

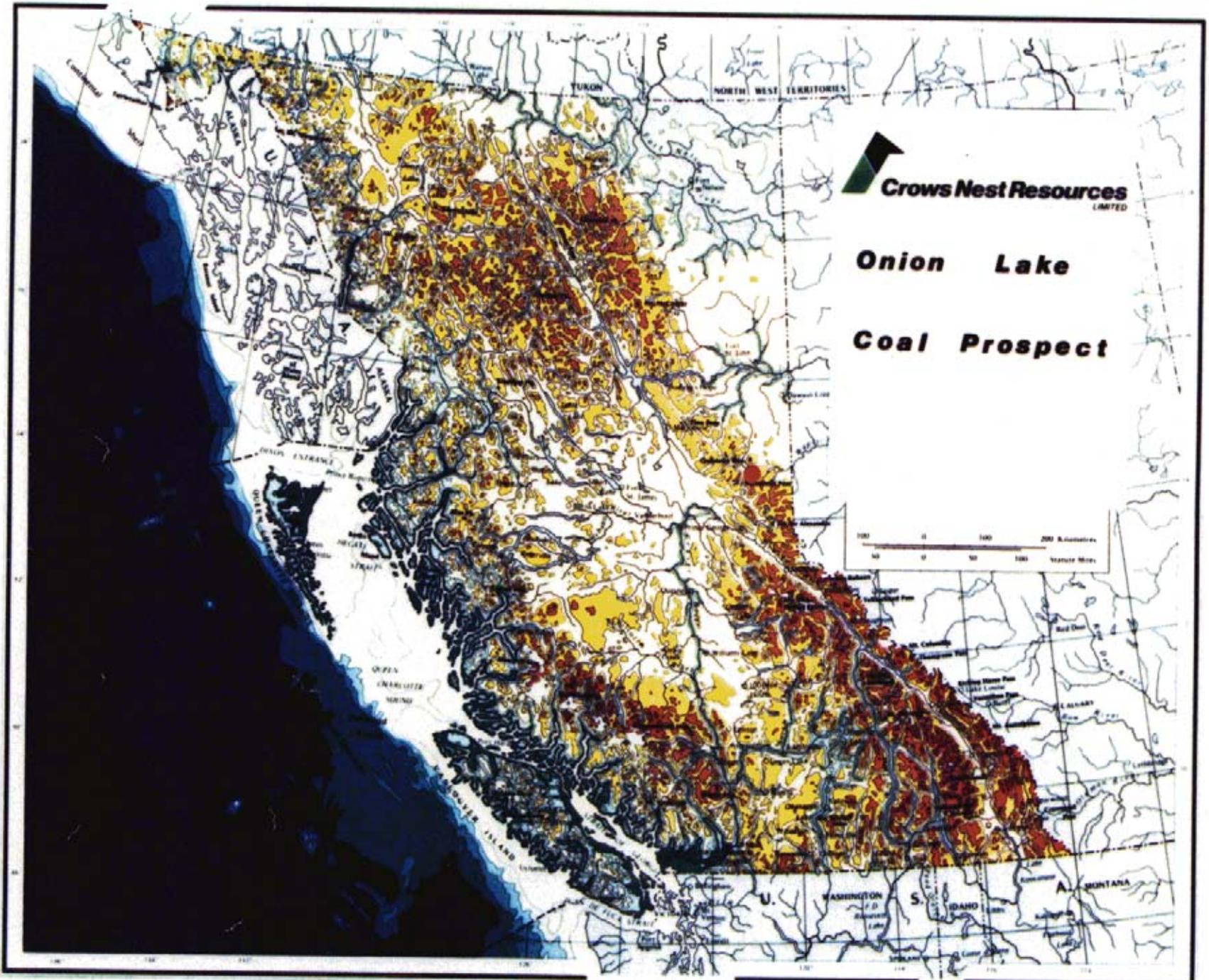
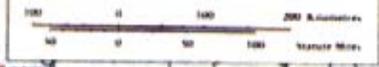
PR-ONION LK 34(1-4)A PROAS  
CROWS NEST RESOURCES

GEOLOGICAL BRANCH  
ASSESSMENT REPORT  
00 567

567



# Onion Lake Coal Prospect





# Crows Nest Resources

Eau Claire Place, 525 - 3rd Avenue S.W., Calgary, Alberta (403) 232-4355 **LIMITED**  
P.O. Box 2699, Station M, Calgary, Alberta T2P 2M7 Telex 03-822505

December 20, 1984

Ministry of Energy, Mines & Petroleum Resources  
617 Government Street  
Victoria, B.C.  
V8V 1X4

Attention: Mr. P. Hagen  
Coal Administrator

Dear Mr. Hagen:

Enclosed please find our report on the Onion Lake project.

