

CARBON CREEK COAL BASINREPORT OF EXPLORATION ACTIVITIES1973 FIELD SEASON**CONFIDENTIAL**

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NTS { 93-0-15 }
 { 94-B-2 } MAPS.

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C.L. NOS. 1736-1790 INCL.

COAL LEASE NOS. 319-328 INCL.

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ABSTRACT

During the summer of 1973, Utah Mines Ltd., a wholly owned subsidiary of Utah International Inc., conducted a coal exploration program in the Carbon Creek Coal Basin of north-eastern British Columbia. Exploration efforts for this third year of operations were concentrated in the northern and central areas on coal licence nos. 1736 to 1767 inclusive, and coal lease nos. 319 to 328 inclusive, an area of 42 square miles. A voluntary reclamation program was carried out over the disturbed areas within the entire 65 square miles of the property, 55 square miles of coal licence nos. 1736 to 1790 inclusive, and ten coal lease nos. 319 to 328 inclusive, held by P. Burns Foundation Ltd., under option to Utah Mines Ltd.

The main objective of the 1973 exploration program was to test the lateral continuity and character of seams 14, 15 and 31, which were estimated to contain, prior to the results of this year's program, approximately 50 per cent of the in-place coal reserves having the best overall coking properties in the Carbon Creek block.

On 15th May, 1973, mobilization commenced by barging camp facilities, road building equipment and supplies from Dunlevy Landing (a docking area on Williston Reservoir, approximately ten miles west of W.A.C. Bennet Dam) to Carbon Creek. Final mobilization of drill equipment was completed on 27th May, 1973, following completion of the preceeding Dunlevy project. (See "Dunlevy Project, Report of Exploration Activities, 1973 Field Season") All over-water operations were contracted to Findlay Navigation of MacKenzie, British Columbia.

Camp facilities were completed using the site for the 1971 and 1972 programs, an area one-half mile north of Seven Mile Creek, on the west side of Carbon Creek. Road construction

for the 1973 program had already begun with equipment brought over on the first trip during the Dunlevy project.

Upon returning to the Carbon Creek area, all access roads were found to be in excellent condition. Bridges and abutments needed no repairs. During 1973, an additional four and three-quarter miles of access roads were constructed. Road construction, drillsite preparation, and reclamation work was contracted to Peter and Paul Demeulemeester Ltd. of Chetwynd, British Columbia. Slashing, burning and burying debris in accordance with Forest Service requirements was carried out during the road building program.

Drilling operations (Canadian Longyear, drilling contractor) commenced on 29th May, 1973, and were completed 5th September, 1973. Eleven HQ (2 1/2") diamond drill core holes were completed for a total drilled footage of 6,642 feet. In addition, bulk samples were obtained from three principal coal seams by drilling five 6" diameter core holes for a total footage of 846 feet. All coal core samples, 1.0 foot and greater, were field tested for their free-swelling properties and then forwarded to laboratories for additional controlled analysis. All rock cored was studied and lithologically described. In addition, each drill hole, when hole conditions permitted, was probed using a geophysical instrument which recorded a gamma-ray curve and resistivity curve of the stratigraphic section.

From 1st to 25th July, 1973, drilling operations on Carbon Creek were interrupted while the drill equipment was used to complete the 1973 East Mount Gething and Adams projects. (See respective reports, "Report of Exploration Activities, 1973 Field Season") During this interval, a B-1 helicopter was retained on a full-time basis to provide access to these areas from the Carbon Creek base camp as well as support for a reconnaissance geological mapping program in the area.

Approximately thirty miles of geologic traverses were completed on various tributaries of Carbon Creek.

Utah's exploratory drilling in the Carbon Creek Coal Basin has tested approximately 2,800 feet of the coal-bearing Lower Cretaceous Gething Formation. Results continued to confirm, as originally anticipated from all previous drilling in the Carbon Creek area, that the principal coal beds remain to be lenticular over relatively short distances, continue to split in places and change in quality between drill holes.

Structurally, the Carbon Creek Coal Basin is a broad, synclinal feature located in the Inner Foothills of the Rocky Mountains. The Foothills Belt is generally characterized by complex folds and major west-dipping thrust faults. Relatively simple structural conditions are recognized in the Carbon Creek area, as compared to the more complex structures within this deformed belt.

Utah's program to monitor the environment of the Carbon Creek area was continued in 1973 by B.C. Research. These ecological studies of the flora, fauna and physical parameters will be utilized as a base guide to minimize environmental disturbance in the event of a future coal mine development. In addition, a voluntary reclamation project was initiated by Utah Mines Ltd. All previously slashed areas, drillsites, and road-sides were graded and seeded and approved by the British Columbia Forest Service. To control unnecessary erosion, due to road construction, water diversion ditches and cross trenches were constructed on excessively steep road grades.

INTRODUCTION

This report provides supplementary geological data to exploratory programs conducted by Utah Mines Ltd. in 1971 and 1972 on 55 square miles of coal licences nos. 1736 to 1790 inclusive, and 10 coal lease nos. 319 to 328 inclusive, held by

P. Burns Foundation Ltd., under option to Utah Mines Ltd.

Early in 1971, Utah International Inc., parent company of Utah Mines Ltd., negotiated with Trend Exploration Ltd., a Colorado corporation, the transfer of 143 coal licences covering 89,753 acres in northeastern British Columbia. Contiguous with 55 coal licences in the Carbon Creek area are ten alienated coal leases, totaling 6,400 acres acquired through negotiation with the Burns Foundation Ltd. of Calgary.

An initial exploration program in 1971 indicated favorable results for a continued exploration effort. By the end of the 1972 field season, twenty-three HQ (2 1/2") diamond drill core holes, totalling 16,048 feet and 34 miles of access roads had been completed.

The 1973 exploration program was planned to test the lateral continuity and character of seams 14, 15 and 31. Eleven core holes, totalling 6,642 feet were drilled, supported by an additional 4 3/4 miles of constructed access roads.

PROPERTY

The Carbon Creek property, one of four licenced areas, (Figure 1) comprising a total of 89,753 acres, was acquired through a negotiation agreement with Trend Exploration Ltd., a Colorado corporation. This licenced area, (Plate 1) is comprised of a total of 65 square miles of coal licences nos. 1736 to 1790, inclusive, and ten alienated coal leases nos. 319 to 328, inclusive, held by P. Burns Foundation Ltd. of Calgary and under option agreement to Utah Mines Ltd.

Details as to the ownership agreements and interest concerning the coal properties are not contained in this report. Utah Mines Ltd. is sole operator of the property at this time and has available all legal documents pertaining to working agreements.

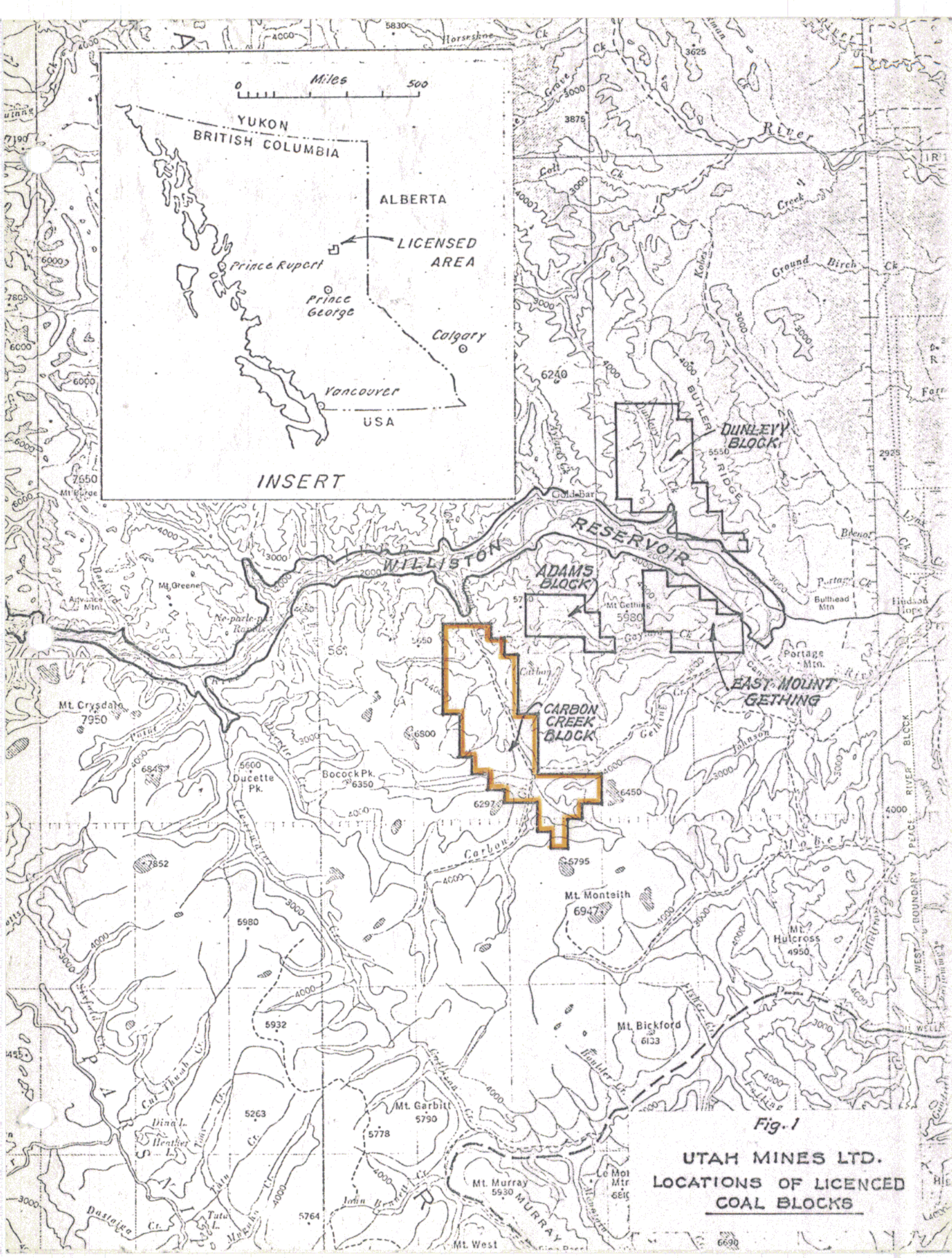


Fig. 1

UTAH MINES LTD.
LOCATIONS OF LICENCED
COAL BLOCKS



PHOTO 1: Mobilization of equipment by tug and barge into Carbon Creek.

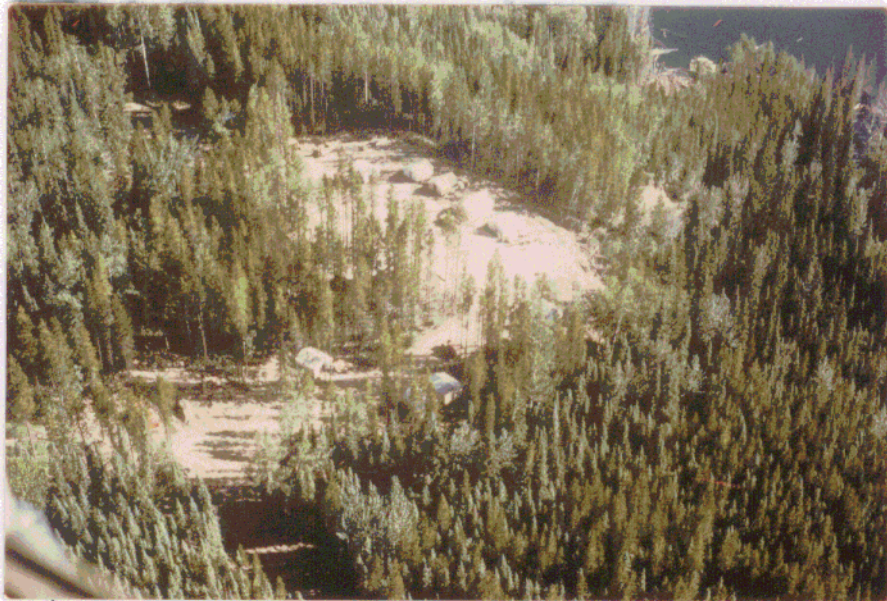


PHOTO 2: Aerial view of the campsite located one-half mile north of Seven Mile Creek on the west side of Carbon Creek. The crew boat and dock can be seen at the upper right hand corner.

LOCATION AND ACCESS

The Carbon Creek property is located about 20 miles west of the W.A.C. Bennett Dam, and approximately 25 miles north of the John Hart Highway, which connects Prince George and Dawson Creek. Chetwynd is approximately 45 miles to the southeast and Mackenzie is 40 miles to the southwest. No public or private access roads exist allowing vehicular access into the Carbon Creek area.

The Carbon Creek embayment of the Williston Reservoir extends five miles southward from the main part of the lake providing access to the northern end of the property. From Dunlevy Landing (a docking site approximately ten miles west of the W.A.C. Bennett Dam) to Carbon Creek, an overwater distance of 25 miles, adequate water depth permits large boats and barges easy access into the area.

Access via chartered float plane or helicopter is available from Mackenzie or Fort St. John.

ECOLOGICAL STUDIES

B.C. Research, an independent group supported by the British Columbia Research Council, continued an ecological survey, designed to monitor the existing environment of the Carbon Creek area. The survey commenced during Utah's 1971 exploration program and continued during the 1972 program. The survey includes studies of wildlife, fish, vegetation, water quality, with stream bed and soil sampling. Float trips down Carbon Creek, helicopter-supported field trips, road and off-road traverses were conducted by a two-man team for one week during July, 1973. This survey was performed to provide a base guideline in which subsequent environmental changes due to exploration activities or mine development may be compared.

RECLAMATION

During the 1973 exploration program, Utah Mines Ltd. initiated a reclamation program on the Carbon Creek project. Measures were taken, with the approval of the British Columbia Forest Service, to minimize disturbance to the area due to road and drillsite construction and to protect and ensure proper drainage, minimizing siltation of stream beds. Excessive grades were avoided during road construction, but where necessary, cross ditches for erosion control were added. All timber felled for road construction, including leaning trees, were slashed and bucked and met the approval of the British Columbia Forest regulations.

Prior to the conclusion of the exploration season, road shoulders, drillsites and campsites which were cleared during 1971, 1972 and 1973 exploration programs were cleared of any debris, regraded and seeded with a seed mixture suitable for the environmental conditions of the Carbon Creek area. This seed mixture was recommended and approved by the Forest Service and consisted of the following seed:

Creeping Red Fescue	40%
Alsike Clover	40%
Timothy	20%

Excessive debris which could not be buried was burned when wet weather conditions prevailed. Burning permits, with certain restrictions, were obtained from the British Columbia Forest Service.

SUMMARY OF THE 1972 EXPLORATION RESULTS

1. Fourteen HQ (2 1/2") core holes were drilled in the Carbon Creek area totalling 9,296 feet.
2. Coal quality analyses were determined on approximately 130 coal core samples. These determinations are proximate analysis on head samples on a natural and dry basis.
3. Fourteen miles of new access road and construction of three bridges were completed in the project area.



PHOTO 3: A seeded area along the roadside between DDH 71-1 and camp. The seed mixture tended to germinate and grow better in areas of restricted sunlight, such as this. The photo was taken 2 1/2 months after seeding.



PHOTO 4: A closeup photo of Photo 3. Note the Alsike Clover at the left center and the tall Timothy at the upper right and lower center. Creeping Red Fescue makes up the remainder.



PHOTO 5: A cleared area along the main road just south of camp before seeding.



PHOTO 6: The same area after seeding and germination.

4. Geological studies of core samples, geophysical logs and outcrops were conducted.
5. Ecological studies were continued in order to monitor environmental disturbance and formulate a basic guide for any future mine development.
6. A contract prepared topographic map suitable for a detailed geologic study was completed.

The 1972 exploration work has been described in a confidential company report, "Carbon Creek Coal Basin, Summary Report, 1972 Field Season" by D.S. Fullerton.

FIELD SEASON - 1973 - LOGISTICS

MOBILIZATION: Field equipment for the program was trucked to Dunlevy Landing, 18 miles west of Hudson Hope and loaded aboard a 40 X 120 foot barge. Findlay Navigation Ltd. of Mackenzie, British Columbia, was contracted on a per trip basis to barge equipment for Utah into Carbon Creek. On 15th May, 1973, one D-7 bulldozer, a pickup truck, a 50 foot trailer, fuel tanks, miscellaneous camp materials and supplies were towed to the Carbon Creek Landing, (Photo 1). A base camp used during 1971 and 1972, located about one-half mile north of Seven Mile Creek on the west side of Carbon Creek, was reconstructed while access roads to initial drillsites were begun. A total of eight plywood and canvas aluminum frame tents (Photo 2) were built to accomodate and board all project personnel. The road construction crews lived in a trailer which was supplied by the heavy equipment contractor. A large generator provided electricity for lights and kitchen equipment, while a nearby stream provided an ample supply of water for cooking and washing purposes.

A 26 foot aluminum crewboat, owned by Finlay Navigation, equipped with an inboard V-8 gas engine and Berkley jet drive, was retained on a full time basis for providing transportation, hauling foodstuff, mail and other small items from Dunlevy Landing.

On 25th May, 1973, after completion of the Dunlevy project, a final barge load of two pickup trucks, one Unimog (Daimler-Benz diesel) truck, one D-6 bulldozer, an FN-20 Flextrac Nodwell tracked vehicle, drill equipment and related supplies were towed to Carbon Creek.

Communications were achieved using an FM radio and radio-telephone installed in the crew-boat. The FM set made communications possible with the tug when it was in the area. A 4-channel single side-band radio in camp was utilized for communication between camp, Alpine Helicopters, Northern Thunderbird Airlines of Mackenzie and between camp and British Columbia Telephone in Vancouver.

ROAD CONSTRUCTION: Peter and Paul Demeulemeester Ltd., of Chetwynd, British Columbia, were contracted to build access roads to the various drillsites. The contractor also supplied slashers with chainsaws to cut felled and leaning trees to conform with Forest Service regulations pertaining to Utah's road construction.

Roads and bridges built during the 1971 and 1972 field seasons were in good condition upon arrival with only a few mud slides and fallen trees which were quickly cleared. Any future work in the south-east areas of the licences would entail replacement of the bridge across Carbon Creek, which was removed at the end of the 1972 field season to prevent log jams, and replacement of the abutments which have been washed away during runoff after removal of the bridge.

Four and three-quarters miles of new drill access roads were constructed during 1973. An unusually dry season permitted quick and easy access into the drillsites with little maintenance required after completion. Through the more muddier sections, especially during inclement weather, and immediately following road construction, the FN-20 Flextrac Nodwell tracked vehicle proved to be an invaluable asset (Photo 9).



PHOTO 7: Slash burning along the road south-west of DDH 72-13.
Unburned debris was buried, levelled off and seeded.



PHOTO 8: Looking south along the main road into the 1973 campsite. (All felled timber has been buried) This area was seeded in mid-July and the photograph was taken four weeks later.

DRILLING: As in 1971 and 1972, Canadian Longyear Ltd. was contracted by Utah for core drilling activities on the 1973 Carbon Creek project. Eleven HQ (2 1/2") core holes totalling 6,642 feet and five 6" diameter core holes totalling 846 feet were drilled in 1973. Three year totals of 34 holes and 22,690 feet of HQ core and 5 holes and 846 feet of 6" core are as follows:

<u>1971</u>	
<u>DRILL HOLE</u>	<u>TOTAL DEPTH IN FEET</u>
71-1	824
71-2	830
71-3	887
71-4	996
71-5	657
71-6	677
71-7	617
71-8	737
71-9	<u>527</u>
	6,752
 <u>1972</u>	
72-10	547
72-11	657
72-12	627
72-13	357
72-14	836
72-15	864
72-16	767
72-17	1,001
72-18	627
72-19	527
72-20	801
72-21	491
72-22	497
72-23	<u>697</u>
	9,296

1973

<u>DRILL HOLE</u>	<u>TOTAL DEPTH IN FEET</u>
73-24	684
73-25	898
73-26	716
73-27	656
73-28	316
73-29	375
73-30	746
73-31	576
73-32*	207
73-33	702
73-34	<u>766</u>
	6,642

* Hole stopped in overburden, unable to reach bedrock.

SIX INCH DIAMETER CORE HOLES

<u>DRILL HOLE</u>	<u>TOTAL DEPTH IN FEET</u>
73-25A	62
73-26A	129
73-28A	313
73-29A	256
73-34A	<u>86</u>
	846

FIELD RECONNAISSANCE: During the Adams and East Mount Gething projects, a helicopter supported program of reconnaissance mapping was conducted. Additional stream traverses were added to the 1971 and 1972 coverage to gain more geologic control and data. Approximately thirty miles of traverses were completed. In addition, all coal exposures on roads were examined this year. Butt and face cleat attitudes, thicknesses and seam descriptions were recorded along with photographs of the more pertinent exposures.

GENERAL GEOLOGY

The Carbon Creek map area is located within the structural foothills belt of the Rocky Mountains. This belt, characterized by a series of synclines, anticlines and major west dipping thrust faults, is underlain predominantly by Mesozoic rocks. The high northwesterly trending ridges and steep-sided valleys are generally parallel with the strike of the underlying formations.

These formations, in ascending order, as defined by the Geological Survey of Canada, are present in the area: Upper Jurassic Fernie Formation; Lower Cretaceous Monteith, Beattie Peaks, Monarch, Cadomin and Gething. (Figure 2). Only the Gething Formation is known to contain coal of commercial quantities. Rocks younger than the Gething Formation occur east of the map area; rocks older than the Fernie occur west of the area. Detailed descriptions of the various formations and the lithological variations within the formations are contained in literature. For detailed description of the Gething Formation in Carbon Creek, see "Carbon Creek Coal Basin, Progress Report, 1971 Field Season".

STRUCTURE

The Carbon Creek basin, an intervening syncline embraced by two major anticlinal belts, is approximately eight miles wide with a fold axis 20 miles long, trending in a N 20°W direction. Mathews states "the eastern anticlinal belt, representing the north-westerly continuation of the "Pine River anticline", is relatively simple, but it is intersected in the Carbon Creek area by a major fault which follows the fold axis for approximately 15 miles from Mount McAllister to the Peace River. The western anticlinal belt consists of several en echelon folds in the area of the Monarch, and a single major fold between Mount Wrigley and Mount Barr.

The central synclinal belt of the Carbon Creek Basin contains

Figure 2.

List of Formations
Carbon Creek Coal Basin

*after Stott, 1968 and Matthews, 1947

Series	Group	Formation	Thickness	Lithology
Holocene	erosional surface		0-187'	Alluvium
Pleistocene				Terraced drift Glacial till
Lower Cretaceous	Bullhead Group	Grithing	3000'	Fine to coarse grained, grey, calcareous, carbonaceous sandstone, <u>coal</u> , carbonaceous shale, and conglomerates
		Cadomin	600'±	Sandstone, coarse grained to massive conglomerate, contain- ing chert and quartzite pebbles
	erosional unconformity			
	Minnes Group	"unnamed" transi- tion beds	1000'- 1500'±	Sandstone, fine grained, brown, laminated, crossbedded; <u>coal</u>
		Monach	300'-430'	Sandstone, well-sorted, fine grained
		Beattie Peaks	750'-1200'	Shales, shaly sand- stones and sandstone
		Monteith	1000'	Sandstone, fine - to coarse grained, quartzose
Upper Jurassic		Fernie		Chiefly shale, sandy near top



PHOTO 9: Flextrac-Nodwell FN-20 tracked vehicle; an invaluable asset during inclement weather and road construction.



PHOTO 10: Probing a core hole. This portable logging unit is capable of recording a Gamma-Ray, Resistivity and Self-Potential log. These geophysical logs were run on all drill holes having unobstructed hole conditions which prevent possible loss of probe-head. See Pockets 1 and 2 for logs.

infolded coal-measures of the Gething Formation. The northern part of the structure, north of Ten Mile Creek, is a simple synclinal fold plunging gently southeastward. The southern part of the basin is more complex with several subsidiary folds and flexures.

In the vicinity of Eleven Mile Creek, the basin is complicated by a high-angle, westward dipping thrust fault (here referred to as the Carbon Creek fault) trending N 10° W (See 1971 Progress Report). Westward from the Carbon Creek Fault, two eastward dipping high-angle reverse faults are present.

A central fault, though not exposed, has been interpreted from local dips, airphoto anomalies and projected drill hole control.

