PR-DOWLING CREEK 76(1)A

BOW RIVER RESOURCES LTD./RAINIER ENERGY RESOURCES INC.

PEACE RIVER COAL'PROJECT

NORTHEASTERN BRITISH COLUMBIA

NTS 93-O-16

COAL LICENCES #3634 - #3654

Prepared by:

Paul Dyson Consultants and Holdings Limited, Calgary, Alberta;.,

October 1976

ABSTRACT

Bow River Resources Ltd. and Rainier Energy Resources Inc. hold twenty one coal licences (#3634 - #3654) covering an area of approximately 12,000 acres adjacent to the Peace River in northeastern British Columbia.

Previous exploration in 1971 had indicated the presence of a substantial reserve of coal in the Trojan seam averaging approximately 6 feet thick. A new program of twelve drillholes was proposed in 1976 to further define this coal. Four of these holes were drilled and two confirmed the existence of the Trojan seam. The quality of the coal once again, proved to be of metallurgical grade.

Further exploration is recommended in two areas. The northern portion of the coal licence block should be explored in detail to prove up a mineable reserve of coal and the southwesterly area should be drilled to ascertain the presence of the Trojan seam or other seams.

CONTENTS

pg.

ILLUSTRATIONS

APPENDICES

Refer to Confidential Coal Analysis File

1. INTRODUCTION:

This report has been prepared to present the geological data acquired during April and May 1976 on the coal licences in the Peace River area of British Columbia held jointly by Bow River Resources Ltd. and Rainier Energy Resources Inc. The report is prepared for submittal to the Government of British Columbia in 'accordance with the Regulations under the Coal Act, 1974.

The work described in this report was supervised by Paul Dyson Consultants Ltd. of Calgary who take responsibility for the data obtained but who are not responsible for the curtailment of the program as submitted earlier in the year as a Supplemental Plan of Operations (January 28, 1976) and in accordance with the Coal Mines Regulation Act (Form 7-8 submitted January 28, 1976). The non-completion of this program was a corporate decision by those parties' funding the program and was not a technical decision based on the data accumulated to date.

The results of the additional work carried out have been integrated into the work completed in 1971 (Dyson 1972) and an updated overall assessment of the property is made.

Recommendations for additional work are presented in accordance with the conclusions reached.

2. PROPERTIES

The coal properties were originally acquired during the spring and summer of 1971. They consisted of twenty seven coal licences at that time.

The introduction of the Coal Act, 1974 required licence holders to adjust their coal licences to conform to boundaries according to the National Topographic System grid. As a consequence, the licence block now consists of twenty one coal licences (#3634 - 3654) covering an area of approximately 12,000 acres.

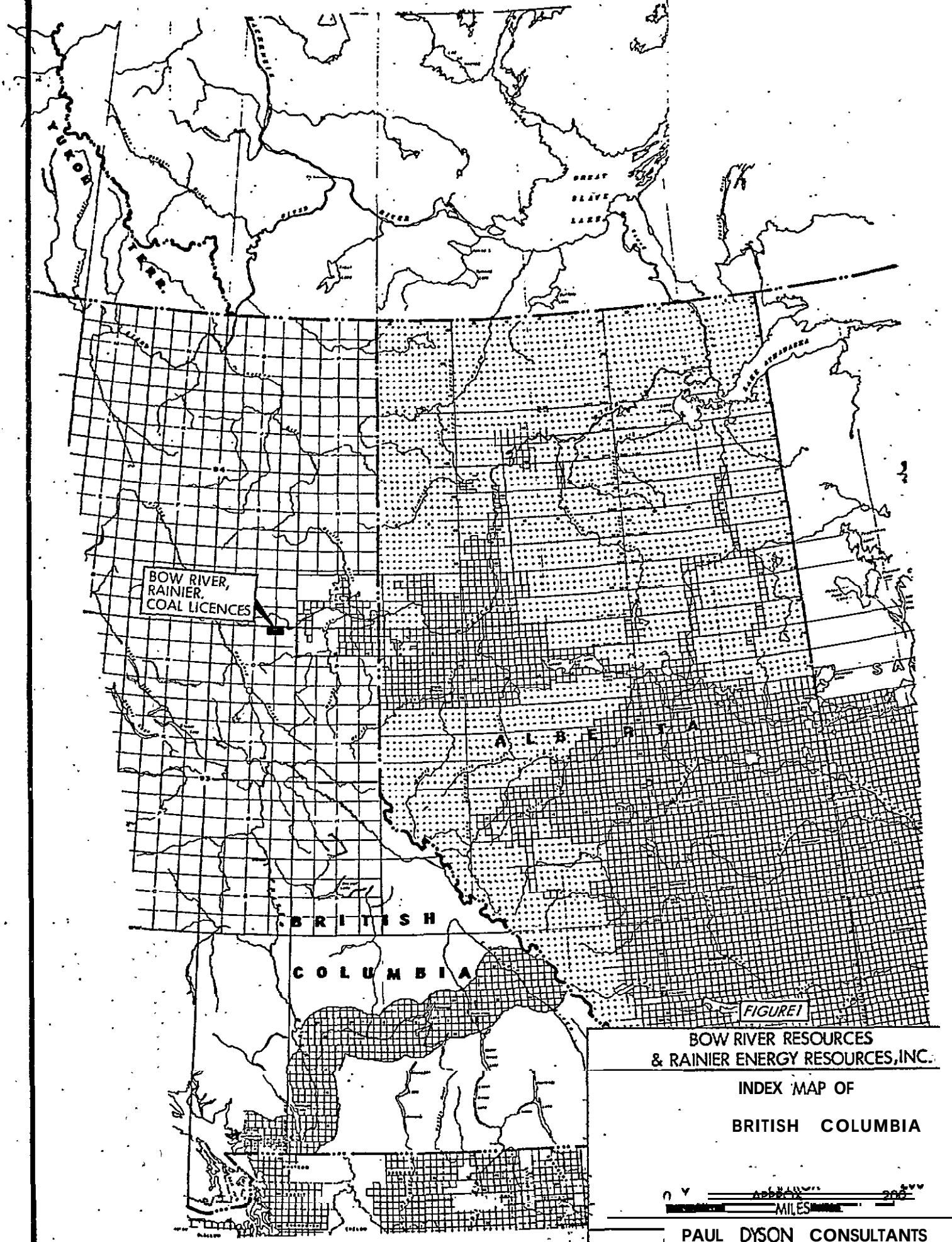
The licences are held jointly by Bow River Resources Ltd. and Rainier Energy Resources Inc. Funds for the exploration are currently being provided by Bri Coal Mining Ltd. of Vancouver who have concluded some form of agreement with the licence holders. The consultants and contractors were retained by Bri Coal Mining Ltd.

3. LOCATION AND ACCESS

The area lies adjacent to the Williston Reservoir in north east British Columbia approximately 90 miles west north west of Dawson Creek and 480 miles almost due north of Vancouver (Fig. 1 and Fig. 2). An all weather paved road extends from both Dawson Creek and Fort St. John to within two miles of the north east corner of the block of coal licences. A good gravel road being used for logging extends into the coal licences along Johnson Creek in the south east corner of the licence block. An extension of this road extends to a point approximately one mile due south of the junction of Track and Dowling Creek on the east bank of Track Creek.

The initial exploration in 1971 took place at the north end of the licence block (Fig. 3). Existing access in this area was by an old winter trail cut by the Pacific Great Eastern Railroad in the winter of 1959/60. While this trail was impassable as found, it was upgraded to provide access to drill sites at a minimum of cost. Only a minor amount of new road construction was required for the initial exploration.

The exploration planned for 1976 consisted of twelve drill holes (P-l and P-12) extending from the junction of Track and Dowling Creeks to the extreme southwestern limit of the


YUKON
T.N.W.
BOW RIVER,
RAINIER,
COAL LICENCES
ALBERTA
BRITISH
COLUMBIA
FIGURE1
BOW RIVER RESOURCES
& RAINIER ENERGY RESOURCES, INC.
INDEX MAP OF
BRITISH COLUMBIA
MILES
PAUL DYSON CONSULTANTS

3 . LOCATION AND ACCESS (Cont'd.)

acreage (Fig. 3). In view of the need to commence the exploration as. soon as possible, it was decided to use a helicopter for access in 1976 and no new roads were constructed.

4. EXPLORATION

The exploration carried out in 1971 had proven the presence of at least one mineable seam of good grade metallurgical grade coal on the property (Dyson 1972 - see results of 1971 drilling Fig. 5 and-Appdx.2). This seam was referred to as the Trojan seam. Additional work in 1971 would further evaluate the potential.

4.1. Objectives

The main objective of the additional proposed drilling - Drillholes P-l to P-12 inclusive (see Fig. 3) - was to check the overall continuity of the Trojan seam and to evaluate other potentially mineable seams in the area.

Essentially Drillholes P-l and P-2 would be "in-fill" holes for the 1971 program. Drillholes P-3 to P-12 inclusive would test this area of the licences for the presence of the Trojan seam. It should be noted that Drillhole #2 (1971) failed to find any Trojan seam (Fig. 5). It was suggested (Dyson 1972) this was probably a local absence'of the seam and the seam would again be present'to the south west. Drillholes P-3 to P-12 would test this assumption.

It was also planned to drill one of the more southwesterly drillholes (P-10, P-11 or P-12) approximately 1,000 feet into the Gething Formation to test for other coal seams. It should

4 : EXPLORATION (Cont'd.)

4.1. Objectives (Cont'd.)

be remembered that Drillhole #1 (1971) did, in fact, penetrate almost 1,000 feet of Gething formation (Fig. 5). The other seams penetrated in this drillhole were non-prospective but no data is'available regarding the lower seams-elsewhere in the coal licence block.

4.2 Methods

The work carried out in 1971 had utilized an old. existing trail in December when the ground for the most part was frozen. Nevertheless, extensive areas of very soft ground were encountered. In view of this experience, the need for some ten miles or so of new road and the time of year (April), it was decided to transport the drill in 1976 by helicopter. All support to the drill would also be by helicopter.

It was decided that a diamond drill equipped with NQ wireline equipment would be used for,the project. On the basis both of a competitive bid and of their experience with this type of operation in the area Canadian Longyear were selected as the contractor.

The program commenced on April 25th anh was completed on May 5th with four holes being drilled. Total completed footage was 1,609 feet. Two of the holes were completed and logged with both a Gamma-Ray Neutron device and a Sidewall Density

4. EXPLORATION (Cont'd.)

4.2 Methods (Cont'd.)

device. The other two holes are presently suspended and will be logged when and if any coal measures are penetrated.

The coal that was recovered was analyzed by Birtley Engineering (Canada) Ltd. in accordance with their recommendations for the most effective analytical program.

The non-coal portions of the core were described in detail and both the written descriptions and the plotted stratigraphic logs form a portion of this report.

5. GEOLOGY

The geology of the Peace River Canyon area is not described in detail in this report. Numerous excellent descriptions of the various rock formations and the lithological variations within the formations are contained in the literature. The stratigraphy is probably best summarized in Stott 1968. However-, a few comments with regard to both the stratigraphy and the structure follow.

5.1. Stratigraphy

The Jurassic and Cretaceous stratigraphy of the Peace River foothills has historically been most difficult to resolve. This has resulted in numerous alternate nomenclature systems having been proposed. The nomenclature of Stott 1971 has been used in this report.

As can be seen from the map (Fig. 3), the only formations which are of concern in an evaluation of the Bow River/Rainier properties are the Gething formation and the lower formations of the Fort St. John group, namely the Moosebar formation and the Commotion formation. Descriptions of these three formations follow:

a. The Gething Formation

The Gething formation is the oldest formation occurring in the area of the Bow River/Rainier coal properties. In general, the Gething

5. GEOLOGY (Cont'd.)

a. The Gething Formation (Cont'd.)

formation consists of'interbedded mudstones, coals and sandstones. The sandstones are usually in thin units and the frequent repetitions of these units are a characteristic feature of the Gething formation. The thickness of the Gething formation in the Peace River Canyon area is believed to be approximately 1,500 feet. A detailed description of the Gething formation of the Peace River Canyon area has been published by Stott.

It is the coal seams of the Gething formation that are the objective of the coal exploration being carried out in the Peace River area. In general, these coal seams vary from a few inches to five to ten feet with isolated occurrences being reported of greater thickness.

b. Moosebar Formation

The Moosebar formation directly overlies the Gething formation. It consists of a monotonous sequence of dark grey to black friable shale. In places thin layers of clay and ironstone occur and a few thin sandstone lenses are present in the upper part of the formation. The formation has been measured at 1,336 feet by Beach and Spivak in 1944 of Track Creek. This location lies within the Bow River/Rainier properties.

5 . GEOLOGY (Cont'd.)

b. Moosebar Formation (Cont'd.)