This report has been prepared by Mr. A. White, Geologist and Mr. D. Fietz, Staff Technologist, both of whom were employed by Crows Nest Resources Limited.

Mr. A. White, Honours B.Sc., graduated in Geology from the University of Waterloo in 1977. Prior to joining Crows Nest Resources Limited in 1980, Mr. White worked as a geologist on a number of mineral exploration programs in Northern Ontario, the Northwest Territories and British Columbia.

Mr. D. Fietz, C.E.T., graduated from Exploration Technology: Mineral Resources from the Northern Alberta Institute of Technology in 1972. Prior to joining Shell Canada Resources Limited/Crows Nest Resources Limited in 1976, Mr. Fietz worked as a geological technologist for the Coal Department of the Energy Resources Conservation Board in Calgary.

In my opinion, Mr. White and Mr. Fietz are fully qualified, by training and experience to prepare this report and this account of work done under their direct supervision.

Yours truly

H.G. Rushton  
Vice President - Development

Enclosure

ONION LAKE  
N.E. B.C.  
COAL EXPLORATION 1984

Coal Licences:    Onion Lake Licences 4220 to 4223 (inclusive) and 4749  
                  Group #242  
                  PEACE RIVER LAND DISTRICT, NORTHEASTERN, B.C.  
HELD BY:            SHELL CANADA RESOURCES LTD.  
OPERATED BY:        CROWS NEST RESOURCES LIMITED

National Topographic Series: 93I/10 WAPITI LAKE

Location:            54° 44' NORTH LATITUDE  
                      120° 48' WEST LONGITUDE  
Authors:             A. WHITE/D. FIETZ  
Field Work:          July 5 to July 9, 1984  
Report Submitted:    December 20, 1984

**CONFIDENTIAL**

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SUMMARY

Previous exploration in Crows Nest Resources' Onion Lake prospect indicate a potential for open pit mining of high volatile bituminous coal. Drilling results from 1981 suggest economical coal reserves are within the Gates member of the Commotion Formation, a division of the Cretaceous Fort St. John Group. Geology is complicated by regional folding and faulting associated with a major Rocky Mountain Front Range thrust fault.

In 1984, on strike extrapolation of the coal measures southward was tested with a helicopter supported NQ diamond drillhole program. The hole was located approximately 1 kilometer south of previous drilling. Results were inconclusive as bedrock was not reached after penetration of 93 meters of overburden. The hole was abandoned and cemented with reclamation of the site completed to the satisfaction of provincial forestry personnel. Further geophysical surveys are required to resolve the geology of the property.

## 2.1 COAL LAND TENURE

The Onion Lake property is comprised of five B.C. Coal Licences 4220-4223 inclusive and 4749 (Group #242) covering an area of 1425 hectares.

Shell Canada Resources Limited holds the licences and Crows Nest Resources Limited (a wholly owned subsidiary) acts as operator of the licences.

The licences are currently in their sixth year, with the exception of 4749, and require an annual expenditure of \$50.00/hectare. The following Table, (Table 1 "B.C. COAL LICENCES TENURE STANDING"), contains detail of tenure.

