2.96
9445-7	1	2.75	21.21	31.11	44.93	0.55	5798	10354	1.85
Weighted Average		2.67	25.45	26.79	45.03	0.41	5591	9984	19.85
Low Ash (<30%) Avg		3.09	20.40	29.53	47.30	0.49	5975	10670	11.88
1993 Overall Average		2.86	26.99	25.05	45.11	0.47	5344	9561	11.34
1994 Overall Average		2.38	28.59	25.85	43.01	0.43	5205	9301	19.61
1993-1994 Average		2.42	28.45	25.79	43.18	0.43	5216	9328	18.94

GEOPHYSICAL SURVEYS

Geophysical surveys during the 1994 field season included 36.9 km of VLF-EM at 10 m intervals on 300 m line spacing and 576 m of reflection seismic with a constant 4 m geophone interval on selected VLF-EM survey lines. VLF-EM survey lines were run with 27.4 km oriented at approximately 130° and 9.5 km oriented at approximately 040°. Those lines oriented at 130° were perpendicular to the strike of the beds in the limbs of the main syncline while those oriented at 040° were used to better delineate the nose of the northerly-plunging fold. Results suggest several fairly continuous VLF-EM conductors on the property that, in tested areas, coincide with coal measures. One such conductor, yet to be tested on the southwest side of Division Mountain, is over 4 km long. Shallow reflection seismic surveys were conducted on Line 10+914N from 9540E to 9740E and on line 13+353N from 9104E to 9480E. Line 10+914 was tested to compare reflection seismic results with known coal seams delineated from two trenches and three drill holes. Line 13+353N was chosen to test a known strong VLF-EM conductor. Results of the test work suggest that reflection seismic surveys may be an effective tool in mapping coal seams on the Division Mountain property. More conclusive evidence will be available once Line 13+353 has been tested with drill holes. A summary of methodology, results and recommendations along with relevant profiles can be found in Appendix IX.

ENVIRONMENTAL SURVEYS

Meteorology

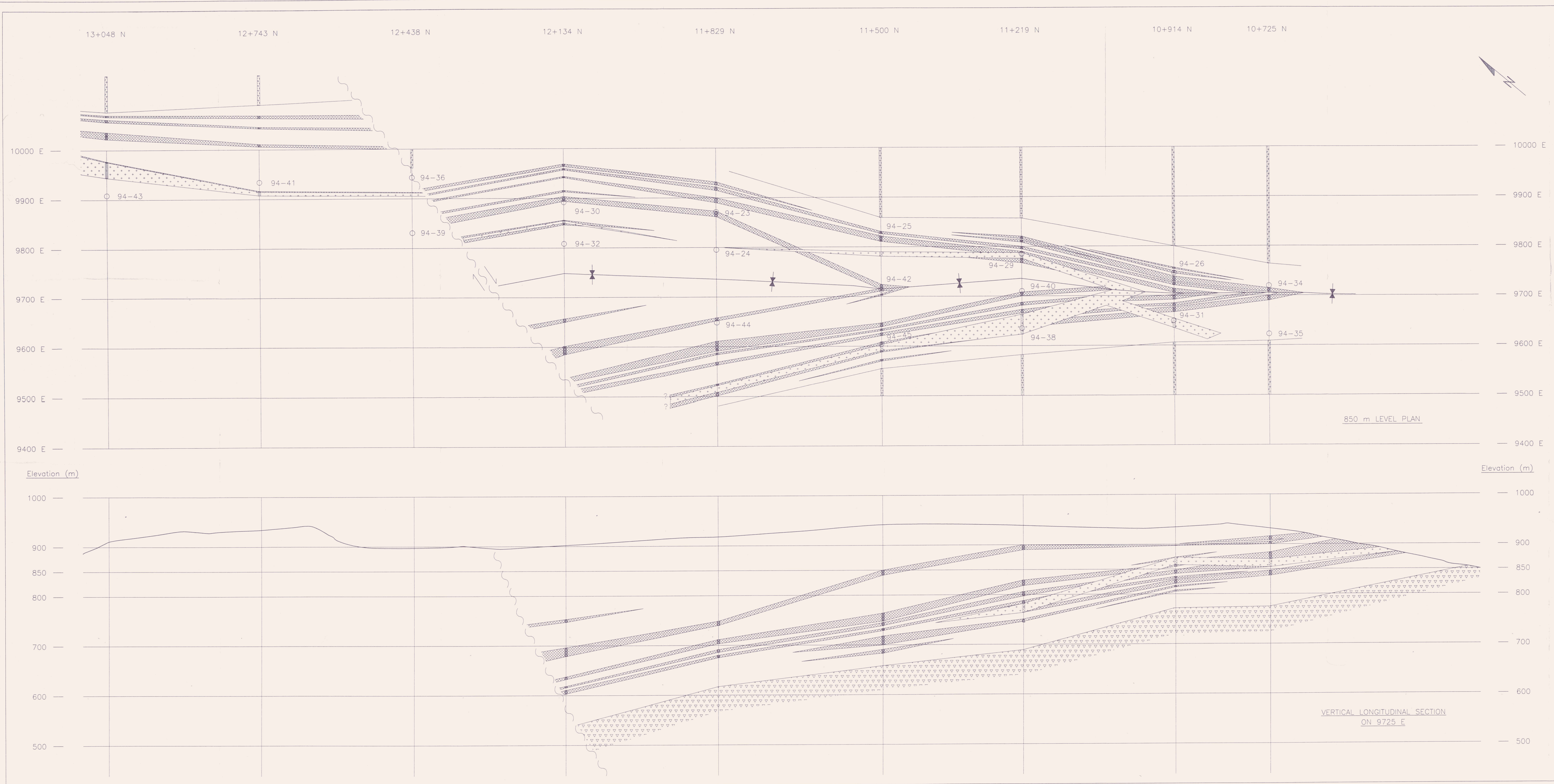
A basic meteorological station consisting of a maximum/minimum thermometer (enclosed in a louvered housing) and a bucket rain gauge were installed at the Division Mountain exploration camp. On site meteorological data collection began in August 1994 and continued throughout the winter by the site watchman. Temperatures and precipitation are measured twice daily and monthly summaries are sent to Environment Canada. Informal discussions with government and industry specialists have begun to determine future air quality and meteorological monitoring requirements. Background air quality parameters would likely include nitrogen oxide, sulphur dioxide and airborne particles. A complete climate station measuring wind speed, cold air temperature, relative humidity, incoming solar radiation and precipitation may be installed in the spring of 1995.

Wildlife

Preliminary research is currently underway on wildlife populations in the Division Mountain area. This includes current and historical population and habitat status of elk, moose, Dall sheep and waterfowl. At present the site watchman (on site from December 1994 to April 1995) is logging all wildlife observations. A schedule for optimum wildlife surveys during the 1995 field season has been proposed by Laberge Environmental Services under the supervision of G.A. Jilson & Associates Inc. of Whitehorse.

Water Quality

Hydrology surveys were contracted to J. Gibson & Associates of Whitehorse, Yukon and completed in two stages June 27 to 28 and October 4, 1994. Water samples and flow measurements were taken at a total of five sites located at upper Klusha Creek, upper Nordenskiöld River and Teslin Creek. All sites are easily accessible by foot. Summaries and data for the surveys are tabulated in Appendix X.



STRATIGRAPHIC LEGEND

- CRETACEOUS (?)
CARMACKS VOLCANICS
Andesite; sills and dykes
JURASSIC-CRETACEOUS
TANGLEFOOT FORMATION
Coal
RICHTOFEN FORMATION
Shale-sandstone Couplets

Syncline fold axes

Fault with movement

○ 94-32 Drill hole piercement point

Figure 24

ARCHER, CATHER & ASSOCIATES (1981) LIMITED

093307

LEVEL PLAN, 850 m

DIVISION MOUNTAIN PROPERTY
CASH RESOURCES LTD.

1:2000 Scale

0 50 100 200 300 metres

APPENDIX I
STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, R. Frank Gish, geologist, with business addresses in Whitehorse, Yukon Territory and Vancouver, British Columbia and residential address in Vancouver, British Columbia, do hereby certify that:

1. I graduated from the University of British Columbia in 1993 with a B.Sc. majoring in Geological Sciences.
2. From 1976 to 1980 and 1986 to present, I have been actively engaged in mineral exploration in the Yukon Territory and am presently employed with Archer, Cathro & Associates (1981) Limited.
3. I have personally participated in and supervised the field work reported herein.

A handwritten signature in black ink, consisting of stylized, overlapping loops and strokes that form the initials 'R' and 'G'.

R.F. Gish, B.Sc.

APPENDIX II
CHRONOLOGY OF SIGNIFICANT EVENTS

CHRONOLOGY OF SIGNIFICANT EVENTS

June 10	Camp opens - F. Gish, J. Dickie, B. Wengzynowski set up camp.
June 27-28	G. Mitchell (Assistant RMO) land use inspection, J. Gibson (J. Gibson & Associates) water sampling.
June 28	Camp closes.
August 20	Camp reopens - F. Gish, D. Moraal, M. Phillips set up camp.
August 25	Excavator trucked to Braeburn and begins walk to camp.
August 26	Excavator trenching commences.
August 30	R. Carne, D. Eaton, J. Franzen tour property.
September 15	R. Carne, J. Maissan (YDC), R. Hill (YTG), P. Flather (journalist) tour property.
September 16	Excavator completes Phase 1 of trenching program, starts walking to Braeburn. Diamond drill trucked to camp.
September 17	D. MacLean (YTG), B. Dickinson, J. Franzen tour property.
September 19	Phase 1 of diamond drilling begins.
September 22	M. Burke (Northern Affairs) tours property.
September 30	R. Carne, J. Ostashek (Yukon Government Leader), J. Duke (Mining Facilitator) tour property.
October 4	J. Gibson water sampling.
October 7	K. Nordin and S. Witheys (Laberge Environmental) tour property and sample creeks.
October 18 - November 4	Four linecutters (Twin Mountain Enterprises Ltd.) cut 37 km of line.
October 18	Excavator trucked to Braeburn and begins walk to camp for Phase 2 of trenching program.

October 19	Phase 1 of diamond drilling completed.
November 4-6	R. Stack, G. Davidson (Amerok Geophysics) VLF-EM survey.
November 5-7	Two surveyors (Underhill) survey drill holes and photo control points.
November 6	First drill of Phase 2 diamond drilling begins.
November 8	Second drill of Phase 2 diamond drilling begins.
November 13-18	M. Powers, G. Lee (Amerok) reflection seismic survey.
November 25	Excavator completes Phase 2 of trenching program.
November 28	B. Scott (YTG Safety Officer), N. Prasad (Chief, Mine Engineering, YTG) tour property.
December 3	G. Bruce (Municipal Advisor, YTG), K. Beacan, J. Beacan, G. Irvine, D. Banks, J. Crocker (Braeburn Lake Community Association) tour property.
December 7-8	Two surveyors (Underhill) survey drill holes.
December 7	B. Clay and cameraman (Nedaa) tour property.
December 7	Phase 2 of diamond drilling completed.
December 9	Camp closes.
December 9	Watchman D. Moraal starts work.

APPENDIX III
CONTRACTORS AND DATES WORKED

LIST OF CONTRACTORS AND DATES WORKED

<u>Contractor</u>	<u>Origin</u>	<u>Date</u>
J. Gibson & Associates	Whitehorse, Yukon	June 27 to 28 October 4
10983 Yukon Ltd.	Whitehorse, Yukon	August 25 to September 16 October 18 to November 25
E. Caron Diamond Drilling	Whitehorse, Yukon	September 19 to October 19 November 5 to December 7
Laberge Environmental Services	Whitehorse, Yukon	October 7
Twin Mountain Enterprises Ltd.	Whitehorse, Yukon	October 18 to November 4
Amerok Geophysics	Whitehorse, Yukon	November 4 to 6 November 13 to 18
Underhill Engineering Ltd.	Whitehorse, Yukon	November 5 to 7 December 7 to 8

APPENDIX IV
PETROGRAPHIC DESCRIPTIONS OF
ANDESITE THIN SECTIONS



Vancouver Petrographics Ltd.

8080 GLOVER ROAD, LANGLEY, B.C. V3A 4P9
PHONE (604) 888-1323 • FAX (604) 888-3642

Report for: Frank Gish,
Archer, Cathro & Associates Ltd.,
1016 - 510 West Hastings St.,
VANCOUVER, B.C.
V6B 1L8

Job 940717

January 9th, 1995

SAMPLES:

8 drill core samples from the Division Mountain Coal Project, as listed below, were submitted for thin sectioning and petrographic examination.

Sample No.	Drill Hole	Depth (m)
1	9426	63.79
2	9426	77.00
3	9428	112.85
4	9438	112.50
5	9438	120.20
6	9440	174.00
7	9443	171.50
8	9444	178.91

SUMMARY:

The samples of this suite are all recognizably of intermediate-mafic volcanic lithology, apparently representing more or less altered porphyritic andesite to basalt.

Samples 5 and 6 are the least altered. They consist of meshwork aggregates of lath-like plagioclase, of grain size 0.05 - 0.2mm, with intergrown augite and interstitial olive-brown secondary material. The latter also forms pseudomorphs of original mafic phenocrysts, and there are some smaller phenocrysts of recognizable augite. Sample 5 contains prominent carbonate-filled amygdules.

Sample 3 is of essentially similar type, but includes a coarse xenolith of a banded carbonate-pyroxene rock of uncertain origin (skarnified sediment or tuff?, flow-banded altered glassy volcanic?).

Sample 4 is also similar to those described above, except that augite is less abundant, being extensively altered to the olive brown secondary mineral. It contains carbonate-filled amygdules.

Sample 8 probably represents a more intense manifestation of the alteration style seen in Sample 4. It has a similar meshwork-textured matrix of fresh plagioclase, but all mafic components (pyroxene and the olive-brown secondary product) are here totally carbonated. The rock contains amygdules (filled principally by carbonate), and is cut by veinlets of carbonate and zeolite.

The remaining three samples (#s 1, 2 and 7) are totally altered volcanics in which the groundmass appears to have been of a glassy or near-glassy character. The latter is now partially devitrified and/or altered to indeterminate clay-like material in which an incipient, relict microlitic fabric is distinguishable. Original mafics and phenocrysts are totally pseudomorphed by carbonate. All three of these rocks contain xenoliths - of black glass in Samples 1 and 2, and of an apparent carbonate-cemented wacke in Sample 7.

The general textural aspect of these volcanics, their partly glassy character, and the common presence of amygdules constitute a strong indication of extrusive origin.

Individual petrographic descriptions are attached.

A handwritten signature in cursive script, reading "J.F. Harris". The signature is fluid and elegant, with the first letters of each name being capitalized and prominent.

J.F. Harris Ph.D.

(929-5867)

Estimated mode

Clay)	48
Cryptocrystalline material)	
Carbonate	40
Chalcedony(?)	trace
Sub-opaque dust	2
Rutile)	trace
Opagues)	
Dark glass (xenolith)	10

Thin section examination of this sample shows it to be totally altered, but with perfect, pseudomorphous preservation of primary textural characteristics - which are clearly those of a fine-grained, microporphyritic volcanic.

The rock is now composed essentially of two components. One is a minutely felted or aggregate-textured to cryptocrystalline material, which is optically indeterminate, but has the look of clay and/or serpentine, or altered feldspathic glass. The other is carbonate.

The carbonate occurs as abundant, discrete, sub-prismatic to sharply angular patches, 0.05 - 0.5mm in size (occasionally aggregating to 1.0mm or more), evenly scattered through a matrix of the cryptocrystalline component. The carbonate patches have the appearance of pseudomorphs of an original phenocrystic constituent, although a few of the larger patches could be amygdules.

Occasionally the carbonate pseudomorphs are flecked or fringed by what looks like microgranular quartz or chalcedony.

The cryptocrystalline component appears minutely fine-grained and essentially featureless in cross-polarized light, but in ordinary transmitted light can be seen to reflect a ghost fabric of sub-oriented swarms of an original lath-like component (presumably plagioclase) as slender forms 0.05 - 0.2mm in size. These are distinguishable by their freedom from the micron-sized sub-opaque dust which pervades the matrix (of the same material) in which they are set.

Many of the carbonate pseudomorphs in this rock exhibit typical crystal forms of hornblende and/or pyroxene. The pseudomorphous fabric in the cryptocrystalline matrix appears to represent incipient development of original feldspar laths in a glassy groundmass. The rock appears to be a totally altered andesite or basalt.

The dark area in one corner of the slide is a mass of opaque glass studded with tiny altered phenocrysts and/or amygdules. It is probably a xenolith of a related lithotype.

SAMPLE 2: 9426 77.0m. ALTERED VOLCANIC WITH GLASSY INTERCALATION

Estimated mode

Clay)	45
Cryptocrystalline material)	
Carbonate	34
Opaque dust	7
Black glass	13
Prehnite(?)	1
Quartz	trace

This sample is closely similar to Sample 1, except that the sectioned portion in this case includes a higher proportion of the black glass variant (coarse xenolith or extrusive intercalation?).

Approximately 50% of the thin section (the weakly yellow-stained, white-etched portion of the off-cut) is a pervasively altered/devitrified andesitic-basaltic volcanic with a primary micro-porphyrific fabric pseudomorphed by carbonate. This assemblage is essentially identical in all respects to that described in Sample 1 (q.v.).

The other half of the off-cut consists of a wedge-shaped area of black material mantled by a less strongly etched greyish variant.

In thin section the latter two phases are found to differ from the white-etched one only in respect of the groundmass. In the black area the groundmass is opaque black glass, and in the grey phase it is similar to that of the white-etched variant, except for a high content of micron-sized opaque dust which renders it turbid to sub-opaque. In both cases the matrices host small, sub-equant phenocrysts pseudomorphed by carbonate and lath-like forms (incipient crystallization of plagioclase in original glass) pseudomorphed by probable clay.

The black glass intercalation includes irregular, branching, interconnected pockets infilled by carbonate or, more rarely, greenish secondary amphibole and a colourless fibrous mineral which may be prehnite. These appear to be amygdules - perhaps indicating that this glassy phase is a scoriaceous flow-top. The amygdaloidal network in the black glass extends as a few thin veinlets through the mantling transition zone.

SAMPLE 3: 9428 112.85m.

Estimated mode		
Host rock		
	Plagioclase	16
	Pyroxene	13
Olive-brown secondary mineral		14
	Carbonate	6
	Prehnite(?)	1
	Rutile)	trace
	Opagues)	
Xenolith		
	Carbonate	19
	Mineral X	5
	Mineral Y	13
	Pyroxene	13

The sectioned portion of this sample shows two different lithotypes in sharp, irregular contact.

One is a weakly potassic volcanic, speckled with tiny phenocrysts and containing a few prominent amygdules; this resembles Sample 4 in general macroscopic appearance.

The other shows parallel mineralogical/textural banding, trending approximately normal to the contact. A thin reaction zone appears to be developed at the immediate contact.

Examination of the large reject piece of core from this sample shows that the banded lithotype occurs as a wedge-shaped xenolith, 3"x3.5"x1.5" in size, within a host of the other.

The host lithotype consists essentially of an intergrowth of plagioclase, clinopyroxene and a fibrous/felted olive-brown secondary mineral. The plagioclase forms a randomly-oriented meshwork of tiny lath-like grains, 50 - 200 microns in size.

Equant granules of clinopyroxene, of comparable size to the plagioclase, plus a diffuse interstitial phase of the olive secondary material, occur intimately intergrown with the plagioclase.

Pyroxene also forms stumpy prismatic phenocrysts 0.2 - 0.5mm in size - mainly fresh, but locally partially to completely altered to carbonate. These sometimes aggregate as clumps. The olive-brown secondary product (chlorite?, secondary amphibole?, serpentine?) either alone or intergrown with carbonate, also forms prominent pseudomorphs of coarser phenocrysts 0.5 - 1.0mm (rarely to 2mm) in size.

Tiny equant specks of opaques and/or rutile are an evenly disseminated accessory.

Sample 3 cont.

The rock contains a few irregular-shaped amygdules infilled by carbonate or a radiate/bladed mineral which may be prehnite.

This lithotype is a typical, partially altered, mafic-rich porphyritic basalt.

The banded lithotype (xenolith) is composed, at one side of the slide, of vuggy, colloform-textured, micritic carbonate, with the vugs infilled by a colourless, aggregate-textured mineral ("mineral X"), or by fibrous/felted, brownish, secondary material ("mineral Y"). Both these phases are of uncertain identity.

This matrix contains rare, small grains of partially altered pyroxene, the abundance of which increases progressively towards the other side of the slide, where the rock is an aggregate of prismatic pyroxene with intergrown "mineral Y" and minor carbonate.

The microscopically prominent, sub-parallel, laminar features are sub-opaque in appearance in thin section, and appear to represent concentrations of fine-grained pyroxene.

This xenolith may be a skarnified limy sediment, a form of altered, partly glassy, tuff, or a flow-banded altered glassy volcanic.

Estimated mode

	Plagioclase	40
Olive-brown secondary mineral		38
	Pyroxene	8
	Carbonate	12
	Opakes)	2
	Rutile)	

This is a rock of typical intermediate-mafic igneous aspect, consisting essentially of an intergrowth of slender plagioclase laths, 0.05 - 0.3mm in length, and an olive-brown, minutely fibrous/sub-radiate secondary product which may be a form of amphibole. This altered mafic component occurs as a diffuse interstitial phase to the feldspars; as more discrete, small, blocky patches to 0.3mm or so; and as scattered, larger aggregates of spherulitic habit (up to 2.0mm in size) which sometimes show pseudomorphous outlines, and probably represent totally altered mafic phenocrysts. Very rare plagioclase phenocrysts to 1.0mm are also present.

The plagioclase shows twinning extinction angles indicative of a composition of around An₅₀ (andesine-labradorite). It is typically fresh. The faint yellow cobaltinitrite stain developed on the off-cut suggests a weakly potassic overall composition.

Pyroxene (probably augite) is a minor constituent, as scattered, tiny granules and aggregated clumps thereof. It is often seen (as remnants?) within patches of the brown secondary mineral, and it may be that the latter has developed largely, by magmatic and deuteric modification, from original early-formed pyroxene.

Tiny, randomly disseminated, equant grains of opakes and rutile are minor accessories.

Another prominent constituent of the rock is carbonate. This occurs as sporadic, discrete, irregular/elongate, sparry-textured patches, 0.5 - 2.0mm in size, commonly fringed by fibrous secondary amphibole. These bodies have the appearance of amygdules.

This rock is a basalt, or basaltic andesite, in which the presence of prominent amygdules is strong evidence of extrusive character.

SAMPLE 5: 9438 120.2m.

BASALT

Estimated mode

Plagioclase	40
Olive-brown secondary mineral	33
Augite	20
Carbonate	5
Opauques	2

This sample is a typical sparsely porphyritic basalt.

Scattered phenocrysts, 0.2 - 1.0mm in size (rarely to 2.0mm) include a few crystals of fresh plagioclase or pyroxene, but the majority consist of pseudomorphs composed of olive-brown, fibrous secondary material, or carbonate rimmed by the above. These probably represent an early-formed generation of mafic phenocrysts - most likely of pyroxene (although 6-sided forms reminiscent of olivine are not uncommon).

The sectioned area includes one or two aggregated clusters of these carbonate pseudomorphs, up to several mm in size.

The dominant rock matrix consists of a meshwork of lathlike crystals of fresh plagioclase (composition labradorite) 0.05 - 0.2mm in size, intergrown with tiny interstitial granules of augite and similar sized or larger original mafics now altered to the olive-brown secondary product.

Fine-grained, equant euhedral opaques (probably mainly magnetite) 20 - 70 microns in size, occur sparsely disseminated throughout.

The plagioclase microlites locally show a sub-trachytic orientation tangential to the coarser phenocrysts, and the rock has the aspect of an extrusive - although there is a lack of definitive evidence in this respect.

Estimated mode

	Plagioclase	31
Olive-brown secondary mineral		38
	Augite	28
	Prehnite?	1
	Rutile)	2
	Opagues)	

As can be seen from macroscopic examination of the slide, approximately 50% of the sectioned area in this sample consists of an apparent composite xenolith of rounded shape, approximately 2X2.5cm in size. This is set in a host rock which is of essentially identical type to Sample 5 - i.e. a relatively mafic-rich basalt.

The host phase consists of a fine-grained intergrowth of randomly oriented laths of fresh plagioclase, 0.05 - 0.2mm in length; equant granules of fresh augite of comparable grain size (sometimes aggregated as clumps to 0.3 or 0.4mm in size; and olive brown, cryptocrystalline to fibrous secondary material (secondary amphibole?) as small pseudomorphs and as a diffuse interstitial component. Disseminated rutile and/or Fe oxides are trace accessories.

The rock is sparsely porphyritic, containing scattered phenocrysts, 0.3 - 1.5mm in size, mainly of fresh augite or pseudomorphs of the secondary mineral. Rare phenocrysts of plagioclase are also seen.

The xenolith is of related composition, differing from the host basalt in mineral proportions and texture. The dark portion is of mafic-rich composition, consisting essentially of a matrix of the olive brown secondary mineral, studded with small grains of fresh augite. Plagioclase appears virtually absent. This rock type includes some coarse skeletal phenocrysts of augite and rounded amygdale-like patches infilled by a minutely felted to bladed/prismatic mineral which is probably prehnite.

The light-coloured half of the xenolith has a major component of plagioclase, of microgranular/felsitic form. This constitutes a matrix to altered phenocrysts (pseudomorphs) of the brown secondary mineral. Augite is minor.

SAMPLE 7: 9443 171.5m.**ALTERED VOLCANIC WITH QUARTZO-FELDSPATHIC XENOLITH**

Estimated mode

Host phase:	
Cryptocrystalline material)	38
Feldspars)	
Carbonate	12
Rutile	trace
Veins, amygdules:	
Carbonate	20
Xenolith:	
Quartz	9
Plagioclase	4
K-feldspar	10
Carbonate	7

This is another sample which incorporates two clearly differentiated lithotypes. The sectioned portion consists mainly of a weakly potassic volcanic phase (of similar macroscopic appearance to that of Samples 1 and 2 (see off-cut) traversed by veinlets of carbonate. However, the end one-third of the sectioned area is clearly quite different, consisting of a wacke-like aggregate of rather coarse, sub-angular grains of quartz, K-feldspar and plagioclase. Examination of the reject core pieces of this sample indicate that this latter phase constitutes a sub-angular xenolith, 2 - 3" in size, in the volcanic host.

Thin section examination of the host phase confirms that it is generally similar to that of Samples 1 and 2, though differing in detail. It consists predominantly of a feathery/felsitic aggregate of low-birefringent cryptocrystalline (probably feldspathic) material. The relict lath-like fabric seen in this sample is on a smaller scale than in Samples 1 and 2, and is less clearly defined. Where recognizable it is more of a sub-trachytic than a meshwork type. Sporadic, diffuse patches of better crystallized groundmass appear to consist of minutely microgranular feldspar.

Sharply defined carbonate pseudomorphs of phenocrysts are sparser than in Samples 1 and 2, but a few of them reach considerable size (2 - 3mm). However, carbonate occurs in a form not seen in the earlier samples, as evenly dispersed, tiny, lath-like flecks in the groundmass - apparently representing the alteration of incipient plagioclase microlites.

The veinlets of sparry carbonate cutting this rock are 0.5 - 2.0mm in thickness. They are spatially associated with some coarse ovoid masses of the same mineral which may represent amygdules.

The xenolithic phase is an aggregate of discrete sub-angular clasts of quartz, K-feldspar and plagioclase, 0.1 - 3.0mm in size, cemented by micritic carbonate. Some of the smaller grains appear partially replaced by the carbonate matrix. The larger clasts include occasional polymineralic aggregates of granitoid type, and one of microgranular feldspar of volcanic aspect.

Estimated mode

Plagioclase	30
Cryptocrystalline material	10
Carbonate	43
Rutile	2
Amygdules:	
Carbonate	3
Quartz	trace
Veinlets:	
Carbonate	10
Zeolite	2

This is another basaltic volcanic in which the mafic constituents are totally altered to (pseudomorphed by) carbonate. In this case the plagioclase component appears completely fresh, is mostly well-crystallized, and is significantly coarser grained than in earlier samples of similar mineralogy (#1 and 2). The proportion of carbonate is also substantially higher.

Texturally this rock closely resembles the relatively fresh basalts represented by Samples 5 and 6; however, neither pyroxene nor the olive-brown secondary mineral seen in those samples survive here - seemingly being totally replaced by carbonate.

Carbonate occurs as abundant, small clumps, 0.05 - 0.2mm in size, scattered through a meshwork to sub-trachytic matrix of sharply defined plagioclase laths, 100 - 200 microns in length. This mode of carbonate is clearly the equivalent of the augite in Samples 5 and 6.

A minor component of cryptocrystalline to glassy material occurs interstitial to the aggregates of plagioclase laths. There are also very rare discrete phenocrysts of plagioclase.

There are also scattered, larger (0.3 - 0.5mm) pseudomorphs of a brownish colour, showing a relict fibrous texture. These clearly represent the carbonated equivalent of the olive brown pseudomorphs in #5 and 6.

Rutile occurs as rather evenly disseminated, equant/skeletal, brown, sub-opaque grains, 50 - 150 microns in size.

The sectioned portion contains a few relatively large amygdules (up to 3mm in size and readily visible in the off-cut block). These are infilled by sparry carbonate, sometimes with cores of quartz. In addition the section is traversed by a zone of parallel veinlets of carbonate, 0.1 - 1.0mm in thickness, in some cases with associated fibrous zeolite as interstitial intergrowths or segmented pockets. The vein carbonate is of at least two distinctive textural types: a dense brown, minutely micritic variety, and a colourless, sparry type.

None of the carbonate in this rock is reactive to dilute acid. It is presumably of dolomitic or ankeritic composition.

APPENDIX V
DRILL HOLE GRID COORDINATES AND INCLINATIONS

Diamond Drill Hole Coordinates

<u>Drill Hole</u>	<u>Northing</u>	<u>Easting</u>	<u>Final Depth (m)</u>	<u>Azimuth (Degrees)</u>	<u>Surface Inclination</u>	<u>Final Inclination</u>
94-23	11+833	9820	160.0	040	50	46
94-24*	11+829	9740	133.8	040	50	48
94-25	11+496	9750	164.0	040	50	45
94-26	10+914	9675	164.9	040	50	50
94-27*	10+612	9620	26.5	040	50	—
94-28	10+609	9620	78.0	040	50	50
94-29	11+219	9710	188.4	040	50	49
94-30	12+134	9845	178.6	040	50	46
94-31	10+914	9630	178.9	040	70	72
94-32	12+134	9760	252.0	040	60	56
94-33	12+134	9630	109.7	220	50	52
94-34	10+725	9690	145.4	040	70	70
94-35	10+725	9690	129.2	220	50	51
94-36	12+438	9800	229.8	040	50	49
94-37	10+710	8800	206.0	040	50	53
94-38	11+219	9710	178.6	220	50	51
94-39	12+438	9920	118.0	040	50	50
94-40	11+219	9710	268.2	—	90	89
94-41	12+754	9920	239.9	040	50	52
94-42	11+500	9680	273.1	040	70	69
94-43	13+048	9887	252.1	040	50	48
94-44	11+840	9706	215.5	220	50	48
94-45	11+500	9680	163.4	220	60	58

*Abandoned

APPENDIX VI
DRILL HOLE UTM COORDINATES

UTM SURVEY COORDINATES

<u>Drill Hole</u>	<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>
DH72-01	6801718.94	442025.25	779.77
DH72-02	6801692.99	442270.02	795.29
DH72-03	6801806.25	441807.89	757.28
DH72-04	6801758.76	441649.24	732.05
DH72-05	6801655.61	441633.24	748.95
DH72-06	6802025.20	441694.09	725.58
DH93-07	6801658.17	442178.73	792.66
DH93-08	6801889.01	441974.43	769.63
DH93-09	6802263.42	441496.15	723.25
DH93-10	6801632.69	442158.24	790.57
DH93-11	6801837.35	441930.65	761.28
DH93-12	6801407.76	442367.52	802.96
DH93-13	6801470.51	442417.88	809.69
DH93-14	Collar not surveyed		
DH93-15	6801496.83	442319.05	798.76
DH93-16	6801975.08	441809.82	734.84
DH93-17	6801995.80	441831.05	733.55
DH93-18	6801910.71	441751.86	738.94
DH93-19	6801778.80	442099.02	790.65
DH93-20	6801798.42	441900.00	766.92
DH93-21	6801784.22	441773.66	757.81
DH93-22	6801452.96	442254.01	799.07
DH94-23	6800048.54	444005.32	912.01
DH94-24	6799983.79	443957.70	916.64
DH94-25	6799779.62	444226.22	936.64
DH94-26	6799362.68	444633.31	934.51
DH94-27	6799123.41	444827.60	924.67
DH94-28	6799125.70	444829.55	924.67
DH94-29	6799577.43	444412.18	939.41
DH94-30	6800250.69	443785.71	905.95
DH94-31	6799366.45	444636.36	934.26
DH94-32	6800187.96	443736.58	898.29
DH94-33	6799319.65	444604.58	934.74
DH94-34	6799254.12	444780.29	930.28
DH94-35	6799253.50	444779.51	930.24
DH94-36	6800417.08	443521.14	887.26
DH94-37	6798559.81	444228.20	957.92
DH94-38	6799579.58	444409.54	939.76
DH94-39	6800538.28	443591.00	876.64
DH94-40	6799579.21	444409.24	939.76
DH94-41	6800683.51	443349.78	890.49
DH94-42	6799726.37	444189.04	947.74
DH94-43	6800862.03	443102.14	875.82
DH94-44	6799957.90	443936.00	918.09
DH94-45	6799728.02	444190.15	947.54

APPENDIX VII
DRILL LOGS

AZ 220

PROJECT 14TH HOLE 94-45 DIP: 50 @ S ; @ LENGTH 163.37 N 11+500 E 96+30 ELEV Page 1 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	0-4.83	OVERBURDEN: TILL BOULDER	OVERB								
5	4.88-8.53	SHALE 20% SILT 50% SAND 20% CONGL 10% FV (FRESH) BROKEN CLAY	SSS- CONGL	63°							
	8.53-9.42	COAL 5% COALY SHALE 25% SILT 40% SAND 30% CONGL 5% FV	C-SSS- CONGL	52°							
10	9.42-10.36	COALY SHALE: SHARPLY BEDDED	COAL								
	10.36-11.68	CONGL: THIN LAM. GRANULE 50% SILT 30% SAND 20%	CONGL								
	11.68-12.33	THIN LAM. SAND, SILT & COAL LAM	SHALE								
	12.33-14.38	SHALE 10% SILT 40% SAND 40% THIN LAM	SSS	70°							
15	14.38-17.49	COALY SILT / SILTSTONE LAMINATED	C-SH- SILT								
	17.49-20.40	CONGL: QZ FSPAR GRANULE 50% PEBBLE 20% SAND + SILT THIN LAMINATED 20%	CONGL	81°							
20	20.40-21.45	SANDY SILTSTONE: THIN LAM. SILT INTER THIN BEDS LIGHT GREY SAND	SAND- SILT	75°							
	21.45-26.21	CONGL: QZ GRANULE 50% PEBBLE 10% MINOR FSPAR THIN LAM SILT 10% THIN COAL FRINGS STRINGERS	CONGL	75°							
25	26.21-28.65	SHEAR ZONE: CONGL 20% THIN LAM SILT 80% DOMINANTLY COARSE	SZ SILT								
	28.65-31.54	CONGL: AS ABOVE									
30											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	31.59-32.00	SANDSTONE FINE GR TO COARSE GR. FU	SAND								
	32.00-32.64	SHALE DARK BROWN, MEDIUM GRAIN	SHALE								
	32.64-33.00	ARGILLIC CONGLOMERATE	ARG.								
	33.00-33.41	COARSE SAND	SAND								
	33.41-36.02	SHALE DARK BROWN, MEDIUM GRAIN, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS	SHALE	59°							
	36.02-37.23	ARGILLIC CONGLOMERATE	ARG.								
	37.23-38.15	SHALE DARK BROWN, MEDIUM GRAIN, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS	SHALE								
	38.15-39.10	SANDSTONE FINE GR TO COARSE GR. FU	SAND								
	39.10-40.13	COAL & SHALE INTERBEDDED	COAL								
	40.13-40.41	SHALE DARK BROWN, MEDIUM GRAIN, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS	SHALE	90°							
	40.41-40.53	SHALE DARK BROWN, MEDIUM GRAIN, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS	SHALE								
	40.53-40.15	SILT SAND, LINEAR TO MOD BEDDING, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS	SILT-SAND	72°							
	40.15-45.16	LC WITH RIP UP CLASTS, MOD BEDDING, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS	SAND								
	45.16-46.49	SANDY CONGL : QTZ FINE GRAINULE 50% PEBBLE 10% SAND 40%, LOCALLY ARGILLIC	SAND-CONGL								
4445-1	46.49-51.50	COAL: 5% BEDDING, 5% BROWN SILT LAM, 5% SHALE THIN LAM, TR PY ON FRACT	COAL	69°							
	51.50-56.57	SANDY SILTSTONE: COARSE SHALE LAM 10%, THIN LAM DARK BROWN SILT 60%, LIGHT BROWN GREY SAND 30%, THINLY BEDDED TO LAM, WEAK TO MOD BEDDING, LOCAL COAL FRAGS & STRINGERS, WEAK BEDDING, LOCAL COAL FRAGS & STRINGERS	SAND-SILT	74° 87°							
	56.57-71.93	CONGLOMERATE: QTZ 70% FSPAD 20% GRAINULE 30% PEBBLE 10%, MASSIVE TO WEAKLY BEDDED, LOCAL SHORT INT OF THINLY LAM SANDY SILT MINOR COAL FRAGS & STRINGERS (2%). EUBEDDING MED GR. PY CLUSTERS ON OPEN FRACTURES.	CONGL	64° 85°							