The contact of the basal shales of the Moosebar formation with the upper sandstone of the Gething formation is, abrupt. In the area under consideration, the lower five feet or so of the Moosebar formation is marked by highly glauconitic beds.which are readily recognizable both in outcrop and in drill cores. This contact is exposed adjacent to drill sites 1 (1971) and 2 (1971).

c. Commotion Formation

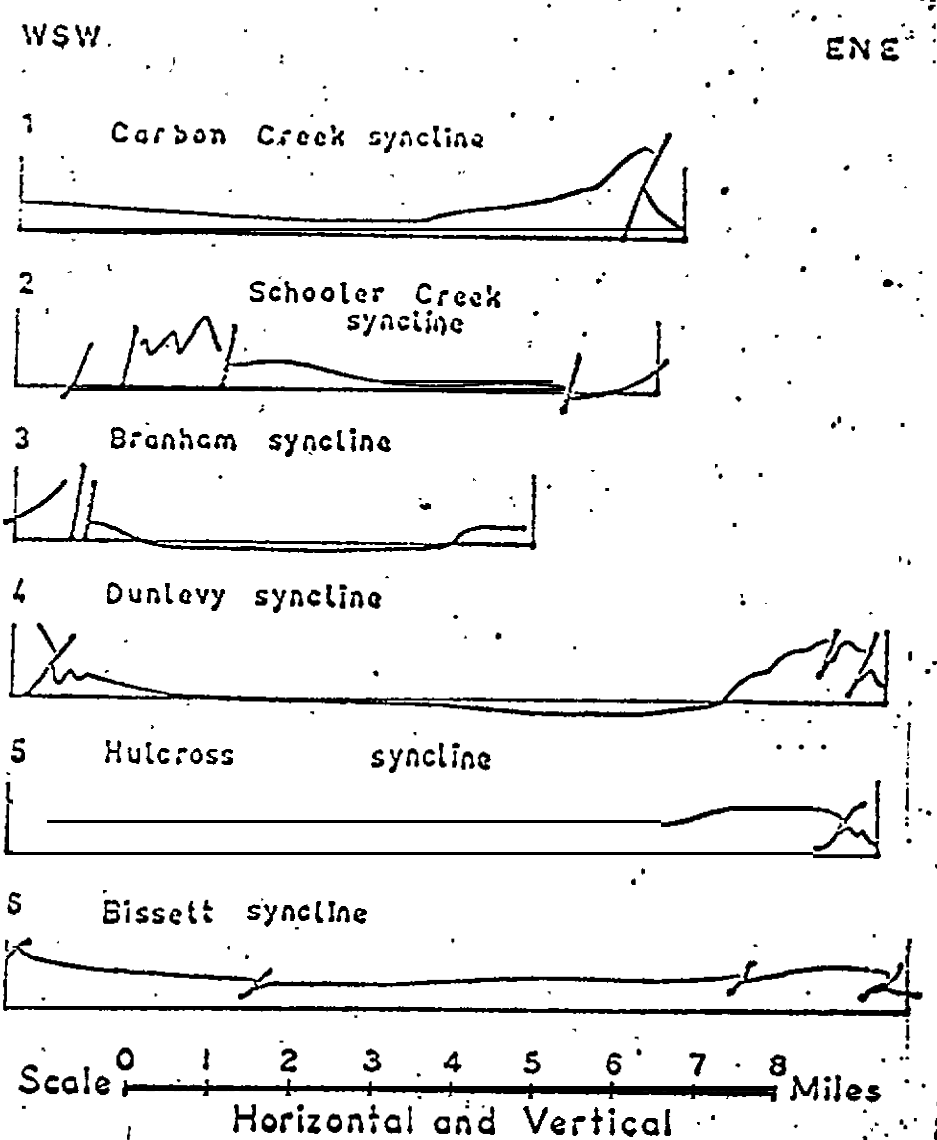
The Commotion formation overlies the Moosebar formation with a gradational contact. The top of the Moosebar formation is drawn at the base of the first thick succession of sandstone which is assigned to the Commotion formation. In the area under consideration, the upper contact of the Commotion formation has not been mapped as the mainly sandstone succession of' the Commotion is shaling out in this area. The upper contact of the Moosebar formation shown on Fig 3 is placed at the base of the lowest prominent sandstone of the Commotion formation (the Gates member). This contact is poorly exposed in the map area and has been located from air photographs.

5. GEOLOGY (Cont'd.)

5.2. Structure.

The coal properties of Bow River and Rainier lie within the foothills structural belt of the Rocky Mountains. This structural belt extends from the United States border to the Yukon along'the east side of the Rocky Mountains. It is, for the most part, characterized by a series of synclines, anticlines and west dipping thrust faults. The intensity of deformation varies from one area to another and the Peace River area is characterized by a particular structural style. This structural style has been well illustrated by Hughes 1967 and has been discussed in some detail by Irish 1968 and Fitzgerald 1968. Essentially the Peace River area consists of large relatively broad synclines between sharply faulted anticlines. It appears that relatively little faulting is associated with the synclines. On Fig. 3, two prominent anticlines can be seen - one east of the Bow River/Rainier properties and one west of the Bow River/Rainier properties. The coal properties themselves are situated in the area between these two coal properties. Geological field work has confirmed the gentle dippling of the syncline which is well illustrated on cross sections AB and AC (Fig. 2).

Exposures in the lower part of Gething Creek and along Gaylard Creek do not show any



Structural Styles, Peace River Area (Hughes 1967)

5. **GEOLOGY** (Cont'd.)

Structure (Cont'd.)

indication of faults existing with more than a few feet in displacement. Even these very small faults were noted in only two or three places. The syncline is believed to be essentially of low dip and unfadlted.

6. COAL

6.1. Introduction

The presence of coal in the Peace River area was first recognized by Alexander McKenzie in-1793. This coal was referred to in several reports both of the Geological Survey of Canada and of the B.C. Department of Mines between that date and 1922. In 1922, a detailed description of the coal occurrences of the Peace River Canuon was made by McLearn (McLearn 1922). In this report at least five seams are reported to exceed 4 feet in thickness and three to exceed 5 feet 9 inches in thickness. These three seams were referred to as the Trojan seam, the Murray seam and the Grant seam. The Trojan seam was described as lying some 120 feet below the top of the Gething formation. The Murray and the Grant seams occur over 1,000 feet lower in the Gething formation. As the coal licences of Bow River and Rainier cover, for the most part, areas underlain by either pre-Gething or Younger formations, it is the Trojan seam which is of most interest. The 1971 exploration program was laid out with this in mind and has been directed towards evaluation of the possible economic potential of this seam. At the same time the initial drill hole in 1971 was used to evaluate the upper 1,000 feet of Gething formation which might contain other viable coal seams not reported by earlier workers.

6. COAL (Cont'd.)

6.2 Occurrences and Distribution

6.2.1. Trojan Seam

The initial drill program in 1971 found the Trojan seam present in three drillholes (No's. 1, 3 and 4) and absent in a fourth (No. 2). This is illustrated on Fig. 5 and described in some detail in the previous report (Dyson 1972). It *was* suggested in this report that the Trojan seam which was absent in drillhole No. 2 (1971), would "again be present to the south and west". This was to be tested by drillholes P-4 to P-12 inclusive. The actual holes to the southwest drilled were 76-1, 76-2 and' 76-3 as shown on the map (Fig. 3). These holes can be discussed in turn.

6.2.1.a. Drillhole 76-l

This drillhole was completed at a depth of 438 feet having commenced in the Moosebar formation and then penetrated approximately 160 feet of Gething formation. The Trojan seam was penetrated from a depth of 377 feet to 382 feet. Two sandstone partings of 1 inch and 3 inches respectively were included in this seam interval (see Stratigraphic Log, and Core Descriptions and Fig. 5).

6.2.1.b. Drillhole 76-2

This drillhole was suspended by a management decision at a depth of. 668 feet

6. COAL (Cont'd.)

6.2.1-b. **Drillhole 76-2** (Cont'd.)
in the Moosebar formation. The Moosebar/ Gething contact would be expected within the next few feet.

6.2.1.c. **Drillhole 76-3**
'This drillhole at the extreme south end of the property was suspended by a management decision at a depth of 165 feet in till and gravel. It is possible that bedrock had just been reached.

6.2.1.d. **Drillhole 76-4**
This drillhole was drilled between drillhole No. 1 (1971) and No. 3 (1971). It was completed at a depth of 338 feet having penetrated approximately 160 feet of Gething formation. As expected the Trojan seam was present. it was 7.4 feet thick containing three thin (1" to 4") partings of sandstone (see Stratigraphic' Log and Core Descriptions and Fig. 5).

This drilling confirms the presence' of the Trojan seam in the northern portion of the licence block and its probable presence to the southwest. The completion of 76-2 and 76-3 will give valuable information on the southwestern area.

6. **COAL** (Cont'd.)

6.2.2. Other Seams

The new drilling adds nothing to the information already available on the other seams. Reference to the previous report (Dyson 1972) and to the Stratigraphic Cross-sections (Fig. 5) illustrates the interpretation of the new drill-holes into the existing data on other seams.

It should be noted that the excellent quality seam found approximately 40 feet below the Trojan seam in No. 4 (1971) is present in both 76-l and 76-4. It is, however, thin in both locations (3').

6.3 Quality

No new data except 'for the coal recovered from the Trojan seam in 76-4 was 'obtained. . . This new information is attached as Appendix 6.

This new analytical data for the +28 mesh material indicates a yield of approximately 60% at 6.6% ash and 0.7 sulphur with an FSI of 4. This is in general agreement with the previous analyses except for a somewhat depressed FSI. (Previously it was 6.) While the +28 mesh material constitutes over 90% of the sample the fines (-28 mesh) show some high FSI material. (FSI = 7)

Birtley, using their experience of Western Canadian coking coals, suggest a yield of 66% with 7% ash and an FSI of 4 1/2.

7 . CONCLUSIONS AND RECOMMENDATIONS

In view of the facts that the Trojan seam exceeds 5 feet in thickness in the north-eastern portion of the licences and is present at the most southwesterly completed drillholes, the recommendations fall into two distinct programs.

7.1. The Northern Area

In this area the Trojan seam is probably the only prospective seam based on the drilling to date. An in place reserve of 15 mm tons is a realistic assumption to a cover of 1,500 feet in the area of coal licences #3642 to #3647. It has been suggested by mining consultants (N.E. Roberts, P. Eng.) that this reserve would probably support an underground mine producing 500,000 tons of clean coal per year. 'In order to complete a feasibility for such a mine, detailed geological mapping, additional drilling and bulk sampling of the seam is required.

In order to carry'out this program a first requirement is a detailed (1:5,000) topographic map on which to plot all the new detailed data. Following the detailed geological mapping, new drillholes should be completed through the Trojan seam on the divide between Gaylard and Dowling Creeks. A hole spacing of 1,500 feet

7. CONCLUSIONS AND RECOMMENDATIONS (Cont'd.)

7.1. The Northern Area (Cont'd.)

is recommended. Selected additional holes would be drilled south of Dowling Creek to test the Trojan seam in the relatively high cover area south of Dowling Creek.

Coincident with this program, the outcrop of the Trojan seam on the divide between Dowling and Gaylard Creeks could be located by a combination of shallow drilling and trenching. An adit could then be driven to extract a ten ton bulk sample for washing and carbonization tests.

Following this program, a feasibility study for the northern area could probably be completed.

7.2 The Southwestern Area

This area of the licences remains relatively unknown. There are indications that the Trojan seam may well be present in the area. This being the case, the presently suspended drill-holes should be completed. At least one other hole halfway between these two should be drilled even if the Trojan seam is thin or absent in both the suspended holes (76-2 and 76-3).

The southern drillhole (76-3) should be deepened to test the upper 1,000 feet of Gething formation in this area.

7. CONCLUSIONS AND RECOMMENDATIONS (Cont'd.)

These two programs are basically distinct and separate. It is believed premature to try and develop a mine in the northern area while the adjacent southwestern area remains an unknown. While it is agreed that the prospects for finding thicker, better coal on the southwest licences is not high it would be a poor decision to proceed with detailed mine feasibility in the northern area prior to at least conducting preliminary exploration in the southwestern area.

I. P. Dyson, P. Geol.

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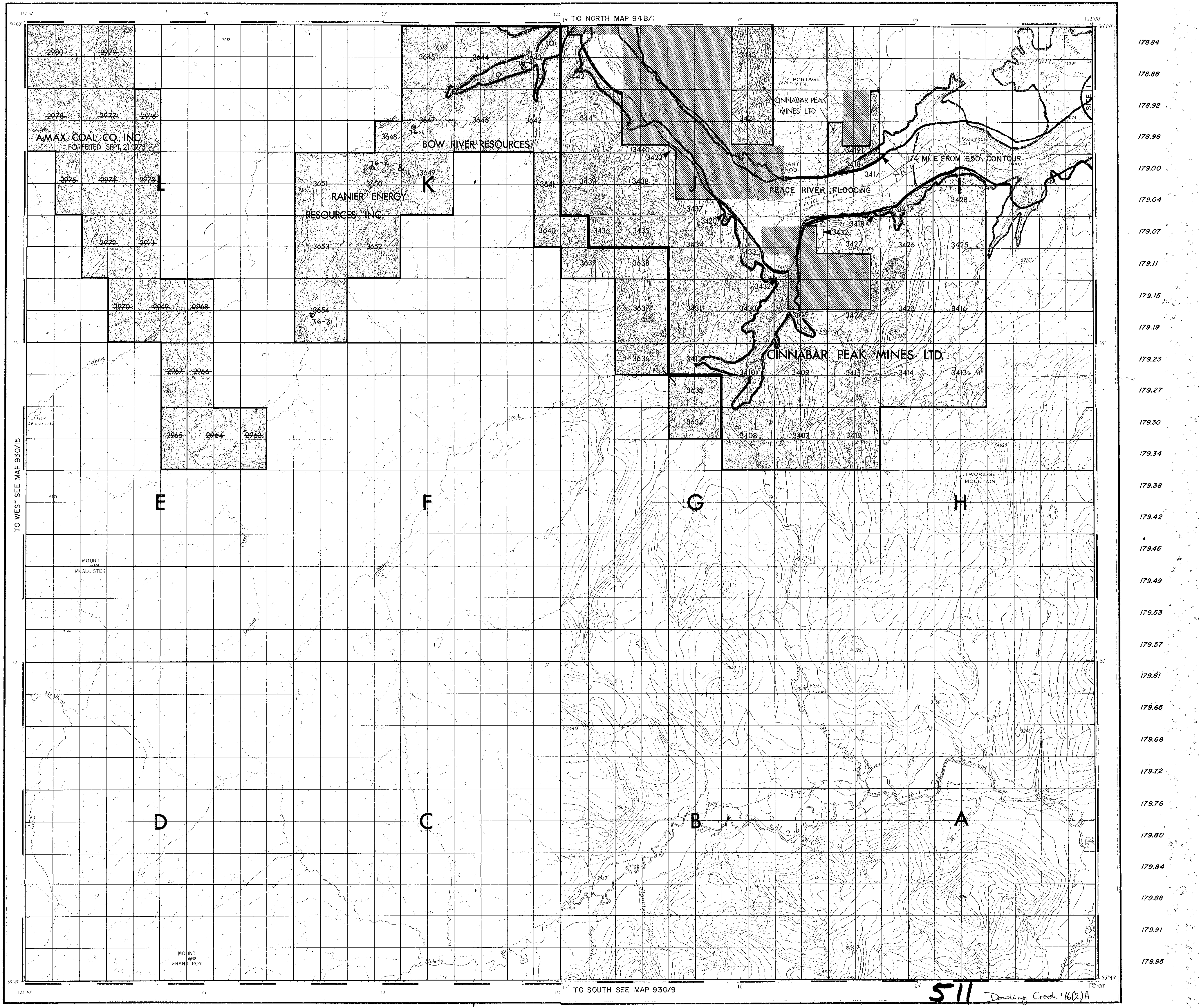
COAL 93-O-16

NATIONAL TOPOGRAPHIC SYSTEM 1:50,000 CANADA SECOND EDITION SHEET 93 O/16

CANADA
MINES AND TECHNICAL SURVEYS
SURVEYS AND MAPPING BRANCH
DEPARTMENT OF LANDS AND FORESTS

FIRST EDITION CANADA SHEET 93 O/16 EAST HALF



511 Dowling Creek 76(2)A

LOCATION BOW RIVER 1976 HOLES

PORTAGE MOUNTAIN
PEACE RIVER DISTRICT
BRITISH COLUMBIA
SCALE 1:50,000
1.25 inches to 1 Mile approximately

REFERENCE

Roads: Boundaries

REFERENCE

House, Building

Foreshore flats

PORTAGE MOUNTAIN
PEACE RIVER DISTRICT
BRITISH COLUMBIA
SCALE 1:50,000
1.25 inches to 1 mile approximately

...nd printed by the Surveys and Mapping
...partment of Mines and Technical Surveys
...otographs taken in 1929, 1939 and 1942.
...rom the First Edition of the 1:63,360
...,000 in 1956.