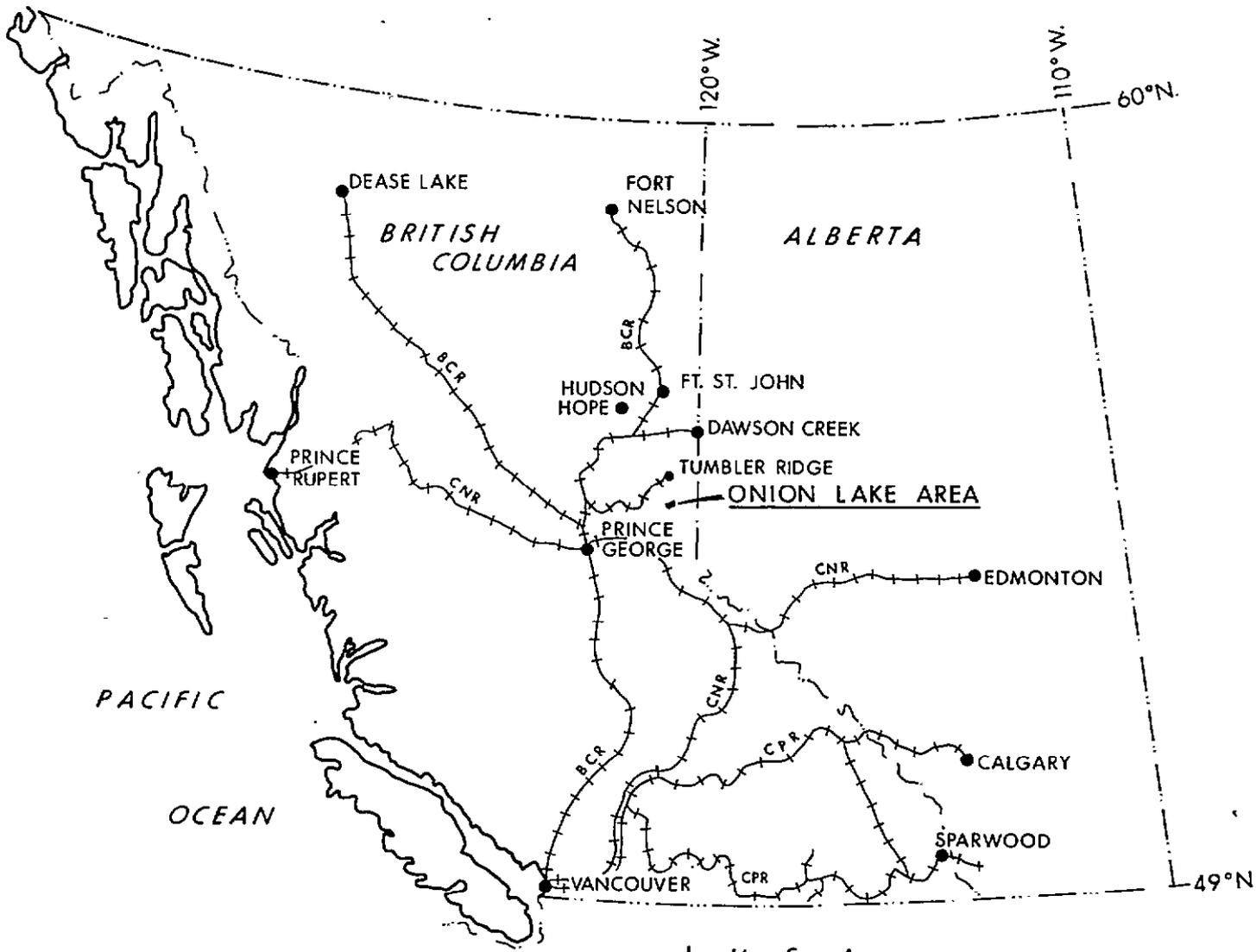
## 2.2 LOCATION, GEOGRAPHY AND PHYSIOGRAPHY

The Onion Lake property is located in the foothills of Northeastern British Columbia in the Peace River Land District. (fig. 1) The property, covering 1425 hectares, is centered at approximately 54° 44' north and 120° 48' west on N.T.S. map sheet 931/10W (Wapiti Lake). Onion Lake to the south, Onion Creek on the east, Fellers Creek to the north and Bone Mountain to the west, bound the area covered by the Onion Lake licences.

The property is 45km south-southeast of the new town of Tumbler Ridge and 125 km south-southwest of Dawson Creek.