AZ 220

PROJECT DIVISION MTN HOLE 94-45 DIP: 50 @ 0 ; @ LENGTH N E ELEV Page 5 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
120	118.27-126.79	ANDESITE: GREY GREEN VERT. FINE GR. MAFIC MATRIX WITH 10-30% FUSION PHENOS WITH KV RIMS & EMBAYMENTS. 1mm - 10mm, 10% CHLORITIZED MAFIC PHENOS. KV 2mm, CHILLED CONTACT. UC WITH 4cm LONG INJECTION FRAG COAL, 20 MORE CHILLED, WITH PARTIALLY ABSORBED CLASTS IN COAL LAMIN. (SAMPLE)	ADD								
125	126.74-128.45	COAL 60% ANDESITE 40% COAL IS ONLY MAFIC DENSE & VERT FINE GR.	CONTACT								
	128.45-128.83	COAL 10% ANDESITE OR SHALE, HEAVILY SHEAR	COAL								
	128.83-138.07	SHALE 40% SILT 30% SAND 40% CONGL 10% COAL FRAGS & STRINGERS IN SAND & CONGL INT. FD.	SSS-C								
130											
	130.84-138.98	SHEAR ZONE: 80% GOUGE	SZ								
135											
	138.67-138.98	DARK BROWN SHALY SILTSTONE: RUBBLE OR GOUGE	SILT								
140	9445-7 138.98-140.97	COAL: BLACK, THE MORE USUAL MED TO COARSE GRAINED, BROKEN, BROWN SHALE LAM 5%	COAL	68°							
	140.97-144.24	DARK BROWN ARKOSIC MUDSTONE: ROUNDED TO SUB-ANGULAR CLASTS, BROWN MUD (PELLETS?) BLACK SHALE, COAL, & MINOR QZ & FS PAR, 1-3 mm, 10% IN MEDIUM MUD MATRIX HEAVILY BEDDED WITH COAL LAM, BROKEN & CRUSHED, CORE	MUD								
145	144.34-147.05	COAL 5% SHALE 15% SILT 30% ARGILLIC SANDY CONG 50% WITH COAL FRAGS & STRINGERS, FAULT GOUGE WITH VERY POOR RECOVERY.	SSS- CONGL								

150

KZ 220

PROJECT 5011601 147N HOLE 74 45 DIP: 50 @ 0 ; @ LENGTH N E ELEV Page 6 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	147.05-147.88	REPEAT OF PREVIOUS CUT	-SIS-	69°							
			CONG								
	147.88-150.10	COAL 10% AS FRAG, STAIN-1, 1 IN THRU-OUT SHALE 10% STAINING DOWN TO 149.86 SILTY MUDSTONE, WEAKLY BEDDED, 10" WHITE SAND KNOCKED OUT OF FRAC	149.86	84°							
155	150.10-150.94	CORRECTION, MASSIVE, ARGILL. MUDSTONE	ARK-								
			SAND								
	150.94-163.37	RICHTOFELI		67°							
				700							
	163.37	EOH 2000h 6-12-94		64°							
160		ACID TEST CORRECTED									
165											
170											
175											
180											

PROJECT Division Mountain HOLE 94-44 DIP: -50 @ 0.0 ; -48 @ EOL LENGTH 215.49 N 111840 E 9706 ELEV _____ Page 1 of 1

[illegible]

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
0	0.00 - 6.40	Overburden - poor recovery, light brown clay with 20% rock fragments	OVB								
5	6.40 - 11.48	Conglomerate 80% Cong. 20% sandstone - arenaceous conglomerate, thick bedded brownish grey conglomerate, clast supported, sandstone matrix, mainly well rounded quartz clasts - trace thin laminated wispy shale intervals - granule size grains									
10	11.48 - 12.89	Shale, Siltstone, sandstone (15%, 15%, 50%, 20% coal) - alternating shale/sandstone layers w med. laminated coal, FU, sharp UC, gradational LC		55°							
15	12.89 - 15.09	Conglomerate 80% cong. 20% sandstone - good fining upward sequence to sandstone sharp lower contact		62°							
20	15.09 - 15.37	Coal 15%, shale 15%, Siltstone 20%, Sandstone 20%, cong. 30% - narrow sequence									
	15.37 - 22.02	Conglomerate 90% Cong, 5% shale, 5% Sandstone - arenaceous conglomerate, slightly brownish grey, wispy thin laminated shale intervals, sandstone matrix, granule sized grains, mainly quartz grains		55° 53°							
	22.02 - 23.32	Shale, Siltstone, Sandstone (30%, 40%, 30%) alternating thin laminated intervals									
	23.32 - 24.27	Conglomerate 80% Cong, 20% sandstone - good FU sequence, gradational UC, sharp LC									
25	24.27 - 24.60	Coal 70% Coal, 30% shale partings	Coal								
	24.60 - 25.53	Sandstone 70% sandstone, 30% conglomerate									
	25.53 - 27.33	Shale, Siltstone, Sandstone (30%, 35%, 35%) - gradational contacts		80° 70°							
	27.33 - 28.84	Sandstone 90% sandstone, 10% shale/coal - light grey sandstone, w minor wispy thin laminated shale/coal, gradational upper + lower contacts		80°							
30											

VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
	(metres)				%	BTU/lb	%	%	%	%	%
30	2884-3671	Conglomerate 80% Cong. 20% Sandstone -light grey arenaceous conglomerate, clast supported, sandstone matrix, granule size grains, mainly quartz grain ~2% wispy thin laminated coal/shale intervals		72°							
35	3671-49.20	Shale, Siltstone, Sandstone (30%, 30%, 40%) - thin to thick laminated, alternating layers of shale, siltstone, sandstone, no true sequence just alternating layers. - <3% coal as layers up to 10cm wide - mainly medium grey sandstone and black shale/siltstone		60° 80° 79° 70° 80° 78° 88°							
40											
45											
50	4920-52.56	Conglomerate 90% conglomerate, 10% sandstone -light grey arenaceous conglomerate, gradational contacts, minor sandstone intervals									
	5256-5445	Shale, Siltstone, Sandstone (30%, 30%, 40%) -alternating thin laminated intervals of the above rock types		72° 80°							
55	5445-6457	Conglomerate 80% cong, 15% sandstone, 5% shale/coal -light grey arenaceous conglomerate, clast supported, sandstone matrix and sandstone intervals, granule sized grains, mainly quartz grains, well rounded grains -minor wispy thin laminated shale/coal intervals		53° 68°							
60											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60		-gradational upper contact, sharp lower contact									
				72°							
65	64.57-66.09	Shale, Siltstone, Sandstone (30%, 30%, 40%) -alternating layers weak FU sequence, gradational LC, ~15% coaly shale + shaly coal									
	66.09-72.34	Conglomerate 70% cong, 30% sandstone -as above cong. but with more sandstone intervals		60°							
70		-minor wispy thin laminated shale/siltstone		80°							
	72.34-73.02	Sandstone 80% sandstone, 20% shale/siltstone argillaceous sandstone, gradational contacts		70°							
	73.02-74.62	Conglomerate 80% cong, 5% shale, 15% sandstone arenaceous conglomerate w wispy thin laminated shale		70°							
75	74.62-80.16	Shale, Siltstone, Sandstone (30%, 30%, 40%) -no sequence, ie no FU or FD just alternating intervals of block shale/siltstone + light grey sst -shale + siltstone occur as wispy thin laminated intervals - sandstone occurs as thin bedded layers -trace of thin laminated coal and argillaceous conglomerate - 10cm distinctive brown siltstone		60°							
				63°							
				70°							
80	9444-1 80.16-84.84	Coal 95% coal, 5% shale partings -good block coal w black streak, vitreous luster, conchoidal fracture, soft intervals	Coal	68°	78						
85	84.84-86.48	Shale 70% shale, 25% siltstone, 5% coal -soft crumbly, black, massive shale/siltstone		79°							
	86.48-88.40	Siltstone 80% siltstone, 10% shale, 10% sandstone -massive hard medium grey siltstone with minor thin laminated shale/siltstone - gradational contacts		78°							
	88.40-90.90	Shale, Siltstone, Sandstone (20%, 30%, 50%) -good FU sequence, gradational contacts									
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90	90.90-93.61	Conglomerate 80% Cong, 15% SST, 5% coal - FU sequence, sharp LC, gradational UC - quartz granule cong, clast supported, sandstone matrix									
	93.61-94.47	Shale, Siltstone, Sandstone (20%, 20%, 60%) mainly thin bedded sst w wispy thin laminated shale/silt.		83°							
	94.47-95.31	Siltstone 80% siltstone, 10% shale, 10% SST - medium grey to slightly brownish		82°							
95	95.31-96.20	Sandstone 80% SST, 20% shale/siltstone - mainly sst w wispy thin laminated shale/siltstone									
	96.20-99.66	Conglomerate 80% cong, 10% coal/shale, 10% sst - granule to fine pebble, quartz, well rounded conglomerate thin to thick laminated coal + minor sst intervals									
	99.66-105.70	Shale, Siltstone, Sandstone (20%, 20%, 60%) - mainly thin bedded sandstone with wispy thin to thick laminated shale/siltstone - no sequence or pattern of FU or FD - good gradational contacts throughout, UC sharp LC gradational		65° 68°							
105	105.70-106.49	Conglomerate 90% cong, 5% sst, 5% shale									
	106.49-107.96	Shale, Siltstone, Sandstone (30%, 20%, 50%) - good FU sequence, sharp UC, gradational internal CT, gradational LC									
	107.96-109.45	Conglomerate, 5% wispy thin laminated shale/coal - quartz granule cong, clast supported, well rounded									
110	109.45-114.00	Coal 15%, Shale 20%, Siltstone 20%, Sandstone 45% - no sequence, just alternating layers - all contacts gradational - intervals range from thin laminated to thin bedded - 113.75-113.90 Conglomerate		83° 80° 79°							
	114.00-119.78	Coal 97% Coal, 3% shale/siltstone - good clean coal, black streak, vitreous luster, conchoidal fracture - very minor to trace pyrite	Coal		82						
115											
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
120	119.78-121.00	Shale 10%, Siltstone 20%, SST 20%, conglomerate 50%		82°							
		119.78-120.80 - good FU sequence of cong + brown siltstone									
		120.80-121.00 - sharp CT to brown siltstone									
9444-3	121.00-124.25	Coal 95% coal, 5% shale partings -as above with common calcite veinlets	Coal	85							
125	124.25-124.97	Siltstone 75% siltstone, 10% SST, 10% shale, 5% coal -slightly brown/medium black siltstone		76°							
9444-3	124.97-126.01	Coal 75% coal, 25% shale partings -as above - good coal	Coal	81							
	126.01-128.93	Shale, Siltstone, Sandstone (20% 30%, 50%) -good FU - both in grain size + layer thickness -very good alternating thin to thick laminations		82°							
130	9444-4 128.93-131.55	Coal 85% Coal, 15% shale -ranges from coal to shaly coal to coaly shale	Coal	32							
	131.55-132.14	Siltstone 70% Siltstone, 10% shale/coal, 20% sandstone -slightly brown siltstone to thin laminated shale, SST		69°							
	132.14-133.10	Shale, Siltstone, sandstone (20%, 20%, 60%) -gradational CT's, alternating thin-thick laminations		73°							
135	133.10-135.85	Conglomerate 85% Cong, 10% SST, 5% wispy shale/silt -granule cong to SST matrix, quartz clasts		65°							
	135.85-141.52	Shale, Siltstone, sandstone (20%, 20%, 60%) -mainly very coarse sandstone with common wispy thin laminated shale/siltstone		75°							
		-no sequence of FU or FD, just alternating sequences -3% coal/shaly coal		77°							
140	9444-5 141.52-145.62	Coal <95% coal, >5% shale/siltstone (mudstone) -coal with shale/mudstone partings -mainly good clean coal to black streak, vitreous luster, conchoidal fracture -minor pyrite along fractures	Coal	88							
	145.62-147.53	Siltstone 70% siltstone, 25% sandstone, 5% shale -light brownish grey siltstone		74°							
145	147.53-148.65	Sandstone 80% sandstone, 15% Cong, 5% shale/coal -medium grey medium to very coarse quartz sandstone -minor shale/coal discontinuous intervals		76°							
150											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	148.65-156.80	Conglomerate 85% Cong, 13% sst, 2% coal/shale -mainly thick bedded granule to fine pebble quartz conglomerate, clast supported with sandstone matrix and minor sandstone intervals -minor wispy discontinuous coal/shale intervals									
155	156.80-158.02	Sandstone 80% sandstone, 20% siltstone -mainly light brown sst w wispy thin laminated siltstone, alternating layers, -gradational contacts both up and down, weak FU sequence		74° 79°							
160	158.02-169.06	conglomerate 85% Cong, 13% sst, 2% coal/shale -as above		72°							
165											
170	169.06-171.68	Siltstone 70% siltstone, 20% sst, 10% shale/coaly shale -mainly dark grey to brownish thick to thin laminated siltstone/mudstone with thick to thin laminated sandstone and minor coaly shale/shale intervals		72° 60°							
175	171.68-172.50	Coal 90% coal 10% cooked coal -good clean coal except for 8cm of hard (difficult to scratch) coal at 172.50m	Coal	72°	100						
180	172.50-181.05	Andesite -light green, chilled margins, ~30% white phenocrysts up to 1cm long, avg 2mm round, ~2% <1mm in size green + black phenocrysts -common calcite fractures	And								

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
180	9444-6	181.05 - 182.87	Coal		88						
		Coal 70% coal, 20% shale, 10% sandstone									
		- 15cm cooked coal at 181.05, shale partings and shaly coal, minor argillaceous/coaly sandstone									
		182.87 - 183.30									
		shale/siltstone, sandstone (20%, 20%, 50%, 10% coal)									
		- mainly coaly/argillaceous block sst with coaly shale/siltstone thin beds									
185	9444-6	183.30 - 185.01	Coal		46						
		Coal 70% coal, 20% shale, 10% sandstone									
		- as above & no cooked coal and softer, more broken									
		185.01 - 199.33									
		Sandstone 80% sandstone, 10% shale, 10% cong.									
		- light to medium grey sandstone with gradational contacts into cong + shale									
190		- sandstone is thick bedded, fine to very coarse grained, mainly coarse grained,									
		- conglomerate intervals are more of a gradational coarser interval in sandstone, quartz clasts, granule size frag, well rounded, sst matrix and matrix supported									
195		- shale beds are very similar to Richlofen i.e. thick laminated block shale alternating with light grey sandstone									
		- all contacts gradational									
		- one 5cm zone of shale rip-up clasts < 1cm in size, angular in a sandstone matrix									
200		199.33 - 199.83	Shale/Sandstone couplets (50% shale, 50% sst.)	Rich	78°						
		- alternating thin to thick laminated									
		199.83 - 201.30	Sandstone 80% sandstone, 10% shale, 10% cong		82°						
		201.30 - 215.49	Shale/Sandstone couplets (70% shale, 30% sandstone)	Rich							
		- alternating thin laminated to thin bedded shale + sandstone			68°						
205		- shale is medium to dark grey in color			75°						
		- sandstone is light grey in color			72°						
		- common calcite veinlets and micro faults			78°						
210											

VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
	(metres)				%	BTU/lb	%	%	%	%	%
0	0.0 - 6.03	Overburden 0-1.5 m no recovery 1.5-6.03m ~60% recovery, appears to be more like colluvium than overburden ie. angular fragments of Tanglefoot rock with very minor sand matrix	TF								
5	6.03 - 6.65	Shale siltstone, sandstone (20%, 30%, 50%)		60°	79						
	6.65 - 10.97	Conglomerate <3% shale/coal partings - light brown, weathered, conglomerate - mainly quartz clasts, avg grain size 2mm		60°	81						
10	10.97 - 12.30	Shale, siltstone, sandstone (10%, 30%, 60%) minor medium to dark grey wispy shale/siltstone with light brown sandstone layers up to 3cm		62°	95						
	12.30 - 17.37	Conglomerate <3% shale/coal partings - light brown weathered conglomerate avg. grain size 3mm, common LI between quartz grains - sharp lower CNT, gradational upper		45°	89						
15	17.37 - 19.82	Shale, siltstone, sandstone (20%, 30%, 50%) - sharp upper CNT, gradational lower CNT - wispy black shale/siltstone bands with light brown sandstone between, fines upward		60° 56° 40°	83						
20	19.82 - 24.38	Sandstone 90% sandstone, 10% siltstone/shale - light greyish-brown sandstone with common wispy bands of siltstone/shale - sandstone avg 4cm wide, siltstone avg < 4mm - gradational upper + lower contacts		55° 70° 52							
25	24.38 - 24.99	Shale, siltstone, sandstone (40%, 40%, 20%)									
	24.99 - 25.50	Sandstone 90% sandstone, 10% siltstone/shale									
	25.50 - 26.10	Shale, siltstone, sandstone (40%, 40%, 20%)		53							
	26.10 - 27.09	Sandstone 90% sandstone, 10% siltstone/shale									
	27.09 - 28.56	Shale, siltstone, sandstone (30%, 30%, 40%)									
	28.56 - 29.85	Sandstone 90% sandstone, 10% siltstone/shale - light brown to slightly black sandstone - minor coal fragments, gradational contacts		30							
30											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
30	29.85-31.08	Shale, Siltstone, Sandstone (40%, 40%, 20%)	TF	38°							
	31.08-34.13	Sandstone 70% Sandstone, 30% shale/siltstone - light brown to slightly grey sandstone beds up to 3cm wide with <5mm wispy shale bands - gradational contacts, less shale down section		32°							
35	34.13-36.64	Sandstone 95% sandstone, 5% shale/siltstone - fairly clean coarse sandstone		52°							
	36.64-37.17	Conglomerate with a 7cm shaly coal layers	(coal)								
	37.17-37.34	Coal 60% coal 40% black shale									
	37.34-38.18	Coaly Shale 70% black shale, 30% coal dark black shale with minor coal bands									
40	38.18-39.63	Shale, Siltstone, Sandstone (10%, 20%, 70%) - sandstone grades into conglomerate		68°							
	39.63-41.42	Conglomerate 90% Cong, 10% sandstone									
	41.42-42.18	Siltstone 70% Siltstone/Shale, 30% sandstone		62°							
	42.18-42.80	Sandstone									
	42.80-44.43	Shale, Siltstone, Sandstone (40%, 40%, 20%), 10cm coal		52°							
45	44.43-44.96	Sandstone 90% sandstone/grey, 10% black shale									
	44.96-48.61	Shale, Siltstone, Sandstone (40%, 40%, 20%) - beds of light grey sandstone with wispy bands of black shale and siltstone		54°							
	48.61-51.72	Sandstone 80% sandstone, 20% conglomerate - sandstone light grey, very minor to nil shale partings, gradational contacts into coarser grained conglomerate		58°							
50	51.72-54.94	conglomerate 95% Conglomerate <5% shale - avg. grain size 3mm mainly quartz - upper contact gradational lower contact sharp		55°							
55	54.94-56.69	Shale, Siltstone, sandstone (20%, 40%, 40%) - minor coaly shale									
	56.69-57.45	Conglomerate - clean conglomerate, sharp upper and lower contacts									
	57.45-59.65	Shale, Siltstone, Sandstone (20%, 40%, 40%) - blackish, wispy shale/siltstone layers <5mm alternating w 1-3cm grey sandstone		80°							
60											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	59.65 - 61.88	Fault (shale, siltstone, sandstone 20%, 40%, 40%) - 40% of unit is grey clay gouge with clasts of sedimentary rocks from 3mm to 4cm	Fault								
	61.88 - 63.09	Shale, Siltstone, Sandstone (20%, 40%, 40%)									
	63.09 - 63.53	Fault (shale, siltstone, sandstone 20%, 40%, 40%) - 60% of unit is soft grey clay w sediment clasts	Fault								
65	63.53 - 65.92	Shale, Siltstone, Sandstone 5cm of coal/shaly coal		33°							
	65.92 - 69.90	Conglomerate 75% Cong, 20% SST, 5% shale/coal - sharp lower CNT, gradational upper and sst CNT - minor narrow shale/coal layers ~2mm wide - avg. grain size 5mm									
70	69.90 - 70.71	Shale, Siltstone, Sandstone (40%, 30%, 30%) - sharp upper + lower contacts									
	70.71 - 73.11	Sandstone 70% SST, 2.5% Cong, 5% shale - light grey sst w minor coarser bands									
	73.11 - 74.67	Conglomerate 95% Cong, 5% coal/shale - avg grain size 4mm									
75	74.67 - 75.34	Coal - soft but still good clean coal	Coal		75						
	75.34 - 113.20	Andesite - darker green andesite than usual - sharp upper + lower contact - 3-5% 1mm white to slightly greenish phenocrysts - 3% <1mm black phenocrysts - common white calcite veinlets up to 1mm wide	And								
80											
85											
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120	121.00 - 121.70	Sandstone, argillaceous (5%) gradational CT's		62°							
	121.70 - 122.35	Conglomerate, matrix supported, argillaceous (3%)		63°							
	122.35 - 123.27	Shale, Siltstone, Sandstone (30% 40% 40%)									
	123.27 - 125.30	Sandstone, 80% ssb, 15% conglomerate, 5% shale - light grey slightly argillaceous sandstone with wispy thin laminated shale, gradational contacts		68°							
125	125.30 - 127.55	Conglomerate, 90% Cong, 5% sst, 5% shale - granule conglomerate, with argillaceous intervals sandstone matrix in part, gradational contacts.		52°							
	127.55 - 130.48	Conglomerate, 95% cong, 5% shale fine pebble conglomerate with minor wispy thin laminated shale - max grain size 1.5cm, clast supported, gradational contacts		56°							
	130.48 - 139.03	Conglomerate, 95% cong, 5% shale granule conglomerate with wispy medium laminated shale/coal, clast supported, sandstone matrix, minor fine pebble conglomerate		50° 50°							
130											
135											
140	139.03 - 140.00	Fault 30% fault gouge, 70% shale clasts clasts 3mm to 5cm in size	Fault								
	140.00 - 140.80	Shale Sandstone Siltstone (20%, 30%, 50%)									
	140.80 - 141.39	Fault 30% fault gouge, 70% shale/sandstone clasts	Fault								
	141.39 - 146.30	Siltstone 70% siltstone, 15% shale, 15% sandstone - medium grey siltstone with shale and sandstone mixed in the matrix - gradational contacts		55° 62°							
145	146.30 - 149.65	Shale 10% Siltstone 10% Sandstone 50% Cong 30% - good coarsening down sequence, gradational contacts within, sharp lower contact		57° 55°							
150											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	149.65-149.95	Coal 60% Coal, 40% shale / coaly shale	Coal								
	149.95-151.79	Siltstone 70% Siltstone, 20% sandstone, 5% coal, 5% shale		65°							
	151.79-152.04	Coal 90% Coal 10% shale partings	Coal								
	152.04-154.78	Shale, Siltstone, Sandstone (10%, 30%, 55%, 5% coal) - minor coal / coaly shale, trace conglomerate - gradational contacts, fining upward sequence		70° 60°							
155	154.78-156.39	Conglomerate 90% conglomerate, 10% sandstone - fine pebble cong. sandstone matrix, both clast and matrix supported.									
	156.39-157.99	Shale, Siltstone, Sandstone (20%, 30%, 50%) - good fining upward sequence		45°							
	157.99-158.34	Conglomerate, argillaceous fine pebble conglomerate		59°							
160	158.34-161.77	Shale, Siltstone, Sandstone (30%, 30%, 40%) - good fining upward, minor shale coal at upper CT									
	161.77-162.82	Conglomerate arenaceous pebble conglomerate - gradational upper and lower contact.		62°							
	162.82-166.72	Shale, Siltstone, Sandstone (20%, 50%, 30%) - mainly wispy medium laminated shale/siltstone with thin bedded grey sandstone		70°							
	166.72-167.53	Conglomerate arenaceous pebble conglomerate		70°							
165	9443-2 167.53-168.52	Coal 80% coal, 20% shale partings	Coal		60						
	168.52-169.43	Sandstone 95% sst, 5% wispy thin laminated shale			100						
	9443-2 169.43-170.69	Coal 95% coal, 5% shale partings - sharp CT's, lower CT w 6cm of 'coated' coal	Coal		61						
170	170.69-172.00	Andesite - very pale green, 5% white phenocrysts trace of green phenocrysts, 10cm cong clast	And		100						
	9443-2 172.00-172.54	Coal 100% coal with 10cm coated contacts upper+lower	Coal	LC 55°	100						
	172.54-174.16	Andesite - very pale green, 5% phenocrysts, calcite veinlets up to 3mm wide	And	UC 57°	100						
	9443-2 174.16-175.13	Coal 95% Coal <5% shale partings	Coal		54						
175	175.13-176.23	Sandstone 95% sst, 5% wispy thin laminated shale			82						
	9443-3 176.23-179.58	Coal 100% coal - good clean coal with only trace coal partings - black streak, vitreous luster, conchoidal fracture	Coal		61						
				58°							
180											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
180	179.58-179.93	Sandstone 90% sst, 10% wispy thin laminated shale		58°	60						
9443-4	179.93-181.87	Coal 80% coal, 20% thin bedded brown siltstone	Coal		61						
	181.87-182.62	Siltstone medium dark to slightly brown siltstone			67						
9443-4	182.62-183.48	Coal >95% coal, <5% wispy thin laminated siltstone	Coal		57						
	183.48-184.43	Siltstone 80% Siltstone, 10% shale, 10% Sandstone									
185	184.43-185.07	Sandstone 90% Sandstone, 10% wispy thin laminated shale, light grey/brown sandstone									
	185.07-191.0	Shale 5% Siltstone 10% Sandstone 40% Cong 40% coal 5% -alternating layers * not FU or FD, no sequence -all contacts gradational, thin laminated, wispy coal/shale/siltstone, thin bedded sst + cong -conglomerate clast supported, granule to fine pebble mainly quartz grains in cong + sandstone									
190	191.00-193.85	Conglomerate 70% cong, 5% coal, 25% sandstone -fine pebble cong, thin-medium bedded with medium laminated sandstone									
	193.85-194.62	Sandstone 80% sandstone, 5% coal, 5% shale, 10% Cong -light brown sandstone									
195	194.62-195.53	Conglomerate 80% cong, 15% sst, 5% coal									
	195.53-198.77	Shale, Siltstone, Sandstone (40%, 40%, 20%) -good FU sequence with gradational contacts and thin bedded units									
	198.77-204.82	Shale/coal 5% Siltstone 10% Sandstone 40% Cong 40% -alternating layers, * not FU or FD, no pattern -all contacts gradational + thin laminated wispy coal/shale = siltstone as argillaceous cong + sst intervals = thin bedded cong/sst, greyish brown, -cong fine pebble + granule, matrix + clast supported		52° 60° 58° 53°							
200	204.82-208.18	Conglomerate 85% cong, 10% sst, 5% coal/shale -fine pebble + granule cong, very minor medium pebble cong, mainly quartz clasts, well rounded, sandstone matrix -minor thin laminated, wispy, shale/coal		58°							
205											
	208.18-210.61	Coal 100% coal, very minor shale partings with trace amounts of coal	Coal	UC 65°	41						
210											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
210	210.61-2130.3	Andesite - light green andesite, <3% white phenocrysts	And								
	9443-5 21303-21325	Coal - cooked coal, hard but scrapes black	Coal		100						
	21325-21344	Andesite -	And								
215	9443-5 21344-21399	Coal, cooked near upper contact, minor pyrite	Coal		100						
	21399-215.29	Sandstone 70% SST, 30% wispy thin laminated shale									
	215.29-217.25	Siltstone 70% siltstone, 10% coal, 20% shale - distinctive brownish siltstone, massive siltstone with wispy thin laminated coal/shale		52° 50°							
	217.25-218.74	Sandstone 70% SST, 30% wispy thin laminated shale/siltstone									
220	218.74-220.23	Siltstone 80% siltstone, 20% shale - distinctive brownish siltstone		65°							
	9443-6 220.23-222.45	Coal >90% coal, <10% shale partings near CT's	Coal	60°	44						
	222.45-229.09	Siltstone 70% Siltstone, 5% shale 15% coal, 10% sandstone - mainly black sandy siltstone with plant fossils - argillaceous sandstones, black to dark grey, thin bedded to shale laminar (222.45-222.74, 223.88-224.24, 225.20-225.55 sandstone beds) - coal mainly occurs as medium laminated alternating with siltstone thick laminated - common pyrite with coal, common brown distinctive siltstone		PF 53° 61° 52°							
225											
	229.09-231.76	Shale Siltstone Sandstone (10%, 40%, 50%) - medium grey to black argillaceous siltstone and sandstone, fining upward		55° 65°							
	231.76-232.00	Conglomerate 90% Cong, 10% shale rip-up clasts									
	232.00-233.50	Shale/Sandstone Couplets 50% shale, 50% sandstone - looks like Richtofen, common calcite fracture filling		60°							
235	233.50-246.81	Sandstone 70% Sandstone, 25% Cong, 5% shale mainly pale grey thick bedded sandstone with gradational contacts into coarser grained conglomerate intervals, sandstone grain size very coarse, conglomerate grain size granules - shale occurs as occasional thin bedded		58°							
240											

	VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
		(metres)				%	BTU/lb	%	%	%	%	%
240			intervals of numerous <1cm in size shale rip-up clasts with a sandstone matrix									
245		246.81-252.06	Shale / Sandstone couplets - Rich to Pen 60% shale, 40% sandstone - mainly medium grey shale with light grey sandstone, both sandstone and shale intervals range from 1 to 10 cm wide	Rich								
250					64°							
					65°							
					61°							
		252.07 m EQH			70°							

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
		Summary									
	000-6.03	Overburden									
	3717-37.34	Coal									
	59.65-61.88	Fault									
	63.09-63.53	"									
	74.67-75.34	Coal 0.67 m									
	75.34-113.20	Andesite									
9443-1	113.20-114.05	Coal 0.85 m									
9443-1	114.59-114.83	Coal 0.24 m									
	139.03-140.00	Fault									
	140.80-141.39	"									
	149.65-149.85	Coal 0.20 m									
	151.79-152.04	" 0.25 m									
9443-2	167.53-168.52	Coal 0.99 m									
9443-2	169.43-170.69	" 1.26 m									
	170.69-172.00	Andesite									
9443-2	172.00-172.54	Coal 0.54 m									
	172.54-174.16	Andesite									
9443-2	174.16-175.13	Coal 0.97 m									
9443-3	176.23-179.58	" 3.35 m									
9443-4	179.93-181.87	" 1.94 m									
9443-4	182.62-183.48	" 0.86 m									
9443-5	208.18-210.61	" 2.43 m									
	210.61-213.03	Andesite									
9443-5	213.03-213.25	Coal 0.22 m									
	213.25-213.44	Andesite									
9443-5	213.44-213.99	Coal 0.55 m									
9443-6	220.23-222.45	Coal 2.22 m									
	246.81-252.07	Richtafen									
	EOH										
		16 coal seams = 17.64m									
		5 Andesite									
	Acid Tests	-50 @ 0.0, -47 @ 121.92, -48 @ 252.07									

AZ 040 -69 273

PROJECT DIVISION MTN HOLE 94-42 DIP: 70@0 ; 70@137 LENGTH 273.10 N 11+500 E 96+80 ELEV Page 1 of 1

VISUAL LOG	FROM-TO (metres)	DESCRIPTION SUMMARY LOG	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	0-3.65	OVER EXPOSED									
	3.65-8.15	COAL SHALE & SHALE									
	8.15-10.41	AREOLITE Limestone									
	11.41-24.19	COAL SHALE 3 CYCLES		24-53°							
	24.19-27.88	CONGLOMERATE		30°							
	27.88-34.52	2 CYCLES COAL-SAND		26-43°							
	34.52-37.03	SANDSTONE, SHEARED ALONG BENDING		46°							
	37.03-47.89	4 CYCLES CO-SSS		23-56°							
	47.89-61.43	SANDY SILTSTONE, CONGLOMERATE		45-50°							
	61.43-80.63	COAL SHALE SILT SAND CONGL WASH WASH		34-42°							
	80.63-94.00	CONGLOMERATE 85.60 SHEAR ZONE		30-45°							
9442-1	94.00-99.97	COAL		64°	64						
	99.97-101.48	SILTY SANDSTONE & COALY SHALE		53°							
9442-2	101.48-103.30	COAL			35						
	103.30-110.01	SHALE SILT SAND 106.80 SHEAR PARA LCA		57-65°							
	110.01-144.73	CONGLOMERATE		51-67°							
	144.73-146.15	COALY SHALE		69							
	146.15-148.81	CONGLOMERATE									
	148.81-153.72	4 CYCLES COAL SHALE SILT SAND		70°							
	153.72-165.24	CONGLOMERATE 153.70, 165.50 SHEAR ZONES		59-87°							
	165.24-169.94	SILTSTONE UC SHEAR ZONE		69°							
9442-3	169.94-181.92	COAL			51						
	181.92-186.08	COAL SHALE SILT SAND		35°							
9442-4	186.08-190.29	COAL		51°	59						
	190.29-209.34	7 CYCLES COAL SHALE SILT SAND MINOR CONGL									
9442-5	209.34-209.91	COAL			67						
	209.91-210.12	TAN SHALE SILTSTONE									
9442-5	210.12-215.18	COAL		54°	67						
	215.18-215.54	TAN PAISLEY MUDSTONE		44°							
9442-5	215.54-218.13	COAL		44°	61						
	218.13-222.75	3 CYCLES COAL SHALE SILT SAND									
9442-6	222.75-227.39	COAL		61°	38						
	227.39-248.35	SANDSTONE & SILTSTONE 248 1m FAULT ZONE		54-63°							
	248.35-273.10	RICHTOFEN		65-86°							
	273.10	EOH 4-12-94 0700h									

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	30.40-34.52	COALY SHALE 40% SILT 40% SAND 20% LAMINATED TO MED BEDDED GRAY COARSELY TURBATED SAND 10% COAL INT. 40% SILT INT WITH 10% COAL GRANULES + PEBBLES, BEDDING IS WEAK TO MOD	SSS	26° B							
	34.52-37.03	SANDSTONE: BROWN, RUSTY THINLY BEDDED + SHEARED ALONG BEDDING, 20% SILTY LAM	SAND	46° B 46° SZ 56° B							
	37.03-38.42	COALY SHALE 70% SILT 20% SAND 10% RARE COAL LAM, LOCALLY FAULTED	SSS	37° B							
	38.42-40.53	SHALE 10% SILT 20% SAND 25% CONGL 40% FU, 1% COAL STRINGERS IN CONGL.	SSS- CONGL	37° 45°							
	40.53-44.06	SHALE 5% SILT 30% SAND 25% CONGL 40% FU, LOCAL TURBATION + REVERSE GRADING	SSS- CONGL	23°							
	44.06-47.89	SHALE 5% SILT 25% SAND 20% CONGL 50% FU, LOCAL TURBATION + REVERSE GRADING + X-BEDDING (SAND BEDS + SILT LAM)	SSS- CONGL	44°							
	47.89-48.64	SANDY SILTSTONE: BUFF SAND, WEAKLY TO WELL SORTED THIN BEDS IN BLACK SILTSTONE WITH MINOR COALY SHALE	SILT								
	48.64-61.43	CONGLOMERATE: GRANULES 60% + PEBBLES 20% QTZ + FSPAR SUBROUNDED, WEAKLY THIN TO MOD BEDDED WITH BROWN SAND LAM TR- 3% COAL STRINGERS + FRAGMENTS TO 12mm GREEN TO LIGHT BROWN	CONGL	50° 45°							