▨ COAL ALIENATED

REFERENCE

Road not well travelled
Trail
Building
Horizontal control point

Falls
Marsh
Sand or gravel
Contours

123°00' 122°30' 122°00' 121°30' 121°00' 120°30' 120°00'

56°00'

55°30'

HAZELTON MTNS

I V E R

PEACE

Federal Ranch

JONES PEAK

Gold Bar

Stanton Flats

Beatton Flats

Indian Head Flats

Bertel Prairie

CARBON PEAK

MT GERDEN

MT BARR

EXPRESS MTN

MT COPPER

MT ROCHFORT

MT WRIGLEY

BOW RIVER RAINIER COAL LICENSES

BEATTON RIVER

BEATTON CANYON

BULLHEAD MTN

Beatton Creek

Hudson Hope

PORTAGE MTN

GRAHAM CREEK

Graham River

MT LOVER

TWEEDIE MTN

BABCOCK PEAK

MT MCALLISTER

MT MONTEITH

BEATTIE CREEK PEAK

FRANK RIVER

MT HUTCROSS

MT MCKIRDY

SUBMARINE MTN

CRUISER MTN

Lone Prairie

Hudson Hope

Bear Flat

Farrell Creek

Monias

Sepass

Worth

Moberly Lake

McMurdo Lake

Lynx Lake

WADE HILL

Hartwell Pond

MT CHAMBERLAIN

MT WARTENBE

Montney

North Pine

Fort St John

Fort St. John

Fort Saint John

Gund Haven

Baldonnel

Baldonnel Strip

Taylor

Fish

Pine River

Two Rivers

Clayburn

Sheerar Dale

Doe River

Valley View

Parkland

Farmington

Sweetwater

Beaverdale

Rolla

Willow Valley

Sunset Prairie

Willowbrook School

Bessborough

Kilkerran

Dawson Creek

South Dawson

Groundbird School

Arena

Pouce Coupe

Fort Heights

Lone Prairie

GREAT NORTHERN PACIFIC EASTERN

ALASKA HIGHWAY

PEACE RIVER PROVINCIAL PARK

Peace River

Cecil Lake

Clear Hills

Parrell Creek

Seven Mile Creek

Kiskatinaw River

Halfway River

Blueberry Creek

Willow River

Bear River

Dawson Creek

Pouce Coupe River

ALBERTA BRITISH COLUMBIA

FIGURE 2

BOW RIVER RESOURCES
&
RAINIER ENERGY RESOURCES, INC.

511 COAL LICENCE LOCATIONS

N.E. BRITISH COLUMBIA

5 MILES 0 5 10

SCALE 1:250,000 OCT. 1976

PAUL DYSON CONSULTANTS

122°30'W 122°25'W 122°20'W 122°15'W 122°10'W 122°05'W 122°00'W

56°05'N

56°00'N

55°55'N

55°50'N

55°45'N

WILLISTON RESERVOIR

BENNETT DAM

PEACE RIVER

PORTAGE MTN.

GRAHAM KNOB

TWORIDGE MOUNTAIN

THIS CONTACT IS BASE OF GATES MEMBER OF FORT ST. JOHN GROUP

A

B

C

X

Y

NO OUTCROPS

This dip taken on small fold.

3635 3636 3637 3638 3639 3640 3641 3642 3643 3644 3645 3646 3647 3648 3649 3650 3651 3652 3653 3654

Km Kcd Kg Kmb Kfsj Qal Kdu

GAYLARD CREEK — GETHING CREEK DETAIL

SCALE : 4 INCHES TO 1 MILE

X_____Y LINE OF CROSS SECTION (see seperate enclosure)

EXPLANATION

RECENT	Qal	Stream Alluvium
UPPER CRET.	Kdu	Sandstone & Conglomerate — Dunvegan Formation
LOWER CRETACEOUS — FORT ST. JOHN GR.	Kfsj	Fort St. John Group Undivided
	Kmb	Moosebor Shale
— BULLHEAD GR.	Kg	Coal, Sandstone & Mudstone — Gething Formation
	Kcd	Sandstones, Shales & Conglomerates — Cadomin Formation
— MINNES GP.	Km	Sandstones, Shales & Minor Coals — Minnes Group Undivided

UNCONFORMITY

UNCONFORMITY

UNCONFORMITY

Formation Boundary

Anticline

Syncline

Thrust Fault

Strike & Dip — Published

Strike & Dip — Measured

Coal Mine (Abandoned)

Coal Occurence Greater Than 5' Other Than Trojan Seam.

O_1 Drill Hole O_{P-1} Drillhole (Proposed)

Existing *Constructed* — APPROX. ROUTE OF ACCESS ROADS

THICKNESS OF TROJAN SEAM (INCL. PARTINGS)

7.5 *Drilled* (8.3) *Reported*

BOW RIVER, RAINIER, COAL LICENCES 3646

511

P.R. Dowling 16-(2) A

FIGURE 3

BOW RIVER RESOURCES LTD.
&
RAINIER ENERGY RESOURCES, INC.

PEACE RIVER COAL PROJECT

OCTOBER, 1976

1 : 50,000

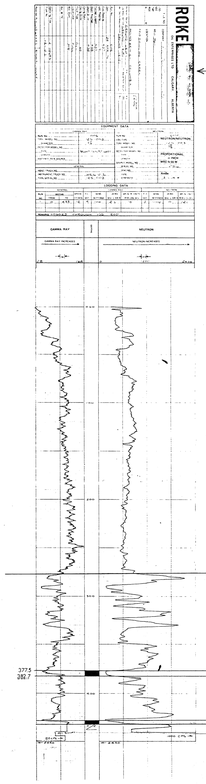
0 1 2

SCALE — MILES

PAUL DYSON CONSULTANTS

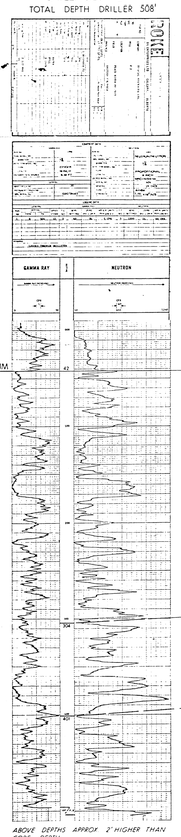
Y

DRILLHOLE 1
TOTAL DEPTH DRILLER 438'



0.85 miles

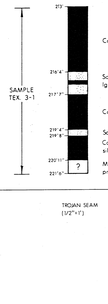
DRILLHOLE 2
TOTAL DEPTH DRILLER 508'



ABOVE DEPTHS APPROX 2' HIGHER THAN CORE DEPTH.

THICKNESS 8'6"
including 1'4"
total partings

SAMPLE TEX. 3-1



Coal, bright lustre, low ash

Sandstone, very fine grained, silty in part, lgt gy — includes 3" coal

Coal, bright lustre, low ash

Sandstone, very fine grained, light gy, soft

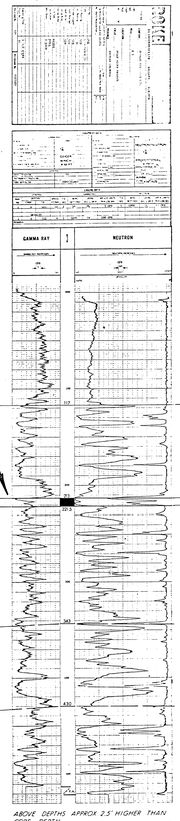
Coal, dull lustre, poorly bonded silty in part

Missing core, probably coal

Moosebar Fm.
Gething Fm.

0.45 MILES

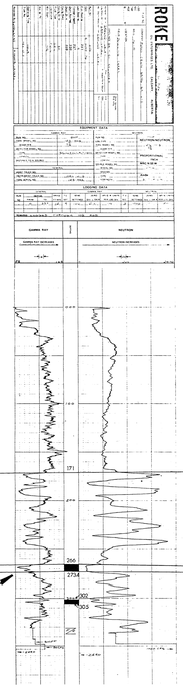
DRILLHOLE 3
TOTAL DEPTH DRILLER 528'



ABOVE DEPTHS APPROX 2.5' HIGHER THAN CORE DEPTH

0.45 MILES

DRILLHOLE 76-4
TOTAL DEPTH DRILLER 338'



THICKNESS 7.4'
INCLUDING 0.9'
TOTAL PARTINGS

LAB SAMPLE 7363

COAL IS PREDOMINANTLY DURAIN WITH VITRAIN BANDS

ALL SANDSTONE IS VERY FINE GRAINED, LIGHT GREY AND NONCALCAREOUS

TROJAN SEAM
(1/2"+1')

THICKNESS 5'6"
including 0'2"
total partings

SAMPLE TEX. 4-1

Coal, bright lustre, low ash

Sandstone, very fine grained, lgt gy

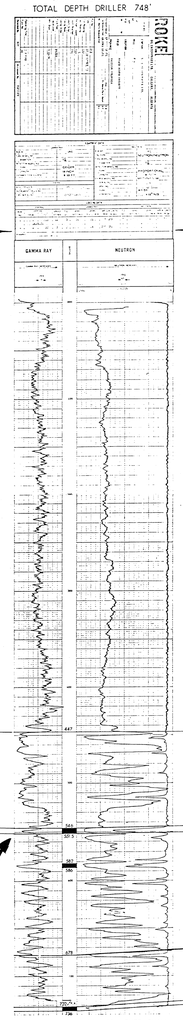
Coal, bright lustre, low ash

Missing core, probably coal

TROJAN SEAM
(1/2"+1')

0.45 MILES

DRILLHOLE 4
TOTAL DEPTH DRILLER 748'



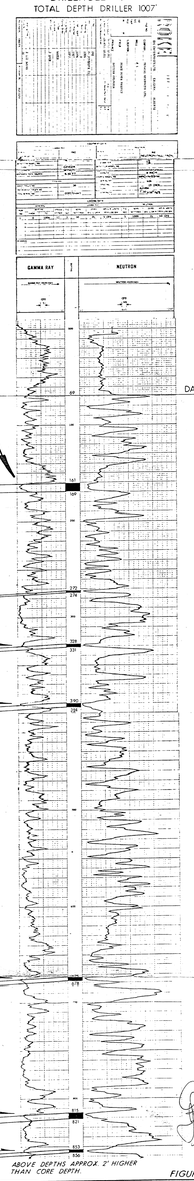
"ABOVE DEPTHS APPROX 2' HIGHER THAN CORE DEPTH.

0.65 miles

BOW RIVER

Y

DRILLHOLE 1
TOTAL DEPTH DRILLER 1007'



THICKNESS 8'0"
including 0'6"
total partings

SAMPLE
TEX 1-1
TEX 1-2
TEX 1-3

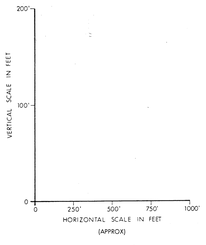
1½" siltst parting

1½ siltst parting

Missing core, probably coal

Moosebar Fm.
Gething Fm.

ABOVE DEPTHS APPROX 2' HIGHER THAN CORE DEPTH.



NOTE: ALL DEPTHS ARE GAMMA-RAY NEUTRON LOG DEPTHS

FIGURE 5

BOW RIVER RESOURCES LTD.
&
RAINIER ENERGY RESOURCES, INC.

CROSS SECTION X – Y

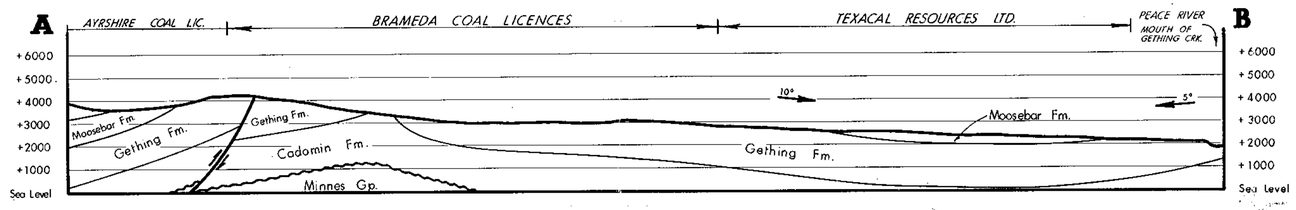
PEACE RIVER COAL PROJECT

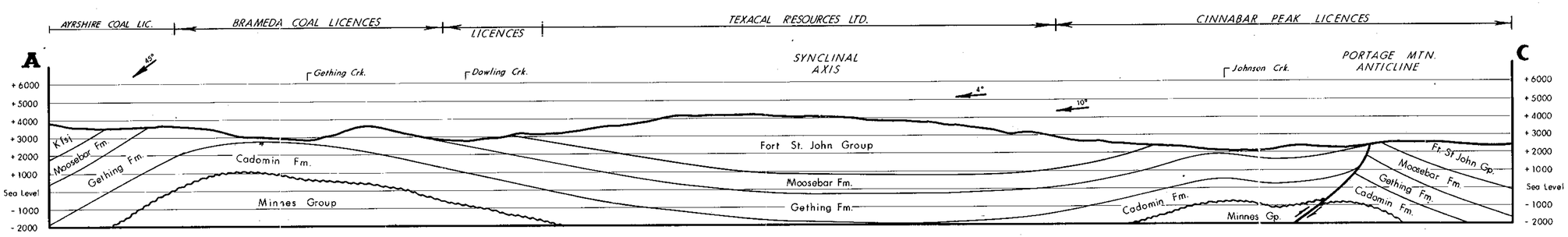
SCALE: Horizontal 1 Inch = 250 Feet
Vertical 2 1/2 Inches = 100 Feet

OCTOBER, 1976

511

PAUL DYSON CONSULTANTS





511

FIG. 6

BOW RIVER RESOURCES LTD.
&
RAINIER ENERGY RESOURCES, INC.

