

1984 EXPLORATION WORK

HAMILTON LAKE COAL LICENCE No. 7483, NELSON LAND DISTRICT  
CUMBERLAND COAL FIELD, Lat. 49 deg. 34', Long. 125 deg. 03'

EAST CENTRAL VANCOUVER ISLAND  
BRITISH COLUMBIA

NTS Sheet 92 F.11

Prepared For :

WELDWOOD OF CANADA LIMITED  
VANCOUVER, BRITISH COLUMBIA

**GEOLOGICAL BRANCH  
ASSESSMENT REPORT**

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Date Work Performed :  
JUNE 18 TO JUNE 29, 1984

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Scanned

Jan 4, 1985

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WORK, 1985

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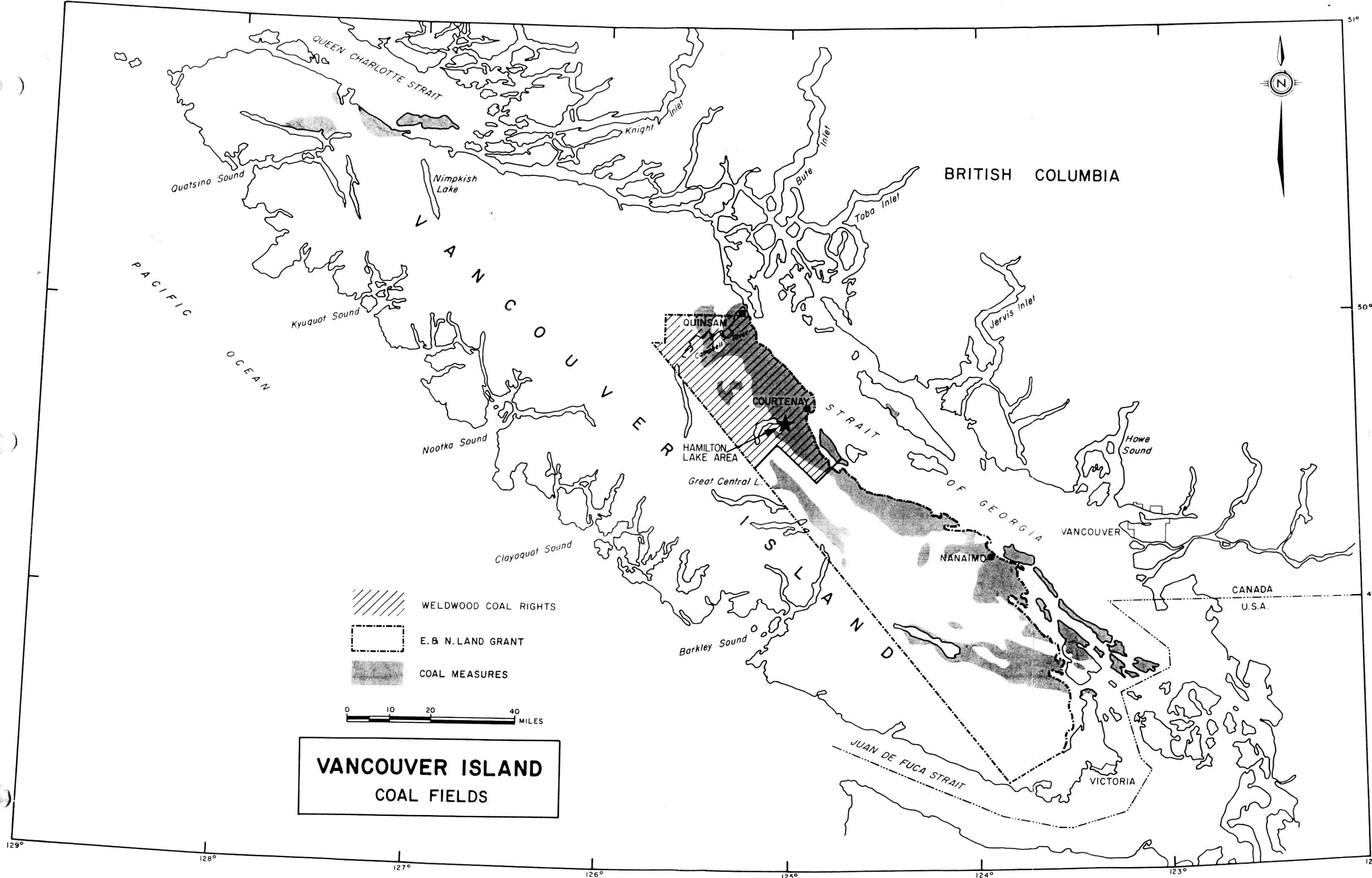
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1984 EXPLORATION WORK

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## Chapter 1

### INTRODUCTION

#### 1.1 LOCATION AND DESCRIPTION OF THE HAMILTON LAKE COAL LICENCES

Coal Licence Numbers 7480, 7481, 7482 and 7483, held by Weldwood of Canada Limited, are located in the Cumberland Coalfield on the east coast of Vancouver Island between Latitude 49 degrees 34' to 49 degrees 36' and Longitude 125 degrees 02' to 125 degrees 05'. Weldwood of Canada Limited owns extensive fee-simple coal rights throughout the Cumberland-Comox area. In addition to these large holdings of fee-simple rights, some of the outlying areas of the coalfield are held by Weldwood of Canada Limited under licence from the British Columbia Provincial Government. The Hamilton Lake area, covering the aforementioned coal licences, is one of these areas.

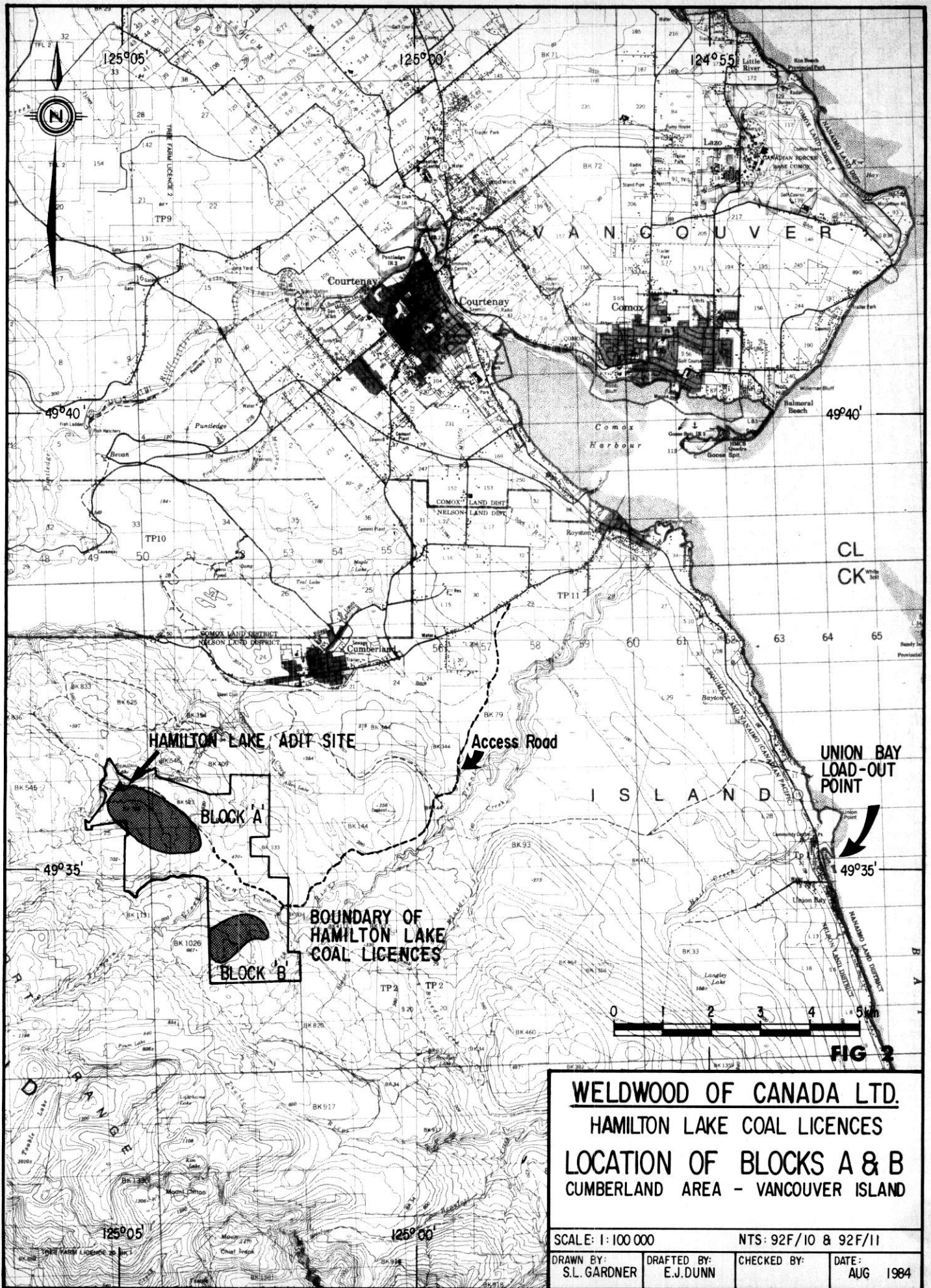
The present coal licences were once part of the the Esquimalt and Nanaimo Railway Land Grant and were held fee simple by Weldwood of Canada Limited after its purchase of Canadian

Collieries in 1964. In 1973 Weldwood cut down on the size of its coal holdings within the Railway Belt. The Hamilton Lake area was surrendered to the Crown. After further evaluations, the company decided to reacquire the area, which necessitated applications for licence.

The Hamilton Lake coal licences, issued on October 1, 1982 form a contiguous block of licences covering approximately 1091 hectares. They lie in the Nelson Land District, approximately 6.5 km due southwest of the village of Cumberland. Access to the area is via 12 km of good gravelled logging road owned and maintained by Pacific Forest Products Ltd.. This logging road joins the Royston-Cumberland highway approximately 3 km northeast of Cumberland. The total road to the old Union Bay shipping wharf is 23 kilometres.

#### 1.1.1 Physiography

The Hamilton Lake Coal Licences cover a high plateau area that overlooks the broad Comox Valley. The towns of Courtenay, Comox and the Comox airport are all visible in the distance to the northeast. The topography on this plateau ranges from 400 to 650 metres above sea level. The plateau is one of a number of low ridges that form the foothills along the east side of the Beaufort Mountains.



**WELDWOOD OF CANADA LTD.**  
**HAMILTON LAKE COAL LICENCES**  
**LOCATION OF BLOCKS A & B**  
**CUMBERLAND AREA - VANCOUVER ISLAND**

SCALE: 1:100 000		NTS: 92F/10 & 92F/11	
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The northern part of the licence area covers part of the Cumberland waterworks district. Hamilton Lake, which is the highest dammed lake in the water supply, directly abuts the coal measures on the north end of the licence area. In keeping with previous studies on the Hamilton Lake licences, this northern part of the licence area is termed Block 'A'.

Drainage in the middle and south end of the licence area occurs in deep, steep-sided valleys. The Trent River is the major drainage in this part of the licence area. Between the Trent River and Idle Creek to the south, a small area of sedimentary deposition occurs. This is termed the Block 'B' area. All of the current year's exploration work is confined to this Block 'B' area.

#### 1.1.2 Description of Previous Work

The coal seams at Hamilton Lake were known about for many years but the relatively inaccessible nature of the area during the mining period and the generally dirty characteristics of the coal at outcrop deterred development.

As part of an on-going program of evaluation and assessment of its holdings, Weldwood of Canada Limited constructed a bulk sample adit in the coal measures near the edge of Hamilton Lake in 1976. A 20 ton bulk sample was extracted and shipped to

Birtley Engineering in Calgary for float-sink and washability testing.

As a follow-up to this work, a number of exploratory drillholes were completed in 1978 in order to determine the size and extent of the coal reserve. These holes confirmed the presence of a number of coal seams in the Block 'A' area north of the Trent River, and the Block 'B' area, south of the Trent River. The scattered nature of the drillholes allowed preliminary reserve estimates to be made for each of the two areas, however it was recognized that more work was required in order to establish the boundaries of each deposit and determine the geology with respect to the coal measures.

In 1983, a small program of field-mapping and surface geology led to the planning of a more detailed drilling program covering both areas, staged over a period of years. The initial stage of this drilling program was completed in June of 1984.

## 1.2 DESCRIPTION OF PRESENT WORK

The 1984 drill program was confined to the Block 'B' area, south of the Trent River. A total of 10 drillholes were completed in this area between June 18 and June 29, 1984. Certain coal sections were cored in three of these holes. Total drilling amounted to 354 metres, with an additional 33 metres cored.

### 1.2.1 Method of Operations

Drilling was conducted on existing access roads which were upgraded with the aid of a D-7 Caterpillar. One Bucyrus-Erie Model 24R air rotary drilling rig equipped with a drill-thru casing hammer for overburden work and a downhole percussion hammer for rock drilling was employed. All holes were cased to the rock with heavy-duty 15.2 cm. water-well casing. Core was retrieved with a standard 3 metre long conventional Christiensen core barrel, cutting 7.6 cm. core. Holes were geophysically logged with a standard gamma-density resistance-caliper log suite. Hole locations were surveyed to a benchmark elevation. Casing was cut off below ground level and holes were cemented with surface plugs.

### 1.2.2 Cost Summary

Table 1 summarizes the field costs of the 1984 work :

TABLE 1. - COST SUMMARY, 1984 EXPLORATION PROGRAM

ITEM	TOTAL COST
Drilling	\$ 8,375.00
Coring	1,400.00
Cementing	562.50
Bits & Consumables	1,116.00
Fuel	408.00
Casing	1,611.00
Travel	315.00
Room & Board	1,050.00
Mobilization	650.00
SUB-TOTAL .....	\$ 15,244.50
Cat Work & Reclamation	2,125.00
Geophysical Logging	2,803.58
Surveying	1,000.00
Supervision	5,506.62
Miscellaneous Supplies	595.10
TOTAL ON-PROPERTY EXPENDITURE :	\$ 27,274.80
OFF-PROPERTY COSTS :	
Map Preparation	3,300.00
Final Reporting	4,900.00
Drafting and Reproduction	912.43
Office and Miscellaneous Supplies	273.48
Word Processing	50.00
Laboratory Analytical Work	5,507.70
TOTAL OFF-PROPERTY EXPENDITURE* :	\$ 14,943.61
GRAND TOTAL* :	\$ 42,218.41

\* NOTE : Does not include head office and administration charges.

The overall cost per foot for this program is \$33.42, or \$110.00 per metre. The direct drilling cost per foot is \$12.95, or

\$42.50 per metre.

The following is a list of contractors which supplied services to Weldwood of Canada Limited during the course of the 1984 field work :

McElhanney Surveying and Engineering, Vancouver, B. C.  
Drillwell Enterprises Ltd., Cowichan Bay, B. C.  
D. Prowse Bulldozing, Courtenay, B. C.  
Don J. Campbell Surveying, Lantzville, B. C.  
Canadian Arctic Survey Systems Ltd., Calgary, Alberta  
Gardner Exploration Consultants, Nanaimo, B. C.

In addition to these contractors, numerous supplies and services were purchased from local businesses in the Courtenay area.

## Chapter 2

### SUMMARY AND CONCLUSIONS

As a result of the current year's exploration on the Block 'B' area of the Hamilton Lake coal licences, the following conclusions can be drawn:

1. A total in-situ coal reserve of 2.21 million tonnes has been proven to occur in the Block 'B' area, within an approximate 10 : 1 raw overburden to coal ratio.
2. This coal reserve is contained within 3 main coal zones in the reserve area, of which the middle zone in particular consists of a number of coal bands separated by rock partings.
3. The seams display a variance in quality and thickness from hole to hole. This variance is due to depositional factors affecting coal seam generation, rather than structural complications.
4. The structure of the area is relatively simple, with the formation dipping uniformly to the northeast, forming a

dip-slope mining situation along the edge of the plateau area.

5. The coal is ranked High Volatile Bituminous 'A', with a Sulphur Content of approximately 2 %. It exhibits good coking qualities, with some sections being high in ash on a raw basis.
6. Drilling shows a continuation of the lowermost and possibly the middle coal zones outside of the existing licence boundary to the southwest.

## Chapter 3

### GEOLOGIC SETTING

Because of its marginal continental location, the geologic history of Vancouver Island is chiefly related to plate tectonics and massive crustal movements on the Pacific margin of North America. Vancouver Island represents submarine and later terrestrial volcanism associated with rifting along an ocean floor subduction zone, formed from the Pacific oceanic plate colliding with the western edge of the North American continental plate and being subducted beneath the continental margin. These crustal movements began in Paleozoic time and have continued to the present. Most of the volcanism associated with the rifting took place in early Mesozoic time<sup>1</sup>. During Jurassic and Triassic time, massive outpourings of pillow and flow lavas, and aquagene tuffs formed volcanic island arcs which eventually formed the Insular Mountain Belt, which covers Vancouver Island, the Queen

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1. Muller, J. E., "Evolution of the Pacific Margin, Vancouver Island and Adjacent Regions", Can. Journal of Earth Science, Vol. 14, 1977



Charlotte Islands, the Alaska Panhandle and the Wrangell and St. Elias ranges of Alaska. These volcanic buildups are represented on Vancouver Island by the thick basalts of the Triassic Karmutsen Formation, and the major batholiths of the acidic Island Intrusions. These volcanic complexes form the basement rock upon which later clastic sediments of Cretaceous Age were deposited.

### 3.1 SEDIMENTATION

In the Cumberland area, Upper Cretaceous sediments of the Nanaimo Group occur in unconformable contact with the volcanic basement rock of the Triassic Karmutsen Formation. The Nanaimo Group in this area is represented by Comox Formation sandstones, siltstones, shales and coal beds. In addition to these, the Benson basal conglomerate member of the Comox Formation is evident. This basal member signifies the beginnings of Late Cretaceous Nanaimo Group deposition on the old erosional surface of the Triassic basalts.

### 3.2 STRUCTURE

The structure of the Cumberland coalfield and areas to the south

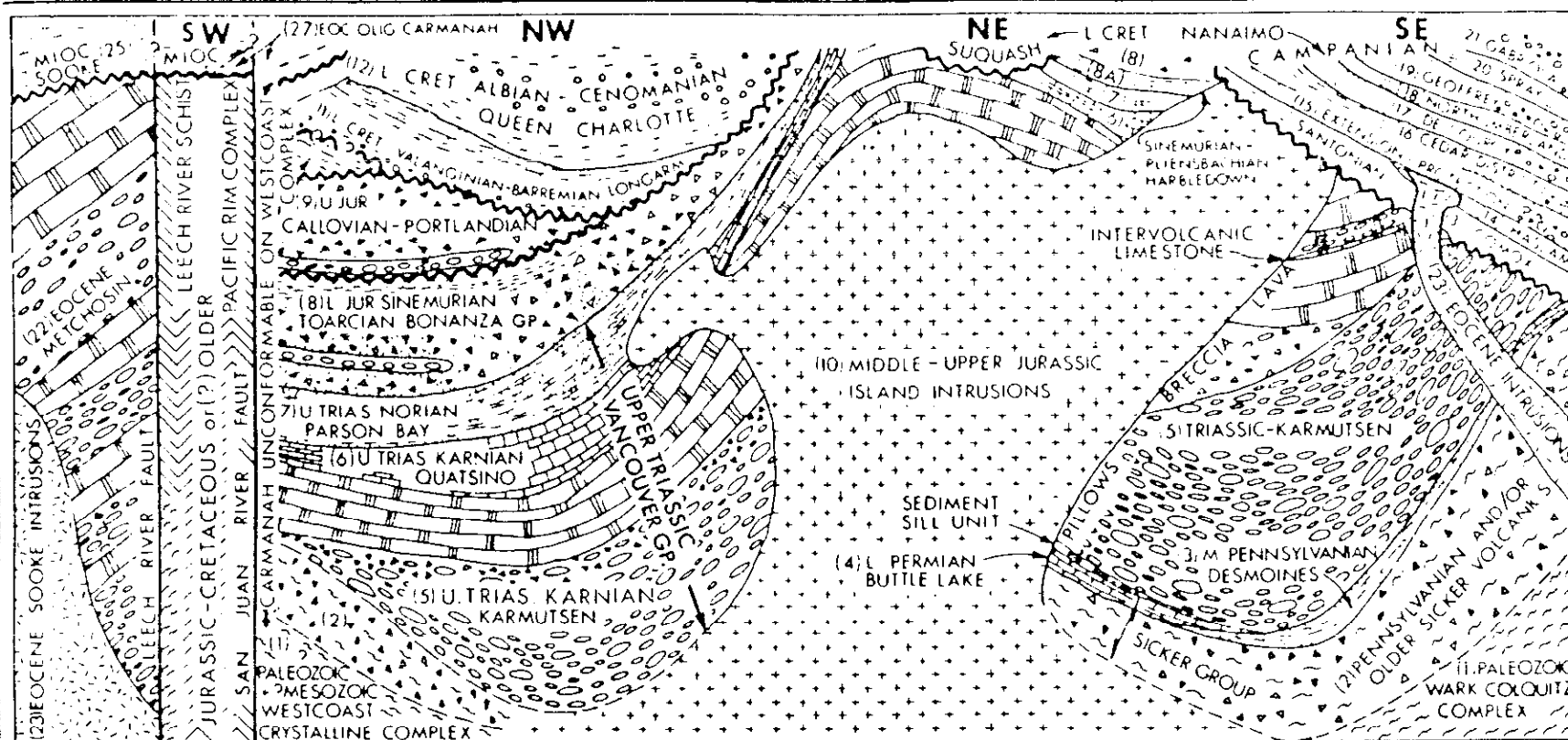
TABLE OF FORMATIONS OF VANCOUVER ISLAND\*

	PERIOD	STAGE	GROUP	FORMATION	SYM-BOL	AVERAGE THICKNESS IN m.±	LITHOLOGY	
CENOZOIC				late Tert.volcs of Port McNeill	Tvs			
		EOCENE to OLIGOCENE early EOCENE		SOOKE BAY	mpTsb		conglomerate, sandstone, shale	
				CARMANAH	eoTc	1,200	sandstone, siltstone, coglomerate	
				ESCALANTE	eTe	300	conglomerate, sandstone	
			METCHOSIN	eTm	3,000	basaltic lava, pillow lava, breccia, tuff		
MESOZOIC	LATE	MAESTRICHTIAN	NANAIMO	GABRIOLA	uKGA	350	sandstone, conglomerate	
				SPRAY	uKS	200	shale, siltstone	
				GEOFFREY	uKG	150	conglomerate, sandstone	
				NORTHUMBERLAND	uKN	250	siltstone, shale, sandstone	
				CAMPANIAN	DE COURCY	uKDC	350	conglomerate, sandstone
					CEDAR DISTRICT	uKCD	300	shale, siltstone, sandstone
					EXTENSION - PROTECTION	uKEP	300	conglomerate, sandstone, shale, coal
					HASLAM	uKH	200	shale, siltstone, sandstone
		SANTONIAN		COMOX	uKC	350	sandstone, conglomerate, shale, coal	
	EARLY	CENOMANIAN	QUEEN	conglomerate unit	IKac	900	conglomerate, greywacke	
		ALBIAN	CHARLOTTE	siltstone shale unit	IKap	50	siltstone, shale	
		APTIAN?						
		VALANGINIAN		LONGARM	IKL	250	greywacke, conglomerate, siltstone	
	MID	TITHONIAN						
CALLOVIAN			Upper Jurassic sediment unit	uJs	500	siltstone, argillite, conglomerate		
EARLY	TOARCIAN?	BONANZA	volcanics	IJB	1,500	basaltic to rhyolitic lava, tuff, breccia, minor argillite, greywacke		
	PLIENSBACHIAN		HARBLEDOWN	IJH			argillite, greywacke, tuff	
LATE	SINEMURIAN							
	NORIAN	VANCOUVER	PARSON BAY	uRPB	450	calcareous siltstone, greywacke, silty-limestone, minor conglomerate, breccia		
	KARNIAN		QUATSINO	uRQ	400	limestone		
	KARMTSEN		muRK	4,500	basaltic lava, pillow lava, breccia, tuff			
MID	LADINIAN		sediment - sill unit	RDs	750	metasiltstone, diabase, limestone		
PALEOZOIC	PENN. and PERM.		SICKER	BUTTLE LAKE	CPBL	300	limestone, chert	
				sediments	CPSS	600	metagreywacke, argillite, schist, marble	
				volcanics	CPsv	2,000	basaltic to rhyolitic metavolcanic flows, tuff, agglomerate	
DEV. or EARLIER								

\* Courtesy: Muller, J.E., "Geology of Vancouver Island" G.S.C. No. O.F. 463, 1977

FIGURE 4

RELATIONSHIPS OF FORMATIONS OF VANCOUVER ISLAND\*



	SANDSTONE GREYWACKE		LIMESTONE		PILLOW-BRECCIA		SHEARFOLDED GREYWACKE ARGILLITE PHYLLITE
	SHALE SILTSTONE		MAINLY INTERMEDIATE TO SILICIC TUFF AND VOLCANIC BRECCIA		PILLOW-LAVA		GNEISS SCHIST
	CONGLOMERATE		INTERMEDIATE TO SILICIC PYROCLASTICS AND GREENSTONE		MAINLY QUARTZ MONZONITE GRANODIORITE		ARGILLITE DIABASE
	CALCAREOUS SANDSTONE SILTSTONE		MAINLY BASALTIC FLOWS		MAINLY QUARTZ DIORITE GABBRO		ANGULAR UNCONFORMITY

\*Courtesy: Muller, J.E., "Geology of Vancouver Island", G.S.C. No. O.F. 463, 1977

of the coalfield is dominated by major normal faults that strike in a general northwest to southeast orientation. These faults are usually downthrown to the northeast. Secondary reverse faulting also occurs. These reverse faults are hinged, so that displacements along the fault line vary from zero to 10 or 20 metres. In the Hamilton Lake area, sedimentary blocks that have been uplifted as a result of tectonic movement are isolated from each other by volcanic terrain from which the later sediments have been completely eroded away, exposing the old Triassic unconformity.

Sedimentary blocks usually dip to the northeast at angles of 6 to 16 degrees. However, near fault zones and areas of intense structural disturbance, dips can be steeper.

### 3.3 SURFICIAL GEOLOGY

The uplifted sedimentary areas, such as the Block 'A' and Block 'B' areas at Hamilton Lake, have been subjected to considerable glacial scour. On the tops of these plateau areas, striations and grooves created by the movement of ice are visible. These striations are aligned in an east-northeasterly direction.

Because of the relatively steep nature of the flanks of the uplifted sedimentary blocks, glacial deposition occurs,

especially on the northeast side of these areas, which is the lee side of the ice movement. Up to 30 metres of glacial till is present in these areas and in the valleys separating them. These till accumulations on the flanks of the hills mask fault contacts and generally smooth out the topographic contours of the Cretaceous erosional surface.

## Chapter 4

### DESCRIPTION OF THE COAL MEASURES

Field work and past drilling indicates that as much as 100 meters of the lowermost part of the Comox Formation occurs in the Hamilton Lake area. This consists of a series of silty shales and mudstones which contains 3 main coal zones and a number of thin coal bands, overlain by a thick-bedded medium to coarse-grained arkosic sandstone. The total thickness of the coal-bearing unit varies from 15 metres in the north part of Block 'A' to 50 metres near the southeast end of Block 'A' and in the Block 'B' area. Figure 5. illustrates the generalized stratigraphic column of the Comox Formation in the Hamilton Lake area.

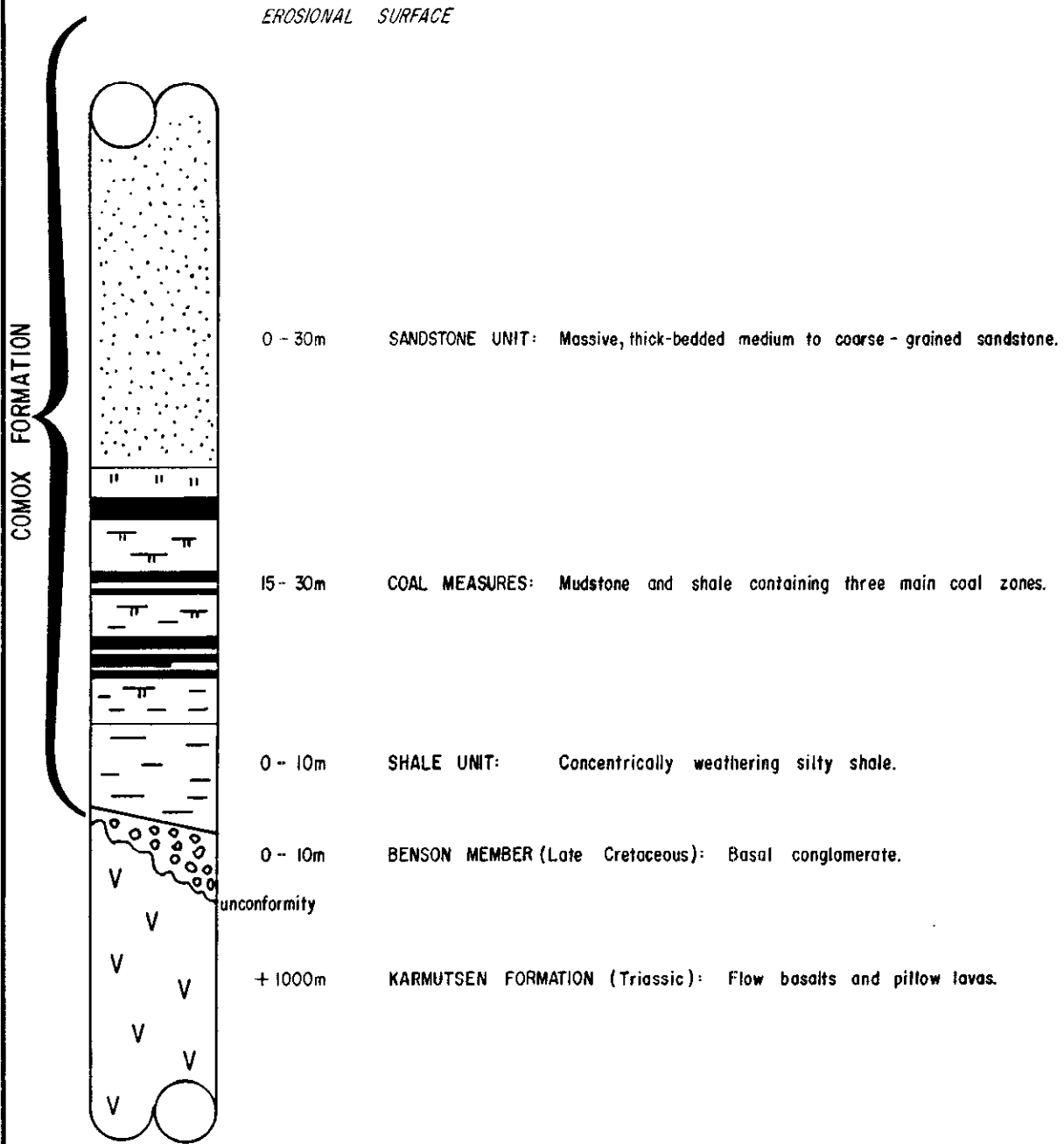
1983 work established a correlation between the coal seams found in the Block 'A' area and Block 'B' area, illustrated by Figure 6. This correlation is further supported by the 1984 drilling on Block 'B', of which Hole HL-84-10C, shown on Figure 6., is an example. As no further work on the Block 'A' area was undertaken in 1984, the reader is referred to the 1983 report

entitled, "The Geology and Coal Resources of the Hamilton Lake Coal Licences, Cumberland Area, Vancouver Island" for a more complete description of the coal measures in Block 'A'.

#### 4.1 BLOCK 'B' COAL MEASURES

The 1984 drilling program, confined to the Block 'B' area of the Hamilton Lake Coal Licences, increased the amount of information about the coal measures in this area. The general nature of the coal seam deposition as outlined in the 1983 work was confirmed, and no structural complications, such as faults, appear to have disturbed the coal measures on Block 'B'. The variation in coal seam generation from hole to hole appears to be a result of a changing environment of deposition during the time that the coal seams were laid down. Figure 7. illustrates a correlation of coal seams using the geophysical logs from the present drilling on Block 'B' in a transverse section northwest to southeast. The section illustrates the rapid lateral changes in coal seam generation across the Block 'B' area.

As a result of work to date, 3 main coal zones occur within the basal 50 metres of the Comox Formation on the Block 'B' area. These three zones are most strongly represented in Hole HL-84-10C, (see Appendix Map IA, and Appendix III).



**FIG 5**

<b>WELDWOOD OF CANADA LTD.</b>			
HAMILTON LAKE COAL LICENCES			
GENERALIZED			
STRATIGRAPHIC COLUMN			
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The upper of these zones usually consists of 0.60 to 1.00 metres of coal contained in one band. This upper zone has been subjected to glacial erosion in the northern part of the reserve area and is not found in holes 01, 02 and 07C. Appendix Map IB. illustrates the structure contours, or elevation of the seam above sea level, and shows the areas of erosion or non-deposition. The uniform nature of these contours suggest that no faulting has taken place over the Block 'B' area.

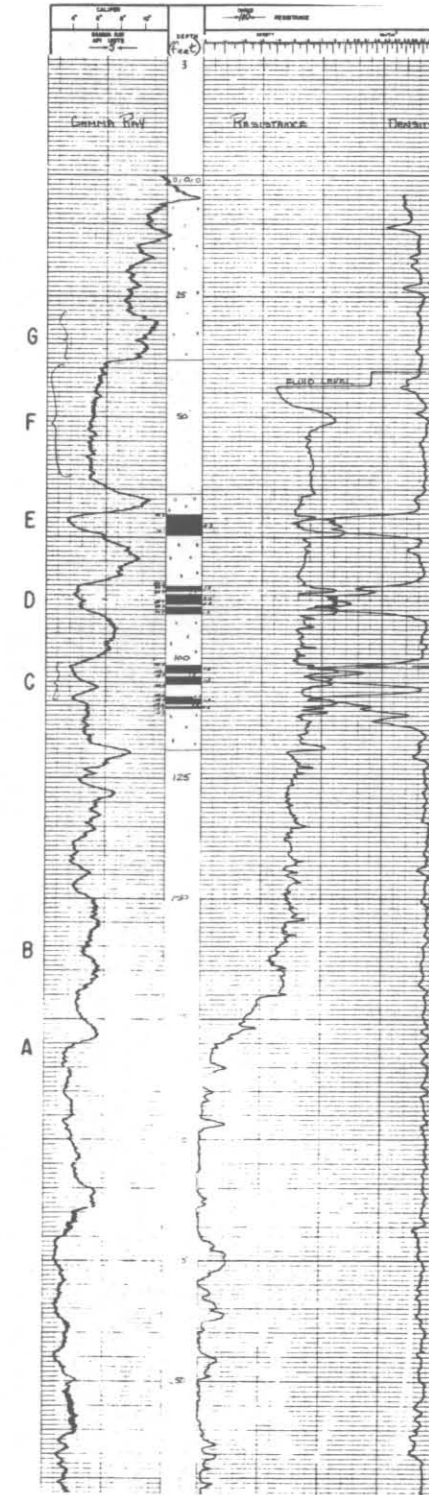
The middle coal zone consists of a number of thin coal bands ranging from 0.20 m in thickness to as much as 1.5 m., separated from each other by 0.50 to 4 metres of siltstone and/or shale. The coal bands themselves suffer from a contamination of parting material, where as much as 50 % of the coal section can be dirt or rock partings.

The lower coal zone is usually the most continuous and uniform of the three, and varies from 0.50 to 1.5 metres in thickness. It is this lowermost coal zone which presents a target for further drilling to the southwest, with possibilities of expanding the reserve area in this direction.

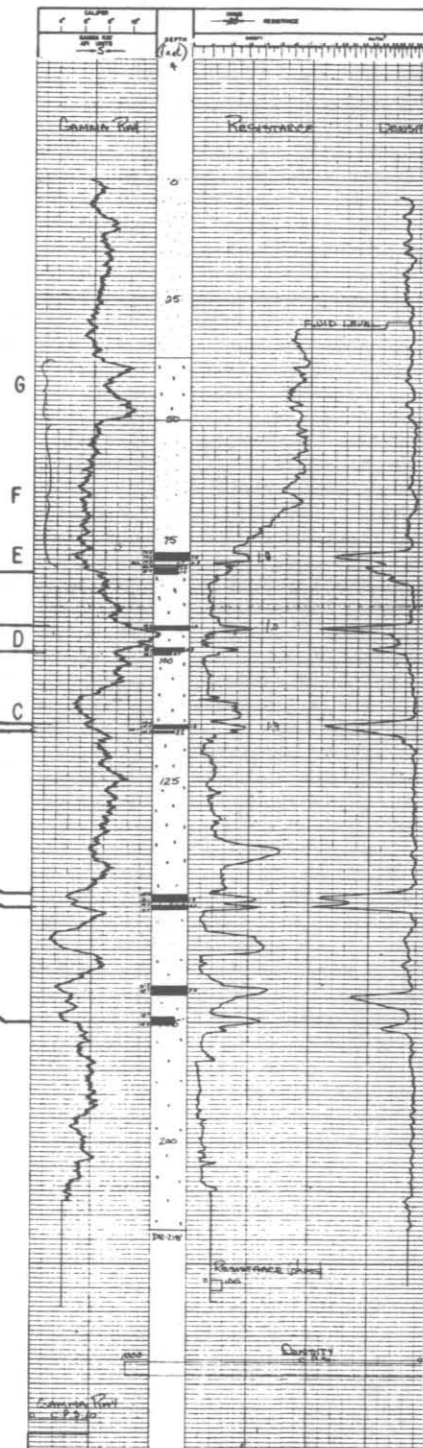
Appendix II contains a number of cross-sections which illustrate the correlation of coal seams over the Block 'B' area.

