

OPEN FILE

GR-Groundhog 80 (1)A

GEOLOGICAL REPORT

- on -

Coal Licenses #4395, #4400, & #4460,

Groundhog Coal Field

British Columbia

- for -

L. G. Scott,

Kitimat, B. C.

Work Completed: June 8 - 14, 1980.

Location: NTS 104 A/16W.
56°52'N; 128°19'W.
180 km. north of Hazelton, B. C.

CONFIDENTIAL

PREPARED BY:

KERR, DAWSON AND ASSOCIATES LTD.,

#1-219 Victoria Street,

Kamloops, B. C.

John R. Kerr, P. Eng.,

December 31, 1980.

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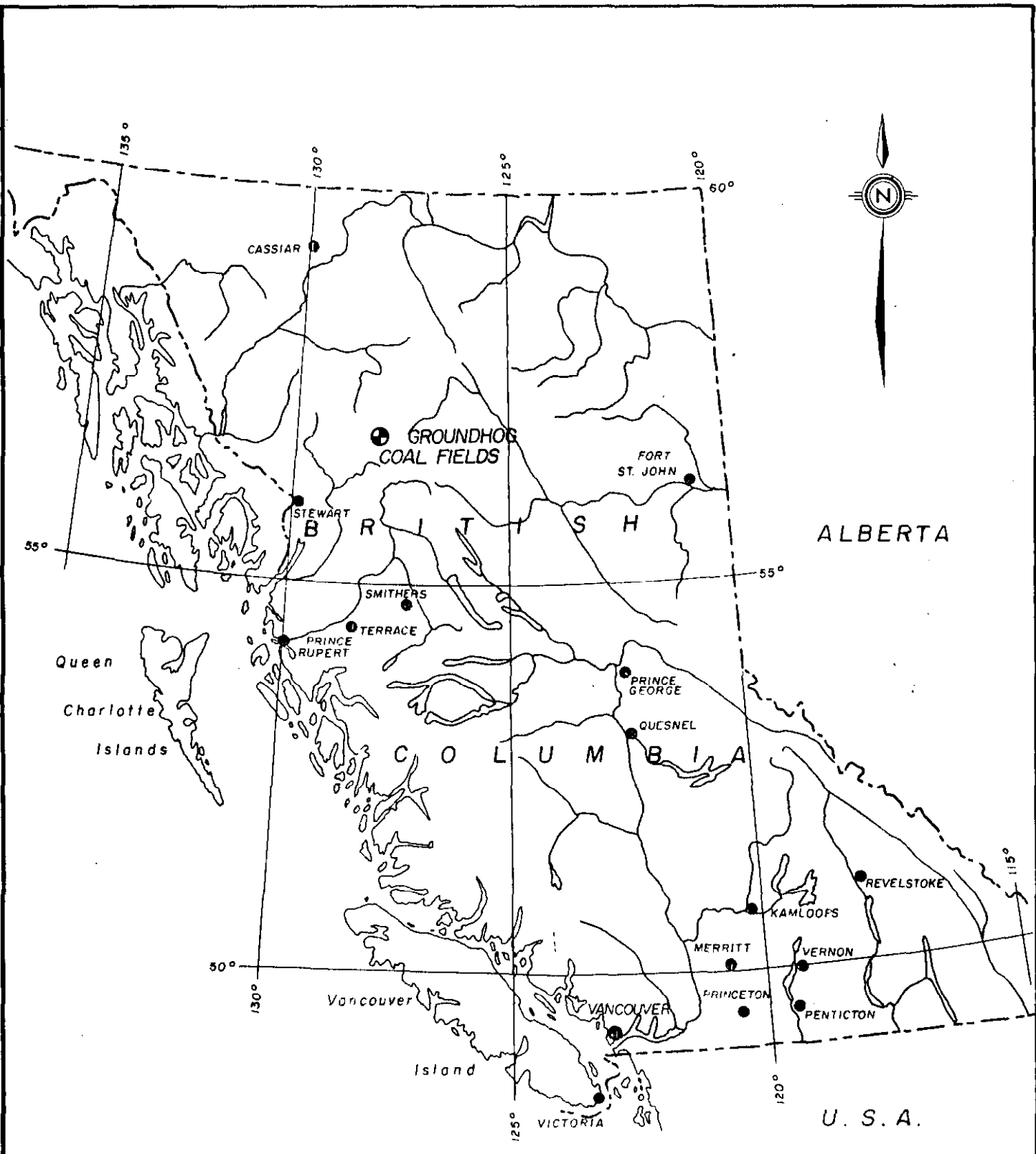
SUMMARY

Mr. L. G. Scott requested that a preliminary geological programme be completed on three coal licenses in the Groundhog Coal Field, located approximately 180 km. north of Hazelton, B. C. The programme was completed by a four-man crew during the period June 8 - 14, 1980. The programme consisted of establishing a 25 km. grid over the licenses, and tying all outcrops into grid stations. Known coal outcroppings were mapped and sampled in detail.

Two potentially economic coal seams are known to exist within the coal licenses, (2.2 m and 3.2 m thick). Thermal content of various samples ranged from 6,929 BTU/lb. to 11,966 BTU/lb. (avg. 9,815 BTU/lb.). Ash content ranged from 13.20% to 41.20%, (avg. 28.42%). It is estimated that clean coal (< 5% ash) would have a thermal content of > 14,000 BTU/lb.

There is no evidence of major structural disturbances or irregularities within the coal licenses. Measured strikes of the sediments range from 135°-180°, dipping gently (10°-20°) to the east. If the two coal

seams are continuous over the entire license area and structural irregularities are minimal, possible geological reserves of coal amount to 32,000,000 tonnes, of which 6,500,000 tonnes could be mined by strip mining methods. Other coal seams may exist within the strata, which would greatly enhance this reserve potential. Diamond drilling at 400 - 500 meter centers is required to substantiate these reserves.



PREPARED FOR L.G. SCOTT	
LOCATION MAP	
GROUNDHOG COAL FIELDS	
Technical Work by: Kerr, Dawson & Assoc. Ltd.	Date : Dec. 1980.
Scale : 1cm. = 87km.	Dwg No. 189-1

INTRODUCTION

General Statement:

Groundhog Coal Ltd. acquired 77 coal licenses in 1978 covering known coal outcroppings near the headwaters of the Skeena River. All but three licenses were dropped during 1979. The three licenses maintained cover key coal outcroppings which were drilled by Placer Development Ltd. during 1970. At the request of L. G. Scott, a preliminary exploration programme was completed during the period June 7 - June 14, 1980. The writer, in accompaniment of Mr. Brian Mountford, P. Eng. and two field assistants completed a geological mapping and sampling programme on the three license areas. This report summarizes the results of this programme.