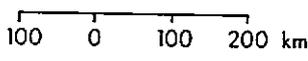
Elevation of the area varies from 1300 to 1830m above sea level. The north and central portions of the licence area are of relatively gentle relief, rolling and climbing to the front slopes of Bone Mountain. To the south and east the topography drops off rapidly into steep wooded slopes. The extreme northeast corner of the property is cut by a deep (approx. 125m) narrow gorge.

Surface exposure of rock on the property is sparse and for the most part, scattered. Outcrop occurs on high barren knobs within licences 4222 and 4223, in the gorge, or along a northwest-southeast trending ridge on the eastern edge of the property.



PACIFIC  
OCEAN

U. S. A.  
N



**Crows Nest Resources Limited**  
EXPLORATION

ONION LAKE  
NE BC

**LOCATION MAP**  
FIGURE 1

AUTHOR WHITE/FIETZ	SCALE AS SHOWN	ENCLOSURE No
DATE 84-12	REVISED	DRAWING No AA-542
1. Accompany		

Approximately 20m of glacial till are exposed in stream cuts, near the middle and south end of the property.

Vegetation within the licence is typical of the boreal and sub-alpine zones. Trees vary from spruce at lower elevations to alpine fir and balsam higher up. Open alpine meadows and barren lichen and moss covered areas occur on the highest slopes.

### 2.3 ACCESS

Currently there is no road access to the Onion Lake property. During the 1984 exploration program access was obtained by helicopter.

Local forestry officials indicated there are hiking and horse trails which lead to the north end of Onion Lake 1km south of the property.

The closest road is the Kinuseo Falls Road 12km north of the property. Road building to the property would be very difficult because of rugged terrain and a large elevation gain between Kinuseo Creek and the licence area. The most probable location of future road access would be along a seismic line which comes from the east, behind Petro Canada's Duke Mountain coal licence block, then crossing Onion Creek and climbing to the higher more prospective ground of the licence area.

The Onion Lake area appears to support an extensive wildlife population. Mountain goats are known to live and calve on Bone Mountain in the winter and early spring. It is believed they then move down and cross the Onion Lake property in late spring/early summer, to get to the gorge near the northeast corner of the property. Drilling in 1984 was postponed until late June to avoid disturbing any goats with young that might be in the area.

The area also supports a large grizzly population. Grizzlies were occasionally seen by field crews during the 1980 mapping program.

3.0 EXPLORATION

3.1 SUMMARY OF PREVIOUS WORK

Previous work on the Onion Lake property has consisted of 1:50 000 geologic mapping and 1 diamond drill hole as detailed in Table 2 below:

TABLE 2

SUMMARY OF PREVIOUS WORK

1979 1:50 000 reconnaissance geologic mapping (Hoffman, 1979)

1980 1:5000 geologic mapping (Bell, 1980)

1981 236m core drilling in 1-NQ size hole (Bell, 1981)

1982 NIL

1983 NIL

## 2.2 1984 EXPLORATION PROGRAM

### 2.2.2 SCOPE AND OBJECTIVES:

Previous exploration (Bell, 1981) indicated potential coal reserves located within the Gates member of the Commotion Formation on the west flank of the Wapiti anticline on CNRL's Onion Lake property. Recommendations at the time included drilling along strike south to ascertain seam continuity and reserve potential. In 1984, it was decided to follow through with this recommendation and locate a diamond drill hole approximately 1150 meters along strike south from the 1981 drill hole.

### 2.2.2 RESULTS

Drilling commenced July 6, 1984 and was completed July 8 having triconed to a depth of 93.3 meters in gravel and sand. This extensive accumulation of overburden indicated that a substantial section of the coal bearing Gates has been removed by glaciation. This presents limitations to the economic potential of the Onion Lake project.

### 2.2.3 EXPLORATION COSTS

The application to extend term of licences (figure 2) outlines the expenditures for the drilling program of 1984. Total cost for the program was \$59,151.18.

#### 2.2.4 LOGISTICS

The exploration crew stayed at the Oakwood Petroleum Grizzly Valley gas plant camp located some 42 kilometers southeast of Tumbler Ridge, B.C. At present, there is no road access within several kilometers of the project area and access is totally helicopter dependant. The diamond drill (Longyear 38) was moved from the North Secus Licence Block using a Bell 205 helicopter (Northern Mountain Helicopters). Crew/supply transportation originated from the Oakwood camp using a Bell 206B helicopter contracted from Okanagan Helicopters. Geophysical logging was accomplished with a portable rig slung from a Bell 206L helicopter.