PEACE RIVER COAL PROJECT

STRUCTURAL CROSS-SECTIONS
A-B, A-C

OCTOBER, 1976

1 :50,000

0 1 2

SCALE — MILES

PAUL DYSON CONSULTANTS

PR-DOWLING CREEK 76 (3) A

APPENDIX 1

GAMMA-RAY NEUTRON LOGS (1971)

ROKE

OIL ENTERPRISES LTD.

CALGARY ALBERTA

GAMMA RAY NEUTRON LOG

COMPANY ROKE OIL ENTERPRISES LTD.

WELL 5-11

FIELD WILDCAT

COUNTY/PARISH

PROVINCE/STATE ALBERTA

LOCATION

PERMANENT DATUM GROUND LEVEL

ELEV. 2705

LOG MEASURED FROM KELLY BUSHING

ELEV. 2715

DRILLING MEASURED FROM KELLY BUSHING

ELEV. 2715

	Date	Run No.	Depth-Driller	Depth-Logger	Bottom Log Interval	Top Log Interval	Casing-Driller	Casing-Logger	Bit Size
	5-11-65	ONE	1000	1000	1000	SURFACE	8 5/8 @ 30	30	7 7/8

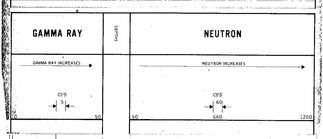
EQUIPMENT DATA

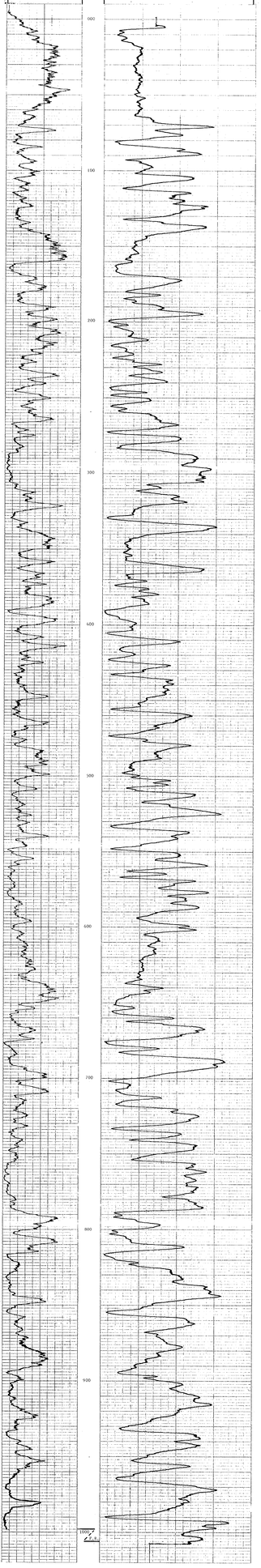
GAMMA RAY		NEUTRON	
RUN NO	ONE	RUN NO	ONE
TOOL MODEL NO		LOG TYPE	NEUTRON/NEUTRON
DIAMETER	1 11/16	TOOL MODEL NO	
DETECTOR MODEL NO		DIAMETER	1 3/8
TYPE	GEIGER	DETECTOR MODEL NO	
LENGTH	18 INCH	TYPE	PROPORTIONAL
DISTANCE TO N SOURCE	8.35 FT	LENGTH	4 INCH
GENERAL		SOURCE MODEL NO	MRC-N-SIS-W
HOIST TRUCK NO	30	SERIAL NO	609
INSTRUMENT TRUCK NO		SPACING	15.9 INCH
TOOL SERIAL NO	CUB2705A65	TYPE	Am-Be
		STRENGTH	7.00×10^6 N/S

LOGGING DATA

RUN NO	GENERAL DEPTH FROM	GENERAL DEPTH TO	GENERAL SPEED FT/MIN	GAMMA RAY F C SEC	GAMMA RAY SENS SETTINGS	GAMMA RAY FLAG DIV L OR R	GAMMA RAY API G-R UNITS PER LOG DIV	NEUTRON F C SEC	NEUTRON SENS SETTINGS	NEUTRON FLAG DIV L OR R	NEUTRON API N UNITS PER LOG DIV
1	0	1000	12	3	30	RIL	5 CPS	5	1000	LIL	60 CPS

REMARKS:





BOKE

GAMMA RAY NEUTRON LOG

BOKE ENTERPRISES LTD. CALGARY, ALBERTA

WELL: 511

FIELD: PROVINCE: BRITISH COLUMBIA

LOCATION: WATER PROJECT

COUNTY: WELL NO.

PERMANENT DATUM: G.L. Elev.: K.B. Elev.: D.F. Elev.:

LOG MEASURED FROM: Ft. Above Perm. Datum

DRILLING MEASURED FROM:

DATE: RUN NO. TYPE LOG DEPTH-DRILLER DEPTH-LOGGER BTM. LOGGED INTERVAL TOP LOGGED INTERVAL CASING-DRILLER CASING-LOGGER BIT SIZE TYPE FLUID IN HOLE DENS. VISC. PH FLUID LOSS SOURCE OF SAMPLE RM @ MEAS. TEMP. RMF @ MEAS. TEMP. RMC @ MEAS. TEMP. SOURCE OF RMF SOURCE OF RMC RM @ BHT MAX. REC. TEMP. EQUIP. NO. LOCATION RECORDED BY WITNESSED BY

511

EQUIPMENT DATA

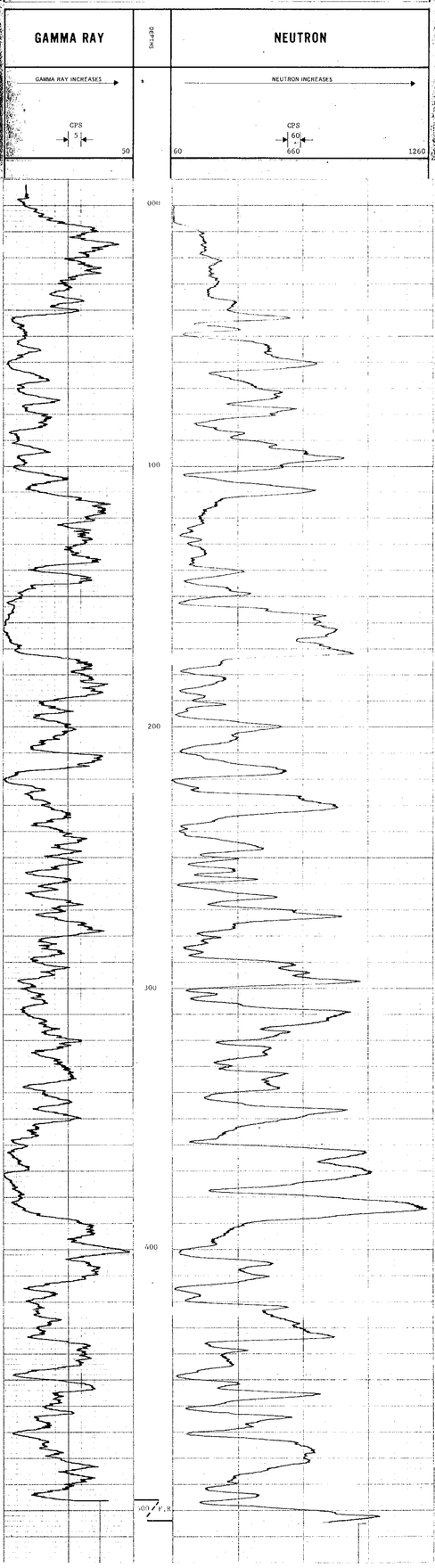
GAMMA RAY		NEUTRON	
RUN NO	ONE	RUN NO	ONE
TOOL MODEL NO		LOG TYPE	NEUTRON/NEUTRON
DIAMETER	1 11/16	TOOL MODEL NO	
DETECTOR MODEL NO		DIAMETER	1 11/16
TYPE	GEIGER	DETECTOR MODEL NO	
LENGTH	18 INCH	TYPE	PROPORTIONAL
DISTANCE TO N. SOURCE	8.55 FT	LENGTH	6 INCH
GENERAL		SOURCE MODEL NO	MRC-N-SS-W
HOIST TRUCK NO	30	SERIAL NO	606
INSTRUMENT TRUCK NO		SPACING	19 INCH
TOOL SERIAL NO	CGN27U4A65	TYPE	AmBe
		STRENGTH	7.00 $\times 10^6$ N/S

LOGGING DATA

GENERAL				GAMMA RAY				NEUTRON			
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	API N. UNITS PER LOG DIV
1	0	504	12	3	60	0L	5 CPS	5	1000	1L	60 CPS

REMARKS

LOGGED THROUGH DRILLSTEM



GAMMA RAY NEUTRON LOG
DENSILOG

OIL ENTERPRISES LTD. CALGARY, ALBERTA

FILE NO.

COMPANY TEXACAL RESOURCES LTD.

WELL # 3

FIELD PEACE RIVER PROJECT

LOCATION

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL — Elev. 1,250 Ft. Above Perm. Datum

Log Measured from GROUND LEVEL — K.B. 0 Ft. — D.F. — G.L.

Run No. ONE

Date 5 DECEMBER 71

Depth Driller 523

Depth Logger 0

Bottom Logged Interval 523

Top Logged Interval 324

Casing Driller 328

Casing Logger

Bit Size 5 1/2 INCHES

Type Fluid in Hole WATER

Salinity, PPM

Density

Level FULL

Max. Recorded Temp. 3 INCHES

Estimated Bottom Hole Temp.

Operating Time 30

Recorded By BEITZER

Witnessed By BEITZER

5M

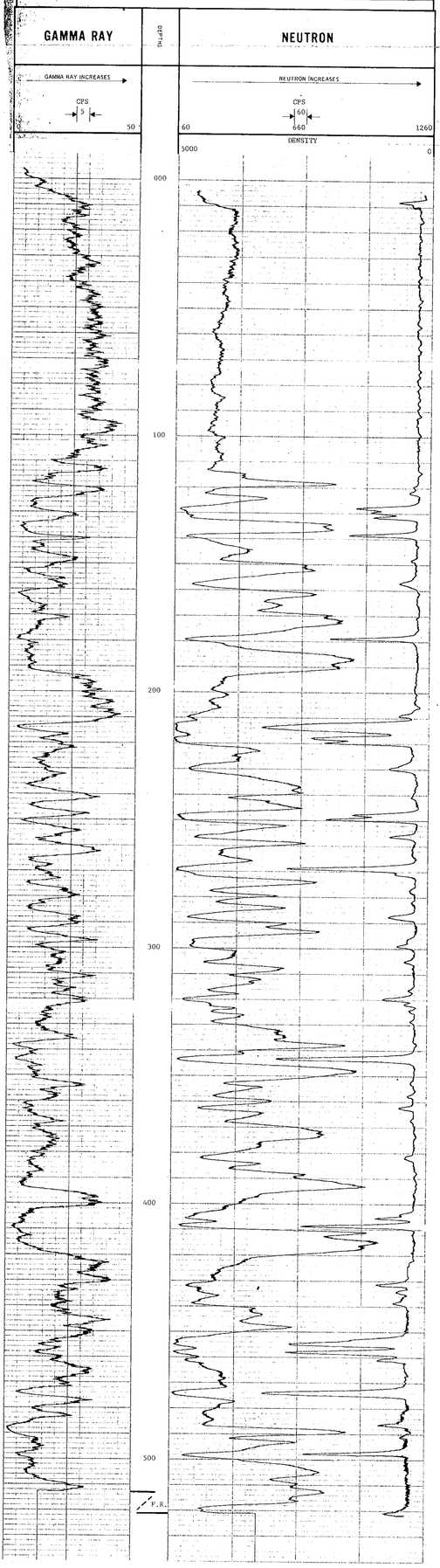
EQUIPMENT DATA

GAMMA RAY	1	NEUTRON	
RUN NO	ONE	RUN NO	ONE
TOOL MODEL NO		LOG TYPE	NEUTRON/NEUTRON
DIAMETER	1 11/16	TOOL MODEL NO	
DETECTOR MODEL NO		DIAMETER	1 11/16
TYPE	GEIGER	DETECTOR MODEL NO	
LENGTH	18 INCH	TYPE	PROPORTIONAL
DISTANCE TO N SOURCE	8.55 FT	LENGTH	6 INCH
GENERAL		SOURCE MODEL NO	MRC-N-SS-W
HOIST TRUCK NO	30	SERIAL NO	606
INSTRUMENT TRUCK NO		SPACING	19 INCH
TOOL SERIAL NO	CGNZ70A65	TYPE	AmBe
		STRENGTH	7.00 x10⁶ N/S

LOGGING DATA

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	NEUTRON T C SEC	NEUTRON SENS SETTINGS	NEUTRON ZERO DIV L OR R	NEUTRON API N. UNITS PER LOG DIV
GENERAL											
1	0	523	12	3	50	OL	5 CPS	5	1000	LL	60 CPS
DENSITY											
1	0	522	9	5	5000	OR	200 CPS				

REMARKS



ROKE

GAMMA RAY NEUTRON LOG

DENSILOG

OIL ENTERPRISES LTD.