The southeastward extent of these faults is presently unknown. It is anticipated that their traces parallel the trend of the major fold axis of the Carbon Creek syncline and are obscured by tight folding in the southeastern part of the area.

A tightly folded zone in the coal-measures is seen from the confluence of the North and South Forks of Eleven Mile Creek eastward toward Carbon Creek. Several en echelon folds, mapped by the Burns Foundation, are recognized in this area. Northward and southward from Eleven Mile Creek, a thick veneer of glacial drift masks these folded structures.

A monoclinial fold flexure can be traced from just east of the mouth of Eleven Mile Creek southeastward to the McAllister Creek area. On the west side of this flexure, dips range from 30° SW to 70° SW, striking generally in a northwesterly direction. On the east side of the fold, dips range from 5° to 15° in a southwest to northwest direction with strikes from northwest to northeast. (Refer to Structural Cross-Sections Southeast Area, in "Carbon Creek Coal Basin, Summary Report, 1972 Field Season").

Structures in the northern and central areas are shown by 13 structural cross-sections (A-A' to M-M', rear leaf) normal to the northwest structural trend. Details may probably best be seen by studying these sections in which the structural and bedding features may be traced from line to line.

FIELD SEASON - 1973- EXPLORATION

OBJECTIVES: The 1973 exploration program was oriented toward the continuation of a systematic evaluation of the metallurgical coal potential of the Carbon Creek area. The program had the following specific objectives:

- (1) To test the lateral continuity and character of Seams 14, 15 and 31.
- (2) To obtain unweathered coal samples suitable for laboratory and washability studies.
- (3) To define relatively large blocks of coal that individually would support an operation for many years.

Two target areas in the Carbon Creek area warranted a continued effort with the above objectives in mind:

- (1) The area north of Seven Mile Creek where Beds 14 and 15 had been intercepted in core holes 71-1 and 72-14.
- (2) The area south of Seven Mile Creek and north of Nine Mile Creek where Bed 31 had been intercepted in core holes 71-3 and 71-9.

Gamma-Ray and Resistivity logs showing bed identification numbers and laboratory sample numbers for D.D.H. 73-24 to 73-34, inclusive, are located in Pockets 1 and 2, and lithologic logs for the core holes are located in Pockets 3 and 4.

TARGET AREA 1 - NORTH OF SEVEN MILE CREEK: This area lies immediately north of Seven Mile Creek, extending northward and westward to the boundary of the licenced property and

eastward to the embayment of Carbon Creek by the Williston Reservoir.

Eight HQ (2 1/2") diamond drill holes tested beds 14 and 15 in this area; numbers 73-24 to 73-29, inclusive, and 73-32 to 73-34, inclusive. Due to a lost coring bit shell in core hole 73-26, the hole was forced to stop prematurely and bed 14 was not intercepted. These eight holes, together with 71-1, 72-14 and 72-17 have tested approximately 1,600 feet of the Lower Gething Formation. Bed 31 was also intercepted, unexpectedly, at shallow depths in core holes 73-25, 73-26 and 73-34.

The coal seams encountered and the correlation of these beds in the northern part of Carbon Creek are shown on Plate 3. Structurally, the area is dominated by the west limits of the northerly trending (with gentle southerly plunge) Carbon Creek syncline. See cross-sections A-A' to G-G' (Plates 5-12).

TARGET AREA 2 - SOUTH OF ELEVEN MILE CREEK: This area lies south of Seven Mile Creek, north of Nine Mile Creek and west of Carbon Creek. The western edge of the area is the west limit of the coal licences.

Two HQ (2 1/2") diamond drill holes tested bed 31 in this area; numbers 73-30 to 73-31. A third hole, 73-32, was unable to reach bedrock due to excessive thickness of overburden. Core hole 73-30 penetrated beds 47 and 46 as well. These two holes, together with 71-3 and 71-9, have tested approximately 1,300 feet of the Gething Formation. Additional drill holes in the immediate area have penetrated the Gething section well above bed 31. These holes bring the total of tested Gething strata in the area up to 1,600 feet.

The coal seams encountered and the correlation of these beds south of Seven Mile Creek area shown on Plate 3. Structurally, the area is located on the western arm of the Carbon

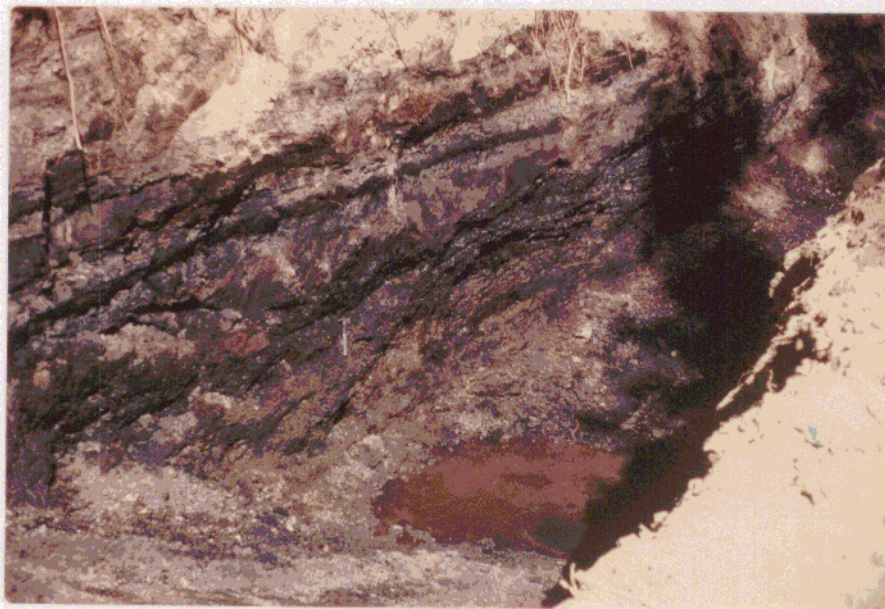


PHOTO 11: Bed 31 on the spur road to D.D.H. 73-33. The roof of the seam was cropping out after construction of the road. A bulldozer was used to expose the entire seam to the floor. Thickness at this location was measured at 6.9 feet.

Creek syncline. See Cross-Sections H-H' to M-M' in leaf.
(Plates 13-17)

COAL GEOLOGY

GENERAL: Results of the 1973 drilling continued to confirm, as originally anticipated from all previous drilling in Carbon Creek, that the principal coal beds remain to be irregular in thickness, exhibiting a lenticular character over relatively short distances. The seams are often interbedded or split with carbonaceous shale, siltstone or sandstone. The roof material immediately overlying the beds consists of any clastic sediment, but most often, a competent shale or siltstone. The floor rocks consist of strong carbonaceous shales, siltstones or sandstones.

PRINCIPAL COAL BEDS: The following review gives a brief description as to the occurrence, thickness and continuity of the principal coal beds 14, 15, 31, 40, 46 and 47, tested during the 1973 field season. These principal beds have been mapped on the geologic maps (Plate 2) by projection of drill hole intercepts utilizing all recorded structural control.

Coal bed isopach maps, with a panel section illustrating the continuity of the beds between drill holes, have been revised by the addition of 1973 core holes 73-24 to 73-34, inclusive. Isopach maps for seams 14, 15, 31, 40, 46 and 47 are included with this report in the rear leaf. (Plates 18-23).

For a description of the remaining principal seams, not intersected during 1973, and a composite stratigraphic section map showing the coal beds of the Gething Formation intercepted in the Carbon Creek area, refer to "The Carbon Creek Coal Basin, Summary Report, 1972 Field Season".

COAL BED 14: Stratigraphically, the lowest potentially economic coal bed encountered to date in the evaluation of the Carbon

Creek area, was intersected in 1971 in core-hole 71-1 and in 1972 in core-hole 72-14. Seven additional core-holes intersected the seam during the 1973 drilling program. The seam ranges in thickness from 2.1 feet in D.D.H. 73-24 to 18.3 feet in D.D.H. 73-29. A 5.6 foot thick carbonaceous shale split in D.D.H. 72-14 decreases to 1.5 feet in D.D.H. 73-28 to the north and 0.2 feet in D.D.H. 73-27 to the west. In D.D.H. 72-17, north of D.D.H. 73-28, the thickness of the split and both benches of the seam is unknown because of its removal by pre-glacial erosion between D.D.H. 73-28 and D.D.H. 72-17. East of D.D.H. 72-14, the 5.6 foot split increases to 11.9 feet in D.D.H. 73-29. Southwest of D.D.H. 72-14, D.D.H. 73-26 was unable to penetrate Bed 14, due to a lost bit shell. Indications are, though, from the nearby D.D.H. 73-34, that the split decreases in thickness, but so does the seam, being 2.9 feet thick in D.D.H. 73-34, with a 0.5 foot split 1.2 feet from the top. Towards the south, the seam is 7.6 feet and 7.9 feet thick in D.D.H. 73-33 and 73-25, respectively, but there were numerous thin carbonaceous partings encountered in each intersection. See Plate 18.

COAL BED 15; 100 to 120 feet above Bed 14, varies in thickness from 2.3 feet in D.D.H.'s 73-26 and 73-34 to 10.2 feet in D.D.H. 72-14. The 1973 drilling continued to confirm its uniform nature, except for a 0.3 foot parting on D.D.H. 73-33, and a 0.7 foot parting in D.D.H. 73-24. Core holes to the south and west of the previously drilled 71-1 indicate the bed is thinning in that direction. As in Coal Bed 14, Bed 15 has been removed by pre-glacial erosion in the vicinity of D.D.H. 72-17. See Plate 19.

COAL BED 31 is approximately 550 feet above Bed 15. The seam was intercepted in five core-holes during 1973, south of Seven Mile Creek, in D.D.H.'s 73-30 and 73-31, as planned, and unexpectedly north of Seven Mile Creek at shallow depths in D.D.H.'s 73-25, 73-26 and 73-34. It continues to average six feet thick. See Plate 20 and Photo 11.

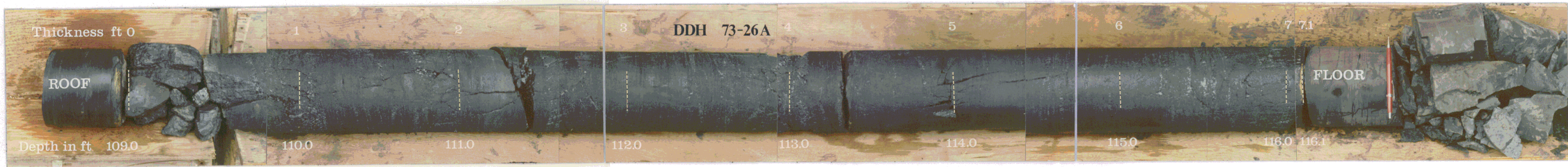


PHOTO 12: 6 inch diameter sample of coal bed 31 from D.D.H. 73-26A.

COAL BED 40: Stratigraphically, 350 feet above Bed 31, Bed 40 underlies an area south of Seven Mile Creek to the north Fork of Eleven Mile Creek. Two core-holes, D.D.H.'s 73-30 and 73-31, intersected Bed 40 bringing the total up to 13 core-hole intersections in the area. The seam was 5.0 feet and 5.5 feet thick in D.D.H.'s 73-30 and 73-31, respectively, but the 1973 drilling, along with nearby D.D.H. 71-2, has indicated the seam is splitting along its northern extremity. See Plate 21.

COAL BED 46 is approximately 250 feet above Bed 40. The seam is confined to the area between Seven Mile and Ten Mile Creeks. The seam was intersected in D.D.H. 73-30 and a 3.3 foot exposure was measured along the roadcut, 200 feet away from the drill hole. The core-hole was collared in the central part of the area where previous drilling has indicated an upper and lower bench for the seam. In D.D.H. 73-30, a 1.9 foot coal seam, interpreted as the lower bench, was encountered, and 2.9 feet above this coal, a 6.0 foot carbonaceous mudstone with coaly blebs is interpreted as the lateral equivalent of the upper bench of Bed 40 encountered in the previous D.D.H.'s 72-11, 71-2 and 72-10. The 3.3 foot exposure mapped along the road is interpreted as the lower bench. For a complete description of the seam, see the 1971 and 1972 progress reports. See Plate 22.

COAL BED 47 varies from 22.0 to 60.0 feet above Bed 46. The bed ranges in thickness from less than 3.0 feet to 6.8 feet in an area between Seven Mile Creek and the North Fork of Eleven Mile Creek. One core hole this year, 73-30, in the northwest part of the area, encountered the seam with a thickness of 5.5 feet. A 2.5 foot exposure on a nearby roadcut is also interpreted as Bed 47. See Plate 23.

COAL QUALITY

Ninety-two coal samples (coal beds greater than 1.0 foot in thickness) recovered from coring operations during the 1973 Carbon Creek program, were sent to Utah's Palo Alto laboratory

for proximate analysis, free-swelling tests, and washability studies.

The free-swelling index determinations were made at Palo Alto, as well as at the exploration site. Ash analysis were also determined at Palo Alto.

The purpose of these tests was to accumulate analytical and coal preparation data so that one could make a classification by rank and determine the quality of the coal seams, mainly using the proximate analysis, F.S.I. and washability data. This information will augment other geological data in order to establish the presence of mineable and/or exploitable coal seams.

Laboratory procedures in the handling of the coal samples are as follows:

- 1) Unseal and air-dry (65° to 90° F) for 24 to 48 hours.
- 2) All individual seam samples crush through 3/8".
- 3) Cone and quarter out head sample.
- 4) Seams of greater than three feet thickness to washability testing and screen sizing - minus 28 mesh to froth flotation.
- 5) All seams to single gravity separation at 1.400.
- 6) Selected heads or gravity separation float products for petrography and comprehensive analysis.
- 7) Compute material balances.

Head analyses on all coal samples from D.D.H. 73-24 to D.D.H. 73-34, inclusive, on those seams greater than 1.0 feet are shown in Appendix A.

COAL RESERVES

On the accompanying coal reserve chart, Table-1, the estimated total in-place coal is shown followed by an estimated strippable reserve at a 10:1 strip ratio. The strip ratio is expressed as cubic yards of overburden removed per ton of coal recovered. All figures shown are in thousands of net short tons.

The in-place figures are broken down into "measured" and "indicated" categories. All estimates of measured reserves include beds for which positive information is available as to thickness and lateral continuity. The outer limit of a block of measured reserves is usually one-quarter mile from the last point of definite information. *too far considering lensoid nature of coal seams here.*

Reserves classified as "indicated" are defined as those computed partly from specific measurement and partly from projection of visible data for considerable distances on geologic evidence. The points of observation are approximately one mile apart, or, as much as one and one-half miles for beds of known continuity. During 1971 and 1972, a distance of one and one-quarter miles from the last point of observation was used.

The 1973 drilling program continued to confirm that the principal coal seams are thickening, thinning and splitting over relatively short distances. On this basis, the outer boundary of the "indicated" category has been reduced to one mile to present a more realistic estimate of the reserves.

Beyond the "indicated" category, "inferred" reserves could be calculated. Reserve estimates in this category are based largely on a broad knowledge of the geological characteristics of the bed, supported by few, or no, actual exposures or measurements. Due to the lenticular nature of the coal seams in the Carbon Creek area, this category is not

(LONG TONS)

TABLE 1

TOTAL IN-PLACE* COAL RESERVE ESTIMATES
IN THOUSANDS OF SHORT TONS

RECOVERABLE** RESERVES
IN THOUSANDS OF SHORT TONS

BED NUMBER	ACREAGE				ACREAGE	STRIP RATIO 10:1 LESS 10% FOR OXIDATION.
	MEASURED INDICATED	MEASURED	INDICATED	TOTAL		
47	1220	(9555)	(11455)	(21010)	220	1,700
	1495	10,510	12,600	23,110		
46	1096	(8927)	(13282)	(22210)	125	1,120
	1404	9,820	14,610	24,430		
40	1276	(9936)	(16900)	(26836)	44	333
	1926	10,930	18,590	29,520		
31	930	(9318)	(1) (16,127)	(25445)	293	3,230
	1768	10,250	17,740	27,990		
15	1125	(11810)	(25927)	(37736)	78	918
	2743	12,990	28,520	41,510		
14	1092	(11864)	(26010)	(37874)	73	910
	2445	13,050	28,610	41,660		
GRAND TOTAL	6739	(61410)	(169700)	(171110)	831	8,211
	11781	67,550	120,670	188,220		

* Coal Seams with a minimum thickness of three feet
and a maximum overburden cover of 1,000 feet.

** See text under "COAL RESERVES" for limitations on coal
seams under this category.

(1) does not include DDH 71-6

justifiable. There is no reasonable assurance that the seam is maintaining a constant particular thickness beyond the limit of the "indicated" category. The figures obtained would be considered unreliable and probably quite erroneous.

Recoverable strip reserves are based on estimates derived from individually mined seams. Highwalls range from 50 to 100 feet at a 10.0:1 strip ratio, depending upon the relative thickness of the coal seam to be removed.

The total volume of coal in-place having a minimum seam thickness of 3.0 feet within the northern and central area of this study is estimated to be approximately 188 million tons. These reserves are calculated on six principal coal seams.

The total estimated recoverable coal at 10.0:1 stripping ratio is approximately 8 million tons on about 831 acres.

Estimates of in-place coal reserves in this report are based on the following assumptions:

- (1) Coal having a minimum recoverable seam thickness of 3.0 feet. A ten per cent loss is also assumed, due to oxidized coal.
- (2) A maximum overburden cover of 1,000 feet.
- (3) Only those areas which could be exploited feasibly by either underground or strip mining methods.

EXPLORATION COSTS

The following statement covers expenditures for cost exploration (through 31st October, 1973) in the Carbon Creek Coal Basin of the Peace River District by Utah Mines Ltd.

<u>ITEM</u>	<u>TOTAL COST</u>	<u>48% ALLOCATED TO CROWN COAL LICENCES</u>
1) DRILLING		
Coal Licences 3,560 feet (48%)		
Burns Leases <u>3,928</u> feet (52%)		
7,488 feet (100%)	\$128,726.10	\$ 70,150.35*
2) ROAD BUILDING	\$ 17,504.58	\$ 8,402.20
Machinery Operation,		
Drillsite Preparation		
Road Maintainance		
Slash Removal		
Coal Licences - 2.72 miles \$9,520.00		\$ 9,520.00*
Burns Leases - <u>2.02</u> miles \$7,070.00		
4.74 miles	\$ 16,590.00	
3) CREWBOAT, TUG AND BARGE SERVICES	\$ 15,602.27	\$ 7,489.09
4) LABOR - SALARIES	\$ 18,090.00	\$ 8,683.20
Geologists and Assistants		
First Aid Attendent		
5) EXPENSE ACCOUNTS	\$ 4,277.41	\$ 2,053.16
Travel Expenses to and from exploration area.		
6) VEHICLE RENTALS	\$ 6,832.11	\$ 3,279.41
7) AIRCRAFT CHARTER	\$ 10,858.72	\$ 5,212.19
Fixed Wing and Helicopter		
Large Helicopter		

<u>ITEM</u>	<u>TOTAL COST</u>	<u>48% ALLOCATED TO CROWN COAL LICENCES</u>
8) SUPPLIES		
Camp Materials	\$ 7,546.58	\$ 3,622.36
Core Boxes, fuel		
9) CAMP COSTS	\$ 10,697.31	\$ 5,134.71
10) COMMUNICATIONS	\$ 258.59	\$ 124.12
11) FREIGHT AND CUSTOMS BROKERAGE	\$ 290.58	\$ 139.48
12) LABORATORY WORK	\$ 18,249.50	\$ 8,644.50*
Sample preparation and analytical work		based on average cost per sample
45 samples on licences		
50 samples on Burns Leases		
13) B.C. RESEARCH	\$ 24,542.50	\$ 20,861.13*
Environmental Monitoring Program		
14) RECLAMATION	\$ 29,508.10	\$ 25,081.89*
Slashing		
"Cat" work		
Seed		
 TOTAL	 \$309,574.35	 \$178,397.79

* See following paragraph

The total footage drilled in Carbon Creek during 1973 was 7,488 feet, of which 3,560 feet, or 48 per cent was drilled on the 55 Coal Licences, Nos. 1736 to 1790, inclusive, and the remaining 3,928 feet, or 52 per cent, was drilled on the Burns Foundation Leases. Expenditures have been allocated to the licences on the basis of footage drilled on the respective properties, except on the following items.

Item 1. DRILLING - The cost allocated to the coal licences is based on actual expenses accrued on a per hole basis.

Item 2. ROAD BUILDING - Cost of roads built on the Carbon Creek property are based on a per mile basis for the individual properties. Costs accrued for machinery operation on duties other than road building are based on a percentage of 52 per cent to 48 per cent allocation.

Item 12. LABORATORY WORK - Costs are based on the average cost per sample.

Item 13 and 14. B.C. RESEARCH AND RECLAMATION - Costs are based on the percentage of total area for the licences (85%) and leases (15%).

Thus, \$178,397.79 was spent on the Coal Licences on the Carbon Creek property during the 1973 summer field season and prior to shutdown for the winter.

SUMMARY OF 1973 EXPLORATION PROGRAM

- 1) Eleven HQ (2 1/2") core holes were drilled in the Carbon Creek area totalling 6,642 feet.
- 2) To obtain bulk samples, five 6" diameter, core holes, totalling 846 feet, were drilled on the Carbon Creek property.
- 3) Coal quality analyses were determined on approximately 95 coal core samples. These determinations are proximate analysis on head samples on a natural and dry basis.
- 4) Four and three-quarters miles of new access roads were completed in the Carbon Creek area.
- 5) Geological studies of core samples, geophysical logs and outcrops were conducted.
- 6) Ecological studies were continued in order to monitor environmental disturbance and formulate a basic guide for any future mine development.
- 7) A voluntary reclamation program by Utah Mines Ltd. was carried out. A seed mixture approved by the British Columbia Forest Service was broadcast on all drillsites and major road disturbances.

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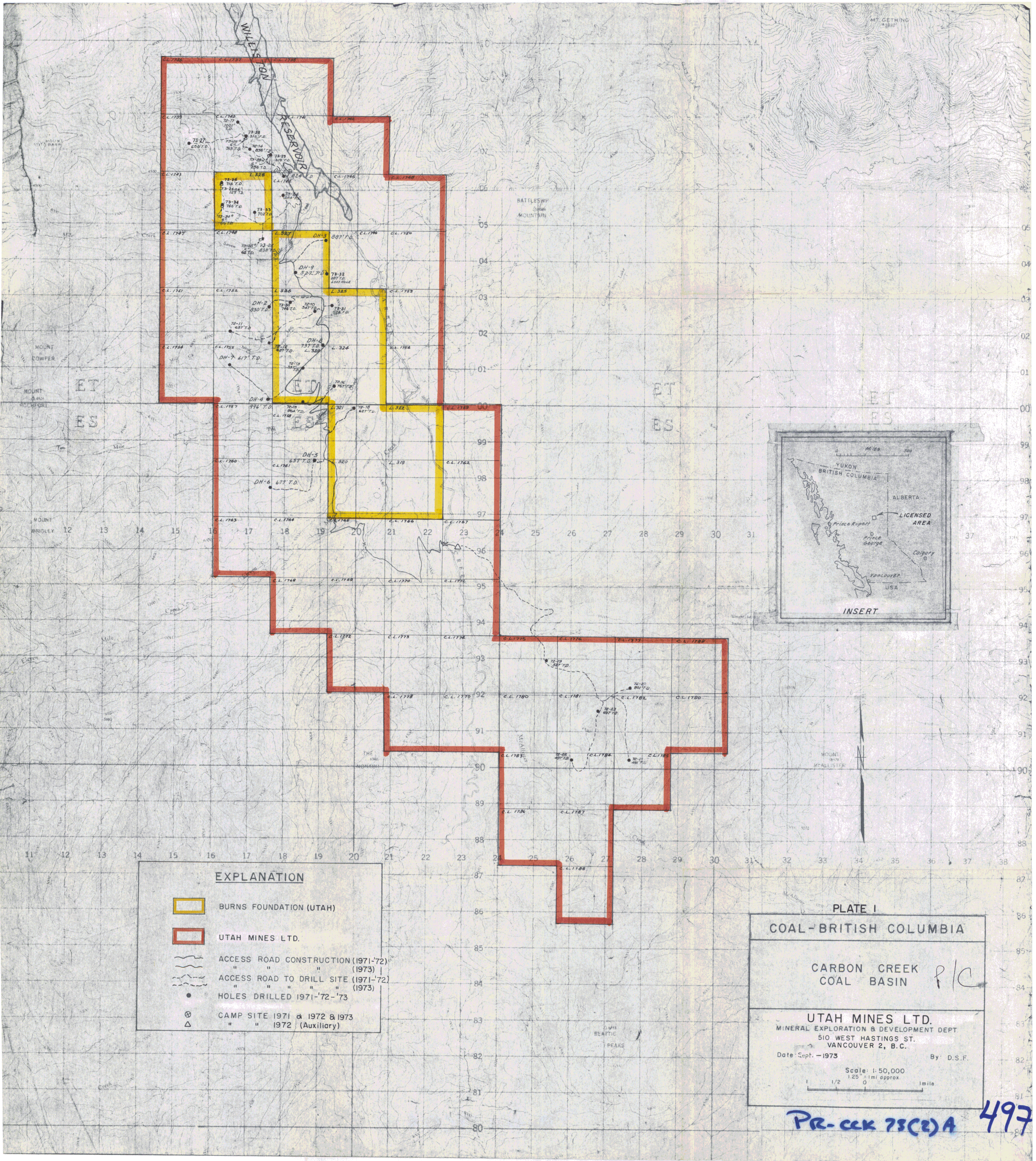
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EXPLANATION

- BURNS FOUNDATION (UTAH)
- UTAH MINES LTD.
- ACCESS ROAD CONSTRUCTION (1971-'72)
- ACCESS ROAD TO DRILL SITE (1971-'72)
- ACCESS ROAD TO DRILL SITE (1973)
- HOLES DRILLED 1971-'72-'73
- CAMP SITE 1971 & 1972 & 1973
- CAMP SITE 1972 (Auxiliary)

PLATE I

COAL-BRITISH COLUMBIA

CARBON CREEK
COAL BASIN *P/C*

UTAH MINES LTD.
MINERAL EXPLORATION & DEVELOPMENT DEPT
510 WEST HASTINGS ST.
VANCOUVER 2, B.C.

