HC-HAT CREEK 75(1) I

Assessment Report
for the

HAT CREEK

COAL EXPLORATION PROJECT

Conducted by

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

On Coal Licence Numbers

2991-3002, 3005-3008, 3655

NTS Area 92 I/12 & 13

by

L.T. Jory, Ph.D., P.Eng.

1 May, 1976

DOLMAGE CAMPBELL & ASSOCIATES LTD.
VANCOUVER, CANADA

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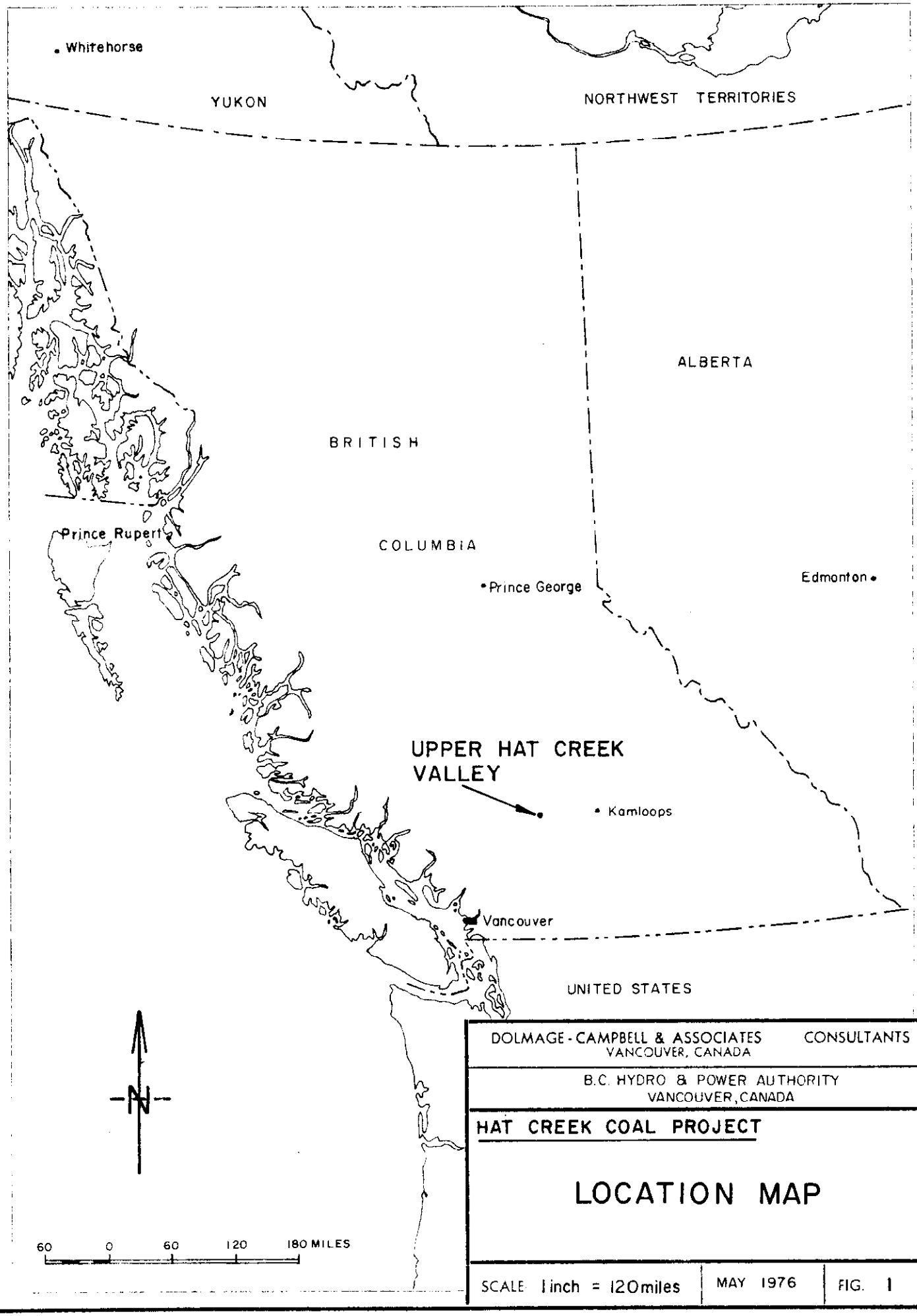

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HAT CREEK COAL PROJECT

LOCATION MAP

SCALE 1 inch = 120 miles | MAY 1976 | FIG. 1

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CONSULTING GEOLOGICAL & MINING ENGINEERS
1000 GUINNESS TOWER
VANCOUVER 1, B.C.

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On Coal Licence Numbers

12, 144, 2753-2762, 3003-3004,
3009-3013

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L.T. JORY, Ph.D., P.Eng.

1 December, 1975

LIST OF ILLUSTRATIONS

51° 00'

B.C.R.

PAVILION RANGE

Pavilion

Pavilion Lake

Bonaparte River

97

Cache Creek

TRACHYTE HILL

12

OUTLINE OF COAL LICENCES

HAT CREEK

CLEAR CREEK

Upper Hat Creek

Fig. 5

Fig. 3, 4

Lillooet

CLEAR RANGE

Fraser River

12

50° 30'

122° 00

River

97

CNR

CPR

Kamloops Lake

Savona

Ashcroft

Thompson

1

121° 30'

N

2 0 2 4 6 8 MILES

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HAT CREEK COAL PROJECT

INDEX MAP

SCALE 1 : 250,000 | MAY 1976 | FIG 2

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INTRODUCTION

The purpose of this report is to summarize the exploration work conducted by British Columbia Hydro and Power Authority (B. C. Hydro) on coal licences in Upper Hat Creek Valley during the spring and summer of 1975. Fieldwork has been underway on a reasonably continuous basis since the early summer of 1974 and is still continuing. Consequently, although the assessment periods for which this report is filed are 10 February to 23 September, 1975 and 16 May to 23 September, 1975, the exploration work conducted and the results obtained which are discussed herein may overlap these periods somewhat. However, all costs incurred during the assessment periods (and listed in the Application to Extend Term of Licence) have been separated from earlier or later costs for work conducted on the two licence groups for which work assessment has been filed.

The project has been administered and supervised by Dolmage Campbell & Associates Ltd. L. T. Jory, Ph.D., P.Eng., has been exploration manager and Mr. J. Rotzien has acted as field supervisor. The geological mapping was done by Mr. P. J. Street. Field assistants during the assessment periods were: D. McCallum, P. Imada, W. Wilmot, H. Svenson, G. Ellis, T. Cunningham, P. Northrop.

LOCATION

Upper Hat Creek Valley, in which the coal licences are situated, is located 120 miles northeast of Vancouver, B. C., midway between the towns of Lillooet and Ashcroft (Figs. 1 & 2). Railheads can be reached at Pavilion, on the B. C. Railroad, 15 miles to the northwest, and at Ashcroft, on the C.P. and C.N. railroads, 24 road miles to the east. Easiest access to the property is from the Trans-Canada Highway at Cache Creek, 19 miles to the east, via the secondary highway (No. 12) between Cache Creek and Pavilion. The closest regularly serviced airport is at Kamloops, 68 miles to the east.

The coal licences are situated in the broad, north-trending, grassland valley, about 15 miles in length, through which flows the upstream portion of Hat Creek. From the north end of this valley Hat Creek flows northeastward through a narrow valley into the Bonaparte River, which flows south to join the Thompson River at Ashcroft.

Upper Hat Creek Valley lies within the Interior Dry Belt of British Columbia at a mean elevation of about 3500 feet. The valley is flanked by somewhat

Upper Hat Creek Valley lies within the Interior Dry Belt of British Columbia at a mean elevation of about 3500 feet. The valley is flanked by somewhat subdued mountains that rise to elevations of 6000-7000 feet four miles to the west of Hat Creek and to elevations 5000-6000 feet six miles to the east. The uplands are covered by thin forests and the valleys are sparsely-treed open ranges of grass and sage.

Rock outcrops are sparse in the floor of the valley. Overburden, consisting of loosely compacted sand and gravel, ranges in depth from 10 to 300 feet in the drilled portions of the coal licences.

COAL LICENCES

All of B.C. Hydro's coal licences in Upper Hat Creek Valley are listed below and shown on Figure 3 although the assessment work, which this report supports, applies only to those licences in groups No. 23 (Yellow) and 24 (Brown).

	Licence No.	Area (acres)	Location*
	2753	640	31/20/26
	2754	638	E½ of 6/21/26 & E½ of 7/21/26
	2755	636	18/21/26
GROUP	2756	639	13/21/27
No. 21	2757	636	14/21/27
ORANGE	2758	630	11/21/27
	2760	319	W½ of W½ of 12/21/27 & W½ of W½ of 1/21/27
	3003	640	19/20/26
	3004	640	30/20/26
	9 licences	5,418 acres	
	12	640	E½ & E½ of W½ of 1/21/27 & W½ of W½ of 6/21/26
	144	320	E½ of W½ of 6/21/26 & E½ of W½ of 7/21/26
GROUP	2759	588	2/21/27
No. 22	2761	640	35/21/27
RED	2762	640	36/20/27
	3009	640	13/20/27
	3010	320	E½ of 23/20/27
	3011	640	24/20/27
	3012	640	25/20/27
	3013	640	26/20/27
	10 licences	5,708 acres	

	Licence No.	Area (acres)	Location*
	2996	635	30/19/26
	2997	642	31/19/26
GROUP	3000	642	6/20/26
No. 23	3001	642	7/20/26
YELLOW	3002	640	18/20/26
	3005	320	N½ of 25/19/27
	3006	640	36/19/27
	3007	640	1/20/27
	3008	640	12/20/27
	9 licences	5,441 acres	
	2991	320	W½ of 17/19/26
	2992	316	N½ of 18/19/26
GROUP	2993	640	19/19/26
No. 24	2994	321	W½ of 20/19/26
BROWN	2995	320	W½ of 29/19/26
	2998	320	W½ of 32/19/26
	2999	320	W½ of 5/20/26
	3655	641	W½ of 8 & 17/20/26
	8 licences	3,198 acres	
Totals	36 licences	19,765 acres	

* Section/Township/Range (West of the 6th Meridian, Kamloops Land District).

HISTORY

Coal in Upper Hat Creek Valley was reported by Dr. G.M. Dawson of the Geological Survey of Canada in 1877 and 1894. The only coal exposures were along the banks of Hat Creek, where the overburden cover had been removed by creek erosion. By 1925 three shallow shafts and two short adits had been driven into the coal along the creek and seven holes had been bored into it. No further work was done on the deposit until 1933.

From 1933 until 1942 a few hundred tons of coal a year were produced from the property and sold in the nearby towns and villages. No work was done from 1942 to 1957. In 1957 the property was optioned by Western Development and Power Ltd., a subsidiary of B.C. Electric Co. Ltd., at which time one Crown Grant claim was extensively explored by surface diamond drilling.

Following the acquisition of B.C. Electric by the Province of British Columbia, the ownership of the one explored Crown Grant claim and two coal licences comprising the Hat Creek coal property passed to British Columbia Hydro and Power Authority. No further exploration was done on the property until mid-1974, when B.C. Hydro began definitive drilling of the deposit. In 1974 B.C. Hydro acquired coal licences covering most of Upper Hat Creek Valley.

GEOLOGICAL SETTING

The valley of Upper Hat Creek is underlain by sedimentary rocks of the coal-bearing Coldwater Formation, of early Tertiary age, flanked by older sedimentary and igneous rocks of the Cache Creek Group, the Spences Bridge Group, and the Mount Lytton batholith, and capped in several places by later Tertiary volcanic rocks.

OVERBURDEN

Bedrock in the valley is for the most part mantled by overburden ranging from a few feet up to 400 feet in thickness, consisting mostly of glacial till, or sands and gravels deposited under conditions associated with the glaciation of the valley. As a result, outcrops generally are sparse, and rocks of the Coldwater Formation, in particular, are exposed in only a very few places, including creek-bed outcrops near the north end of the valley that gave rise to the initial discoveries of coal at Upper Hat Creek. Glacial till extends to the west side of the valley for its full length, and ranges in consistency from a well-compacted, relatively impermeable basal-type boulder-silt till along the centre of the valley to a loosely compacted ablation till towards the west. Much of the east side is blanketed by silt, sand and/or gravel, some of it having been laid down (as in the northeast corner of the valley) in a glacially-dammed lake, or by streams discharging into such a lake. From topography, drilling results, and the known distribution of outcrops, it appears that overburden is relatively shallow over much of the east side of the valley. At the foot of steep limestone bluffs at the north end of the valley, and at the south end near the head of Oregon Jack Creek, talus slopes cover an appreciable area.

BEDROCK

Along the sides of the valley, and in much of the southern half, the Coldwater Formation is also covered by extensive volcanic rocks of Late Tertiary, probably Miocene, age. The varieties of volcanic rocks are described under "Exploration Results - Rock Types".

The sedimentary rocks of Upper Hat Creek Valley are the erosional remnants of a formerly much larger sedimentary basin that may have extended for some hundreds of miles along the eastern flank of the Coast Range mountains that were undergoing tectonic uplift during Early Tertiary time. The existing coal deposits of the Princeton, Tulameen, Merritt and Cariboo (south of Quesnel) areas very likely had a common origin in river-delta swamps along the shoreline of a continental sea that trended northwest-southeast along the flank of the emerging Coast Range mountains.

The Coldwater Formation in Upper Hat Creek occupies a "basin" in a geomorphologic sense only; tectonically, it lies in a "graben", or down-dropped fault block. On the east, west and north, the block is bounded by major longitudinal fault systems, and is cut in several places by oblique transverse faults, some of which transect and offset the longitudinal fault zones. Within these fault blocks, the coal-bearing sedimentary rocks are broadly folded, forming a southward-plunging syncline near the north end of the valley, and a complex of anticlines and synclines further south. As a result of this faulting and folding, the coal beds of the Coldwater Formation lie at widely-varying depths below the surface of bedrock, the depth changing abruptly within a few tens of feet of horizontal distance.

Individual rock types are described under "Exploration Results".

DESCRIPTION OF EXPLORATION WORK CONDUCTED

SURVEYING

Vertical aerial photography, ground control and photogrammetric mapping were carried out in Upper Hat Creek Valley in June 1975. The work was contracted to McElhanney Surveying and Engineering Ltd. of Vancouver, B. C.

From the aerial photography, a topographic map was prepared at a scale of 1" = 2000', covering the valley of Upper Hat Creek for a distance of 15.7 miles from north to south, and a width of 6.6 miles. This distance takes in the valley from just north of the junction of the Upper Hat Creek road with Highway 12, to Blue Earth Creek, a tributary of Hat Creek at the south end of the valley. Laterally, the map extends to about the 5,000 foot elevation on the east side of the valley, and 5,000 to 7,000 foot elevation on the west side.

Elevation controls were established by setting up a total of eleven bench marks, and running third-order levels from a Dominion Government geodetic bench mark at Carquile, near the junction of Highways 12 and 97. A total of 17 other stations provided vertical and horizontal control by triangulation.

Before the aerial photography was carried out, all existing drill sites were, where practicable, flagged so as to be visible from the air. The locations and elevations of these drill sites could thus be determined by photogrammetry.

The grid system of coordinates that had been set up for use in an earlier drilling program in 1957-1959 was re-established in 1974 for the current exploration project. The grid was amended in 1975 by adding 70,000 feet to the northings and 10,000 feet to the eastings, in order to establish a consistent system of positive coordinates for subsequent data processing applications. The 1975 surveying program tied in the control stations and drill holes, as noted above, with this system of coordinates.

An uncontrolled topographic map, at a scale of 1" = 400', covering an area of about 11 square miles, had been prepared in 1974 by Pacific Survey Corporation, of Vancouver, B. C., from aerial photography flown by the Federal Government in 1971. As the exploration program advanced, it required topographic surveying of greater precision and wider areal coverage.

From the 1975 aerial photography, in addition, an orthophotograph was prepared at the same scale as the topographic map (1" = 2000'), covering the same area. Topographic maps and orthophotographs were also made at a scale of

1" = 400', to cover two smaller areas, adjacent to each other, that included the principal exploration drilling targets, i.e. the No. 1 and No. 2 coal deposits.

The base map at 1" = 2000' on which geology and other information is plotted, (Fig. 4), is itself submitted herewith as the product of the above-described survey work for which credit is claimed in the present assessment report.

DRILLING SITE ACCESS AND RECLAMATION

A total of 11,000 feet of roads were either constructed or up-graded to provide access to drilling sites during the period covered by the present assessment report. Some of the work consisted of making relatively short new trails from existing ranch roads to proposed drill sites, but an important part of the work was the improvement of a virtually-abandoned logging road along the west margin of Upper Hat Creek Valley. The work was carried out by Mr. E. Lehman, a resident of the valley.

As a matter of routine, all drill sites were cleaned-up after drilling finished, levelled, seeded with a suitable mix of grasses, and harrowed. The drill crews cleaned-up the sites and did much of the levelling; Mr. Lehman also assisted on occasion. The seeding and harrowing were done by another resident of the valley, Mr. D. Riddler, using a team of horses to pull the harrow, which proved much more practical than a tractor in the restricted space of the typical drill-site.

Drill-hole collars were marked by a 4 x 4 post, painted white and stencilled with the number of the drill-hole.

DRILLING

Fifteen holes totalling 14,340 feet were drilled during the assessment period, six on licenses of the "RED" group and nine in the "ORANGE" group. Footages, coordinates, etc., are listed in the accompanying table. The drilling was contracted to D.W. Coates Enterprises Ltd.

In all instances, overburden was triconed. Bedrock was cored continuously, using NQ wireline equipment (Longyear 38 drills). Drilling was underway prior to the initial assessment dates (10 Feb. and 16 May) but ended in late August, before the end of the assessment periods. It was halted during the spring break-up period in April, but resumed in early May. Acid etch dip tests were taken in most holes.

Hole No.	License Group (R=Red O=Orange)	Coordinates North	Coordinates East	Feet Overburden	Feet (1) Coal	Total Depth	Remarks
75 - 54	O	65489	21266	0	0	500	Completed
- 63	O	60155	23054	250	0	1,000	Completed
- 64	O	57527	22979	210	0	487	Abandoned-drilling difficulties
- 64A	O	57560	22867	192	0	549	Abandoned-drilling difficulties
- 65	O	56297	24335	150	0	740	Abandoned-fault
- 66	R	55087	14655	111	0	128	Abandoned-flowing sand
- 67	R	55197	15736	71	0	715	Completed
- 69	R	55770	19738	110	0	1,338	Completed
- 70	R	51254	19788	100	0	1,280	Abandoned-squeezing
- 71	R	55295	17911	255	0	1,001	Completed
- 77	O	59714	20655	97	1598	1,846	Abandoned-squeezing
- 80	O	63242	20075	50	580	1,752	Completed
- 82	R	59812	19806	182	555	1,491	Completed
- 84	O	60139	21472	200	0	621	Abandoned-fault
- 85	O	60139	21472	215	142	892	Abandoned-squeezing
						14,340	
							"Red" group - 5953 feet
							"Orange" group - 8387 feet

(1) Total thickness of coal beds; includes thin waste bands.

GEOPHYSICS

Surface

In the latter half of May 1975 a trial surface gravimeter survey was conducted in the vicinity of a known thick section of coal (drill hole No. 62). The results were considered sufficiently encouraging to justify extending the coverage over the entire southern part of the valley on east-west lines 4000 feet apart. Eventually, similar coverage was extended over the No. 1 deposit and a potential thermal plant site to the north of the No. 1 deposit. Also, one line was extended three miles to the east of the No. 1 deposit in an area where geological mapping showed thin coal beds to be present in favourable Coldwater Series sedimentary rocks.

The gravity fieldwork, carried out by C.A. Ager and Associates Ltd., was completed in late July, 1975. The results, for which no terrain corrections have been made, are shown on Figure 5. Final preparation of profiles is in progress. The gravity low generally conforms to the coal-bearing areas of the valley; terrain corrections will cause the position of the "low" to shift easterly.

Down-hole

As standard practise, all drill holes on the Hat Creek property were electro-logged. Exceptions occurred only when conditions encountered in a drill hole prevented such logging. The major problem encountered was squeezing of the hole walls which prevented passage of the logging equipment (and might have resulted in loss of the down-hole equipment). To overcome this difficulty as much as possible, most holes were logged through the hole casing and/or the drill rods. However, where squeezing became excessive, even the drill stem could not be left in the hole and thus geophysical logging was impossible.

All down-hole electro-logging was done by Roke Oil Enterprises Ltd. employing a truck-mounted recorder and probe winch. The two most common logs recorded were density and gamma. Less commonly employed were caliper (hole diameter) and resistivity. Results were recorded on transparent logs with a scale of 1 in. = 20 ft. These were later reduced to 1 in. = 40 ft. for convenience of handling.

The geophysical logs for the holes drilled on the RED and ORANGE groups during the assessment period are appended, (Appendix II).

The following table indicates the proportion of drill hole footage on the RED and ORANGE groups that it was possible to geophysically log.

		GEOPHYSICAL LOGGING FOOTAGE			
Hole No.	Length (ft.)	Gamma	Density	Caliper*	Resistivity*
54	500	--	--	--	--
63	1,000	974	974	--	--
64	487	--	--	--	--
64A	549	--	--	--	--
65	740	--	--	--	--
66	128	--	--	--	--
67	715	670	670	140	140
69	1,338	1,320	1,320	--	--
70	1,280	886	886	170	170
71	1,001	950	950	--	--
77	1,846	1,830	1,830	556	556
80	1,752	1,720	1,720	--	--
82	1,491	1,491	1,491	--	--
84	621	590	590	--	--
85	892	870	870	--	--
Total	14,340	11,301	11,301	866	866
%	100	79	79	6	6

* Logged in open-hole only; not through drill stem or casing.

SAMPLING AND ANALYSES

The core from all drill intersections of coal, shaly coal and coaly shale was sampled and analysed. Sample intervals varied from a minimum of about 5 feet (occasionally less) to a maximum in the order of 50 feet. The interval was generally determined by lithology except where lengthy homogeneous sections were encountered; in such cases the maximum interval was applied. The core was split lengthwise by diamond sawing with one half sent for analyses and the other half retained in the core boxes (which are stored on the site).

Analyses were done by Commercial Testing & Engineering Co., Loring Laboratories Ltd. and General Testing Laboratories with check samples from each being sent to the other two.

Proximate analyses were obtained for all samples whereas ultimate, F.S.I., grindability, specific gravity, equilibrium moisture, etc. were obtained only for a selected few samples. Some rock tests have also been conducted as well as preliminary mineralogical studies. After the results have been checked they are input to the B.C. Hydro computer. The computer output is in the form of individual samples (at 0% and 20% moisture) and drill hole averages. Further manipulations are possible and have been done. Computer print-out are appended (Appendix III). Analyses certificates are on file in the offices of Dolmage Campbell & Associates Ltd.

GEOLOGICAL MAPPING

Concurrently with the diamond drilling program, geological mapping of Upper Hat Creek Valley was undertaken. The mapping had been started in the fall of 1974 but was discontinued during the winter months.

In view of time limitations, mapping effort was concentrated on areas in which the relationship of the Coldwater Formation to the later volcanic rocks might be clarified. Thus the northwest, northeast and east-central portions of the valley received the most attention. For geological data pertinent to the western margin and south end of the valley, acknowledgement is made of the courtesy of Dr. N. Church, of the B.C. Department of Mines, who spent several weeks in the Hat Creek-Cache Creek area during the summer of 1975, and kindly made the results of his work available.

Field mapping was carried out mostly by Brunton-compass traverses on foot, using four-wheel-drive vehicles for access to traverse areas. Observations were located on overlays over aerial photographs and the data compiled on a topographic map at a scale of 1" = 2000'.

The geological compilation map submitted with this report (Fig. 3) is of a preliminary nature. A final interpretation will require microscopic examination of rock specimens, and correlation of mapping data with the results of drilling and geophysical surveys.

EXPLORATION RESULTS

ROCK TYPES

a. Basement

Cache Creek Group - Permian:

This group is divided into two components: the Marble Canyon Formation, consisting of massive limestone, in places recrystallized; and an unnamed mixed suite of greenstones, phyllites, cherts and other sedimentary and volcanic rocks displaying slight to moderate low-grade metamorphism.

The Marble Canyon limestones are in fault contact with Tertiary rocks on the northwest, north, east-central and southeast margins of Upper Hat Creek Valley. The mixed suite abuts against Tertiary sedimentary rocks on the northeast margin, i.e. on the western slopes of the Trachyte Hills, but the nature of the contact is not clear. The Marble Canyon limestones in some places enclose small lenses or pockets of the greenstone suite. In Upper Hat Creek Valley, this is observed in the massive limestone bluffs just north of the road leading to Oregon Jack Creek, and it is a familiar feature of the limestone deposit being worked by Steele Bros. Ltd. in their quarry near Crown and Pavilion lakes. Much of the Marble Canyon limestone is so massive that bedding cannot be determined, but at the north end of the valley, there is evidence of bedding striking approximately north to northwest, with very steep to vertical dips. By contrast, on the east-central margin of the valley, dips are also steep but the bedding strikes approximately east-west.

Spences Bridge Group - Cretaceous

Rocks of this group are exposed along the west-central and southwest margins of the valley. The few outcrops seen in the course of mapping consist mostly of dacite and andesite volcanics showing a moderate degree of alteration. They were not seen in contact with the Tertiary sedimentary rocks.

Mount Lytton Batholith - Cretaceous

Granodiorite and diorite intrusive rocks flank the northwest corner of Upper Hat Creek, but appear to be separated from the Tertiary sedimentary rocks in the valley by a narrow septum of Cache Creek limestones of the Marble Canyon Formation.

b. Coldwater Formation - Eocene (Early Tertiary)

Although outcrops are rare, it is known from diamond drilling that the entire valley of Upper Hat Creek is underlain by siltstones, sandstones, conglomerates and coal that make up the Coldwater Formation. Also, numerous exposures of rhyolitic tuffaceous rocks, in the east-central portion of the valley, may form part of this unit. Knowledge of the Coldwater Formation in Upper Hat Creek Valley comes mostly from drill cores.

Coldwater beds are more abundantly exposed in an area that straddles Highway 12 several miles to the northeast of Upper Hat Creek, but the rocks seen in that location probably belong to a portion of the stratigraphic section lower than that seen in drilling in Upper Hat Creek Valley. They consist of a cyclical sequence of conglomerate, sandstone, and siltstone, with minor shale and volcanics, of which four cycles totalling about 4500 feet in thickness were mapped by Dr. T. Hoy of the B.C. Department of Mines in 1974.

Of these, the uppermost 1000 feet may correspond to the "basal" beds, intersected by drilling in Upper Hat Creek Valley, that underlie the coal-bearing beds. The drilled portion of the Coldwater section may total as much as 5800 feet of conglomerate, siltstone, shale and coal; of this the "basal" 1000 feet just noted (in very general figures) includes appreciable sandstone and conglomeratic sandstone of volcanic origin, some of the enclosed pebbles apparently being derived from older volcanics, such as the pre-Tertiary Spences Bridge Group. Of this 5800 feet, up to 2200 feet consists of coal with some intercalations of minor siltstone and sandstone.

This thickness for the coal is derived by tentative correlation of coal strata from a number of drill holes in No. 1 deposit. However, in No. 2 deposit there may also be a true thickness of coal of around 2200 feet, but this is made up of a principal layer up to 1500 feet thick, and another layer (of lower quality than the former) of about 700 feet in thickness. The top of the principal layer has been recognized in several holes by the gradational character of its contact with overlying clayey siltstones, but no drill hole has yet traversed the entire thickness of this coal layer. As the two layers of coal appear to be in fault contact, it cannot be entirely certain that there is no stratigraphic overlap.

The coal sequence is overlain by at least 1000 feet of uniform siltstone which may or may not have thin coal or coaly beds intercalated with it immediately above the main coal layer. This may be equivalent to a thick monotonous section (1000-2000 feet thick) of claystone that is adjacent to a fault zone that truncates No. 2 deposit on its west side. The claystone here is overlain by interbedded siltstone and conglomerate.

The Coldwater Formation could thus be up to 9300 feet thick, as follows:-

Siltstone or claystone with overlying conglomerate	2000	5800'
Coal	2200	
Coarser clastics, including volcanogenic sandstones and conglomerates	1600	
Remainder of coarse cyclincal clastics as in northeast block	3500	
	9300	

An eroded surface was developed on this sequence, and this in turn was covered in part by Late Tertiary volcanic rocks.

c. Volcanic Rocks

These volcanic rocks, all probably of later Tertiary, e.g. Miocene, age, comprise several phases whose interrelationships may be surmised, but cannot be proven because of the lack of contacts between rocks of different phases.

From older to younger (probable order), they are:-

i. Flow rhyolite and rhyolite tuff, lapilli tuff, tuffaceous siltstone, sandstone and conglomerate.

The most northerly exposure of this rock is in the nose of the low hills immediately east of the upper road and just north of Medicine Creek, where westerly-dipping (40-45°) tuffaceous sandstone and siltstone appear to be roughly conformable with basalts and dacites that flank these hills. This rock is seen again in a series of exposures in the wooded hills of the east-central portion of Upper Hat Creek Valley, close to the road, from White Rock Creek for perhaps three miles to the north. They include lapilli tuff (with small 'nodules' of darker volcanics in a white matrix), massive dense tuffaceous sandstone, and silty to sandy tuffs that include conglomerates and clearly show water-laid, horizontal stratification. One such exposure even has large angular, rafted blocks of older basalts within well stratified tuffs. One occurrence of white rhyolite with very distinct flow banding, lying within a few hundred feet of a (probable) fault contact with Cache Creek Group limestones northeast of the head of White Rock Creek, probably also belongs to this unit.

No estimate of total thickness of the rhyolite volcanics can be made, but if the cliffs of conglomeratic tuff in Medicine Creek are part of this unit, they may be at least 150 to 200 feet thick.

ii. Interfingered breccias and flows of basalt, or of reddish-brown volcanic rocks of slightly less basic composition. In places the breccia matrix consists of well-lithified material of composition comparable with that of the fragments, elsewhere (but commonly in close association with the former) it is of a more friable, less cohesive material resembling a volcanic mud.

These rocks flank the low hills that run northward from the White Rock Creek area to Ambusten Creek, and may include the area between Ambusten and Medicine creeks. In only two places are they actually exposed on the tops of these hills. They probably include the breccias resembling mud-flows that are seen along Upper Hat Creek road just south of Ambusten Creek. They may also include basalt breccias near Finney and Aleece lakes (NW margin of Upper Hat Creek Valley).

iii. Dacites and/or andesites, in flows and breccias, medium to light greenish-brown or green, in places with a pronounced platy parting habit that may reflect flow-structure or the cooling of sheets of molten flow material. In places they are almost cherty.

These rocks are seen almost exclusively flanking the hills just east of the road north of Medicine Creek, and because of their steep westerly-dipping flow structure and parting planes, at first seem roughly conformable with the nearby Coldwater beds intersected in DDH 74-36, and thus old enough to have undergone deformation along with the Coldwater Formation. However, the flow structure is probably an initial, not a secondary or deformational, structure, and these rocks are most likely to be part of the late Tertiary (Miocene) vulcanism.

iv. Basalt flows, dark brown, very fresh-looking, commonly with fine-grained olivine phenocrysts. These rocks are partially preserved as a capping of the line of hills in ii. above, and in a small area just north of Harry Lake (NE margin of Upper Hat Creek Valley), where they form a series of three or more sill-like ledges with abruptly stepped edges.

v. Basalt scoria and breccias, of relatively fresh appearance, partly surrounding the "Dry Lake" of the No. 1 coal deposit area, and forming a short ridge or bench about one mile northwest of Dry Lake, uphill to the west of the Houth meadows (NW corner of Upper Hat Creek Valley).

Amygdaloidal basalts that underlie a prominent elongate hill immediately south of Finney Lake appear to be old enough possibly to be Early Tertiary in age, perhaps older than the Coldwater Formation.

Until radioactivity-dating of these various volcanics is available, it is reasonable to suggest that all of them (except the last-mentioned) formed part of a series of volcanic episodes that followed Coldwater deposition in late Tertiary time, ie. they probably correspond generally to the Kamloops group of volcanic rocks seen near Cache Creek and between there and Kamloops. One is tempted to suggest that the striking linearity of the "flanking" volcanics along the eastern slopes of Upper Hat Creek Valley could be linked to a system of volcanic vents and fissures, perhaps controlled by the same fault systems that produced the Hat Creek graben structure. However, other than this partly-linear distribution of volcanic outcrops there is no evidence to support the suggestion.

CORRELATION

Correlation of coal and other rock types from drilling results is difficult from the amount of data presently available. Lithological and down-hole geophysical logging and proximate analytical results are all employed where available. Physical problems encountered are wide hole spacing (due to the early stage of exploration, topographic conditions, and land ownership) and hole squeezing (which results in non-completion of some holes and the inability to geophysically log others). Geological hindrances to correlation are faulting, lensing of units along strike and/or dip, folding, variation in ash or carbonaceous components in coal and coaly rock, and lack of marker horizons.

Gross correlations can be based on coal versus non-coal sections, and on conglomerate or conglomeratic sandstone zones. More detailed correlations generally must rely on geophysical signatures of rock units which, because of the reasons noted above, are often non-consistent even over short lateral intervals.

It is expected that as more data becomes available from closer spaced drilling, correlations within the coal deposits will become easier and the configuration of the coal seams will be much better understood.

NATURE AND CONFIGURATION OF COAL

Exploration conducted since the early summer of 1974, and still continuing, has indicated two separate coal deposits in Upper Hat Creek Valley. The No. 1 deposit is situated near the north end of the valley, and the No. 2 deposit in the approximate north-south centre of the valley (Fig. 3). The drilling filed as work-assessment on Groups No. 23 (Yellow) and No. 24 (Brown) was all done about the No. 2 deposit.

The No. 1 deposit contains individual coal beds up to several hundred feet in thickness and has a maximum aggregate coal thickness in the order of 1600 feet. The seams have been dislocated by a number of steeply-dipping normal faults striking approximately northwest and northnortheast. The deposit is about one mile in north-south length and slightly less than a mile in width at it's southern end. It consists of a southerly plunging syncline with limbs dipping at 30° to 60°. There are indications that the southern limits of the deposit are due to depositional features (shaling-out) whereas the north, east and west limits are principally a result of erosion of an originally larger deposit (with possibly some shaling-out to the west).

The No. 2 deposit is not well understood as yet. It is elongated in a NNW direction; total length is approximately 19,000 feet and average width about 2500 feet. It locally subcrops at bedrock surface but elsewhere may be overlain by up to 600 feet of fine grained clastic sedimentary rocks. Maximum drilled vertical thickness is 1950 feet. Present, rather sparse, information suggests that the coal may occur as a gentle anticline with axis approximately along the elongate centre of the deposit. Both limbs may be disrupted or terminated by steeply-dipping normal faults.

COAL ANALYSES

Results of proximate analyses indicate the following characteristics for the Hat Creek coal deposits, (at 20% moisture):

	Maximum	Minimum	Range	Mean
Ash (%)	65.7	9.6	56.1	28.4
Volatile Matter (%)	39.1	9.9	29.2	26.8
Fixed Carbon (%)	39.4	1.7	37.7	23.9
Gross Calorific Value (Btu/lb.)	9013	519	8494	5814
Sulphur (%)	1.9	0.0	1.9	0.13

Moisture (%) - in-situ moisture is estimated to be 20%.

The relationship between ash and calorific value can be expressed by the following regression equation:

$$\text{Ash (\%)} = 13080 - 160.6 \times \text{CV (Btu/lb.)}$$

As more data becomes available these figures may alter slightly. As well, results for the No. 1 and No. 2 deposits will be determined separately.

The rank of the coal is Subbituminous B; it is non-coking.

DOLMAGE CAMPBELL & ASSOCIATES LTD.
CONSULTING GEOLOGICAL & MINING ENGINEERS
1000 GUINNESS TOWER
VANCOUVER 1, B.C.

CONCLUSIONS

At least two major coal deposits, termed No. 1 and No. 2, occur in Upper Hat Creek Valley within coal licences held by British Columbia Hydro and Power Authority. Exploration work conducted within portions of these licences, Group No. 23 and Group No. 24, during the period 1 May, 1975 to 1 May, 1976 has helped to indicate the extent, limits, configuration, and quality of the No. 2 deposit.

Diamond drilling results (lithologic logs, geophysical logs and analyses) have provided the most definitive information about the coal characteristics and configuration. The geological mapping has contributed to a better understanding of relationships of various rock units and of the composition and structure of the individual units. The gravity survey results have shown that the two known deposits occur in a distinct linear gravity low; it can therefore be postulated that more deposits or coal occurrences may be situated elsewhere within this anomalous zone.

Exploration of the deposits and the valley is continuing.

Respectfully submitted,

DOLMAGE CAMPBELL & ASSOCIATES LTD.

L.T. Jory, Ph.D., P.Eng.
Exploration Manager.