Site preparation included slashing, limbing and bucking of timber. Tight hole conditions necessitated leaving approximately 90 meters of casing in the hole. Upon completion of drilling, the hole was cemented to surface and the site reclaimed to B.C. forestry personnel specifications.

### 3.0 GEOLOGY

#### 3.1 REGIONAL GEOLOGY (Figure #3)

Cretaceous marine and non-marine strata consisting of the Minnes, Bullhead and lower Fort St. John Groups are located in a belt trending northwest-southeast from Onion Lake, B.C. The strata have been folded into the regional Wapiti anticline - Onion syncline fold pair. The folds are developed in the footwall plate of a Rocky Mountain Front Range thrust fault separating Paleozoic carbonates from the Cretaceous sediments. This folding has created potential for dip-slope open pit mining of coal measures within the Cretaceous strata.

#### 3.2 ONION LAKE STRATIGRAPHY

Figure 4 outlines the stratigraphy of the Cretaceous sediments in the Onion Lake area.

### MINNES GROUP

The Minnes group is located stratigraphically beneath the Cadomin formation of the Bullhead Group. It typically is composed of sequences of marine and non-marine sediments. In addition, coal or coaly beds occur but they are rarely thicker than two meters and seem to have limited lateral continuity. Locally, the Minnes is exposed in the core of the Wapiti anticline and contains massive, thick conglomerates beneath the Cadomin formation. These conglomerate units are distinguished from Cadomin conglomerates on the basis of brown colour, softer nature of the rock and absence of Cadomin-like pink and green pebbles.

### CADOMIN FORMATION

This unit is 30-35 meters thick exposed as a marker unit outlining the Onion syncline and the west limb of the Wapiti anticline. The dominant rock-type is non-marine conglomerate with minor coarse sandstone. Outcrops are light grey weathering and contain distinctive pink and green pebbles and cobbles.

### GETHING FORMATION

Conformably overlying the Cadomin formation is the non-marine Gething formation comprising sandstones, conglomerates, minor siltstone and coal. As a complication to stratigraphy, the Gething near Onion Lake contains almost 50% conglomerate as extensive strike length cliffs and ridges. Coal development within the Gething has been severely limited by the coarse clastic deposition. It is considered that only two thin seams may be present in the Onion area and little exploration has been undertaken in this unit. Stratigraphic thickness is estimated to be 80 meters on the Onion property.

### MOOSEBAR FORMATION

The Moosebar formation defines the base of the Fort St. John Group and indicates a change of facies from non-marine to marine conditions of sedimentation. A 40 meter measurable section of the recessive weathering shales can be found in the Gorge at Onion Lake with the formation thinning southward to 25 meters at Secus Mountain and thickening northward toward Sukunka.

Commotion Formation (Gates Member)

Conformably overlying the Moosebar formation and indicating a return to non-marine facies is the Gates member of the Commotion Formation. Rock types include sandstone, conglomerate, siltstone, mudstone and coal. In the Onion Lake area, the basal part of the Gates is known as the Torrens sandstone, a readily discernible marker unit of brown-grey, crossbedded sandstone considered to represent a transitional boundary between marine and non-marine deposition. Due to structural complications, thickness of the Gates on the west flank of the Wapiti anticline is unknown but estimates in other areas suggest 362 to 435 meters. Drilling evidence at Secus as well as the 1981 Onion Lake hole indicate that the thickest coal accumulation in the Gates is developed within the first 20 to 30 meters above the Torrens sandstone. The coal stratigraphy above this section is not well known due to poor exposure and lack of drilling. The Hulcross and Boulder Creek members of the Commotion Formation are not present on the Onion Lake property and will not be discussed.

