

**ARCHER, CATHRO**  
**& ASSOCIATES (1981) LIMITED**  
**CONSULTING GEOLOGICAL ENGINEERS**

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**ASSESSMENT REPORT**  
**1995 FIELD WORK**  
**DIVISION MOUNTAIN COAL PROJECT**  
**SOUTHERN YUKON TERRITORY**

Coal Exploration Licences Y457 to Y459, Y464 to Y478, Y479, Y480, Y486 and Y487

NTS 115H/8

Whitehorse Mining District

Prepared by

Archer, Cathro & Associates (1981) Limited

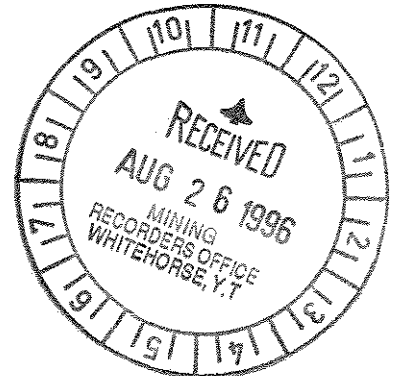
for

**CASH RESOURCES LTD.**

Work conducted between March 22 to August 30, 1995

R.F. Gish, B.Sc.

May, 1996



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## **SUMMARY AND RECOMMENDATIONS**

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 Energy Corporation 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 during the two year period between June 1993 and June 1995 consisted of geophysical surveys, excavator trenching and diamond drilling totalling 7845 m in 48 holes.

Exploration at Division Mountain has been directed toward outlining sufficient open pitable reserves for a mine-mouth power plant. Drill-indicated, undiluted mineable reserves now total 31.7 million tonnes of High Volatile Bituminous "B" coal with a strip ratio of 3.36 bank m<sup>3</sup>/tonne. A further 13.3 million tonnes of geological reserves with a similar strip ratio have been outlined by wide-spaced drilling for a total open pitable coal inventory of 45 million tonnes.

Results of Proximate Analysis and washability tests suggest that a high quality export thermal coal product can be readily produced with 4.4% total moisture, 9.9% ash, 30.1% volatile matter, 57.4% fixed carbon, 0.52% sulphur and a calorific value of 7019 cal/g (12,530 Btu/lb).

Current reserves are sufficient for over 200 years of mine-mouth power generation at a rate of forty megawatts. Even if only twenty percent of the reserve is dedicated to power generation, remaining coal is insufficient to capitalize a major export thermal coal operation beyond break

even or marginal rates of return at current prices. With Pacific Rim thermal coal markets forecast to improve markedly over the next five years, every effort should be made to capitalize on this by identifying new reserves. The Division Mountain deposit is open to extension downdip and along strike in both directions and there are several untested high potential targets located nearby on the property. Initial evaluation should consist of excavator testing with follow-up by diamond drilling.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

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

R.F. Gish, B.Sc.

## **INTRODUCTION**

The 1995 exploration program was funded by Cash Resources Ltd. and managed by Archer, Cathro & Associates (1981) Limited. The work was carried out during the period from March 22 to August 30 and consisted of geological mapping excavator trenching, extensive environmental surveys and nine diamond drill holes totalling 1980 m. The Author's Statement of Qualifications is given in Appendix I.

The exploration camp is located approximately 200 m southeast of the Nordenskiöld River. Following the 1995 field season many of the tent frames were removed. Left at the site were four tent frames, a core logging facility and a kitchen-dry complex. A Land Use Permit to store the buildings has been authorized for a period of three years ending March 14, 1999.

### **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. 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 (Figure 2). 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>
Y457-Y459	Whitehorse	November 17, 1996
Y464-Y478	Whitehorse	September 6, 1997
Y479-Y480	Whitehorse	September 23, 1998
Y486	Whitehorse	April 17, 1999
Y487	Whitehorse	April 17, 1999

Figure 1

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

# LOCATION

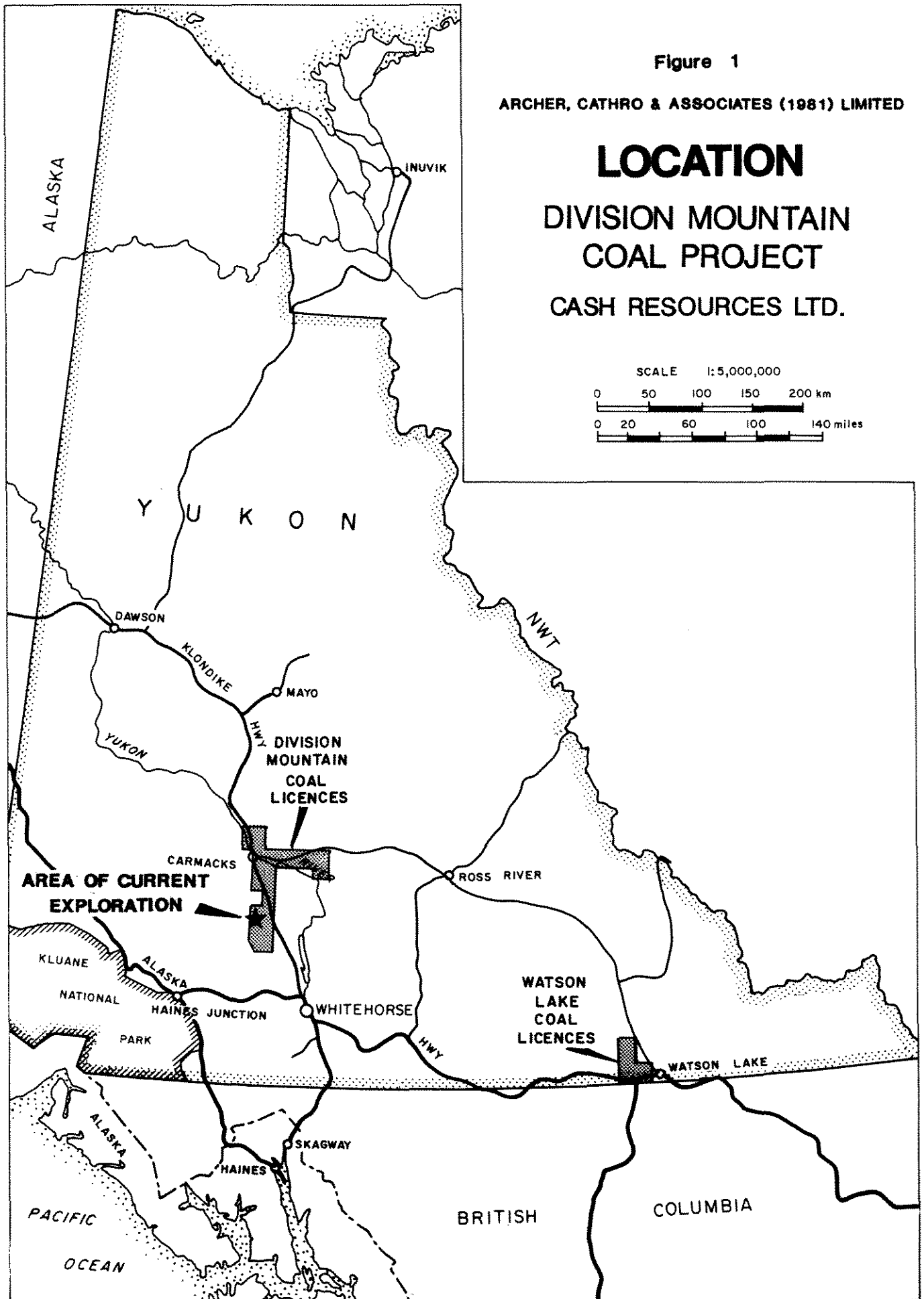
## DIVISION MOUNTAIN COAL PROJECT

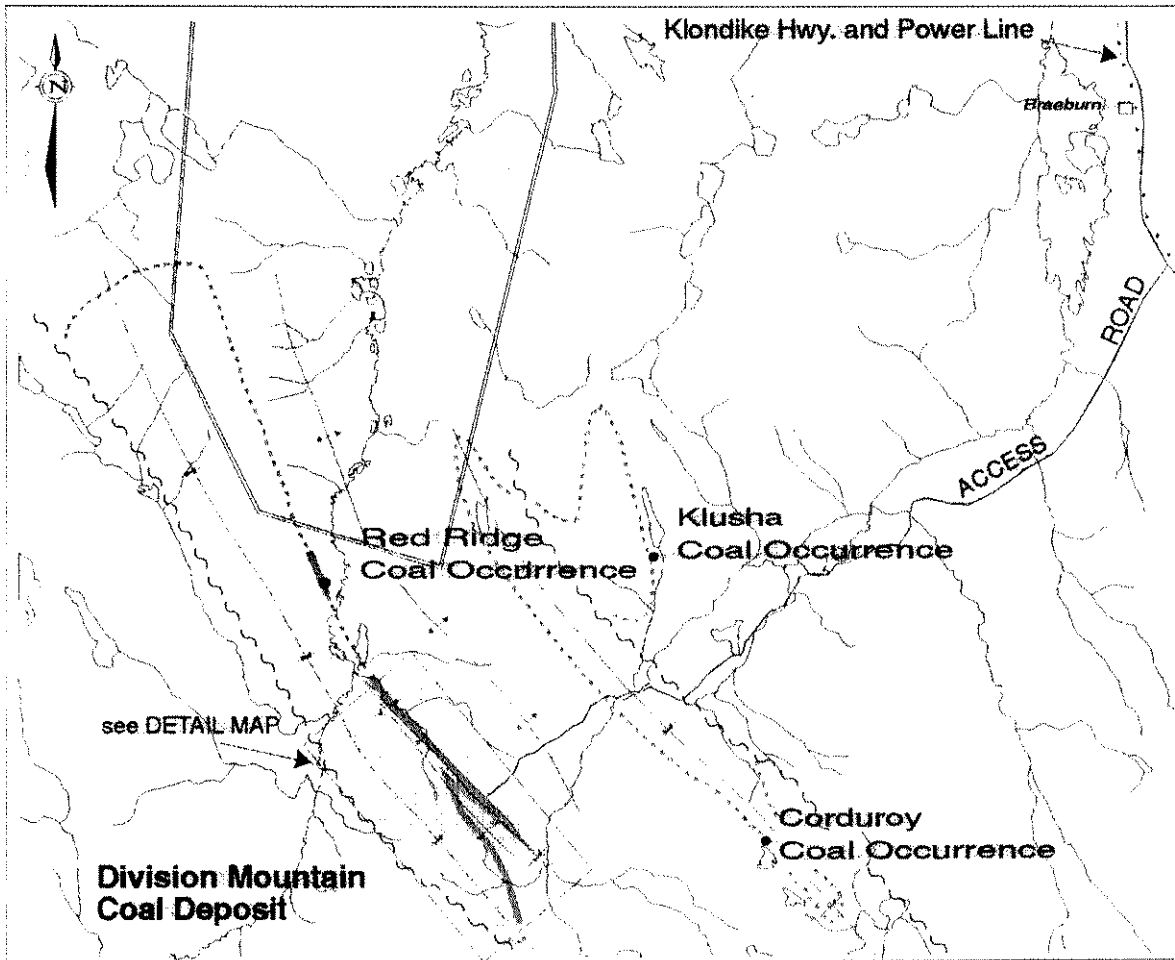
CASH RESOURCES LTD.

SCALE 1:5,000,000

0 50 100 150 200 km

0 20 60 100 140 miles

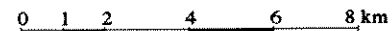




- ==== Champagne-Aishihik Band land claim
- - - Coal measures (approximate)
- Coal measures (defined)
- Known coal occurrence
- ~ Fault
- ⤵ Syncline axis
- ⤴ Anticline axis

Figure 2

**LOCATION PLAN**  
**DIVISION MOUNTAIN PROJECT**



## **HISTORY AND PREVIOUS WORK**

In 1907 D. Cairnes of the Geological Survey of Canada mapped and sampled three coal seams 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 near the Teslin Creek coal outcrop. Eight seams were exposed ranging in thickness from 0.6 to 4.4 m. A 1047 m, six hole diamond drill program conducted in the Teslin Creek area by Arjay Kirker in 1972 outlined a geological reserve of 2.5 million tonnes.

In October 1992 Cash Resources Ltd. purchased the Territorial Coal Exploration Licenses enclosing the Division Mountain coal occurrences. During the 1993 field season 16 holes totalling 1810 m were drilled to test the Teslin Creek area. This diamond drilling program defined four seams with an average raw coal aggregate thickness of 10 m over a 1 km strike length. Measured open pittable reserves were calculated at 2.6 million tonnes to a depth of 200 m, confirming the Arjay Kirker estimate. Hand trenching at Red Ridge 5 km to the north exposed a total thickness of 11.4 m of raw coal in three seams and demonstrated continuity of the coal measures.

An exploration program consisting of 5.9 km of excavator trenching and 6034 m of HQ-size diamond drilling in 32 holes was carried out during 1994 and 1995 to explore a 5 km long southeasterly extension of previously known coal-bearing strata along the limbs of a northerly-plunging syncline-anticline pair. This work was successful in discovering a new area of coal deposition with thicker seams than the Teslin Creek area and a dramatically lower strip ratio.

All coal drill intersections greater than 1 m thick were submitted for Proximate Analysis, generally in samples composed of the entire seam core intersection. Representative intersections of coal were composited for secondary tests such as grindability, washability, ash chemistry and Ultimate Analysis. Environmental surveys, including biological and botanical inventories and water quality assessment, were also carried out.

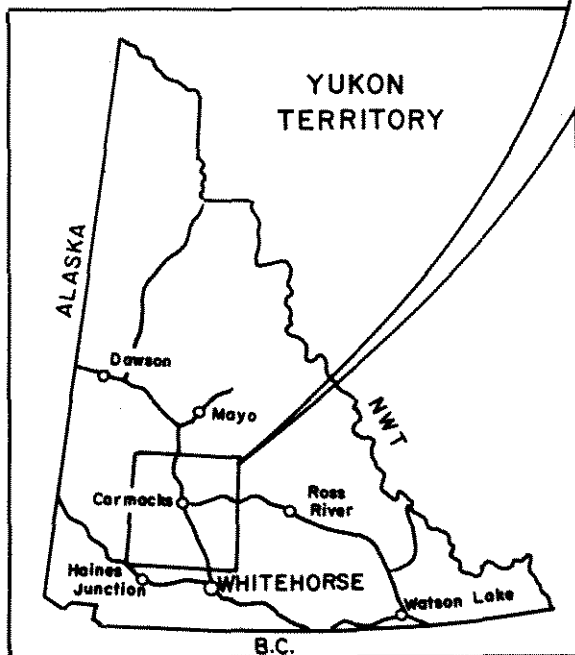
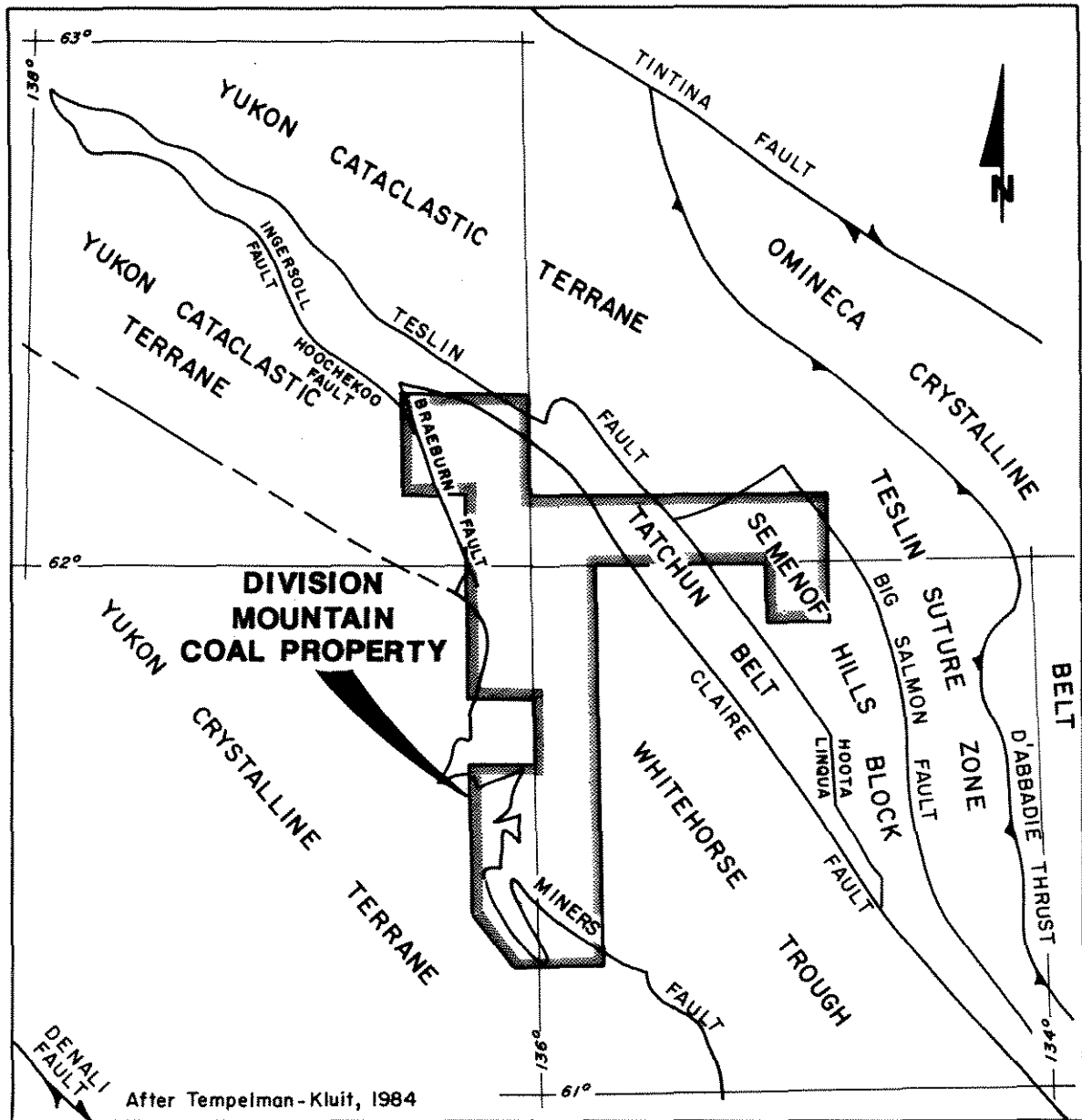
## **GEOMORPHOLOGY**

Topography in the Division Mountain area is characterized by rolling hills and broad river valleys with local regions of moderate to steep relief along northerly-trending ridges. Elevations range between 670 and 1680 m. Most of the area is mantled by glacial till and outwash between 1 and 60 m thick. Permafrost is generally restricted to poorly drained areas of moderate to dense vegetation. Natural bedrock exposure is less than 5%, especially within the generally recessive coal measures.

## **REGIONAL SETTING**

The Division Mountain area lies within Whitehorse Trough, a northwest-trending, fore-arc basin comprised of Mesozoic volcanic and sedimentary rocks (Figure 3). Bounded by the Omineca Crystalline Belt to the east and the Coast Plutonic Complex to the west, the Whitehorse Trough constitutes the northern end of the Intermontane Belt of the Canadian Cordillera. Descriptions of the geology of Whitehorse Trough, in general, and the Division Mountain area, in detail, are largely adapted from Dickie and Hein (1988), Dickie and Hein, (1992) and Dickie (1994). Property geology was previously summarized by Carne and Gish (1996).

During Late Triassic time an island arc assemblage consisting of a 7000 m thick succession of Lewes River Group aphyric to augite-phyric basaltic andesite flows, breccias and tuff, conglomerate, wacke, limestone and shale was deposited within Whitehorse Trough. Succeeding Jurassic basin-fill stratigraphy is more complex due to disconformities and hiatus in sedimentation and to diachronous or interfingering relationships in the shallow water and nearshore facies. In general, two sequences are present: Lower and Middle Jurassic conglomerate and sandstone turbidites of the marine to deltaic Laberge Group; and, Middle Jurassic to Cretaceous conglomerate, sandstone, mudstone and coal of the largely alluvial Tantalus Formation.



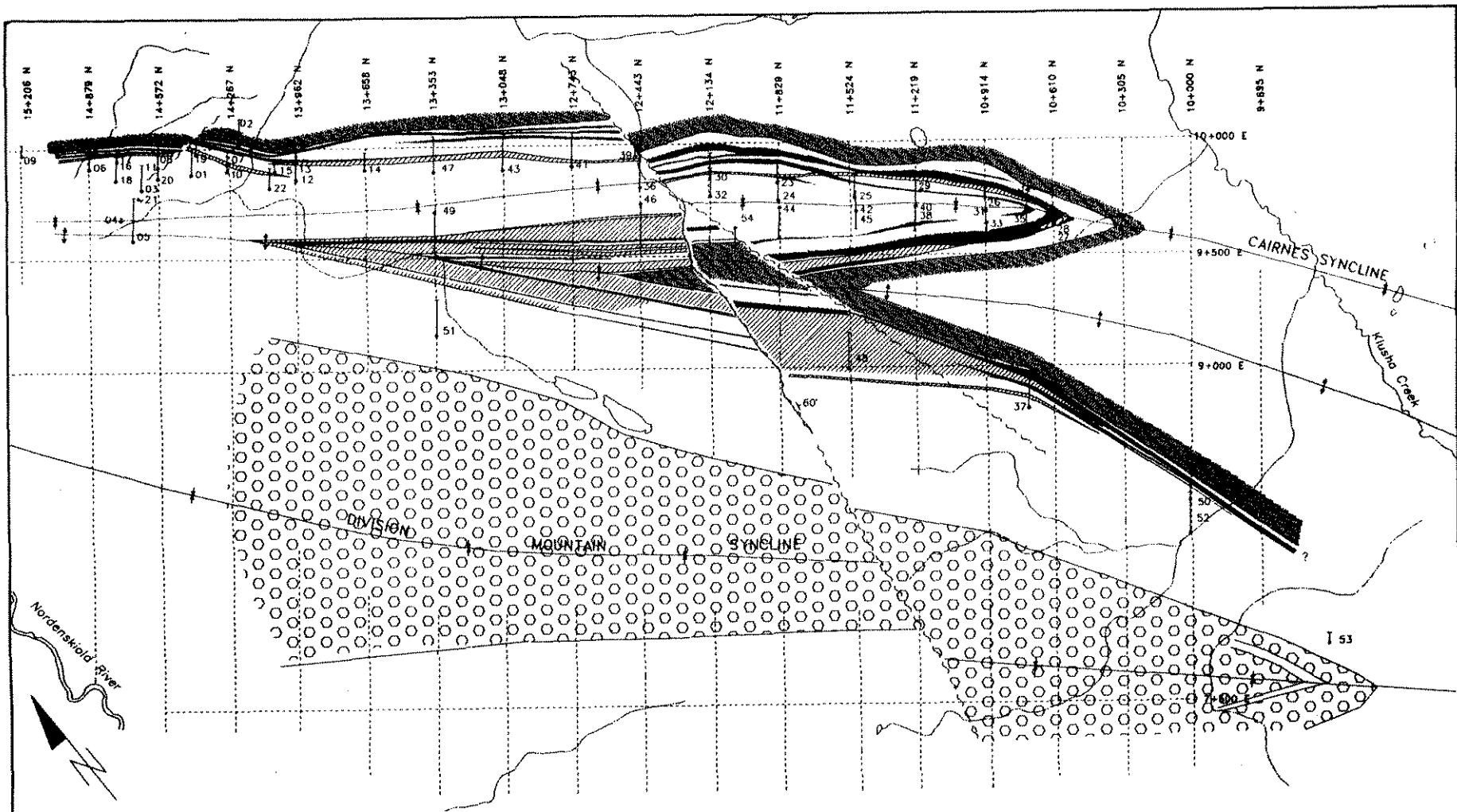
**Figure 3**  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**TECTONIC SETTING  
 AND REGIONAL GEOLOGY**  
 DIVISION MOUNTAIN COAL PROJECT  
**CASH RESOURCES LTD.**

## **STRATIGRAPHY**

Geology of the Division Mountain area is given on Figure 4. Detailed geology of the main area of exploration is shown on Figure 5 with cross sections through the coal measures on Figures 6 to 32.

The Laberge Group in the Division Mountain area is represented by the shallow marine Richtigofen Formation and the fluvial-deltaic, coal-bearing Tanglefoot Formation. The lithologically distinctive Richtigofen Formation serves as an easily recognizable base for the overlying coal measures. Brown weathering black mudstone, with wispy siltstone to fine sandstone laminae in the form of low amplitude cross-stratification, alternates with thick (>10 m) intervals of massive brown weathering calcareous sandstone. A Lower to Middle Jurassic depositional span is recorded elsewhere in Whitehorse Trough for the unit but since this sequence is likely diachronous, being a record of a nearshore facies that migrated with basin fill, the precise age of the Richtigofen Formation in this area will not be known until it is locally constrained by paleontological data.