APPENDIX II

GEOPHYSICAL LOGS OF DRILL HOLES

NOTE

Computer print-outs of coal analyses summaries are not available at present for the following holes:

75- 78
75- 99
75-104
76-115
76-119

APPENDIX III

COAL ANALYSES SUMMARIES

DIAMOND DRILL HOLE 75-068

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS						ESTIMATED IN-SITU MOISTURE OF 20.00%						
			% EQUIL	% AS RECVD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	1203.5	53																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	612.5	13																
SODA & POTASH TESTS:		7																
MAXIMUM				21.69	75.79	41.35	44.45	11139	1.62	0.392	0.431	60.63	33.08	35.56	8911	1.30	0.313	0.345
MINIMUM				8.97	14.19	16.89	6.30	1119	0.32	0.216	0.018	11.35	13.51	5.04	895	0.25	0.173	0.015
RANGE				12.72	61.60	24.46	38.15	10020	1.30	0.176	0.413	49.28	19.57	30.52	8016	1.05	0.140	0.330
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		53		13.41	48.55	27.85	23.59	5501	0.70			38.84	22.28	18.87	4400	0.56		
ARITHMETIC MEAN (SERIES 1-199)		53		13.63	48.33	28.00	23.66	5522	0.68	0.298	0.237	38.66	22.40	18.92	4417	0.54	0.238	0.190
STANDARD DEVIATION				2.64	14.00	5.72	8.50	2216	0.30	0.054	0.123	11.20	4.57	6.80	1773	0.24	0.043	0.099
COEFF. OF VARIATION %				19.39	28.97	20.41	35.92	40.13	44.33			28.97	20.41	35.94	40.13	44.80		

REGRESSION EQUATIONS (DRY BASIS): Y = 83.80 - 0.00639X WHERE Y = PERCENTAGE OF ASH,
X = 13096.59 -156.27Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9896

<><> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES,
ONLY THE 36 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00%DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-073

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES % EQUIL	MOISTURES % AS RECVD	DRY BASIS % ASH	DRY BASIS % V.M.	DRY BASIS % F.C.	DRY BASIS GROSS BTU /LB.	DRY BASIS % SULFR	DRY BASIS % SODA	DRY BASIS % POTAS	ESTIMATED IN-SITU MOISTURE OF 20.00% % ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	1674.0	62																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	264.5	9																
SODA & POTASH TESTS:		6																
MAXIMUM				27.00	74.19	40.88	39.18	9821	1.30	0.739	0.787	59.35	32.71	31.35	7856	1.04	0.592	0.629
MINIMUM				9.42	19.93	16.97	8.55	1889	0.30	0.157	0.185	15.94	13.58	6.84	1511	0.24	0.126	0.148
RANGE				17.58	54.26	23.91	30.63	7932	1.00	0.582	0.602	43.41	19.13	24.51	6345	0.80	0.466	0.481
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		62		17.08	45.68	29.35	24.96	6019	0.65			36.55	23.48	19.97	4814	0.52		
ARITHMETIC MEAN (SERIES 1-199)		62		16.89	46.86	28.78	24.36	5855	0.64	0.448	0.429	37.48	23.02	19.48	4684	0.51	0.359	0.343
STANDARD DEVIATION				4.37	11.84	4.75	7.63	1802	0.23	0.222	0.203	9.47	3.80	6.10	1441	0.18	0.178	0.162
COEFF. OF VARIATION %				25.89	25.27	16.51	31.32	30.78	35.25			25.27	16.52	31.34	30.78	35.69		

REGRESSION EQUATIONS (DRY BASIS): Y = + 84.92 - 0.00651X WHERE Y = PERCENTAGE OF ASH.
X = +13033.27 -153.46Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9917

<><> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 45 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-074

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS						ESTIMATED IN-SITU MOISTURE OF 20.00%						
			% EQUIL	% AS RECVD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	1950.0	59																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	280.0	2																
SODA & POTASH TESTS:		4																
MAXIMUM				19.70	66.57	39.79	40.77	9657	5.46	0.380	0.112	53.26	31.84	32.62	7726	4.37	0.304	0.090
MINIMUM				1.17	19.64	20.73	9.40	2137	0.33	0.206	0.015	15.71	16.58	7.52	1709	0.27	0.165	0.012
RANGE				18.53	46.93	19.06	31.37	7520	5.13	0.174	0.097	37.55	15.26	25.10	6017	4.10	0.139	0.078
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		59		13.22	38.96	31.78	29.26	6851	0.87			31.17	25.43	23.41	5480	0.70		
ARITHMETIC MEAN (SERIES 1-199)		59		12.95	41.91	30.72	27.36	6376	0.86	0.308	0.054	33.52	24.58	21.89	5101	0.68	0.247	0.043
STANDARD DEVIATION				4.07	12.53	5.12	7.88	1963	0.67	0.077	0.044	10.03	4.10	6.30	1570	0.54	0.062	0.035
COEFF. OF VARIATION %				31.40	29.90	16.66	28.79	30.79	77.79			29.91	16.67	28.79	30.79	78.45		

REGRESSION EQUATIONS (DRY BASIS): Y = + 80.07 - 0.00604X WHERE Y = PERCENTAGE OF ASH,
X = +13252.51 -165.50Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9672

<>< NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 48 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-079

SERIES	TOTAL NO. OF SAMPLES	NO. OF SAMPLES USED	MOISTURE %	DRY BASIS ASH %	V.M. %	F.C. %	GROSS BTU/LB.	SULFUR %	SODA %	POTAS %	ESTIMATED IN-SITU MOISTURE OF 20.00% ASH %	V.M. %	F.C. %	GROSS BTU/LB.	SULFUR %	SODA %	POTAS %
SERIES 1-199 :	2092.0	54															
SERIES 201-299 :	0.0	0															
SERIES 301-399 :	674.0	3															
SOME E MOISTURE TESTS:		1															
MAXIMUM			26.30	70.48	57.51	57.71	6714	1.25			56.32	29.85	50.17	6970	1.00		
MINIMUM			16.00	24.98	19.17	9.96	2754	0.17			19.98	15.33	7.98	2202	0.14		
RANGE			10.30	45.42	38.14	27.75	3960	1.08			36.34	14.52	42.19	4767	0.86		
WEIGHTED MEAN (EXCLUDING SER.S 201-399)	54		21.66	46.32	31.56	20.12	6724	0.66			32.26	25.25	22.49	5380	0.54		
ARITHMETIC MEAN (SERIES 1-199)	54		21.45	44.16	30.17	25.68	6194	0.66			35.32	24.16	20.54	4955	0.54		
STANDARD DEVIATION			2.56	14.56	5.06	8.57	1181	0.26			10.66	4.67	8.86	1505	0.22		
COEFF. OF VARIATION %			10.72	30.57	16.65	35.31	30.36	40.92			30.57	16.86	35.39	30.36	41.15		

REGRESSION EQUATIONS (DRY BASIS): Y = + 88.26 - 0.00712X WHERE Y = PERCENTAGE OF ASH,
X = +17368.27 -140.35Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9976

<SPECIAL NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 49 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED. (55.00% DRY BASIS = 44.00% ASH AT 20.00% MOISTURE)

HAT CREEK COAL PROJECT — STATISTICAL ANALYSIS OF PROXIMATE TEST DATA
DIAMOND DRILL HOLE 75-051

SAMPLE TYPE	TOTAL LENGTH (FEET)	COUNT	MOISTURE %	AS RECVD %	DRY BASIS ASH %	V.M. %	F.C. %	GROSS BTU/LB.	SULFR %	SODA %	POTAS %	ESTIMATED IN-SITU MOISTURE OF 20.00% ASH %	V.M. %	F.C. %	GROSS BTU/LB.	SULFR %	SODA %	POTAS %
SERIES 1-199 :	1795.5	66																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	257.5	11																
SODA & POTASH TESTS:		0																
MAXIMUM			28.71	74.92	58.21	42.28	9757	1.74	0.610	0.856	59.94	36.57	53.83	7606	1.39	0.466	0.685
MINIMUM			4.04	19.56	15.66	4.41	1342	0.22	0.319	0.288	15.60	12.54	5.53	1074	0.18	0.255	0.230
RANGE			24.67	55.42	42.55	37.87	8415	1.52	0.291	0.568	44.34	24.03	48.30	6532	1.21	0.211	0.455
ARITHMETIC MEAN		66	19.26	47.70	27.09	25.13	5730	0.56			38.22	21.67	20.10	4582	0.46		
(EXCLUDING SERIES 201-299)																		
ARITHMETIC MEAN		66	18.99	50.00	26.26	25.80	5723	0.56	0.414	0.579	39.99	20.96	19.03	4588	0.45	0.331	0.463
(SERIES 1-199)																		
STANDARD DEVIATION			5.15	12.76	5.26	8.79	2011	0.24	0.102	0.197	19.96	4.16	7.04	1009	0.20	0.082	0.157
COEFF. OF VARIATION %			27.35	27.46	19.66	36.95	37.69	43.16			27.40	19.56	36.97	37.66	43.62		

REGRESSION EQUATIONS (DRY BASIS): $Y = +36.25 - 0.00672X$ WHERE Y = PERCENTAGE OF ASH,
$X = +12852.59 - 148.77Y$ X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9663

<*> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 56 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED. (55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

SAMPLE TYPE	TOTAL LENGTH	NO.	NO. RECVD	% RECVD	DRY BASIS ASH %	V.M. %	F.C. %	GROSS BTU/LB.	SULFUR %	SODA %	POTAS %	ESTIMATED IN-SITU MOISTURE OF 20.00% ASH %	V.M. %	F.C. %	GROSS BTU/LB.	SULFUR %	SODA %	POTAS %
SERIES 1-199 :	7150.0	28																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	150.0	2																
SODA & POTASH TESTS:		0																
MAXIMUM			32.6	97.04	41.57	48.26	10061	1.07				46.65	33.10	37.06	8545	0.86		
MINIMUM			19.7	42.27	27.19	15.06	4166	0.30				9.82	22.31	12.06	3535	0.24		
RANGE			12.9	44.77	13.48	31.20	6513	0.77				35.81	10.79	25.02	5210	0.62		
STANDARD DEV/N (EXCLUDING SERIES 201-399)	.X		27.74	94.80	34.11	31.05	7567	0.65				27.69	27.29	24.62	6058	0.51		
ARITHMETIC MEAN (SERIES 1-199)		28	27.47	94.52	34.14	31.35	7616	0.67				27.61	27.51	25.06	6094	0.53		
STANDARD DEVIATION			3.10	10.44	3.47	7.25	1562	0.21				6.35	2.77	5.76	1249	0.17		
COEFF. OF VARIATION %			11.10	10.29	10.15	23.06	20.50	30.84				30.24	10.15	23.06	20.50	31.19		

REGRESSION EQUATIONS (DRY BASIS): Y = + 85.44 - 0.0[illegible]X WHERE Y = PERCENTAGE OF ASH,
X = +12767.59 -249.66Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9436

<<< NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES,
ONLY THE 25 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

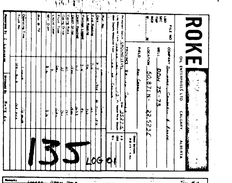
DIAMOND DRILL HOLE 75-089

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES % EQUIL	MOISTURES % AS RECVD	DRY BASIS % ASH	DRY BASIS % V.M.	DRY BASIS % F.C.	DRY BASIS GROSS BTU /LB.	DRY BASIS % SULFR	DRY BASIS % SODA	DRY BASIS % POTAS	ESTIMATED IN SITU MOISTURE OF 20.00% % ASH	ESTIMATED IN SITU MOISTURE OF 20.00% % V.M.	ESTIMATED IN SITU MOISTURE OF 20.00% % F.C.	ESTIMATED IN SITU MOISTURE OF 20.00% GROSS BTU /LB.	ESTIMATED IN SITU MOISTURE OF 20.00% % SULFR	ESTIMATED IN SITU MOISTURE OF 20.00% % SODA	ESTIMATED IN SITU MOISTURE OF 20.00% % POTAS
SERIES 1-199 :	510.5	17																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	202.5	4																
SODA & POTASH TESTS:		2																
MAXIMUM				28.51	46.75	38.77	42.66	9689	1.06	0.984	0.255	37.40	31.02	34.15	7751	0.87	0.787	0.204
MINIMUM				25.16	19.66	29.74	23.50	5875	0.38	0.274	0.150	15.73	23.80	18.80	4700	0.36	0.219	0.120
RANGE				3.33	27.09	9.03	19.16	3814	0.70	0.710	0.105	21.67	7.22	15.33	3051	0.57	0.568	0.084
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		17		26.90	29.20	34.88	35.92	8352	0.62			23.36	27.91	28.74	6682	0.50		
ARITHMETIC MEAN (SERIES 1-199)		17		26.65	30.95	34.26	34.79	8116	0.64	0.629	0.203	24.75	27.40	27.83	6493	0.50	0.503	0.162
STANDARD DEVIATION				0.95	7.67	2.87	5.01	1080	0.21	0.502	0.074	6.14	2.29	4.01	864	0.17	0.402	0.059
COEFF. OF VARIATION %				3.55	24.80	8.36	14.41	13.31	32.65			24.80	8.36	14.41	13.31	33.13		

REGRESSION EQUATIONS (DRY BASIS): Y = + 88.51 - 0.00709X WHERE Y = PERCENTAGE OF ASH,
X = +12478.81 -140.97Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9985

<><> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 17 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)



DDH 75-73

RESISTANCE

GAMMA RAY

OHMS

RUN No. 1

DDH 75-73

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD
SEC
TWP
RGE
W ____ M

COMPANY COMINCO CANADA INC.

WELL 75-79A

LOCATION 45,281N 25,679E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum ____ Elev. 3919

Log Measured from ____ ft. Above Perm. Datum

Rig Measured from ____ ft. Above Perm. Datum

K.B. ____

D.F. ____

G.L. ____

Other Services

Run No. 1

Date 8/6/79

First Reading 290

Last Reading 0

Hole Size 6 1/4

Type Fluid in Hole WATER

Max. Rec. Temp. 65°F

Equip. Location 3156

Recorded By E.C. GARDINER

Witnessed By ROTHWELL

RUN NO	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN	T.C. SEC	GAMMA RAY SENS SETTINGS	GAMMA RAY ZERO DIV L OR R	GAMMA RAY API G.R. UNITS PER LOG DIV	SIDEWALL DENSILOG T.C. SEC	SIDEWALL DENSILOG SENS SETTINGS	SIDEWALL DENSILOG ZERO DIV L OR R	SIDEWALL DENSILOG CPS/DIV
1	0	290	10					3	1000	2R	16.103
1	0	290	16	3	100	0	5				

REMARKS HOLE LOGGED THROUGH CASING 290-65
THROUGH TWO CASINGS 65-0

TOOL # 554
TOOL # 13

DDH 75-79A

135 (2)

DEPTH

GAMMA RAY API

0 50

100

BULK DENSITY (GRAMS/CC)

3919
000
OB
2 CASINGS
2 CASINGS CASING
100
3800
200
FR
300
3600
← ZERO
← 50 CPS
DDH 75-79A
ZERO →
← 2 DIV/R
← 100 CPS

DOLMAGE CAMPBELL AND ASSOCIATES LTD

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

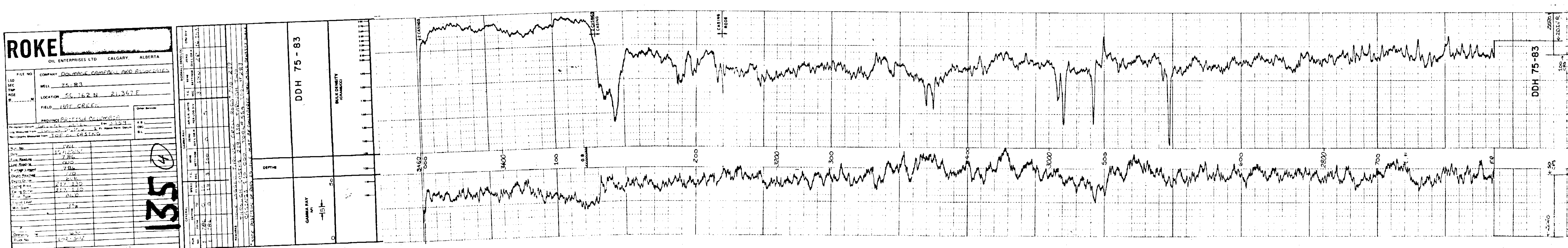
HAT CREEK PROJECT — DRILL RECORD

Coordinates	45,496' N 24,704' E	Length	532'	Hole No.	75-96
		Azimuth	—	Date	20 Jul 1975
Reference Elev.	3789	Dip	-90°	Logged by	J. Ritzman
Ground Elev.	3788'	Core Size	NQ	Sheet	1 of 2

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
	0		Datum		Note Original ground elev. 3789			
			OVERBURDEN					
			Hard clay					
	20		Gravel with boulders					
			Silty clay with cobbles					
	40		Clay					
	60		Silty clay with gravel					
	80							
3700								
	100		Silty clay					
	120		Gravel with boulders					
	140		Silty clay					
	160		Mixture of gravel, clay and small boulders					
			Clay					
	180							
3600			Gravel with boulders					
	200		Clay					
			SILTSTONE		Gray to dark gray			
	220		Light green gray and gray brown soft to very soft, silt with small interbedded sst, is bioturbated and healed with many stickensided surfaces and planes is highly chloritic very like shale and carb lam Dominant joint sets are oriented at 60° and 45°		Light green, hard, very soft, very fine sand, very dark green chlorite flakes slip surfaces			
	240				Gray, very hard, limit			
					Light green to dark green, soft			
					Light gray, hard sst			
	260				Light to dark gray, hard to very soft, fairly fine bioturbated sst and sst			
	280				Dark gray to gray brown, hard to very soft, pulverized The fragments are not bioturbated			
	300							
3520								
			END OF HOLE AT 332 feet					
	340							

135 (3)

DRILL HOLE : 75-96
SHEET NO : 2 OF 2


ROKE
OIL ENTERPRISES LTD CALGARY ALBERTA
COMPANY DOMINION CAMPBELL AND ASSOCIATES
WELL 75-83
LOCATION 56.162 N 21.367 E
FIELD HAT CREEK
PROVINCE BRITISH COLUMBIA
DDH 75-83
DEPTH
GAMMA RAY
BULK DENSITY (GAMMA-GG)
CASING
CASING SHOE
DDH 75-83

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

COMPANY DOMAGE CAMPBELL AND ASSOC.

WELL 75-78

LOCATION 54,334 N. 23,529 E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Other Services

Pr. Measured from GROUND LEVEL Elev. 2600'

Log Measured from 1.00' ABOVE CASING 2' Ft. Above Perm. Datum

Dr. Depths Measured from TOP OF CASING

Run No.	ONE
Dated	15 JULY
First Reading	9630
Last Reading	0500
Footage Logged	6630
Depth Reached	9630
Depth Driller	9630
Casing Size	13⅜
Casing Depth	139.5
Fluid Type	MUD
Fluid Level	
Max. Diam.	13⅜
Operating Time	4 hrs
Truck No.	104-SW1

Recorded By E.D. WARREN Witnessed By COLE/GAK

Gamma Ray API Units: Sens. 10, Time Const. 3, Speed 60, Depth Interval 100, Depth Unit FEET, Log Interval 1:240

Borehole Compensated Formation Density Log/Gamma Ray Neutron Log/Gamma Ray: Run No. ONE, Date 15 JULY, Type Log 4 3/4" - D, Depth-Driller 9630, Depth-Logger 9630, Bottom Logged Interval 9630, Top Logged Interval 6630, Type Fluid in Hole MUD, Density 10.0, Viscosity 60, Fluid Loss 6.0, Source of Sample CIRCULATION, Rm @ Meas. Temp. .33 @ 70, Rmf @ Meas. Temp. .28 @ 70, Rmc @ Meas. Temp. .44 @ 70, Source: Rmf Rmc MEASURED, Rm @ BHT .19 @ 150, Time Since Circ. 4 hrs, Max. Rec. Temp. 150, Equip. No. & Location TOOL #554 1004 # 13

DDH 75-78

135 (S)

BULK DENSITY

DEPTH

GAMMA RAY API

0 — 150 — 300

2 CASINGS

2 CASINGS / CASING

9600 9500 9400 9300 9200 9100 9000

100

0.0

ZERO → 2 GAPI R ← 100 CPS

DDH 75-78

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD SEC TWP RGE M

COMPANY DOMTIGE CAMPBELL AND ASSOCIATES

WELL 75-89

LOCATION 55.733N 22.081E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev 3552

Log Measured from TOP OF CASING 3 ft Above Perm. Datum

Drill Depths Measured from

Owner Services GR. DENS GR. RES

E.B. CBL B.L.

Run No.	ONE	TWO
Date	25 SEPTEMBER	26 SEPTEMBER
First Reading	640	128
Last Reading	128	900
Footage Logged	492	128
Depth Reached	621	120
Depth Driller	713	713
Casing Rotary	128	12
Casing Driller	128	12
Fluid Type	MUD	MUD
Liquid Level	126	
Max Diam	3 1/8	3 1/8
Operating Time	3 hr	1 hr
Truck No.	102-542	102-542

Recorded By E. QUARDS K. Witnessed By

135

GENERAL

RUN NO	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN
162	0	605	10

GAMMA RAY

T.C. SEC	SENS SETTINGS	ZERO DIV L OR R	API G.R. UNITS PER LOG DIV

SIDEWALL DENSILOG

T.C. SEC	SENS SETTINGS	ZERO DIV L OR R	CPS/ DIV
3	1000	2R	38.61

REMARKS ANGLE HOLE - 55° AZIMUTH 090° TOOL # 554 TOOL #457

NOTE SPECIAL CALIPER SCALE

2 4 | DEPTHS | CALIPER (DIAMETER - INCHES) 6 8

DDH 75-89

BULK DENSITY (GRAMS/CC)

3339
000
100
3400
200
300
400
3200
500
600

Fe

DDH 75-89

1000 CPS +20 IU R ZERO

ROKE

OIL ENTERPRISES LTD CALGARY, ALBERTA

FILE NO.

COMPANY DOMINION CAMPBELL GAS ASSOC.

WELL 75-72

LOCATION 29,750 N 20,100 E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Other Services

Run No.	ONE
Date	28 JUNE 1975
Feet Reading	2000
Feet Reading	0000
Casings Logged	1502
Depth Reached	1510
Depth Driller	1510
Casing Depth	1506
Casing Driller	1510
Fluid Type	MUD
Fluid Level	2000
Max. Recorded Temp.	31°C
Operating Time	5 HR
Truck No.	204-SW3

Recorded by EDWARDS K. Witnessed by ROTZIEN

DDH 75-72

135 (7)

BASE LOGGED GAMMA

DEPTH

GAMMA RAY API UNITS 150 0

CASING SHOE

DDH 75-72

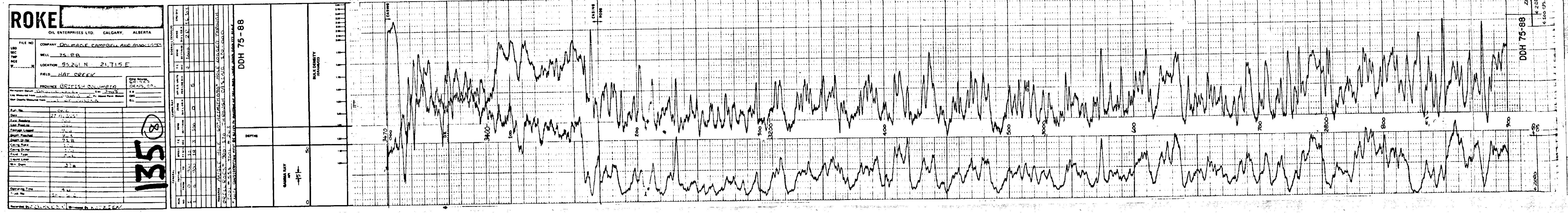
ZERO

+200 K

+100 SPS

+50 CPS

ZERO


ROKE
OIL ENTERPRISES LTD. CALGARY, ALBERTA
COMPANY DOLMAGE CAMPBELL AND ASSOCIATES
WELL 75-88
LOCATION 9526 N 2175 E
FIELD HAT CREEK
PROVINCE BRITISH COLUMBIA
DDH 75-88
DDH 75-88
135 (8)

ROKE [redacted]

OIL ENTERPRISES LTD. CALGARY, ALBERTA

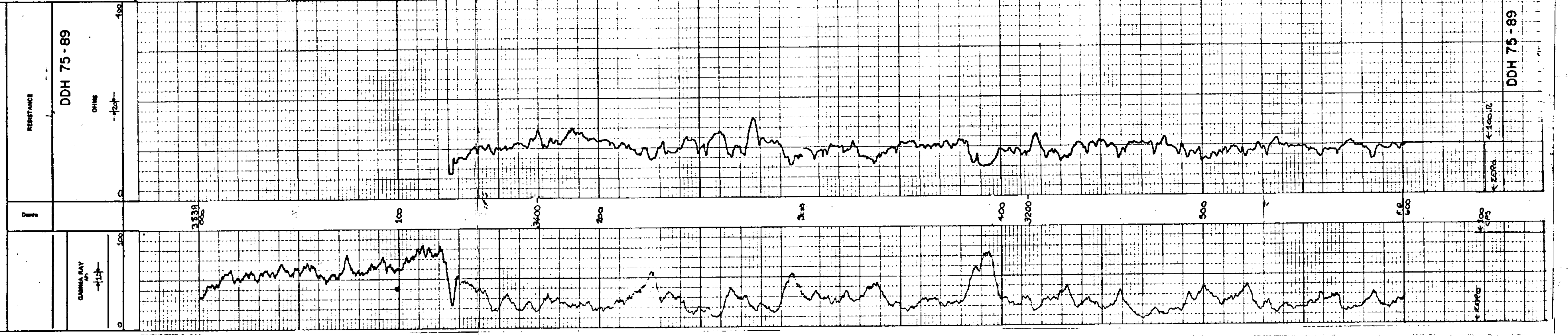
FILE NO.	
LSD	
SEC	
TWP	
RGE	
W M	
COMPANY	DOLMAGE, CAMPBELL AND ASSOCIATES
WELL	75-89
LOCATION	55 733 N 22 081 E
FIELD	HAT CREEK
PROVINCE	BRITISH COLUMBIA
Other Services	GR, DENS DENS, CAL
Permanent Datum	GROUND LEVEL
Elev.	3536
Log Measured from	TOP OF CASING 3 Ft. Above Perm. Datum
Well Depths Measured from	TOP OF CASING
K.B.	
CBG	
G.L.	

Run. No.	ONE	TWO
Date	25 SEPTEMBER	26 SEPTEMBER
First Reading	600	128
Last Reading	128	000
Footage Logged	472	128
Depth Reached	603	132
Depth Driller	713	713
Casing Roke	128	12
Casing Driller	128	12
Fluid Type	MUD	MUD
Liquid Level	126	
Min. Diam	3 1/8	3 1/8
Rm @ °F		
Operating Time	3 hr	1 hr
Truck No.	102-SU2	102-SU2

Recorded By EDWARDS K Witnessed By ROTZIEN

135 ⑨

Remarks ANGLE HOLE -55° AZIMUTH 090° TOOL # 283



ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD
SEC
TWP
RGE
W ____ M

COMPANY DOLMAGE, CAMPBELL AND ASSOCIATES

WELL 75-76

LOCATION 21,500' N, 25,460' E

FIELD HATCREEK

PROVINCE BRITISH COLUMBIA

Other Services: DENS, CAL, DR, DENS

Permanent Datum: GROUND LEVEL Elev. 4012

Log Measured from: TOP OF CASING 2 Ft. Above Perm. Datum

Other Depths Measured from: TOP OF CASING

K.B. ____

D.F. ____

G.L. ____

Rig No. ONE

Date 26th JULY 1975

First Reading 0'

Last Reading 1355'

Casing Logged 0'

Depth Reported 1355'

Depth Logged 1357'40"

Casing Rate 360' /HR

Casing Driller 360' /HR

Fluid Type FRESH

Fluid Level FULL

Max. Rec. Temp. 116

Bit Size & Type

Operating Time 4 hr

Truck No. L-4 C-3

Recorded By D. WILKINSON

Witnessed By

135 (10)

Remarks: TOOL #10

GAMMA RAY API

10

Depths

RESISTANCE

DDH 75-76

OHMS

20

40

4014
000

4000

G.S.

100

RUN 2

RUN 1

200

3800

300

400

3600

500

600

3400

ZERO

ZERO

100 CPS

100 Ω

DDH 75-76

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

SIDEWALL DENSILOG

FILE NO

LSD SEC TWP RGE M

COMPANY DOLMAGE CAMPBELL AND ASSOCIATES

WELL 75-105A

LOCATION 53-11N-23-39E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Other Services

Run No.	ONE
Date	15 NOVEMBER
Fm. Bottom	285
Last Reading	000
Recorded Logged	285
Depth Reached	288
Depth Dr. Log	315
Casing Reader	
Casing Driller	315
Fluid Type	MUD
Liquid Level	000
Max. Temp.	31/8
Operating Time	2 hr.
Truck No.	102-SU2

Witnessed By ROTZIEN

Permanent Datum GROUND LEVEL Elev. 3876

Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum

Start Depth Measured from TOP OF CASING

K.B.
D.F.
G.L.

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO.	DEPTH FROM	DEPTH 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	CPS/ DIV
1	0	285	19					3	1000	2R	170
1	0	285	18	3	100	0	5				

REMARKS HOLE LOGGED THOUGH CASING* 285-000 Tool#554 Tool#283

*DATE, CONFIGURATION MUST BE ATTACHED TO THE CONTENTS OF BOX WHEN UNDER GENUS NAME

DDH 75-105A

DEPTH

GAMMA RAY API

0 50

135 (11)

BULK DENSITY (GRAMS/CC)

3878

CASING

3800

100

O.B.

200

3600

300

ZERO

500 CPS

200 API

ZERO

50 CPS

DDH 75-105A

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD SEC TWP RGE W ____ M

COMPANY DOLMAGE CAMPBELL AND ASSOCIATES

WELL 75-74

LOCATION 48.000N 24.428E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Other Services: GR

Permanent Datum: GROUND LEVEL — Elev. 3759

Log Measured from: TOP OF CASING — Above Perm. Datum: K.B. ____ D.F. ____ G.L. ____

Drlg Measured from: TOP OF CASING

Rec. No.											
Date	24/E										
Run No.	ONE										
Date	16 JULY 1975										
First Reading	840										
Last Reading	340										
Footage Logged	500										
Depth Reached	843										
Depth Driller	2232										
Casing Rdr.	340										
Casing Driller	340										
Fluid Type	MUD										
Liquid Level											
Rm Dens	378										
Operating Time	Lbr										
Truck No	104-503										

Recorded By: E.D. OBRIEN — Witnessed By: ____

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO.	DEPTHS FROM	DEPTHS 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	CPS/ DIV
1	840	340	10					3	1000	2R	1/63

REMARKS: Tool # 554 Tool # 481

CALIPER (DIAMETER – INCHES)

DEPTH

DDH 75-74

135 (12)

BULK DENSITY (GRAME/CC)

3400

400

500

3200

600

700

3000

800

1000 CPS

← 2 DIV →

DDH 75-74

ZERO

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD
SEC
TWP
RGE
W ____ M

COMPANY Dolmage, Campbell and Associates

WELL 75-88

LOCATION 55,261 N 21,715 E

FIELD Hat Creek

PROVINCE British Columbia

Permanent Datum: Ground Level Elev. 3468'
Log Measured from: Top of Casing 2 Ft. Above Perm. Datum
All Depths Measured from: Top of Casing

K.B.
D.F.
G.L.

Other Services: GR-RES

Run No.	One		
Date	27 August		
First Reading	810		
Last Reading	170		
Feet per Logged	640		
Depth Reached	813		
Depth Driller	918		
Casing Rate	170		
Casing Driller	170		
Fluid Type	Mud		
Liquid Level			
Max Diam.	3 1/8		
Operating Time	4 Hr.		
Truck No.	102 - 542		

135 (3)

Recorded By: EDWARDS K. Witnessed By: ROTHKAM

GENERAL RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN	GAMMA RAY T.C. SEC.	GAMMA RAY SENS SETTINGS	GAMMA RAY ZERO DIV.L OR R	GAMMA RAY API G.R. UNITS PER LOG DIV.	SIDEWALL DENSILOG T.C. SEC.	SIDEWALL DENSILOG SENS SETTINGS	SIDEWALL DENSILOG ZERO DIV.L OR R	SIDEWALL DENSILOG CPS/ DIV
1	170	810	10					3	1000	2R	36.63

REMARKS

2 4 6 — DEPTHS — CALIPER (DIAMETER – INCHES) 8 10

DDH 75-88

BULK DENSITY (GRAMS/CC)

200
3200
400
500
3000
600
700
2800
800
F.P.

← 2 DIV R
ZERO →
← 1000 CPS

DDH 75-88

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD
SEC
TWP
RGE
W

COMPANY DOLMAGE, CAMPBELL AND ASSOCIATES

WELL 75-74

LOCATION 48.000N 24.428'E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 3259'

Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum

Drill Measured from TOP OF CASING

ONE RUN ONLY
DENSICAL
GR, DEAD

Run No.	ONE
Date	16 JULY 1975
First Reading	1120
Last Reading	340
Footage Logged	780
Depth Reached	1123
Depth Driller	2312
Casing Rate	340
Casing Driller	340
Fluid Type	MUD
Liquid Level	
Max. Diam.	3 7/8
Rm @ °F	
Operating Time	1 hr
Truck No.	104 - SU3

Recorded By EDWARDS K. Witnessed By ROKE

Remarks TOOL # 13

135 (14)

Depth

GAMMA RAY API

RESISTANCE

DDH 75-74

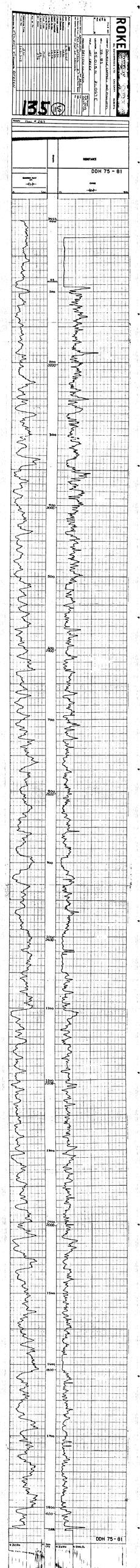
OHMS

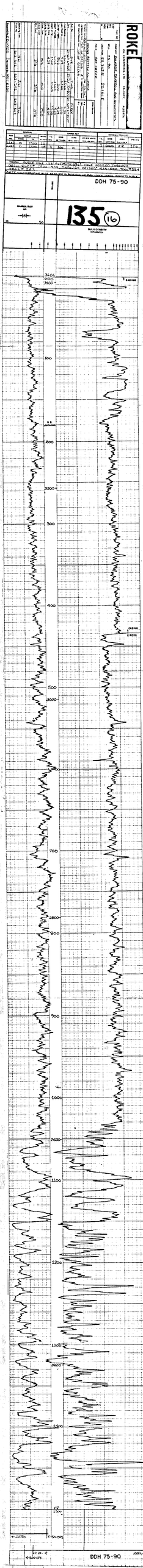
0 100 0 400

3400 400 500 3200 600 700 3000 800 900 2800 1000 1100

EOH

← 100 CPS ← KERO ← 100 Ω DDH 75-74


ROKE
135
DDH 75 - 81
RESISTANCE
OHMS
DDH 75 - 81


ROKE
DDH 75-90
135
(116)
GAMMA RAY API
BULK DENSITY GRAMS/CC
3406
3400
600
3200
300
400
500
3000
700
2800
800
900
1000
2600
1100
1200
1300
2400
1400
DDH 75-90

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.

LSD
SEC
TWP
RNGE
MER

COMPANY DOLMAGE CAMPBELL AND ASSOCIATES

WELL 75-76

LOCATION 21,500'N 25,460'E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 4012
Log measured from KELLY BUSHING 2 Ft. Above Perm. Datum
Drilling Measured from KDP OR CASING

Other Services
GRC - ZDL
DEN - DSS, CAL

KB
DF
GL

Rig No.	
Date	18/19 JULY
Time Started	1270
Time Finished	0100
Type Logged	1270
Depth Reached	1273
Depth Driller	1300
Casing Size	145
Casing Driller	145
Fluid Type	MUD
Fluid Level	48
Main Rec.	3/8
Operating Time	5 hr
Truck No.	104 - SU3

Recorded By E.D. VEROS K. Witnessed By ROTZIEN

GENERAL

RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN
1	0	1270	10
1	0	1270	18

GAMMA RAY

RUN NO.	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API G.R. UNITS PER LOG DIV.
1	3	100	0	5

SIDEWALL DENSILOG

RUN NO.	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	CPS/ DIV
1	3	1000	2R	16103
1	1			

REMARKS HOLE LOGGED THROUGH DRILL RODS 1270-145
THROUGH CASING 145-000 TOOL # 554 TOOL # 459

DEPTHS

135 (17)

DDH 75-76

GAMMA RAY API

0 — 150 — 60

BULK DENSITY KG/M3/CC

CASING

RODS

4014
000
4000
0.0.
100
200
3800
300
400
3600
500
600
3400
700
800
3200
900
1000
3000
1100
1200
2800
FR

← ZERO ← 50 CPS

DDH 75-76

ZERO →
← 2 DIV R
← 600 CPS

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	53,566' N 21,597' E	Length	1007'	Hole NR.	76-119
Reference Elev.	3486'	Azimuth	270°	Date	FEB. 1976
Ground Elev.	3484'	Dip	-60°	Logged by	J. Rotzien
		Core Size	NQ	Sheet	1 of 5

ELEVATION IN FEET | DEPTH IN FEET

STRATIGRAPHY

STRAT. PLOT | MAJOR ROCK UNITS

DETAIL & STRUCTURE

SYMBOL | DESCRIPTION

CORE LOSS | SAMPLE NO. | ASH AT 20% MOISTURE

Datum

OVERBURDEN

Gravel

Boulders and gravel

Sand with some boulders

Boulders and gravel

Silty sand and gravel

Clayey sand with some silt and gravel

Sand with some gravel and some silt

SILTSTONE

Grey to grey brown, soft, massive shf with very few variations. Most of sequence is intensely sheared at 60° to C.A.

CARB. SILTSTONE

Dark brown to black, mod. hard to hard, slightly carb. to carb. massive shf with minor soft, light brown beds of shf

CLEAN COAL

Black, very hard, clean coal with minor beds of buff shf and i.b. of grey to green shf

Note: Original ground elev. 3484'

Tricored

(0.5) buff to light grey, mod. hard shf and sltst with fracture at 10° to C.A.

1 cm of buff, very soft shf

(0.2) yellow brown, soft shf

Grey brown, mod. hard, shf with several buff lam.

(0.2) green and rusty, soft shf

With numerous irregular lam of buff to white hard shf

Grey brown to buff, very hard to hard sltst

Grey brown to dark brown, hard shf

Grey brown to black, hard to soft shf to carb. shf

(0.6) blue grey to black, hard shf to carb. shf

(0.3) black, hard coaly shf

Black, hard carb. shf

Black, mod. hard, coaly to carb. shf

(0.1) black, soft, carb. shf

(0.6) black, hard to soft coaly shf

Black, hard to very soft, i.b. silty coal and carb. to coaly shf

(0.3) buff, very hard, calc. shf

(0.3) grey to buff, very hard, calc. shf

(0.2) black, hard, silty coal with carb. shf laminae

Banding

(0.4) black, very soft, carb. shf

(0.6) black, hard, silty coal

(0.6) buff, very hard, calc. shf

Banding

(0.8) black, hard to soft, coaly sltst

(0.8) black, hard, silty coal

Banding

Black, hard to soft, coaly sltst

(0.6) buff, very hard, calc. sltst

(0.4) black, soft, coaly sltst

(0.6) black, mod. hard, coaly shf

(0.4) black, hard, silty coal

Black, hard, silty coal

Black, hard to mod. hard, finely i.b., clean and silty coal

Buff, very hard, calc. sltst

Black, hard to very hard, finely i.b., clean and silty coal with minor clean coal laminae

Black to dark brown, hard to mod. hard, slightly carb. sltst

Black, hard, silty coal with buff, very hard, calc. shf lam. at 958' and 961'

(0.3) buff, very hard, calc. sltst

(0.6) grey brown, very hard sltst

(0.6) buff, very hard, calc. sltst

(0.4) buff, very hard, calc. sltst

(0.1) Irregular buff very hard, calc. shf lam

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16

END OF HOLE AT 1007 feet

135 (18)

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.

LSD
SEC
TWP
RGE
W ___ M

COMPANY DOMINION, CAMPBELL AND ASSOCIATES

WELL 75-88

LOCATION 55,261 N 21,715 E

FIELD HOT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 3468

Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum

Elev.: K.B. ___ D.F. ___ G.L. ___

Other Services: DENS. CAL G.R. DENS.

	RUN
Run No.	ONE
Date	27.6.82
First Reading	810
Last Reading	170
Footage Logged	640
Depth Reached	813
Depth Driller	918
Casing Rotes	170
Casing Driller	170
Fluid Type	MUD
Liquid Level	
Max. Disam.	3 7/8
Rm @ °F	
Operating Time	3 hr
Truck No.	102 - SU2

Recorded By EDWARDS K. Witnessed By ROTZIEN

135

Remarks ANGLE HOLE -060° AZIMUTH 090°

DDH 75-88

GAMMA RAY API
10
0 100

Depths

RESISTANCE
OHMS
20
0 400

200
300
3200
400
500
3000
600
700
2800
800
ZERO

ZERO 50 CPS ZERO 100 Ω

DDH 75-88

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	45,536' N	Length	1507'	Hole No.	78-100
	26,803' E	Azimuth	—	Date	OCT. 1978
Reference Elev.	3962'	Dip	-90°	Logged by	J. Ratzlaff
Ground Elev.	3960'	Core Size	NQ	Sheet	1 of 8

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
3800	0		Datum		Note: Original ground elev. 3968'			
			OVERBURDEN					
			RHYOLITE ? Tricored					
	20							
	40							
	60							
	80							
	100							
	120							
	140							
	160							
3800	180							
	200		SILTSTONE Gray brown, very soft to med. hard	25 60 75 75	Yellow laminae of clst (0.2) buff, med. hard slst			
	220							
	240		CLAYSTONE Blue grey, very soft to med. hard, slightly silty clst	75 80 75	Colour changing from gray brown to blue. Buff, soft Buff, soft			
	260							
	280			70 65 70 75 75	(0.1) buff, med. hard slst (0.1) yellow, med. hard clst (0.4) buff, med. hard slst (0.1) buff, med. hard clst			
	300							
	320			60	Several laminae up to 0.1 thick of buff to yellow clst in blue gray, med. hard clst			
	340		FAULT ZONE Blue gray, very soft with hard fragments, clst breccia with buff to yellow clst laminae	20 45				
3600	360				Buff, very soft clst			
	380			75				
	400							
	420				(0.1) buff, very soft clst			
			SILTY CLAYSTONE Gray to gray brown, med. hard	70 70	Gray, med. hard to soft			
	440			60	Gray, med. hard			
	460			45	With carb. plant fossils			
	480							
	500			70 65 60 65	(0.3) buff, hard slst			
	520							
	540							
3400	560			60	(0.1) buff, hard slst			
	580			55	(0.2) buff, hard slst			
	600			60	(0.1) buff, soft clst			
	620			55 55 60	(0.3) light grey brown clst (0.2) buff, soft clst (0.1) buff very soft clst			
	640							
	660			60	(0.1) buff, hard slst (0.2) buff, very hard clst			
	680							
	700			55	(0.1) buff, soft clst (0.8) buff, med. hard slst (0.2) buff, hard slst			
	720							
	740			15 60	(0.1) buff, soft clst (0.3) buff, hard slst (0.1) buff, hard slst			
3200	760			60	Buff to blue gray, finely interbedded slst and clst			
	780				(0.2) buff, soft clst			
	800							
	820		SHALE Gray to dark brown, hard	70 70 35 10				
	840							
	860			65	(0.1) buff, hard, buff slst			
	880			10				
	900			35				
	920			10				
	940			70				
	960			70				
3000	980			70 60 10	(0.2) buff, hard slst (0.3) buff, hard laminated slst (0.3) buff, very hard slst			
	1000		CARB. SILTSTONE Dark brown, hard, carb. slst laminated in part	60 80			1	
	1020			10			2	
	1040		CLEAN COAL Black, very hard, clean coal	65	(0.1) buff, soft slst (0.2) blue green very soft clst (0.3) buff, soft slst			
	1060			65 70 10 10	Rusty, hard laminae (2) of slst		3	
	1080			65	(0.3) gray brown, hard carb slst (0.2) gray brown, hard, carb. slst			
	1100			65	Weak conc of resin beads		4	
	1120			45	(0.2) black, very soft, coaly slst			
	1140			65	Conc of resin beads		5	
	1160			60	(0.2) hard, silty			
2800					(0.2) med. hard coaly slst (0.1) buff, very hard slst Very soft, coaly to carb slst			
	1180			10	(0.1) soft, coaly slst		6	
	1200			65 45 50 10	Hard, silty Black to grey, hard to very hard, finely interbedded coal and carb to clayey slst. Silty		7	
	1220			65				
	1240			45 60	Coal dull, very hard, slst laminae (0.3) buff coaly slst (0.2) very soft, carb. slst (0.2) very soft, coaly slst Hard to soft, silty coal with minor carb slst		8	
	1260			65	Clean Soft, coaly slst			
	1280			10 20	(0.3) very soft, carb slst (0.3) soft, coaly slst (0.2) rusty buff, hard slst			
	1300			65	Dark grey, hard, carb. slst Weak conc of resin beads		9	
	1320			65 10 10 10	(0.4) soft, coaly slst (0.1) very soft coaly slst (0.1) very soft carb slst Dark gray to gray brown, very soft slst (1.6) slst			
	1340			10 10	(0.2) soft coaly slst Conc. of resin beads (0.1) soft, silty coal		10	
	1360			10 35	(0.7) very soft, carb. slst (0.6) dark brown to black, soft carb slst Silty coal Conc. of resin beads			
2600					Laminae of buff, very hard calc slst (0.2) buff, hard, calc. slst Hard to very hard, interbedded clean and silty coal			
	1380			65			11	
	1400			10	(0.4) soft carb. slst Silty coal with slst lam. (0.2) buff, very hard slst	Weak conc. of resin beads		
	1420			10 10	(0.3) (0.2) very soft, carb. slst		12	
	1440			65 65	Buff, very hard, calc. slst lam. in clean coal Black to brown, very soft, carb to coaly slst Silty (0.8) coaly slst (0.5) carb slst 1 cm of buff, hard slst			
	1460			60	2 lam. of buff, hard slst (0.6) soft, carb. slst		13	
	1480			65 65	Silty with 0.2' soft carb. slst (0.2) buff, hard slst (0.7) med. hard, coaly slst (0.1) crushy buff, hard slst. Badly highly contorted		14	
	1500			65	Very fine lam. of buff slst Irregular			
			END OF HOLE AT 1507 Feet					
	1520							

135 (20)

ROKE

SIDEWALL DENSILOG
CALIPER

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO
LSD
SEC
TWP
RGE
W. M

COMPANY DOLMAGE, CAMPBELL AND ASSOC.
WELL 75-68
LOCATION 53,341 N 21,577 E
FIELD HAT CREEK
PROVINCE BRITISH COLUMBIA

Other Services: GR-RES DENS, GR

Permanent Datum GROUND LEVEL Elev. 3485.5
Log Measured from TOP OF CASING 15 Ft. Above Perm. Datum
Well Depths Measured from TOP OF CASING

K.B.
D&G
G.L.