Date: Sept. - 1973 By: D.S.F.

Scale: 1:50,000
1.25" = 1 mi approx.
1 1/2 0 1 mile

PR-CK 73(2)A 497

497
Plate 2, Carbon Creek Coal Basin
(West Half)
PR-CK 73(2)A

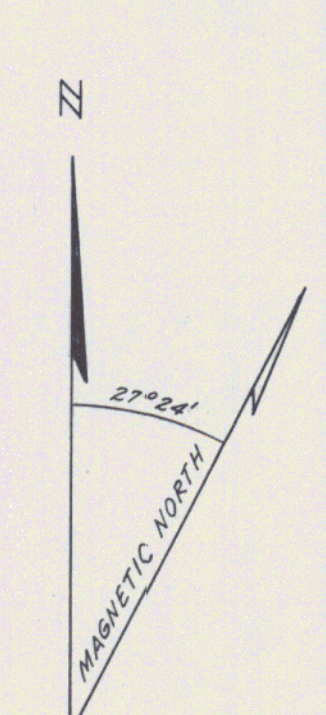
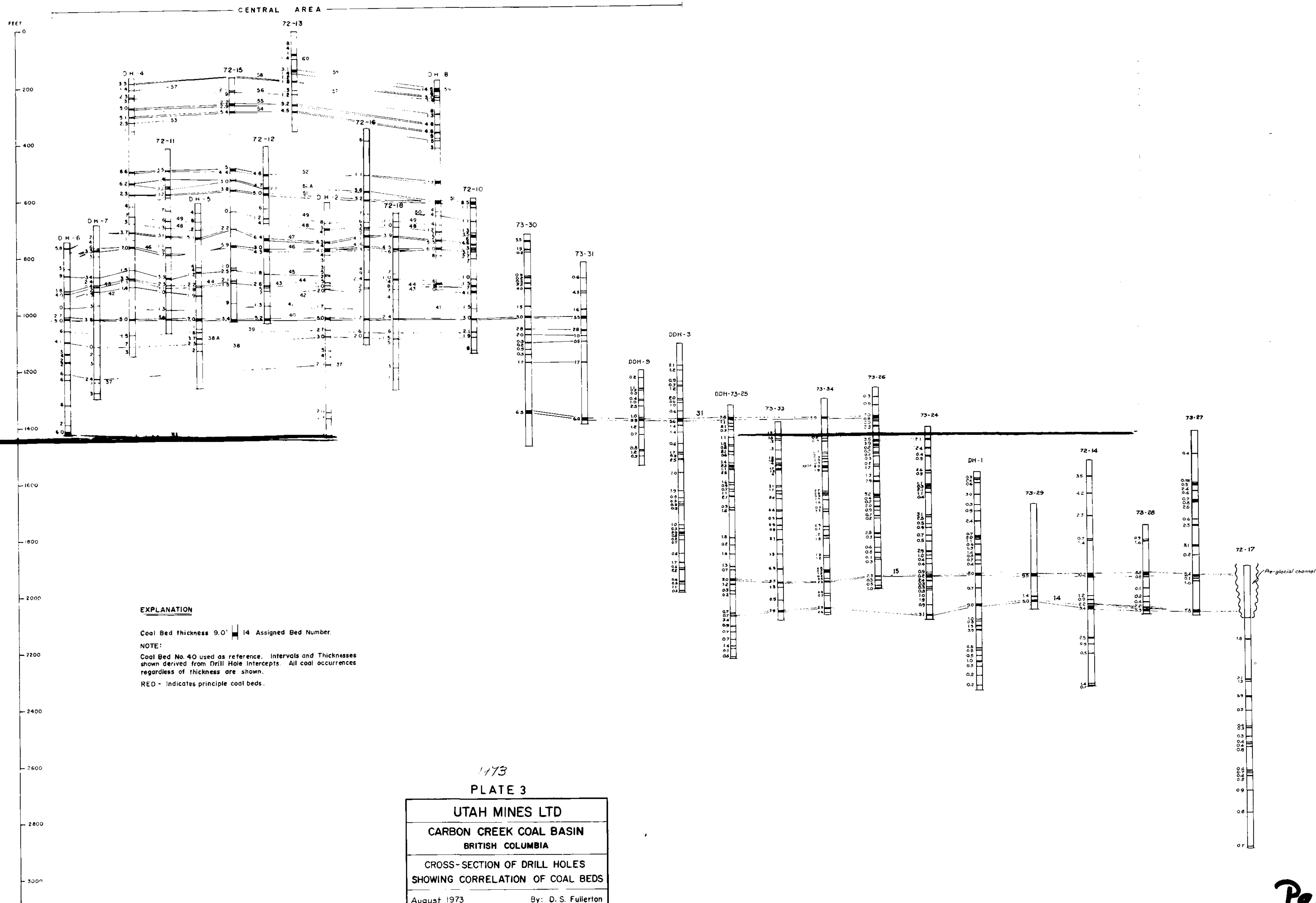


PLATE 2
UTAH MINES LTD
GEOLOGICAL MAP
OF
CARBON CREEK COAL BASIN
(WEST HALF)
PEACE RIVER AREA
BRITISH COLUMBIA

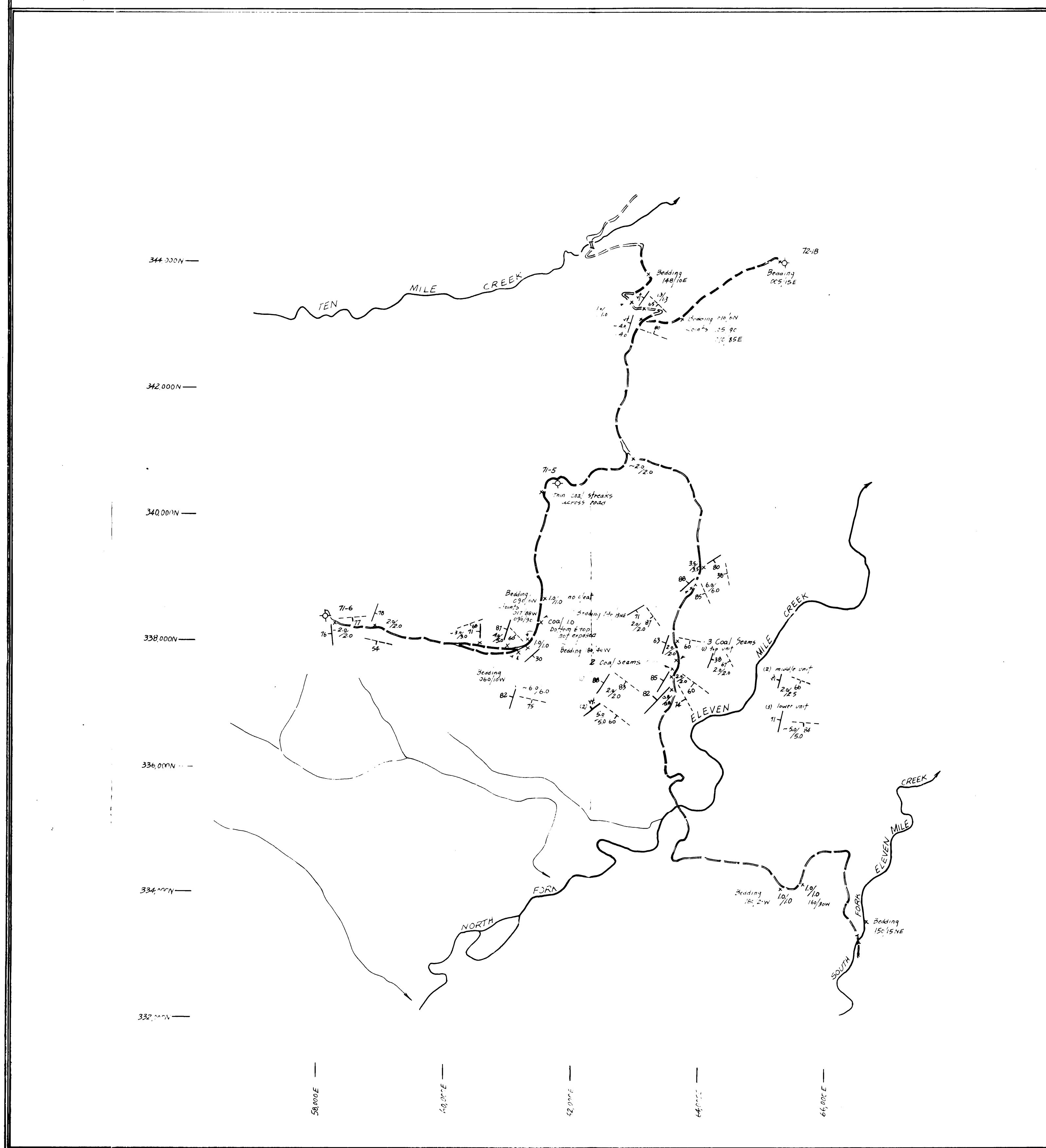
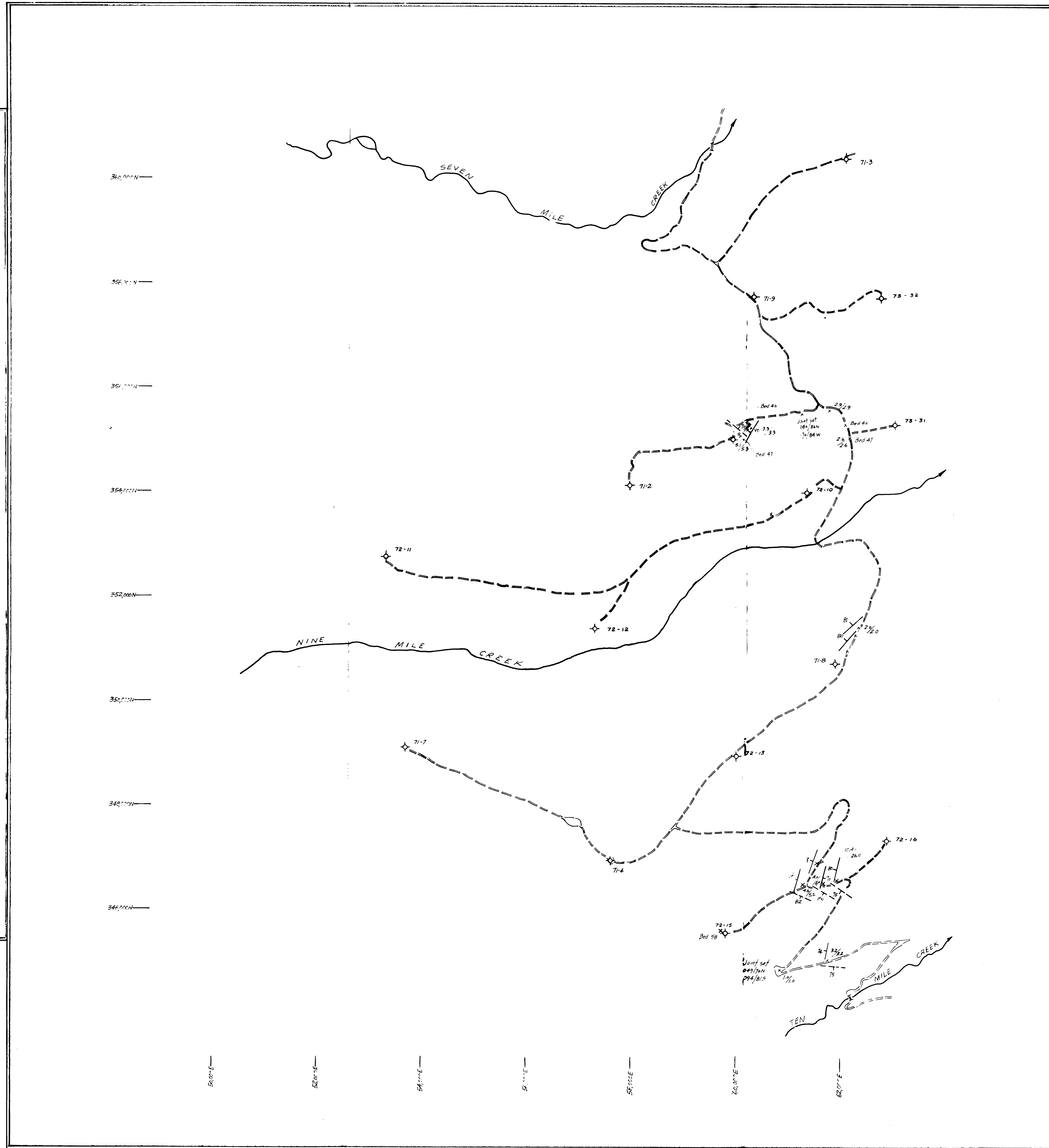
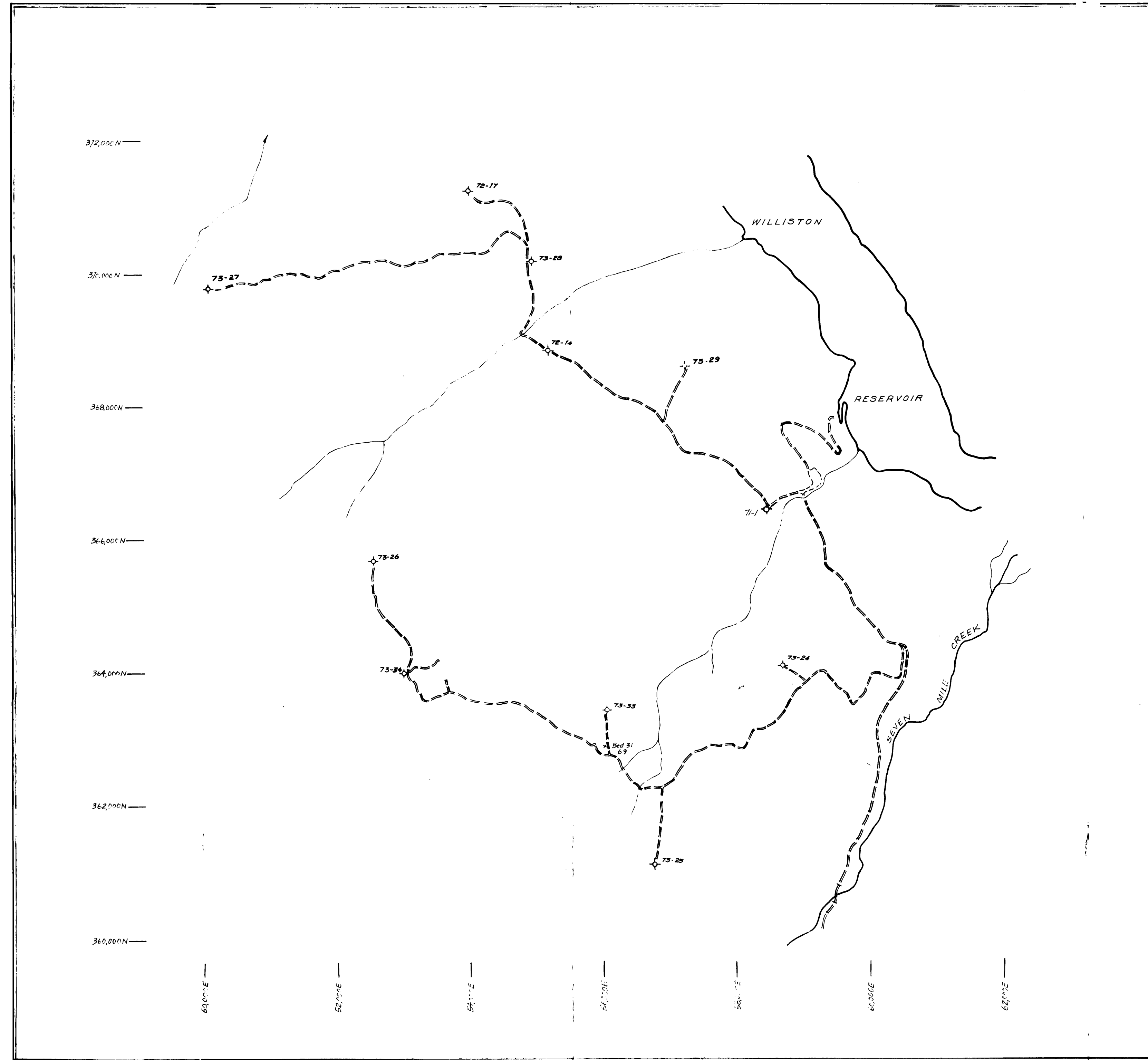
Scale 1" = 1000'
OCTOBER 1973
D. S. FULLERTON
D. N. JOHNSON

- LEGEND**
- Stream alluvium
 - Glacial terrace deposits, sand & gravel
 - Glacial drift
 - UNCONFORMITY
 - Gething Formation
 - Cadomin Formation
- Symbols**
- Fault, short dash where approximate, dotted where concealed
 - Fault, major disturbance, trace unknown
 - Contact, definite
 - Contact, approximate
 - Coal bed subcrop, approximate, number indicates principle seam, Dotted where thinning to less than 3.0 feet
 - Strike and dip of bedding
 - Axis of monoclinoidal fold
 - Coal outcrop, measured thickness where indicated
 - Diamond Drill location
 - Adit, Burns Foundation 1940's
 - PHOTO GEOLOGY
 - Airphoto - Bedding trace of strata
 - Dip and strike of bedding



497

PR-CCK 73(2) A



LEGEND

- ROAD
- 73-24 - DIAMOND DRILL HOLE
- 86° - BUTT CLEAT ATTITUDE
- $\frac{3.9}{5.2}$ NET GROSS - COAL BED WITH MEASURED NET AND GROSS THICKNESSES (IN FEET)
- 74° - FACE CLEAT ATTITUDE

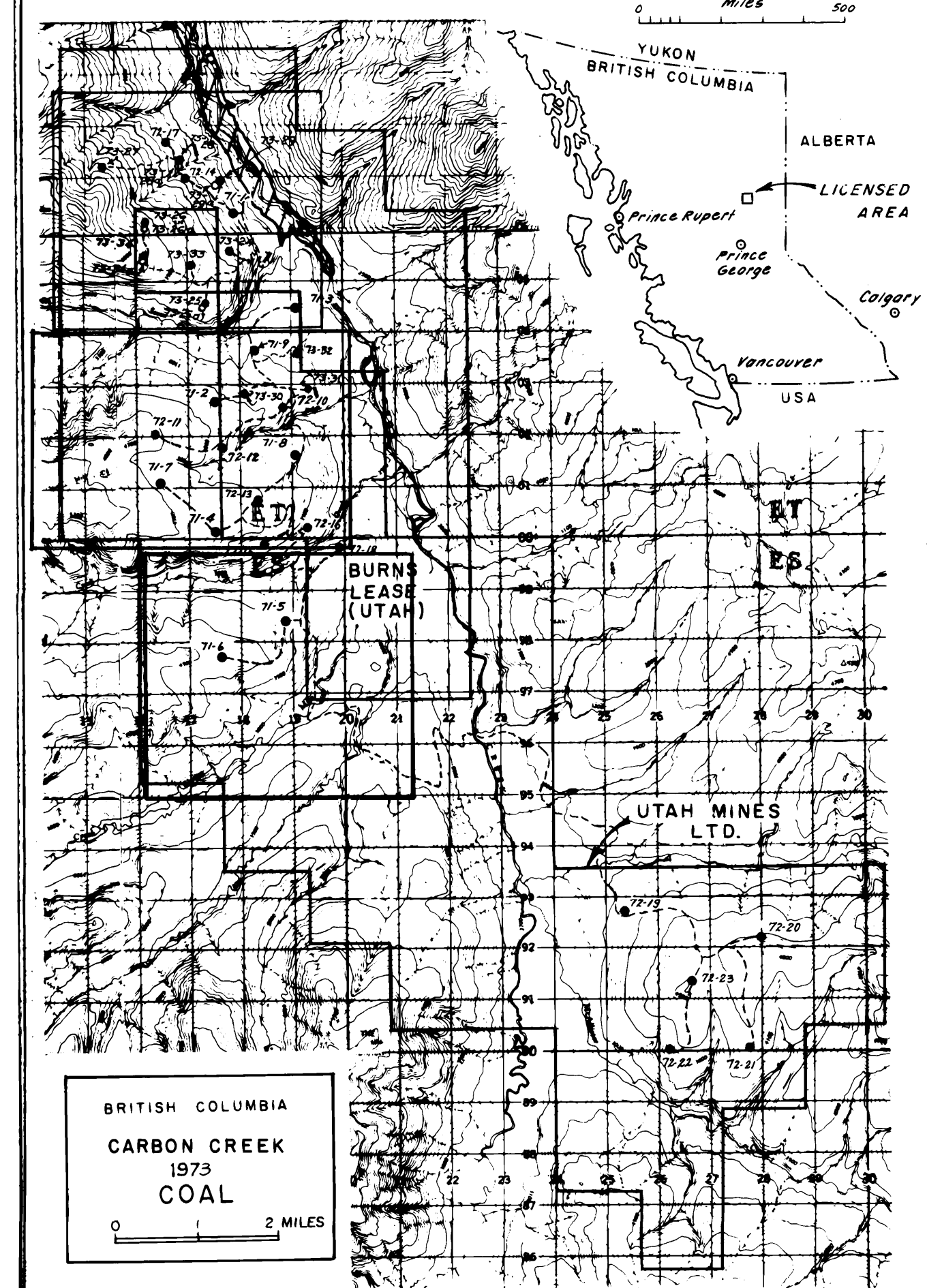


PLATE 4 497

UTAH MINES LTD.
MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

BUTT AND FACE CLEAT ATTITUDES
FOR COAL EXPOSURES

CARBON CREEK
WEST HALF

Work by: U.M.L.G.D.N. Date: Jan. 1974 NTS Ref. of
Drawn by: D.N. Map Revised: 2000 3000
SCALE IN FEET

PR-CK73(2)A

PLATE 5

UTAH MINES LTD.