Tanglefoot Formation strata in the Division Mountain area record a complex fluvial-deltaic depositional environment. Age is probably Middle Jurassic. In general the Tanglefoot Formation consists of upwardly fining sequences of alternating sandstone-conglomerate beds and black shale or shaly mudstone, the latter commonly containing coaly shale or coal seams. A section measured by Dickie (1994) near Division Mountain consists of fifteen sedimentary cycles, each on the order of approximately 10 m thick. A typical cycle consists of:



**Figure 4**

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

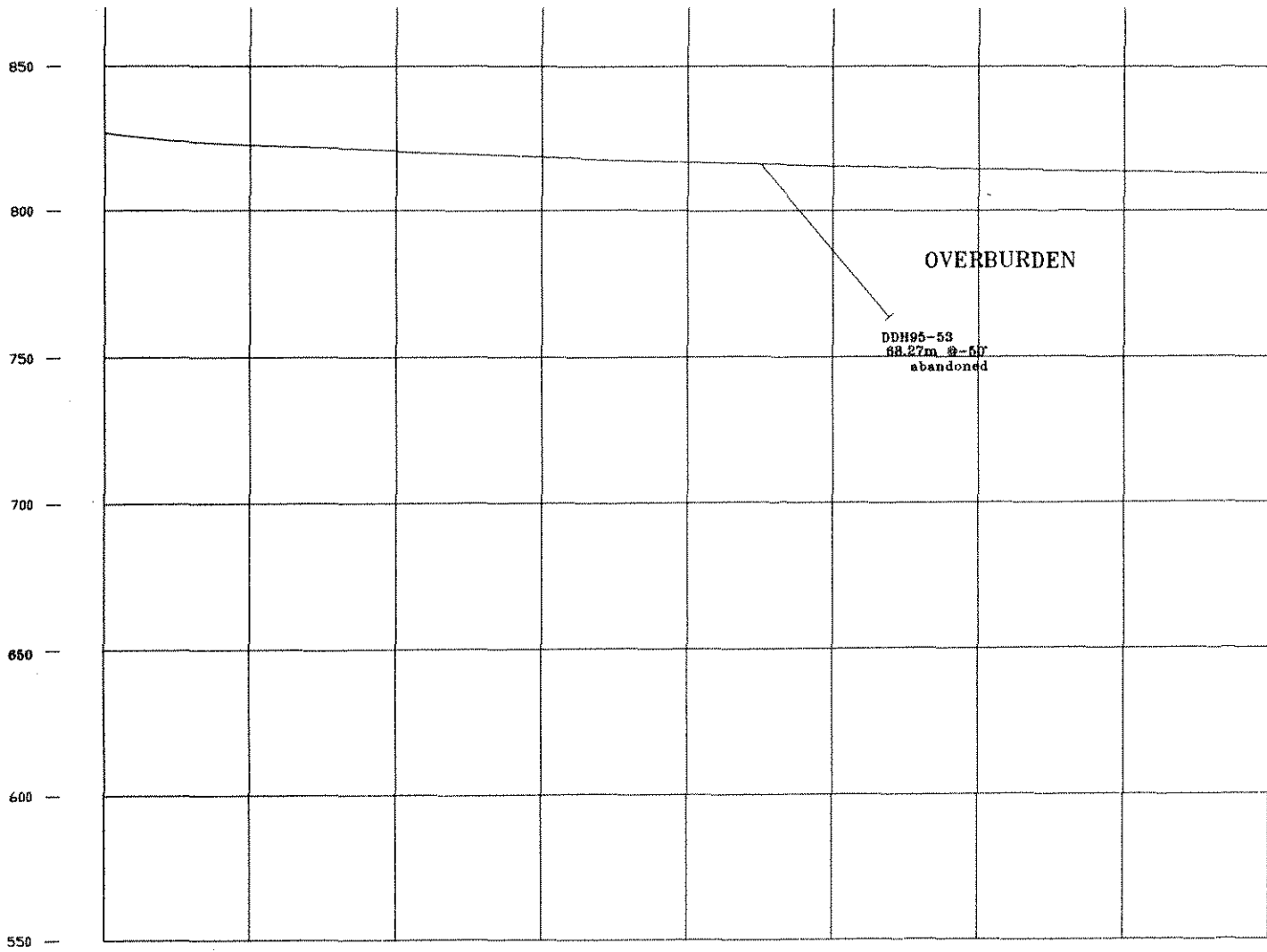
# GEOLOGY MAP

DIVISION MOUNTAIN AREA





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7500 E      7550 E      7600 E      7650E      7700 E      7750 E      7800 E      7850 E      7900 E



STRATIGRAPHIC LEGEND

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

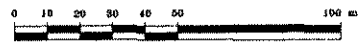
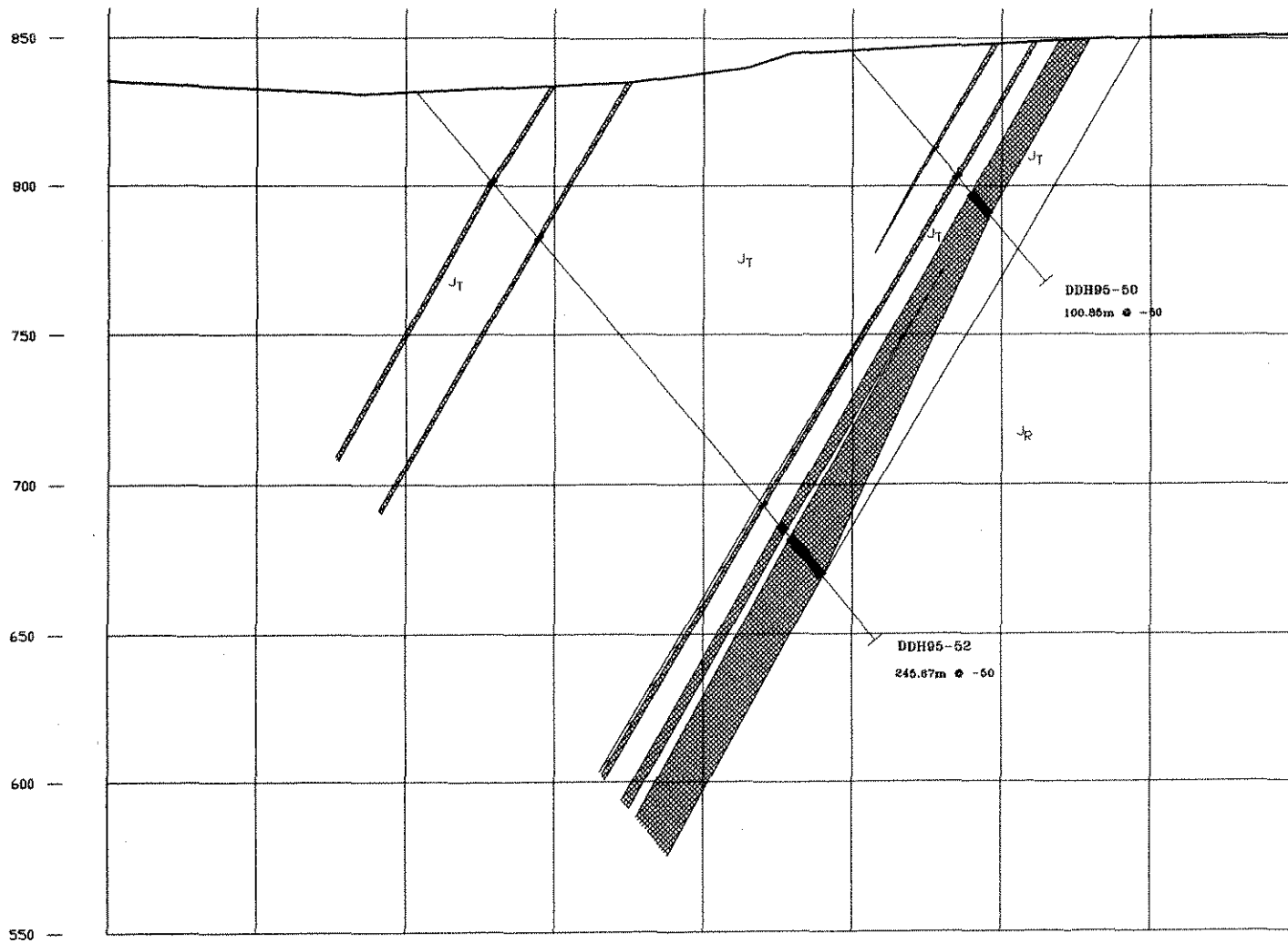


Figure 4  
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

CROSS SECTION  
9+300 N  
DIVISION MOUNTAIN PROPERTY  
CASH RESOURCES LTD.

8150 E      8200 E      8250 E      8300 E      8350 E      8400 E      8450 E      8500 E      8550 E



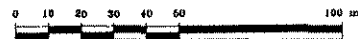
**STRATIGRAPHIC LEGEND**

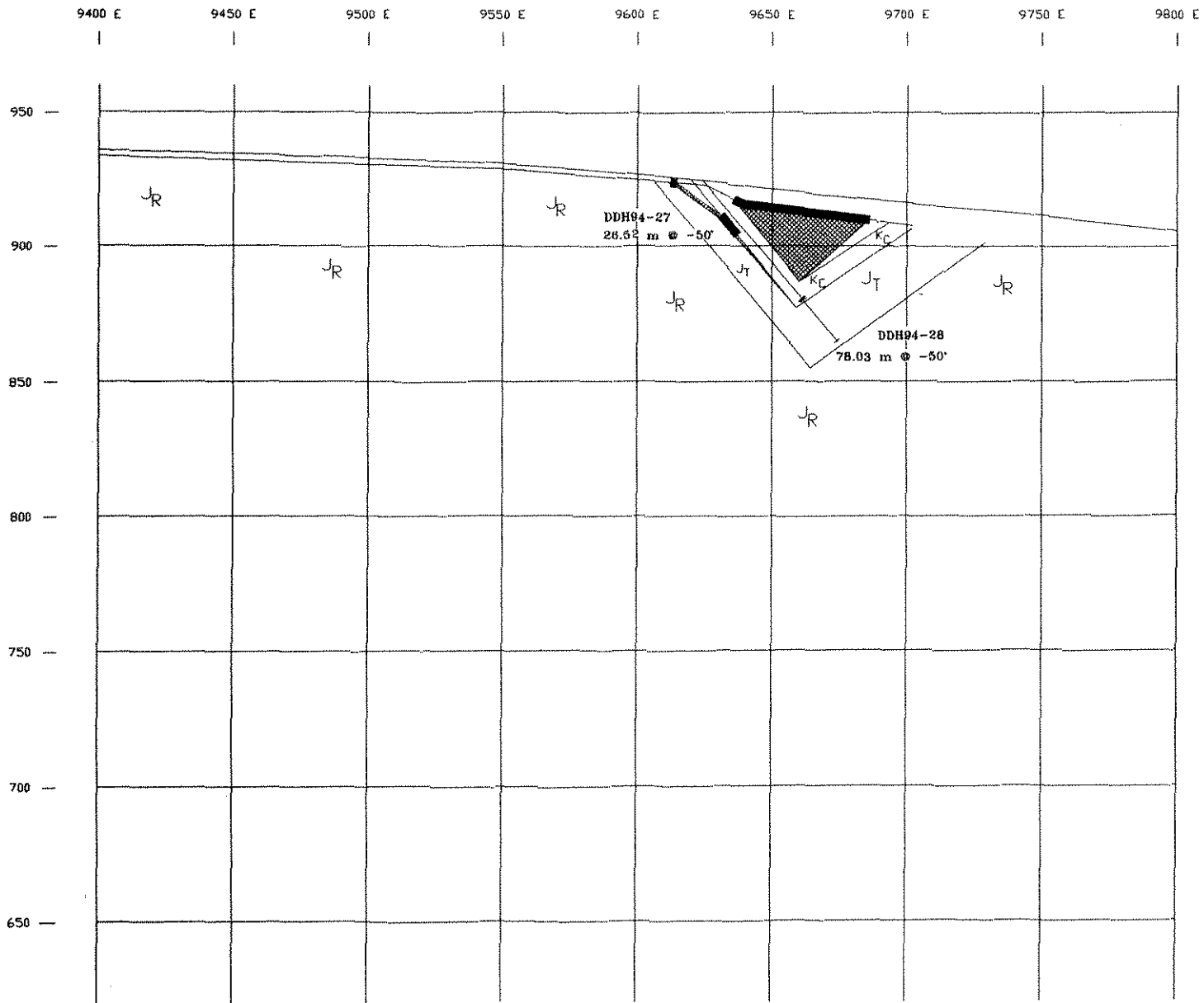
- CRETACEOUS (?)
- CARMACKS VOLCANICS
- K<sub>C</sub> Andesite sills and dykes
- JURASSIC-CRETACEOUS
- TANGLEFOOT FORMATION
- Coal
- J<sub>T</sub> Shale, Siltstone, Sandstone, Conglomerate
- RICHTOFEN FORMATION
- J<sub>R</sub> Shale-sandstone Couplets

Figure 7  
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

**CROSS SECTION  
10+000N**

DIVISION MOUNTAIN PROPERTY  
CASH RESOURCES LTD.





STRATIGRAPHIC LEGEND

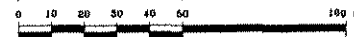
- CRETACEOUS (?)  
CARMACKS VOLCANICS
- KC Andesite; sills and dykes
- JURASSIC-CRETACEOUS  
TANGLEFOOT FORMATION
- Coal
- JT Shale, Siltstone, Sandstone  
Conglomerate
- RICHTOFEN FORMATION
- JR Shale-sandstone Couplets

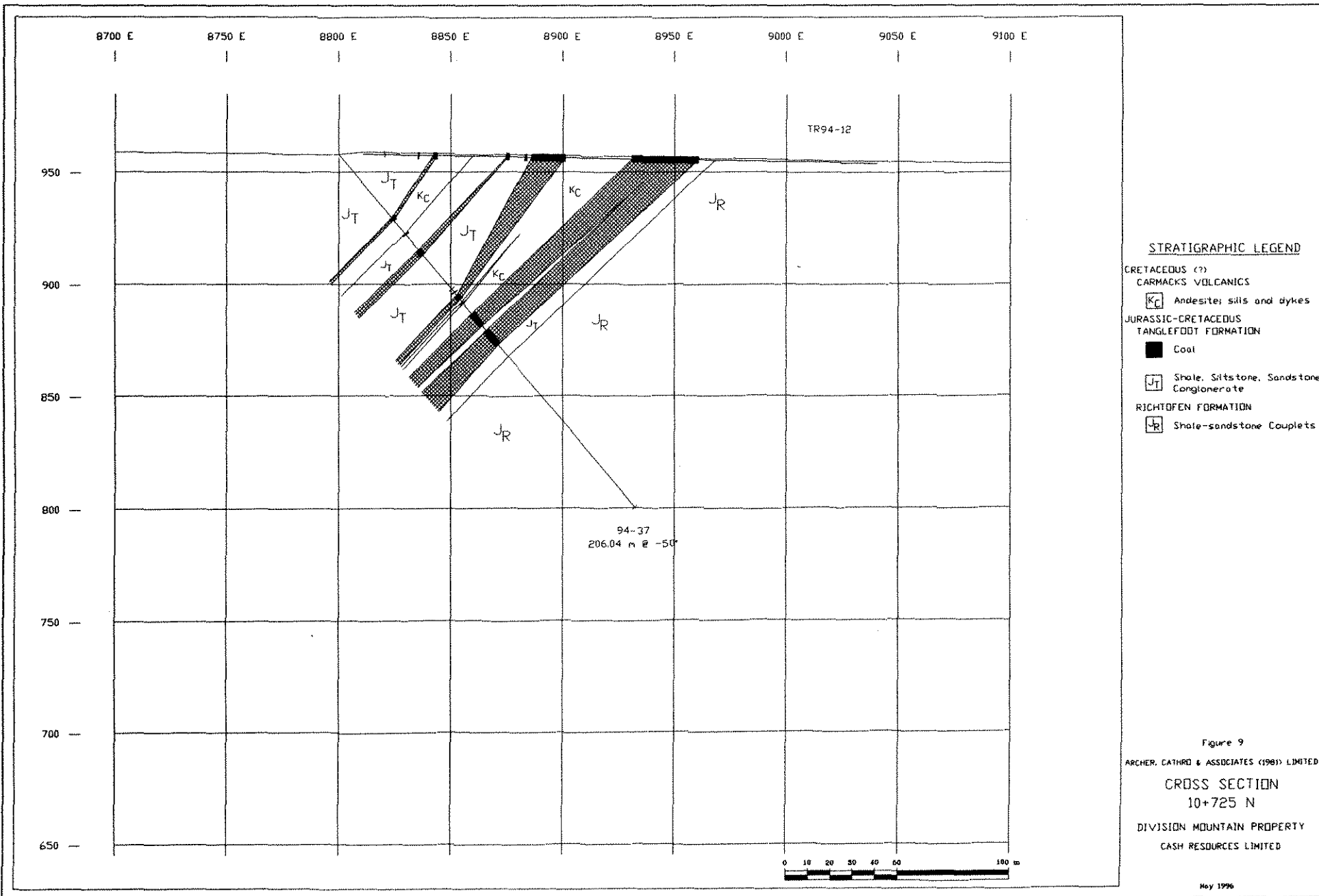
Figure 8

ARCHER, CATHRO & ASSOCIATES (1991) LIMITED

CROSS SECTION  
10+610 N

DIVISION MOUNTAIN PROPERTY  
CASH RESOURCES LTD.

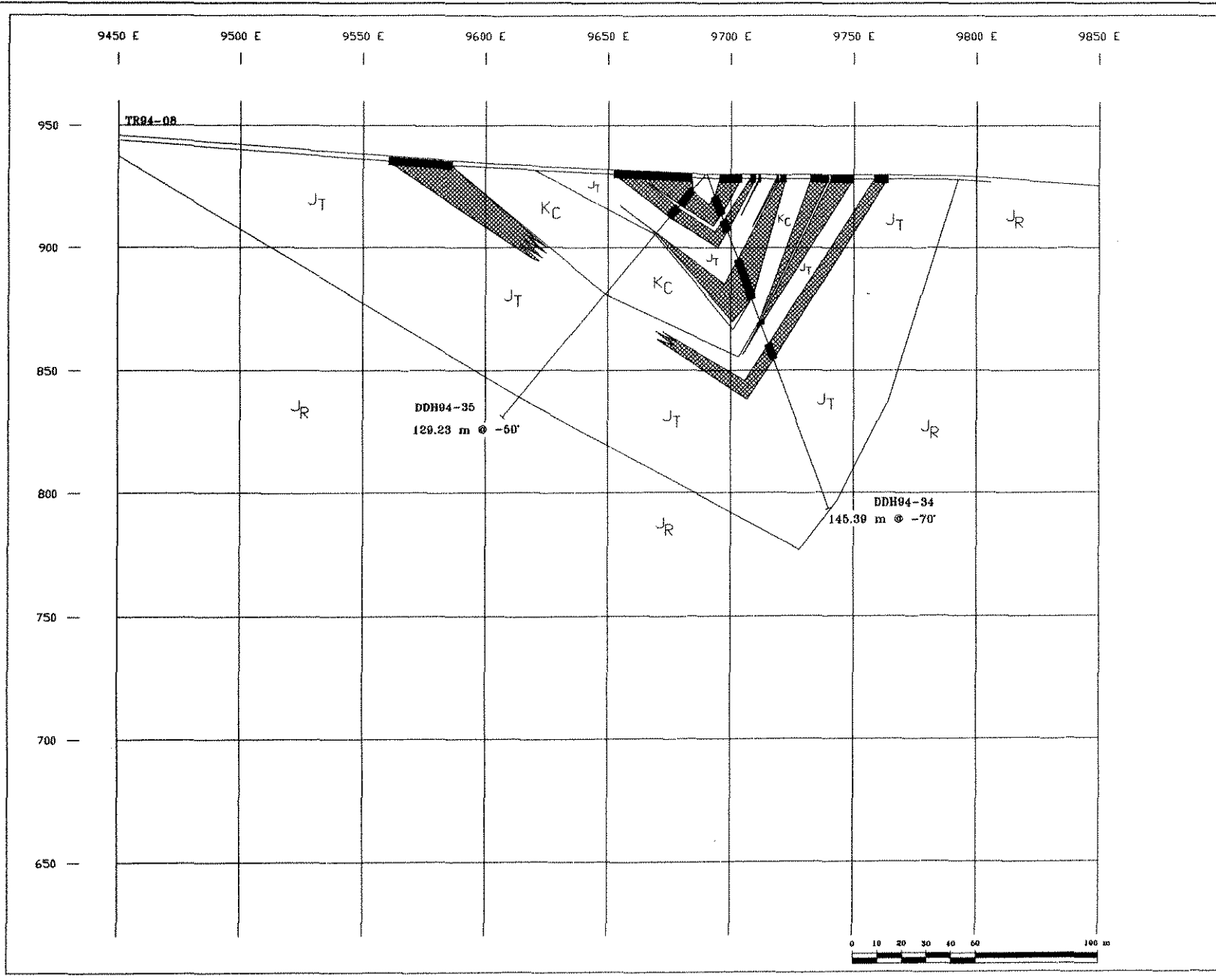




**STRATIGRAPHIC LEGEND**

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

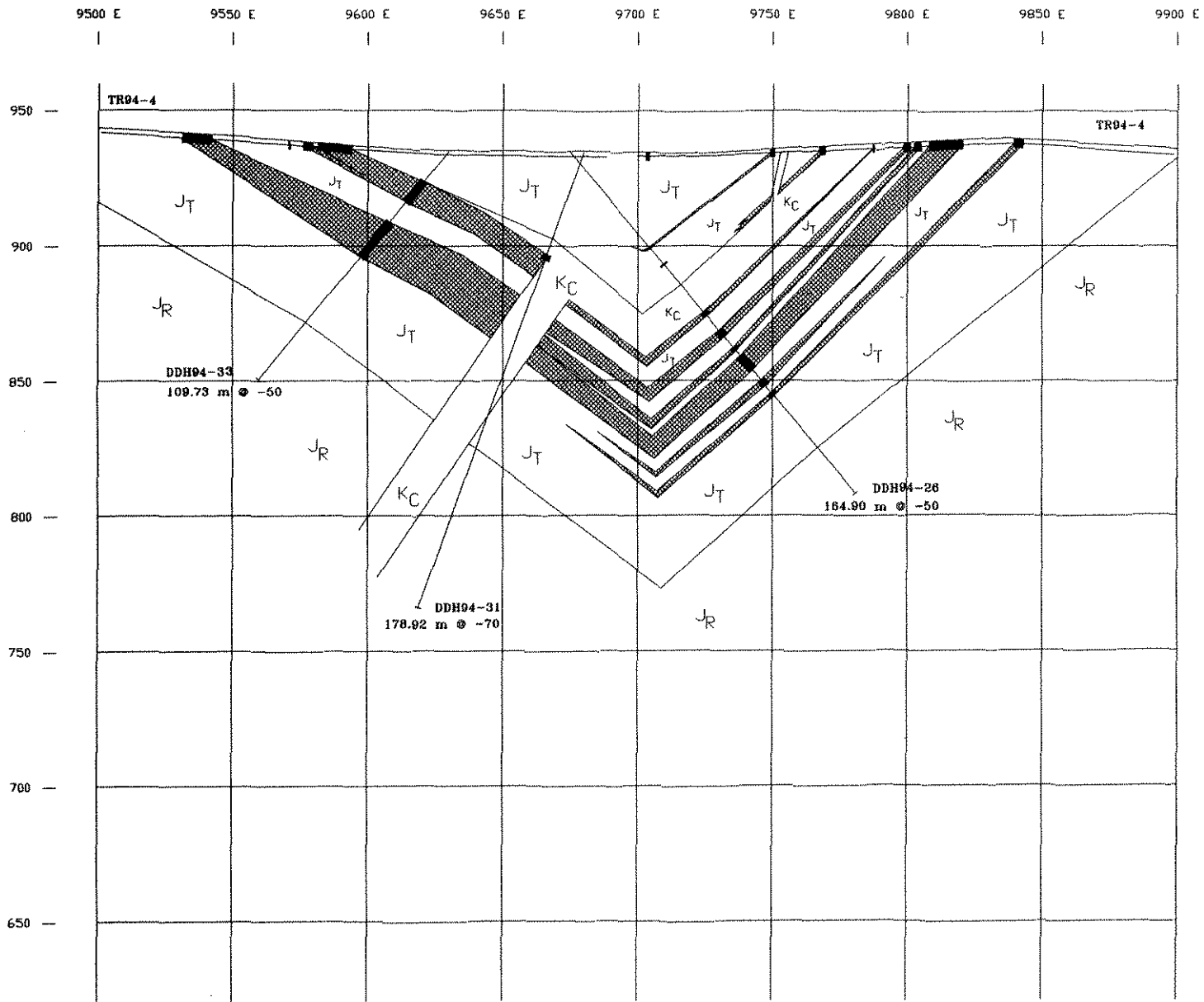
Figure 9  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 10+725 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED



**STRATIGRAPHIC LEGEND**

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

Figure 10  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 10+725 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED

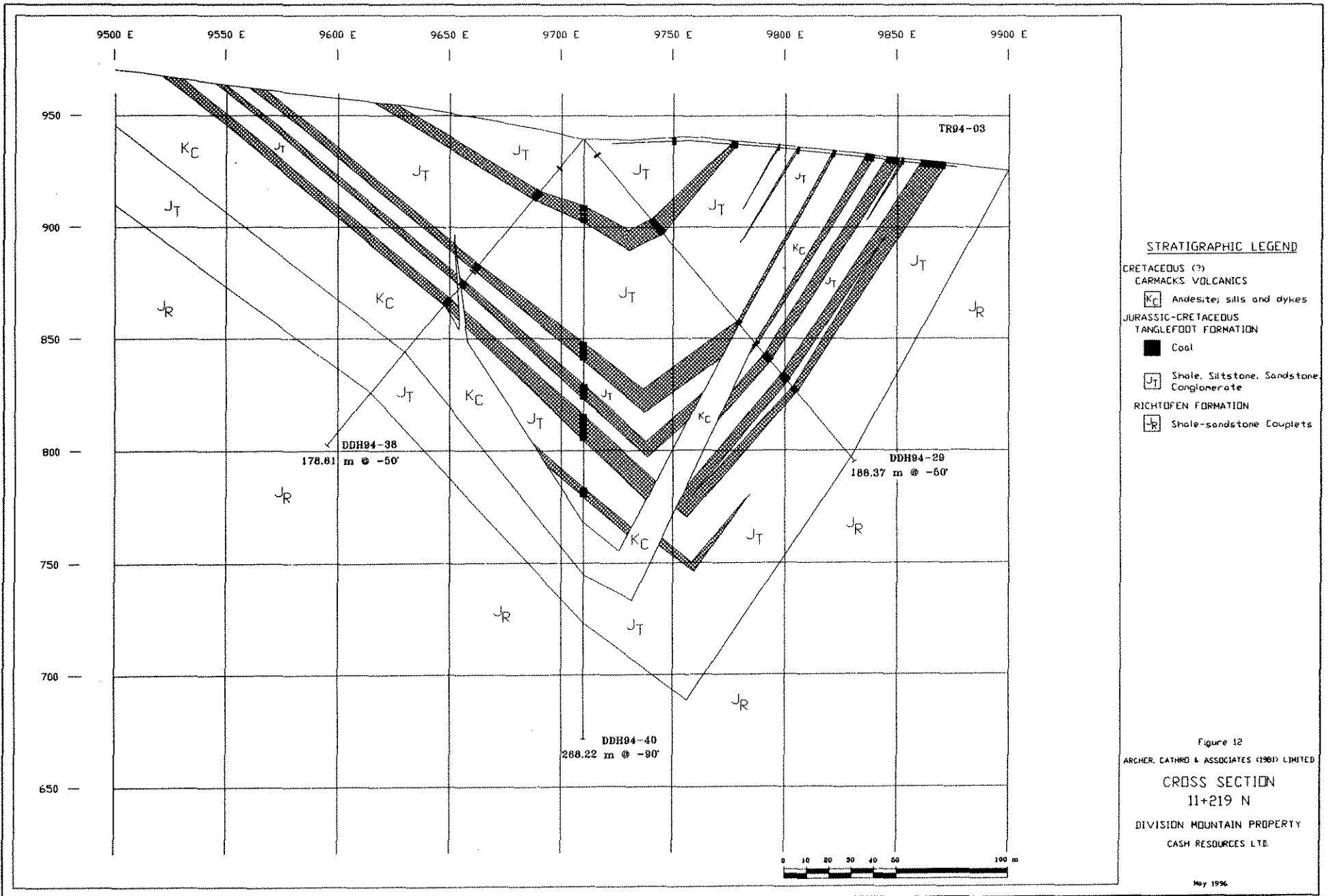


**STRATIGRAPHIC LEGEND**

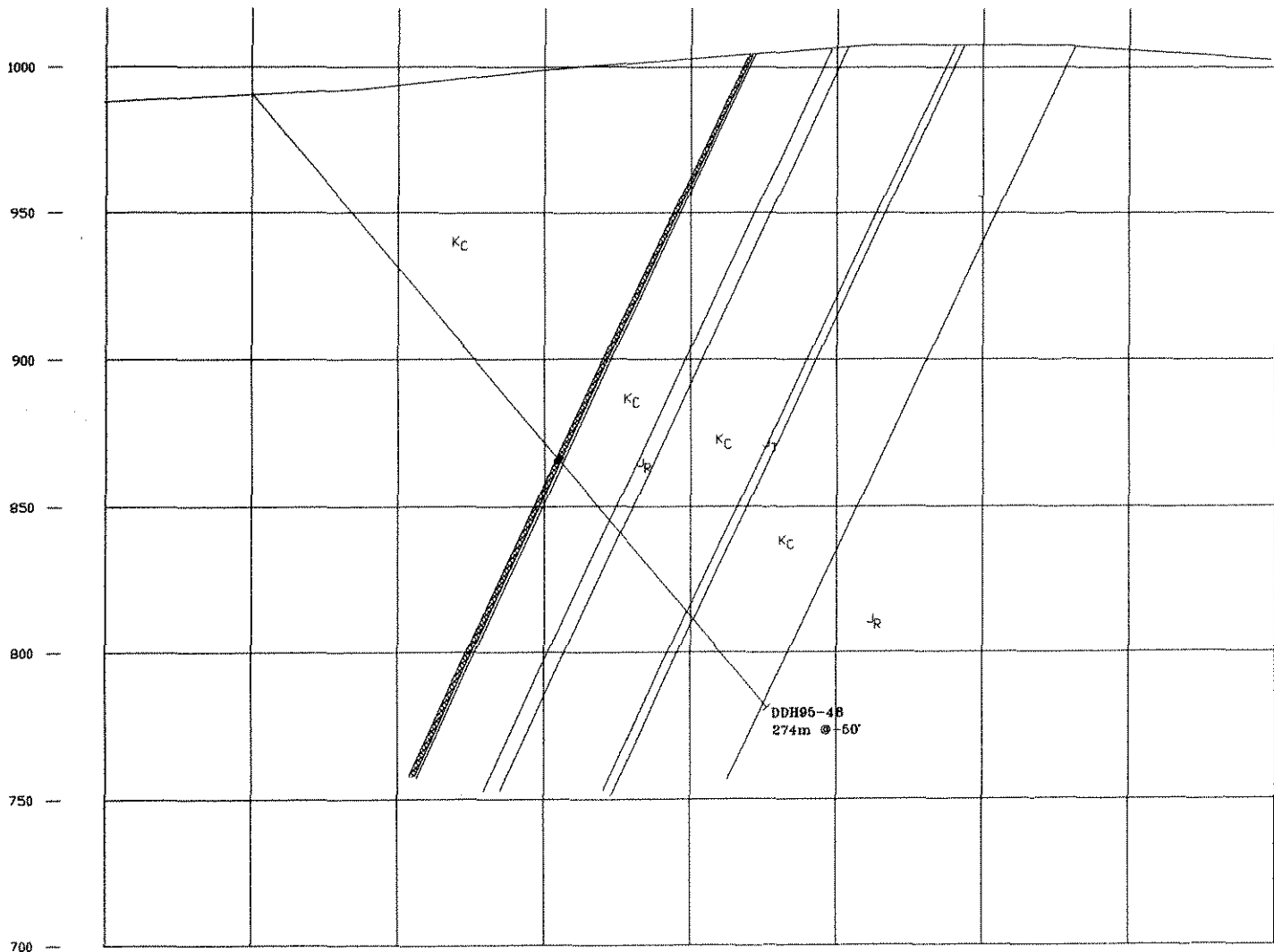
- CRETACEOUS (?)
- CARMACKS VOLCANICS
  - KC Andesite; sills and dykes
- JURASSIC-CRETACEOUS TANGLEFOOT FORMATION
  - JT Shale, Siltstone, Sandstone, Conglomerate
- RICHTOFEN FORMATION
  - JR Shale-sandstone Couplets

Figure 11  
 ARCHER, CATHRO & ASSOCIATES (1991) LIMITED  
**CROSS SECTION**  
 10+914 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.





8950 E      9000 E      9050 E      9100 E      9150 E      9200 E      9250E      9300 E      9350 E

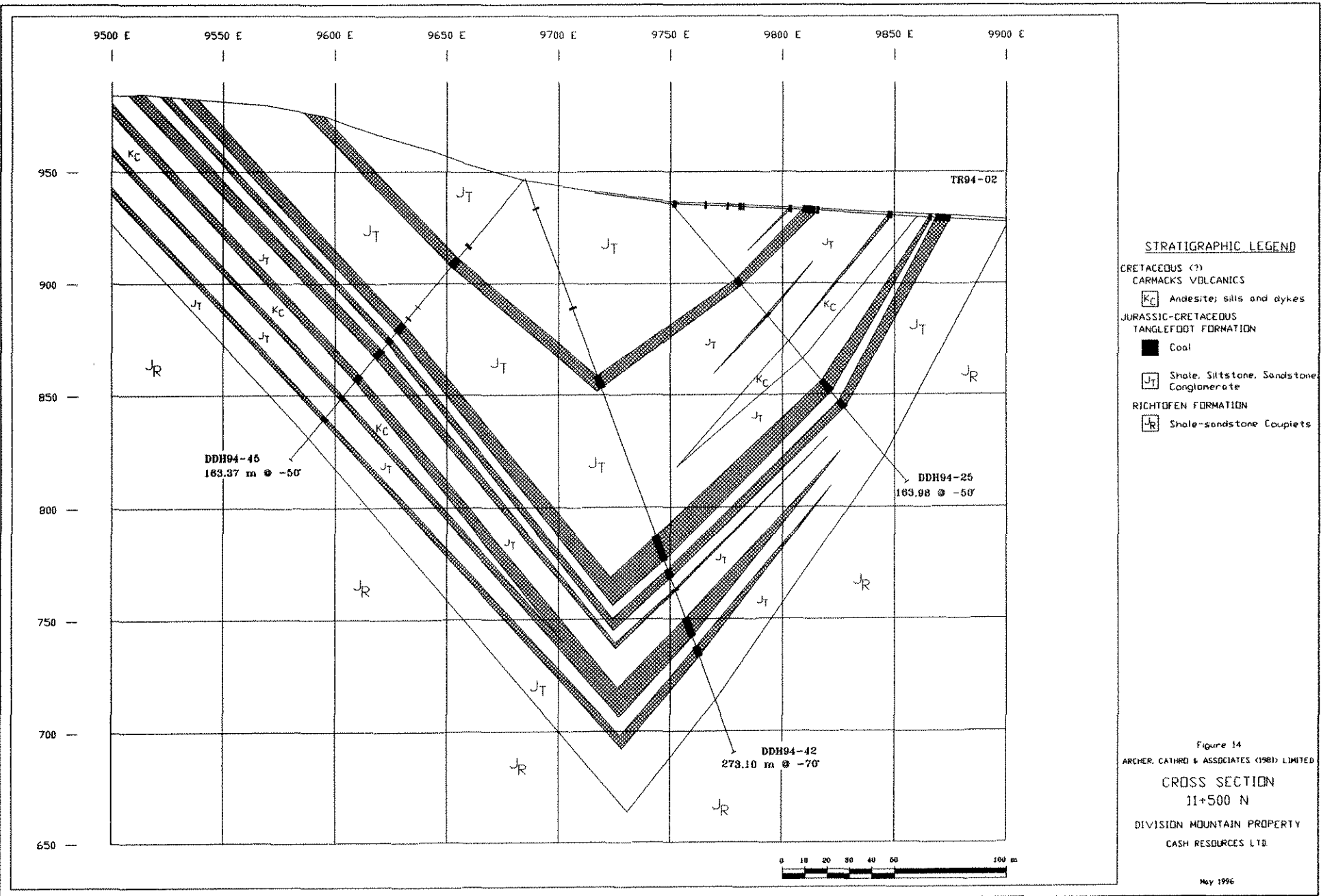


**STRATIGRAPHIC LEGEND**

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

Figure 13  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 11+500N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.

MAY 1996



**STRATIGRAPHIC LEGEND**

- CRETACEOUS (?)
- CARMACKS VOLCANICS
- KC Andesite; sills and dykes
- JURASSIC-CRETACEOUS
- TANGLEFOOT FORMATION
- Coal
- JT Shale, Siltstone, Sandstone Conglomerate
- RICHTGFEN FORMATION
- JR Shale-sandstone Coupiets

Figure 14  
 ARCHER, CATIRD & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 11+500 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.

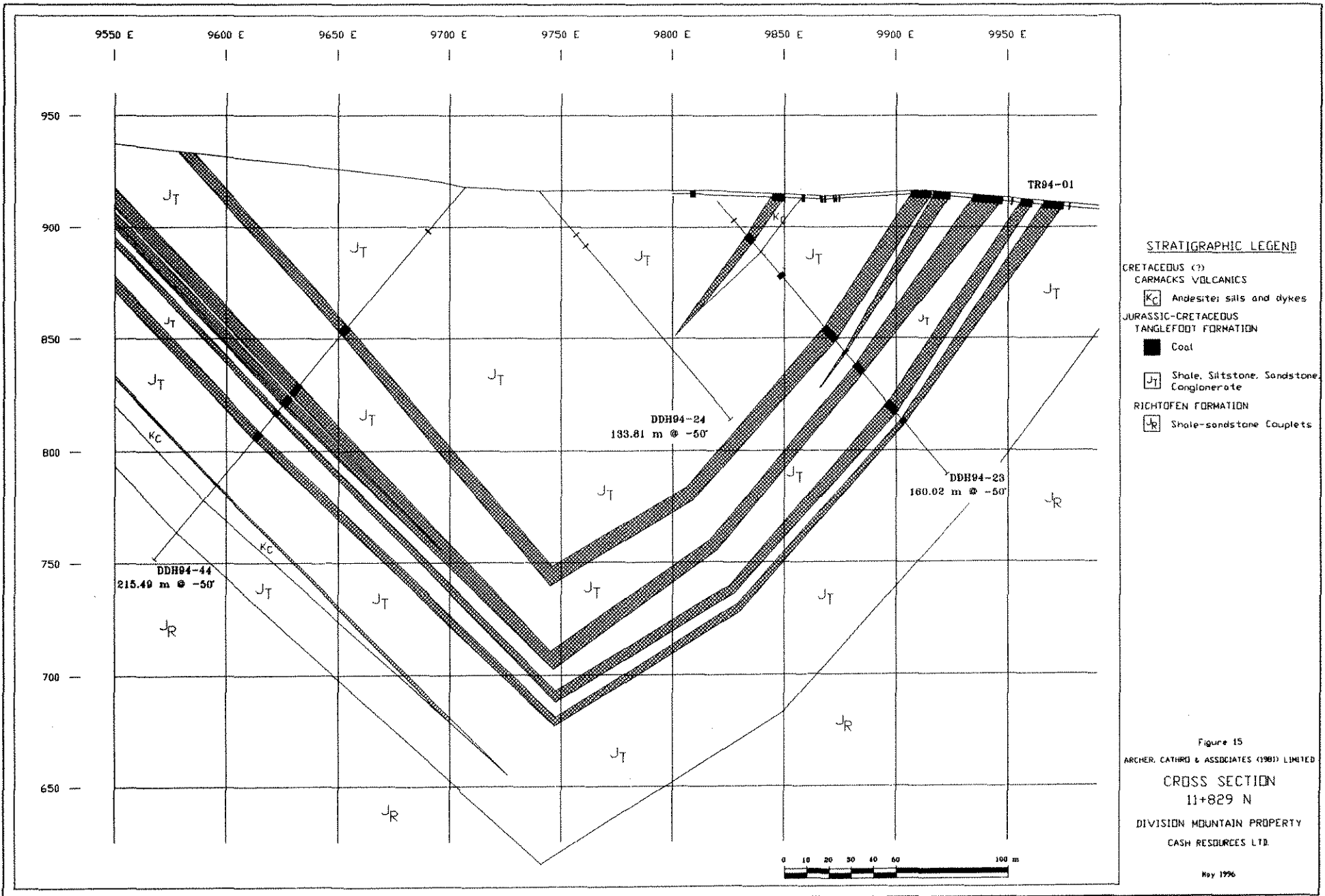
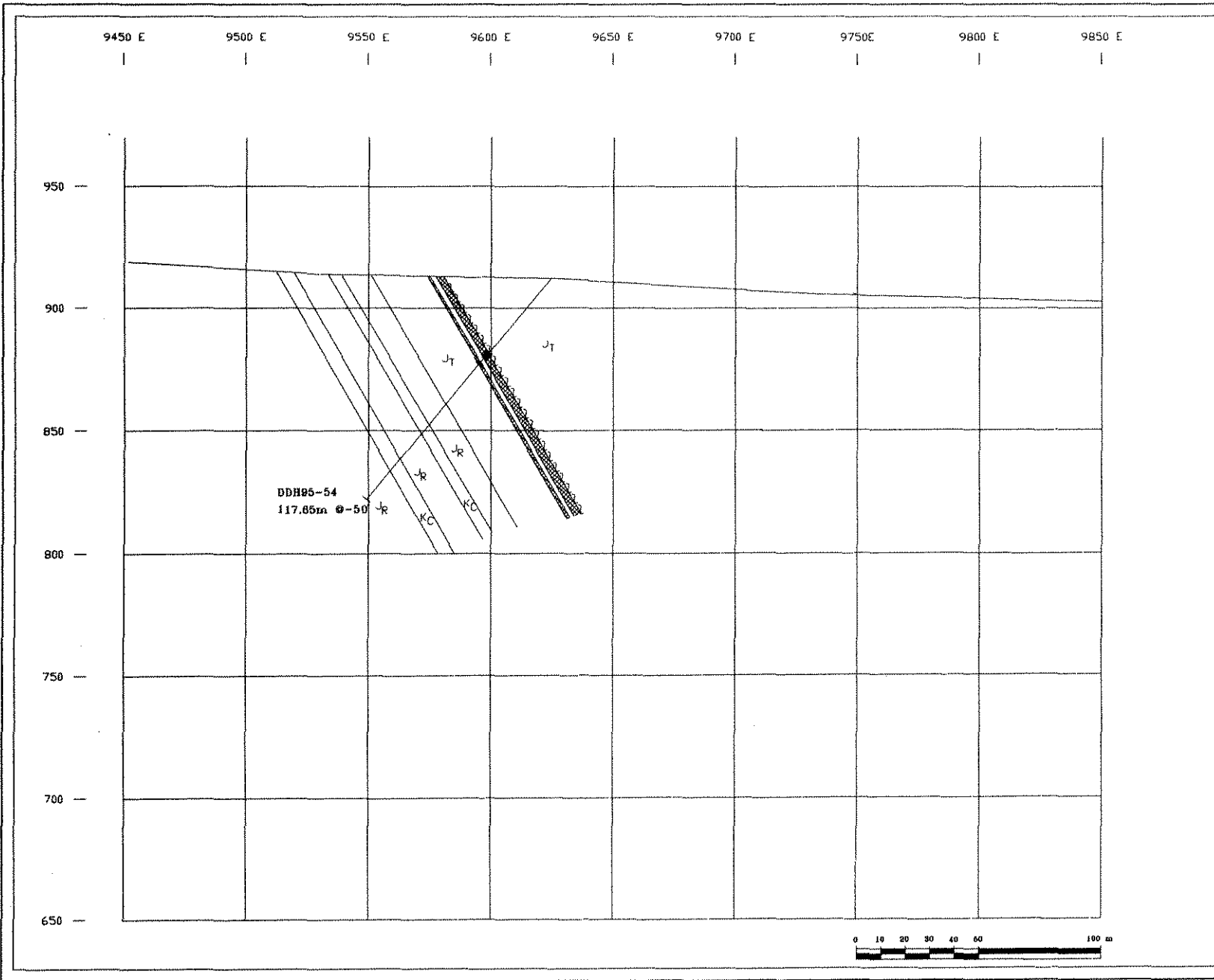


Figure 15  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 11+829 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.



STRATIGRAPHIC LEGEND

- CRETACEOUS (?)
- CARMACKS VOLCANICS
  - $K_C$  Andesite; silt and dykes
- JURASSIC-CRETACEOUS
- TANGLEFOOT FORMATION
  - Coal
  - JT Shale, Siltstone, Sandstone, Conglomerate
- RICHTOFEN FORMATION
  - $J_R$  Shale-sandstone Couplets

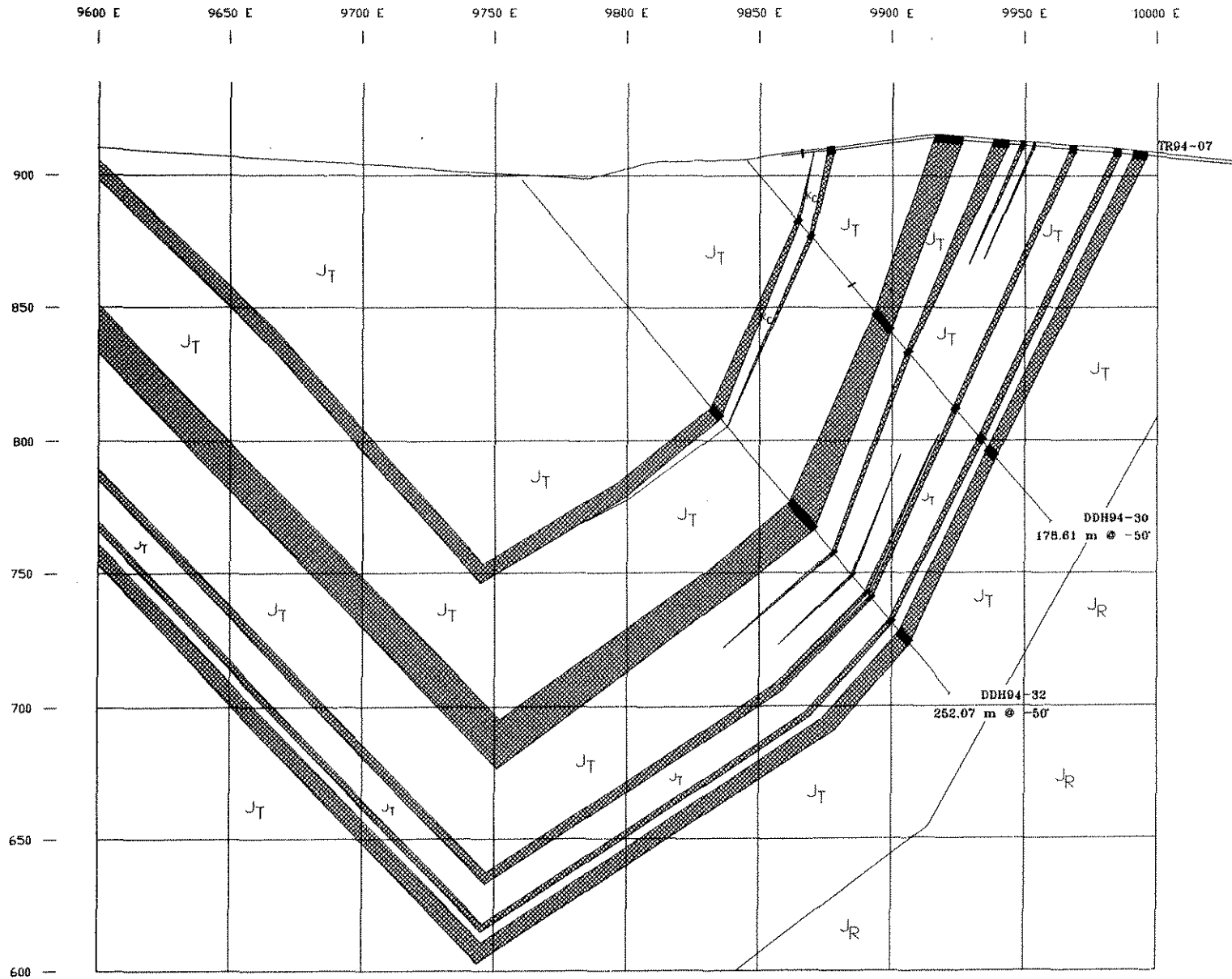
Figure 16

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

CROSS SECTION  
12+025N

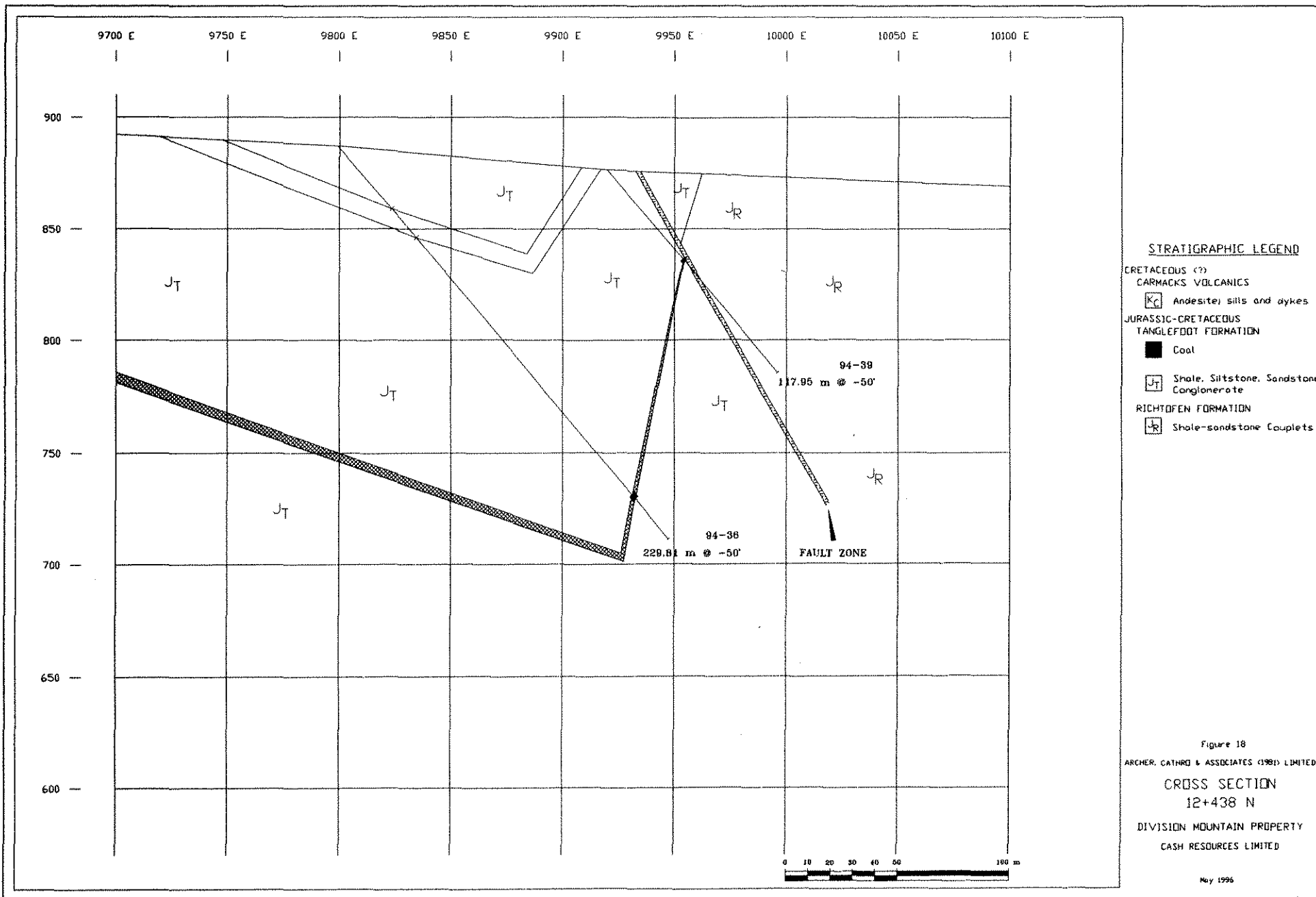
DIVISION MOUNTAIN PROPERTY  
CASH RESOURCES LTD.