NORTHWEST

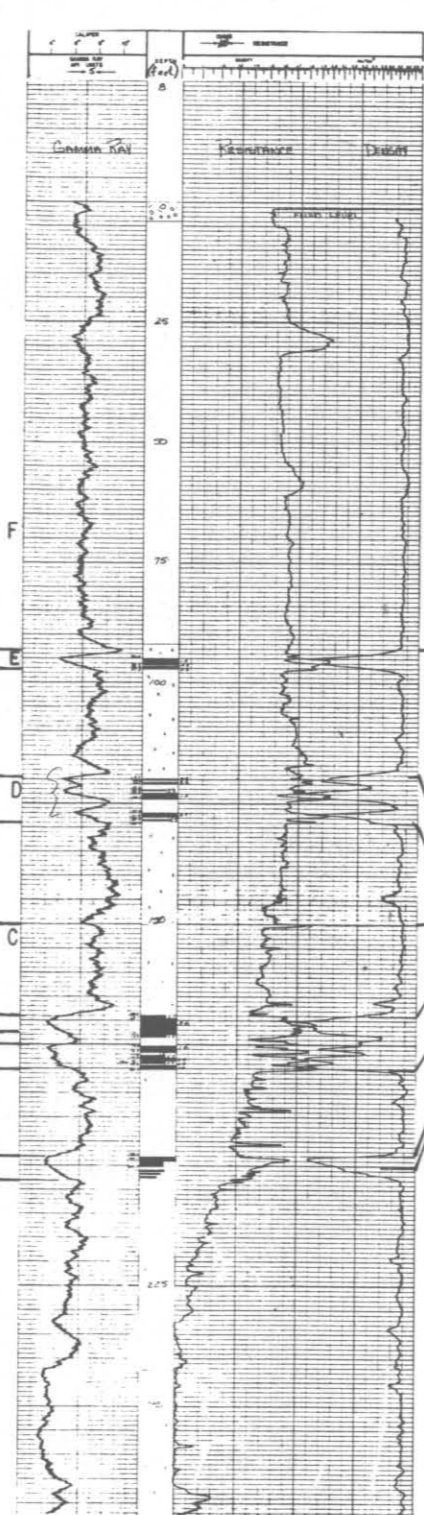
HOLE HL-78-3  
K.B. Elevation 575m



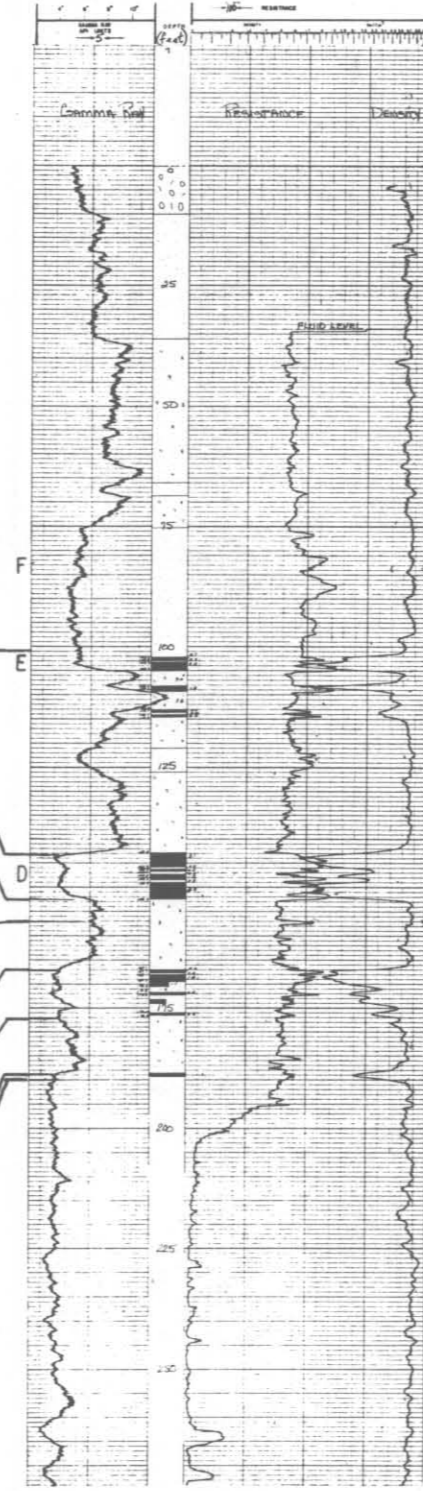
HOLE HL-78-4  
K.B. Elevation 584 m



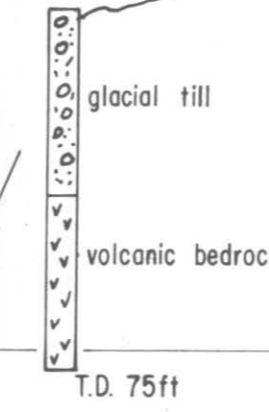
HOLE HL-78-8  
K.B. Elevation 530m (corrected)



HOLE HL-78-7  
K.B. Elevation 485m



HOLE HL-78-17  
K.B. Elevation 457m  
(no geophysical log)

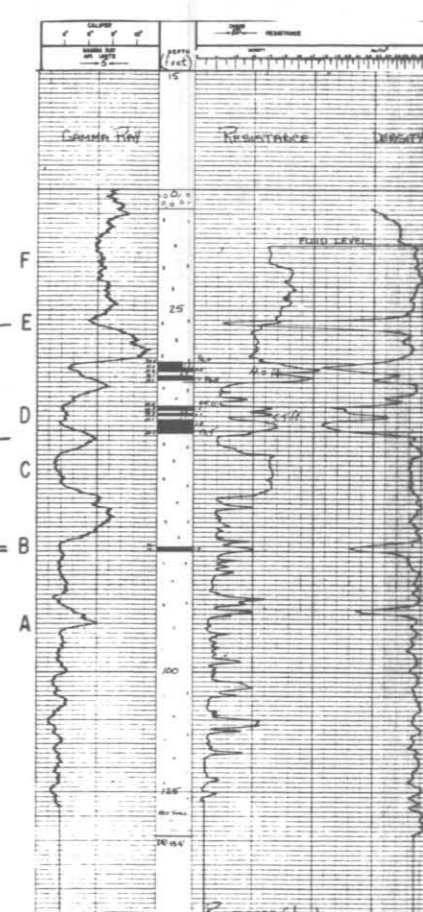


Karmutsen Formation  
Basalts

Triassic Volcanics  
(Pre - Cretaceous)

SOUTHEAST

HOLE HL-78-15  
K.B. Elevation 445m



HOLE HL-84-10c

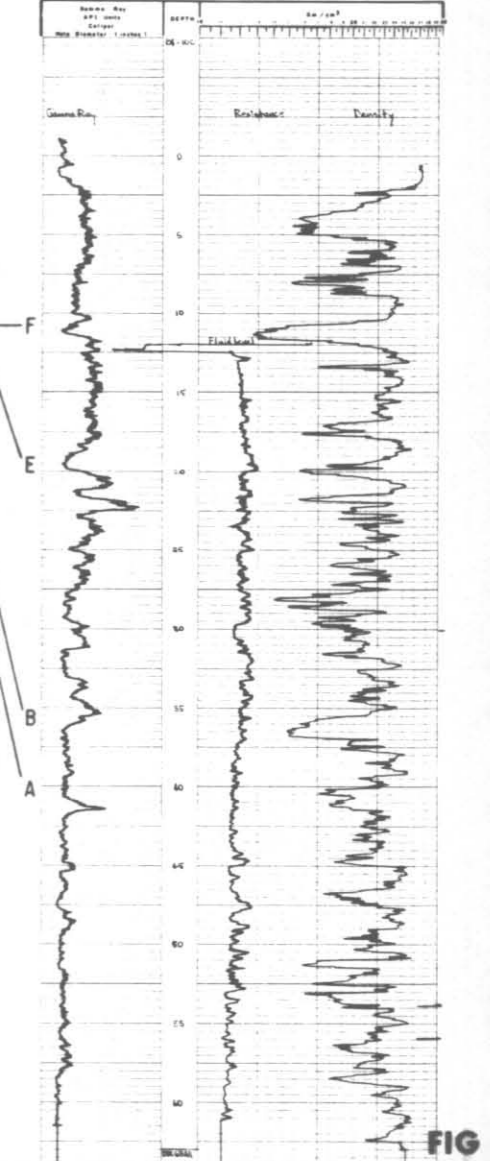


FIG 6

Horizontal Scale 1:5000  
Vertical Scale 1:480  
Datum: Upper Coal Seam

WELDWOOD OF CANADA LTD.  
HAMILTON LAKE COAL LICENCES  
LONGITUDINAL SECTION  
RESERVE BLOCKS A & B

DRAWN BY: S.L. GARDNER  
DRAFTED BY: E.J. DUNN  
CHECKED BY:  
DATE: JUNE 1983

## Chapter 5

### CALCULATION OF IN-SITU COAL RESERVES, BLOCK 'B' AREA

The recent drilling has identified boundaries of the coal reserve on the north, east and southeast. Previous mapping work has located the volcanic-sedimentary contact on the west and southwest. Further follow-up drilling is required to prove that the coal seams continue in this direction to the volcanic-sedimentary contact.

Table 2. illustrates the aggregate raw coal thickness for each of the drillholes within the presently defined boundaries of the coal reserve in Block 'B' :

TABLE 2. AGGREGATE RAW COAL THICKNESS - BLOCK 'B' COAL RESERVE

HOLE NUMBER	AGGREGATE COAL THICKNESS (m)*	VERTICAL OVERBURDEN TO COAL RATIO **
HL-84-01	1.85	8.89 : 1
HL-84-02	2.85	7.12 : 1
HL-84-03	2.14	20.93 : 1
HL-84-04	3.25	8.46 : 1
HL-84-05C	2.30	7.87 : 1
HL-84-07C	2.70	4.13 : 1
HL-84-08	1.35	6.44 : 1
HL-84-09	2.80	8.71 : 1
HL-84-10C	4.50	7.22 : 1
HL-78-11	2.62	10.73 : 1
HL-78-15	2.81	4.48 : 1

\* : includes all seams 0.50 m. or greater

: includes all partings less than 0.10 m. thick

\*\* : includes all overburden, interburden, plus partings greater than 0.10 m. thick

: does not include additional overburden associated with pit walls or mining benches

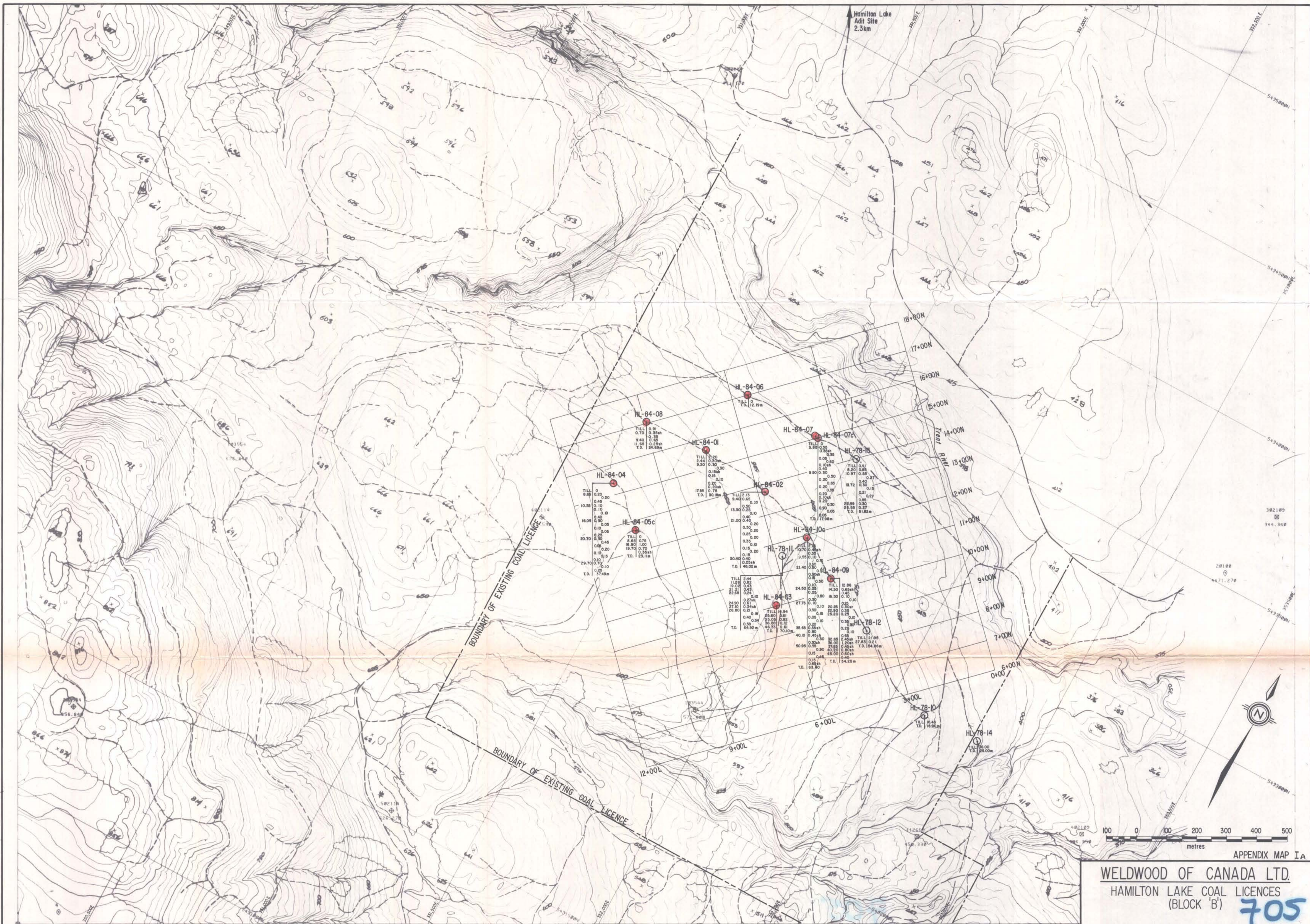
: does not take into account coal losses associated with mining

As a result of these drillhole intersections, a boundary for the calculation of in-situ coal reserves can be inferred. This boundary, shown on Appendix Map IC, is arbitrarily placed at the approximate 10 : 1 vertical overburden to coal ratio. In areas where the seams thin or disappear as shown by the drilling, the boundary is drawn to the midway point between holes. Where the reserve area is open, such as the southwest side of the deposit, the reserve boundary is drawn to a 150 metre radius of investigation around each drillhole.

## 5.1 METHOD OF CALCULATION OF COAL RESERVES

As described in the above section, a boundary has been placed on the coal reserves in Block 'B' using certain criteria which approximate a total in-situ raw overburden to coal ratio of 10 : 1, based on vertical coal seam and overburden thicknesses. By employing areal calculations on plan for the area contained within this reserve boundary, a total reserve area of 532,475 sq. metres is arrived at. In order to derive a volume of coal present within this area, an average aggregate seam thickness of 2.71 metres can be used. This thickness results from taking a simple average of the aggregate coal thicknesses of the drillholes within the reserve area. These holes are relatively evenly spaced throughout this area, thus are weighted evenly. An average dip of 10 degrees on the coal measures can be used to apply a correction factor for dip. This 10 degree figure has been confirmed from surface readings of the formation dip and strike, and can be measured on the cross-sections, which are at right angles to the formation strike. Assuming an average 10 degree dip, a coal thickness of 2.71 metres and a Relative Density of the coal of 1.5, a figure of 41,421 tonnes per hectare can be used to calculate the total coal in-place within the reserve area -

41,421 tonnes/ha X 53.25 ha = 2,205,668 tonnes in-situ  
OR, 2.21 million tonnes



JOB: 40130-B SCALE: 1/5000 TD: HAMILTON LAKE

Area  
 Year Drilled  
 Hole Number (c-cored)  
 Drillhole Location  
 TILL 0  
 0.55 → Coal Thickness (m)  
 0.40 → Parting Thickness (m)  
 0.50 → Depth to Top of Coal Seam (m) → 10.97  
 0.37 → T.D. 19.78m → Total Depth of Hole

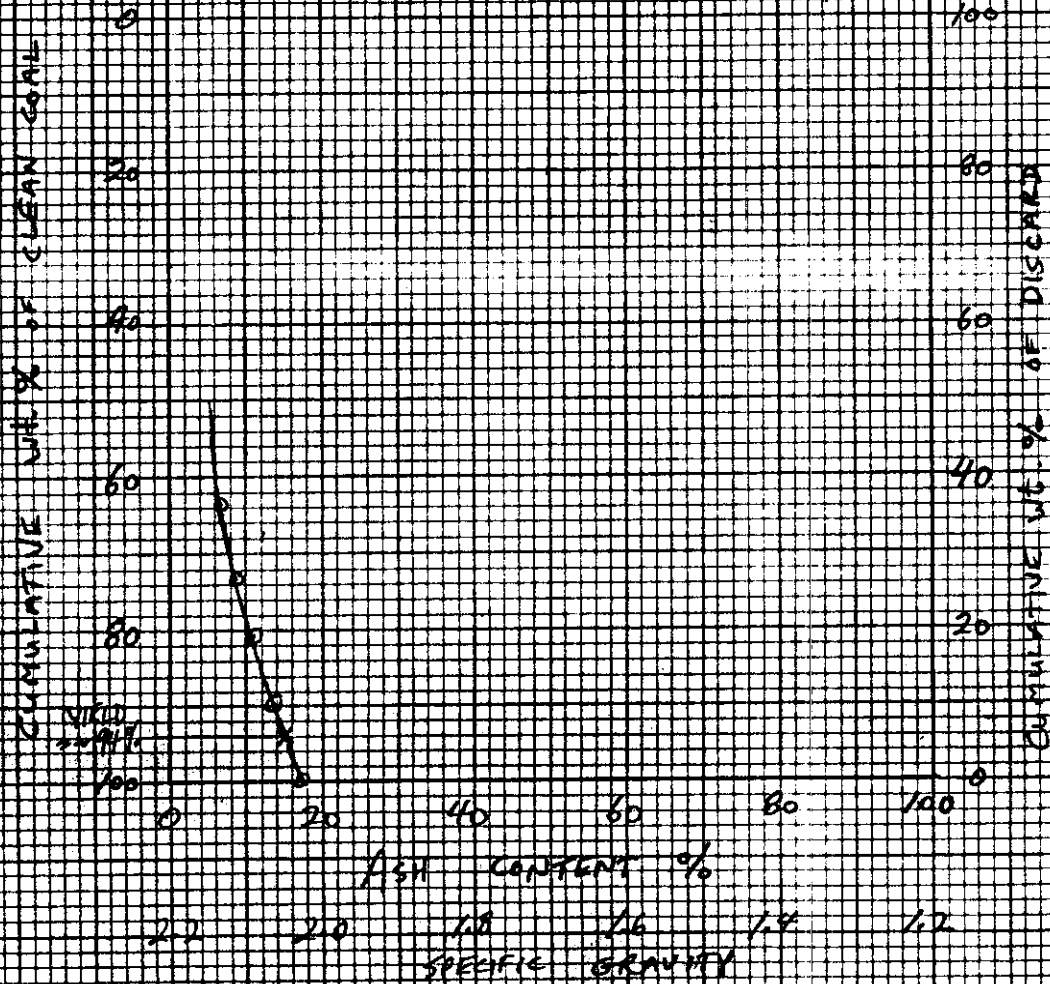


Compiled by  
**THE McELHANNEY GROUP LTD.**  
 1166 Alberni St., Vancouver, B.C., Canada  
 From aerial photography at an approximate scale of 1:28,000  
 flown in 1981.

SCALE: 1:5000 NTS: 92F/11  
 DRAWN BY: S.L. GARDNER DRAFTED BY: E.J. DUNN CHECKED BY: DATE: JULY 1984

**WELDWOOD OF CANADA LTD.**  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B') **705**  
 DRILLHOLE INFORMATION **(MI)**

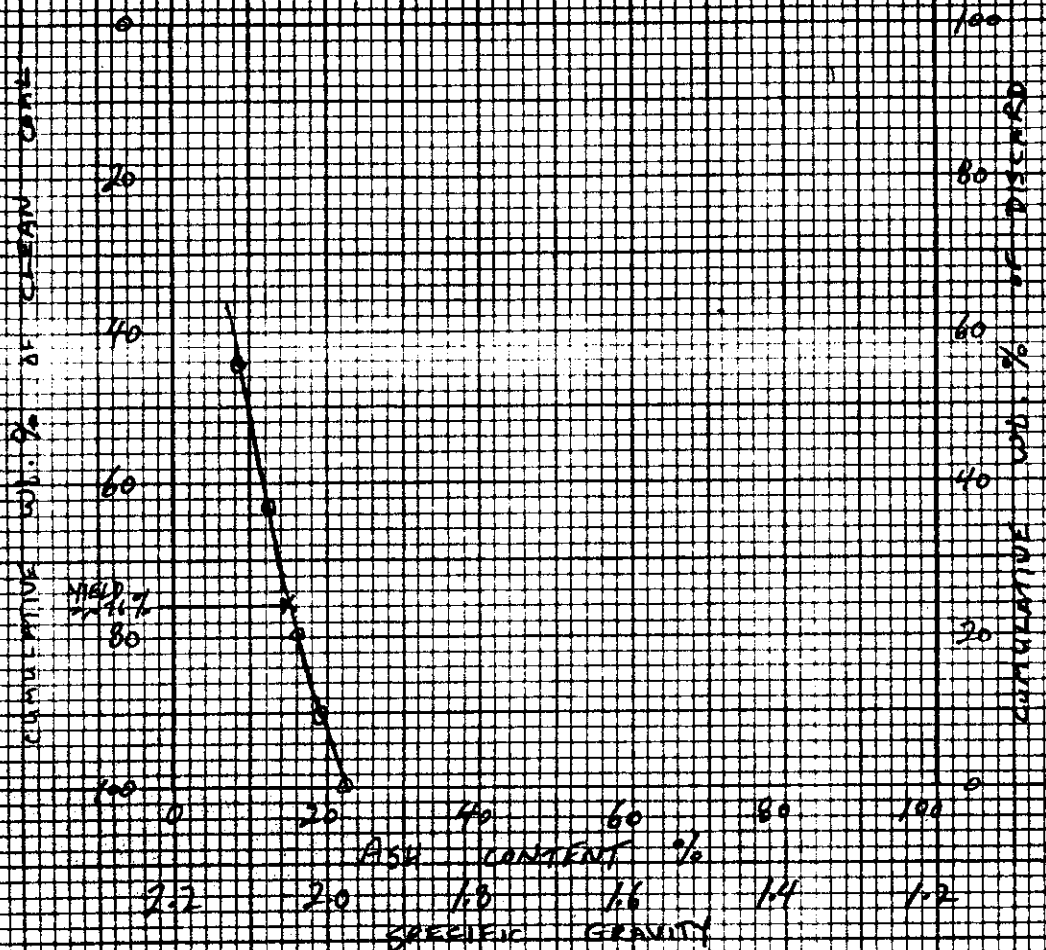
APPENDIX MAP I A



HOLE No. 84-05c SAMPLE No. 1 (51 metres)  
 25 x .015 mm FRACTION  
 (97.22% OF TOTAL SAMPLE)

YIELD CURVE

X = 0.15% ASH PRODUCT



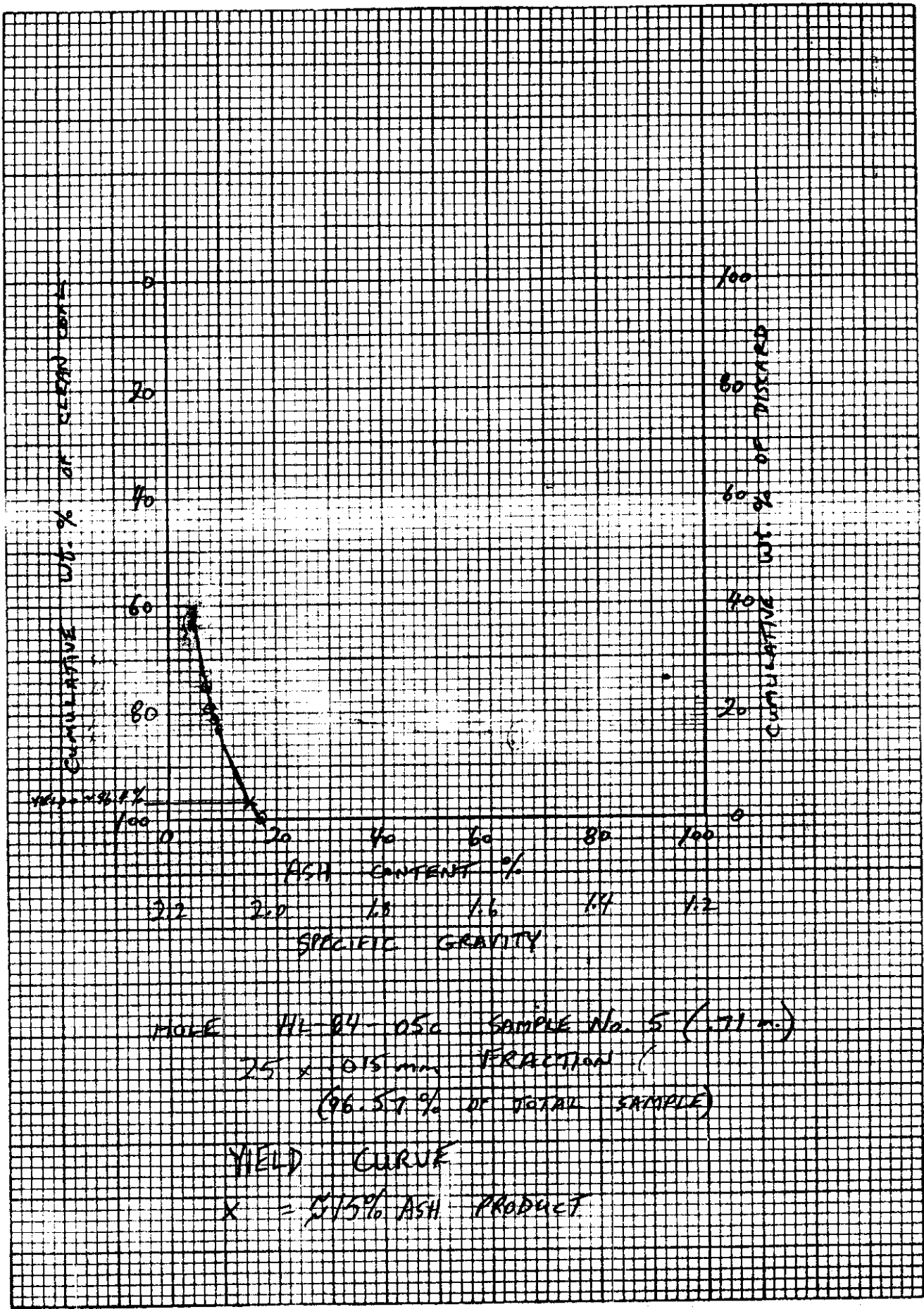
HOLE #1 - 84 - 05C SAMPLE No. 3 (-.85 m.)

25 x .075 mm FRACTION  
(95.12% OF TOTAL SAMPLE)

YIELD CURVE

X = 4.15% ASH PRODUCT





## Chapter 6

### COAL QUALITY

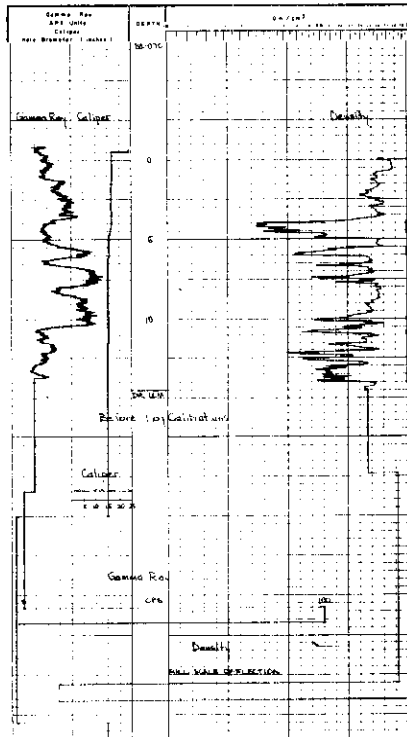
In order to evaluate coal quality trends in the Block 'B' area, coal sections in three of the ten holes were cored. Coring was performed with a conventional 3 metre long Christiensen core barrel, cutting 7.62 cm. diameter core. A modified insert type core bit was used, with air as the flushing medium. Core recoveries were greater than 90 % in all holes.

Appendix IV contains quality information gathered as a result of the coring work. This appendix section includes corehole log descriptions of the cored sections, sample inventories for each of the holes, analytical flowsheets, washability tables plus all of the raw laboratory data. Due to budget constraints, core samples recovered from hole HL-84-10C were not analysed. These samples are stored at General Testing Labs in Vancouver for possible future work.

Figure 8 illustrates head assays of raw coal samples for Hole HL-84-07C prior to any screening or float/sink testing. A number of conclusions can be drawn from the analytical work on the Block

# RAW COAL ANALYTICAL DATA

HL-84-07c



Moisture	Ash	Volatiles Matter	Fixed Carbon	Sulphur	Calorific Value (Btu/lb)	Free Swelling Index
1.60	26.21	27.10	45.09	1.00	10,339	6.0
1.17	27.52	29.20	42.11	4.19	11,357	6.0
0.91	33.13	30.98	34.98	6.14	9,375	6.5
0.93	65.43	23.41	10.23	1.73	3,106	1.0
0.95	36.97	27.70	34.38	3.04	8,818	4.0
1.36	38.20	27.60	32.84	0.84	8,384	4.5
1.40	41.17	24.73	32.70	0.41	7,894	3.0

**FIG 8**

\*NOTE: Ash content reflects the gross seam section, as partings were not removed prior to analytical work.

**WELWOOD OF CANADA LTD.**  
 HAMILTON LAKE COAL LICENCES  
 RAW COAL QUALITY  
 (AIR - DRIED BASIS)\*  
 BLOCK 'B'

DRAWN BY: S.L.GARDNER	DRAFTED BY: E.J.DUNN	CHECKED BY:	DATE: AUGUST 1984
--------------------------	-------------------------	-------------	----------------------

'B' area :

1. All of the coal seams exhibit good coking qualities, with F.S.I.'s ranging from 8.5 in the cleaner raw coal sections to 3 in the high ash seams. This coking tendency is comparable to the seam analysed in the Bulk Sample work of 1975 on the Block 'A' area.
2. Sulphur contents are variable and range from less than 1 % to as much as 6 %. Sulphur is present as pyritic nodules and bands within the seam. Pyritic material is also present within the mudstone partings and silty interburden material. Washability testing on different size fractions in Hole HL-84-07C shows that the pyrite material is not concentrated in the finer fractions, which indicates that processing of the coal will have only a minimal effect on sulphur content. Selective mining methods will, however, be able to remove some of the pyritic accumulations. The composite of all the coal samples from hole HL-84-07C contains 2.02 % sulphur. This value probably represents a good average value for the coal seams on the Block 'B' area.
3. The in-situ ash content of the composite of all of the coal samples from Hole HL-84-07C is 40 %. Hole HL-84-05C, which is southwest of Hole HL-84-07C, shows in-situ ash contents

of 17 to 20 % in the raw coal samples, however the seam sections in 05C are thinner. The yield curves included in Appendix IV for each of the holes indicate that clean coal yields of about 50% could be expected for the dirtier seams in the northern part of Block 'B' around hole 07C, while yields of about 78 % could be expected for the southwestern part of Block 'B' around hole 05C. These yield figures do not include losses associated with mining and delivery of raw coal to the plant.

4. Laboratory testing indicates that the percentage of 0.15 mm X 0 fraction is low. This very fine fraction is usually less than 4 % of the total sample in the cleaner, low ash seams, and usually less than 7 % of the total sample in the dirtier seams.

#### 6.1 Recommendations as a Result of the Analytical Work

It is recommended that Hole HL-84-10C be recored during the next program, with additional seam sections in the lower part of the hole cored for washability testing. The original samples could also be included in this work.

Any further washability testing should include a wider range of Relative Densities, starting from 1.3 and scaling up in increments of .10 to 1.9 R. D. This would entail 7 separating specific gravities on each sample rather than the current 4.

## Chapter 7

### CONCLUSIONS AND RECOMMENDATIONS

As a result of the 1984 exploration work and previous year's findings, the following conclusions can be drawn with regards to the Hamilton Lake Block 'B' area :

1. A total in-situ coal reserve of 2.21 million tonnes has been proven to occur in the Block 'B' area, within an approximate 10 : 1 raw overburden to coal ratio.
2. This coal reserve is contained within 3 main coal zones in the reserve area, of which the middle zone in particular consists of a number of coal bands separated by rock partings.
3. The seams display a variance in quality and thickness from hole to hole. This variance is due to depositional factors affecting coal seam generation, rather than structural complications.
4. The structure of the area is relatively simple, with the formation dipping uniformly to the northeast, forming a

dip-slope mining situation along the edge of the plateau area.

5. The coal is ranked High Volatile Bituminous 'A', with a Sulphur Content of approximately 2 %, and generally exhibits good coking qualities, with some sections being high in ash on a raw basis.
6. Drilling shows a continuation of the lowermost and possibly the middle coal zones outside of the existing licence boundary to the southwest.

As a result of the current work, and because of the company's demonstrated commitment to its present holdings in the area, the author recommends that an additional licence area to the southwest of the existing licences be applied for, in order to maximize the company's reserve base. This recommendation is outlined on Appendix Map ID. The additional licence area to be applied for covers approximately 160 ha and would involve an initial cash outlay of less than \$1,000.00 to secure.

Exploration drilling will be required to confirm the maximum extent of the coal seams in the new area. In addition, more coring work on the Block 'B' area would be desirable.



## 7.1 1985 EXPLORATION PROPOSAL, HAMILTON LAKE BLOCK 'B'

Appendix Map ID outlines additional exploration work required to prove the extension of the coal seams to the southwest of the present licence area and properly define the southern limit of economic mining on the present licence area. Also, coring work on the present licences will augment coal quality information (refer to Section 6.1, Coal Quality).

Using this year's exploration work as a guide to estimating costs of the 1985 program, the proposed work will cost approximately \$55,000.00 to complete. This includes all laboratory costs.

## REFERENCES

1. Curcio, M. P., "1978 Exploration Work, Hamilton Lake Coal Licences" (Oct. 1978), Weldwood of Canada Limited
2. Gardner, S. L., "The Geology and Coal Resources of the Hamilton Lake Coal Licences, Cumberland Area, Vancouver Island" (May, 1983), Weldwood of Canada Limited
3. Horvat, F., "Hamilton Lake Bulk Sample Work", (Feb., 1977), Birtley Engineering Ltd. for Weldwood of Canada Limited
4. Muller, J. E., "The Geology of Vancouver Island", (1977), Geological Survey of Canada O.F. 463
5. Muller, J. E., "Evolution of the Pacific Margin, Vancouver Island and Adjacent Regions", Can. Journal of Earth Science, Vol. 14, 1977
6. Muller, J. E. & Jeletsky, J. A., "Geology of the Upper Cretaceous Nanaimo Group, Vancouver Island and Gulf Islands, British Columbia", (1970), G. S. C. Paper 69-25



PLATE I. - Bucyrus Erie Model 24R drilling rig used in Hamilton Lake drilling and coring operations.

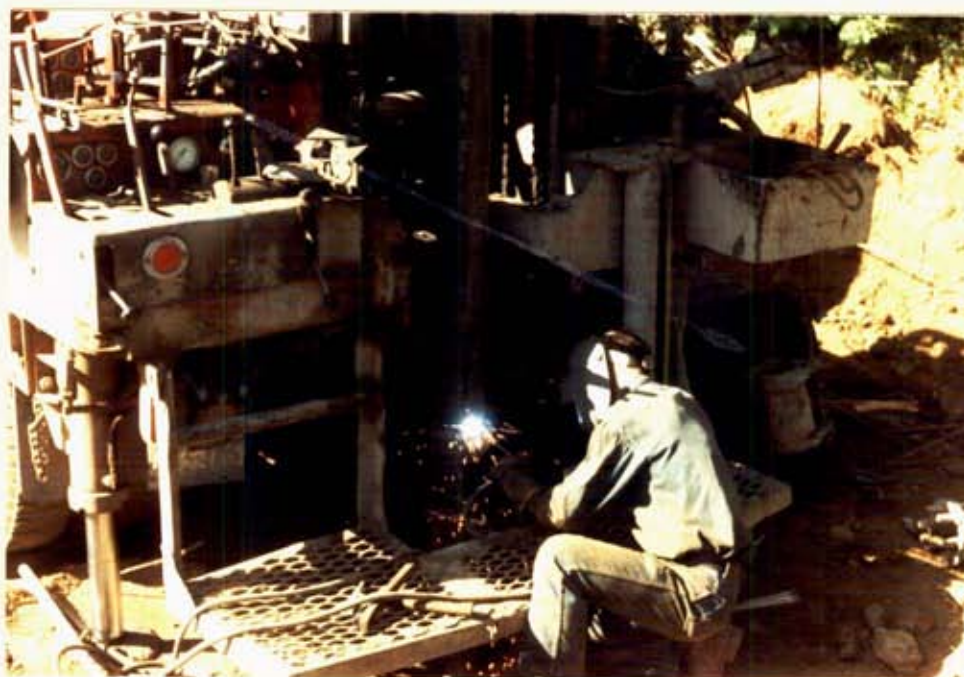


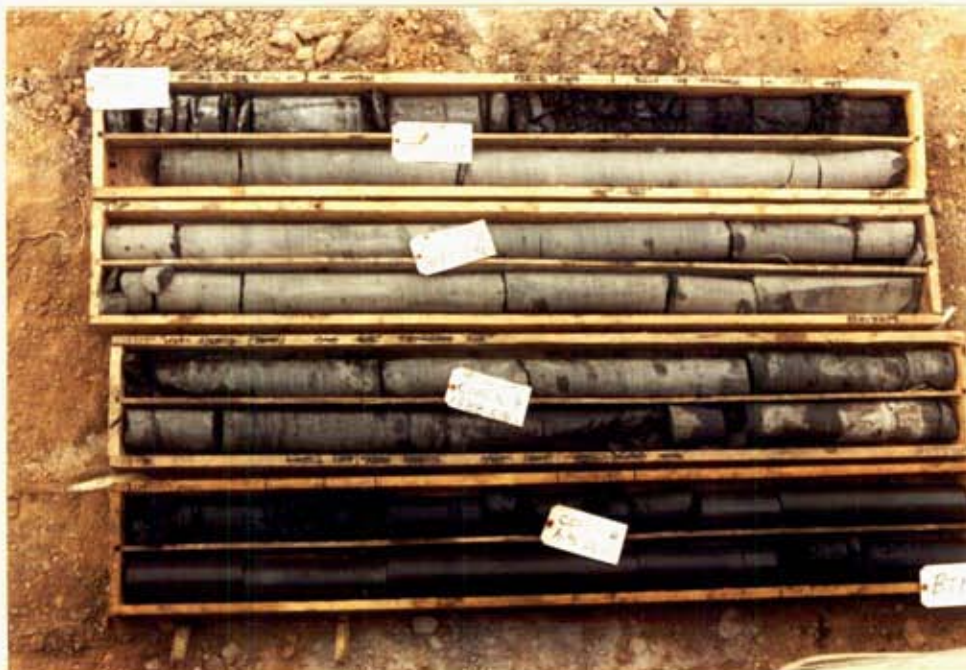
PLATE II. - Welding two 6 metre joints of casing during overburden drilling, Hole HL-84-03.