Location and Access:

The Groundhog coal field is located in north-western British Columbia, approximately 150 km. north-east of Stewart, and 180 km. due north of Hazelton. Geographic co-ordinates of the center of the three coal licenses are 56°52'N, and 128°19'W (NTS 104A/16W).

Access to the licenses on the ground is difficult. The B. C. R. right-of-way has been cleared along the eastern bank of the Skeena River. A construction road follows the clearing. Several bridge wash-outs and slides block this road to rail-end at Chipmunk, ~ 35 km. to the southeast. Access to the licenses is best gained by helicopter. Several swampy areas provide easy landing sites. An airstrip is situated at the Kluatantan River, approximately 20 km. to the southeast. This airstrip is suitable for small fixed-wing aircraft.

Future development of the Groundhog coal fields would depend on completion of the B.C.R. rail line. Distance to Prince George is 495 km. Alternative access, providing direct routes to tidewater, are along the Skeena River to Hazelton, and along the Nass River to Greenville, distances of 200 - 250 km.

Topography and Vegetation:

The Groundhog coal fields lies at the headwaters of three major river systems. The Stikine River drains the northern portion; the Nass River drains the southwestern portion; and the Skeena River drains the southeastern portion. General terraine in the coal field

is mountainous, with broad, relatively flat basins in the major river valleys.

The three coal licenses are located on the western valley slopes of the Skeena River. Relief is flat to moderate, ranging from 1,060 m (a.s.l.) in the northeast corner of the licenses to 1,460 m (a.s.l.) in the southwest corner. The drainages of Discovery Creek, Davis Creek, and Evans Creek form local steep escarpments.

The license area is generally forested, with stands of spruce, balsam, and occasional poplar trees. Underbrush is light in the lower areas; however, in the higher elevations, thick, dense, low-lying alpine spruce occurs. There are numerous swamps within the license area, vegetation being swamp grass and tag alder.

Coal Licenses:

<u>License No.</u>	<u>Lot No.</u>	<u>Expiry Date</u>
4460	126	November 30, 1982
4400	127	November 30, 1982
4395	128	November 30, 1982

All licenses are contiguous, and are owned by Groundhog Coal Ltd.

History:

The history of the Groundhog coal fields is well documented in "Geology of the Groundhog Coal field" by Willard D. Tompson, March, 1977. The following summarizes Mr. Tompson's account.

The earliest recorded discovery of coal in the area was made in 1900, in the Spatsizi River area, some 30 km. northwest of the Groundhog. James McEvoy discovered coal on Discovery Creek in 1903. Subsequent discoveries were on Abraham Creek, Trail Creek, Telfer Creek and Beirnes Creek. During the period 1904-1913, development work was completed on all seams. Commercial production was never achieved.

Work in the coal field was idle until 1948, when the G.S.C. sent a crew into the area to evaluate and map the coal bearing lithologies. Due to mobilization problems, very little was accomplished during this programme.

Coastal Coal Ltd. acquired 24 licenses in 1966. Under the supervision of R.V. Best and J. M. Block, a party of eight geologists, assistants and prospectors geologically mapped a 1,500 square mile area. In 1969 and 1970, Placer Development Ltd., Quintana Minerals Corp. and National Coal Corp., geologically mapped 200 square miles in the Skeena River valley area. Six diamond drill holes were completed in late 1970. The licenses were permitted to lapse in the early 1970's.

Although coal licenses currently exist over most of the favourable coal bearing lithosome, there is no documented work in the area during the period 1970-1980.

FIELD PROGRAMME - 1980.

A four-man crew headed by the writer and Mr. Brian Mountford, P. Eng. commenced work in the Groundhog on June 2, 1980, mobilizing out of Smithers, B. C. Supplies were shipped to the Kluatantan airstrip by Smithers Air Services Ltd. Northern Mountain Helicopters Ltd. provided mobilization of crews and supplies to the various fly camps. The initial week was spent on licenses not applicable to this report. On June 8, 1980, a camp was constructed on Discovery Creek.

Work on the three license areas consisted of establishing a 25 km. reconnaissance grid over the license area, with lines spaced at 250 meter intervals. All grid lines were geologically mapped, tying all outcrops into grid stations. In addition, all creeks were geologically mapped and prospected.

The two known seam occurrences were located, mapped, and sampled in detail. Coal exposures were hand trenched prior to sampling.

A total of 14 samples were collected from the various seams. Samples were sent to the laboratories of Commercial Testing and Engineering Co. in Vancouver for a normal proximate analysis. This analysis includes:

Moisture Content (as received)

Ash Content

Volatile Content

Fixed Carbon Content

Thermal Content (BTU/lb)

Sulphur Content

As samples were collected in very wet conditions (snow and rain), the moisture content, as reported, was not used, as the value would not reflect the true moisture content of natural coal. Sample locations and results are plotted on Figure 189-5. The laboratory results are appended as Appendix B.

GEOLOGYGeneral Geology:

The Groundhog coalfields are located in the southeastern portion of the Bowser Basin. The Bowser Basin is an assemblage of deltaic and basin sedimentary rocks of Upper Jurassic and Lower Cretaceous Age. The Groundhog area is mainly deltaic deposits, the coal seams deriving from thick peat bogs, common to most deltas.

Various lithologies within the Bowser Assemblage in the Groundhog area have been recognized since early development of the coal seams. The most recent attempt to classify these lithologies was made by Tompson, et al, from work completed during the 1969/70 field seasons. As the writer confined the 1980 programme to detail in the coal-bearing strata, very little can be added to Tompson's interpretation, and the following description of each "Lithosome" (stratigraphic unit), is summarized from Tompson's 1977 report.

I. McEVOY RIDGE LITHOSOME

Probably the oldest stratigraphic unit of the Groundhog area, this lithosome is characterized by well indurated, dark coloured, poorly sorted, fine to coarse grained clastic rocks. Mudstone and fine to coarse grained sandstone, occasionally grading to a chert pebble conglomerate, are the predominant rock. Bedding thicknesses vary from thin to medium.

II. COAL BEARING LITHOSOME

The Coal Bearing Lithosome conformably overlies the McEvoy Ridge Lithosome. The contact is exposed at the head of Anthracite Creek, and according to Tompson is a well-defined conformable contact.

Poorly indurated rocks of this lithosome are defined as carbonaceous shales and mudstones (85-90%) and fine-coarse grained clastic sandstones. It is within the carbonaceous shales that seams of dense, hard coal occur. Bedding thicknesses vary from medium to thick.

III. DEVIL'S CLAW CONGLOMERATE

The Devil's Claw Conglomerate conformably overlies the Coal Bearing Lithosome, the contact exposed on Table Mountain. Tompson defines the contact as well-defined and conformable.

The dominant rock type of this lithosome is a medium-coarse chert pebble conglomerate, occurring as irregular beds 10-60 meters thick. Pebbles are commonly 2-4 cm. in diameter; however, range as large as 10-15 cm. in diameter. Common pebble colours are black, green and cream. The matrix is generally a fine-medium grained, siliceous sandstone.