VANCOUVER BRITISH COLUMBIA

CARBON CREEK COAL BASIN

PEACE RIVER AREA

BRITISH COLUMBIA

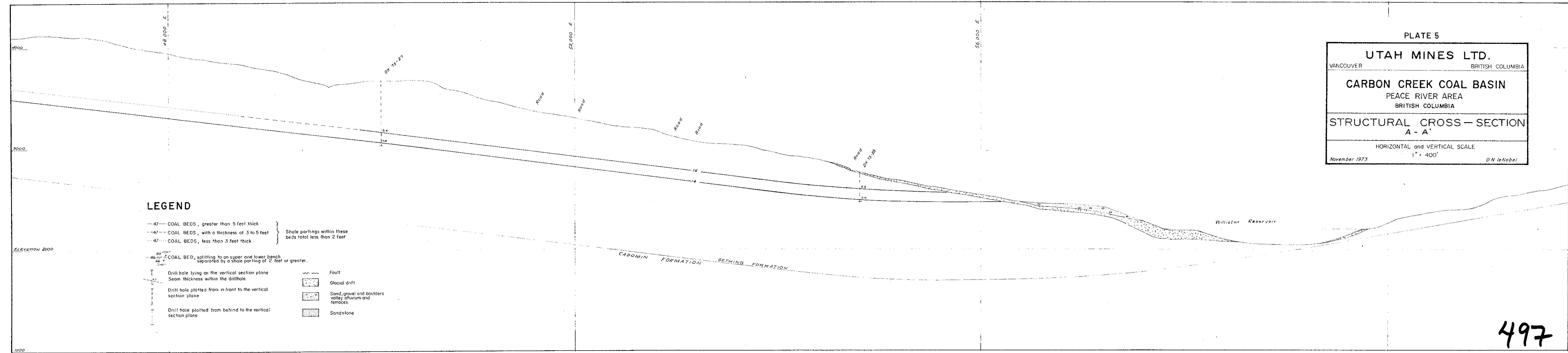
STRUCTURAL CROSS-SECTION

A - A'

HORIZONTAL and VERTICAL SCALE

1" = 400'

November 1973 D.N. leNobel



- LEGEND**
- 47 — COAL BEDS, greater than 5 feet thick
 - - 47 - - COAL BEDS, with a thickness of 3 to 5 feet
 - ... 47 ... COAL BEDS, less than 3 feet thick
 - 46 upper
46 lower
--- 46 --- COAL BED, splitting to an upper and lower bench separated by a shale parting of 2 feet or greater.
 - Drill hole lying on the vertical section plane
 - Seam thickness within the drillhole
 - Drill hole plotted from in front to the vertical section plane
 - Drill hole plotted from behind to the vertical section plane
 - Fault
 - Glacial drift
 - Sand, gravel and boulders valley alluvium and terraces
 - Sandstone
 - Shale partings within these beds total less than 2 feet

497

PR-CCR 73(2)A

PLATE 6

UTAH MINES LTD.

VANCOUVER

BRITISH COLUMBIA

CARBON CREEK COAL BASIN

PEACE RIVER AREA

BRITISH COLUMBIA

STRUCTURAL CROSS-SECTION

B - B'

HORIZONTAL and VERTICAL SCALE

1" = 400'

November 1973

D.N. leNobel

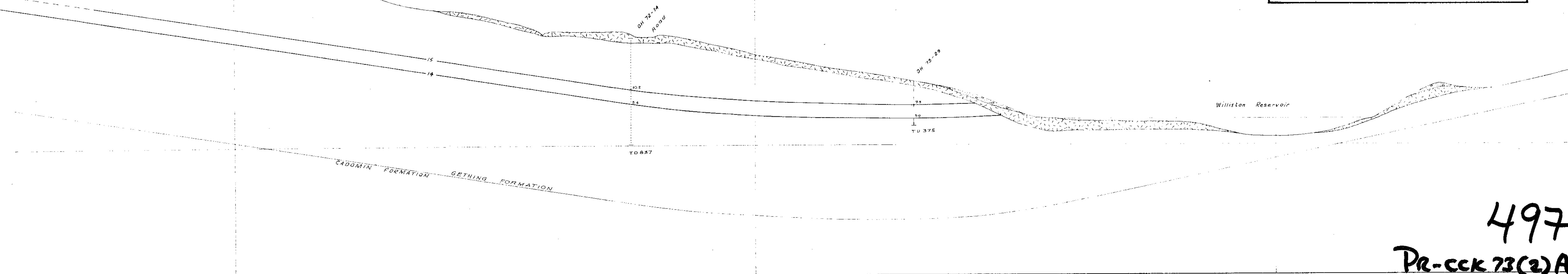
LEGEND

- 47 — COAL BEDS, greater than 5 feet thick
 - - 47 - - COAL BEDS, with a thickness of 3 to 5 feet
 - ... 47 ... COAL BEDS, less than 3 feet thick
- Shale partings within these beds total less than 2 feet.

- 46 ⁴⁶ COAL BED, splitting to an upper and lower bench separated by a shale parting of 2 feet or greater.

- Drill hole lying on the vertical section plane
- Seam thickness within the drillhole
- Drill hole plotted from in front to the vertical section plane
- Drill hole plotted from behind to the vertical section plane

- Fault
- Glacial drift
- Sand, gravel and boulders valley alluvium and terraces
- Sandstone



497

PR-CCK 73(2)A

PLATE 7

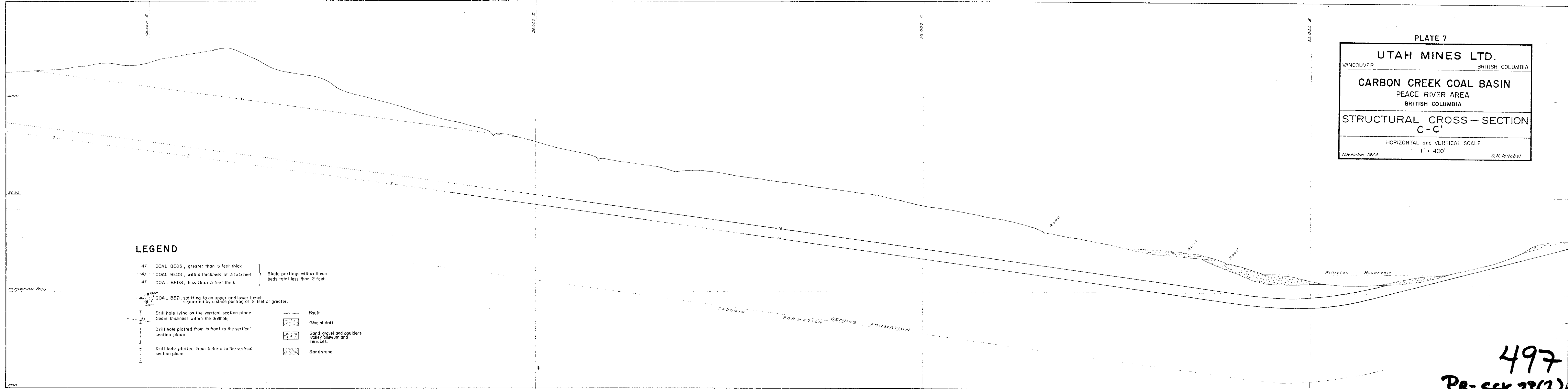
UTAH MINES LTD.
VANCOUVER BRITISH COLUMBIA

CARBON CREEK COAL BASIN
PEACE RIVER AREA
BRITISH COLUMBIA

STRUCTURAL CROSS-SECTION
C-C'

HORIZONTAL and VERTICAL SCALE
1" = 400'

November 1973 D.N. leNobel



LEGEND

- 47 — COAL BEDS, greater than 5 feet thick
- - 47 - - COAL BEDS, with a thickness of 3 to 5 feet
- ... 47 ... COAL BEDS, less than 3 feet thick
- 46 - 46 - COAL BED, splitting to an upper and lower bench separated by a shale parting of 12 feet or greater.
- Drill hole lying on the vertical section plane
- Seam thickness within the drillhole
- Drill hole plotted from in front to the vertical section plane
- Drill hole plotted from behind to the vertical section plane
- Fault
- Glacial drift
- Sand, gravel and boulders valley alluvium and terraces
- Sandstone

497
PR-CCR 73(2)A

PLATE 8

UTAH MINES LTD.

VANCOUVER BRITISH COLUMBIA

CARBON CREEK COAL BASIN

PEACE RIVER AREA

BRITISH COLUMBIA

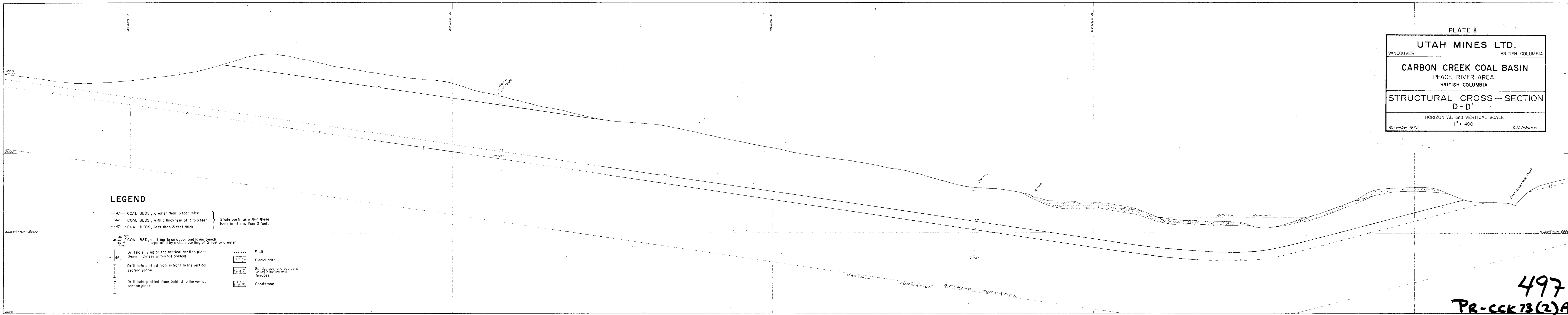
STRUCTURAL CROSS-SECTION

D-D'

HORIZONTAL and VERTICAL SCALE

1" = 400'

November 1973 D.N. leNobel.

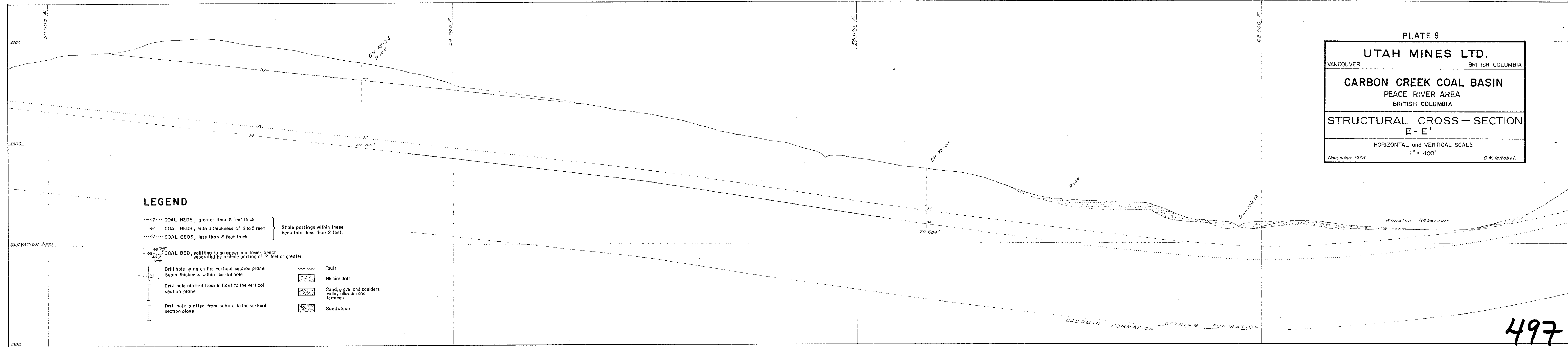


LEGEND

- 47— COAL BEDS, greater than 5 feet thick
- - -47- - COAL BEDS, with a thickness of 3 to 5 feet
- ...47... COAL BEDS, less than 3 feet thick
- Shale partings within these beds total less than 2 feet.
- 46 upper
46 lower
COAL BED, splitting to an upper and lower bench separated by a shale parting of 2 feet or greater.
- 43 Drill hole lying on the vertical section plane
Seam thickness within the drillhole
- Drill hole plotted from in front to the vertical section plane
- Drill hole plotted from behind to the vertical section plane
- Fault
- Glacial drift
- Sand, gravel and boulders valley alluvium and terraces.
- Sandstone

497

PR-CCK 73(2)A



497
73(2)A
Pr-cek

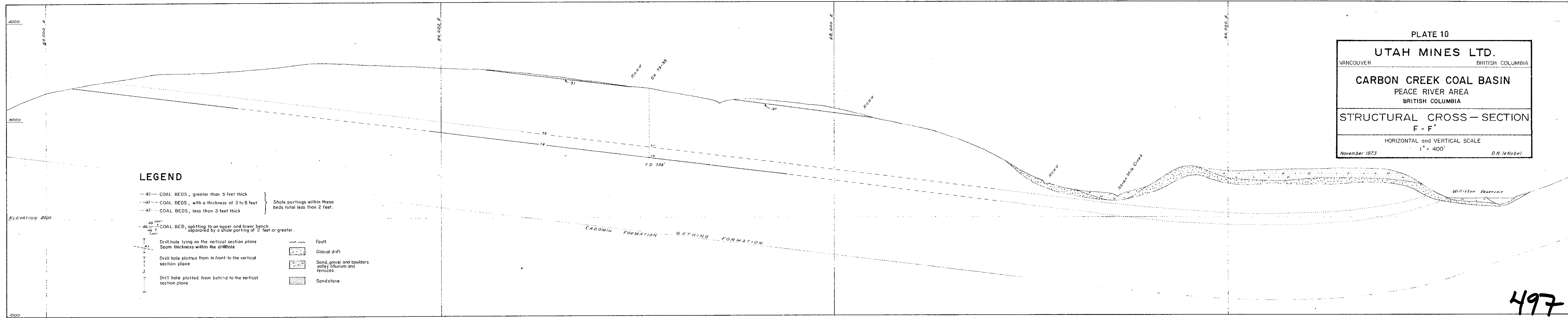


PLATE 10

UTAH MINES LTD.

VANCOUVER BRITISH COLUMBIA

CARBON CREEK COAL BASIN

PEACE RIVER AREA

BRITISH COLUMBIA

STRUCTURAL CROSS-SECTION

F - F'

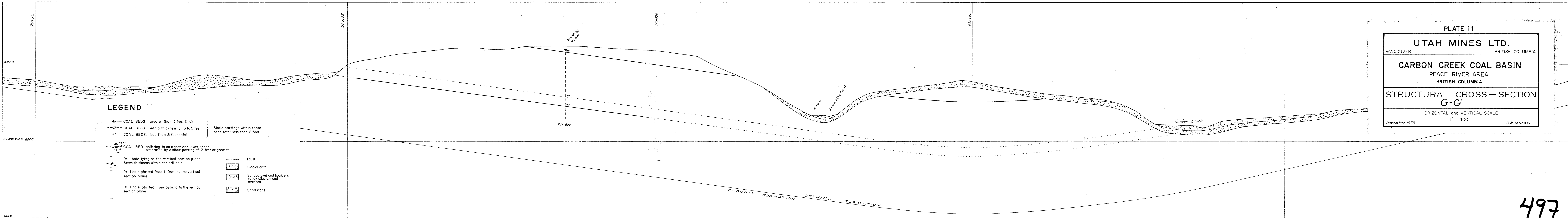
HORIZONTAL and VERTICAL SCALE

1" = 400'

November 1973 D.N. LeNobel

497

PR-CKK 73(2)A



497

PR-CCK 73(2)A

UTAH MINES LTD.

VANCOUVER

BRITISH COLUMBIA

CARBON CREEK COAL BASIN

PEACE RIVER AREA

BRITISH COLUMBIA

STRUCTURAL CROSS - SECTION
H - H'

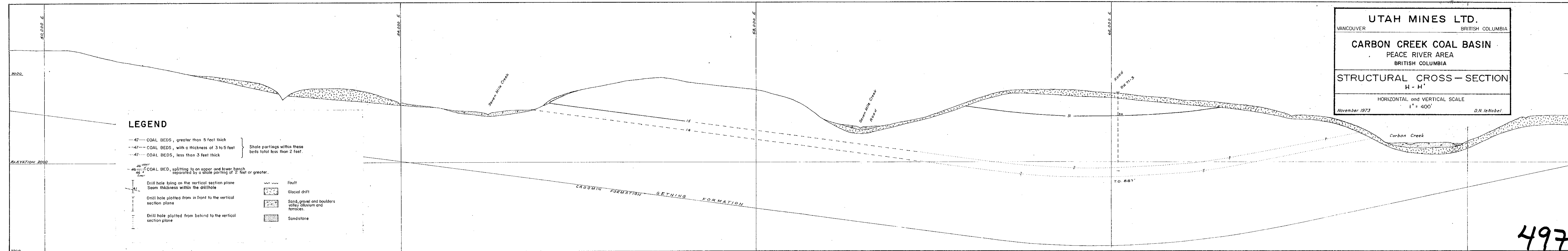
35.

HORIZONTAL and VERTICAL SCALE

$$l'' = 400$$

November 1973

D.N. leNobel



PR-cek 73(2)A

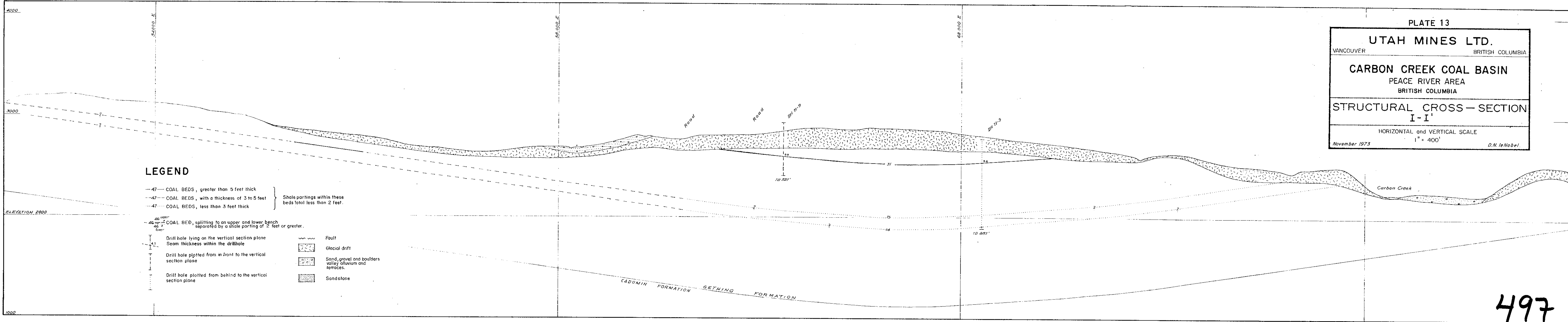


PLATE 13

UTAH MINES LTD.
VANCOUVER BRITISH COLUMBIA

CARBON CREEK COAL BASIN
PEACE RIVER AREA
BRITISH COLUMBIA

STRUCTURAL CROSS-SECTION
I-I'

HORIZONTAL and VERTICAL SCALE
1" = 400'

November 1973 D.N. leNobel

497

PR-CK 73(2)A

PLATE 15

UTAH MINES LTD.
VANCOUVER
BRITISH COLUMBIA

CARBON CREEK COAL BASIN
PEACE RIVER AREA
BRITISH COLUMBIA

STRUCTURAL CROSS-SECTION
K-K'

HORIZONTAL and VERTICAL SCALE
1" = 400'
November 1973
D.N. leNobel

LEGEND

- 47 COAL BEDS, greater than 5 feet thick
- 47 COAL BEDS, with a thickness of 3 to 5 feet
- 47 COAL BEDS, less than 3 feet thick
- 46 COAL BED, splitting to an upper and lower bench separated by a shale parting of 2 feet or greater.
- Drill hole lying on the vertical section plane
Seam thickness within the drillhole
- Drill hole plotted from in front to the vertical section plane
- Drill hole plotted from behind to the vertical section plane
- Shale partings within these beds total less than 2 feet.
- Fault
- Glacial drift
- Sand, gravel and boulders valley alluvium and terraces.
- Sandstone

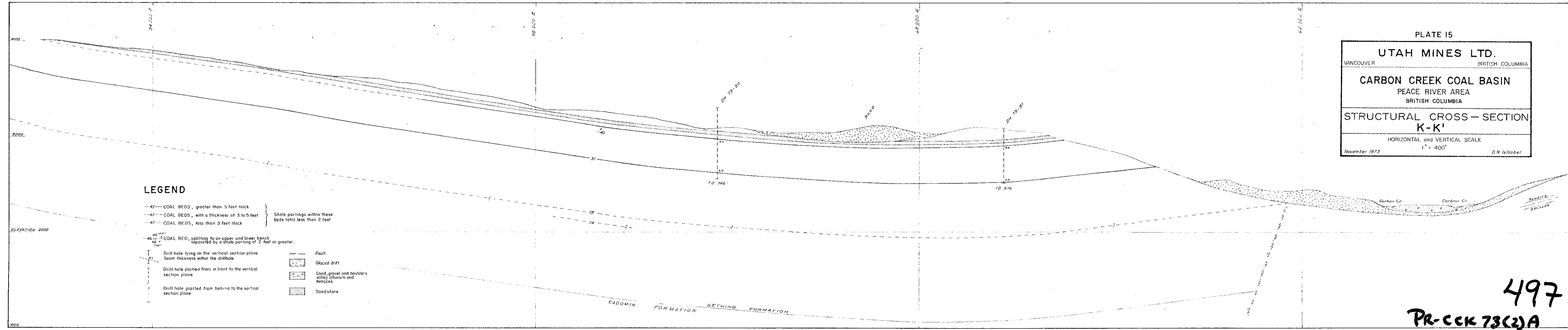


PLATE 16

UTAH MINES LTD.

VANCOUVER

BRITISH COLUMBIA

CARBON CREEK COAL BASIN

PEACE RIVER AREA

BRITISH COLUMBIA

STRUCTURAL CROSS-SECTION
L-L'

HORIZONTAL and VERTICAL SCALE

1" = 400'

November 1973

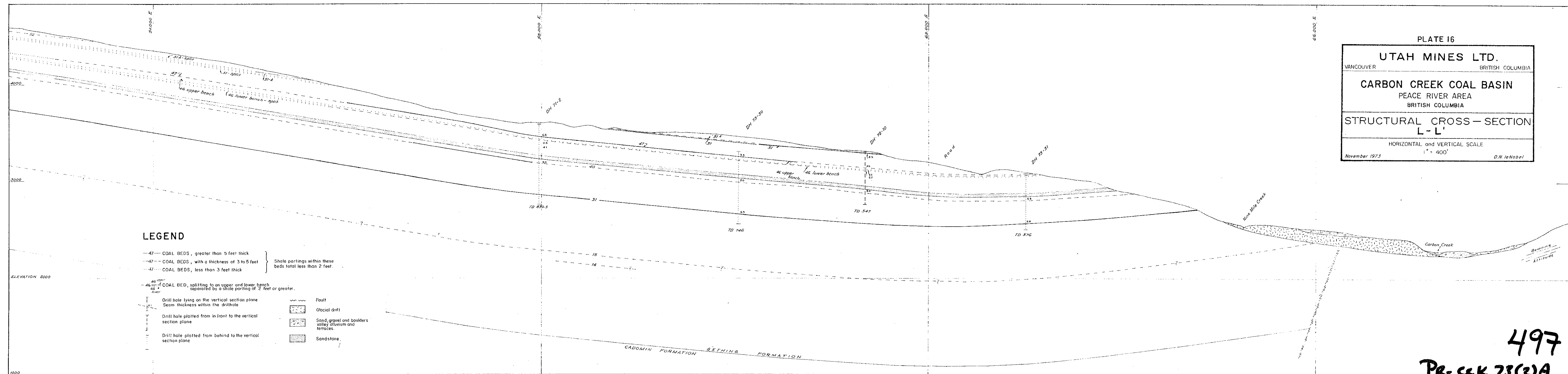
D.N. leNobel

LEGEND

- 47— COAL BEDS, greater than 5 feet thick
 - - -47- - COAL BEDS, with a thickness of 3 to 5 feet
 - · - · -47- · - COAL BEDS, less than 3 feet thick
- Shale partings within these beds total less than 2 feet.