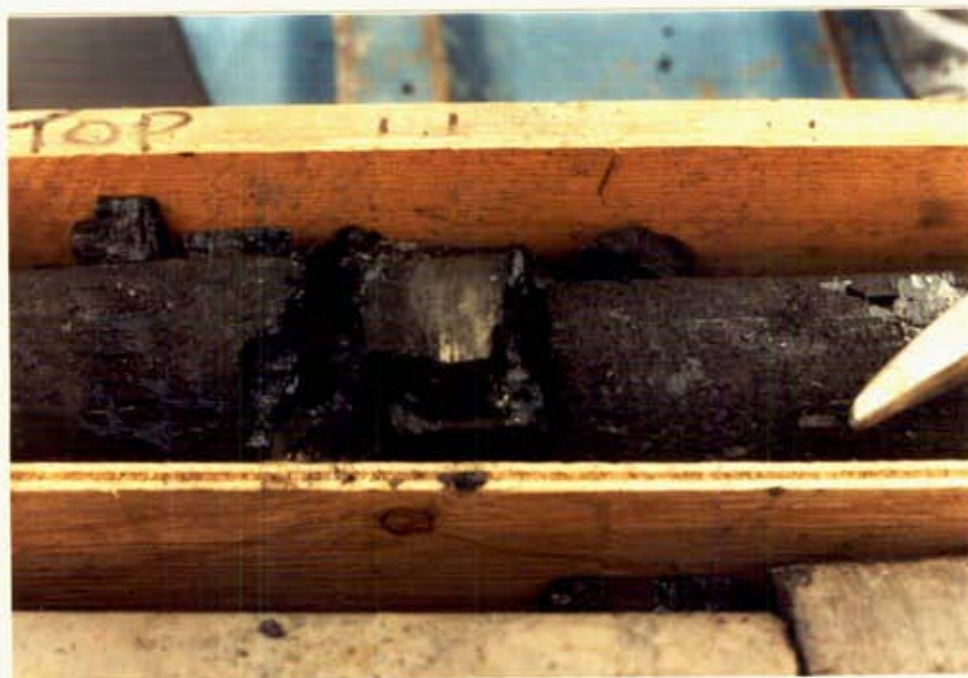
PLATE III. - Rock drilling with downhole percussion hammer.



PLATE IV. - Core retrieval operations, Hole HL-84-05C.



PLATES V. & VI. - Cored sections, 7.77 m. - 23.13 m., Hole HL-B4-05C



PLATES VII. & VIII. - Close-up of pyritic sulphur band in coal seam at 20.22 m. depth in HL-84-05C.

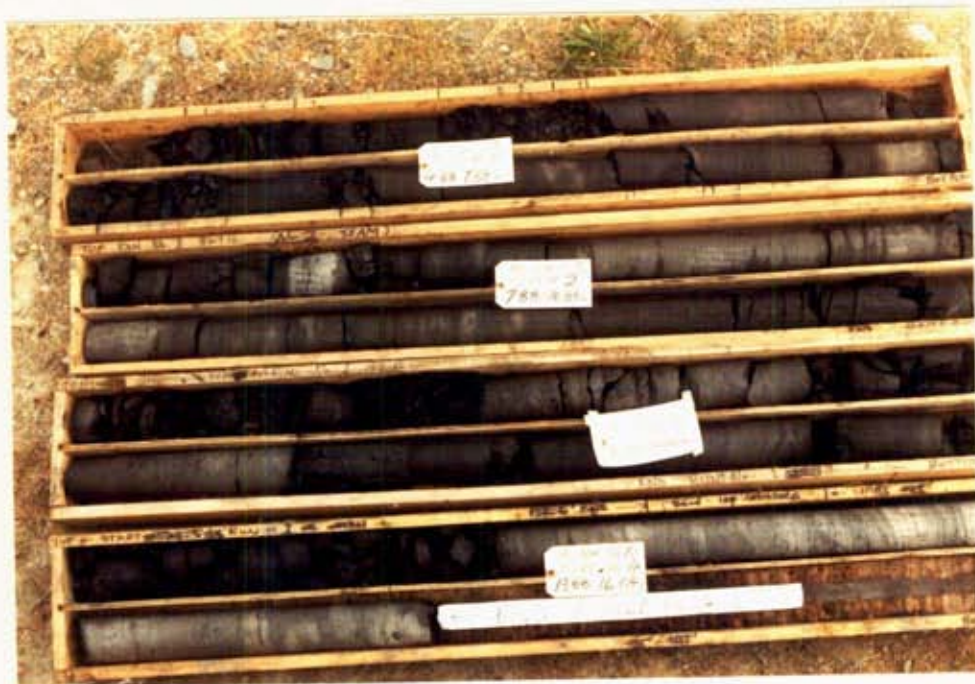


PLATE IX. - Cored sections, 4.88 m. - 16.04 m., Hole HL-B4-07C



PLATE X. - Cores 1 & 2, 12.50 m. - 16.50 m., Hole HL-B4-10C  
Note : Error in labelling depths in photograph.



PLATE XI. - Cores 3 & 4, 18.50 m. - 24.50 m., Hole HL-B4-10C



PLATE XII. - Core 4, HL-B4-10C, showing pyritic bands at base of coal and in partings.





PLATE XIV. - Cementing and abandonment operations.



PLATE XV. - Reclamation operations.

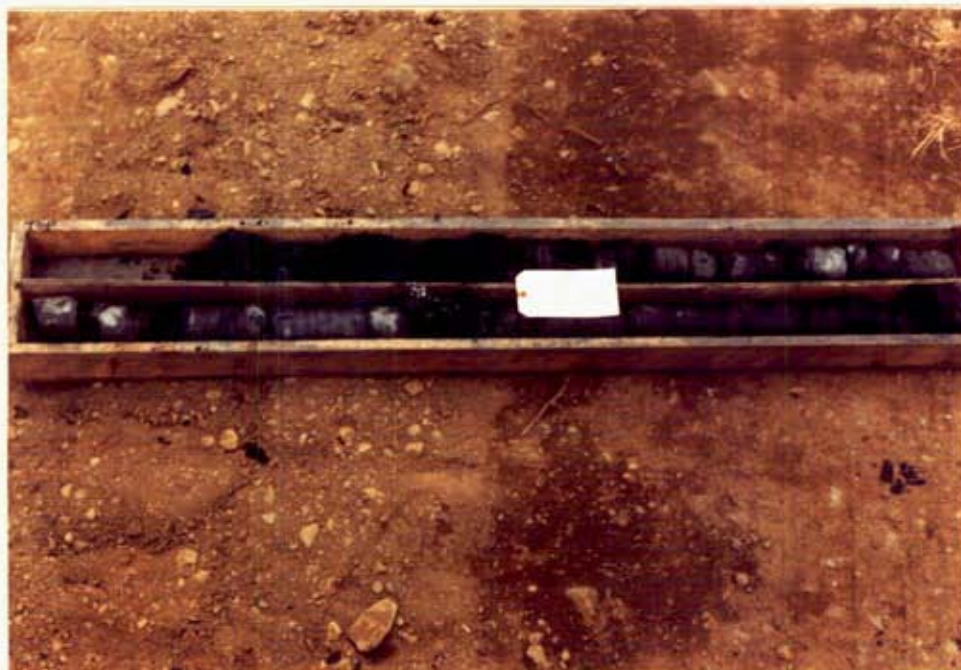
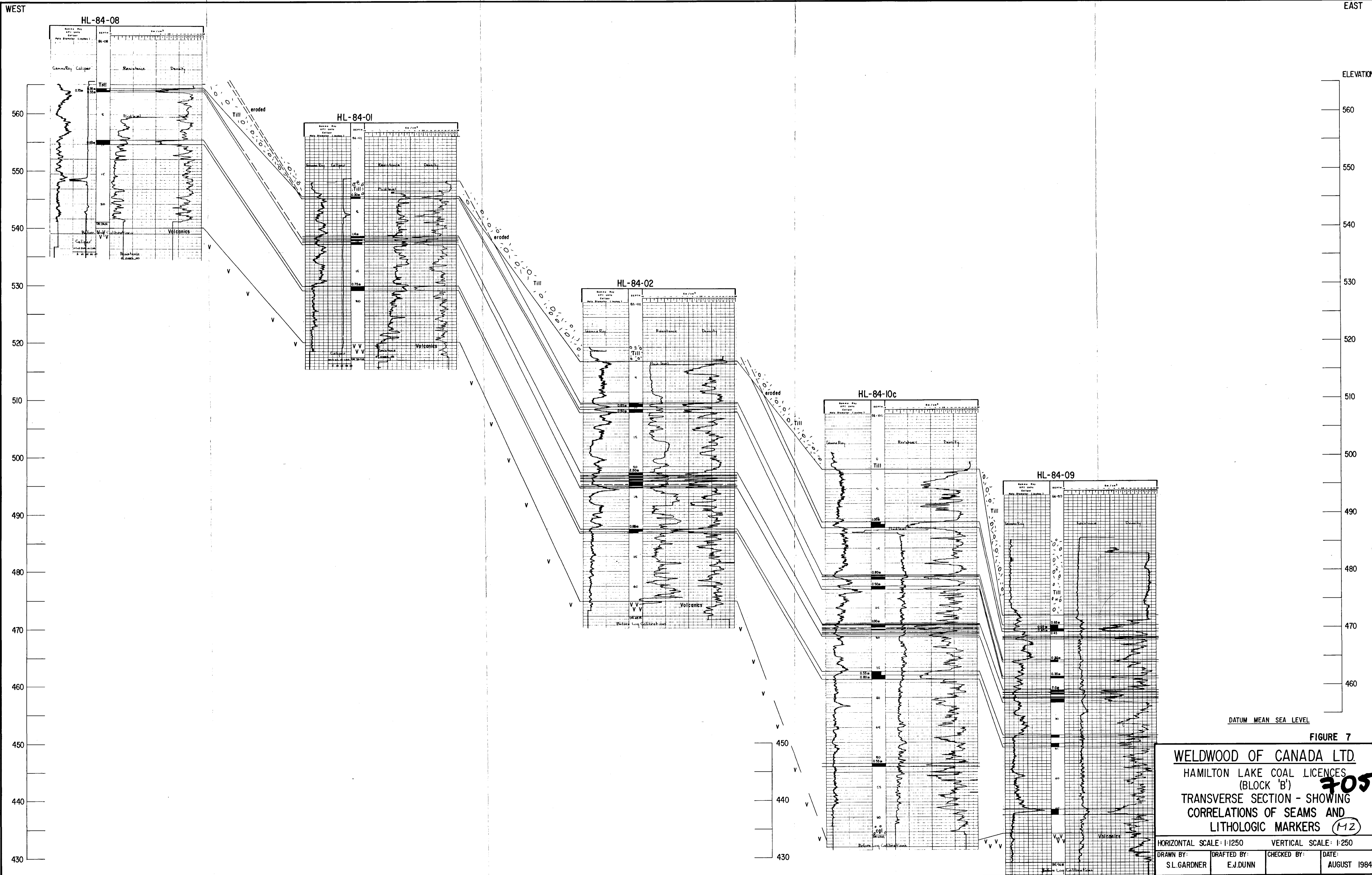


PLATE XIII. - Core 5, 24.50 m. - 27.50 m., Hole HL-84-10C

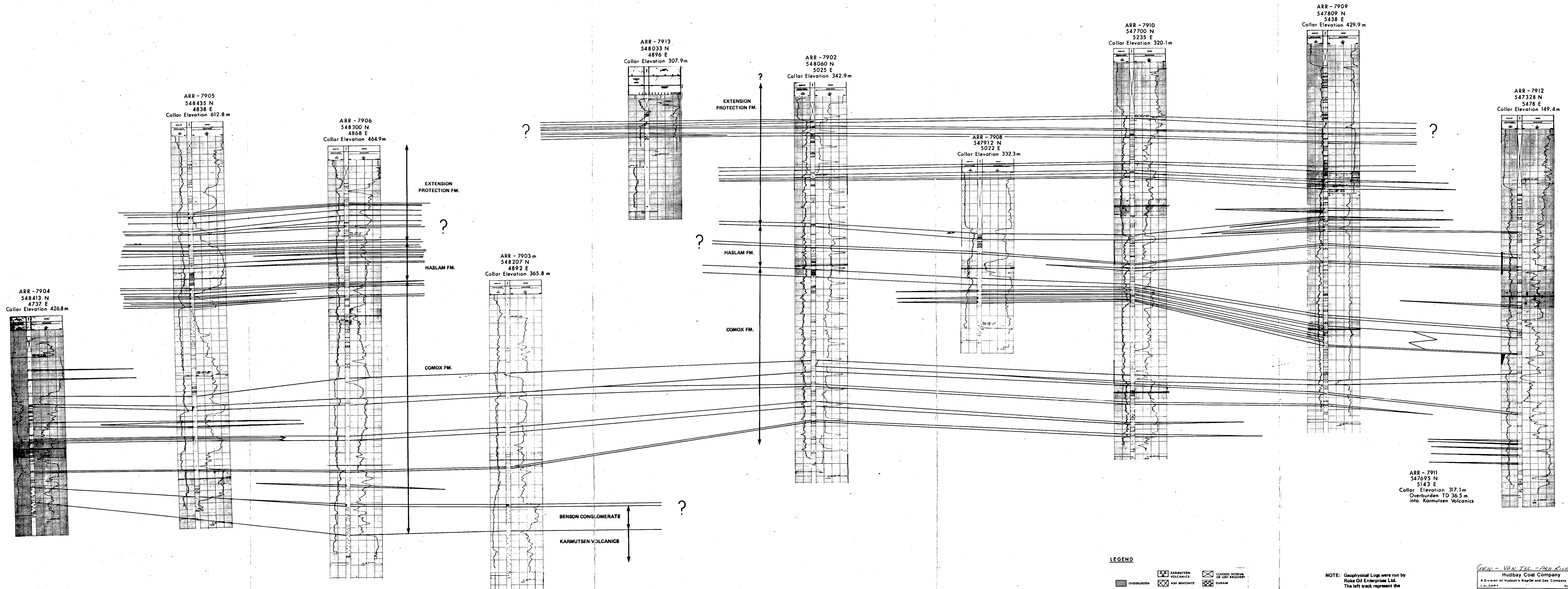


DATUM MEAN SEA LEVEL

FIGURE 7

WELWOOD OF CANADA LTD.  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B') **705**  
 TRANSVERSE SECTION - SHOWING  
 CORRELATIONS OF SEAMS AND  
 LITHOLOGIC MARKERS **(M2)**

HORIZONTAL SCALE: 1:1250		VERTICAL SCALE: 1:250	
DRAWN BY: S.L.GARDNER	DRAFTED BY: E.J.DUNN	CHECKED BY:	DATE: AUGUST 1984



**LEGEND**

OVERBURDEN	KARMUTSEN VOLCANICS	COVERED INTERVAL OR LOST RECOVERY
SANDSTONE	ASH-BENTONITE	DURAIN
SILTSTONE	SEAT BARTH	FUSAIN
MUDSTONE (CARBONACEOUS)	VITRAIN	BONY COAL
SHALE	CLARAIN	CONGLOMERATE
	CLAROURAIN	COAL

**NOTE:** Geophysical Logs were run by Roke Oil Enterprises Ltd. The left track represent the Gamma Ray trace and the right track represents the Neutron trace. Lithology in middle track is an interpretation based on responses from Geophysical Logs. Drill Logs are Not Dip Corrected.

705 (1)  
M3

GEN - VAN ISL - ASH RIVER 79(1)A

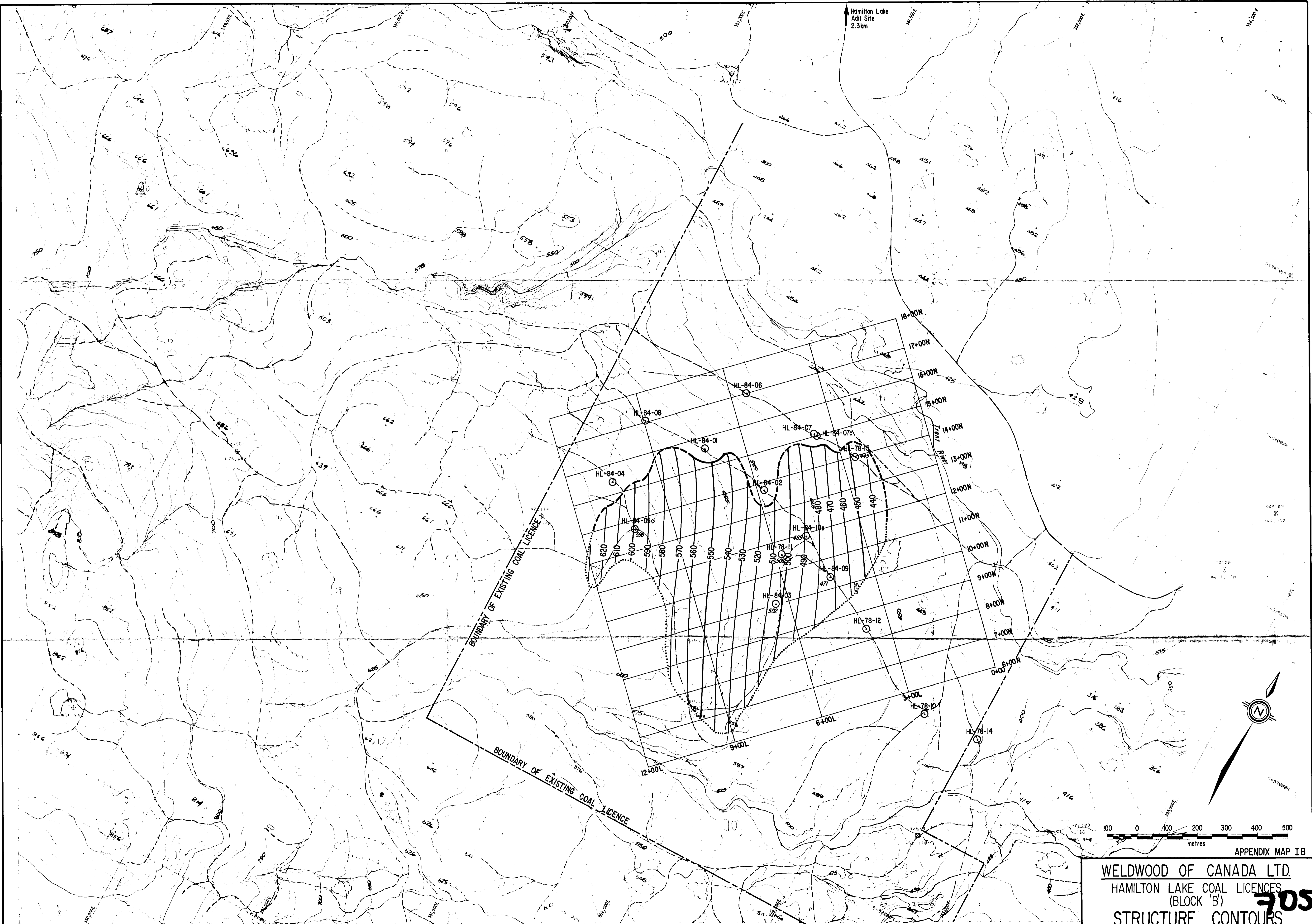
**Hudbay Coal Company**  
A Division of Hudson's Bay Oil and Gas Company Limited  
ALBERTA

**ASH RIVER PROJECT**

**CORRELATION CHART**

SCALE 1:500    PREP BY R. J. Tolbot    DATE 1979-10  
APP'D BY    FILE NO.    HC-2374 L-32

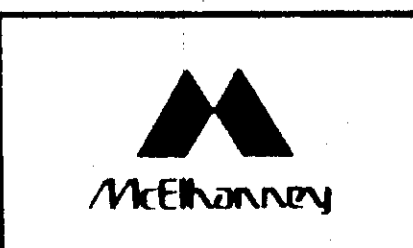
40



HP 40142 2 SCALE 1:5000 ED HAMILTON LAKE

- RESERVE BOUNDARY  
 ——— OUTCROP  
 - - - - - SUBCROP  
 ······ SHALE-OUT

STRUCTURE CONTOUR INTERVAL = 10m



THE McELHANNEY GROUP LTD.  
 July 1981 28 000  
 1 5000 June 1984  
 5 Metres 1 of 1

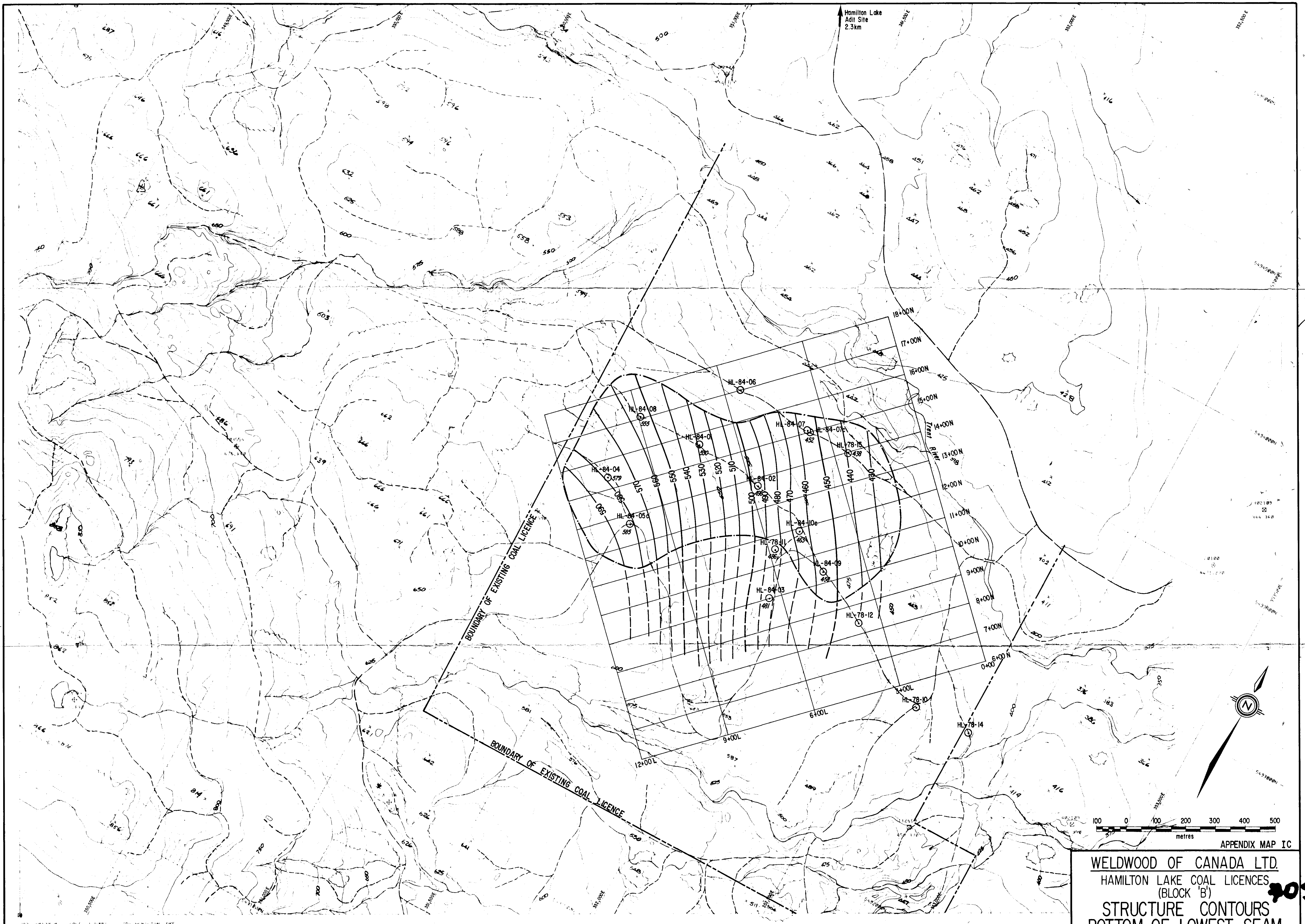
100 0 100 200 300 400 500  
 metres

APPENDIX MAP 1B

WELDWOOD OF CANADA LTD.  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B')  
 STRUCTURE CONTOURS  
 TOP OF UPPER SEAM

705  
 114

SCALE: 1:5000 NTS: 92 F/11  
 DRAWN BY: S.L.GARDNER DRAFTED BY: E.J.DUNN CHECKED BY: DATE: JULY 1984



APPENDIX MAP IC

WELDWOOD OF CANADA LTD.  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B')  
 STRUCTURE CONTOURS  
 BOTTOM OF LOWEST SEAM  
 (COAL SEAM ≥ 0.50m THICK)

SCALE: 1:5000 NTS: 92F/11  
 DRAWN BY: S.L. GARDNER DRAFTED BY: E.J. DUNN CHECKED BY: DATE: JULY 1984



THE McELHANNEY GROUP LTD.  
 July 1981 28 000  
 1:5000 June 1984  
 5 Metres 1 of 1




Boundary of coal reserves with approximate gross overburden to coal ratio of 10:1

STRUCTURE CONTOUR INTERVAL = 10m

305  
 MS



JOB: 40130-0 SCALE: 1/5000 ID: HAMILTON LAKE

-  Area recommended for Licence Aquisition
-  Boundary of Comox Deposition as determined from 1983 Surface Geological Mapping
-  Proposed Drillhole, numbered in order of priority, c = corehole



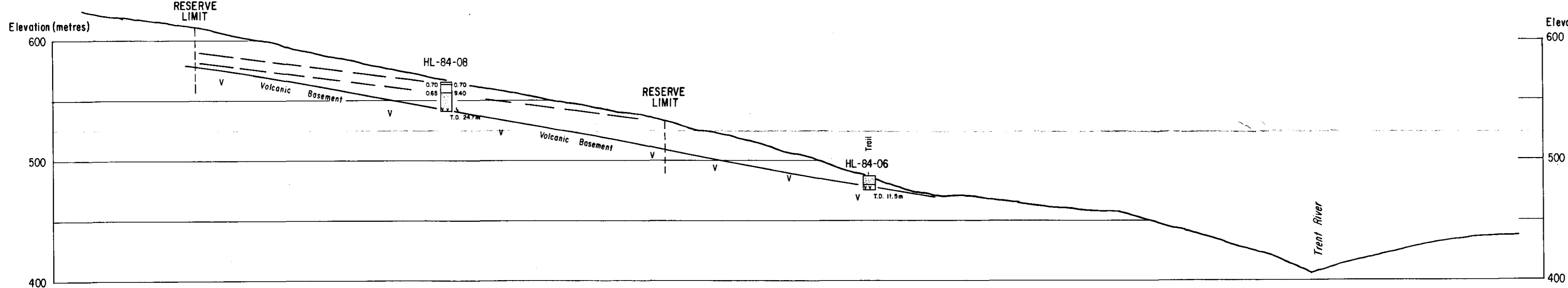
THE McELHANNEY GROUP LTD.  
 1833 West 10th Street, Vancouver, B.C. V6H 1Y1  
 July 1984  
 1:5000  
 June 1984  
 5 Metres

WELDWOOD OF CANADA LTD.  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B')  
**PROPOSED LICENCE ACQUISITION  
 AND FURTHER EXPLORATION  
 WORK**

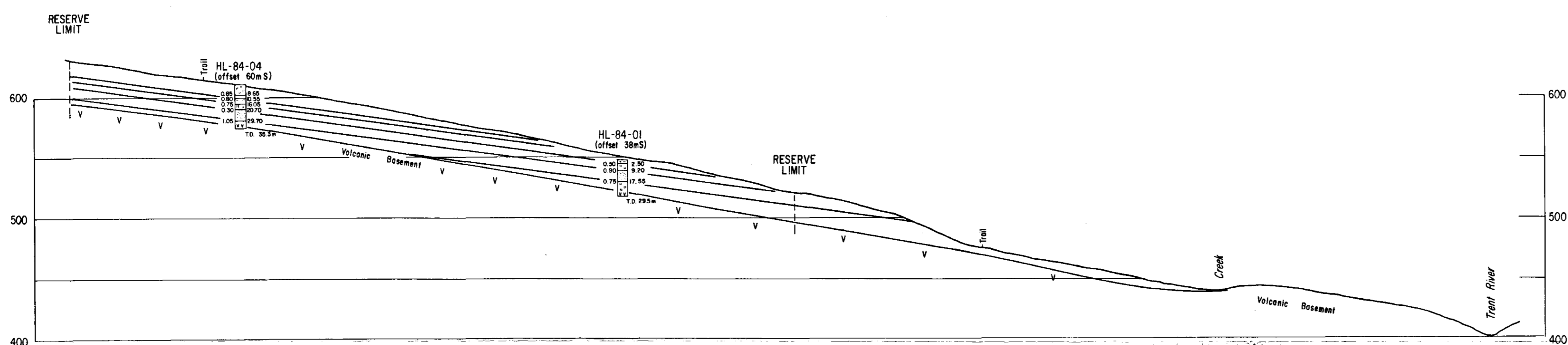
SCALE: 1:5000	NTS: 92 F/11
DRAWN BY: S.L.GARDNER	DRAFTED BY: E.J.DUNN
CHECKED BY:	DATE: JULY 1984

APPENDIX MAP ID

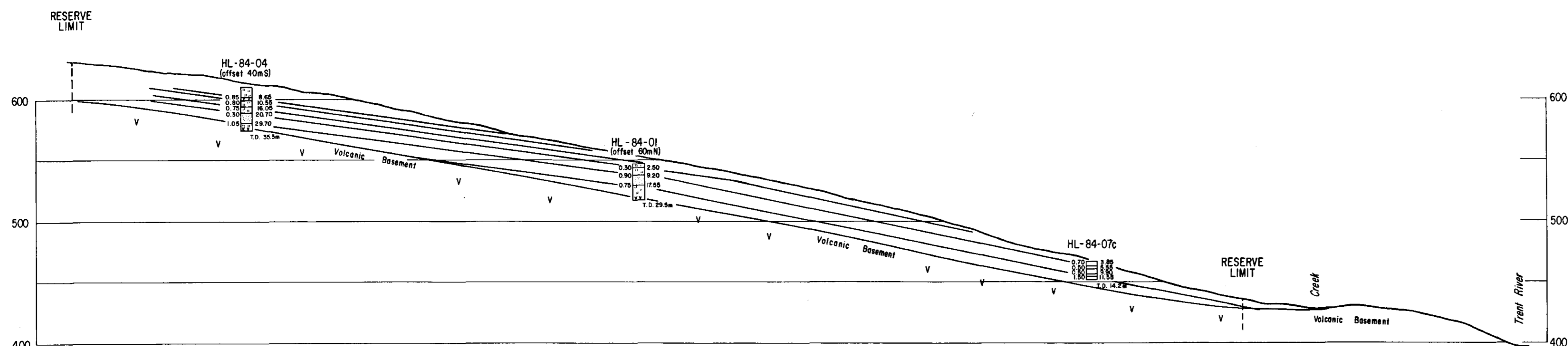
705  
 (16)



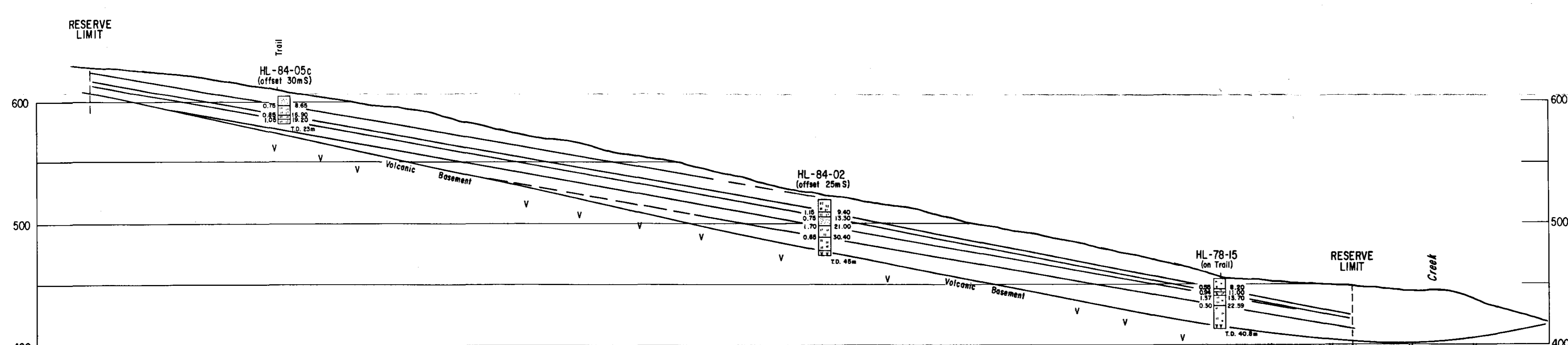
Elevation (metres above sea level)  
SECTION 17+00N



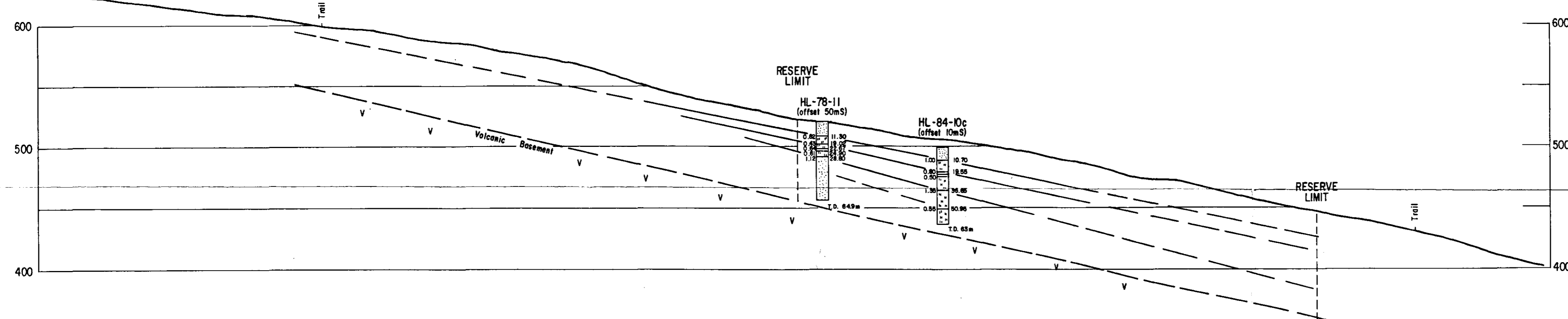
SECTION 16+00N



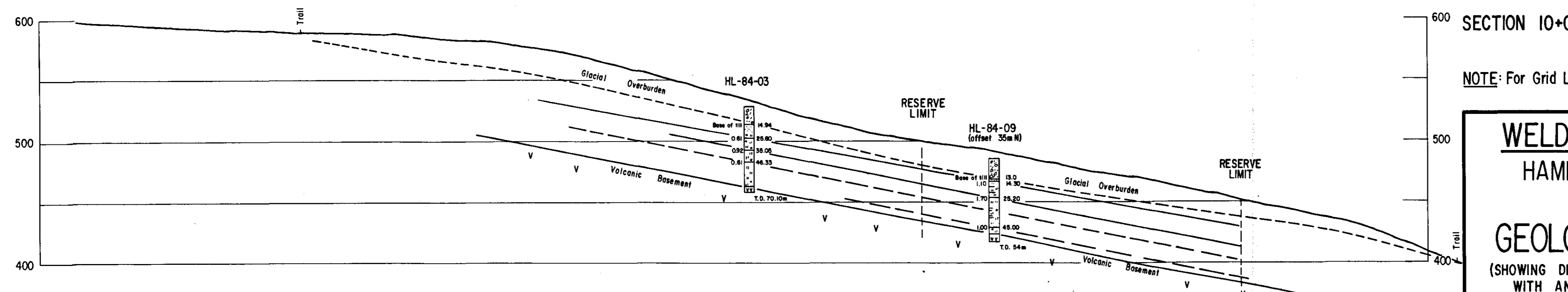
SECTION 15+00N



SECTION 14+00N



SECTION 12+00N



SECTION 10+00N

**LEGEND**  
 Trail  
 Coal Seam - 1.75  
 Thickness (metres)  
 25.20 - Depth to top of coal (metres)  
 Sandstone  
 Siltstone  
 Volcanics  
 T.D. 54m - Total Depth of Hole (metres)

NOTE: For Grid Locations, Refer to Appendix Maps  
 APPENDIX II - SECTIONS

**705**  
**M7**  
**WELWOOD OF CANADA LTD.**  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B')  
**GEOLOGIC CROSS SECTIONS**  
 (SHOWING DRILLHOLE DATA AND BOUNDARY OF COAL RESERVES  
 WITH AN APPROXIMATE 10:1 GROSS OVERBURDEN RATIO)

HORIZONTAL AND VERTICAL SCALE: 1:2500  
 DRAWN BY: S.L.GARDNER  
 DRAFTED BY: E.J.DUNN  
 CHECKED BY:  
 DATE: AUGUST 1984



HL - 84 - 01

LOCATION : 493,072 N. - 351,564 E.                      ELEVATION : 547.8 m

DATE COMPLETED : June 19, 1984

DRILLER : Drillwell Enterprises Ltd.  
          T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	2.44	2.44	Till Overburden
2.44	2.74	.30	Siltstone
2.74	3.35	.61	COAL
3.35	12.19	8.84	Siltstone
12.19	16.46	4.27	Sandstone
16.46	17.98	1.52	Siltstone
17.98	18.29	.31	COAL
18.29	26.52	8.23	Siltstone
26.52	30.18	3.66	Volcanics

CANADIAN  
ARCTIC  
SURVEY  
SYSTEMS LTD. 708 - 55 A STREET N.W. CALGARY, ALTA.