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
65	61.43-61.93	COAL & SHALE / COAL & RUBBLE & GOUGE	C-SH								
	62.03-63.43	CONGLOMERATE RUBBLE WITH CHALKY COAL	CONGL								
	63.43-67.36	SILTSTONE: BLACK SILTSTONE MOD. SORT	SILT	42°							
		SANDY SH. COALY SHALE INT. WITH LAMINATED LOCAL PURPLE MARS. SILTSTONE FRAG. L.A.A. LCA		28° 40°							
70	67.36-72.06	SANDSTONE: LIGHT BROWN GRAY TYPICAL WITH 20% COALY SHALE & 40% CONGL INT. FROKEN WITH WHITE GRUNT GOUGE	SAUD								
75	72.06-72.20	SHEAR ZONE: UC OF COALY SHALE: GOUGE	SZ								
	72.20-74.33	COALY SHALE: THIN, DISCONTINUOUS LAM COAL 10%	C-SH								
	74.33-77.83	SANDY CONGL	CONGL								
	77.83-78.30	SHALE: TAN, THINLY LAM WITH 5% BLACK DISCONTINUOUS WISPY SHALE, DISAPPEARING DOWNHOLE, LC 20% COAL STAIN	SHALE-TAN	38° B							
80	78.30-80.63	SANDY SILTSTONE: MOD SORTING, WEAK TO MOD TURBATION, COAL STRINGERS & FRAGS 3% LOCALLY WELL INTERLAM.	SILT	34°							
85	80.63-94.00	CONGLOMERATE: WEAKLY MED BENDED, 37.3% SHAR GRANULE 30% PEBBLE 50%, SUB-ROUNDED, SAND MATRIX, WITH COAL LAM, STRINGERS & FRAGS 5%	CONGL	45° 40° 30°							
	85.40-85.80	SHEAR ZONE: TOP OF MORE SANDY INT	SZ								
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
15.0	150.98-151.62	COAL 20% SHALE 30% SILT 20% SAND 20% . F11	SSS	71° B							
	151.62-152.64	COAL 20% SHALE 30% SILT 20% SAND 20% . F11	SSS								
	152.64-153.72	COAL 10% SHALE 10% SILT 20% SAND 60%	SSS								
	153.72-153.80	INTER BEDDED									
15.5	153.80-155.72	SILTSTONE: GOUGE & SAND. ARDUB BEDD.	SZ	55°							
	155.72-165.24	SILTSTONE: 92% FINE GRANULE 60%		57°							
		FEED 10% SAND 20% THIN TO THICK		57°							
		BEDDED. LIGHT GREY. SHEAR. V. & LC									
16.0											
16.5	165.24-165.94	SILTSTONE: BLACK, NEARLY BEDDED. CALCIC.	SZ	69°							
		VN BX AT 166.7. SAND 10% TOWARDS									
		POSTION OF INT. WITH INCREASED COAL SEAMS.									
	167.77-167.94	SHEAR ZONE: GOUGE	SZ	53°							
17.0	169.94-181.92	COAL: BLACK, MOD BEDDED, LOCALLY COMPACT	COAL		51						
		USU RUBBLE TO GOUGE. V. ON FRAC PLANE.									
		TR-2%, BROWN SHALE LAMINATIONS 5-10%									
		GRAD LC									
17.5											
18.0											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
180	181.92-186.08	COAL 20% SILT 30% SAND 40% : VERY INTER- LAMINATED, LOCAL SOFT SED DEF	C-SSS	35°							
185	9442-4 186.08-190.29	COAL : CRUSHED TO WEAKLY COMPACT SHALE LAM 5%, TR-1% P	COAL	51°	59						
190	190.29-195.65	COAL 10% SHALE 10% SILT 40% SAND 40%, MOD INTER LAM TO THINLY BEDDED.	C-SSS	50° 47°							
	195.65	FAULT COARSE 5cm	FLT								
195	195.65-196.49	COAL & SHALE COAL	SH-C								
	196.49-197.66	COAL 20% SHALE 20% SILT 50% SAND 10% WEAKLY INTERLAM, COAL SEAMS 1mm-5cm	C-SSS	61° 53°							
200	197.66-200.07	CONGLOMERATE ARGILLIC 60% FSPAR GRAINLE CONGL. MASSIVE	CONGL								
	200.07-205.43	COALY SHALE 20% SILT 40% SAND 40% : DARK BROWN TO LIGHT GREY BROWN, WEAKLY INTER LAMINATIONS, MINOR COAL STRINGERS, FU	C-SSS	71°							
	202.75-202.85	FAULT COARSE									
205	205.43-207.50	COALY SHALE 40% SILT 20% SAND 40% : FU, GREY BROWN, INTERLAM TO THINLY BEDDED, COAL STRINGERS 5%, LOCAL SOFT SED DEF	C-SSS	29°							
	207.50-208.98	COALY SHALE 10% SILT 40% SAND 50% : FU, WEAKLY INTERLAM TO THINLY BEDDED	C-SSS								
	208.98-209.34	INTERLAM SHALE COAL & SILT	C-SH	54°							

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
9442-5	209.34-209.91	COAL	COAL		67						
	209.91-210.12	TAN DISCONTINUOUS THINLY LAM. SHALY SILTSTONE	SILT		67						
7442-5	210.12-215.18	COAL: LOCALLY CRUSHED, BLACK, WITH BROWN LAM. SHALE (1 BED 6cm) 10% GRAD. LC. MINOR NETWORK CALCIC VNLTs	COAL	54° B	67						
215	SAMPLE 215.18-215.54	DARK BROWN SHALE GRADING RAPIDLY TO A YELLOW/TAN "PAISLEY" (SOME MUD CRACKS?) MUDSTONE WITH MICROSTRIKES COAL, GRADING RAPIDLY THRU DARK BROWN SHALE TO COAL. CALCIC VNLTs	MUD	44°							
220	7442-5 215.54-218.13	COAL: LOCALLY CRUSHED, TR. CALCIC VNLTs GRAD. LC	COAL	44°	61						
	218.13-220.20	COALY SHALE BX: DARK BROWN HEAVILY BX SHALE. MINOR SANDY LENTHES	C-SH-BY								
	220.20-221.11	LIGHT BROWN LAM. SILT / SANDSTONE, CALCIC FILLED TENSION CRACKS, MINORLY 90° TO LCA	SAND								
225	221.11-222.75	COAL 20% TAN SILTSTONE 10% COALY SHALE 5%	C-SH								
9442-6	222.75-227.39	COAL: CRUSHED, GRAD. LC, GRAD. LC SHALE 10% TR PY	COAL	61°	38						
	227.39-237.44	BLACK, TAIL FRECKLED, MEDIUM SANDSTONE COAL LAMINATIONS & STRINGS 10% BROWN SHALE VNLTs 5% SILTSTONE THIN BEDS 10%	ARG SAND	77°							
235	237.44-242.56	SILTSTONE: BLACK MUD THINLY BEDDED, COAL LAMINATIONS 15 cm BUT USED AS LAM OR COALY SHALE LAM 20%, MINOR SANDY BEDS	SILT	63°							

[illegible]

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
0	0 - 3.85	Overburden - poor recovery									
	3.85 - 8.14	Conglomerate, pale brown in color, avg grain size 4mm, max grain size 7mm -mainly quartz clasts			62						
5											
	8.14 - 12.65	Shale siltstone, sandstone (40%, 40%, 20%) -medium to dark black, finely layered, breaks easily, mainly fragments <3cm in size		50°	52						
10	12.65 - 12.63	Conglomerate pale brown to light grey -avg. grain size 2mm			82						
	12.63 - 13.09	Shale (50% shale, 30% siltstone, 20% coaly shale) - minor black coaly shale trace cherty coal			100						
15	13.09 - 15.45	Shale siltstone sandstone (15%, 30%, 55%) -coarse light brown sandstone with thin wispy bands of shale + siltstone		45° 50° 50°	75						
	15.45 - 17.10	Conglomerate, pale brown to slightly grey, -mainly quartz clasts up to 1cm in size			100						
	17.10 - 20.25	Shale (10%), Siltstone (20%) Sandstone (35%), Conglomerate (35%) - fining upward sequence, gradational contacts			72						
20	20.25 - 20.70	Shale, siltstone, sandstone (15%, 45%, 40%) -mainly dark grey siltstone/sandstone		55° 63°	100						
	20.70 - 22.33	Siltstone, 70% siltstone 20% chalk, 10% sandstone -minor coaly shale zone in a siltstone			50						
25	22.33 - 31.19	Andesite - light green to slightly grey, fresh hard andesite with minor soft andesite at lower contact			94						
30											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30	3119-32.61	Coal - 70% Coal, 30% shaly coal/coaly shale			55						
	32.61-33.94	Shale, Siltstone, Sandstone (30%, 40%, 30%)		63°	65						
	33.94-34.13	Coal 80% coal, 20% shaly coal			84						
	34.13-35.25	Shale Siltstone Sandstone (30%, 40%, 30%) -medium grey to dark grey		65°	31						
	35.25-35.45	Coal 70% coal, 30% coaly shale			75						
35	35.45-36.87	Shale, Siltstone, Sandstone (30%, 40%, 30%)			100						
	36.87-37.50	Coal 70% coal, 30% coaly shale			46						
	37.50-37.93	Shale Siltstone, Sandstone (30%, 40%, 30%)		68°	88						
	37.93-38.1	Coal 70% coal, 30% coaly shale			94						
	38.1-38.30	Shale, Siltstone, Sandstone (30%, 40%, 30%)		70	100						
40	38.30-39.58	Conglomerate			94						
	39.58-40.87	Shale Siltstone, Sandstone (40%, 40%, 20%)			53						
	40.87-41.95	Conglomerate			74						
	41.95-44.80	Siltstone, 70% siltstone, 20% shale, 10% sandstone -mainly black siltstone with minor coaly shale and black shale			62						
	44.80-54.40	Shale Siltstone, Sandstone (25%, 25%, 50%) -dark grey to black shale / siltstone with light grey sandstone -sandstone bands up to 10cm wide, average 1cm wide, mainly fine grained, minor coarser grained zones almost a conglomerate -shale / siltstone as thin wispy layers, <0.7cm -very minor cross bedding		70°	83						
45				68°							
				70°							
				65°							
				67°							
50	54.40-55.30	Conglomerate 90% Conglomerate, 10% shale avg grain size >1mm			95						
	55.30-56.25	Shale 80% Black Shale, 20% Siltstone		78°	61						
	56.25-58.48	Shale, Siltstone, Sandstone (20%, 40%, 40%)			100						
	58.48-61.80	Conglomerate 80% conglomerate, 20% sandstone -very minor shale partings <1mm wide -gradational contacts except sharp lower CNT		77°	96						
60											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	61.80 - 62.00	Coal - good black clean coal			70						
	62.00 - 63.09	Conglomerate - avg. fragment size 0.4 mm			100						
	63.09 - 65.64	Shale, Siltstone, Sandstone (10%, 30%, 60%) - mainly light grey sandstone layers average 1cm wide with thin black shale/siltstone layers		70	90						
65	65.64 - 73.09	Conglomerate - light grey conglomerate, very minor shale partings (<1%), average grain size 3mm, max grain size 1cm - mainly quartz grains - upper contact gradational, lower contact sharp			95						
70	73.09 - 75.36	Shale, Siltstone, Sandstone (20%, 30%, 50%) mainly alternating shale/siltstone/sandstone very minor shale breccia zone (1-10cm)		80	100						
75	75.36 - 76.64	Sandstone, 80% sandstone 20% shale/siltstone light grey, fine grained minor black shale/silt layers		65	100						
	76.64 - 76.98	Shale 70% black shale, 30% coaly shale		75	59						
	76.98 - 78.48	Sandstone 80% sandstone, 20% shale/silt as above		68	100						
	78.48 - 81.60	Shale, Siltstone, Sandstone (30%, 40%, 30%) - 10cm conglomerate band, gradational contacts		62	94						
80	81.60 - 82.47	Conglomerate 70% cong, 20% sandstone, 10% shale - gradational contacts			100						
	82.47 - 94.28	Shale, Siltstone, Sandstone (15%, 35%, 50%) - light grey sandstone bands, avg 1cm wide with common shale/siltstone bands up to 1cm wide - minor - 5% conglomerate - all contacts gradational with both fining upward and fining downward sequences		75	100						
85											
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90		-gradational contact									
	94.28-95.00	Shale, Coal/Shale 50% Coal, 50% Shale - common calcite veins			42						
95	95.00-98.37	Shale, Siltstone, Sandstone (15%, 35%, 50%)		57	100						
	98.37-99.06	Conglomerate average grain size 2.5 mm, maximum 4mm			100						
	99.06-99.63	Shale, Siltstone, Sandstone (15%, 35%, 50%)			100						
100	99.63-100.98	Conglomerate 70% Cong, 30% sandstone -gradational upper + lower contacts			100						
	100.98-103.40	Shale, Siltstone, Sandstone (15%, 35%, 50%)			100						
	103.40-104.10	Sandstone 5% shale/siltstone, gradational contacts		50	100						
				70							
	104.10-110.85	shale, siltstone, Sandstone (20%, 40%, 40%) - sandstone layers up to 1cm wide with common block shale/siltstone layers up to 1cm wide - gradational contacts		65	100						
105				65							
110	110.85-116.70	Conglomerate 95% Cong, 5% Shale/coal - light grey conglomerate, average fragment size 2.5mm, maximum size 1cm - mainly quartz grains ~80% - 15% matrix, mainly fine grained clasts - 5% shale/coal clasts, avg 2mm in size - sharp lower contact gradational upper contact			100						
115	116.70-120.42	Shale, Siltstone, Sandstone (20%, 40%, 40%) - 5cm coal at upper contact			100						
				55							
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
180	179.15-179.58	Shale, Siltstone, Sandstone (10%, 30%, 60%) - gradational contacts, fining upwards sequence		55° 65°	100						
	179.58-185.72	Conglomerate 95% Conglomerate, 5% shale/coal - light grey conglomerate, average grain size 4mm, maximum 1cm, minor <3mm shale bands - gradational upper contact, sharp lower contact.			100						
185	185.72-186.00	Shale/shaly coal 90% shale, 10% coal			100						
	186.00-188.43	Shale Siltstone Sandstone (10%, 30%, 60%) - mainly light brown sandstone with thin layers of black shale and siltstone		55°	100						
	188.43-189.80	Conglomerate 70% conglomerate, 30% sandstone - light brown sandstone, cong avg grain size 4mm		77°	100						
190	189.80-190.35	Sandstone 90% sandstone, 10% shale/siltstone		80°	100						
	190.35-190.90	Conglomerate gradational upper CNT, sharp lower			100						
	190.90-191.30	Sandstone 90% sandstone, 10% shale/siltstone			100						
	191.30-191.60	Conglomerate gradational upper CNT, sharp lower			100						
	191.60-192.15	Sandstone as above, light brown			100						
195	192.15-196.36	Conglomerate 90% conglomerate, 10% shale/coal - avg grain size 4mm, max 1cm, sharp lower CNT			100						
	196.36-197.50	Shale/shaly coal 55% shale, 45% coal mix soft brown/black shale and black coal		40° 40°	53						
194-4	197.50-203.41	Coal 95% coal, 5% shale - good clean black coal, vitreous luster and conchoidal fracture, black streak - 202.34-202.56 sandstone parting - not sampled			61						
200	203.41-205.74	Shale Siltstone Sandstone (40%, 40%, 20%) mainly black shale, brown siltstone and minor grey sandstone, gradational contacts - minor black shale clasts in brown siltstone matrix		50° 50°	75						
205	205.74-219.85	Sandstone 95% sandstone, 5% conglomerate - light to medium grey sandstone, fairly clean ie. very minor shale partings no coal bands - minor coarser grained zones of conglomerate - common calcite veinlets up to 1mm wide			96						
210											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
210		average grain size < 1mm, < 1% of clasts up to 2cm in size - most grains are quartz - fairly coarse grained sandstone almost a conglomerate									
215											
220	219.85-223.35	Sandstone Breccia - difficult unit to interpret - appears to be a clasts of sandstone in a sandstone breccia - numerous calcite veinlets			97						
225	223.35-228.17	Sandstone 80% sandstone, 10% cong, 10% shale - mainly light grey sandstone with gradational contacts into coarser grained material - minor medium grey layers of shale, up to 3cm layers of numerous narrow wispy shale layers < 3mm in width			100						
230	228.17-228.90	Shale / sandstone couplets 50% shale, 50% sst - medium grey alternating shale + sandstone	Richlofen	52°	100						
	228.90-229.95	Conglomerate avg. grain size 2mm, max. 1cm			100						
	229.95-230.75	Shale / sandstone couplets as above		58°	100						
	230.75-231.87	Conglomerate as above, sharp contacts			100						
	231.87-234.82	Shale / sandstone couplets 70% shale 30% sst - good dark shales alternating with light grey sandstones - sst average 1cm wide, shale ~ 7cm		57°	100						
235	234.82-235.60	Conglomerate as above		60°	100						
	235.60-238.50	Shale / Sandstone couplets as above - good soft sediment deformation		62°	100						
240	- 239.88										

[illegible]

COLLAPSED 22-11-94

PROJECT DIVISION MTN HOLE 94-40 DIP: -90@ 0 ; -81@ 211 LENGTH 268.22 N 11+244 E 97+20 ELEV Page 1 of 9

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
0	0-4.63	OVERFLOWED HOLE	CVRN								
5	4.63-6.00	ARKOSE WITH 40% THIN INTERBEDS & LAM SILTSTONE	ARK								
	6.00-11.58	CONGLOMERATE: HEAVILY BEDDED QTZ ARK CONGL WITH COALY SHALE THIN INTERBEDS & LAM. FRAGMENTED, SHARP & OXIDIZED	CONGL	70° B							
10	11.58-15.76	COARSENING DOWN CYCLE (CLC): 20cm COALY SHALE, 90cm LAMINATED SILT + SAND WITH LOCAL RIPPLES, SCOURED, BEST MASSIVE TO HEAVILY BEDDED QTZ GRAINLE CONGL WITH MINOR LAM SHALE & FRAG COAL	SSS CONGL	75° B							
15	15.76-24.91	SHALY COAL 4% SHALE 10% SILT 60% SANDST 20% INTERLAM TO FINE INTERBEDDED LOCAL LOAM CASTS, X-BEDDING, RIPPLES & SCOUR SHARPLY GRAN CONTACTS, 3 COAL SEAMS 12 cm, 8 cm, 3 cm	C-SSS	75° 73° 60° 73° 57° 73°							
20											
25	24.91-25.24	TAN, WEAKLY BEDDED SILTY SHALE	SHALE								
	25.24-29.54	SHARP CONTACT WITH BROWN SILTST GRADING RAPIDLY TO MOD INTERLAM THINLY INTERBED BLACK SILTSTONE 60%, BLACK SHALE 40% GREY SAND 30%. GRAD LOWER CONTACT DARK BROWN SHALE TO COALY SHALE	SSS	82°							
30											

PROJECT 1411-11-10-11 HOLE 1411-11-10-11 DIP: 90° @ ; @ LENGTH N E ELEV Page 3 of 9

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
60	58.98-67.97	COAL 5% SHALE 20% Silt 30% SAND 40% LAIN TO THIN BEDDED, CHANNEL OPEN CONTACTS LOCAL MUDROCK & X-BEDDINGS. COAL AS BEAMS TO 5cm, BUT USED 6. SILENT LAM OF FINGERED BEDDINGS IN COAL & SILENT LAM.	SSS	53° 61° 56° 66°							
65	67.97-77.52	CONGLOMERATE 82% FINE GRAINED 80% PEBBLES 1% MASSIVE TO WEAKLY BEDDED SANDY LAMINAR COAL 1% SILENT LAM.	CONGL								
70											
75	77.52-82.86	SHALE 10% Silt 30% SAND 50% CONGL 5% MOD TO WELL LAIN TO THIN BEDDED MINOR COAL FINGERS	SSS	59°							
80											
85	82.86-84.10	WEAKLY BEDDED, FINE GRAINED SANDY CONGLOMERATE	SAND								
90											
95	84.10-90.41	SHALE 20% Silt 10% SAND 40% MOD TO WELL BEDDED, WEAKLY TUBED LAM TO THIN BEDDED, CHANNEL OPEN CONTACTS SOFT SILT CL. LONG GRAN. LOWER CONTACT COALY SHALE	SSS	39° 34° 40°							
100											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
90	9440-2	90.91-99.03	COAL: V. L. COARSE, COMPACT WITH LOCAL RUBBLE, 10% INTERLAM. BROWN & BLACK SHALE, 3% CALC. MICROFAC. FILL, PY TR 10% FRAC COAL	COAL	52°	79					
		92.16-93.06	BROWN SHALE PARTING								
95											
100		99.03-100.43	BROWN & BLACK LAMINATED SHALE, MINOR SILT	SHALE	40°						
		100.43-100.52	LIGHT GRAY SHALE								
		100.52-102.18	SHALE 10% SILT 70% SAND 20% WEAKLY LAM	SSS	32°						
		102.18-105.23	ARKOSIC CONGLOMERATE: WEAKLY TO MOD REDDED QTZ F. SP. GRAINULES 60%, COAL FRAGS & STRIPES 3%	ARK CONGL							
105		105.23-106.04	COAL SHALE	C-SH							
		106.04-106.39	QTZ F. SP. GRAINULE CONGLOMERATE	CONGL							
		106.39-109.80	DARK BROWN COAL SHALE & SILTSTONE, LAMINATED WITH COAL STRINGERS & NARROW SEAMS MINOR SANDY SILTSTONE GRAIDS	C-SH	38° B 30°						
110	9440-3	109.80-114.20	COAL: FRAC, COMPACT TO BROKEN, TR 2% PY, SHALE LAM 5%, TR SAND, TR CALC MICROFAC	COAL	32°						
115	9440-4	114.20-116.43	COAL, SH. COAL: BLACK TO DARK BROWN SILTY & SANDY LAM 5-10%, TR 2% CALC MICROFAC	C-SH-C							
		116.43-118.09	DARK BROWN SHALE BX IN COAL SHALE MATRIX GRAD. LOWER CONTACT	SHALE BX	43°						
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
150											
155	144.6-155.80-159.83	COAL: BROWN, BLACK WITH DARK BROWN SHALE CLASTS (EX) 4' 14" TP-1%, P/	COAL	32°B							
160	159.83-164.29	COALY SHALE: DARK BROWN, VIGILANT LAMINATED + THINLY BEDDED, TURBATED, WITH COAL + LIGHTER BROWN SHALE CLASTS AN 4" WHITE SOFT NON FIZZY CLAY-LIKE MINERAL AS FRAC COATINGS	CO-SH								
165	164.29-170.30	COALY SHALE: BLUE BLACK, VIGILANT LAMINATED TURBATED, SPAD CONTACT OBSERVED BY BROKEN CORE, LESS WHITE SOFT MINERAL, COAL FRAC + FALTINGS 10-20%, CLASTS 4 BY INCREASED TURBULENCE	CO-SH	34° 50° S2							
170	170.30-194.55	ANDESITE: 15cm CHILLED CONTACT, GREEN GREY, PREVIOUS CHL ALT AMPHIBOLE 2-5 mm CALCIC AMPHIBOLE + NETWORK MICROFAC RAPE PREVIOUS FLAG TO 1cm 190.80 SPEARING 10cm CHILLED LC	AND	MASSIVE							
175											
180											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	29.80-32.80	conglomerate 95% cong 5% shale/siltstone - minor bands of shale up to 5cm wide	rock/str	80	100						
	32.80-33.78	shale 15% siltstone 20% sandstone 20% conglomerate 45% sequence - sharp upper + lower contacts		72	100						
	33.78-34.37	coal 15%, shale 10%, siltstone 10%, conglomerate 65% minor coal + coaly shale at upper CHT ~10cm		75°	100						
	34.37-38.40	shale, siltstone, sandstone (20% 40% 40%) - dark grey to black shale/siltstone with minor reddish sandstone/darkose bands up to 3cm wide		88°	106						
	38.40-39.27	conglomerate - slightly reddish			100						
	39.27-49.17	shale, sandstone, siltstone (20% 40% 40%) as above, gradational contacts between black shales and greyish sandstones - minor sandstone layers up to 10cm wide and minor coarse grained sandstones			106						
				82°							
				85°							
				65°							
				80°							
				45°							
	49.17-51.80	conglomerate 90% cong, 10% shale - light grey in color, avg grain size 1-2mm		62°	96						
	51.80-52.39	shale, siltstone, sandstone (20% 40% 40%)		55°	96						
	52.39-52.80	coal, shaly coal 60% coal, 40% shale		78°	60						
	52.80-53.34	shale, siltstone, sandstone (20% 30% 60%)			40						
	53.34-55.40	conglomerate - pale grey, fine grained conglomerate, avg grain size 1-2mm		82°	87						
	55.40-57.61	Fault Zone - low angle structure to core axes - common black gauge zones cutting light grey sandstones		Fault 10	56						
				Fault 5							
				Fault 11							
	57.61-61.63	sandstone sandstone 90%, shale 10% - pale grey color, soft easily broken, avg. grain size < 1mm - minor black shale bands, minor fault textures	Richstofm		87						
				Fault 12							

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	61.63-62.57	Fault Zone - black shale fault zone, soft	Foliated		59						
	62.57-63.05	Sandstone - light grey, fine grained			100						
	63.05-63.46	Fault Zone - black fault zone, soft, crumbles			70						
	63.46-64.36	Sandstone - light grey, fairly soft			87						
	64.36-64.61	Fault Zone - light grey, broken, zone 4, gauge			80						
65	64.61-71.32	Sandstone - light grey, medium hard average grain size < 1mm,			100						
70											
	71.32-72.70	Sandstone/shale couplet, - 70% light grey sandstone and 30% black shale		45°	100						
	72.70-81.10	Sandstone - light grey, fine grained sandstone - very minor shale bands - very slightly green - ? glauconitic ?		45°							
75											
80	81.10-81.52	Sandstone/shale couplet - 50% black shale 50% light grey sandstone		50°	100						
	81.52-82.37	Sandstone medium grey to slightly greenish, - very minor shale partings		55° 45° 52°							
	82.37-94.03	Sandstone/shale couplet - 50% Black shale 50% light grey sandstone - rhythmic - sharp contacts between shale + sandstone - sandstone bands up to 50cm wide, average 1 cm wide, black shale bands up to 6 cm wide, average 1 cm.			100						
85				55°							
				53°							
				60°							
90				52°							

PROJECT DIVISION MTN HOLE 94-38 DIP: 50 @ 0 ; 51 @ 178 LENGTH 178.61 N 11+244 E 97+20 ELEV _____ Page 1 of 1

Archer, Cathro & Associates (1981) Limited

AZ 220

CORRECTED

PROJECT DIV MTN HOLE 94-38 DIP: @ 0 ; -51 @ 178 LENGTH 178.61 N 11+244 E 97+20 ELEV Page 1 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
0	0-2.17	OVERBURDEN: GLACIAL TILL	DIRT								
	3.17-8.28	ARKOSE: LIGHT BROWN & GRAY ARKOSE & ARKOSIC SANDSTONE WITH 20% GRANULES & PEBBLES QTZ & FELSP	ARK	43° B							
5	8.28-10.40	SH SILT SAND CONGL COARSENING DOWN CYCLE COAL FRAGS 8.28-8.40	SSS								
10	10.40-16.33	SH SILT SAND CONGL CDC (COARSENING DOWN CYCLE) SH 5% SILT 40% SAND 20% GRANULE CONGL 35% MINOR COAL FRAGS & STRIPES IN CONGL 13.17-13.23 FAULT ZONE	SSS CONGL	65° B 77° B							
15	16.33-16.66	SILTY SANDSTONE: FINING DOWN, GRAD LC, SHARP UC	SAND								
	16.66-17.11	SHALY COAL	SH-C								
	17.11-18.20	SH SILT SAND 90%	SSS								
	18.20-18.50	COALY SHALE: SHALY GRAD UC & LC	C-SH								
20	18.50-25.44	SH SILT SAND: INTERBEDDED SHALE & SILT IN SANDSTONE WITH LOCAL SCORING 18.98-19.10, 24.14-24.46 COAL	SSS	85° 70° 82° 57°							
25	25.44-27.28	CONGLOMERATE: QTZ ARKOSE GRANULE CONGL LIGHT BROWN GREY, MASSIVE, TR COAL FRAGS GRAD UC, SHARP LC	CONGL								
	27.28-30.37	SHALE SILT SAND: Z CDC, LAMINATED TO THINLY BEDDED. SH 50% SILT 30% SAND 20%	SSS	63° 64°							
30											

PROJECT DIV MIN HOLE 94-38 DIP: 50 @ 0 ; @ LENGTH N E ELEV Page 2 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30	9438-1	30.37-35.10 COAL: COMPETENT TO VERY BROKEN, 10% THIN BEDS, BROWN SILTSTONE 32.71-32.87 BROWN COALY SILTSTONE	COAL	67°	65						
35		35.10-36.72 SILTY COALY SHALE: DARK BROWN & BLACK LAMINATED TO THINLY BEDDED SHALES SILTS & MINOR SAND. COAL 36.41-36.72	SILT C-SH	67° B							
		36.72-40.30 SILTY SANDSTONE: BROWN TO DARK GRAY MED GR SANDSTONE WITH UNSORTED SILT & SILT LAM	SAND	75° B							
40		40.30-52.03 ARKOSE CONGLOMERATE: MEDIUM TO WEAKLY BEDDED, ARKOSIC GRANULE PEBBLE QTZ FSPAR CONGL. LOCAL MEGA RIPPLE, INCREASE IN COAL FRAGS & STRINGERS DOWNHOLE, FROM TR TO 5%, SHARP LC	ARK CONGL	61° B 73° LC							
45											
50											
		52.03-53.76 COAL 3% SHALE 5% SILT 20% SAND 50% CONGL 20% CDC. COAL AS THIN SPARS 1cm, SAND WITH WEAK X-BEDDING & SCOUR & FILL, BROWN	C-SSS CONGL	64° B							
55		53.76-55.44 Shale, Sandstone, Conglomerate (15%, 50%, 35%) - good firming upwards, coarse cong (avg 5mm in size) - sharp lower contact									
		55.44-57.14 Coal, Shale, Siltstone, Sandstone, Conglomerate sequence 14cm coal, 10% shale, 20% silt, 40% sst, 20% cong		75°	86						
		57.14-58.35 Shale, Siltstone, Sandstone (10%, 40%, 50%) pale brownish sandstone interlayered w siltstone		63°	94						
60		58.35-59.11 Conglomerate to coarse sandstone		64°	100						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	59.11-61.12	Shale, Siltstone, Sandstone (25% 20% 55%)		63°	95						
	61.12-62.15	Conglomerate avg 21mm, max 4mm			100						
	62.15-62.58	Shale 20% Siltstone 20% Sand 20% Cong 20% calciferous		70°	100						
	62.58-65.25	Shale, Siltstone, Sandstone (20% 20% 60%)			100						
		-light brown sandstone with common <1cm shale/siltstone partings (medium grey to black)		55°							
	65.25-66.08	Conglomerate average grain size 22mm, maximum grain size 44mm, light grey in color		70°	100						
	66.08-71.00	Shale, Siltstone, Sandstone (15% 30% 55%)			100						
		-light brown sandstone layers avg 1cm wide with common wispy shale/siltstone layers									
	71.00-72.85	Black Shale - good black shale, brown streak, no significant partings			100						
9438-2	72.85-76.24	Coal - good clean black coal, black streak, vitreous luster, conchoidal fracture, very minor shale partings			66						
	76.24-77.02	Conglomerate average grain size 1mm, common small black shale clasts, sharp lower contact		65	100						
	77.02-77.35	Coal / Shaly Coal - 60% coal, 40% shale			100						
	77.35-78.38	Conglomerate gradational upper contact		70°	100						
	78.38-78.87	Shale 70% Black Shale, 20% siltstone, 10% sandstone			100						
	78.87-79.77	Conglomerate common small shale clasts < 4mm		73°	100						
	79.77-80.46	Shale 70% Black Shale, 20% siltstone, 10% sandst			100						
	80.46-80.94	Conglomerate as above		65° B	100						
	80.94-82.63	SHALE + COALY SHALE: BLACK, WEAKLY LAMINATED	C-SH	66°							
		SHALE WITH COAL PARTINGS + STRINGERS									
9438-3	82.63-85.59	COAL + SHALY COAL: VITREOUS, CRUMBLY COAL WITH SHALE PARTINGS 10% + MINOR CALC MICROVNLTs			95						
	85.59-87.63	ANDESITE: STRONG CLAY ALT WITHIN 15 cm OF CONTACTS. TAN GREEN WITH WHITE CLAY CALCITE FILLED AMYGDULES 5%.	AND								
	87.63-92.90	COAL 20% SHALE 70% SAND 5% CONGL 5%		71° B							
				57°							

PROJECT DIVISION MTN HOLE 94-38 DIP: 50 @ 0 ; @ LENGTH N E ELEV Page 4 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90	9438-4	92.90-97.08	COAL: VERY CRUMBLY TO WEAKLY BROKEN, DISSEMINATED 5%, SHALE PARTINGS 10%	CCAL	72						
95											
100		97.08-124.20	ANDESITE: MASSIVE, 10-30% WHITE AMYGDULES TO 6mm, TAN GREEN + ROSE TAU IN 2m CONTACT ZONES + GREY GREEN CENTRAL ZONE WITH SPAR PHELOS 3-20% TO 1cm AV 2mm + CHL ALT PHELOS 1-4mm 5-10% LOCAL WEAK BX, STRONG BX 20cm LC	AND							
105											
110											
115											
120											

PROJECT WIN MTN HOLE 94-38 DIP: @ ; @ LENGTH N E ELEV Page 5 of 4

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120											
125	124.20-126.30	SHALE: BLACK SHALE WITH 5-10% COAL PARTINGS + FRAGS, WEAKLY BX WITH BROWN + BLACK SHALE CLASTS, INCREASING FINE GRADE	SHALE								
	126.30-128.56	BROWN SHALE BY: BROWN SHALE 100% BX, FINE GRADE, BROWN TO 600 FAIRLY WHITE, MINOR SAND LENSES + CLASTS	SHALE	83° B							
130	128.56-146.43	CONGLOMERATE: DARK GREY + BROWN GREY, MASSIVE TO WEAKLY BEDDED WITH SILTY + SANDY LAMINATIONS + THIN BEDS 10-20% . SCATTERED 1/2" GRAINLES QTZ FERRAR SHALE ± MAFIC, RARE PEBBLES + COBBLES BROWN LAMINATED SHALE + SILTSTONE, + QTZ	CONGL	86° B 78°							
135											
140											
145	146.43-148.10	BLACK SHALE BROWN SILT TAN SAND (30% 40% 30%) IN SHORT COARSENING DOWN CYCLES, UPPER CONGL THINS OUT AS LOWER RICHTOFEN CYCLES IN.	SSS	79°							
	148.10-177.52	RICHTOFEN: BLACK THINLY BEDDED SHALES WITH LIGHT GREY VISIPY SILT LAMINATIONS, RARE FINE GR SAND THIN BEDS + SMALL RIPPLES	RICT	86° 85° 90°							
150											

BEST ATTAINABLE IMAGE

PROJECT	DIV	MTN	HOLE	94 - 38	DIP:	@	:	@	LENGTH	178.61	N	E	ELEV	Page 6 of 6
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[illegible]

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
30	30.71-34.22	- dull grey, quartz rich, poorly sorted, clast supported granule to pebble sized conglomerate			98						
35	34.22-36.96	- dark brown to tan massive siltstone with coal fragments 36.40-36.41 - sharp contact to quartz pebble, clast supported conglomerate		80 contact 84	91						
	36.96-38.17	Coal - massive, 2 calcite veinlets @ 84°		86	98						
40	38.17-46.06	- Andesite - with calcareous amygdalites, generally more mafic than other andesites, color dark green - becomes pale grey to tan down hole towards coal contact									
45	46.06-46.60	Coal - is randomly oriented calcite veinlets		contact 34	100						
	46.60-50.00	- above coal grades into massive coaly shale			88						
50	50.00- 51.65	- broken contact to laminated tan arkose and dark siltstone		70 75	100						
	51.65- 55.57	- gradational contact to coarse to very coarse grained arkose with general trend of coarsening down hole			99						
55	55.57-58.57	- sharp contact to Coal - shattered, broken, several calcite veinlets and trace py - parting not in sample 57.91-58.30 andesite is py present in veinlets and disseminated			100						
	58.57-58.86	- grey "bleached" andesite			100						
60	58.86-59.10	- black massive coaly shale									