### 3.3 STRUCTURAL SETTING

As discussed earlier and indicated on figure #5, major structures within the Onion Lake property include the Wapiti anticline - Onion syncline fold pair and a regional west dipping thrust fault forming the western boundary to the property. This is best illustrated on Bell's cross-section in appendix C of his 1981 report. It appears that the Wapiti anticline is an upright asymmetric structure plunging northward. The inconsistencies of core-bedding angles in the upper section of the Gates member in borehole ON81-1 as well as dip direction changes within the Gates on the west flank of the Wapiti anticline suggest subsidiary folding and possible faulting on the west limb as one approaches the Rocky Mountain front-range thrust fault. Thus, prospecting in the Gates member may be hampered by these structural complexities. In addition, figure #6 is a cross-section 1000 meters south of Bell's section illustrating the geology close to borehole ON84-1. The extensive gravel intersection suggests much of the Gates in this area has been removed by Pleistocene glacial activity.

### 3.4 COAL GEOLOGY AND QUALITY

As no bedrock was encountered in borehole ON84-1, a discussion of the coal geology and quality information from borehole ON81-1 is required. A total of 8 zones or seams greater than 1.0 meter were intersected in the Gates member to the top of the Torrens sandstone. This was an aggregate thickness of 28.9 meters over 169.3 meters of apparent section and translates into a down the hole rock to coal ratio of 6:1. Two thick coal zones are evident in the section, the first immediately above the Torrens sandstone consisting of two seams (seams 1 and 2) 1.9 and 6.9 meters in apparent thickness inclusive. The second zone is immediately beneath the second conglomerate unit above the Torrens, consisting of 3 seams 8.5, 4.0 and 4.7 meters in apparent thickness (seams 6, 7, 8).

As coal quality was not submitted in the 1981 report, it is included here for completeness (Enclosure #1). <sup>CONFIDENTIAL</sup> Results indicate volatile matter (air-dry basis) ranges from 27% to 31% with raw ash varying from 9 to 40%. Sulphur values are less than 1% and heat content ranges from 7300 to 7900 Kcal/Kg. Rank classification for these coals is high Volatile Bituminous 'A' on a dry ash-free basis. Table III summarizes the quality data for the individual seams in borehole ON81-1.

TABLE III

<u>Seam</u>	<u>Top</u> <u>Depth(m)</u>	<u>Base</u> <u>Depth(m)</u>	<u>Raw</u> <u>Ash</u>	<u>Float</u> <u>Ash(ADB)</u>	<u>Float</u> <u>VM(ADB)</u>	<u>Float</u> <u>FSI</u>	<u>Float</u> <u>S</u>	<u>Yield</u>
8	41.5	50.0	21.03	6.36	29.78	6.5	.35	74
7	54.17	58.10	40.1	9.82	27.64	5.5	.25	55
6	69.71	74.41	21.56	5.6	29.81	7.0	.52	74
5	100.36	101.35	9.24	5.66	31.11	8.5	.98	91
4	116.2	117.58	NS	NS	NS	NS	NS	NS
3	122.11	123.11	13.54	4.97	27.94	6.0	.56	82
2	155.61	163.17	15.46	6.13	29.59	7.0	.4	92
1	167.42	169.3	84.3	7.13	26.99	4.5	.35	66

NOTE: 1) Float Values @ 1.6 S.G.

2) Seams 2, 7 are mathematically composited values.

#### 4.0 RESULTS AND RECOMMENDATIONS FOR FURTHER WORK

The absence of bedrock in borehole ON84-1 severely limits the extrapolation of seams identified in borehole ON81-1 along strike southward. This has a negative impact on reserve potential and mineability. The overburden problems encountered in hole ON84-1 may be of local effect and it is recommended that a seismic refraction survey be conducted to further delineate the extent and depth of cover for the property.