GAMMA-DENSITY & RESISTANCE

COMPANY WELWOOD OF CANADA LTD.

WELL HL-BA-01  
FIELD CUMBERLAND  
PROVINCE B.C.

705  
(71)

493,072N 351,564E  
Ltd. Sec. Twp. Rge. W.

Permanent Datum G.L. Elev. 541.8M Elev. K.B. \_\_\_\_\_  
Log measured from G.L. \_\_\_\_\_ ft. above perm. Dat. D.F. \_\_\_\_\_  
Drilling measured from G.L. \_\_\_\_\_ G.L. \_\_\_\_\_

Date	21 June 84	Time	Three
Run No.	One	Res.	Caliper
Type Log	Nuclear		
Depth - Driller	30M		
Depth - Logger	29.5M		
Bottom Logged Interval	0		
Top logged interval	Water		
Type fluid in hole	N/A		
Salinity, perm. Cl.	N/A		
Density	4.25M		
Level	N/A		
Max. rec. temp. deg. F.	N/A		
Operating rig time	1.25 hrs.		
Recorded by	S. Sawchuk		
Witnessed by	S. Sawchuk		

Field Note This Reading and Log Conforms to API RP 33

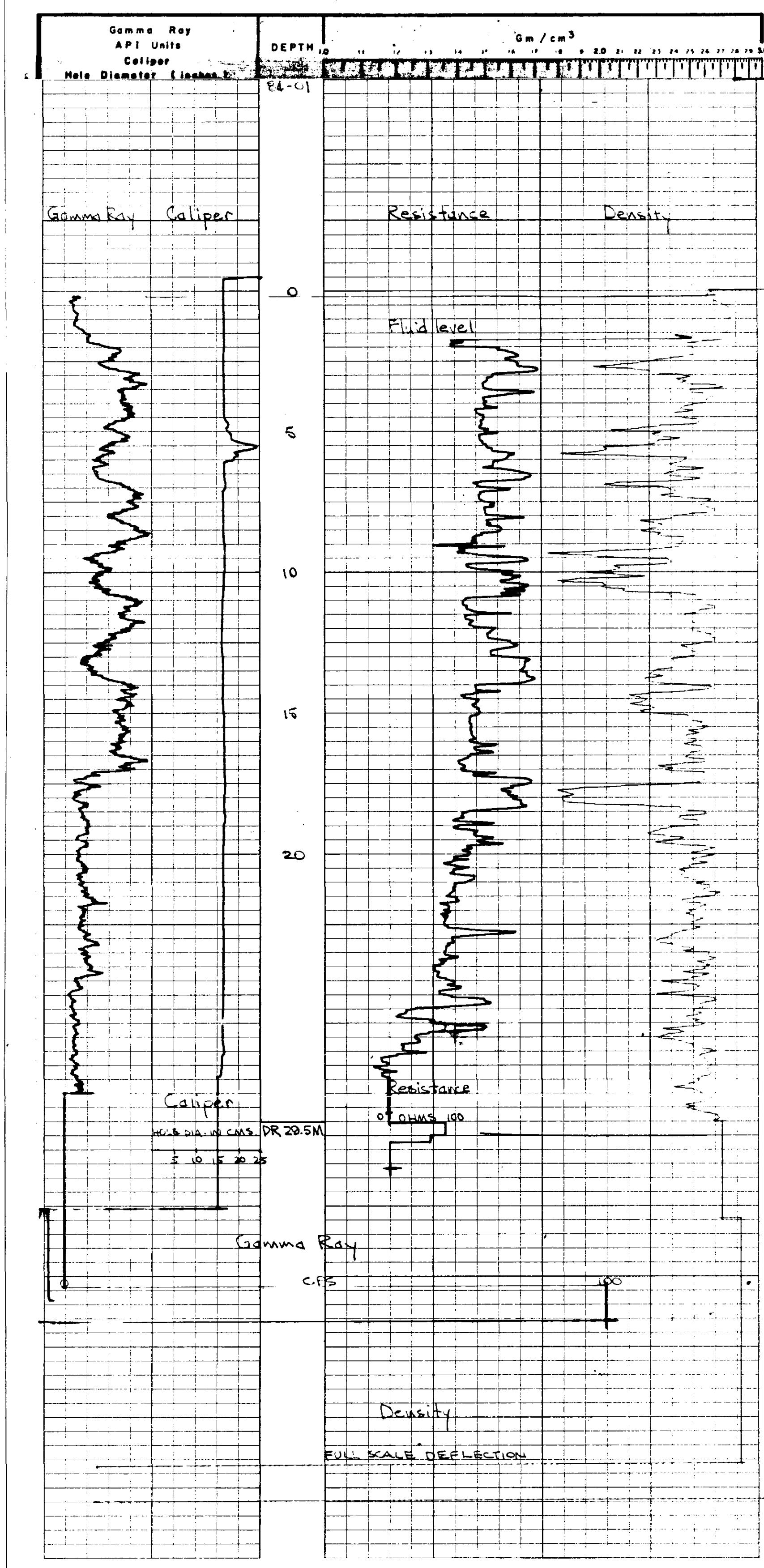
EQUIPMENT DATA									
Gamma Ray					Resistance				
Run No.	One	Run No.	Two	Density	Three	Caliper	Three		
Tool Model No.	L-10A	Tool Model No.	CP-516	CP-516	CP-516	CP-516	CP-516		
Diameter	2.6cm	Diameter	2.6cm	2.6cm	2.6cm	2.6cm	2.6cm		
Detector Model No.	CP-516	Type	MF	Spacing	3.8cm				
Type	Scint.	Length	5cm	Horiz. Scale	40 S/div.				
Length	3.8cm	Rm @ 9F	N/A	Source Model	MDVP				
General					Density				
Hoist Truck No.	4	Serial No.	687	Isotope	Am 241				
Inst. Truck No.	4	Strength	128 mC						
Location	Courtenay								

LOGGING DATA																					
General					Gamma Ray																
Run No.	1	From	22.5M	To	0	Speed	3.3	T.C. Sec.	1	Sens. Settings	100	Zero Div. L or R	IR	API G.R. Units per Log Div.		T.C. Sec.	1	Sens. Settings	IK	Zero Div. L or R	IK

Reference Literature: N/A

Remarks: Gamma curve recorded 25M shallow  
Resistance curve recorded 25M deep  
Drillwell Enterprises



HL - 84 - 02

LOCATION : 493,043 N. - 351,804 E.      ELEVATION : 519.1 m

DATE COMPLETED : June 20, 1984

DRILLER : Drillwell Enterprises Ltd.  
T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	2.13	2.13	Till
2.13	8.23	6.10	Siltstone
8.23	9.14	0.91	Sandstone
9.14	10.06	0.92	COAL
10.06	10.36	0.30	Siltstone
10.36	10.97	0.61	COAL
10.97	13.11	2.14	Siltstone
13.11	13.72	0.61	COAL
13.72	15.54	1.82	Siltstone
15.54	18.90	3.36	Sandstone
18.90	21.95	3.05	Siltstone
21.95	23.16	1.21	COAL
23.16	25.91	2.75	Sandstone
25.91	27.74	1.83	Siltstone
27.74	29.57	1.83	Sandstone
29.57	40.84	11.27	Siltstone
40.84	41.45	0.61	Sandstone
41.45	42.06	0.61	Siltstone
42.06	46.02	3.96	Volcanics

CANADIAN ARCTIC SURVEY SYSTEMS LTD. 709 - 35 A STREET N.W. CALGARY, ALTA. (22)

**GAMMA-DENSITY & RESISTANCE**

COMPANY WELDKOOD OF CANADA LTD.

WELL DRILLHOLE HL-84-02

FIELD CUMBERLAND

PROVINCE B.C.

485 048N 351 806E

**705**

PERMITS: G.L. 11. above perm. Dal.

Log measured from G.L. 11. above perm. Dal.  
 Drilling measured from G.L. 11. above perm. Dal.

Run No. 26 Slave '81  
 Date  
 Type Log One  
 Depth - Dripper 45M  
 Depth - Logger 45M  
 Bottom logged interval ASM  
 Top logged interval  
 Type fluid in hole WATER  
 Salinity, PPM Cl. N/A  
 Density N/A  
 Level 3M  
 Max. rec. temp. deg. F. N/A  
 Operating rig time 1.25 hrs.  
 Recorded by G. Samchukin  
 Witnessed by S. Sanderson

SOFT-HOLE RECORD  
 Bit From To Size Wgt. From To  
 1 15cm SACT I.D.

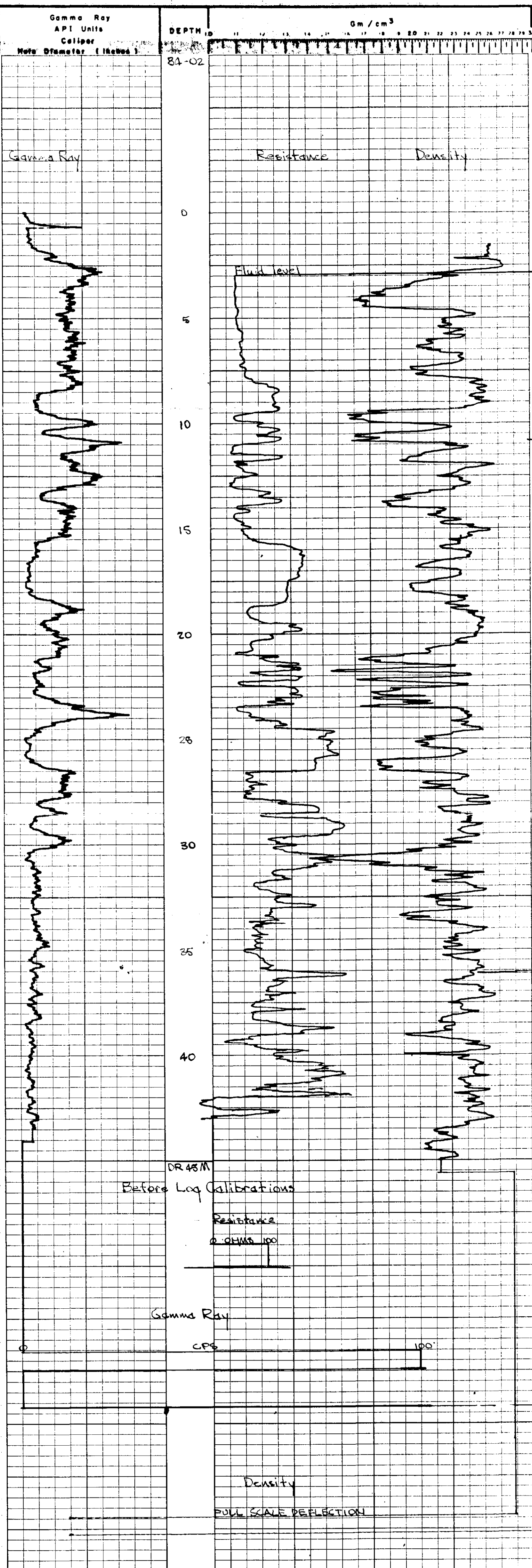
Run No.	Bit	From	To	Size	Wgt.	From	To
1	15cm SACT		I.D.				

Note here TWS Reading and Log Conforms to API WP 33

EQUIPMENT DATA							
Gamma Ray		Resistance		Density		Colliper	
Run No.	One	Run No.	Two	Run No.	One	Run No.	Three
Tool Model No.	1-10A	Tool Model No.	1-10A	Tool Model No.	1-10A	Tool Model No.	1-10A
Diameter	2.6cm	Diameter	2.6cm	Diameter	2.6cm	Diameter	2.6cm
Detector Model No.	CP-516	Type	ME	Type	F	Type	EM
Type	Selvat	Spacing		Spacing	3.8cm	Spacing	
Length	3.8cm	Length	5cm	Length		Length	
		Horiz. Scale	20R/div	Horiz. Scale		Horiz. Scale	
		Rm @ 0°	N/A	Rm @ 0°		Rm @ 0°	
Host Truck No.	1	Source Model		Source Model	MDVP	Source Model	
Inst. Truck No.	1	Serial No.		Serial No.	687	Serial No.	
Location	Cumbrandy	Isotope		Isotope	Am-241	Isotope	
		Strength		Strength	128.0c	Strength	

LOGGING DATA										
General				Gamma Ray				Density		
Run No.	Depth From	Depth To	Speed R/Min	T.C. Sec.	Sens. Settings	Zero Div. L or R	API G.R. Units per Log Div.	T.C. Sec.	Sens. Settings	Zero Div. L or R
1	45M	Surf	3.3	1	100	IR		1	IK	IL

Reference Literature: N/A  
 Remarks: Drillwell Enterprises  
 Caliper Curve: N/A



HL - 84 - 03

LOCATION : 492,735 N. - 352,016 E.

ELEVATION : 527.8 m

DATE COMPLETED : June 21, 1984

DRILLER : Drillwell Enterprises Ltd.  
T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	14.94	14.94	Till overburden
14.94	23.47	8.53	Sandstone
23.47	25.60	2.13	Silty Shale
25.60	26.21	0.61	COAL
26.21	35.05	8.84	Siltstone
35.05	35.97	0.92	COAL
35.97	36.88	0.91	Siltstone
36.88	37.00	0.12	COAL
37.00	46.33	9.33	Siltstone
46.33	46.94	0.61	COAL
46.94	49.68	2.74	Siltstone
49.68	53.34	3.66	Sandstone
53.34	61.87	8.53	Siltstone
61.87	63.40	1.53	Sandstone
63.40	64.62	1.22	Siltstone
64.62	70.10	5.48	Volcanics

HOLE BRIDGED : NO GEOPHYSICAL LOG

HL - B4 - 04

LOCATION : 492,830 N. - 351,348 E.      ELEVATION : 609.8 m

DATE COMPLETED : June 22, 1984

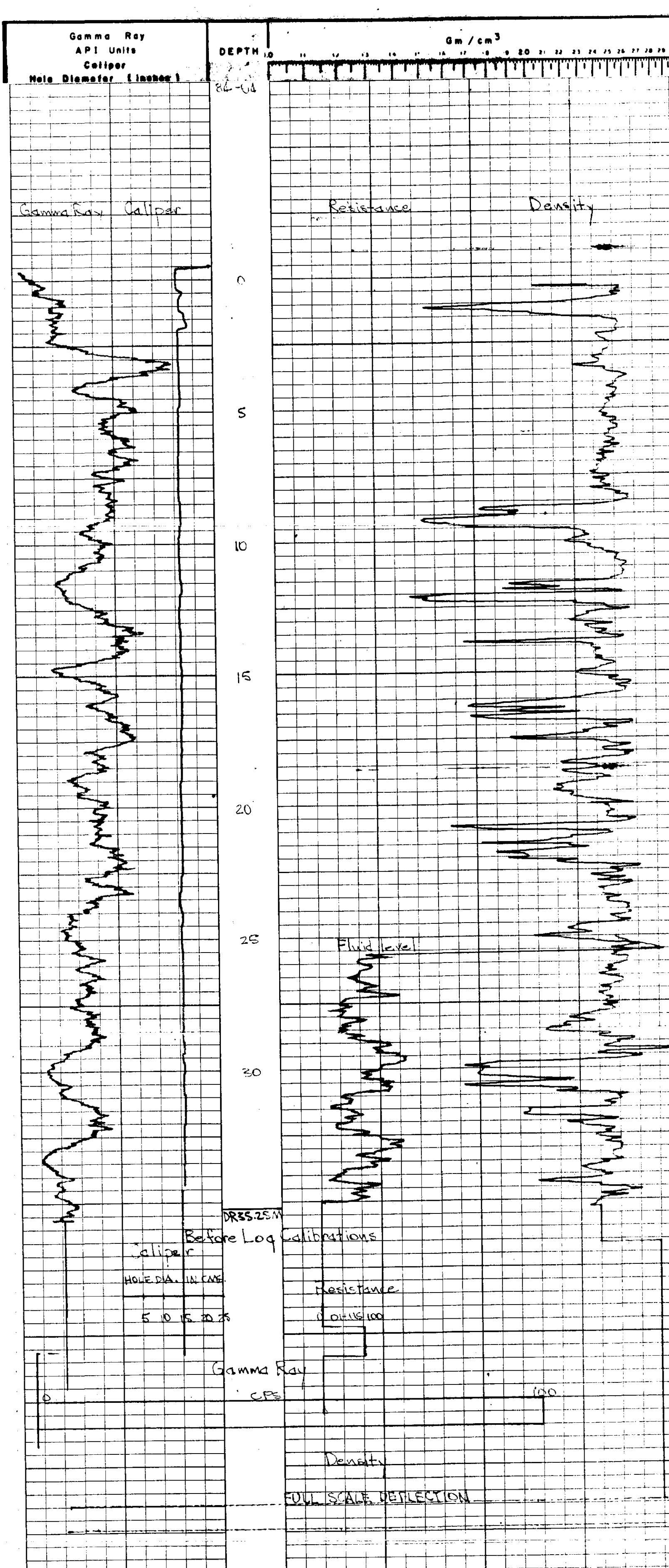
DRILLER : Drillwell Enterprises Ltd.  
T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	.91	0.91	Sandstone
.91	8.23	7.32	Silty Shale
8.23	9.14	0.91	Sandstone
9.14	9.75	0.61	COAL
9.75	11.58	1.83	Silty Shale
11.58	12.50	0.92	COAL
12.50	17.07	4.57	Silty Shale
17.07	17.15	0.08	COAL
17.15	19.50	2.35	Siltstone
19.50	19.60	0.10	COAL
19.60	26.82	7.22	Siltstone
26.82	30.18	3.36	Sandstone
30.18	31.39	1.21	COAL
31.39	32.00	0.61	Sandstone
32.00	32.10	0.10	COAL
32.10	36.58	4.48	Siltstone
36.58	37.49	0.91	Volcanics

<b>CANADIAN ARCTIC SURVEY SYSTEMS LTD.</b> 708 - 35 A STREET N.W. CALGARY, ALTA.		<b>GAMMA-DENSITY &amp; RESISTANCE</b>	
COMPANY <u>WELDMOR OF CANADA LTD.</u> WELL <u>DRILLHOLE HL-84-04</u> FIELD <u>CUMBERLAND</u> PROVINCE <u>B.C.</u> 492, BRON 351, 248E Other Services		(43)	
Permanent Datum <u>G.L.</u> Elev. <u>609.8M</u> Elev. K.B. _____ Log measured from <u>G.L.</u> "i. above perm. Dat. _____ Drilling measured from <u>G.L.</u> _____ G.L. _____	Date <u>21 June 84</u> Run No. <u>One</u> Type Log <u>Nuclear</u> Res. _____ Depth - Driller <u>37M</u> _____ Depth - Logger <u>35.25M</u> _____ Bottom logged interval <u>35.25M</u> _____ Top logged interval _____ Type fluid in hole <u>Water</u> Salinity, ppm Cl. _____ Density _____ Level _____ Max. rec. temp. deg. F. _____ Operating rig time _____ Recorded by <u>S. Schneider</u> Witnessed by _____	BORE - HOLE RECORD No. <u>1</u> BIT From <u>35.25M</u> To _____ Size _____ CASING RECORD No. _____ Size _____ WT. _____ From _____ To _____	

Field here This Reading and Log Conforms to API RP 33

EQUIPMENT DATA											
Gamma Ray						Resistance					
Run No.	One					Run No.	Two				
Tool Model No.	L-104					Tool Model No.	L-104				
Diameter	2.6cm					Diameter	2.6cm				
Detector Model No.	CP-516					Type	ME				
Type	Scint.					Spacing	3.8cm				
Length	3.8cm					Length	5cm				
General						Horiz. Scale	50g/div.				
Moist. Truck No.	4					Rm @ °F	N/A				
Inst. Truck No.	4					Source Model	HDVP				
Location	COURTENAY					Serial No.	687				
LOGGING DATA						Isotope	Am-241				
General						Strength	125 mC				
Gamma Ray			Density								
Run No.	Depth	Speed	T.C.	Sens.	Zero	API G.R. Units	T.C.	Sens.	Zero		
1	35.25M	0	3.3	1	100	R	1	1K	1L		
Reference Literature: N/A											
Remarks: Drillwell Enterprises											



HL - 84 - 05 C

LOCATION : 492,728 N. - 351,488 E.      ELEVATION : 606.2 m

DATE COMPLETED : June 22, 1984

DRILLER : Drillwell Enterprises Ltd.  
T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	7.77	7.77	Sandstone
7.77	8.66	0.89	Mudstone
8.66	9.42	0.76	COAL
9.42	16.76	7.34	Siltstone
16.76	16.98	0.22	Sandstone
16.98	17.98	0.99	COAL
17.98	19.75	1.77	Siltstone
19.75	20.82	1.07	COAL
20.82	23.11	2.29	Siltstone

REMARKS : Cored Interval - 7.77 to 23.11 metres.



## CORE DESCRIPTIONS

HOLE HL-84-05C

INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
7.77	8.52	.75	Mudstone: Medium brown; soft; thin coaly laminae throughout
8.52	8.66	.14	Mudstone: As above; highly fractured and broken; thin coal bands; abundant pyrite
8.66	8.78	.12	COAL: Completely crushed & badly mixed with thin rock bands and powdery coal material
8.78	8.99	.21	COAL: Bright and blocky; completely crushed; clean; soft; brittle; no visible pyrite
8.99	9.24	.25	COAL: Harder; relatively unbroken; Bright and blocky; some boney and dirty layers
9.24	9.29	.05	COAL: Soft; broken up; some dirty coal mixed in;
9.29	9.33	.04	BONE: sandy texture; greenish at top grading down to dark grey-black; carbonaceous at bottom;
9.33	9.39	.06	COAL: Bright and blocky; hard; fairly clean;
9.39	9.42	.03	COAL: Soft; powdery; fairly clean; mixed up;
9.42	10.77	1.35	Siltstone: Dark grey; uniform; some thin calcite veins horizontal to bedding; sandy near base;
10.77	13.88	3.11	Siltstone: Medium brown to grey muddy; fairly soft; uniform;
13.88	16.76	2.88	Siltstone: As above;
16.76	16.98	.22	Sandstone: Medium grey; medium grained; salt & pepper texture; hard; thin black wisps of coaly material;
16.98	17.22	.24	COAL: Bright and blocky; clean; some pyrite; light in weight

INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
17.22	17.32	.10	COAL: Soft; crushed; powdery; clean; visible pyrite
17.32	17.51	.19	COAL: Bright and blocky; clean; broken up;
17.51	17.83	.32	COAL: Bright and blocky; clean; unbroken; vertical calcite veining; some visible pyrite
17.83	17.93	.10	COAL: Dull; dirty; boney
17.93	17.98	.05	Shale: Dark grey to black; very thin bright coaly laminae throughout;
17.98	19.75	1.77	Siltstone: Dark grey; muddy; uniform; soft; some visible pyrite
19.75	19.88	.13	COAL: Bright and blocky; clean
19.88	19.91	.03	Mudstone: carbonaceous
19.91	20.11	.20	COAL: Bright and blocky; clean;
20.11	20.22	.11	COAL: As above;
20.22	20.24	.02	Pyrite Band
20.24	20.46	.22	COAL: Bright and blocky; clean; vertical calcite on cleats;
20.46	20.58	.12	BONE; sandy texture; coaly; dull; hard
20.58	20.76	.18	COAL: Blocky; dull; dirty
20.76	20.82	.06	Shale and coal mixed; thin interbedded bands;
20.82	23.11	2.29	Siltstone: Dark grey; soft; uniform; some thin coal laminae in places; end of core

CORE RECOVERY: 99.8 %

CANADIAN ARCTIC SURVEY SYSTEMS LTD. 708 - 35 A STREET N.W. CALGARY, ALTA.

**GAMMA-DENSITY & RESISTANCE**

COMPANY WELDKOOD OF CANADA LTD.  
 WELL DRILLHOLE HL-84-05C  
 FIELD CUMBERLAND  
 PROVINCE B.C.  
 T492128N 11511489E  
 Other Services

Permanent Datum G.L. Elev. 608.2M Elev. K.B. \_\_\_\_\_  
 Log measured from G.L. 11. above perm. Dat. D.F. \_\_\_\_\_  
 Drilling measured from G.L. O.L. \_\_\_\_\_

Date 21 June 1984  
 Run No. One Type Two  
 Type Log Nuclear Res. Three  
 Depth - Driller 23M Caliper  
 Depth - Logger 23M  
 Bottom logged interval 0  
 Top logged interval 0  
 Type fluid in hole Water  
 Salinity, PPM Cl. N/A  
 Density N/A  
 Level N/A  
 Max. rec. temp. deg. F. N/A  
 Operating rig time 1.25 hrs.  
 Recorded by S. Sander  
 Witnessed by S. Sander

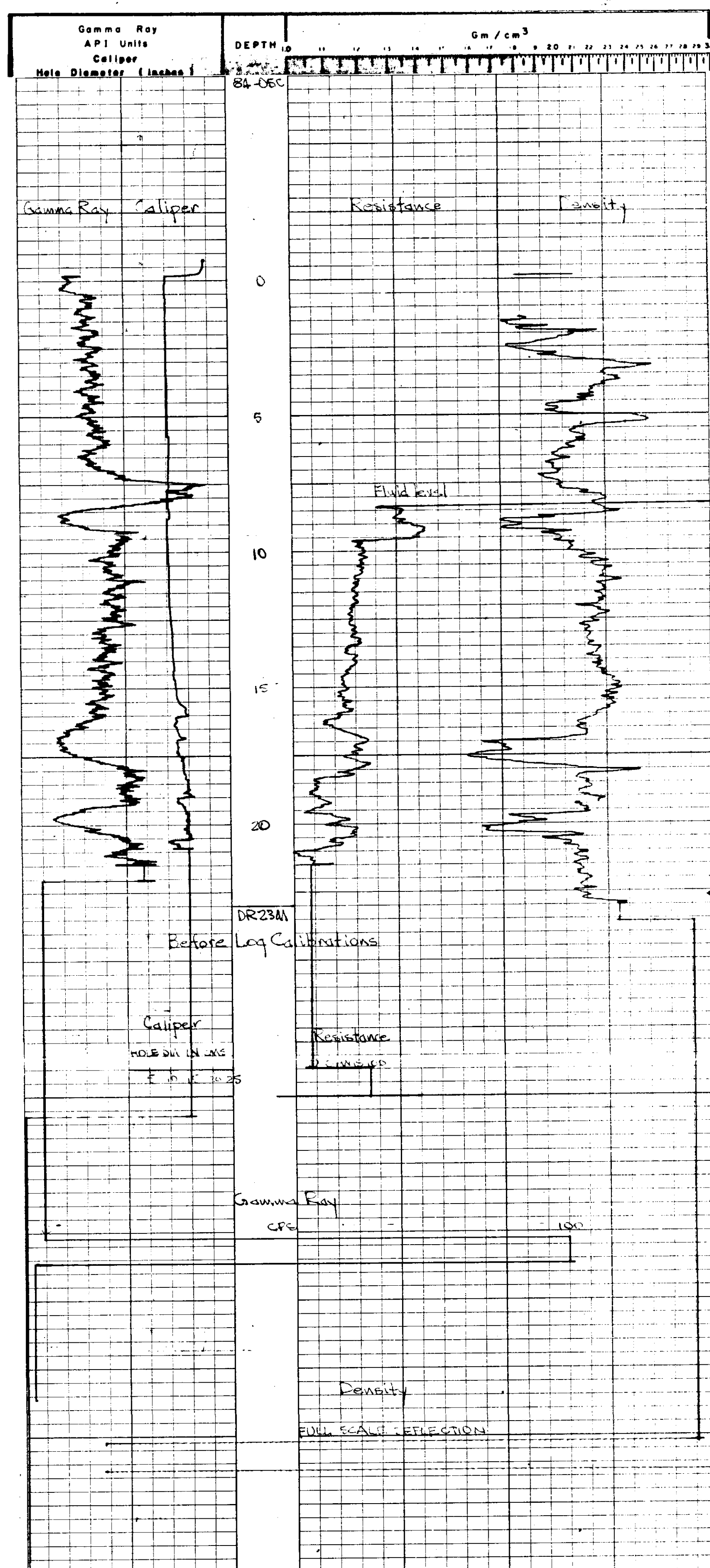
Fold Here This Heading and Log conforms to API RP 33

EQUIPMENT DATA							
Gamma Ray		Resistance		Density		Caliper	
Run No.	<u>One</u>	Run No.	<u>Two</u>				
Tool Model No.	<u>L-104</u>	Tool Model No.	<u>L-104</u>				
Diameter	<u>2.6cm</u>	Diameter	<u>2.6cm</u>				
Detector Model No.	<u>CP-516</u>	Type	<u>MF</u>				
Type	<u>Scint</u>	Spacing					
Length	<u>3.8cm</u>	Length	<u>5.1cm</u>				
General		Horiz. Scale	<u>40 g/div.</u>				
Hole Truck No.	<u>4</u>	Rm @ °F	<u>N/A</u>				
Inst. Truck No.	<u>4</u>	Source Model					
Location	<u>Courtenay</u>	Serial No.					
		Isotope					
		Strength					

LOGGING DATA									
General		Gamma Ray				Density			
Run No.	Depths	Speed	T.C.	Sens.	Zero	API G.R. Units	T.C.	Sens.	Zero
	From To	ft/min	Sec.	Settings	Div. L or R	per Log Div.	Sec.	Settings	Div. L or R
<u>1</u>	<u>23M</u> <u>0</u>	<u>3.3</u>	<u>1</u>	<u>100</u>	<u>IR</u>		<u>1</u>	<u>100</u>	<u>16</u>

Reference Literature: N/A

Remarks: Drilled Enterprises  
Caliper & Gamma curves recorded, 5M shallow.



HL - 84 - 06

LOCATION : 493,305 N. - 351,100 E.                      ELEVATION : 487.5 m

DATE COMPLETED : June 23, 1984

DRILLER : Drillwell Enterprises Ltd.  
          T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	3.05	3.05	Weathered Shale
3.05	8.23	5.18	Sandstone
8.23	12.19	3.96	Volcanics

**CANADIAN ARCTIC SURVEY SYSTEMS LTD.**  
**GAMMA-DENSITY & RESISTANCE**

708 - 35 A STREET N.W. CALGARY, ALTA.

COMPANY WELDWOOD OF CANADA LTD.

WELL DRILLHOLE HL-84-06

FIELD CUMBERLAND

PROVINCE BC

493,305 N 351100 E

Lat. Sec. Twp. Rge. W.

Permament Datum G.L. Elev. 487.5M Elev. K.B. D.F. G.L.

Log measured from G.L. ft. above perm. Dat.

Drilling measured from G.L. G.L.

Date 27 June 84

Run No. One

Type Log Nuclear

Depth - Driller 12M

Depth - Logger 11.5M

Bottom logged interval 11.5M

Top logged interval 0

Type fluid in hole Water

Salinity, ppm Cl. N/A

Density N/A

Level N/A

Mar. rec. temp. deg. F. N/A

Operating rig time 1 hr.