Intertongued with the conglomerate are mudstone and shale, similar to the dominant rock type of the Coal Bearing Lithosome.

IV. LONESOME MTN. LITHOSOME

The Lonesome Mtn. Lithosome conformably overlies the Devil's Claw Conglomerate, and is the youngest rock in the Groundhog area. Exposures of the contact are

difficult to recognize; however, Tompson interprets one on Table Mtn. The contact is described as very gradational.

The dominant rock-type of this lithosome is a tan to dark brown, well indurated sandstone, occasionally grading into conglomerate. Mudstone and shale are interbedded with the sandstone, beds ranging in thickness from 4-9 meters. Irregular carbonaceous and coal lenses occur within the shale. Conglomerate beds and lenses are found in the lower portion of the Lonesome Mtn. Lithosome.

Structure:

The structural features of the Groundhog area are very complex, marked by areas of intense disturbance and irregularities, and areas where the strata is relatively undisturbed and predictable. Several relatively flat-lying thrust faults have been interpreted, the most prominent being the Groundhog thrust, which lies approximately 3 km. SW of the Skeena River.

Several normal and reverse faults have been observed and interpreted within the Groundhog area. These have caused local disturbances to the strata. Drag folding development of cleavage, fracturing, and secondary alteration are associated with these faults.

Rocks in the upper plate of the Groundhog thrust are observed to be highly disturbed and contorted. This feature is easily observed, as rocks of the upper plate form mountainous terraine (Devil's Claw Mtn.) where outcrops are plentiful. Rocks of all lithosomes of the Bowser Assemblage have been identified in the upper plate. Rocks of the lower plate are located in the broad, relatively flat Skeena River valley. Outcrops are not plentiful; however, all mapped outcrops have been identified as belonging to the coal bearing lithosome. Seventy to eighty percent of the outcrops mapped in the Skeena River valley indicate a north to northwest strike and a gentle dip (5-20°) generally to the northeast.

Along the Skeena River, outcrops were examined in detail at two locations, where strata is highly disturbed and contorted. 2.2 km. northwest of Currier

Ck., one outcrop showed a moderately dipping normal fault, with drag folding apparent in the upper plate. Detailed examination of the rock indicates that a secondary cleavage has developed in the shale, with bedding features crossing the cleavage planes. At Langlois Creek, apparent bedding attains a very steep dip ($> 70^\circ$). Detailed examination revealed that a secondary cleavage had developed; however, appears conformable to the bedding. The fault plane was not positively identified at this location.

At both locations, the disruptions appear very local, and are probably confined to the plane of the fault. At Langlois Creek, an outcrop 50 - 75 meters east of the disturbed rock, shows very flat-lying undisturbed bedding.

It is within this lower plate of the Groundhog thrust that the potential for developing coal reserves exists, and the three subject coal licenses of this report are located.

Property Geology:

The three coal licenses were mapped at a scale of 1:10,000 using a reconnaissance grid as control (see Figure 189-3). Outcrops are scarce over most of the license area, being confined to the main creek valleys.

Outcrops mapped were mainly a fine-medium grained, gritty, well bedded, sandstone, and a black, fine grained occasionally carbonaceous, fissile shale or mudstone. At two locations on Discovery Creek, coal seams were located in outcrop. All rock outcrops examined were identified as belonging to the Coal Bearing Lithosome. Scarcity of outcrops made interpretation of various lithologies impossible.

The interpreted plane of the Groundhog thrust fault passes through the western portion of the coal licenses. Outcrops from the upper plate, however, were not recognized.

All bedding attitudes measured from outcrop on the license area were relatively flat, strikes ranging from 135° to 180°, and dips from 10 - 20°E.

There is no evidence of any major structural disturbance within the license area.

The two areas of coal outcroppings were mapped and sampled in detail (see Figure 189-4). Four coal seams ranging in thickness from 0.7 - 2.4 meters occur in carbonaceous shale. In the Upper Discovery Creek area, two coal seams (0.7 - 2.2 meters thick), are separated by 5.1 meters of interbedded sandstone and carbonaceous shale. In the Lower Discovery Creek area, two coal seams (0.9 and 2.3 meters thick) are separated by 0.4 meters of carbonaceous shale. This may be considered one large seam 3.6 meters thick, with a 0.4 meter shale parting. Coal found as float in the creek banks 75 - 200 meters upstream from the Lower Discovery Creek showings, indicate that other coal seams probably exist in the strata.

It is impossible to develop a detailed stratigraphic section of the sediments within the coal licenses. The best section is provided from the detailed drill logs of DDH #70-2 and 70-3. As these holes are approximately 1,100 meters apart, correlation of the sediments and coal seams between the drill holes is impossible.

ECONOMIC POTENTIAL

Two potentially economic coal seams are known to exist within the coal license area.

UPPER DISCOVERY CREEK SEAM:

Two seams of coal were located; however, only one appears to have sufficient thickness (2.2m) for mining. The other seam is narrow (0.7 m) and contains an unusually high content of sulphur (9.97%), mainly as sulphides.

The main seam was exposed and sampled at three various locations. Results of the laboratory proximate analysis of the samples over an average thickness of 2.2 m is as follows:

	<u>As received</u>	<u>Dry</u>
% Moisture	15.58	--
% Ash	25.88	31.09
% Volatile	13.57	16.46
% Fixed Carbon	44.97	52.45
BTU/lb.	7,532	8,805
% Sulphur	.33%	.40%

Diamond drill hole #70-2 intersected the Upper Discovery Creek coal seam at vertical depths of 59.3 - 61.2 meters (thickness 1.9m). Analysis of the drill core is as follows:

% Moisture	.49%
% Ash	36.88%
% Volatile	4.21%
% Fixed Carbon	58.42%
BTU/lb.	8,966
% Sulphur	.43%

There is a good correlation of results of the drill core to the results of surface samples on a dry basis. The high moisture content in the surface sample was due to the fact that the samples were collected during spring break-up when snow was still on the ground.

If no major structural disturbances exist, the Upper Discovery Creek coal seam would exist over 90% of the three coal licenses. This would amount to possible geological reserves of approximately 20,000,000 tonnes, of which 1,500,000 tonnes could be mined by strip mining methods.

LOWER DISCOVERY CREEK SEAM:

Two seams of coal were located and sampled in outcrop, separated by a 0.4 meter shale parting. Total thickness of coal (not including shale) is 3.2 meters.