5.0

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- G.S.C. (1960): Cretaceous Rocks of Smokey and Pine Rivers Area Rocky Mountain Foothills, Alberta and British Columbia; Map 21-1960
- Stott, D.F. (1961) Type Sections of Some Formations of the Lower Cretaceous Fort St. John Group Near Pine River, British Columbia; Geological Survey of Canada, Paper 61-11
- Stott, D.F. (1963): Stratigraphy of the Lower Cretaceous Fort St. John Group and Gething and Cadomin Formations, Foothills of Northern Alberta and British Columbia; Geological Survey of Canada, Paper 62-39
- Stott, D.F. (1973): Lower Cretaceous Bullhead Group between Bullmoose Mountain and Tetsa River, Rocky Mountain Foothills, Northeastern British Columbia; Geological Survey of Canada, Bulletin 219
- Stott, D.F. (1974): Lower Cretaceous Coal Measures of the Foothills of West-Central Alberta and Northeastern British Columbia; in CIM Bulletin Vol. 67, No. 749, Pages 87-100
- Stott, D.F. (1979): Lower Cretaceous Bullhead and Fort St. John Groups, Between Smokey and Peace Rivers, Rocky Mountain Foothills, Alberta and British Columbia; Geological Survey of Canada, Bulletin 152



# APPLICATION TO EXTEND TERM OF LICENCE

I, Glen C. Proudfoot, agent for Shell Canada Resources Limited.

(Name)

(Name)

(Address)

(Address)

P.O. Box 100

Calgary, Alberta, T2P 2H5

Valid FMC No. 207568

hereby apply to the Minister to extend the term of Coal Licence(s) No(s). 4220, 4221, 4222, 4223, 4749 (group 242)

for a further period of one year.

2. Property name ONION LAKE, PROSPECT PEACE RIVER LAND DISTRICT

3. I am allowing the following Coal Licence(s) No(s). to forfeit. NA

4. I have performed, or caused to be performed, during the period January 1, 1984 to December 31, 1984, work to the value of at least \$ 59151.18

on the location of coal licence(s) as follows:

CATEGORY OF WORK	Licence(s) No(s).	Apportioned Cost
Geological mapping	.....	.....
Surveys: Geophysical	.....	.....
Geochemical	.....	.....
Other	.....	.....
Road construction	.....	.....
Surface work	.....	.....
Underground work	.....	.....
Drilling	<u>4222</u>	<u>51453.22</u>
Logging, sampling, and testing	<u>4222</u>	<u>5067.89</u>
Reclamation	.....	.....
Other work (specify)	.....	.....
Off-property costs	.....	<u>2630.07</u>

5. I wish to apply \$ 59151.18 of this value of work on Coal Licence(s) No(s). 4220, 4221, 4222, 4223.

6. I wish to pay cash in lieu of work in the amount of \$ NA on Coal Licence(s) No(s).

7. The work performed on the location(s) is detailed in the attached report entitled Onion Lake Exploration 1984

December 18, 1984  
(Date)

[Signature]  
(Signature)

Supervisor Land  
(Position)

GEOLOGICAL MAPPING

Yes  No

Area (Hectares)

Scale

Duration

Reconnaissance

Detail: Surface

Underground

Other\* (specify)

Total Cost \$

GEOPHYSICAL/GEOCHEMICAL SURVEYS

Yes  No

Method

Grid

Topographic

Other\* (specify)

Total Cost \$

ROAD CONSTRUCTION

Yes  No

Length

Width

On Licence(s) No.(s)

Access to

Total Cost \$

SURFACE WORK

Yes  No

Length

Width

Depth

Cost

Trenching

Seam Tracing

Crosscutting

Other\* (specify)

Total Cost \$

UNDERGROUND WORK

Yes  No

No. of Adits

Maximum Length

No. of Holes

Total Metres

Cost

Test Adits

Other workings\*

Total Cost \$

DRILLING

Yes  No

Hole Size

No. of Holes

Total Metres

Cost

Core: Diamond

NO.

1

93.3

51453.22

Wireline

Rotary: Conventional

Reverse circulation

Other\* (specify)

Contractor

TONTO DRILLING COMPANY

Where is the core stored?