CALGARY, ALBERTA

File No.

Permanent Datum: GROUND LEVEL — Elev.: K.B. — D.F. — G.L.

Log Measured from: KELLY BUSHING — 7 Ft. Above Perm. Datum

Drilling Measured from: KELLY BUSHING

Rge. — Twp. — Sec. — Unit

Other Services

Date: 3-DECEMBER-74

Run No.: ONE

Depth-Driller: 1334

Depth-Logger: 1334

Bottom Logged Interval: 1332

Top Logged Interval: 0

Casing-Driller: 7" @ 1334

Casing-Logger: 7" @ 1334

Bit Size: 6 1/4"

Type Fluid in Hole: WATER

Dens.: 8.4

Visc.: 30

pH: 7.5

Fluid Loss: 3 3/4CC

Source of Sample: CIRCULATED

R_m @ Meas. Temp.: .5 @ 70°F

R_mf @ Meas. Temp.: .4 @ 70°F

R_mc @ Meas. Temp.: .6 @ 70°F

Source: R_mf: CALCULATED — R_mc: CALCULATED

R_m @ BHT: .3 @ 110°F

Time Since Circ.: 4 HRS

Max. Rec. Temp.: 110°F

Equip. No. & Location: 2211 — 2211

Recorded By: R. BAKER

Witnessed By: BAKER

FIELD: PEACE RIVER AREA

LOCATION: 16-6-78-25W5

WELL: 6-16

COMPANY: TEXACAL RESOURCES LTD.

511

EQUIPMENT DATA

GAMMA RAY		NEUTRON	
RUN NO	ONE	RUN NO	ONE
TOOL MODEL NO		LOG TYPE	NEUTRON/NEUTRON
DIAMETER	1 5/8	TOOL MODEL NO	
DETECTOR MODEL NO		DIAMETER	1 5/8
TYPE	GEIGER	DETECTOR MODEL NO	
LENGTH	18 INCH	TYPE	PROPORTIONAL
DISTANCE TO SOURCE	8.55 FT	LENGTH	6 INCH
		SOURCE MODEL NO	MPC-1418-W
GENERAL		SERIAL NO	606
HOIST TRUCK NO	30	SPACING	19 INCH
INSTRUMENT TRUCK NO		TYPE	Amba
TOOL SERIAL NO	CDN2704A65	STRENGTH	2.00 X10⁴ N/S

LOGGING DATA

GENERAL				GAMMA RAY				NEUTRON			
RUN NO.	DEPTHS FROM	TO	SPEED F/MIN	T.C. SEC	SENS SETTINGS	ZERO DIV. & CPS	API G.R. UNITS PER LOG DIV.	T.C. SEC	SENS SETTINGS	ZERO DIV. & CPS	API N. UNITS PER LOG DIV.
1	0	1333	12	.5	50	04	6 CPS	3	1000	17	60 CPS
	DENSITY										
2	0	732	9	3	5000	08	200 CPS				

REMARKS

GAMMA RAY | 5"=100' | NEUTRON

GAMMA RAY INCREASES → CPS 0 60

NEUTRON INCREASES → CPS 60 660 1260

4000 DENSITY 0

000 100 200 300 400 500 600 700

F.P.

APPENDIX 2

GAMMA-RAY NEUTRON AND SIDEWALL DENSITY LOGS

(1976)

Re: Dawson Ck 76/8A

ROKE OIL ENTERPRISES LTD. CALGARY, ALBERTA

GAMMA RAY NEUTRON LOG

FILE NO

COMPANY Rocky Talisman Energy Sask Ltd.

WELL 76-1

LOCATION

FIELD DOWLING CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. Ft. Above Perm. Datum

Log Measured from GROUND LEVEL K.B.

Well Depths Measured from GROUND LEVEL G.L.

LSD SEC TWP RGE W M

John Simon DEAS

Rec. No. ONE

Date 28 APR 76

Last Reading 4377

Footage Logged 4377

Depth Reached 4378

Casing Driller 40

Casing Logger

Casing Type

Casing Wt.

Liquid Level FULL

Mch. Diam. N.R.

Rm @ °F

Operating Time 1½ HOURS

Truck No HELI 1

Recorded By SANDY GARARD

Witnessed By HANSKEL

511

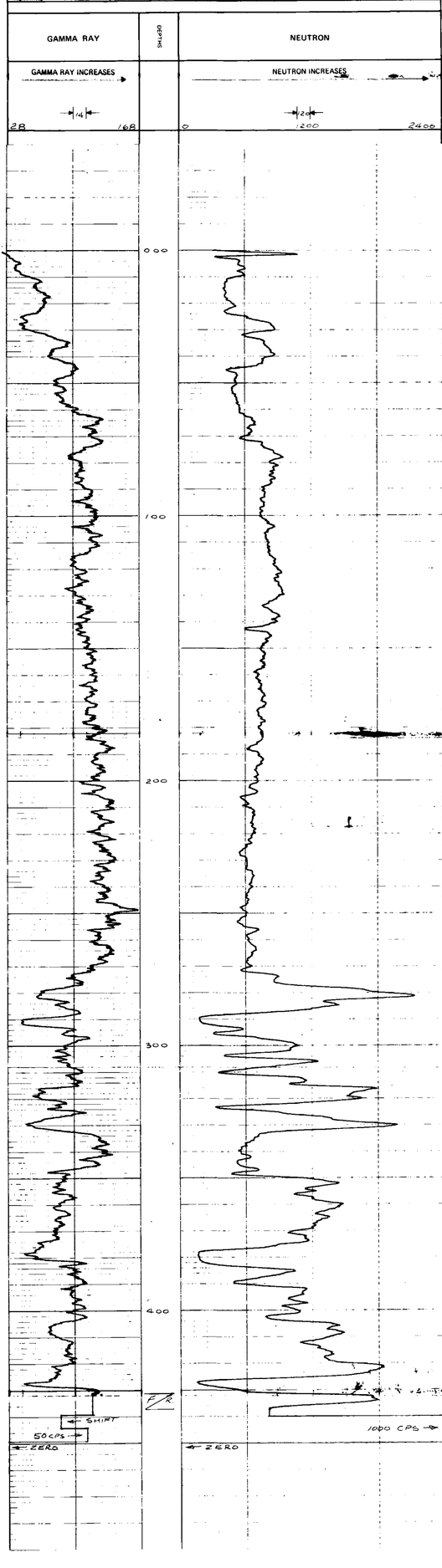
EQUIPMENT DATA

GAMMA RAY		NEUTRON	
RUN NO.	ONE	RUN NO.	ONE
TOOL MODEL NO.	125-003	LOG TYPE	NEUTRON/NEUTRON
DIAMETER	1 11/16	TOOL MODEL NO.	125-003
DETECTOR MODEL NO.		DIAMETER	1 11/16
TYPE	SCINTILLATION	DETECTOR MODEL NO.	
LENGTH		TYPE	PROPORTIONAL
DISTANCE TO N SOURCE		LENGTH	4 INCH
GENERAL		SOURCE MODEL NO.	MRC-N-SS-W
HOIST TRUCK NO.		SERIAL NO.	256
INSTRUMENT TRUCK NO.	HELI 1	SPACING	
TOOL SERIAL NO.	125-003	TYPE	AmBe
		STRENGTH	3 CURIE

LOGGING DATA

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.	NEUTRON T.C. SEC.	NEUTRON SENS SETTINGS	NEUTRON ZERO DIV. L OR R	NEUTRON API N. UNITS PER LOG DIV.
1	0	4333	12	4	100	2 L	14	3	1000	0	120

REMARKS LOGGED THROUGH NQ ROD



Re-Digitize Run 1 (3) 1/2

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

SIDEWALL DENSILOG

FILE NO.

LSD SEC TWP RGE W ____ M

COMPANY Chang Jiang Song Su Ltd

WELL Zk-1

LOCATION

FIELD BROOKLYN CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. K.B.
Log Measured from KELLY BUSHING 5.00 Ft. Above Perm. Datum D.F.
G.L.

Date Nov 23 APR 76
Run No. ONE
Depth Driller 433
Depth Logger 436
Bottom Logged 436
Top Logged 433
Casing Driller 9 5/8 @ 60
Casing Logger
Bit Size 8 1/2
Type Fluid in Hole GEL
Dens. Visc. 9.0 43
pH Fluid Loss
Source of Sample CIRC.
Rm @ Meas. Temp.
Rmf @ Meas. Temp.
Rmc @ Meas. Temp.
Source of Rmf and Rmc
Rm @ BHT
Time Since Circ. 1 1/2 HOURS
Max. Rec. Temp. Deg. F
Equip. Location NEW. W. 4
Recorded By RUSTOM A.R.D.
Witnessed By MASKELL

511

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	433	12					3	1000	2 R	37.25

REMARKS LOGGED THROUGH NQ ROD

Tool # 422

DEPTHS

CALIPER
(DIAMETER – INCHES)

GAMMA RAY
API

BULK DENSITY
(GAMMAS)

000
100
200
300
400
FE

SHIFT
500 CPS
ZERO

Re: DOWLING CR 76(3)A 76-4

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

GAMMA RAY NEUTRON LOG

FILE NO.
LSD
SEC
TWP
RGE
W ____ M

COMPANY PUNG JEUN SANG SA LTD

WELL 76-4

LOCATION

FIELD DOWLING CREEK

PROVINCE BRITISH COLUMBIA

Other Services: DENG

Permanent Datum GROUND LEVEL Elev. K.B.
Log Measured from GROUND LEVEL Ft. Above Perm. Datum CSG
Well Depths Measured from GROUND LEVEL G.L.

Run. No.	ONE
Date	4 MAY 76
First Reading	337
Last Reading	0
Footage Logged	337
Depth Reached	338
Depth Driller	338
Casing Roke	
Casing Driller	30
Fluid Type	GEL
Liquid Level	FULL
Min. Diam.	NO
Rm @ °F	
Operating Time	1 HOUR
Truck No.	HELI 1

511

Recorded By SUNDGAARD Witnessed By HANKEL

EQUIPMENT DATA

GAMMA RAY: RUN NO. ONE; TOOL MODEL NO. 125-003; DIAMETER 1 5/8; DETECTOR MODEL NO. SCINTILLATION; TYPE; LENGTH; DISTANCE TO N. SOURCE

NEUTRON: RUN NO. ONE; TOOL TYPE NEUTRON/NEUTRON; TOOL MODEL NO. 125-003; DIAMETER 1 5/8; DETECTOR MODEL NO. PROPORTIONAL; TYPE; LENGTH INCH; SOURCE MODEL NO. MRC-N-SS-W; SERIAL NO. 256; SPACING; TYPE AmBe; STRENGTH 3 CURIES

GENERAL: HOIST TRUCK NO. HELI 4; INSTRUMENT TRUCK NO. 125-003; TOOL SERIAL NO.

LOGGING DATA

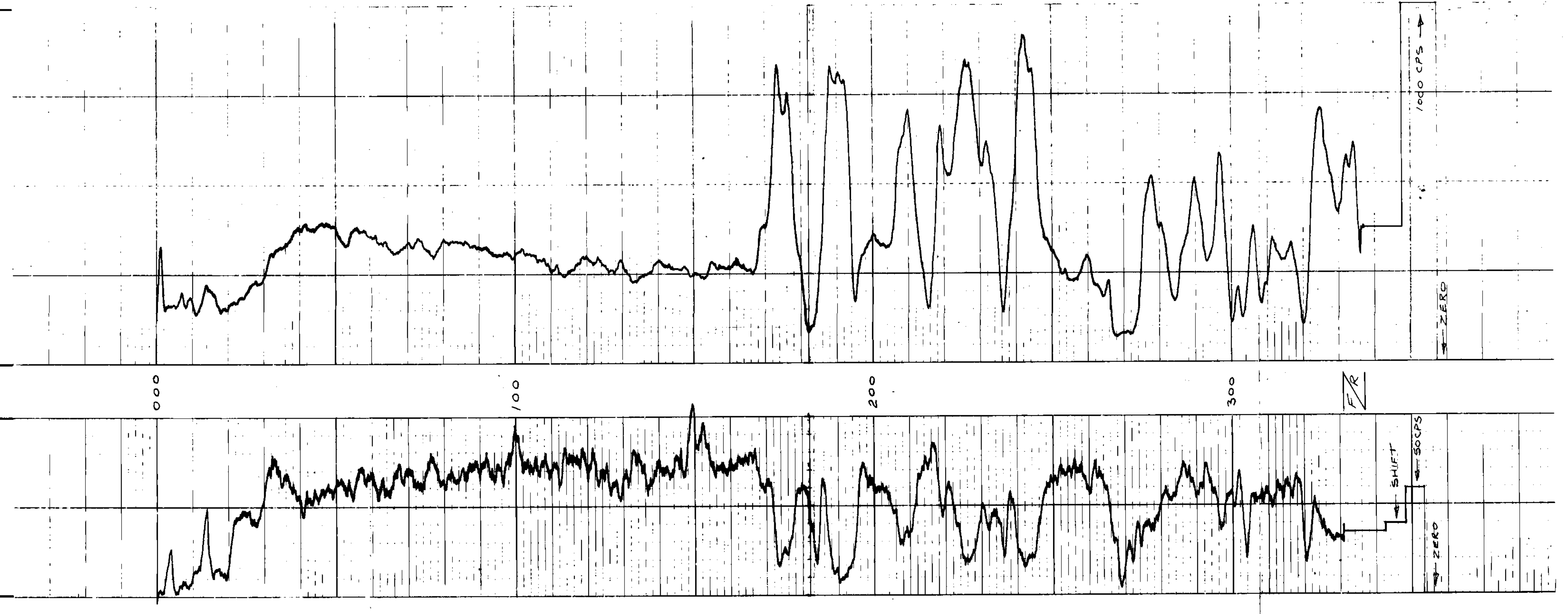
RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT/MIN	GAMMA RAY T.C. SEC.	GAMMA RAY SENS SETTINGS	GAMMA RAY ZERO DIV. L OR R	GAMMA RAY API G. R. UNITS PER LOG DIV.	NEUTRON T.C. SEC.	NEUTRON SENS SETTINGS	NEUTRON ZERO DIV. L OR R	NEUTRON API N. UNITS PER LOG DIV.
1	0	337	12	4	100	2 L	14	3	1000	0	120

REMARKS LOGGED THROUGH 30 ROD

NEUTRON — NEUTRON INCREASES — 2400 — 200 — 0

DEPTHS — 000 — 100 — 200 — 300

GAMMA RAY — GAMMA RAY INCREASES — 28 — 14 — 48



Re. Drilling 6.C. 76/3/4 JC 4

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

SIDEWALL DENSILOG

FILE NO.