Recorded by G. Sandhu

Witnessed by S. Sandhu

BORE-HOLE RECORD		CASING RECORD	
Run No.	Bit From To	Size	Wgt. From To
1	15cm Surf	1.0"	

**705**

(75)

Field Here This Reading and Log Conforms to API RP 53

**EQUIPMENT DATA**

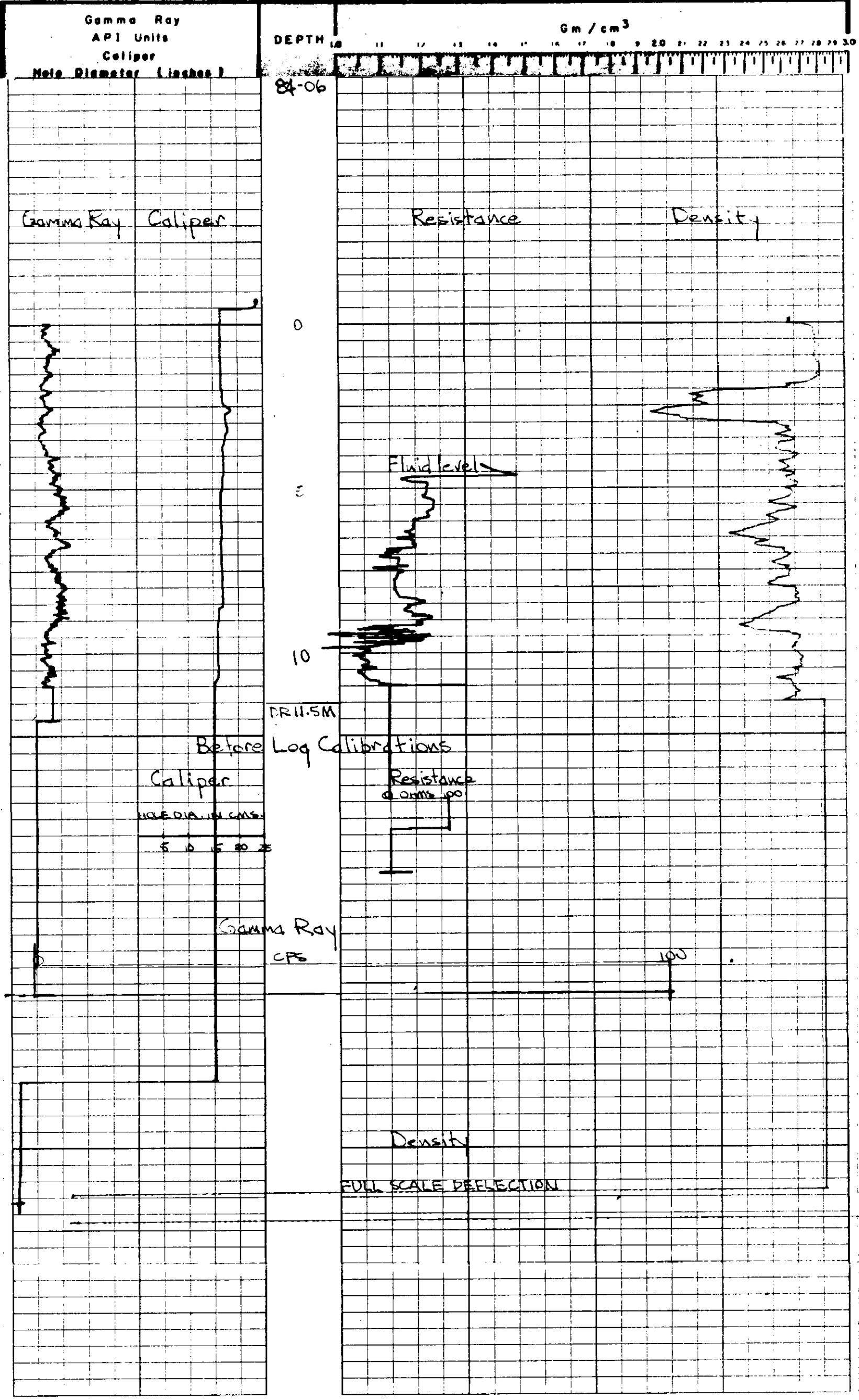
Gamma Ray				Resistance				Density				Caliper			
Run No.	One			Run No.	TWO			Run No.	One			Run No.	N/A		
Tool Model No.	L-104			Tool Model No.	L-104			Tool Model No.	L-104			Tool Model No.	L-104		
Diameter	2.6cm			Diameter	2.6cm			Diameter	2.6cm			Diameter	2.6cm		
Detector Model No.	CP-516			Type	MF			Type	F			Type	N/A		
Type	Scint.			Spacing				Spacing	3.8cm			Spacing			
Length	3.8cm			Length	5cm			Length				Length			
				Horiz. Scale	40g/div.			Horiz. Scale				Horiz. Scale			
				Rm @ °F	N/A			Rm @ °F				Rm @ °F			
General				Source Model				H D V P							
Host Truck No.	4			Serial No.				Serial No.	687			Serial No.			
Inst. Truck No.	4			Isotope				Isotope	Am-241			Isotope			
Location	Antenna			Strength				Strength	125 mC			Strength			

**LOGGING DATA**

General				Gamma Ray				Density			
Run No.	From	To	Speed	T.C. Sec.	Sens. Settings	Zero Div. L or R	API G.R. Units per Log Div.	T.C. Sec.	Sens. Settings	Zero Div. L or R	
1	11.5M	0	3.3	1	100	IR		1	16	16	

Reference Literature: N/A

Remarks: PC Well Enterprises



HL - 84 - 07

LOCATION : 493,285 N. - 351,864 E.                      ELEVATION : 465.6 m

DATE COMPLETED : June 23, 1984

DRILLER : Drillwell Enterprises Ltd.  
          T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	2.44	2.44	Weathered Shale
2.44	4.88	2.44	Shale
4.88	5.18	0.30	Sandstone
5.18	5.79	0.61	COAL
5.79	6.10	0.31	Shale
6.10	6.71	0.61	COAL
6.71	10.36	3.65	Shale
10.36	10.41	0.05	COAL
10.41	11.28	0.88	Shale
11.28	11.33	0.05	COAL
11.33	13.11	1.78	Shale
13.11	13.19	0.08	COAL
13.19	14.02	0.83	Shale
14.02	14.09	0.07	COAL
14.09	15.24	1.15	Shale
15.24	17.98	2.74	Sandstone

HL - 84 - 07 C

LOCATION : 493,285 N. - 351,867 E.                      ELEVATION : 465.6 m

DATE COMPLETED : June 23, 1984

DRILLER : Drillwell Enterprises Ltd.  
          T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	4.88	4.88	Shale
4.88	4.93	0.05	Sandstone
4.93	5.52	0.59	COAL
5.52	5.57	0.05	Claystone
5.57	5.63	0.06	COAL
5.63	6.13	0.50	Siltstone
6.13	6.66	0.53	COAL
6.66	7.09	0.43	Siltstone
7.09	7.10	0.01	COAL
7.10	7.21	0.11	Siltstone
7.21	7.22	0.01	COAL
7.22	7.60	0.38	Siltstone

REMARKS : Cored Interval - 4.88 - 7.60 metres

## HL-84-07C

INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
4.88	4.93	.05	Sandstone: Dark grey; medium grained; very hard
4.93	5.13	.20	COAL: Soft and broken; fissile; powdery; abundant pyrite
5.13	5.38	.25	COAL: bright and blocky; hard; clean unbroken; abundant pyrite;
5.38	5.52	.14	COAL: Soft; crushed and broken powdery; soft; fissile
5.52	5.57	.05	Claystone: Soft; wet; plastic; greenish-grey; coal mixed in;
5.57	5.63	.06	COAL: As above; high angle fracture on lower contact;
5.63	6.13	.50	Siltstone: Dark grey; muddy; soft; uniform; pyritic lenses
6.13	6.19	.06	COAL: Hard; dull; boney; dirty
6.19	6.33	.14	COAL: bright and blocky; cleaner; fairly hard; some shaly material in thin bands;
6.33	6.41	.08	COAL: Soft; crushed; powdery; some dirt mixed in;
6.41	6.61	.20	COAL: Hard; unbroken; clean bright and blocky
6.61	6.66	.05	COAL: bright and blocky layers with thin boney sections mixed in;
6.66	7.09	.43	Siltstone: Dark grey; muddy uniform; soft; minor coaly laminae at top;
7.09	7.10	.01	COAL: vitrinite
7.10	7.21	.11	Siltstone: As above, but with some lensoid coaly material;
7.21	7.22	.01	COAL: bright and blocky; clean
7.22	7.60	.38	Siltstone: As above with some carbonaceous material; pyritic bands throughout;
7.60	7.65	.05	Siltstone; As above;
7.65	7.75	.10	COAL: dull; dirty; fissile
7.75	7.77	.02	COAL: dull; shaley;



INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
7.77	8.18	.41	Siltstone: hard; coaly
8.18	8.28	.10	Sandstone; Medium greenish grey; fine-grained; thin coaly wisps throughout; hard; resistant;
8.28	8.39	.11	COAL: unbroken; some dull, dirty sections near base
8.39	9.84	1.45	Siltstone: dark grey to brown; muddy; uniform; one waterbearing high angle fracture;
9.84	9.86	.02	COAL: clean and bright
9.86	10.22	.36	Siltstone: As above;
10.22	10.61	.39	Mudstone: Dark brown; thin bright coal laminae throughout;
10.61	10.91	.30	COAL: bright and blocky; clean; contains hard boney lenses pyritic nodule 3 cm. in diameter
10.91	11.14	.23	Mudstone: dark grey; shaley broken; coaly at base
11.14	11.22	.08	Coal and Mudstone mixed in core tube
11.22	11.32	.10	Mudstone: Dark brown; carbonaceous; fissile
11.32	11.41	.09	Mudstone: silty; harder; carbonaceous; unbroken
11.41	11.63	.22	COAL: soft; crushed; clean and blocky
11.63	12.18	.55	Mudstone: medium grey; with dark grey bands; silty
12.18	12.24	.06	Mudstone: soft; powdery; carbonaceous and coaly
12.24	12.42	.18	COAL: bright and blocky, but dirty at top
12.42	12.80	.38	Siltstone; medium grey; muddy dark grey bands throughout
12.80	12.99	.19	COAL: bright and blocky; clean hard; unbroken
12.99	13.05	.06	COAL: dull; fissile; dirty
13.05	13.24	.19	COAL: bright and blocky; clean hard; unbroken; slightly dirty at base;
13.24	13.49	.25	Mudstone: Medium to dark brown soft; unbroken;

INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
13.49	13.76	.27	COAL: bright and blocky; clean; hard; some thin dull bands in middle; visible pyrite
13.76	14.18	.42	COAL: As above; visible pyrite clean; bright and blocky
14.18	14.25	.07	COAL: dull; platy; fissile
14.25	14.35	.10	COAL: clean; hard; abundant pyrite; bright and blocky
14.35	14.41	.06	Mudstone; dark brown to black; abundant coaly material
14.41	14.48	.07	COAL: clean; bright and blocky; some dull bands
14.48	15.30	.82	Sandstone: dark grey grading downward to light grey; fine grained grading downward to medium grained; hard and massive; thin black coaly laminae throughout;
15.30	15.86	.56	Sandstone: As above; alternating light and dark bands;

CORE RECOVERY = 98.4 %

**CANADIAN ARCTIC SURVEY SYSTEMS LTD.**  
 708 - 35 A STREET N.W. CALGARY, ALTA.

**GAMMA-DENSITY & RESISTANCE**

COMPANY **WELDMOOD & CANADA LTD.**  
 WELL **DRILLHOLE HL-84-07**  
 FIELD **CUMBERLAND**  
 PROVINCE **B.C.**  
 493,285 N 351,867 E  
 Other Services

**705**

Permanent Datum **G.L.** Elev. **\_\_\_\_\_**  
 Log measured from **G.L.** ft. above perm. Dat. **\_\_\_\_\_**  
 Drilling measured from **G.L.** Elev. **\_\_\_\_\_**  
 Date **27 June '81**

Run No.	One	Two	Three
Type Log	Nuclear	RES.	Caliper
Depth - Driller	14.25M		
Depth - Logger	14.25M		
Bottom logged interval	14.25M		
Top logged interval	0		
Type fluid in hole	Water		
Salinity, ppm Cl.	N/A		
Density	N/A		
Level	11.8M		
Max. rec. temp. deg. F.	N/A		
Operating rig time	1.0 hr		
Recorded by	G. Simons		
Witnessed by	S. Gardner		

Field Note This Heading and Log Conforms to API RP 33

**EQUIPMENT DATA**

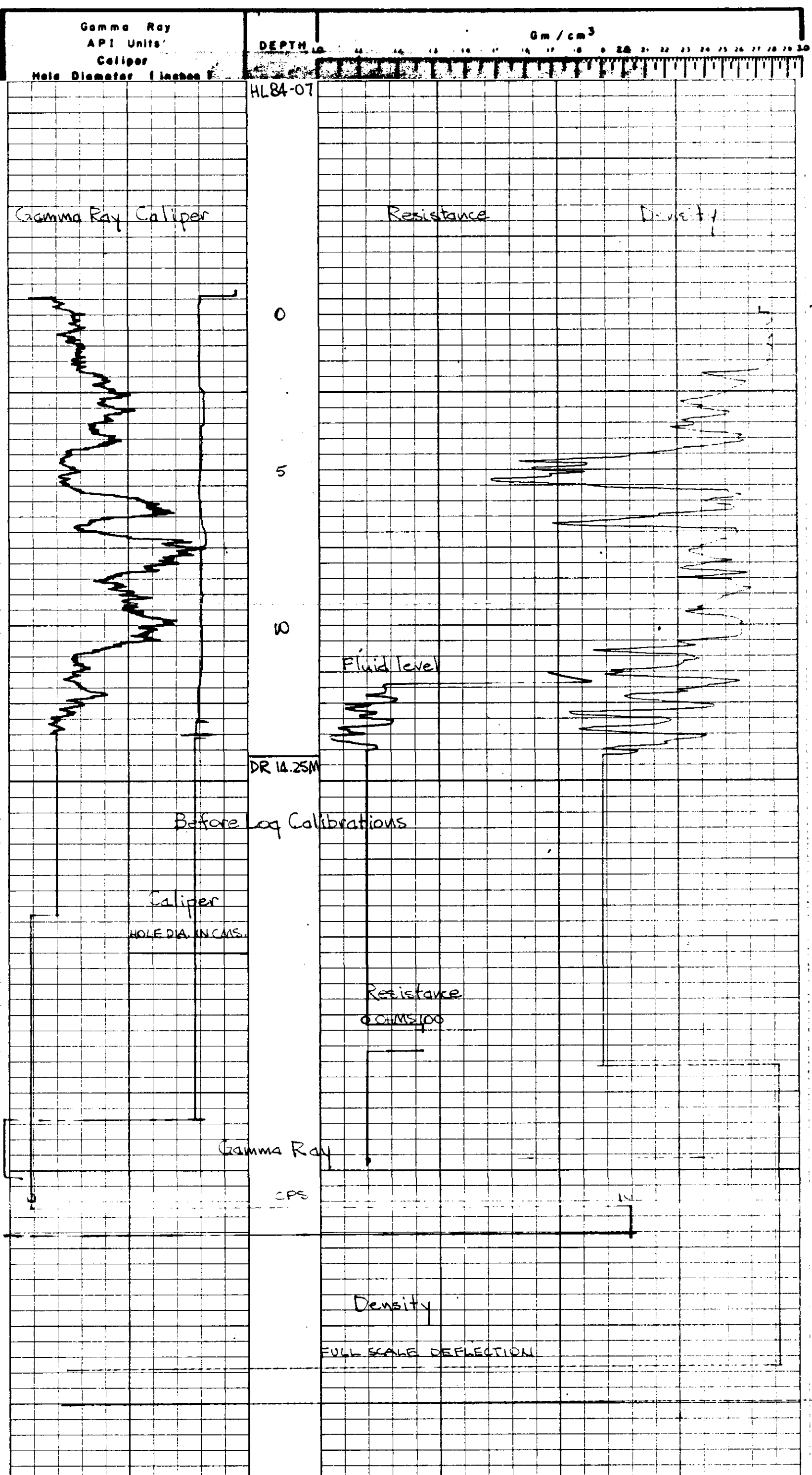
Gamma Ray		Resistance		Density		Caliper	
Run No.	One	Run No.	Two	Run No.	One	Run No.	Three
Tool Model No.	L-10A	Tool Model No.	L-10A	Tool Model No.	L-11A	Tool Model No.	L-11A
Diameter	2.6cm	Diameter	2.6cm	Diameter	2.6cm	Diameter	2.6cm
Detector Model No.	CP-516	Type	ME	Type	F	Type	F
Type	Scint.	Spacing		Spacing	2.8cm	Spacing	2.8cm
Length	3.8cm	Length	5cm	Length		Length	
		Horiz. Scale	40.5/div.	Horiz. Scale		Horiz. Scale	
		Rm @ °F	N/A	Rm @ °F		Rm @ °F	
Host Truck No.	1	Source Model		Source Model	HDVP	Source Model	
Inst. Truck No.	1	Serial No.		Serial No.	687	Serial No.	
Location	Courtenay	Isotope		Isotope	Am-137	Isotope	
		Strength		Strength	125 mC	Strength	

**LOGGING DATA**

General		Gamma Ray				Density			
Run No.	1	Speed	T.C.	Sens.	Zero	API G.R. Units	T.C.	Sens.	Zero
	14.25M	From To	Sec.	Settings	Div. L or R	per Log Div.	Sec.	Settings	Div. L or R
			1	100	IR		1	1K	1L

Reference Literature: N/A

Remarks: Drillwell Enterprises



CANADIAN ARCTIC SURVEY SYSTEMS LTD.

708 - 35 A STREET N.W. CALGARY, ALTA.

GAMMA-DENSITY & RESISTANCE

COMPANY WELDMOOD OF CANADA LTD. (L7)

WELL DRILLHOLE HL-BA-07C

FIELD CUMBERLAND

PROVINCE B.C.

495285 N 351 80 TE

705

Other Services

Permanent Datum G.L. Elev. 465.1 M. Elev. K.M.

Log measured from G.L. ft. above perm. Dat. D.F.

Drilling measured from G.L. G.L.

Date 27 June '81

Run No. One

Type Log Nuclear

Depth - Driller 1 AM

Depth - Logger 1 AM

Bottom logged interval 1 AM

Top logged interval 0

Type fluid in hole None

Salinity, ppm Cl. N/A

Density N/A

Level N/A

Max. rec. temp. deg. F. N/A

Operating rig time 1 hr.

Recorded by G. S. Seward

Witnessed by S. Seward

BORE-HOLE RECORD

CASING RECORD

No. Bit From To Size Wgt. From To

1 13cm S&W T-7

Fold Here This Heading and Log Conforms to API RP 35

EQUIPMENT DATA

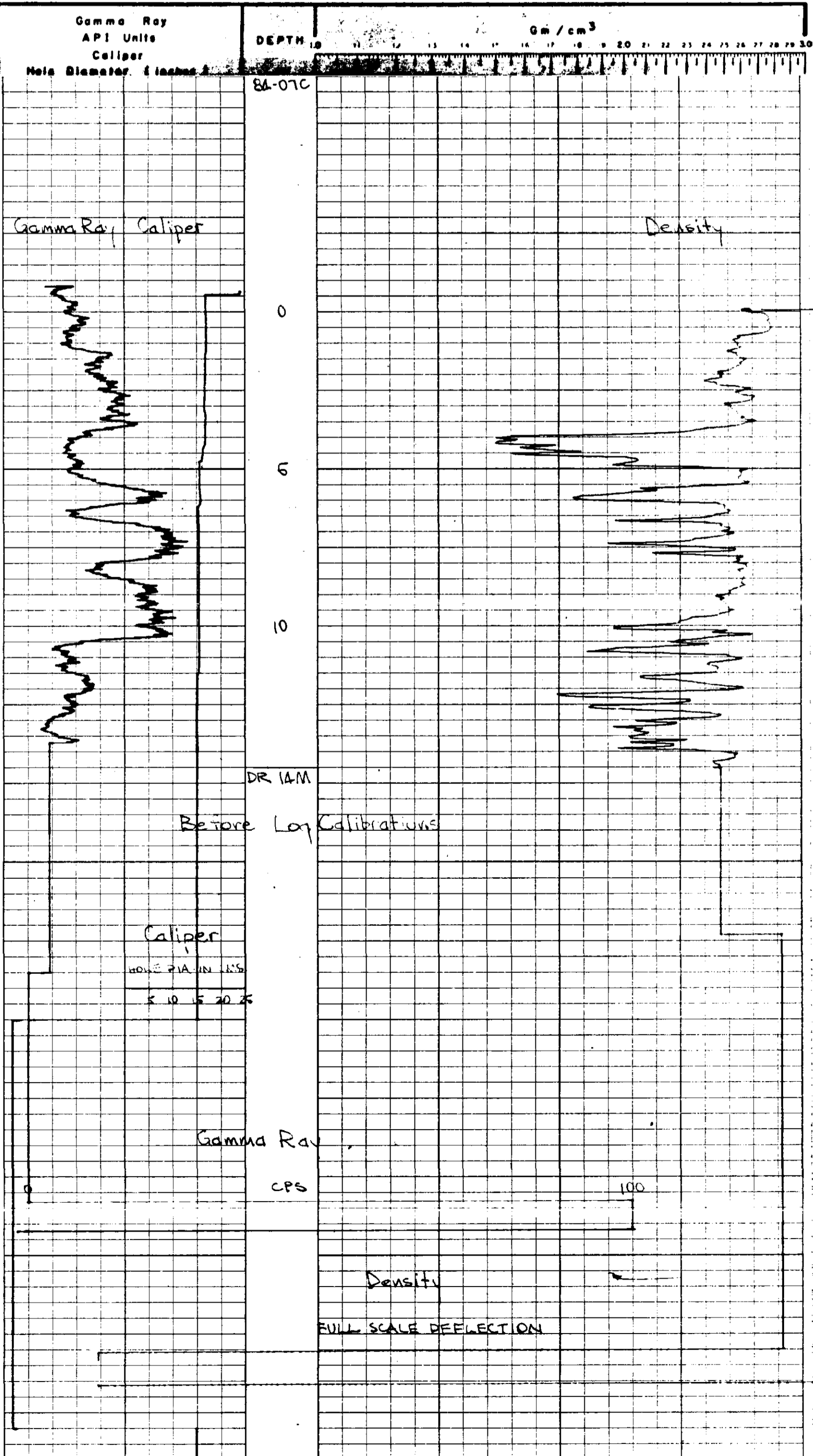
Table with columns: Run No., Tool Model No., Diameter, Detector Model No., Type, Length, Resistance, Density, Caliper, Source Model, Serial No., Isotope, Strength.

LOGGING DATA

Table with columns: Run No., Depths (From, To), Speed (RPM), T.C. (Sec.), Sens. (Settings), Zero (Div. L or R), API G.R. Units (per Log Div.), T.C. (Sec.), Sens. (Settings), Zero (Div. L or R).

Reference Literature: N/A

Remarks: Drillwell Enterprises



HL - 84 - 08

LOCATION : 493,058 N. - 351,348 E.                      ELEVATION : 565.1 m

DATE COMPLETED : June 24, 1984

DRILLER : Drillwell Enterprises Ltd.  
          T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	0.91	0.91	Till
0.91	1.52	0.61	COAL
1.52	3.05	1.53	Siltstone
3.05	5.79	2.74	Sandstone
5.79	6.40	0.61	Siltstone
6.40	7.62	1.22	Sandstone
7.62	9.14	1.52	Siltstone
9.14	9.75	0.61	COAL
9.75	11.89	2.14	Siltstone
11.89	12.19	0.30	COAL
12.19	13.72	1.53	Siltstone
13.72	20.73	7.01	Sandstone
20.73	23.16	2.43	Siltstone
23.16	24.08	0.92	Sandstone
24.08	24.69	0.61	Volcanics

**CANADIAN ARCTIC SURVEY SYSTEMS LTD.**  
**GAMMA-DENSITY & RESISTANCE**

708 - 35 A STREET N.W. CALGARY, ALTA.

COMPANY WELWOOD OF CANADA LTD.

WELL DRILLHOLE HL-84-08

FIELD CUNBERLAND

PROVINCE B.C.

45,058N 121,348E

Ltd. Sec. Tap. Rge. W.

Permanent Datum G.L. Elev. 5661 M Elev. K.R.   
 Log measured from G.L. ft. above perm. Dat.  D.F.   
 Drilling measured from G.L. G.L.

Date 26 June '84

Run No. Dive I two Three

Type Log Nuclear Res. Caliper

Depth - Driller 23M

Depth - Logger 23M

Bottom logged interval 23M

Top logged interval Water

Type fluid in hole N/A

Salinity, ppm Cl. N/A

Density N/A

Level 5.5M

Max. rec. temp. deg. F. N/A

Operating rig time 1.25 hrs.

Recorded by S. Schwab/K.J.R.

Witnessed by S. Gardner

BORE-HOLE RECORD		CASING RECORD	
Run No.	Bit From To	Size	Wt. From To
1	15m SWCT	T.O.	

Field Here This Reading and Log Conforms to API RP 35

**EQUIPMENT DATA**

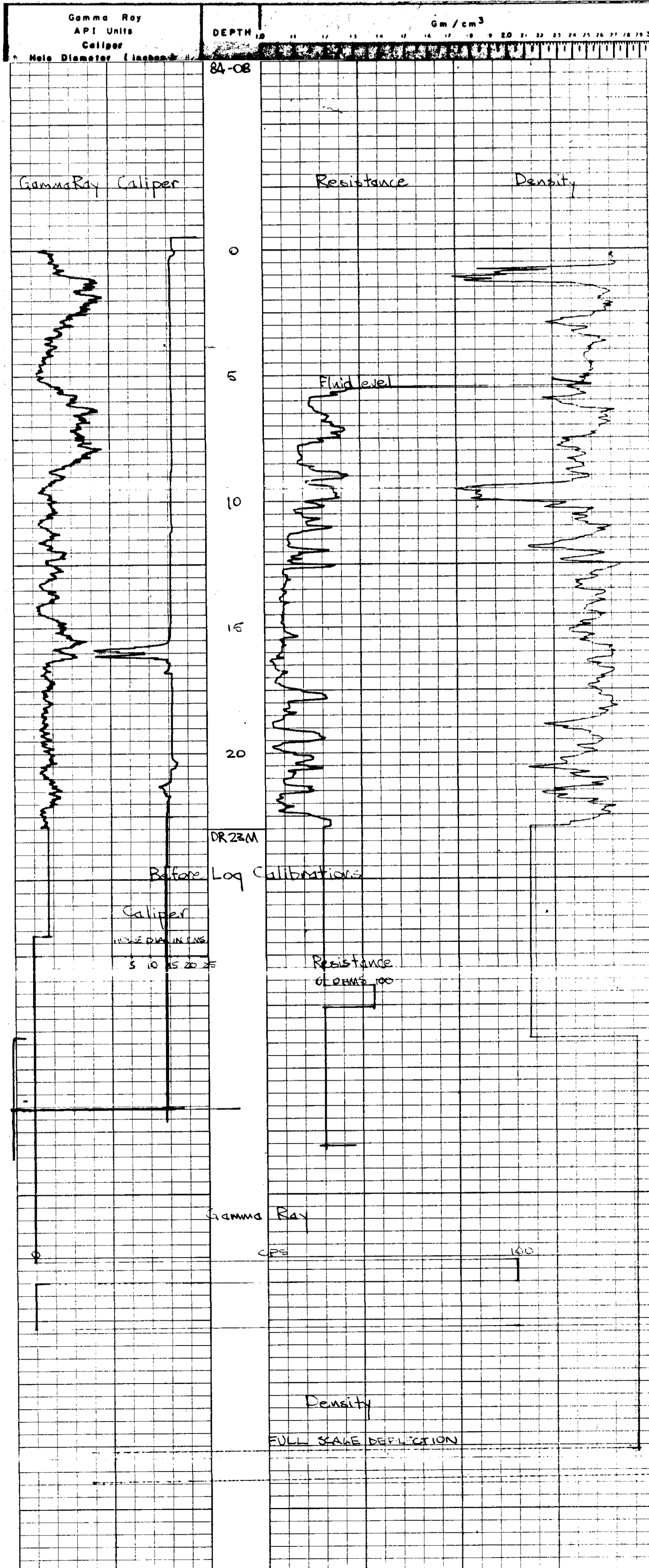
Gamma Ray				Resistance				Density				Caliper			
Run No.	<u>One</u>			Run No.	<u>Two</u>			Run No.	<u>One</u>			Run No.	<u>Three</u>		
Tool Model No.	<u>L-10A</u>			Tool Model No.	<u>L-10A</u>			Tool Model No.	<u>L-10A</u>			Tool Model No.	<u>L-10A</u>		
Diameter	<u>2.6cm</u>			Diameter	<u>2.6cm</u>			Diameter	<u>2.6cm</u>			Diameter	<u>2.6cm</u>		
Detector Model No.	<u>CF-51b</u>			Type	<u>ME</u>			Type	<u>F</u>			Type	<u>EM</u>		
Type	<u>Scint.</u>			Spacing	<u></u>			Spacing	<u>3.8cm</u>			Spacing	<u></u>		
Length	<u>3.8cm</u>			Length	<u>5cm</u>			Length	<u></u>			Length	<u></u>		
General				Horiz. Scale	<u>40.5/div.</u>			Horiz. Scale	<u>N/A</u>			Horiz. Scale	<u></u>		
Holder Truck No.	<u>4</u>			Source Model	<u></u>			Source Model	<u>H D V P</u>			Source Model	<u></u>		
Inst. Truck No.	<u>A</u>			Serial No.	<u></u>			Serial No.	<u>687</u>			Serial No.	<u></u>		
Location	<u>Courtenay</u>			Isotope	<u></u>			Isotope	<u>Am 13241</u>			Isotope	<u></u>		
				Strength	<u></u>			Strength	<u>128 mC</u>			Strength	<u></u>		

**LOGGING DATA**

Run No.	General		Gamma Ray				Density			
	From	To	Speed Ft/Min	T.C. Sec.	Sens. Settings	Zero Div. L or R	API G.R. Units per Log Div.	T.C. Sec.	Sens. Settings	Zero Div. L or R
1	23M	Surf	23M	1	100	IR		1	IK	IL

Reference Literature: N/A

Remarks: Drillwell Enterprises



HL - 84 - 09

LOCATION : 492,895 N. - 352,136 E. ELEVATION : 485.4 m

DATE COMPLETED : June 25, 1984

DRILLER : Drillwell Enterprises Ltd.  
T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	12.80	12.80	Till
12.80	14.06	1.22	Shale
14.06	14.33	0.27	COAL
14.33	15.54	1.21	Shale
15.54	16.15	0.61	COAL
16.15	22.25	6.10	Siltstone
22.25	22.56	0.31	COAL
22.56	24.08	1.52	Siltstone
24.08	24.18	0.10	COAL
24.18	24.69	0.51	Siltstone
24.69	26.21	1.52	COAL
26.21	28.04	1.83	Sandstone
28.04	28.65	0.61	Siltstone
28.65	32.00	3.35	Siltstone
32.00	33.22	1.22	COAL, w/ siltstone parting
33.22	37.49	4.27	Siltstone
37.49	37.79	0.30	COAL
37.79	39.01	1.22	Siltstone
39.01	39.62	0.61	COAL
39.62	41.76	2.14	Sandstone
41.76	44.50	2.74	Siltstone
44.50	45.11	0.61	COAL
45.11	45.72	0.61	Siltstone
45.72	46.63	0.91	COAL
46.63	49.38	2.75	Siltstone
49.38	54.25	4.87	Volcanics

**CANADIAN ARCTIC SURVEY SYSTEMS LTD.**  
 708 - 35 A STREET N.W. CALGARY, ALTA.

**GAMMA-DENSITY & RESISTANCE**

COMPANY **WELLDWOOD OF CANADA LTD.**

WELL DRILLHOLE HI-84-09

FIELD **CUMBERLAND**

PROVINCE **B.C.**

**705**

4827855 N 3522000 E

Permeant Datum **G.L.** Elev. **495.4M** Elev. R.B. \_\_\_\_\_  
 Log. measured from **G.L.** ft. above perm. Dat. \_\_\_\_\_  
 Drilling measured from **G.L.** G.L. \_\_\_\_\_

Date **21 June 84**  
 Run No. **One**  
 Type Log **Nuclear**  
 Depth - Driller **SAM**  
 Depth - Logger **SAM**  
 Bottom tagged interval **5.2M**

Top tagged interval **0**  
 Type fluid in hole **Water**  
 Specific gravity **N/A**  
 Density **N/A**

Level **Full**  
 Mer. rec. temp. deg. F **N/A**  
 Operating rig time **1:25 hrs.**  
 Recorded by **C. Sawchuk**  
 Witnessed by **S. Sandover**

BORE-HOLE RECORD		CASING RECORD	
Run No.	Bit From To	Size	Wt. From To
1	5.2M	T.D.	

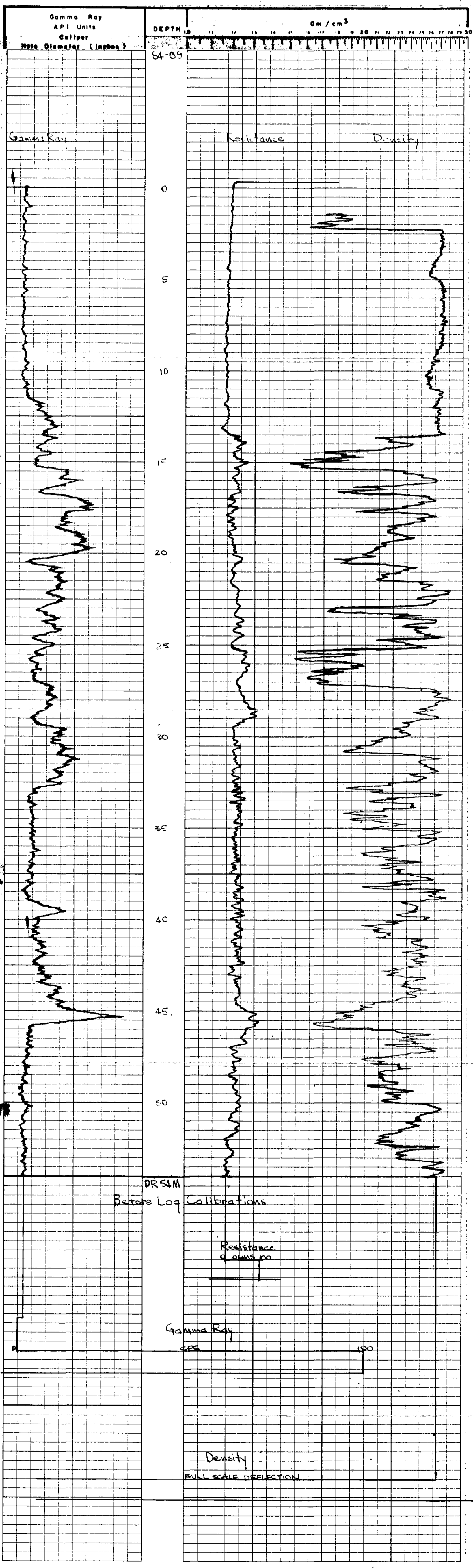
Print here

EQUIPMENT DATA							
Gamma Ray		Resistance		Density		Calliper	
Run No.	1-104	Run No.	Two				
Tool Model No.	L-104	Tool Model No.	L-104				
Diameter	2.6cm	Diameter	2.6cm				
Detector Model No.	CP-516	Type	ME				
Type	Scint.	Spacing	3.8cm				
Length	3.8cm	Length	5cm				
		Horiz. Scale	40% div.				
		Rm @ °F	N/A				
General		Source Model					
Host Truck No.	A	Serial No.					
Inst Truck No.	A	Isotope					
Location	Calgary	Strength					

LOGGING DATA					
General		Gamma Ray		Density	
Run No.	Depths From To	Speed RA/Min	T.C. Sec.	Sens. Settings	Zero Div. L or R
	5.1M	0	3.3	100	IR

Reference Literature: N/A

Remarks: Drilwell Enterprises





## HL-84-10C

INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
12.50	15.50	3.00	Siltstone; Dark grey; sandy; highly fractured at 60 degrees to horizontal;
15.50	16.83	1.33	Siltstone: As above;
16.83	17.43	.60	Siltstone; medium grey; soft and crushed;
17.43	18.10	.67	LOST CORE
18.10	18.50	.40	Siltstone; medium to dark grey; slightly harder; broken at base
18.50	18.80	.30	Siltstone; As above; shattered
18.80	19.32	.52	Sandstone: medium grey; medium grained; pyritic; coaly wisps throughout
19.32	19.42	.10	COAL: soft; shaley; dirty; pyritic
19.42	19.52	.10	Siltstone: carbonaceous; slickensided and fractured;
19.52	19.68	.16	COAL: bright and blocky; hard pyrite throughout; some fissile layers; slickensides near horizontal fractures
19.68	19.70	.02	COAL: soft; dull; shaley
19.70	20.13	.43	COAL: bright and blocky; some fissile layers; visible pyrite
20.13	20.97	.84	Siltstone: Medium to dark grey; uniform; highly pyritic
20.97	21.50	.53	LOST CORE?
21.50	21.74	.24	Siltstone: As above; pyritic layers near base
21.74	21.82	.08	COAL: Bright and blocky; with layers of vitrinite up to 1 cm
21.82	21.87	.05	COAL: Softer; shaley; dull
21.87	21.92	.05	COAL: Bright and blocky; clean; hard
21.92	21.93	.01	Mudstone: Dark brown; slightly carbonaceous; fairly hard
21.93	22.20	.27	COAL: Bright and blocky; hard, clean abundant pyrite in cleats; slightly dirty near base

INTERVAL (m)		THICKNESS (m)	DESCRIPTION
FROM	TO		
22.20	22.22	.02	PYRITE BAND: hard; boney; lensoid
22.22	23.10	.88	Mudstone: Dark grey; highly pyritic with thin, horizontal pyritic layers & pyrite sheeting on high angle fractures; slightly carbonaceous near top; broken in middle
23.10	23.29	.19	BONE COAL: Brown coal bands up to .5 cm.; interbedded with silty mudstone & boney layers; hard
23.29	23.46	.17	COAL: Bright and blocky; clean; hard; some visible pyrite
23.46	23.49	.03	Sandstone: Dark brownish grey; fine grained; very hard; coaly wisps throughout
23.49	23.60	.11	Sandstone: Medium grey; fine grained; very hard; highly pyritic at base
23.60	23.67	.07	COAL: Bright and blocky; clean becoming soft & dirty near base
23.67	24.36	.69	Mudstone: Dark grey to brown; some thin coal laminae at top; carbonaceous; thin pyritic bands throughout; thin horizontal calcite bands in middle; bottom contact is slickensided high angle fracture plane
24.36	24.43	.07	COAL: fractured parallel to high angle fracture at upper contact; could be repeat section; fissile but fairly clean;
24.43	24.50	.07	LOST CORE?
24.50	24.60	.10	COAL: Dull; fissile; dirty; shaley; broken up
24.60	24.85	.25	COAL: Soft; crushed & mixed with shale; some bright, blocky pieces
24.85	25.00	.15	Mudstone: Medium grey; soft; crushed and mixed with some coal
25.00	25.33	.33	LOST CORE ?
25.33	27.26	1.93	Siltstone; Medium grey; some soft sections;
27.26	27.40	.14	COAL: Bright and blocky; broken up; pyritic
27.40	27.50	.10	Siltstone: As above; end of core

CORE RECOVERY = 89.3 %

HL - 84 - 10 C

LOCATION : 492,976 N. - 352,000 E. ELEVATION : 499.6 m

DATE COMPLETED : June 25, 1984

DRILLER : Drillwell Enterprises Ltd.  
T. Stallybrass

DEPTH (metres)			DESCRIPTION
From	To	Thickness	
0	2.13	2.13	Till
2.13	10.36	8.23	Sandstone
10.36	10.97	0.61	Shale
10.97	11.28	0.31	COAL
11.28	12.50	1.22	Siltstone
12.50	18.80	6.30	Siltstone
18.80	19.32	0.52	Sandstone
19.32	19.42	0.10	COAL
19.42	19.52	0.10	Siltstone
19.52	20.13	0.61	COAL
20.13	21.74	1.61	Siltstone
21.74	21.92	0.18	COAL
21.92	21.93	0.01	Mudstone
21.93	22.20	0.27	COAL
22.20	22.22	0.02	Pyrite band
22.22	23.10	0.88	Mudstone
23.10	23.29	0.19	Boney Coal
23.29	23.46	0.17	COAL
23.46	23.60	0.14	Sandstone
23.60	23.67	0.07	COAL
23.67	24.36	0.69	Mudstone
24.36	24.43	0.07	COAL
24.43	24.50	0.07	Lost Core?
24.50	24.85	0.35	COAL
24.85	25.00	0.15	Mudstone
25.00	26.93	1.93	Siltstone
26.93	27.07	0.14	COAL
27.07	27.17	0.10	Siltstone
27.17	27.50	0.33	Lost Core?
27.50	29.26	1.76	Siltstone
29.26	29.87	0.61	COAL
29.87	31.09	1.22	Siltstone
31.09	35.97	4.88	Sandstone
35.97	37.19	1.22	COAL
37.19	39.62	2.43	Siltstone
39.62	39.93	0.31	COAL
39.93	48.46	8.53	Siltstone

48.46	49.38	0.92	Sandstone
49.38	53.64	4.26	Siltstone
53.64	54.00	0.36	COAL
54.00	54.56	0.56	Siltstone
54.56	54.86	0.30	COAL
54.86	56.69	1.83	Siltstone
56.69	57.00	0.31	COAL
57.00	59.74	2.74	Siltstone
59.74	63.40	3.66	Conglomerate

REMARKS : Cored Interval, 12.50 - 27.50 metres.