Average results of three samples collected from the seam are as follows:

	<u>As Received</u>	<u>Dry Basis</u>
% Moisture	18.16	- -
% Ash	26.66	32.54
% Volatile	11.84	14.47
% Fixed Carbon	43.34	52.99
BTU/lb.	7,788	9,523
% Sulphur	.34	.41

Diamond drill hole #70-3 intersected the Lower Discovery Creek coal seam at vertical depths of 16.3 - 18.3 meters (thickness - 2.0 meters). Analysis of the drill core is as follows:

% Moisture	.61
% Ash	13.20
% Volatile	5.43
% Fixed Carbon	80.76
BTU/lb.	11,966
% Sulphur	.97

Correlation of these results with those of the surface samples was not as good; however the surface samples were taken over a greater width than the drill core samples. The possibility of surface contamination or dilution can add to a high ash (low BTU/lb.) content. The high moisture content in the surface samples is due to conditions at time of sampling.

If continuous, the Lower Discovery Creek coal seam would exist over approximately 30% of the license area, provided no major structural problems exist. Possible geological reserves would be approximately 12,000,000 tonnes, of which 5,000,000 tonnes could be mined by strip mining methods.

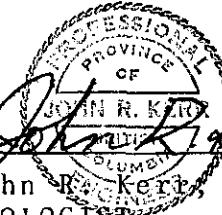
In summary, two coal seams of economic thickness are known to exist within the coal license area. In total, possible geological reserves amount to 32,000,000 tonnes, of which 6,500,000 tonnes could be mined by strip mining methods. In addition, other coal seams may exist that are not exposed in surface outcrop. Diamond drilling at 400-500 meter centers is required to substantiate these reserves.

RECOMMENDATIONS

Continued work on the coal licenses is justified, and should be oriented at developing coal reserves. The programme is to allow for approximately 5,000 meters of diamond drilling, consisting of 30 holes, each 120 - 200 meters deep. Specific emphasis is placed on developing a stratigraphic section of the sediments, and interpretation of any structural disturbances or irregularities.

Respectfully Submitted By:

KERR, DAWSON & ASSOCIATES LTD.,


John R. Kerr
John R. Kerr, P. Eng.,
GEOLOGIST

Kamloops, B. C.,
December 31, 1980.

APPENDIX A

COST STATEMENT

APPENDIX B

LABORATORY ANALYSES

COMMERCIAL TESTING & ENGINEERING CO.

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147 RIVERSIDE DRIVE, NORTH VANCOUVER, B.C.
V7H 1T6, CANADA
OFFICE TEL. (604) 929-2228

BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by
Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D1-01 (0-1.5)
Sample taken at -----
Sample taken by -----
Date sampled -----
Date received June 30, 1980

Analysis report no. 64-19559

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	14.69	xxxx
% Ash	73.38	86.01
% Volatile	8.82	10.34
% Fixed Carbon	<u>3.11</u>	<u>3.65</u>
	100.00	100.00
BTU	746	874
% Sulphur	0.23	0.27

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
S. Morrin
Regional Manager



Charter Member

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OFFICE TEL. (604) 929-2228BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by

Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D1-01 (1.5-2.6)

Sample taken at -----

Sample taken by -----

Date sampled -----

Date received June 30, 1980

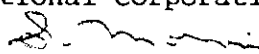
Analysis report no. 64-19560

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	11.07	xxxx
% Ash	71.56	80.47
% Volatile	8.83	9.93
% Fixed Carbon	<u>8.54</u>	<u>9.60</u>
	100.00	100.00
BTU	1405	1580
% Sulphur	0.13	0.15

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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S. Morrin
Regional Manager


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811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D1-01 (2.1-4.0)
Sample taken at -----
Sample taken by -----
Date sampled -----
Date received June 30, 1980

Analysis report no. 64-19561

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	6.85	xxxx
% Ash	22.45	24.10
% Volatile	9.87	10.60
% Fixed Carbon	<u>60.83</u>	<u>65.30</u>
	100.00	100.00
BTU	9817	10539
% Sulphur	0.35	0.38

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.
Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
S. Morrin
Regional Manager



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OFFICE TEL. (604) 929-2228

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811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D1-02 (0-1.9)
Sample taken at -----
Sample taken by -----
Date sampled -----
Date received June 30, 1980

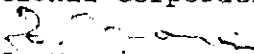
Analysis report no. 64-19556

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	14.96	xxxx
% Ash	66.65	78.38
% Volatile	9.33	10.97
% Fixed Carbon	<u>9.06</u>	<u>10.65</u>
	100.00	100.00
BTU	1857	2184
% Sulphur	0.26	0.30

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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S. Morrin
Regional Manager



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OFFICE TEL. (604) 929-2228

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811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by Brian Mountford & Associates

Kind of sample reported to us	Coal Sample - D1-02 (2.4-4.6)
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 30, 1980

Analysis report no. 64-19557

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	16.44	xxxx
% Ash	26.53	31.75
% Volatile	13.79	16.50
% Fixed Carbon	<u>43.24</u>	<u>51.75</u>
	100.00	100.00
BTU	7477	8948
% Sulphur	0.37	0.44

Respectfully submitted,
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S. Morrin
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811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by
Brian Mountford & Associates

Kind of sample reported to us	Coal Sample -	D1-02 (4.6-5.1)
Sample taken at	-----	
Sample taken by	-----	
Date sampled	-----	
Date received	June 30, 1980	

Analysis report no. 64-19558

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	9.51	xxxx
% Ash	83.06	91.79
% Volatile	5.77	6.38
% Fixed Carbon	<u>1.66</u>	<u>1.83</u>
	100.00	100.00
BTU	339	375
% Sulphur	0.24	0.26

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
S. Morrin
Regional Manager



Charter Member

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GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 AREA CODE 312 726-8434

RESIDENT MANAGER
WESTERN CANADA OPERATIONS



PLEASE ADDRESS ALL CORRESPONDENCE TO:
147 RIVERSIDE DRIVE, NORTH VANCOUVER, B.C.
V7H 1T6, CANADA
OFFICE TEL. (604) 929-2228

BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by
Brian Mountford & Associates

Kind of sample reported to us	Coal Sample - D2-01
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 30, 1980

Analysis report no. 64-19563

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	7.90	xxxx
% Ash	23.01	24.98
% Volatile	7.43	8.07
% Fixed Carbon	<u>61.66</u>	<u>66.95</u>
	100.00	100.00
BTU	9505	10279
% Sulphur	9.18	9.97

Respectfully submitted,
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Regional Manager



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BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by
Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D3-01
Sample taken at -----
Sample taken by -----
Date sampled -----
Date received June 30, 1980

Analysis report no. 64-19564

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	23.46	xxxx
% Ash	28.65	37.43
% Volatile	17.05	22.27
% Fixed Carbon	<u>30.84</u>	<u>40.30</u>
	100.00	100.00
BTU	5303	6929
% Sulphur	0.28	0.37

Respectfully submitted,
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S. Morrin
Regional Manager



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V7H 1T6, CANADA
OFFICE TEL. (604) 929-2228

BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by
Brian Mountford & Associates

Kind of sample reported to us	Coal Sample - D4 (4.0-4.7)
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 30, 1980

Analysis report no. 64-19565

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	12.37	xxxx
% Ash	67.64	77.19
% Volatile	7.54	8.60
% Fixed Carbon	<u>12.45</u>	<u>14.21</u>
	100.00	100.00
BTU	1683	1921
% Sulphur	0.05	0.06

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

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S. Morrin
S. Morrin
Regional Manager



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BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by Brian Mountford & Associates

Kind of sample reported to us	Coal Sample - D4 (4.7-5.6)
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 30, 1980

Analysis report no. 64-19566

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	18.71	xxxx
% Ash	18.09	22.25
% Volatile	12.78	15.72
% Fixed Carbon	<u>50.42</u>	<u>62.03</u>
	100.00	100.00
BTU	9165	11274
% Sulphur	0.29	0.36

Division of Peabody International Corporation (Canada) Ltd.