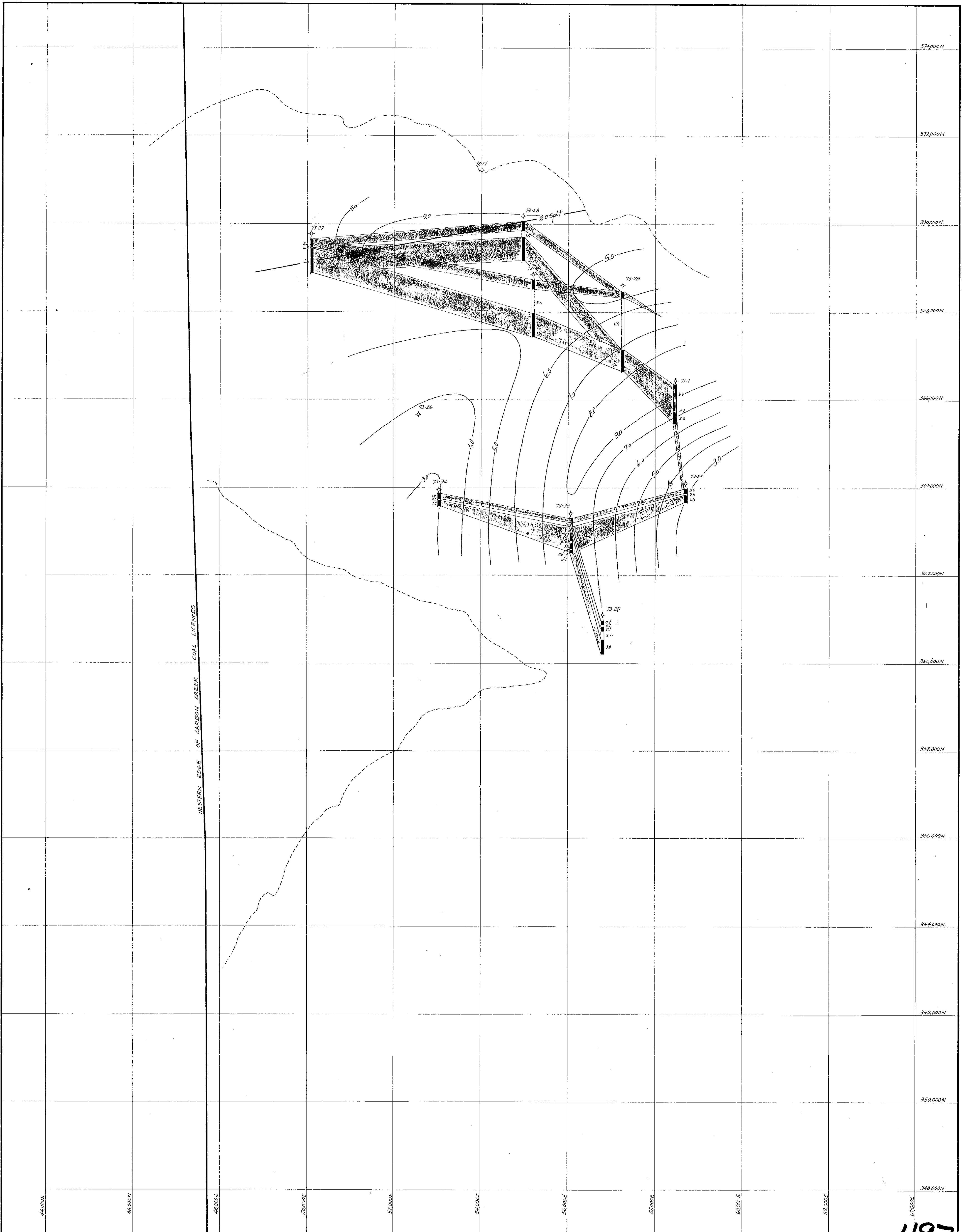
- 46 upper bench
46 lower bench
COAL BED, splitting to an upper and lower bench separated by a shale parting of 2 feet or greater.

- Drill hole lying on the vertical section plane
Seam thickness within the drillhole
- Drill hole plotted from in front to the vertical section plane
- Drill hole plotted from behind to the vertical section plane
- Fault
- Glacial drift
- Sand, gravel and boulders
valley alluvium and terraces.
- Sandstone



497

PR-CK 73(2)A



LEGEND

- COAL BED OUTCROP - (INDEFINITE)
- COAL BED SUBCROP UNDER VENEER OF GLACIAL DRIFT
- 8.0 COAL THICKNESS IN FEET
- 2.0 COAL BED SPLIT
- 73-33 DIAMOND DRILL HOLE

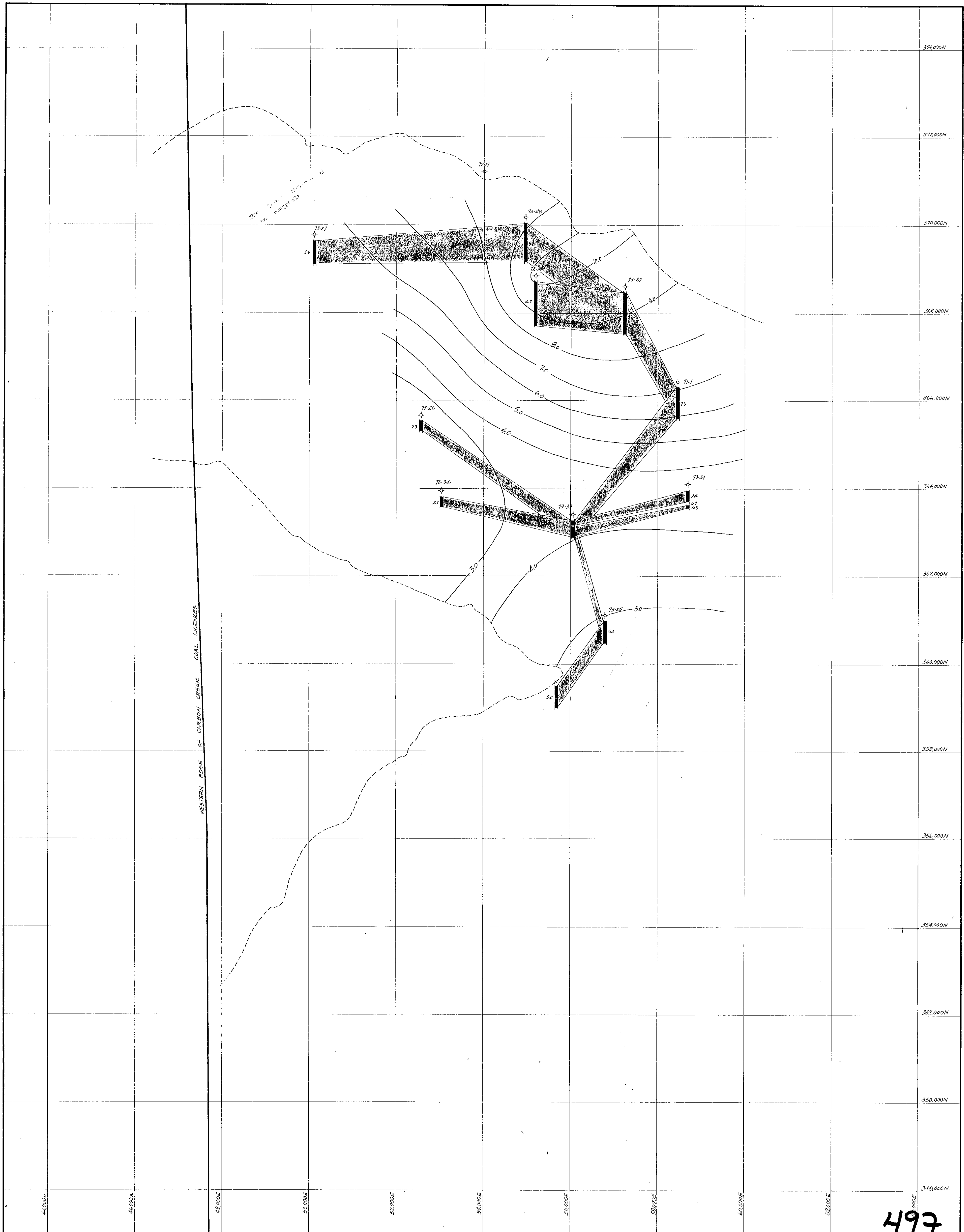
VERTICAL SCALE 1" = 10 FT.

PLATE 18

497

UTAH MINES LTD. MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT VANCOUVER BRITISH COLUMBIA		
CARBON CREEK COAL BASIN Bed No. 14 COAL ISOPACH WITH PANEL SECTION OF COAL BED		
Work by: <i>D.N. LeN</i>	Date: <i>Nov 23, 1973</i>	NTS Ref: <i>93 0/15E</i>
Drawn by: <i>D.N. LeN</i>	Revised:	MAP of
SCALE IN FEET		

PR-CKK 73(2)A



LEGEND

- COAL BED OUTCROP - (INDEFINITE)
- COAL BED SUBCROP, UNDER VENEER OF GLACIAL DRIFT
- 6.0 --- COAL THICKNESS IN FEET
- x OUTCROP, THICKNESS MEASURED
- ☆ 73-29 DIAMOND DRILL HOLE

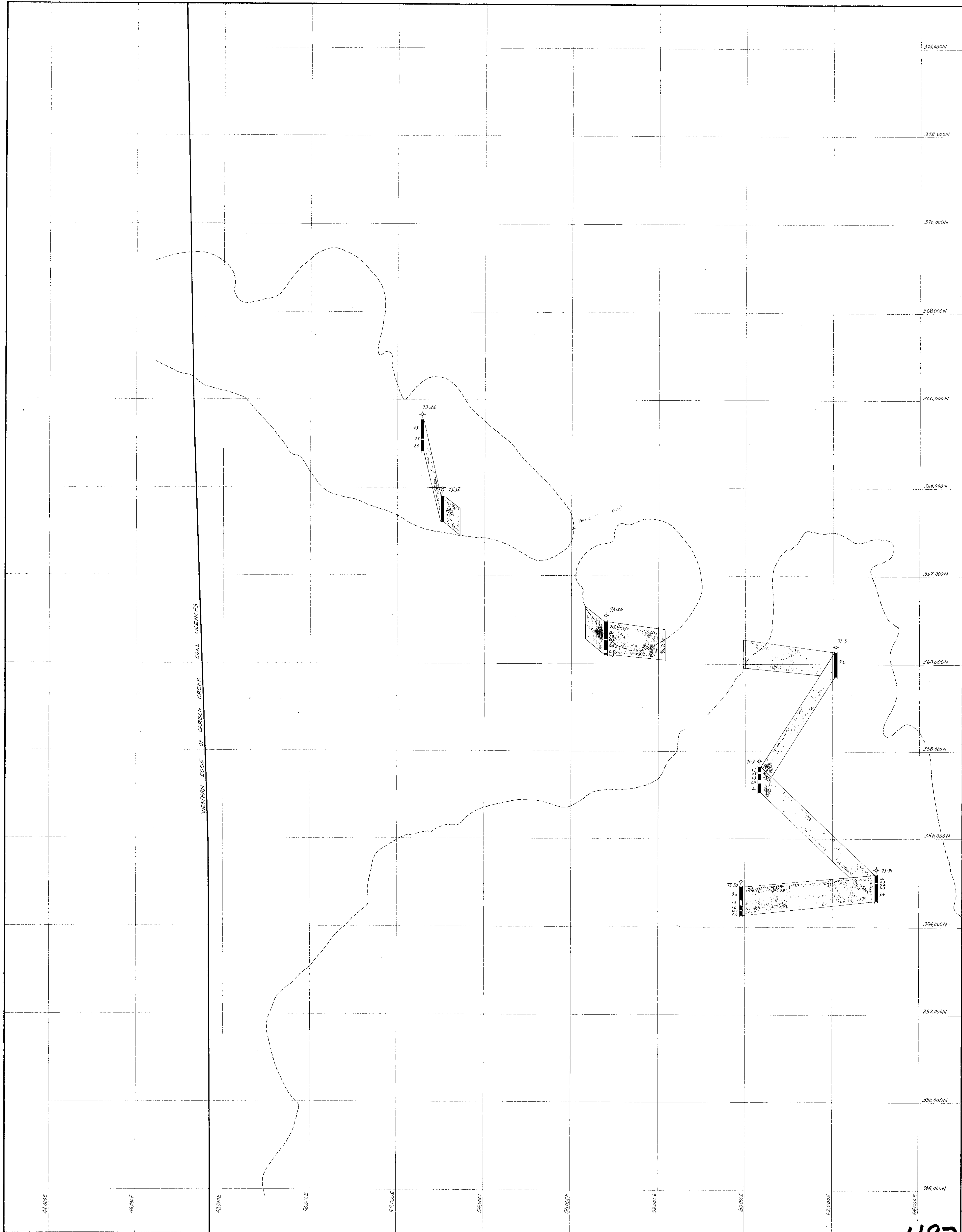
VERTICAL SCALE 1" = 10 FT.

PLATE 19

UTAH MINES LTD.		
MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT		
VANCOUVER BRITISH COLUMBIA		
CARBON CREEK COAL BASIN		
Bed No. 15		
COAL ISOPACH WITH PANEL SECTION OF COAL BED		
Work by: D.N. IeN.	Date: Nov. 23, 1973	NTS Ref. 93.0/5E
Drawn by: D.N. IeN.	Revised:	MAP of
SCALE IN FEET		

497

PR- cck 73(2)A



LEGEND

- COAL BED OUTCROP - (INDEFINITE)
- - - COAL BED SUBCROP, UNDER VENEER OF GLACIAL DRIFT
- ✦ 73-25 DIAMOND DRILL HOLE

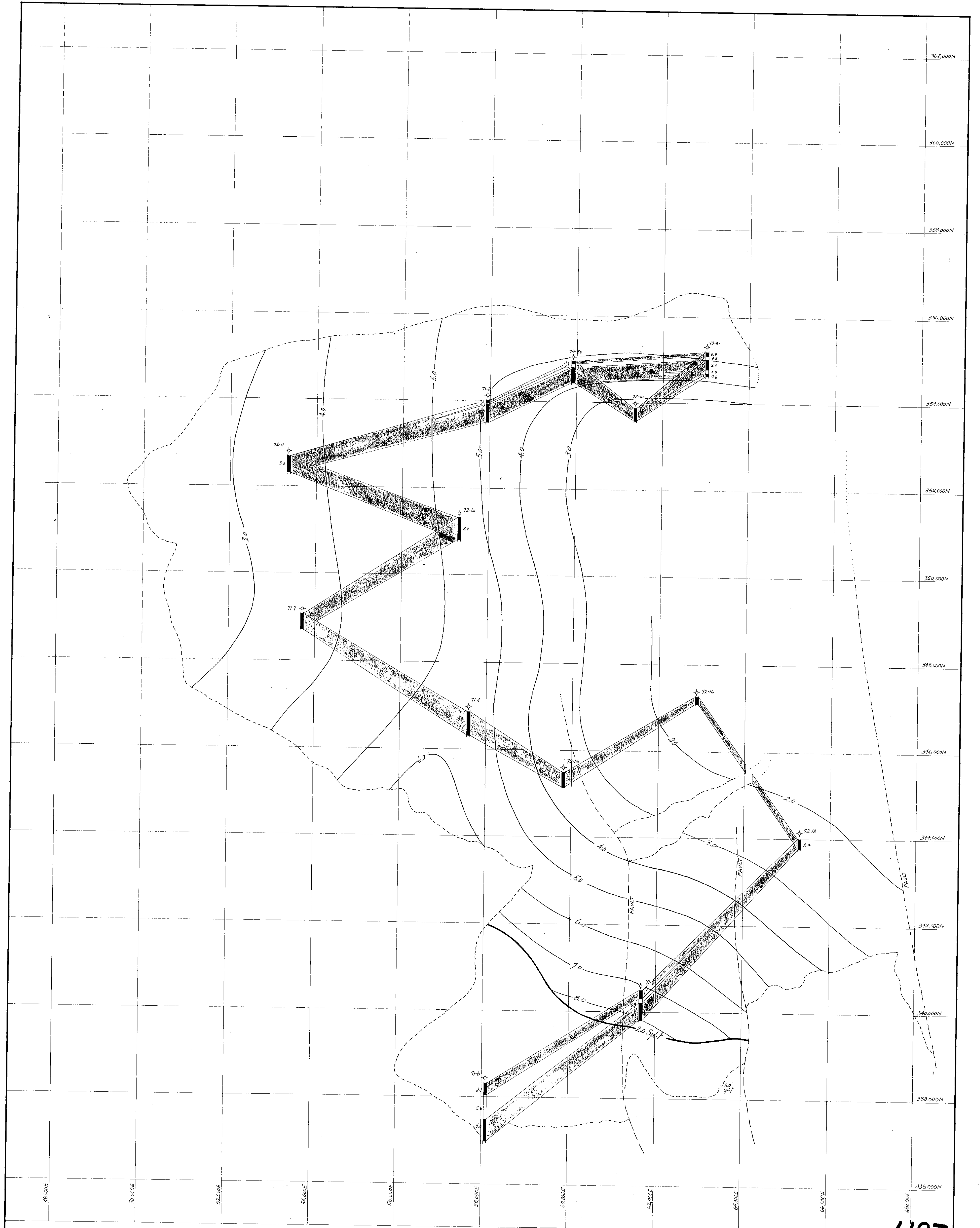
VERTICAL SCALE 1" = 10 FT.

PLATE 20

497

UTAH MINES LTD. MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT VANCOUVER BRITISH COLUMBIA		
CARBON CREEK COAL BASIN Bed No. 31		
COAL ISOPACH WITH PANEL SECTION OF COAL BED		
Work by <i>D.N.I.N.</i> Drawn by <i>D.N.I.N.</i>	Date <i>Nov. 21, 1973</i> Revised	NTS Ref <i>93 015E</i> MAP of
SCALE IN FEET 		

PR-CCK 73 (2) A



LEGEND

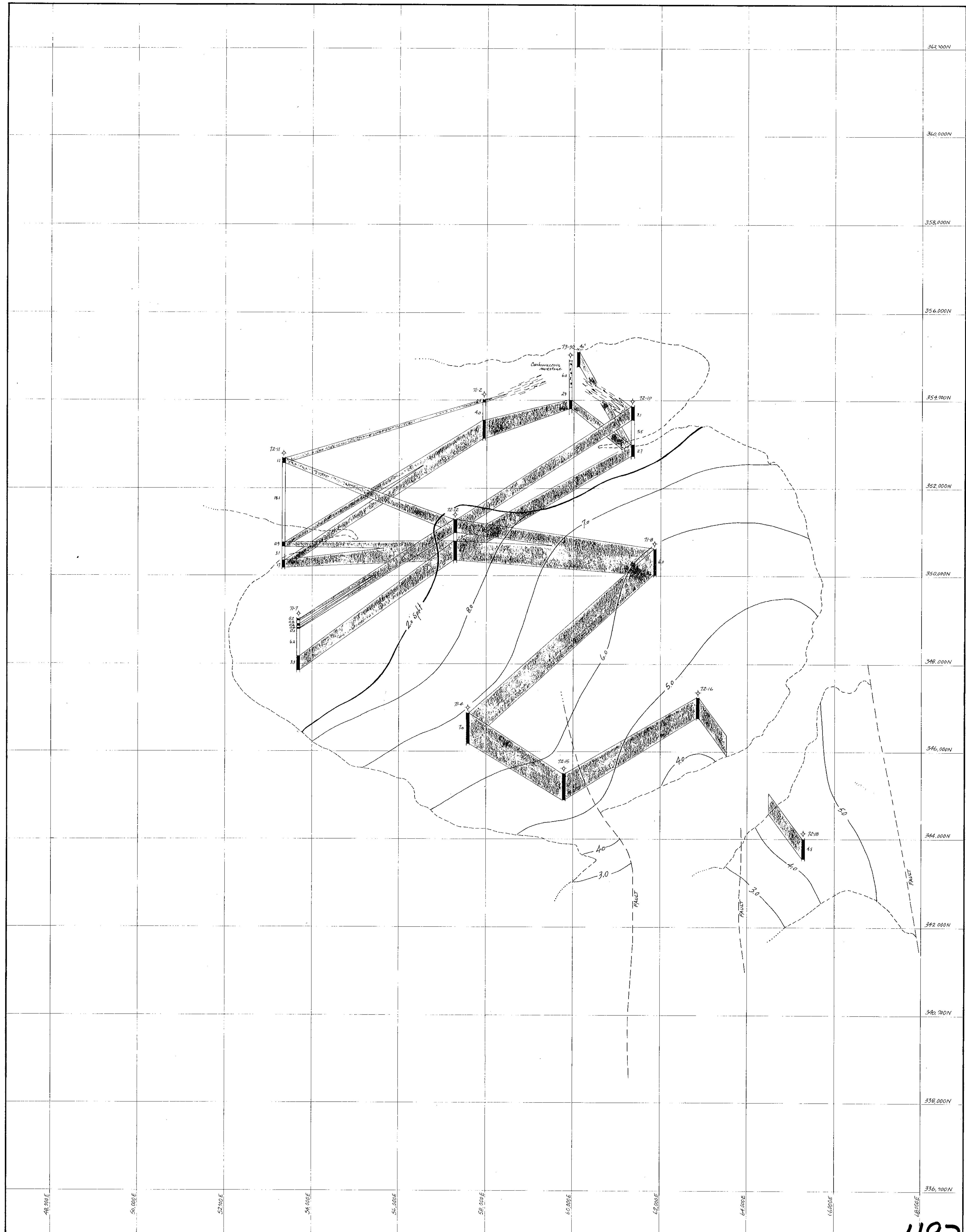
- COAL BED OUTCROP - (INDEFINITE)
- 8.0 COAL THICKNESS IN FEET
- 2.0 COAL BED SPLIT
- FAULT, DOTTED WHERE INDEFINITE
- ★ 72-15 DIAMOND DRILL HOLE

VERTICAL SCALE 1" = 10 FT.

PLATE 21

UTAH MINES LTD. MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT VANCOUVER BRITISH COLUMBIA		
CARBON CREEK COAL BASIN Bed No. 40		
COAL ISOPACH WITH PANEL SECTION OF COAL BED		
Work by: D.N./eN. Drawn by: D.N./eN.	Date: Nov. 21, 1973 Revised:	NTS Ref. 93 0/15E MAP of
SCALE IN FEET 0 1000 2000 3000		

PR- cck 73(c)A



LEGEND

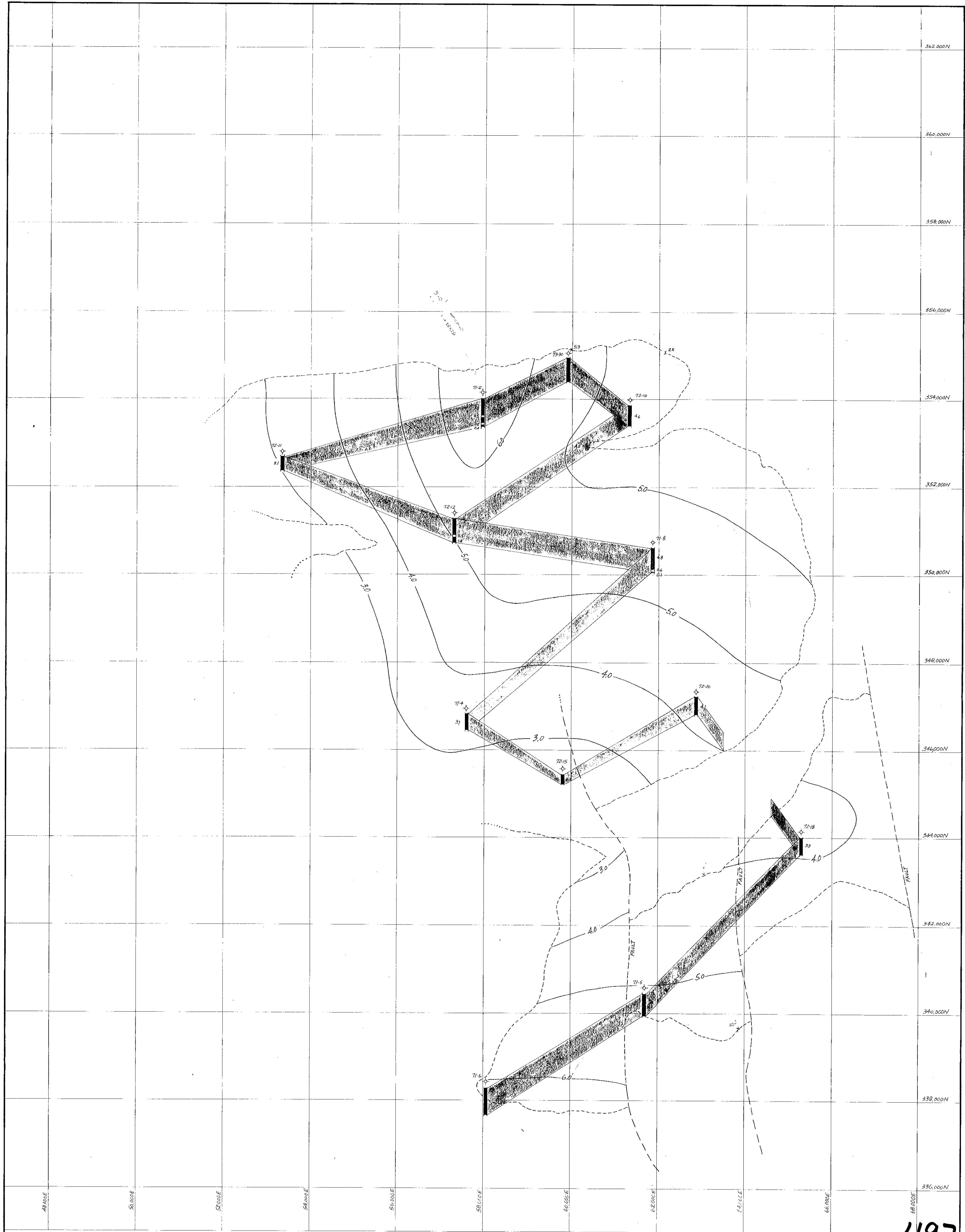
- COAL BED OUTCROP - (INDEFINITE)
- COAL BED SPLIT
- THICKNESS OF COAL BED 46 UP TO 2.0 FOOT SPLIT
- FAULT, DOTTED WHERE INDEFINITE
- OUTCROP, THICKNESS MEASURED
- 73-30 DIAMOND DRILL HOLE

VERTICAL SCALE 1" = 10 FT.