MAY 1996



- STRATIGRAPHIC LEGEND**
- CRETACEOUS (?)
  - CARMACKS VOLCANICS
  - Kc Andesite, sills and dykes
  - JURASSIC-CRETACEOUS
  - TANGLEFOOT FORMATION
  - Coal
  - JT Shale, Siltstone, Sandstone Conglomerate
  - RICHTOFEN FORMATION
  - JR Shale-sandstone Couplets

Figure 17  
 ARCHER, CATHRD & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 12+134 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED



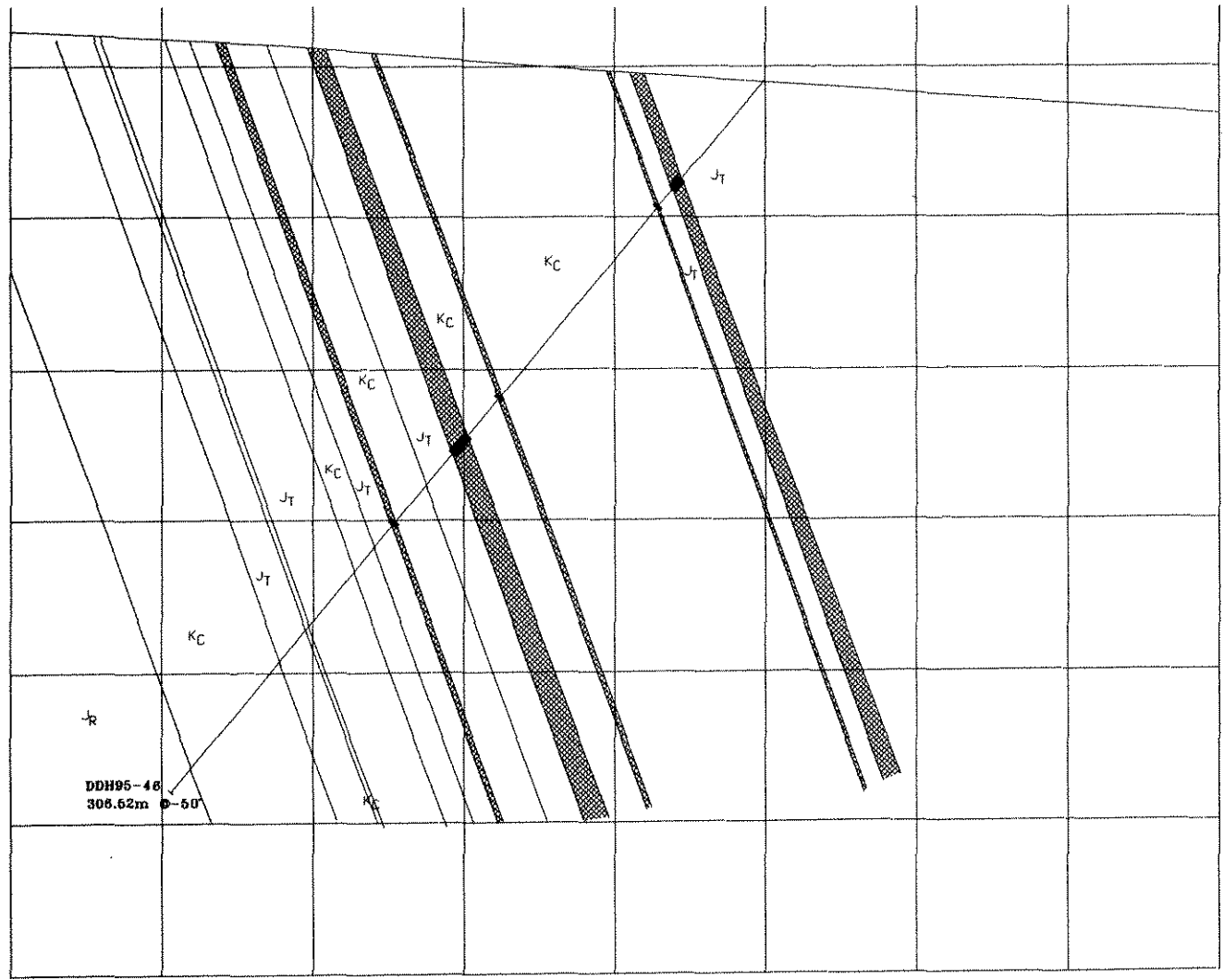
**STRATIGRAPHIC LEGEND**

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

Figure 18  
 ARCHER, GATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 12+438 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED

9500 E      9550 E      9600 E      9650 E      9700 E      9750 E      9800E      9850 E      9900 E

900  
850  
800  
750  
700  
650  
600



DDH95-48  
308.62m @ -50'

STRATIGRAPHIC LEGEND

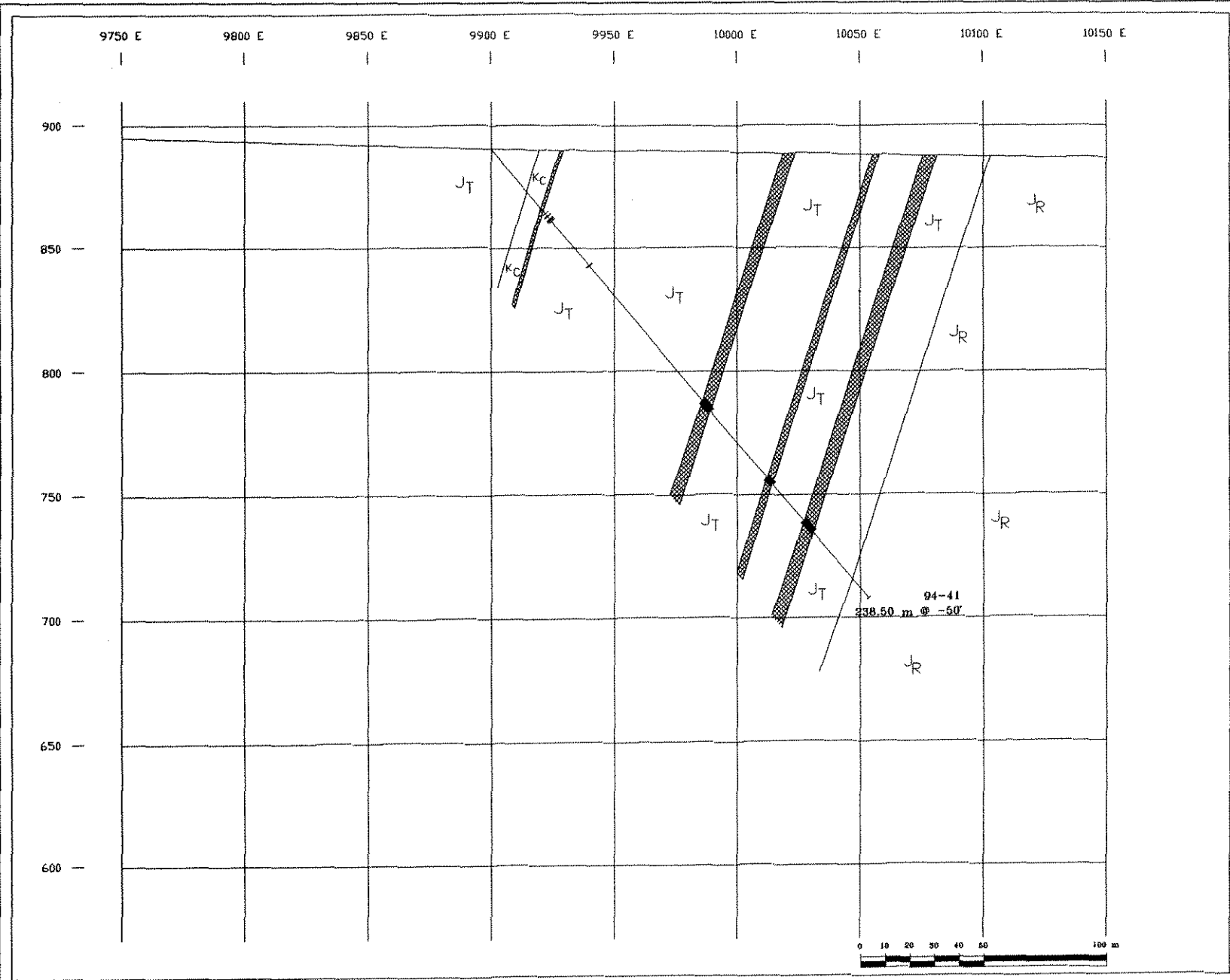
- CRETACEOUS (?)
- CARMACKS VOLCANICS
- K<sub>c</sub> Andesite; sills and dykes
- JURASSIC-CRETACEOUS
- TANGLEFOOT FORMATION
- Coal
- J<sub>t</sub> Shale, Siltstone, Sandstone, Conglomerate
- RIGHTOFEN FORMATION
- J<sub>r</sub> Shale-sandstone Couplets

Figure 19  
ARCHER, CATHRO & ASSOCIATES (1987) LIMITED

CROSS SECTION  
12+438N

DIVISION MOUNTAIN PROPERTY  
CASH RESOURCES LTD.

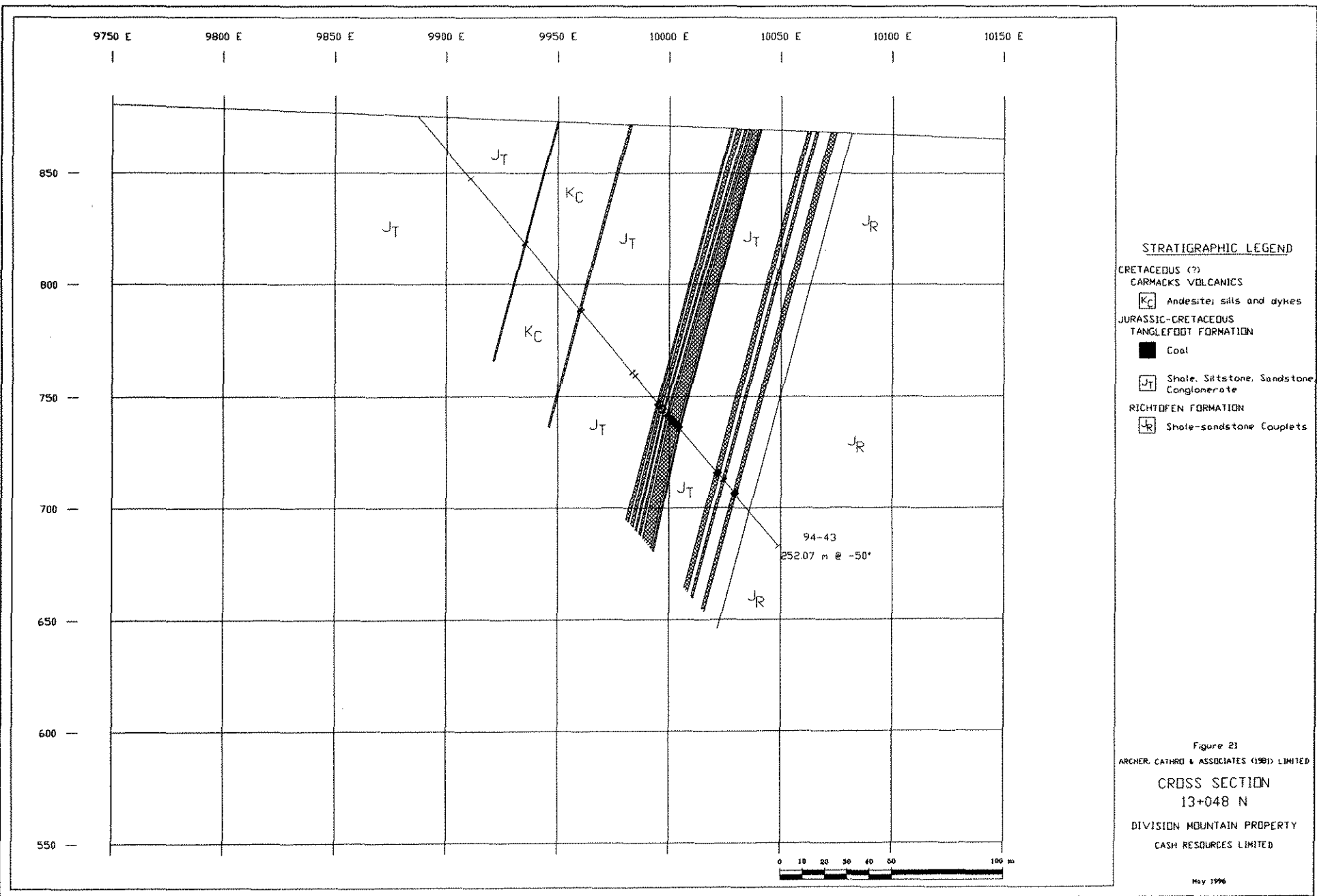




**STRATIGRAPHIC LEGEND**

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

Figure 20  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 12+743 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED

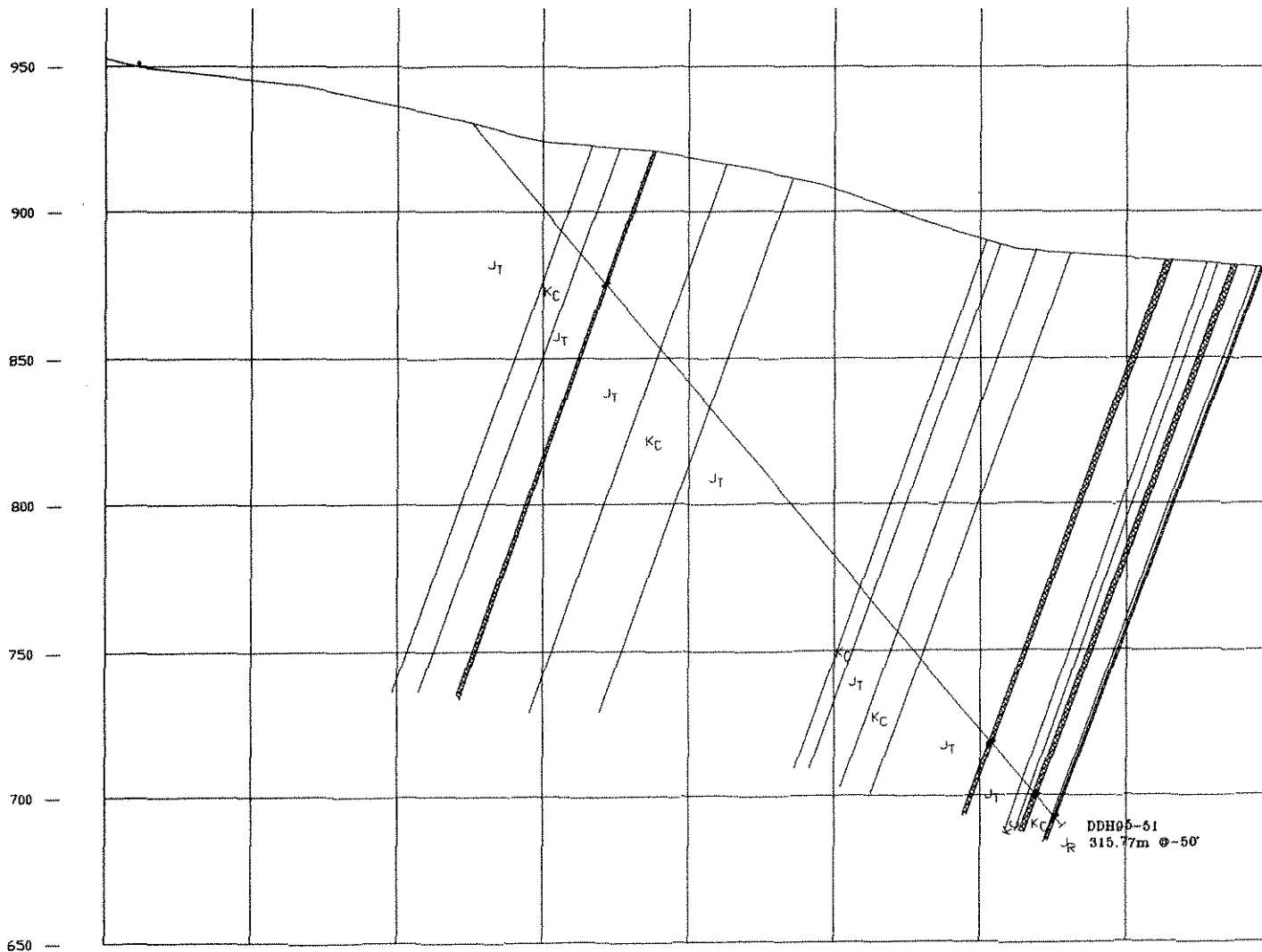


**STRATIGRAPHIC LEGEND**

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

Figure 21  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
**13+048 N**  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED

9050 E      9100 E      9150 E      9200 E      9250 E      9300 E      9350E      9400 E      9450 E



**STRATIGRAPHIC LEGEND**

- CRETACEOUS (?)
- CARMACKS VOLCANICS
  - Andesite: sills and dykes
- JURASSIC-CRETACEOUS
- TANGLEFOOT FORMATION
  - Coal
  - Shale, siltstone, sandstone, conglomerate
- RICHTHOFFEN FORMATION
  - Shale-sandstone couplets

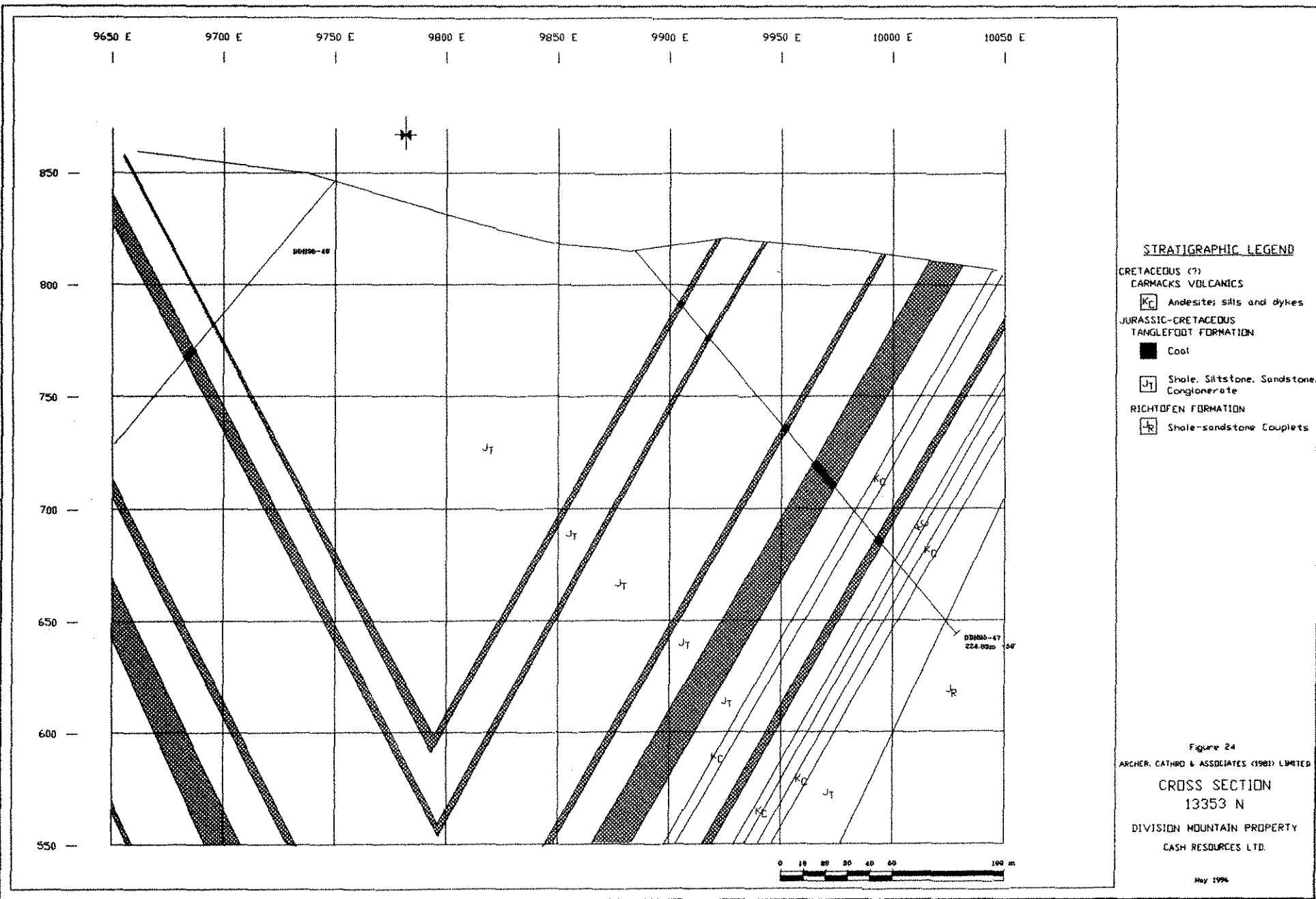
Figure 22  
 ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

**CROSS SECTION  
 13+353N**

DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.



MAY 1996

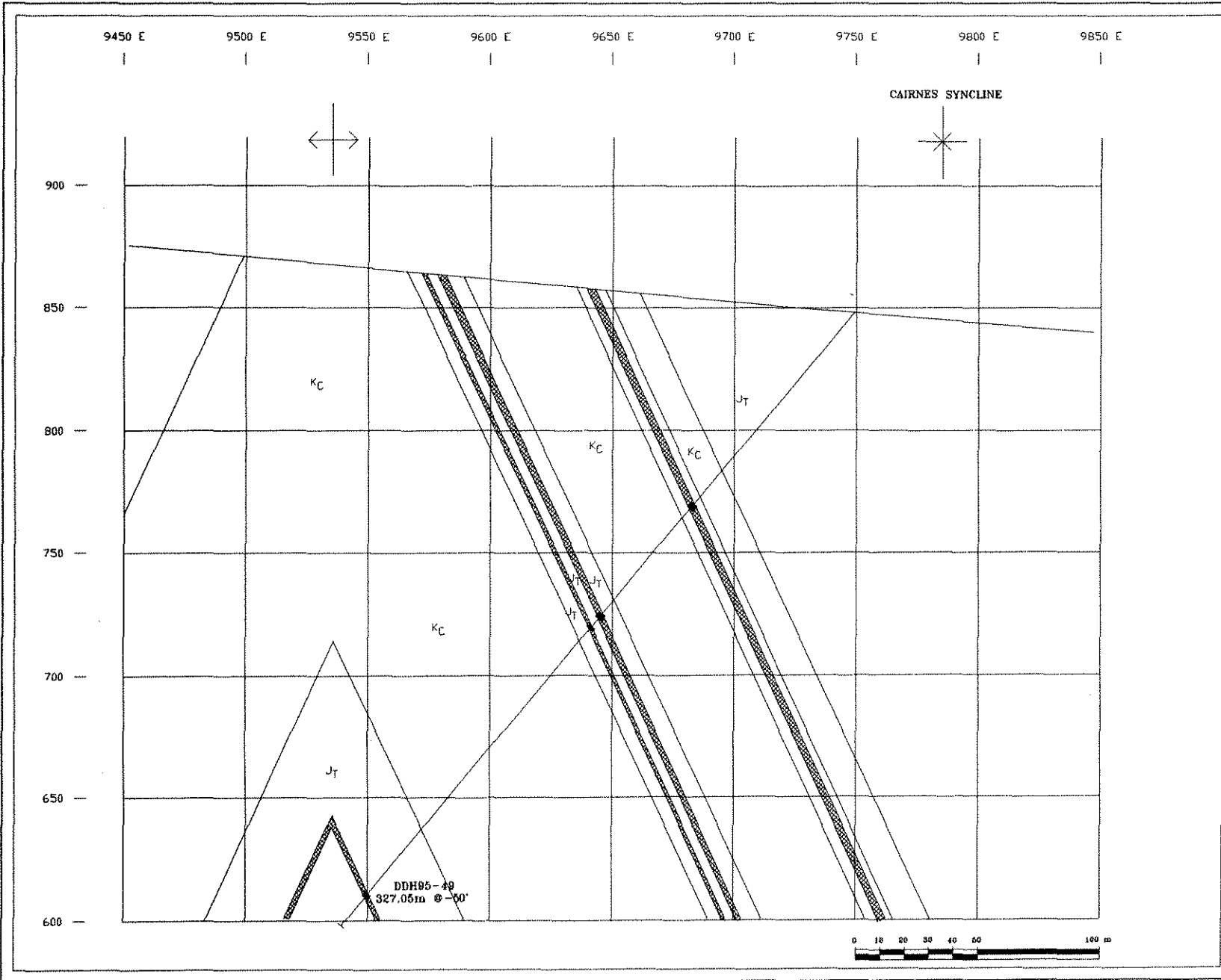


**STRATIGRAPHIC LEGEND**

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

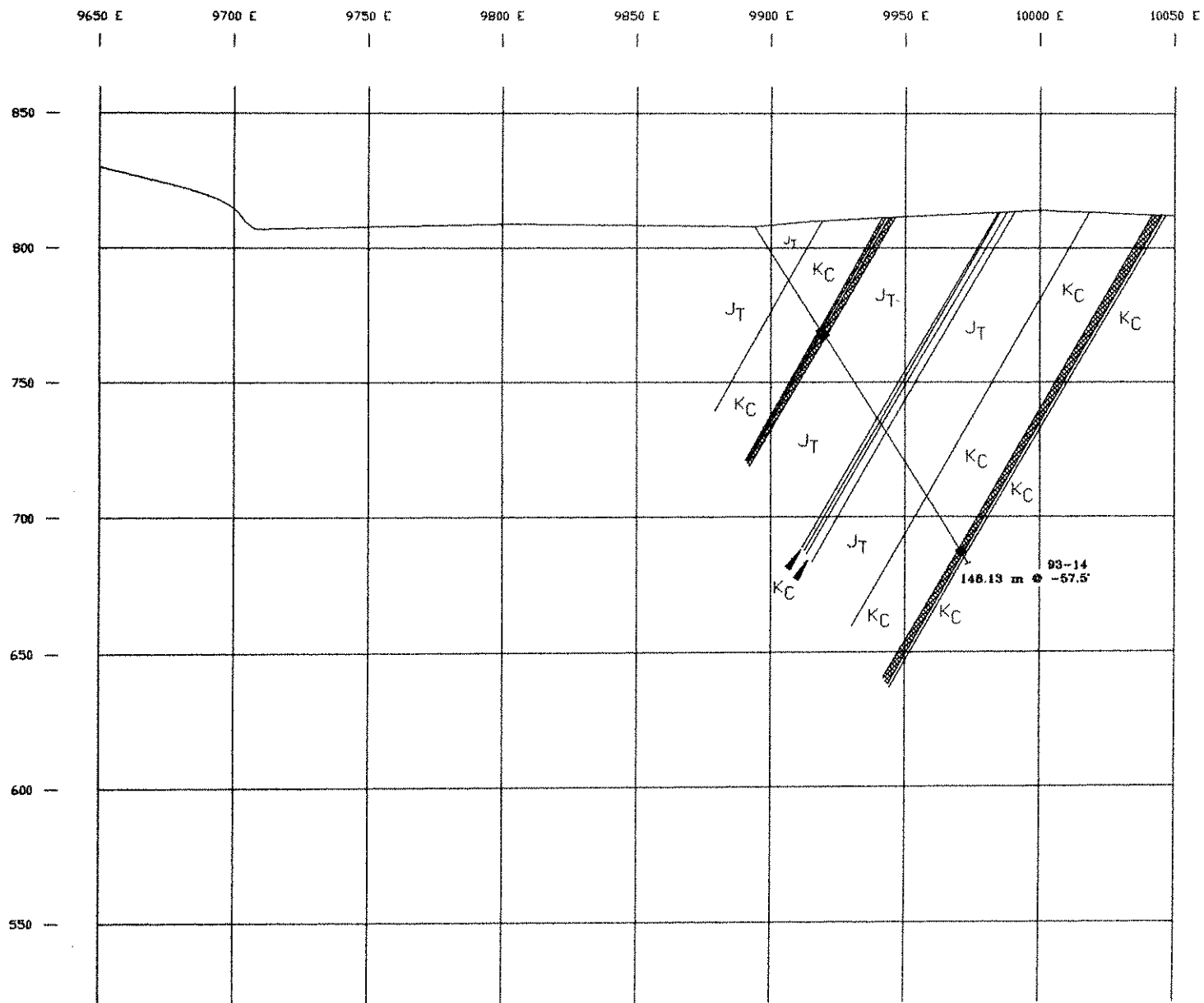
Figure 24  
 ARCHER, CATHRO & ASSOCIATES (1983) LIMITED  
**CROSS SECTION**  
 13353 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.

May 1996



- STRATIGRAPHIC LEGEND**
- CRETACEOUS (?)
  - CARMACKS VOLCANICS
    - K<sub>C</sub> Andesite; sills and dykes
  - JURASSIC-CRETACEOUS
  - TANGLEFOOT FORMATION
    - Coal
    - J<sub>T</sub> Shale, Siltstone, Sandstone Conglomerate
  - RICHTOFEN FORMATION
    - J<sub>R</sub> Shale-sandstone Couplets

Figure 23  
 ARCHER, CATHER & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 13+353N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.