Respectfully submitted,
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S. Morrin
S. Morrin
Regional Manager



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OFFICE TEL. (604) 929-2228

BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D4 (5.6-6.0)
Sample taken at -----
Sample taken by -----
Date sampled -----
Date received June 30, 1980

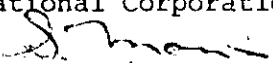
Analysis report no. 64-19567

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	6.64	xxxx
% Ash	86.35	92.49
% Volatile	4.93	5.28
% Fixed Carbon	<u>2.08</u>	<u>2.23</u>
	100.00	100.00
BTU	394	422
% Sulphur	0.21	0.23

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING

Division of Peabody International Corporation (Canada) Ltd.


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Regional Manager



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BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by Brian Mountford & Associates

Kind of sample reported to us	Coal Sample - D4 (6.0-7.1)
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 30, 1980

Analysis report no. 64-19568

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	18.01	xxxx
% Ash	28.02	34.17
% Volatile	13.54	16.51
% Fixed Carbon	<u>40.43</u>	<u>49.32</u>
	100.00	100.00
BTU	7563	9224
% Sulphur	0.26	0.32

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.
Division of Peabody International Corporation (Canada) Ltd.

S. Morrin
S. Morrin
Regional Manager



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OFFICE TEL. (604) 929-2228

BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by
Brian Mountford & Associates

Kind of sample reported to us Coal Sample - D4 (7.1-8.3)
Sample taken at -----
Sample taken by -----
Date sampled -----
Date received June 30, 1980

Analysis report no. 64-19569

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	17.76	xxxx
% Ash	33.88	41.20
% Volatile	9.19	11.17
% Fixed Carbon	<u>39.17</u>	<u>47.63</u>
	100.00	100.00
BTU	6637	8070
% Sulphur	0.46	0.56

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Division of Peabody International Corporation (Canada) Ltd.

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S. Morrin
Regional Manager



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OFFICE TEL. (604) 929-2228BRIAN MOUNTFORD & ASSOCIATES LTD.
811 - 675 West Hastings Street
VANCOUVER, BC
V6B 1N2

July 22, 1980

Sample identification
by

Brian Mountford & Associates

Kind of sample reported to us	Coal Sample - D4 (8.3-9.0)
Sample taken at	-----
Sample taken by	-----
Date sampled	-----
Date received	June 30, 1980

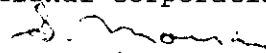
Analysis report no. 64-19570

PROXIMATE ANALYSIS

	<u>As Rec'd.</u>	<u>Dry Basis</u>
% Moisture	11.72	xxxx
% Ash	74.96	84.91
% Volatile	8.77	9.93
% Fixed Carbon	<u>4.55</u>	<u>5.16</u>
	100.00	100.00
BTU	1208	1368
% Sulphur	0.13	0.15

Respectfully submitted,
COMMERCIAL TESTING & ENGINEERING CO.

Division of Peabody International Corporation (Canada) Ltd.


S. Morrin
Regional Manager


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APPENDIX C

STATEMENT OF QUALIFICATIONS

JOHN R. KERR, P. ENG.

Geological Engineer

#1-219 VICTORIA STREET • KAMLOOPS, B.C. V2C 2A1 • TELEPHONE (604) 374-0544

CERTIFICATE

I, JOHN R. KERR, OF KAMLOOPS, BRITISH COLUMBIA, DO HEREBY CERTIFY THAT:

- (1). I am a member of the Association of Professional Engineers of British Columbia, and a Fellow of the Geological Association of Canada.
- (2). I am a geologist employed by Kerr, Dawson and Associates Ltd. of #1-219 Victoria Street, Kamloops, B. C.
- (3). I am a graduate of the University of British Columbia (1964), with a B.A. Sc. degree in Geological Engineering.
- (4). I have practised my profession continuously since graduation.
- (5). I supervised and assisted in the collection of data as compiled in this report. I am the author of this report which is based on the aforementioned data.



John R. Kerr
John R. Kerr, P. Eng.,
GEOLOGIST

Kamloops, B. C.

December 31, 1980.

GROUNDHOG COALFIELD
SUPPORT STATEMENT FOR EXPLORATION
DURING THE 1980 SEASON ON COAL
LICENCES: #4395, #4400, #4460

SALARIES & WAGES

2 Engineers and 2 Assistants:
35 days @ \$207.65 (average) \$7,200.00

FOOD & ACCOMMODATION

Field work 415.00

SUPPORT AIRCRAFT

Helicopter and fixed wing 3,045.00

FIELD SUPPLIES

Survey instruments, protection
safety equipment, radio telephone
from various suppliers 640.00