CANADIAN ARCTIC SURVEY SYSTEMS LTD. 708 - 35 A STREET N.W. CALGARY, ALTA.		GAMMA-DENSITY & RESISTANCE	
COMPANY WELDMOOD OF CANADA LTD. (LID)		WELL DRILLHOLE HL-84-10C	
FIELD CUMBERLAND		PROVINCE B.C.	
432,916 N 352,000 E		Other Services	
Permanent Datum G.L. _____ Elev. 499.6M		Elev. K.B. _____	
Log measured from G.L. _____ ft. above perm. Dat.		D.F. _____	
Drilling measured from G.L. _____		G.L. _____	
Date	27 June 84	Run No.	Two
Type Log	Nuclear	Depth - Driller	63M
Depth - Logger	63M	Bottom logged interval	0
Type fluid in hole	Water	Salinity, perm ct.	N/A
Density Level	N/A	Meas. rec. temp. deg. F.	N/A
Operating rig line	125 ft/s	Recorded by	S. Gaudin
Witnessed by	S. Gaudin	BORE-HOLE RECORD	
No. Bit From To		Casing Record	
1 150M 200M		Size WT. From To	

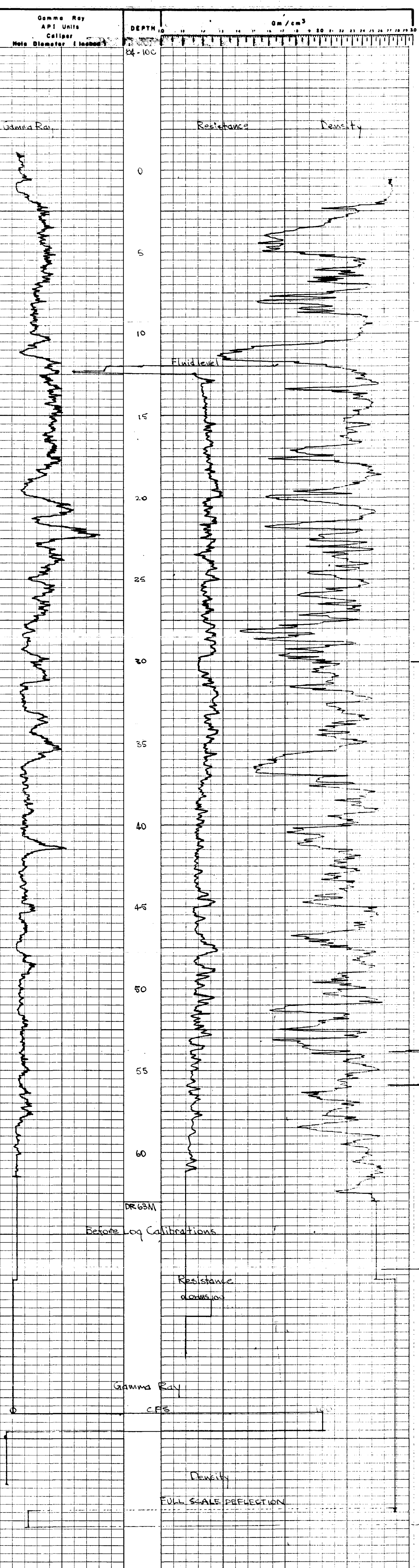
This Heading and Log Confirms to API RP 53

EQUIPMENT DATA			
Gamma Ray		Resistance	
Run No.	One	Run No.	Two
Tool Model No.	L-104	Tool Model No.	L-104
Diameter	2.6cm	Diameter	2.6cm
Detector Model No.	CP-51b	Type	ME
Type	Scint.	Specie	3.8cm
Length	3.8cm	Length	5cm
		Horiz. Scale	50g/div.
		Rm @ °F	N/A
General			
Host Truck No.	4	Source Model	HDVP
Inst. Truck No.	4	Serial No.	687
Location	CUMBERLAND	Isotope	60Co
		Strength	128 mC

LOGGING DATA					
General		Gamma Ray		Density	
Run No.	Depth	Speed	T.C.	Sens.	Zero
	From To	M/Min	Sec.	Settings	Div. L or R
1	63M 0	3.3	1	100	IR

Reference Literature: N/A

Remarks: Drillwell Enterprises  
Caliper curve N/A  
Gamma & Resistance curves recorded 5M shallow.

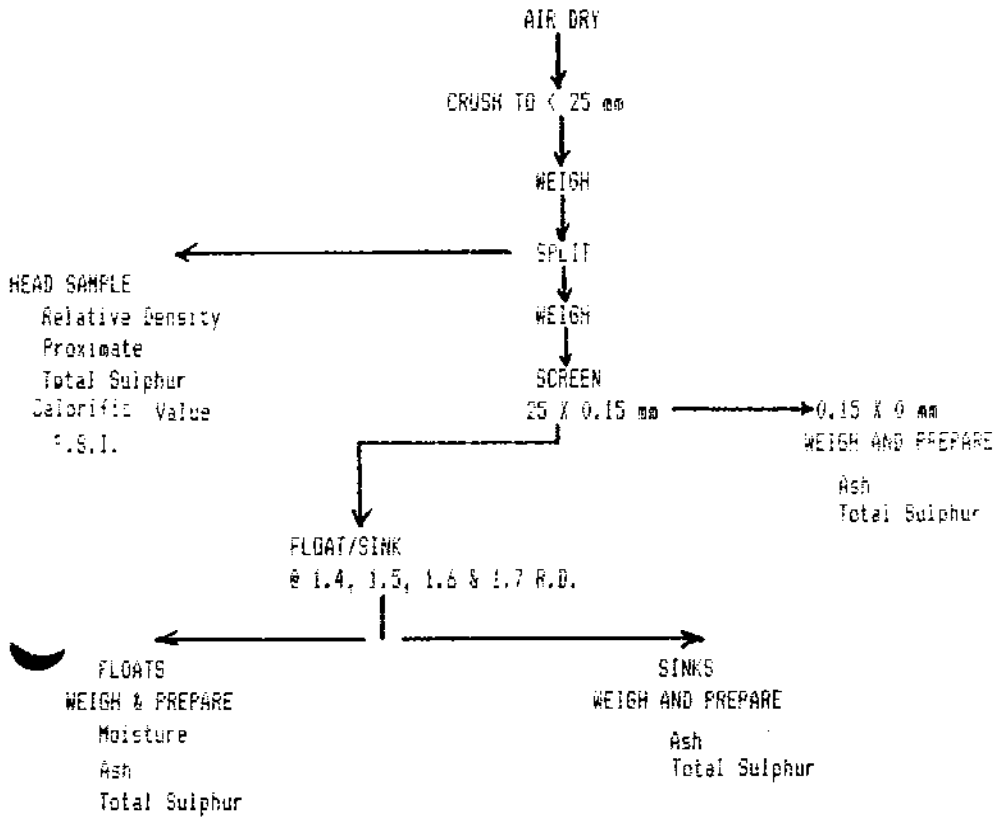


APPENDIX IV. - Appendix Figure IV. A. :

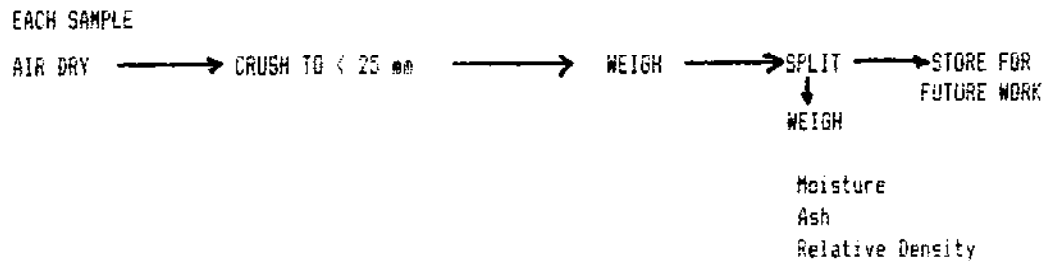
ANALYTICAL FLOWSHEET FOR HOLE HL - 84 - 05C

COAL SAMPLES 1, 3, and 5 -

EACH SAMPLE:



DILUTION SAMPLES 2, 4, and 6 -



## CORE SAMPLE INVENTORY

HOLE NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL (metres)	SAMPLE THICKNESS (metres)	SAMPLE DESCRIPTION
HL-84-05C	1	8.78 - 9.29	.51	COAL (upper)
HL-84-05C	2	9.29 - 9.42	.13	FLOOR MATERIAL
HL-84-05C	3	16.98 - 17.83	.85	COAL (middle)
HL-84-05C	4	17.83 - 17.98	.15	FLOOR MATERIAL
HL-84-05C	5	19.75 - 20.46	.71	COAL (lower)
HL-84-05C	6	20.46 - 20.82	.36	FLOOR MATERIAL
HL-84-07C	1	4.93 - 5.63	.70	COAL (upper)
HL-84-07C	2	5.63 - 6.13	.50	PARTING (upper)
HL-84-07C	3	6.13 - 6.66	.53	COAL (upper)
HL-84-07C	4	6.66 - 6.74	.08	FLOOR MATERIAL
HL-84-07C	5	10.61 - 10.91	.30	COAL (middle)
HL-84-07C	6	10.91 - 11.41	.50	SHALE (middle)
HL-84-07C	7	11.41 - 11.63	.22	COAL (middle)
HL-84-07C	8	12.80 - 13.24	.44	COAL (lower)
HL-84-07C	9	13.24 - 13.49	.25	ROCK (lower)
HL-84-07C	10	13.49 - 14.35	.86	COAL (lower)
HL-84-07C	11	14.35 - 14.48	.13	FLOOR MATERIAL
HL-84-10C	1	19.32 - 20.13	.81	COAL (middle)
HL-84-10C	2	21.74 - 22.20	.46	COAL (middle)
HL-84-10C	3	23.10 - 23.46	.36	COAL (middle)

# WELDWOOD OF CANADA LTD.

Hole Number: HL-84-05C Area: HAMILTON LAKE BLOCK 'B'  
 Location: HAMILTON LAKE BLOCK 'B' Elevation: 606.2 m.  
492,728 N. - 351,488 E. Page 1 of 4

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN Scale: 1:40				% REC
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)	
MUDSTONE Medium brown; soft; thin coaly laminae throughout.			7.50			
			8.00		.75	
MUDSTONE : As above; highly fractured & broken; more abundant thin coal bands; abundant pyrite			8.50		.14	
COAL : Completely crushed and badly mixed with thin rock bands & powdery coal material	Sample #1 8.78				.12	
COAL : Bright and blocky, but crushed; clean; soft but brittle; no visible pyrite			9.00		.21	
COAL : Harder, relatively unbroken; generally bright & blocky; fairly clean but some boney layers	Sample #1 9.29				.25	
COAL : Soft; broken up; bright w/ dirty coal mixed					.05	
BONE : Sandy texture; greenish black					.04	
COAL : Hard; bright & blocky; fairly clean	Sample #2 9.42				.06	
COAL : Soft; powdery; fairly clean; mixed up			9.50		.03	
SILTSTONE : Dark grey; massive and uniform; some very thin calcite veins parallel to bedding; becoming sandy near base.			10.00		1.35	
			10.50			



# WELDWOOD OF CANADA LTD.

Hole Number: HL-84-05C Area: HAMILTON LAKE BLOCK 'B'

Location: 492,728 N. - 351,488 E. Elevation: 606.2 m.

Page 2 of 4

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN				% RE
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)	
SILTSTONE : Medium brown to grey; muddy; Soft; Uniform; Unbroken;			11.00	" "	3.11 m	
				" "		
				" "		
			11.50	" "		
				" "		
				" "		
			12.00	" "		
				" "		
			12.50	" "		
				" "		
			13.00	" "		
			" "			
			13.50	" "		
			" "			
			14.00	" "		

# WELDWOOD OF CANADA LTD.

Hole Number: HL-84-05C Area: HAMILTON LAKE BLOCK 'B'  
 Location: 492,728 N. - 351,488 E. Elevation: 606.2 m.  
 Page 3 of 4

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN			
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)
<p>SILTSTONE : Medium brown to grey; muddy; Soft; Uniform;</p> <p>SANDSTONE : Medium grey to white; med. grained; hard; lithic; thin black wisps of coaly matter</p> <p>COAL : Clean, bright &amp; blocky; some visible pyrite</p> <p>COAL : Clean, but crushed and powdery; visible pyrite</p> <p>COAL.: Clean, bright &amp; blocky, broken up and fractured</p>			14.00	" "	
				" "	
			14.50	" "	
				" "	
			15.00	" "	
				" "	
			15.50	" "	3.10 ■
				" "	
			16.00	" "	
				" "	
			16.50	" "	
				" "	
			16.98	" "	.22 ■
			17.00	" "	.24 ■
				" "	.10 ■
	17.50	" "	.19 ■		

Sample #3

# WELDWOOD OF CANADA LTD.

Hole Number: HL-84-05C Area: HAMILTON LAKE BLOCK 'B'  
 Location: 492,728 N. - 351,488 E. Elevation: 606.2 m.  
 Page 4 of 4

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN Scale: 1:40				
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)	% REC
COAL : Bright & blocky; clean; unbroken; some visible pyrite; vertical calcite veining;	#3		17.50		.32 m	
	#4					
COAL : Dull; dirty; boney					.10 m	
SHALE : Dark grey to black; very thin bright coaly laminae throughout;	#4		17.98		.05 m	
SILTSTONE : Dark grey; muddy; soft; uniform; pyritic			18.00	"	1.77 m	
				"		
			18.50	"		
				"		
			19.00	"		
				"		
COAL : Clean; bright & blocky;	#5		19.75		.13 m	
	Sample #5		20.00			
MUDSTONE : Carbonaceous;					.03 m	
COAL : Clean; bright & blocky;					.11 m	
COAL : Clean; bright & blocky					.02 m	
PYRITE BAND : Finely disseminated pyrite in coaly matrix					.22 m	
COAL : Clean; bright & blocky;	Sample #5				.22 m	
	20.46					
COAL : Boney, sandy texture; hard; dull	Sample #6		20.50		.12 m	
COAL : Dull; dirty; blocky	Sample #6					
					.18 m	
SHALE & COAL MIXED : Thin interbedded bands;					.06 m	
	20.82					
SILTSTONE : Dark grey; soft; uniform; occasional thin coal laminae;			21.00		2.29 m	

# General Testing Laboratories

A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2

Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:  
STEPHEN L. GARDENER,  
274 Westwood Road,  
R.R. #3, Site 'S'  
Nanaimo, B.C.,  
V9R 5K3

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE: 64-21659	August 14, 1984

WE HAVE ANALYZED the herein described submitted samples of coal  
and report as follows:

MARKED: CORE SAMPLES FROM HOLE HL-84-05C

SAMPLE NO.	SAMPLE INTERVAL	THICKNESS	DESCRIPTION
1	8.78 - 9.29 metres	.51 m	COAL (upper seam)
2	9.29 - 9.42 metres	.13 m	FLOOR MATERIAL (upper seam)
3	16.98 - 17.83 metres	.85 m	COAL (middle seam)
4	17.83 - 17.98 metres	.15 m	FLOOR MATERIAL (middle seam)
5	19.75 - 20.46 metres	.71 m	COAL (lower seam)
6	20.46 - 20.82 metres	.36 m	FLOOR MATERIAL (lower seam)

Results are on following pages.

THIS COMPANY ACCEPTS NO RESPONSIBILITY EXCEPT FOR THE DUE PERFORMANCE  
OF INSPECTION AND/OR ANALYSIS IN GOOD FAITH AND ACCORDING TO THE RULES OF  
THE TRADE AND OF SCIENCE

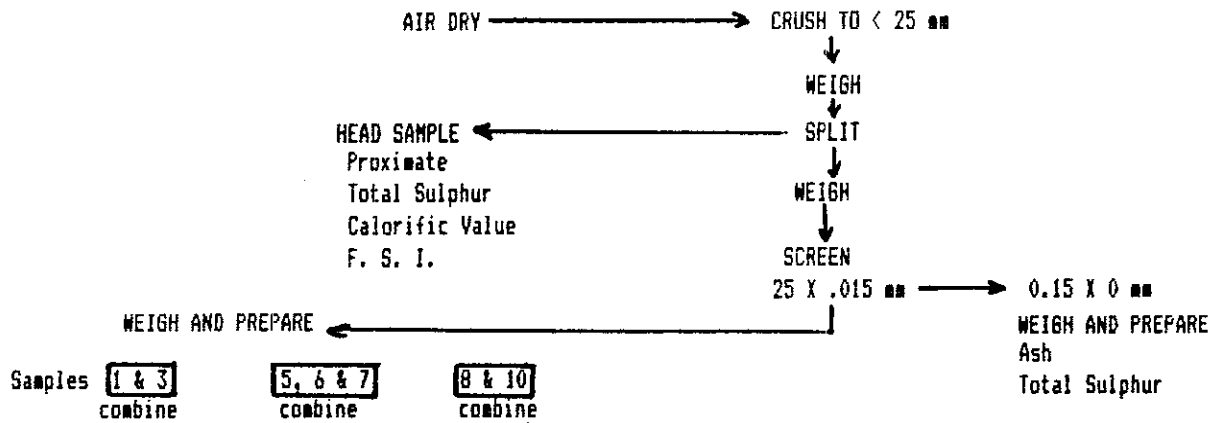
SIGNATURE AND TITLE

APPENDIX IV B. - QUALITY DATA, HOLE HL - 84 - 07C

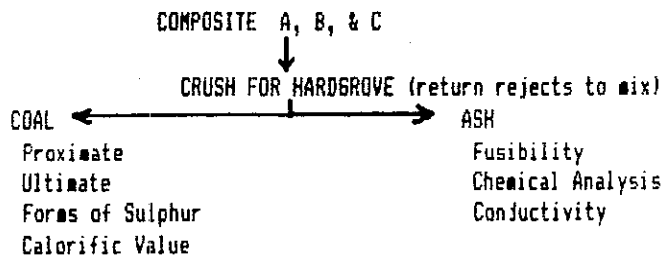
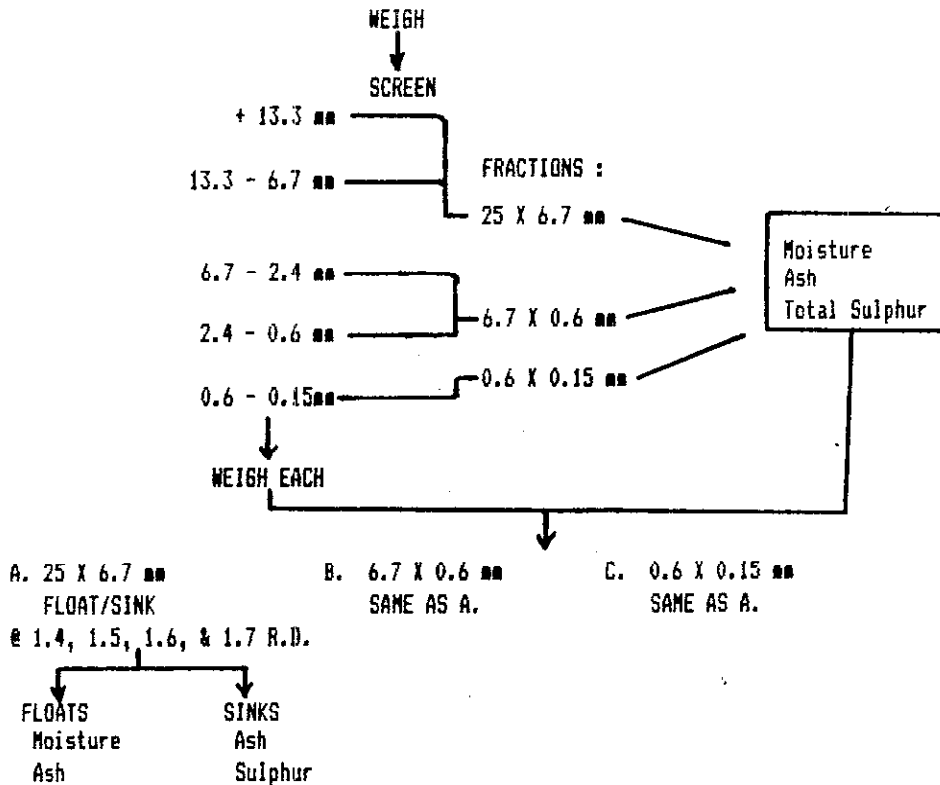
ANALYTICAL FLOWSHEET, HL-84-07C

COAL SAMPLES 1, 3, 5, 6, 7, 8, and 10

EACH SAMPLE



FOR EACH OF THE THREE COMPOSITES :


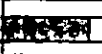




CORE SAMPLE INVENTORY

HOLE NUMBER	SAMPLE NUMBER	SAMPLE INTERVAL (metres)	SAMPLE THICKNESS (metres)	SAMPLE DESCRIPTION
HL-84-05C	1	8.78 - 9.29	.51	COAL (upper)
HL-84-05C	2	9.29 - 9.42	.13	FLOOR MATERIAL
HL-84-05C	3	16.98 - 17.83	.85	COAL (middle)
HL-84-05C	4	17.83 - 17.98	.15	FLOOR MATERIAL
HL-84-05C	5	19.75 - 20.46	.71	COAL (lower)
HL-84-05C	6	20.46 - 20.82	.36	FLOOR MATERIAL
HL-84-07C	1	4.93 - 5.63	.70	COAL (upper)
HL-84-07C	2	5.63 - 6.13	.50	PARTING (upper)
HL-84-07C	3	6.13 - 6.66	.53	COAL (upper)
HL-84-07C	4	6.66 - 6.74	.08	FLOOR MATERIAL
HL-84-07C	5	10.61 - 10.91	.30	COAL (middle)
HL-84-07C	6	10.91 - 11.41	.50	SHALE (middle)
HL-84-07C	7	11.41 - 11.63	.22	COAL (middle)
HL-84-07C	8	12.80 - 13.24	.44	COAL (lower)
HL-84-07C	9	13.24 - 13.49	.25	ROCK (lower)
HL-84-07C	10	13.49 - 14.35	.86	COAL (lower)
HL-84-07C	11	14.35 - 14.48	.13	FLOOR MATERIAL
HL-84-10C	1	19.32 - 20.13	.81	COAL (middle)
HL-84-10C	2	21.74 - 22.20	.46	COAL (middle)
HL-84-10C	3	23.10 - 23.46	.36	COAL (middle)

# WELDWOOD OF CANADA LTD.

Hole Number: HL-84-07C Area: HAMILTON LAKE BLOCK 'B'  
 Location: 493,285 N. - 351,867 E. Elevation: 465.6 m.  
 Page 1 of 3

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN Scale: 1:20				
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)	% REC.
			4.50			
Sandstone: dark grey, medium grained	4.93				.05	
COAL: soft, fissile, powdery	Sample #1		5.00		.20	
COAL: hard, bright and blocky					.25	
COAL: soft, fissile, powdery					.14	
Claystone	5.63		5.50		.05	
COAL: hard, boney, dull						.06
Siltstone: soft, uniform, muddy	Sample #2				.50	
				6.00		
COAL: dull, boney	Sample #3				.06	
COAL: hard, bright and blocky					.14	
COAL: soft, crushed, powdery					.08	
COAL: clean, bright and blocky	Sample #4		6.50		.20	
COAL: clean and dirty layers						.05
Siltstone: pyritic bands throughout; muddy, uniform	6.66					
	6.74					
					.43	
			7.00			
Thin, clean coal bands					.01	
					.11	
					.01	
Siltstone: As above					.38	
			7.50			
					.05	
COAL: dull and dirty					.10	
					.02	
Siltstone: hard, some coaly material					.41	
			8.00			

# WELDWOOD OF CANADA LTD.

Hole Number: HL-84-07C Area: HAMILTON LAKE BLOCK 'B'  
 Location: 493,285 N. - 351,867 E. Elevation: 465.6, m.  
 Page 2 of 3

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN Scale: 1:20			
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)
Sandstone: Medium grey, fine grained COAL: unbroken; dull sections at base			8.00		
					.10
					.11
Siltstone: dark grey to brown; muddy uniform			8.50	" "	
				" "	
			9.00	" "	
				" "	1.45
COAL: Thin, clean band			9.50	" "	
				" "	.02
Siltstone: As above;			10.00	" "	
				" "	.36
Mudstone: Dark brown; thin bright coal laminae throughout					.39
			10.50		
COAL: Bright and blocky; pyritic nodule 3 cm. in diameter	10.61				.30
	Sample #5				
Mudstone: dark grey; shaley			10.91		
					.23
	Sample #6		11.06		
Coal and Mudstone mixed in core tube Mudstone: carbonaceous					.08
					.19
COAL: Soft; crushed; bright and blocky	Sample #7		11.41		
	11.63		11.50		.22



# WELWOOD OF CANADA LTD.

Hole Number: HL-84-07C Area: HAMILTON LAKE

Location: 493,285 N. - 351,867 E. Elevation: 465.6 m.

Page 3 of 3

DESCRIPTION	SAMPLE INTERVAL	CORE COLUMN Scale: 1:20				
		CORE RECOVERED	DEPTH (m)	LITHOLOGY	THICKNESS (m)	% REC.
Mudstone: Medium grey, silty			12.00		.55	
Mudstone: Soft, carbonaceous					.06	
COAL: Bright and blocky, dirty at top					.18	
Siltstone: Medium grey, muddy			12.50		.38	
	12.80					
COAL: Clean, bright and blocky	Sample #8		13.00		.19	
COAL: Dull, fissile					.06	
COAL: Clean, bright and blocky, hard					.19	
	13.24					
Mudstone: Medium to dark brown, soft	Sample #9				.25	
	13.49					
COAL: Clean, bright and blocky, hard visible pyrite, some thin dull bands in middle	Sample #10		13.50		.27	
COAL: As above					.42	
			14.00			
COAL: Dull, platy, shaly bands					.07	
COAL: Clean, hard, bright and blocky, abundant pyrite					.10	
Mudstone: abundant coaly material	14.35				.06	
COAL: bright and blocky, some dull bands, broken	Sample #11				.07	
	14.48					
Sandstone: Dark grey grading downward to light grey, fine-grained grading downward to med. grained, hard, thick-bedded			14.50		.82	
			15.00			
			15.50		.56	

D. Campbell

June 29/84 ①

HORIZ DIST	HORIZ	DIFF ELEV	ELEV R.M	BEAR TO PT.	CO-ORDS
		BALANCED = 45	642.59		
170.50	0°	-20.65 - .05 (-20.70)	621.89		

79.98 245-53.50  
-1.68 + .40  
(-1.28) 641.31

641.31

72.0 131-46-00 (+1.28) 642.59  
NAIL IN HUB

622.03

-621.89

168.42 0° +20.85 - 42  
(+20.43) 642.32 231-00-00

(∴ BALANCED TP2 = 622.03)

124.65 0-00-00 96-43-40 96-44-00  
179-37-40 276-44-00  
-8.30 - 74  
(-9.04) 612.99

51  
140  
231

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June 29/84 ②

HORIZ DIST	HORIZ	DIFF ELEV	ELEV	TO PT. BEAR.	CO-ORD
			612.99		
57.38	0-00-00 204-08-00 180-00-00 24-08-20	204-08-00 204-08-20	204-08-10		
54.99	180-00-00 27-27-20 207-27-20	-8.01 + 1.16 (-6.85) -6.68 - .16 (-6.84)	606.14 606.15		

66.43 0° 606.14  
107-09-20 107-09-20 107-09-10  
180-00-20 107-09-00

287-09-20  
+2.18 + .81  
(+2.99) 609.13

64.50 0° 609.13  
187-19-40 187-19-40 187-20-00  
180-00-20 187-20-20

7-20-40  
-53 + .06  
(-52.94) 608.66

42.18 142-57-40 (+1.09) 609.75  
+ .95 + .14

ENDURO WATERPROOF No. 11 PRINTED IN U.S.A.

June 29/84 ③

HORIZ DIST	HORIZ	DIFF ELEV	ELEV R.M	TO PT. BEAR.	CO-ORD
			606.14		
44.89	0° 245-19-00 180-00-00 65-19-20	245-19-00 245-19-20	245-19-10		
59.62	222-59-20 180-00-00 42-59-20	222-59-20 222-59-20	222-59-20		
79.95	0° 188-32-00 180-00-00 8-31-40	188-32-00 188-31-40	188-31-50		
97.0	0° 153-00-00 180-00-00 333-00-00	153-00-00 153-00-00	153-00-00		
234.70	215-50-10 179-59-20 35-50-00	215-50-10 215-50-40	215-50-25		

602.13  
-5.24 + 1.23  
(-4.01) 602.13

600.05  
-2.15 + .07  
(-2.08) 600.05

598.99  
-1.98 + .92  
(-1.06) 598.99

598.99  
+ .68 + .10  
(+ .78) 599.77

599.77  
-8.45 - 1.16  
(-9.61) 590.16

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705

HI	SLOPE %	TOP P.R.	E R.R.	BOT P.R.	SLOPE DIST
1.570	TC TP#3 <sup>N</sup> <sub>E</sub>	262-03-00	0.409	0.115	58.5
41	TP#4	262-03-00	0.409	0.115	58.5
73	DH# 7	263-04-20	1.725	1.442	55.8
HL-84-05c					
1.580	TC TP#4 <sup>N</sup> <sub>E</sub>		BSTP#3 <sup>N</sup> <sub>E</sub>		
.77	TP#5	88-07-00	0.770	0.435	66.5
1.540	TC TP#5 <sup>N</sup> <sub>E</sub>		BSTP#4 <sup>N</sup> <sub>E</sub>		
.48	TP#6	269-31-30	1.480	1.155	64.5
1.530	TC TP#6 <sup>N</sup> <sub>E</sub>		TP#7 <sup>N</sup> <sub>E</sub>		
39	DH# L-84-04	88-42-20	1.388	1.178	42.2
END OF TRAVERSE					

HI	SLOPE %	TOP P.R.	E R.R.	BOT P.R.	SLOPE DIST.
1.50	TC TP#4		BSTP#2		
27	TP#7	263-20-40	0.500	0.270	45.5
1.47	TC TP#7		BSTP#4		
1.40	TP#8	267-56-10	1.700	1.403	59.7
1.52	TC TP#8 <sup>N</sup> <sub>E</sub>		BSTP#7		
.60	TP#9	91-25-00	1.000	0.600	80.0
1.52	TP#9		BSTP#8		
1.42	TP#10	270-24-10	1.900	1.415	97.0
1.56	TC TP#10		BSTP#9		
2.72	TP#11	92-03-40	3.900	2.720	235.0

HI	SLOPE %	TOP P.R.	E R.R.	BOT P.R.	SLOPE DIST.
1.22	TC TP#11		BSTP#10		
1.00	TP#12	262-47-40	1.700	1.000	140.0
1.52	TC TP#12		BSTP#11		
.48	TP#13	97-21-20	0.700	0.480	34.0
1.58	TC TP#13		BSTP#12		
1.03	TP#14	261-09-40	1.600	1.028	115.2
1.55	TC TP#14		BSTP#13		
1.70	TP#15	268-21-40	2.200	1.700	100.0
1.55	TC TP#15		BSTP#14		
2.89	TP#16	93-15-00	3.400	2.885	103.0
1.52	TC TP#16		BSTP#15		
1.13	TP#17	265-55-40	1.400	1.130	54.0

June 29/89

(4)

HORIZ DIST.	HORIZ	DIFF ELEV	ELEV	TO PT BEAR	CO-ORD
✓ 00			590.16		
137.80	162-43-40 180° 342-44-20	162-43-40 162-44-00 162-44-20	✓ 162-44-00	jc L intersection	
		-17.42 +.22 (-17.20)	572.96		
✓ 33.44	0-00-00 125-16-20 180° 305-16-40	125-16-20 125-16-40 125-16-30			
		-4.32 + 1.04 (-3.28)	569.68		
112.48	✓ 00 156-48-00 180° 336-48-00	156-48 156-49	569.68	e Int.	
		-17.49 + .55 (-16.94)	552.74		
✓ 99.92	00 139-15-00 180-00-10 319-15-00	139-15-00 139-14-55 139-14-50			
		-2.86 - .15 (-3.01)	549.73		
102.67	✓ 00 162-21-20 179-59-20 342-21-40	162-21-20 162-21-50 162-22-20			
		-5.83 - 1.34 (-7.17)	542.56		
53.73	00 179-29-40 180-00-10 359-29-40	179-29-40 179-29-30 179-29-35			
		-3.83 + .39 (-3.44)	539.12		

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June 29/89

(5)

HORIZ DIST.	HORIZ	DIFF ELEV	ELEV	TO PT BEAR	CO-ORD
✓ 00			539.12		
138.55	164-00-40 180° 344-00-40	164-00-40 164-00-40			
		-14.19 - .36 (-14.55)	524.57		
115.83	180° 343-34-00 (163-34 00)	-11.65 + .33 (-11.32)	527.80		
113.71	00 172-16-50 180° 352-17-20	172-16-50 172-17-20 172-17-05			
		-9.45 + .62 (-8.83)	515.74		
27.85	209-25-20	-2.06 - .04 (-2.10)	513.64	Int of rds	
82.43	00 214-40-40 180° 34-40-20	214-40-40 214-40-30 214-40-20			
		-6.85 + .43 (-6.42)	509.32		
60.18	0-00-00 209-40-10 180-00-10 29-40-10	209-40-05 209-40-05			
		-10.46 + .64 (-9.82)	499.50		

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June 29/84

(6)

HORIZ DIST.	HORIZ	DIFF ELEV	ELEV	TO PT BEAR	CO-ORD
00			499.50		
6.2	324-21-20	7.01 + .11 (+7.12)	499.62		
164.80	268-48-00	-14.05 - .05 (-14.10)	485.40		
68.50	00 86-36-30 180° 266-37-00	86-36-30 86-37-00 86-36-45			
		+3.73 + .85 (+4.58)	504.08		

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HI	SLOPE %	TOP R.R.	C.R.R.	BOT. R.R.	SLOPE DIST.	
1.54	1.2	TP#17	BS TP#16			
1.90	TP#18	95-50-50	2.600	1.900	70 X 2 = 140.0	
1.21	DL-395-44-40	1.800	1.210	0.630	117.0	
1.56	TP#19	94-45-00	1.500	0.935	0.355	114.5
1.52	TP#19	94-13-30	1.700	1.560	1.420	28.0
1.09	TP#20	265-15-00	1.500	1.088	0.670	83.0
1.530	TP#20			BS TP#19		
.89	TP#21	260-08-20	1.200	0.890	0.580	62.0

HI	SLOPE %	TOP R.R.	C.R.R.	BOT. R.R.	SLOPE DIST.	
1.51	TP#21		BS TP#20			
1.40	DL-42	270-03-40	1.400	1.368	1.338	6.2
1.56	DL-2	265-07-40	2.400	1.562	0.740	166.0
.66	TP#22	86-53-10	1.000	0.660	0.313	68.7

HI	SLOPE %	SLOPE DIST	HORIZ DIST	DIFF ELEV	ELEV	
1.51	TP#22		BS TP#21		504.08	
1.32	TP#23	82-51-50	63.78	63.28 (+8.11)	512.19	
1.46	TP#23		BS TP#22		512.19	
1.32	TP#24	84-20-00	157.66	156.89 (+16.71)	528.90	
1.23	DL-1	85-11-40	80.31	80.03 (+6.73 + .13)	519.05	
1.44	TP#24		BS TP#23		528.90	
1.25	83-01-40	111.82	110.98 (+13.57 + 1.19)	(+13.76)	542.66	
1.66	TP#25	83-24-30	153.55	152.87 (+17.63 + 2.22)	(+17.41)	546.31
1.52	TP#25		BS TP#24		546.31	
1.25	DL-2	86-29-40	20.21	20.16 (+1.24 + 1.27)	(+1.51)	547.82
1.25	TP#26	85-34-00	47.61	47.47 (+3.68 + .27)	(+3.95)	550.26

D. Campbell

OVERCAST  
June 30/84 (7)

HORIZ. & REMARKS TOP PT BEAR CD-ORD

0°  
147-48-45 147-48-45  
179-59-40  
327-48-30 147-48-50 147-48-47

0°  
196-28-00 ✓  
180° 196-28-15  
16-28-30

195-53-00

162-40-10 COAL OUTCROP

0°  
162-05-10 162-05-10  
179-59-50  
342-05-20 162-05-30 162-05-20

211-43-05

0°  
193-06-20  
180° 193-06-30  
13-06-40

ENDURO  
WATERPROOF No. 11  
PRINTED IN U.S.A.

Light RAIN

June 30/84 (8)

HORIZ. & REMARKS TOP PT BEAR CO-ORDS

0°  
165-28-30 11 165-28-31  
180-00-03  
345-28-35 165-28-32

153-46-10

0°  
179-01-10 179-01-10  
179-59-55 179-01-27  
359-01-40 179-01-45

0°  
208-13-10 208-13-10  
180° 208-13-25  
28-13-40 208-13-40

0°  
187-29-00 187-29-00  
179-59-30 187-29-15  
7-29-00 187-29-30

0°  
146-31-30 145-31-30  
179-59-30 145-32-00  
325-32-00 145-32-30

ENDURO  
WATERPROOF No. 11  
PRINTED IN U.S.A.

RAINING

June 30/84 (9)

HORIZ. & REMARKS TOP PT BEAR CO-ORD

0°  
158-13-10 158-13-10  
180° 158-13-20  
338-13-30 158-13-30

0°  
241-53-00 241-53-00  
179-59-45 241-53-18  
61-53-20 241-53-35

0°  
172-50-40 172-50-40  
180° 172-50-35  
352-50-30 172-50-30

0°  
215-49-20 215-49-20  
180° 215-49-10  
35-49-00 215-49-00

0°  
253-03-20 253-03-20  
180-00-08 253-03-21  
73-03-30 253-03-22

ENDURO  
WATERPROOF No. 11  
PRINTED IN U.S.A.