Run. No.	ONE		
Date	11 JUNE 1975		
First Reading	99		
Last Reading	00		
Footage Logged	99		
Depth Reached	101		
Depth Driller	1843		
Casing Rioke	13		
Casing Driller	13		
Fluid Type	MUD		
Liquid Level	14		
Min. Diam.	3 3/8		
Operating Time	1/2 Hr		
Truck No	104-SUR		

Recorded By EDWARDSK Witnessed By ROTZIEN

GENERAL: RUN NO. 1; DEPTHS FROM 0, TO 99; SPEED FT/MIN 10
GAMMA RAY: SENS SETTINGS; T.C. SEC.; ZERO DIV.L OR R; API G.R. UNITS PER LOG DIV.
SIDEWALL DENSILOG: T.C. SEC. 3; SENS SETTINGS 1000; ZERO DIV.L OR R 2R; CPS/DIV 36 63

REMARKS: TOOL # 554 TOOL # 459 OPEN Hole

CALIPER (DIAMETER - INCHES): 6 · 10
DEPTHS: 2 4 6
DDH 75-68
135 (21)
BULK DENSITY (GRAMS/CC)

DDH 75-68
ZERO →
3487
000
FS 100
+2 DIV/R
1000 CPS

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD
SEC
TWP
RGE
W. ____ M

COMPANY DOLMAGE, CAMPBELL AND ASSOCIATES

WELL 75-89

LOCATION 55,733 N 22,081 E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Other Services
GR-RES
GEOL, CAL

Permanent Datum GROUND LEVEL Elev. 3000
Log Measured from TOP OF CASING 3 Ft. Above Perm. Datum
Was Depths Measured from TOP OF CASING

Run No.	ONE							
Date	24 SEPTEMBER							
First Reading	645							
Last Reading	000							
Footage Logged	645							
Depth Reached	698							
Depth Driller	713							
Casing Rate								
Casing Driller	6.50							
Fluid Type	MUD							
Liquid Level	12R							
Min. Diam.	3 7/8							
Operating Time	3hr							
Truck No.	102-502							
Recorded By	EDWARDS K.							
Witnessed By	ROZZELL							

RUN NO.	GENERAL DEPTHS FROM	GENERAL DEPTHS TO	GENERAL SPEED FT/MIN	GAMMA RAY T.C. SEC.	GAMMA RAY SENS SETTINGS	GAMMA RAY ZERO DIV. L OR R	GAMMA RAY API G.R. UNITS PER LOG DIV.	SIDEWALL DENSILOG T.C. SEC.	SIDEWALL DENSILOG SENS SETTINGS	SIDEWALL DENSILOG ZERO DIV. L OR R	SIDEWALL DENSILOG CPS/DIV
1	0	693	10					3	1000	2R	110
1	0	645	18	3	100	0	5				

REMARKS ANGLE HOLE -55° AZIMUTH 090° HOLE LOGGED THROUGH CASING 645-000 TOOL # 554 TOOL # 283

*NOTE: CORRELATION MUST BE DONE TO POSITION OF CASING WHEN USING DENSILOG SCALE

DDH 75-89

DEPTH

GAMMA RAY API

0 50

135 (22)

BULK DENSITY KG/M3/DIV

3339
000

CASING

100

3400

200

300

400

3200

500

600

3000

F.R.

1000 CPS

+20IVR

ZERO

+ZERO

50CPS

DDH 75-89

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.

SEC
TWP
RGE
M

COMPANY COLUMBIA CAMPBELL AND ASSOCIATES

WELL 75-76

LOCATION 21,500'N 25,460'E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 4012
Log Measured from TOP OF CASING 2 ft. Above Perm. Datum
Drill Depth Measured from TOP OF CASING

Other Services
GR-RES
DENS-CAL

Run No. ONE
Date 18/19 JULY
First Reading 670
Last Reading 000
Footage Logged 670
Depth Reached 673
Depth Driller 1300
Casing Size 20/16S
Casing Depth 20/16S
Fluid Type MUD
Fluid Level 48
Bit From 13⅜
Bit To

Operating Time 2hr
Truck No 104-SU3

Recorded By EDWARDS K. Witnessed By ROTZEEN

135 (3)

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO.	DEPTHS FROM	DEPTHS 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	CPS/ DIV
1	0	670	10					3	1000	2R	36.63

REMARKS Tool # 554 Tool # 459

DEPTH

CALIPER
(DIAMETER – INCHES)
2 4 6 8 10

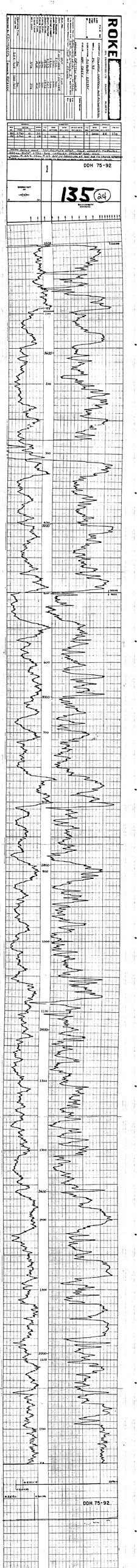
DDH 75-76

BULK DENSITY
(GRAMS/CC)

4014
000
4000
a.s.
100
200
3800
300
400
3600
500
600
3400
F.R.

DDH 75-76

<2 DIV R
≤ 1000 CPS
ZERO →


ROKE
DDH 75-92
135
24
DDH 75-92

ROKE OIL ENTERPRISES LTD. CALGARY, ALBERTA

SIDEWALL DENSILOG

FILE NO.

COMPANY DOLMAGE CAMPBELL AND ASSOCIATES

WELL 75-104

LOCATION 49 791N - 241466

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

LSD SEC TWP RGE W M

Permanent Datum GROUND LEVEL Elev. 3749

Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum

Drill Depths Measured from TOP OF CASING

Other Services: K.B. DF G.L.

Run No.	ONE	TWO
Date	8 NOVEMBER	8 NOVEMBER
First Reading	685	220
Last Reading	220	000
Footage Logged	465	220
Depth Reached	688	246
Depth Driller	702	702
Casing Roke	220	220
Casing Driller	220	220
Fluid Type	MUD	MUD
Liquid Level		
Bit in Diam.	3⅞	3⅞
Operating Time	3hr	
Truck No.	102-SU2	

Recorded By EDWARDS Witnessed By ROTZIEN

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO.	DEPTHS FROM	DEPTHS 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	CPS/ DIV
1&2	0	680	10					3	1000	2R	170
1&2	0	685	18	3	100	0	5				

REMARKS HOLE LOGGED THROUGH DRILL RODS* 685-220', THROUGH CASING* 220-90', THROUGH TWO CASINGS 90'-000' Tool #554
ANGLE HOLE - 55° AZIMUTH 090° Tool #283

*NOTE: [illegible]

DDH 75-104

135 (25)

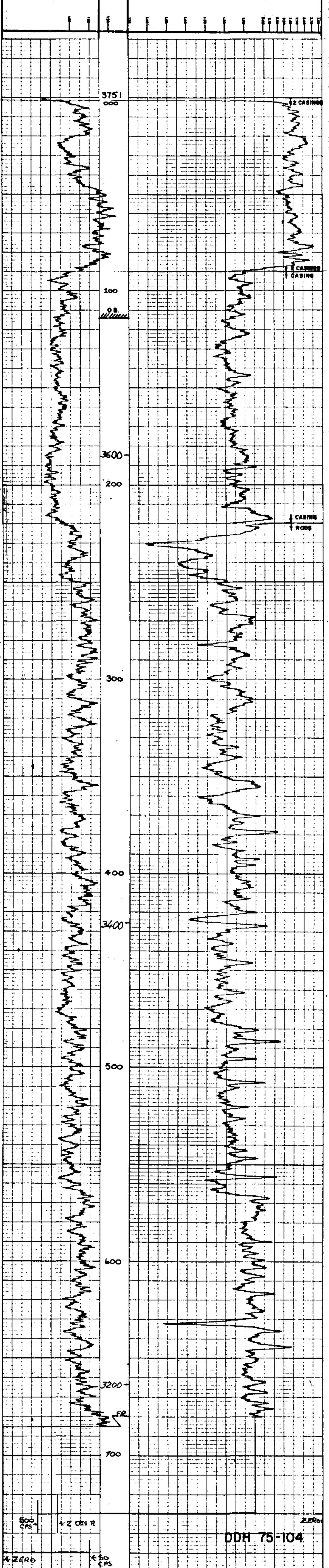
GAMMA RAY API

-|5|-

0 50

DEPTHS

BULK DENSITY (GRAMS/CC)



DDH 75-104

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	45,405' N	Length	408'	Hole No.	75-98
	24,808' E	Azimuth	000°	Date	OCT. 1975
Reference Elev.	3827'	Dip	-85°	Logged by	J. Retzlaff
Ground Elev.	3825'	Core Size	NQ	Sheet	1 of 3

ELEVATION & DEPTH IN FEET	STRATIGRAPHY		DETAIL & STRUCTURE		CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
	STRAT. PLOT	MAJOR ROCK UNITS	SYMBOL	DESCRIPTION			
		Datum		Note: Original ground elev. 3827'			
0		OVERBURDEN					
20		Gravel and boulders					
3800							
40		Clay, gravel and small boulders					
60		Clay and gravel					
80							
100		Gravel and small boulder					
120							
140		Clay and gravel					
160		Gravel and clay					
180							
		Clay with gravel					
200							
220		Gravel, boulders with clay					
3600							
240		SILTSTONE					
		Grey brown, moderately hard to soft		Tricored			
			45				
			60	(0-2) buff, soft clay			
280			80				
				Soft			
300			10				
			45	Moderately hard			
320							
			80	(0-1) (0-1) buff, hard silt			
340				Moderately hard			
			60				
360				(0-3) light grey silt			
			10				
380							
400		END OF HOLE AT 408 feet					
420							

135 (26)

DRILL HOLE : 75-98
SHEET NO. : 3 OF 3

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	55,621' N 23,044' E	Length	495'	Hole No.	76-116
		Azimuth	-	Date	JAN 1976
Reference Elev.	3850'	Dip	-90°	Logged by	J. Ratzlaff
Ground Elev.	3849'	Core Size	NQ	Sheet	1 of 3

ELEVATION in FEET	DEPTH in FEET	STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 3849' No wash samples obtained. 0% drilling fluid return			
			OVERBURDEN Gravel with sand Clay and sand					
	20		Open gravel Clay and sand					
	40							
3800	60		Clay					
	80		Sand					
	100		Gravel					
	120		Clay					
	140		Gravel with cobbles and boulder					
	160		Sand					
	180		**SILTSTONE** Grey, soft to mod. hard, massive with minor beds of buff to tan silst and clst		Tricorned			
	200							
	220							
	240				Grey, soft Tan, L.M. soft clst Lam. / pebble, very soft clst Several lam. buff very soft clst			
3600				10	(0.2) buff, very hard silst			
	260				(0.1) buff, soft clst Lam. of buff, very soft clst			
				10	(0.1) buff, mod. hard silst (0.3) buff, soft silst (0.3) buff, soft silst (0.2) buff, soft clst			
	280				Tan, soft clst lam.			
	300			45	(0.2) (0.2) buff, mod. hard silst			
	320				Grey, mod. hard			
				45	(0.2) buff, mod. hard silst			
	340			5	(0.1) buff, very hard silst			
	360				(0.1) tan, very soft clst Grey, very soft to soft (0.1) buff, soft silst			
				30				
	380				(0.1) tan, very soft clst Grey, mod. hard			
	400				Grey, very soft to soft (0.1) buff, very soft clst			
				60				
	420				Grey, mod. hard (0.2) tan, soft silt			
				45				
	440							
3400								
	460				Grey, mod hard to soft			
	480							
			END OF HOLE AT 495 feet					
	500							

135 (27)

DRILL HOLE : 76-116
SHEET No. : 3 OF 3

ROKE

GAMMA RAY - RESISTANCE LOG

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

LSD
SEC
TWP
RGE
W ____ M

COMPANY DOLMAGE, CAMPBELL AND ASSOC.

WELL 75-68

LOCATION 53,341 N 21,577 E

FIELD HAT CREEK

PROVINCE BRITISH COLUMBIA

Other Services: DENS, CAL DENS, GR

Permanent Datum GROUND LEVEL Elev 3485.5 K.B. ____

Log Measured from TOP OF CASING 1.5 Ft. Above Perm. Datum CSG ____

Other Depths Measured from TOP OF CASING G.L. ____

Run No.	ONE		
Date	11 JUNE 1975		
First Reading	100		
Last Reading	000		
Footage Logged	100		
Depth Reached	102		
Depth Driller	1843		
Casing Rdrs	13		
Casing Driller	13		
Fluid Type	MUD		
Liquid Level	14		
Rm Dam	3 3/8		
Rm @ °F			
Operating Time	1/2 hr		
Truck No.	104-SU3		

Recorded By EDWARDS K. Witnessed By ROTZIEN

135 88

OPEN HOLE

TOOL # 13

Remarks

RESISTANCE

DDH 75-68

OHMS 100 20k 0

Depths

GAMMA RAY API 10 0

DDH 75-68

100 Ω ← ZERO

3487 000

102 FT

100 CPS ← ZERO

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	55,621' N	Length	382'	Hole No.	76-114
	23,043' E	Azimuth	270°	Date	JAN. 1976
Reference Elev.	3850'	Dip	-80°	Logged by	J. Roizen
Ground Elev.	3848'	Core Size	NQ	Sheet	1 of 2

ELEVATION in FEET	DEPTH in FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE Nos.	ASH AT 20% MOISTURE (0 20 40 60 80)
	0		Datum		Note: Original ground elev. 3849'			
			OVERBURDEN					
			Gravel					
			Clay and sand					
	20		Open gravel					
			Clay and sand					
	40							
3800			Clay					
	60							
	80		Sand					
	100		Gravel					
			Clay					
	120							
	140		Gravel with cobbles and boulders					
			Sand					
	160		SILTSTONE Grey, med. hard to soft with numerous minor buff to tan clst beds		Tricored			
	180							
	200				(0.1) buff, soft clst; (0.1) buff, med. hard clst			
	220				Grey, soft brecciated			
	240				(0.1) buff, soft			
3600								
	260				(0.2) buff, hard; (0.1) light grey, soft; (0.4) buff, very soft clst			
	280				Grey, med. hard to soft, with numerous beds of brecciated clst			
	300							
	320				(0.3) buff, very soft clst; (0.1) tan, soft clst			
	340				(0.1) tan, very soft clst; (0.3) buff, med. hard			
	360				Lam. buff, soft clst			
	380		END OF HOLE AT 382 feet		Tricored			
	400							

135 (29)

DRILL HOLE : 76-114
SHEET No. : 2 OF 2

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	45,245' N / 24,223' E	Length	1508'	Hole No.	75-101
		Azimuth	-	Date	OCT 1975
Reference Elev.	3726'	Dip	-90°	Logged by	P.J. Street
Ground Elev.	3724'	Core Size	NQ	Sheet	1 of 8

ELEVATION IN FEET | DEPTH IN FEET | STRATIGRAPHY (STRAT PLOT, MAJOR ROCK UNITS) | DETAIL & STRUCTURE (SYMBOL, DESCRIPTION) | CORE LOSS | SAMPLE No. | ASH AT 20% MOISTURE

STRATIGRAPHY

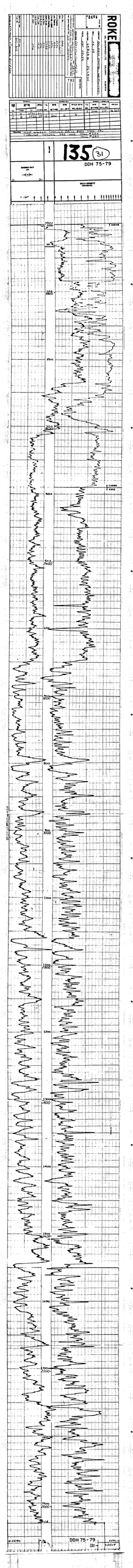
- Datum
- OVERBURDEN
  - Clay, gravel and boulders
  - Clay
  - Boulders
  - Sand and clay
  - Gravel
  - Clay
  - Gravel
  - Sand and boulders
  - Gravel
  - Clay
- SILTSTONE — Grey to dark grey, soft to med. hard, laminated slst with carbonized plant remains on some parting surfaces.
- CLEAN COAL — Black, very hard with interbeds of soft, carb. to coaly slst
- MIXED UNIT — Black to grey, very soft to very hard, interbedded mixture of clean coal to slst and clst. The dominant fracture set is parallel to the bedding
- CLEAN COAL — Black, very hard with interbeds of hard silty coal and soft, carb and coaly slst
- MIXED UNIT — Black to light grey, very hard to very soft, interbedded mixture of coal, coaly to carb slst, slst and sst
- CLEAN COAL — Black, very hard
- END OF HOLE AT 1508 feet

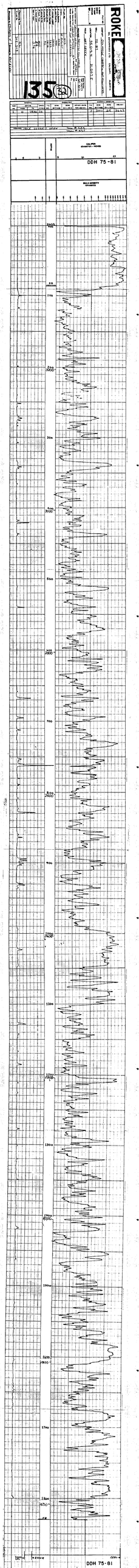
DETAIL & STRUCTURE — DESCRIPTION

- Note: Original ground elev. 3725'
- Triconed
- Dark grey, very soft clst
- Dark grey soft clst
- Very fine calc. slst, fracture infills with pale grey to buff slst
- Dark grey, very soft slst
- Dark grey, soft clst
- (0.5) buff to grey, hard sandy slst
- Interbedded with clst
- With hard, very buff, finely lam. slst
- With numerous small beds (0.25 - 0.3') of soft clst
- Grey, mod. hard
- With numerous small beds of soft clst and minor beds of buff slst
- (0.5) buff to grey, hard
- (0.3) buff, hard
- (0.2) buff, hard
- (0.8) buff, hard
- (1.5) buff, very hard
- Dark brown, very soft carb.
- Black, soft, coaly slst
- Black, soft, coaly slst
- Black, soft, coaly slst
- (0.5) black, mod hard, coaly slst
- 60% black, soft coaly slst
- (0.5) black, soft, coaly slst
- banding
- banding
- Black, soft, coaly slst
- Black, soft friable coaly slst
- Light grey, hard sandy slst
- Light grey, very soft slst
- Grey, mod hard, finely lam slst
- Grey, mod hard, massive slst
- Grey, mod hard, finely lam slst
- Grey, mod hard, lam slst
- Dark brown to black, soft coaly to carb. slst
- Black, hard, silty coal
- Black, very hard clean coal
- Black, hard silty coal
- Black hard clean coal
- Black to dark brown, very hard to soft finely interbedded clean and silty coal and coaly to carb slst
- Grey, soft slst
- Black, soft to hard fissile, interbedded silty coal and coaly slst
- Dark grey, very soft clst
- Grey soft slightly carb. slst
- Grey to black, hard to soft finely interbedded coal and coaly to clean slst
- Black, soft, coaly slst
- Black, soft coaly slst
- (0.1) buff, hard slst
- Black, soft, coaly to carb slst
- Black, soft, coaly slst
- (0.5) black, soft, carb slst
- (0.2) yellowish buff soft slst
- (0.3) black soft coaly clst
- 50% black soft, coaly slst
- (0.5) black, soft, coaly clst
- Black soft, coaly slst
- Dark brown to black, mod. hard, carb to coaly lam. slst
- Black, soft, carb to coaly slst
- Black, hard coaly slst
- (0.1) buff, hard, calc. slst
- Black, soft coaly clst
- (0.5) black, soft, coaly clst
- Black, mod hard coaly slst
- (0.1) buff, hard slst
- Black soft coaly slst
- Buff hard slst lam. folded in clean coal
- Black, soft silty coal
- (0.3) black soft coaly slst
- Black, soft coaly clst
- (0.25) grey, very hard, calc. wood
- Light grey, hard, fine to coarse grained sst with interbedded soft grey clst
- Dark grey to black, soft to very hard, finely interbedded silty coal and coaly to carb slst with minor clean coal
- Dark grey to black soft finely interbedded carb slst and clst
- Light grey, hard congl. sst
- Light grey, hard, fine to coarse grained sst
- Grey to grey brown soft, interbedded slst and clst
- Black, very hard to soft, finely interbedded silty coal and carb to coaly slst with minor clean coal
- Grey, hard, interbedded slst and sst
- Black, soft, carb to coaly slst
- Grey, mod hard lam. slightly carb slst
- Very hard to hard interbedded clean and silty coal
- Grey, hard slst with minor clean coal and carb. slst
- Clean coal
- (0.1) grey hard slst
- Clean coal
- Black hard to soft finely interbedded silty and carb slst
- (0.3) buff hard slst
- Clean coal with minor silty coal
- Dark grey, mod hard, slightly carb slst
- Clean coal
- Dark brown to black, soft to hard carb slst
- Clean coal with slst laminae
- 2 (0.2) grey, hard, sandy slst
- Black soft carb slst with minor coaly slst
- Grey to light grey, hard, massive slst with a trace of carb material
- (0.1) slst of grey hard slst
- (0.1) grey, hard slst
- Clean coal
- Grey, hard slst
- Light grey, hard very coarse tuff sst
- Grey, hard slst
- Silty coal, mod. fissile
- Dark brown to black, soft to mod hard carb. to coaly slst
- Clean coal
- (0.3) grey, very hard, calc. wood
- Black, soft, carb. to coaly slst
- Clean coal
- (0.8) grey, hard, calc. wood
- Dark brown to black, mod hard carb. to coaly slst
- Light grey, intergradational slst and sst.
- Black, hard to very hard interbedded clean and silty coal
- Black, soft, carb. slst
- Black, hard to very hard, clean and silty coal
- Grey, mod. hard slightly carb slst
- Clean coal
- Light grey hard finely calc. slst interbedded with carb to coaly material
- Clean coal
- Same as 1321'-1323'
- Black, soft to very soft coaly slst
- Grey, soft, slightly carb. slst
- Silty coal
- Black to light brown, hard carb slst grading into silty coal.
- (0.6) silty coal
- (0.5) buff, hard, slightly carb slst
- (0.4) silty coal
- (0.3) light brown, very hard slst
- (0.1) buff, very hard slst
- (0.3) silty coal
- (0.6) silty coal
- Black, mod. hard, silty coal
- Dark brown, very hard, slightly carb slst

SAMPLE No.: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32

135 (30)


ROKE
135
31
DDH 75-79
DDH 75-79


ROKE
135
DDH 75-81
DDH 75-81

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	83,411' N	Length	315'	Hole No.	75-105A
	23,385' E	Azimuth	-	Date	NOV. 1975
Reference Elev.	3878'	Dip	-90°	Logged by	J. Ratzlaff
Ground Elev.	3876'	Core Size	NQ	Sheet	1 of 2

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 3878			
			OVERBURDEN					
	20							
			Clay and boulders					
	40							
	60							
3800	80							
			Cored. Silt with 10-15% sand and gravel. Sand and gravel sub-angular to sub-rounded. Well indurated, saturated, tan to buff.					
	100							
	120							
	140		Silt with sand and gravel					
	160		VOLCANIC BRECCIA		Tricored			
			Grey to green, very soft clay matrix with angular fragments of dark green basalt and light grey host up to 2" in dia.					
	180							
	200							
	220				Green, very soft, chloritized volcanic breccia			
	240				Light grey, hard host breccia with minor chloritized clst			
	260							
3600	280				Dark green, very soft to very hard, chloritized, volcanic breccia			
	300							
			END OF HOLE AT 315 feet					
	315							

135 (33)

ROKE OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.	
COMPANY	Dolmage Campbell and Associates
WELL	75-97
LOCATION	4800N-23590E
FIELD	Hat Creek
PROVINCE	British Columbia
Permanent Datum	Ground Level, Elev. 3623
Log Measured from	Top of Casing, 1 Ft. Above Perm. Datum
Drl. Depths Measured from	Top of Casing

Run No.	One	Two
Date	13 October	13 October
First Reading	1500	285
Last Reading	285	000
Footage Logged	1215	285
Depth Reached	1503	425
Depth Driller	1508	1508
Casing Roke	285	285
Casing Driller	285	285
Fluid Type	Mud	Mud
Fluid Level		
Bit Diam.	3 7/8	3 7/8
Operating Time	5hr	2hr
Truck No.	102-5U2	102-5U2
Recorded By	Edwards	
Witnessed By	Rotzien	

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API & R. UNITS PER LOG DIV.	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	CPS/DIV
1+2	0	1490	10					3	1000	2R	170
1+2	0	1500	18	3	1000	0	5				

REMARKS: HOLE LOGGED THROUGH DRILL RODS* 1500-285 THROUGH CASING* 285-000 TOOL # 554 TOOL # 283

*NOTE: POSITION OF DRILL RODS MUST BE CONSIDERED WHEN USING DENSITY SCALE

DDH 75-97

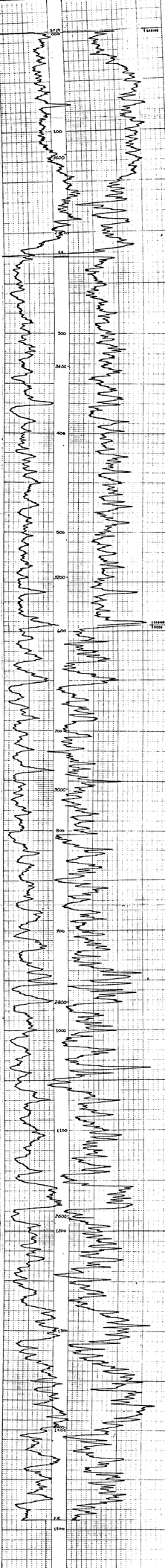
GAMMA RAY API -|5|- 0 50 | DEPTHS | 135 (34) BULK DENSITY (GRAMS/CC)

DDH 75-97

ROKE

DDH 75-95

135 (35)



DDH 75-95

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO

COMPANY DOLMAGE, CAMPBELL AND ASSOCIATES

WELL 75-93

LOCATION 50498 N - 21533 E

FIELD NAT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 3720 K.B.

L. of Measured from TOP OF CASING 2 Ft. Above Perm. Datum G.L.

Other Depths Measured from TOP OF CASING

Run No.	ONE
Date	4 OCTOBER
First Reading	385
Last Reading	000
Feet of Logged	385
Depth Reached	388
Depth Driller	388
Casing Rake	
Casing Driller	455
Fluid Type	MUD
Liquid Level	
Rotn Datm	378
Operating Time	3 hr
Truck No	102-SU2

Recorded By EDWARDS Witnessed By ROTZIEN

RUN NO.	GENERAL DEPTHS FROM	GENERAL DEPTHS TO	GENERAL SPEED FT/MIN	GAMMA RAY TIME SETTING	GAMMA RAY T.C. SEC.	GAMMA RAY SENS DIV'L DIS. B	GAMMA RAY API R.B. UNITS PER LOG DIV.	BOREHOLE DENSILOG TIME SETTING	BOREHOLE DENSILOG T.C. SEC.	BOREHOLE DENSILOG PE RHO DIV'L DIS. R	CPS/DIV
1	385	0	10	100	1	0	5	1000	3	2R	170
1	385	0	10	100	1	0	5	1000	3	2R	170

REMARKS ANGLE HOLE 55° AZIMUTH 030° HOLE LOGGED THROUGH CASING 385-000 TOOL # 554 TOOL # 13

NOTE: CALIBRATION MUST BE CHECKED IN PRODUCTION ZONE WHEN ABOVE DENSITY VALUES

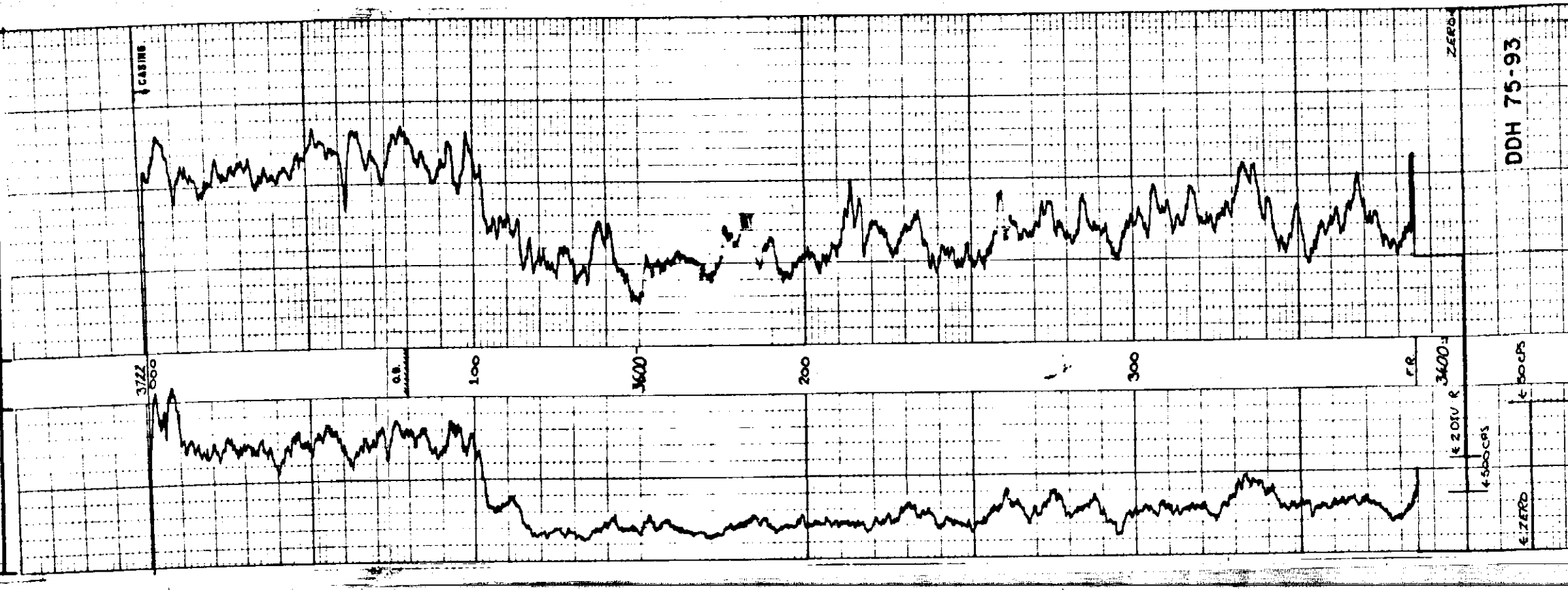
DDH 75-93

135 (36)

DEPTHS

GAMMA RAY API 0 150

BULK DENSITY (GM/CC) 3 2



ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.
LSD
SEC
TWP
RGE
W ... M

COMPANY DOLMAGE, CAMPBELL AND ASSOCIATES
WELL 76-116
LOCATION 55°21'N - 23°44'E
FIELD HAT CREEK
PROVINCE BRITISH COLUMBIA

Other Services

Permanent Datum GROUND LEVEL Elev. 3848 — K.B. —
Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum — D.F. —
Drill Depths Measured from TOP OF CASING — G.L. —

Run. No.	ONE	
Date	26 JANUARY	
First Reading	280	
Last Reading	000	
Footage Logged	280	
Depth Reached	282	
Depth Driller	495	
Casing Rota		
Casing Driller	4½	
Fluid Type	MUD	
Liquid Level	000	
Min. Diam	3⅞	
Operating Time	2 hours	
Truck No	30	

Recorded by EDWARDS Witnessed by ROTZIEN

RUN NO.	GENERAL DEPTH FROM	GENERAL DEPTH TO	GENERAL SPEED FT/MIN	GENERAL T.C. SEC	GAMMA RAY ZERO DIV'S.	GAMMA RAY ZERO SETTINGS	GAMMA RAY AMPLITUDE UNITS PER DIV'S.	GAMMA RAY T.C. SEC	BOREHOLE DIAMETER ZERO SETTINGS	BOREHOLE DIAMETER DIV'S. OR IN.	CASING SIZE
1	0	280	10	1	0	100	5	3	1000	2.K	11.0
1	0	280	18	1							

REMARKS HOLE LOGGED THROUGH CASING @ 280-000
TOOL # 554 TOOL # 15

* METRIC EQUIVALENT FOR 4½" CASING IS 11.4 KG/M

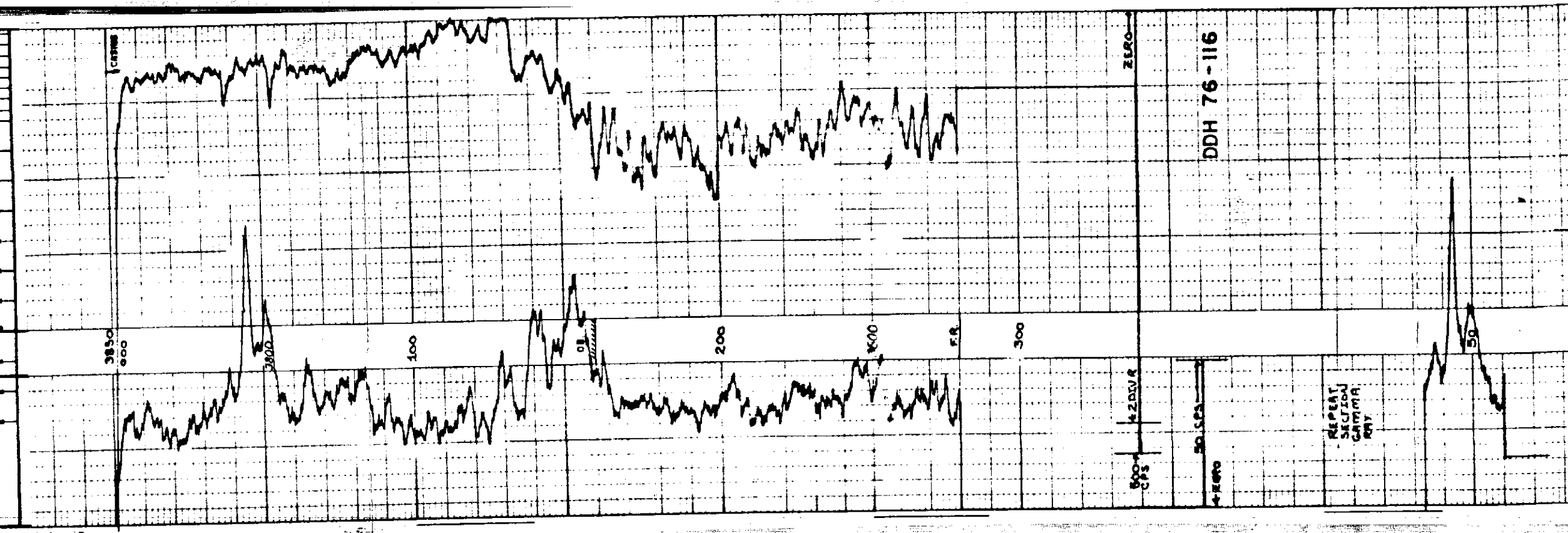
DDH 76-116

135 (37)

DEPTHS

BULK DENSITY (GM/CM3)

GAMMA RAY API 150 0



ROKE OIL ENTERPRISES LTD. CALGARY, ALBERTA

GAMMA RAY SIDEWALL DENSILOG

FILE NO.