ANALYSES

Commercial Testing 510.00

REPORT COMPILATION

2,294.85

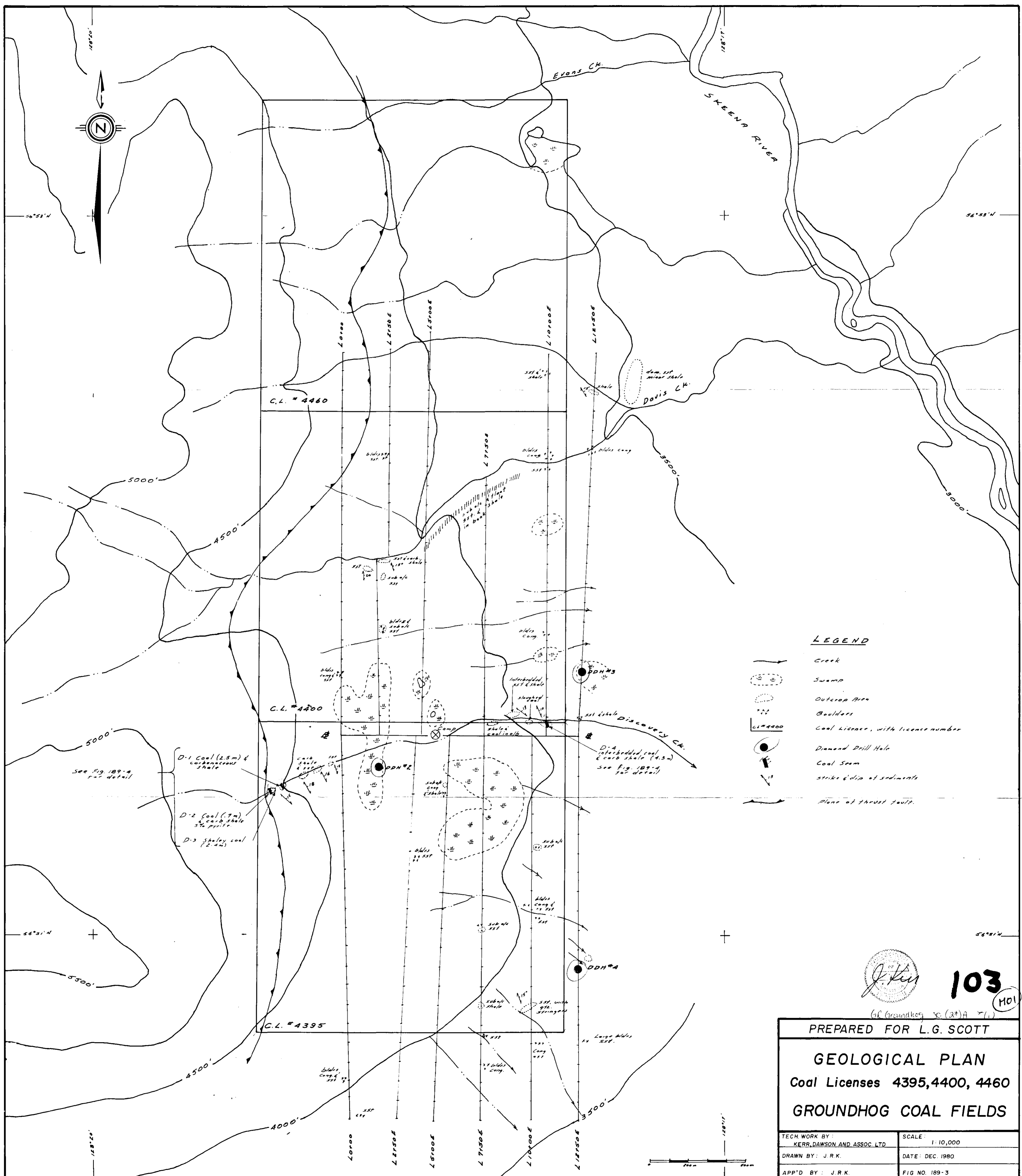
MISC.

Workers Compensation payments
for field work 70.00

\$14,174.85

Signed *Renee Spofforth*

Renee Spofforth
for BRIAN MOUNTFORD & ASSOCIATES LTD.



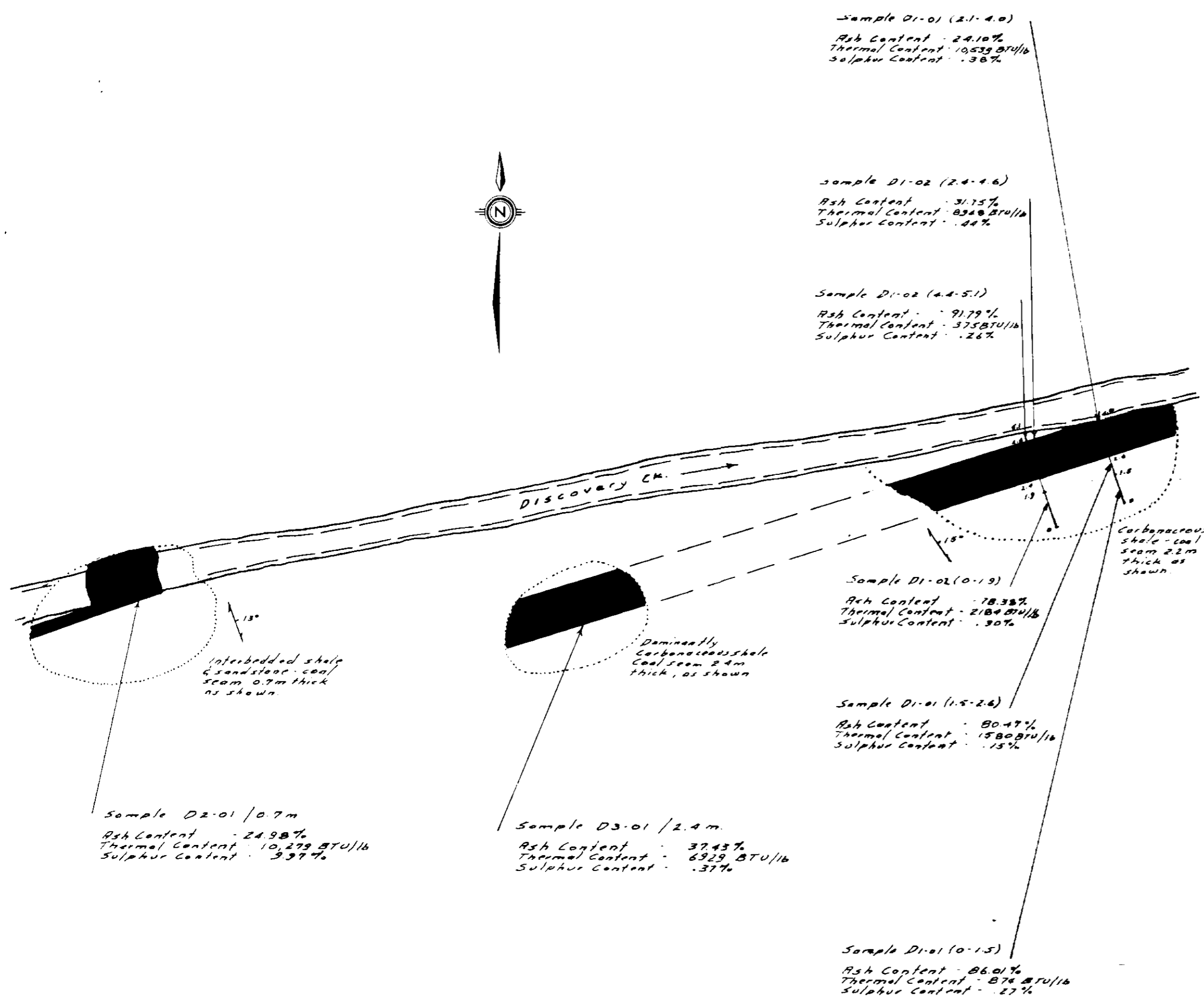
LEGEND

- Creek
- Swamp
- Outcrop Area
- Boulders
- Coal License, with licence number
- Diamond Drill Hole
- Coal Seam
- strike & dip of sediments
- Plane of thrust fault.