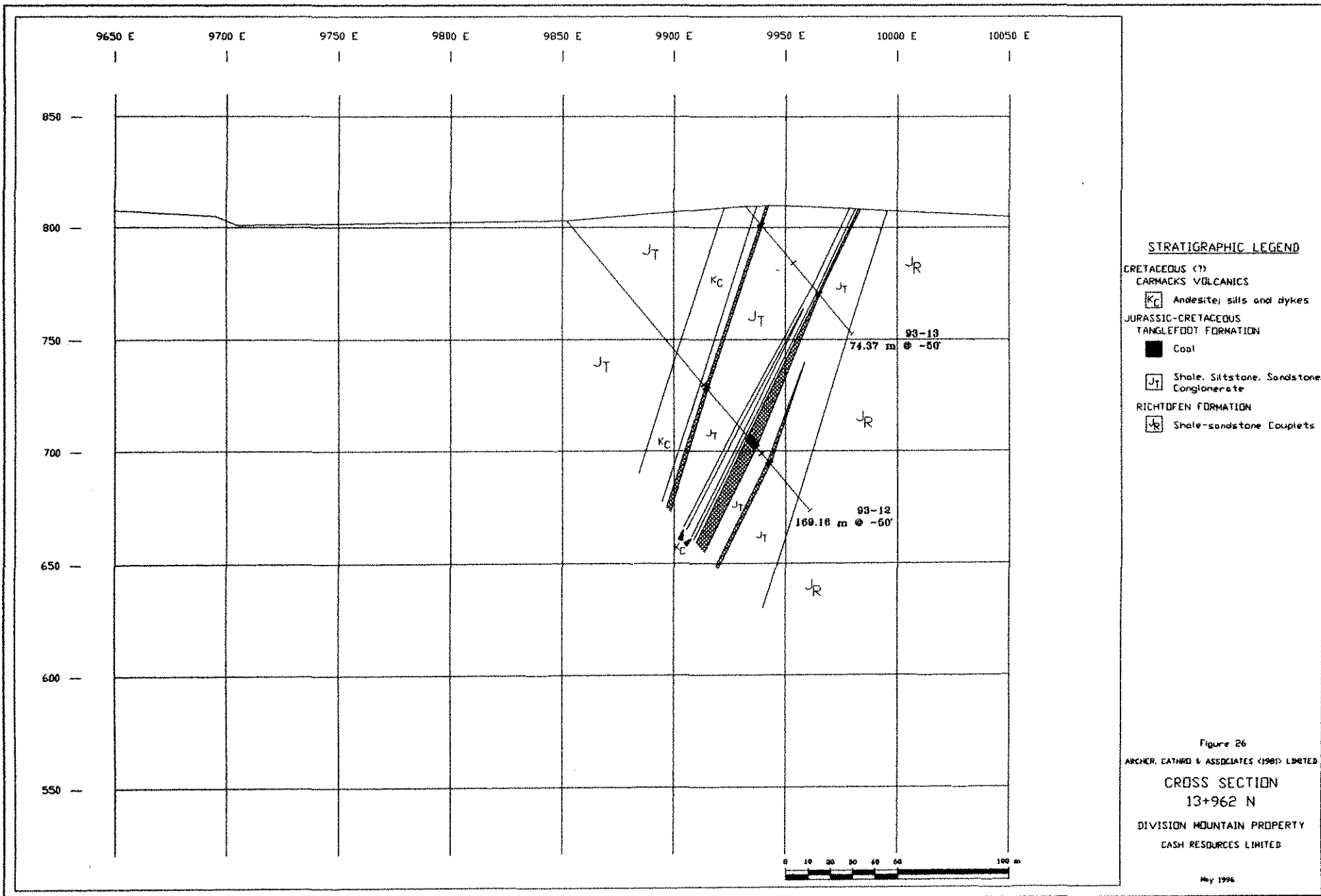
**STRATIGRAPHIC LEGEND**

CRETACEOUS (?)  
 CARMACKS VOLCANICS  
 KC Andesite; sills and dykes

JURASSIC-CRETACEOUS  
 TANGLEFOOT FORMATION  
 JT Shale, Siltstone, Sandstone, Conglomerate

RICHTOFEN FORMATION  
 Shale-sandstone Couplets

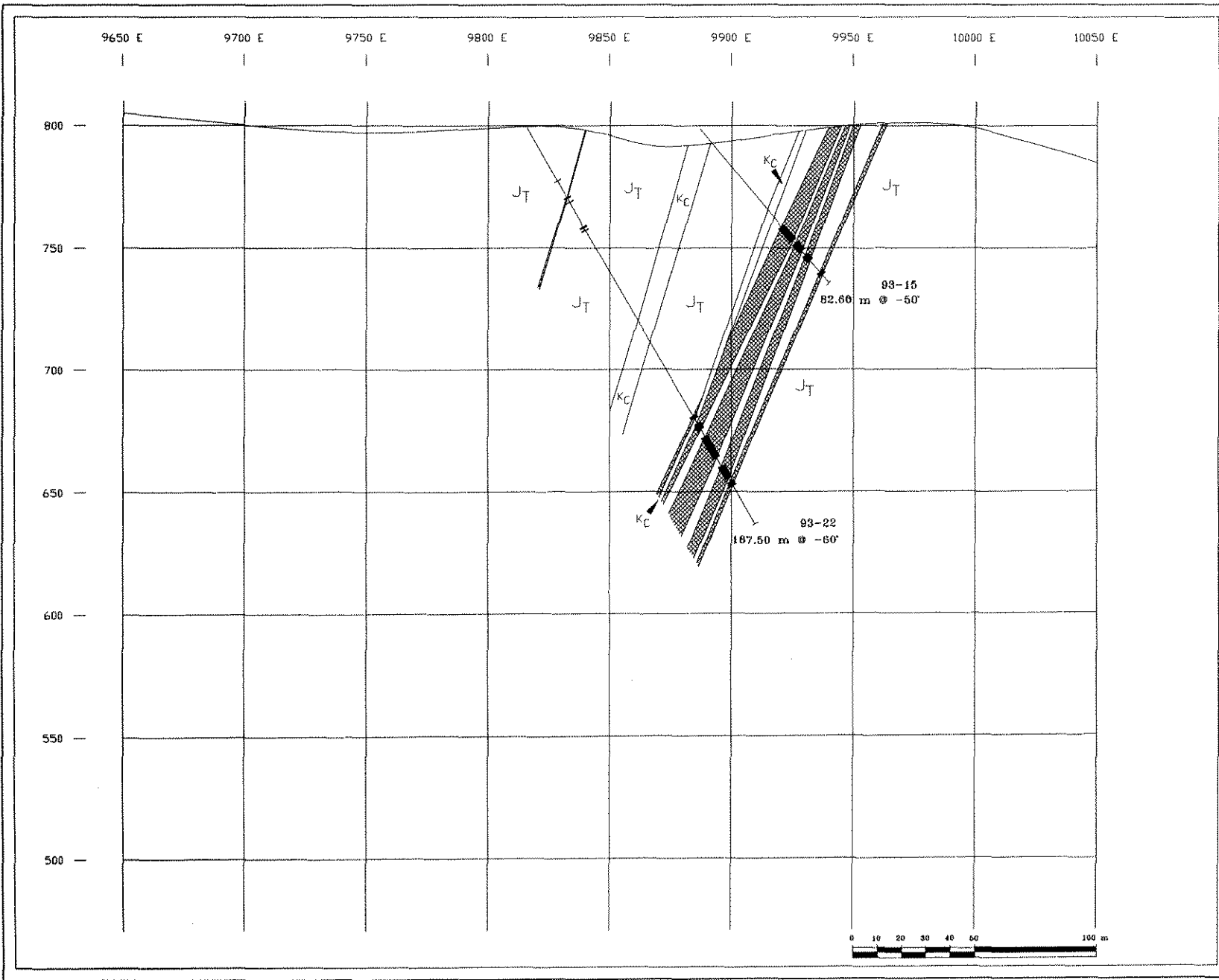
Figure 25  
 ARCHER, CATHRO & ASSOCIATES (1991) LIMITED  
**CROSS SECTION**  
 13+658 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED



**STRATIGRAPHIC LEGEND**

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

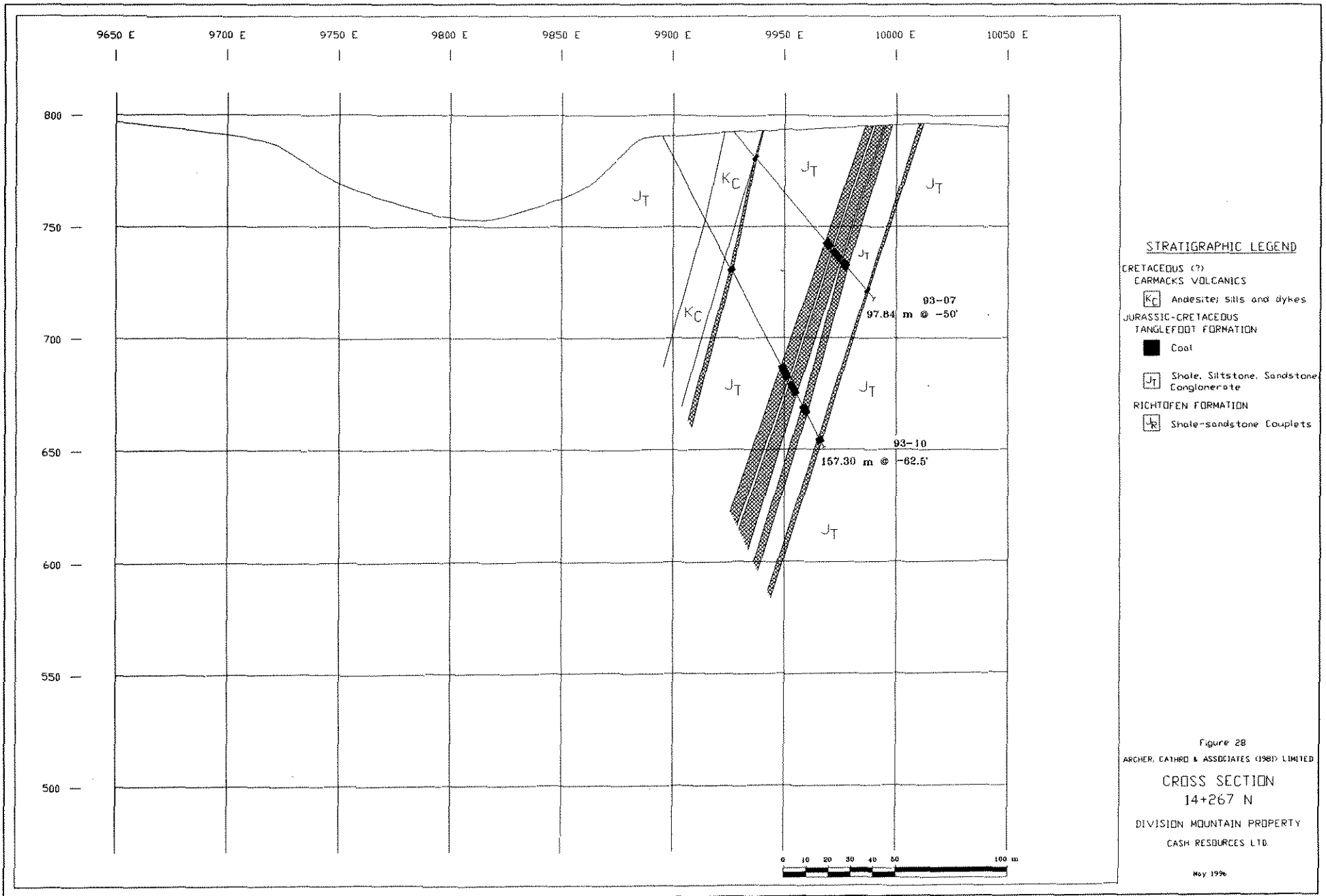
Figure 26  
 ARCHER, CATRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 13+962 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED



**STRATIGRAPHIC LEGEND**

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

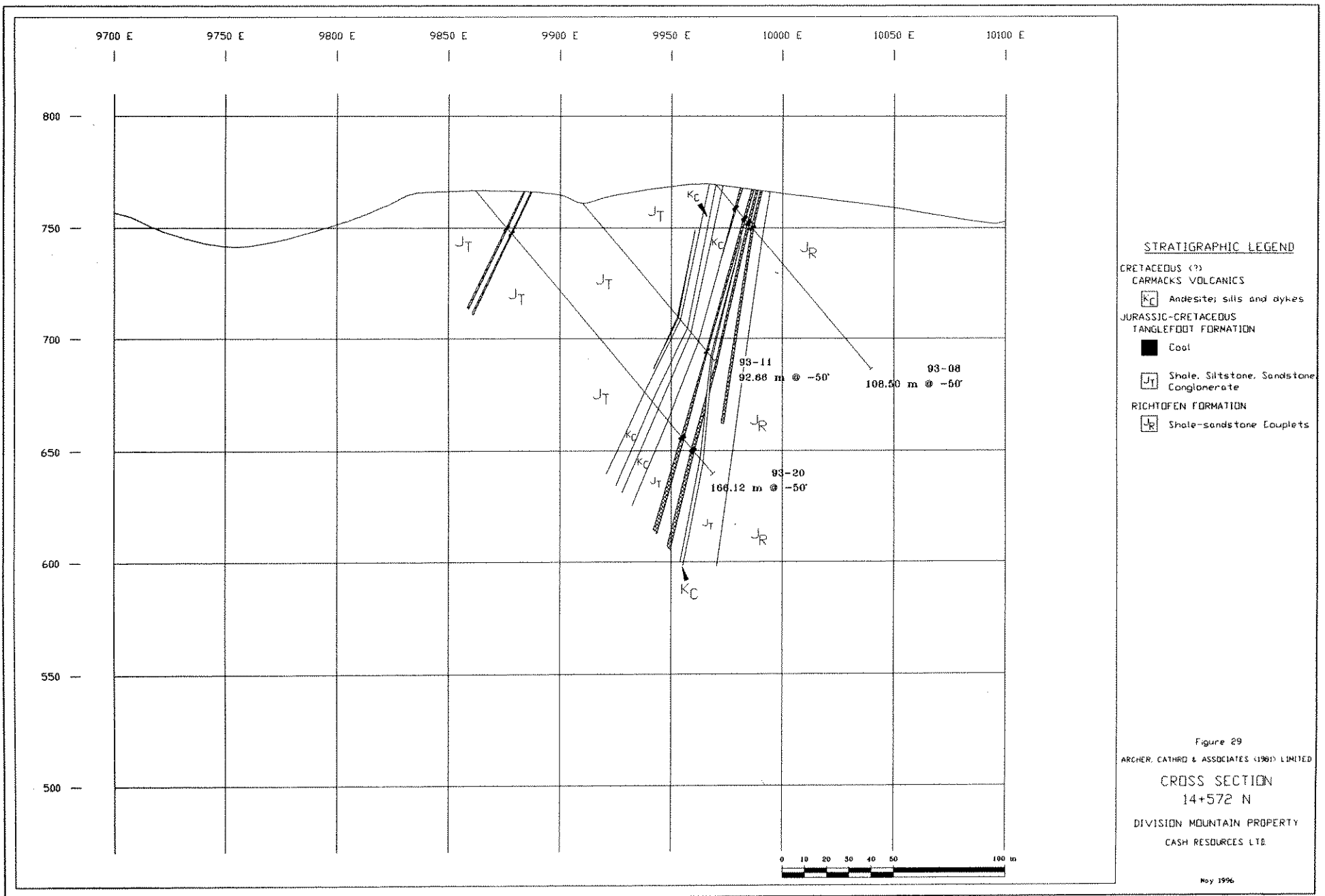
Figure 27  
 ARCHER, CATHER & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 14+075 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LIMITED

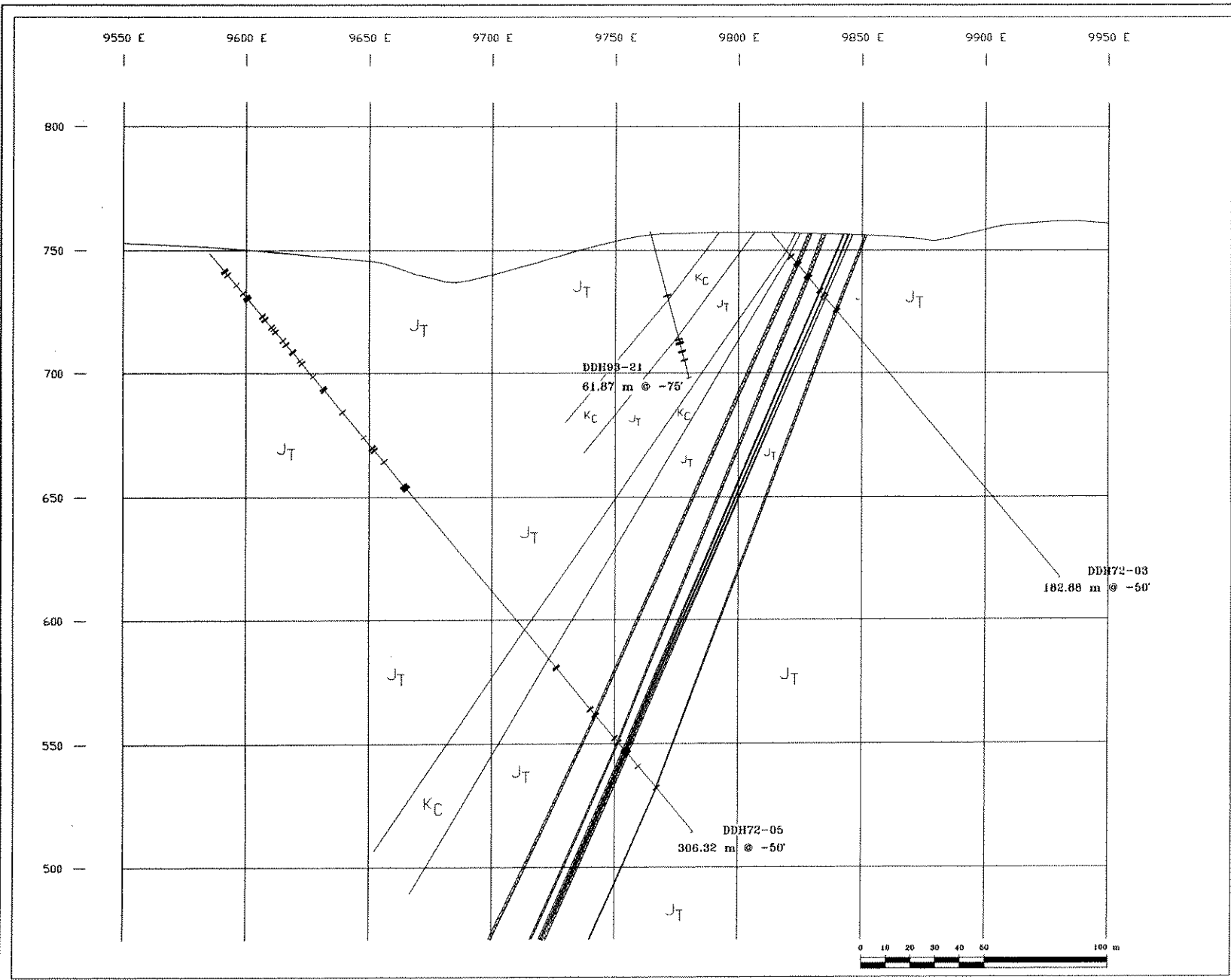


**STRATIGRAPHIC LEGEND**

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

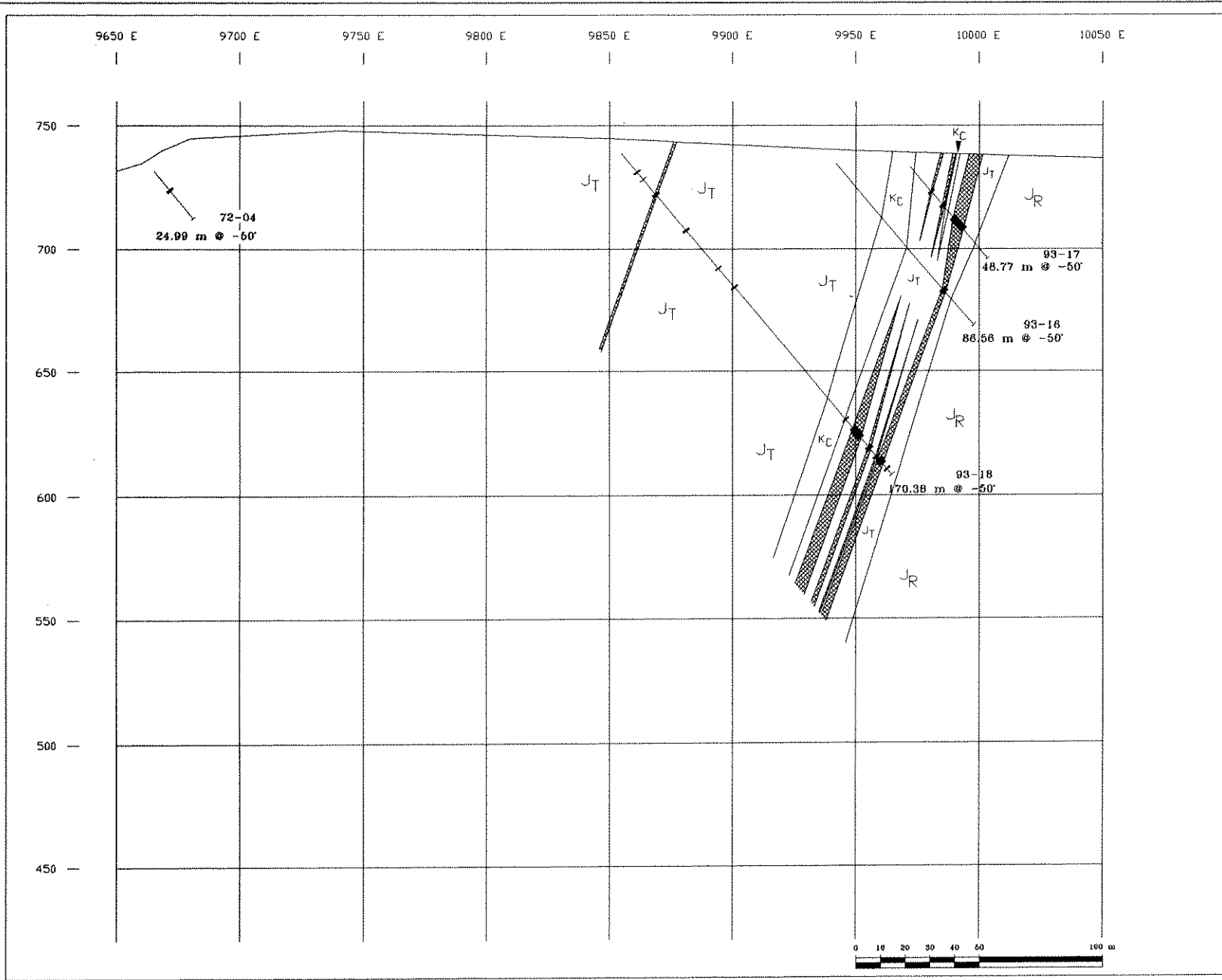
Figure 28  
 ARCHER, EATHELD & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 14+267 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.





- STRATIGRAPHIC LEGEND**
- CRETACEOUS (?)
  - CARMACKS VOLCANICS
    - KC Andesite, sills and dykes
  - JURASSIC-CRETACEOUS
  - TANGLEFOOT FORMATION
    - Coal
    - JT Shale, Siltstone, Sandstone  
Conglomerate
  - RICHTOFEN FORMATION
    - JR Shale-sandstone Couplets

Figure 30  
 ARCHER, CATRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 14+650 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.



**STRATIGRAPHIC LEGEND**

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

Figure 31  
 ARCHER, GATHRO & ASSOCIATES (1981) LIMITED  
**CROSS SECTION**  
 14+745 N  
 DIVISION MOUNTAIN PROPERTY  
 CASH RESOURCES LTD.



1. a scour-based arkosic pebble conglomerate containing fossils, twigs and branches lying transverse to paleoflow along 1 to 2 m trough foresets;
2. conglomerate lags infilling troughs as lenticular beds;
3. a fining-upward zone of medium- to fine-grained arkose containing trough cross-beds which exhibit an upward decrease in set size;
4. grey organic-rich shale or shaly mudstone containing leaves, grasses and *Metasequoia* needles and twigs;
5. coaly shale to shaly coal, commonly rich in coalified twigs and branches;
6. banded coal; and,
7. either a transition back to grey shale or an abrupt termination by the basal pebbly conglomerate bed of the next cycle.

The depositional environment was one of a rapidly aggrading flood-dominated delta. Cross-bedded conglomerate-sandstone cycles represent point-bar deposits from a high energy fluvial system. Paleocurrent variance supports a meandering river interpretation. Of particular interest is that, despite the generally coarse-grained nature of the channel sandstones and conglomerates, the overbank deposits and related coals are relatively thick and demonstrate remarkable lateral continuity. Coal seams were deposited in long-lived delta plain swamps that served as collection sites for transported organic material and for generation of peat bogs. Closer to the Tanglefoot-Tantalus contact, coal becomes less abundant. Instead, grey shale and coaly shale predominates as much thinner beds than the coal seams lower in the succession.

Favourable exploration targets exist 3800 m northeast of Division Mountain (Figure 4) where a northeasterly-dipping Tanglefoot Formation outcrop was located. Coal float was found within 1000 m of this outcrop. This suggests that another cycle of the coal-bearing Division Mountain Syncline and Cairnes Syncline Tanglefoot sequences may be present.

Resistant beds of thick-bedded chert pebble conglomerate of the Tantalus Formation cap the Tanglefoot-bearing sequence, forming prominent topographic highs at Division Mountain and Red Ridge. Depositional environment of the Tantalus Formation appears to be one of an active flood plain. Coal measures have previously been explored within the Tantalus conglomerates 100 km to the north of Division Mountain in the Carmacks region. There is no current evidence to suggest however, that the Tantalus Formation is coal-bearing in the Division Mountain area.

Small stocks, dykes and sills of porphyritic basalt, andesite and dacite intrude the Tanglefoot Formation coal measures. The presence of glassy chill zones and rare amygdaloidal textures are indicative of emplacement in a near surface setting. Age of the intrusions is unknown but they are probably related to regionally extensive volcanic rocks of the Cretaceous Carmacks Group which unconformably overlie the Laberge and Tantalus stratigraphy in the Division Mountain area.

## COAL

Aggregate coal thickness at Division Mountain (in seams greater than 1 m thick) ranges from about 10 m at Teslin Creek to 32 m in Hole 94-37. The only detailed petrologic examination of the coal was carried out by Beaton et al (1992) on detailed samples taken from a trench exposure at Teslin Creek. The main seam here is typical of bulk coal reserves established at Division Mountain. It is 11.0 m thick, with two shale partings 65 and 38 cm thick.

Petrographically, on a mineral-matter free basis, the coals average 54% vitrinite, predominately desmocollinite. Macerals of the liptinite group (primarily sporangite) comprise, on average, 10% of the coal. Average total inertite content, principally fusinite, is 36%. Some anisotropic fusinite (pyrolytic carbon) is wood char derived from peat fires.

Mineral matter content varies throughout the seam, ranging from 4 to 47% and closely follows ash content. The most common minerals are quartz and kaolin with lesser calcite and siderite.

Whole core samples of coal intersections were sent to Chemex Labs Ltd. of North Vancouver, B.C. for proximate analyses which includes determination of calorific value and percent sulphur. Analytical Certificates from 1995 diamond drilling are located in Appendix IV.