LSD
SEC
TWP
RGE
W ___ M

COMPANY DOLMAGE CAMPBELL AND ASSOCIATES
WELL 75-105
LOCATION 53539 N - 23350 E
FIELD HAT CREEK
PROVINCE BRITISH COLUMBIA

Other Services

Permanent Datum GROUND LEVEL Elev. 3887
Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum
Drilling Depths Measured from TOP OF CASING

K.B. ___
D.F. ___
G.L. ___

Run No.	ONE	TWO	THREE
Date	26 NOVEMBER	27 NOVEMBER	28 NOVEMBER
First Reading	470	580	510
Last Reading	000	510	470
Footage Logged	470	70	40
Depth Reached	473	583	510
Depth Driller	500	815	815
Casing Roke			
Casing Driller	475	510	510
Fluid Type	MUD	MUD	MUD
Fluid Level	000	000	
Bit in Diam	3⅞	3⅞	3⅞
Operating Time	3 hr	2 hr	1 hr
Truck No	102-SU2	102-SU2	102-SU2

Recorded By EDWARDS K Witnessed By ROTZIEN

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO	DEPTHS FROM	DEPTHS 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	CPS/DIV
1	0	470	10					3	1000	2R	170
1,2,3	0	580	18	3	100	0	5				

REMARKS WLE LOGGED THROUGH DRILL RODS 580-510 THROUGH CASING 510-000 TOOL # 283 TOOL # 554

NOTE CONSIDERATION MUST BE GIVEN TO THE DIAMOND DRILL ... DENSITY SCALE

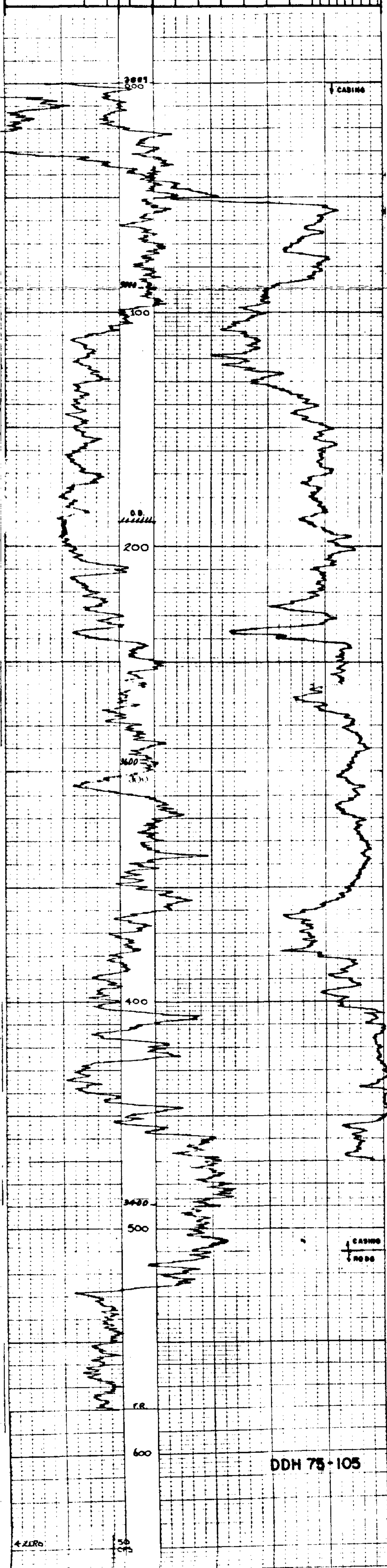
DEPTH

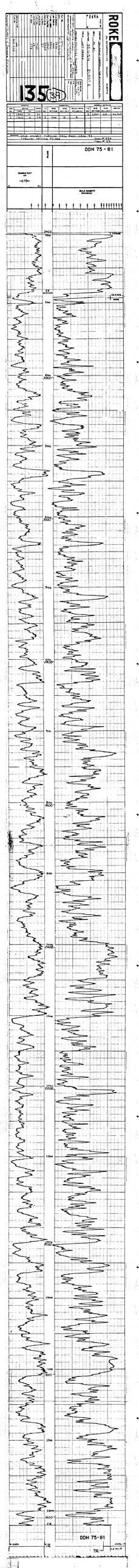
DDH 75-105

135 (38)

GAMMA RAY
API
5
0 50

BULK DENSITY
(GRAMS/CC)




ROKE
DDH 75 - 81
135
DDH 75 - 81

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.

LSD
SEC
TWP
RGE
W4 M

COMPANY Columbia Compagnie and Associates

WELL 75-100

LOCATION 45.538N-26.803E

FIELD HOT CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 3960

Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum

Spud Depth Measured from TOP OF CASING

K.B.
GRD.
G.L.

Other Services

Run No.	ONE
Date	26 OCTOBER
Elev. Reading	1500
Last Reading	000
Footage Logged	1500
Depth Reached	1503
Depth Driller	1507
Casing Size	194
Casing Driller	195
Fluid Type	MUD
Liquid Level	000
Min. Diam.	3 1/8
Operating Time	5 HOURS
Truck No.	102-SV2

Recorded by EDWARDS Witnessed by ROY FIEN

GENERAL

RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN
1	0	1490	10
1	0	1500	18

GAMMA RAY

T.C. SEC.	SENS SETTINGS	ZERO DIV.L OR R	API G.R. UNITS PER LOG DIV.
3	100	0	5

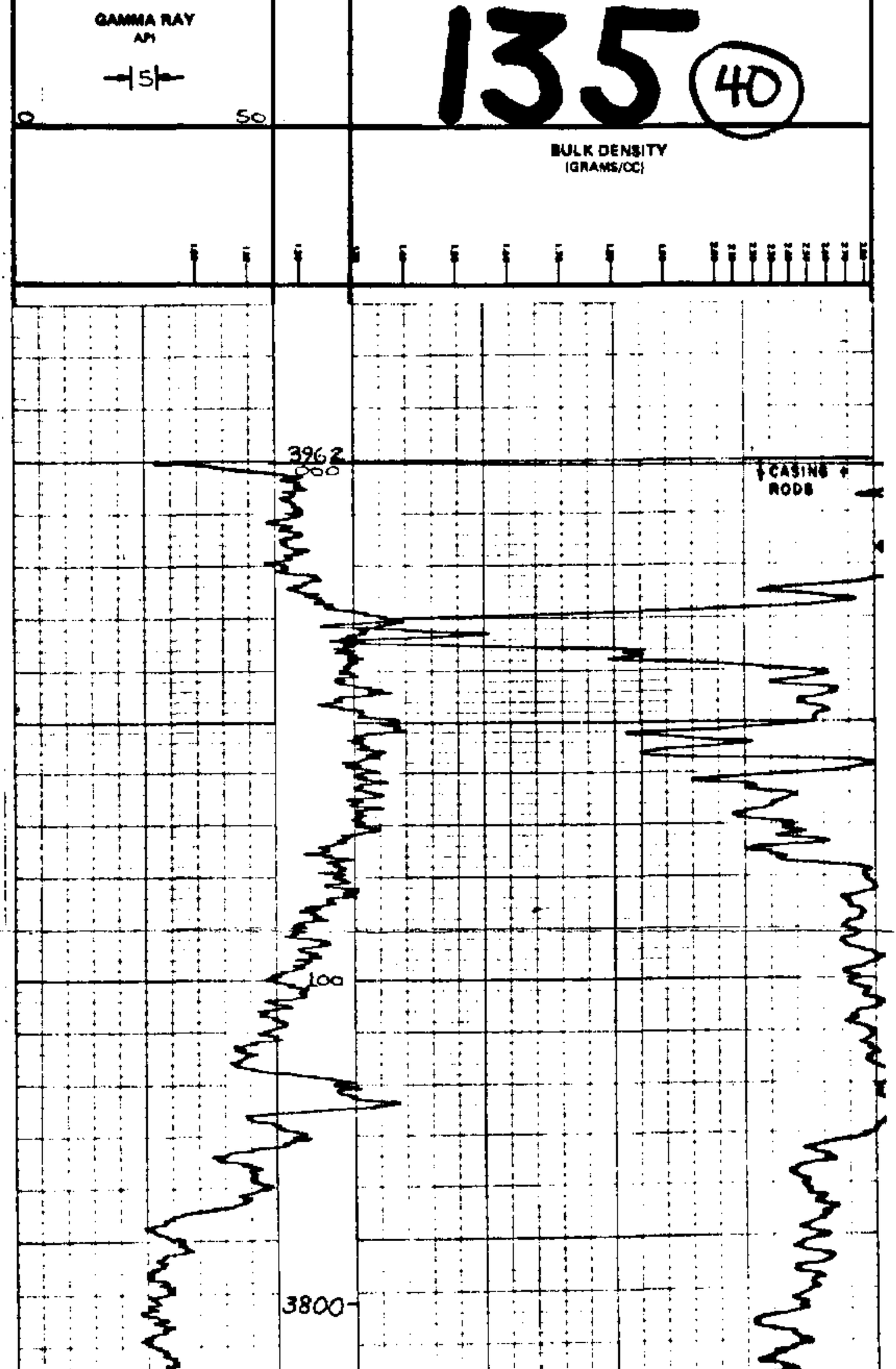
SIDEWALL DENSILOG

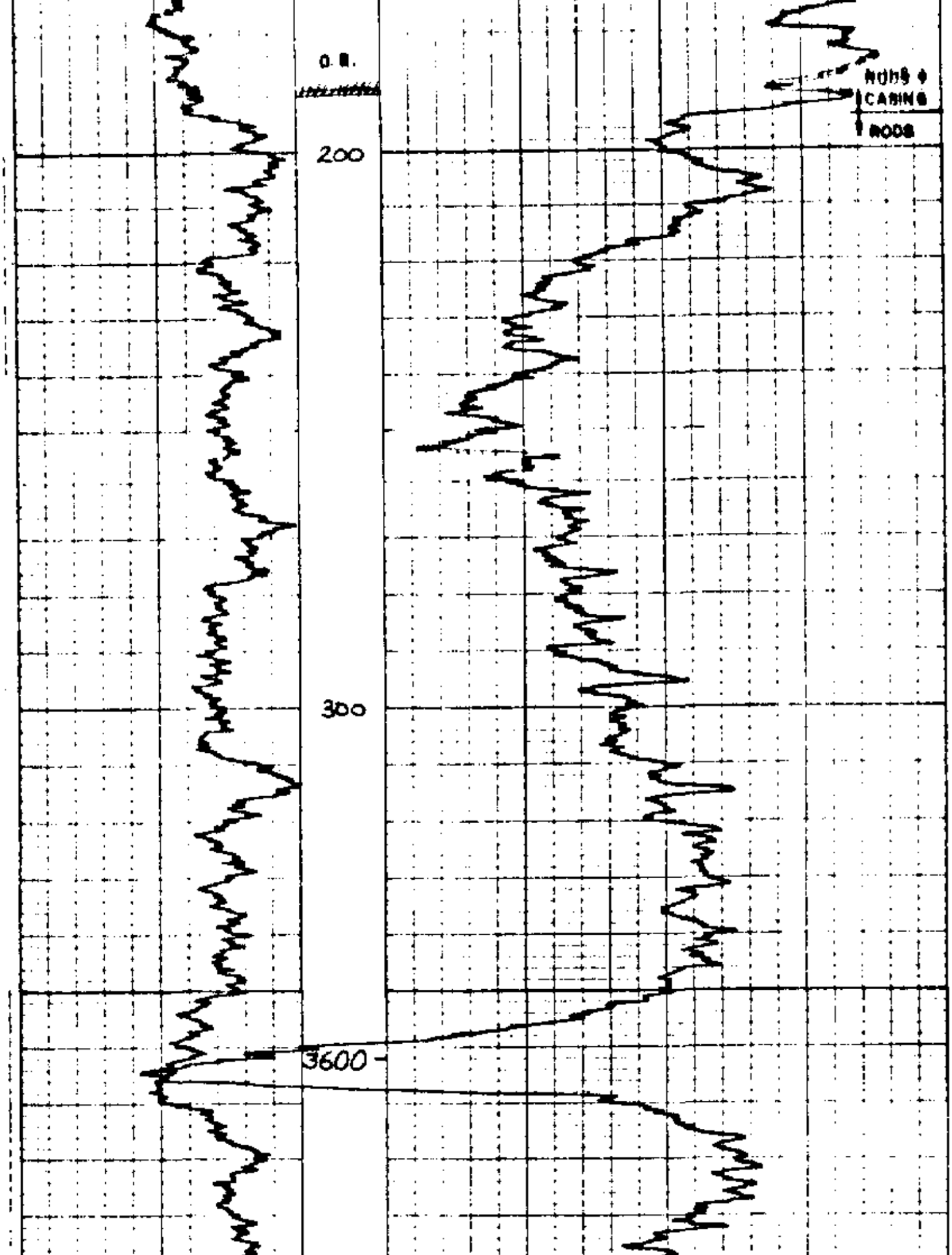
T.C. SEC.	SENS SETTINGS	ZERO DIV.L OR R	CPS/ DIV
3	1000	2R	17.0

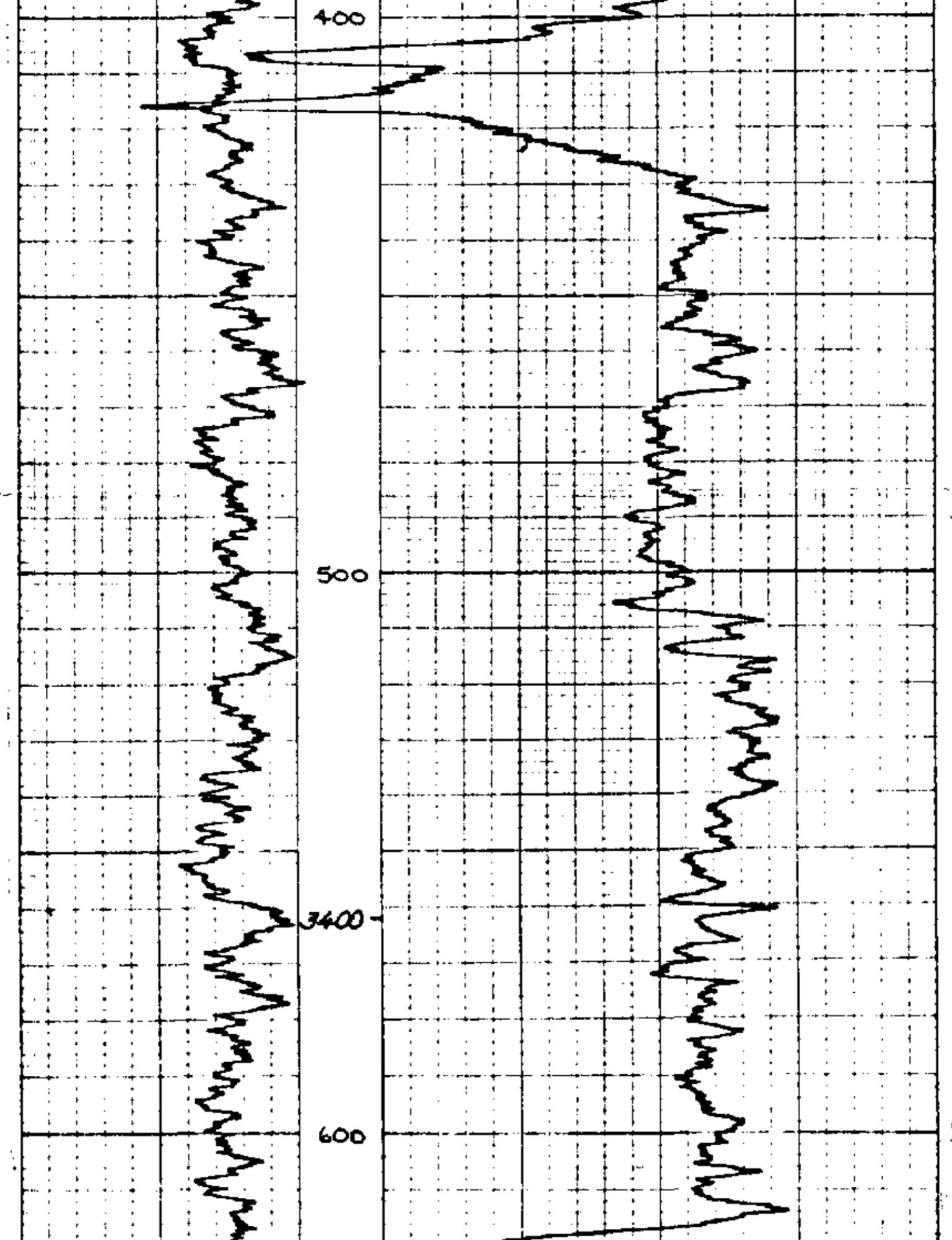
REMARKS HOLE LOGGED THROUGH DRILL RODS* 1500-194
THROUGH RODS* PLUS CASING* 194-000
TOOL # 554 RODS # 283
*NOTE: CONSIDERATION MUST BE GIVEN TO POSITION OF RODS WHEN USING DENSITY SCALE

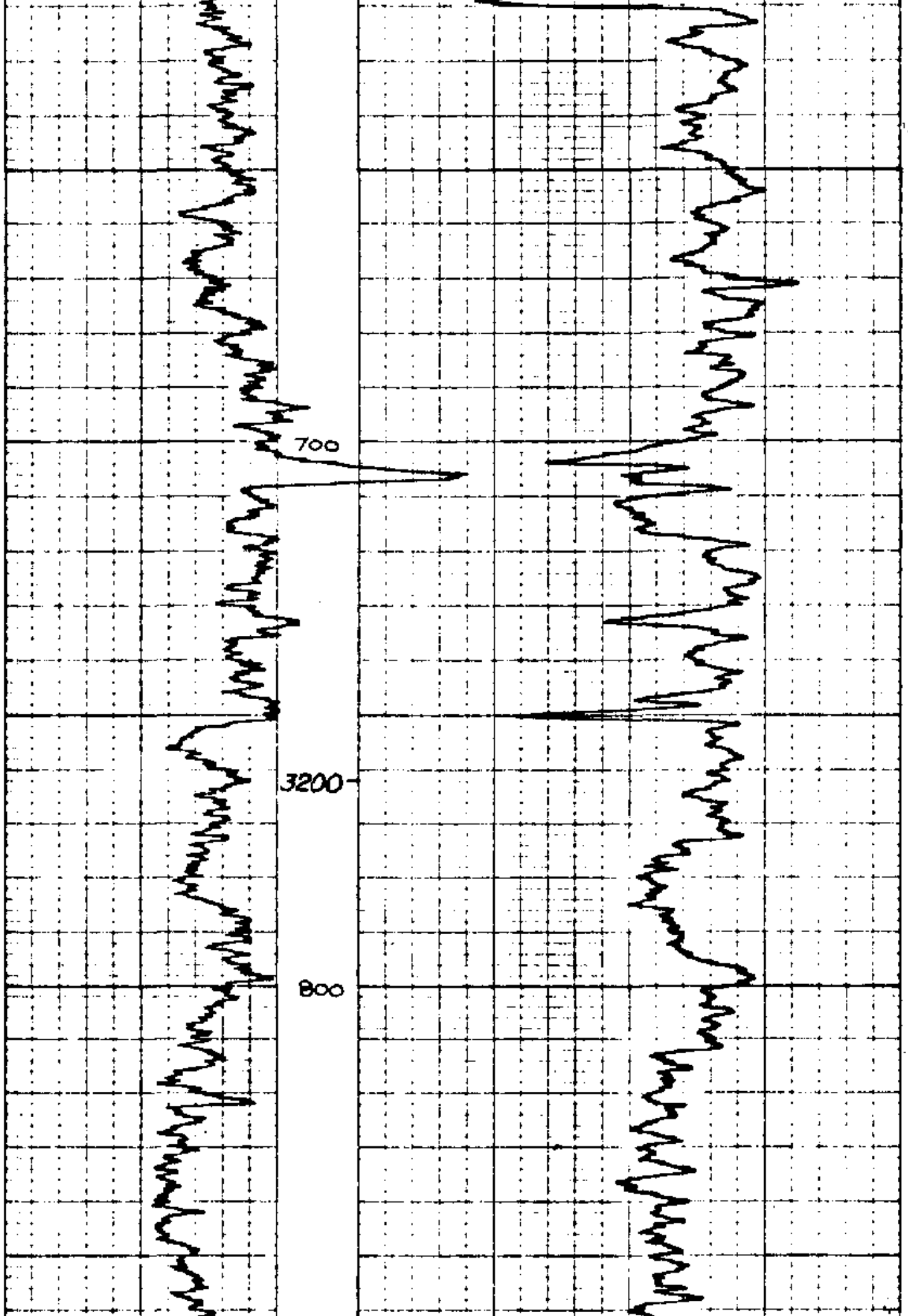
DEPTHS

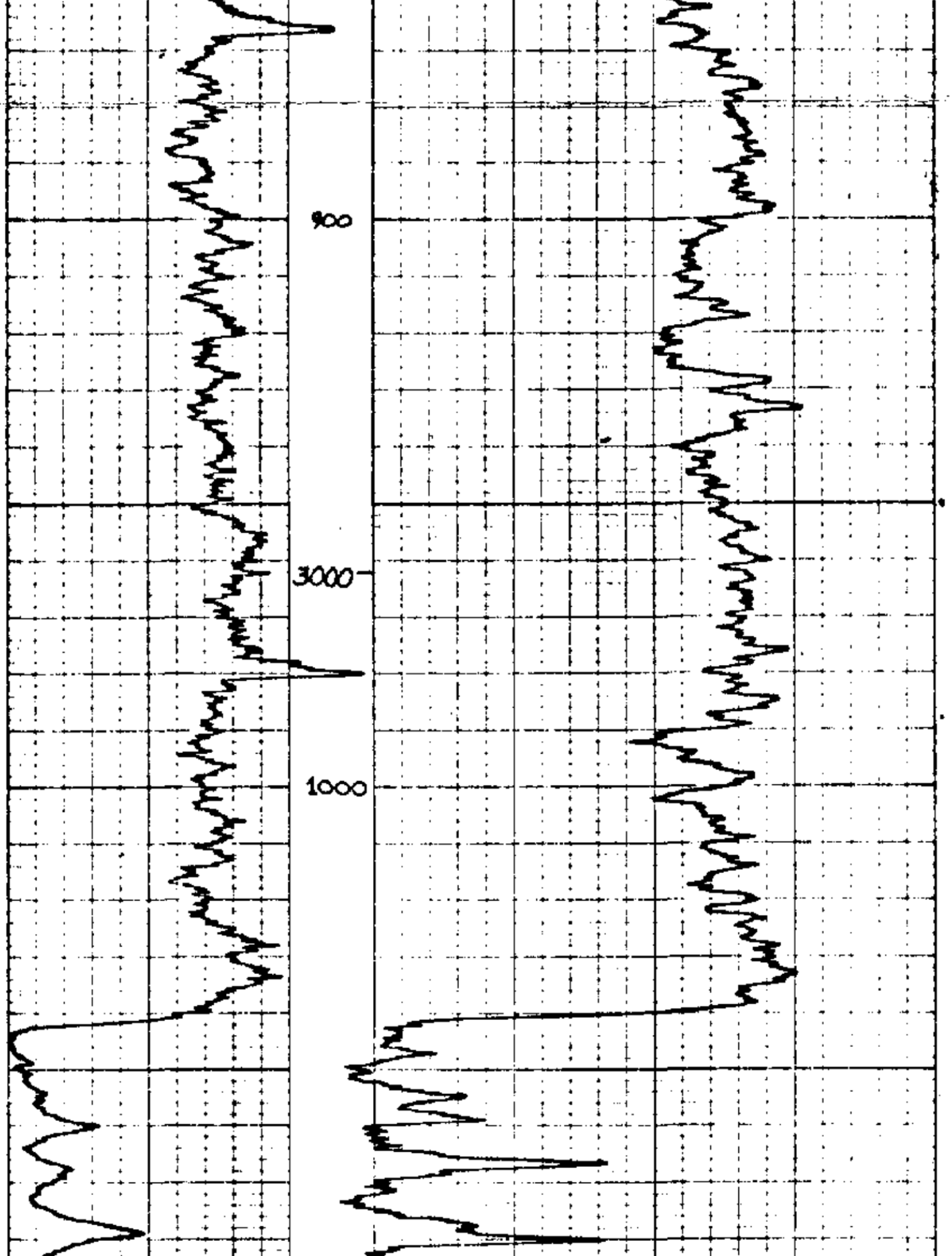
DDH 75-100


GAMMA RAY
API
5
0
50
135
40
BULK DENSITY
(GRAMS/CC)
3962
CASING +
RODS
100
3800


O.B.
NUTS &
CASING
RODS
200
300
3600


400
500
3400
600


700
3200
800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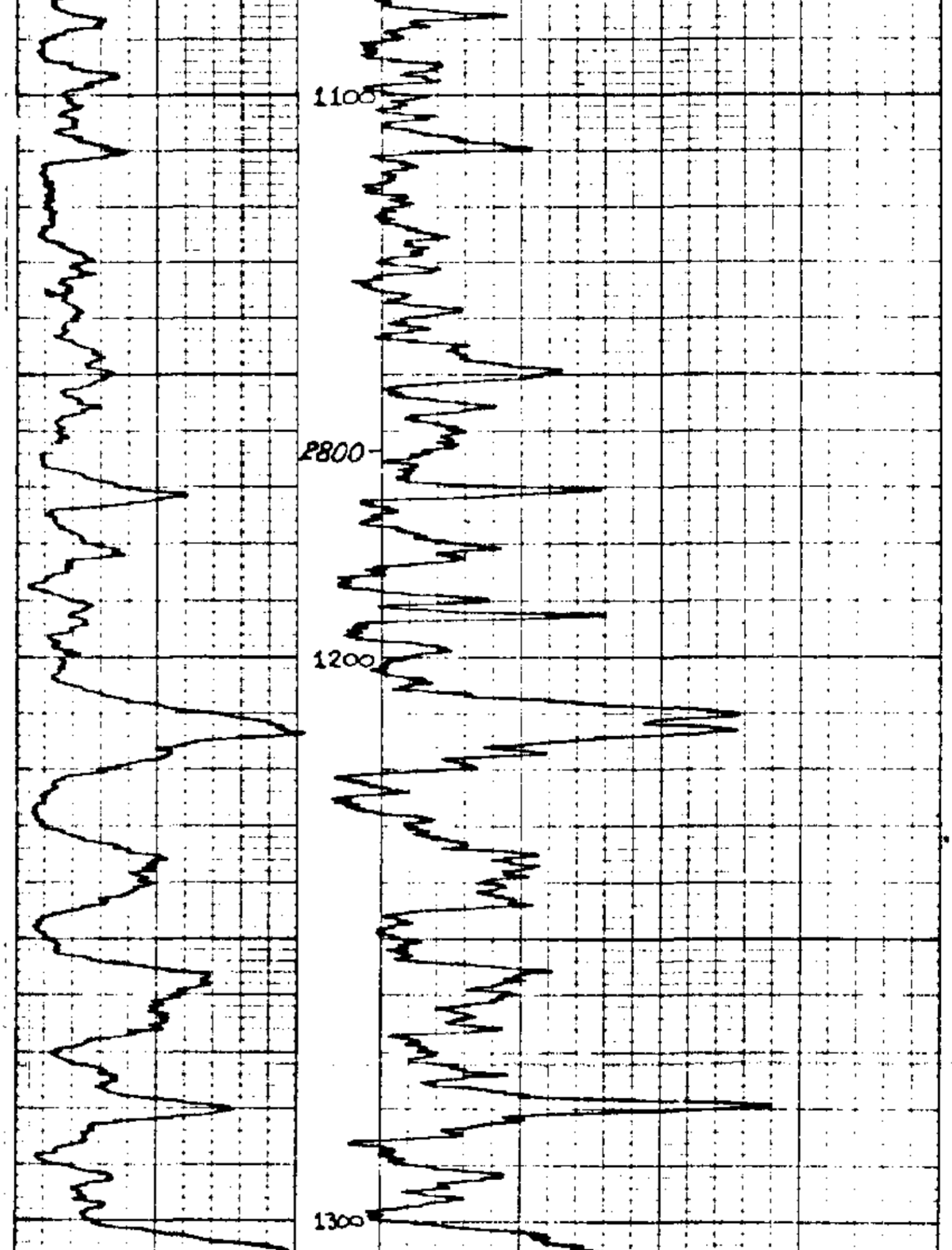
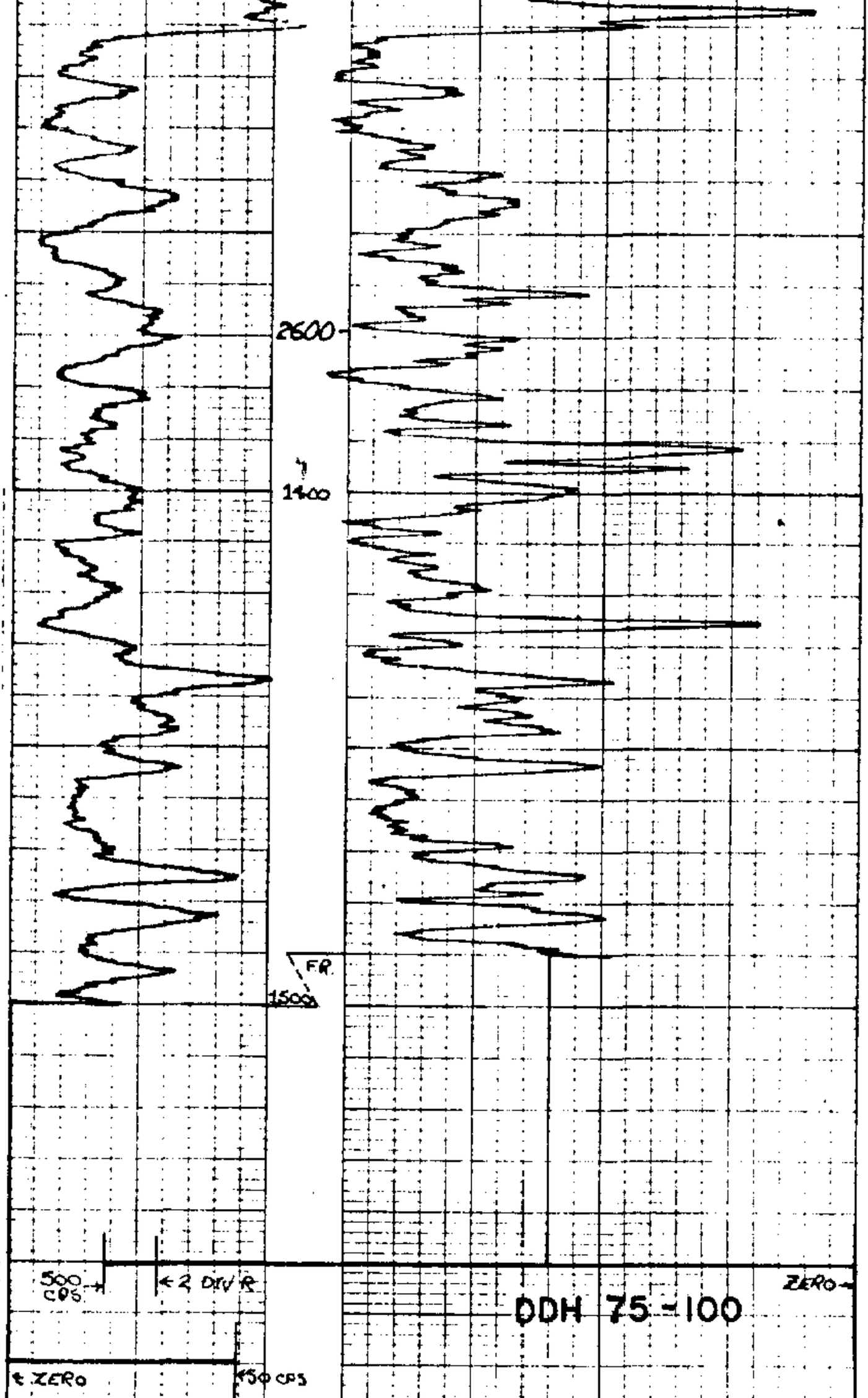
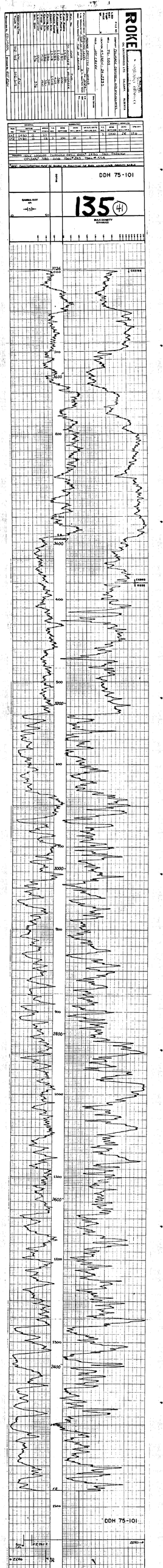
3000
1000


1100
P800
1200
1300


2600
1400
F.R.
1500
500 CPS
2 DIV/R
ZERO
DDH 75-100
ZERO
150 CPS


ROKE
DDH 75-101
135
DDH 75-101

DDLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

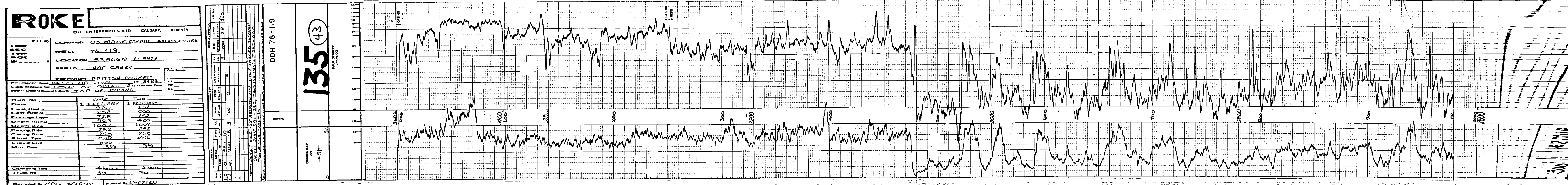
HAT CREEK PROJECT — DRILL RECORD

Coordinates	53,139' N	Length	1007'	Hole No.	76-115
	22,587' E	Azimuth	—	Date	JAN. 1976
Reference Elev.	3667'	Dip	-90°	Logged by	P. Northrop
Ground Elev.	3666'	Core Size	NQ	Sheet	1 of 5

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 3668'			
			OVERBURDEN Gravelly sand with cobbles and boulders					
	20							
	40		Clay with sand and gravel and with discrete layers of gravel					
	60							
3600								
	80							
	100							
			VOLCANIC BRECCIA Blue green, soft to hard, volcanic breccia with silty clay matrix and black volcanic particles. Mod tough, mod. plastic (soils log)		Tricorned			
	120							
	140							
	160							
	180							
	200							
	220		VOLCANIC BRECCIA Blue green, soft to hard, volcanic breccia with silty clay matrix and black volcanic particles	90				
	240			90				
	260			90				
3400				90	I.B. with red brown to brown, soft clyst Blue green, soft to hard, volcanic breccia			
	280		SILTSTONE Blue grey to grey brown, soft to hard clst	90	(0.2') blue green volcanics Blue grey mud hard to soft slst to sandy slst			
				60	Hard, with minor fine congl. Dark grey to grey brown, hard (0.2') black, soft, slightly carb. clst			
	300				Grey brown, hard to soft			
			CLEAN COAL	60				
	320				(0.6') black, hard, silty		1	
				85				
	340			70	(0.1') dark brown, hard clst with 0.5° slip 10° to C.A.			
					(0.3') black, hard, silty			
	360				Grey brown to brown, hard to very hard slst with coaly lam.		2	
				70				
	380							
				85	Buff, very hard, calc. slst with minor coal lam.			
	400				(0.2') buff, very hard, calc. slst Silty coal grading into dark grey, brown soft clst in seams		3	
					(0.2') black, soft, coaly clst (0.5')			
	420			85	Brown to dark brown, hard to soft clst to silty clst			
					(0.6') black soft, coaly clst		4	
	440			70	Grey brown, soft clst			
					Grey brown, soft clst			
				85				
	460				Silty coal			
3200				70	Silty coal			
					Silty coal		5	
	480			99	Approx. base of main coal beds			
					(0.2') buff, very hard, calc. clst (0.3') black, soft, coaly clst (0.4') dk. brown, soft clst			
	500			70	(0.6') black, hard, silty coal (0.6') black, soft, carb. clst		6	
					(0.2') silty hard clst (0.8') black, soft, coaly to carb clst (0.6') dk. grey brown, soft blocky clst			
	520				Silty coal			
				70	Silty coal			
	540				(0.3') black, soft, carb clst (0.2') silty coal			
				60	(0.1') brown to buff, hard clst (0.5') black, soft, carb to coaly clst (0.3') silty coal		7	
	560				Black, soft to hard, coaly to carb clst			
				85	(0.8') silty coal			
					(0.6') black, soft, carb clst			
	580			70	(0.4') black, soft carb clst			
					(0.2') black, soft coaly clst (0.3') black, hard silty coal		8	
	600			85	Conc. of resin beads			
					(0.4') black, soft, carb. clst (0.3') black, soft, coaly clst			
					(0.8') black, soft carb to coaly clst (0.6') black, soft carb clst			
	620				(0.5') black, soft, carb. clst (0.2') black, soft, coaly clst (0.2') buff, calc. slst, very hard, calc. clst (0.8') coaly clst			
				85				
	640				(0.6') black, soft, coaly clst (0.3') black soft, carb clst Banding (0.6') black, soft, coaly clst (0.6') black, mod hard coaly clst		9	
				30				
	660			10				
3000				85				
	680			70	(0.4') light brown, hard clst		10	
				8	Banding Silty coal (0.3') dark brown, soft clst Black, hard, silty coal			
	700				Dark brown to black, soft carb to coaly clst			
				85	Silty coal (0.7') dark brown, hard clst with coal lam.		11	
	720			70				
	740			85			12	
	760				Dark brown to grey brown, mod. hard to soft clst (0.6') brown, hard clst			
				70			13	
	780				(0.2') silty coal			
				65				
	800				Black, hard to soft, carb to coaly clst			
				70	Conc. of resin beads		14	
	820			85	Black, soft, carb clst (0.1') dark brown, hard clst			
				60 70	Irregular			
	840			70	(0.4') black, soft, coaly clst (0.2') black, hard, silty coal			
				10	(0.4') black, mod hard, carb clst (0.2') silty coal (0.6') mod hard, carb to coaly clst		15	
	860			85	(0.2') mod hard, coaly clst (0.3') silty coal Soft, carb. to coaly clst			
2800					(0.1') dark brown, hard clst			
				70			16	
	900				(0.3') black, soft, carb clst (0.2') silty coal (0.2') soft coaly slst (0.4') black, soft, carb clst Black, hard & soft mixture of clean, silty coal and coaly clst Carb clst 0.1M fine, brown clst lam.			
				8	Banding			
					Grey brown, mod hard clst			
	920			70	(0.3') silty coal (0.4') grey brown, mod hard clst		17	
					(0.1') grey brown, very hard, calc slst			
	940				(0.1') brown, hard slst			
				15	Buff to grey, very hard calc slst lam			
					(0.2') silty coal Silty coal			
	960			85	(0.6') black, soft, coaly clst Conc. of buff, very hard, calc. clst Buff, very hard, calc. clst		18	
	980			70				
					Silty coal Black, mod hard, carb clst		19	
	1000			20				
			END OF HOLE AT 1007 feet					
	1020							

135

42


ROKE
OIL ENTERPRISES LTD. CALGARY, ALBERTA
COMPANY DOLMAGE CAMPBELL AND ASSOCIATES
WELL 76-119
LOCATION 53.56 GN - 21.597E
FIELD HAT CREEK
PROVINCE BRITISH COLUMBIA
DDH 76 - 119
135 (43)
DEPTHS
GAMMA RAY API UNITS
Run No. ONE TWO
Date 1 FEBRUARY 1 FEBRUARY
Log Bottom 980 232
Last Reading 252 000
Recorder Used 228 232
Depth Started 981 400
Depth Fin. 1007 1007
Casing Rdr. 252 252
Casing Drlr. 250 250
Fluid Type MUD MUD
Fluid Level OPEN
Max. Diam. 5 7/8
Operating Time 4 hours 2 hrs
Truck No. 30 30
Recorded By ADL JARDS
Witnessed By ROTHEW

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

SIDEWALL DENSILOG

FILE NO

LSD
SEC
TWP
RGE
W ____ M

COMPANY Dolmage Campbell and Associates

WELL 75-103

LOCATION 4791.2N - 2547.8E

FIELD Hat Creek

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. 3878

Log Measured from TOP OF CASING 2 Ft. Above Perm. Datum

Drilling Depths Measured from TOP OF CASING

K.B. ____
D.F. ____
G.L. ____

Other Services

Run. No.	ONE
Date	9 NOVEMBER
First Reading	1185
Last Reading	000
Footage Logged	1185
Depth Reached	1188
Depth Driller	1202
Casing Rdrs	340
Casing Driller	340
Fluid Type	MUD
Logged Level	000
Mins. Down	3½
Operating Time	4 hrs
Truck No.	102-502

Recorded By EDWARDS

Witnessed By ROTZIEN

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO.	DEPTHS FROM	DEPTHS 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	CPS/ DIV
1	0	1185	10					3	1000	2R	17.0
1	0	1185	18	3	100	0	5				

REMARKS HOLE LOGGED THROUGH DRILL RODS 1185-340, THROUGH RODS PLUS CASING 340-000 TOOL # 554 TOOL # 283

*ABBR. CONSIDERATION MUST BE GIVEN TO BOREHOLE ROD LOGS WHEN INTERPRETING

DDH 75-103

DEPTHS

GAMMA RAY API

0 — 5 — 50

135 (44)

BULK DENSITY (GRAMS/CC)

3880 000

CASING + RODS

3800 100 200 O.B. 3600 300 RODS + CASING + RODS 400 3400 500 600 3200 700 800 3000 900 1000 2800 1100 F.R. 1200

500 CPS

+2.0 I/V R

ZERO

DDH 75-103

ROKE OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO	
COMPANY	DOLMAGE CAMPBELL AND ASSOCIATES
WELL	76-115
LOCATION	53139N - 22587E
FIELD	HAT CREEK
PROVINCE	BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev 3166
Log Measured from TOP OF CASING 1 Ft. Above Perm. Datum
Drill Depths Measured from TOP OF CASING

Run No	ONE	TWO
Date	23 JANUARY	23 JANUARY
First Reading	990	312
Last Reading	312	000
Footage Logged	678	312
Depth Reached	993	310
Depth Driller	1000	1000
Casing Driller	312	312
Casing Rule	312	312
Fluid Type	MUD	MUD
Liquid Level	000	
Bit/Hole Diam	3⅞	3⅞
Operating Time	4 hours	2 hours
Truck No	30	30