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
60	59.10-59.40	- grey, well sorted clast supported coarsening down hole, quartz rich granule conglomerate			100						
	59.40-62.95	- sharp contact to massive black shale, dk brown siltstone and coaly shale		contact 58	99						
	62.95-65.21	- sharp contact to laminated to interbedded grey med grained sandstone and black shale		82	100						
65	65.21-66.44	- soft black massive shale		86							
	66.44-67.40	- soft grey arkose grading to soft granule conglomerate			73						
	67.40-70.45	- soft black shale becoming more competent down hole			96						
					93						
70		68.80-69.40 - coarse grain dirty grey arkose									
		70.32-70.80 - several bands of grey arkose									
	72.45-73.00	- coarse grained dark siltstone w coal fragments			100						
	73.00-74.11	- banded dk coarse grained siltstone and grey coarse grained sandstone		70	98						
75	74.11-75.28	- dirty grey "pebble texture" clast supported granule conglomerate, poorly sorted			98						
	75.28-78.50	Siltstone - sandstone, shale (50%, 25%, 25%) - mainly medium grey siltstone with 3-10 cm bands of light grey sandstone + dark black shale to coaly shale - gradational contacts			98						
80	78.50-79.62	Coal - good black, vitreous, conchoidal fracture		75	100						
	79.62-79.64	Siltstone w ~10% sandstone, 10% shale			95						
	79.64-79.84	Coal - 80% coal, 20% black shale			100						
	79.84-80.23	Siltstone w ~10% sandstone, 10% shale		80	100						
	80.23-80.52	Coal 70% coal, 30% black shale			100						
	80.52-82.05	Siltstone sandstone shale, 50% coarse sandstone, 30% siltstone, 20% shale			88						
85	82.05-84.24	Coal good clean coal w <5% shale partings			75						
	84.24-84.92	Andesite weathered andesite, sharp CNT		CNT 15°	100						
	84.92-85.45	Coal good clean coal w <5% shale partings		80°	100						
	85.45-86.06	Sandstone shale Siltstone conglomerate (20,20,20,40)			100						
	86.06-86.56	Coal 80% coal, 20% black shale		78°	100						
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90	86.56 - 92.66	Andesite light greyish-green w/ 5% white phenocrysts, from 1 to 10 mm in size - some calcite veinlets up to 2 mm wide			100						
	92.66 - 99.80	Coal good clean coal, good conchoidal fracture, vitreous luster, ~5% coal partings		80°	84						
95											
100	99.80 - 102.55	Andesite light grey to very slightly green, 5-7% white phenocrysts, 1 to 10 mm in size			89						
	102.55 - 110.95	Coal good clean coal, vitreous luster, conchoidal fracture		73°	81						
105											
110	110.95 - 114.16	Siltstone - brownish black with ~5% black shale coal clasts up to 1x4cm in size - gradational upper & lower contacts			100						
	114.16 - 115.38	Shale / Siltstone 50% shale 50% siltstone - black shale bands with minor brownish siltstone bands		75°	97						
115	115.38 - 116.87	Sandstone light grey, coarse grained sandstone, gradational contacts			100						
	116.87 - 117.90	Conglomerate light grey 2-4 mm grain size, avg 3 mm in size			100						
120											

[illegible]

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
180											
	183.72-187.20	Shale, Siltstone, Sandstone (50%, 40%, 10%) - black shale + siltstone with - 1cm wide bands of light grey sandstone. - common calcite veinlets some with pyrite - in part soft black mud.		80 80	75						
185	187.20-206.04	Sandstone 10% Shale, 5% conglomerate - shale occurs as < 4mm black bands and as fragments 1x0.5x0.5 cm in size - these fragments or shale rip up clasts form block layers of numerous aligned clasts with a sandstone matrix - < 0.5% of rock is black shale clasts up to 8x3 cm in size (deformed/compressed logs or trees?) - conglomerate occurs as a gradational coarsening of the sandstone		77°	100						
190											
195											
200				88 90 85							
205											
	EOH 206.04m 676'										

PROJECT DIVISION	MTN	HOLE 94-36	DIP: -50 @ 0 ; @	LENGTH 229-81 N 12+438 E 981.00	ELEV	Page	of
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PROJECT	DIV	MTN	HOLE	94-36	DIP:	50 @ 0 ; @	LENGTH	229.81	N 12 + 438	E 98 + 00	ELEV	Page	1	of	8
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Archer, Cathro & Associates (1981) Limited

↑ INCREASING
↓ DECREASING

PROJECT DIV MTH HOLE 94-36 DIP: 50 @ 0; @ LENGTH N E ELEV Page 2 of 8												
VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT LCA	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %	
30	32.83-33.07	COALY SHALE: SHARP UPPER CONTACT, MASSIVE TO POORLY BEDDED, APPROX 30% SILT + SAND GRAINS.	C-SH	55° UC	100							
	33.07-36.88	SAND SILTSTONE RHYTHMITE: GRAD U/C WITH ↑ SAND + BEDDING DEFN. BULK OF UNIT HAS 1-2cm SAND (50%) BANDS WITH 1mm - 3cm SILTY INTERBEDS (50%). RARE LAM TO 2mm + FRAGS TO 4mm COAL. SOFTENED DEF NEAR LC.	SILT SAND RHYTH	27-37° B								
35	36.88-37.78	SHALY COAL: BROKEN CORE, BROWN STREAK	SH-C		60							
	37.78-41.06	COALY SHALE + SILT + SAND: LIGHT BROWN STREAK, W/KA TO MOD BEDDED WITH COALY SHALE + COAL FRAGS 10-20%, SILTSTONE 50% SILTY SANDSTONE 30%. LC FAULT GOUGE 10cm.	SSS	32° B	90							
40	41.06-43.56	CONGL SAND SILT SHALE: TOP 20 cm CONGL GRADING INTO SANDST, SILTY SANDST, SILTST, SHALE, LAST 20 cm COALY SHALE, LC FAULTED	SSS									
	43.56-51.76	CONGLOMERATE: MASSIVE, TEXTURE AS A VERY COARSE GRAINED ARKOSIC SANDSTONE. COAL FRAGS TO 8cm, USU 4mm + ARCUATE (SLUMPING) RARE HAIRLINE SEAMS, 2-5%.	CONGL QTZ	65° B								
	46.77-46.88	COAL SEAM, CHIELED		64°								
50	51.76-53.03	SILTST BX: BLACK, SHALY SILTSTONE BRECCIA, ANGULAR FRAGS ALL SIZES SH, SAND, CONGL COAL, MATRIX SUPPORTED, MOD BEDDED INT	SILT BX	42° B	87							
	53.03-53.92	COAL: BROKEN CORE, COAL + SHALY COAL	SH-C		31							
	53.92-60.25	CONGLOMERATE: MASSIVE, QTZ + FSPAR, COAL FRAGS + MICROSEAMS (USU BX) 2%, CALC FRAC + VNLTs, LOCAL FLOODING, 10%	CONGL QTZ	71° FR								
55												
60												

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	60.25-60.32	COALY SHALE: SHARP UC, COMPRESSING TO SAND DOWN HOLE	C-SH								
	60.32-61.72	SANDSTONE: MOD BEDDED ANGLES GRAD FLATTENING DOWN HOLE. 50° CONGLOMERATE BEDS, 10% NARROW SILTY BEDS, GRAD LC, BEDDING FADES OUT + COAL FRAGS APPEAR, LIGHT BROWN GREY	SAND	46° B							
				26° B							
65	61.72-82.24	CONGLOMERATE: MASSIVE, GREY, QTZ + FSPAR, COAL FRAGS MICROSEAMS + STRINGERS 1-3% FINE SHALE CLASTS TO 6 cm	CONGL	18° B							
			QTZ								
70											
75											
80	82.24-85.30	ARKOSIC SANDSTONE: TAN GREY, MED TO COARSE GK, WEAKLY BEDDED WITH STRINGERS + RARE MICROSEAMS COAL 3%, BEDDING FLATTENS TO 0 ABOVE LC.	SAND	31° B							
			ARK	26° B							
85	85.30-96.71	CONGLOMERATE: MASSIVE TO VERY WEAKLY BEDDED QTZ > FSPAR CONGLOMERATE, COAL SEAMS, STRINGERS + PODS 5-10%, SANDY INTERBEDS 10-20% LC 2-8°, SHARP, MARKED BY 1cm COAL SEAM	CONGL	18° B							
			QTZ	20° B							
				33° B							
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90											
95	96.71-99.19	SANDY SILTSTONE: BLACK, MASSIVE SANDY SILTSTONE LOCAL BEDDING / FOL PARA LCA, COAL FRAGS 2-4mm 2%, 1 COAL SEAM 2cm WIDE	SILT SAND	0° B							
100	99.19-102.37	CONGLOMERATE: QTZ > FSPAR, DARK TO LIGHT GREY & TAN GREY, MASSIVE, COAL FRAGS & STRINGERS 3% 102.96-103.07 SHALY COAL SEAM, IRREG	CONGL QTZ								
105											
110	108.37-129.57	SANDY SILTSTONE: BLACK MASSIVE TO WEAKLY BEDDED SILTSTONE & SANDY SILTSTONE, WITH GREY SANDSTONE STRINGERS, BEDS TO 2cm, RIP UP CLASTS & SLUMP BEDS. BEDDING ANGLES DYING THROUGH LCA. MINOR SHALE LAM 10-3mm, COAL FRAGS TO 4cm, SEAMS 4mm PARA LCA, TOTAL 3% SILT 70% SAND 25% LOCAL LOAD CASTS & CROSS BEDDING	SILT SAND	13° 0° 13° 9°							
115											
120											

AZ 040

PROJECT DW/ 14711 HOLE 74-36 DIP: 50 @ 0 ; @ LENGTH N E ELEV Page 5 of 8

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120											
125											
130	129.57-130.70	CONGLOMERATE: QTZ > FSPAR, MASSIVE	CONGL								
	130.70-130.98	COALY SHALE, BRUCIA: BLACK MASSIVE COALY SHALE & SHALE MATRIX WITH BROWN SHALE SUBROUND CLASTS, IRREG & SHARP CONTACTS	C-SH BX								
	130.98-130.58	CONGLOMERATE: QTZ > FSPAR, MASSIVE, TEXTURE AS A VERY COARSE GR SANDSTONE, GREY, DARK GREY & BROWN GREY, PAPE SANDY LAMINATION, GRAD INCREASE IN COAL FINESS & STRUCTURE, FROM TK TO 5%, WEAK COHESION OVER 1 METER SCALE	CONGL	12° B 42° 0° 14°							
135											
140											
145											
150											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	150.53-150.37	SHALY COAL: VERY BROKEN COKE, SHARP UC, SHARPLY GRAD LC	SH-C		48						
	150.37-162.19	SHALY 30% SANDY 30% SILTSTONE 40%: STRONGLY MOD BEDDING SWINGS THROUGH LC, RIP UP CLASTS, SOFT SED DEFORMATION 40%	SSS	11° B 0° 3°							
155											
160											
	162.19-163.17	SHALE & COALY SHALE: SOFT WHITE AMORPHOUS FRAC COATING	C-SH	MASSIVE							
	163.17-166.25	SANDY 40% SILTSTONE 50% SHALE 10% WEAK TO MOD BEDDING, RIP UP CLASTS & SOFT SED DEF	SSS	9° 0° 20°							
165	166.25-168.60	SHALE & MINOR COALY SHALE: MASSIVE, BROKEN COKE, GRAD UC & LC	SHALE								
	168.60-169.61	SANDY SILTSTONE: GREY SPECKLED BLACK, WEAKLY BEDDED SILT 70% SAND 30%	SAND	59°							
170	169.61-170.87	SILTY 20% SANDSTONE 80%: MASSIVE, MINOR COAL FRAGS, DARK GREY	SILT SAND								
	170.87-179.66	CONGLOMERATE: QZ > FSPAR MASSIVE, GREY, MINOR COAL FRAGS & STRINGERS, RARE SANDY BEDS	CONGL QZ	80°							
175											
180											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
180	179.66-188.16	SHALE 30% SILT 40% SAND 30%: BLACK GREY 4 BROWN BANDED, MOD TO WELL BEDDED 4mm TO 4cm, LOCAL SLUMPING, MINOR COAL WITH SHALY BEDS	SSS	72° B 87° 40° 45°							
185											
	188.16-189.11	CONGLOMERATE: QTZ CONGLOM NEARLY INTERBEDDED WITH COARSE BROWN SAND	CONGL QTZ	30°							
190	189.11-191.04	COALY SHALE 20cm SHALE SILT SAND SEQUENCE	CSSS								
	191.04-192.85	" " CONGL SEQ.	CSSS								
	192.85-194.15	SILTY 40% SANDSTONE 60%: IRREG MOD BEDDED SANDSTONE, BEDS 4mm-5cm WITH NARROW LAM SILTSTONE: MINOR QTZ-CARB NETWORK MICROINCLTS	SILT SAND	63° 55°							
195	194.15-198.63	CONGLOMERATE: QTZ > FSPAR > CALCITE, GRANULES 90% 2-4mm, SANDY MATRIX	CONGL								
	198.63-200.40	SHALE SILT SAND CONGL SEQUENCE, TR COAL AT TOP.	SSS CONGL								
200	200.40-201.28	COALY SHALE + SHALE	C-SH								
	201.28-201.91	SHALE BX: DARK BROWN SHALE SUBANG CLAST. IN BLACK SHALE MATRIX, BK RL 10cm SANDY SILTSTONE	SHALE BX								
	201.91-203.89	SHALY COAL, COALY SHALE, SILT, SAND SEQUENCE	CSSS	84°							
1436-2	203.89-206.27	SHALY COAL, COAL, COALY SHALE: COAL BEDS 2mm-5cm 33%	SH-C-SH								
205	206.27-209.12	SILTY SANDSTONE: WAVEY, WELL BEDDED, THICK LAM TO THIN BEDS, WEAK RIPPLE & X-BEDDING	SILT SAND	61° 59°							
210											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION 10% 10% 50% 20% 10%	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
210	209.12-215.75	COAL COALY SHALE SILT SAND CONGL: GRADATIONAL	C-SSS	67° B							
		CONTACTS THRU-OUT, WEAK TO MOD BEDDING		71							
		COAL 209.35-209.41 210.75-211.32		72							
		212.04-212.07 212.42-212.49		63							
		215.05-215.29 * SMALLER INT TOTAL ~ 10%									
215		LC 20cm GRANULE CONGL									
	215.75-218.52	COAL SHALE SILT SAND CONGL: COARSENING DOWN	CSSS	63°							
		SEQUENCE WITH LOCAL REVERSE GRADING, COAL	CONGL	85°							
		4 SHALE FIP UP CLASTS. TOP 6cm COAL.									
		216.22-216.30 MUD SEAM/SHEAR		85° SH							
220	218.52-228.60	SHALE SILT SAND CONGL ROUGHLY COARSENING DOWN	CSSS	78° B							
		WITH REVERSALS, LOCAL MIXING & NARROW	CONGL	57° B							
		COAL & COALY SHALE SEAMS.									
		220.10 COAL BRANCH									
225											
230	228.60-229.81	CONGLOMERATE: QTZ > FSPAR GRANULE - PEBBLE	CONGL	62°							
		WEAKLY BEDDED, MINOR SILTY SAND THIN BEDS	QTZ								
		228.82-228.90 FAULT GUDGE COALY SHALE									
		COAL FRAGS & MICROSEAMS 2%									
	229.81	EOH 19-11-94 1600h									

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
0	0.00 - 3.66	Overburden	Conglomerate								
	3.66 - 6.45	Conglomerate 90% Conglomerate, 10% Sandstone - fine to medium grained conglomerate, average grain size 1mm, max 3mm in size - minor calcite veinlets and minor limonite weathering rims lower contact sharp			83						
5	6.45 - 8.84	Shale 80% shale, 10% siltstone, 10% sandstone - mainly coaly shale with minor shaly coal			33						
	8.84 - 16.31	Coal 95% Coal, 5% shale partings - good clean block coal w block streak, vitreous luster and conchoidal fracture - common pyrite along fractures		55°	75						
10				55°							
				55°							
15	16.31 - 18.00	Conglomerate 70% conglomerate, 20% Sandstone 10% siltstone + shale - light to medium grey, ~4 10-50cm wide fining upward layered sequences of above rocks		55°	94						
	18.00 - 18.90	Coal 80% Coal, 20% shale partings		60°	74						
20	18.90 - 19.22	Conglomerate 70% conglomerate, 30% sandstone-shale		60°	100						
	19.22 - 23.25	Coal 90% Coal, 10% shale partings - common pyrite along fractures, common shale partings up to 5cm wide			82						
	23.25 - 25.60	Shale 50% black shale, 30% shaly coal, 20% coaly shale			78						
25	25.60 - 31.60	Shale, Siltstone, Sandstone 55% Sandstone/arkose, 35% siltstone, 10% shale - light grey to slightly tan, fine grained silt inter layered with dark grey siltstone and minor black shale		70° 75°	86						
30											

VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
	(metres)				%	BTU/lb	%	%	%	%	%
30	31.60 - 31.80	Cool good clean, block, strat, concoidal fracture			95						
	31.80 - 32.56	Conglomerate medium to dark grey, fine grained conglomerate avg. grain size 2mm			100						
	32.56 - 64.23	Andesite light greyish green andesite 3% of unit is white phenocrysts up to 1cm in size, average 3mm in size. some appear to be quartz + calcite - trace of small black phenocrysts - common calcite veinlets up to 5mm wide average 3mm wide			91						
35											
		- upper contact at 32.56 is sharp with up breccia but a weak shear structure									
40											
45											
		403 - 430 bleached and softer andesite,									
50											
55											
		- sharp lower contact at 64.23 - zone from 63.75 - 64.23m with andesite breccia fragments up to 4cm, avg 1cm in size in a dark grey matrix									
60											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60											
	64.23-64.55	Coaly shale black shale with very minor coal			100						
	64.55-65.35	Conglomerate medium grey to black with average clast size of 1mm			90						
65	65.35-67.66	Coal 60% Coal, 40% shaly coal - black to brown streak, fairly high shale content with zones of good coal			75						
	67.66-78.12	Shale 70% Shale, 15% Sandstone, 15% Siltstone - medium grey to dark grey shale with common layers of siltstone and sandstone - sandstone layers are light grey and up to 4 cm in size, average 5mm wide - siltstone is dark grey and forms layers of coarser grained material between shale + sandstone layers. - gradational upper + lower contacts		70° 80° 75° 80° 85°	81						
70											
	78.12-83.27	Sandstone 85% Sandstone, 10% shale, 5% Siltstone - light to medium grey in color, medium grained sandstone with ~3% shale ripups - shale/siltstone occur as dark bands up to 3 cm wide of finely layered rock - good gradational contacts - average grain size fine but grades into a coarse grained sandstone		80°	100						
80											
	83.27-85.60	B-Andesite - light grey/very light green, 5% phenocrysts ≤ 1mm in size, both black + white. - looks different than the above andesite - upper CNT sharp lower CNT ~ 50 cm breccia zone		CNT 45°	100						
85											
	85.60-88.40	Sandstone - as above			97						
	88.40-89.20	Conglomerate coarse grained avg 4mm wide			100						
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90	8420-108.77	Sandstone 70% Sandstone, 15% shale/siltstone, 15% conglomerate	single-bed		100						
		- sandstone: pale grey, fine to coarse grained with common shale rip-up clasts up to 1cm in size average 0.7cm in size (~3% of unit is shale rip-ups)		70°							
		- shale/siltstone occurs as bands up to 7cm wide, composed of numerous 1-5 mm layers of sandstone/shale/siltstone - these bands are medium to dark grey to black in color		80°							
95		- conglomerate zones occur as a gradational sequence of coarser grained material within sandstone - conglomerates have an average grain size > 1mm and some grains are up to 0.7cm in size		85°							
		* This unit contains more conglomerate than the Richtofen and appears to have a lower energy with less conglomerates and less fining upward sequences down section		88°							
100				89°							
				90°							
				85							
105					100						
	108.77-109.95	Sandstone 60% Sediments, 40% chert?									
		- distinctive unit is a pale grey/tan, slightly clear, fairly hard, banded unit mixed in with the sediments - origin unclear									
110	109.95-118.65	B-Andesite			96						
		- medium to dark grey in color									
		- very minor phenocrysts, ~3% of rock is < 1mm white to slightly green in color									
115		- very minor pyrite along fractures									
		- common calcite veinlets up to 2mm wide									
		- looks different than regular andesite i.e. finer grained, less and smaller phenocrysts, medium grey in color									
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
0	0-3.05	Overburden	Single Foot								
	3.05-9.75	Sandstone, Siltstone, Shale			75						
		40% Sandstone / Arkose, 20% Siltstone, 40% shale		50°							
		- basically alternating layers of Sandstone + shale									
		up to 3cm of sandstone, avg. 1cm of sandstone and		45°							
5		avg. 3mm of shale, minor siltstone layers									
	5.5-5.79 m	fine grained conglomerate, avg. grain		45°							
	7.0-7.38 m	size < 1mm in size, max grain size									
	8.0-8.3 m	7mm									
	8.93-9.11 m										
	9.75-17.72	Coal			91						
10		- good clean coal, dark black in color +									
		streak, conoidal fracture, minor narrow calcite									
		veinlets									
		- very minor shale bands at upper contact									
		- lower contact is gradational but sharp									
		- 130 + 135 are 3cm shale bands		60°							
15		- minor pyrite along fractures									
	17.72-18.80	Siltstone, Sandstone, Cong. Sequence (30%, 30%, 40%)			85						
		- good gradational contacts									
	18.80-19.40	Siltstone Sandstone Cong Sequence (30%, 30%, 40%)		60°	97						
	19.40-20.20	Siltstone with 2cm of coal at upper contact +			93						
20		conglomerate from 1970-1990									
	20.20-24.99	Coal			89						
		- good clean coal up to 24.50 then with a									
		higher shale content, ie. slightly brown streak									
		- generally, a black streak, conoidal fracture		65°							
		and vitreous luster - sharp lower contact									
25	24.99-25.17	Conglomerate, avg. grain size 4mm			100						
	25.17-25.47	Coal, shale, siltstone, conglomerate sequence, 2cm coal			90						
	25.47-28.20	Coal, shale, siltstone, sandstone cong sequence		55°	96						
		2cm coal, 5% shale, 10% siltstone, 70% sandstone, 15% cong.									
		good gradational sequence, mainly light grey									
		sandstone minor cong avg 4mm grains									
30	28.20-31.50	Shale, Siltstone, Sandstone (15%, 15%, 70%)			75						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	638-64.60	Coaly Shale - dark black with a brown streak, near contact at 638 closer to a shaly coal	Shale		86						
	64.60-65.48	Coal - fairly clean coal, only minor shaly zones - black streak, concoidal fracture			82						
65	65.48-66.30	Shale 90% shale, 10% siltstone - light brown streak, minor siltstone layers			100						
	66.30-71.90	Shale, Siltstone, Sandstone (15%, 30%, 55%) - gradational contacts at top + bottom - good fining upwards, basically narrow bands (~1 cm wide) which fine upwards in a larger fining upward cycle, minor calcite veinlets + trace coal clasts		30°	92						
70	71.90-73.97	Conglomerate 85% conglomerate, 15% sandstone - lower contact sharp, upper contact gradational - fines upward into a sandstone from a fine grained conglomerate, avg 1mm in size		45°	100						
75	73.97-80.50	Coal coal to shaly coal - 90% coal and 10% shale (shale forms narrow bands avg 7mm wide) - coal with black streak, very minor pyrite and calcite		30°	82						
80	80.50-83.14	Shale 80% shale, 10% coal, 10% siltstone - coal occurs as bands up to 5cm wide and as coaly shale - coal is black with only minor partings		30° 45° 35°	76						
85	83.14-93.22	Shale, Siltstone, Sandstone (30%, 40%, 30%) - good fining upward sequence, more shale near top + more sandstone near bottom		30° 5° 20° 35°	86						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90			Engelst	35°							
	93.22-98.80	Sandstone 80% Sandstone 20% Conglomerate -light grey coarse grained sandstone to fine grained conglomerate, -common calcite veinlets upto 1cm wide -very minor shale or coal partings			100						
95											
	98.80-100.20	Shale, Siltstone, Sandstone (15%, 40%, 45%) -trace of coal		60°	91						
100				75°							
	100.20-104.38	Sandstone 90% sandstone, 10% Conglomerate -as above light grey sandstone ~5% shale partings, common calcite veinlets		60°	95						
	104.38-104.90	Shale, Siltstone, Sandstone (40%, 40%, 20%) -medium to dark grey shale/siltstone coarsens downward to 15cm of ~1cm shale clasts in sandstone matrix, gradational contacts		65°	100						
105											
	104.90-114.539	Sandstone 90% Sandstone, 5% Conglomerate, 5% shale -as above light grey sandstone, moderate (~3%) clasts of black shale avg <1cm in size, max ~3cm in size -gradational contacts, especially with conglomerate zones which are just zones of coarser grained material -shale zones are marked below and occur as shale/siltstone bands up to 2cm wide but average 1cm wide and as shale ripup clasts in a sandstone matrix (ie 50% shale forms bands and 50% of shale forms zones of ripup clasts in a sandstone matrix)		45°	97						
110				45°							
115											
120											

PROJECT Division mountain HOLE 94-33 DIP: 60 @ 0 ; 52 @ 360' LENGTH 360' N 10+914 E 9630 ELEV _____ Page 1 of 4

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
0	0.00-5.94	overburden									
5	5.94-7.96	coarse grained sandstone grading to poorly sorted quartz pebble conglomerate, likely to mid oxd			76						
	7.96-10.74	sharp contact to 1m coal grading to black shale to laminated black shale and tan arkose		82	72						
10	10.74-11.83	grey well sorted quartz rich small pebble conglomerate			100						
	11.83-14.48	sharp contact to laminated black shale and tan arkose		72	76						
15	14.48-24.58	Coal - partings 15.34-16.06 andesite 19.96-20.76 choc siltstone w plant fossils 21.33-23.74 andesite			87						
20											
25	24.38-27.43	- dark brown to tan brown bedded arkose, coarsening down hole		64	86						
	27.43-28.23	- grey brown well sorted quartz pebble conglomerate			87						
	28.23-34.00	- laminated to bedded shale and tan arkose		73	100						
30											

PROJECT _____ HOLE 94-33 DIP: @ ; @ LENGTH N E ELEV _____ Page 2 of 4

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30											
35	34.00 - 50.60	Coal - soft and broken to 38.40 35.54 - 37.34 - parting shale, coaly shale & siltstone - trace py on fractures			53						
40											
45											
50	50.60 - 54.25	- very broken black shale grading to broken dk brown arkose			31						
55	54.25 - 70.20	- brown coarse grained arkose grading to well sorted granule conglomerate with some (larger) feldspar clasts downhole 69.65 to 70.20 - becomes med oxd			87						
60											

PROJECT HOLE 94-33 DIP: @ ; @ LENGTH N E ELEV Page 3 of 4												
VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %	
60												
65												
70	70.20-74.98	sharp contact to laminated shale and tan brown arkose grading to tan brown arkose w/ better coal fragments		contact B2 B2	96							
75	74.98-79.05	grades to laminated to banded, black shale and grey coarse grained sandstone		B2	79							
80	79.05-82.30	sharp contact in 3cm of fine grained vitreous shale, grading to fine grained vitreous grey sandstone grading to well sorted granule w/ky calcareous conglomerate			100							
	82.30-109.73	sharp contact to laminated black shale and light grey sandstone with occasional calcite veins, "striped unit"	richbfen	contact B2 B1 B4	100							
	91.64-95.25	grey, coarse grained quartz rich sandstone with angular shale fragments										
85												
90												

[illegible]

PROJECT division mountain HOLE 94-32 DIP: 57 @ 122; 56 @ 252 LENGTH 252.07 N 12134 E 9760 ELEV _____ Page 1 of 9

Archer, Cathro & Associates (1981) Limited

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30	29.56-33.93	-sharp contact to fine grained dark brown sandstone grading to laminated to bedded sandstone and arkose grading to coarse grained tan grey arkose			89						
				72							
				73							
	33.93-35.26	-black coaly shale to calcite veins grading to interbedded shale and arkose to coal fragments to tan grey poorly sorted small pebble conglomerate		73	100						
35											
	35.26-37.63	-dark brown fine grained siltstone with coal fragments grading to grey arkose with occasional thin beds of shale		75	95						
	37.63-38.67	-black coaly shale grading to laminated shale and tan brown arkose grading to tan brown arkose		73	89						
40											
	38.67-40.33	-dark brown shale to coal fragments grading to light brown arkose to thin beds of shale grading to coarse grained tan grey arkose		65	57						
	40.33-41.44	-black shale to coal fragments grading to laminated black shale and tan brown arkose		contact 60	81						
				68							
45	41.44-58.06	-light grey, calcareous, poorly sorted pebble conglomerate clast size ave 2.5mm, grades to medium brown		60	96						
				63							
50											
55											
	58.06-60.57	-laminated to bedded black shale and brown arkose to coal fragments		53	90						
60											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	60.57-62.08	- sharp contact to brown arkose grading to quartz rich well sorted conglomerate		contact 52	99						
	62.08-62.67	- sharp contact to dark brown shale w coal fragments		contact 53	100						
	62.67-63.09	- light grey quartz rich well sorted conglomerate			100						
	63.09-64.10	- dark brown shale w coal fragments		50	81						
	64.10-64.82	- light grey quartz rich well sorted conglomerate		45	100						
65	64.82-71.12	- black sandy shale grading to laminated bedded shale and tan brown arkose grading to coarse grained tan arkose		62	90						
70	71.12-74.10	- sharp contact to dark brown siltstone w coal fragments grading to bedded siltstone and brown arkose		contact 62	80						
75	74.10-76.28	- sharp contact to dull grey well sorted granule conglomerate		contact 71	95						
	74.78-75.10	- coal shale		62							
	76.28-83.92	- vitreous black shale grading to dark brown siltstone grading to tabular bedded to laminated siltstone and arkose		56	90						
				52							
80											
85	83.92-84.75	- grades to tan grey quartz arenite			100						
	84.75-87.52	- grades to laminated tan brown arkose and black shale		54	94						
				72							
	87.52-89.14	- grades to massive dark siltstone with coal fragments and calcite veinlets		33	84						
90	89.14-91.24	- massive shale w vitreous fractures			74						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90	91.24 - 92.23	- sharp contact to dirty brown arkose		contd 32	100						
	92.23 - 93.74	- dark brown siltstone w coal fragments			81						
	93.74 - 95.57	- grades into brown arkose which grades into a tan quartz arenite		40	100						
95				45							
	95.57 - 96.71	- laminated shale and arkose w coal stringers grading to tan arkose		23	81						
	96.71 - 107.33	- laminated to banded brown siltstone w plant fossils and tan arkose		45	86						
100				45							
				55							
				65							
105											
				58							
	107.53 - 108.05	- matrix supported quartz pebble conglomerate			100						
110	108.05 - 108.37	- dark brown siltstone w plant fossils			100						
	108.37 - 109.21	- grey brown clast supported well sorted conglomerates			98						
	109.21 - 110.27	- dark brown siltstone w plant fossils grading to brown tan arkose			100						
115	110.27 - 111.00	- dark brown siltstone w plant fossils		contd 42	100						
	111.00 - 111.55	- pale grey quartz arenite w coal fragments		52	100						
	111.55 - 111.86	- dark brown siltstone w coal fragments grading to arkose			100						
120	111.86 - 117.19	Coal w some calcite veins			73						
	117.19 - 121.00	Andesite			100						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120	121.00-121.63	- shaly coal to coaly shale			100						
	121.63-123.80	- coarse dirty brown siltstone grading to grey brown arkose			82						
125	123.80-133.96	- pale grey, quartz rich, clast supported, pebble conglomerate clasts sub rounded to subangular - 7 cycles within the conglomerate of coarsening downhole 1mm to 5mm			83						
130											
	133.96-134.00	- sharp contact to broken black shale			100						
135	134.00-134.72	- sharp contact to well sorted light grey granule conglomerate		contact 80	100						
	134.72-136.85	- sharp contact to dull grey sandstone grading to grey brown arkose		contact 60	100						
	136.85-138.84	- poorly sorted, clast supported, subrounded to rounded conglomerate, avg clast size 4mm			88						
140	138.84-147.77	- sharp contact to massive dark siltstone with several bands of medium to very coarse grained tan brown arkose		72	86						
				63							
				63							
145				63							
	147.77-153.66	- well sorted, quartz rich, clast supported, subangular to subrounded, granule conglomerate			81						
150											

PROJECT		HOLE 94-32		DIP: @ ; @	LENGTH	N	E	ELEV	Page 4 of 9			
VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %	
150		- 150.36-150.90 - laminated dark siltstone and tan arkose		63								
	153.66-155.09	- dark brown siltstone w/ plant fossils, with some tan brown beds of arkose		68	100							
155	155.09-158.24	- interbedded coaly shale, dull grey argonite, laminated siltstone + arkose		52	94							
	158.24-160.41	Coal - parting (not in sample) 160.8-160.64 - py on fracturing surfaces - calcite veinlets		58	93							
160												
165												
170	172.41-180.34	- dark brown siltstone w/ plant fossils grading to interbedded siltstone and arkose grading to tan arkose grading to poorly sorted granule to pebble, moderately calcareous (clasts), conglomerate		53	98							
				53								
175				58								
				60								
180												

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
180	180.34-182.94	- sharp contact to dark brown siltstone w coal stringers, gradual increase in tan arkose down hole becoming interbedded siltstone and arkose at 54°		contact 50	45						
	182.94-184.17	Coal - broken to shattered			43						
185	184.17-188.37	- brown grey, clast supported, poorly sorted granule conglomerate w coal stringers			87						
	188.37-191.66	- sharp contact to dark brown siltstone		70	100						
190	191.66-192.23	sharp contact to tan clast supported well sorted conglomerate, 2 cycles of coarsening down hole		contact 75	100						
	192.23-193.31	- sharp contact to interbedded dark brown siltstone w coal fragments and black coaly shale		contact 73	69						
	193.31-194.37	- gradational contact to very coarse grained arkose coarsening down hole w coal fragments and stringers becoming lower contact			100						
195	194.37-195.22	- Coal		contact 45	82						
	195.22-200.15	- dark brown siltstone w coal fragments grading to light brown arkose grading to well sorted clast supported granule to pebble conglomerate coarsening down hole		43	99						
200	200.15-202.70	- interbedded small to large pebble, clast supported poorly sorted conglomerate and brown tan arkose		59	98						
	202.70-204.00	- Coal			52						
	204.00-205.11	- laminate dark brown siltstone w plant fossils and tan fine grained arkose		66	98						
205	205.11-206.40	Coal		56	66						
	206.40-216.00	- interbedded dark brown siltstone w plant fossils and laminated tan brown arkose + shale coal fragments and stringers throughout.		62	96						
				62							
210											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
210											
215	216.60-218.41	Coal - broken			36						
	218.41-222.30	ARKOSE // COALY SHALE: TAN ARKOSE WITH <5% QTZ PEBBLES INTERBEDDED WITH BLACK COALY SHALE & MINOR WISPY BROWN PYRITIC SHALE			76						
220											
	222.30-228.36	Coal INTERBEDDED WITH BROWN & BLACK SHALES 20%, UP TO 1% PY ON FRAC. CALC RICH SEAMS TO 2cm WIDE, 2%.			66						
225											
	228.56-231.95	BLACK COALY SHALE GRAD. CHANGES TO DARK BROWN WISPY LAMINATED SILTSTONE WITH BLACK SHALE FRAGS 20%			71						
230											
	231.95-232.46	ARKOSIC CONGL: WEAKLY BEDDED, UNSORTED PEBBLE ARKOSE CONGLOMERATE		39° B	100						
	232.46-246.00	ARKOSE: LOAD CAST UPPER CONTACT WITH THIN LAM BROWN SILTSTONE, RAPIDLY GRADING TO MED GREY TO BROWN GREY ARKOSE INTERBEDDED WITH COARSE GRAINED SANDSTONE 15%, BROWN SILTSTONE 10%, & COALY SHALE <5% WITH RIP UP CLASTS, CS < 2.5 cm INT. RARE CLASTS SILTSTONE TO 4 cm.		48°-62°							
235											
240											