PLATE 22

UTAH MINES LTD.		
MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT		
VANCOUVER BRITISH COLUMBIA		
CARBON CREEK COAL BASIN		
Bed No. 46		
COAL ISOPACH WITH PANEL SECTION OF COAL BED		
Work by: D.N./eN	Date: Nov. 21, 1973	NTS Ref: 93 0/15E
Drawn by: D.N./eN	Revised:	MAP of
SCALE IN FEET		

PR-CLK 73(2)A



LEGEND

- COAL BED OUTCROP (INDEFINITE)
- 6.0 COAL BED THICKNESS IN FEET
- FAULT, DOTTED WHERE INDEFINITE
- x OUTCROP, THICKNESS MEASURED
- 73-30 DIAMOND DRILL HOLE

VERTICAL SCALE 1" = 10 FT.

PLATE 23

UTAH MINES LTD. MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT VANCOUVER BRITISH COLUMBIA		
CARBON CREEK COAL BASIN Bed No. 47		
COAL ISOPACH WITH PANEL SECTION OF COAL BED		
Work by: <i>D.N.R.N.</i> Drawn by: <i>D.N.R.N.</i>	Date: <i>Nov. 22, 1973</i> Revised:	NTS Ref: <i>93 0/15E</i> MAP of
SCALE IN FEET 0 1000 2000 3000		

PR-cek 73(2)A

UTAH MINES LTD.
DRILL & CORE LOG

HOLE NO. DOH 13-24

LOG BY: RJS WIGINGTON

LOG 87: R J S WILKINSON
JUNE 1 1973

ELEV: 2830'

ELEV: 364125

N 364125

NO. 1 SIZE: HQ (2 1/2")

MOLE SIZE: HY 22721

AIR ☐ WATER ☒

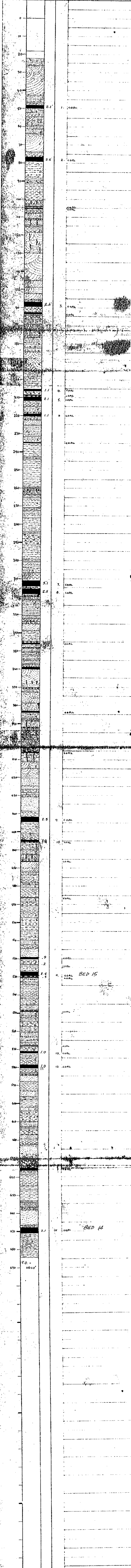
HOLE NO. 73-24

SECTION: CARBON CREEK

PROJECT: CARBON CREEK

LEASE. *C.L. 1744*

LITHOLOGY



LEGEND

- | | |
|------|---|
| | <i>Conglomerate</i> |
| | <i>Med. gr. sandstone</i> |
| | <i>V.f. - fine grain sandstone</i> |
| | <i>Silty sandstone</i> |
| | <i>Sandy siltstone</i> |
| | <i>Siltstone</i> |
| | <i>Muddy siltstone</i> |
| | <i>Silty mudstone</i> |
| | <i>Mudstone</i> |
| | <i>Carbonaceous mudstone</i> |
| | <i>Coal, coaly or carbonaceous debris</i> |
| | <i>Coaly streaks</i> |
| | <i>Coal</i> |
|
 | |
| | <i>Small cross-beds</i> |
| | <i>Large cross-beds</i> |
| | <i>Contorted bedding</i> |
| | <i>Pelecypods</i> |
| | <i>Burrows</i> |

BED 15

BED 14

497

PR - CLK 73(3)A

NOTES

UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-25

OG BY D.N. 12N

DATE June 7 1973

ELEV 3170'

N 361 100

E 56825

HOLE SIZE 1 1/2" (2 1/2")

AIR ☐ WATER ☒

T.O. 898 P.D.

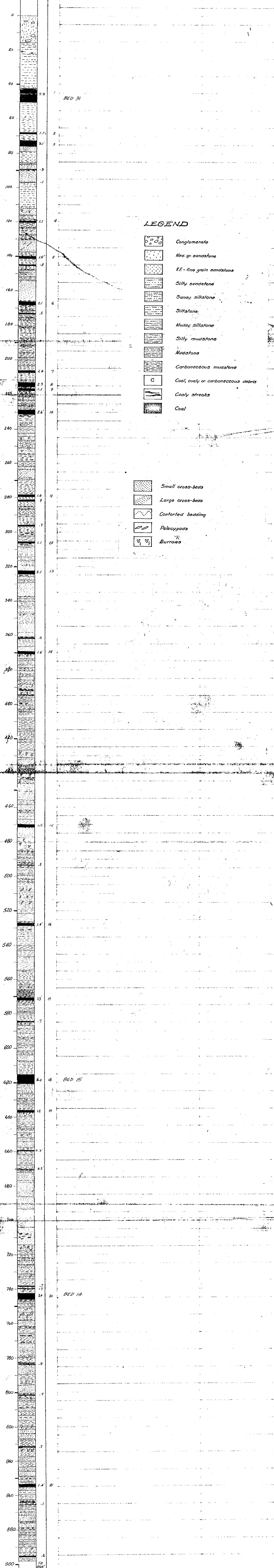
HOLE NO. 73-25

PROJECT CARBON CREEK

LEASE C.L. 114B

SEC. T R

REC	DEPTH	THICK	SPACE	UNIT	LITHOLOGY
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UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-26

HOLE NO. 73-26

LOG BY: D.N. N.

ELEV: 3700

HOLE SIZE: HQ (2 1/2")

PROJECT: CARBON CREEK

DATE: JUNE 12, 1973

N 365,650

AIR ☐ WATER ☒

LEASE 328

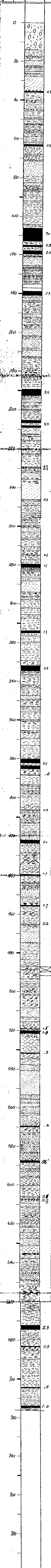
E 52575

TD 716 PD

SEC T R

LITHOLOGY

497



BED 31

LEGEND

- Conglomerate
- Med. gr. sandstone
- V.F. fine grain sandstone
- Silty sandstone
- Sandy siltstone
- Siltstone
- Muddy siltstone
- Silty mudstone
- Mudstone
- Carbonaceous mudstone
- Coal, coaly or carbonaceous debris
- Coaly streaks
- Coal

- Small cross-beds
- Large cross-beds
- Contorted bedding
- Pelecypods
- Burrows

BED 15

TOTAL DEPTH 716'

PR-CCK 73(3)A

HOLE NO.

UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-27

LOG BY D. S. Fullerton

DATE 14 June 1973

ELEV 3680

N 369,800

E 50,100

HOLE SIZE: 4 1/2" (2 1/2")

AIR ☐ WATER ☒

TD 656 PD

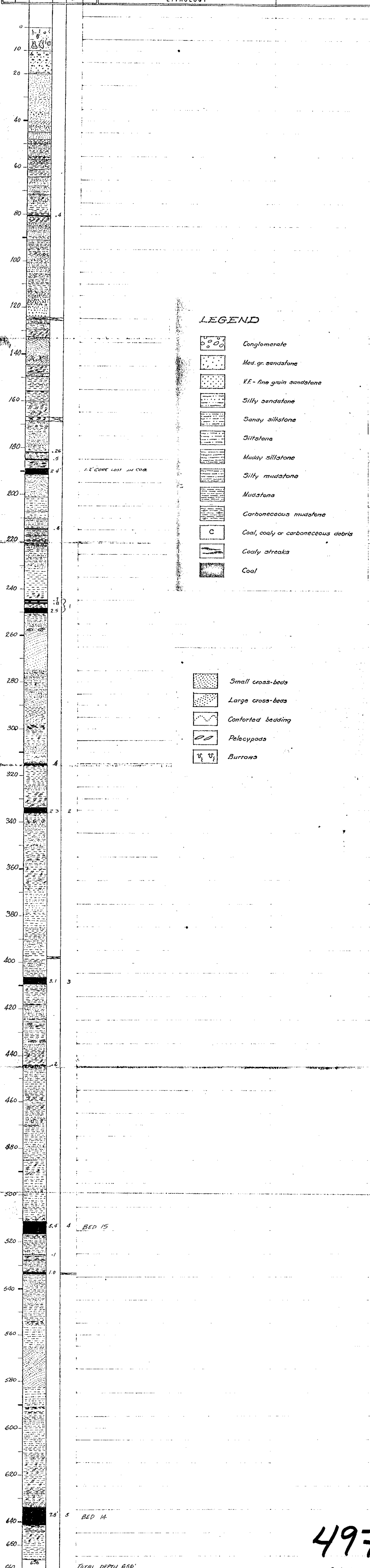
HOLE NO. 73-27

PROJECT CARBON CREEK

LEASE C.L. 1739

SEC T R

#	REC	DEPTH	STRIP LOG	THICK	SAMPLE NO.	LITHOLOGY
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497

PR-CCK 73(3)A

HOLE NO.

UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-28

LOG BY: D.S. Fullerton

DATE: 17 June 1913

ELEV. 2780

N 370,080

E 54825

HOLE SIZE: HQ (2 1/2")

AIR ☐

WATER ☒

T.D.

P.O.

HOLE NO. 73-28

PROJECT: CARBON CREEK

LEASE: C.L. 1740

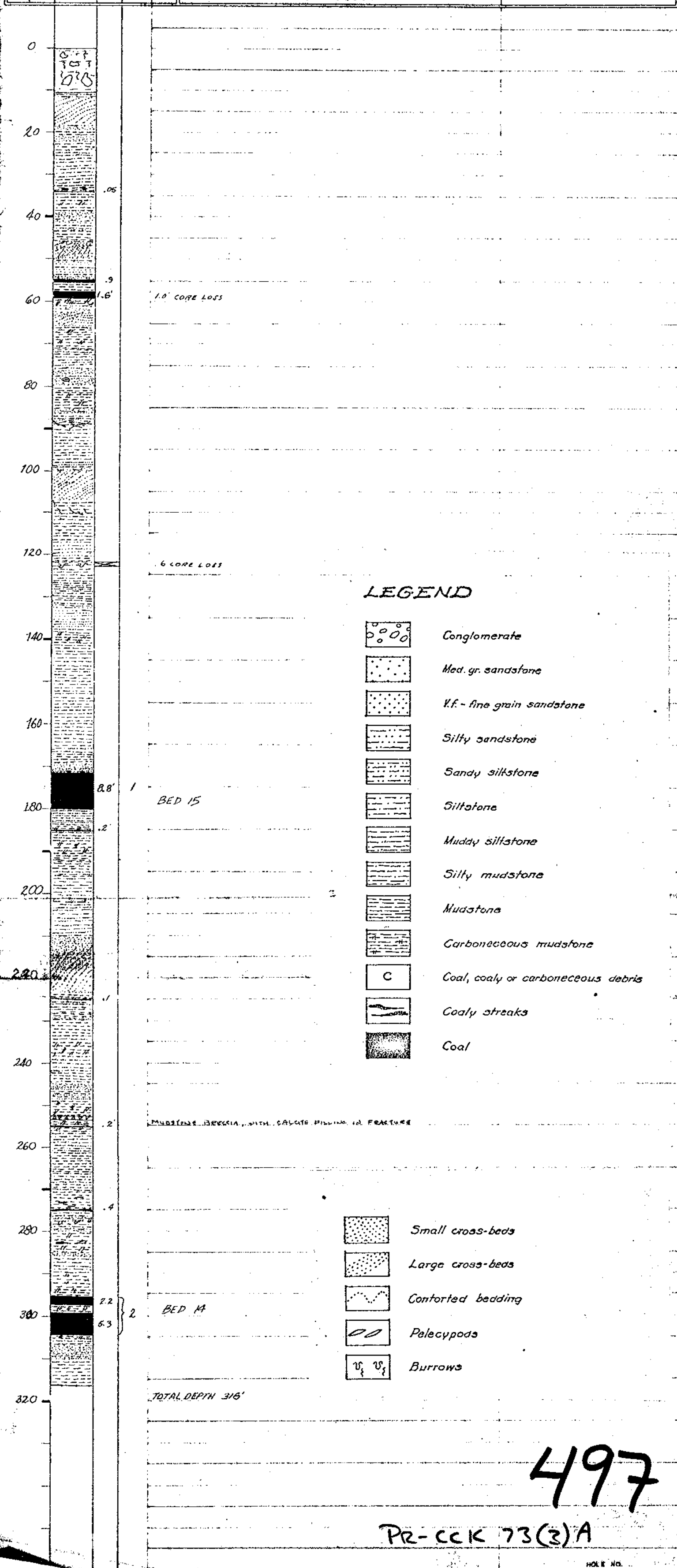
SEC.

T.

R.

% REC	DEPTH	STRIP LOG	THICK	SAMPLE NO.
-------	-------	-----------	-------	------------

LITHOLOGY



497

PR-CCK 73(3)A

HOLE NO.

UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-29

LOG BY D.N. LeN

DATE JUNE 19, 1973

ELEV 2520

N 368750

E 57250

HOLE SIZE HG (2 1/2")

AIR ☐ WATER ☒

TD 375 PD

HOLE NO. 73-29

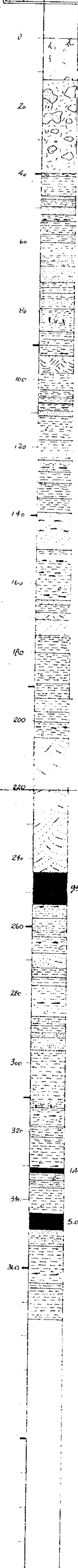
PROJECT CARBON CREEK

LEASE CL 1740

SEC T R

N° REC	DEPTH	STRIP LOG	THICK	SAMPLE NO
--------	-------	-----------	-------	-----------

LITHOLOGY



LEGEND

- Conglomerate
- Med. gr. sandstone
- kf - fine grain sandstone
- Silty sandstone
- Sandy siltstone
- Siltstone
- Muddy siltstone
- Silty mudstone
- Mudstone
- Carbonaceous mudstone
- Coal, coaly or carbonaceous debris
- Coaly streaks
- Coal

- Small cross-beds
- Large cross-beds
- Contorted bedding
- Pelecypods
- Burrows

497

PR-CCK 73(3)A

TOTAL DEPTH 375'

PR-CCK 73(3)A

HOLE NO.

HOLE NO. 73-30

HOLE NO. 73-30

PROJECT: CARBON CREEK

LEASE: #326

LITHOLOGY

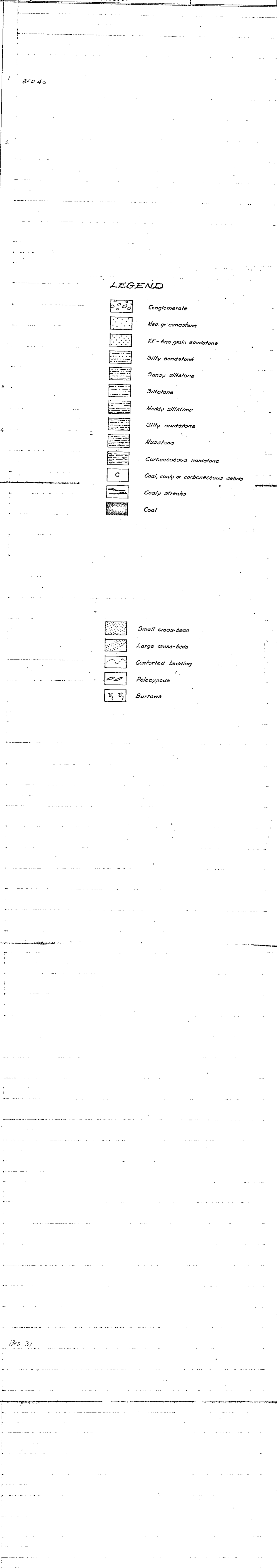


Figure 1. Schematic representation of the experimental design. The subjects were divided into two groups: a control group and an experimental group. The control group received a standard training program, while the experimental group received a training program with a focus on the specific skills required for the task. The results of the training program were compared between the two groups.

497

PR-CCK 73(3)A

UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-31

LOG BY D.N. McN. & R.G.A.

DATE JUNE 26 1973

ELEV 3050

N 355.200

E 62.950

HOLE SIZE 4 1/2" (2 1/2")

AIR ☐ WATER ☒

T.D. 576 PD

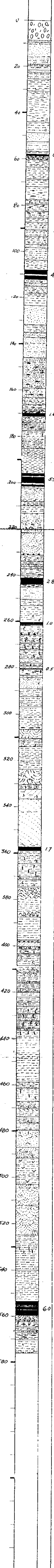
HOLE NO. 73-31

PROJECT CARBON CREEK

LEASE 325

SEC T R

REC	DEPTH	STRIP LOG	THICK	SAMPLE NO.	LITHOLOGY
-----	-------	-----------	-------	------------	-----------



0.01, 0.0, 0.00, 0.00

0.6

coal/mudstone

4.3

1.6

5.5

BED 40

2.8

1.0

0.5

1.7

6.0

BED 31

T.D. 576

LEGEND

- Conglomerate
- Med. gr. sandstone
- V.F. - fine grain sandstone
- Silty sandstone
- Sandy siltstone
- Siltstone
- Muddy siltstone
- Silty mudstone
- Mudstone
- Carbonaceous mudstone
- Coal, cnaly or carbonaceous debris
- Coaly streaks
- Coal

- Small cross-beds
- Large cross-beds
- Contorted bedding
- Paleocypods
- Burrows

497

PR- CCK 73(3) A

HOLE NO.

UTAH MINES LTD. DRILL & CORE LOG

HOLE NO. 73-34

LOG BY: DN 16N

DATE: AUGUST 2, 1973

ELEV. 3780

N 363.875

E 53.125

HOLE SIZE HQ (2 1/2')

AIR ☐

WATER ☒

T.D. 766

P.D.

HOLE NO. 73-34

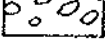
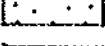
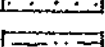
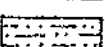
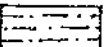
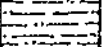
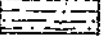
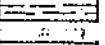
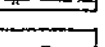
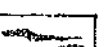
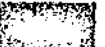
PROJECT: CARBON CREEK

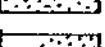
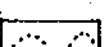
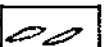
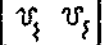
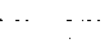
LEASE: 328

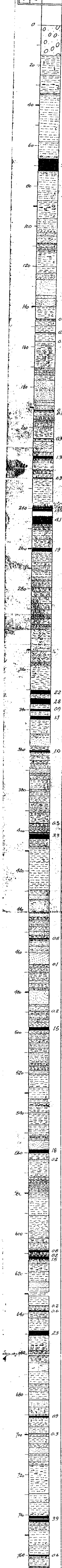
SEC. T. R.

LITHOLOGY

LEGEND

-  Conglomerate
-  Med. gr. sandstone
-  V.f. - fine grain sandstone
-  Silty sandstone
-  Sandy siltstone
-  Siltstone
-  Muddy siltstone
-  Silty mudstone
-  Mudstone
-  Carbonaceous mudstone
-  Coal, coaly or carbonaceous debris
-  Coaly streaks
-  Coal

-  Small cross-beds
-  Large cross-beds
-  Contorted bedding
-  Pelecypoda
-  Burrows



39.0 - 39.8 FAULT GOUGE 50° C.A.

59 1 COAL BED 31

13 2

210 3

260 4

22 5

28 6

09 7

17 7

360 10

43 8

33 8

BITUMINOUS MUD 422.2 - 423.6

05

01

15 9

18 10

02

08 11

02 15

02

06

23 12 BED 15

39 13 BED 14

TOTAL DEPTH 766'

497

PR - CCK 73(3)A

HOLE NO.

Widco[®] WELL LOG

COMPANY UTAH MINES LTD.AREA CARBON CREEK COAL BASINWELL 73-24COUNTY PEACE RIVER AREA STATE BRITISH COLUMBIA

COORDINATES:

N 364125E 56725ELEVATION: 2630

D.F.

K.B.

G.L. 2630COMPANY UTAH MINES LTD.
WELL 73-24
LOCATION CARBON CREEK COAL BASIN

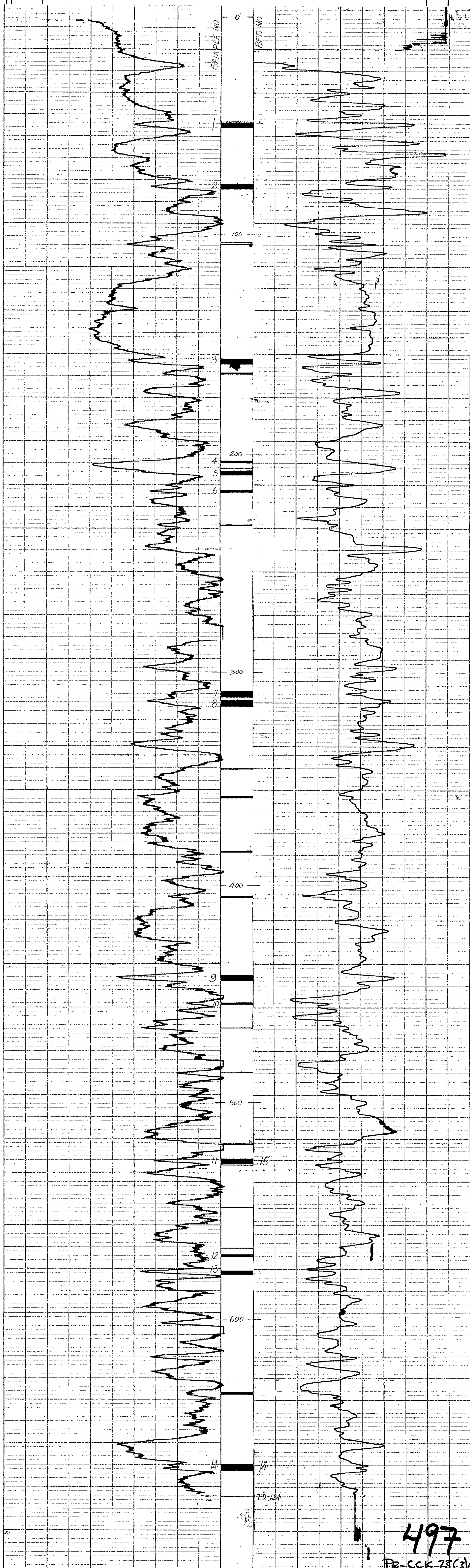
	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date	<u>June 1, 1973</u>		Nature		
First Reading	<u>0</u>		Density		
Last Reading	<u>0.61</u>		Viscosity	@ F	@ F
Footage Logged			Resistivity	@ F	@ F
Bottom (Driller)			Res. @ BHT	@ F	@ F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size			Logged by	<u>D. Wightman</u>	
Bit Size			Witnessed by	<u>N. Le Noble</u>	

REMARKS

* Reg. U.S. Pat. Off.

GALVA RT 100
SCALE = 1.00 OHM/IN
2.50-SLIPSRESISTIVITY LOG
SCALE = 100 OHMS

FO 139



Widco WELL LOG

COMPANY STAN MINES LTD.