Recorded By EDWARDS Witnessed By ROTZIEN

GENERAL				GAMMA RAY				SIDEWALL DENSITY			
RUN NO.	DEPTH FROM	TO	SPEED FT/MIN	T.C. SEC	SENS SETTINGS	ZERO DIV.L OR R	API OR R UNITS PER LOG DIV.	T.C. SEC	SENS SETTINGS	ZERO DIV L OR R	CPS/DIV
1,2	0	990	10					3	1000	2 R	17.0
1,2	0	990	18	3	100	0	5				

REMARKS HOLE LOGGED THROUGH DRILL RODS* 990-312, THROUGH CASING* 312-000, TOOL # 554 TOOL # 15

*NOTE: CONSIDERATION MUST BE GIVEN TO REDUCTION OF RODS WHEN USING DENSITY SCALE

DDH 76-115

135 (45)

GAMMA RAY API — 15 — 0 50

DEPTHS

BULK DENSITY (GRAMS/CC)

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	53,539' N	Length	895'	Hole No.	75-105
	23,350' E	Azimuth	–	Date	NOV. 1979
Reference Elev.	3887'	Dip	-90°	Logged by	J. Retzlaff
Ground Elev.	3889'	Core Size	NQ	Sheet	1 of 5

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
3800	0		Datum		Note: Original ground elev 3889			
			OVERBURDEN					
	20		Sand with gravel and silt 20% angular cuttings, Sand fine to coarse and subrounded, Brown, Slightly cohesive (SW)					
	40		Sand and Gravel with some silt 30% angular cuttings, Sand medium to coarse and well rounded, Gravel subrounded, Brown, Slightly cohesive (SW-GW)					
			Gravel and Sand as above with only a trace of silt (GW-SW)					
	60		Sandy Gravel with a trace of silt as above (SW)					
	80		Gravel and Sand as in 40'-50' (GW-SW)					
3800			Sandy Gravel as in 50'-70'					
	100		Sand with some gravel and layers of clay (CH), 15% angular cuttings, sand 30% clay, Sand coarse to medium subrounded to rounded, Clay highly plastic, tan (gravel, Brown), cohesive (SW) with (CH)	(CH)				
	120		Sand with some Clayey sand and clay (CH), Sand medium grained, sub-angular to subrounded, Clay, highly plastic, tan, gravel Brown, cohesive (SW) with (CH)					
			Clayey sand, Sand sub-angular to rounded medium grained, Brown, highly cohesive, Tan, gravel Brown (SC)					
	140		Clay with some Sand and Gravel, Clay grained, dry to 0% plasticity, Brown (CH) with (SW) and					
	160							
	180							
			VOLCANIC BRECCIA					
	200		Brown to tan, highly plastic clay matrix with dark grey to black, red, rusty and white, angular to sub-angular volcanic rock fragments. The clay content is variable (5% to 95%)		Tricored. Lithology determined by wash samples			
	220							
	240							
	260							
	280							
3600								
	300							
	320							
	340							
	360							
	380							
	400							
			CHERT BRECCIA					
	420		Steel grey, soft to very soft, chert breccia with angular to sub-angular chert fragments within a dark blue to black clay matrix		Rusty volcanic breccia			
					Rusty volcanic breccia			
	440				Tricored. No cuttings in drilling mud return			
	460		**VOLCANIC BRECCIA ?**		Tricored. No cuttings in drilling mud return			
	480							
3400					Core loss			
	500							
	520				Tricored. No cuttings in drilling mud return			
			SILTSTONE					
	540				Tricored. No cuttings in drilling mud return			
	560							
	580							
	600				Small chips of soft recovered when tricone pulled			
	620				Tricored. No cuttings in drilling mud return			
	640							
	660							
3200	680							
	700							
	720				Tricored. 0% drilling mud return			
	740							
	760							
	780							
	800							
	820							
	840							
	860							
	880							
3000			END OF HOLE AT 895 Feet					
	900							

135 (46)

DRILL HOLE : 75-105
SHEET NR. : 5 OF 5

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 47,912'N, 25,478'E
Reference Elev. : 3680'
Ground Elev. : 3678'
Length : 1202'
Azimuth : –
Dip : -90°
Core Size : NQ
Hole No. : 75-103
Date : NOV. 1975
Logged by : P. Northrop
Sheet : 1 of 6

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
	0		Datum		Note : Original ground elev. 3678'			
			OVERBURDEN					
	20		Clay with cobbles					
	40		Sand					
	60							
3800	80							
	100		Sand with boulders					
	120							
	140		Clay					
	160		Sand with boulders					
	180							
	200		Clay					
	220		Sand					
	240		CLAY STONE Grey brown to dark grey, very hard to very stiff with minor interbed of silt					
	260							
3600	280							
	300							
	320				Light brown, to grey brown silt with minor clst			
	340				(0.3) light brown, hard slst			
	360				(0.1) buff, very hard slst			
	380				Grey brown slst			
	400				(1.4) light brown, very hard slst / (0.6) grey, hard slst			
	420				(0.2) brown, very hard slst			
	440				(0.1) light brown, very hard slst			
	460				(0.8) light brown, very hard slst with soft brown, shale, joint planes			
3400	480							
	500				(1.2) light brown, very hard slst			
	520				(0.1) buff, soft clst			
	540				(0.6) light brown, finely interbed of soft grey clst / (0.1) light brown, very hard slst			
	560							
	580				(0.8) buff, very hard slst			
	600							
	620							
	640							
	660				(0.7) buff, very hard slst			
3200	680				(0.4) dark grey, hard clst with buff, very hard slst fragment / (0.2) buff, very hard slst / (0.3) brown, very soft slst			
	700							
	720							
	740							
	760				(0.2) buff, very hard clst			
	780							
	800				(0.1) brown, very hard slst			
	820				(0.5) buff, very hard clst grading to dark grey hard clst / (0.9) white very hard calcite / (0.2) buff, very hard clst			
	840				(0.2) grey hard slst			
	860							
3000	880							
	900				(0.3) brown, very hard clst very fractured			
	920				(0.1) grey hard slst			
	940				(0.3) light brown, very hard slst with dark brown silt laminations / (0.2) brown, very hard slst			
	960				(0.7) light brown, hard clst			
	980							
	1000				(0.1) light brown, med. hard slst			
	1020				(0.1) light brown, hard slst			
	1040				Grey, hard clst			
	1060				(0.4) light grey, hard clst Colour change to predominantly dark grey			
2800	1080							
	1100							
	1120							
	1140							
	1160				Brown to dark brown, very hard finely interbedded clst			
	1180				Brown, hard clst with dark brown silt laminations			
	1200		END OF HOLE AT 1201.8 feet		Dark brown, hard clst			
	1220							

135 (47)

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 49,791' N, 24,146' E
Reference Elev. : 3751'
Ground Elev. : 3749'
Length : 702'
Azimuth : 090°
Dip : -55°
Core Size : NQ
Hole No. : 75-104
Date : NOV 1978
Logged by : J. Ratzlaff
Sheet : 1 of 4

ELEVATION in FEET / DEPTH in FEET	STRAT PLOT	MAJOR ROCK UNITS	SYMBOL	DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
0	Datum			Note : Original ground elev. 3749'			
		OVERBURDEN					
		Gravel and boulders					
20		Gravel					
40		Gravel and boulders					
		Gravel					
60 / 3700							
80		Gravel and boulders					
100		Clay					
		CARB. SILTSTONE					
120		Dark brown, soft to mod hard carb. silt		Fractured			
140				Very soft			
160				(0-2) rusty, buff, silt			
180 / 3600				Mod. hard			
200				Very soft			
220		CLAYSTONE					
240		Grey, very soft to mod hard clst		Very soft, intensely sheared			
260				Soft			
280							
300							
320							
340				Grey, brown, mod. hard laminated clst			
360							
380				(0-1) buff, hard clst			
400							
420				(0-1) buff, hard, slst			
				(0-1) buff, hard slst			
480							
				(0-1) buff, hard slst / (0-1) buff, hard slst			
520				(0-1) white, hard calcite			
540							
560							
580							
600							
620							
640				(0-1) buff, soft clst			
660 / 3200				(0-25) buff, hard slst			
680				(0-4) buff, hard slst			
700		END OF HOLE AT 702 feet		(0-3) buff, hard slst			
720							

135 (48)

DRILL HOLE : ...75-104....
SHEET NO. : 4 OF 4...

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 56,782' N, 20,161' E
Reference Elev. : 3406'
Ground Elev. : 3404'
Length : 1508'
Azimuth : 090°
Dip : -55°
Core Size : NQ
Hole No. : 75-90
Date : SEPT. 1975
Logged by : J. Retzlaff
Sheet : 1 of 8

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note : Original ground elev. 3404'			
3400			OVERBURDEN					
	20							
	40							
	60							
	80							
	100							
	120							
	140							
	160							
	180		SILTSTONE Gray, soft to mod. hard, weakly fissile massive slst; with buff, very hard to mod. hard, minor interbeds of slst and clst and with sparse coaly fragments.	25	(0-1) buff, mod. hard slst			
	200			65	(0-2) buff, soft clst			
	220				(0-3) buff, very hard slst (0-1) buff, hard sst (0-5) buff, hard sst			
	240			5				
3200	260			10	2(0-2) buff, very hard clst (0-4) buff, hard to very hard slst			
	280			65	(0-1) buff, soft slst			
	300			40				
	320			60				
	340			65	(0-1) hard sst			
	360							
	380			25	(0-1) hard sst			
	400							
	420				(0-1) hard slst (0-2) mod. hard slst (0-2) mod. hard slst			
	440				(0-7) light grey, very hard limst with clay infilled fractures			
	460			60	(0-1) soft slst			
	480							
	500			60				
3000	520		Colour changing to predominantly grey and brown.	60	(0-2) hard slst			
	540				(0-1) white, very hard limst with very hard limst lenticles in slst			
	560			65	(0-2) buff, soft slst			
	580			60	(0-1) buff and blue, soft clst (0-2) mod. hard slst			
	600							
	620			65				
	640			60 90	(0-1) buff, hard clst			
	660			75				
	680			65				
	700			30 60	(0-2) light grey, very hard calc slst (0-8) buff, soft slst			
	720			60				
	740			75				
	760			65				
2800	780			65				
	800			30				
	820			65	(0-6) light grey, very hard, limst with clay infilled fragments			
	840							
	860							
	880			10	(0-3) buff, mod. hard slst			
	900			10	(0-1) buff, hard slst (0-1) grey, hard limst			
	920							
	940			10	(0-2) buff, very hard slst (0-3)			
	960				Irregular laminae of limst			
	980							
	1000			65				
	1020							
	1040		MIXED UNIT Black to grey brown, mod. hard to very hard mixed unit of interbedded coal and coaly to clean slst	30	Grey brown, mod. hard to soft brecciated slst with minor shear (0-6) slst Silty coal		1	
2600					Clean coal Carb. slst Silty coal with resin beads (0-3) grey slst with coal lam. (0-3) grey soft slst Silty coal (0-3) very hard slst Clean coal with resin beads		2	
	1060			65	Clean coal with minor carb. slst and resin beads		3	
	1080				Soft carb. slst Clean coal Silty coal with numerous minor beds of carb. slst and clean coal. Rusty hard slst laminae abundant		4	
	1100			50	Gray to black, mod. hard to soft slst with variable carb. content and minor clean coal		5	
	1120		CLEAN COAL Black, very hard, clean coal with interbeds of carb. slst	55	With irregular grey brown slst Grey, petrified wood With irregular slst laminae		6	
	1140			30	Hard silty coal with light grey slst Grey brown to black, very fair, hard to soft carb. slst Grey brown to black, very hard to soft finely interbedded carb. slst and clean coal		7	
	1160			60	(0-1) buff, hard slst (0-1) buff, hard slst laminae (0-1) light grey brown hard slst (0-2) buff, hard slst (0-8) grey brown, very hard calcified slst		8	
	1180			65	Soft, carb. slst (0-2) grey, brown, hard slst Black to grey, soft, carb. slst with (0-1) rusty slst (0-7) grey to black, soft carb. slst			
	1200			50 55	2(0-1) grey hard calc. slst Grey soft carb. slst Black and grey, hard to very hard finely interbedded clean coal and carb. slst (0-7) black, soft, carb. slst		9	
	1220			55	Buff slst laminae (0-5) black, soft, carb. clst			
	1240			60	Light grey, very hard, calc. wood (0-3) buff, very hard slst (0-6) brown to black, soft carb. slst (0-6) light grey, calc. wood		10	
	1260			55	Irregular, grey slst laminae			
1280				30	(0-4) black, soft, coaly slst			
	1300			55	(0-1) rusty hard slst		11	
	1320			45	Grey, hard slst laminae (0-3) rusty brown hard slst			
2400					(0-1) light grey hard slst			
	1340				Light grey, hard slst with clean coal lam. Black, hard to soft, carb. slst with minor silty coal		12	
	1360			55	(0-2) grey, hard slst Grey to black, hard slst with silty Numerous, minor beds of grey slst in clean coal (0-2) grey, hard slst with coaly lam			
	1380			60	2(0-1) grey hard slst (0-3) dark grey, hard coaly slst (0-3) grey and buff, hard slst			
				55	With numerous minor interbeds of grey slst		13	
	1400				Grey, hard slst with coal fragments Silty coal (0-3) grey, hard slst (0-7) grey white and buff, hard slst		14	
	1420			45	Black, very hard, blocky (0-1) grey, hard slst Black, very hard, blocky with numerous minor grey slst beds Grey to dark grey, hard rubbly slst with minor clean coal		15	
	1440				Black, very hard, blocky to sound, clean coal		16	
					Grey, very hard, sound petrified wood		17	
	1460			45	Grey, hard rubbly slst		18	
	1480				Black, very hard, blocky to sound clean coal with sparse minor beds and laminae of grey slst			
	1500			45 45			19	
			END OF HOLE AT 1508 Feet					
	1520							

135 (49)

DRILL HOLE : 75-90
SHEET No. : 8 OF 8

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	47,912' N 25,475' E	Length	667'	Hole No.	75-103A
		Azimuth	-	Date	OCT. 1975
Reference Elev.	3880'	Dip	-90°	Logged by	J. Rutter
Ground Elev.	3878'	Core Size	NQ	Sheet	1 of 4

ELEVATION IN FEET / DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
0		Datum		Note - Original ground elev. 3878'			
0		OVERBURDEN					
20		Clay with cobbles					
40		Sand					
80 / 1800		Sand with boulders					
100							
120		Clay					
140							
160		Sand with boulders					
180							
200		Clay					
220		Sand					
240		CLAYSTONE Grey to blue grey, very soft to moderately hard, with minor beds of buff silt and clst					
260							
280 / 3600							
300				Blue grey, very soft, clst			
320							
				(0.2) buff, mod hard, clst			
				Intensely sheared clst, shears at 40° to C.A.			
340							
				(0.3) buff, hard slst			
360				(0.4) buff, hard slst			
				(0.6) buff, hard slst (0.8) buff, hard slst			
380				(0.2) buff, hard slst			
400				(0.1) buff, hard slst			
				1/2 inch of black and white clst			
				(0.2) buff, mod hard slst			
440				(0.2) buff, very hard slst (0.6) buff, very hard slst			
460				3 laminae of black and white clst			
				(0.5) grey brown, hard slst			
500				(0.2) buff, very hard slst			
520							
540							
560							
580				(0.3) buff, soft clst			
600							
620							
640				(0.1) buff, hard clst			
660		END OF HOLE AT 667 feet					
680 / 3200							

135 (50)

DRILL HOLE : 75 - 103A
SHEET NO. : 4 OF 4

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 30,727' N, 21,367' E
Reference Elev. : 3461'
Ground Elev. : 3460'
Length : 414'
Azimuth : 090°
Dip : -55°
Core Size : NQ
Hole No. : 75-86
Date : AUG. 1975
Logged by : J. Ritzlen
Sheet : 1 of 3

ELEVATION IN FEET / DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
0		Datum		Note: Original ground elev. 3460'			
		OVERBURDEN					
		Boulders					
20		Sand					
		Sand and gravel with boulders					
40							
		Sand with clay and boulders					
60							
3400		Clay and boulders					
80							
		Clay					
100							
120		Clay with layers of boulders					
140							
160							
		SILTSTONE					
180		Grey to grey brown, moderately hard to hard, with minor buff clst and sltst and traces of carb. material					
				(0-2) buff, hard			
200				(0-1) buff, hard			
				(0-1) buff, hard			
				(0-1) buff, hard			
220							
240							
260							
280							
300				Grey blue, soft clst			
3200							
320							
340							
360				Grey to light brown, hard to very hard, calc. sltst and dst			
380				Grey, very hard, calc. Grey, mod. hard dst with calcite veinlets. Grey brown, soft			
400				Grey brown, soft to mod. hard intensely sheared.			
420		END OF HOLE AT 414 feet					

135 (51)

DRILL HOLE : 75-86
SHEET NO. : 3 OF 3

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 94,334' N
23,529' E
Reference Elev. : 4003'
Ground Elev. : 4001'

Length : 723'
Azimuth : –
Dip : -90°
Core Size : NQ

Hole NR. : 75-78
Date : JULY 1975
Logged by : J Rotzien
Sheet : 1 of 4

ELEVATION in FEET / DEPTH in FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
4000 / 0		Datum		Note: Original ground elev. 4001			
		OVERBURDEN					
20		Clay and shale					
40							
60		Red clay					
80							
100		Clay and shale					
120							
140		BEDROCK (FROM GAMMA AND DENSITY LOGS) No return (Fricared) Attempt of coring unsuccessfull.					
160							
180							
200 / 3800							
220							
240							
260							
280							
300		RHYOLITE TUFF Light grey, hard, fine to medium crystalline; coal fragments ≤ ¼" sparse					
320							
340							
360							
380							
400 / 3600							
420		VOLCANIC BRECCIA (Lahar) Blue green, grey green and yellowish brown, soft and friable, with very hard volcanic fragments; matrix varies from clay to very fine sst; highly chloritised unit; lost fragments up to 3" but generally ¼" - 1" in diameter					
440							
460							
480							
500							
520							
540		SILTY SANDSTONE Dark grey, very soft with occasional volcanic pebbles					
560							
580							
600 / 3400		INTERBEDDED DETRITAL ROCK Dark to light grey green, mod hard to soft		Sst Interbedded brecciated clst (0.2) buff, very hard clst Interbedded Sltst and Sst			
620				Interbedded clst and sltst			
640				Interbedded clst and sst which has been sheared and healed			
660				Sst with irregular white clay nodules			
680				Fine grained congl.			
700				Brecciated clst			
		COAL Black, hard to soft, interbedded clean and silty coal		Silty (0.1) buff, hard sltst Clean			
720		END OF HOLE AT 723 feet					
740							

135 (52)

DRILL HOLE : 75-78
SHEET NO. : 4 OF 4

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	55,261' N	Length	918'	Hole No.	75-88
	21,715' E	Azimuth	088°	Date	AUGUST 1975
Reference Elev.	3470'	Dip	-60°	Logged by	J. Ratzlaff
Ground Elev.	3468'	Core Size	NQ	Sheet	1 of 5

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 3467'			
			OVERBURDEN Sand and boulders					
	20		Clay with boulders					
	40							
			CLAYSTONE Red, soft					
	60							
3400	80				Tricaned			
	100							
	120							
	140							
			CLAYSTONE Blue grey to red, soft		Tricaned			
	160		CLEAN COAL Black, very hard, with minor silty coal and carb. slst		With minor carb slst		1	
	180							
	200				(0.2) grey, soft carb slst Dark to grey, hard to soft, coaly slst (0.2) grey, soft c/st (0.8) grey to black, soft, coaly c/st			
	220				(0.2) grey brown, soft, carb. slst Grey to black, soft, coaly slst (0.1) buff, very hard slst		2	
	240				Grey brown, soft, carb. slst with 0.3' of coal (0.1) buff, very hard c/st			
	260				(0.2) (0.3) black soft, coaly slst Irregular veinlets, buff, very hard slst (0.7) black, soft, coaly slst		3	
	280				3(0.2) black, soft silty coal			
	300				(0.3) brecciated very hard calc. slst (0.1) buff, very hard slst (0.4) grey brown soft carb. slst (0.3) grey, soft, coaly slst			
3200								
	320				(0.5) grey brown soft carb. slst (0.1) buff, hard slst Dark grey, soft slst with coaly fragments		4	
	340				(0.1) grey, soft c/st (0.2) buff brown, soft carb. c/st (0.3) grey hard, calc. slst (0.3) grey brown buff carb slst Grey brown to black, hard to soft, clean coal and carb. slst (0.1) grey brown, soft, carb slst (0.1) (0.1) grey brown, soft, carb slst (0.1)			
	360				(0.4) grey brown, soft carb slst			
					Black, very hard to soft, clean and silty coal with shearing			
	380						5	
	400				Black, very hard, clean with irregular blebs of calc. slst (0.2) (0.2) dark grey, soft carb slst (0.1) (0.1) Black to grey, soft, coaly slst (0.1) rusty, very hard slst Black, hard silty Black, hard silty			
	420		SILTY COAL Black, hard to very hard, inter bedded clean and silty coal with carb. slst and resin beds up to ¼" diameter		Black, hard to soft, finely inter-bedded clean and silty and carb slst (0.6) buff, hard slst Black, very hard, clean		6	
	440				Black to light grey brown, hard to soft silty to carb. slst Black, very hard to soft, finely inter bedded clean and silty coal and carb. slst			
	460				Black, very hard, clean with minor silty		7	
	480				Black, hard silty (0.5) buff, soft slst Black, very hard to soft, finely inter bedded clean and silty coal with minor grey brown carb slst		8	
	500				Black, very hard, clean		9	
	520							
3000								
	540				Black, hard, silty coal with minor clean coal and carb. slst		10	
	560				Black, very hard, clean with minor silty coal (0.3) buff, hard slst Black, hard to soft, finely inter bedded silty coal and coaly and carb. slst		11 12	
	580				Black, very hard, clean with minor silty coal		13	
	600				Black, very hard to soft, finely inter bedded clean and silty coal and coaly to carb. slst		14	
	620				Black to dark brown, soft, carb to coaly slst Black, hard to soft, silty coal and coaly slst		15	
	640				Black, soft, coaly slst Grey, soft slst with minor clean coal (0.6) rusty, hard slst			
	660				Black, very hard to hard, finely inter bedded silty and clean coal Black, soft, coaly slst Black, hard to soft, finely inter bedded silty coal and coaly slst		16	
	680				Black, very hard to soft, finely inter-bedded clean and silty coal with numerous 0.3-1.5' beds of carb slst		17	
	700		SILTY COAL Black, hard to very hard, silty coal with inter-bedded clean coal and minor carb. slst		(0.2) buff, hard slst Black, soft, coaly slst with minor clean		18	
	720				(0.2) buff, hard slst Black, very hard, clean coal (0.1) buff, hard slst with minor white slst veinlets, clean coal Black, soft, carb slst		19	
	740				Black, hard to very hard, jointed (0.3) dark grey, calc. silty wood Black, very hard, clean coal Dark grey, very hard, calc. wood Black, very hard, clean coal (0.7) buff, very hard, calc. slst veinlets		20	
2800								
	760				Black, hard, silty coal (0.3) buff, very hard, calc. slst veinlets Black, hard Black, hard to soft, finely inter-bedded silty coal and coaly slst (0.6) buff, hard buff Black, hard clean coal (0.7) grey, very hard calc. wood		21	
	780				Black, hard with minor clean coal		22	
	800				With grey brown slst laminae (0.7) buff, very hard calc. veinlets (0.2) buff, hard slst		23	
	820				(0.3) grey brown, soft slst Black to grey brown soft slst and Black, very hard, coaly slst (0.3) buff, very hard slst veinlets with grey brown slst laminae			
	840				Black to dark grey brown soft carb slst Black, very hard, clean coal with healed fractures filled with white clst Dark grey brown, hard slst Black, very hard, clean with white clst laminae Black, very hard clean coal (0.2) buff, very hard clst Black, very hard clean coal (0.1) buff, very hard clst Black, very hard clean coal		24	
	860				(0.1) grey brown, hard clst (0.1) buff, very hard, calc. clst veinlets		25	
	880				(0.3) buff, hard slst (0.1) rusty, hard slst			
	900				(0.2) buff, very hard, calc. clst Black, soft coaly slst (0.3) (0.1) buff, hard slst		26	
	920		END OF HOLE AT 918 feet					
	940							

135 (53)

DRILL HOLE : 75-88
SHEET NO. : 5 OF 5

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 50,762'N, 21,367'E
Reference Elev. : 3460'
Ground Elev. : 3459'
Length : 808'
Azimuth : —
Dip : -90°
Core Size : NQ
Hole No. : 75-83
Date : AUG. 1975
Logged by : J. Rolzien
Sheet : 1 of 4

ELEVATION in FEET	DEPTH in FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
	0		Datum		Note : Original ground elev. 3459'			
			OVERBURDEN					
	20		Boulders and sand					
	40							
3400	60		Clay and boulders					
	80							
	100		Boulders					
	120		CLAYSTONE Grey to grey brown, mod hard to soft with carb. fragments		Tricored			
	140				(0·2) buff, soft			
	160							
	180							
	200							
	220							
	240				(0·2) buff, soft; (0·1) buff, soft; (0·2) buff, mod hard			
3200	260							
	280							
	300							
	320				(0·5) light grey, very hard lmst with clst infilling of joints			
	340							
	360				(0·2) buff, mod hard			
	380				Grey, mod hard to soft slst			
	400							
	420				(0·1) buff, soft			
	440							
3000	460							
	480							
	500				Buff to white, very hard lmst with clay filled tension cracks (0·1) white, very hard lmst			
	520							
	540							
	560				with numerous very soft beds			
	580							
	600							
	620							
	640							
2800	660							
	680				(0·2) light grey, hard, calc. slst			
	700				(0·7) buff, hard slst			
					(0·2) buff, hard slst			
	720				(0·1) buff, hard slst			
					with calc. laminae and veinlets (0·2) buff, hard			
	740							
	760				(0·1) buff, hard slst			
	780							
					(0·2) buff, hard slst			
	800				(0·8) buff, hard slst			
			END OF HOLE AT 808 feet					
	820							

135 (54)

DRILL HOLE : 75-83
SHEET Nº : 4 OF 4

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	50,762' N	Length	262'	Hole No.	75-83A
	21,367' E	Azimuth	-	Date	AUG. 1975
Reference Elev.	3460'	Dip	-90°	Logged by	J Roizen
Ground Elev.	3459'	Core Size	NQ	Sheet	1 of 2

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 3459'			
			OVERBURDEN					
	20		Boulders and sand					
	40							
3400	60		Clay and boulders					
	80							
	100		Boulders					
	120		CLAYSTONE Gray, moderately hard to soft with traces of carb. material		Triconed			
	140			45				
	160			60				
	180			45				
	200							
	220							
	240			60	(0-1) buff, soft sst			
					(0-1) buff, soft slst			
3200	260			60				
			END OF HOLE AT 262 feet					
	280							

135 (55)

DRILL HOLE : 75-83A

SHEET No. : 2 OF 2

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates: 53,341' N, 21,877' E	Length: 1843'	Hole No.: 75-68	
Reference Elev.: 3487'	Azimuth: —	Date: MAY 1975	
Ground Elev.: 3485.6'	Dip: -90°	Logged by: J. Rotzien	
	Core Size: NQ	Sheet: 1 of 9	

ELEVATION IN FEET | DEPTH IN FEET | STRATIGRAPHY (STRAT. PLOT, MAJOR ROCK UNITS) | DETAIL & STRUCTURE (SYMBOL, DESCRIPTION) | CORE LOSS | SAMPLE No. | ASH AT 20% MOISTURE

Datum

Note: Original ground elev. 3488'

Stratigraphy (major rock units)

- 0 ft: OVERBURDEN — Boulders; Gravel and boulders; Gravel; Gravel and clay; Gravel; Clay
- 140 ft: SILTSTONE — Grey brown, moderately hard, with minor beds of buff sltst and a trace of very fine carb. fragments
- 310 ft: MIXED UNIT — Silty coal, carb. sltst and sltst soft interbedded.
- MIXED UNIT
- 350 ft: COAL — Black, hard, silty to clean, with minor interbeds of carb. sltst - zones of resin beads upto ⅛" in diameter.
- 680 ft: CARB. SILTSTONE — Light grey to grey brown, moderately hard to soft; minor silty coal
- 700 ft: COAL — Black, hard, clean, with silty coal and minor interbeds of coaly, carb. and clean sltst.
- 795 ft: SILTY COAL — Black, hard, silty with interbedded clean coal and minor beds of clean and carb. sltst.
- 885 ft: MIXED UNIT — Interbedded coal, coaly sltst, carb. sltst and sltst; black to light grey, moderately to very hard.
- 1335 ft: CLEAN COAL — Black, very hard, with finely interbedded light grey, very hard sltst
- 1430 ft: INTERBEDDED SANDSTONE AND SILTSTONE — Light grey, very hard interbedded slst and sst with carb. fragments
- 1510 ft: MIXED UNIT — Black to light grey, very hard interbedded clean coal and carb. slst and sst.
- 1565 ft: CLEAN COAL — Black, very hard, clean, with minor beds of carb. sltst
- 1730 ft: MIXED UNIT — Black to light grey, very hard to hard, clean and silty coal with coaly sltst
- 1815 ft: CLEAN COAL — Black, very hard
- END OF HOLE AT 1843 Feet

Detail & structure (descriptions)

- 2(0.1) light grey, soft slst
- Soft
- Buff
- (0.2) buff, hard
- Dark grey
- (0.2) light grey, soft sst
- (0.3) buff, hard
- (0.2) buff, hard
- Dark weakly laminated
- Dark grey soft
- Dark
- (0.5) light grey
- (0.5) light grey, hard with rust stains.
- Light grey to dark grey brown laminated.
- Grey to black interbedded carb. and clean slst
- Very hard clean coal with minor soft slst
- Grey brown interbedded carb and clean slst
- (0.3) calcite veins
- Clean
- (0.2) soft silty
- Clean
- Silty with soft zones
- Soft coaly slst
- Dark grey to black, hard to soft interbedded clean coal & carb. slst
- Hard to soft interbedded clean and silty
- Silty with minor soft zones
- (0.6) with buff, very hard slst laminae
- Interbedded silty coal, coaly, carb. and clean slst
- Very hard, clean
- Silty
- Interbedded slst, coaly slst and silty coal.
- Very hard, clean
- Dark grey, soft carb. slst
- Light grey, very hard calc. wood
- Silty with minor coaly slst beds.
- Light grey, soft, slightly carb. slst
- Silty and clean
- Slightly carb. slst
- Soft, coaly slst
- Hard, slightly carb. with calc. fossils
- Clean
- Silty. Soft, coaly slst
- Dark grey, moderately hard slst
- Clean with minor silty beds
- (1.1) buff, hard slst
- Clean with minor coaly beds
- (0.1) buff, hard slst with trace Horsetails
- Clean
- Silty
- Silty
- Dark grey, mod. hard, coaly slst
- Silty and clean
- Moderately hard, coaly slst
- (0.5) dark grey, mod. hard, coaly slst
- Dark grey, mod. hard, carb. slst
- Very hard
- Silty with minor clean beds
- Dark grey to black, hard, carb and coaly slst
- Resin beads upto ⅛" in diameter
- Dark grey, soft carb. slst
- Interbedded silty coal and coaly slst.
- Silty coal and coaly slst
- (0.6) buff, very hard slst with some Horsetails.
- With minor beds clean and coaly slst
- Slightly carb. slst
- Interbedded carb slst and silty coal.
- Clean coal
- (0.3) buff slst
- Silty coal
- Calc. wood
- Carb. slst
- Silty coal with coaly slst.
- Interbedded coaly and carb. slst
- Calcified wood
- Silty coal
- Silty coal and carb. slst with (1.9) congl. sst
- Slst and sst with coal fragments and minor clean coal beds.
- Silty coal
- (0.1) buff slst
- (0.3) coal
- (0.3) buff slst
- Clean coal.
- Slst with coal fragments and minor clean coal
- (0.5) congl. slst
- Slst with minor clean coal
- Silty coal and coaly slst with minor clean coal.
- Calc. sst with coal fragments
- Interbedded clean and silty coal and coaly slst
- Slst with coal laminae
- Silty coal
- Very fine to fine grained with coal laminae and small clean coal beds.
- Clean coal with minor slst beds
- Laminated carb. to coaly slst with minor clean coal.
- Slst with coal laminae and minor clean coal.
- Sst with carb. laminae
- Lam carb. to coaly slst
- Lam. carb. slst
- Fine sst with carb. fragments
- Carb. slst with minor clean coal beds
- Clean coal with minor carb slst beds
- Coaly slst
- Carb. to coaly lam. in slst
- Clean coal
- Slst with carb. fragments
- Interbedded clean coal and carb. slst
- Slst
- With minor slst beds
- Interbedded slst and sst
- With minor slst beds
- Fine congl.
- Sst
- Lam. slst with minor sst beds
- Sst with minor slst, congl. and traces of clean coal beds
- Coaly slst
- Clean coal with interbedded coaly slst (0.3)
- Carb. slst
- Carb. slst
- Finely interbedded clean coal and carb. slst
- Carb. slst with minor silty coal.
- (0.1) buff, very hard slst
- (0.4) grey brown, hard carb. slst
- (0.3) grey brown, hard carb. slst
- Silty.
- Grey brown, hard, calc. carb. slst
- (0.2) grey brown, hard, calc. carb. slst
- Grey brown, hard carb. slst
- (0.5) carb. slst.
- (0.1) buff, hard slst
- Silty
- (0.3) carb. slst
- (0.1) buff, very hard slst
- Buff, hard, carb. tuff
- Cavity - Fault zone
- Clean coal and carb. slst
- Carb. slst
- Silty coal
- Coaly slst
- Coaly slst, petrified wood resin beads ⅛ ¼".
- Finely interbedded coaly slst and silty and clean coal.

Samples No. 1–67

135 (56)

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 49,281' N, 25,679' E
Reference Elev. : 3919'
Ground Elev. : 3917'

Length : 297'
Azimuth : —
Dip : -90°
Core Size : NQ

Hole No. : 75-79A
Date : JULY 1975
Logged by : J. Retfalvi
Sheet : 1 of 2

DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
0		Datum		Note: Original ground elev. 3917			
		OVERBURDEN Mud and rhyolite					
		RHYOLITE Light grey, moderately hard, [illegible]					
				Tricone			
				Tricone			
				Brecciated			

DRILL HOLE : 75-79A
SHEET No. : 2 OF 2

DOLMAGE CAMPBELL & AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates :	29,750'N	Length =	886'	Hole NR. :	75-72
	20,100' E	Azimuth =	-	Date :	JUNE 1975
Reference Elev. :	4165'	Dip =	-90°	Logged by :	J. Rovisco
Ground Elev. :	4163'	Core Size =	NQ	Sheet :	1 of 5

ELEVATION in FEET	DEPTH in FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOLS	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 4163'			
			OVERBURDEN Gravel and clay					
	20		Sand and clay					
	40							
	60		Clay					
	80							
	100							
	120		Boulders, gravel and clay					
	140		Sand					
			Boulders and gravel					
	160							
4000			Clay					
	180		SILTY CLAYSTONE Dark grey to grey green, very soft to soft, massive					
	200			32				
	220			65				
	240							
	260			40	(0-4) buff to grey brown, soft clst			
	280			80				
	300							
	320			35				
	340							
	360			65				
3800								
	380			65	(0-1) white, soft clst			
	400			80				
				35				
	420							
				65				
	440			65	(0-5) grey brown, soft clst			
	460							
	480			80				
			CLAYSTONE Dark grey brown, moderately hard to soft, with numerous plant fossils.					
	500			80				
	520							
	540			10	(0-3) grey brown, soft			
	560				(0-5) blue grey, soft sst			
3600			SANDSTONE Blue grey, soft	60				
	580				Blue grey to grey, soft, interbedded slst and sst			
			SILTSTONE Grey, soft to moderately hard, massive					
	600			10				
	620							
	640			10				
	660							
			SANDSTONE Light grey, soft to mod. hard fine to coarse grained, lam. with carb. laminae					
	680			70	Conrgl. sst with carb. laminae Laminated finely interbedded sst with carb. laminae			
	700			75	Conglomeratic Light grey to grey brown Medium grained Fine grained			
	720			85				
	740				Silty			
	760							
3400								
	780							
			DETRITAL ROCKS Dark to light grey, mod hard to soft, slst and fine to coarse sst, with carb. laminae.		Dk gry, friable, sandy slst (0-2) buff, soft clst (0-3) buff, soft mod. hard clst Fine to med., sandy slst			
	800							
	820				Soft laminated, friable sst			
					Soft, friable, fissle slst			
	840			85	Silty sst			
	860				Sandy slst (0-2) buff, soft clst (0-3) buff, soft mod. hard clst Conrgl. sst and slst laminae			
	880				Medium grained sst with carb. laminae Fine grained sst and carb. laminae			
			END OF HOLE AT 886 feet					
	900							

135 ≤8

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT – DRILL RECORD

Coordinates	21,900' N	Length	1300'	Hole No.	75-76
	25,460' E	Azimuth	–	Date	JULY 1975
Reference Elev.	4014'	Dip	-90°	Logged by	J. Relzlea
Ground Elev.	4012'	Core Size	NQ	Sheet	1 of 7

ELEVATION IN FEET / DEPTH IN FEET	STRAT PLOT	MAJOR ROCK UNITS	SYMBOL	DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
Datum				Note: Original ground elev. 4012'			
0		OVERBURDEN Boulders and sand					
4000 20		Clay					
40		Boulders					
60		Clay					
80		SILTSTONE Grey, moderately hard, laminated with many minor beds of light grey sst and traces of carb. material		Tricorned			
100				(0-3) sst (0-2) white, moderately hard			
120							
140							
160							
180				(0-1) rusty, hard sst			
200				(0-2) rusty buff, very hard sst			
3800 220							
240							
260				(0-3) buff, hard (0-2) buff, hard (0-3) light grey, hard sst			
280				(0-5) buff, hard			
300							
320				(0-1) buff, very hard (0-1) light grey, hard			
340				(0-1) buff, soft clst			
				(0-2) buff, soft, sandy clst			
360							
380				(0-1) buff, hard			
400				(0-2) hard sst			
3600 420							
440				Grey green, soft to med. hard			
460				(0-2) buff hard (0-3) light grey, hard (0-4) grey, brown, hard			
480							
500				(0-5) light brown, med. hard clst (0-1) light grey, soft sst			
520				(0-1) buff, soft (0-1) buff, hard			
540							
560				(0-2) light grey, med. hard (0-2) buff, soft clst Buff, soft clst			
580							
600		Fissile		(0-1) rusty, soft clst			
3400 620							
640							
660							
680							
700		CLAYSTONE Black to dark brown; fissile, moderately hard, laminated, slightly carb. with buff to light grey silt laminae; fissile parallel to bedding; minor zones of highly carb. silt					
720							
740							
760							
780							
800							
3200 820							
840							
860							
880							
900							
920							
940		SILTSTONE Blue grey to grey, moderately hard to hard with interbedded sst and discrete laminae of silty and clean coal		Laminated medium sst with coaly laminae With laminae of fine sst and coaly material With coaly laminae With coaly and sandy laminae Laminated sst with coal fragments and coal laminations, minor cross bedding evident Interbedded slst and sst with sparse coaly laminae			
960							
980							
1000							
3000 1020		SHALE Light grey to gray, moderately hard, laminated shale with minor beds of sst. 95% of the fractures are parallel to the bedding					
1040							
1060							
1080							
1100		CARBONACEOUS SHALE Dark grey to black, moderately hard, laminated carb. shale, with the carb content increasing with depth to 1140'. The carb content then decreases with depth to 1154'. This unit is weakly fissile parallel to the bedding and contains minor zones of coaly shale					
1120							
1140							
1160		SHALE Grey moderately hard, laminated shale with carb. zones. This unit is highly fissile parallel to the bedding		With carb laminae			
1180							
1200				Carb.			
2800 1220				Carb. (0-2) buff slst Carb.			
1240				Carb. laminae			
1260				With sparse sst laminae			
1280				Sandy shale with sst laminae			
1300		END OF HOLE AT 1300 feet					

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DRILL HOLE : ...75-76.....
SHEET No. : ..7 OF ..7...