LSD
SEC
TWP
RGE
W.M.

COMPANY PURE JEWEL SASK. S.A. LTD.

WELL 26-4

LOCATION

FIELD ROSEBUD CREEK

PROVINCE BRITISH COLUMBIA

Permanent Datum GROUND LEVEL Elev. K.B.
Log Measured from GROUND LEVEL Ft. Above Perm. Datum
Drilling Measured from GROUND LEVEL D.F.
G.L.

Other Services: GRN

Recorded By SUNDBAARD Witnessed By HANSEN

Run No.	ONE
Date	4 MAY 76
First Reading	330
Last Reading	0
Footage Logged	330
Depth Reached	333
Depth Driller	338
Casing Driller	30
Fluid Type	GEL
Liquid Level	FULL
Min. Diam.	NA
Operating Time	1 HOUR
Truck No.	HELJ

511

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	330	12					3	1000	2 L	3725
2	160	180	12	→	EXPANDED	SCALE					

REMARKS LOGGED THROUGH NO ROD

TOOL #422

DEPTHS

CALIPER
(DIAMETER – INCHES)

GAMMA RAY
API

BULK DENSITY
(GRAMS/CC)

100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280

000
100
200
300
FR.
160
170
180

SHIFT
500 CPS
ZERO

APPENDIX 3

LITHOLOGIC LOGS (1.976)

511

PAUL DYSON CONSULTANTS

M. DOWLING CR 76(8)A.

STRATIGRAPHIC LOG

DRILL HOLE BR 76-1 AREA Dowling Creek

COMPANY Bow River Resources/Bri Coal

COORDINATES ---

GROUND ELEVATION --- TOTAL DEPTH 438

MECHANICAL LOGS RUN GR/Sidewall Density

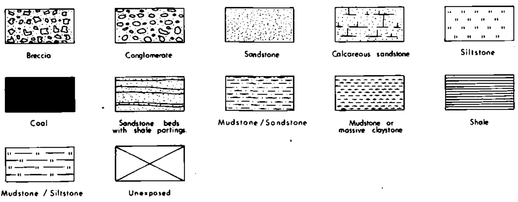
DRILLING METHOD Diamond/Wireline

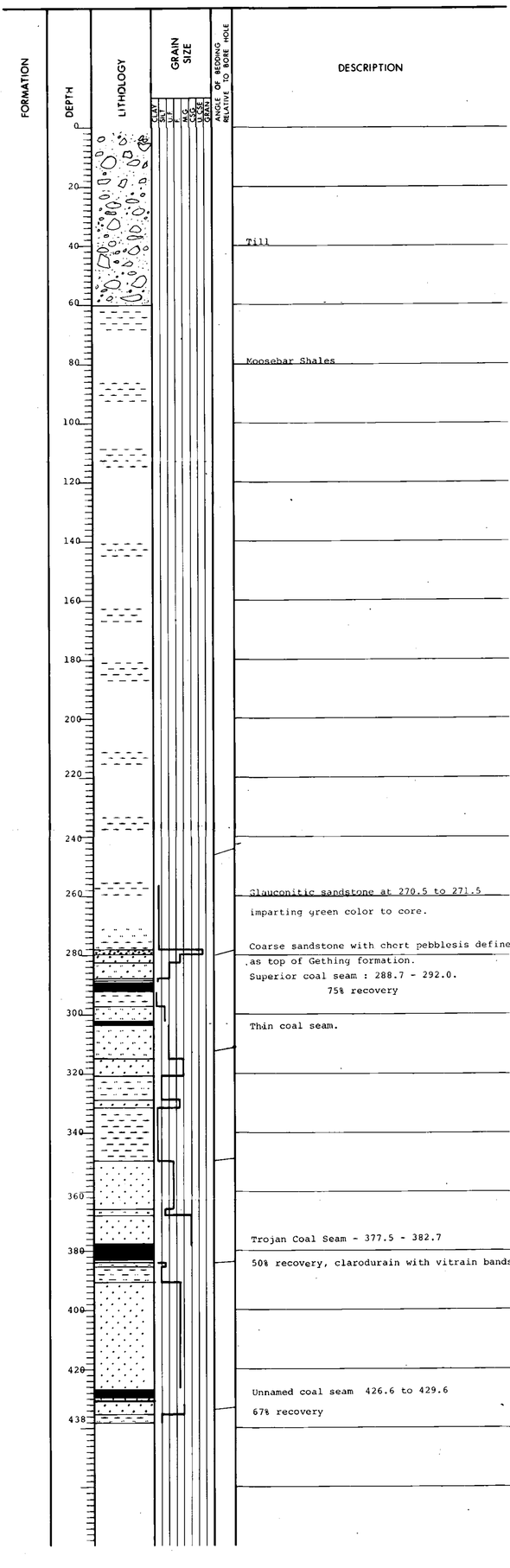
HOLE SIZE NQ DATE OF COMPLETION April 29, 1976

LOGGED BY R. Hankel

REMARKS

LITHOLOGIC SYMBOLS





511

PR. DOWLING CR 76 (3)A.

PAUL DYSON CONSULTANTS

STRATIGRAPHIC LOG

DRILL HOLE BR 76-2 AREA Dowling Creek

COMPANY Bow River Resources/Bri Coal

COORDINATES ---

GROUND ELEVATION --- TOTAL DEPTH 668

MECHANICAL LOGS RUN Nil

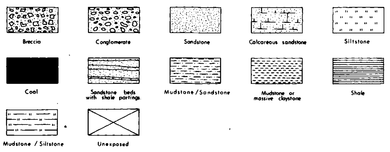
DRILLING METHOD Diamond/Wireline

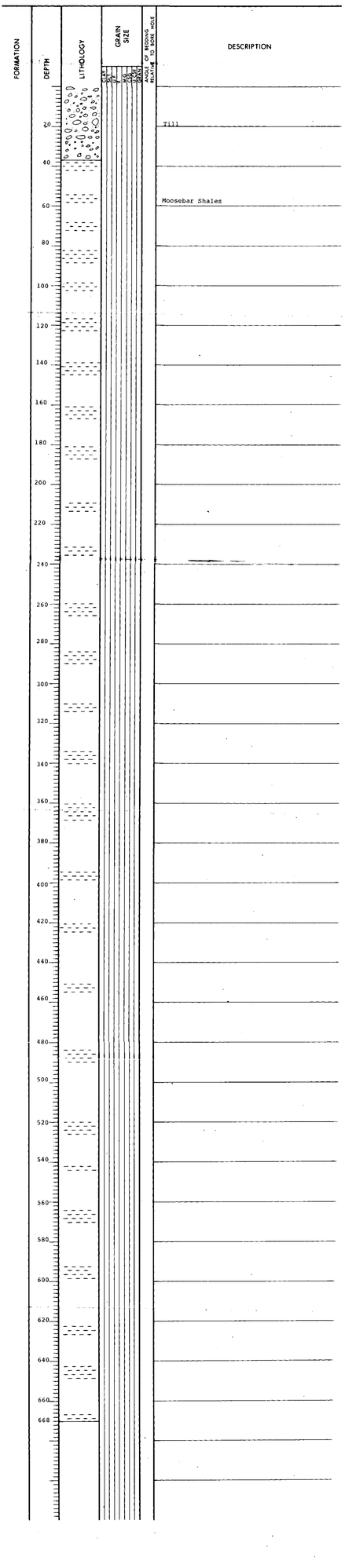
HOLE SIZE NQ DATE OF COMPLETION April 30, 1976

LOGGED BY R. Hankel

REMARKS

LITHOLOGIC SYMBOLS





511

Pt. Dowling Ck 76(3)A.

PAUL DYSON
CONSULTANTS

STRATIGRAPHIC - LOG

DRILL HOLE BR 76-3 AREA Dowling Creek

COMPANY Bow River Resources/Bri Coal

COORDINATES ---

GROUND ELEVATION --- TOTAL DEPTH 165

MECHANICAL LOGS RUN Nil

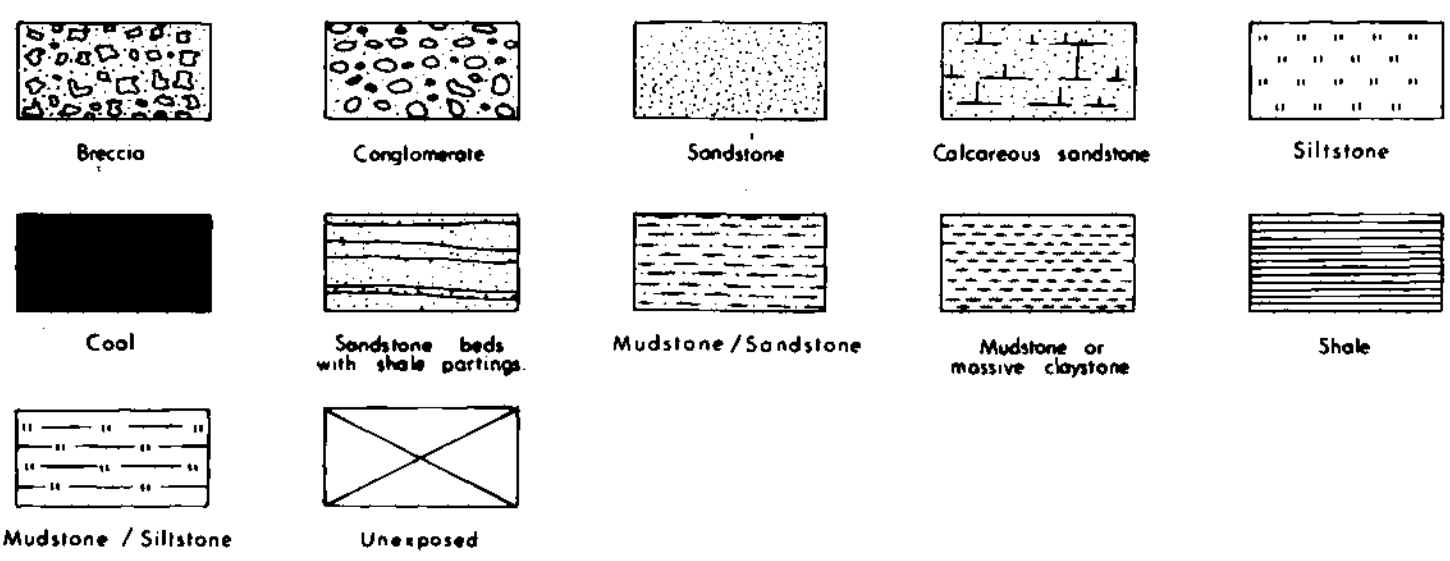
DRILLING METHOD Diamond/Wireline

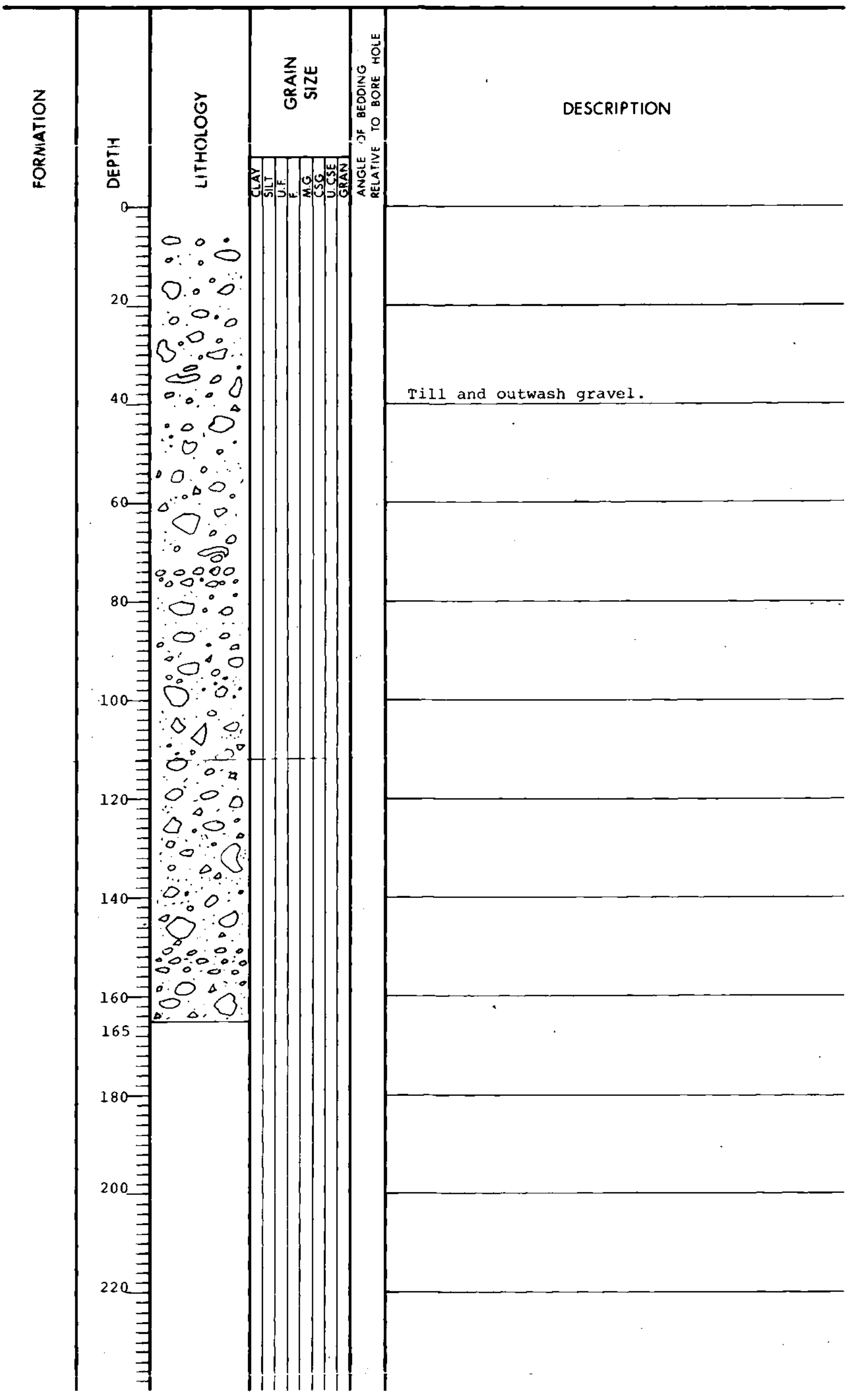
HOLE SIZE NQ DATE OF COMPLETION May 4, 1976

LOGGED BY R. Hankel

REMARKS

LITHOLOGIC SYMBOLS





511

PAUL DYSON CONSULTANTS

Ar. Dowling Cr 76(3)A.