PROJECT Division number HOLE 94-31 DIP: 70 @ 0 ; 72 @ 178 LENGTH 178.92 N 104914 E 9680 ELEV Page 1 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
0	0 - 3.05	casing									
5	3.05 - 19.20	brown grey, calcareous, inequigranular, clast supported conglomerate, clasts from 1 to 18 mm, avg 2 mm, some bedding, most clasts sub rounded			90						
10		7.08-7.10 coal in calcite veins									
				72							
15				68							
20		13.07-13.80 numerous coal stringers									
25	19.20-25.01	sharp contact to several successions of black shale grading to laminated shale/siltstone and grey brown sandstone several 2-5cm bands of shaly coal			90						
				68							
				72							
30	25.01 - 25.98	sharp contact to gtz-feldspar, equigranular, sub rounded grey pebble conglomerate, clast supported, clasts 2mm		contact 73	100						
	25.98-28.58	sharp contact to fine grained "crusher" soft coal grading to banded black shale, laminated shale sandstone and grey small pebble conglomerate		66	98						
				60							

PROJECT _____ HOLE 94-31 DIP: @ ; @ LENGTH N E ELEV _____ Page 2 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30	28.58-33.53	-grey brown to light grey inequigranular chst supported conglomerate due to 5mm 33.61-33.50 silicified			100						
	33.53-39.81	-sharp contact to pale green andesite 34.58-37.53 sharp contact to broken soft becoming increasingly harder, dull grey, fine grained, tuff?		contact 74 82	100						
35											
40	39.81- 41.96	Coal - dull with calcite veins			96						
	41.96- 53.93	-sharp contact to grey brown to grey fine grained tuff? 44.00-44.69 - coarse grained mafe banded tuff? increasingly light green/ten down hole		76	89						
45											
50											
55	53.93-103.50	dark to medium green andesite w randomly oriented calcite veins, grades to pale green to grey at lower contact.			100						
60											

[illegible]

	VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90												
95												
100												
		103.50-109.05	sharp contact to dk conglomerate, clast supported sub rounded clasts, coarsening down hole, grain size from 1.0 mm to 15.0 mm		contact 55° 72	100						
105												
110		109.05-116.37	- 2cm black shale, sharp contact to brown grey very coarse grained arenite with angular coal and black shale fragments grading to grey inequigranular clast supported conglomerate, widely calcareous		contact 69 86	100						
115		116.37-178.92	- laminated to banded black shale and grey tan sandstone/ arenite	Richtofen ↓	70 69	100						
		118.83-120.66	- contact 73 to inequigranular granule conglomerate, lower contact 34°									
					46							

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120				40							
				58							
125		124.27-135.36 - pale grey quartz rich inequigranular matrix supported granule conglomerate									
130											
135				46							
				38							
				46							
140				45							
		140.64-147.50 - pale grey, calcareous inequigranular granule conglomerate w occasional angular to subangular clasts of black shale									
145											
				32							
150											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
0	0.00-5.40	overburden									
5	5.40-6.49	broken interbedded dk grey shale and tan siltstone		65	46						
	6.49-7.49	broken wily and broken tan med grained arkose			91						
	7.49-10.83	laminated to interbedded lower dk grey sandstone with thin 1mm bands of black silt		70	96						
		0.55-8.96 - coarse grained grey arkose w/ calcareous		64	100						
10	10.83-11.16	- calcareous light brown grey fine grained arkose		66	100						
	11.16-11.70	- sharp contact to greyish brown calcareous conglomerate, clast size increasing down hole from 1mm to 5mm		contact 68	100						
	11.70-13.35	- broken contact to shale (contact 60)		60	78						
15	13.35-13.70	- sharp contact to grey coarse grained arkose		contact 68	100						
	13.70-14.96	- grey brown fine to medium grained arkose with coal fragments close to lower contact		62	100						
	14.96-17.55	- coaly shale grading to banded shale and grey brown sandstone		78	77						
	17.55-18.85	- broken banded coaly shale, shale and grey arkose			60						
20	18.85-20.05	- above grades into grey brown sandstone with thin black 1-2mm bands of black shale		73	65						
	20.05-20.60	- sharp contact to irregularly quartz rich pebble conglomerate clast size up to 0.5cm		contact 84	91						
	20.60-20.98	- sharp contact to banded dark grey siltstone and calcareous tan qtz rich conglomerate			88						
25	20.98-23.02	- brown grey calcareous qtz rich very coarse grained arkose to conglomerate			93						
	23.02-24.40	- laminated grey siltstone, shale and coaly shale		62	85						
	24.40-24.67	- sharp contact to qtz rich conglomerate clast size 2-4mm			100						
	24.67-29.50	- sharp contact to banded coaly shale to plant fossils, shale, siltstone and calcareous arkose		73	50						
30	29.50-31.17	- Coal no partings, calcareous near lower contact			68						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
30	31.17-37.00	Andesite - light green, calcite veins, becomes lighter towards lower contact			100						
35	37.00-38.62	Coal - w calcite veins			65						
	38.62-48.70	dark brown to black shale grading to laminated shale and fine grained arkose, grading to calcareous arkose grading to calcareous conglomerate with clast size increasing down hole up to 1cm		64	99						
40											
45											
50	48.70-54.83	med grained arkose grading to calcareous conglomerate clast size increasing down hole			93						
55	54.83-55.93	- sharp contact to bedded siltstone and black shale grading to black shale to shaly coal		b1	95						
	55.93-56.90	fine grained arkose grading to coarse grained arkose			97						
	56.90-59.05	sharp contact to coaly shale grading to bedded shale and fine grained tan arkose w coal fragments		contact 78 60	66						
60	59.05-60.34	grades to tan grey pebble conglomerate clasts to .7cm			96						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
60	60.34-61.58	sharp contact to interbedded black shale, chaz brown siltstone fine grained tan arkose		contact 71	85						
	61.58-61.78	shaly coal		76	80						
	61.78-63.08	willy calcareous tan grey inequigranular conglomerate			100						
	63.08-65.69	black coaly shale grading to laminated shale and siltstone, grading to tan sandstone, grading to calcareous conglomerate clast 2-5 mm		63	87						
65	65.69-69.85	- black shale grading to laminated shale and tan siltstone, to fine grained arkose to greyish conglomerate		82	98						
70	69.85-73.15	sharp contact to laminated fine grained tan arkose and black shale, fining down hole		62	97						
	73.15-74.56	- sharp contact to calcareous feldspar, & pebble conglomerate			96						
	74.56-74.98	- sharp contact to massive shale w plant fossils		contact 69							
75	74.98-84.75	- Coal parting 80.13-80.60			71						
80											
85	84.75-89.00	- sharp contact to interbedded shale and brown siltstone, grading to arkose grading to conglomerate - clast supported, clasts up to 1 cm		74	71						
		87.00-88.09 - shattered to broken									
90	89.00-94.10	- sharp contact to massive shale grading to siltstone		65	93						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90		grading to interbedded siltstone and arkose									
95	94.10-96.05	Coal w calcite concretions, no partings			78						
	96.05-98.08	-sharp contact to black coaly shale grading to dk brown siltstone w coal fragments grading to interbedded siltstone and tan arkose		80	87						
	98.08-98.78	-sharp contact quartz rich, inequigranular conglomerate clast size up to 1.5cm interbedded with several beds of brown arkose		83	100						
100	98.78-100.67	-brown med grained arkose (with several .5cm qtz clasts) grading to small pebble conglomerate w coal fragments			90						
	100.67-103.35	-dk brown siltstone to fine grained arkose w coal fragments		60	100						
105	103.35-105.46	-sharp contact to tan brown, very calcareous, inequigranular conglomerate clast size up to .5cm, few coal fragments		contact 71	100						
	105.46-106.36	-sharp contact to black massive shale w abundant coal fragments			84						
	106.36-109.00	-well defined contact to tan grey, somewhat equigranular small pebble conglomerate, bed stringer near bottom contact			91						
110	109.00-111.95	-sharp contact to black coaly shale grading to brown siltstone grading to dark grey arkose		contact 63	95						
	111.95-113.70	-interbedded fine to medium grained tan brown arkose and .4cm clast conglomerate			99						
	113.70-121.53	-inequigranular, clast supported, calcareous conglomerate, clasts up to 1.5cm		69	100						
115		118.90-119.05 - Coal									
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120	121.53-123.53	Coal - no partings			71						
	123.53-126.59	interbedded to laminated, siltstone, shale, coaly shale		62	98						
125	126.59-136.17	- massive brown siltstone to laminated brown siltstone and tan brown argill to abundant plant fossils		78	99						
130											
135	136.17-138.72	Coal parting 137.91-138.07, sample includes a 4cm tan shale parting		78	49						
	138.72-141.73	- 138.72-139.26 - massive choc brown siltstone w abundant plant fossils			96						
140		139.26-139.81 - laminated brown siltstone and tan argill		69							
		139.81-140.53 - massive choc brown siltstone w abundant plant fossils & coal fragments									
145	140.53-141.73	py found on sand fractures		80							
	141.73-141.93	interbedded argill and siltstone									
	141.93-146.57	massive black shale		66	100						
		Coal - shales partings 1-2cm each total ~9cm calcite veins, py on fractures			78						
150		145.80-146.15 - broken, crumbly, dull earthy coal unusual oily smell									

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	146.57 - 151.00	- black coaly shale grades over 11cm to very coarse grain med brown arkose, grading to tan grey conglomerate clasts up to 5cm, due 9cm, seasonal bands of shale through the conglomerate @ 72° up to 6cm wide			100						
155	151.00 - 155.75	- brown siltstone (9cm) grades to grey arkose (6cm) grades to small pebble conglomerate			93						
	155.75 - 160.33	- coarse grained arkose to small pebble conglomerate general trend of coarsening down hole, fully calcareous			100						
160	155.75 - 156.14	- laminated arkose and black shale and shale fragments in arkose									
	156.63 - 156.86	- laminated arkose and black shale		72							
	160.31 - 160.34	- black shale									
	161.13 - 161.23	- black shale interbedded to siltstone		74							
	162.12 - 162.19	- black shale									
	162.38 - 162.62	- black shale grading to fine grained arkose									
165	160.33 - 178.61	- grey small pebble to pebble, inequigranular conglomerate, coarsening down hole			100						
	166.33 - 166.42	- coaly shale grading to fine grain arkose									
170											
175											
	178.61	cdh									
180											

AZ 040

PROJECT division mountain HOLE 94-29 DIP: 50° @ 0 ; 49 @ 391 LENGTH 188.37 N 11244 E 9720 ELEV Page 1 of 7

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
	0.00-4.57	overburden									
	4.57-4.80	dark brown broken siltstone			90						
	4.80-7.32	dirty grey tan small pebble quartz rich conglomerate grain size increases down hole			70						
	7.32-7.90	sharp contact to coarse grained striped grey siltstone		48	78						
				53							
	7.90-8.40	sharp contact tan grey very coarse grained arkose		contact 52	100						
	8.40-8.90	sharp contact to coaly shale grading to very coarse grained arkose w coal stringers		35	92						
	8.90-9.76	Coal 8.90-9.00, grading to laminated black shale, siltstone and arkose, grading to grey small pebble conglomerate			72						
	9.76-10.61	black shale grading to laminated shale and grey siltstone grading to grey arkose		52	96						
	10.61-10.80	gradational contact over 16 cm to black coaly shale		42	97						
	10.80-11.30	interbedded shale and grey arkose		61	100						
	11.30-18.74	- grey quartz rich small pebble conglomerate 17.50-18.26 laminated brown siltstone & shale		54	92						
				43							
	18.74-21.15	- coarse grained arkose grading to pebble conglomerate coarser than other conglomerates encountered in this hole, coal stringers		contact 33	106						
				48							
	21.15-21.53	- banded qtz rich small pebble conglomerate and laminated siltstone & shale		45	97						
	21.53-25.81	- sharp contact to coarse grained brown arkose w plant fossils that grades to finegrained charcoal brown siltstone to massive brownish black shale		53	99						
		23.66-24.24 - sharp contact to banded small pebble conglomerate w coal fragments		39							
		24.69-25.81 - interbedded coal, shaly coal siltstone & arkose									
	25.81-33.33	interbedded to banded brown siltstone and med grained arkose		36 to 42	92						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30	33.33-33.54	- massive chocolate brown shale w coal fragments and coal seam = 2cm, total 40% coal			100						
	33.54-34.97	- laminated to banded shale and light brown arkose 36.25-36.50 Coal		53	100						
	34.97-35.36	- gradational contact to grey siltstone to fine grained brown arkose		66 54	100						
35	35.36-36.40	- massive coaly shale grades to brown tan arkose		43	100						
	36.40-39.22	- gradational contact to black massive shale w plant fossils		56	87						
40	39.22-40.25	- gradational contact from shale to brown arkose to pebble conglomerate w coal fragments		45-56	94						
	40.25-46.73	- sharp contact to black shale grading to ch. brown siltstone (sometimes laminated to black shale)		contact 60 48	97						
45	46.73-55.07	Coal w calcite veinlets, pyrite fractures parting 52.00-52.51		84	95						
50											
55	55.07-57.65	brown siltstone w plant fossils with increasing amounts of arkose down hole		83	84						
	57.65-58.60	very coarse grained light grey arkose contact 80		73	99						
	58.60-59.50	black shale grading to light brown siltstone to arkose		83	89						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
60	59.50-77.51	small pebble calcareous conglomerate grading to large pebble calcareous conglomerate, clast size up to 2.0 cm - several cycles within the conglomerate from small pebble to large pebble, some bedding		69	100						
65											
70		70.22-70.33 - contact 80° sharp contact to shale 70.76-78.81 - " " "									
75											
	77.51-78.73	coarse grained brown calcareous arkose with coal stringers close to upper contact			97						
80	78.73-81.78	- sharp contact to black shale w coal stringers throughout, grading to striped to laminated black shale and brown siltstone grading to small pebble conglomerate		83	78						
	81.78-83.12	- sharp contact to black shale that quickly grades to laminated shale and brown siltstone to plant fossils									
85	83.12-83.97	- sharp contact to black brown shale grading to brown arkose		contact 72	78						
	83.97-84.62	- sharp contact to quartz rich small pebble conglomerate w coal fragments			97						
	84.62-88.00	- interbedded shaly shale, shale and brown siltstone		84	91						
90	88.00-91.14	- sharp contact to small pebble conglomerate, clast size increases down hole to approx. 3.5 cm		62	90						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90		90.34-90.54 - laminated brown siltstone and tan arkose		81							
	91.14-94.50	91.14-91.24 - dark brown sandstone with feldspar clasts 3mm		contact 74	100						
		91.24-94.50 - laminated to striped dark siltstone and light brown siltstone/arkose		83							
95	94.50-100.00	small pebble conglomerate coarsening down hole signs of sorting		88	100						
100	100.00-104.16	- sharp contact to coarse grained arkose grading to pebble conglomerate, general trend of coarsening down hole to 0.5cm ore clast size		64	96						
	104.16-104.37	sharp contact starting with coal stringers to arkose grading to quartz rich conglomerate		contact 53	100						
105	104.37-106.31	sharp contact to laminated shale and brown siltstone plant fossils grading to massive black shale w coal fragments		83	69						
	106.31-106.38	no core sand washed out			0						
	106.38-108.15	Coal, broken, poor recovery			49						
110	108.15-119.13	Andesite			96						
		108.15-108.70 - soft clay altered andesite									
		110.47-115.67 - increase in mafic, darker blocky areas around larger feldspar crystals									
115											
	119.13-120.40	Coal, w calcite veinlets, core shattered			79						
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
120	120.40-122.16	massive black shale grading to brown siltstone to tan coarse grained arkose		68	100						
	122.16-123.26	sharp contact to massive black shale w coal fragments and occasional bands of brown siltstone		70	100						
	123.26-124.45	sharp contact to coarse grained arkose grading to pebble conglomerate clasts 2-3mm		contact 76	92						
125	124.45-124.60	siltstone		82	100						
	124.60-125.70	sharp contact to banded sandstone siltstone and qtz rich small pebble conglomerate		73	97						
	125.70-129.93	shaly coal and coal			54						
	129.93-132.60	parting - laminated to striped tan arkose and black shale		72							
130	132.60-137.41	chocolate brown siltstone w coal fragments and thin bands of black shale grading to fine grained tan arkose		72 80	90						
	137.41-141.79	gradational contact to chocolate brown siltstone w coal stringers grading to light brown arkose with thin bands of black shale grading to small pebble conglomerate, calcite concretions throughout		76 73	92						
135	141.79-142.40	Coal & calcite concretions present, sample includes siltstone partings about 3cm total			60						
	142.40-145.08	parting 139.88 - 139.96 dull grey shale 141.46 141.57									
140	145.08-148.08	coarse grain brown arkose		73	100						
	148.08-149.20	laminated to banded brown tan arkose and shale		63	82						
145	149.20-150.90	Coal no partings, trace py			32						
150	150.90-152.00	chocolate brown siltstone w coal fragments		83	100						
	152.00-153.00	interbedded coarse grained arkose									

PROJECT _____ HOLE 9129 DIP: @ ; @ LENGTH _____ N _____ E _____ ELEV _____ Page 6 of 7

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	150.90-151.40	gradational contact to coarse grained gk rich dark grey slightly calcareous arkose			100						
	151.90-155.58	- coaly shale grading to massive shale and siltstone in coal fragments (trace fossil burrows? 152.50)			100						
155	155.58-156.43	- grades to grey brown very coarse grain arkose		B4	100						
	156.43-161.83	- sharp contact to coaly shale grading to medium brown siltstone in clasts of shale, no coal frags. 158.60-158.80 - trace fossils, burrows?		contact B9 71							
160	161.83-172.70	- grades to feldspar rich, grey brown, coarse grained arkose, grain size increases down hole			100						
170	172.70-174.20	- grades to tan calcareous, small pebble conglomerate			100						
175	174.20-175.50	- sharp contact to green grey siltstone grading to fine grained arkose grading to pebble conglomerate		contd B9 80	100						
	175.50-176.27	- sharp contact to grey arkose in laminations and thin bands of black shale and shale fragments		88	100						
	176.27-179.78	- grey med-coarse grained arkose coarsening down hole			100						
180											

PROJECT div mtn HOLE 94-28 DIP: 55 @ 0 ; 50 @ 78 LENGTH 78.03 N 10+609 E 9620 ELEV Page 1 of 3

VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
	(metres)				%	BTU/lb	%	%	%	%	%
0	0.00 - 3.09	overburden									
1											
	3.09 - 59.35	Andesite - grey green									
		- calcite amygdules (planned veins)									
5		- feldspar phenocrysts larger than usual									
10											
15											
20											
25		24.53 - 25.50 - brown tan broken w/ky and andesite									
30											

PROJECT _____ HOLE 94-27A DIP: @ ; @ LENGTH N E ELEV Page 2 of 3

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30											
35		34.40-35.10 - brown tan soft andesite									
		35.10-36.00 - light grey soft clay andesite									
		36.00-36.00 - brown tan soft andesite									
40		39.30-39.97 - light grey soft andesite									
		39.97-40.50 - broken black shale									
		40.50-41.80 - broken grey to tan altered andesite									
		w 4cm feldspar vein									
45											
50											
55		57.82-58.06 - Coal - massive, dirty									
		58.06-59.35 - soft, broken grey, w/ly calcareous andesite									
		59.35-59.60 - broken shaly coal									
60	59.35-60.90	Broken black coaly shale									

PROJECT division mountain HOLE 94-87 DIP: 50 @ 0 ; @ LENGTH 26.52 N 104.12 E 9620 ELEV Page 1 of 1

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
0	0-3.35	over burden									
	3.55-17.23	Andesite - grey with small feldspar phenocrysts with calcite veins no preferred orientation			73						
5											
		7.17-7.40 - soft clay, orange tan									
		7.40 - brown tan w/ky ore									
10											
15											
	17.23-26.52	- broken contact to Coal to few calcite veins coal is 90% broken to shatterd, coal does not appear as clean as usual.			83						
20		19.65-20.12									
		- contact 8" to thick green sandy clay textured soft broken altered andesite.									
		22.00-23.50		9613							
		- coal becomes brittle, py									
25											
	26.52	coh									
30											

PROJECT Division Mountain HOLE 94-26 DIP: 50° @ 0 ; 50° @ 164' LENGTH 164.90 N 10+918 E 9675 ELEV Page 1 of 6

VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
	(metres)				%	BTU/lb	%	%	%	%	%
0	0.00-3.81	overburden									
1											
5	3.81-5.33	- brown tan coarse grained arkose, grain size increases down hole			92						
	5.33-11.28	- quartz rich pebble conglomerate in sand stringers inequigranular clast supported, clast size ave 6cm up to 3cm, sub rounded			84						
10	11.28-18.53	- sharp contact to grey calcareous coarse grained arkose grading to conglomerate clast supported, ave 6cm clasts sub rounded, clast size of conglomerate increases and decreases several times		16	90						
15											
20	18.53-30.66	- tan grey inequigranular conglomerate, general trend is clast size increasing down hole from 1mm to .5cm 18.98-19.50 - broken to abundant coal stringers 20.38-22.60 - " " " possible bedding 20			96						
25											
30											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
30	30.66-31.31	- a few cm of coal grading to brown siltstone		50	97						
	31.31-33.55	- sharp contact to grey siltstone pebble conglomerate in coal stringers some bands of coarse grained arkose general trend of coarsening down hole		contact 50	92						
	33.55-33.83	broken to shattered shale and siltstone			80						
35	33.83-35.36	sharp contact to pebble conglomerate cherts .5cm noticeably larger cherts than 33.31-33.55		contact 90	93						
	35.36-37.93	- broken becoming shattered									
	37.93-42.15	- dark choc brown siltstone w coal fragments & stringers 37.93 - starts grading into light brown med grained arkose		40 60 52	98						
40	42.15-47.21	- black massive sandy shale - coal content = 10% 43.76-44.69 - interbedded to laminated light grey arkose and black shale		53 56	91						
	46.02-47.02	Coal - no partings, py on fracture surfaces			76						
45	47.21-49.40	- above grades into grey brown siltstone to banded tan arkose and brown siltstone		51	93						
	49.40-49.80	- light grey coarse grained arkose to small pebble conglomerate			97						
50	49.80-51.48	- choc brown siltstone w coal fragments contact 65 to arkose and small pebble conglomerate		52	89						
	50.50-50.60	- shattered sandy shale									
	51.48-52.67	- choc brown siltstone w coal fragments grading to laminated light grey arkose and siltstone		57	95						
	51.63-51.81	Coal									
55	52.67-53.65	- laminated siltstone and shale grading to off white arkose		64	85						
	53.65-54.12	- sandy shale grading in light grey med grained arkose to coal stringers		66	98						
	54.12-54.42	- Coal - massive									
60	54.42-54.83	- choc brown siltstone grading to laminated sandstone and			98						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
60		siltstone w coal stringers									
	54.83-56.85	coarse grained grey arkose / small pebble conglomerate			100						
	56.85-60.01	brown siltstone grading to laminated grey arkose and brown siltstone grading to grey small pebble conglomerate		80	98						
				72							
65	60.01-61.65	- black massive shale w coal fragments to coaly shale			89						
	61.65-63.79	- Coal and shaly coal			71						
	63.79-77.00	- Andesite - soft green grey grades to olive green andesite w calcite veins and amygdalae, mafic more abundant towards top. thuff? sill?			100						
70											
75											
	77.00-78.94	Coal - no partings, minor py on fractures			77						
	78.94-79.96	- very coarse grained arkose grades from black to tan coal stringers		72	98						
80	79.96-80.76	- black shale grading to siltstone to coarse grained arkose		contact 80	98						
	80.76-81.07	"			98						
	81.07-81.37	"			98						
	81.37-82.14	"			100						
	82.14-85.53	- choc brown siltstone grading to laminated arkose + siltstone, coal stringers present and increase down hole		70	91						
85	85.53-85.69	- sharp contact to grey small pebble conglomerate to coal stringers		contact 74	100						
	85.69-88.95	Coal; massive parting 87.68-87.92, part on fracture surfaces		76	76						
90	88.95-93.88	- sharp contct - massive choc brown siltstone w plant fossils grading to laminated arkose + siltstone grading to calcareous		contact 88	92						
				80							

PROJECT _____ HOLE 94-210 DIP: @ ; @ LENGTH N E ELEV _____ Page 4 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV	RM	ASH	VM	FC	S
						BTU/lb	%	%	%	%	%
90		arkose to coal stringers									
	93.88-94.09	- fine grained siltstone to coaly shale			80						
	94.09-95.48	- Coal - <0.1% py			74						
95	95.48-97.39	- massive black shale grading to chcc brown siltstone grading to laminated siltstone & sandstone		74	93						
	97.39-98.05	- massive black shale to coal fragments grading to chcc brown siltstone as coal fragments		88	91						
	98.05-105.05	Coal - no partings <0.1% py, some calcite veins			69						
100											
105	105.05-109.88	- massive chocolate brown siltstone with coal fragments		70	83						
	105.10-105.60	- laminated siltstone and light brown sandstone									
	106.98-107.38	"									
	108.85-109.05	"									
110	109.88-112.78	Coal - py on some fractures <0.1%, several parting 2cm			60						
	112.78-116.03	- massive chocolate brown siltstone to coal fragments grading to banded siltstone and light brown very coarse grained sandstone		72	98						
115	116.03-117.70	Coal - py <0.1% on fractures, calcite vein ~1mm, 4 siltstone partings total 2cm		76	91						
	117.70-119.63	- sharp contact to massive black shale to <0.1% py, coal fragments and plant fossils grading to chocolate brown siltstone			83						
120	119.63-120.85	- banded black shale, siltstone and sandstone		72	82						

PROJECT HOLE 94-26 DIP: @ ; @ LENGTH N E ELEV Page 5 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
130	120.85-142.86	grades to small pebble to pebble conglomerate to blocks of qtz, calcarenite, shale, siltstone, calcite - general trend of coarsening down hole			100						
135	128.76-129.00	2 x 8cm dark brown siltstone @ 60°									
135	133.55-133.60	fine grained dark brown siltite @ 64°									
140	142.86-145.87	- clasts 0.5cm max size - sharp contact to "striped unit" rich blue laminated to banded calcareous black shale and grey fine grained arkose		contact 80 78	91						
145	145.87-147.68	grey arkose coarsening down hole to pebble conglomerate			100						
	147.68-148.38	sharp contact to "striped unit", flame structures bottom down hole		67	100						
	148.38-148.90	sharp contact to very coarse grained arkose to small pebble conglomerate		68 contact 72	98						
150											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
0	0.00 - 5.48	overburden									
5	5.48 - 7.71	orange tan to grey, w/ky oxd med to coarse grained arkose			75						
	7.71 - 7.92	broken to shattered black coaly shale			90						
	7.92 - 15.15	light brown laminated siltstone with thin beds of black shale, plant fossils present		70	59						
10	8.87 - 9.29	coaly shale to shaly coal, broken to shattered									
	13.62 - 13.65	" " " "		78							
15	15.15 - 15.78	- grey qtz rich coarse grained arkose (gradational contact) with coal stringers grading to small pebble conglomerate		62	100						
	15.78 - 16.05	- very sharp contact @ 54° from conglomerate to darker arkose @ coal fragment contact suggests offset		43	100						
	16.05 - 17.94	- black broken coal shale grading to siltstone to sandstone to arkose		55 62	62						
20	17.94 - 18.44	- black coaly shale grading to dark brown arkose		62	86						
	18.44 - 18.59	- massive choc brown shale grading to dark brown arkose with fragment (up to 2cm x 5cm) of choc brown shale frag size increases down hole		57	100						
	18.59 - 19.26	- sharp contact to coarse grained arkose to banded and laminated tan sandstone and black shale		66	96						
25	19.26 - 19.56	- sharp contact to better qtz rich pebble conglomerate w/ coal stringers		contact S6 62	100						
	19.56 - 22.22	- laminated grey med to fine grained arkose and black shale		74	74						
	22.22 - 22.62	- sharp contact @ 74° - grey small pebble conglomerate		83	100						
	22.62 - 25.91	- laminated tan sandstone and dark brown siltstone		72	94						
30	25.91 - 27.85	- med grey arkose grading to quartz rich pebble conglomerate			87						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
30		26.41 to 26.97 - laminated tan sandstone and black shale		70							
	27.85-29.21	- massive black shale grading to light brown siltstone w/ coal fragments grading to dark grey coarse grained arkose w/ coal fragments		80	93						
		28.15-28.23 - shattered black vitreous shaly coal									
35		28.38-28.44									
	29.21-30.57	29.21-29.31 - black coaly shale to shaly coal 29.31-30.48 - dirty brown sandstone increasing grain size down hole, w/ thin laminations of black shale, coal fragments present		85	92						
		30.48-32.57 - grades to med grained qtz pebble conglomerate, some bedding present 70° to 80°			100						
40	32.57-36.04	gradational contact to fine grained dk brown siltstone grading to laminated tan sandstone w/ black shale increasing grain size down hill		73	83						
	36.04-36.82	- broken black shale grading into laminated tan sandstone and black shale with increasing sandstone downhill		72	99						
45		grades to med grained arkose, coal fragments present after 36.61									
	36.82-37.02	grades into black coaly shale			95						
	37.02-39.82	Sharp contact to brown grey arkose grading to light grey coarse arkose w/ calcic veins		contact 72	83						
	39.82-41.72	- banded to laminated black shale, grey arkose, brown siltstone		74	76						
50	41.72-45.27	- massive black to chn brown shale with some thin bands of sandstone		82	93						
	45.27-49.13	- Coal - massive, no partings, py on fracture surfaces			80						
	49.13-50.46	- black coaly shale grading to dark grey brown sandstone		74	71						
	50.46-52.74	- coaly shale (≈ 20 cm) grading to banded siltstone and arkose		76	92						
55	52.74-66.37	- light grey coarse grained arkose to small pebble conglomerate, increasing coal stringers down hole, w/ calcareous		74-84	99						
		59.71-60.07 - tan brown laminated sandstone w/ black shale		60							
		62.53-63.50 - sandstone w/ coal fragments increasing grain size down hole		74							
60		64.70-65.65 - sandstone increasing grain size down hole		70							

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
60											
65	66.37-67.37	Coal parting 66.69-66.82 coaly shale			57						
	67.37-68.88	black shale grading to striped tan brown sandstone and char brown siltstone		83	99						
		68.50 - contact to coarse grained arkose grading to small pebble conglomerate									
70	68.88-71.52	- black shale with thin beds of brown siltstone grading into off white small pebble conglomerate with occ coal stringers		72	77						
	71.52-77.97	- char brown siltstone grading to grey arkose grading to pebble conglomerate grain size increases down hole		70							
75											
	77.97-81.70	- dk char brown fine grained massive siltstone grading to laminated band grey arkose & siltstone, grading to black massive shale and coaly shale -		70	96						
80		81.08 - becomes mostly soft and broken									
	81.70-92.07	- Andesite - tuff			100						
		- light green to calcite veins grading to dark green									
		- bottom contact appears to contain black clasts									
85											
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
90											
	92.07-95.17	sharp contact to interbedded shale, shaly coal, coaly shale and black small pebble cong (qtz + felds in shale matrix) 92.08-92.38 colored andesite		contact 72°	100						
	95.17-96.61	sharp contact to very coarse grain tan grey arkose w coal stringers, calcite veins 2mm, 95.50 py on fracture surface		contact 70°	92						
95	96.61-101.67	dark char broken siltstone w coal fragments grading to limonite(?) light brown sandstone and char brown siltstone, grading to coarse grain arkose / small pebble conglomerate w coal stringers 87.21-87.39 - light grey, "bleached"? andesite - conglomerate, fining up hole - rip up clasts 5 to 10cm above lower contact		74	99						
100	101.67-104.90	- char brown siltstone grading to coarse grained arkose w calcite veins, core 80% broken		72	81						
105	104.90-111.56	- Coal massive, few calcite vein (<1m), py on some fracture surfaces 106.79-106.89 - off-white tan, 90% calcite? veins <1mm thick = 90° to core axis * 111.25 reduced HQ → NQ			78						
110	111.56-113.85	- black broken coaly shale grading to limonite arkose to grey small pebble conglomerate		53	87						
	113.85-116.13	- sharp contact to dirty grey sandstone becoming laminated w black shale		70	99						
115	116.13-116.80	- broken black coaly shale			30						
	116.80-120.85	Coal - poor recovery, broken, minor calcite veining py on fractures			32						
120											
125											
130											
135											
140											
145											
150											
155											
160											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
150	i	152.30 cross bedding 40° + 80° 152.55-152.60 soft broken laminat shale siltstone after 152.60 marked change in bedding & core stringers increasing in frequency		39							
155		154.74-160.09 - med grey equigranular calcareous sandstone w calcit waste and coal fragments 159.00-160.15 sharp contact upper contact 69° lower 23°		contact 22 15°	98						
160		160.09-163.98 - laminated to banded calcareous grey sandstone and black shale many small oolites 2.1cm w calcit vein along main fault		20 42 0	73						
		<u>Samples</u>									
		9425-1 45.27-49.13									
		9425-2 104.70 - 111.56									
		9425-3 116.80 - 120.85									

PROJECT Diu Mtn HOLE 94-24 DIP: 50 @ collar: 48 @ 133m LENGTH 133.81 N 11+836 E 9740 ELEV Page 1 of 5

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
	0.00-6.47	overburden - mud, small rounded rocks 3-7cm									
5	6.47-22.41	overburden (?) - mud-clay matrix, polymictic clasts up to 15cm, immature conglomerate, matrix becomes increasingly competent with depth, clasts sub-rounded									
10											
15											
20	22.41-24.40	- interbedded tan brown sandstone with black shale		55 65	95						
		23.76-23.82 - coal - broken vitreous									
25	24.40-25.71	- grades over 4cm span into a small pebble, light grey conglomerate mostly feldspar & quartz clasts			98						
	25.71-25.76	- Black (shaly) shale - sharp contact			100						
	25.76-26.00	- sharp contact to coarse grained grey arkose w/ coal stringers @ 70°		contact 70	100						
	26.00-26.21	- black massive (shaly) coal									
	26.21-26.90	- sharp contact to dk grey arkose w/ coal fragments			100						
30	26.90-28.70	- grades over 5cm to black massive shale, grading to		60	98						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
		a laminated black shale - brown siltstone grading to coarse grained arkose									
	28.70-29.90	- banded dk grey siltstone and tan brown sandstone		70	77						
	29.90-30.50	- banded coarse grained sandstone and tan brown sandstone		68	100						
	30.50-32.55	- sharp contact to dirty brown coarse grained siltstone grading to tan brown sandstone to light grey coarse grained arkose		contact 70	99						
	32.55-32.58	- interbedded shale and siltstone		67							
	32.58-32.85	- Coal - massive no partings		contact 75	95						
	32.85-33.27	- fine grained siltstone grading to laminated siltstone sandstone			88						
	33.27-33.35	- grey coarse grained arkose			100						
	33.35-33.87	- black massive shale grading to fine grained brown siltstone with abundant coal fragments		70	100						
	33.87-34.80	- coarse grained brown sandstone with calcareous becoming laminated with black shale from 34.59		75	97						
	34.80-36.55	- 34.80-34.87 Coal		82	85						
		- grading to black shale									
		- 35.70 grading to laminated sandstone a shale to med grey arkose									
	36.55-38.40	- 36.55-36.88 - banded shale, sandy shale, shale, fine grained siltstone			81						
		- grading to tan brown sandstone to coarse grained arkose									
	38.40-44.40	- laminated to banded black shale and tan brown sandstone		60	93						
		44.40-44.50 Coal									
		45.50-45.88 arkose contacts sharp 70° - 70°									
	49.10-52.00	- tan arkose - broken up size 5cm		70	97						
	52.00-60.42	- tan "grey" calcareous, small pebbles quartz rich conglomerate, coal stringers and fragments		60	88						