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	21,820' N 26,390' E	Length	398'	Hole No.	75-75
		Azimuth	—	Date	JULY 1975
Reference Elev.	3937'	Dip	-90°	Logged by	J. Rotzien
Ground Elev.	3938'	Core Size	NQ	Sheet	1 of 2

ELEVATION IN FEET	DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0		Datum		Note: Original ground elev. 3932'			
			OVERBURDEN					
	20		Gravel					
	40		Boulders					
	60		Sand					
	80		Boulders					
	100							
	120		Clay and boulders					
3800	140		Boulders					
	160		Clay and boulders					
	180		Clay					
	200		Sand					
	220		Clay					
			SILTSTONE Light grey, soft to moderately hard		Tricored			
	240							
	260			10	Light grey brecciated with mod. hard fragments in soft material			
	280							
	300			30				
	320							
3600								
	340			80	(0.1) dark grey laminae			
			CLAYSTONE Grey, very soft					
	360			10				
	380		SLST					
	400		END OF HOLE AT 398 feet					

135 60

DRILL HOLE : 75-75
SHEET No. : 2 OF 2

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	50,871' N / 22,523' E	Length	1940'	Hole Nº	75-73
Reference Elev.	3529'	Azimuth	—	Date	JUNE 1975
Ground Elev.	3527.5'	Dip	-90°	Logged by	J. Rolcion
		Core Size	NQ	Sheet	1 of 9

Column headings: ELEVATION IN FEET | DEPTH IN FEET | STRATIGRAPHY: STRAT PLOT, MAJOR ROCK UNITS | DETAIL & STRUCTURE: SYMBOL, DESCRIPTION | CORE LOSS | SAMPLE Nº | ASH AT 20% MOISTURE (20 40 60 80)

Datum

Note: Original ground elev. 3529'

OVERBURDEN

Sand with boulders

Clay and cobbles

Sand - red, yellow and green

Black and brown mud with coal

Clay

Clay and gravel

COAL
Black, hard to very hard, clean and silty with dark grey to black, soft to hard carb and coaly sltst.
Calcite bands are scattered throughout

Triconed

1

Coaly sltst with clean coal

2

(0.2) grey, very hard, calc. sltst
Clean

Carb. sltst

3

Carb. sltst
Clean

4

Clean coal and carb. sltst.

Fault
Coaly sltst

5

Clean
Coaly sltst

Clean

6

(0.5) rusty, very hard calcitic banding into clean coal

Interbedded coaly sltst and clean coal

7

Clean with calcitic veins at 50°
Carb. sltst

8

Interbedded clean coal and carb. sltst

9

Coaly sltst
Clean

10

Interbedded clean coal and coaly sltst

11

Clean with soft coaly sltst

12

With minor soft coaly sltst

13

Silty

14

Clean

Interbedded carb. sltst and silty and clean coal

15

Clean
Fault - no recovery
Clean

16

Clean

17

Clean
(0.5) clean with light grey, very hard sltst lams.

18

Clean

Clean

19

Dark brown soft carb. sltst
Clean
Carb. sltst

20

Clean

Interbedded carb. sltst and clean coal

21

Clean

22

Very large core losses

23

CLEAN COAL
Black, very hard, with silty coal and carb. sltst

With carb. sltst

Dark grey brown carb. sltst

24

And carb. sltst
With carb. sltst lam. at 796'
Carb. sltst

25

Coaly sltst
Interbedded carb. sltst and clean coal

(0.1) grey sltst

26

MIXED UNIT
Black to grey brown, very hard to soft interbedded sltst, carb. to coaly sltst, silty coal and minor clean coal

Coaly sltst and silty coal
Clean

27

Lam. coaly
Slightly carb.

Silty with minor clean beds

Only recovered is clean coal

28

With minor silty coal

29

COAL
Black, very hard, clean, with beds of silty coal, carb. sltst and sltst

30

Lam. coaly sltst
Silty
(0.5) soft sltst

31

With interbedded carb. sltst

With minor interbedded carb. sltst

32

Interbedded silty coal and coaly sltst

Sltst grading to silty coal

With laminations of buff, very hard marcasite bearing sltst

33

Coaly sltst

SANDY SILTSTONE AND SANDSTONE
Light grey to grey brown, hard, interbeds with coaly laminae and fragments

Sandy

Finely interbedded

INTERBEDDED COAL AND SILTSTONE
Black to light grey, hard to very hard

Clean

34

With coaly laminae

35

Silty

36

With coaly laminae

37

Carb.

CLEAN COAL
Black, very hard with minor sltst and silty coal

38

(0.5) dark grey brown, hard calc. carb. sltst
Black to dark grey brown, very hard to soft interbedded clean and silty coal and carb. sltst.

39

(0.1) grey, soft sltst
(0.5) grey, hard, calc. sltst
Silty

(0.2) buff, hard sltst

40

Silty

41

(0.2) buff, hard sltst
(0.4) grey, hard sltst

(0.2) buff, hard sltst

Dark grey, hard, carb. sltst

(0.1) grey brown, hard sltst

42

0.1 laminations of grey brown hard sltst

(0.3) buff to grey brown hard sltst
Dark grey brown, soft, carb. sltst

43

Buff, hard sltst lam.

(0.2) buff, hard sltst

(0.3) buff, hard sltst

Dark grey, hard, carb. to coaly sltst

44

Black, soft, coaly sltst

Silty
Buff, very hard fmst

45

COAL
Black to dark grey, hard to very hard, interbedded clean and silty coal, and carb. sltst

46

Clean

(0.1) grey, hard sltst
Clean

47

48

CLEAN COAL
Black, very hard

2 (0.1) buff, hard sltst
(0.2) grey hard sltst

49

(0.2) buff, hard, calc. sltst

COAL
Black to dark grey, hard to very hard, clean with zones of finely interbedded silty coal, coaly and carb. sltst and larger beds of silty coal and carb. sltst

(0.2) buff, hard sltst lam.

50

(0.5) dark grey, hard carb. sltst

Finely interbedded coal and carb. sltst

51

White and black, very hard fmst with coal fragments

Clean

52

Coaly sltst and silty coal

53

Slightly carb. sltst
Silty

Clean

54

Coaly sltst
Clean
Carb. sltst
Silty

55

Finely interbedded coal and carb. sltst

CLEAN COAL
Black, very hard

Buff, very hard, calc. sltst beds (0.1 - 0.2)
Silty
Silty
(0.2) buff hard sltst

56

Interbedded carb. sltst and clean coal

SILTY COAL
Black, hard to very hard, with finely interbedded carb. and coaly sltst and clean coal - the silty coal is interspersed with very fine bands of clean coal and carb. sltst (1/16" - 1/8") beds

(0.3) light grey, hard, carb. sltst
Clean with calcite veins

57

(0.3) buff, hard carb. sltst

58

With some clean

COAL
Black, very hard, clean with interbedded coaly and carb. sltst

(0.4) light grey, hard, carb. sltst

59

(0.1) light grey, hard carb. sltst
(0.1) salt and pepper grey calc. wood

Coaly sltst
Salt and pepper, grey, very hard, calcified wood

60

(0.5) grey, hard, carb. sltst

Grey brown carb. sltst
Silty
Dark grey slightly carb. sltst

Finely interbedded silty and clean and carb. and coaly sltst

61

Grey to black, hard carb. sltst

62

Calcified wood with clean laminae
Silty with resin beads & 1/4"
Coaly sltst

63

Silty

(0.2) buff, very hard calc. sltst
Carb. sltst
Calc. wood with marcasite crystal
Coaly sltst; marcasite veins

64

Carb. sltst grading to clean coal

Finely interbedded silty coal and coaly sltst

65

Grey calcified wood

Finely interbedded silty coal, clean coal and coaly sltst

66

Carb. sltst

SANDSTONE
Light grey, very hard, very fine grained with a trace of carb. fragments and fossils

END OF HOLE AT 1940 feet

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DOLMAGE CAMPBELL AND ASSOCIATES LTD.

[illegible]RITISH COLUMBIA HYDRO AND POWER AUTHORITY

BIG CREEK PROJECT — DRILL RECORD

[illegible]	55,733'N	Length	713'	Hole No.	75-89
[illegible]	22,081' E	Azimuth	090°	Date	SEPT. 1975
[illegible]	3539'	Dip	-88°	Logged by	J. Rotzien
[illegible]	3538'	Core Size	NQ	Sheet	1 of 4

STRATIGRAPHY		DETAIL & STRUCTURE				ASH AT 20% MOISTURE
MAJOR ROCK UNITS		SYMBOL	DESCRIPTION	CORE LOSS	SAMPLE NO.	
			Note: Original ground elev. 3538'			
VOLCANIC ASH Buff, soft, unconsolidated volcanic ash, tricored. Rock description obtained from [illegible] samples						
COAL Black, hard to very hard, coal with resin beads [illegible]" in diameter.			Tricored			
			Black, very hard to very soft, [illegible] interbedded clay, coaly, coaly silt and carb. silt		1	
			Buff, very hard clst			
					2	
			Resin beads Black, hard, silty coal and coaly slst			
			(1.0) black, hard, silty coal			
			(0.3) black, mod. hard coaly slst with solution cavities		3	
			(1.0) black, soft, carb. clst			
			(0.3) buff, very hard, calc. slst		4	
			minor cleavage Black to dark brown carb. clst with [illegible]			
coal, hard, black			Black to dark brown, hard to soft, coaly slst		5	
			Black, hard to soft coaly slst			
			(1.0) black, hard, coaly slst		6	
			(0.5) black very hard coaly slst Light grey, hard, tuff slst Black, hard to soft, silty coal with coaly slst			
			Irregular Clean with sparse resin beads		7	
			Buff to grey, mod hard slst Dark brown to black, mod. hard to very hard carb. slst, grading into clean coal		8	
			Black, hard friable silty coal Clean with resin beads up to ¼" in diameter		9	
			Clean with minor carb slst			
			(0.6) hard, coaly slst		10	
			(0.2) hard, coaly slst			
			(1.0) hard silty coal (0.9) buff, very hard slst Hard to soft, silty coal and carb slst			
			(1.0) soft, coaly slst Soft, coaly slst		11	
			(1.5) hard to soft, silty coal			
					12	
			(0.5) soft, coaly slst			
			Hard, coaly slst		13	
			(0.5) buff to light grey hard slst (0.5)			
			Hard, silty coal		14	
			Hard to soft, silty coal and carb. slst			
			Clean with minor coaly slst		15	
			(0.2) buff, hard slst			
			3(0.1) laminae of buff, hard slst Hard to soft, finely interbedded silty coal and coaly slst		16	
SILTSTONE Dk. to dark, gray brown, very [illegible] mod. hard, pulverized [illegible] carb. slst			Hard, hard, finely interbedded carb. and coaly slst Soft		17	
					18	
END OF HOLE 713 Feet						

[illegible]35 (62)

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	49,881'N	Length	294'	Hole NR	75-99
	23,936'E	Azimuth	090°	Date	OCT. 1978
Reference Elev.	3719'	Dip	-55°	Logged by	J. Reitzig
Ground Elev.	3716'	Core Size	NQ	Sheet	1 of 2

DEPTH in FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NR.	ASH AT 20% MOISTURE
0		Datum		Note: Original ground elev. 3718'			
		OVERBURDEN Sand and boulders					
		Clay					
		MIXED UNIT Grey to black, very hard to very soft		Triconed			
				Dark grey to black, carb sst interbedded clean coal			
				Hard to very hard finely interbedded clean and silty coal			
				Grey, very hard, slightly calc. sst Very hard to very soft, finely interbedded clean coal and carb sst			
				Dark grey, mod. hard sst with coal particles Very hard to very soft, interbeds of clean coal to carb sst			
		END OF HOLE AT 294 feet		Grey brown, mod. hard sst Hard silty coal			

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DRILL HOLE : ....75-99.....
SHEET NR. : 2 OF 2...

DOLMAGE CAMPBELL AND ASSOCIATES LTD

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	48,000' N / 24,428' E	Length	2232'	Hole Nr.	75-74
		Azimuth	—	Date	JULY 1975
Reference Elev.	3761'	Dip	-90°	Logged by	J. Rotzien
Ground Elev.	3759'	Core Size	NQ	Sheet	1 of 11

ELEVATION IN FEET | DEPTH IN FEET | STRATIGRAPHY (STRAT. PLOT, MAJOR ROCK UNITS) | DETAIL & STRUCTURE (SYMBOL, DESCRIPTION) | CORE LOSS | SAMPLE Nº | ASH AT 20% MOISTURE

Datum

Note: Original ground elev. 3761'

OVERBURDEN

Clay with boulders

Clay

Clay

Clay and boulders

Triconed

CLEAN COAL — Black, very hard, with interbedded soft silty coal

Hard to soft, interbedded clean and silty coal — 1

Very hard, silty with marcasite

Soft, coaly slst

(0.2) buff, hard slst

2

With resin beads & ½" diameter. — 3

(0.4) rusty, very hard slst — 4

Slightly to very carb. slst interbedded with silty coal — 5

(0.4) rusty to grey br. carb slst, Hard silty coal — 6

With minor interbeds of soft silty coal and coaly slst

Grey mod. hard slst — 7

With minor intervals of soft silty coal

Interbedded with silty coal, coaly slst and carb. slst — 8

Numerous minor interbeds of silty coal — 9

(0.4) grey carb. slst, Silty coal and carb slst — 10

(0.4) buff, hard slst

(0.4) white hard slst — 11

Minor beds of silty coal

12

MIXED UNIT — Black, hard to soft, finely inter-bedded silty coal and coaly slst, with minor carb. slst — 13

COAL — Black, very hard, clean coal with silty coal, resin beads are abundant throughout. — 14

Dark, grey brown, carb slst

Silty

Interbedded clean and silty coal

(0.1) light grey hard slst — 15

Hard to soft, silty

Occasional white slst laminae

MIXED UNIT — Black to light grey, very hard to soft, carb. slst with clean and silty coal

(0.3) light grey calc. slst, Silty coal — 16

Carb. slst

Buff, hard slst

COAL — Black, very hard, clean coal with occasional interbeds of soft silty coal.

Irregular laminae buff to white slst

Coaly slst — 17

Resin beads and occasional white slst laminae

(0.5) grey, very hard calcified wood — 18

Minor interbeds of silty coal

Silty

Coaly slst

Minor interbeds of silty coal and coaly slst

Coaly and carb. slst — 19

Light grey slst laminae

Black to rusty, soft coaly slst — 20

Black to grey brown carb and coaly slst — 21

With irregular laminae of white slst

Silty

With interbedded silty coal — 22

Buff, very hard, slst

With interbedded silty coal and carb. slst

With irregular grey calc. slst laminae and silty coal

With minor soft silty coal beds — 23

(0.3) buff, very hard slst

(0.2) rusty, hard slst

With minor interbedded carb. slst — 24

SILTY COAL — Black, hard to very hard, with interbedded carb. to coaly slst and clean coal

Dark grey brown, soft, carb slst — 25

(0.5) buff, hard slst

Light grey, very hard, calc. slst

Light grey, very hard, calc. slst

With coaly slst — 26

Grey brown, carb. slst

Interbedded with clean coal — 27

(0.1) buff, hard slst

(0.1) grey brown, med hard, carb slst

Finely interbedded with clean coal

(0.5) grey brown, soft, carb slst — 28

Finely interbedded with clean coal and carb. slst

With minor clean coal — 29

Finely interbedded with coaly slst

With minor carb. slst — 30

Carb slst grading into silty coal

Interbedded with clean coal and carb. slst — 31

Soft, carb. slst

With minor carb. slst — 32

(0.5) grey brown, med hard, carb slst

CLEAN COAL — Black, very hard, with minor interbeds of silty and carb. slst

With silty coal — 33

Buff, laminated slst

Carb. slst — 34

With 3 (0.2) beds of coaly slst

With many interbeds of silty coal and carb. slst

With buff slst laminations

With minor silty coal — 35

(0.2) buff, hard slst

(0.5) buff, hard — 36

SILTY COAL — Black, hard to soft with interbedded slst — 37

Coaly slst

CLEAN COAL — Black, very hard, with resin beads and some silty coal

Buff, very hard, calc. slst with coaly laminations

(0.3) buff to black, very hard, calc. slst with coaly laminae — 38

Silty

Soft carb. slst

Buff, very hard, slst laminae — 39

Buff, very hard slst

Hard, coaly slst

Numerous, buff, very hard, irregular slst laminae — 40

41

Soft, silty coal — 42

Soft silty

(0.1) buff, hard slst

Grey, hard, calc. coaly slst — 43

(0.2) buff, very hard, calc. slst — 44

45

Finely interbedded silty and clean — 46

Hard, carb. slst

(0.4) buff, very hard carb. slst

(0.1) buff, very hard carb. slst — 47

Silty coal and carb slst

Finely interbedded silty coal, coaly and carb. slst — 48

(0.3) buff, very hard slst

Grey, very hard, calcified wood

Silty coal and carb. slst — 49

50

(0.5) dark grey, hard slst

(0.3) dark grey, hard slst

Hard carb. slst — 51

Soft slightly carb. slst

(0.5) buff, very hard slst — 52

Hard, silty

With buff, slst lam. and resin beads

Soft carb. to coaly slst

Buff, very hard, irregular slst lam. — 53

Hard, carb. slst

Hard coaly slst

(0.2) buff, very hard, irregular slst lam. notions

With numerous buff slst lam. — 54

Interbedded silty coal and coaly slst

COAL — Black, very hard to hard, clean with interbedded silty coal and carb. to coaly slst

Carb. and coaly slst — 55

Interbedded silty coal and coaly slst

Finely interbedded carb. slst, clean and silty coal — 56

(0.2) buff, very hard slst

Carb. to coaly slst — 57

Finely interbedded coal and slst

CLEAN COAL — Black, very hard, with minor interbedded of silty coal to slst

(0.2) buff, very hard, irregular slst laminae. — 58

MIXED UNIT — Black to light grey, very hard to soft, inter-bedded clean and silty coal and carb. slst

Carb. slst with minor clean coal

Clean coal

Carb. to coaly slst — 59

END OF HOLE AT 2232 feet

135 (64)

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

COLUMBIA HYDRO AND POWER AUTHORITY

T CREEK PROJECT — DRILL RECORD

0,498' N	Length	463'	Hole No.	75-93
3,533' E	Azimuth	090°	Date	SEPT 1975
722'	Dip	-55°	Logged by	J. Roizen
720'	Core Size	NQ	Sheet	1 of 3

IGRAPHY		DETAIL & STRUCTURE		CORE LOSS	SAMPLE No.	ASH AT 20°C MOISTURE
ROCK UNITS		SYMBOL	DESCRIPTION			
			Note: Original ground elev. 3721'			
LIRDEN						
	sand gravel					
ZONE						
	ish brown, very soft clst		Buff, soft slst beds			
CLAYSTONE						
	soft, coaly clst with clean coal and resin				1	
			Black, very hard to soft, finely interbedded coaly clst and coalroal			
COAL					2	
	ary hard, clean coal with interbeds of coaly slst		Soft, coaly slst			
	ty coal and with yarse beads.	40				
		20	(0.2) soft, coaly slst		3	
		40	Joint with marcasite coating			
			(0.2) soft, coaly slst			
			Conc. of resin beads			
			(0.1) dark brown, soft carb clst			
		0 20				
		40			4	
			(0.1) black, soft, silty coal			
			(0.1) silty coal			
		12	(0.2), 2(0.1), (0.2) silty coal			
		100				
			Hard to soft, clean coal with 3 beds of silty coal		5	
		55				
			Silty coal			
			(0.4) soft, coaly clst			
			(0.1) dark brown, soft, carb slst			
			(0.2) silty coal			
			(0.2) dark brown, soft, carb slst			
			2(0.2) silty coal, (0.2) carb slst, (0.2) silty coal	After sinbeds	6	
		15				
		65	Irregular, buff, very hard slst			
			Irregular, grey green, soft, slst		7	
		25	Marcasite coating on joint surface. Marcasite coating on joint surface			
			Hard to soft, coaly soft with minor silty coal		8	
		80	(0.6) soft, silty coal			
			2(0.2) soft, carb. slst		9	
			(0.2) silty coal			
		85			10	
			Black, soft, coaly slst		11	
		85				
SILTSTONE						
	Green to grey brown, soft to very soft, brecciated slst	55				
		40				
END OF HOLE AT 463 feet						

135 (65)

DRILL HOLE: 75-93

SHEET NO.: 3 OF 3

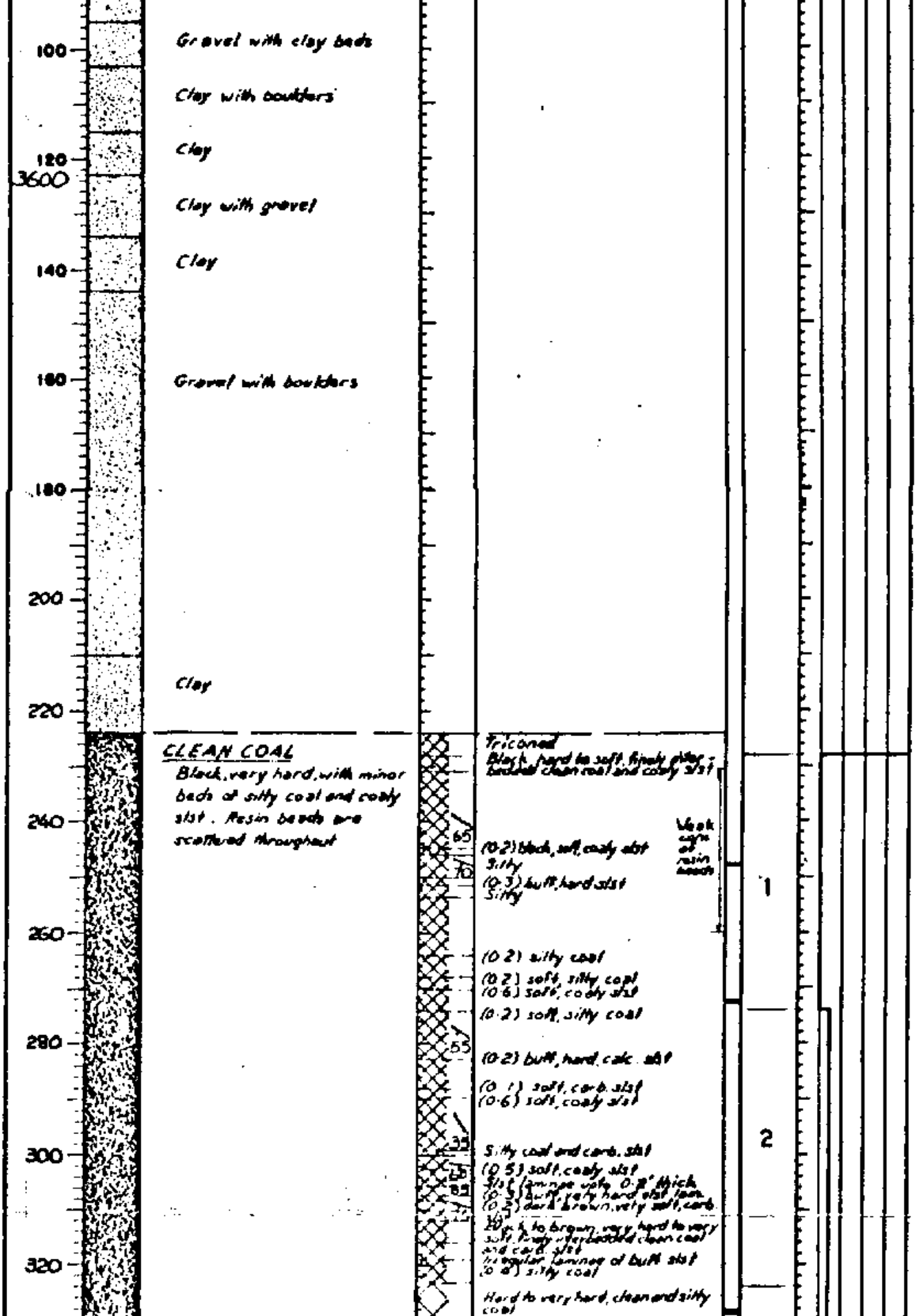
DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	49,861' N 23,925' E	Length	1507'	Hole No.	75-95
		Azimuth	270° -	Date	OCT. 1975
Reference Elev.	3719'	Dip	-75°	Logged by	J. Roizion
Ground Elev.	3717'	Core Size	NQ	Sheet	1 of 8

ELEVATION in FEET	DEPTH in FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
	0	Datum			Note: Original ground elev. 3718'			
			OVERBURDEN					
	20		Boulders with gravel					
	40		Gravel					
			Clay with boulders					
	60							
	80		Gravel					


100
Gravel with clay beds
Clay with boulders
Clay
120
3600
Clay with gravel
Clay
140
160
Gravel with boulders
180
200
Clay
220
CLEAN COAL
Black, very hard, with minor beds of silty coal and coaly slst. Resin beds are scattered throughout
240
65
70
(0·2) black, soft, coaly slst
Silty
(0·3) buff, hard slst
Silty
Weak sign of resin beads
1
260
(0·2) silty coal
(0·2) soft, silty coal
(0·6) soft, coaly slst
(0·2) soft, silty coal
280
55
(0·2) buff, hard, calc. slst
(0·1) soft, carb. slst
(0·6) soft, coaly slst
2
300
35
Silty coal and carb. slst
(0·5) soft, coaly slst
Slst (laminae only 0·2" thick)
(0·5) buff, very hard slst, lam.
(0·3) dark brown, very soft, carb.
Dark to brown, very hard to very soft, finely interbedded clean coal and carb. slst
Irregular laminae of buff slst
(0·8) silty coal
320
Hard to very hard, clean and silty coal

3400

340

Hard to soft, silty coal

Buff to white, hard slst laminae

Silty coal

(0.2) brown, very soft, carb. slst

Thin lam of white calc. wood

(0.2) rusty buff, very hard slst

360

Hard to very soft, finely interbeds of silty coal and carb. slst

With rusty bands

(0.2) very soft, carb. slst

(0.2) brown, very soft slst

(0.3) very soft, coaly slst

380

SILTY COAL

Black, very hard to soft, with interbedded clean coal and coaly to carb. slst

Hard to soft, finely interbedded silty coal and carb. slst

(0.2) grey to white, very hard calc. slst

Soft to med. hard, carb. slst

400

(0.1) buff, very hard slst

Coaly slst

Hard to very hard, finely interbeds of clean and silty coal

(0.7) coaly slst

With numerous minor interbedded carb and coaly slst

420

(0.4) soft, carb. slst

440

Very soft carb slst

(0.3) coaly slst

(0.2) very soft, carb. slst

With minor clean coal

Soft to very soft, carb slst

460

Hard to soft, finely interbedded silty coal and coaly slst

(0.2) buff, very hard, calc. slst

Med hard, coaly slst

Very hard to soft, clean coal with minor silty coal and coaly slst

480

(0.4) light grey, very hard slst

(0.3) soft carb. slst

(0.2) (0.3) soft, coaly slst

(0.7) (0.4) soft, carb. slst

500

(0.2) soft carb. slst

(0.2) (0.3) (0.2) soft, coaly slst

soft carb. slst

(0.3) soft, carb. slst

520

(0.2) (0.1) (0.1) soft, coaly slst

(0.4) soft, carb. slst

540

CLEAN COAL

Black, very hard, with minor beds of buff slst and carb. to coaly slst

White to buff, irregular clst lam.

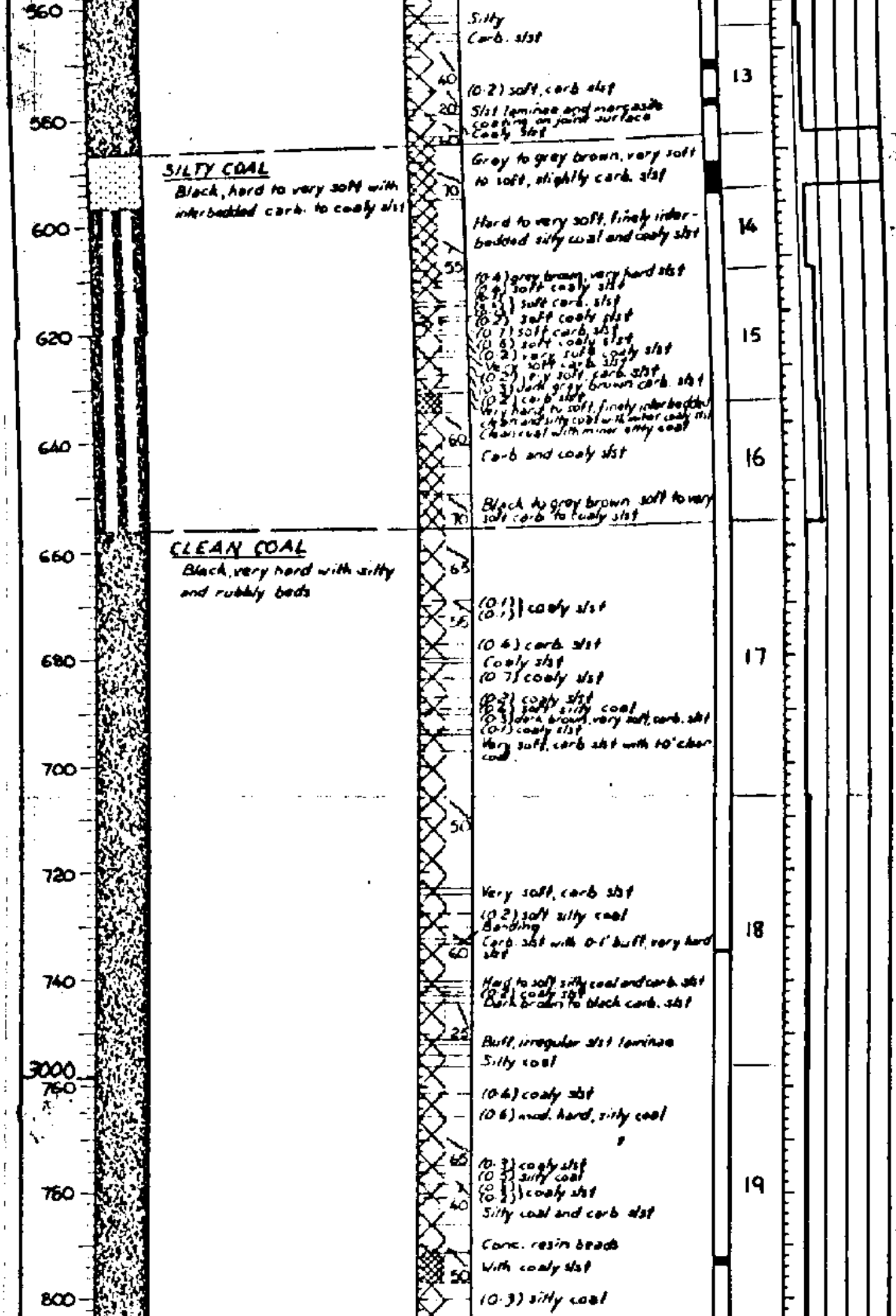
2(0.3) hard, coaly slst

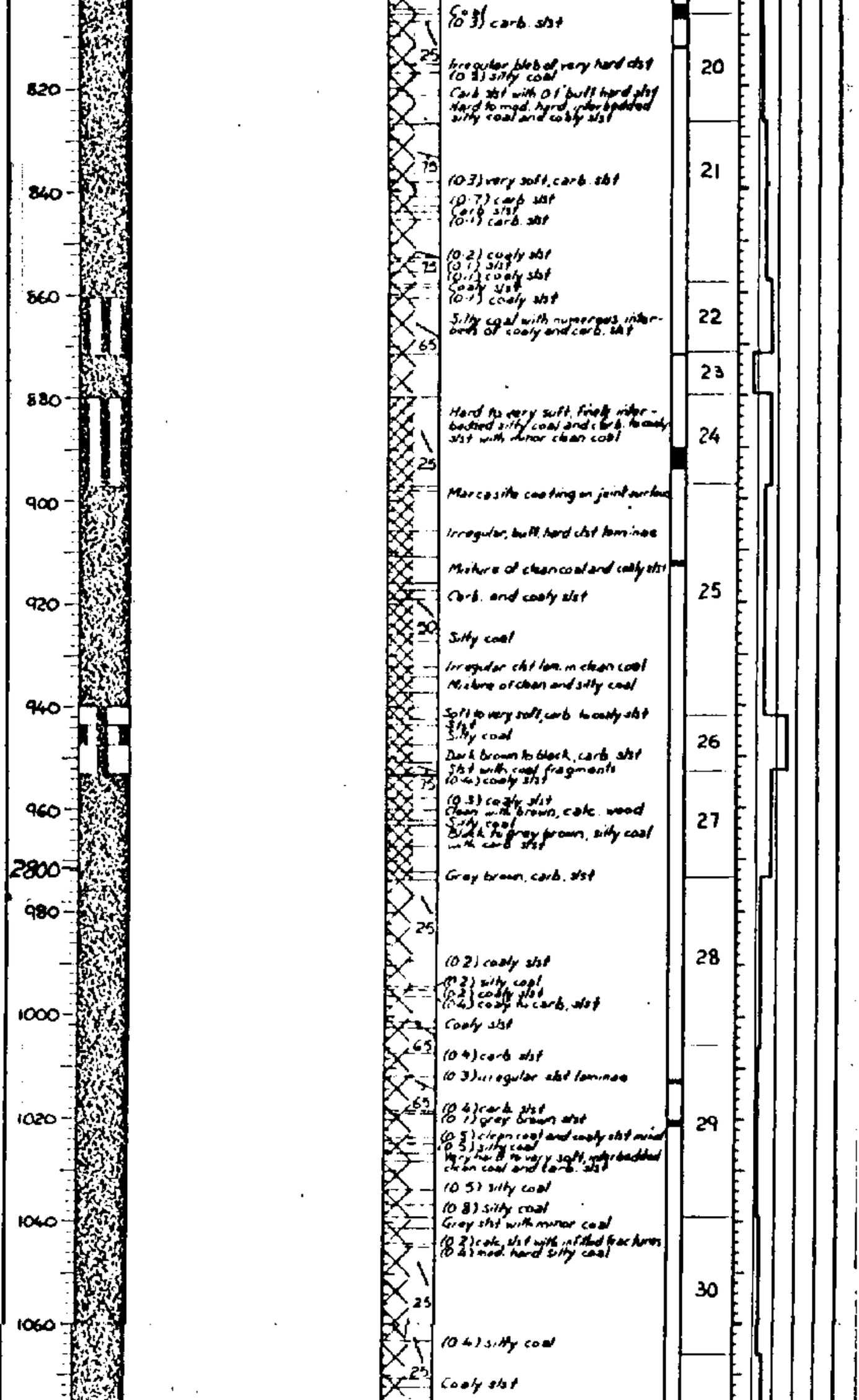
1½" diameter resin band

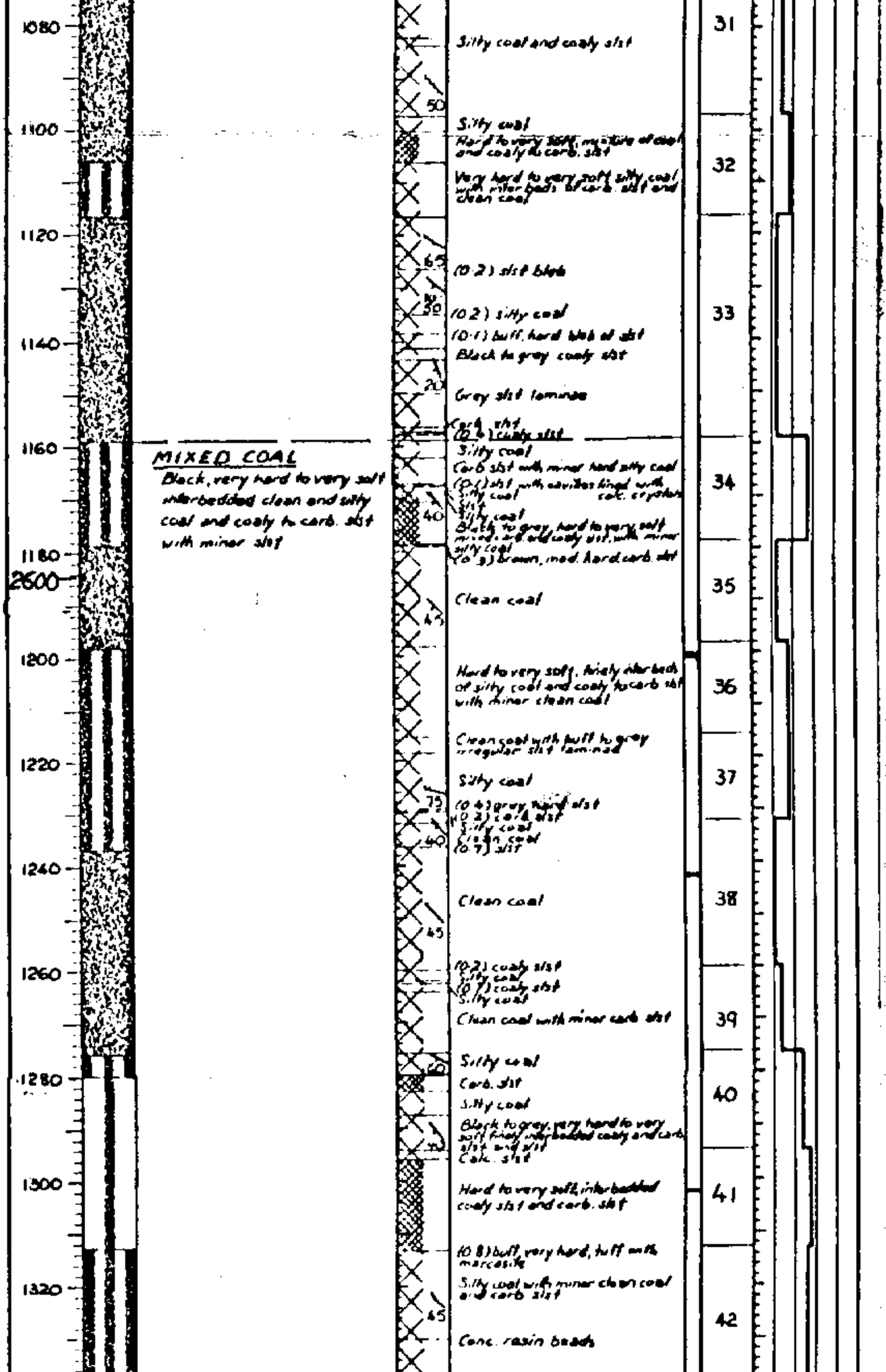
3200

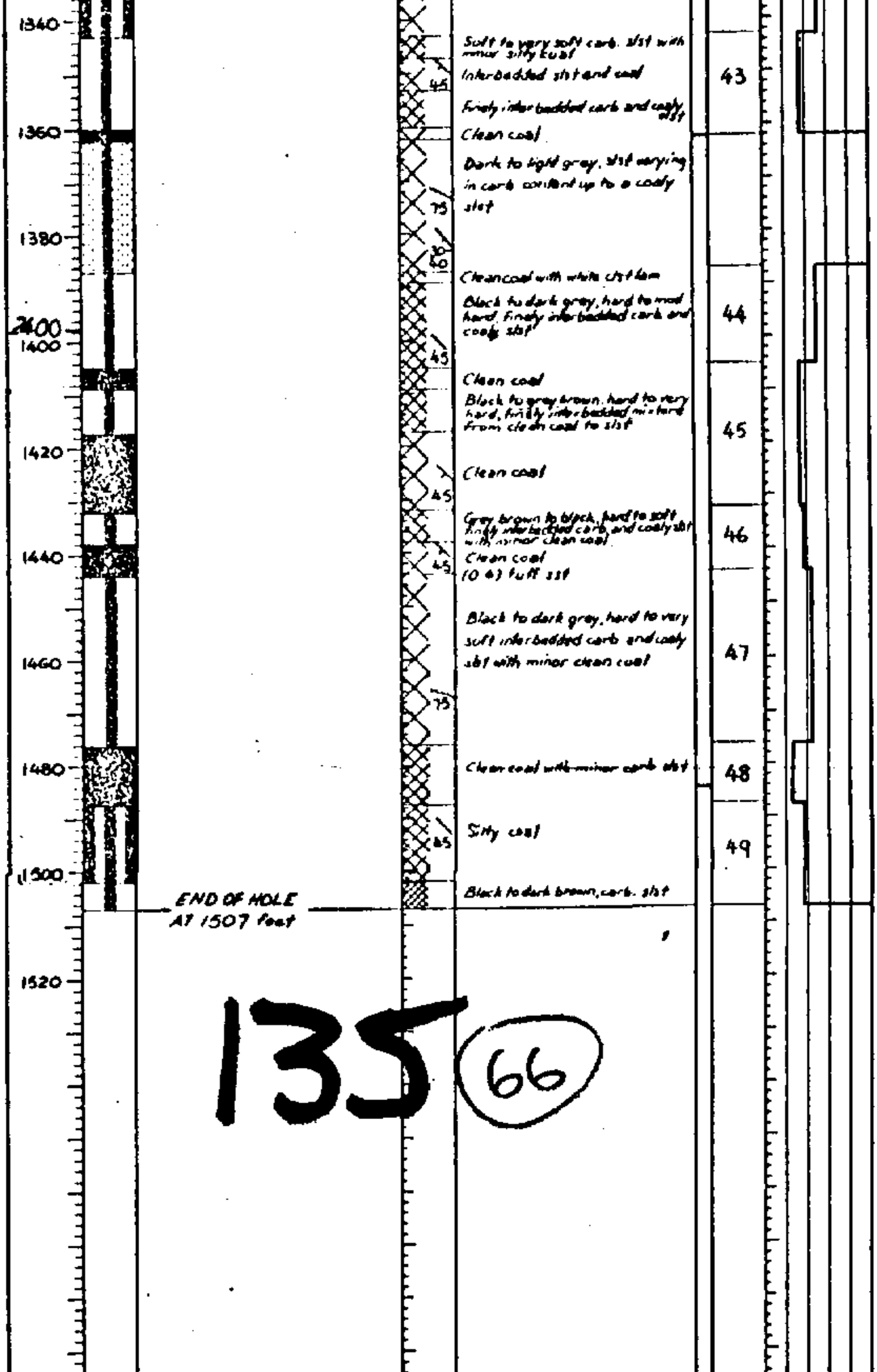
Irregular buff slst laminae

3 4 5 6 7 8 9 10 11 12


560
580
600
620
640
660
680
700
720
740
3000
760
760
800
SILTY COAL
Black, hard to very soft with interbedded carb. to coaly slst
CLEAN COAL
Black, very hard with silty and rubbly beds
Silty
Carb. slst
(0.2) soft, carb slst
Slst laminae and marcasite coating on joint surface
Coaly slst
Grey to grey brown, very soft to soft, slightly carb. slst
Hard to very soft, finely interbedded silty coal and coaly slst
(0.4) grey brown, very hard slst
(0.4) soft coaly slst
(0.1) soft carb. slst
(0.2) soft coaly slst
(0.1) soft carb. slst
(0.6) soft coaly slst
(0.2) very soft coaly slst
Very soft carb. slst
(0.2) fair soft carb. slst
(0.3) dark grey brown carb. slst
(0.2) carb slst
Very hard to soft, finely interbedded carbon and silty coal with other coaly slst
Clean coal with minor silty coal
Carb and coaly slst
Black to grey brown soft to very soft carb to coaly slst
(0.1) (0.1) coaly slst
(0.6) carb. slst
Coaly slst
(0.7) coaly slst
(0.2) coaly slst
(0.2) soft silty coal
(0.3) dark brown, very soft carb. slst
(0.1) coaly slst
Very soft, carb slst with 10" clean coal
Very soft, carb slst
(0.2) soft silty coal
Banding
Carb slst with 0.1' buff, very hard slst
Hard to soft silty coal and carb. slst
(0.2) coaly slst
Dark brown to black carb. slst
Buff, irregular slst laminae
Silty coal
(0.6) coaly slst
(0.6) mod. hard, silty coal
(0.3) coaly slst
(0.3) silty coal
(0.1) (0.2) coaly slst
Silty coal and carb slst
Conc. resin beads
With coaly slst
(0.3) silty coal
13
14
15
16
17
18
19