STRATIGRAPHIC LOG

DRILL HOLE BR 76-4 AREA Dowling Creek

COMPANY Bow River Resources/3ri Coal

COORDINATES ---

GROUND ELEVATION --- TOTAL DEPTH 338

MECHANICAL LOGS RUN GRN/Sidewall Density

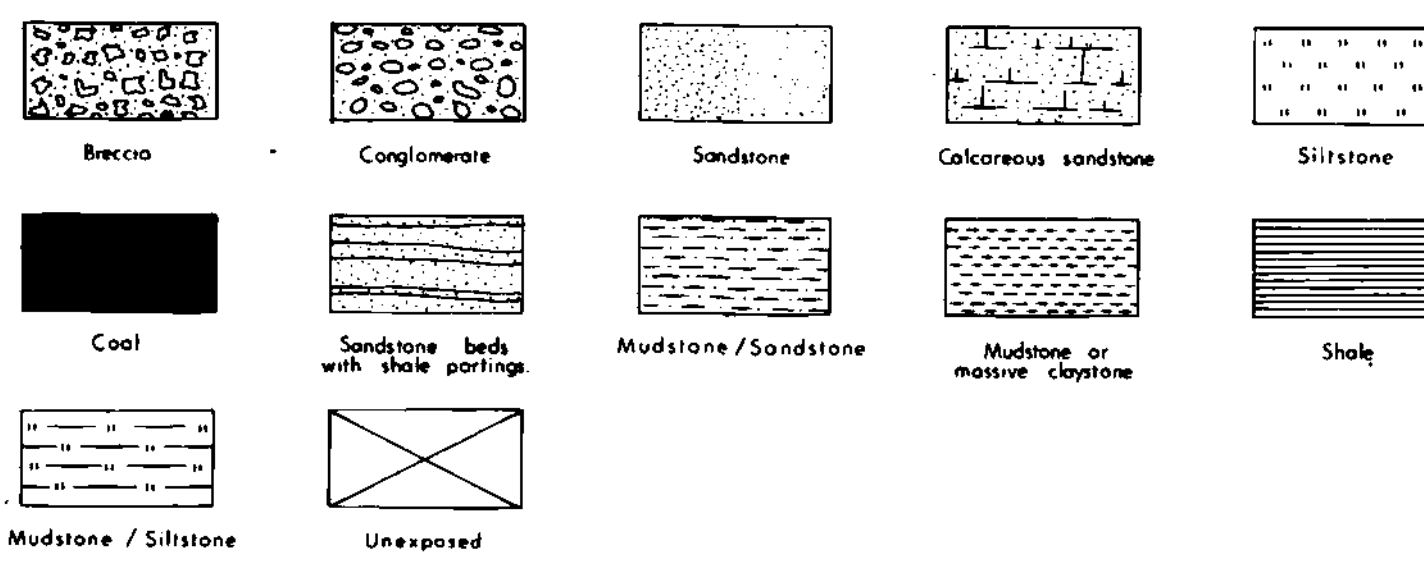
DRILLING METHOD Diamond Wireline

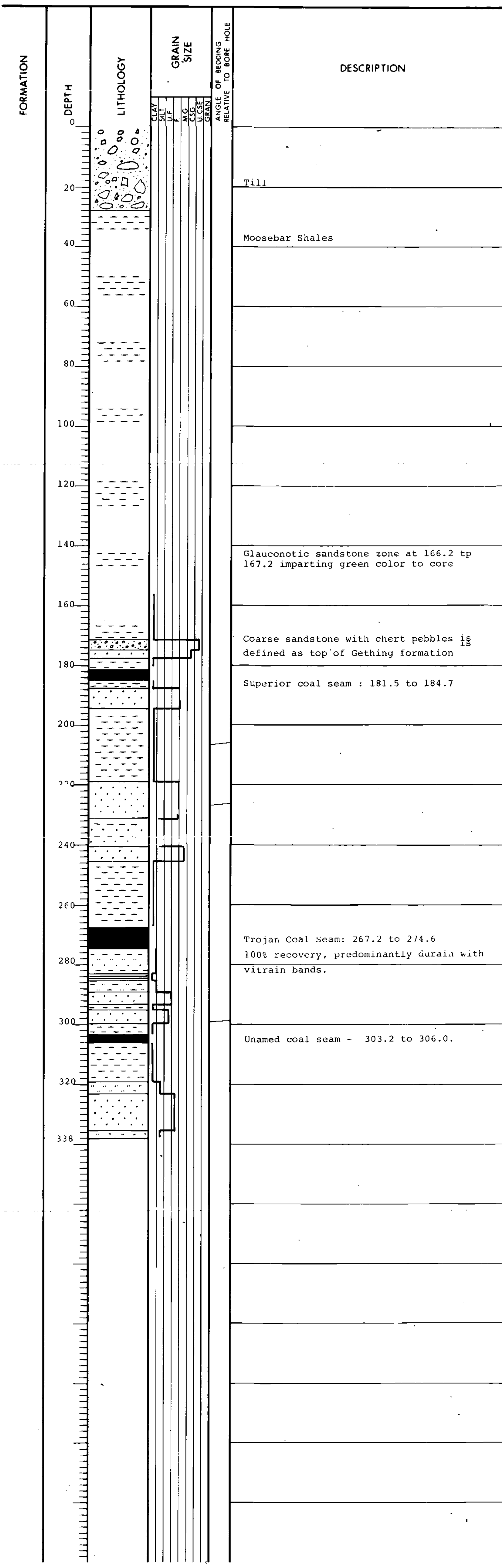
HOLE SIZE NQ DATE OF COMPLETION May 4, 1976

LOGGED BY R. Hankel/Paul Dyson

REMARKS

LITHOLOGIC SYMBOLS





APPENDIX 4

CORE DESCRIPTIONS (1976)

Hole # 76-l. (vertical)

0 - 6	Triconed and cased through overburden, till and outwash.
60 - 270.5	Shales of Moosebar formation, dark grey; slightly silty; calcareous (moderately); a sequence of marine mudstones exhibiting homogenity of appearance; only occasional. and poorly developed laminae discernable; core locally broken and fractured; wet mud seam at 69.5 to 69.9; occasional pelecypod; few thin siltier zones up to 2" thick, some local pyrite pockets; only very occasional; BCA obtainable; at 248. BCA = 74°; silty zones lighter in color and more calcareous.
270.5 - 27'1.5	Mudstone; medium green due to glauconite layers and inclusions; also greater amount' of pyrite nodules and crystals; silt content higher than above unit; otherwise ..... typical of Mooseb'ar shales.
271.5 - 278	Shales of Moosebar formation; exhibiting. -features very similar to description of Moosebar above; however,, silt content higher than above; gradational below.
27.8 - 279.7	Conglomerate and coarse grained sandstone; medium grey; pebbles of black chert, mean diameter 1/16"; pyrite inclusion's; defined as top of Gething formation; abrupt below.
279.7 - 282.4	Sandstone; light grey; fine grained; undulating fine laminations; carbonaceous laminae; weakly calcareous; abriipf below. BCA 80°.
282.4 - 287.7	Sandstone/Siltstone; alternating sequence; sands light/medium grey and very fine grained; silts dark grey, moderately calcareous, pyrite pockets; gradational below; BCA 78°.

287.9 - 288.7	Mudstone; dark grey; slightly silty, non calcareous; carbonaceous; gradational b e l o w .
288.7 - 292.0	COAL: 2.5' of 3.3' recovered; mostly clarodurain with vitrain bands; .5' sandy band at 291.
292.0 - 297.5	Mudstone; dark grey/black; top .7' soft, non-lithified mud; only occasional silt layer otherwise featureless; gradational below.
297.5 - 302.2	Sandstone/siltstone; finely interbedded; wavy lamination; sands very fin-e grained; non calcareous; bedding irregular and discontinuous; fairly gradational below-. BCA = 82° to 78°.
302.2 - 303	COAL - vitrain and clarain.'
303 - 315	Siltstone/Sandstone; silts dominate; sands medium grey; cross-laminated and irregular discontinous layers; non calcareous; BCA = 81°; gradational-below.
315 - 321.5	Sandstone: light/medium grey; fin-e/ medium grained; carbonaceous laminae; cross-laminated; wavy laminae; gradational and sequential below; BCA = 76°.
321.5 - 328.6	Siltstone/Mudstone; medium/dark grey; moderately calcareous top half; very calcareous lower half; silts increase with depth; occasional carbonaceous layers; erosional below.
328.6 - 331.7	Sandstone: medium grey; fine grained; few silt lenses; laminated and cross laminated; gradational below.
331.7 - 348.7	Mudstone; dark grey; silt layers in lower half; 'upper half argillaceous non calcareous mud; lower half very calcareous silty; occasional carbonaceous layers.

348.7 - 366	Sandstone; mediu/dark grey; very fine/ fine grained; laminated; carbonaceous; coaly shards and specks; silty bands more prevalent with depth; 360' to 362' lamination is discontinuous and disrupted: BCA = 80°; plant remains.
366 - 368	Siltstone; dark grey; very calcareous; few sand inclusions; otherwise featureless; gradational below.
368 - 377.5	Sandstone; medium/dark grey; medium/ coarse grained; silty throughout with occasional silt bands; calcareous; irregular lamination; cross laminated; carbonaceous layers bottomward; coaly shards at 376; gradational below.
377.5 - 382.7	COAL ZONE '1.5' of 3.0' recovered, substantially clarodurain with vitrain bands; two medium grained sandstone bands 1" and 3" thick at 379.7 and 380.3; abrupt below; bottom 1/2" bony.
382.7 - 383.7	Mudstone; dark grey/black; silty; featureless.
383.7 - 385.3.	Siltstone; medium/dark grey; wavy lamination; some very fine sand layers; few mud layers; non calcareous; carbonaceous coaly shards; plant remains.
385.3 - 390.4	Mudstone/Siltstone; banded sequence muds becoming more dominant with depth; silts medium grey; muds black, argillaceous; wavy contacts between lithologies; non calcareous;. .3' coal at base; BCA 78°; abrupt below.
390.4 - 426.6	Sandstone; medium/dark grey; fine grained with few thin zones of medium grained; carbonaceous; non calcareous; occasional coaly shard or stringers; very faint lamination; homogeneous appearance; fractured and rehealed 419.0' to 419.2'.

426.6 - 429.6	COAL! - durain and vitrain, 2' of 3' recovered.
429.6 - 430.6	Sandstone;-dark grey; very fine grained; carbonaceous; gradational below; becoming slightly argillaceous bottomward.'
430.6 - 430.9	Bony coal.
430.9 - 435.5	Sandstone; medium grey; fine/medium grained; occasional thin silt band; laminated and cross laminated; strongly calcareous; gradational below; BCA 80°.
435.5 - 438	Siltstone/Mudstone; dark grey; alternating thin bands with abrupt contacts between; muds becoming more dominant with depth;- silts calcareous,muds non calcareous; occasional thin fine sand layer.'
	T. D. 438.0'

Hole BR 76-2 (vertical)

0 - 37	Triconed and cased; till and gravel.
37 - 38	Coarse grained sandstone; appears to be a boulder.
38 - 668'	Shales of Moosebar formation; dark grey; slightly silt with occasional thin silt band; otherwise homogeneous appearance exhibiting few sedimentary structures; occasional pyrite crystals; non calcareous; a sequence of marine mudstone indicating slow, continuous deposition in a quiet environment; at 154': a 2" slickensided and polished soft clay, indications of fracturing. and- slippage; much slicken- sided and broken core between 492 and-- 505 (driller getting short runs of 2' and 3' before blackage of core barrel).

T.D. - 668'

Hole BR 76-3

0	-	165	Overburden of till and gravel.
			(Note: possible bedrock at 165'.)
			T.D. 165'

Hole BR 76-4

0 - 28	Till
28 - 171.6	Moosebar - glauconite zone 166.2 - 167.2; very fine sandstone; glauconite is finely disseminated throughout.
171.6 - 174.8	Sandstone; coarse; scattered pebbles (1/4" - 1/2") of chert and quartsite; occasional mud and carbonaceous siltstone clasts to 1". Erosional base to unit with sandstone intrustions into underlying muddy unit.
174.8 - 177.4	Sandstone; light grey/ mediu/coarse grained; (0.5' section of very fine sandstone and silt exhibiting disrupted bedding and very fine laminations.), laminated and cross laminated; non calcareous,~ erosional below;
177.4 - 181.5	Mudstone; dark grey; silty with occasional fine band; bands and conspicuous blobs of pyrite; non calcareous.
181.5 - 184.7	COAL!
	181.5 - 182.5 Coal, dull, homogeneous
	182.5 - 183.3 Partings, alternating — sequence of carbonaceous mudstone/silt.
	183.3 - 184.7 Coal, bright, banded vitrain with conspicuous cleats.
184.7 - 187.5	Mudstone; medium/dark grey; increasingly silty to base, gradational to unit below.
187.5 - 194.1	Sandstone;. light/medium grey; fine/ medium grained; wispy lamination with. carbonaceous siltstone bands; non calcareous.
194.1 - 218.5	Mudstone; dark grey; top half of unit exhibits numerous discontinuous (less than 1/4") bands of light grey, very fine sandstone. Occasional very thin (less than 1/4") coal lens. Lower half more homogeneously mudstone, non calcareous, gradational to unit below. BCA at 210 80°.