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	60.42-62.40	interbedded black shale and brown sandstone grading to tan sandstone with occasional thin bands of black shale		contact 50°	98						
	62.40-65.12	- over 15cm grades back to black shale, grading to interbedded black shale, tan sandstone, grading to sandstone, grading to coarse grained arkose		60							
				contact 52°	84						
65	65.12-66.76	- sharp contact to dirty brown siltstone w plant fossils grading to banded sandstone and siltstone		contact 50°	88						
				70							
	66.76-67.00	sharp contact to light grey coarse grained arkose			100						
	67.00-68.60	- laminated to banded siltstone and sandstone w coal stringers		68	96						
	68.80-72.85	- grades into qtz rich equigranular, grey arkose coal fragments from 72.45 to 72.85			93						
70											
	72.85-75.00	- sharp contact to black massive shale		55	97						
		73.65-73.73 - fossil coal									
		74.45 - grades to grey coarse grained arkose									
75											
	75.00-77.09	- sharp contact to black massive shale			100						
		75.49-75.94 - grades to laminated fine grained brown arkose		75							
		76.38-76.63 - "									
	77.09-82.39	- sharp contact to dull grey med to coarse grained arkose		contact 45°	93						
				80							
80											
	82.39-84.97	- sharp contact to black shale grading to brown sandstone w calcite veins, becomes broken at 83.80		contact 64°	95						
85											
	84.97-89.20	- broken black shale grading to laminated brown sandstone and black shale		66	94						
		85.95-86.26 - (contact 63°) "vein breccia" fragments									
		lim to 8cm, no rotation, arkose									
		86.26-86.63 - broken grey arkose									
		87.77-87.82 - broken angular arkose surrounded by and in black shale									
90											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90	89.20-90.54	- sharp contact to black massive coaly shale		contact 90	88						
	90.54-96.01	- grades to tan laminated sandstone 91.11 → 91.70 "breccia" cherts of arkose and rotated sandstone 92.70 → 93.12 coarse grained arkose 94.49 - 95.28 quartz rich pebble conglomerate		50	100						
95	96.01-97.34	- black shale grading to sandstone to coarse grained arkose		60	93						
	97.34-98.88	- dark siltstone grading to laminated sandstone and siltstone grading to grey arkose		66	67						
	98.88-102.55	- massive black coaly shale grading to sandstone to arkose to coal stringers		73	92						
100	102.55-107.27	- sharp contact to interbedded black shale, fine grained siltstone and coaly shale vitreous 104.80-105.46 - coal		53	57						
105											
	107.27-118.38	sharp contact to light grey-light tan, calcareous small pebble conglomerate w/ coal stringers and fragments 115.80-115.85 - increase in clast size to 3-5mm. 113.62 - .75cm py vein @ 34° 113.63 - 4cm "clast" of coal		contact 76	99						
110											
115											
	118.38-123.75	sharp contact to med grained arkose grading to small pebble conglomerate w/ coal stringers		contact 56 76	98						
120											

PROJECT Div mtn HOLE 94-23 DIP: 50 @ 0m; 46 @ 160m LENGTH 1602 N 111840 E 9820 ELEV 914m Page 1 of 6

VISUAL LOG	FROM-TO	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
	(metres)			to coreax	%	BTU/lb	%	%	%	%	%
	0.00-5.79	overburden									
5	5.79-7.17	grey sandstone - coarsening down hole, some coal stringers grades into dirty grey arkose			62						
	7.17-8.20	sharp contact - grey small pebble conglomerate, clasts 2-5mm		contact 45	82						
	8.20-9.45	interbedded sandstone - arkose - conglomerate			56						
10	9.45-10.61	sharp contact - dirty grey sandstone with several 3-4 cm grey-tan coarse grained arkose		contact 105	98						
	10.61-11.32	sharp contact - med grey coarse grained arkose w coal stringers		contact 85	87						
	11.32-11.66	- shaly coal			90						
	11.66-12.80	- black massive shale grades through dk brown siltstone, sandstone to light grey coarse grained arkose w coal stringers			85						
15	12.80-12.85	- broken black massive shale									
	12.85-13.41	- brown siltstone grading to tan med grained arkose		50	93						
	13.41-14.45	- black massive shale grading to a brown siltstone		50	86						
		- 14.17-14.25 - breccia, fragments 1.0-2.5 cm of black shale to brown sandstone									
20	14.45-15.22	- sharp contact to grey arkose, some bedding		contact 60	94						
	15.22-17.90	- black massive shale grading into a dark brown siltstone		48	91						
		16.40-16.80 contact 80° coarse grained, light brown arkose		75							
25		17.00-17.10 shaly coal, broken									
	17.90-20.42	- light grey massive siltstone w plant fragments and coal stringers			78						
	20.42-24.60	- coal massive (4.18m)			90						
	24.60-30.39	- andesite - dark green w calcite veinlets			93						
30											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
30	30.39-32.45	- black massive coal - no partings			60						
	32.45-32.61	- coarse grained grey arkose w slightly altered feldspars			100						
	32.61-32.98	- massive argillaceous shale			89						
	32.98-33.03	- coal - broken, vitreous			87						
	33.03-36.94	- dirty brown banded siltstone grading into a grey sandstone/arkose		60	95						
35		- 35.00- coal fragments become present									
	36.94-39.20	- grey - very coarse grained arkose w coal fragments and coal stringers, becomes coarser grained down hole		contact 83	87						
		- 38.70 - 38.92 only shale									
40	39.20-43.33	- black massive shale that gradually grades into a grey and black banded siltstone to a light brown sandstone with coal stringers, to arkose to small pebble conglomerate (calcareous)		75	97						
	43.33-45.03	- massive black shaly coal			82						
		* Coal 43.38 - 43.50 (.12m)									
		43.75 - 43.81 (.06m)									
45	45.03-45.48	- black massive to fissile coal sharp contact to below		62	93						
	45.48-46.35	- light brown to tan coarse grained arkose w coal stringers			95						
	46.35-48.46	- massive black shale grading to brown siltstone w coal fragments to light grey coarse grained arkose / small pebble conglomerate w coal fragments			95						
		* shaly coal 47.38 - 47.69									
50	48.46-50.90	- sharp contact to massive black shale grading to laminated brown siltstone and black shale, becoming increasingly coarse grained down hole, grading to a coarse grained arkose		contact 84	98						
		* coal 49.27 - 49.30		70							
		* coaly shale 49.30 - 49.60									
55	50.90-51.16	- massive black coaly shale			92						
	51.16-51.51	- grades to a dirty brown coarse grained arkose			100						
		- 51.51 flame structure (tops up hole) at sharp contact between coarse grained arkose and black massive argillaceous shale			73						
60											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
	51.51-52.39	- black argillaceous shale grading to laminated shale + brown siltstone		78	87						
	52.39-58.89	- sharp contact to grey-tan coarse grained calcareous arkose which grades to a light grey small pebble polymitic calcareous conglomerate to sub rounded to round clasts 2-5mm		contact 72	100						
65	58.89-59.88	- sharp contact - dark grey brown laminated siltstone		contact 70	100						
	59.88-72.38	- sharp contact to tan grey calcareous pebble conglomerate clasts sub angular to rounded size 3mm		70	98						
70	72.38-73.30	- sharp contact to dark dirty brown siltstone to coal fragments		73	76						
	73.30-73.67	- sharp contact to grey coarse grain arkose grading to small pebble qtz rich conglomerate to coal fragments		contact 83	100						
	73.67-74.10	- sharp contact to dark dirty brown laminated siltstone to coal strings are .5cm wide most @ 80°		contact 85	86						
75	74.10-74.50	- somewhat abrupt contact to dirty grey med grained calcareous arkose to abund coal fragments & stringers		83	96						
	74.50-82.42	- Coal - massive - on fracture surfaces some pyrite		65?	78						
	78.20-78.47	- dirty brown siltstone to tan qtz rich arkose			98						
80	78.55-78.80	- small pebble qtz rich conglomerate			100						
	82.42-90.72	- dark brown massive siltstone to coal fragments		68	91						
	82.87-83.06	- @ 80° band of brown sandstone									
	84.12-84.44	- " " "									
85											
	88.30-89.54	- contact 74°									
		- black massive coal - some shaly coal			86						
90											

PROJECT _____ HOLE 94-23 DIP: @ ; @ LENGTH N E ELEV Page 4 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC %	CV BTU/lb	RM %	ASH %	VM %	FC %	S %
90	90.72-96.05	- sharp contact to brown sandstone grading to interbedded sandstone, coarse grained arkose and shale pebble w/ly calcareous conglomerate, all have occasional coal fragments		69	99						
95	96.05-101.10	Coal - some shaly coal, some plant fossils parting 99.35-99.53 brown siltstone			81						
100	101.10-104.85	- brown grey laminated sandstone		70	88						
105	104.85-111.39	- contact over 2cm to light brown to grey calcareous med grained arkose with coal stringers up to 1cm, several 10cm beds of qtz rich small pebble conglomerate		68	98						
110	111.39-111.74	- coal			100						
	111.74-118.31	- dirty dark brown fine grained laminated siltstone to plant fossils and coal stringers		contact 75 73 80	100						
115		- 115.50 cross bedding * Coal 116.93 - 117.00 117.06 - 117.10									
	118.31-124.44	- Coal - vitreous - some plant fossils, fracture surfaces		66	91						
120											

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
120		122.60-123.65 - 6 partings 1.0 to 2.0 cm tan brown shale, not included in sample									
125	124.44-127.06	tan to dark brown laminated siltstone, w calcite veins $\approx$ 2mm and coal stringers		76	100						
	126.57-126.58	coal - vitreous									
	127.06-127.58	tan brown med grained arkose w calcite veins and coal stringers			100						
	127.58-128.20	- interbedded black coaly shale, shaly coal, calcareous med grained arkose			73						
130	128.20-130.70	- Coal (vitreous + massive) interbedded with shaly coal + coaly shale		76	88						
		- pyrite on fracture surfaces									
		- 128.92-129.72 - coaly siltstone and arkose not part of sample									
	130.70-133.60	- massive dark brown to black shale/siltstone with abundant coal fragments		74	90						
140	133.60-134.60	- grades into arkose w coal stringers		60	97						
	134.60-135.36	- interbedded massive brown fine grained mudstone and coarse grained arkose			92						
	135.36-136.30	- sharp contact 78° to dirty brown coarse grained sandstone w coal stringers		contact 78	100						
145	136.30-137.08	- sharp contact to massive brown mudstone		contact 74	96						
		136.70-136.81 light brown arkose									
	137.08-137.46	- black massive shale grading to broken coaly shale			76						
	137.46-140.20	- massive brown mudstone w coal fragments		76	89						
		138.75-138.92 - brown sandstone									
	140.20-140.81	- above mudstone grades into dirty brown siltstone			79						
150	140.81-141.00	- brown gritty broken sandstone									
	141.00-141.52	- contact @ 10° to core axis between above sandstone and brown crumbly small pebble conglomerate calcareous, appears that some of the matrix has been chemically weathered			73						
	141.52-141.77	- same as above but less weathering			100						
	141.77-142.15	- soft broken brown siltstone			50						

PROJECT _____ HOLE 94-23 DIP: @ ; @ LENGTH N E ELEV _____ Page 6 of 6

VISUAL LOG	FROM-TO (metres)	DESCRIPTION	UNIT	STRUCT	REC	CV	RM	ASH	VM	FC	S
					%	BTU/lb	%	%	%	%	%
155	140.15-141.25	- dirty brown siltstone 142.97 calcareous @ 25°			100						
	141.25-148.86	- sharp contact to interbedded arkose and quartz pebble slightly calcareous conglomerate, clast size 3mm to 5cm thin coal stringers throughout, black & quartz, feldspar, calcareous sandstone, shale		contact ss 74	98						
160	148.86-149.66	- med grey coarse grained arkose			80						
	149.66-160.02	- green grey soft calcareous, med grained arkose grades to green grey soft calcareous conglomerate									
	160.02	cdh									
165		<u>Samples</u>									
		9423-1 20.42-24.60									
		9423-2 30.39-32.45									
		9423-3 74.50-82.42									
		9423-4 88.30-89.54									
		9423-5 96.05-101.10									
		9423-6 118.31-124.44									
		9423-7 128.20-130.70									

APPENDIX VIII
ANALYTICAL CERTIFICATES



Chemex Labs Ltd.

Analytical Chemists

Geochemists

Registered Assayers

212 Brooksbank Ave.
North Vancouver, B.C.
Canada V7J 2C1

Phone: (604) 984-0221

Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

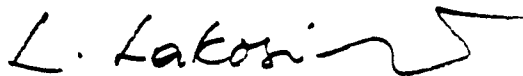
Certificate No.: A9432817
Invoice No.: I9481500
Project: Division Mtn. Coal
Date: January 3, 1995

Attn: Rob Carne

Date Received: December 13, 1994
Date Reported: December 23, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9445-1 14.1 Kg	A.D. Dry	3.00	31.58 32.55	27.85 28.71	37.57 38.74	0.37 0.38	4725 4871 7223
9445-2 17.38 Kg	A.D. Dry	3.43	17.00 17.60	30.92 32.02	48.65 50.38	0.45 0.47	6110 6327 7679
9445-3 8.1 Kg	A.D. Dry	3.51	19.65 20.37	28.49 29.53	48.35 50.10	0.50 0.52	5826 6039 7583
9445-4 11.9 Kg	A.D. Dry	3.15	23.36 24.12	27.26 28.15	46.23 47.73	0.49 0.51	5562 5743 7568
9445-5 3.64 Kg	A.D. Dry	1.28	27.85 28.22	28.39 29.13	41.22 43.00	0.58 0.59	5150 5217 7267
9445-6 5.9 Kg	A.D. Dry	0.40	35.37 35.51	13.99 14.04	50.24 50.45	0.16 0.16	4251 5268 6618
9445-7 3.98 Kg	A.D. Dry	2.75	21.21 21.81	31.11 31.99	44.93 46.20	0.55 0.56	5639 5798 7415

Note: All coal weights received are air dried



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Analytical Chemists

Geochemists

Registered Assayers

212 Brooksbank Ave.
North Vancouver, B.C.
Canada V7J 2C1

Phone: (604) 984-0221

Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9432816
Invoice No.: I9481500
Project: Division Mtn. Coal
Date: January 3, 1995

Attn: Rob Carne

Date Received: December 13, 1994
Date Reported: December 23, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9444-1 15.9 Kg	A.D. Dry	3.35	29.62 30.65	28.22 29.20	38.81 40.15	0.43 0.45	5082 5258 7581
9444-2 20.95 Kg	A.D. Dry	3.35	18.32 18.96	31.34 32.43	46.99 48.61	0.46 0.48	6080 6291 7763
9444-3 16.0 Kg	A.D. Dry	3.02	24.80 25.58	27.92 28.79	44.26 45.63	0.47 0.48	5451 5621 7553
9444-4 3.2 Kg	A.D. Dry	2.15	25.08 25.63	28.62 29.25	44.15 45.12	0.57 0.59	5510 5632 7572
9444-5 16.77 Kg	A.D. Dry	2.56	26.28 26.97	28.93 29.69	42.23 43.34	0.49 0.50	5366 5507 7541
9444-6 13.0 Kg	A.D. Dry	1.41	78.42 79.54	11.38 11.55	8.79 8.91	0.16 0.16	

Note: All coal weights received are air dried

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Canada V7J 2C1

Phone: (604) 984-0221

Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9432815
Invoice No.: 19481500
Project: Division Mtn. Coal
Date: January 3, 1995

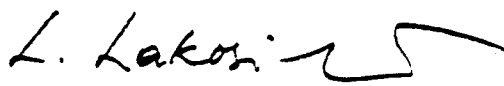
Attn: Rob Carne

Date Received: December 13, 1994

Date Reported: December 23, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9443-1 6.1 Kg	A.D. Dry	2.04	67.33 68.73	8.03 8.20	22.60 23.07	0.10 0.10	
9443-2 13.5 Kg	A.D. Dry	1.20	42.75 43.27	13.24 13.40	42.81 43.33	0.30 0.30	4020 4069 7173
9443-3 7.4 Kg	A.D. Dry	1.88	25.03 25.51	26.61 27.12	46.48 47.37	0.38 0.38	5552 5659 7596
9443-4 8.3 Kg	A.D. Dry	1.46	44.93 45.59	23.65 24.00	29.96 30.41	0.40 0.40	3803 3860 7094
9443-5 8.4 Kg	A.D. Dry	1.85	35.44 36.11	15.26 15.54	47.45 48.35	0.42 0.43	4967 5060 7921
9443-6 3.57 Kg	A.D. Dry	1.80	27.77 28.28	29.94 30.49	40.49 41.23	0.46 0.46	5335 5433 7576

Note: All coal weights received are air dried



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To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9432814
Invoice No.: I9481500
Project: Division Mtn. Coal
Date: January 3, 1995

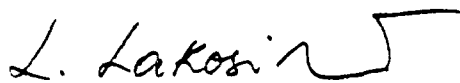
Attn: Rob Carne

Date Received: December 13, 1994

Date Reported: December 23, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9442-1	A.D.	3.03	22.17	29.54	45.26	0.42	5723
Dry			22.87	30.46	46.67	0.43	5902
21.3 Kg							7651
9442-2	A.D.	1.43	65.38	19.19	14.00	0.56	
Dry			66.33	19.47	14.20	0.56	
4.8 Kg							
9442-3	A.D.	2.20	25.30	29.39	43.11	0.40	5401
Dry			25.87	30.05	44.08	0.41	5523
39.1 Kg							7450
9442-4	A.D.	2.29	25.31	27.50	44.90	0.42	5448
Dry			25.91	28.14	45.95	0.43	5576
11.3 Kg							7526
9442-5	A.D.	2.14	25.82	28.93	43.11	0.42	5479
Dry			26.38	29.56	44.06	0.42	5599
30.6 Kg							7606
9442-6	A.D.	1.82	41.74	25.79	30.65	0.39	3927
Dry			42.51	26.27	31.22	0.40	3999
11.1 Kg							6957

Note: All coal weights received are air dried



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Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9432233
Invoice No.: I9481409
Project: Division Mtn. Coal
Date: December 14, 1994

Attn: Rob Carne

Date Received: December 5, 1994
Date Reported: December 14, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9441-1 3.99 Kg	A.D. Dry	1.45	86.28 87.55	8.98 9.12	3.29 3.33	0.46 0.47	
9441-2 17.72 Kg	A.D. Dry	2.45	32.04 32.84	26.93 27.61	38.58 39.55	0.35 0.36	4919 5042 7509
9441-3 10.24 Kg	A.D. Dry	7.02	34.00 36.56	7.49 8.06	51.49 55.38	0.31 0.34	4621 4970 7835
9441-4 16.78 Kg	A.D. Dry	2.59	31.99 32.84	26.55 27.26	38.87 39.90	0.72 0.74	4876 5005 7453

Note: Sample weights are air dry



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To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9432232
Invoice No.: I9481409
Project: Division Mtn. Coal
Date: December 14, 1994

Attn: Rob Carne

Date Received: December 5, 1994
Date Reported: December 14, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9440-1 22.87 Kg	A.D. Dry	3.45	21.13 21.88	29.84 30.91	45.58 47.21	0.45 0.46	5673 5875 7521
9440-2 31.14 Kg	A.D. Dry	3.33	17.99 18.61	30.86 31.93	47.82 49.46	0.46 0.47	5979 6185 7599
9440-3 18.17 Kg	A.D. Dry	3.37	18.68 19.33	29.22 30.24	48.73 50.43	0.48 0.50	5869 6074 7529
9440-4 10.54 Kg	A.D. Dry	2.44	43.71 44.80	25.12 25.74	28.73 29.46	0.45 0.46	3731 3824 6928
9440-5 48 Kg	A.D. Dry	2.62	28.58 29.35	27.79 28.54	41.01 42.11	0.43 0.44	5099 5236 7412
9440-6 12 Kg	A.D. Dry	1.29	25.21 25.54	25.95 26.29	47.55 48.17	0.69 0.70	5672 5747 7718

Note: Sample weights are air dry

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Phone: (604) 984-0221
Telex: 04-352597
Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431750
Invoice No.: I9481403

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 25, 1994
Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9438-1	A.D.	2.65	34.95	26.83	35.57	0.35	4456
19.19 Kg	Dry		35.90	27.56	36.54	0.36	4577
							7141
9438-2	A.D.	1.83	30.45	8.65	59.07	0.35	5452
9.25 Kg	Dry		31.02	8.81	60.17	0.36	5554
							8051
9438-3	A.D.	3.27	47.32	10.52	38.89	0.32	3370
18.06 Kg	Dry		48.92	10.87	40.21	0.33	3484
							6820
9438-4	A.D.	5.24	54.76	10.85	29.15	0.20	2059
19.87 Kg	Dry		57.79	11.45	30.76	0.21	2172
							5147

Note: Sample weights are air dry

L. Lakon

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Phone: (604) 984-0221
Telex: 04-352597
Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431452
Invoice No.: I9481402

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 21, 1994

Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9437-1 7.03 Kg	A.D. Dry	2.17	75.22 76.89	11.75 12.02	10.86 11.09	0.18 0.19	
9437-2 9.92 Kg	A.D. Dry	1.47	50.24 50.99	10.55 10.70	37.74 38.31	0.57 0.57	3060 3106 6337
9437-3 8.26 Kg	A.D. Dry	1.31	38.31 38.82	17.91 18.14	42.47 43.04	0.75 0.76	4335 4392 7179
9437-4 30.79 Kg	A.D. Dry	2.23	27.07 27.68	23.95 24.49	46.75 47.83	0.34 0.34	5186 5305 7335
9437-5 33.75 Kg	A.D. Dry	2.13	28.52 29.14	26.22 26.79	43.13 44.07	0.74 0.76	5062 5172 7299

Note: Sample weights are air dry

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Geochemists

Registered Assayers

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North Vancouver, B.C.
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Phone: (604) 984-0221

Telex: 04-352597

Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431749

Invoice No.: 19481403

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 25, 1994

Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %
9436-1	A.D.	0.89	77.38	15.84	5.89	0.20
1.73 Kg	Dry		78.08	15.98	5.94	0.20
9436-2	A.D.	1.17	80.94	13.63	4.26	0.14
1.51 Kg	Dry		81.90	13.79	4.31	0.14

Note: Sample weights are air dry

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Phone: (604) 984-0221
Telex: 04-352597
Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431451
Invoice No.: 19481402

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 17, 1994
Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9435-1 25.17 Kg	A.D. Dry	2.41	21.58 22.11	30.67 31.42	45.34 46.47	0.55 0.56	5656 5796 7441
9435-2 19.51 Kg	A.D. Dry	1.94	44.17 45.05	23.96 24.43	29.93 30.52	0.47 0.48	3681 3754 6831
9435-3 9.87 Kg	A.D. Dry	0.79	76.79 77.40	13.66 13.77	8.76 8.83	0.22 0.23	

Note: Sample weights are air dry

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Telex: 04-352597

Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431453

Invoice No.: I9481402

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 21, 1994

Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9434-1	A.D.	2.70	20.47	29.44	47.39	0.40	5540
	Dry		21.03	30.26	48.71	0.41	5694
30.45 Kg							7210
9434-2	A.D.	1.89	40.88	24.01	33.22	0.40	4078
	Dry		41.66	24.47	33.87	0.40	4157
21.62 Kg							7126
9434-3	A.D.	2.95	39.12	17.84	40.09	0.38	4208
	Dry		40.31	18.38	41.31	0.39	4336
67.00 Kg							7266
9434-4	A.D.	1.63	41.27	25.04	32.06	0.68	4008
	Dry		41.95	25.45	32.60	0.69	4075
28.85 Kg							7019

Note: Sample weights are air dry

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Phone: (604) 984-0221

Telex: 04-352597

Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431450

Invoice No.: 19481042

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 17, 1994

Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9433-1	A.D.	1.79	18.94	24.86	54.41	0.67	5884
15.63 Kg	Dry		19.29	25.32	55.39	0.69	5991
							7423
9433-2	A.D.	2.15	21.36	30.40	46.09	0.58	5373
21.01 Kg	Dry		21.83	31.07	47.10	0.59	5491
							7025

Note: Sample weights are air dry

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Telex: 04-352597
Fax: (604) 984-0218

To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431449
Invoice No.: I9481402

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 17, 1994
Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9432-1 5.95 Kg	A.D. Dry	2.35	38.99 39.93	18.95 19.40	39.71 40.67	0.31 0.32	4317 4421 7360
9432-2 28.84 Kg	A.D. Dry	2.60	19.82 20.35	29.12 29.89	48.46 49.76	0.43 0.44	5879 6037 7579
9432-3 1.76 Kg	A.D. Dry	1.49	47.53 48.25	24.01 24.38	26.97 27.37	0.38 0.38	3552 3605 6967
9432-4 2.09 Kg	A.D. Dry	1.91	23.08 23.53	30.32 30.91	44.69 45.56	0.62 0.63	5724 5835 7631
9432-5 2.05 Kg	A.D. Dry	1.80	31.75 32.33	28.59 29.11	37.86 38.56	0.51 0.52	4899 4989 7372
9432-6 2.10 Kg	A.D. Dry	1.57	27.00 27.43	30.98 31.48	40.45 41.09	0.54 0.55	5417 5504 7584
9432-7 12.90 Kg	A.D. Dry	1.46	46.85 47.55	24.44 24.80	27.25 27.65	0.36 0.37	3510 3562 6791

Note: Sample weights are air dry

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Telex: 04-352597
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To: Archer Cathro & Assoc. (1981) Ltd.
1016 - 510 West Hastings Street
Vancouver, BC
V6B 1L8

Certificate No.: A9431448

Invoice No.: I9481402

Date: December 13, 1994

Attn: Rob Carne

Date Received: November 17, 1994

Date Reported: December 8, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9431-1	A.D.	9.06	41.87	12.64	36.43	0.77	3056
9.7 Kg	Dry		46.04	13.89	40.07	0.84	3360
							6228

Note: Sample weights are air dry

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To: Archer, Cathro and Associates (1981) Ltd.
Box 4127
Whitehorse, YT
Y1A 3S9

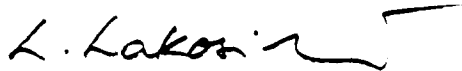
Certificate No.: A9429914
Invoice No.: I9481242
Project: Division Mtn Coal
Date: November 8, 1994

Date Received: October 28, 1994
Date Reported: November 8, 1994

Division Mountain Coal: DDH 9430

	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9430-1	A.D.	2.28	36.60	11.36	49.76	0.30	4207
4.3 Kg	Dry		37.46	11.63	50.91	0.31	4305
							6883
9430-2	A.D.	2.31	27.97	10.56	59.16	0.44	5073
6.0 Kg	Dry		28.63	10.81	60.56	0.45	5193
							7276
9430-3	A.D.	3.06	16.87	29.71	50.36	0.51	6067
20.3 Kg	Dry		17.40	30.64	51.96	0.52	6259
							7577
9430-4	A.D.	2.62	22.98	28.18	46.22	0.54	5583
5.8 Kg	Dry		23.60	28.94	47.46	0.56	5733
							7504
9430-5	A.D.	2.34	25.13	31.03	41.50	0.59	5489
4.9 Kg	Dry		25.73	31.77	52.50	0.61	5620
							7567
9430-6	A.D.	1.79	52.66	24.97	20.58	0.43	2861
4.5 Kg	Dry		53.62	25.42	20.96	0.44	2913
							6281
9430-7	A.D.	1.99	40.07	26.38	31.56	0.59	4114
15.3 Kg	Dry		40.89	26.91	32.20	0.60	4197
							7100

NOTE: SAMPLE WEIGHTS ARE AIR DRIED



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To: Archer, Cathro and Associates (1981) Ltd.
Box 4127
Whitehorse, YT
Y1A 3S9

Certificate No.: A9429118
Invoice No.: I9481193
Project: Division Mtn Coal
Date: October 26, 1994

Date Received: October 18 1994
Date Reported: October 26, 1994

Sample	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9428-1	A.D. Dry	2.99	32.19 33.18	26.69 27.51	38.13 39.31	0.36 0.37	4829 4978 7450
22.09 Kg							
9428-2	A.D. Dry	4.83	27.44 28.83	21.85 22.96	45.88 48.21	0.30 0.31	4925 5175 7271
2.40 Kg							
9428-3	A.D. Dry	5.54	23.99 25.40	7.63 8.08	62.84 66.52	0.28 0.30	5283 5593 7497
4.26 Kg							
9428-4	A.D. Dry	2.23	25.65 26.24	28.03 28.67	44.09 45.09	0.62 0.64	5357 5479 7428
4.43 Kg							
9428-5	A.D. Dry	2.67	28.15 28.92	28.01 28.78	41.17 42.30	0.36 0.37	5086 5225 7351
9.36 Kg							
9428-6	A.D. Dry	2.48	20.58 21.11	31.40 32.19	45.54 46.70	0.62 0.64	5743 5889 7464
3.46 Kg							

NOTE: WEIGHTS ARE AS RECEIVED (WET)

L. Lakonin

Certified by:



Chemex Labs Ltd.

Analytical Chemists

Geochemists

Registered Assayers

212 Brooksbank Ave.
North Vancouver, B.C.
Canada V7J 2C1

Phone: (604) 984-0221
Telex: 04-352597
Fax: (604) 984-0218

To: Archer, Cathro and Associates (1981) Ltd.
Box 4127
Whitehorse, YT
Y1A 3S9

Certificate No.: A9428489
Invoice No.: I9481155
Project: Division Mtn Coal
Date: October 20, 1994

Date Received: October 11, 1994
Date Reported: October 20, 1994

Sample Number	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
DH 9426-1	A.D. Dry	2.46	28.16 28.87	26.81 27.49	42.57 43.64	0.73 0.75	5212 5344 7512
2.35 Kg							
DH 9426-2	A.D. Dry	7.07	52.90 56.92	2.82 3.03	37.21 40.05	0.43 0.46	2344 2522 5854
5.61 Kg							
DH 9426-3	A.D. Dry	7.97	35.02 38.05	8.11 8.81	48.90 53.14	0.50 0.55	4087 4441 7169
4.63 Kg							
DH 9426-4	A.D. Dry	3.42	20.02 20.73	28.85 29.87	47.71 49.40	0.48 0.50	5836 6042 7622
8.30 Kg							
DH 9426-5	A.D. Dry	3.04	18.57 19.15	32.10 33.11	46.29 47.74	0.64 0.66	5807 5989 7407
3.49 Kg							
DH 9426-6	A.D. Dry	3.04	18.81 19.40	29.84 30.78	48.31 49.82	0.39 0.40	5859 6043 7497
15.19 Kg							
DH 9426-7	A.D. Dry	2.90	20.32 20.92	31.65 32.60	45.13 46.48	0.60 0.62	5752 5924 7491
5.30 Kg							
DH 9426-8	A.D. Dry	2.02	47.98 48.97	23.49 23.97	26.51 27.06	0.54 0.55	3274 3341 6547
7.42 Kg							

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Certificate No.: A9428493
Invoice No.: I9481155
Project: Division Mtn Coal
Date: October 20, 1994

Date Received: October 6, 1994
Date Reported: October 12, 1994

	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9425-1	A.D. Dry	2.98	19.29 19.88	30.03 30.95	47.70 49.17	0.39 0.40	5734 5910 7377
13.0 Kg							
9425-2	A.D. Dry	3.11	20.90 21.57	29.75 30.71	46.24 47.72	0.41 0.42	5674 5856 7467
9.7 Kg							
9425-3	A.D. Dry	2.07	28.24 28.84	31.24 31.90	38.45 39.26	0.50 0.51	4965 5070 7125
2.8 Kg							

NOTE: WEIGHTS ARE AS RECEIVED (WET)

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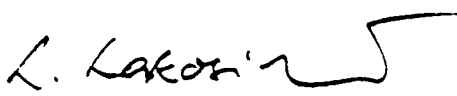
To: Archer, Cathro and Associates (1981) Ltd.
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Y1A 3S9

Certificate No.: A9428492
Invoice No.: I9481155
Project: Division Mtn Coal
Date: October 20, 1994

Date Received: October 6, 1994
Date Reported: October 12, 1994

Sample Number	Basis	R.M. %	Ash %	V.M. %	F.C. %	Sulphur %	C.V. Cal/g
9423-1	A.D.	1.60	28.68	22.65	47.07	0.37	5001
	Dry		29.15	23.02	47.83	0.37	5082
10.0 Kg							7173
9423-2	A.D.	1.04	54.27	16.95	27.74	0.28	2597
	Dry		54.84	17.13	28.03	0.28	2625
4.3 Kg							5812
9423-3	A.D.	2.20	18.76	30.73	48.31	0.42	6000
	Dry		19.18	31.42	49.40	0.43	6135
16.1 Kg							7591
9423-4	A.D.	2.11	29.45	26.13	43.80	0.49	5161
	Dry		30.08	26.70	44.74	0.51	5273
3.9 Kg							7542
9423-5	A.D.	2.29	22.46	29.16	46.09	0.49	5720
	Dry		22.98	29.84	47.18	0.50	5854
12.2 Kg							7601
9423-6	A.D.	1.70	41.00	28.69	39.97	0.52	4086
	Dry		41.71	29.19	40.66	0.53	4157
14.1 Kg							7132
9423-7	A.D.	1.71	42.91	25.96	29.42	0.38	3857
	Dry		43.66	26.41	29.93	0.39	3924
4.7 Kg							6965

NOTE: WEIGHTS ARE AS RECEIVED (WET)


Certified by:

APPENDIX IX
GEOPHYSICAL SURVEY DATA

MEMORANDUM

AMEROK GEOPHYSICS
(403) 668-7672 (Phone/Fax)

November 9, 1994
File: 94-11

To: Rob Carne / Frank Gish

From: Mike Power

Re: Division Mountain VLF-EM survey results

This memo describes the VLF-EM survey performed at the Division Mountain Coal Property from November 3 - 6, 1994.

a. Survey Specifications. The survey crew consisted of Graham Davidson, P.Geol. and Ron Stack equipped with a pair of Omni Plus VLF-EM receivers. Measurements were taken at 10 m intervals over 27.4 line-km of primary survey lines using the Jim Creek Wa. transmitter and over 9.5 line-km of secondary survey lines using the Lualualei Ha. transmitter. The primary survey lines were oriented at 128° , orthogonal to the strike of beds in the limbs of a syncline centred on Division Mountain. The secondary survey lines were located in the nose of the fold and oriented at 38° . Both transmitters were well coupled with conductors perpendicular to the survey lines and field strengths were acceptable throughout the survey. Measurements of the in-phase, quadrature and total field strength were taken at each station, recorded electronically in the instruments and dumped to a laptop computer at the end of the survey day. When properly initialized, the Omni Plus records the data so that a true cross-over consists of a positive to negative cross-over when travelling east or north along the survey lines. This may be verified by noting the sense of the cross-overs along the most northern conductor in Figure 1; it is coincident with the recently discovered extension of the Carnes Seam. The field crew resurveyed several sections of the lines surveyed in 1993 to allow the two data sets to be levelled and to verify their integrity. The two data sets were then merged and are plotted together.

b. Results. Annotated stacked profile maps of the Jim Creek and Lualualei data are attached (Figures 1 and 2). These show the VLF in-phase (solid) and quadrature (dashed) profiles together with the survey grid. Conductor axes are shown as thick lines on these plots. Figure 1 shows both sets of conductors with the Jim Creek conductors solid and the Lualualei conductors dashed. Conductor axes are interpreted to be located at the inflection point of the in-phase cross-over. It is assumed that the majority of the conductors are stratigraphic units and thus conformable with the overall structure in the area. There is considerable ambiguity in the location and trend of conductor axes in the nose of the fold as a consequence of the line spacing.

c. **Conclusions and recommendations.** The results suggest that the coal seam coincident with the conductor near 10000E might not be present in the surveyed area southwest of the synclinal axis. Two fairly continuous conductors were detected in the southwest limb of the fold but these appear to correspond to conductor(s) up-section from the coal seam in the northeast limb of the fold. This inference is based on an ambiguous determination of conductor axis locations in the nose of the fold performed without the benefit of a local geology map; hopefully it is wrong. It might be wise to test the two conductors in the southwest limb at your earliest convenience. If the coal seam is not found here, the grid may have to be extended to the southwest, and to the southeast in the axial zone of the fold. If this proves necessary, I would suggest using a tighter line spacing in the axial zone to permit a less ambiguous determination of conductor axis trends.

Respectfully submitted,
AMEROK GEOPHYSICS



M. A. Power M.Sc. P. Geo.
Geophysicist



AMEROK GEOPHYSICS

ARCHER CATHRO & ASSOCIATES (1981) LTD.

**REFLECTION SEISMIC SURVEY AT THE
DIVISION MOUNTAIN COAL PROPERTY,
BRAEBURN AREA, YUKON TERRITORY**

M. A. Power M. Sc. P. Geo.

Coal Leases

CEL Y452-453

NTS: 115 H 8

Territory / Province: Yukon Territory

Mining District: Whitehorse

Work Performed: November 7-19, 1994

Date: November 27, 1994

Introduction

A test reflection seismic survey was conducted at the Division Mountain Coal Property between November 13 and 18, 1994 to determine whether this geophysical technique might be useful in mapping the coal measures found there. This report describes the survey and its results.

Shallow reflection seismic survey techniques

Seismic surveys have been used to map strata with contrasting bulk density and rigidity for the past seventy years. Two general methods are used. The reflection seismic method records reflections from strata beneath an array of geophones while the refraction seismic method records refracted waves travelling along the boundary between strata with contrasting velocities. Until the 1980's, only the refraction seismic method was used in shallow subsurface investigations to any extent. It will only work in situations where the seismic velocity of the layers above and including the refractor of interest increases with depth. If a layer of low velocity exists within the package overlying the refractor of interest, the calculated depth to this horizon will be in error - sometimes significantly. Refraction methods are inappropriate for locating coal beds because these horizons generally have lower seismic velocities than the overlying strata and thus do not produce direct refractions to the earth's surface.