AREA CARBON CREEK COAL BASIN

WELL 73-25

COUNTY ELACU RIVER AREA STATE BRITISH COLUMBIA

COORDINATES:

N 3° 11' 00"

E 5° 03' 12"

ELEVATION: 3176'

O.F.

X.B.

G.L. 3170'

COMPANY STAN MINES LTD.
WELL 73-25
LOCATION CARBON CREEK COAL BASIN

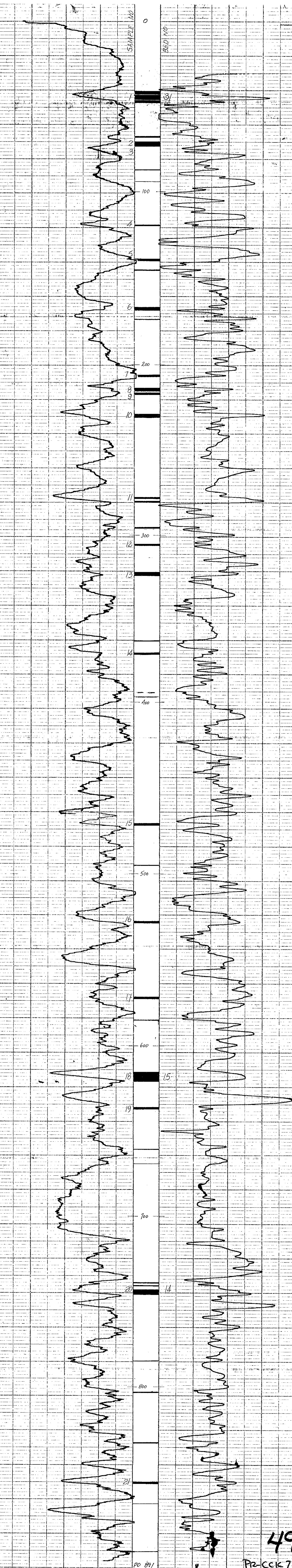
	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date	<u>JUL 2, 1972</u>		Nature		
First Reading	<u>0</u>		Density		
Last Reading	<u>6538</u>		Viscosity	<u>@</u> F	<u>@</u> F
Footage Logged			Resistivity	<u>@</u> F	<u>@</u> F
Bottom (Driller)			Res. @ BHT	<u>@</u> F	<u>@</u> F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size					
			Logged by	<u>D.N. J. NOLAN</u>	
			Witnessed by	<u>D. WIGINGTON</u>	

REMARKS

GAMMA RAY LOG
SCALE 0.10 BK/GR
3 VC-NECS

RESISTIVITY LOG
SCALE = 100 OHMS

FO-139



PD 891
DD 898

497
PR-CEK 73(3)A

Widco*

WELL LOG

COMPANY STEEL RINGS LTD.

AREA CARBON CREEK COAL BASIN

WELL 73-20

COUNTY LEASCH RIVER AREA STATE ILLINOIS COALFIELD

COORDINATES:

N. 35.50'

E. 11.71'

ELEVATION: 2700

D.F.

K.B.

G.L. 2700

COMPANY STEEL RINGS LTD.
WELL 73-20
LOCATION CARBON CREEK COAL FIELD

Date June 12, 1953
First Reading 0
Last Reading 716
Footage Logged
Bottom (Driller)
Casing (From Log)
Casing (Driller)
Casing Size
Bit Size
Bit Size

Run No. 1

Run No. 2

MUD

Nature
Density
Viscosity
Resistivity
pH
Circ. Temp.
B.H. Temp.

Run No. 1

Run No. 2

Logged by D.W. LeNoble
Witnessed by

REMARKS

* Reg. U.S. Pat. Off.

GALVA RAY LOG

SCALE = 1010 OHMS/IN

3 TC-2028

RESISTIVITY LOG

SCALE = 100 OHMS

FO-139

SAMPLE NO.

BED NO.

0

100

200

300

400

500

600

700

TOTAL
DEPTH
716

497

WELL LOG

COUNTY BEAVER RIVER AREA STATE BRITISH COLUMBIA

D.F. _____
K.B. _____

COMPANY UYAL NINES, LTD.
WELL 73-27
LOCATION CARBON CREEK COAL, 3A

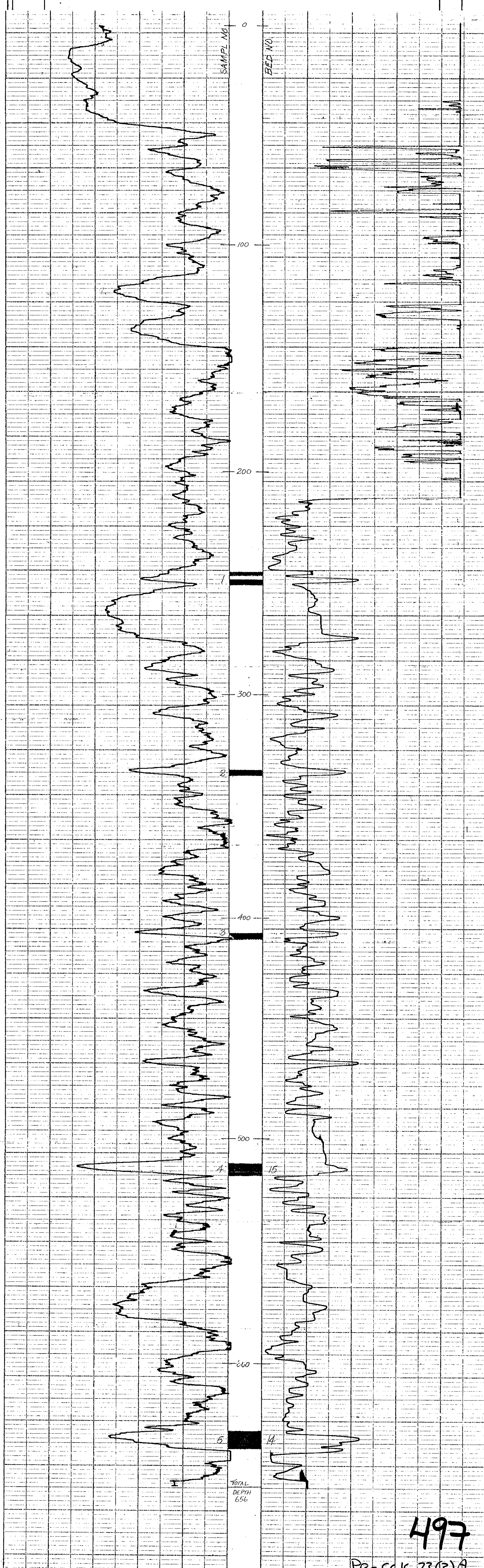
	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date June 16, 1973			Nature		
First Reading 0			Density		
Last Reading 656			Viscosity	@ °F	@ °F
Footage Logged			Resistivity	@ °F	@ °F
Bottom (Driller)			Res. @ BHT	@ °F	@ °F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size:					
Bit Size:					
			logged by	D.S. Fullerton	

REMARKS

* Reg. U.S. Pat. Off.

CAMERA RAY LOG:

RESISTIVITY 100



PO-6016-73(2)A

Widco*

WELL LOG

COMPANY DEAL MINES LTD.
AREA CARBON CREEK COAL BASIN
WELL 73-28
COUNTY PLACER RIVER AREA STATE

COORDINATES:
N 370989
E 51822
ELEVATION: 2760
D.F.
K.B.
G.L. 2760

COMPANY DEAL MINES LTD.
WELL 73-28
LOCATION CARBON CREEK COAL BASIN

	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date <u>17th JUNE, 1973</u>			Nature		
First Reading <u>0</u>			Density		
Last Reading <u>110</u>			Viscosity	@ °F	@ °F
Footage Logged			Res. @ BHT	@ °F	@ °F
Bottom (Driller)			pH		
Casing (From Log)			Circ. Temp.		
Casing (Driller)			B.H. Temp.		
Casing Size					
Bit Size:					
Bit Size:					
			Logged by <u>D.J. Fullerton</u>		
			Witnessed by		

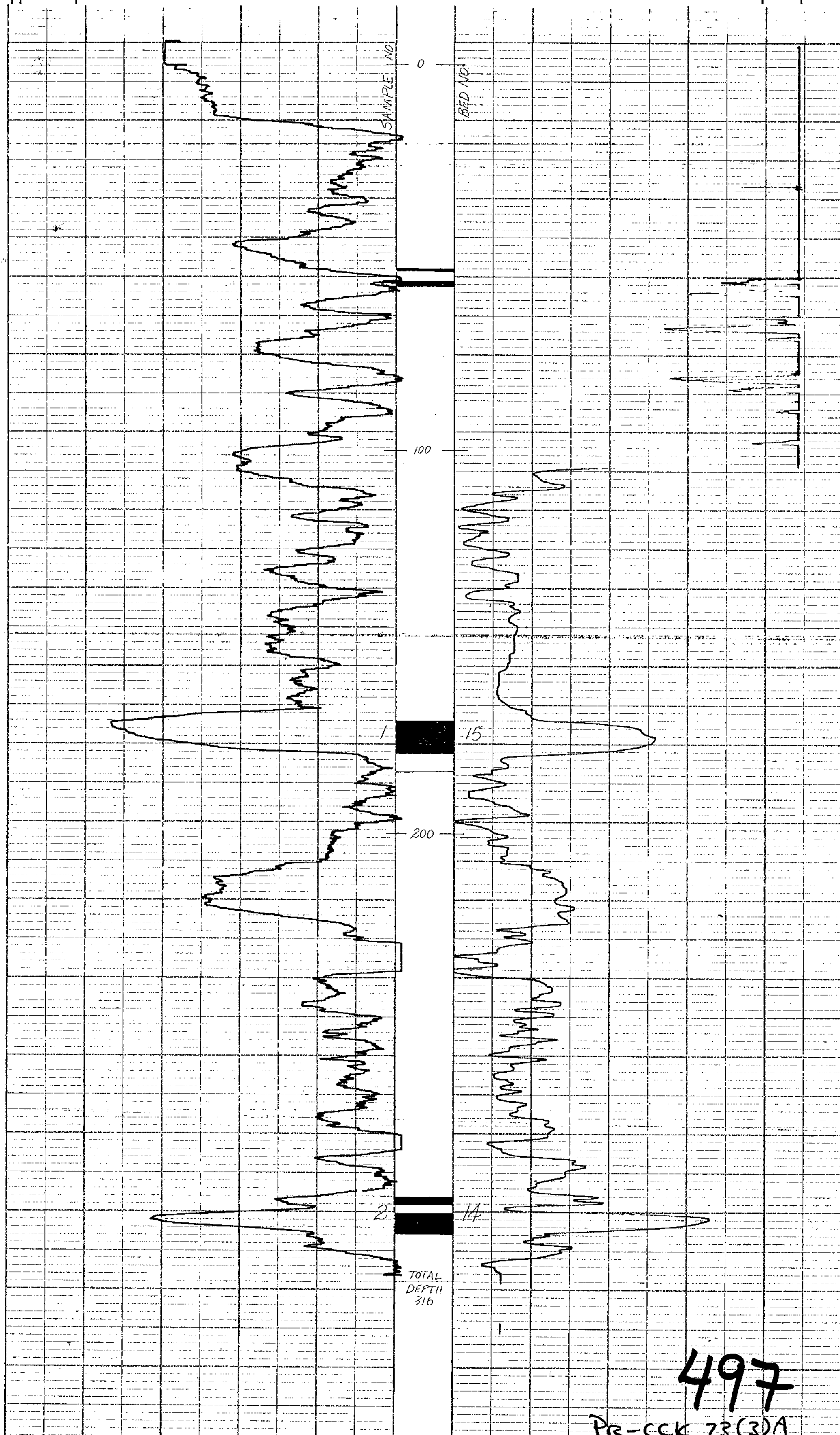
REMARKS

* Reg. U.S. Pat. Off.

GRAPHIC SCALE
SCALE = 1000 OHMS
3 INCHES

RESISTIVITY LOG
SCALE = 200 OHMS

FO.139



MADE IN U.S.A.

CHART NO. 102

WIDCO DIVISION OF BEARHART OWEN INDUSTRIES, FORT WORTH, TEXAS

MADE IN U.S.A.

CHART NO. 102

WES. FORT WORTH, TEXAS

WELL LOG

COMPANY UTAH MINES LTD.
WELL 73-29
LOCATION CARBON CREEK COAL BAS

COMPANY UTAH MINES LTD.
AREA CARBON CREEK COAL BASIN
WELL 73-29
COUNTY PLACE RIVER AREA STATE BRITISH COLUMBIA

COORDINATES: _____
N 368750'
E 57250'
ELEVATION: 3520'
D.F. _____
K.B. _____
G.L. 3520'

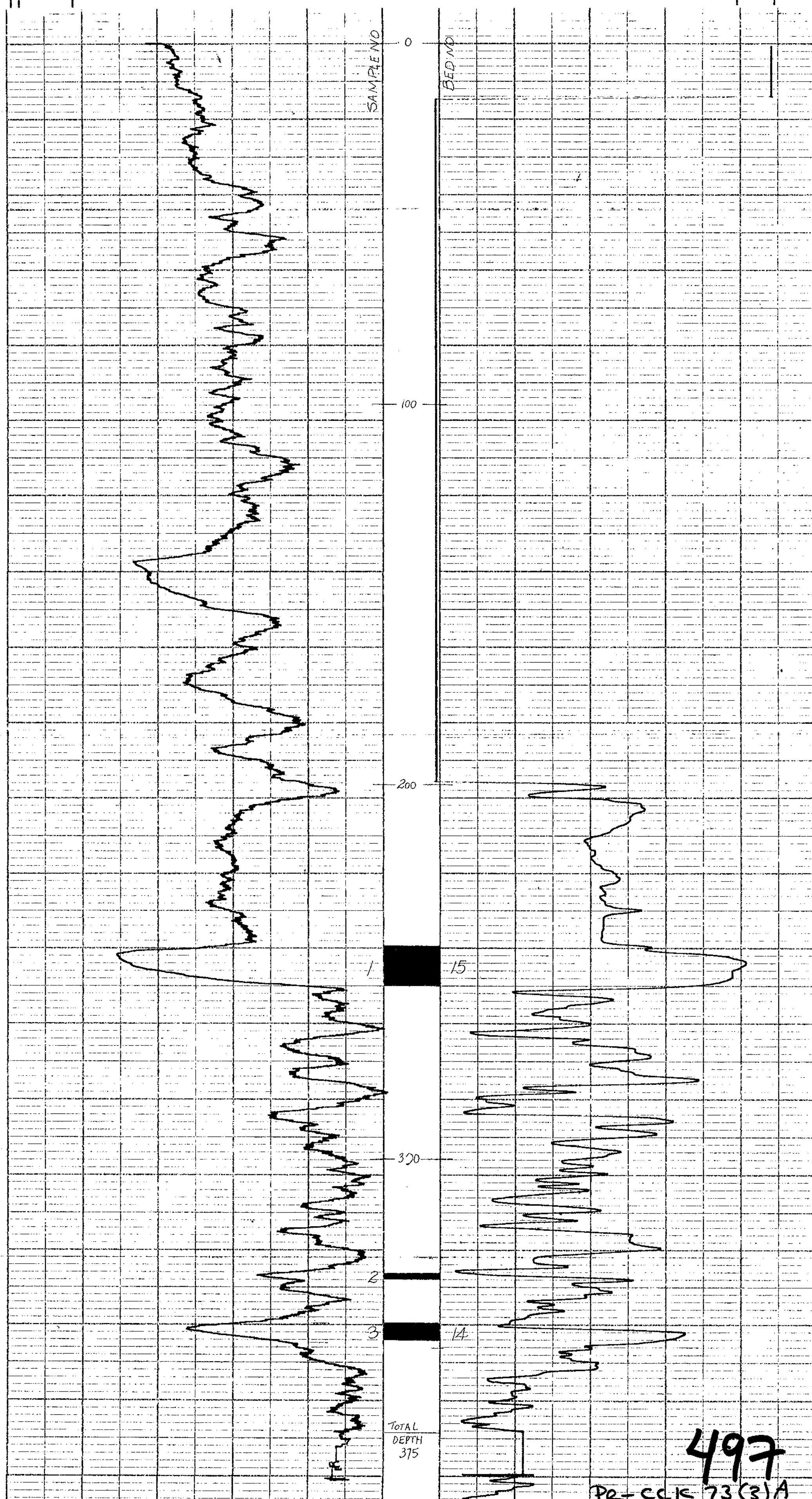
	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date 19th Jan., 1973			Nature		
First Reading 6			Density		
Last Reading 375			Viscosity	@ °F	@ °F
Footage Logged			Resistivity	@ °F	@ °F
Bottom (Driller)			Res. @ BHT	@ °F	@ °F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size:					
Bit Size:					
			Logged by		
			Witnessed by		

REMARKS

* Reg. U.S. Pat. Off.

GAMMA RAY LOG

SCALE = 0.00 MP/EE

RESISTIVITY LOG
SCALE 100 OHMS

Widco[®] WELL LOG

COMPANY UTAH MINES LTD.
AREA CARBON CREEK COAL BASIN
WELL 73-30
COUNTY PLACER RIVER AREA STATE BRITISH COLUMBIA

COORDINATES:
N. 355000
E. 59980
ELEVATION: 3505'
D.F.
K.B.
G.L. 3305'

COMPANY UTAH MINES LTD.
WELL 73-30
LOCATION CARBON CREEK COAL BASIN

	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date <u>23rd June, 1973</u>			Nature		
First Reading <u>0</u>			Density		
Last Reading <u>746</u>			Viscosity	@ °F	@ °F
Footage Logged			Resistivity	@ °F	@ °F
Bottom (Driller)			Res. @ BHT	@ °F	@ °F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size					
Bit Size					
			Logged by <u>D.N. Le Goff</u>		
			Witnessed by		

REMARKS

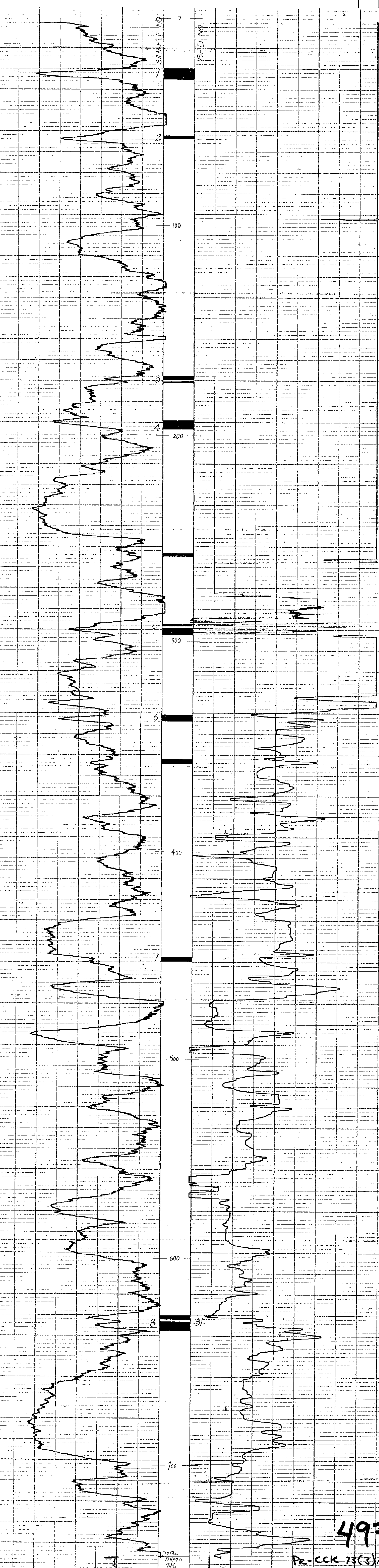
GAMMA RAY LOG

SCALE: 1.010 MH/HR
1 TC-5000

RESISTIVITY LOG

SCALE: 100 OHMS

FO-129



497

PR-CCK 73(3)A

Widco*

WELL LOG

COMPANY UTAH MINES LTD.
AREA CARBON CREEK COAL BASIN
WELL 73-31
COUNTY PEACE RIVER AREA STATE BRITISH COLUMBIA

COORDINATES:
N 355200
E 62950
ELEVATION: 3050'
D.F. _____
K.B. _____
G.L. 3050'

COMPANY UTAH MINES LTD.
WELL 73-31
LOCATION CARBON CREEK COAL BASIN

	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date <u>26 Feb. 1973</u>			Nature		
First Reading <u>0</u>			Density		
Last Reading <u>576</u>			Viscosity	@ °F	@ °F
Footage Logged			Resistivity	@ °F	@ °F
Bottom (Driller)			Res. @ BHT	@ °F	@ °F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size:					
Bit Size:					
			logged by <u>P.N. 10-103-1</u>		
			Witnessed by		

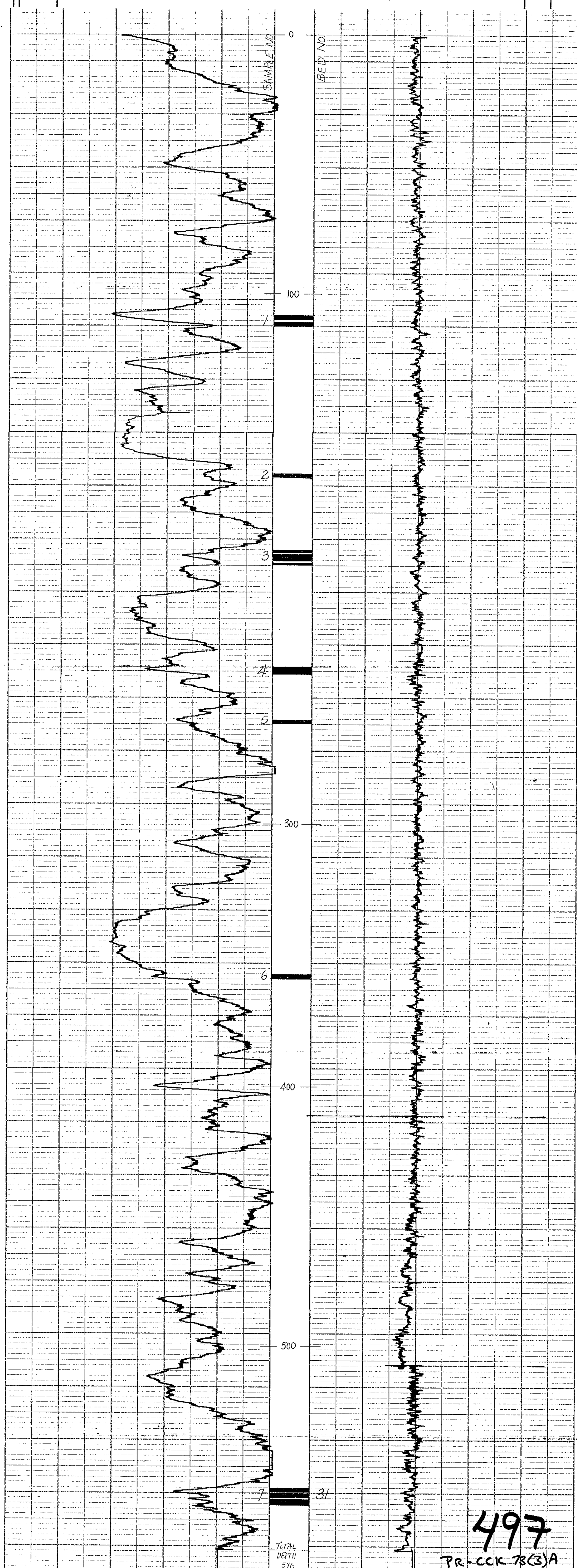
REMARKS

* Reg. U.S. Pat. Off.