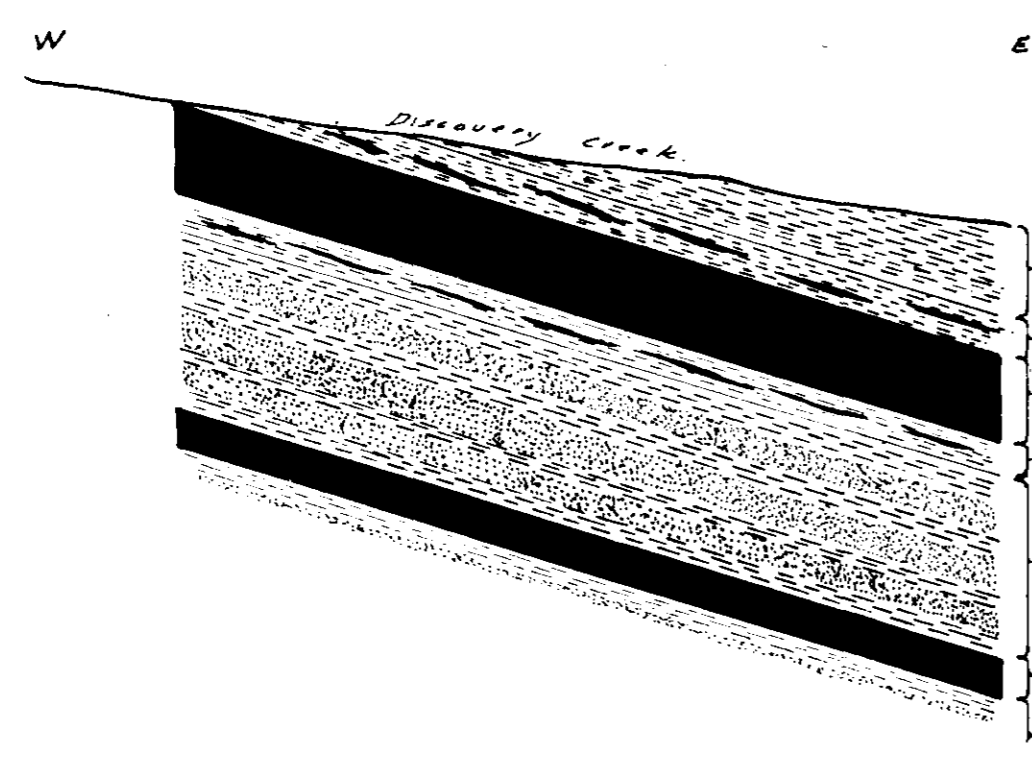


103
101

PREPARED FOR L.G. SCOTT	
GEOLOGICAL PLAN	
Coal Licenses 4395, 4400, 4460	
GROUNDHOG COAL FIELDS	
TECH. WORK BY: KERR, DAWSON AND ASSOC. LTD.	SCALE: 1:10,000
DRAWN BY: J.R.K.	DATE: DEC. 1980
APP'D BY: J.R.K.	FIG. NO. 189-3

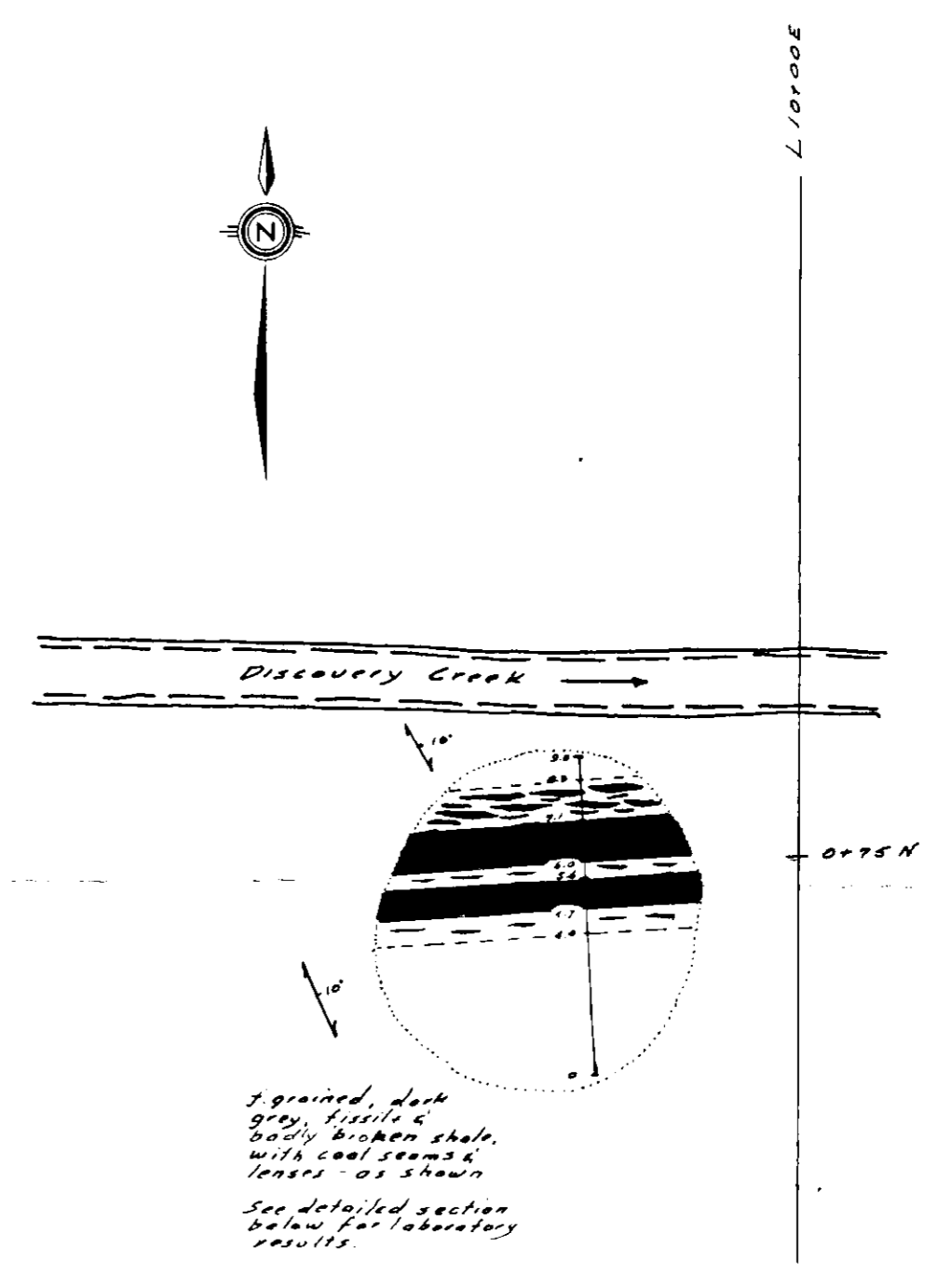


Detailed Plan - Upper Discovery Creek
Showing Seams in Outcrop
D-1, D-2 & D-3
Scale 1:200