## **STRUCTURE**

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. 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 1994-95 exploration trends  $310^{\circ}$  and plunges  $9^{\circ}$  to the northwest. The east limb dips between  $25^{\circ}$  and  $45^{\circ}$  to the northeast.

The folded stratigraphy has only been slightly modified by northwest- and northeast-trending normal faults with minor dip-slip displacements.

### **1995 DRILL PROGRAM**

The 1995 drill program consisted of nine HQ-size drill holes totalling 1979.7 m. Drill production averaged 17.4 m per twelve hour shift (including moves). One hole, 95-53 was abandoned after 68 m when bedrock was not encountered. Survey data for all the Division Mountain drill holes is given in Appendix II.

All physical work on the property was performed under the provisions of a Territorial Land Use Permit. This includes the use of sumps at drill sites to collect return water from the drills. Upon completion of the drill holes the drill sites were reseeded and where possible 0.5 to 1.0 m black spruce seedlings were transplanted with a greater than 90% survival rate. Inspections were carried out by land use officers on a regular basis. No outstanding land use permit deficiencies remain from the 1995 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, twenty-four hour basis using two, two-man crews per drill. While two drills were used, a drill foreman supervised the work and a 16,000 litre capacity water truck supplied water from a lake on the property.

All 1993, 1994 and 1995 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. Results from the downhole surveys show little or no change from surface inclinations. A list of corrected dips is given in Appendix II.

The drill core was logged and sampled on site. All drill logs for the property are located in Appendix III. Casing depths ranged from 3.0 to 62.3 m in Hole 95-53 where bedrock was never encountered. Core recovery of the coal intersections averaged 75%. All holes were drilled with HQ (6.25 cm) diameter core however, badly broken ground necessitated reducing to NQ (4.75 cm) diameter in two holes.

**1995 TRENCHING PROGRAM**

The 1994-1995 excavator program consisted of thirty trenches totalling 5.9 km in length. In total, 928 hours of Caterpillar 235 excavator time was used to complete the trenches. The excavator was operated under contract by 10983 Yukon Ltd. of Whitehorse. All trenches were backfilled and reseeded upon completion as per land use regulations.

## **RESERVES**

Drill-indicated, undiluted raw coal reserves for all zones at Division Mountain total 31.7 million tonnes of coal with a strip ratio of 3.36 bank m<sup>3</sup>/tonne. A further 13.3 million tonnes of geological reserves with a similar strip ratio have been outlined by wide-spaced drilling for a total open pitable coal inventory of 45 million tonnes. Reserves are open to expansion along strike in both directions, and at depth. Further potential exists nearby in unexplored areas of favourable stratigraphy (Figure 4).

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Beaton, A.P., Cameron A.R. and Goodarzi, F.

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- 1992: A Pleinsbachian submarine slope and conglomeratic gully-fill succession; Richtofen to Conglomerate Formation transition (Laberge Group), Brute Mountain, Yukon; in Yukon Geology, Vol. 2, Indian and Northern Affairs Canada, p.71.

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- 1984: Geology, Laberge (105E) and Carmacks (115I), Yukon Territory; Geological Survey of Canada, Open File 1101.

**APPENDIX I**

**AUTHOR'S 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.



R.F. Gish, B.Sc.

**APPENDIX II**  
**DIAMOND DRILL HOLE COORDINATES**

## APPENDIX II

### Diamond Drill Hole Coordinates

a) Grid coordinates of 1994-95 drill hole collars.

<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	9680	178.9	040	70	72
94-32	12+134	9760	252.0	040	60	56
94-33	10+914	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
95-46	12+438	9750	306.3	220	50	53
95-47	13+353	9875	224.0	040	50	50
95-48	11+524	9000	274.3	040	50	53
95-49	13+353	9750	327.1	220	50	57
95-50	10+000	8400	100.6	040	50	53
95-51	13+353	9175	315.8	040	50	53
95-52	10+000	8250	245.7	040	50	53
95-53*	9+300	7725	68.3	040	50	---
95-54	12+025	9625	117.7	220	50	48

\*Abandoned in bad ground

**APPENDIX II (cont'd)**

b) UTM coordinates (approximate) of 1995 drill hole collars.

<u>Drill Hole</u>	<u>Northing</u>	<u>Easting</u>	<u>Elevation</u>
95-46	6,800,380	443,485	892
95-47	6,801,040	442,860	832
95-48	6,799,190	443,755	994
95-49	6,800,945	442,785	847
95-50	6,797,795	444,535	846
95-51	6,800,500	442,420	928
95-52	6,797,695	444,465	836
95-53	6,796,835	444,670	832
95-54	6,798,800	443,720	920

**APPENDIX III**  
**DIAMOND DRILL HOLE LOGS**

Azimuth 220°

DIVISION MOUNTAIN PROJECT HOLE 95-46 DIP: 50 @ collar, 53 @ FOH LENGTH 306.32 N 12438 E 9750 ELEV 895 Page 1 of 1

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		Summary								
	000-41.76	OVD								
9546-1	42.67-46.91	Coal - poor	4.24						89%	
	54.14-55.05	Coal - ~15% shale	0.91						80%	
	56.39-135.59	Andesite ✓	79.20							
	135.59-136.82	Coal - poor, cooked	1.23						83%	
	136.82-152.87	Andesite ✓	1605							
9546-2	152.87-156.10	Coal - poor, cooked	3.23						95%	
9546-3	156.85-160.78	Coal - ~20% shale	3.93						93%	
	174.46-174.86	Coal - cooked	0.40						100%	
	174.86-190.05	Andesite	15.19							
9546-4	190.05-191.67	Coal - 10% shale	1.62						100%	
	201.49-211.00	Andesite	9.51							
	211.00-211.12	Coal - ~35% shale	0.12						95%	
	235.12-236.22	Andesite	1.10							
	249.00-249.90	Coal - 70% shale	0.90						84%	
	249.90-295.25	Andesite	43.35							
	296.65-306.32	Richtofen								
			166.40m	16.58m					recovery	
				54.40'					over drill	
			54%	5.4%					intervals	
		Acid Tests	95-46	152.4m	50.35°					
			95-46	306.32m	53.89°					



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
			OVB							
	35.97-36.88	Overburden - recovery improves, mainly rounded intrusive rocks in light grey clay + sand								
	36.88-41.76	Overburden ferricrete? ← poorly developed - soft light grey clay/sand with rounded rock fragments up to 15cm in size								
	41.76-42.67	shale, Siltstone, Sandstone (40, 20, 40)								
9546-1	42.67-46.91	Coal 80% Coal, 20% shale - mainly black vitreous coal with zones of light to med grey shale	TF							
				BD 70°						
	46.91-49.53	Shale, Siltstone, Sandstone (40, 25, 25) 10% coal - weak FU, mainly alternating layers of above - thickly laminated								
	49.53-50.48	Shaly Coal 70% Coal, 30% shale thin to thick laminated, black to dark grey								
	50.48-50.95	Coaly Shale 70% shale, 30% coal V. thin bedded, weak FU, alternating coal/shale								
	50.95-51.65	Shale, Siltstone, Sandstone (40, 30, 30) Trace of coal good FU sequence, M. thin bedded		BD 73°						
	51.65-52.40	Conglomerate 70% cong, 20% sandstone, 10% shale ave 2mm rock frag. in a sandstone matrix, thin bedded with wispy sst/shale laminae		BD 70°						
	52.40-54.14	shale, Siltstone, Sandstone (20, 20, 40) ~10% conglomerate alternating thin to M. thin beds		BD 65°						
Coal	54.14-55.05	Coal 85% coal, 15% shale thin to thick laminae of alternating coal/shale		BD 75°						



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
20		andesite cont'	And							
		- common calcite / carbonate veins up to 4mm wide, avg 2mm wide, white carbonate and clear quartz								
15		- slight alteration near veins, andesite is slightly bleached to a lighter green		CV 55°						
		- minor darker green andesite with more common phenocrysts		CV 50°						
10				CV 15°						
				CV 22°						
0				CV 13°						
				CV 18°						
5										
0										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
And		andesite cont'	And	CV 22°						
				CV 10°						
				CV 60°						
				CV 40°						
				CV 35°						
				CV 12°						
		133.80-136.82 very light green andesite -possibly chilled margin								
Coal	135.59-136.82	Coal cooked coal - hard black coal, streak black to white - minor calcite veinlets - appears to be cooked due to andesites - contacts appear intrusive ie good breccia and lasts of coal in andesite	TF	UC 65°						
				LC ~75°						
And	136.82-152.87	Andesite - common white and dark green phenocrysts - white phenocrysts up to 1cm in size - minor calcite / carbonate veins, 2 up to 1cm wide with 0.5 cm of blueish ribbon banded quartz with 0.5 cm of white carbonate - mainly a mixture of quartz + carbonates in each vein	And	CV 65°						
				CV 77°						
				CV 10°						
				CV 30°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
9546-2	152.87 - 156.10	Coal - cooked coal, ~ >10% shale partings - hard to scratch; common ~1mm wide, QZ/CA veins, discontinuous; thickly laminated coal/shale;	TF	BD 65°						
				BD 70°						
	156.10 - 156.85	coal, shale, siltstone, Sandstone conglomerate (5, 20, 15, 30, 30%) - thick laminated to very thin beds of alternating or weakly FU sequences; black to dark grey in color		BD 75°						
9546-3	156.85 - 160.78	Coal 80% Coal, 20% shale partings - thick laminated to very thin bedded, alternating coal/shale layers, weak calcite veinlets, zones of good coal		BD 70°						
	160.78 - 163.06	Shale/Siltstone/Sandstone (40, 20, 40%) - thick laminated to very thin bedded; alternating layers with an overall FU sequence		BD 70°						
	163.06 - 169.16	Conglomerate (70%), Sandstone 25%, shale 5% - medium bedded cong with wispy thin laminated shale and thin bedded sandstone - very fine to medium pebble quartz clast cong, with a sandstone matrix, matrix supported very minor clast supported		BD 70°						
	169.16 - 172.21	Shale/Siltstone/Sandstone (40, 20, 40%) - good FU sequence, shale more common at top while sandstone more common at bottom - thin laminated at top to thin bedded at bottom		BD 70°						
	172.21 - 174.46	(Conglomerate (75%) sandstone 20%, shale 5%) - medium bedded, very fine to medium chert pebble conglomerate, thin laminated sandstone and minor wispy thin laminated shale		BD 80°						
Coal	174.46 - 174.86	Coal - cooked coal - hard to scratch; common 1mm wide CB/CA veinlets, discontinuous veinlets - intrusive contact, with andesite intruding into coal		BD 60°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
And	174.86-190.05	Andesite 174.86-175.66 -brecciated andesite with white veinlets and minor black matrix - chilled margins of andesite, pale green and white phenocrysts are more common and larger in middle of this zone than edges - common QZ/CA veinlets, avg 2mm wide, max 8mm wide, some veinlets with separate QZ + CA bands, several different angles and cross cutting relationships - sharp lower contact no breccias	And	UC 50° CV 10° CV 30° CV 10° CV 45° LC 80°						
9546-4	190.05-191.67	Coal 85% coal, 15% shale, cooked coal - slightly cooked coal, ie fairly hard; black metallic lark, minor 1mm wide QZ/CA veinlets - gradational lower contact with black shale	TF	BD 85° BD 75°						
	191.67-196.59	Shale, Siltstone, Sandstone (40, 30, 30) - good FU sequence, with several smaller FU sequences - thin to medium bedded - black shale, dark grey siltstone, medium grey sst		BD 70° BD 65°						
	196.59-201.49	Conglomerate (80%) sandstone 15% shale, 5% - light grey, medium bedded, very fine to medium pebble quartz conglomerate with thin laminated wispy shale zones		BD 70°						
And	201.49-211.00	Andesite - sharp contact to pale greenish gray andesite - common QZ/CA veinlets - phenocrysts (submicron) pale white & pale green increase in size towards the middle (up to 1cm) - 204.94-204.97 - broken and altered to clay	And	UC 40 VN 0-15						
		- sharp lower contact to grey lower andesite		LC 20						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/b	%	%	%	%	%
Coal	211.00 - 211.12	Coal - 65% coal, 35% siltstone, coarse grained textured coal - = .5% med gr py des and veinlets, qtz-car veinlets	TFF							
	211.12 - 211.37	Conglomerate - granule sized, rounded to subrounded, clast supported qtz conglomerate		BD 62 UC 60						
	211.37 - 213.03	Shale, Siltstone, Sandstone (40, 40, 20) - 211.37 - 211.40 fault? soft gougey shale - general FU sequence		UC 78 BD 58						
	213.03 - 217.27	Shale, Siltstone, Sandstone (5, 15, 80) - general FU sequence w/ 2 bands of qtz grain cong 7+15cm - tied to thick laminations - 216.00 - 217.27 numerous coal veinlets 1-2mm @ 78°		UC 72 BD 78						
	217.27 - 217.40	Siltstone - choc brown siltstone w abundant plant fossils		UC 63						
	217.40 - 223.18	Sandstone - fine to very coarse grained FU sequence w 1 to 2 mm coal veinlets		BD 63						
	223.18 - 224.03	Shale, Siltstone, Sandstone - FD laminated sequence to choc brown massive shale w plant fossils		UC 83 BD 73						
	224.03 - 235.12	Coal, Shale, Siltstone, Sandstone, Conglomerate (10, 35, 15, 15, 25) - alternating layers of the above rocks with local FU sequences and common gradational contacts - good coal layers up to 10cm wide, - black shale as layers, wispy laminae and matrix - siltstone as massive brownish, very thin beds - sandstone as coarser grained zones w shale matrix - conglomerate w gradational upper + lower contacts - very weak CB/CA veinlets		BD 65° BD 55° BD 65° BD 55° BD 65°						
And	235.12 - 236.22	Andesite - pale green brecciated, minor phenocrysts, common carbonate veinlets	And.							
	236.22 - 237.92	Conglomerate (80%) shale (20%) - minor shale at contact w and and as irreg. laminae	TFF	BD 65°						
	237.92 - 240.14	Coal, Shale, Siltstone, Sandstone, Conglomerate (1, 24, 10, 35, 30) - good FU sequence, mainly thick laminations with gradational CT, and repeating sequences.		BD 45° BD 65°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
40	240.14 - 243.10	Coal, Shale, Siltstone, Sandstone, Conglomerate (2, 13, 5, 35, 45) - good FU sequence, mainly pale grey cong w layer width decreasing up section	TFF	BD 55° LC 70°						
	243.10 - 245.67	Shale, Siltstone, Sandstone (40, 25, 30) cong ~5% - good FU sequence, minor brown siltstone, shale as laminae + matrix, very coarse sst or cong at bottom		EL 55°						
45	245.67 - 247.30	Shale, Siltstone, Sandstone (40, 25, 30) cong ~5% - as above except with some sedimentary breccias developed in coarse sst / cong.		BD 65°						
	247.30 - 249.00	Shale, Siltstone, Sandstone (40, 15, 40) cong >5% - as above with minor sedimentary breccias near bottom, sharp UC + LC as in above.								
50	Coal 249.00 - 249.90	Shaly coal >70% shale in coal + shale - streak from white to black, very poor coal								
	And 249.90 - 249.25	Andesite - typical andesite - common white carbonate veinlets, minor zones with brecciation and minor blue grey matrix - UC with very minor ch'd andesite or rooked coal, also minor brecciated andesite - common white and green phenocrysts	AND	CV 20° CV 45° CV 20° CV 45° CV 25° CV 15°						
55										
60										
65										
70										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
70		Andesite cont' - typical andesite w increasing calcite/ carbonate fractures after 204 m	And							
				CV 20°						
75										
				CV 25°						
80										
				CV 40						
				CV 20°						
85										
				CV 55°						
				CV 40°						
				CV 25°						
90		294.13 - reduced to NQ								
95	295.25-296.65	conglomerate (90%) sandstone, 10% very fine to coarse pebble conglomerate sandstone matrix, clasts mainly quartz w minor shale	TFF							
				BD 70°						
Rich	296.65-299.70	Richtofen (100%) (shale ~70% sandstone ~30%) - alternating layers of black shale and light grey sandstone - sst laminae very thin to thick laminae - shale thin laminated to thin bedded - minor carbonate veinlets	Rich							
				BD 70°						
				BD 65°						
00										
				BI 70°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/b	%	%	%	%	%
	299.70 - 306.32	Rich to frn cong 50%, sandstone 35%, shale 15% - mainly alternating layers of the above rocks, only weak FU sequence in congl/sst - cong - medium grey in color, thin to medium bedded very fine pebble quartz conglomerate - sandstone - light grey, coarse to fine sand, thinly laminated to thin bedded - shale - black, fine grained, mainly as thin to thick laminae with some rip-up clasts up to 4 cm in size.	Rich							
				BD 65°						
				BD 65°						
				BD 65°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	0.00 - 5.49	Overburden - poor recovery, minor rock fragments	OVB							
	5.49 - 7.88	Sandstone (80%) shale 10%, Conglomerate 10% - mainly pale to dark grey sst as thin bedded FU sequences, with wispy medium to thick laminae of shale and conglomerate	TF	BD 70° BD 75°						
	7.88 - 9.70	Conglomerate (70%) sandstone 25%, shale 5% - very fine pebble conglomerate, quartz clasts in a sandstone matrix, with minor wispy thin laminae of shale - medium to thick bedded FU sequences		BD 70° CV 50° CV 45° CV 50°						
	9.70 - 20.70	Conglomerate (90%) sandstone 7%, shale 3% - very fine to medium chert/quartz pebble conglomerate, sandstone matrix, mainly matrix supports w minor clast supported - minor wispy shale layers and discontinuous shale rip-up clasts - very minor quartz/carbonate veinlets		BD 65° BD 65° BD 65°						
	20.70 - 21.50	Coal, shale, siltstone, sandstone, Cong (3, 15, 7, 25, 50) - good FU sequence, mainly coarser material								
	21.50 - 22.12	Coal, shale, siltstone, sandstone, Cong (3, 10, 7, 50, 30)								
	22.12 - 23.24	Coal, shale, siltstone, sandstone, Cong (3, 10, 7, 30, 50) - good FU sequence, very minor coal, mainly coarser		BD 50°						
	23.24 - 24.87	Shale, siltstone, sandstone (30, 20, 50) - mainly alternating layers of thin to thick laminated shale/siltstone with thick laminated to thin bedded sandstone, sharp contacts		BD 50° BD 60°						
	24.87 - 27.05	Conglomerate (80%) sandstone 20% medium bedded, sst matrix very fine to fine grained								
	27.05 - 27.95	Coal, shale, siltstone, sandstone, Cong (1, 20, 4, 50, 25) - good FU sequence, some alternating layers								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	27.95 - 29.94	Shale, Siltstone Sandstone (40, 15, 40) Coal 5% -good FU sequence, gradational contacts -minor wispy thick laminae of coal at top	TF	BD 65° BD 60°						
	29.94 - 30.78	Shale (70%) Siltstone 25%, Coal 5% -mainly hard black shale w thin wispy coal		BD 65°						
①	30.78 - 33.00	Coal (80%) shale 15%, cooked coal 5% -medium laminated to thin bedded coal, minor shale lamina and coal cooked near lower CT		BD 55°						
	33.00 - 50.55	Andesite -typical andesite -medium green in color, minor narrow QZ/CA veils -upper contact chilled with breccia and minor blue matrix -lower contact sharp	And	UC 50 CU 15° CU 15° CU 10° CU 15° CU 30° CU 25° LC 70°						
9547-2	50.55 - 52.01	Coal (80%) shale 20% -mainly laminated coal with minor shale laminations, minor cooked coal at contact -sharp upper CT, gradational lower CT	TF	BD 60°						
	52.01 - 54.84	Shale (70%) Sandstone 25%, siltstone 5% -mainly black shale with minor thick laminations of sandstone - gradational lower CT		BD 75°						
	54.84 - 61.36	Shale, Siltstone Sandstone (50, 10, 40) -generally a FU sequence with local alternating layers, layers range from 0.1 to 3cm wide		BD 25° BD 60°						





SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
120										
25	5 124.77-138.90	Coal - calcareous, dull black med compotent coarse 128.70-131.37 - coaly shale, siltstone, sandstone	Coal	UC 75 BD 65						
30	6									
35										
40	138.90-148.22	Siltstone - fine to coarse grained, dk brown, med calcite veins @ 28 sand cross cut, general Fu sequence	TFF	BD 66 CU 28						
	142.95-143.85	Coal - compotent, non calcareous								
45	148.22-153.16	Conglomerate (Conglomerate 70%, Sandstone 30%) O - brownish grey to light grey, gravel to pebble cbst supported, rounded to subrounded conglomerate		BD 63 BD 68						
50										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	153.16-158.60	Andesite - dk green - calcite veinlets primarily 0° and 55° - larger white (felspar?) phenocrysts are found towards the the middle of the andesite	And	CV 55 CU 0  LC 68						
	158.60-161.94	Conglomerate - grey, calcareous poorly sorted granule to pebble clast supported conglomerate	TFF							
	161.94-164.30	Coal, Shale, Siltstone, Sandstone, Conglomerate (15%, 20%, 50%, 5%, 10%)								
	164.30-168.40	Shale, Siltstone, Sandstone, Conglomerate (10, 20, 20, 50) Fu - broken shale + coaly shale grades to arkosic siltstone + sandstone, to poorly sorted clast supported calcareous pebble conglomerate		BD 67 BD 71						
6	168.40-171.68	Coal 80% shale 20% - shattered to conchoidal, dull to vitreous	Coal							
	171.68-172.40	Andesite - pale grey green aphanitic Coal 171.80 - 172.00	And	UC 70 BD 68						
	172.40-181.61	Shale 85%, Siltstone 15% - black to dk grey massive shale w some <5° - coaly shale and laminated grey siltstone w bedding - shale w plant fossils 173.58-173.80 - Andesite clast	TFF	BD 66  BD 64 BD 62						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
80	181.61-185.43	Andesite - light to dark green aphanitic, calcite veinlets < 0.5m cross cutting	And							
	183.80-184.40	Shale (5-10% coal)		BD 60						
75	185.43-190.97	Shale, Siltstone, Sandstone (40%, 20%, 40%) - shale + coaly shale grades to arkosic siltstone to laminated sandstone	TFF							
	186.96-187.35	Andesite		BD 70						
0	190.97-196.44	Andesite - dull green aphanitic, few if any phenocrysts - sparry carbonate veins, cross cutting no dominant orientation	And							
	194.20-195.76	Coaly Shale								
5	196.44-201.57	Shale, Siltstone, Sandstone (5%, 65%, 30%) FU - gradational contacts between shale-silt-sst - shale - black massive - siltstone - dk chor brown w/ plant fossils - occasional clasts and laminations of black coaly shale within siltstone	TFF	UC 46						
		- sandstone - med to coarse grained, shale & siltstone laminae throughout		BD 74						
				BD 67						
	201.57-202.69	Conglomerate FU - clast supported, subrounded, feldspar & calcareous granule conglomerate								
5	202.69-210.20	Sandstone - FU - primarily arkosic sandstone - occasional 2cm coaly shale veins @ 55-60° - sparry carbonate veins and calcite veinlets @ random orientations		BS6°						
10										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
10	210.20-211.08	Conglomerate - FU O-calcareous, chert supported, subrounded gtz rch granule conglomerate	TFF							
	211.08-212.75	Shale Siltstone Sandstone - FD 50% 10% 40% - med grained sandstone with 2-5cm bands of choc brown siltstone - 212.38-212.43 coal w calcite concretions - shale coaly shale		UC 60 BD 63 BD 60						
15	212.75-217.22	Shale Siltstone Sandstone - general FU 20 40, 40 - alternating layers w a general FU trend of dk brown shale, choc brown siltstone w plg <1mm speckles, med to coarse grained sandstone 213.46-213.89 - matrix supported, angular to rounded pebble conglomerate		BD 66						
20	217.22-220.57	Rechtöfen - "striped" shale-sandstone couplets 219.82-220.08 - sandstone	RCH	UC 63 BD 58						
25	220.57-224.03	Conglomerate FU O-matrix supported granule to pebble conglomerate - feldspar rich								
	224.03	EOH								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	0.00 to 6.50	Overburden	OVR							
	6.50-11.15	Andesite - broken, textures vary from aphanitic to 0.1mm speckled w feldspar, to amygdules 3mm of sparry carbonate sparry carbonate veins @ 90 9.90-10.15 - Brecciated Andesite	AND							
	11.15-13.86	Brecciated Andesite - light green aphanitic matrix. fragments 2mm to 10cm, some subrounded but most sub angular, average size 0.5cm, pyrite on some fracture surfaces								
	13.86-22.25	Andesite - dark green, fresh andesite w 0.5mm to 1.0mm laths of plagioclase, calcite veinlets general orientation 50 to 65, broken from 18.0 to 18.5 and 19.61 to 20.5								
	22.25-39.41	Brecciated Andesite - orange tan weathering andesite breccia. fragments average 1cm and subrounded, varies from "lean breccia" with very little rotation to poorly sorted higher energy mechanism, trace pyrite on fracture surfaces 36.50-39.41 - increasing py 40.5% - some shale and gtz frags		cv 06"						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
50										
5		36.50-39.41 - increasing pyrite <0.5% - not all fragments andesite; some shale some qtz								
0	39.41-78.20	Broccated Andesite - greenish gray, more competent and harder than previous intervals re less weathering								
5										
0										
5		- average size of fragments increase however no sign of preferential sorting - composition of fragments becomes more varied however still mostly andesite - matrix becoming increasingly darker								
0										



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		dark green to dark brown, trace py throughout 89.19 - 89.57 - black massive shale w coal fragments and pyrite								
		96.01 - 96.20 - ore broken and considerably softer								
	101.19 - 134.40	Andesite - dark green aphanitic andesite								
				CV 39						
				CV 58						
				CV 58						
				CV 33						
				CV 44						
				CV 49						
				UC 55						
		113.92 - 114.44 - sparry carbonate vein on upper and lower contact of highly calcareous interval of broken andesite								
				UC 58						
				LC 60						
		117.98 - 120.27 - Breccia - matrix tan brown to black fragments tan weathered andesite, flow banding? @ 50° 119.89 streaks @ 50°								













SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		Summary								
	0.00-3.35	OWD								
	83.85-84.10	Coal - poor, ~30% shale	0.25							
	84.25-97.97	Andesite	13.72							
9549-1	102.41-105.16	Coal	2.75							
	109.67-109.95	Coal	0.28							
	109.95-152.52	Andesite	42.57							
9549-2	160.93-163.37	Coal - good	3.05							
	164.68-165.58	Coal - poor, ~30% shale	0.90							
9549-3	167.79-169.19	Coal - good	1.40							
	174.04-174.95	Coal - poor, ~20% shale, 10% cooked	0.91							
	174.95-271.89	Andesite	96.94							
	273.61-273.83	Coal - poor	0.22							
	274.31-274.52	Coal - poor	0.21							
	282.17-282.55	Coal - Very poor	0.38							
	286.72-287.18	Coal - good coal, ~20% shale	0.46							
	288.87-289.21	Coal - good, ~20% shale	0.34							
	307.37-308.28	Coal - good	0.91							
9549-4	310.12-311.96	Coal - good, >20% shale	1.84							
	319.65-320.10	Coal - poor	0.45							
	327.05 EOH		153.23	143.5m						
			47%	44%						
		Coal 14.35m in 15 seams 4 samples over 9.04m								
		Andesite 153.23 in 3 zones								
		Acid Tests -50° @ collar -57° @ 327.05m								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	0.00-3.35	Overburden - very poor recovery - no sand or clay just intrusive rock fragments and conglomerate float - casing to ~ 2.74m								
	3.35-10.77	Conglomerate (95%) sandstone 4%, shale 1% - mainly light grey cong. with light tan weathering - fine to coarse pebble conglomerate, mainly fine pebble sized quartz clasts - matrix is sandstone - conglomerate is matrix supported w/ minor clast supported - minor wispy discontinuous laminae of shale and sandstone	TFF							BD 70°
	10.77-12.43	Conglomerate (75%) sandstone 20%, shale 5% - as above except with more laminae of sst + shale								BD 65°
	12.43-15.15	Shale, siltstone, sandstone (30, 10, 60%) coal < 2% - a FU sequence w/ 5cm of coal at top, but made up of alternating thin laminae to thin bedded sst/shale								BD 65°
	15.15-15.55	Conglomerate (100%) gradational UC, sharp LC								BD 60°
	15.55-15.75	Shale (70%) siltstone 15%, sandstone 15% - dark black shale with wispy sst/siltstone laminae								BD 70°
	15.75-21.36	Conglomerate (80%) sandstone 10%, shale 10% - light grey, mainly granule sized quartz clasts in a sst matrix w/ minor wispy sst/shale laminae and discontinuous coal clasts; LC gradational								BD 65°
	21.36-23.13	Shale, siltstone, sandstone (40, 10, 50%) Coal < 5% - FD from 21.36 to 21.64, then ~ 5cm coal, then good FU sequence to 23.13, locally layers of above units repeat and some coarse sst at LC. - lower contact gradational								BD 60° BD 55°
	23.13-32.45	Conglomerate (80%) sandstone 10%, shale/coal 10% - light grey, clast size from 1mm to 13mm, avg. fine granule in size, mainly quartz clasts, with a quartz - sandstone matrix - cong in mainly matrix supported with some clast supported zones.								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		- minor wispy discontinuous sandstone/shale laminae, some coaly shale to coal fragments + laminae	TFF	BD 65°						
32.45	45.87	Shale, Siltstone, Sandstone (40, 10, 50%)								
		- mainly alternating layers of the above rocks		BD 70°						
		- shale as black, wispy thin-thick laminations								
		- siltstone as brownish black layers up to 10 cm wide and fairly massive or as laminae		BD 70°						
		- sandstone as medium to light grey, thin-thick laminations, mainly as couplets w/ shale								
		- very minor to trace white CB veinlets		BD 70°						
		41.12 - 42.30 ~ 30% conglomerate w/ shale/sandstone in this zone								
				BD 70°						
		- UC sharp and unconformable								
		- LC slightly gradational but still sharp								
45.87	46.82	Conglomerate (95%), shale/sandstone 5%								
		- light grey quartz granule cong w/ shale/sst laminae								
46.82	48.35	Shale, Siltstone, Sandstone (60, 10, 20) Cong ~ 10%		BD 70°						
		good FU sequence, mainly shale with some coarse sst and cong at the bottom								
		- both UC + LC are sharp and unconformable		BD 70°						
48.35	49.68	Shale, Siltstone, Sandstone (20, 70, 60%) Cong ~ 10%								
		good FU sequence, mainly sst to coarse sst/Cong.		BD 75°						
49.68	50.95	Shale, Siltstone, Sandstone (30, 10, 50%) coal < 3%								
		good FU sequence, minor coal @ UC, UC sharp								
50.95	51.71	Conglomerate (95%), shale 5%, UC gradational, LC sharp								
51.71	54.07	Shale, Siltstone, Sandstone (45, 10, 45%) LC gradational		BD 70°						
		weak FU sequence, mainly alternating shale/sst laminae								
54.07	55.18	Conglomerate (90%), sandstone ~ 10%, shale < 2%								
		weak FU quartz granule cong, gradational contacts		BD 70°						
55.18	59.93	Shale, Siltstone, Sandstone (45, 10, 45%)								
		mainly alternating layers of wispy, thin-thick laminated shale/sst, weak-very weak FU								
		UC + LC gradational								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	59.95-70.90	Conglomerate (100%) - light grey conglomerate, - granule to medium pebble clasts in a sandstone matrix - clasts mainly quartz - matrix supported - very clear conglomerate with only trace sst/shale/coal laminae or clasts. - nil white CB veinlets - lower contact with more common sst/shale laminae and appears to be a gradational FO sequence	TEF							
	70.90-79.20	Shale, Siltstone, Sandstone (35, 10, 50%) cong ~ 5% - alternating layers of above or minor FU sequences - shale as black thin to thick wispy laminae - siltstone as very pale brown laminae - sandstone as light grey laminae usually alternating or shale, occasionally as thin beds coarsening down section to conglomerate - very minor white CB veinlets - LC sharp		BD 80°						
				BD 70°						
				BD 70°						
				BD 70°						
				BD 75°						
	79.20-80.65	Conglomerate (85%) sandstone 10%, shale 5% - medium grey, matrix supported, quartz clasts both sst + shale matrix, minor shale clasts + sst laminae		UC 70°						
	80.65-83.85	Shale (70%) sst 5%, siltstone 5%, cong 10%, coal 10% - mainly black shales or laminae to thin beds of sst/siltst/cong/coal, UC + LC are gradational								
Coal	83.85-84.10	Coal (80%) shale 20% - poor coal, high shale content								
	84.10-84.25	Shale (100%) slightly cooked								
And	84.25-97.97	Andesite - typical medium green andesite with common white and green phenocrysts - fairly common to minor white CB veinlets - sharp UC + LC - no breccia at contact.	And	CU 25°						
				CU 70°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		Andesite cont'	And	CU 45°						
				CU 20°						
				CU 35°						
				CU 25°						
	97.97-102.41	Shale (70%) sandstone 25% coal 5% - dark black shale thin laminae to thin bedded with thin to thick light grey sst laminae - LC gradational, UC sharp - possibly a weak FD sequence - coal at UC+LC as layers up to 3cm wide	TFF	BD 70° BD 65°						
9549-1	102.41-105.16	Coal (70%) shale 30% - black coal with a black streak, thin laminae of shale and very minor shale breccia - gradational contacts, conformable UC+LC		BD 65° BD 60°						
	105.16-107.75	Shale (90%) sandstone <10% coal <2% - mainly black shale, thin bedded, minor coal laminae and sst near lower contact		BD 60° BD 55°						
	107.75-108.50	Sandstone (80%) conglomerate 20% - medium grey, weak FU w cong at lower contact		BD 55°						
	108.50-108.87	Shale (80%) sandstone 10%, coal 10% - mainly black shale w coal laminae, weak FU sequence								
	108.87-109.67	Conglomerate (90%) sandstone 10% - medium grey, granule to fine pebble, quartz cong								
Coal	109.67-109.95	Coal (70%) shale 30% - soft, black coal/shale mash, sharp UC+LC								
And	109.95-152.52	Andesite - typical medium green andesite with common white CB veinlets - common greenish and white phenocrysts up to 8mm in size avg 4mm		CU 25° CU 30° CU 70°						



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		Andesite cont'	And							
	152.52-154.45	Coaly shale shale 70%, coal 25%, sandstone 5% - black shale w/ coal and shaly coal layers upto 7cm wide, minor fine grained sandstone laminae	TFF	BD 70°						
	154.45-154.85	shale siltstone sandstone (30, 20, 40%) cong 10% dark grey, weak FU sequence w/ some alternating		BD 65° BD 60°						
	154.85-155.45	Conglomerate (70%) Sandstone 20%, shale 10% weak FU, some alternating layers, minor shale laminae		BD 70°						
	155.45-156.15	Shale, Siltstone, Sandstone (30, 20, 40%), coal 10% good FU sequence, with common alternating laminae								
	156.15-160.93	Shale (80%) sandstone 15% coal <5%, siltstone 5% mainly alternating layers wispy sst laminae to black shale		BD 55°						
9549-2	160.93-162.37	Coal (90%) shale 10% - good clean coal, black streak, thin shale laminae								
	162.37-164.18	Coal, Shale, Siltstone, Sandstone, Cong (3, 30, 5, 30, 32%) - good FU with some alternating layers		BD 65°						
	164.18-164.60	Shale, Siltstone, Sandstone (30, 10, 40%) cong <10%, coal <10% - weak FU, with alternating layers		BD 75°						
Coal	164.68-165.58	Coal (70%), shale 30% - poor quality coal		BD 60°						
	165.58-166.13	Shale, siltstone, sandstone (30, 10, 60%) - good FU sequence with gradational contacts		BD 65°						
	166.13-167.79	Conglomerate (90%) w/ wispy shale/sst laminae, 10% - medium grey, good FU, shale/sst matrix, granule @2/shale		BD 65°						
9549-3	167.79-169.19	Coal (80%) shale 20% - good quality coal								
	169.19-174.04	Shale Siltstone, Sandstone (45, 10, 40%) coal <5% alternating thin to thick laminae of black shale and light grey sandstone - minor thin coal laminae to 10cm of coaly shale - UC gradational, LC sharp w/ coarser sst at bottom		BD 75° BD 75° BD 65°						
Coal	174.04-174.95	Coal (70%) shale 20%, cooked coal 10% - high shale/mud content and last 10cm is cooked coal								
And	174.95-271.89	Andesite - typical light green andesite with only minor white and dark green phenocrysts - appears to be chilled near contact.	And							

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		andesite cont' - white CB vein common up to 3mm wide	And							
		- white CB veins up to 2cm wide with veigs and different colors		CV 20°						
				CV 20						
		- andesite becomes darker green with more phenocrysts.		CV 25°						
				CV 35°						
		- phenocrysts become less common and smaller		CV 45°						
		- white CB veins more commonly with narrow alteration zones of bleached andesite up to 1.5cm on either side of each CB veinlets		CV 15°						
		- very minor breccia zones of cracked andesite with a black matrix								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		andesite cont'	AND							
		• common white CB veinlets up to 1cm wide, avg 3mm, some with narrow alteration zones of bleached andesite up to 5mm on either side of each veinlet		CU 50°						
		- trace pyrite mixed with white carbonate veinlets		CU 70°						
				CU 20°						
				CU 40°						
				CU 30°						
				CU 15°						
				CU 30°						
				CU 25°						
				CU 25°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
40		Andesite cont'	And							
		- typical green andesite to ~5% <2mm green phenocrysts and ~1% >1.5mm white phenocrysts								
45		- white CB veins avg 3mm wide, max 10mm, ~4-5 per meter, most with alteration zones up to 2cm on either side, shown by bleached green appearance of andesite								
50										
				CU 10						
				CU 25°						
55				CU 25°						
				CU 30°						
60										
				CU 30°						
				CU 35°						
65				CU 30°						
		Lower contact sharp with no breccia, just a sharp and/cool contact		CU 50°						
70										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
270	271.09-273.61	Shale (80%) sandstone 10%, coal <10% -hard, black shale, cooked?, minor sst + coal laminae	TTF	UC 55°						
	Coal 273.61-273.83	Coal (80%) shale 20% - poor coal -soft black coal in shale + shale laminae -UCTIC are gradational		BD 40° BD 30° BD 46°						
275	273.83-274.31	Coal, Shale, Siltstone, Sandstone, Conglomerate (5,15,5,50,25) -good FU sequence, sharp LC, grades into above coal								
	Coal 274.31-274.52	Coal (70%) shale 30% poor coal		BD 50°						
280	274.52-275.38	Coaly Shale shale 60% coal 40% v. poor coal thin coal laminae alternating w/ shale, gradational CT's								
	275.38-281.30	Shale, Siltstone, Sandstone (40,20,40) coal <2% alternating fine to thick laminae of above		BD 35°						
	281.30-281.66	Coaly Shale shale 60% coal 40% v. poor coal		BD 35°						
85	281.66-282.17	Coal, Shale, Siltstone, Sandstone, Conglomerate (5,25,5,40,25) -good FU sequence, sharp LC grades into above coal								
	Coal 282.17-282.55	Coal (70%) shale 30% very poor coal		BD 35°						
	282.55-286.72	Shale, Siltstone, Sandstone (40,20,40) coal 7% -alternating layers, thin to thick laminae, minor thin coal laminae		BD 40° BD 35°						
90	Coal 286.72-287.18	Coal (80%) shale 20% good quality coal -black streak, hard, vitreous luster, v. minor shale		BD 70° BD 70°						
	287.18-288.87	Shale (80%) coal 5%, siltstone/sandstone 15% -hard black shale, with minor thin laminae sst		BD 45°						
95	Coal 288.87-289.21	Coal (80%) shale 20% good quality coal								
	289.21-291.15	Sandstone (80%) conglomerate 10%, shale 10% -medium grey sst, v. weak FU, minor shale laminae & cong zones		BD 40°						
	291.15-292.85	Shale, Siltstone, Sandstone (40,10,50%) -v. weak FU sequence, mainly alternating layers, gradational CT's		BD 40°						
00	292.85-293.33	Conglomerate (70%) sandstone 15%, shale clasts 15% gradational contacts, common 15cm shale clasts		BD 30°						
	293.33-300.20	Shale, Siltstone, Sandstone (50,10,40%) -mainly alternating layers of above -dark to medium black shale with minor light grey thin sandstone laminae -generally hard yet broken rock		BD 35° BD 40°						
				BD 30°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
100	300.20 - 307.37	Conglomerate (70%) sandstone 25%, shale/coal 5% mainly cong. w thin wispy shale laminae, minor discontinuous coal clasts + common thick sandstone laminae - cong is a granule to medium quartz pebble cong on a sandstone matrix and matrix supported - sharp LC, gradational UC and internal gradational CT's	TFF	BD 30°						
105	Coal 307.37 - 308.28	Coal (80%) shale 20% - good coal - hard, black, black streak, vitreous luster, trace PY		BD 25°						
	308.28 - 310.12	Shale (80%) sandstone 15%, coal 5% weak FU sequence, mainly hard black shale w coal laminae and minor coarser sand sized grains - minor smooth slickenside like surfaces								
10	9549-4 310.12 - 311.96	Coal (80%) shale 20% - fairly good coal - gradational upper + lower contacts, mainly hard block vitreous coal w 1.5cm black coal mush at LC + 3cm shale near LC		BD 40°						
	311.96 - 312.43	Siltstone (70%) coal 7%, sandstone 8%, shale 15% - good FU with brownish hard massive siltstone								
15	312.43 - 319.22	Shale Siltstone Sandstone (25, 10, 65%) - mainly alternating layers of above with classic sst/shale laminae and gradational UC+LC - light grey sst, slightly brown siltstone, black shale - thick sst laminae, fine shale laminae		BD 40° BD 40° BD 30° BD 55°						
	319.22 - 319.65	Siltstone (70%) coal 15%, shale 10%, sandstone 5% - weak FU sequence, gradational contacts		BD 40° BD 30°						
20	Coal 319.65 - 320.10	Coal (70%) shale 30% poor coal - 1/2 interval is good hard coal, 1/2 is soft coaly mush								
	320.10 - 324.73	Shale (70%) coal 10%, siltstone 20% - alternating layers - thick laminae to medium bedded alternating black shale + chocolate brown siltstone - minor good coal bands up to 3cm wide - gradational CT's		BD 30° BD 30°						
25	324.73 - 327.05	Siltstone (80%) shale 10%, shale clasts 10% - massive chocolate brown siltstone with thin black shale laminae and minor black shale rip-up clasts, trace fossil clasts of plant leaves etc.		BD 20° BD 20° BD 20° BD 35°						
705										
41										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
0	0.00-39.90	overburden	OVR							
40	39.90-42.36	Conglomerate - brown gray, w/ky calcareous, granule to pebble quartz rich conglomerate w/ 1 to 3 mm coal seams, neither FU or FD	TFF							
	42.36-42.83	Coal - soft, broken to shattered, poor recovery								
	42.83-45.56	SSS (20,40,40) neither FU or FD beds 60% broken, 40% competent, lower contact broken 4 carbonate veins		BD 66'						
45	45.56-47.31	Conglomerate - brown gray, granule to pebbles, qtz rich w/ 1mm coal seams & coal fragments		BD 70 LC 80'						
	47.31-48.47	Sandstone FU - laminated shale and siltstone		BD 80						
	48.47-53.79	CSSSG (1,4,30,30,35) FU - coal fragments in conglomerate - coal, shale - soft & weathered - 53.00-53.79 - broken								
50	53.79-55.35	Coal - 90% 53.79-53.95 coaly shale sample 53.95 to 55.35 trace pyrite on fracture surfaces core broken average size = 4cm	Coal							
9550-1										
55	55.35-59.26	CSSSG (1,4,15,20,60) FU, coaly shale to cherty brown siltstone to laminated shale + sandstone to calcareous arenaceous conglomerate - plant fossils in siltstone	TFF	CV 18 BD 80 LC 80						
60	59.26-61.72	Sandstone - med grained arkosic sandstone w/ coal frag								
9550-2	61.72-71.51	Coal - trace py on bedding planes, vitreous - 80% broken to shattered - good coal	Coal							
65										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	71.51-75.15	Siltstone - massive dark brown siltstone w coal fragments		BD 74						
		74.41-75.15 - increasing number of shale laminations signs of soft sediment deformation								
	75.15-77.72	Sandstone - gradational contact to coarse grained sandstone								
	77.72-86.25	Conglomerate - gradational contact to feldspar rich dirty brown unequigranular granule conglomerate								
	86.25-100.58	Richtofen shale/sandstone couplet, "typical" looking richtofen formation, approx 10:1 shale to sst average width of sst lamination 4mm		UC 79 BD 78 CV 0 CV 85  CV 75 BD 84  BD 81						





SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	31.50 - 37.68	Shale Siltstone Sandstone (20, 30, 50%) coal <1% -alternating layers of above rocks; sharp UC -appears to be FD toward lower contact -mainly medium grey sandstone w thin bedding alternating with slightly brownish very thin bedded siltstone and wispy thin to thick black shale laminae - 3cm of coal at lower contact	TTF							
				BO 75°						
				BO 70°						
				BD 60°						
	37.68 - 37.75	Andesite - 6cm pale green dyke, coal at UC+LC	And	DD 50°						
	37.75 - 38.27	Conglomerate (80%) medium pebble cong 10%, sandstone 10% -weak FU sequence, sharp LC, gradational UC	TTF	CT 55°						
				DD 75°						
	38.27 - 38.40	Shale (70%) coal 10% siltstone/sandstone 20%		BO 70°						
	38.40 - 38.70	Shale, Siltstone, Sandstone (30, 30, 40%) -good FU sequence, gradational contacts.								
	38.70 - 40.70	Conglomerate (70%) medium pebble cong 10%, sandstone 10% -weak FU sequence, gradational contacts								
	40.70 - 48.60	Medium Pebble Conglomerate (80%) cong/sandstone 20% -medium bedded, medium pebble conglomerate with gradational contacts into thinly bedded granule conglomerate and coarse sandstone -conglomerate is matrix supported with an average clast size of 9mm and clasts of shale, quartz, green cherts and intrusives		BD 55°						
				BD 60°						
	48.60 - 58.30	Andesite -pale green chilled margins while darker green core with <2mm white and green phenocrysts, max 7mm long green laths -minor carbonate veins up to 1mm wide -lower contact also chilled w ~1m of light green andesite, less phenocrysts, sharp LC		CU 30°						
				CU 45°						
				CU 50°						
				CU 40°						
				CU 20°						
	58.30 - 70.53	Medium Pebble Conglomerate (80%) cong/sandstone, 20% mainly medium bedded medium pebble conglomerate with gradational contacts into thinly bedded								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
		conglomerate and coarse sandstone - conglomerate is matrix supported with minor clast supported zones; average clast size 8mm with a maximum size of 2.5cm; clasts are rounded to well rounded; ~70% of unit is clasts; matrix is sandstone	TTF							
		- conglomerate and coarse sandstone are a gradational sequence; avg grain size 2mm; - very minor thin wispy shale laminae - clasts in cong are quartz 25%, green chert? 25%, black chert 25%, shale, intrusives, others.								
	70.53 - 71.70	Shale, Siltstone, Sandstone (50, 10, 40%) - good FU sequence, with alternating laminae of above rocks, sharp UC + LC		BD 60°						
Coal	71.70 - 72.54	Coal (80%) Shale 20% good coal - hard, black, black streak, vitreous,		BD 60°						
	72.54 - 73.05	Shale, Siltstone, Sandstone (40, 10, 50%) - good FU sequence, mainly alternating layers, gradational CTs		BD 70°						
	73.05 - 74.86	Conglomerate (90%), sandstone 10% - good FU sequence, sharp LC, 2-3mm avg grain size		BD 80°						
Coal	74.86 - 74.98	Coal (70%) shale 30%, poor coal, soft, high shale								
	74.98 - 77.57	Shale, Siltstone, Sandstone (45, 10, 45%) - weak FU sequence, mainly alternating black shale and grey sandstone laminae		BD 65°						
	77.57 - 79.86	Conglomerate (80%) sandstone 15%, shale 5% - mod FU sequence, cong in sst laminae + wispy shale near UC.								
	79.86 - 90.42	Shale, Siltstone, Sandstone (35, 10, 40%) Cong 10%, coal 5% - mainly alternating layers of shale + sst with weak local FU sequences; gradation CTs in zone - sst is medium grey, thin bedded - shale is black, wispy thin laminae in sst and minor zones of thin bedded coaly shale - minor thin bedded cong/coarse sst with black shale matrix - lower contact gradational, upper contact sharp		BD 60°						
				BD 45°						
				BD 65°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
90	92.42 - 92.13	Conglomerate (90%) sandstone 10% - weak FU to massive cong., quartz granule cong w/ shale/sandstone matrix, very dark grey, matrix supported		BD 80°						
	92.13 - 94.75	Shale, Siltstone, Sandstone (50, 10, 15%) Cong 15%, coal 10% - alternating layers of above to weak FU, all CT's gradational - laminated to thin bedded, minor coaly-shale laminae		BD 75°						
95	94.75 - 96.48	Conglomerate (70%) sandstone 20%, shale 10% - alternating layers of above to very weak FU; gradational CT's at UC+LC as well as internally; cong as dark grey quartz granule cong w/ a shale/sandstone matrix - sst dark grey, fine grained, grades into shale		BD 70°						
	96.48 - 97.31	Shale (70%) sandstone/cong 20%, coal 10% - black shale w/ thick sst/cong laminae + minor coal								
100	97.31 - 98.80	coal, Shale, Siltstone, Sandstone, (conglomerate (5, 20, 10, 20, 45) - weak FU sequence, UC gradational, LC sharp - mainly quartz granule cong grading up to coaly-shale		BD 65°						
	98.80 - 100.45	shale (80%) sandstone <15%, coal <5% - mainly black shale with thick sandstone laminae and minor coaly-shale, shale is soft w/ some coal								
05	100.45 - 126.20	Andesite - typical andesite - 1.5m at UC + 1.0 m at LC are chilled andesite w/ a pale to light green color, smaller less common phenocrysts and texture changes to fine/glassy near contacts		UC 20						
				CV 55°						
10				CV 45°						
				CV 35°						
				CV 40°						
15				CV 45°						
				CV 15°						
				CV 40°						
20				CV 40°						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
				LC 80						
	126.20 - 126.80	Coal Shale Siltstone Sandstone Cong (5, 10, 5, 30, 50%) -good FU sequence, coal at UC, sharp LC, Brecciated?								
	126.80 - 127.93	Coal, Shale, Siltstone, sandstone Cong (<1%, 20, 10, 30, 40%) -good FU sequence in alternating layers, sharp UC/LC								
	127.93 - 130.00	Shale (80%) sandstone 15%, Coal <15% -mainly black shale w coal + coaly shale laminae and minor siltstone/sandstone laminae/beds								
	130.00 - 130.90	Sandstone - sharp contact to medium to very coarse grained feldspar rich sandstone, five distinctive beds of different grain sizes, no FU or FD trends		UC 08° BD 38 BD 22						
	130.90 - 131.29	Shale dirty black coaly shale								
	131.29 - 132.12	Sandstone FU sequence, feldspar rich very coarse grained shale matrix								
	132.12 - 134.88	Shale 70% coaly shale, 30% coarse sandstone shale soft and crumbly								
	134.88 - 135.92	Conglomerate - similar to above sandstone only with larger particles, qz and feldspar clasts in black shale matrix		BD 45 BD 52						
	135.92 - 138.68	Shale 30% shale, 50% coaly shale, 20% shaly coal, entire interval is soft, trace pyrite on bedding planes		BD 50						
	138.68 - 140.00	Conglomerate sharp upper contact, trace py disseminated and beds, 80% conglomerate, 20% coaly shale, conglomerate similar to above conglomerate		UC 52						
	140.00 - 140.45	Shale - soft crumbly coaly shale								
	140.45 - 141.05	Conglomerate qtz rich, shale matrix, matrix supported, avg least 5mm								
	141.05 - 141.43	Shale - massive black coaly shale		UC 23						
	141.43 - 142.16	Andesite - very calcareous pale green andesite w chilled margins and sharp upper & lower contacts, w 1mm wide randomly oriented calcite veins		UC 85 LC 50						
	142.16 - 149.03	Shale 80% shale + coaly shale, 15% siltstone, 5% coal coal broken to shaly, plant fossils abundant in siltstone w shale laminae		BD 80						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	149.03-151.64	Conglomerate 70% conglomerate, 30% laminate shale + siltstone sharp contacts between beds, dirty gray granule qtz-feldspar conglomerate		BD 65 BD 7a						
	151.64-157.04	CSSSC Coal 10% Shale 15% Siltstone 15% Sandstone 10% Cong 50% Coal 152.00-152.64, Conglomerate - gray to honey brown granule to small pebble matrix supported, w/ky calcareous Siltstone - laminated to shale, plant fossils		BD 70						
	157.04-158.71	CSSSC Coal 35% Shale 5% Siltstone 5% Sandstone 5% Cong 50% FU sequence Coal 157.04-157.64 - brittle vitreous, trace py								
	158.71-159.66	CSSSC Coal 25% Shale 20% Siltstone 10% Sandstone 5% Cong 40% Coal 158.71-158.90, general FU sequence		BD 76b 86 UC 67°						
	159.66-160.00	CSSSC - Coal 10% Shale 15% Siltstone 10% Sandstone 20% Cong 50% gradational contacts throughout sequence		UC 67°						
	160.00-161.58	CSSC Coal 3% Shale 37% Silt 15% Sst 25% Cong 20% sharp upper lower contacts, other gradational, Shale coaly shale w/ plant fossils, sandstone and cong are interbedded		LC 7a BD 70						
	161.58-166.30	SSS shale 40, Siltstone 40 Sandstone 10 Cong 10 - FU sequence, most abundant rock is laminated shale and siltstone w/ coal fragments and plant fossils								
	166.30-166.70	Coaly shale broken to shattered coal shale to shaly coal								
	166.70-167.15	Conglomerate FU, fine grained granule brown calcareous								
	167.15-168.71	CSSSC coal 5% Shale 5% Silt 30% Sand 10% Cong 50% FU shale, silt w/ plant fossils and coal fragments, sharp contact to cong - brown calcareous		BD 68 LC 68 BD 7a						
	168.71-170.27	SSS 80% laminated shale + siltstone laminae in sst								
	170.27-171.97	Conglomerate - poorly sorted granule to small pebble quartz rich								
	171.97-173.46	Shale - massive black shale w/ coal fragments								
	173.46-174.28	Conglomerate - gradational contact to tan gray qtz rich granule conglomerate								
	174.28-201.15	CSSSC cycles - 12 cycles of coaly shale/shale, siltstone, sandstone conglomerate typically contacts are gradational except for upper and lower conglomerate contacts, FU coaly shale/shale - shattered to massive siltstone/sandstone - generally laminated w/ plant								