HI	SLOPE %	SLOPE DIST	HORIZ DIST	DIFF ELEV	ELEV
1.46	TC TP#26		BS TP#25		550.26
1.36	TP27	85-18-50	174.28	173.71 (+14.24+10)	564.60
1.47	TC TP#27		BS TP#26		564.60
1.25	TP#26	88-54-40	11.36	11.36 (+2.22+2.25)	565.07
	HL-84-08				
1.25	TP28	97-35-00	55.73	55.69 (+2.35+2.27)	567.17
1.48	TC TP#28		BS TP#27		567.17
1.25	TP29	268-42-30	42.81	42.80 (-.97+2.3)	566.43
1.51	TC TP29		BS TP#28		566.43
1.25	TP30	91-27-40	50.92	50.80 (-1.30+2.6)	565.39
1.52	TC TP30		BS TP29		565.39
1.25	TP31	274-24-20	34.45	34.36 (+2.65+2.27)	568.31
				(+2.92)	

HI	SLOPE %	SLOPE DIST	HORIZ DIST	DIFF ELEV	ELEV
1.45	TC TP#31		BS TP30		568.31
1.25	TP32	88-24-40	31.78	31.77 (+1.88+2.0)	569.39
1.56	TC TP32		BS TP31		569.39
1.25	TP33	94-54-30	83.60	83.28 (-7.15+3.1)	562.55
1.53	TC TP#33		BS TP#32		562.55
1.25	TP34	95-16-00	93.33	92.93 (-8.57+2.8)	554.26
1.57	TC TP#34		BS TP#33		554.26
1.25	TP35	93-41-30	30.83	30.79 (-1.99+3.2)	552.59
1.54	TC TP#35		BS 34		552.59
1.25	36	47-05-00	110.58	109.74 (-13.64+2.9)	539.24
				(-13.35)	

HI	SLOPE %	SLOPE DIST	HORIZ DIST	DIFF ELEV	ELEV
1.52	TC TP36		BS TP35		539.24
1.25	TP36	37-94-23-50	48.64	48.50 (-3.73+2.7)	535.78
1.52	TP 37		BS TP36		535.78
1.25	TP38	95-27-40	155.00	154.31 (-14.25+2.7)	521.30
1.51	TP38		BS TP37		521.30
1.25	TP39	97-25-50	70.93	70.33 (-9.17+2.6)	512.39
1.60	TC TP39		BS TP38		512.39
1.25	TP40	95-55-00	263.58	262.18 (-27.17+3.5)	485.57
1.54	TC TP40		BS TP39		485.57
1.25	TP41	85-42-40	21.47	21.40 (+1.67+2.9)	487.47
	HL-84-00			(+1.90)	
1.25	TP41	94-46-30	59.79	59.59 (-4.98+2.9)	480.88
				(-4.69)	

HORIZ  $\times$

TO PT BEAR CO-ORD <sup>June 30/84</sup> (11)

26-33-40

COAL seam

00  
195-03-00  
180°  
15-03-18 195-03-09

168-39-40

HL-84-07c  
BH

HL-84-07 3 m beyond

ENDURO  
WATERPROOF No 11  
PRINTED IN U.S.A.

DH TRAV. HAMILTON LAKE

HI	SLOPE	TOP R.R.	& R.R.	EST. RR	SLOPE DIST
1.490	KE TP#1	N 10,000.00 E 10,000.00	35 TP#2	N E	
1.54	TP#2	96-54-20	2.400	1.540	0.670 173.0
1.09	TP#1	91-12-20	1.500	1.090	0.700 80.0
1.560	KE T/A			BS TP#1	
.74	89-37-50	1.100	0.740	0.380	...
1.530	KE TP#2	N E		BS TP#1	
1.95	TP#1	277-03-202.800	1.952	1.090	171.0
2.27	TP#3	266-11-20	2.900	2.274	1.648 125.2

DH LOCATIONS

DH	LOCATION	ELEV
HL-84-01	N 493,072.00 E 351,564.00	547.8
HL-84-02	N 493,043.00 E 351,804.00	519.1
HL-84-03	N 492,735.00 E 352,016.00	527.8
HL-84-04	N 492,830.00 E 351,348.00	609.8
HL-84-05C	N 492,728.00 E 351,488.00	606.2
HL-84-06	N 493,305.00 E 351,100.00	487.5
HL-84-07	N 493,285.00 E 351,864.00	465.6
HL-84-07c	N 493,285.00 E 351,867.00	465.6
HL-84-08	N 493,058.00 E 351,348.00	565.1
HL-84-09	N 492,895.00 E 352,136.00	485.4
HL-84-10C	N 492,976.00 E 352,000.00	499.6
COAL outcrop	N 493,065.00 E 351,622.00	542.7
COAL SEAM	N 493,279.00 E 351,806.00	495.3



Rain

JUNE 30/84 (10)

HORIZ. & REMARKS TO PT BEAR.

CO-ORD

HL 84-06 DH9

HL 84-07 (10)

JUN 25 4184-07C Parking lot

(402114)

642,590

00  
 200-55-00 200-55-00  
 180-00-10 200-55-15  
 20-55-40 200-55-30

00  
 204-04-50 204-04-50  
 180-04-50 204-04-50  
 24-04-50 204-04-50

00  
 167-58-10  
 179-59-50  
 347-59-00 167-59-10

00  
 187-52-10  
 180-00-10 187-52-25  
 7-52-40

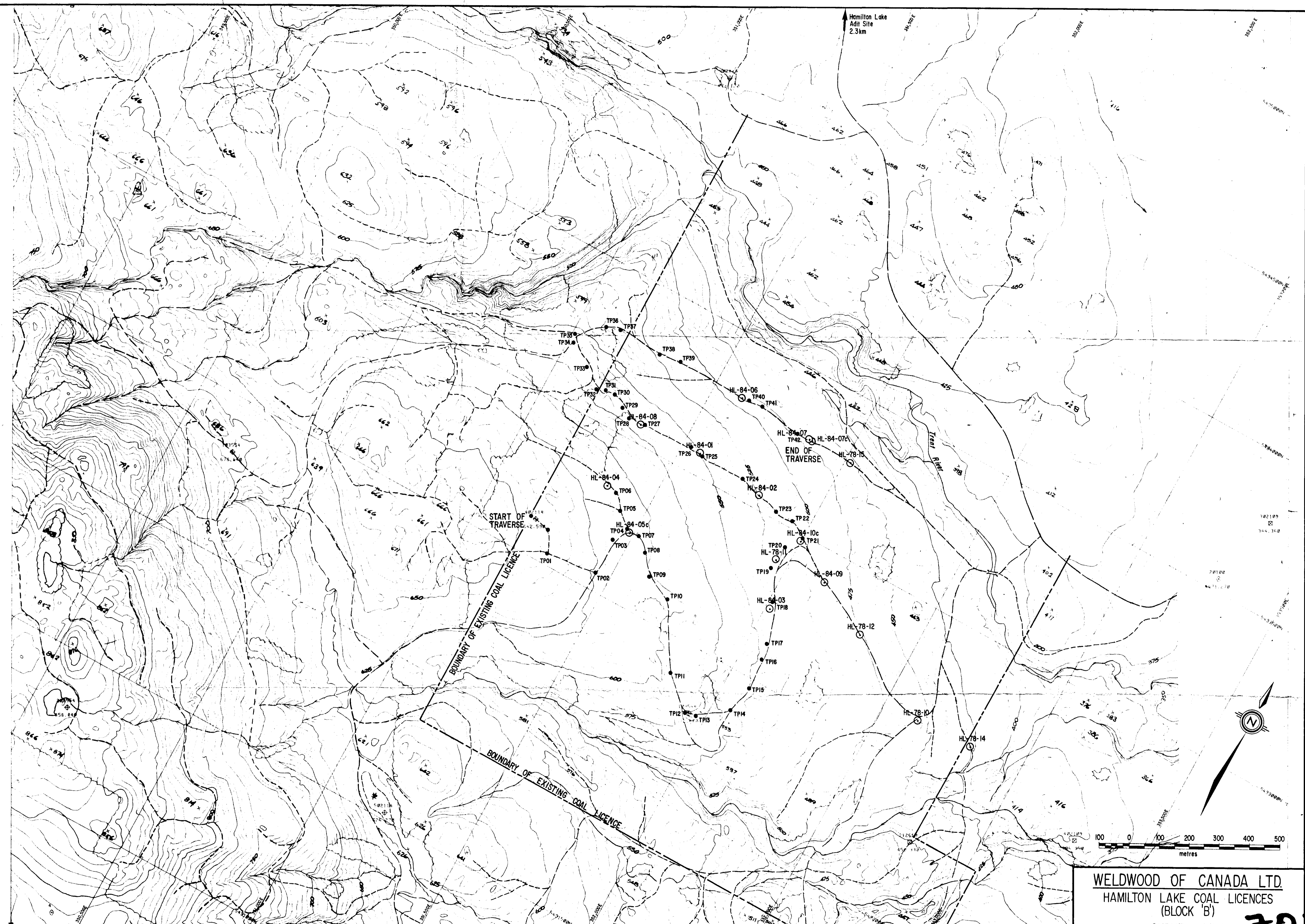
345-44-20

00  
 173-24-00  
 180-24-00 173-24-00  
 353-24-00

- JOHN PHILLIPS on

DAN AITKEN





40130-0 SCALE: 1/5000 TO: HAMILTON LAKE

**LEGEND**

- HL-84-09c Drillhole Location and Number  
(c = corehole)
- TP01 • Turning Point in Survey Traverse



THE McELHANNEY GROUP LTD.  
 28 000  
 15000 June 1984  
 5 Metres 1 of 1

**WELDWOOD OF CANADA LTD.**  
 HAMILTON LAKE COAL LICENCES  
 (BLOCK 'B')  
 SURVEY DATA  
 1984 DRILL PROGRAM

SCALE: 1:5000		NTS: 92F/11	
DRAWN BY: S.L.GARDNER	DRAFTED BY: E.J.DUNN	CHECKED BY:	DATE: JULY 1984

705  
 MB

EX-HAMILTON AREA  
E4A  
CONFIDENTIAL COAL  
ANALYSES (BOTH  
COPIES OF REPORT)

00705 (2)

**General Testing Laboratories**  
A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2  
Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:  
  
STEPHEN L. GARDNER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-05C 1

PAGE NO: 1

AIR DRY MOISTURE (%): 0.87

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.26	21.00	34.25	43.49	2.96	6206	1.42	6.5
DRY	-	21.26	34.68	44.04	2.99	6285	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	97.22
.015 X 0	2.78

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	26.27	1.52

**~~CONFIDENTIAL~~**

....12

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SIGNATURE AND TITLE

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TO:

STEPHEN L. GARDENER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

PAGE NO: 2

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	63.77	0.81	6.76	-
	DRY	-	-	6.81	-
1.5F	A.D.	9.05	1.06	22.16	-
	DRY	-	-	22.39	-
1.6F	A.D.	7.92	1.05	32.38	-
	DRY	-	-	32.72	-
1.7F	A.D.	9.17	1.17	39.50	-
	DRY	-	-	39.96	-
1.7S	A.D.	10.09	-	51.92	5.03

..../3

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TO:

STEPHEN L. GARDNER

## CERTIFICATE OF ANALYSIS

No.

DATE:

FILE:

August 14, 1984

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-050 3

PAGE NO: 3

AIR DRY MOISTURE (%): 2.58

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.75	23.41	29.64	45.20	2.25	5920	1.47	8.5
DRY	-	23.82	30.16	46.00	2.29	6025	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	95.12
.015 X 0	4.88

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	32.13	1.45

..../4

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

STEPHEN L. GARDENER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

PAGE NO: 4

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	44.27	1.14	8.57	-
	DRY	-	-	8.66	-
1.5F	A.D.	19.32	1.05	21.89	-
	DRY	-	-	22.12	-
1.6F	A.D.	15.41	1.14	30.65	-
	DRY	-	-	31.00	-
1.7F	A.D.	11.32	1.03	39.20	-
	DRY	-	-	39.60	-
1.7S	A.D.	9.68	-	51.54	2.98

..../5

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SIGNATURE AND TITLE



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TO:  
  
STEPHEN L. GARDNER

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	August 14, 1984

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-050 5 PAGE NO: 5

AIR DRY MOISTURE (%): 1.36

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.27	17.35	32.26	49.12	3.53	6626	1.41	8.5
DRY	-	17.57	32.67	49.75	3.57	6711	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	96.57
.015 X 0	3.43

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	23.79	3.35

..../5

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TO:  
  
STEPHEN L. GARDENER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

PAGE NO: 6

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	74.80	1.21	7.39	-
	DRY	-	-	7.48	-
1.5F	A.D.	4.31	0.80	18.09	-
	DRY	-	-	18.23	-
1.6F	A.D.	2.14	0.94	28.19	-
	DRY	-	-	28.45	-
1.7F	A.D.	2.18	0.92	37.32	-
	DRY	-	-	37.66	-
1.7S	A.D.	16.57	-	59.85	10.06

..../7

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:  
  
STEPHEN L. GARDENER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-024-050 2

PAGE NO: 7

AIR DRY MOISTURE (%): 0.47

RAW COAL-residual moisture, ash, Specific Gravity

BASIS	R.M. %	ASH %	S.G.
A.D.	1.13	34.13	1.67
DRY	-	34.52	-

..../8

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise

TO:  
  
STEPHEN L. GARDENER

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	August 14, 1984

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-050 4

PAGE NO: 8

AIR DRY MOISTURE (%): 1.03

RAW COAL-Residual Moisture, Ash, Specific Gravity

BASIS	R.M. %	ASH %	S.G.
A.D.	1.07	48.69	1.85
DRY	-	49.21	-

..../9

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:  
  
STEPHEN L. GARDNER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-050 6

PAGE NO: 9

RAW DRY MOISTURE (%): 0.92

**RAW COAL-Residual Moisture, Ash, Specific Gravity**

BASIS	R.M. %	ASH %	S.G.
A.D.	0.90	60.70	2.08
DRY	-	61.25	-

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*P. J. Jordan*  
SIGNATURE AND TITLE

HL-84-05C

SAMPLE No. 1

25 X .015mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt.% of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	63.77	6.76	4.31	4.31	63.77	6.76	13.43	36.23	37.07	72.82
1.4-1.5	9.05	22.16	2.61	6.32	72.82	8.67	11.43	27.18	42.04	16.97
1.5-1.6	7.92	32.38	2.56	8.88	80.74	11.00	8.86	19.26	46.01	17.09
1.6-1.7	9.17	39.50	3.62	12.50	89.91	13.91	5.24	10.09	51.92	19.26
1.7 +	10.09	51.92	5.24	17.74	100.00	17.74	0	0	-	-
			17.74							

HL-84-05C

SAMPLE No. 3

25 X .015mm FRACTION

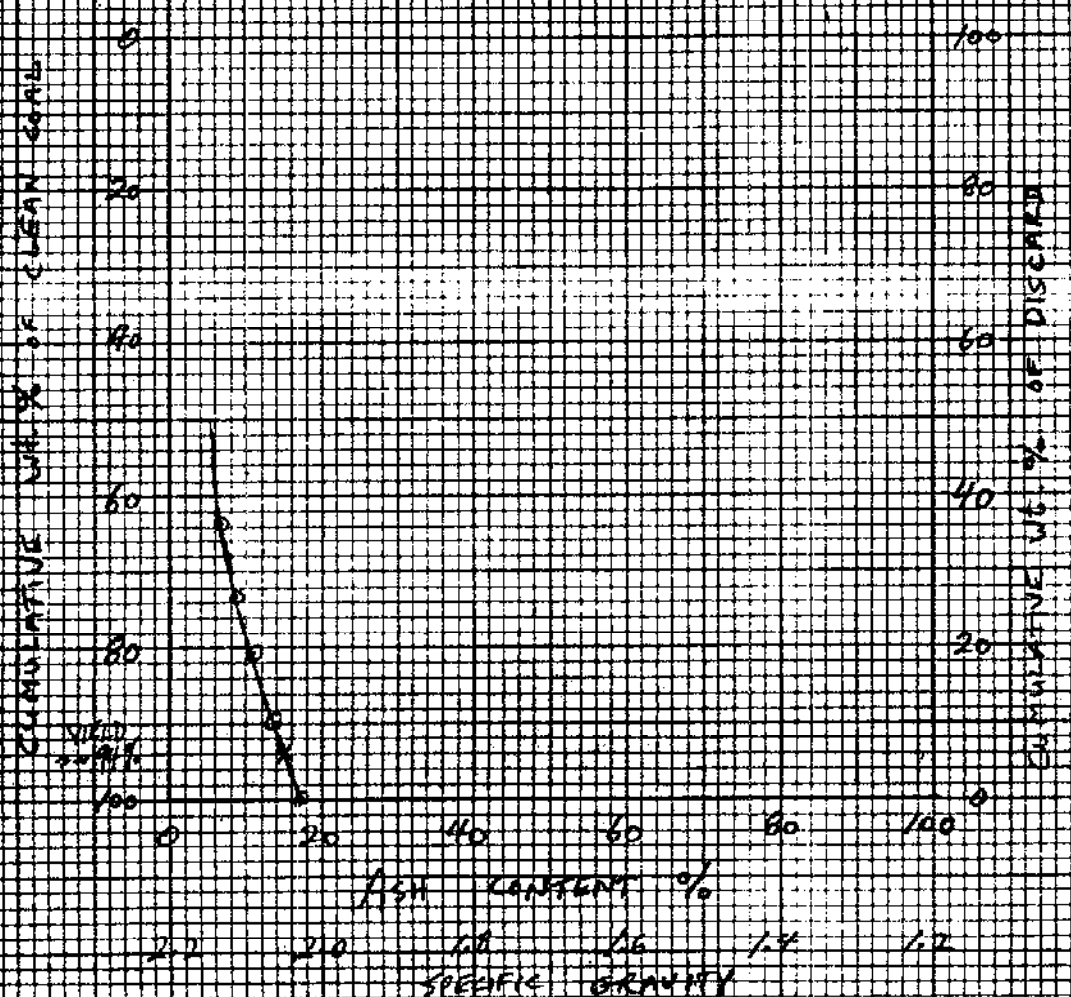
S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt.% of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	44.27	8.57	3.79	3.79	44.27	8.57	18.38	55.73	32.98	63.59
1.4-1.5	19.32	21.89	4.23	8.02	63.59	12.62	14.15	36.41	38.86	34.73
1.5-1.6	15.41	30.65	4.72	12.75	79.00	16.13	9.43	21.00	44.89	26.73
1.6-1.7	11.32	39.20	4.14	17.18	90.32	19.03	4.99	9.68	51.54	21.00
1.7 +	9.68	51.54	4.79	22.17	100.00	22.17	0	0	-	-
			22.17							

HL-84-05C

SAMPLE No. 5

25 X .015mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt.% of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	74.80	7.39	5.53	5.53	74.80	7.39	16.55	25.20	66.05	63.59
1.4-1.5	4.31	18.09	0.78	6.31	79.11	7.97	15.87	20.89	75.95	4.20
1.5-1.6	2.14	28.19	0.60	6.91	81.25	8.51	15.26	18.75	81.40	11.21
1.6-1.7	2.18	37.32	0.81	7.72	83.43	9.26	14.45	16.57	87.20	18.75
1.7 +	16.57	59.85	9.92	17.64	100.00	17.64	4.53	0	-	-
			17.64							



HOLE No. 84-05c SAMPLE No. 1 (51 holes)  
 25 x .015 mm FRACTION  
 (97.22% OF TOTAL SAMPLE)

YIELD CURVE  
 X = 15% ASH PRODUCT



ASH CONTENT %	SPECIFIC GRAVITY
20	1.3
40	1.6
60	1.4
80	1.2

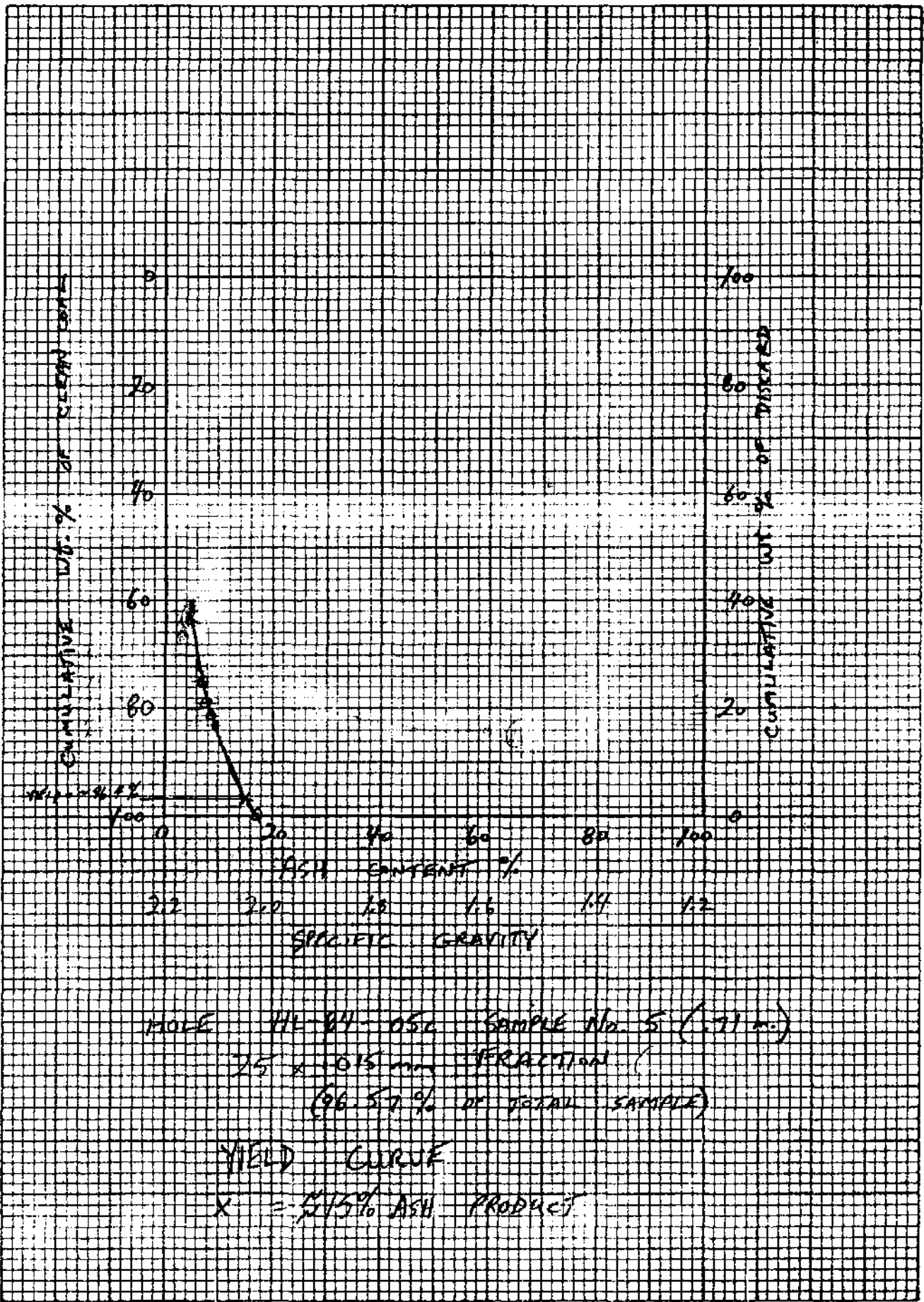
HOLE HL-84-D50 SAMPLE No. 3 (85 m)

25 x 2015 mm FRACTION  
(95.12% OF TOTAL SAMPLE)

YIELD CURVE

X = 2.15% ACH PRODUCT





MOLE 41L-84-05C SAMPLE No. 5 (.71 m.)  
 25 x .015 mm FRACTION (  
 96.57% OF TOTAL SAMPLE)

YIELD CURVE  
 X = 5.15% ASH PRODUCT

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TO:  
STEPHEN L. GARDNER,  
274 Westwood Road,  
R.R. #3, Site 'S'  
Nanaimo, B.C.  
V9R 5K3

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE: 8406-2752C	August 15, 1984

RE: HL-84-07C  
Samples 1, 3, 5, 6, 7, 8 and 10

WE HAVE ANALYZED the herein described submitted samples of Coal and report as follows:

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-07C 1

AIR DRY MOISTURE (%): 2.45

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.60	26.21	27.10	45.09	1.00	5739	-	6.0
DRY	-	26.63	27.54	45.82	1.01	5832	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	92.80
.015 X 0	7.20

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	37.90	0.87

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A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2

Telephone: (004) 254-1847 Telex: 04-507514 Cable: Supervis



TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C 3

AIR DRY MOISTURE (%): 1.90

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.17	27.52	29.20	42.11	4.19	6304	-	6.0
DRY	-	27.84	29.54	42.60	4.23	6378	-	-

### SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	92.92
.015 X 0	7.08

### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	35.80	2.59

THIS COMPANY ACCEPTS NO RESPONSIBILITY EXCEPT FOR THE DUE PERFORMANCE OF INSPECTION AND/OR ANALYSIS IN GOOD FAITH AND ACCORDING TO THE RULES OF THE TRADE AND OF SCIENCE

SIGNATURE AND TITLE

# General Testing Laboratories

A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2

Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 5

AIR DRY MOISTURE (%): 1.18

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	0.91	33.13	30.98	34.98	6.14	5204	-	6.5
DRY	-	33.43	31.26	35.30	6.19	5251	-	-

### SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	95.44
.015 X 0	4.56

### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	29.71	3.58

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C 6

AIR DRY MOISTURE (%): 1.64

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	0.93	65.43	23.41	10.23	1.73	1724	-	1.0
DRY	-	66.04	23.62	10.32	1.74	1740	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	93.68
.015 X 0	6.32

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	51.73	1.84

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 7

AIR DRY MOISTURE (%): 4.21

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	0.95	36.97	27.70	34.38	3.04	4895	-	4.0
DRY	-	37.32	27.96	34.70	3.06	4941	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	89.04
.015 X 0	10.96

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	35.68	2.03

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SIGNATURE AND TITLE

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Vancouver, B.C. Canada V6A 1W2

Telephone: (604) 254-1847 Telex: D4-507514 Cable: Supervise



TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-024-07C 8

AIR DRY MOISTURE (%): 1.32

#### AW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.36	38.20	27.60	32.84	0.84	4654	-	4.5
DRY	-	38.72	27.98	33.29	0.85	4718	-	-

#### SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	94.93
.015 X 0	5.07

#### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	30.97	0.96

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C 10

AIR DRY MOISTURE (%): 1.85

#### RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.40	41.17	24.73	32.70	0.41	4382	-	3.0
DRY	-	41.75	25.08	33.16	0.41	4444	-	-

#### SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	95.86
.015 X 0	4.14

#### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	33.92	0.52

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SIGNATURE AND TITLE

Analytical and Consulting Chemists, Bulk Cargo Specialists, Surveyors, Inspectors, Samplers, Weighers

MEMBER American Society For Testing Materials - The American Oil Chemists Society - Canadian Testing Association  
REFEREE AND/OR OFFICIAL CHEMISTS FOR - National Institute of Oilseed Products - The American Oil Chemists Society  
OFFICIAL WEIGHMASTERS FOR Vancouver Board of Trade



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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C FRACTION 0.6 X 0.15 MM COMPOSITE A+B+C

FEED COAL-Residual Moisture, Ash, Total Sulphur  
Fraction:

BASIS	R.M. %	ASH %	T.S. %
A.D.	0.98	31.03	1.65
DRY	-	31.33	1.66

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	50.12	1.18	5.76	-
	DRY	-	-	5.82	-
1.5F	A.D.	7.14	1.24	7.23	-
	DRY	-	-	7.32	-
1.6F	A.D.	4.85	1.66	9.58	-
	DRY	-	-	9.74	-
1.7F	A.D.	4.63	2.05	11.71	-
	DRY	-	-	11.95	-
1.7S	A.D.	33.26	-	62.30	2.11

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-054-070 FRACTION 6.7 X 0.6 MM COMPOSITE A+B+C

FEED COAL: Residual Moisture, Ash, Total Sulphur  
Fraction:

BASIS	R.M. %	ASH %	T.S. %
A.D.	1.02	35.35	1.95
DRY	-	35.71	1.97

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	41.17	1.22	7.20	-
	DRY	-	-	7.28	-
1.5F	A.D.	9.14	0.91	22.85	-
	DRY	-	-	23.05	-
1.6F	A.D.	6.34	0.94	30.80	-
	DRY	-	-	31.09	-
1.7F	A.D.	5.59	0.91	37.42	-
	DRY	-	-	37.76	-
1.7S	A.D.	37.76	-	64.52	2.52

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 FRACTION 25 X 6.7 MM COMPOSITE A+B+C

FEED COAL-Residual Moisture, Ash, total Sulphur  
Fraction:

BASIS	R.M. %	ASH %	T.S. %
A.D.	1.07	46.57	1.60
DRY	-	47.07	1.61

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	20.09	1.16	9.20	-
	DRY	-	-	9.30	-
1.5F	A.D.	10.12	1.12	23.21	-
	DRY	-	-	23.47	-
1.6F	A.D.	8.30	1.13	33.08	-
	DRY	-	-	33.45	-
1.7F	A.D.	8.51	1.02	40.50	-
	DRY	-	-	40.91	-
1.7S	A.D.	52.98	-	54.90	3.22

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## CERTIFICATE OF ANALYSIS



TO:

No.	DATE:
FILE:	

STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 COMPOSITE NO. C SAMPLES 8+10

### Screen Yields

FRACTION MM	YIELD (%)
+13.3	4.12
13.3 X 6.7	44.40
6.7 X 2.4	26.73
2.4 X 0.6	15.49
0.6 X 0.15	9.25
0.15 X 0	0.01

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-094-070 COMPOSITE NO. 8 SAMPLES 5+6+7

#### Screen Yields

FRACTION MM	YIELD (%)
+13.3	3.20
13.3 X 6.7	43.49
6.7 X 2.4	25.77
2.4 X 0.6	16.79
0.6 X 0.15	9.66
0.15 X 0	1.09

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TO:

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**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-070 COMPOSITE NO. A SAMPLES 1+3

Screen Yields

FRACTION MM	YIELD (%)
+13.2	2.43
13.2 X 6.7	34.64
6.7 X 2.4	30.39
2.4 X 0.6	20.07
0.6 X 0.15	10.86
0.15 X 0	1.61

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No.

DATE:

FILE:

### COMPOSITE ANALYSIS

#### AIR DRY BASIS:

Residual Moisture	1.27%
Ash	39.98%
Volatile Matter	26.28%
Sulphur	2.02%
FSI	3½

#### DRY BASIS:

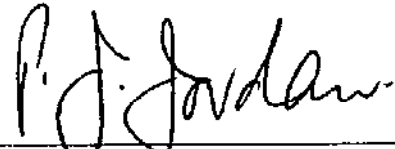
Calorific Value	4476 cal./gram
Carbon	46.38%
Hydrogen	3.42%
Chlorine	0.12%

#### ASH FUSION:

IT	2570°F
ST	2700+°F
HT	2700+°F
FT	2700+°F

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P.J. Jordan

  
SIGNATURE AND TITLE

Analytical and Consulting Chemists, Bulk Cargo Specialists, Surveyors, Inspectors, Samplers, Weighers

MEMBER American Society For Testing Materials - The American Oil Chemists Society - Canadian Testing Association  
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OFFICIAL WEIGHMASTERS FOR Vancouver Board of Trade

HL-84-05C

SAMPLE No. 1

25 X .015mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	63.77	6.76	4.31	4.31	63.77	6.76	13.43	36.23	37.07	72.92
1.4-1.5	9.05	22.16	2.01	6.32	72.82	8.67	11.43	27.18	42.04	16.97
1.5-1.6	7.92	32.38	2.56	8.88	80.74	11.00	8.86	19.26	46.01	17.09
1.6-1.7	9.17	39.50	3.62	12.50	89.91	13.91	5.24	10.09	51.92	19.26
1.7 +	10.09	51.92	5.24	17.74	100.00	17.74	0	0	-	-
			17.74							

HL-84-05C

SAMPLE No. 3

25 X .015mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	44.27	8.57	3.79	3.79	44.27	8.57	18.38	55.73	32.98	63.59
1.4-1.5	19.32	21.89	4.23	8.02	63.59	12.62	14.15	36.41	38.86	34.73
1.5-1.6	15.41	30.65	4.72	12.75	79.00	16.13	9.43	21.00	44.89	26.73
1.6-1.7	11.32	39.20	4.44	17.18	90.32	19.03	4.99	9.68	51.54	21.00
1.7 +	9.68	51.54	4.99	22.17	100.00	22.17	0	0	-	-
			22.17							

HL-84-05C

SAMPLE No. 5

25 X .015mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	74.80	7.39	5.53	5.53	74.80	7.39	16.65	25.20	66.05	63.59
1.4-1.5	4.31	18.09	0.78	6.31	79.11	7.97	15.87	20.89	75.95	4.20
1.5-1.6	2.14	28.19	0.60	6.91	81.25	8.51	15.26	18.75	81.40	11.21
1.6-1.7	2.18	37.32	0.81	7.72	83.43	9.26	14.45	16.57	87.20	18.75
1.7 +	16.57	59.85	9.92	17.64	100.00	17.64	4.53	0	-	-
			17.64							



HL-84-07C COMPOSITE SAMPLES A+B+C

0.6 X .15mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	50.12	5.76	2.89	2.89	50.12	5.76	22.24	49.88	44.60	57.26
1.4-1.5	7.14	7.23	0.52	3.40	57.26	5.94	21.73	42.74	50.84	11.99
1.5-1.6	4.85	9.58	0.46	3.87	62.11	6.23	21.26	37.89	56.12	9.48
1.6-1.7	4.63	11.71	0.54	4.41	66.74	6.61	20.72	33.26	62.30	37.89
1.7 +	33.26	62.30	20.72	25.13	100.00	25.13	0	0		
			25.13							

HL-84-07C COMPOSITE SAMPLES A+B+C

6.7 X .6 mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	41.17	7.20	2.96	2.96	41.17	7.20	30.50	58.83	51.84	50.31
1.4-1.5	9.14	22.85	2.09	5.05	50.31	10.04	28.41	49.69	57.17	15.48
1.5-1.6	6.34	30.80	1.95	7.01	56.65	12.37	26.45	43.35	61.03	11.93
1.6-1.7	5.59	37.42	2.09	9.10	62.24	14.62	24.36	37.76	64.52	43.35
1.7 +	37.76	64.52	24.36	33.46	100.00	33.46	0	0	-	-
			33.46							

HL-84-07C COMPOSITE SAMPLES A+B+C

25 X 6.7 mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	20.09	9.20	1.85	1.85	20.09	9.20	37.63	79.91	47.09	30.21
1.4-1.5	10.12	23.21	2.35	4.20	30.21	13.89	35.28	69.79	50.55	18.42
1.5-1.6	8.30	33.08	2.75	6.94	38.51	18.03	32.53	61.49	52.91	16.81
1.6-1.7	8.51	40.50	3.45	10.39	47.02	22.10	29.09	52.98	54.90	61.49
1.7 +	52.98	54.90	29.09	39.48	100.00	39.48	0	0	-	-
			39.48							

HL-84-07C COMPOSITE SAMPLES A+B+C

0.6 X .15mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	50.12	5.76	2.89	2.89	50.12	5.76	22.24	49.88	44.60	57.26
1.4-1.5	7.14	7.23	0.52	3.40	57.26	5.94	21.73	42.74	50.84	11.99
1.5-1.6	4.85	9.58	0.46	3.87	62.11	6.23	21.26	37.89	56.12	9.48
1.6-1.7	4.63	11.71	0.54	4.41	66.74	6.61	20.72	33.26	62.30	37.89
1.7 +	33.26	62.30	20.72	25.13	100.00	25.13	0	0		
			25.13							

HL-84-07C COMPOSITE SAMPLES A+B+C

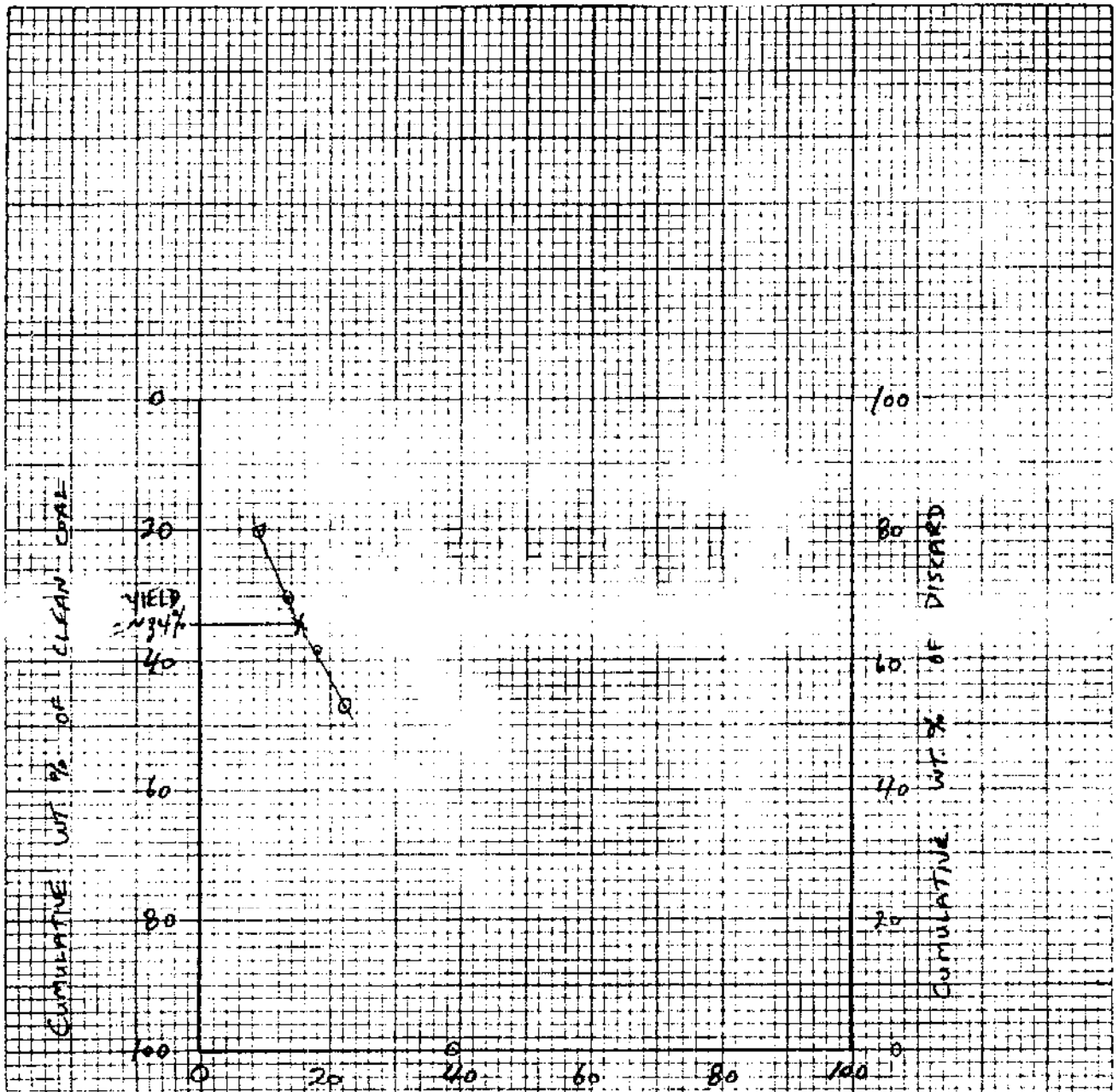
6.7 X .6 mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	41.17	7.20	2.96	2.96	41.17	7.20	30.50	58.83	51.84	50.31
1.4-1.5	9.14	22.85	2.07	5.05	50.31	10.04	26.41	49.69	57.17	15.48
1.5-1.6	6.34	30.80	1.96	7.01	56.65	12.37	26.45	43.35	61.03	11.93
1.6-1.7	5.59	37.42	2.09	9.10	62.24	14.62	24.36	37.76	64.52	43.35
1.7 +	37.76	64.52	24.36	33.46	100.00	33.46	0	0	-	-
			33.46							