820
840
860
880
900
920
940
960
2800
980
1000
1020
1040
1060
(0·3) carb. slst
Irregular bleb of very hard slst
(0·3) silty coal
Carb slst with 0·1' built hard slst
Hard to mod. hard, interbedded silty coal and coaly slst
(0·3) very soft, carb. slst
(0·7) carb slst
Carb slst
(0·1) carb. slst
(0·2) coaly slst
(0·1) slst
(0·1) coaly slst
Coaly slst
(0·1) coaly slst
Silty coal with numerous interbeds of coaly and carb. slst
Hard to very soft, finely interbedded silty coal and carb. to coaly slst with minor clean coal
Marcasite coating on joint surface
Irregular, built hard slst laminae
Mixture of clean coal and coaly slst
Carb. and coaly slst
Silty coal
Irregular slst lam. in clean coal
Mixture of clean and silty coal
Soft to very soft, carb. to coaly slst
Silty coal
Dark brown to black, carb. slst
Slst with coal fragments
(0·4) coaly slst
(0·3) coaly slst
Clean with brown, calc. wood
Silty coal
Black to grey brown, silty coal with carb slst
Grey brown, carb. slst
(0·2) coaly slst
(0·2) silty coal
(0·2) coaly slst
(0·4) coaly to carb. slst
Coaly slst
(0·4) carb slst
(0·3) irregular slst laminae
(0·4) carb slst
(0·1) grey brown slst
(0·5) clean coal and coaly slst mixed
(0·5) silty coal
Very hard to very soft, interbedded clean coal and carb. slst
(0·5) silty coal
(0·8) silty coal
Grey slst with minor coal
(0·2) calc. slst with infilled fractures
(0·4) mod. hard silty coal
(0·4) silty coal
Coaly slst
20
21
22
23
24
25
26
27
28
29
30


1080
1100
1120
1140
1160
1180
2600
1200
1220
1240
1260
1280
1300
1320
MIXED COAL
Black, very hard to very soft interbedded clean and silty coal and coaly to carb. slst with minor slst
Silty coal and coaly slst
Silty coal
Hard to very soft, mixture of coal and coaly to carb. slst
Very hard to very soft silty coal with inter beds of carb. slst and clean coal
(0.2) slst blebs
(0.2) silty coal
(0.1) buff, hard blebs of slst
Black to grey coaly slst
Grey slst laminae
Carb. slst
(0.4) coaly slst
Silty coal
Carb slst with minor hard silty coal
(0.1) slst with cavities lined with calc. crystals
Silty coal
Slst
Silty coal
Black to grey, hard to very soft mixed and oily coaly slst, with minor silty coal
(0.3) brown, med. hard carb. slst
Clean coal
Hard to very soft, finely interbedded of silty coal and coaly to carb slst with minor clean coal
Clean coal with buff to grey irregular slst laminae
Silty coal
(0.4) grey hard slst
(0.2) carb slst
Silty coal
Clean coal
(0.7) slst
Clean coal
(0.2) coaly slst
Silty coal
(0.7) coaly slst
Silty coal
Clean coal with minor carb slst
Silty coal
Carb. slst
Silty coal
Black to grey, very hard to very soft finely interbedded coaly and carb slst and slst
Calc. slst
Hard to very soft, interbedded coaly slst and carb. slst
(0.8) buff, very hard, buff with marcasite
Silty coal with minor clean coal and carb slst
Conc. resin beads
31
32
33
34
35
36
37
38
39
40
41
42


1340
1360
1380
1400
1420
1440
1460
1480
1500
1520
Soft to very soft carb. slst with minor silty coal
Interbedded slst and coal
Finely interbedded carb and coaly slst
Clean coal
Dark to light gray, slst varying in carb content up to a coaly slst
Clean coal with white clst lam
Black to dark gray, hard to mod hard, finely interbedded carb and coaly slst
Clean coal
Black to gray brown, hard to very hard, finely interbedded mix hard from clean coal to slst
Clean coal
Gray brown to black, hard to soft finely interbedded carb and coaly slst with minor clean coal
Clean coal
(0.4) fuff sst
Black to dark gray, hard to very soft interbedded carb and coaly slst with minor clean coal
Clean coal with minor carb slst
Silty coal
Black to dark brown, carb. slst
43
44
45
46
47
48
49
END OF HOLE
AT 1507 feet
135
66

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates	47,846' N 23,159' E	Length	313'	Hole NR	75-94
		Azimuth	090°	Date	OCT. 1978
Reference Elev.	3621'	Dip	-65°	Logged by	J. Raixiss
Ground Elev.	3619'	Core Size	NQ	Sheet	1 of 2

ELEVATION IN FEET / DEPTH IN FEET	STRATIGRAPHY: STRAT. PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
0		Datum		Note: Original ground elev. 3619'			
		OVERBURDEN					
		Sand with boulders					
20 / 3600							
		Clay					
40							
		Clay with sand					
60							
		Sand					
		Clay					
80							
		Clay with cobbles					
100							
		Sand with cobbles					
		Clay with cobbles					
120							
		Mixture of sand, clay and gravel					
		Clay					
140							
		Clay with cobbles					
		Clay					
160							
		Gravel					
180							
200							
		Clay with cobbles					
220							
		Clay					
240 / 3400							
		Sand with cobbles					
		Sand					
260		Clay with boulders					
		Clay					
280							
		Gravel with boulders					
300							
		END OF HOLE AT 313 feet					
320							

135 (67)

DRILL HOLE : 75-94

SHEET No. : 2 OF 2

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 55,015' N, 21,067' E
Reference Elev. : 3405'
Ground Elev. : 3401'
Length : 1838'
Azimuth : –
Dip : -90°
Core Size : NQ
Hole Nº. : 75-81
Date : JULY 1975
Logged by : J. Rotzien
Sheet : 1 of 9

STRATIGRAPHY – MAJOR ROCK UNITS
Datum
OVERBURDEN: Sand; Gravel and boulders; Boulders; Sand; Clay and sand; Sand, clay and boulders; Coal; Sand and boulders; Clay
COAL: Black, soft to very hard, interbedded clean and silty coal with dark brown carb. clst; resin beads ≤ 1/4" sparse
CLEAN COAL: Black, very hard with interbedded back to grey, hard to soft slst and carb. slst
MIXED UNIT: Grey to black, hard to soft, interbedded clean and silty coal, carb. slst and sst. Clean coal
COAL: Black, hard, clean coal with interbedded silty coal and detrital rock; coal commonly contains resin beads ≤ 1/16" in diameter and white clst laminae
CLEAN COAL: Black, very hard, with minor beds of grey slst
MIXED UNIT: Light grey to black, hard to very hard slst with interbedded coal. Slst is carb. in parts with coaly fragments.
CLEAN COAL: Black, very hard with minor buff to white slst and clst beds
COAL: Black to grey, hard to very hard clean coal with interbedded silty coal, carb. slst and coaly slst. Resin beads up to 1/8" are scattered throughout coal
MIXED UNIT: Light grey to black, hard to very hard, interbedded mixture of slst, carb. slst, coaly slst, silty coal and clean coal
END OF HOLE AT 1838 feet

Note: Original ground elev. 3401'

SAMPLE Nº.	DETAIL & STRUCTURE – DESCRIPTION
1	Triconed; Finely interbedded silty coal and carb. clst
2	Silty
3	Clean; Carb. clst; Silty
4	Clean
5	(0.4) soft coaly slst; Silty with minor beds of carb. to coaly slst; White clst laminae; Silty with minor beds of carb to coaly slst
6	Clean; Silty; Clean; (0.7) buff very hard clst; Clean with occasional white clst laminae; (0.1) rusty, hard slst; Finely interbedded silty and clean
7	Clean; (0.2) rusty, hard slst; Clean with occasional white clst laminae
8	Finely interbedded carb. slst and silty coal
9	Clean; Silty with carb slst; Clean with occasional bands of buff, hard slst; Carb. slst; Clean
10	Clean; Carb. slst; Silty; With irregular buff slst laminae; Finely interbedded clean and silty coal and carb. slst; (0.2) rusty hard slst; Silty; (0.4) buff, very hard slst; Finely interbedded clean coal & carb. slst
11	Slightly carb fine sst; Carb slst; (0.2) buff, very hard slst
12	Coaly slst; Finely interbedded, slst and carb. slst with minor clean coal
13	(0.5) white clst laminae; (0.6) white to buff, hard slst
14	With minor silty beds
15	Soft carb. slst with minor buff hard slst; Finely interbedded clean coal and carb. slst
16	Slightly carb. sst
17	With minor silty; (0.2) buff, very hard slst; (0.2) buff, very hard slst
18	(0.2) buff, very hard slst
19	(0.1) buff, very hard slst; Silty; Slightly carb. slst
20	Carb. to coaly slst; (0.2) buff, hard slst
21	Slightly carb. slst; Silty; (0.2) buff, very hard slst; Silty; (0.2) buff, very hard slst; Finely interbedded clean and silty coal and coaly slst; Coaly slst; Slightly carb. slst with minor clean coal
22	Buff slst laminae; Silty; Silty
23	Carb slst; (0.4) buff, hard slst; White, hard slst laminae; Slightly carb. slst; Carb. slst; Silty; Slightly carb slst with numerous small beds of clean
24	
25	Finely interbedded clean coal and coaly slst; Coaly slst
26	(0.2) buff, very hard slst; Carb. slst; (0.4) buff, very hard slst; (0.5) light grey, very hard calc. wood; Carb. slst with white clst laminae; (0.3) grey coaly slst
27	(0.6) light grey, very hard, breccia calcified slst; Interbedded clean coal and coaly slst; Finely interbedded clean coal and coaly slst
28	Slightly carb. sandy slst; Fine grained cong.; Graded bed slst - sst - cong.; Finely interbedded carb slst, clean and silty coal - coal has white clst lam.; Clean coal; Finely interbedded clean coal and carb. slst; Slightly carb. slst
29	Clean coal and coaly slst; (0.5) buff, very hard, sandy slst; Interbedded clean coal and carb. slst
30	Clean with clst laminae; Coaly slst; Silty; Finely interbedded coaly and carb. slst; Slightly carb slst with minor silty coal
31	Clean with small interbeds of coaly slst; Clean
32	(0.7) grey, very hard, calc. sst; Silty; Carb. and coaly slst; Silty (0.3) calcified wood; (0.1) rusty, hard slst
33	Clean; Slightly carb very fine grained sst; Clean with minor beds and laminae of grey slst
34	(0.6) soft, carb. slst; Carb. slst; Silty, with minor carb. slst
35	Grey, coaly slst
36	Silty; Carb coaly slst; Slst with coal fragments; Sst with coal fragments; Slightly carb. slst with coal fragments and laminae; Sandy slst with occasional coaly laminae
37	Finely interbedded clean and silty coal and carb. slst
38	Slst with coal laminae and resin beads; Interbedded clean and silty coal and coaly slst; Slst with coaly laminae
39	Interbedded clean coal and slst
40	(0.3) buff, hard slst; Coaly slst; White clst laminae
41	(0.1) rusty slst (45°); (0.3) buff slst
42	White calcified wood with some clean coal; Buff clst laminae; Carb slst; Irregular white clst laminae
43	(0.7) carb. slst; (0.2) buff slst; Irregular white clst laminae; Carb. slst; Carb. to coaly slst; Numerous white clst laminae in clean coal
44	Coaly slst; Slightly carb. slst
45	Slst with coal laminae; Silty coal; Finely interbedded carb. slst and clean coal; Clean coal with occasional white clst laminae
46	Finely interbedded carb. slst and silty coal; Silty coal
47	Irregular white clst laminae; Calcified wood; Clean coal
48	Clean coal white clst laminae; Interbedded clean coal and carb. slst; Clean coal; (0.3) buff sst; (0.7) calcified wood; Clean coal
49	(0.4) carb. slst; Clean coal; Slightly carb. slst; Clean coal; Finely interbedded clean coal and carb. slst; (0.3) rusty slst
50	
51	Coaly slst; Carb. to coaly slst; Finely interbedded clean coal and coaly slst
52	With numerous white clst laminae
53	Interbedded coal, carb slst, slst; beds vary from 1" to 5"
54	Clean coal; Grey laminae, carb. slst; (0.5) grey carb slst; (0.2) grey, carb. slst
55	(0.1) grey slst; Finely interbedded clean and silty coal and coaly to clean slst
56	Interbedded slst and fine grained sst with coal laminae and fragments; Carb slst grading down to clean coal; Finely interbedded silty coal and coaly slst
57	With many small interbeds of silty coal and coaly slst
58	
59	Carb. to coaly slst; Slst with fragments of clean coal; Silty and clean coal with white clst laminae
60	Finely interbedded clean and silty coal and carb slst
61	Slst with coaly laminae
62	Very finely interbedded coal and slst; Clean coal; Silty coal with 0.5' calcified wood
63	Very finely interbedded coal and slst
64	Finely interbedded clean and silty coal with minor slst
65	Finely interbedded silty coal and carb. slst
66	Slst; Carb. to coaly slst; Clean coal with minor carb. slst; (0.7) white clst
67	Clean coal with buff to grey slst and clst laminations; Calcified wood; Clean coal; Finely interbedded clean coal and carb. slst

135 (68)

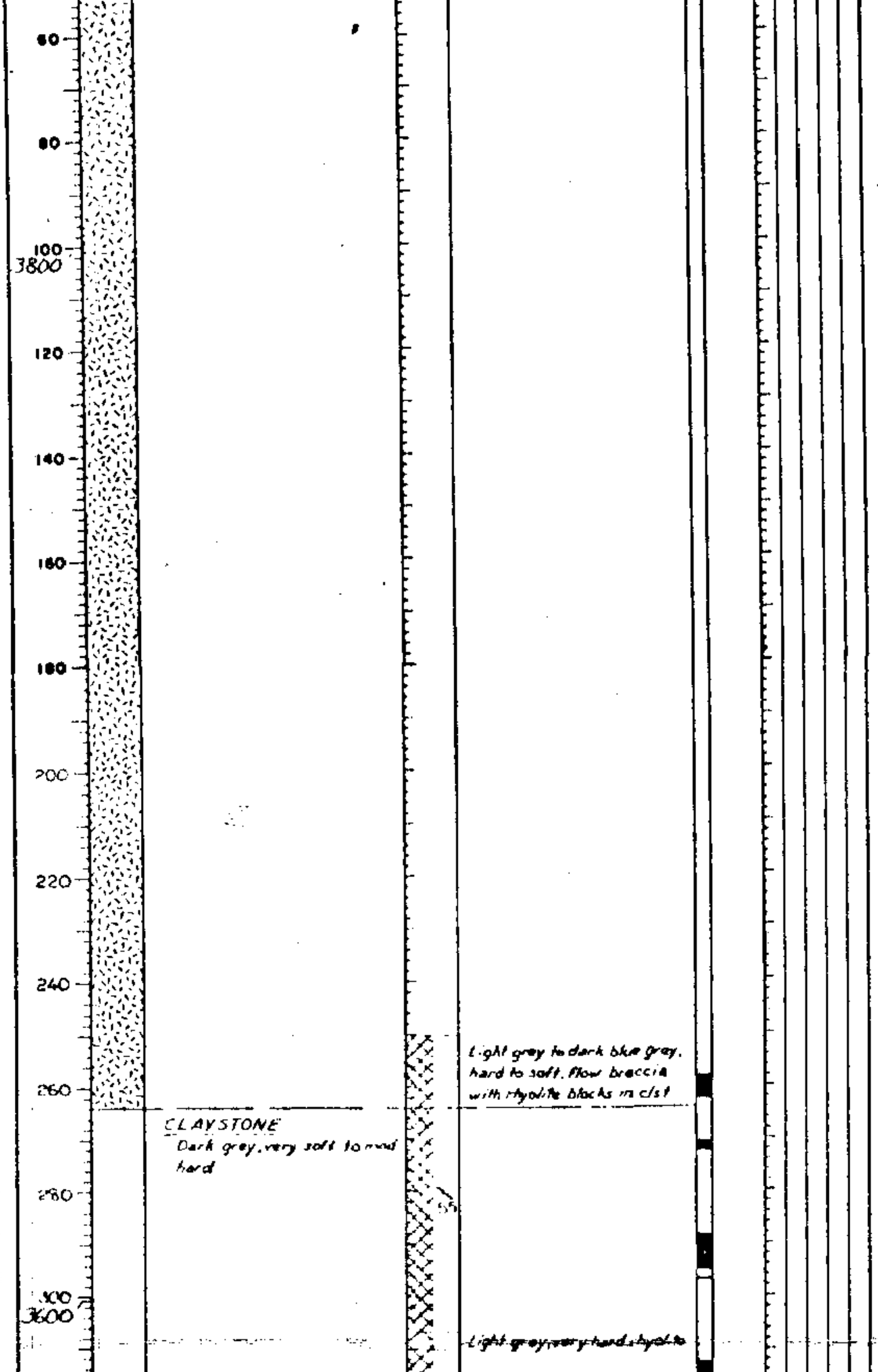
DOLMAGE CAMPBELL AND ASSOCIATES LTD.

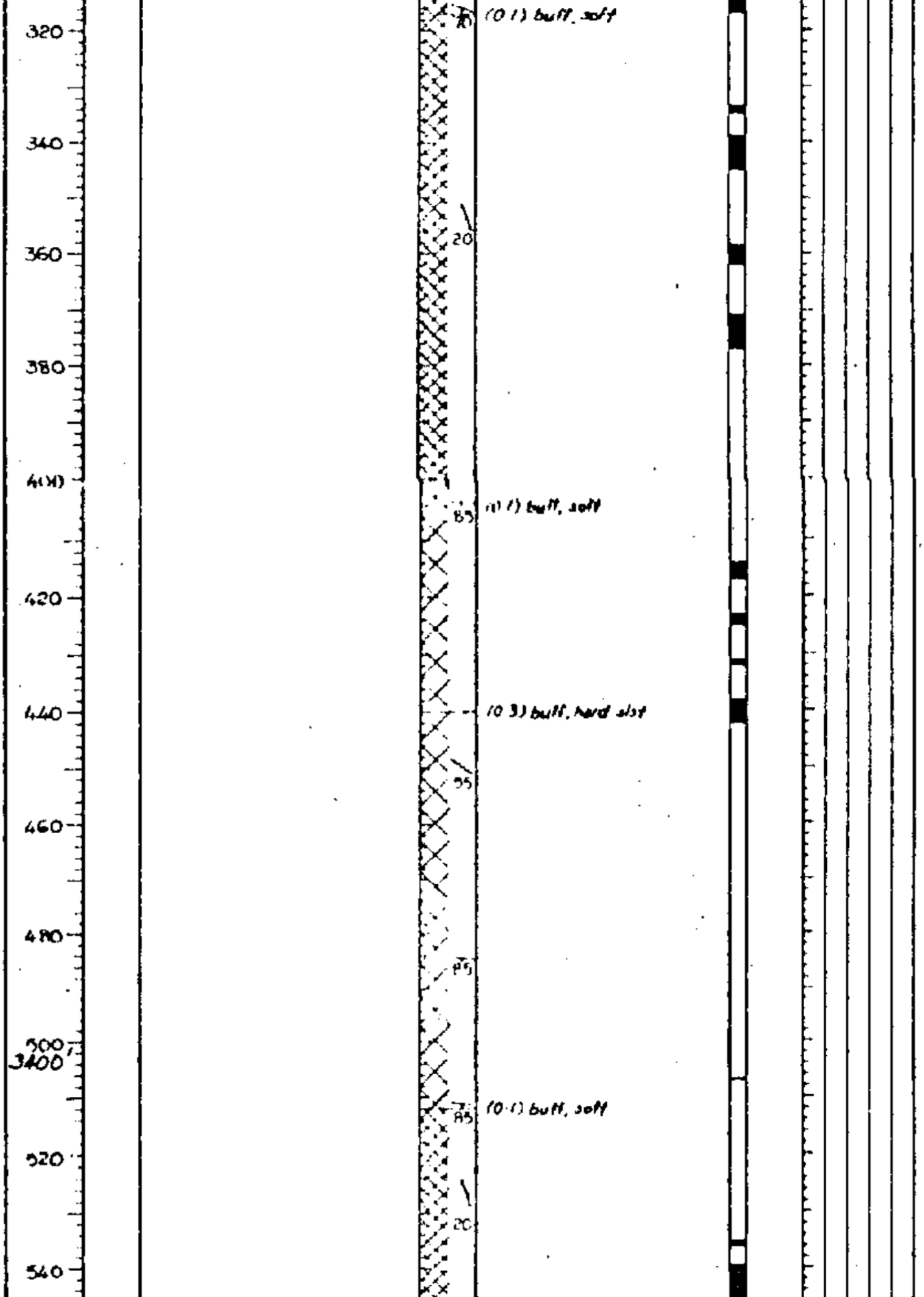
BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

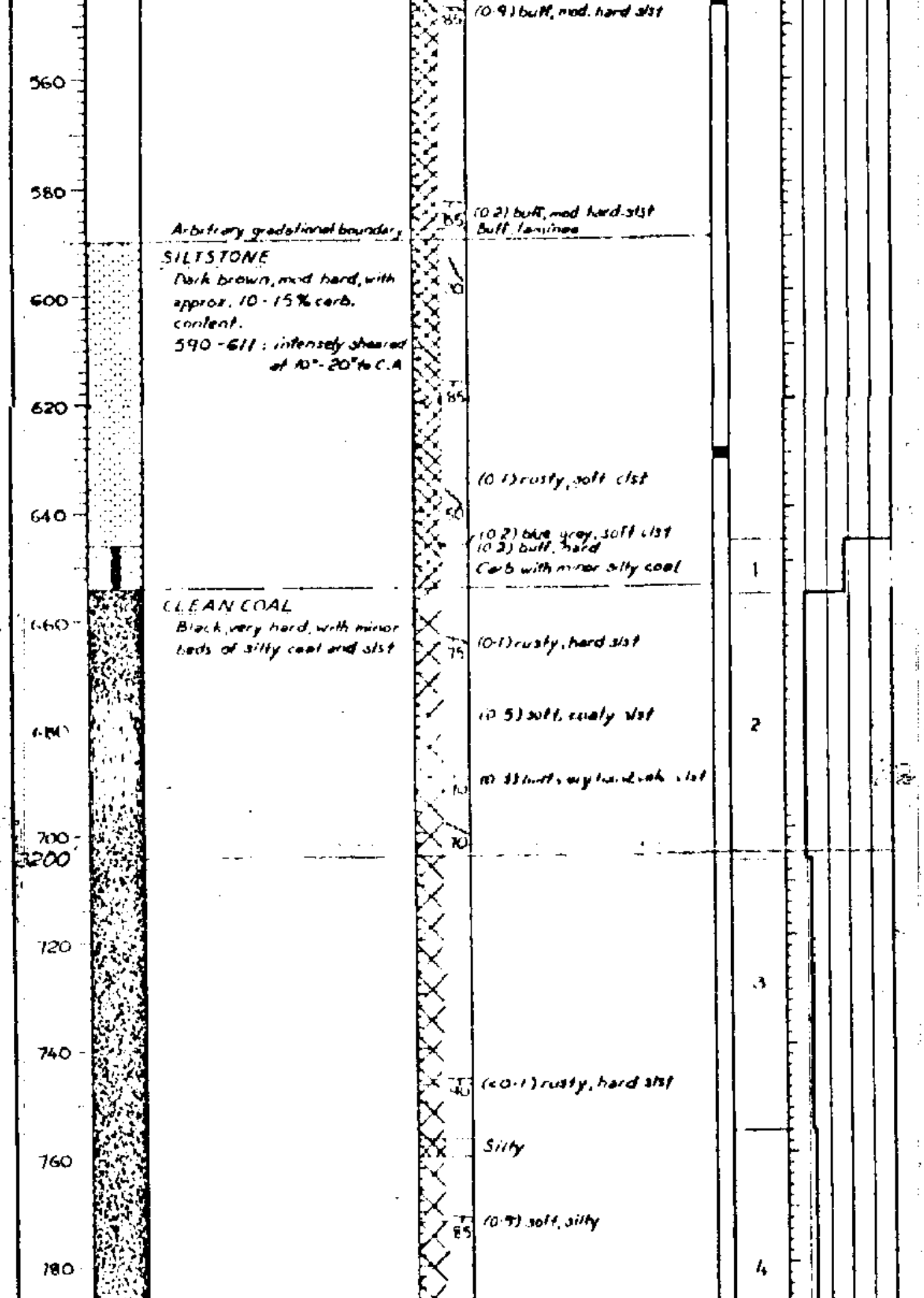
HAT CREEK PROJECT — DRILL RECORD

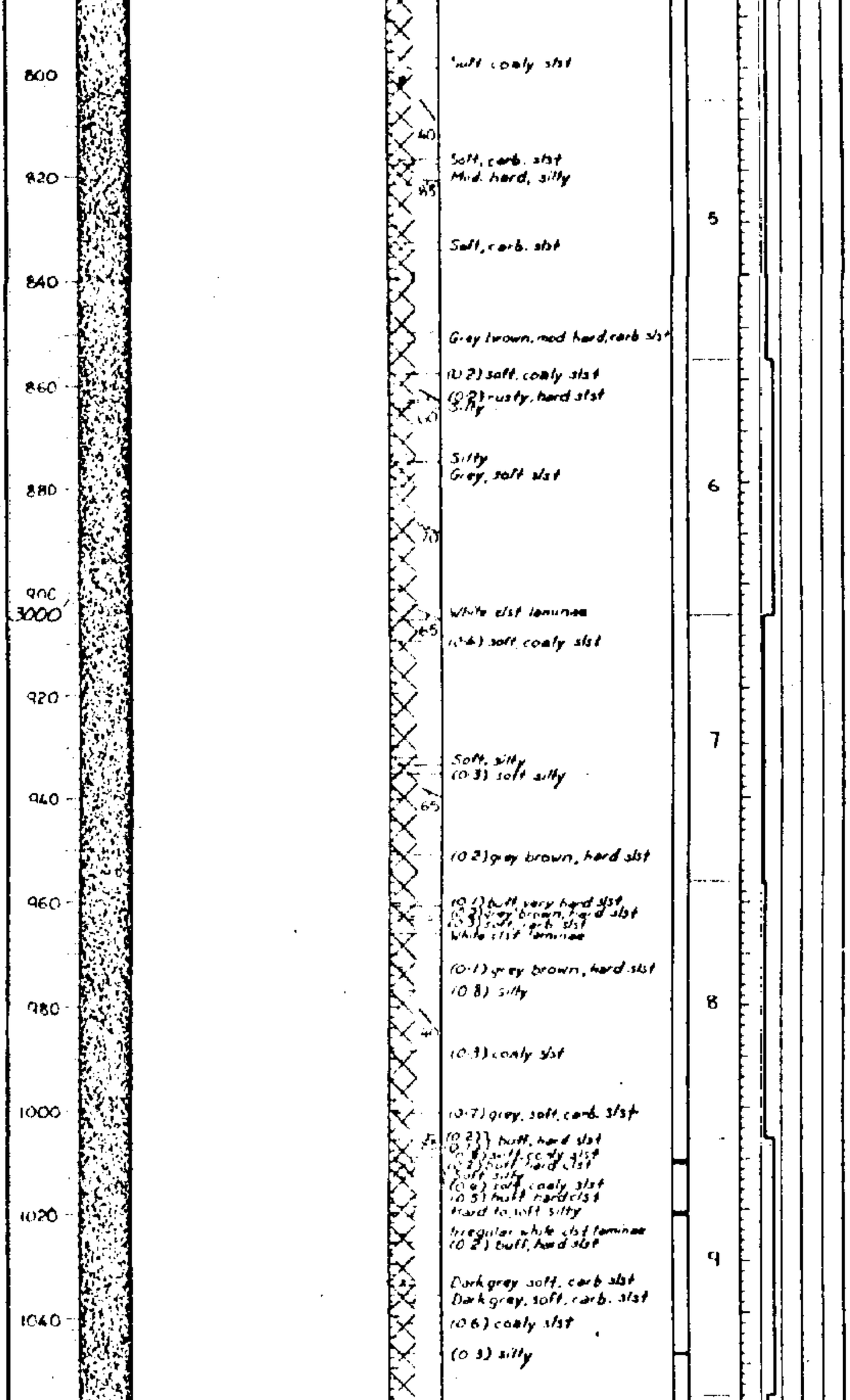
Coordinates	45,268' N	Length	1948'	Hole No.	75-79
	25,453' E	Azimuth	–	Date	AUG. 1975
Reference Elev.	3901'	Dip	-90°	Logged by	J. Rolzien
Ground Elev.	3899'	Core Size	NQ	Sheet	1 of 10

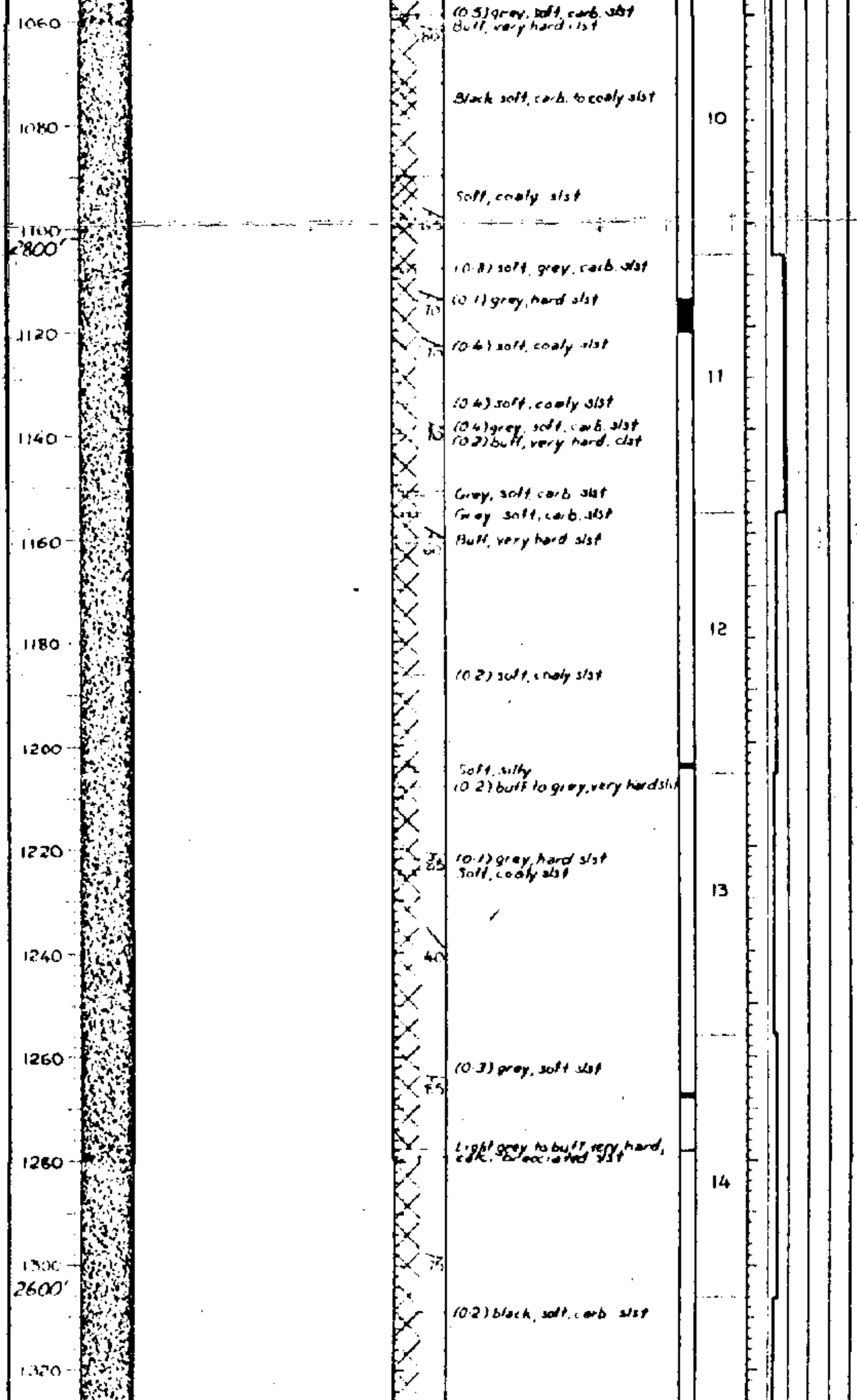
ELEVATION IN FEET / DEPTH IN FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE No.	ASH AT 20% MOISTURE
0	Datum			Note: Original ground elev. 3896'			
		OVERBURDEN Mud and rhyolite					
20							
40		RHYOLITE White to light grey, mod. to very hard, finely crystalline		Tricored			


60
80
100
3800
120
140
160
180
200
220
240
260
280
300
3600
CLAYSTONE
Dark grey, very soft to mod hard
Light grey to dark blue grey, hard to soft, flow breccia with rhyolite blocks in c/st
Light grey, very hard, hyol to


320
340
360
380
400
420
440
460
480
500
3400
520
540
(0 1) buff, soft
20
85
(0 1) buff, soft
(0 3) buff, hard slst
35
85
(0·1) buff, soft
20


560
580
600
620
640
660
680
700
720
740
760
780
Arbitrary gradational boundary
SILTSTONE
Dark brown, mod hard, with approx. 10 - 15% carb. content.
590 - 611 : intensely sheared at 10° - 20° to C.A
CLEAN COAL
Black, very hard, with minor beds of silty coal and slst
(0·9) buff, mod. hard slst
(0·2) buff, mod hard slst
Buff laminae
(0·1) rusty, soft clst
(0·2) blue grey, soft clst
(0·3) buff, hard
Carb with minor silty coal
(0·1) rusty, hard slst
(0·5) soft, sealy slst
(0·3) buff, very hard carb slst
(<0·1) rusty, hard slst
Silty
(0·9) soft, silty
1
2
3
4


800
820
840
860
880
900
3000
920
940
960
980
1000
1020
1040
buff coaly slst
40
Soft, carb. slst
Mod. hard, silty
85
Soft, carb. slst
Grey brown, mod hard, carb slst
(0.2) soft, coaly slst
(0.2) rusty, hard slst
silty
Silty
Grey, soft slst
70
White slst laminae
65
(0.4) soft, coaly slst
Soft, silty
(0.3) soft silty
65
(0.2) grey brown, hard slst
(0.1) buff very hard slst
(0.3) grey brown, hard slst
(0.3) soft, carb. slst
White slst laminae
(0.1) grey brown, hard slst
(0.8) silty
40
(0.3) coaly slst
(0.7) grey, soft, carb. slst
(0.2) buff, hard slst
(0.1) buff, coaly slst
(0.2) buff, hard slst
Soft silty
(0.6) soft, coaly slst
(0.5) buff, hard slst
Hard to soft silty
Irregular white slst laminae
(0.2) buff, hard slst
Dark grey soft, carb slst
Dark grey, soft, carb. slst
(0.6) coaly slst
(0.3) silty
5
6
7
8
9


1060
1080
1100
2800'
1120
1140
1160
1180
1200
1220
1240
1260
1280
1300
2600'
1320
(0.5) grey, soft, carb. slst
Buff, very hard clst
Black soft, carb. to coaly slst
Soft, coaly slst
(0.8) soft, grey, carb. slst
(0.1) grey, hard slst
(0.6) soft, coaly slst
(0.4) soft, coaly slst
(0.4) grey, soft, carb. slst
(0.2) buff, very hard, clst
Grey, soft carb slst
Grey soft, carb. slst
Buff, very hard slst
(0.2) soft, coaly slst
Soft, silty
(0.2) buff to grey, very hard slst
(0.1) grey, hard slst
Soft, coaly slst
(0.3) grey, soft slst
Light grey to buff, very hard, calc. bioclastic slst
(0.2) black, soft, carb slst
10
11
12
13
14

1340

Soft, carb. slst

White to grey clst laminae

1360

(0.3) soft, carb. clst
(0.2) buff, very hard slst

1380

(0.2) soft coaly slst
(0.1) soft, coaly slst

1400

(0.5) black, soft, carb. slst
Soft, carb. slst with clean coal
(0.8) grey, hard slst

1420

Med. hard coaly slst
(0.2) soft, coaly slst

1440

Black, soft carb. slst
Grey clst laminae
(0.2) grey, soft, carb slst
Soft coaly slst
Buff, very hard clst laminae

1460

(0.5) black, soft, carb. slst

1480

Gray, hard slst laminae

(0.1) black, soft, carb. slst
(0.6) carb. slst

1500

2400

INTERBEDDED CLEAN AND SILTY COAL
Black, hard to very hard

Silty
(0.2) grey, hard slst
Clean
(0.1) buff, hard slst
Clean
Coaly slst
Clean
Silty
Carb. slst
Silty
Silty coal and carb. slst

1520

Silty
(0.3) grey brown, soft, carb slst
Clean
Carb. slst
Silty
(0.1) buff slst (0.3) grey slst
Clean with petrified wood
Clean
Clean with white clst laminae
Grey to brown, soft, carb slst