Before the 1980's, the reflection seismic method was not considered to be a cost effective means of investigating shallow targets because of the cost of data processing. The Geological Survey of Canada and Kansas Geological Survey pioneered the application of digital engineering seismographs to shallow reflection surveys (Pullen and Hunter 1990, Steeples and Miller 1990). The GSC tried to develop two methods which required a minimum of post-collection data processing whereas the KGS attempted to adapt state-of-the-art common depth point methods used by the oil exploration industry. The most cost-effective methods of conducting shallow reflection seismic surveys are currently the Optimum Window and Optimum Offset methods developed by the GSC. The Optimum Window method was tested in the Yukon in the early 1980's in permafrost terrain near Dawson City with poor results due to high velocity ground roll in frozen black muck. To the author's knowledge, the survey described in this report constitutes the only other test of shallow reflection methods in the Territory to date.

Both Optimum Window and Optimum Offset surveys were tried during this survey. The Optimum Offset method was felt to be the most effective means of mapping subsurface reflectors on the property. The method is illustrated in Figure 1. Shots and geophones are separated by a constant distance d . Each shot is received by one geophone and the spacing between shots/geophones is from 2 to 5 m, depending upon the resolution required.

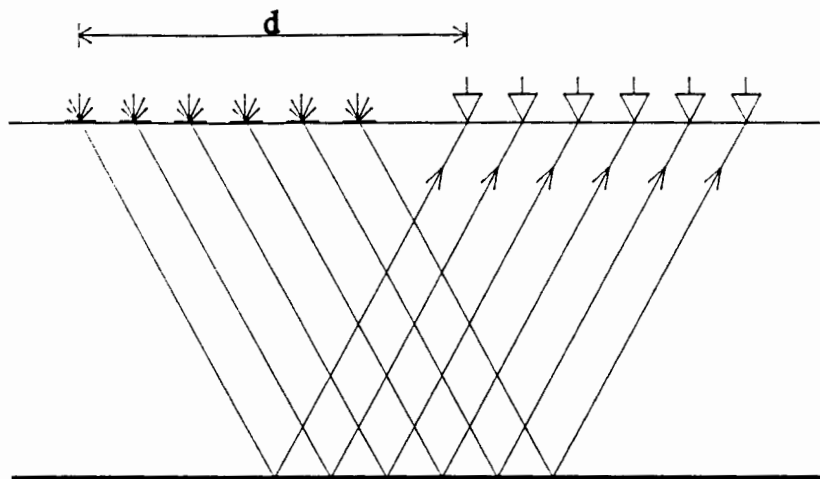
The separation between shot and geophone is critical and is determined from a conventional in-line refraction shot. This consists of recording a shot fired immediately off the end of an array of 12 geophones or (ideally) in the middle of a spread of 24 geophones. An example of a refraction shot is shown in Figure 2. The first arrival on the seismogram is a refraction from the base of the "low velocity layer" or LVL. This is commonly the water table or the top of bedrock. The blast wave from the explosion is a linear arrival with an apparent velocity of around 330 m/s (the speed of sound) and behind this arrival in time is ground roll from the blast. No useful information arrives after the blast wave in records of this length. In petroleum exploration, records are made for several seconds after the blast and reflections from deeper horizons can be recorded once the ground roll subsides; this approach will not work on shallow reflections arriving during the ground roll. Between the LVL refraction and the blast wave, however, is a time interval which varies depending upon the offset in which reflections from bedrock and layers within bedrock may be recorded. By varying the offset, the survey can be designed to detect near surface reflections to considerable depth in the interval preceding the blast wave arrival. The optimum offset is determined by the required depth of investigation, the apparent velocity of the refractor and by the relative arrival times of the reflections. This offset is then used throughout the Common Offset survey, allowing the reflection seismogram to be processed in the field as arrivals are recorded. Post processing is largely cosmetic and involves filtering the data to accentuate the reflections and adjusting the gain of the channels to equalize the strength of the reflections.

Survey specifications

A two man crew consisting of G. Lee P. Eng. (Surveyor/blaster) and M. Power (Operator) performed the seismic survey. The survey was conducted with a Geometrics S-12 Smartseis 12 channel digital seismograph rented from Geometrics Ltd. of Sunnyvale California. This incorporates 32-bit analog to digital converters, preconversion (analog) filtering, post conversion filtering, automatic gain control (AGC) and a variety of presentation formats. Output consists of digital data on disk or thermal printer seismograms. Unfortunately, this instrument is not capable of trace-to-trace amplitude equalization or individual trace time shifting. Standard 40 Hz reflection geophones were used in the survey and the energy source consisted on one to (rarely) three sticks of CIGEL 60% initiated with EB caps and a Nimbus HVB-1 High Voltage Blaster. The blaster simultaneously fires the charge and initiates the seismograph. Burn delays on the EB caps in the author's experience, while not negligible, are consistent and the errors introduced are no more than would be produced if the seismograph were triggered from a nearby geophone. Following the survey, the topography of the survey lines was measured with a total station transit and electronic distance measuring instrument and used to convert the depths into elevations.

The Optimum Offset surveys were conducted on Line 10914N from 9540E to 9740E and on Line 13353N from 9104E to 9480E. A constant 4 m geophone interval and 48 m optimum offset was used throughout the survey. Optimum offset shots were always grid west of the geophones. At each array setup, an in-line record with a shot 4 m grid west of the last

(a)



(b)

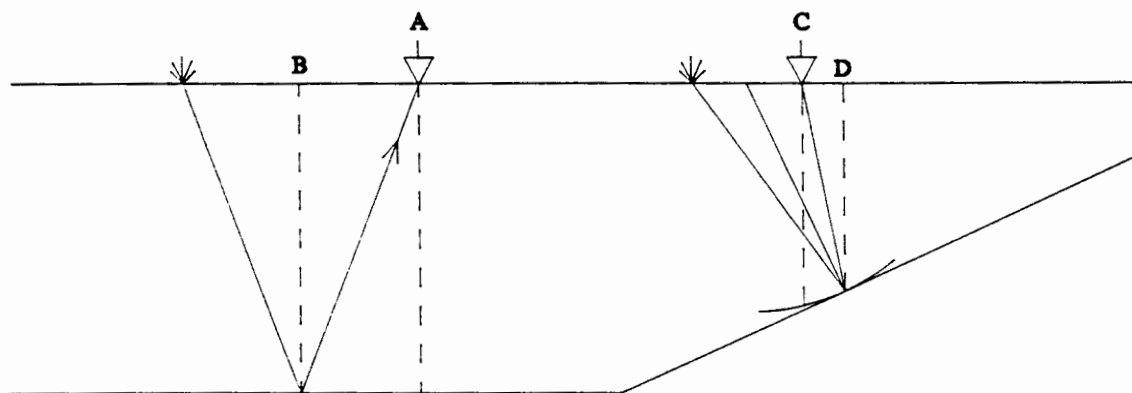


Figure 1. Reflection seismic surveys. (a) Common Offset array. Shots and geophones separated by constant offset 'd'. (b) Migration. Reflections are plotted below phone locations (A & C) and not at true reflection points. On flat reflectors, this is mid-way between shot and phone. On dipping reflectors, the reflection point moves up-dip.

GEOMETRICS

SmartSeis

READ FROM 9.DAT
 LINE NUMBER 13353
 SHOT LOC -4.00
 SAMPLE INTERVAL 250 uS
 ACR FILT LO CUT 70HZ
 DISP FILT LO CUT 140HZ

GROUP INTERVAL 4.00
 PHONE 1 LOC 44.00
 RECORD LEN 256 MS
 NOTCH 8HZ
 HI CUT 500HZ

11:30 17/NOV/1994
 SHOT INTERVAL 0.00
 PHONE 12 LOC 0.00
 DELAY 8 MS
 STACKS 1
 AGC 100

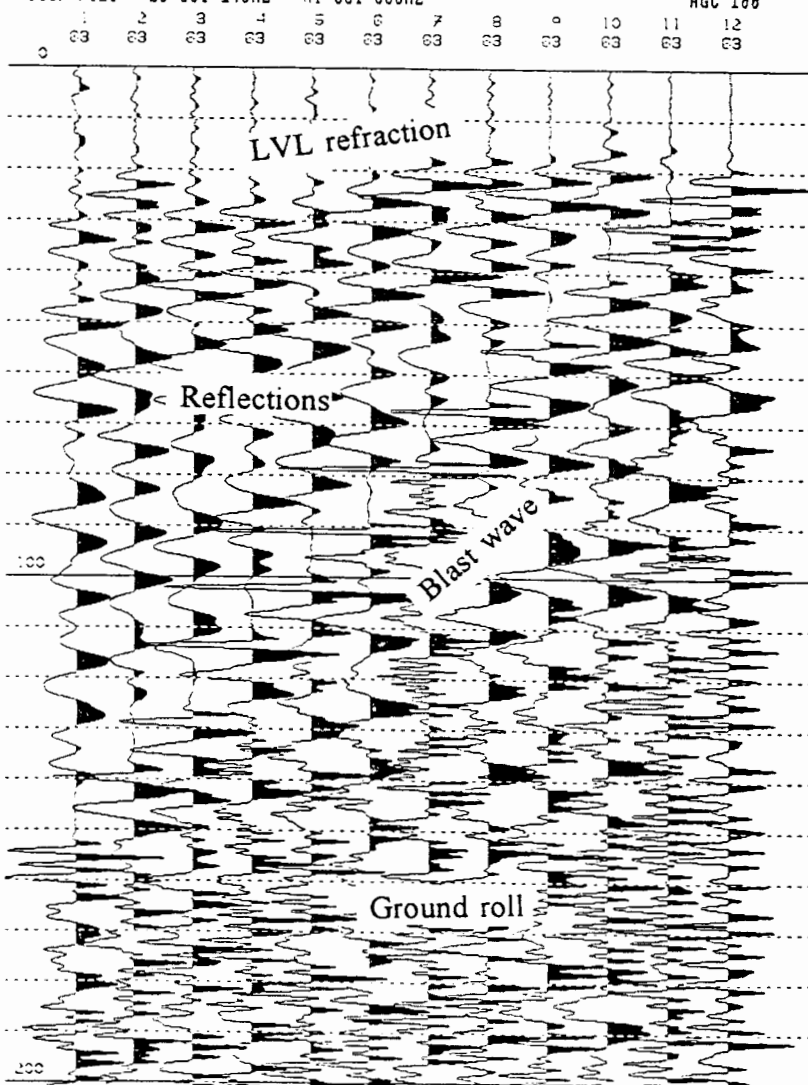


Figure 2. Refraction record from Line 13353N. Geophone spacing 4 m. Shot was fired 4 m from phone 12.

geophone was also recorded to allow for a determination of the LVL velocity. Both digital and paper copies of the data were made in the field. The digital data is recorded in SEG-2 format. Post collection data processing consisted of AGC adjustment using a fixed 20 ms window and filtering using 140 Hz low cut and 500 Hz high cut filters. These filters were selected to accentuate high frequency reflections while rejecting wind and heavy equipment noise. Gain was adjusted to try and equalize reflections to the same amplitude on adjoining traces. All paper records were made off the seismograph using the on-board software and the thermal printer. The LVL refraction and subsequent reflections were timed and entered into Microsoft-Excel where depth conversions and topographic corrections were performed. The velocity of the LVL and a mean velocity of bedrock below the LVL were determined with on-board software using 6 refraction records and 17 reflection records from data collected on line 13353N. The linear velocity of the first arrival recorded before the LVL refraction was used to determine the LVL velocity and best Normal Move Out (NMO) fits to the reflections were used to determine the velocity of the rock and overburden overlying the reflectors. An LVL velocity of 620 m/s and average bedrock velocity of 2200 m/s were determined in this manner and used in the depth conversions.

Results

Optimum offset survey results for lines 10914N and 13353N are shown in Figures 3 and 4. The top section of each figure is a composite seismogram showing geophone location on the horizontal axis and arrival time in ms on the vertical axis. Individual reflections identified by the interpreter are highlighted on the seismic section. The horizontal arrival at 150 ms is the blast wave from the shot and no reflection data is visible below it. The AGC attenuates arrivals just before the blast wave, creating a dead zone with no apparent signal just before the blast wave arrival. The apparent depths to the reflectors are shown in the depth section below the seismic section. The surface topography and depth to the base of the LVL are the top two traces in the depth sections with the base of the LVL shown as a thick line. Traces below these two are the apparent locations of the reflections identified in the seismic section. The depths of the reflectors were calculated in three stages. First the depth to the base of the LVL was calculated from the refraction arrival time and the refraction arrival time subtracted from the total arrival time. This interval arrival time is then used to calculate the depth to the reflector beneath the LVL using the bedrock velocity. Finally the depth to the base of the LVL and the depth from the LVL to the reflector are added together and corrected for surface topography. All elevations are referenced to arbitrary datums. There is considerable relief in the reflectors shown in the depth sections. This may be due to uncompensated static shifts in the LVL, phase changes in the reflections (ie. wave shape changes), missed facies changes or to real relief in the reflectors themselves.

The depth sections are not migrated and thus are not a truly accurate picture of the reflector location. Conventional (unmigrated) seismic section presentation displays the geophone trace immediately below the recording geophone location and assigns calculated depths to a point immediately below this geophone. The actual reflection point (ie. depth point) is not at this

location (Figure 1 (b)). If the shot-geophone separation is large relative to the depth of investigation and if the reflector is flat, the depth point is midway between the shot and geophone. If the reflector dips, the depth point is not mid-way between the shot and geophone but instead tends to shift up-dip. On the depth section, this tends to flatten the steeply dipping sections of the reflector. Full migration of seismic data is computationally intensive and expensive; it has been omitted in this case. Partial migration to correct the sections for the effect of large phone-shot offset was performed by shifting the depth points one half the optimum offset to the west, placing them over the reflection point on flat reflectors.

The first surveys were conducted on line 10914N in an area where coal has been located in trenches and drill holes. The results this line are poor because of ground noise from a nearby diamond drill and because the surface of the ground had been disturbed during trenching, thereby making it difficult to get good geophone plants and introducing static errors. Nonetheless, several continuous reflections were recorded. Drill hole 94-26 is at 9686E and 5.5 m west of the survey line. Drill hole coal intersections are projected into the plane of section in the depth section. The continuous reflection labelled C corresponds with the thickest coal intersection in the drill hole (98-105 m). The projected outcrop of this reflector at 9800E is within the exposed coal measures.

Better results were obtained on Line 15535N where ground conditions were more favourable. Strong coherent reflections were obtained over flat-lying stratigraphy and reflections can be traced some distance in the section. A parasitic anticline occurs along the larger syncline spanning the section. The short wavelength anticline fold may be the down dip extension of a folded VLF conductor which outcrops/subcrops to the north. In the absence of drill hole or trenching information it is impossible to determine which if any of the reflections might be coal seams.

Discussion

It appears that reflection seismic surveys may be an effective tool in mapping coal seams on the Division Mountain Coal Property. Several problems remain to be solved before the method can be a cost effective complement to drilling. These include survey layout, logistical problems and data processing requirements.

Survey design procedures commonly used in 2-D seismic work in the oil industry could be applied to cut down the number of drill holes required for stratigraphic correlation and to permit confident extrapolation of the seismic data over a wide area. Lines should be looped, much as in a topo survey traverse, to tie reflections together and to ensure that consistent marker horizons are being traced accurately from line to line. The easiest way to accomplish this is to survey tie lines at the ends of the seismic lines in a given area and tie all the seismic and topo survey data together following the survey. If a couple of marker horizons can be identified throughout the area and followed from line to line around the loops, reliable

depth sections can be constructed from the survey data. In this case, a minimum number of confirmatory drill holes would be required and drilling could be concentrated in areas where the seismic survey indicates economic coal.

It is difficult to confidently follow steeply dipping reflections in the seismograms. This is a consequence of a relatively wide geophone interval (4 m). This causes spatial aliasing - the introduction of spurious (but very real looking) low frequency effects in the seismograms. Several approaches can be used to minimize the problems caused by this effect. If the lines are looped, bad picks or misties will become obvious once the interpreter tries to close. If there are several flat lying sections with steeply dipping intervals, this approach may not work. An alternative tack is to tighten up the phone spacing to around 2 m but the cost and delay may be prohibitive in steep areas. Lastly, more drill holes may be required in order to ground-proof the seismic data in areas of steep dip.

Several changes to the survey procedure could greatly enhance survey rates and improve cost effectiveness. Optimum efficiency will be achieved when the blaster and operator spend as much time as possible at their respective tasks during the survey day. To achieve this, time spent getting to the survey lines and setting up individual spreads must be minimized. A third man employed solely in setting up geophone arrays (ie. a jughound) is necessary to achieve any speed at all in rough terrain. Any equipment used in the survey should be mounted on pack frames and not hand carried. A warmed container will have to be built for any seismograph operated below 0°C and as small a generator as possible should be used to charge the batteries and warm the instrument. If the lines permit, an ATV should be used to ferry equipment along the lines. It is not advisable to run reflection surveys over thick snow pack given the requirement to dig each geophone into the ground. A 12 take-out blasting cable and switching box should be constructed to allow the blaster and operator to fire and record the 12 phone spread within as short a time as possible. Unfortunately, it appears that high explosives will be required if the depth of investigation is to exceed 20 or 30 m. If a large seismic program is undertaken, it might be best to have a separate crew run the topographic surveys and allow the seismic crew to concentrate on shooting.

Data processing on subsequent surveys should be conducted with industry standard software such as Vista or Seistrix to allow better statics corrections, trace-to-trace amplitude equalization and time shifting of the individual traces. Full in-field data processing will be required to quickly identify and correct errors. The volume of data collected in any production survey will necessitate fully automated computerized data processing. Using the experience of GSC personnel as a guide, it appears that average survey rates of 400 to 800 m per day should be possible using a 4 m phone spacing (Pullen and Hunter 1990).

Conclusions and recommendations

The results of the test survey lead to the following general conclusions:

- a. Seismic reflection techniques can be used to map the coal seams at Division Mountain. The Optimum Offset reflection seismic method provides the best trade-off between resolution of coal bearing strata, survey efficiency and cost.
- b. Powder will be required to achieve a depth of investigation of around 150 m. This depth will be required in order to confidently follow coal seams through synclinal axes and into the more shallow limbs.
- c. A geophone spacing of 4 m provides a compromise between survey efficiency and survey detail acceptable in much of the survey area. In areas of steep dip, it may be necessary to tighten the spacing in order to confidently detail steeply dipping reflectors.
- d. Reflection seismic surveys cannot directly locate coal seams with any confidence. While thick coal seams produce good reflections, other horizons within the stratigraphy also appear to be reflectors. Drill hole and trenching data will have to be incorporated into the interpretation process if the coal seams are to be confidently mapped with seismic surveys.

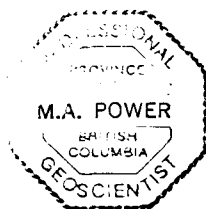
and the following site specific conclusions:

- a. The overall structure delineated by drilling and trenching in the south end of the parasitic fold on the east limb of the Division Mountain Syncline extends north at least as far as line 13353.
- b. The surveys conducted on lines 10914N and 13353N suggest that folds with wavelengths in the order of 50 to 100 m may be superimposed on the overall synclinal structure.

If it is determined that seismic surveys should be used to map the coal seams at Division Mountain, it is recommended that:

- a. Explosives be used as the energy source to permit mapping the coal seams to a depth sufficient to delineate structures.
- b. A three man crew be used with any 12-channel instrument and that there is ready access to the survey grid.
- c. Fully computerized data processing be used to allow the survey crew to keep up with the data and provide complete results in the field.
- d. Survey lines be tied together with tie lines at each end to permit horizons to be followed confidently from line to line.
- e. Topographic surveys should be conducted prior to the seismic survey if a large program is undertaken.

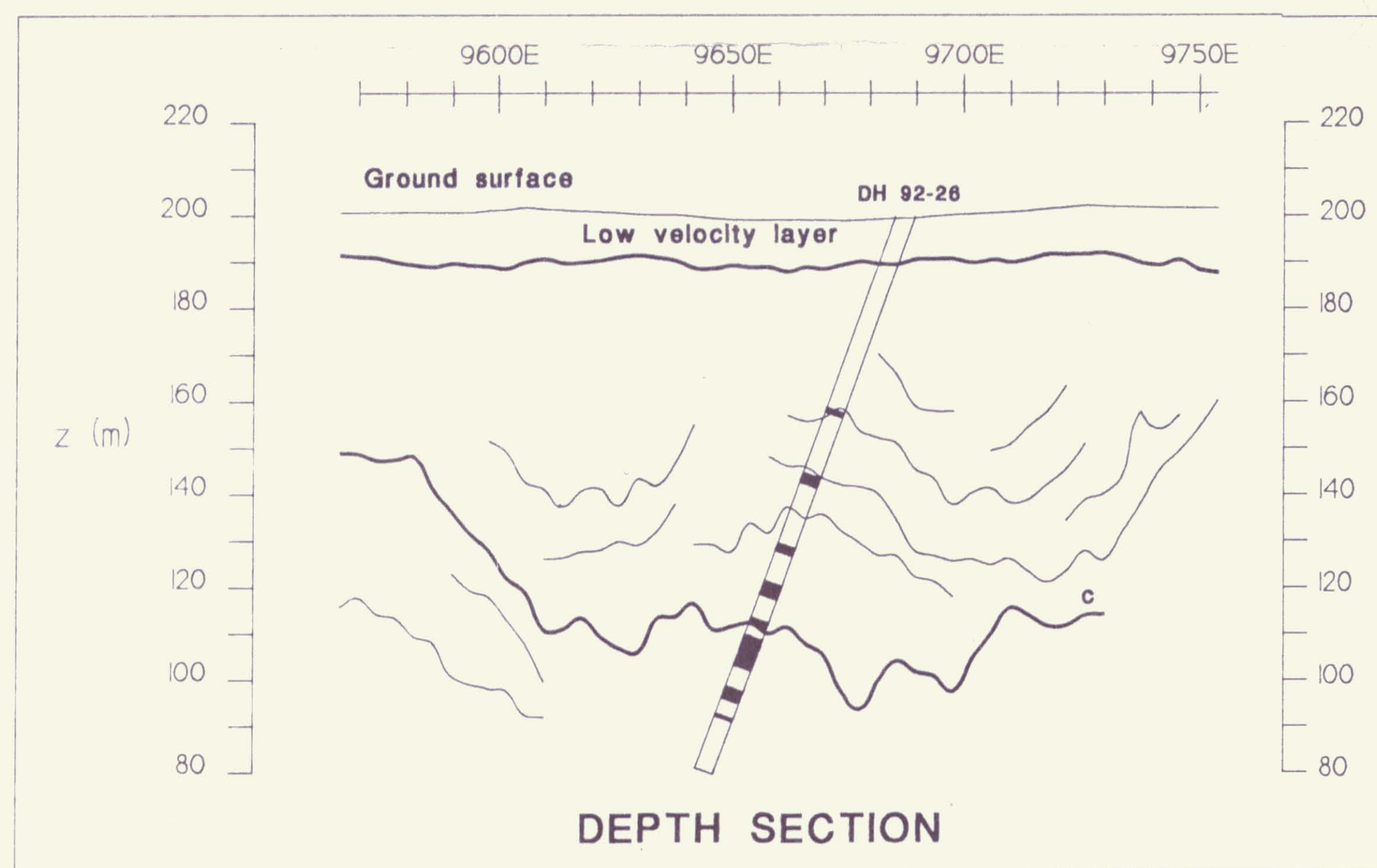
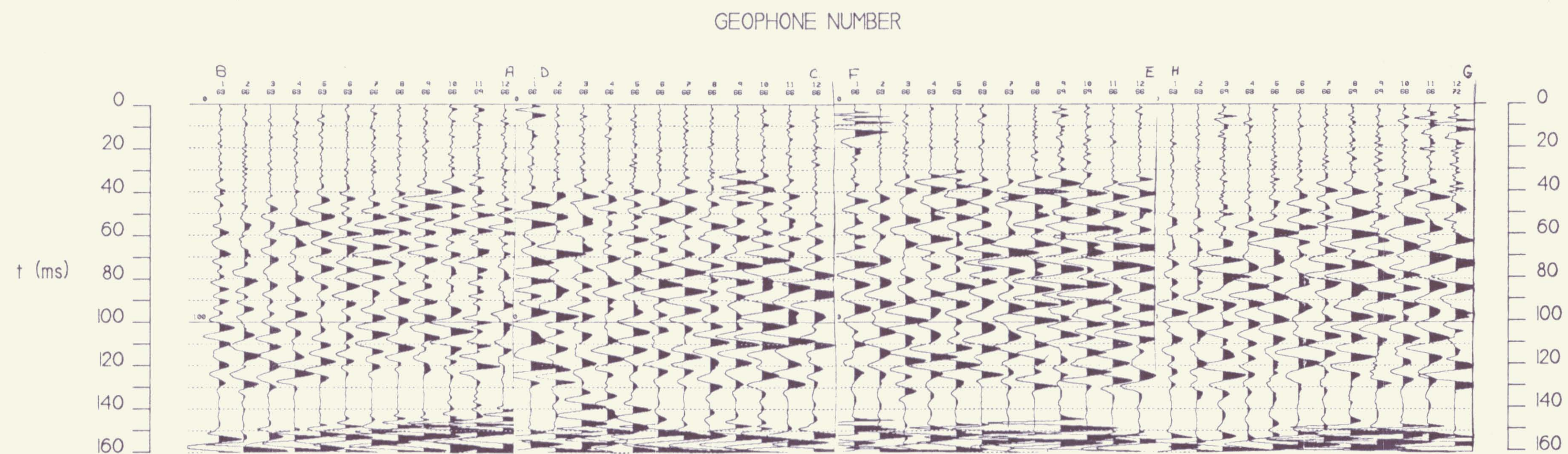
Respectfully Submitted,
AMEROK GEOPHYSICS



M. A. Power M. Sc. P. Geo.
Geophysicist

References Cited

- Pullen, S. and J. A. Hunter 1990. Delineation of buried bedrock valleys using the Optimum Offset shallow seismic reflection technique. in: S. Ward (ed.) Geotechnical and Environmental Geophysics - Volume III: Geotechnical. p75-88.
- Steeple, D.W. and R.D. Miller 1990. Seismic reflection methods applied to engineering, environmental and groundwater problems. in: S. Ward (ed.) Geotechnical and Environmental Geophysics - Volume I - Review and Tutorial. p 1-30.



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metres

093307

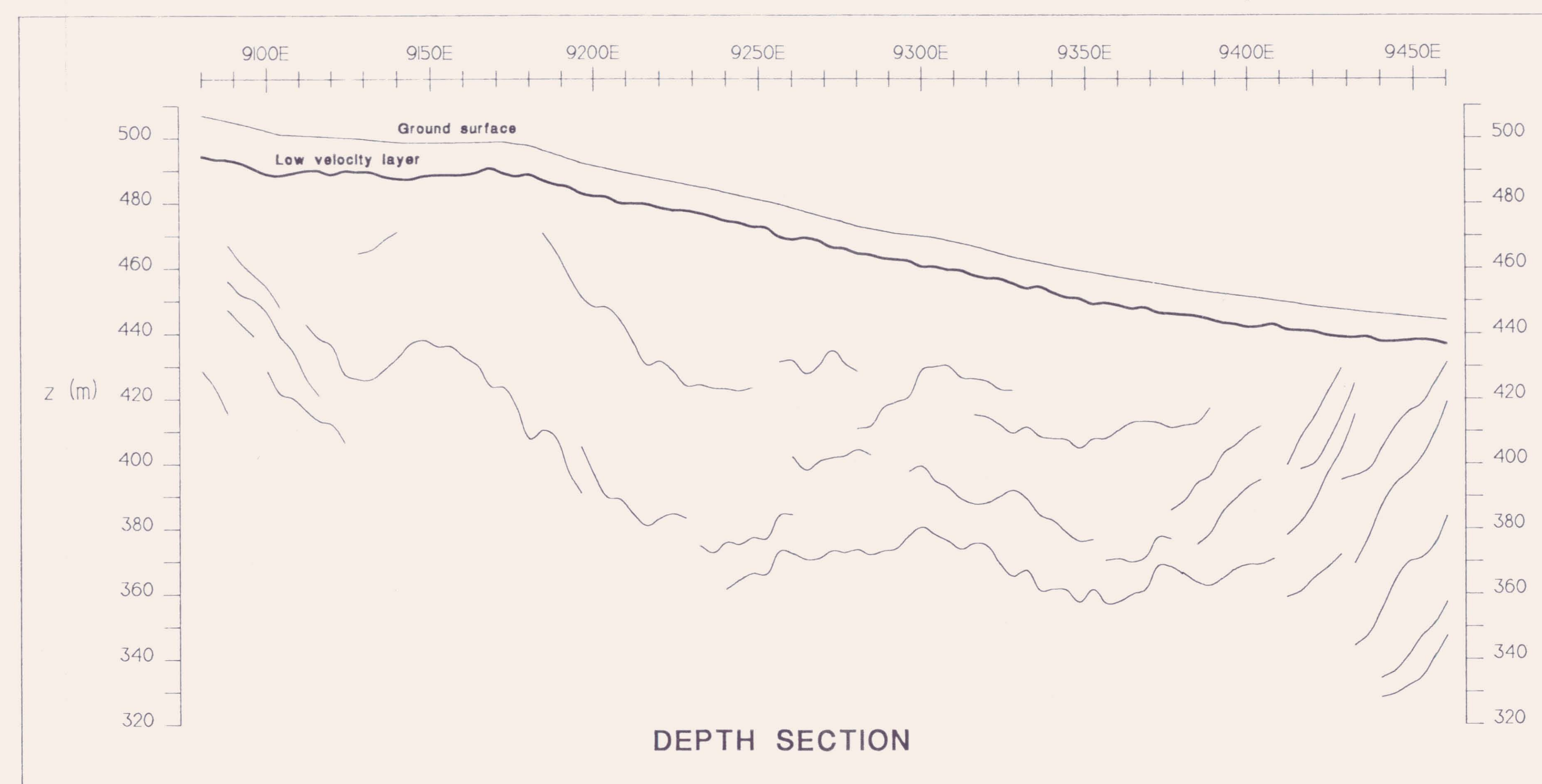
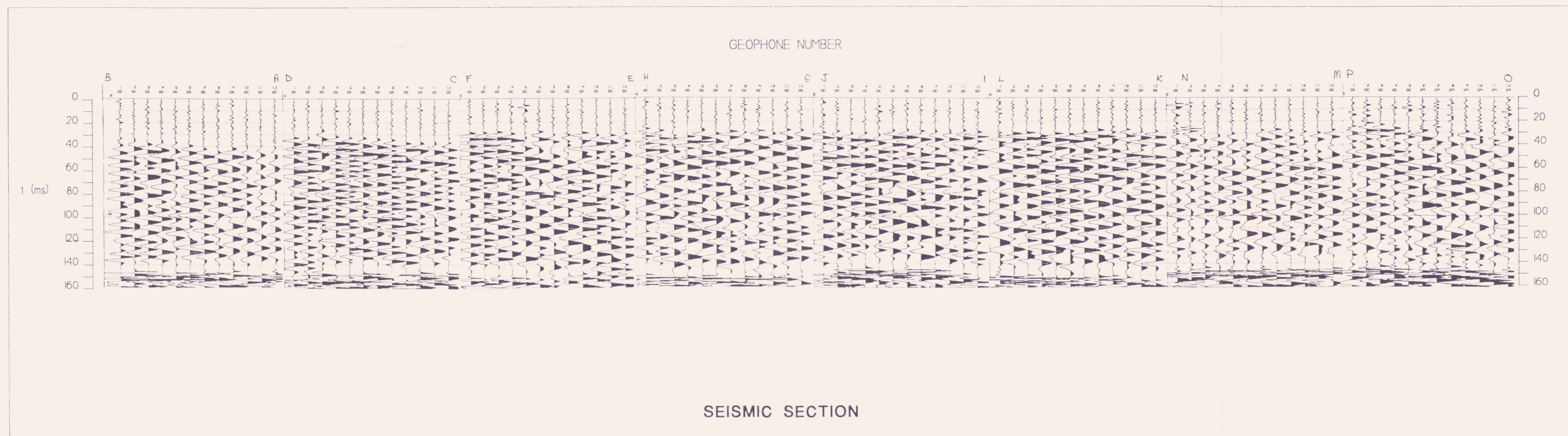
DWG ③



CASH RESOURCES LTD.	DIVISION MOUNTAIN COAL	
Optimum Offset Seismic Survey Line 10914N	Mining District: Whitehorse	
	NTS: 105 H 8	Scale: 1:1,000
	OPERATOR: G. Lee / M. Power	
	DATE: 24NOV94	Figure: 3



AMEROK GEOPHYSICS



0 50 metres

093307

PROJECT
PROVINCIAL
M.A. POWER
SARANTO
COLLIERIES
GEOPHYSICS

CASH RESOURCES LTD.	DIVISION MOUNTAIN COAL
Optimum Offset Seismic Survey Line 13353N	Mining District: Whitehorse NTS: 1:5 H 8 Scale: 1:1,000
AMEROK GEOPHYSICS	OPERATOR: G. Lee / M. Power DATE: 24NOV94 Figure: 4

APPENDIX X
HYDROLOGICAL SURVEY DATA

J. Gibson & Associates
Site 15 Comp 111 RR # 2
Whitehorse, Yukon
Y1A 5W8

July 21, 1994

Archer, Cathro & Associates (1981) Limited
1016 - 510 West Hastings Street
Vancouver, B.C.
V6B 1L8

Dear Rob:

I enclose a copy of the water quality analysis results along with results of field measurements for the June, 1994 survey of the Division Coal property.

The survey was done jointly with Gord Mitchell of the Northern Affairs Land Use section. Access was by truck and ATV.

All five sites were sampled on this survey, with flow measurements taken at the upper Klusha Creek, Upper Nordenskiold River and Teslin Creek sites. Compared with June 26, 1993 flow results, both the Klusha and Nordenskiold drainages show decreased volumes, 57% and 62% respectively of volumes measured in 1993.

Laboratory results include a duplicate sample at station DC-2 and a lab inhouse quality control duplicate analysis for station DC-3.

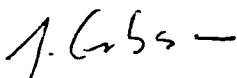
Water quality analysis results show some minor anomalies:

- an increase from the upper to lower Nordenskiold in sulfur (2.4 to 8.5 mg/l).
- an increase in total alkalinity and color from upstream to downstream in the Nordenskiold River.
- increases in aluminum (<0.01 to 0.13 mg/l), iron (0.135 to 0.277 mg/l) and titanium (0.003 to 0.01 mg/l) with downstream movement in the Klusha drainage.
- Lead and selenium were below detection levels at all stations this survey (previously high).

A final 1994 survey is planned for mid October to coincide with the 1993 surveys. As in 1993, a final report for the 1994 surveys will be written after the October survey.

I also enclose my invoice for performing the survey.

Yours truly,



John Gibson.

Quanta Trace Laboratories Inc.

#401-3700 Gilmore Way
Burnaby, B.C. V5G 4M1

Tel: (604) 438-5226

Fax: (604) 436-0565

To: J. GIBSON & ASSOCIATES

W/O: 23645 Page 1

Sample type	water	water	water	water	water
Identification	DC-1	DC-1	DC-2	DC-2	DC-2
Lab Reference #	23645-001	23645-001	23645-002	23645-002	Duplicate 23645-003

PHYSICAL TESTS - ALKALINITY

Hydroxide CaCO3	< 5.	-	< 5.	-	< 5.
Carbonate CaCO3	< 5.	-	< 5.	-	< 5.
Bicarb. CaCO3	97.	-	105.	-	110.
Total Alk. CaCO3	97.	-	105.	-	110.
Results in	mg/L		mg/L		mg/L

PHYSICAL TESTS

Colour TCU	15.	-	15.	-	15.
Conduct. uS/cm	225.	-	230.	-	230.
pH	7.9	-	8.2	-	8.2
Turbidity FTU	4.	-	3.	-	4.

SOLIDS

Suspended 105C	6.	-	6.	-	7.
Results in	mg/L		mg/L		mg/L

ANIONS BY IEC

Sulfate SO4	8.4	-	9.1	-	9.1
Results in	mg/L		mg/L		mg/L

NITROGEN

Ammonia NH3-N	-	-	< 0.05	-	< 0.05
NO2 + NO3 N	< 0.005	-	< 0.005	-	< 0.005
Results in	mg/L		mg/L		mg/L
Total Cyanide CN	0.02	-	< 0.005	-	< 0.005
O-Phosphate PO4-P	< 0.005	-	< 0.005	-	< 0.005
Results in	mg/L		mg/L		mg/L

ICP - ULTRASONIC NEBULIZATION

Method used	filt. 0.45u wave HNO3		filt. 0.45u wave HNO3		filt. 0.45u	
	DISSOLVED	TOTAL	DISSOLVED	TOTAL	DISSOLVED	
TOTAL HARDNESS						
T Hardness CaCO3	109.	110.	114.	115.	108.	