GARMA RAY LOG
SCALE - 1010 MK/HR
3 TC-5000

RESISTIVITY LOG
SCALE - 100 OHMS

FO-139



Widco^{*} WELL LOG

COMPANY UTAH MINES LTD.
AREA CARBON CREEK COAL BASIN
WELL 73-33
COUNTY PEACE RIVER AREA STATE BRITISH COLUMBIA

COORDINATES:
N. 363185'
E. 56100'
ELEVATION: 3320'
D.F.
K.B.
G.L. 3320'

COMPANY UTAH MINES LTD.
WELL 73-33
LOCATION CARBON CREEK COAL BASIN

	Run No. 1	Run No. 2	HUD	Run No. 1	Run No. 2
Date <u>29th July, 1973</u>			Nature		
First Reading <u>0</u>			Density		
Last Reading <u>702</u>			Viscosity	@ °F	@ °F
Footage Logged			Res. @ BHT	@ °F	@ °F
Bottom (Driller)			pH		
Casing (From Log)			Circ. Temp.		
Casing (Driller)			B.H. Temp.		
Casing Size					
Bit Size:					
Bit Size:					
			Logged by <u>D.N. Le Nobel</u>		
			Witnessed by <u>T. Maciejewski</u>		
			<u>L. Gustafson</u>		

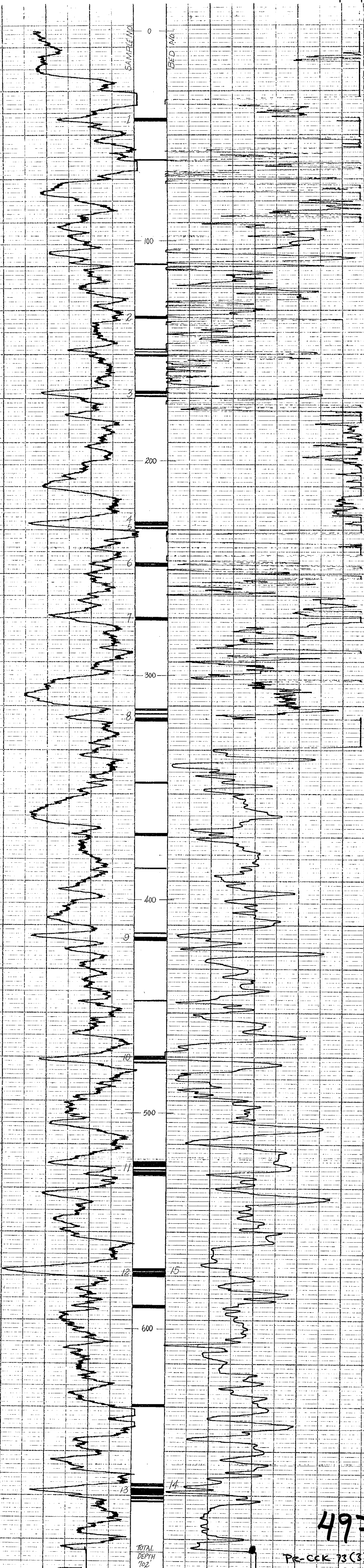
REMARKS:

* Reg. U.S. Pat. Off.

GAMMA RAY LOG
SCALE = .010 MK/HR
3 TC-SECS

RESISTIVITY LOG
SCALE = 100 OHMS

FO-129



TOTAL DEPTH 702

497

PE-CEK 73(3)A

Widco[®] WELL LOG

COMPANY UTAH MINES, LTD.
AREA CARBON CREEK COAL BASIN
WELL 73-34
COUNTY PLACE RIVER AREA STATE BRITISH COLUMBIA

COORDINATES:
N. 363475'
E. 53125'
ELEVATION: 3730'
D.F. _____
K.B. _____
G.L. 3760'

COMPANY UTAH MINES, LTD.
WELL 73-34
LOCATION CARBON CREEK COAL BASIN

	Run No. 1	Run No. 2	MUD	Run No. 1	Run No. 2
Date <u>2nd Aug., 1973</u>			Nature		
First Reading <u>0</u>			Density		
Last Reading <u>76.6</u>			Viscosity	@ °F	@ °F
Footage Logged			Resistivity	@ °F	@ °F
Bottom (Driller)			Res. @ BHT	@ °F	@ °F
Casing (From Log)			pH		
Casing (Driller)			Circ. Temp.		
Casing Size			B.H. Temp.		
Bit Size:					
			Logged by <u>S. K. Nobel</u>		
			Witnessed by <u>L. Guenther</u>		

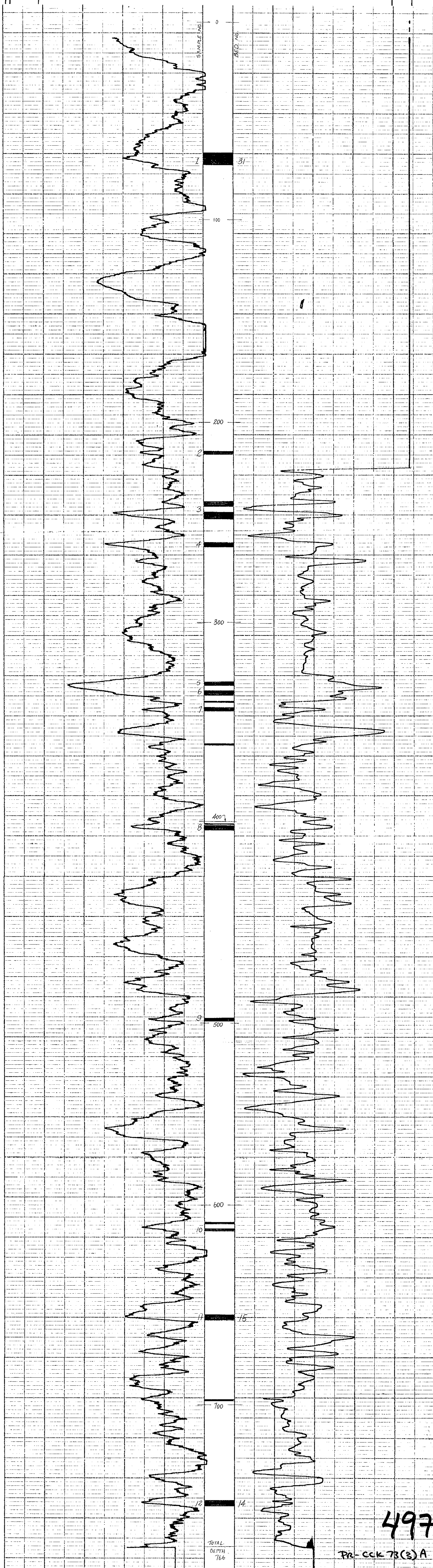
REMARKS

* Reg. U.S. Pat. Off.

GAMMA RAY LOG
SCALE = 1010 MR/HR
3 TC-SECS.

RESISTIVITY LOG
SCALE = 100 OHMS

FO-139



CONFIDENTIAL
CONFIDENTIAL

APPENDIX A

TABLE 1

CARBON CREEK COAL

Hole No. 73-24

Head Analysis

HOLE NO: 73-24
 LOCATION: 58.725E x 364, 125N
 ELEVATION: 2,830 feet
 LICENCE NO: C.L. 1744

Air Dry Basis

Sample No.	Footage	No. Of Feet	% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	47.8-49.9	2.1	1.90	25.58	0.87	21.63	50.89	10680	2 1/2
2	76.6-79.0	2.4	1.47	14.11	1.06	26.06	58.36	12721	8 1/2
3	156.6-159.2	2.6	2.15	7.07	0.74	23.18	67.60	13419	1/2
4	205.0-206.1	1.1	1.41	4.57	0.86	26.25	67.77	14343	7 1/2
5	209.5-211.6	2.1	1.42	7.15	0.73	21.41	70.02	14070	2 1/2
6	219.0-220.1	1.1	1.19	31.20	0.87	32.02	35.59	9414	2 1/2
7	311.0-314.1	3.1	1.24	44.01	0.65	19.80	34.95	7918	5 1/2
8	315.9-318.4	2.5	1.56	16.60	0.71	20.36	61.48	12504	2 1/2
9	441.7-444.6	2.9	1.33	11.56	0.75	20.98	66.13	13305	3 1/2
10	454.5-455.6	1.1	1.01	16.12	1.06	28.47	54.40	12235	8
11	526.9-529.3	2.4	1.16	10.92	0.81	22.80	65.12	13742	7 1/2
12	571.0-572.0	1.0	1.05	37.36	0.60	18.64	42.95	9337	8
13	578.4-580.3	1.9	1.22	11.99	0.83	24.01	62.78	13351	7 1/2
14	667.7-670.8	3.1	1.00	34.72	0.72	17.45	46.83	9803	6 1/2

15
(1-2)23
(7-50)80
7-120
18-2550
25-706
2-8

TABLE 1CARBON CREEK COALHole No. 73-24Head Analysis

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	26.08	0.89	22.05	51.87	10887
2	14.32	1.08	26.45	59.23	12911
3	7.23	0.76	23.69	69.08	13714
4	4.64	0.87	26.63	68.73	14548
5	7.25	0.74	21.72	71.03	14273
6	31.58	0.88	32.41	36.01	9527
7	44.56	0.66	20.05	35.39	8017
8	16.86	0.72	20.68	62.46	12702
9	11.72	0.76	21.26	67.02	13484
10	16.28	1.07	28.76	54.96	12360
11	11.05	0.82	23.07	65.88	13903
12	37.76	0.61	18.84	43.40	9436
13	12.14	0.84	24.31	63.55	13516
14	35.07	0.73	17.63	47.30	9902

TABLE 2
CARBON CREEK COAL

Hole No. 73-25

Head Analysis

HOLE NO: 73-25
LOCATION: 56,825E x 361,100N
ELEVATION: 3,170 Feet
LICENCE NO: C.L. 1748

Air Dry Basis

Sample No.	Footage	Feet	% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	42.7- 50.5	7.8	1.63	28.63	0.66	23.53	46.21	10335	3 1/2
2	67.9- 69.0	1.1	1.03	35.30	1.41	26.25	37.42	9099	5
3	72.9- 76.0	3.1	1.07	40.50	0.65	19.73	38.70	8665	3 1/2
4	119.1-120.2	1.1	2.06	12.43	0.82	21.60	63.91	12600	0
5	140.0-141.5	1.5	1.58	52.76	0.83	17.35	28.31	6713	2
6	166.2-168.3	2.1	1.26	29.14	0.99	22.72	46.88	10451	7
7	206.0-207.4	1.4	1.28	20.81	1.19	24.15	53.76	11672	7
8	213.1-215.4	2.3	1.09	23.88	0.81	23.02	52.01	11264	8 1/2
9	216.4-217.5	1.1	1.12	19.01	0.93	25.54	54.33	12120	9
10	228.8-231.4	2.6	1.12	9.88	1.01	22.72	66.28	13002	2 1/2
11	278.1-279.7	1.6	1.57	6.94	0.93	25.45	66.04	14048	2 1/2
12	305.3-306.4	1.1	1.02	29.32	0.72	20.22	49.44	10531	2 1/2
13	322.3-324.4	2.1	1.17	10.82	0.97	26.49	61.52	13358	8 1/2
14	369.0-370.6	1.6	1.04	10.07	0.93	23.70	65.19	13484	2
15	469.8-471.3	1.5	1.02	9.24	0.95	23.23	66.51	13661	2
16	527.0-528.4	1.4	1.13	28.43	0.78	21.71	48.73	10437	3
17	570.8-572.1	1.3	0.86	11.96	1.38	28.87	58.31	13213	9
18	615.5-620.5	5.0	1.46	16.82	1.00	21.92	59.80	12340	4
19	636.0-637.2	1.2	1.10	52.10	0.55	15.87	30.93	6994	3
20	742.6-746.0	3.4	1.21	13.06	0.63	21.04	64.69	13102	2 1/2
21	854.8-856.2	1.4	0.99	8.40	0.68	22.64	67.97	13959	9

TABLE 2
CARBON CREEK COAL

Hole No. 73-25

Head Analysis

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	29.10	0.67	23.92	46.98	10506
2	35.67	1.42	26.52	37.81	9194
3	40.94	0.66	19.94	39.12	8759
4	12.69	0.84	22.05	65.26	12865
5	53.61	0.84	17.63	28.76	6821
6	29.51	1.00	23.01	47.48	10584
7	21.08	1.21	24.46	54.46	11823
8	24.14	0.82	23.28	52.58	11388
9	19.23	0.94	25.83	54.94	12257
10	9.99	1.02	22.98	67.03	13149
11	7.05	0.94	25.86	67.09	14272
12	29.62	0.73	20.43	49.95	10640
13	10.95	0.98	26.80	62.25	13516
14	10.18	0.94	23.95	65.87	13626
15	9.33	0.96	23.47	67.20	13802
16	28.75	0.79	21.93	49.29	10556
17	12.06	1.39	29.12	58.82	13328
18	17.07	1.01	22.24	60.69	12523
19	52.68	0.56	16.05	31.27	7072
20	13.22	0.64	21.30	65.48	13262
21	8.48	0.69	22.87	68.65	14099

TABLE 3CARBON CREEK COALHole No. 73-26Head Analysis

HOLE NO: 73-26
LOCATION: 52,575E x 365,650N
ELEVATION: 3,700 feet
LICENCE NO: Lease 328

Sample No.	Footage	No. Of Feet	Air Dry Basis						
			% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	106.0-113.0	7.0	1.74	38.62	0.45	20.78	38.86	8675	2
2	189.4-192.9	3.5	1.83	26.56	0.59	20.63	50.98	10686	2 1/2
3	205.2-209.1	3.9	1.53	41.50	0.54	18.51	38.46	8493	2 1/2
4	279.7-281.4	1.7	1.58	19.17	0.71	22.59	56.66	11751	2 1/2
5	331.7-334.6	2.9	1.52	22.95	0.77	21.71	53.82	11232	3
6	380.1-385.3	5.2	1.55	38.31	0.47	17.15	42.99	8865	2
7	421.9-423.9	2.0	1.89	4.52	0.81	23.75	69.84	14333	2 1/2
8	519.1-521.9	2.8	1.41	41.30	0.50	18.25	39.04	8588	3
9	672.2-674.5	2.3	1.65	8.10	0.81	25.20	65.05	13921	9

TABLE 3CARBON CREEK COALHole No. 73-26Head Analysis

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	39.30	0.46	21.15	39.55	8829
2	27.06	0.60	21.01	51.93	10885
3	42.14	0.55	18.80	39.06	8625
4	19.48	0.72	22.95	57.57	11954
5	23.30	0.78	22.05	54.65	11405
6	38.91	0.48	17.42	43.67	9005
7	4.61	0.83	24.21	71.18	14609
8	41.89	0.51	18.51	39.60	8711
9	8.24	0.82	25.62	66.14	14155

TABLE 4CARBON CREEK COALHole 73-27Head Analysis

HOLE NO: 73-27
 LOCATION: 50,100E x 369,800N
 ELEVATION: 3,680 feet
 LICENCE NO: C.L. 1739

Air Dry Basis

<u>Sample No.</u>	<u>Footage</u>	<u>No. Of Feet</u>	<u>% H₂O</u>	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>	<u>FSI</u>
1	244.6-248.6	4.0	1.41	41.41	0.40	23.92	33.26	7605	2
2	333.7-336.0	2.3	1.43	5.93	0.76	26.04	66.60	14413	9
3	406.6-409.7	3.1	1.38	12.21	0.62	24.06	62.35	13154	3
4	511.2-516.6	5.4	1.48	22.77	0.46	20.72	55.03	11447	2 1/2
5	633.9-641.7	7.8	1.27	28.05	0.35	21.67	49.01	10790	2 1/2

Dry Basis

<u>Sample No.</u>	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	42.00	0.41	24.26	33.74	7714
2	6.02	0.77	26.42	67.56	14622
3	12.38	0.63	24.40	63.22	13338
4	23.11	0.47	21.03	55.86	11619
5	28.41	0.35	21.95	49.64	10929

TABLE 5

CARBON CREEK COALHole No. 73-28Head Analysis

HOLE NO: 73-28
 LOCATION: 54,825E x 370,080N
 ELEVATION: 2,780 feet
 LICENCE NO: C.L. 1740

Sample No.	Footage	No. Of Feet	Air Dry Basis						
			% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	171.2-180.0	8.8	2.30	6.47	0.43	22.90	68.33	13624	2
2	(295.3-297.5	2.2	1.36	40.15	0.36	15.17	43.32	8776	2
	(299.0-304.3	5.3							

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	6.62	0.44	23.44	69.94	13945
2	40.70	0.36	15.38	43.92	8897

TABLE 6.CARBON CREEK COALHole No. 73-29Head Analysis

HOLE NO: 73-29
LOCATION: 57,250E x 368,750N
ELEVATION: 2,520 feet
LICENCE NO: C.L. 1740

Sample No.	Footage	No. Of Feet	Air Dry Basis						
			% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	243.9-253.4	9.5	1.39	5.62	0.32	21.29	71.70	14458	4
2	330.5-331.9	1.4	1.26	7.89	0.68	23.43	67.44	14069	7
3	343.8-348.8	5.0	1.49	8.59	0.54	18.97	70.95	14266	2

Sample No.	Dry Basis					
	% Ash	% S	% VM	% FC	Btu	
1	5.70	0.32	21.59	72.71	14662	
2	7.98	0.69	23.72	68.30	14249	
3	8.72	0.55	19.26	72.02	14482	

TABLE 7CARBON CREEK COALHole No. 73-30Head Analysis

HOLE NO: 73-30
LOCATION: 59,980E x 355,000N
ELEVATION: 3,305 feet
LICENCE NO: Lease 326

Sample No.	Footage	No. Of Feet	Air Dry Basis						
			% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	24.0- 29.5	5.5	3.10	10.32	1.02	23.41	63.17	12680	2 1/2
2	56.4- 58.3	1.9	2.94	4.71	0.95	25.55	66.80	13660	2 1/2
3	172.5-176.0	3.5	2.13	41.15	0.74	18.77	37.95	8266	2 1/2
4	192.9-196.9	4.0	1.88	18.02	2.37	25.39	54.21	11981	4
5	291.9-296.9	5.0	1.88	30.40	0.90	23.10	44.62	9934	3 1/2
6	337.0-339.8	2.8	2.46	7.25	0.88	24.93	65.36	13492	2
7	451.2-452.9	1.7	1.47	10.41	1.61	27.64	60.48	13112	8 1/2
8	627.7-634.2	6.5	1.56	33.29	0.94	22.50	42.65	9627	5

TABLE 7

CARBON CREEK COAL

Hole No. 73-30

Head Analysis

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	10.65	1.05	24.16	65.19	13086
2	4.85	0.98	26.33	68.82	14074
3	42.05	0.76	19.18	38.77	8446
4	18.36	2.42	26.39	55.25	12211
5	30.98	0.92	23.54	45.43	10124
6	7.43	0.90	25.56	67.01	13832
7	10.57	1.63	28.05	61.38	13308
8	33.82	0.95	22.86	43.32	9780

TABLE 8

CARBON CREEK COALHole No. 73-31Head Analysis

HOLE NO.: 73-31
 LOCATION: 62,950E x 355,200N
 ELEVATION: 3,050 feet
 LICENCE NO: Lease 325

Sample No.	Footage	No. Of Feet	Air Dry Basis						
			% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	107.8-112.1	4.3	1.64	25.01	1.02	30.82	42.53	9204	2
2	169.7-171.3	1.6	1.79	16.20	1.30	29.07	52.94	12138	7
3	195.7-201.2	5.5	1.91	32.82	1.10	22.20	43.07	9564	4 1/2
4	241.1-243.9	2.8	2.20	2.32	0.71	26.19	69.29	13499	2 1/2
5	260.4-261.4	1.0	1.73	7.78	3.08	30.72	59.77	13450	9
6	357.2-358.9	1.7	1.44	6.35	2.70	29.92	62.29	13367	9
7	453.4-459.4	6.0	1.52	29.04	1.60	25.08	44.36	10264	6

TABLE 8

CARBON CREEK COALHole No. 73-31Head Analysis

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	25.43	1.04	31.33	43.24	9357
2	16.50	1.32	29.60	53.90	12359
3	33.46	1.12	22.63	43.91	9750
4	2.37	0.73	26.78	70.85	13803
5	7.92	3.13	31.26	60.82	13687
6	6.44	2.74	30.36	63.20	13562
7	29.49	1.62	25.47	45.04	10422

TABLE 9

CARBON CREEK COALHole No. 73-33Head Analysis

HOLE NO: 73-33
 LOCATION: 56,100E x 363,185N
 ELEVATION: 3,320 feet
 LICENCE NO: Lease 328

Sample No.	Footage	No. Of Feet	Air Dry Basis						
			% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	43.1-44.8	1.7	1.99	6.96	0.81	23.15	67.90	13329	2
2	134.0-135.0	1.0	2.01	4.90	1.11	26.64	66.45	14094	8 1/2
3	168.4-169.7	1.3	1.77	3.34	0.89	27.04	67.85	14400	9
4	228.0-230.0	2.0	2.00	2.25	0.76	26.24	69.51	14444	3
5	230.6-231.7	1.1	1.88	6.34	0.64	25.62	66.16	13985	6
6	247.0-248.7	1.7	1.65	13.45	0.71	24.02	60.88	12855	3
7	273.4-275.4	2.0	1.37	17.26	0.85	25.79	55.58	12300	9
8	317.4-319.0	1.6	1.73	11.13	0.80	24.16	62.98	13084	2
9	417.2-420.3	3.1	1.59	10.25	0.84	23.88	64.28	13428	4
10	473.9-475.6	1.7	1.92	14.92	0.66	21.42	61.74	12436	2
11	522.0-528.3	6.3	1.54	27.56	0.63	18.88	52.02	10725	2
12	570.9-574.6	3.7	1.72	9.29	0.70	25.00	63.99	13405	2
13	670.3-678.2	7.9	1.36	17.12	0.73	23.21	58.31	12358	4 1/2

TABLE 9CARBON CREEK COALHole No. 73-33Head Analysis

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	7.10	0.83	23.62	69.28	13600
2	5.00	1.13	27.19	67.81	14383
3	3.40	0.91	27.53	69.07	14659
4	2.30	0.78	26.78	70.92	14739
5	6.46	0.65	26.11	67.43	14253
6	13.68	0.72	24.42	61.90	13071
7	17.50	0.86	26.15	56.35	12471
8	11.33	0.81	24.59	64.08	13314
9	10.42	0.85	24.27	65.31	13645
10	15.21	0.67	21.84	62.95	12679
11	27.99	0.64	19.18	52.83	10893
12	9.45	0.71	25.44	65.11	13640
13	17.36	0.74	23.53	59.11	12528

TABLE 10

CARBON CREEK COAL

Hole No. 73-34

Head Analysis

HOLE NO: 73-34
 LOCATION: 53,125E x 363,875N
 ELEVATION: 3,780 feet
 LICENCE NO: Lease 328

Air Dry Basis

Sample No.	Footage	No. Of Feet	% H ₂ O	% Ash	% S	% VM	% FC	Btu	FSI
1	66.6-72.5	5.9	1.75	19.46	1.08	27.27	51.52	11582	6
2	214.1-215.4	1.3	1.50	8.86	1.01	31.19	58.45	13522	9
3	239.0-247.9	8.9	1.77	19.76	1.33	25.89	52.58	11678	6 1/2
4	259.8-261.7	1.9	1.87	4.72	0.91	29.42	63.99	14126	8 1/2
5	330.1-332.3	2.2	1.79	4.03	0.62	26.71	67.47	14168	2
6	334.3-337.1	2.8	1.82	13.22	0.50	27.76	57.20	12733	4 1/2
7	343.1-344.8	1.7	1.59	12.25	0.69	30.23	55.93	12738	7 1/2
8	400.8-404.1	3.3	1.65	24.75	0.62	21.19	52.41	10976	2
9	497.7-499.2	1.5	1.95	7.23	0.82	23.35	67.47	13682	2
10	558.2-560.0	1.8	1.55	14.09	1.42	27.27	57.09	12180	3
11	611.2-612.7	1.5	1.79	6.16	0.78	24.58	67.47	13903	5
12	648.5-650.8	2.3	1.57	4.47	0.81	24.02	69.94	14174	2
13	740.5-744.4	3.9	1.42	38.13	0.57	18.47	41.98	9158	4

TABLE 10CARBON CREEK COALHole No. 73-34

<u>Sample No.</u>	<u>Dry Basis</u>				
	<u>% Ash</u>	<u>% S</u>	<u>% VM</u>	<u>% FC</u>	<u>Btu</u>
1	19.81	1.10	27.76	52.43	11788
2	8.99	1.03	31.66	59.35	13728
3	20.12	1.35	26.36	53.52	11888
4	4.81	0.93	29.98	65.21	14395
5	4.10	0.63	27.20	68.70	14426
6	13.47	0.51	28.27	58.26	12969
7	12.45	0.70	30.72	56.83	12944
8	25.17	0.63	21.55	53.28	11160
9	7.37	0.84	23.81	68.82	13954
10	14.31	1.44	27.70	57.99	12372
11	6.27	0.79	25.03	68.70	14156
12	4.54	0.82	24.40	71.06	14400
13	38.68	0.58	18.74	42.58	9290