1540

Clean

1560

Coaly slst
Clean
(0.5) coaly slst

15

16

17

18

19

20

21

1580

Silty

Clean

Finely interbedded silty coal and carb. slst

Clean

Finely interbedded silty coal and carb. slst

Clean and silty

white to grey, very hard, calc. slst

Clean

22

1600

1620

SILTY COAL

Black, hard, with interbedded carb. slst and minor slst and clean coal

(0.5) grey, hard carb. slst

(0.4) black, soft carb. slst

Clean with (0.2) grey slst

Clean

Dark grey, carb. slst

23

1640

Grey, hard, carb. slst

Clean

Finely interbedded slst and silty coal

1660

Grey brown, soft carb. slst

24

with minor clean coal

1680

25

Finely interbedded clean and silty coal and carb. slst

(0.1) buff, hard slst

Grey, soft slst

(0.4) grey brown, hard carb. slst

1700

2200

Finely interbedded clean and silty

26

Soft, coaly slst

Clean

1720

Finely interbedded silty coal and carb. slst

Grey brown, soft carb. slst

1740

Clean

(0.2) grey, very hard, calc. slst

Clean

27

1760

Clean with interbedded carb. slst

Grey, hard sst with coal fragments

1780

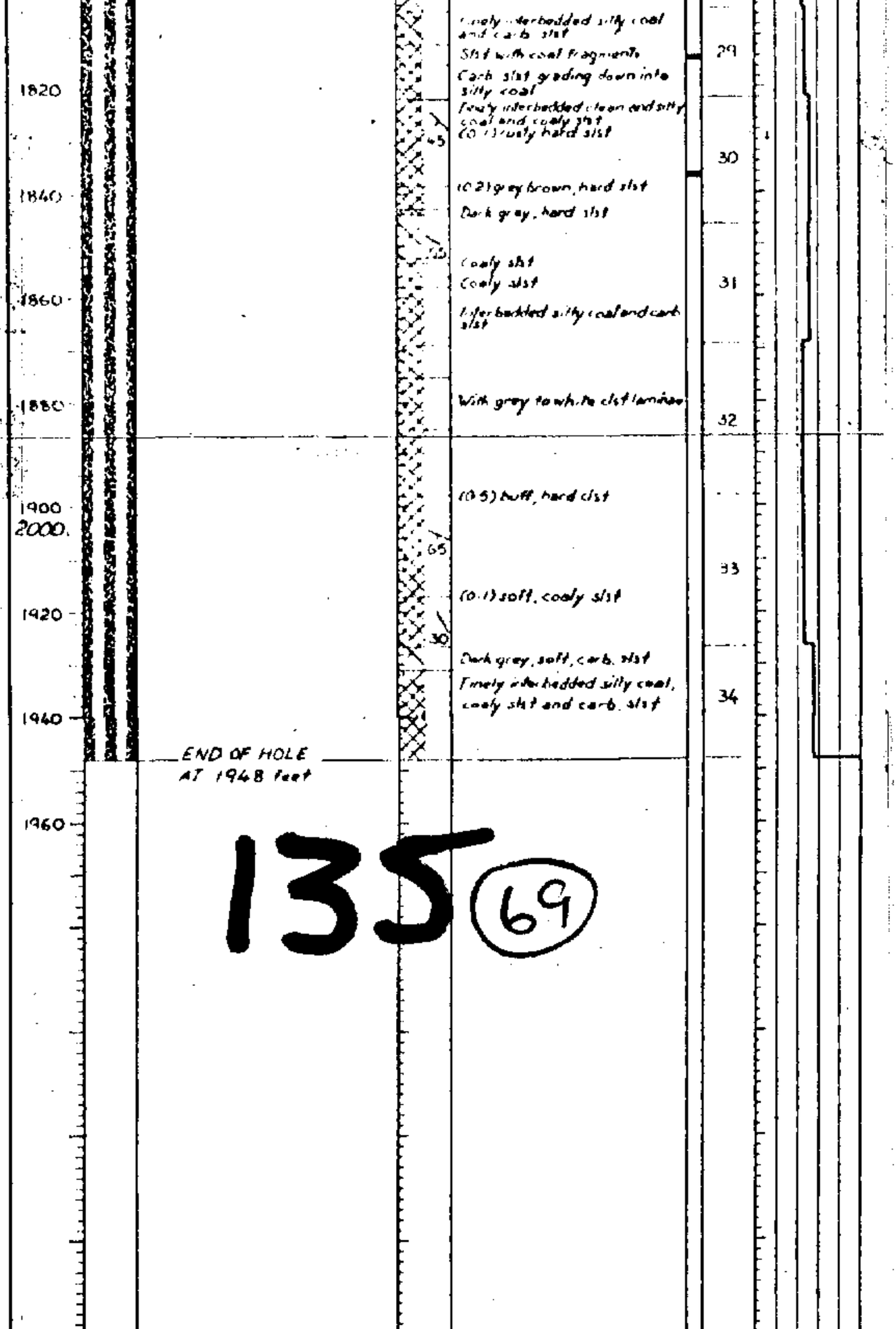
(0.1) buff, hard slst

Finely interbedded clean coal and carb. slst

28

1800

Clean


Finely interbedded silty coal and carb. slst
Slst with coal fragments
Carb. slst grading down into silty coal
Finely interbedded clean and silty coal and coaly slst
(0.1) Finely hard slst
(0.2) grey brown, hard slst
Dark grey, hard slst
Coaly slst
Coaly slst
Interbedded silty coal and carb. slst
With grey to white clst laminae
(0.5) buff, hard clst
(0.1) soft, coaly slst
Dark grey, soft, carb. slst
Finely interbedded silty coal, coaly slst and carb. slst
END OF HOLE AT 1948 feet
1820
1840
1860
1880
1900
2000.
1920
1940
1960
29
30
31
32
33
34
45
75
65
30

135 (69)

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 48,004' N, 23,590' E
Reference Elev. : 3624'
Ground Elev. : 3623'
Length : 1508'
Azimuth : —
Dip : -90°
Core Size : NQ
Hole No. : 75 - 97
Date : OCT. 1975
Logged by : J. Rotzien
Sheet : 1 of 8

ELEVATION in FEET	DEPTH in FEET	STRATIGRAPHY: STRAT PLOT	STRATIGRAPHY: MAJOR ROCK UNITS	DETAIL & STRUCTURE: SYMBOL	DETAIL & STRUCTURE: DESCRIPTION	CORE LOSS	SAMPLE NO.	ASH AT 20% MOISTURE
	0		Datum		Note Original ground elev. 3626'			
			OVERBURDEN					
3600	20		Clay					
	40		Silty with boulders					
	60		Clay					
			Sand with boulders and cobbles					
	80		Clay					
			Sand					
	100							
	120		Boulders					
			Sand with gravel					
	140		Clay with sand					
	160		Clay					
	180		Sand					
	200		Sand with cobbles					
3400	220		Sand					
			Gravel					
	240		Sand with gravel					
	260							
	280		SILTSTONE Grey brown, hard					
	300				(0.6) buff, mod. hard buff sst Lamina , buff, hard slst			
	320							
	340							
	360				(0.6) buff, soft, fine grained sst (0.1) buff, hard slst Several laminae of buff hard slst			
	380							
4000					(0.1) buff, hard slst			
	420				(0.1) buff, hard slst			
					(0.1) buff, mod. hard slst			
	440		CLEAN COAL Black, very hard, with minor beds of buff slst and coaly to carb slst		(0.2) buff, soft slst and slst (0.8) rusty, buff, hard slst (0.2) buff, hard slst		1	
	460				(0.3) black, soft coaly slst			
					(0.3) black, soft carb slst			
	480				(0.1) buff hard slst		2	
	500				(0.7) black, soft, coaly slst (0.4) black soft, coaly slst Black, hard to soft, silty coal		3	
3800					Black, soft, coaly slst			
	520				(0.7) black, mod. hard silty coal (0.1) black, soft, coaly slst Laminations of carb beads (0.2) (0.3) black, soft coaly slst (0.3) black, soft, silty coal			
	540				(0.2) black, soft carb slst (0.7) black, mod. hard to soft, silty coal (0.1) gray, hard slst		4	
	560				(0.3) black, soft, coaly slst (0.3) dark gray brown, soft carb slst (0.1) black soft coaly slst			
					Black, hard clean coal with hard to soft coal			
	580				(0.2) (0.7) buff slst Irregular lam. of buff, hard slst			
					(0.8) black, soft coaly slst (0.2) black, soft carb slst (0.1) buff, hard slst		5	
	600				Irregular lam. of buff, hard slst Black, soft, coaly slst			
					Irregular blebs of buff very hard (0.5) black, soft coaly slst			
	620		MIXED UNIT Black to light gray, very hard to soft, clean and silty coal with inter-beds of slst and carb slst		Irregular blebs of buff gray hard slst (0.5) dark gray brown, soft to slst Black, hard coaly slst Light gray, hard slst Black, soft, silty carb slst Black, soft coaly slst Gray brown slst		6	
3000								
	640				Irregular lam. of buff, hard slst Irregular blebs of buff to gray very hard slst (0.2) coaly slst (0.8) rusty slst Laminae of coal and carb slst Black soft coaly to carb slst Silty coal		7	
	660				Black very hard, clean coal Black to gray brown interbeds of coal and carb slst (0.4) hard to soft, fine grained silty coal and carb slst		8	
					Black, hard silty coal			
	680				Black, hard silty coal, fine bedded (0.5) black, soft coaly slst Light gray, very hard, carb slst Silty coal Gray brown mud hard slst		9	
	700				Silty coal			
	720				(0.1) rusty, hard slst Silty coal Gray to gray brown, mud hard slst with coal fragments		10	
	740		CLEAN COAL Black, very hard, with small inter-beds ranging from slst to silty coal		Core of resin beads (0.4) gray, soft coaly slst, carb slst (0.6) Irregular white slst lam. in clean coal (0.3) brown, very soft carb slst (0.3) buff to gray, carb slst (0.2) gray, hard slst Core of resin beads (0.2) very brown to black carb slst Irregular lam. of buff to gray slst (0.1) very brown carb slst Silty coal		11	
	760				Core of resin beads (0.1) white, soft gypsum slst (0.1) gray, soft coaly slst, carb slst (0.3) very hard slst Core of resin beads Light gray, very hard to fine grained slst, thin buff slst beds Clean Silty coal, dark brown carb slst (0.4) coal with irregular blebs of buff to gray hard slst		12	
	780				Silty coal Soft, carb. slst (0.2) soft, coaly slst Silty coal (0.5) soft coaly slst (0.6) silty coal (0.3) soft, hard, soft slst Irregular lam. of slst Silty coal		13	
	800				(0.3) very hard slst Core of resin beads Light gray, very hard to fine grained slst thin buff slst beds Clean Silty coal (0.2) dark brown carb slst (0.3) coal with irregular blebs of buff to gray hard slst		14	
	820				Silty coal			
2800					Soft, carb. slst		15	
	840				(0.2) soft, coaly slst Silty coal (0.5) soft coaly slst (0.6) silty coal (0.3) soft, hard, soft slst Irregular lam. of slst Silty coal			
	860				Black to gray, hard to soft carb slst		16	
	880				(0.3) very soft, carb. slst White, hard slst lam. Black to gray brown carb slst Dark brown, soft, carb slst (0.1) buff, very hard slst		17	
	900				(0.6) silty coal Light gray, calc. slst with coal frag. Numerous gray hard slst lam Silty coal Black to gray brown, hard to very soft, interbedded silty coal and carb slst			
	920				(0.3) very hard calc. slst (0.1) buff, hard slst (0.1) gray brown, very carb slst (0.2) gray, hard slst Silty coal		18	
	940				Black to gray brown, very hard to soft, interbedded coal and carb slst Hard, coaly slst Light gray, very hard slst beds Lam. of buff, hard slst (0.4) carb slst			
	960				Lam. of buff, hard slst Light gray to dark gray very hard slst (0.3) buff, soft, carb slst (0.3) buff, hard slst Black to dark gray brown, soft, coaly to carb slst		19	
	980		SILTY COAL Black, hard with inter-bedded clean coal, coaly to carb slst and slst		Silty coal (0.2) brown slst with coal frag. (0.4) black to gray brown calc. slst with numerous lam. of gray brown slightly calc. slst Black, very soft, carb. slst Very hard to hard, inter-bedded with clean coal (0.3) gray hard slst (0.3) soft slst Clean coal		20	
	1000				Very hard, soft, inter-bedded clean coal and hard slst Black to gray brown, hard to soft, coaly slst with coal frag. Light gray to gray brown, soft to very soft, silty, carb slst		21	
	1020				With gray brown slst lam.		22	
2600								
	1040				Light gray to black, soft to very soft calc. slst with numerous lam. of gray brown, very hard slst (0.5) gray brown, very hard slst interbedded silty coal and carb. slst Very hard to soft, finely interbedded clean coal, silty coal, carb. slst and lam. of gray slst		23	
	1060		MIXED UNIT Black to light gray, very hard to soft, inter-bedded sequence of clean coal, silty coal, carb. to coaly slst, slt and sst		Black to light gray, very hard, silty coal, carb. slst, slt and sst Gray brown, mod hard, very fine grained sst Very hard to hard, clean and silty coal with gray brown slst lam		24	
	1080				(0.3) gray brown, very hard carb slst Silty coal with numerous carb slst Silty coal with irregular carb slst Clean coal			
	1100				Gray hard, very fine to fine grained sst (0.5) soft, coaly slst (0.5) buff, hard, slt sst Black, soft, coaly slst Very hard to very soft, silty coal and carb slst		25	
					(0.5) buff, hard, slt sst			
	1120				Black to gray to gray brown, very hard to soft, inter-bedded coal and carb. to clean slst		26	
	1140				Gray brown, hard, carb slst with coaly (0.1) rusty buff hard (diffuse) lam (0.5) gray, mod. hard slst Hard to very hard inter-bedded clean and silty coal with numerous gray brown slst lam.		27	
	1160				Light gray, very hard calc. wood Hard to very hard, clean and silty coal Gray brown to black, mod. hard carb slst with small inter-beds of coal		28	
	1180				Gray to gray brown, mod. hard, inter-bedded (0.2) and slst with coal fragments Clean coal		29	
	1200				(0.2) light gray, very hard, calc. wood (0.2) gray brown, hard slst Gray to gray brown, hard to soft, silty, carb slst Silty coal			
	1220				Clean coal with large core of resin beads Silty coal Clean coal		30	
2400					Silty coal Coaly slst with inter-beds of clean coal Black, hard to soft silty coal with numerous carb slst			
	1240				Clean coal (0.2) grey brown, hard slst		31	
					(0.2) black, mod. hard, coaly slst Black to brown, soft coaly and carb slst			
	1260				Gray brown, hard, slightly carb slst Very hard, slst with coaly and coaly lam (0.2) buff, gray to white lam. (0.5) gray brown hard slst		32	
					(0.3) light gray, hard irregular slst lam (0.5) black, brown, soft carb slst (0.3) black, soft carb slst			
	1280				Black to dark brown, carb slst Silty coal with numerous inter-beds and lam. of gray brown slst		33	
	1300				Gray to gray brown, hard to very hard slst with coaly fragments and lam., and lam. fine grained sst		34	
	1320				Clean coal Black to gray brown, very hard to hard, finely inter-bedded coal and slst Gray brown hard, carb slst with coaly lam and fragments Gray brown to black, hard carb slst with coal lam. and beds of clean coal		35	
	1340		CLEAN COAL Black, very hard, with small inter-beds of silty coal and numerous minor inter-beds of coaly to clean slst		(0.1) gray brown, hard slst (0.7) gray brown to black, hard to soft carb slst Gray brown to black, mod hard, carb slst Dark brown soft carb. slst		36	
	1360				(0.6) dark brown, soft carb slst Gray brown, carb slst with coaly lam (0.2) black hard coaly slst Gray brown, hard slst laminae			
	1380				(0.1) gray, hard, calc. slst (0.3) (0.1) black, soft carb slst		37	
	1400				Irregular gray brown, hard slst lam Black, very soft, carb. slst			
					Black, very soft, carb slst (0.2) irregular buff, hard slst (0.3) irregular buff, hard slst (0.8) irregular buff, hard slst Irregular, buff, hard slst		38	
	1420							
2200					Silty coal			
	1440				(0.2) gray brown, hard slst lam			
					Black to light gray, hard, silty coal and 0.4' slst		39	
	1460				Silty coal (0.5) silty coal (0.3) gray, hard slst			
	1480				Black, hard to soft, silty coal and carb slst, with light gray slst lam			
					(0.3) gray, hard slst (0.2) black, soft, coaly slst Gray, hard slst lam. in clean coal (0.3) black, hard, coaly slst Black, hard to soft, inter-bedded coal		40	
	1500							
			END OF HOLE AT 1508 Feet					
	1520							

135 (70)

DRILL HOLE : 75 - 97

DOLMAGE CAMPBELL AND ASSOCIATES LTD.

BRITISH COLUMBIA HYDRO AND POWER AUTHORITY

HAT CREEK PROJECT — DRILL RECORD

Coordinates : 50,868' N, 22,533' E	Length : 1832'	Hole No. : 75-92	
Reference Elev. : 3528'	Azimuth : 270°	Date : SEPT. 1975	
Ground Elev. : 3526'	Dip : -55°	Logged by : J. Retzlen	
	Core Size : NQ	Sheet : 1 of 9	

ELEVATION IN FEET | DEPTH IN FEET | STRATIGRAPHY (STRAT PLOT, MAJOR ROCK UNITS) | DETAIL & STRUCTURE (SYMBOL, DESCRIPTION) | CORE LOSS | SAMPLE No. | ASH AT 20% MOISTURE

Datum

OVERBURDEN (0–100 ft)
Gravel and clay
Clay
Gravel
Gravel with boulders
Clay
Gravel with boulders
Clay

Note: Original ground elev 3526'

MIXED UNIT (100–330 ft)
Black to grey, very soft to very hard, interbedded clst, carb. to coaly clst and clean and silty coal.

Tricone
Dark grey, very soft clst
Black, very soft coaly clst
Dark grey, very soft carb. clst
Black, very soft, coaly clst
Black, very hard, clean coal
Black, very soft, carb. clst, with minor clean coal
Brown to black, soft, carb. to coaly slst with minor clean coal
Black, hard to very hard, finely interbedded clean and silty coal
Black, very hard, clean coal with minor silty coal and resin beads
Light grey to grey brown, soft slst with minor carb. content

COAL (330–405 ft)
Black, very hard to soft, interbedded clean and silty coal with coaly slst

Clean
Hard to soft coaly slst
Very hard to soft, finely interbedded clean coal and coaly slst
Clean
Finely interbedded clean coal and carb. slst

MIXED UNIT (405–500 ft)
Light grey to black, very soft to very hard, interbedded slst, carb. to coaly slst and clean and silty coal

Hard to very hard, interbedded clean and silty coal with minor coaly slst
Triconed. No core: driller says coal
Hard silty coal
Grey brown, very soft, carb. slst

CLEAN COAL (500–775 ft)
Black, very hard, clean coal with interbeds of carb. slst and slst and silty coal. Resin beads up to ¼" are present but sparse.

Coal with resin beads
Grey brown to black, med. hard to soft, slightly carb. slst
Silty coal with minor clean coal
Grey brown to black, carb. slst
Silty coal
(0.7) black, hard, coaly slst
Silty coal
Carb. slst with 0.3 of clean coal
Grey to black, soft carb. slst with minor clean coal
Black to grey brown, soft carb. slst
Hard to soft silty coal grading down to carb. slst
With minor carb. slst and silty coal

SILTSTONE (775–810 ft)
Grey to grey brown, soft slst. Fragments of hard slst encased within the softer material. Only traces of fine carb. fragments are evident.

CLEAN COAL (810–1065 ft)
Black, very hard, clean coal with interbeds of silty coal and minor beds of carb. slst. Resin beads up to ⅛" in diameter are scattered throughout this unit.

Black to dark grey, hard carb. slst
Hard silty coal
(0.2) soft carb. slst
Dark grey, med. hard coaly slst
With minor buff slst laminae
(0.1) grey hard slst
Irregular laminae of buff slst
Conc. of resin beads
Irregular laminae of buff slst
Grey brown, soft carb. slst
Silty coal
Silty coal

COAL (1065–1120 ft)
Black, very hard to soft, interbedded clean and silty coal with carb. to coaly slst

CLEAN COAL (1120–1375 ft)
Black, very hard, clean coal with minor silty coal and carb. slst. Resin beads up to 1" in diameter are scattered throughout.

Clean
Silty
Grey, med. hard carb. slst
(0.3) soft grey hard slst
Silty
(0.1) buff hard slst
(0.3) silty coal
Conc. resin beads
Buff hard slst lam. in clean coal
(0.4) soft, coaly slst
Black to grey brown, hard coaly slst
Silty
Black to dark grey, hard coaly slst
Black to dark grey, hard to soft coaly slst with clean coal
(0.2) grey hard slst
Black, hard to soft, silty coal
(0.3) grey very hard calc. wood

MIXED UNIT (1375–1705 ft)
Black to light grey brown, hard to very hard, interbedded gradations from slst to fine grained sst to clean coal. The contacts between the beds are gradational. 80% of the fractures are due to drill action.

Grey to black, hard carb. slst
Light grey brown, very hard sst with coaly fragments
Light grey, very hard slst
Silty
Grey, very hard, very fine to fine grained sst with coal fragments and laminae
Black, hard to soft interbedded clean coal and carb. slst
Silty
Hard to very hard interbedded clean and silty coal
Grey brown to light grey, very hard, very fine to coarse grained sst with varying carbonate content and coal fragments and laminae
Hard, silty coal
Black to grey, hard, coaly slst
Grey to black, hard, sandy slst with coal fragments
Grey to grey brown, hard fine to medium grained sst with coal fragments

SANDSTONE (1705–1832 ft)
Grey, hard, very fine to coarse grained sst with carb. and coaly laminae

Light grey green, hard to med. hard, very fine to coarse grained, bedded sst with sparse coal fragments and laminae
Light grey, very hard, slightly calc. grit to pebble congl. with coal fragments
Grey, hard to soft, very fine grained sst with minor silty beds and with coal fragments

END OF HOLE AT 1832 feet

Samples No. 1–54

135 (71)

DIAMOND DRILL HOLE 75-101

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS						ESTIMATED IN SITU MOISTURE OF 20.00%						
			% EQUIL	% AS REC'VD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	875.5	32																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	645.5	10																
SODA & POTASH TESTS:		5																
MAXIMUM				30.82	33.09	34.96	37.46	8207	0.78	0.381	0.627	66.47	27.97	29.97	6046	0.62	0.305	0.502
MINIMUM				11.90	28.67	13.18	3.73	0	0.16	0.203	0.283	22.94	10.54	2.99	0	0.13	0.163	0.226
RANGE				18.92	4.42	21.78	33.73	8207	0.62	0.178	0.344	43.53	17.43	26.98	6046	0.49	0.142	0.276
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		32		19.37	25.29	24.53	20.19	4526	0.45			44.23	19.62	16.15	3621	0.36		
ARITHMETIC MEAN (SERIES 1-199)		32		19.54	25.76	24.33	19.69	4446	0.46	0.307	0.458	44.62	19.46	15.91	3556	0.36	0.246	0.367
STANDARD DEVIATION				4.65	1.90	6.36	9.73	2365	0.16	0.072	0.126	12.72	5.10	7.78	1908	0.13	0.058	0.101
COEFF. OF VARIATION %				20.75	28.50	26.22	48.89	53.64	35.08			28.50	26.23	48.91	53.65	35.46		

REGRESSION EQUATIONS (DRY BASIS): Y = + 84.47 − 0.00854X WHERE Y = PERCENTAGE OF ASH,
X = +12910.25 −152.82Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = −0.9829

<<> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 15 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-090

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS						ESTIMATED IN SITU MOISTURE OF 20.00%						
			% EQUIL	% AS RECVD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	436.5	17																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	1069.5	4																
SODA & POTASH TESTS:		3																
MAXIMUM				25.32	69.27	37.48	46.20	10644	1.59	0.589	0.665	55.42	29.98	36.96	8516	1.27	0.471	0.532
MINIMUM				14.79	16.32	20.09	10.64	2630	0.30	0.317	0.135	13.06	16.07	8.52	2104	0.24	0.254	0.108
RANGE				10.53	52.95	17.39	35.56	8014	1.29	0.272	0.530	42.36	13.91	28.44	6412	1.03	0.217	0.424
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		17		21.48	39.99	30.63	29.38	6887	0.66			31.99	24.50	23.50	5510	0.53		
ARITHMETIC MEAN (SERIES 1-199)		17		20.83	43.79	29.32	26.89	6327	0.68	0.426	0.339	35.03	23.45	21.51	5062	0.54	0.341	0.271
STANDARD DEVIATION				2.84	12.87	4.59	8.85	1945	0.32	0.144	0.286	10.30	3.67	7.06	1556	0.25	0.115	0.228
COEFF. OF VARIATION %				13.63	29.39	15.65	32.83	30.74	46.96			29.40	15.66	32.83	30.74	47.01		

REGRESSION EQUATIONS (DRY BASIS): Y = + 81.23 - 0.00601X WHERE Y = PERCENTAGE OF ASH,
X = +13498.97 -166.17Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9816

<><> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES,
ONLY THE 14 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

HAT CREEK COAL PROJECT — STATISTICAL ANALYSIS OF PROXIMATE TEST DATA
DIAMOND DRILL HOLE 75-092

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS						ESTIMATED IN SITU MOISTURE OF 20.00%						
			% EQUIL	% AS RECVD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	1323.5	52																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	506.5	15																
SODA & POTASH TESTS:		7																
MAXIMUM				33.64	73.79	37.05	37.62	8582	1.46	0.664	0.614	59.03	29.64	30.15	6867	1.16	0.531	0.492
MINIMUM				12.10	27.48	18.21	5.46	1722	0.22	0.149	0.166	21.98	14.57	4.39	1378	0.18	0.119	0.149
RANGE				21.54	46.31	18.84	32.20	6861	1.24	0.515	0.428	37.05	15.07	25.76	5489	0.98	0.412	0.343
WEIGHTED MEAN (EXCLUDING SERIES 301-399)	52			20.63	47.34	28.80	24.66	5640	0.66			37.87	22.88	19.24	4516	0.53		
ARITHMETIC MEAN (SERIES 1-199)	52			20.11	49.90	27.67	22.38	5680	0.69	0.325	0.343	39.90	22.13	17.90	4224	0.51	0.260	0.275
STANDARD DEVIATION				4.54	12.51	4.89	8.59	1870	0.22	0.168	0.149	10.01	3.91	6.87	1496	0.18	0.135	0.119
COEFF. OF VARIATION %				22.59	25.06	17.68	38.39	35.42	34.80			25.04	17.68	38.41	35.41	35.25		

REGRESSION EQUATIONS (DRY BASIS): Y = + 76.27 - 0.00560X WHERE Y = PERCENTAGE OF ASH,
X = +13609.31 -176.42Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9526

<> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 52 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-093

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS							ESTIMATED IN SITU MOISTURE OF 20.00%						
			% EQUIL	% AS RECVD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	357.0	11																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	124.0	3																
SODA & POTASH TESTS:		2																
MAXIMUM				26.28	63.06	42.52	42.65	10053	1.08	0.082	0.101	50.45	34.01	34.12	8042	0.87	0.066	0.081
MINIMUM				19.75	15.99	22.12	14.81	2685	0.46	0.032	0.043	12.79	17.70	11.85	2148	0.37	0.025	0.034
RANGE				6.53	47.07	20.40	27.84	7368	0.62	0.050	0.058	37.66	16.31	22.27	5894	0.50	0.041	0.047
WEIGHTED MEAN (EXCLUDING SERIES 201-299)		11		23.62	23.15	38.30	38.57	9059	0.61			18.50	30.64	30.86	7248	0.49		
ARITHMETIC MEAN (SERIES 1-199)		11		23.48	26.61	36.90	36.49	8520	0.63	0.057	0.072	21.29	29.51	29.19	6816	0.50	0.046	0.056
STANDARD DEVIATION				2.30	13.35	5.43	7.96	2113	0.17	0.035	0.041	10.66	4.35	6.37	1690	0.13	0.029	0.033
COEFF. OF VARIATION %				9.81	50.09	14.72	21.82	24.80	26.39			50.10	14.73	21.82	24.80	27.02		

REGRESSION EQUATIONS (DRY BASIS): Y = + 82.66 - 0.00655X WHERE Y = PERCENTAGE OF ASH.
X = +12605.88 -152.49Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9897

<><> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 10 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED. (55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-095

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES % EQUIL	MOISTURES % AS RECVD	DRY BASIS % ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	ESTIMATED IN SITU MOISTURE OF 20.00% % ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	1234.0	49																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	271.0	5																
SODA & POTASH TESTS:		7																
MAXIMUM				27.16	70.55	38.16	43.02	9740	1.79	0.256	0.413	56.44	30.53	34.42	7792	1.44	0.204	0.330
MINIMUM				11.14	20.29	18.76	6.76	1825	0.29	0.027	0.039	16.23	15.01	5.41	1460	0.23	0.022	0.032
RANGE				16.02	50.26	19.40	36.26	7915	1.50	0.229	0.374	40.21	15.52	29.01	6332	1.21	0.182	0.298
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		49		19.16	38.18	31.48	30.33	7044	0.70			30.55	25.18	24.27	5634	0.56		
ARITHMETIC MEAN (SERIES 1-199)		49		18.92	40.07	30.73	29.20	6757	0.72	0.117	0.132	32.05	24.58	23.36	5406	0.57	0.093	0.105
STANDARD DEVIATION				3.62	12.15	4.87	8.05	1890	0.27	0.082	0.134	9.72	3.89	6.44	1512	0.22	0.065	0.107
COEFF. OF VARIATION %				19.12	30.33	15.84	27.55	27.97	38.00			30.34	15.84	27.56	27.97	38.29		

REGRESSION EQUATIONS (DRY BASIS): Y = + 66.67 - 0.00684X WHERE Y = PERCENTAGE OF ASH,
X = +12604.46 -146.11Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9918

<<>> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 42 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED. (55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-097

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES % EQUIL	MOISTURES % AS RECVD	DRY BASIS % ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	ESTIMATED IN SITU MOISTURE OF 20.00% % ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	986.5	59																
SERIES 201-299 :	0.0	0																
SERIES 301-399 :	526.5	10																
SODA & POTASH TESTS:		6																
MAXIMUM				26.92	74.42	36.70	41.24	9299	0.78	0.692	0.744	59.54	29.36	32.99	7440	0.62	0.554	0.595
MINIMUM				10.30	22.06	17.02	8.55	1480	0.26	0.183	0.215	17.65	13.62	6.84	1584	0.21	0.146	0.172
RANGE				16.62	52.36	19.68	32.69	7819	0.52	0.509	0.529	41.89	15.74	26.15	5856	0.42	0.408	0.423
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		59		19.54	44.72	28.76	26.51	6144	0.51			35.78	23.01	21.21	4915	0.41		
ARITHMETIC MEAN (SERIES 1-199)		59		19.22	47.53	27.74	24.88	5768	0.51	0.433	0.571	37.90	22.19	19.90	4615	0.41	0.346	0.457
STANDARD DEVIATION				4.34	14.17	5.41	8.92	2013	0.12	0.197	0.206	11.34	4.32	7.14	1610	0.10	0.158	0.165
COEFF. OF VARIATION %				22.59	29.91	19.49	35.85	34.89	23.78			29.92	19.49	35.86	34.89	24.69		

REGRESSION EQUATIONS (DRY BASIS): Y = + 67.30 - 0.00695X WHERE Y = PERCENTAGE OF ASH.
X = +12585.91 -144.15Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9677

<<< NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 25 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

DIAMOND DRILL HOLE 75-100

SAMPLE TYPE	TOTAL LENGTH	COUNT	MOISTURES		DRY BASIS						ESTIMATED IN SITU MOISTURE OF 20.00%						
			% EQUIL	% AS RECVD	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS	% ASH	% V.M.	% F.C.	GROSS BTU /LB.	% SULFR	% SODA	% POTAS
SERIES 1-199 :	521.5	14																
SERIES 201-249 :	0.0	0																
SERIES 301-399 :	984.5	2																
SODA & POTASH TESTS:		0																
MAXIMUM				27.40	56.38	42.65	43.43	10275	0.85			69.11	34.10	34.74	8220	0.68		
MINIMUM				21.00	14.86	13.22	0.40	961	0.22			11.89	10.57	0.32	769	0.17		
RANGE				6.40	71.52	29.41	43.03	9314	0.63			57.22	23.53	34.42	7451	0.51		
WEIGHTED MEAN (EXCLUDING SERIES 301-399)		14		25.02	55.21	33.64	31.15	7496	0.56			28.17	26.91	24.92	5996	0.45		
ARITHMETIC MEAN (SERIES 1-199)		14		24.87	37.34	32.83	29.83	7217	0.55			29.87	26.26	23.86	5773	0.44		
STANDARD DEVIATION				1.75	21.45	8.33	13.21	2830	0.18			17.14	6.67	10.57	2264	0.14		
COEFF. OF VARIATION %				7.03	57.39	25.36	44.27	39.22	32.36			57.40	25.39	44.28	39.22	33.10		

REGRESSION EQUATIONS (DRY BASIS): Y = + 87.90 - 0.0070BX WHERE Y = PERCENTAGE OF ASH,
X = +12403.65 -141.11Y X = GROSS BTU PER POUND.

LINEAR CORRELATION COEFFICIENT = -0.9983

<<> NOTE: IN DERIVING THE ABOVE REGRESSION EQUATIONS FROM THE 1-199 SERIES SAMPLES, ONLY THE 12 SAMPLES CONTAINING ASH VALUES < 55.00% HAVE BEEN USED.
(55.00% DRY ASH = 44.00% ASH AT 20.00% MOISTURE)

OUTLINE OF COAL LICENCES

GROUP Nº 22 (Red)
Ten Licences
5708 Acres

GROUP Nº 21 (Orange)
Nine Licences
5418 Acres

GROUP Nº 23 (Yellow)
Nine Licences
5441 Acres

GROUP Nº. 24 (Brown)
Eight Licences
3198 Acres.

ALL GROUPS
36 Licences
19,765 Acres

W. BOUNDARY FAULT
ALEECE FAULT
MAG FAULT
WEST BOUNDARY FAULT
E. BOUNDARY FAULT
Medicine Creek Fault

2757 2756 2755 2758 C.G.S. 83912E 2760 144 2754 2759 12 2761 2762 2753 3013 3012 3004 3010 3011 3003 3009 3002 3655 3008 3001 3007 3000 2999 3006 2997 2998 3005 2996 2995 2993 2994 2992 2991

LEGEND

Late Tertiary (Miocene)

Volcanics undifferentiated

Early Tertiary (Eocene)

Mostly covered : Coldwater Fm. (siltstone, sandstone, coal) subcrop known in many locations by drilling; a few outcrops along creek beds etc.

Cretaceous

Spences Bridge Group : andesite, dacite, basalt

Mount Lytton Batholith : granodiorite, diorite

PERMIAN

Cache Creek Group

Marble Canyon Fm. : limestone

Greenstone suite : (altered volcanics, chert, phyllite etc.)

135 (1)

75(1)I

B. C. HYDRO & POWER AUTHORITY

DOLMAGE CAMPBELL & ASSOCIATES LTD

GEOLOGICAL COMPILATION
UPPER HAT CREEK VALLEY

FIG. 3

FIG. 4

GEOLOGY AND DRILL HOLE LOCATIONS

B. C. HYDRO & POWER AUTHORITY

DOLMAGE CAMPBELL & ASSOCIATES LTD.

SCALE : - 1 INCH TO 2000 FEET

CONTOUR INTERVAL 50 FEET
(UP TO 4500 FEET)
100 FT INTERVAL ABOVE 4500 FT

M.S.L. DATUM

COMPILATION NOTE

This map was compiled by MCELHANNEY SURVEYING & ENGINEERING LTD. from aerial photography taken May 13, 1975 at an approximate scale of 1 inch to 2000 feet.

CONTROL NOTE

Mapping is based on ground control surveys established to 3rd order accuracy.

Coordinate origin is based on the prior D.C.A. drill hole survey with addition of 70,000 feet to Northings and 10,000 feet to Eastings.

Grid bearing is astronomic north through station 6259. Horizontal distances are reduced to 3,000 foot elevation datum Elevation datum is geodetic, established from Geodetic Branch Mark 5837 at Cariboo.

P/C

(2) 135 ~~138~~ ~~Refile~~

LEGEND

Spot Elevation - 9275 Lake

Main Road Creeks

Secondary Road Swamp

Tracks or Trail Ditch

Buildings Contours 3100

Fence Depression Contour

Dams Trees

Outcrop areas (defined, approximate)

Outcrop data supplied by Dr. N Church, B.C. Dept of Mines

Strike and dip of bedding (inclined , vertical)

Foliation (inclined, vertical)

Planar structure, parting etc. associated with volcanic flow structure (inclined , vertical)

Joint sets (inclined, vertical)

75-89 Diamond drill holes pertinent to assessment report

LEGEND

LATE TERTIARY

Prob. Miocene : andesite, dacite, basalt, in flows and breccias ; comprises at least 5 phases ; prob. equivalent of Kamloops Group.

rhyolite, rhyolitic tuff ;

EARLY TERTIARY

Eocene : Coldwater Formation : coal, siltstone, sandstone, conglomerate.

CRETACEOUS

Spences Bridge Group : andesite, dacite, basalt.

Mount Lytton Batholith : granodiorite, diorite.

PERMIAN

Cache Creek Group :

Marble Canyon Formation : limestone

Greenstone suite (altered volcanics, chert, phyllite etc.)

E. BOUNDARY FAULT

W. BOUNDARY FAULT

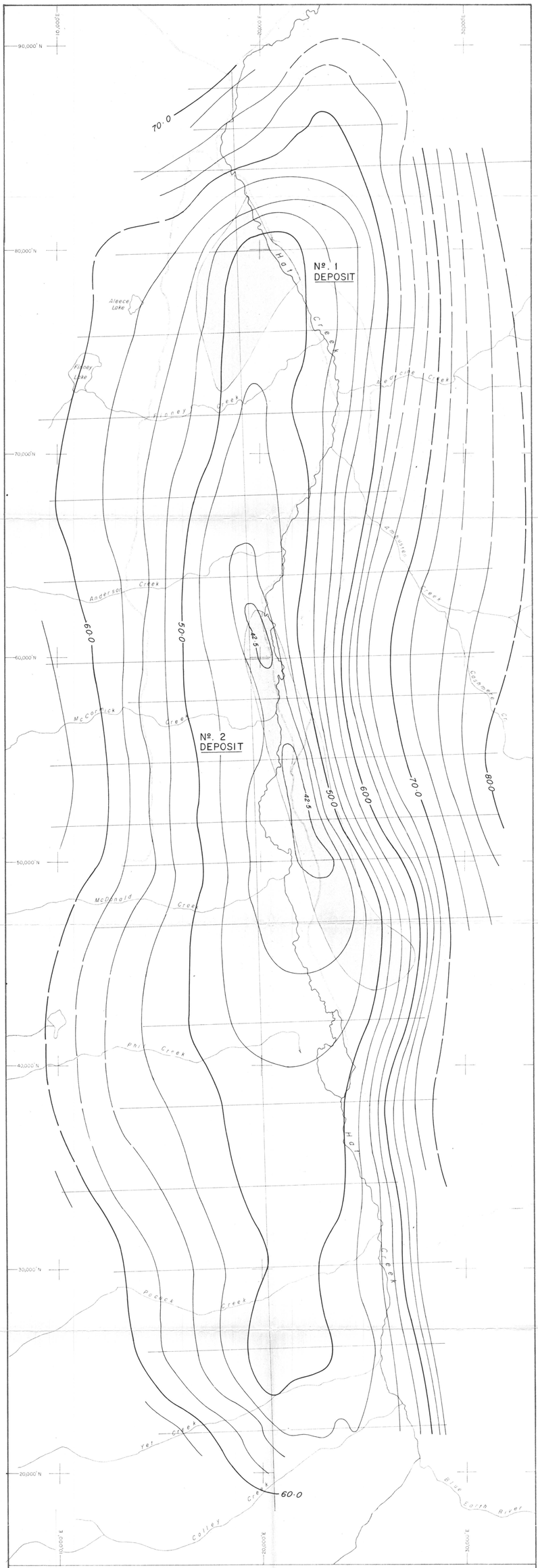
MAG FAULT

MEDICINE FAULT

ALEEGE FAULT

BOUNDARY FAULT

CREEK


10,000 E
20000 E
30,000 E
90,000 N
80,000 N
70,000 N
60,000 N
50,000 N
40,000 N
30,000 N
20,000 N
70.0
60.0
50.0
42.5
№. 1
DEPOSIT
№. 2
DEPOSIT
Hat Creek
Aleece Lake
Fishey Lake
Fishey Creek
Anderson Creek
McCorkick Creek
McDonald Creek
Phil Creek
Pocock Creek
Coldwater Creek
Cornwall Creek
Buck Creek
Clear Creek
Medicine Creek
Blue Earth River
Coley Creek
2000 0 2000 4000 FEET
UNCORRECTED FOR TERRAIN
CONTOUR INTERVAL - 2.5 mgal.
135 (3)
DOLMAGE CAMPBELL & ASSOCIATES LTD. CONSULTANTS
VANCOUVER, CANADA
B.C. HYDRO & POWER AUTHORITY
VANCOUVER, CANADA
HAT CREEK COAL PROJECT
GRAVITY SURVEY
SCALE - 1" = 2000'
MAY 1976
FIG. 5