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	213.00-214.72	CSSEC coal 10%, shale 5%, silt 10%, sand 60%, congl 15% general FU sequence conglomerate - plug rich, coal-broken		UC 65 BD 70						
	214.72-218.90	SSS - intervals rather than FU or FD 33%, 33%, 33% 70% of interval is black shale laminae within siltstone and fine grained sandstone, coal fragments throughout								
	218.90-225.38	Conglomerate - grey, matrix to clast supported, plug rich subrounded small pebble conglomerate, neither FU or FD		BD 60						
	225.38-227.30	Coaly Shale 40% coal, 50% shale, 10% andesite, coaly shale soft.								
	227.30-239.82	Andesite dark green w <1mm black pyroxene phenocrysts grading to broken pale green w round 1mm plug phenocrysts @ random orientations throughout @ random orientations								
	239.82-242.32	Coaly Shale Coal 5%, Coaly Shale 90%, Cong 5%, soft but competent								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S	
					BTU/lb	%	%	%	%	%	
40	242.32-243.37	Conglomerate FD rounded, plagioclase rich, clast to matrix supported									
45	243.37-251.90	SSS shale 15%, siltstone 60%, sandstone 15%, conglomerate 10% intervals of each neither FU or FD upper and lower conglomerate contacts are sharp, all others are gradational conglomerate is qtz rich granule size, 60% of subround is shale laminae within siltstone and sandstone, coal fragments < 5mm seams throughout		BD 68							
				BD 83							
				BD 83							
				BD 82							
50	251.90-252.76	Conglomerate tan gray, calcareous, clast supported, plagioclase rich fine pebble									
	252.76-254.17	Sandstone - light gray fine grained to some shale laminae		BD 58							
55	254.17-260.50	Conglomerate - sharp up and lower contacts, light gray qtz rich, granule to fine pebble, matrix to clast supported neither FU or FD		UC 73							
60	260.50-261.56	SSS shale 40%, siltstone 45%, sandstone 5%, dark shale, between laminated shale and siltstone, coal fragments and plant fossils throughout		UC 90							
				LC 68							
				BD 70							
65	261.56-262.25	Conglomerate waxy calcareous dirty gray granule conglomerate									
	262.25-264.90	Steady Coal steady coal 60%, shale 25%, conglomerate 15% 28cm of coaly shale w 20% rounded to angular fragments of calcite (to trace py) and sandstone outside interval is broken									
	264.90-272.75	Conglomerate - non calcareous to moderately calcareous, dirty gray, qtz-feldspar granule conglomerate, < 1mm coal seams @ 60°									
70											

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	272.75-273.05	Coal coal 80%, shaly coal 20%, shattered to broken vitreous	Coal							
	273.05-276.76	SSS shale 30% siltstone 45%, sandstone 25%, neither FU or FD 50% shale laminae in siltstone and sandstone coal fragments throughout	TFF	BD 72 BD 74						
9551-1	276.78-278.27	Coal massive, vitreous, good, w/ky calcareous from 1 to 3mm long calcite concretions	Coal							
	278.27-282.91	SSS - 33%, 33%, 33%, 80% is laminated shale laminae in siltstone + sandstone, non of the usual coal fragments observed	TFF	BD 64 BD 74 BD 68						
	282.91-293.35	Conglomerate calcareous, light gray, qtz = feldspar rich primarily clay supported granule to fine pebble conglomerate, neither FU or FD, matrix becomes increasingly black during the last metre								
	293.35-294.06	Coal - massive, competent, vitreous	Coal							
	294.06-297.83	Andesite - pale green	And							
	297.83-300.50	CSSSC coal 15%, shale + coal shale 35%, siltstone 20% sandstone %, conglomerate 15%								

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
300		coal is shattered, coaly shale is soft, some siltstone laminae within sandstone, congl. w/ly calcareous		BD 6a2						
9551-2	300.50-302.27	Coal - 80% competent, 20% shattered, moderately good coal	Coal							
	302.27-310.00	4mm wide calcite veinlets throughout Andesite - jade green, becoming pale green towards upper and lower contacts, fine grained except towards lower contacts where 1 to 5mm round calcareous phenocrysts begin to appear, there are ~20 calcite veins but common orientation is 42	And	CV 42						
310	310.00-311.10	SSS - coaly shale 35%, siltstone 30%, sandstone 35% coaly shale massive, w/ly calcareous, sandstone - broken, coarse grained		TFF						
	311.10-312.00	Coal - poor to mod quality, soft	Coal							
	312.00-312.56	Andesite - soft highly weathered	And							
315	312.56-315.77	Shale - broken, soft, 30% coaly shale		TFF						
	315.77	EOH								
320										



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
30	30.22-39.22	Medium Pebble Conglomerate - 80% MPC, 20% Set, gradational contact over several metres, conglomerate very similar to MPC from 14.02 to 27.50. Set to matrix supported, wide range of clast size 1mm to 2cm average 0.8cm. Average shape is subrounded.		BD 78						
35		pebbles consists mostly of chert, andesite, shale feldspar, unidentified green rock, several general FU sequences, occasional coal veinlets several mm wide.		BD 79						
10	39.22-43.94	Conglomerate fairly abrupt contact from MPC to brownish gray qtz rich granule conglomerate most noticeable differences between the granule cong and the above MPC is color - gray to brownish gray, clast size - med peb to granule clasts, irregularity in MPC and equigranular in granule cong. clast composition - MPC chert, and shale, green rock granule mostly qtz + feldspar								
15	43.94-44.55	43.69-43.89 - laminated shale, siltstone, sandstone Sandstone - coarse grained gray sandstone with 20% coal laminae and small 4mm coal fragments		BD 82						
0	44.55-46.19	Coal - hard compact, vitreous, no py seen	Coal							
0	46.19-48.00	Siltstone - laminated choc brown siltstone and shale, contains plant fossils		BD 78						
	48.00-50.90	Sandstone - very coarse grained sandstone FU 48.51-48.65 - coal in trace py 49.87-50.20 - coaly shale								
55	50.90-52.92	Conglomerate sharp contact to dirty gray small pebble conglomerate, qtz + feldspar rich to 4 bands between 3 and 10 cm of laminated shale and siltstone		UC 74 BD 83						
	52.92-58.88	SSS 55% 40% 5% - coaly shale (and) laminated siltstone (to plant fossils + coal fragments) + shale, 1 interval of coarse grained sandstone		BD 74						
0	58.88-61.69	Conglomerate - sharp contact to dirty gray qtz + feldspar rich granule conglomerate		UC 74						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
65	61.69-70.28	CSSSG 10% 30% 20% 25% 15% alternating layers, no general FU or FD trend	TCF							
9558-2	69.00-70.25	Coal massive, vitreous, Shale - massive black Siltstone - often w plant fossils and laminated shale	Coal							
65	71.28-73.12	Conglomerate - dirty grey, micaceous, qtz + feldspar rich siltstone w 2 bands totalling 0.85m of pebble conglomerate		BD 77						
70	73.12-75.22	Siltstone char brown siltstone (w coal frag) w laminated shale laminae		BD 84						
75	75.22-75.68	Conglomerate - sharp contact to small pebble conglomerate		UC 72						
	75.68-76.00	Sandstone - very coarse grained sandstone								
	76.00-79.00	SSS - general FU sequence 40% 20% 40% massive brown black shale w trace py and thin siltstone laminations, sharp contact to very coarse grained dirty grey sandstone with several 1 to 5m shale beds		BD 68 BD 76						
30	79.00-80.35	CSSSG 10% 20% 10% 55% 5% FU sequence Coal: 12cm shaltered		BD 78						
	80.35-81.99	CSSSG 5% 5% 5% 10% 75% FU sequence Coal: 8cm shaltered mud								
35	81.99-87.61	CSSSG 5% 22% 15% 10% 48% general FU sequence coal: 30 cm more compact w fine coal with 10 1mm to 5m coal veinlet		BD 75						
	87.61-90.31	CSSSG 10% 10% 10% 10% 60% FU sequence coal: 24cm shaltered congl - chert upper thin red granitic size		BD 70						
0										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
90	90.31-92.39	CSSSG 3% 20% 20% 7% 50% general FU coal lam shatterd, siltstone-choc brown to coal fragments sharp contact @ 75° to qz-feld rich clast supported sandstone								
	92.37-95.18	Shale 90% shale, 10% siltstone massive shale to coal fragments and siltstone laminae		BD 75						
95	95.18-96.16	Conglomerate light brown inequigranular granule to pebble conglomerate								
	96.10-100.00	SSS 50% 45% 5% neither FU or FD rather intervals of each to gradational contacts, shale contains coal fragments		BD 82 BD 72						
00	100.00-102.31	Conglomerate - gray equigranular qtz-feldspar, clast supported granule conglomerate								
	102.31-107.74	SSS 60% shale, 30% siltstone, 10% shale, general fining up coal fragments throughout		BD 82						
05	107.74-108.66	CSSSG 2% 5% 5% 20% 68% - fining up sequence coal in the form of coaly shale, all contacts gradational		BD 83						
	108.66-108.81	Siltstone massive choc brown siltstone to abundant coal fragments, sharp contact		LC 84						
10	108.81-109.46	Conglomerate - gray equigranular feldspar quartz rich granule cong.								
	109.46-109.71	Siltstone - massive choc brown siltstone, sharp contacts		BD 89						
	109.71-110.33	Conglomerate - gray, qtz rich inequigranular granule cong to coal concretions @ 80°								
	110.33-111.75	SSS 10% 20% 70% FU sequence with gradational contacts, coal fragment in shale and siltstone, coal concretions in sandstone, sandstone coarse grained		BD 64						
15	111.75-112.00	SSS 40% 50% 10% - coaly shale, laminated silt to coal frag		BD 75						
	112.00-112.63	Conglomerate general FU, quartz rich, clast supported conglomerate		UC 84						
	112.63-114.44	SSS 10% 25% 65% 2 FU cycles, coal concretions in laminated shale + siltstone, sandstone very coarse towards lower contact		BD 89						
0										

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	114.44-115.12	SSS 20%, 40%, 40% intervals rather than FU or FD coal fragments throughout, sandstone very coarse								
	115.12-117.60	Conglomerate inequigranular granule to small pebble sand fragments @ 69°C								
	117.60-117.96	SSS 95, 45, 10 laminated shale and siltstone leaf + stem plant fossils in siltstone		BD 76						
	117.96-123.26	Sandstone 70% sst 30% granule conglomerate FD sequence sharp upper and lower contacts								
	123.26-126.91	CSSSG coaly shale 1% shale 25% siltstone 50% sst 15% cong 9% - sharp upper and lower contacts, contacts within interval all gradational, primarily shale laminae within siltstone + sandstone some cross bedding conglomerate inequigranular		BD 70						
	126.91-136.50	SSS 35% 55% 10% primarily shale laminae within siltstone, no FU or FD sequences		BD 68 BD 78 BD 72						
	136.50-139.20	Conglomerate sharp contact to inequigranular granule to pebble conglomerate w coal fragments and veinlets		UC 70						
	139.20-150.64	SSS 40%, 40%, 20% intervals rather than FU or FD w 20% of interval laminated shale w silt and/or sand coal frags in siltstone		BD 82						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
50	150.64 - 162.15	Conglomerate - gray inequigranular clast supported granule to small pebble abundant to subabundant <del>rich</del> rich conglomerate								
55										
60	162.15 - 167.80	SSS - 40% 40% 20% general FU sequence 60% of interval shale laminae within siltstone		BD 80						
65	167.80 - 176.97	Conglomerate - light gray to brown gray calcareous fine granule to fine pebble, neither FU or FD, bands of various grain/pebble sizes, coal seams present 0.5mm to 2mm thick		CS 48 (coal seams) CS 72						
70										
75	176.97 - 178.80	SSS 30% 30% 40%, neither FU or FD, broken, sandy shale, 80% laminated shale in siltstone and sandstone, 1mm thick coal seams		LM 74 BD 78						
80	178.80 - 181.42	Sandstone - brown tan, waxy calcareous, 80% <del>brilliant</del> , coarse grained, 30cm band of laminated shale and sandstone		LM 75						

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
30	181.42-185.10	SSS 10% shaly coal 10% coaly shale 20% shale 50% siltstone, 10% sandstone, alternating layers (not FU or FA) core generally soft	TFF	BD 63 BD 65						
35	185.10-186.20	Andesite - bleached to be green in chilled margins 185.21-185.55 shale & coaly shale	And	UC 60						
95-3	186.20-187.45	Coal competent, vitreous, good quality	Coal							
0	187.45-195.26	SSS 50% shale, 10% siltstone, 40% sandstone FU massive black to brown shale w/ coal fragments and plant fossils, grey calcareous often laminated med to coarse grained sandstone #35 4mm thick coal seams	TFF	BD 70						
5	95-4 195.26-198.42	Coal - vitreous, 50% broken, calcareous veins	Coal							
0	198.42-200.816	Coaly shale - Shaly Coal - broken	TFF							
95-5	200.816-217.30	Coal - vitreous, 90% broken, poor recovery, calcareous	Coal							

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
210										
115	217.70-245.67	Richfen - shale-sandstone couplets, typical looking Richfen	Rich	BD 72						
20										
25		225.06 - coarse grained gray sandstone that grades several times to conglomerate w/ clasts up to 2cm trace of pyrite, within the sandstone are several bands up to 40cm of the above shale/sandstone couplets								
30										
35										
40										



**SUMMARY 95-53**

NORTHING 9300

DEPTH 68.28m 224 ft.

AZIMUTH 040

EASTING 7725

DIP COLLAR -50

<u>TYPE</u>	<u>FROM</u>	<u>TO</u>
OVERBURDEN	0.00	68.28 (eoh)

Bedrock had not been reached after 68.28m (224 ft) and the hole was subsequently abandoned.

No core was recovered but washings from the drill water return contained sand and clay. It is likely that this hole was drilled into a river bed.

SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
	0.00-32.30	overburden - similar to overburden from 94-32, varies from sandstone to medium grained conglomerate to 2 to 3 cm rounded clasts in a soft brown matrix	OVR							
	32.30-33.18	Siltstone chocolate brown broken siltstone w several coal seams <1cm wide, average size of coals 3-4 cm	TFF							
	33.18-39.60	Sandstone med to coarse grained, gray, at top rich broken to shattered, w cubic veins along fracture surfaces, fault = 39.40								
	39.60-40.00	low contact broken siltstone - light brown to thick shale laminar slickensides? @ 60°								
	40.00-42.98	Coal - Coal: Shale - poor to zero recovery, ratio of coal to coaly shale increases	Coal							
	42.98-45.26	Conglomerate - shale fragments up to 3.5 cm in a soft clay matrix	TFF							
	45.26-46.20	Coal - poor quality sand shale throughout, soft	Coal	UC 45						
	46.20-52.12	Sandstone - fine grained dk dirty gray soft to medium top becoming increasingly hard down hole								
	52.12-67.81	Conglomerate - dk dirty gray fine grained, matrix supported fine grained, similar to above but only coarser grained, becomes slightly more greenish and calcareous down hole								



SAMPLE No.	FROM - TO (metres)	DESCRIPTION	UNIT	STRUCT	CV	RM	ASH	VM	FC	S
					BTU/lb	%	%	%	%	%
				BD 72						
				BD 72						
		94.84-96.06 Richtofen Conglomerate (?) - sandstone to medium pebble conglomerate with thick shale matrix								
	96.06-102.50	Andesite - dark green aphanitic calcareous andesite w round 2 mm white noncalcareous amygdales chilled magmas								
	102.50-117.65	Richtofen - sharp contact to coarse grained gray sandstone 70% sst, 10% shale/sandstone couplets, 20% conglomerate - dk gray, matrix similar to sandstone just large clasts, contacts w bands of shale/sandstone couplets are very sharp @ 60°								
				BD 72						
	117.65	coh		BD 70						

**APPENDIX IV**  
**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 W. Hastings Street  
Vancouver, BC  
V6B 1L8

Certificate No.: A9515052/53  
Invoice No.: I9580374  
Project: Division Mtn. Coal  
Date: April 20, 1995

Date Received: April 9, 1995  
Date Reported: April 20, 1995

Sample	Basis	RM %	Ash %	VM %	FC %	Sulphur %	CV Cal/gram
DH 9546-1 14.4 KG	AD Dry	5.26 ---	31.71 33.47	9.89 10.44	53.14 56.09	1.05 1.11	4,675 4,934
DH 9546-2 17.1 KG	AD Dry	3.98 ---	30.51 31.77	9.66 10.06	55.85 58.17	0.17 0.18	4,778 4,976
DH 9546-3 17.2 KG	AD Dry	1.88 ---	47.13 48.03	10.11 10.30	40.88 41.67	0.37 0.38	3,694 3,765
DH 9546-4 9.4 KG	AD Dry	2.85 ---	39.17 40.32	9.28 9.55	48.70 50.13	0.31 0.32	4,204 4,327

Sample	Basis	RM %	Ash %	VM %	FC %	Sulphur %	CV Cal/gram
DH 9547-1 10.2 KG	AD Dry	6.00 ---	47.95 51.01	6.50 6.91	39.55 42.08	0.19 0.20	3,137 3,337
DH 9547-2 6.3 KG	AD Dry	5.36 ---	49.73 52.55	6.10 6.45	38.81 41.00	0.23 0.24	2,858 3,020
DH 9547-3 9.4 KG	AD Dry	7.36 ---	25.04 27.03	6.20 6.69	61.40 66.28	0.33 0.36	5,098 5,503
DH 9547-4 16.6 KG	AD Dry	5.74 ---	22.41 23.77	9.49 10.07	62.36 66.16	0.46 0.49	5,258 5,578
DH 9547-5 21.1 KG	AD Dry	2.23 ---	26.22 26.82	27.70 28.33	43.85 44.85	0.47 0.48	5,425 5,549
DH 9547-6 5.5 KG	AD Dry	1.71 ---	33.28 33.86	27.77 28.25	37.24 37.89	0.38 0.39	4,708 4,790

**NOTE: WEIGHTS (KG) ARE AIR DRIED**

Certified by:



# Chemex Labs Ltd.

Analytical Chemists

Geochemists

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212 Brooksbank Ave.  
North Vancouver, B.C.  
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To: Archer, Cathro & Assoc. (1981) Ltd.  
1016 - 510 W. Hastings Street  
Vancouver, BC  
V6B 1L8

Certificate No.: A9516360/61  
Invoice No.: 19580471  
Project: Division Mtn. Coal  
Date: May 12, 1995

Date Received: April 28, 1995  
Date Reported: May 12, 1995

Sample	Basis	RM %	Ash %	VM %	FC %	Sulphur %	CV Cal/gram
9549-1	AD	3.28	31.17	13.86	51.69	0.45	4,574
13.1 Kg	Dry	---	32.23	14.33	53.44	0.47	4,729
9549-2	AD	1.74	27.07	8.38	62.81	0.62	5,595
11.2 Kg	Dry	---	27.55	8.53	63.92	0.63	5,694
9549-3	AD	3.06	33.63	10.48	52.83	0.21	4,619
6.5 Kg	Dry	---	34.69	10.81	54.50	0.22	4,765
9549-4	AD	0.76	30.96	17.52	50.76	0.62	5,386
5.6 Kg	Dry	---	31.20	17.65	51.15	0.62	5,427
9550-1	AD	2.52	23.42	28.67	45.39	0.49	5,538
2.3 Kg	Dry	---	24.03	29.41	46.56	0.50	5,681
9550-2	AD	2.13	21.33	30.63	45.91	0.39	5,731
2.2 Kg	Dry	---	21.79	31.30	46.91	0.40	5,856

**NOTE: WEIGHTS (KG) ARE AIR DRIED**

*L. Lakovic*

Certified by:



# 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: Cash Resources Ltd.  
c/o Archer, Cathro & Assoc. (1981) Ltd.  
1016 - 510 W. Hastings Street  
Vancouver, BC  
V6B 1L8

Certificate No.: A9517225/7226

Invoice No.: I9580514

Project: Division Mtn. Coal

Date: May 22, 1995

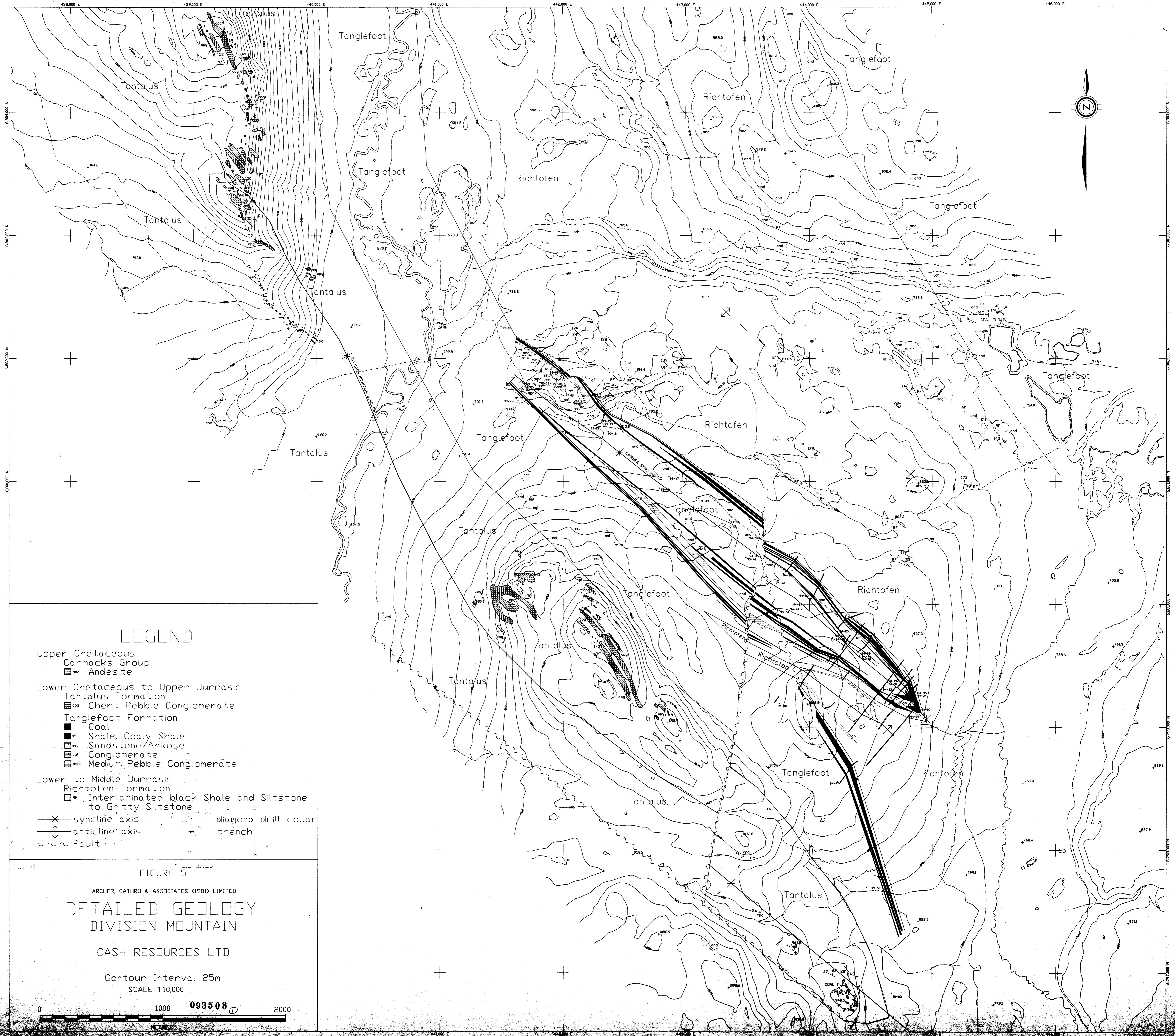
Date Received: May 12, 1995

Date Reported: May 19, 1995

Sample	Basis	RM %	Ash %	VM %	FC %	Sulphur %	CV Cal/gram
9551-1 5.3 Kg	AD Dry	2.59 ---	18.77 19.27	31.49 32.33	47.15 48.40	0.47 0.48	5,952 6,110
9551-2 6.7 Kg	AD Dry	4.40 ---	31.47 32.92	10.28 10.75	53.85 56.33	0.34 0.36	4,645 4,859
9552-1 4.7 Kg	AD Dry	4.38 ---	8.18 8.56	31.24 32.67	56.20 58.77	0.40 0.42	6,756 7,060
9552-2 4.9 Kg	AD Dry	3.66 ---	27.17 28.20	26.17 27.16	43.00 44.64	0.37 0.38	4,934 5,121
9552-3 5.4 Kg	AD Dry	2.11 ---	43.10 44.03	21.15 21.60	33.64 34.37	0.32 0.33	2,625 2,682
9552-4 5.6 Kg	AD Dry	2.77 ---	17.30 17.80	34.95 35.95	44.98 46.25	0.56 0.58	5,927 6,096
9552-5 3.0 Kg	AD Dry	2.22 ---	23.01 23.53	31.73 32.45	43.04 44.02	0.36 0.37	5,542 5,668

**NOTE: WEIGHTS (KG) ARE AIR DRIED**

Certified by:



**LEGEND**

- Upper Cretaceous
    - Carmacks Group
    - Andesite
  - Lower Cretaceous to Upper Jurassic
    - Tantalus Formation
      - Chert Pebble Conglomerate
    - Tanglefoot Formation
      - Coal
      - Shale, Coaly Shale
      - Sandstone/Arkose
      - Conglomerate
      - Medium Pebble Conglomerate
  - Lower to Middle Jurassic
    - Richtofen Formation
      - Interlaminated black Shale and Siltstone to Gritty Siltstone
- \* syncline axis      diamond drill collar  
 + anticline axis      trench  
 ~~~~~ fault

FIGURE 5

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

**DETAILED GEOLOGY**  
DIVISION MOUNTAIN

CASH RESOURCES LTD.

Contour Interval 25m  
SCALE 1:10,000