218.5 - 230.8	Sandstone; fine medium grained; light grey, upper half generally darker. Generally laminated/cross laminated with dark silty bands. Portions of slumped bedding: Two zones with minor slickensides at 228 and 228.9.
230.8 - 240.2	Interbedded sequence of very fine sandstone and mudstone (1/2" beds) possible 1/4" burrows. BCA 80° - 85°.
240.2 - 245.7	Sandstone; light/medium grey; medium grained, increasingly laminated and cross laminated towards base of unit. Transitional to unit below. Sharply calcareous.
245.7 - 267.2	Mudstone; dark grey/black; occasional. very fine sandstone in top 1' of unit and lowermost 1.5'. 0.4' very fine sandstone immediately overlying coal. Mudstone is non calcareous and generally featureless.
267.2 - 274.6	(TROJAN SEAM) 7.4' (100% recovery)

267.2 - 267.9	Coal
267.9 - 268.2	Sandstone (.4)
268.2 - 270.9	Coal
279.9 - 271.0	Sandstone (.1)
271.0 - 273.2	Coal
273.2 - 273.6	Sandstone (.4)
273.6 - 274.6	Coal

Coal 6.5'; ptg. 0.9'. Sandstone is all very fine grained, light grey, erosional contacts with coal, non calcareous.--Coal is. predominatly durain with vitrain bands.

274.6 - 283	Alternating sequence generally dark grey in appearance of very fine sandstone/ mudstone/siltstones. Underlying laminae. Non-calcareous through, contacts between lithology abrupt and occasional erosional; sandstone are laminated/cross laminated. Burrowed in lower 2' - filled with sandstone; gradational below.

283 - 285	Mudstone; dark grey/black, carbonaceous.
285 - 289	Siltstone/Mudstone; medium/dark .grey, finely banded appearance, non calcareous.
289 - 292.8	Sandstone; light/medium grey; very fine/ fine grained; moderately calcareous in more silty units.
292.8 - 295.6	Mudstone; silty;. dark grey; contains lenses of silt and very fine sandstone which are calcareous.
295.6 - 299.5	Sandstone; light/medium grey; fine becoming very fine towards the base of unit; laminated and cross laminated; load structures; some scour and fill structures; strongly calcareous in upper portion of unit; gradational--below.:-.:-
299.5 - 303.2	Mudstone.; medium/dark grey; carbonaceous with coaly shards and stringers throughout; pyrite band at 303 - 303.3; Coal bands 300 - 300.3 - vitrain - non calcareous except for pyrite zone. Abrupt contact at base.
303.2 - 306	COAL SEAM - containing 0.5' of very fine sandstone. (Note: 0.5' core missing.)
306 - 319	Mudstone; medium/dark grey; top half generally banded with very fine sandstone; erosional contact between lithologies; carbonaceous zones; burrowed as unit 274.6 - 283. At 315 unit becomes silty to base with increasing calcareous content. Gradational below.
319 - 322.9	Siltstone; medium/dark grey containing. 0.8' coal at 320.6 - 321.4; non calcareous and featureless.

322.9 - 335.4	Sandstone; light/medium grey; generally fine grained with occasional medium/ coarse and very fine zones; 328 - 335.4 contains numerous carbonaceous laminae and coaly shards, discontinuous lamination 1' zone of bioturbated. sands at 327'; unit generally very calcareous; erosional contact with unit below.
335.4 - 338	Silststone; dark grey; argillaceous containing plant fragments; very calcareous and generally 'featureless.

T.D. 338'

re-DOWLING cl. 76(4)A.

OPEN FILE

~~CONFIDENTIAL~~

APPENDIX 5

ANALYSES OF TROJAN SEAM (1971)

To: PAUL DYSON CONSLTS & HLDS LTD.
Ste. 3004, 505 6th St. S.W.,
Calgary 1, Alta

File No. 4802
Date Nov. 26, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	INH. %H2O	% V.M.	% ASH	% F.C.	FSI
RAW COAL					
TEX 1-1	.70	22.43	17.35	59.52	3½
TEX 1-2	.62	22.39	17.77	59.22	6
TEX 1-3	.35	30.29	25.86	43.50	7
TEX 1-4	.53	20.29	22.98	56.20	3%
TEX 1-5	.44	25.79	16.26	57.51	7
TEX 1-6	.46	18.38	3.80	77.36	½
TEX 1-7	.46	14.43	32.41	52.70	½
TEX 1-8	.49	18.73	8.43	72.35	1

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MAOE BY ME UPON THE HEREIN DESCRIBED SAMPLES. . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: PAUL DYSON CONSLTS & HLDGS LTD.
Ste. 3004 505 6th St. S.W.,
Calgary 1, Alta.

Attn: Mr. Paul Dyson

File No. 4802
Date Nov. 26, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	% Float	% Sink
SINK-FLOAT ANALYSIS		
1.60 S.G.		
TEX-1-1	85.4	14.6
TEX-1-2	80.9	19.1
TEX-1-3	49.8	50.2
TEX-1-4	73.6	26.4
TEX-1-5	79.7	20.3

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

Licensed Assayer of British Columbia

To: PAUL DYSON CONSLTS & HLDNS LTD.
Ste. 3004 505 6th St. S.W.,
Calgary 1, Alta.

Attn: Mr. Paul Dyson

File No. 4802
Date Nov. 26, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	INH %H2O	% V.M.	% ASH	% F.C.	% S	FSI
ANALYSIS OF FLOATS						
1.60 S.G.						
TEX-1-1	.60	23.75	7.82	67.83	.54	4½
TEX-1-2	.51	23.86	6.43	69.20	.55	7
TEX-1-3	.44	26.15	6.52	66.89	.59	8
TEX-1-4	.42	23.07	10.66	65.85	.94	5
TEX-1-5	.45	24.35	9.14	66.06	.86	7½

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

C. Lim C. Jones

Licensed Assayer of British Columbia

To: PAUL DYSON CONSULTANTS & HOLDINGS LTD.
Ste. 3004 505 Sixth Street S.W.
Calgary 1, Alberta

Attn: Mr. Paul Dyson

File No. 4860
Date Dec. 13, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	INH %H2O	% V.M.	% ASH	% F.C.	FSI
RAW COAL					
4-1	.42	22.55	16.68	60.35	5
4-2	.32	26.51	22.84	50.33	8
4-3	.34	18.05	27.86	53.75	1
TEX 3-1	.49	19.85	32.16	41.48	3½

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

A. L. McIsaac
Licensed Assayer of British Columbia

To: PAUL DYSON CONSULTANTS & HOLDINGS LTD.
Ste. 3004 505 Sixth St. S.W.
Calgary 1, Alberta
Attn: Mr. Paul Dyson

File No. 4860
Date Dec. 13, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	% Float	% Sink
SINK-FLOAT ANALYSIS		
S.G. 1.60		
4-1	83.1	16.9
4-2	61.0	39.0
4-3	53.2	46.8
TEX 3-1	60.4	39.6

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MAOE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.

Pulps Retained one month unless specific arrangements made in advance.

A. L. McInnes
Licensed Assayer of British Columbia

To: PAUL DYSON CONSULTANTS & HOLDINGS LTD.
Ste. 3004 505 Sixth Street S.W.
Calgary 1, Alberta
Attn: Mr. Paul Dyson

File No. 4860
Date Dec. 13, 1971
Samples Coal

Certificate of ASSAY

LORING LABORATORIES LTD.

SAMPLE No.	INH %H2O	% V.M.	% A S H	% F.C.	% S	FSI
ANALYSIS OF FLOATS						
4-1	.37	23.45	7.40	68.78	.80	6½
4-2	.33	28.49	6.31	64.81	.73	9
4-3	.27	21.40	8.65	69.68	.91	2
TEX3-1	.35	24.30	6.46	68.89	.64	6

I Hereby Certify THAT THE ABOVE RESULTS ARE THOSE ASSAYS MADE BY ME UPON THE HEREIN DESCRIBED SAMPLES . . . .

Rejects Retained one month.
Pulps Retained one month unless specific arrangements made in advance.

A. L. McIsaac
Licensed Assayer of British Columbia

APPENDIX 6

ANALYSES OF TROJAN SEAM (1976)

BOW RIVER RESOURCES

June 1, 1976.

SAMPLE: Hole #76-4

LAB. NO.: 7363

HEAD RAW ANALYSIS

A.D.M.%	R.M.%	ASH%	V.M.%	F.C.%	S.%	F.S.I.	H.G.I.	CALC. FACTORS
0.3	0.8	27.8	22.3	49.1	0.73	3	67	adb
	1.1	27.7	22.2	49.0	0.73	-	-	arb
		28.0	22.5	49.5	0.74	-	-	db

"SIZE/RAW ANALYSES: (on gross sample crushed down to minus 1/4") adb

SIZE FRAC.	WT.%	ASH%	R.M.%	V.M.%	F.C.%	S.%	F.S.I.	CUMULATIVE WT.%	CUMULATIVE ASH%	CUMULATIVE S.%
1/4" X 28M	91.4	29.5	d . 7	22.0	47.8	0.70	3' .	91.4	29.5	0.70
28M X 100M	6.1	21.8	0.6	24.6	53.0	0.71	6 1/2	97.5	29.0	0.70
100M X 0	2.5	29.5	0.6	24.7	45.2	0.67	4	100.0	29.0	0.70

SINK-FLOAT ANALYSIS: 1/4" X 28M (WT.% = 91.4) adb

S.G. FRAC.	WT.%.	ASH%	R.M.%	V.M.%	F.C.%	S.%	F.S.I.	CUMULATIVE WT.%	CUMULATIVE ASH%	CUMULATIVE S.%
-1.45	62.2	5.5	0.6	24.6	69.3,	0.69	4 1/2	62.2	5.5	0.69
1.45-1.50	1.2	23.6	0.6	23.1	52.7	0.78.	3 1/2	63.4	5.8	0.69
1.50-1.60	2 . 0	30.8	0.6	22.6	46.0	0.86	2 1/2	65.4	6.6	0.70
+1.60	34.6	73.2	0.5.	17.8	8.5	0.63	N.A.	100.0	29.6	0.67

BOW RIVER RESOURCES'

June 1, 1376..

SAMPLE Hole #76-4

LAB. NO.:, 7 3 6 3

ANALYSES ON 1/4" X 28M FLOATS @ 1.60 S.G. (TOTAL YIELD = 59.8%)

CALCULATED R.M.%	CALCULATED ASH%	PROXIMATE V.M.%	PROXIMATE F.C.%	CALC. S.%	CALC. F.S.I.	SOFT. TEMP. °C	RUHR DILATOMETER TEST MAX. DIL. TEMP. °C	MAX., CONT.%	MAX DILAT.%	G.NO.	
0.6	6.6	24.5	68.3	0.70	4	400	"	19	"	"	ADB
	6.6	24.6	68.8	0.70	"						D B

SINK-FLOAT ANALYSIS: 28M X 100M (WT.% = 6.1) adb

S.G. FRAC.	WT.%	ASH%	R.M.%	V.M.%	F.C.%	S.%	F.S.I.	CUMULATIVE WT.%	CUMULATIVE ASH%	CUMULATIVE S.%
-1.45	75.6	4.1	0	25.9	69.0	0.70	7 1/2	75.6	4.1	0.70
1.45-1.56	1.5	18.0	0.6	23.1	58.3	0.66	1 1/2	77.1	4.4	0.70
1.50-1.60	1.3	27.1	0.8	21.3,	50.8	0.71	1 1/2	78.4	4.8	0.70
+1.60	21.6	72.2	0.7	20.8	6.3	0.76	N.A.	100.0	19.3	0.71

ANALYSES ON 28M X 100M FLOATS @ 1.60 S.G. (TOTAL YIELD = 4.8%)

CALCULATED R.M.%	CALCULATED ASH%	PROXIMATE V.M.%	PROXIMATE F.C.%	CALC. S.%	CALC. F.S.I.	SOFT. TEMP.°C	RUHR DILATOMETER TEST MAX. DIL. TEMP.°C	MAX. CONT.%	MAX DILAT.%	G.NO.	
1.0	4.8	25.6	68.6	0.70	7	384	20	462	22 "	1.05	ADB
	4.8	25.9	69.3	0.71	"						DB

BOW RIVER RESOURCES

June 1, 1976

SAMPLE: Hole #76-4

LAB. NO.: 7363

FROTH FLOTATION: 100M X 0 (WT. % = 2.5) 5% P.D., 0.48 lb/T of 4:1=K:MIBC
1 min. cond., Stage I & II each 1 min

PRODUCT	WT.%	ASH%	R.M.%	V.M.%	F.C.%	S.%	F.S.I.	CUMULATIVE WT.%	CUMULATIVE ASH%	CUMULATIVE S.%	
STAGE I	53.9	10.9	0.7	26.0	62.4	0.72	7	53.9	10.9	0.72	AOB
STAGE II	14.9	13.5	0.7	25.7	60.1	0.71	6 1/2	68.8	11.5	0.72	ADB
TAILS	31.2	69.2	0.5	21.9	8.4	0.57	N.A.	100.0	29.5	0.67	ADB

ANALYSES ON COMPOSITE* (1/4" X 100M FLOATS @ 1.60 S.G.)+(100M X) FROTH I & II) TOTAL YIELD = 66.3%

R.M.%	PROXIMATE H %	PROXIMATE V.M.%	F.C.%	S.%	F.S.I.	H.G.I.	SOFT. TEMP.°C	RUHR DILATOMETER TEST MAX. DIL. TEMP.°C	MAX. CONT.%	MAX. DILAT.%	G.NO.	
0.7	7.0	24.3	68.0	0.	4 1/2	68	384	-	17	-	-	ADB

Birtley Engineering
Subsidiary of Great West Steel Industries