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W/O: 23645 Page 2

Sample type		water		water		water		water		water	
Identification		DC-1		DC-1		DC-2		DC-2		DC-2	
Lab Reference #		23645-001		23645-001		23645-002		23645-002		23645-003	
ICP - ULTRASONIC NEBULIZATION											
Method used		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3	
		DISSOLVED		TOTAL		DISSOLVED		TOTAL		DISSOLVED	
Aluminum	Al	<	0.01	<	0.06	<	0.01	<	0.05	<	0.01
Antimony	Sb	<	0.02	<	0.02	<	0.02	<	0.02	<	0.02
Arsenic	As	<	0.02	<	0.02	<	0.02	<	0.02	<	0.02
Barium	Ba		0.0463		0.0460		0.0471		0.0471		0.0455
Beryllium	Be	<	0.0002	<	0.0002	<	0.0002	<	0.0002	<	0.0002
Bismuth	Bi	<	0.02	<	0.02	<	0.02	<	0.02	<	0.02
Cadmium	Cd	<	0.0006	<	0.0006	<	0.0006	<	0.0006	<	0.0006
Calcium	Ca		33.3		33.3		34.5		34.9		33.0
Chromium	Cr	<	0.001	<	0.001	<	0.001	<	0.001	<	0.001
Cobalt	Co	<	0.001	<	0.001	<	0.001	<	0.001	<	0.001
Copper	Cu		0.009		0.009		0.011		0.017		0.009
Iron	Fe		0.037		0.148		0.071		0.146		0.046
Lead	Pb	<	0.01	<	0.01	<	0.01	<	0.01	<	0.01
Lithium	Li	<	0.002	<	0.002	<	0.002	<	0.002	<	0.002
Magnesium	Mg		6.23		6.26		6.61		6.71		6.27
Manganese	Mn		0.017		0.024		0.021		0.024		0.017
Molybdenum	Mo	<	0.005	<	0.005	<	0.005	<	0.005	<	0.005
Nickel	Ni	<	0.001	<	0.001	<	0.001	<	0.002	<	0.001
Phosphorus	P	<	0.06	<	0.06	<	0.06	<	0.06	<	0.06
Potassium	K		1.2		1.3		1.2		1.2		1.3
Selenium	Se	<	0.02	<	0.02	<	0.02	<	0.02	<	0.02
Silicon	Si		2.90		2.98		3.03		3.23		2.92
Silver	Ag	<	0.001	<	0.001	<	0.001	<	0.001	<	0.001
Sodium	Na		3.87		3.88		4.12		4.92		3.97
Strontium	Sr		0.24		0.27		0.25		0.27		0.23
Sulfur	S	<	0.1		2.4		7.9		8.5		3.9
Tin	Sn	<	0.01	<	0.01	<	0.01	<	0.01	<	0.01
Titanium	Ti		0.003		0.005		0.003		0.005		0.002
Thorium	Th	<	0.01	<	0.01	<	0.01	<	0.01	<	0.01
Uranium	U	<	0.07	<	0.07	<	0.07	<	0.07	<	0.07
Vanadium	V	<	0.002	<	0.002	<	0.002	<	0.002	<	0.002
Zinc	Zn	<	0.005	<	0.005	<	0.005	<	0.005	<	0.005
Zirconium	Zr	<	0.001	<	0.001	<	0.001	<	0.001	<	0.001
Results in		mg/L		mg/L		mg/L		mg/L		mg/L	

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To: J. GIBSON & ASSOCIATES

W/O: 23645 Page 3

Sample type	water	water	water	water	water
Identification	DC-2	DC-3	DC-3	DC-3	DC-3
Fraction		Duplicate	Duplicate	Duplicate	Duplicate
Lab Reference #	23645-003	23645-004A	23645-004A	23645-004B	23645-004B
PHYSICAL TESTS - ALKALINITY					
Hydroxide CaCO3	-	< 5.	-	< 5.	-
Carbonate CaCO3	-	< 5.	-	< 5.	-
Bicarb. CaCO3	-	160.	-	160.	-
Total Alk. CaCO3	-	160.	-	160.	-
Results in		mg/L		mg/L	
PHYSICAL TESTS					
Colour TCU	-	48.	-	48.	-
Conduct. uS/cm	-	470.	-	470.	-
pH	-	7.8	-	7.9	-
Turbidity FTU	-	< 1.	-	< 1.	-
SOLIDS					
Suspended 105C	-	< 5.	-	< 5.	-
Results in		mg/L		mg/L	
ANIONS BY IEC					
Sulfate SO4	-	4.9	-	4.9	-
Results in		mg/L		mg/L	
NITROGEN					
Ammonia NH3-N	-	< 0.05	-	< 0.05	-
NO2 + NO3 N	-	< 0.005	-	< 0.005	-
Results in		mg/L		mg/L	
Total Cyanide CN	-	0.014	-	0.008	-
O-Phosphate PO4-P	-	< 0.005	-	< 0.005	-
Results in		mg/L		mg/L	
ICP - ULTRASONIC NEBULIZATION					
Method used	ulwave HNO3	filt. 0.45ulwave HNO3	ulwave HNO3	filt. 0.45ulwave HNO3	ulwave HNO3
	TOTAL	DISSOLVED	TOTAL	DISSOLVED	TOTAL
TOTAL HARDNESS					
T Hardness CaCO3	110.	231.	233.	217.	220.

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W/O: 23645 Page 4

Sample type		water	water	water	water	water
Identification		DC-2	DC-3	DC-3	DC-3	DC-3
		Duplicate				
Fraction			Duplicate	Duplicate	Duplicate	Duplicate
Lab Reference #		23645-003	23645-004A	23645-004A	23645-004B	23645-004B
ICP - ULTRASONIC NEBULIZATION						
Method used		ulwave HNO3	filt. 0.45u	ulwave HNO3	filt. 0.45u	ulwave HNO3
		TOTAL	DISSOLVED	TOTAL	DISSOLVED	TOTAL
Aluminum	Al	0.05	< 0.01	< 0.01	< 0.01	0.02
Antimony	Sb	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Arsenic	As	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Barium	Ba	0.0477	0.0231	0.0236	0.0219	0.0215
Beryllium	Be	< 0.0002	< 0.0002	< 0.0002	< 0.0002	< 0.0002
Bismuth	Bi	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Cadmium	Cd	< 0.0006	< 0.0006	< 0.0006	< 0.0006	< 0.0006
Calcium	Ca	34.3	58.4	58.9	55.2	56.5
Chromium	Cr	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	Co	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	0.013	0.012	0.019	0.010	0.018
Iron	Fe	0.157	0.041	0.063	0.036	0.072
Lead	Pb	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Lithium	Li	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Magnesium	Mg	6.51	20.7	21.1	19.3	19.9
Manganese	Mn	0.028	0.014	0.018	0.014	0.015
Molybdenum	Mo	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	Ni	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Phosphorus	P	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Potassium	K	1.4	0.8	0.7	0.9	1.
Selenium	Se	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Silicon	Si	2.95	6.27	6.77	5.87	5.87
Silver	Ag	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sodium	Na	4.05	11.8	11.9	11.4	12.1
Strontium	Sr	0.18	0.55	0.61	0.52	0.56
Sulfur	S	0.9	18.9	18.9	18.8	19.4
Tin	Sn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Titanium	Ti	0.005	0.003	0.003	0.003	0.004
Thorium	Th	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Uranium	U	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Vanadium	V	< 0.002	0.004	0.004	< 0.002	< 0.002
Zinc	Zn	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Zirconium	Zr	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Results in		mg/L	mg/L	mg/L	mg/L	mg/L

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W/O: 23645 Page 5

Sample type	water	water	water	water
Identification	DC-4	DC-4	DC-5	DC-5
Lab Reference #	23645-005	23645-005	23645-006	23645-006

PHYSICAL TESTS - ALKALINITY

Hydroxide CaCO3	< 5.	-	< 5.	-
Carbonate CaCO3	< 5.	-	< 5.	-
Bicarb. CaCO3	147.	-	162.	-
Total Alk. CaCO3	147.	-	162.	-
Results in	mg/L		mg/L	

PHYSICAL TESTS

Colour TCU	17.	-	25.	-
Conduct. uS/cm	330.	-	320.	-
pH	8.3	-	8.5	-
Turbidity FTU	1.	-	1.	-

SOLIDS

Suspended 105C	< 5.	-	< 5.	-
Results in	mg/L		mg/L	

ANIONS BY IEC

Sulfate SO4	24.2	-	24.8	-
Results in	mg/L		mg/L	

NITROGEN

Ammonia NH3-N	< 0.05	-	< 0.05	-
NO2 + NO3 N	< 0.005	-	< 0.005	-
Results in	mg/L		mg/L	

Total Cyanide CN	0.022	-	< 0.005	-
O-Phosphate PO4-P	< 0.005	-	< 0.005	-
Results in	mg/L		mg/L	

ICP - ULTRASONIC NEBULIZATION

Method used	filt. 0.45ul wave HN03	filt. 0.45ul wave HN03	filt. 0.45ul wave HN03	filt. 0.45ul wave HN03
	DISSOLVED	TOTAL	DISSOLVED	TOTAL
TOTAL HARDNESS				
T Hardness CaCO3	147.	150.	147.	153.

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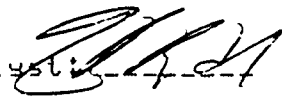
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W/O: 23645 Page 6

Sample type		water		water		water		water	
Identification		DC-4		DC-4		DC-5		DC-5	
Lab Reference #		23645-005		23645-005		23645-006		23645-006	
ICP - ULTRASONIC NEBULIZATION									
Method used		filt. 0.45u wave HNO3		filt. 0.45u wave HNO3		filt. 0.45u wave HNO3		filt. 0.45u wave HNO3	
		DISSOLVED		TOTAL		DISSOLVED		TOTAL	
Aluminum	Al	<	0.01	<	0.01	<	0.01	<	0.13
Antimony	Sb	<	0.02	<	0.02	<	0.02	<	0.02
Arsenic	As	<	0.02	<	0.02	<	0.02	<	0.02
Barium	Ba		0.0685		0.0691		0.0662		0.0665
Beryllium	Be	<	0.0002	<	0.0002	<	0.0002	<	0.0002
Bismuth	Bi	<	0.02	<	0.02	<	0.02	<	0.02
Cadmium	Cd	<	0.0006	<	0.0006	<	0.0006	<	0.0006
Calcium	Ca		39.3		34.9		38.2		39.0
Chromium	Cr	<	0.001	<	0.001	<	0.001	<	0.001
Cobalt	Co	<	0.001	<	0.001	<	0.001	<	0.001
Copper	Cu		0.011		0.012		0.010		0.01
Iron	Fe		0.081		0.135		0.076		0.277
Lead	Pb	<	0.01	<	0.01	<	0.01	<	0.01
Lithium	Li	<	0.002	<	0.002	<	0.002	<	0.002
Magnesium	Mg		11.9		12.3		12.4		12.2
Manganese	Mn		0.024		0.031		0.017		0.034
Molybdenum	Mo	<	0.005	<	0.005	<	0.005	<	0.005
Nickel	Ni	<	0.001	<	0.001	<	0.001	<	0.001
Phosphorus	P	<	0.06	<	0.06	<	0.06	<	0.06
Potassium	K		1.1		1.4		1.		1.1
Selenium	Se	<	0.02	<	0.02	<	0.02	<	0.02
Silicon	Si		4.16		4.56		3.75		3.76
Silver	Ag	<	0.001	<	0.001	<	0.001	<	0.001
Sodium	Na		12.1		12.8		11.7		11.9
Strontium	Sr		0.36		0.37		0.37		0.37
Sulfur	S	<	0.1		5.2		0.6		7.6
Tin	Sn	<	0.01	<	0.01	<	0.01	<	0.01
Titanium	Ti		0.003		0.003		0.003		0.01
Thorium	Th	<	0.01	<	0.01	<	0.01	<	0.01
Uranium	U	<	0.07	<	0.07	<	0.07	<	0.07
Vanadium	V	<	0.002		0.004	<	0.002		0.003
Zinc	Zn	<	0.005	<	0.005	<	0.005	<	0.005
Zirconium	Zr	<	0.001	<	0.001	<	0.001	<	0.001
Results in		mg/L		mg/L		mg/L		mg/L	

Test results are for internal use only. Quanta Trace liability is limited to the testing fee paid.

Analyst: 

Division Coal Property

June, 1994 - Water Quality Field Measurements

Station	pH (ru)	Cond.(us/cm)	Temp(C)	D.O.(mg/l)	Q(cms)
DC-1	8.38	225	8.9	6.8	3.095
DC-2	8.42	226	10.5	6.8	-
DC-3	7.73	448	3.9	4.8	<0.5 est
DC-4	8.42	323	9.7	7.0	0.452
DC-5	8.79	310	12.1	5.5	-

Station Locations: DC-1 = Nordenskiold River upstream
DC-2 = Nordenskiold River downstream
DC-3 = Teslin Creek draining north face Div. Mt.
DC-4 = Klusha Creek upstream
DC-5 = Klusha Creek downstream

Water Quality field measurements taken with an ICM Multimeter - all parameters calibrated previous day to known standards, dissolved oxygen compensated for atmospheric pressure.
Flow volumes (Q) measured with Price meter.

STAFF GAUGE - DISCHARGE CALIBRATION

Project Name Division Site ID: DC-1

Project #: Date: June 27/94

S.G. @ Start none S.G. @ Finish: none

Distance	Depth	Velocity	Width	Area	Discharge
3.1	0	0	0.2	0	0
3.5	0.64	0.28	0.7	0.448	0.12544
4.5	0.61	0.401	1	0.61	0.24461
5.5	0.54	0.359	1	0.54	0.19386
6.5	0.58	0.386	1	0.58	0.22388
7.5	0.45	0.393	1	0.45	0.17685
8.5	0.78	0.229	1	0.78	0.17862
9.5	0.72	0.245	0.9	0.648	0.15876
10.3	0.74	0.304	0.8	0.592	0.179968
11.1	0.72	0.318	0.75	0.54	0.17172
11.8	0.45	0.353	0.7	0.315	0.111195
12.5	0.42	0.409	0.7	0.294	0.120246
13.2	0.56	0.311	0.7	0.392	0.121912
13.9	0.42	0.386	0.7	0.294	0.113484
14.6	0.46	0.401	0.85	0.391	0.156791
15.6	0.44	0.464	1	0.44	0.20416
16.6	0.48	0.544	1	0.48	0.26112
17.6	0.44	0.498	1	0.44	0.21912
18.6	0.42	0.454	0.7	0.294	0.133476
19	0	0	0.2	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
15.9			15.9	8.528	3.095212

Data Logger Reading: no logger

Channel under ice?: no

Method: Price meter

Crew: Gibson

STAFF GAUGE - DISCHARGE CALIBRATION

Project Name Division Site ID: DC-4

Project #: Date: June 27/94

S.G. @ Start none S.G. @ Finish: none

Distance	Depth	Velocity	Width	Area	Discharge
3.9	0	0	0.1	0	0
4.1	0.17	0.333	0.25	0.0425	0.014152
4.4	0.2	0.359	0.3	0.06	0.02154
4.7	0.15	0.298	0.3	0.045	0.01341
5	0.2	0.274	0.3	0.06	0.01644
5.3	0.21	0.566	0.3	0.063	0.035658
5.6	0.16	0.51	0.3	0.048	0.02448
5.9	0.25	0.401	0.3	0.075	0.030075
6.2	0.27	0.604	0.3	0.081	0.048924
6.5	0.31	0.464	0.25	0.0775	0.03596
6.7	0.3	0.51	0.2	0.06	0.0306
6.9	0.34	0.604	0.2	0.068	0.041072
7.1	0.31	0.617	0.2	0.062	0.038254
7.3	0.34	0.617	0.2	0.068	0.041956
7.5	0.24	0.28	0.2	0.048	0.01344
7.7	0.24	0.311	0.25	0.06	0.01866
8	0.2	0.401	0.3	0.06	0.02406
8.3	0.12	0.154	0.175	0.021	0.003234
8.35	0	0	0.025	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
4.45			4.45	0.999	0.451915

Data Logger Reading: no logger

Channel under ice?: no

Method: Price meter

Crew: Gibson

Division Coal Property

October 3, 1994 - Field Measurement Results

Station	pH(ru)	Cond.(us/cm)	Temp (C)	D.O.(mg/l)	Q(cms)
DC-1	7.98	234	1.9	6.8	2.691
DC-2	8.06	50.5?	1.8	6.2	-
DC-3	7.56	521	0.1	7.7	<0.001
DC-4	8.09	341	1.7	8.0	0.746
DC-5	8.01	362	3.8	6.7	-

Station Locations : DC-1 Nordenskiold River u/s Division Mt
DC-2 Nordenskiold River d/s Division Mt
DC-3 Teslin Creek at road crossing
DC-4 Klusha Creek u/s Division Mt
DC-5 Klusha Creek d/s Division Mt

Water quality field measurements taken with an ICM Multimeter - all parameters calibrate previous day to known standards. Dissolved oxygen compensated for atmospheric pressure.

Flow volumes (Q) measured with Price velocity meter.

STAFF GAUGE - DISCHARGE CALIBRATION

Project Name: Division Coal

Site ID : DC-4

Project #:

Date: Oct 4, 1994

S.G. @ Start: no S.G.

S.G. @ Finish: no S.G.

Distance (m)	Depth (m)	Velocity (m/s)	Width (m)	Area (m sq)	Discharge (cms)
4.05	0	0	0.125	0	0
4.3	0.25	0.353	0.325	0.08125	0.028681
4.7	0.24	0.555	0.4	0.096	0.05328
5.1	0.2	0.348	0.45	0.09	0.03132
5.6	0.12	0.51	0.5	0.06	0.0306
6.1	0.19	0.435	0.45	0.0855	0.037192
6.5	0.23	0.884	0.45	0.1035	0.091494
7	0.26	0.807	0.45	0.117	0.094419
7.4	0.3	0.826	0.4	0.12	0.09912
7.8	0.31	0.347	0.4	0.124	0.043028
8.2	0.2	0.903	0.4	0.08	0.07224
8.6	0.19	0.617	0.4	0.076	0.046892
9	0.15	0.646	0.4	0.06	0.03876
9.4	0.12	0.342	0.4	0.048	0.016416
9.8	0.12	0.342	0.4	0.048	0.016416
10.2	0.18	0.28	0.4	0.072	0.02016
10.6	0.08	0.342	0.35	0.028	0.009576
10.9	0.24	0.347	0.2	0.048	0.016656
11	0	0	0.05	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
6.95			6.95	1.33725	0.746250

Data Logger Reading: no logger

Channel under ice?: no - aquatic veg 4.05-5.1 and 9.0-11.0

Method: Price meter

Crew: J. Gibson

STAFF GAUGE - DISCHARGE CALIBRATION

Project Name: Division Coal

Site ID : DC-1

Project #:

Date: Oct 4, 1994

S.G. @ Start: no S.G.

S.G. @ Finish: no S.G.

Distance (m)	Depth (m)	Velocity (m/s)	Width (m)	Area (m sq)	Discharge (cms)
3.5	0	0	0.15	0	0
3.8	0.52	0.464	0.45	0.234	0.108576
4.4	0.52	0.417	0.8	0.416	0.173472
5.4	0.56	0.417	1	0.56	0.23352
6.4	0.46	0.51	1	0.46	0.2346
7.4	0.38	0.486	1	0.38	0.18468
8.4	0.36	0.475	1	0.36	0.171
9.4	0.35	0.449	1	0.35	0.15715
10.4	0.42	0.417	1	0.42	0.17514
11.4	0.41	0.417	1	0.41	0.17097
12.4	0.56	0.359	1	0.56	0.20104
13.4	0.44	0.386	1	0.44	0.16984
14.4	0.36	0.426	1	0.36	0.15336
15.4	0.4	0.454	1	0.4	0.1816
16.4	0.4	0.318	1	0.4	0.1272
17.4	0.58	0.182	1	0.58	0.10556
18.4	0.56	0.426	0.6	0.336	0.143136
18.6	0	0	0.1	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
			0	0	0
15.1			15.1	6.666	2.690844

Data Logger Reading: no logger

Channel under ice?: no

Method: Price meter

Crew: J. Gibson

Quanta Trace Laboratories Inc.

#401-3700 Gilmore Way
Burnaby, B.C. V5G 4M1

Tel: (604) 438-5226

Fax: (604) 436-0565

ANALYSIS OF WATER SAMPLES

To: J. GIBSON & ASSOCIATES
Site 15, Comp 111, RR2
Whitehorse, Yukon *
Y1A 5W8

Workorder: 24439
Received : 06-Oct-94
Completed: 17-Oct-94

Attn: John Gibson

Re: Division Coal/Baseline Wtrs

Quanta Trace Laboratories Inc.

#401-3700 Gilmore Way
Burnaby, B.C. V5G 4M1

Tel: (604) 438-5226
Fax: (604) 436-0565

To: J. GIBSON & ASSOCIATES

W/O: 24439 Page 1

Sample type	effluent	effluent	effluent	effluent	effluent
Identification	DC-1	DC-1	DC-2	DC-2	DC-3
Lab Reference #	24439-001	24439-001	24439-002	24439-002	24439-003
PHYSICAL TESTS - ALKALINITY					
Total Alk. CaCO ₃	115.	-	115.	-	191.
Results in	mg/L		mg/L		mg/L
PHYSICAL TESTS					
Colour TCU	5.	-	5.	-	38.
Conduct. uS/cm	235.	-	235.	-	515.
pH	8.2	-	8.2	-	8.1
Turbidity FTU	2.	-	2.	-	1.
SOLIDS					
Suspended 105C	< 5.	-	< 5.	-	< 5.
Results in	mg/L		mg/L		mg/L
ANIONS BY IEC					
Sulfate SO ₄	10.3	-	10.1	-	86
Results in	mg/L		mg/L		mg/L
NITROGEN					
Ammonia NH ₃ -N	< 0.05	-	< 0.05	-	< 0.05
NO ₂ + NO ₃ N	0.017	-	0.007	-	< 0.005
Results in	mg/L		mg/L		mg/L
PHOSPHOROUS					
Ortho PO ₄ -P	0.019	-	0.018	-	0.037
Results in	mg/L		mg/L		mg/L
Total Cyanide CN					
Results in	< 0.005	-	< 0.005	-	< 0.005
	mg/L		mg/L		mg/L

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To: J. GIBSON & ASSOCIATES

W/O: 24439 Page 2

Sample type		effluent	effluent	effluent	effluent	effluent
Identification		DC-1	DC-1	DC-2	DC-2	DC-3
Lab Reference #		24439-001	24439-001	24439-002	24439-002	24439-003
ICP - ULTRASONIC NEBULIZATION						
Method used		filt. 0.45µm	ultrasonic HNO3	filt. 0.45µm	ultrasonic HNO3	filt. 0.45µm
		DISSOLVED	TOTAL	DISSOLVED	TOTAL	DISSOLVED
Aluminum	Al	< 0.01	0.03	< 0.01	0.04	< 0.01
Antimony	Sb	< 0.02	0.02	< 0.02	0.02	< 0.02
Arsenic	As	< 0.02	0.02	< 0.02	0.02	< 0.02
Barium	Ba	0.0503	0.0509	0.0492	0.0498	0.0190
Beryllium	Be	< 0.0002	0.0002	< 0.0002	0.0002	< 0.0002
Bismuth	Bi	< 0.02	0.02	< 0.02	0.02	< 0.02
Cadmium	Cd	< 0.0005	0.0005	< 0.0005	0.0005	< 0.0005
Calcium	Ca	35.7	35.8	35.1	35.3	61.7
Chromium	Cr	< 0.001	0.001	< 0.001	0.001	< 0.001
Cobalt	Co	< 0.001	0.001	< 0.001	0.001	< 0.001
Copper	Cu	0.003	0.005	0.003	0.005	0.004
Iron	Fe	0.080	0.278	0.043	0.132	0.043
Lead	Pb	< 0.01	0.01	< 0.01	0.01	< 0.01
Lithium	Li	< 0.002	0.002	< 0.002	0.002	< 0.002
Magnesium	Mg	7.34	7.39	7.36	7.44	23.5
Manganese	Mn	0.014	0.021	0.015	0.021	0.018
Molybdenum	Mo	< 0.005	0.005	< 0.005	0.005	< 0.005
Nickel	Ni	< 0.001	0.001	< 0.001	0.001	0.004
Phosphorus	P	< 0.06	0.06	< 0.06	0.06	< 0.06
Potassium	K	1.6	1.7	1.6	1.7	2.5
Selenium	Se	< 0.02	0.03	< 0.02	0.02	< 0.02
Silicon	Si	4.29	4.32	4.25	4.24	7.48
Silver	Ag	< 0.001	0.001	< 0.001	0.001	< 0.001
Sodium	Na	4.78	4.79	4.62	4.70	13.1
Strontium	Sr	0.28	0.28	0.27	0.28	0.55
Sulfur	S	3.3	3.5	3.4	3.4	26.4
Thorium	Th	< 0.01	0.01	< 0.01	0.01	< 0.01
Tin	Sn	< 0.01	0.01	< 0.01	0.01	0.01
Titanium	Ti	0.001	0.002	0.001	0.003	0.001
Uranium	U	< 0.07	0.07	< 0.07	0.07	< 0.07
Vanadium	V	< 0.002	0.002	< 0.002	0.002	0.003
Zinc	Zn	< 0.006	0.007	< 0.005	0.005	< 0.005
Zirconium	Zr	< 0.001	0.001	< 0.001	0.001	< 0.001
Results in		mg/L	mg/L	mg/L	mg/L	mg/L

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To: J. GIBSON & ASSOCIATES

W/O: 24439 Page 3

Sample type	effluent	effluent	effluent	effluent	effluent
Identification	DC-3	DC-4	DC-4	DC-4	DC-4
Fraction		Duplicate	Duplicate	Duplicate	Duplicate
Lab Reference #	24439-003	24439-004A	24439-004A	24439-004B	24439-004B
PHYSICAL TESTS - ALKALINITY					
Total Alk. CaCO ₃	-	164.	-	168.	-
Results in		mg/L		mg/L	
PHYSICAL TESTS					
Colour TCU	-	8.	-	8.	-
Conduct. uS/cm	-	340.	-	340.	-
pH	-	8.3	-	8.3	-
Turbidity FTU	-	2.	-	2.	-
SOLIDS					
Suspended 105C	-	< 5.	-	< 5.	-
Results in		mg/L		mg/L	
ANIONS BY IEC					
Sulfate SO ₄	-	10.4	-	10.4	-
Results in		mg/L		mg/L	
NITROGEN					
Ammonia NH ₃ -N	-	< 0.05	-	< 0.05	-
NO ₂ + NO ₃ N	-	< 0.005	-	< 0.005	-
Results in		mg/L		mg/L	
PHOSPHOROUS					
Ortho PO ₄ -P	-	0.025	-	0.025	-
Results in		mg/L		mg/L	
Total Cyanide CN					
Results in	-	< 0.005	-	< 0.005	-
		mg/L		mg/L	

To: J. GIBSON & ASSOCIATES

W/O: 24439 Page 4

Sample type		effluent	effluent	effluent	effluent	effluent
Identification		DC-3	DC-4	DC-4	DC-4	DC-4
Fraction			Duplicate	Duplicate	Duplicate	Duplicate
Lab Reference #		24439-003	24439-004A	24439-004A	24439-004B	24439-004B
ICP - ULTRASONIC NEBULIZATION						
Method used		ulwave HNO3	filt. 0.45u	ulwave HNO3	filt. 0.45u	ulwave HNO3
		TOTAL	DISSOLVED	TOTAL	DISSOLVED	TOTAL
Aluminum	Al	0.02	0.02	0.02	< 0.01	0.02
Antimony	Sb	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Arsenic	As	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Barium	Ba	0.0196	0.0711	0.0754	0.0721	0.0751
Beryllium	Be	< 0.0002	< 0.0002	0.0003	< 0.0002	0.0003
Bismuth	Bi	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Cadmium	Cd	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Calcium	Ca	64.8	42.6	44.8	43.7	44.4
Chromium	Cr	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt	Co	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Copper	Cu	0.006	0.002	0.007	0.002	0.005
Iron	Fe	0.060	0.045	0.100	0.045	0.077
Lead	Pb	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Lithium	Li	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
Magnesium	Mg	24.0	12.0	12.4	12.3	12.3
Manganese	Mn	0.017	0.017	0.024	0.017	0.024
Molybdenum	Mo	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Nickel	Ni	0.002	0.001	0.001	0.001	0.001
Phosphorus	P	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
Potassium	K	2.5	1.6	1.7	1.6	1.8
Selenium	Se	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Silicon	Si	7.50	5.13	5.16	5.22	5.20
Silver	Ag	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Sodium	Na	13.3	11.2	11.5	11.4	11.5
Strontium	Sr	0.56	0.37	0.39	0.38	0.39
Sulfur	S	26.4	3.7	3.8	3.6	3.9
Thorium	Th	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Tin	Sn	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Titanium	Ti	0.002	0.001	0.001	0.001	0.001
Uranium	U	< 0.07	< 0.07	< 0.07	< 0.07	< 0.07
Vanadium	V	0.003	0.002	0.002	0.002	0.002
Zinc	Zn	< 0.005	< 0.005	< 0.005	< 0.005	< 0.006
Zirconium	Zr	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Results in		mg/L	mg/L	mg/L	mg/L	mg/L

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To: J. GIBSON & ASSOCIATES

W/O: 24439 Page 5

Sample type	effluent	effluent
Identification	DC-5	DC-5
Lab Reference #	24439-005	24439-005
PHYSICAL TESTS - ALKALINITY		
Total Alk. CaCO3	187.	-
Results in	mg/L	
PHYSICAL TESTS		
Colour TCU	6.	-
Conduct. uS/cm	380.	-
pH	8.2	-
Turbidity FTU	1.	-
SOLIDS		
Suspended 105C	< 5.	-
Results in	mg/L	
ANIONS BY IEC		
Sulfate SO4	30	-
Results in	mg/L	
NITROGEN		
Ammonia NH3-N	< 0.05	-
NO2 + NO3 N	< 0.005	-
Results in	mg/L	
PHOSPHOROUS		
Ortho PO4-P	0.029	-
Results in	mg/L	
Total Cyanide CN	< 0.005	-
Results in	mg/L	

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To: J. GIBSON & ASSOCIATES

W/O: 24439 Page 6

Sample type		effluent		effluent		effluent		effluent	
Identification		DC-5		DC-5		TB QC		TB QC	
						Transport		Transport	
						Blanks		Blanks	
Lab Reference #		24439-005		24439-005		24439-006		24439-006	
ICP - ULTRASONIC NEBULIZATION									
Method used		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3		filt. 0.45µ wave HNO3	
		DISSOLVED		TOTAL		DISSOLVED		TOTAL	
Aluminum	Al	<	0.01	<	0.01	<	0.01	<	0.01
Antimony	Sb	<	0.02	<	0.02	<	0.02	<	0.02
Arsenic	As	<	0.02	<	0.02	<	0.02	<	0.02
Barium	Ba		0.0634		0.0637	<	0.0006	<	0.0006
Beryllium	Be	<	0.0002		0.0003	<	0.0002	<	0.0002
Bismuth	Bi	<	0.02	<	0.02	<	0.02	<	0.02
Cadmium	Cd	<	0.0005	<	0.0005	<	0.0005	<	0.0005
Calcium	Ca		54.4		54.5		0.02	<	0.01
Chromium	Cr	<	0.001	<	0.001	<	0.001	<	0.001
Cobalt	Co	<	0.001	<	0.001	<	0.001	<	0.001
Copper	Cu		0.003		0.006	<	0.002	<	0.002
Iron	Fe		0.034		0.064	<	0.003		0.013
Lead	Pb	<	0.01	<	0.01	<	0.01	<	0.01
Lithium	Li	<	0.002	<	0.002	<	0.002	<	0.002
Magnesium	Mg		13.2		13.6	<	0.01	<	0.01
Manganese	Mn		0.030		0.030	<	0.001	<	0.001
Molybdenum	Mo	<	0.005	<	0.005	<	0.005	<	0.005
Nickel	Ni	<	0.001	<	0.001	<	0.001	<	0.001
Phosphorus	P	<	0.06	<	0.06	<	0.06	<	0.06
Potassium	K		2.2		2.2	<	0.2	<	0.2
Selenium	Se	<	0.02	<	0.02	<	0.02	<	0.02
Silicon	Si		5.96		5.98	<	0.06	<	0.06
Silver	Ag	<	0.001	<	0.001	<	0.001	<	0.001
Sodium	Na		8.71		8.78	<	0.06	<	0.06
Strontium	Sr		0.37		0.38	<	0.01	<	0.01
Sulfur	S		8.0		8.2	<	0.1	<	0.1
Thorium	Th	<	0.01	<	0.01	<	0.01	<	0.01
Tin	Sn	<	0.01	<	0.01	<	0.01	<	0.01
Titanium	Ti	<	0.001		0.001	<	0.001	<	0.001
Uranium	U	<	0.07	<	0.07	<	0.07	<	0.07
Vanadium	V		0.003		0.003	<	0.002	<	0.002
Zinc	Zn	<	0.005	<	0.005	<	0.005	<	0.005
Zirconium	Zr	<	0.001	<	0.001	<	0.001	<	0.001
Results in		mg/L		mg/L		mg/L		mg/L	

Test results are for internal use only. Quanta Trace liability is limited to the testing fee paid.

Analyst: _____

QUALITY CONTROL REPORT
SAMPLE # 24439-1

Cations

Calcium	35.7	Magnesium	7.34
Sodium	4.78	Potassium	1.6

Anions

Phenolphthalein Alkalinity	0	Total Alkalinity	115
Sulphate(SO4)	10.3	Chloride(Cl)	0
Fluoride(F)	0	Nitrate Nitrogen(NO3)	0

Results For Sample #24439-1

STATUS

LIMITS:

Cation-Anion Bal.:

PASSED

Cation Sum = 2.63406

Anion Sum = 2.51225

Difference = .121811

<= .14544

QUALITY CONTROL REPORT
SAMPLE # - 2

Cations

Calcium	35.1	Magnesium	7.36
Sodium	4.62	Potassium	1.6

Anions

Phenolphthalein Alkalinity	0	Total Alkalinity	115
Sulphate(SO4)	10.1	Chloride(Cl)	0
Fluoride(F)	0	Nitrate Nitrogen(NO3)	0

Results For Sample #-2

STATUS

LIMITS:

Cation-Anion Bal.:

PASSED

Cation Sum	= 2.59881
Anion Sum	= 2.50808
Difference	= .907226E-01

<= .145375

QUALITY CONTROL REPORT
SAMPLE # - 3

Cations

Calcium	61.7	Magnesium	23.5
Sodium	13.1	Potassium	2.5

Anions

Phenolphthalein Alkalinity	0	Total Alkalinity	191
Sulphate(SO4)	86	Chloride(Cl)	0
Fluoride(F)	0	Nitrate Nitrogen(NO3)	0

Results For Sample #-3

	STATUS	LIMITS:
Cation-Anion Bal.:	PASSED	
Cation Sum	= 5.64571	
Anion Sum	= 5.60756	
Difference	= .381546E-01	<= .193417

QUALITY CONTROL REPORT
SAMPLE # - 4

Cations

Calcium	42.6	Magnesium	12
Sodium	11.2	Potassium	1.6

Anions

Phenolphthalein Alkalinity	0	Total Alkalinity	164
Sulphate(SO4)	10.4	Chloride(Cl)	0
Fluoride(F)	0	Nitrate Nitrogen(NO3)	0

Results For Sample #-4

STATUS

LIMITS:

Cation-Anion Bal.:

PASSED

Cation Sum	= 3.64097
Anion Sum	= 3.49335
Difference	= .14762

<= .160647

QUALITY CONTROL REPORT
SAMPLE # - 5

Cations

Calcium	54.4	Magnesium	13.2
Sodium	8.71	Potassium	2.2

Anions

Phenolphthalein Alkalinity	0	Total Alkalinity	187
Sulphate(SO4)	30	Chloride(Cl)	0
Fluoride(F)	0	Nitrate Nitrogen(NO3)	0

Results For Sample #5

STATUS

LIMITS:

Cation-Anion Bal.:

PASSED

Cation Sum	= 4.23553
Anion Sum	= 4.36116
Difference	= .125629

<= .174098