IDEALIZED SECTION
Upper Discovery Creek
Scale 1:200

Description	Ash Content (average)	Thermal Cont. (average)
Dominantly Carbonaceous shale	82.20%	1329 BTU/lb
Carbonaceous shale with narrow coal lenses	80.4%	1580 BTU/lb
Black Hard Coal 2.1m occasionally shored carbonaceous shale	31.09%	8803 BTU/lb
Interbedded shale & sandstone. Total section not exposed	Not sampled	
Black coal - pyrite 9.93% sulphur	24.98%	10,279 BTU/lb
Sandstone & shale	Not sampled	



Detailed Plan - Lower Discovery Creek
Showing Seams in Outcrop D-4
Scale 1:200

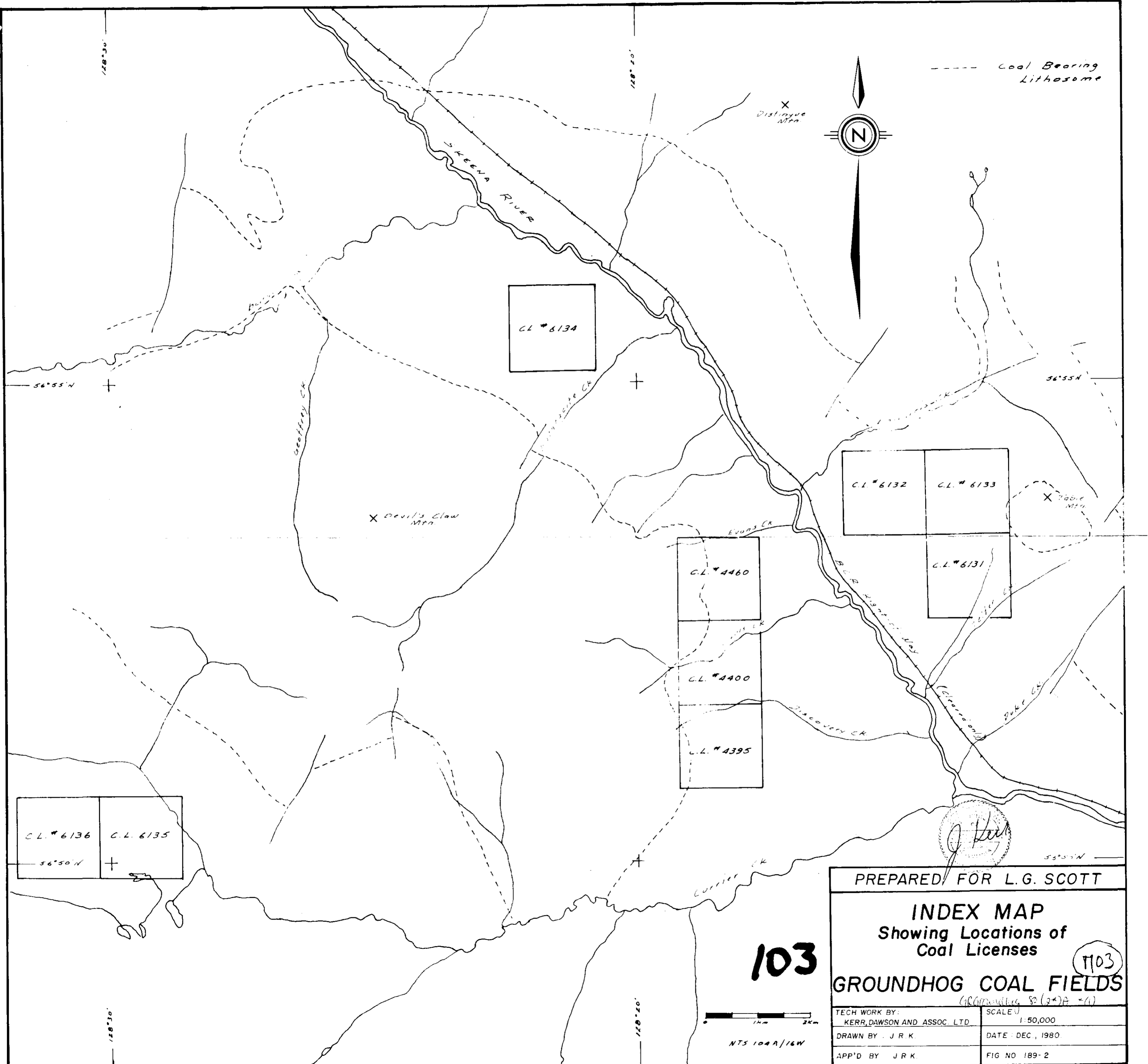
Description	Ash Content	Thermal Content	Sulphur Content
Overburden			
Dominantly finely grained, dark grey, fissile & broken shale. Some carbonaceous seams	Not Sampled		
Carbonaceous shale with minor coal lenses	77.19%	1921 BTU/lb	.06%
Hard, black coal	22.25%	11,274 BTU/lb	.36%
Shale - some coal	92.43%	422 BTU/lb	.23%
Hard black coal	34.17%	9224 BTU/lb	.32%
Shaly & shored coal	41.20%	8070 BTU/lb	.56%
Shale, minor coal	84.90%	1368 BTU/lb	.15%
Overburden			
Discovery Creek			

IDEALIZED SECTION
Lower Discovery Creek
Scale 1:100

PREPARED FOR L.G. SCOTT

DETAILED PLAN 103
Coal Seam Occurrences
Discovery Creek C.L.4395
GROUNDHOG COAL FIELDS

TECH. WORK BY: KERR, DAWSON AND ASSOC. LTD. SCALE: AS SHOWN
DRAWN BY: J.R.K. DATE: DEC. 1980
APP'D BY: J.R.K. FIG. NO. 189-4



PREPARED FOR L.G. SCOTT

INDEX MAP
Showing Locations of
Coal Licenses

GROUNDHOG COAL FIELDS

TECH WORK BY:
KERR, DAWSON AND ASSOC. LTD.

DRAWN BY: J.R.K.

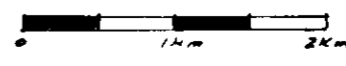
APP'D BY: J.R.K.

SCALE: 1:50,000

DATE: DEC, 1980

FIG NO 189-2

103



NTS 104 A/16W

1103

Groundhog 80 (2*)A - (1)