HL-84-07C COMPOSITE SAMPLES A+B+C

25 X 6.7 mm FRACTION

S. G. FRACTION	Wt. %	Ash %	% Wt. of Ash of Total	Cum. Wt. % of Ash	Cum. Wt. % of Floats	Cum. Ash % of Floats	Sink Wt. of Ash %	Cum. Wt. % of Sinks	Cum Ash % of Sinks	S.G. DISTRIBUTION Wt. %
-1.3			0	0	0					
1.3-1.4	20.09	9.20	1.85	1.85	20.09	9.20	37.63	79.91	47.09	30.21
1.4-1.5	10.12	23.21	2.35	4.20	30.21	13.89	35.28	69.79	50.55	18.42
1.5-1.6	8.30	33.08	2.75	6.94	38.51	18.03	32.53	61.49	52.91	16.81
1.6-1.7	8.51	40.50	3.45	10.39	47.02	22.10	29.09	52.98	54.90	61.49
1.7 +	52.98	54.90	29.09	39.48	100.00	39.48	0	0	-	-
			39.48							



	ASH	CONTENT %			
22	2.0	1.8	1.6	1.4	1.2

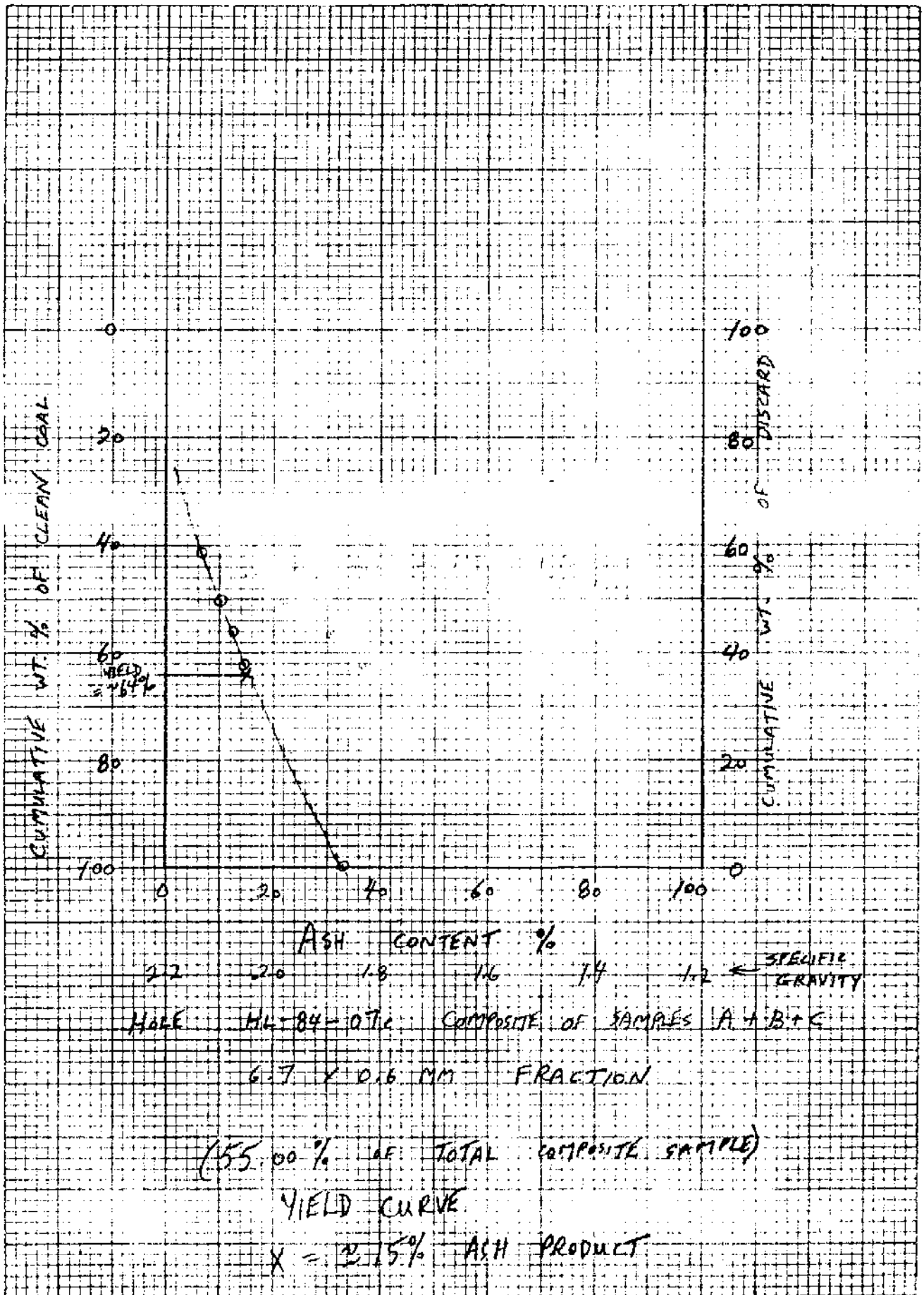
MOLE H<sub>2</sub>C 84-DTC COMPOSITE OF SAMPLES A, B, & C

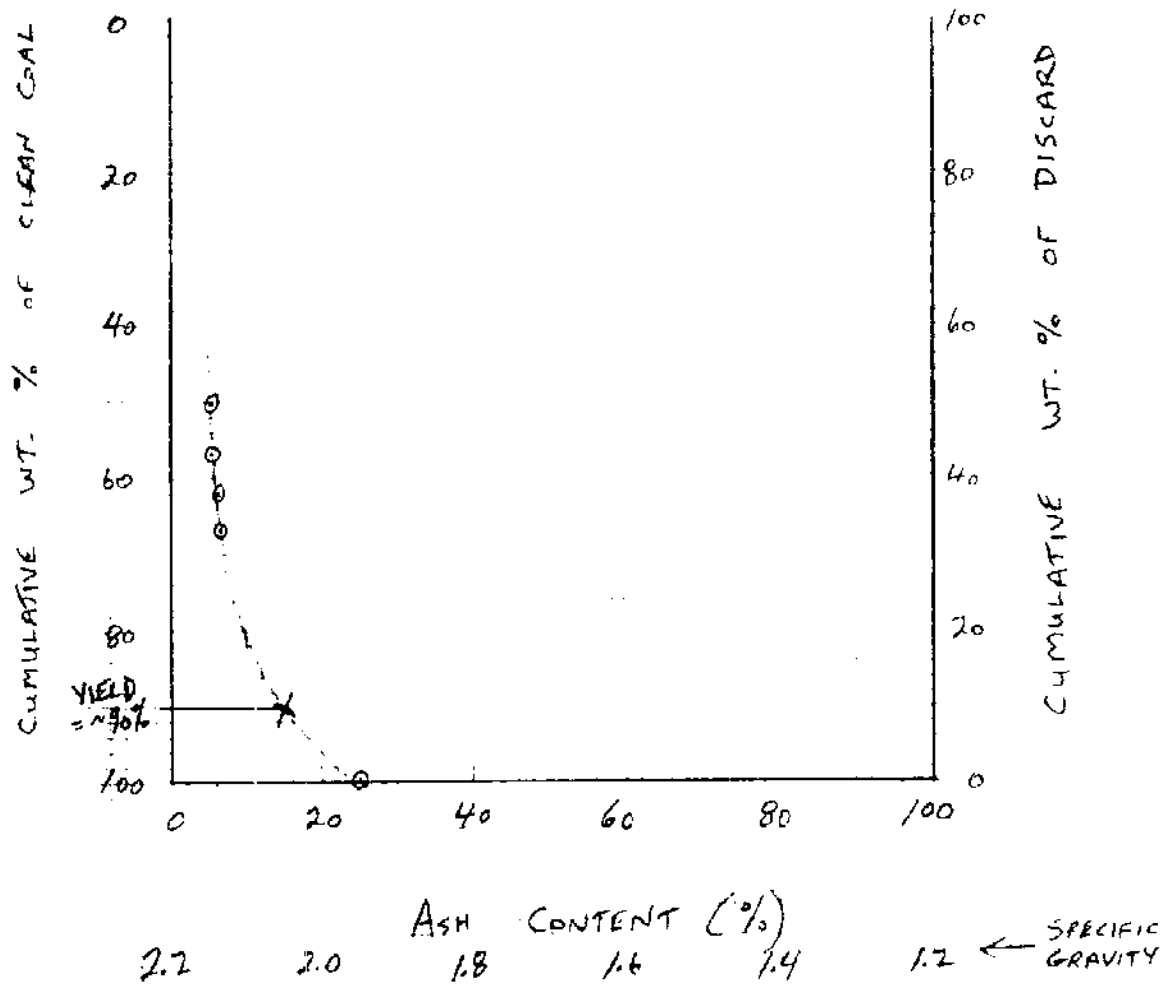
25 x 6.7 MM FRACTION

(44.76% OF TOTAL COMPOSITE SAMPLE)

YIELD CURVE

X = ~ 15% ASH PRODUCT





HOLE HL-84-07C COMPOSITE OF SAMPLES A+B+C

0.60 mm X 0.15 mm FRACTION

(.01% OF TOTAL COMPOSITE SAMPLE)

YIELD CURVE

X = ~15% ASH PRODUCT

**General Testing Laboratories**  
A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:  
Mr. Stephen L. Gardener,  
274 Westwood Road,  
R.R. #3, Site "S"  
Nanaimo, B.C.,  
V9R 5K3

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE: 8406-2752C	August 22, 1984

WE HAVE ANALYZED the herein described submitted sample of COAL and report as follows:

SAMPLE IDENTITY:

HL - 84 - 07C (COMPOSITE)

COAL ASH

MINERAL ANALYSIS OF ASH

PERCENT WEIGHT IGNITED BASIS

Silica	SiO <sub>2</sub>	44.73
Alumina	Al <sub>2</sub> O <sub>3</sub>	34.03
Titania	TiO <sub>2</sub>	2.11
Ferric Oxide	Fe <sub>2</sub> O <sub>3</sub>	11.69
Lime	CaO	4.24
Magnesia	MgO	0.52
Potassium Oxide	K <sub>2</sub> O	0.12
Sodium Oxide	Na <sub>2</sub> O	0.04
Sulfur Trioxide	SO <sub>3</sub>	1.86
Phos. Pentoxide	P <sub>2</sub> O <sub>5</sub>	0.36
Strontium Oxide	SrO	0.05
Barium Oxide	BaO	0.03
Manganese Oxide	Mn <sub>3</sub> O <sub>4</sub>	0.17
		<u>99.95</u>

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*R. Roberts*  
R. Roberts - General Manager

SIGNATURE AND TITLE

**CONFIDENTIAL**

**General Testing Laboratories**  
A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2

Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

STEPHEN L. GARDNER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-050 1

PAGE NO: 1

AIR DRY MOISTURE (%): 0.87

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.26	21.00	34.25	43.49	2.96	6206	1.42	6.5
DRY	-	21.26	34.68	44.04	2.99	6285	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	97.22
.015 X 0	2.78

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	26.27	1.52

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TO:

STEPHEN L. GARDENER

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	August 14, 1984

PAGE NO: 2

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	63.77	0.81	6.76	-
	DRY	-	-	6.81	-
1.5F	A.D.	9.05	1.06	22.16	-
	DRY	-	-	22.39	-
1.6F	A.D.	7.92	1.05	32.38	-
	DRY	-	-	32.72	-
1.7F	A.D.	9.17	1.17	39.50	-
	DRY	-	-	39.96	-
1.7S	A.D.	10.09	-	51.92	5.03

.... / 3

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TO:  
  
STEPHEN L. GARDNER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-050 3

PAGE NO: 3

AIR DRY MOISTURE (%): 2.52

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.75	23.41	29.64	45.20	2.25	5920	1.47	8.5
DRY	-	23.82	30.16	46.00	2.29	6025	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	95.12
.015 X 0	4.88

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	32.13	1.45

.... / 4

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TO:

STEPHEN L. GARDENER

## CERTIFICATE OF ANALYSIS

No.

DATE:

FILE:

August 14, 1984

PAGE NO: 4

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	44.27	1.14	8.57	-
	DRY	-	-	8.66	-
1.5F	A.D.	19.32	1.05	21.89	-
	DRY	-	-	22.12	-
1.6F	A.D.	15.41	1.14	30.65	-
	DRY	-	-	31.00	-
1.7F	A.D.	11.32	1.03	39.20	-
	DRY	-	-	39.60	-
1.7S	A.D.	9.62	-	51.54	2.98

.... /5

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TO:  
 STEPHEN L. GARDNER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-050 5 PAGE NO: 5

AIR DRY MOISTURE (%): 1.36

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.27	17.35	32.26	49.12	3.53	6626	1.41	8.5
DRY	-	17.57	32.67	49.75	3.57	6711	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	96.57
.015 X 0	3.43

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	23.79	3.35

...../5

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TO:  
STEPHEN L. GARDNER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

PAGE NO: 6

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	74.80	1.21	7.39	-
	DRY	-	-	7.48	-
1.5F	A.D.	4.31	0.80	18.09	-
	DRY	-	-	18.23	-
1.6F	A.D.	2.14	0.94	28.19	-
	DRY	-	-	28.45	-
1.7F	A.D.	2.18	0.92	37.32	-
	DRY	-	-	37.66	-
1.7S	A.D.	16.57	-	59.85	10.06

..../7

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TO:  
  
STEPHEN L. GARDENER

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	August 14, 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-050 2

PAGE NO: 7

AIR DRY MOISTURE (%): 0.47

RAW COAL-residual moisture, ash, Specific Gravity

BASIS	R.M. %	ASH %	S.G.
A.D.	1.13	34.13	1.67
DRY	-	34.52	-

.../8

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise

TO:

STEPHEN L. GARDENER

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	August 14, 1984

### STEVE GARDNER -- FLOWSHEET

SAMPLE NO: HCL-084-050 4

PAGE NO: 8

AIR DRY MOISTURE (%): 1.03

RAW COAL-Residual Moisture, Ash, Specific Gravity

BASIS	R.M. %	ASH %	S.G.
A.D.	1.07	48.69	1.85
DRY	-	49.21	-

.... /9

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

STEPHEN L. GARDENER

**CERTIFICATE OF ANALYSIS**

No.

DATE:

FILE:

August 14, 1984

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-050 6

PAGE NO: 9

WET DRY MOISTURE (%): 0.92

RAW COAL-Residual Moisture, Ash, Specific Gravity

BASIS	R.M. %	ASH %	S.G.
A.D.	0.90	60.70	2.08
DRY	-	61.25	-

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SIGNATURE AND TITLE



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A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2

Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:  
STEPHEN L. GARDENER,  
274 Westwood Road,  
R.R. #3, Site 'S'  
Nanaimo, B.C.  
V9R 5K3 .

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE: 8406-2752C	August 15, 1984

RE: HL-84-07C  
Samples 1, 3, 5, 6, 7, 8 and 10

WE HAVE ANALYZED the herein described submitted samples of Coal and report as follows:

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C 1

AIR DRY MOISTURE (%): 2.45

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.60	26.21	27.10	45.09	1.00	5739	-	6.0
DRY	-	26.63	27.54	45.82	1.01	5832	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	92.80
.015 X 0	7.20

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	37.90	0.87

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SIGNATURE AND TITLE

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A Division of SGS Supervision Services Inc.

1001 East Pender Street,  
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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C 3

AIR DRY MOISTURE (%): 1.90

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M.	ASH	V.M.	F.C.	T.S.	C.V.	S.G.	FSI
	%	%	%	%	%	CAL/G		
A.D.	1.17	27.52	29.20	42.11	4.19	6304	-	6.0
DRY	-	27.84	29.54	42.60	4.23	6378	-	-

### SIZE FRACTION - Screen Yields

FRACTION	YIELD
MM	(%)
25 X 0.15	92.92
.015 X 0	7.08

### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION	ASH	TOTAL SULPHUR
MM	%	%
.15 X 0	35.80	2.59

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

## CERTIFICATE OF ANALYSIS

No.

DATE:

FILE:

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 5

AIR DRY MOISTURE (%): 1.18

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	0.91	33.13	30.98	34.98	6.14	5204	-	6.5
DRY	-	33.43	31.26	35.30	6.19	5251	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	95.44
.015 X 0	4.56

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	29.71	3.58

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SIGNATURE AND TITLE

Analytical and Consulting Chemists, Bulk Cargo Specialists, Surveyors, Inspectors, Samplers, Weighers

MEMBER American Society For Testing Materials - The American Oil Chemists Society - Canadian Testing Association  
REFEREE AND OR OFFICIAL CHEMISTS FOR - National Institute of Oilseed Products - The American Oil Chemists Society  
OFFICIAL WEIGHMASTERS FOR Vancouver Board of Trade

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 6

AIR DRY MOISTURE (%): 1.64

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	0.93	65.43	23.41	10.23	1.73	1724	-	1.0
DRY	-	66.04	23.62	10.32	1.74	1740	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	93.68
.015 X 0	6.32

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	51.73	1.84

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SIGNATURE AND TITLE

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise



TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-07C 7

AIR DRY MOISTURE (%): 4.21

RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	0.95	36.97	27.70	34.38	3.04	4895	-	4.0
DRY	-	37.32	27.96	34.70	3.06	4941	-	-

SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	89.04
.015 X 0	10.96

FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	35.68	2.03

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1001 East Pender Street,  
Vancouver, B.C. Canada V6A 1W2

Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervise

TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 8

AIR DRY MOISTURE (%): 1.32

#### AW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.36	38.20	27.60	32.84	0.84	4654	-	4.5
DRY	-	38.72	27.98	33.29	0.85	4718	-	-

#### SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	94.93
.015 X 0	5.07

#### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	30.97	0.96

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SIGNATURE AND TITLE



# General Testing Laboratories

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No.	DATE:
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### STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-024-070 10

AIR DRY MOISTURE (%): 1.85

#### RAW COAL-Proximate, Total Sulphur, Specific Gravity, FSI

BASIS	R.M. %	ASH %	V.M. %	F.C. %	T.S. %	C.V. CAL/G	S.G.	FSI
A.D.	1.40	41.17	24.73	32.70	0.41	4382	-	3.0
DRY	-	41.75	25.08	33.16	0.41	4444	-	-

#### SIZE FRACTION - Screen Yields

FRACTION MM	YIELD (%)
25 X 0.15	95.86
.015 X 0	4.14

#### FRACTION ANALYSIS - Ash, Total Sulphur

FRACTION MM	ASH %	TOTAL SULPHUR %
.15 X 0	33.92	0.52

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

### STEVE GARDNER -- FLOWSHEET

SAMPLE NO: HCL-084-07C FRACTION 0.6 X 0.15 MM COMPOSITE A+B+C

FEED COAL-Residual Moisture, Ash, Total Sulphur  
Fraction:

BASIS	R.M. %	ASH %	T.S. %
A.D.	0.98	31.03	1.65
DRY	-	31.33	1.66

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	50.12	1.18	5.76	-
	DRY	-	-	5.82	-
1.5F	A.D.	7.14	1.24	7.23	-
	DRY	-	-	7.32	-
1.6F	A.D.	4.85	1.66	9.58	-
	DRY	-	-	9.74	-
1.7F	A.D.	4.63	2.05	11.71	-
	DRY	-	-	11.95	-
1.7S	A.D.	33.26	-	62.30	2.11

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SIGNATURE AND TITLE

Analytical and Consulting Chemists, Bulk Cargo Specialists, Surveyors, Inspectors, Samplers, Weighers

MEMBER American Society For Testing Materials - The American Oil Chemists Society - Canadian Testing Association  
REFEREE AND/OR OFFICIAL CHEMISTS FOR - National Institute of Oilseed Products - The American Oil Chemists Society  
OFFICIAL WEIGHMASTERS FOR Vancouver Board of Trade



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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL 084-070 FRACTION 6.7 X 0.6 MM COMPOSITE A+B+C

FEED COAL - Residual Moisture, Ash, Total Sulphur  
Fraction:

BASIS	R.M. %	ASH %	T.S. %
A.D.	1.02	35.35	1.95
DRY	-	35.71	1.97

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	41.17	1.22	7.20	-
	DRY	-	-	7.28	-
1.5F	A.D.	9.14	0.91	22.85	-
	DRY	-	-	23.05	-
1.6F	A.D.	6.34	0.94	30.80	-
	DRY	-	-	31.09	-
1.7F	A.D.	5.59	0.91	37.42	-
	DRY	-	-	37.76	-
1.7S	A.D.	37.76	-	64.52	2.52

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TO:

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-070 FRACTION 25 X 6.7 MM COMPOSITE A+B+C

FEED COAL-Residual Moisture, Ash, Total Sulphur  
Fraction:

BASIS	R.M. %	ASH %	T.S. %
A.D.	1.07	46.57	1.60
DRY	-	47.07	1.61

FRACTION: 25.0 X .015 MM

Float/Sink - Residual Moisture, Ash, Sulphur

S.G.	BASIS	YIELD %	R.M. %	ASH %	T.S. %
1.4F	A.D.	20.09	1.16	9.20	-
	DRY	-	-	9.30	-
1.5F	A.D.	10.12	1.12	23.21	-
	DRY	-	-	23.47	-
1.6F	A.D.	8.30	1.13	33.08	-
	DRY	-	-	33.45	-
1.7F	A.D.	8.51	1.02	40.50	-
	DRY	-	-	40.91	-
1.7S	A.D.	52.98	-	54.90	3.22

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TO:

## CERTIFICATE OF ANALYSIS

No.	DATE:
FILE:	

STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 COMPOSITE NO. C SAMPLES 8+10

### Screen Yields

FRACTION MM	YIELD (%)
+13.3	4.12
13.3 X 6.7	44.40
6.7 X 2.4	26.73
2.4 X 0.6	15.49
0.6 X 0.15	3.25
0.15 X 0	0.01

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TO:

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	

STEVE GARDNER - FLOWSHEET

SAMPLE NO: HCL-084-070 COMPOSITE NO. 6 SAMPLES 5+6+7

Screen Yields

FRACTION MM	YIELD (%)
+13.3	3.20
13.3 X 6.7	43.49
6.7 X 2.4	25.77
2.4 X 0.6	16.79
0.6 X 0.15	9.66
0.15 X 0	1.09

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Telephone: (604) 254-1647 Telex: 04-507514 Cable: Supervisa



TO:

**CERTIFICATE OF ANALYSIS**

No.	DATE:
FILE:	

**STEVE GARDNER - FLOWSHEET**

SAMPLE NO: HCL-084-070 COMPOSITE NO. A SAMPLES 1+3

Screen Yields

FRACTION mm	YIELD (%)
+13.2	2.43
13.2 X 6.7	34.64
6.7 X 2.4	30.39
2.4 X 0.6	20.07
0.6 X 0.15	10.86
0.15 X 0	1.61

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## CERTIFICATE OF ANALYSIS

TO:

No.	DATE:
FILE:	



### COMPOSITE ANALYSIS

#### AIR DRY BASIS:

Residual Moisture	1.27%
Ash	39.98%
Volatile Matter	26.28%
Sulphur	2.02%
FSI	3½

#### DRY BASIS:

Calorific Value	4476 cal./gram
Carbon	46.38%
Hydrogen	3.42%
Chlorine	0.12%

#### ASH FUSION:

IT	2570°F
ST	2700+°F
HT	2700+°F
FT	2700+°F

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P.J. Jordan

SIGNATURE AND TITLE

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## CERTIFICATE OF ANALYSIS

TO:  
Mr. Stephen L. Gardener,  
274 Westwood Road,  
R.R. #3, Site "S"  
Nanaimo, B.C.,  
V9R 5K3

No.	DATE:
FILE: 8406-2752C	August 22, 1984

WE HAVE ANALYZED the herein described submitted sample of COAL and report as follows:

SAMPLE IDENTITY:

HL - 84 - 07C **COMPOSITE A+B+C**

COAL ASH

### MINERAL ANALYSIS OF ASH

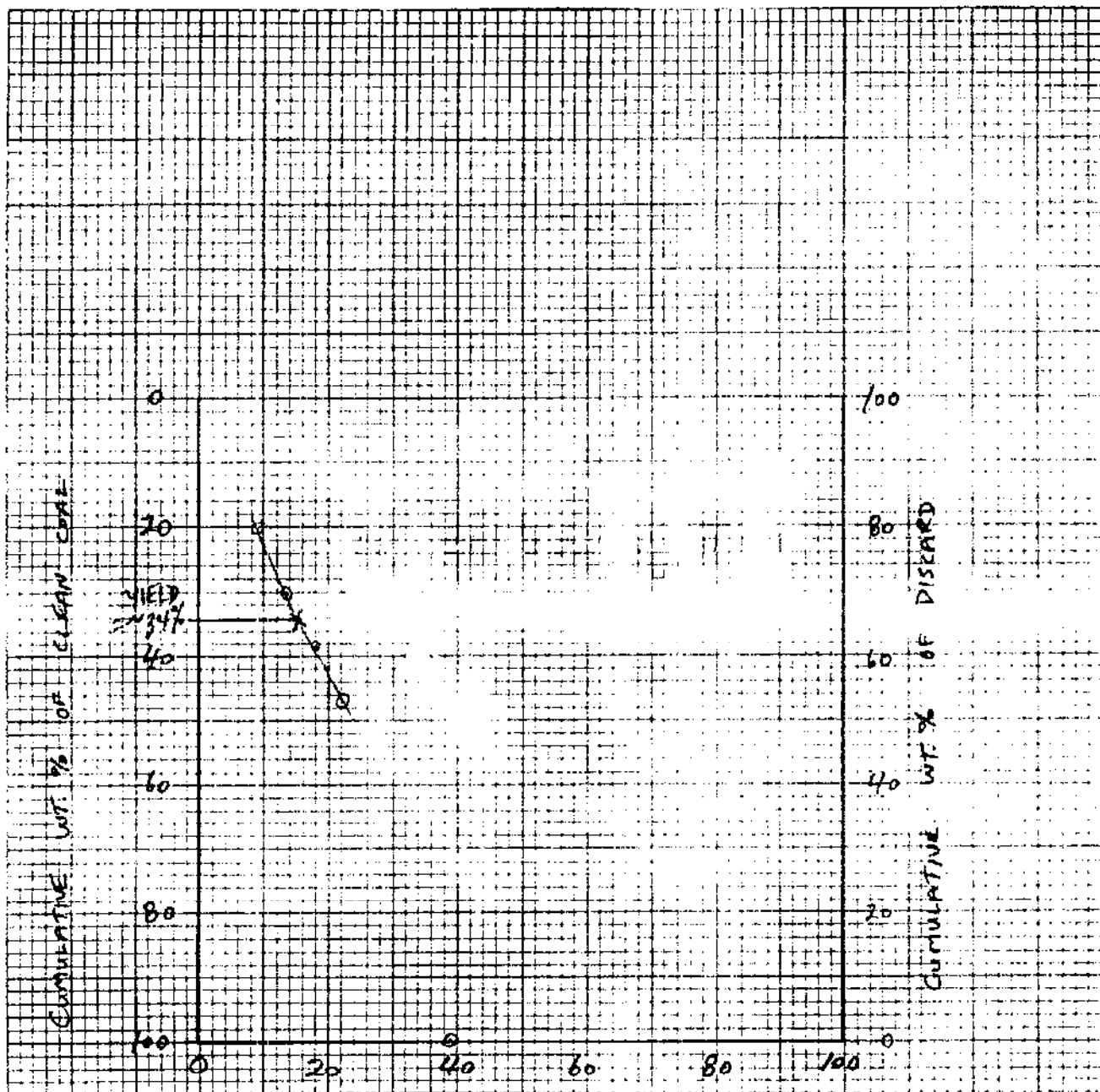
### PERCENT WEIGHT IGNITED BASIS

Silica	SiO <sub>2</sub>	44.73
Alumina	Al <sub>2</sub> O <sub>3</sub>	34.03
Titania	TiO <sub>2</sub>	2.11
Ferric Oxide	Fe <sub>2</sub> O <sub>3</sub>	11.69
Lime	CaO	4.24
Magnesia	MgO	0.52
Potassium Oxide	K <sub>2</sub> O	0.12
Sodium Oxide	Na <sub>2</sub> O	0.04
Sulfur Trioxide	SO <sub>3</sub>	1.86
Phos. Pentoxide	P <sub>2</sub> O <sub>5</sub>	0.36
Strontium Oxide	SrO	0.05
Barium Oxide	BaO	0.03
Manganese Oxide	Mn <sub>3</sub> O <sub>4</sub>	0.17
		<hr/>
		99.95

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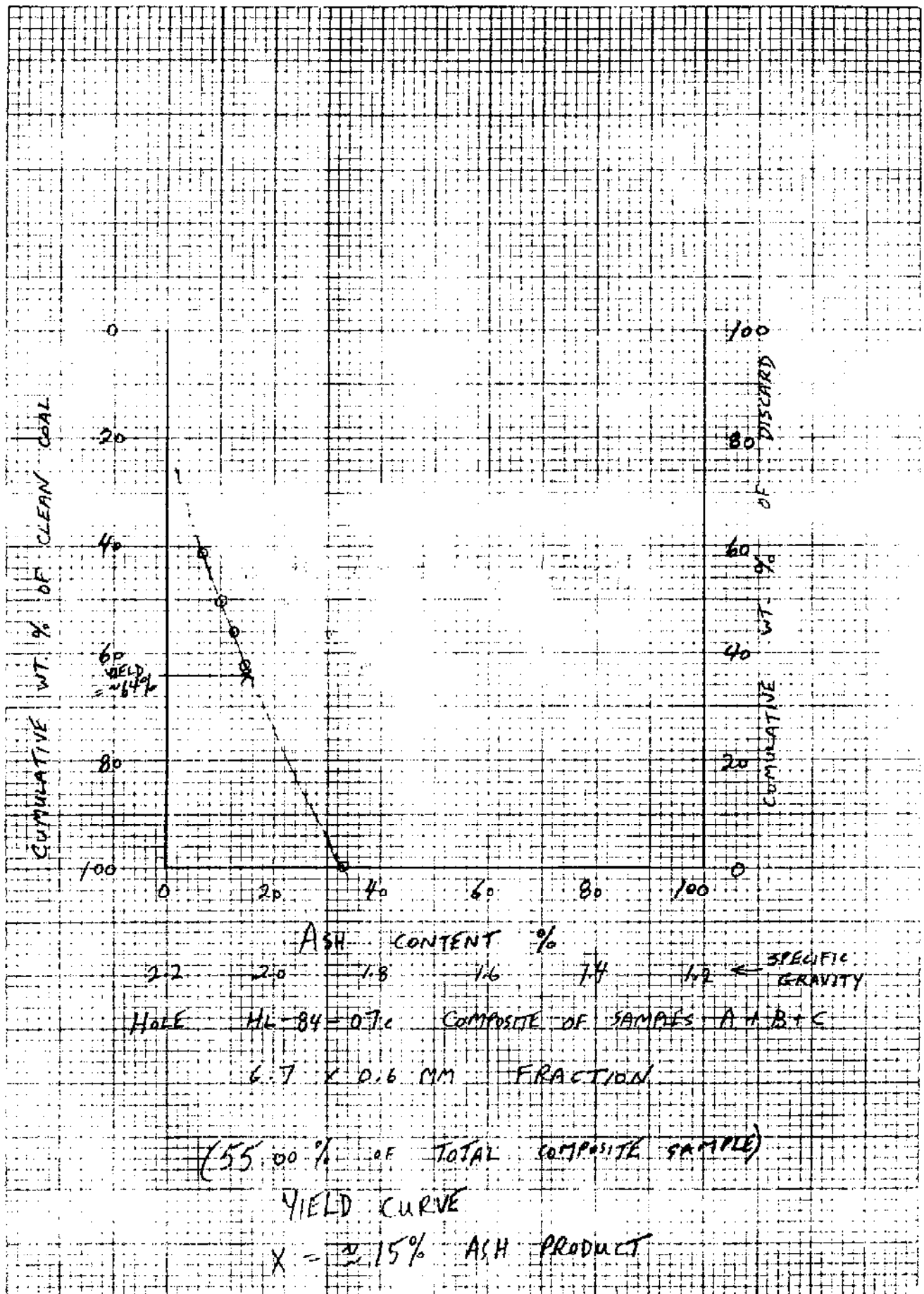
*R. Roberts*  
R. Roberts - General Manager

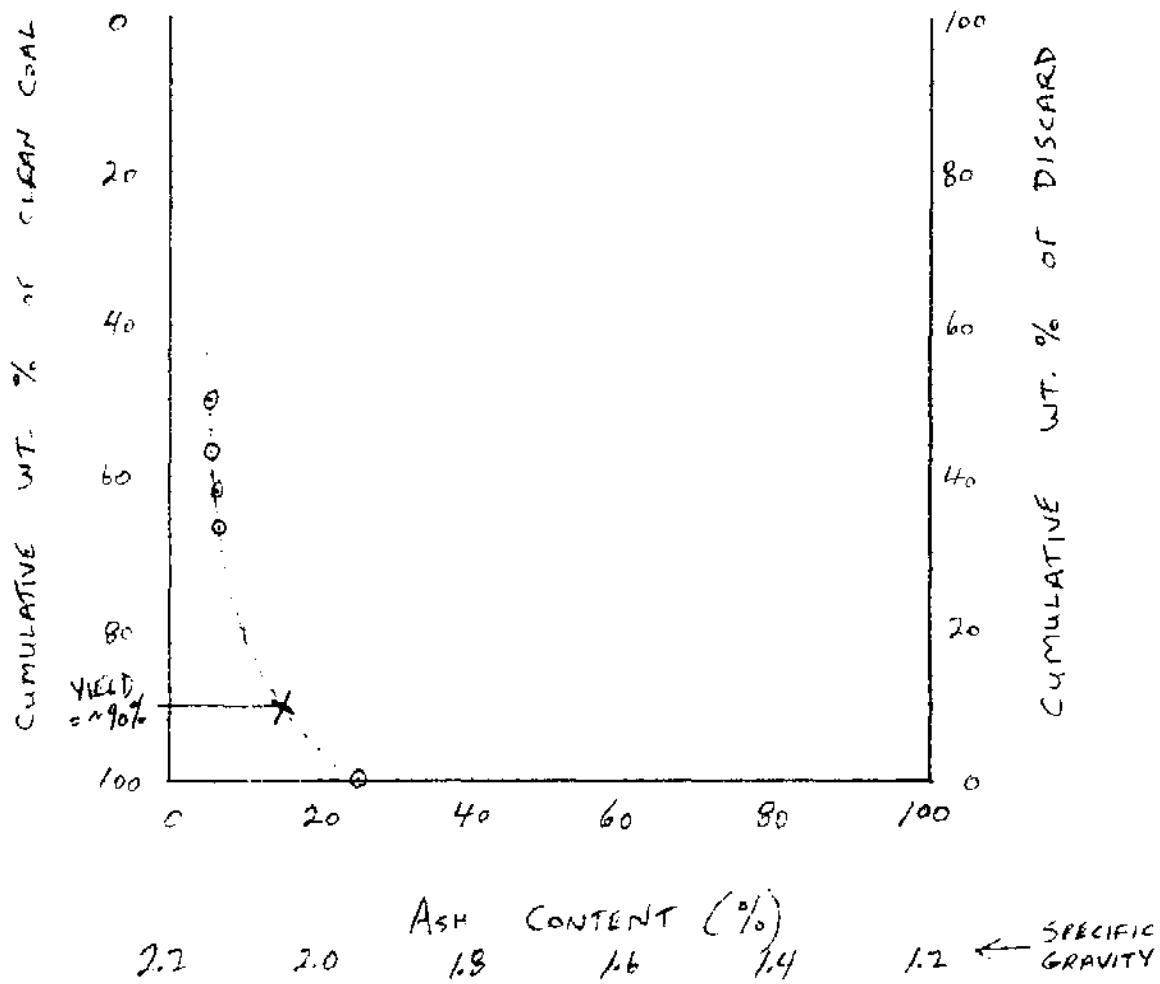
SIGNATURE AND TITLE



ASA CONTENT %  
 22      20      1.8      1.6      1.4      1.2  
 SPECIFIC GRAVITY  
 HOLE HL 84-07C COMPOSITE OF SAMPLES A, B, C  
 25 x 6.7 cm FRACTION  
 (44.76% OF TOTAL COMPOSITE SAMPLE)  
 YIELD CURVE  
 X = 75% ASA PRODUCT







HOLE HL-84-07c COMPOSITE OF SAMPLES A+B+C

0.60 mm X .015 mm FRACTION

(.01% OF TOTAL COMPOSITE SAMPLE)

YIELD CURVE

X =  $\approx$  15% ASH PRODUCT