No Core recovered hole T.D. in overburden

Total Cost \$ 51453.22

LOGGING, SAMPLING, AND TESTING

Yes  No

Lithology: Drill samples

Core samples

Bulk samples

Logs: Gamma-neutron

Density

Other\* (specify)

Testing: Proximate analysis

FSI

Washability

Carbonization

Petrographic

Plasticity

Other\* (specify)

Total Cost \$ 5067.89

RECLAMATION

Yes  No

Details

Total Cost \$

OTHER WORK (Specify details)

Yes  No

Cost

Total Cost \$

OFF-PROPERTY COSTS

Yes  No

Details Geological Report Time and Materials

Total Cost \$ 2630.07

Total Expenditures \$ 59151.18

December 18, 1984  
(Date)

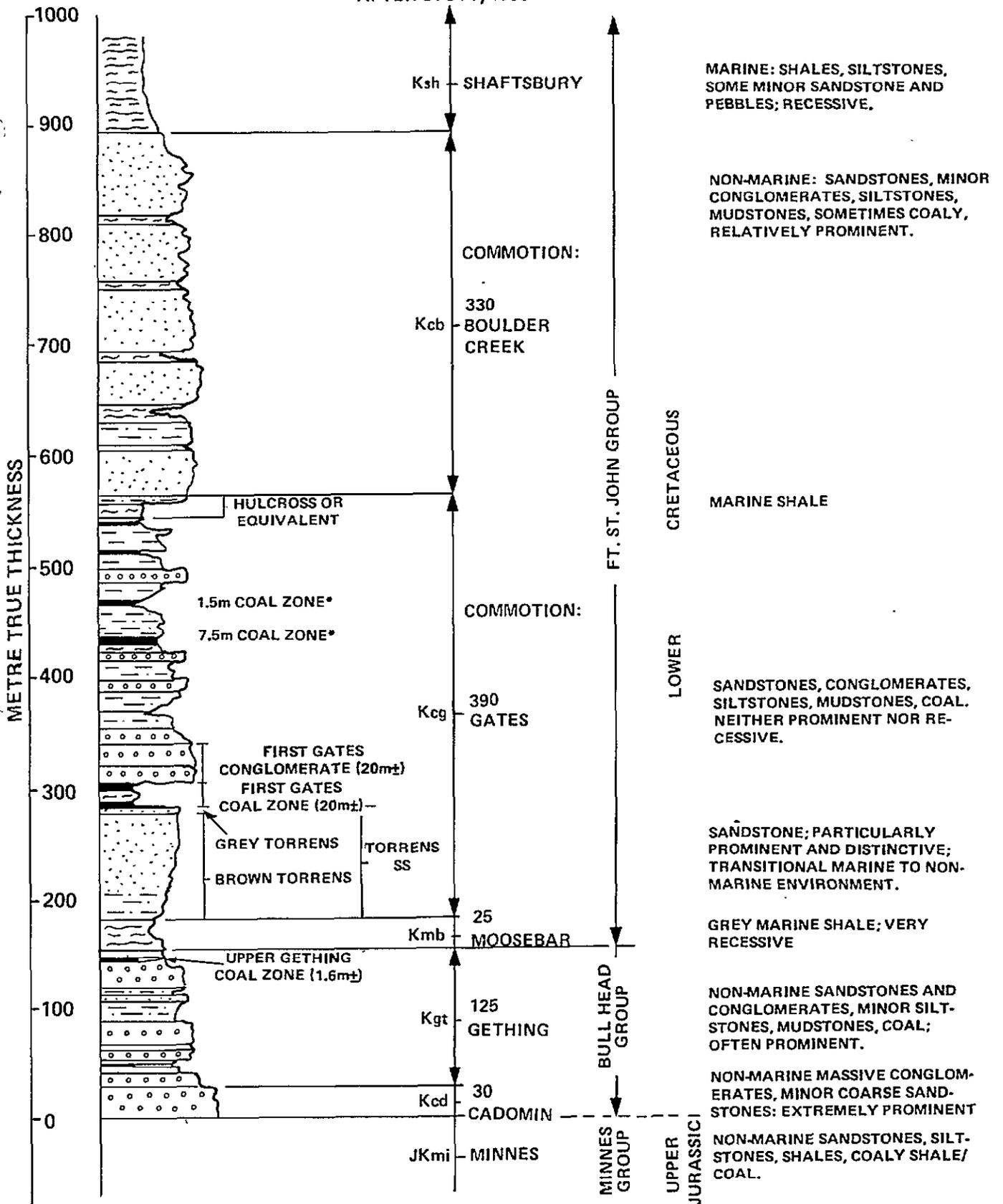
(Signature)

Manager, Geology

(Position)

\*A full explanation of other work is to be included.

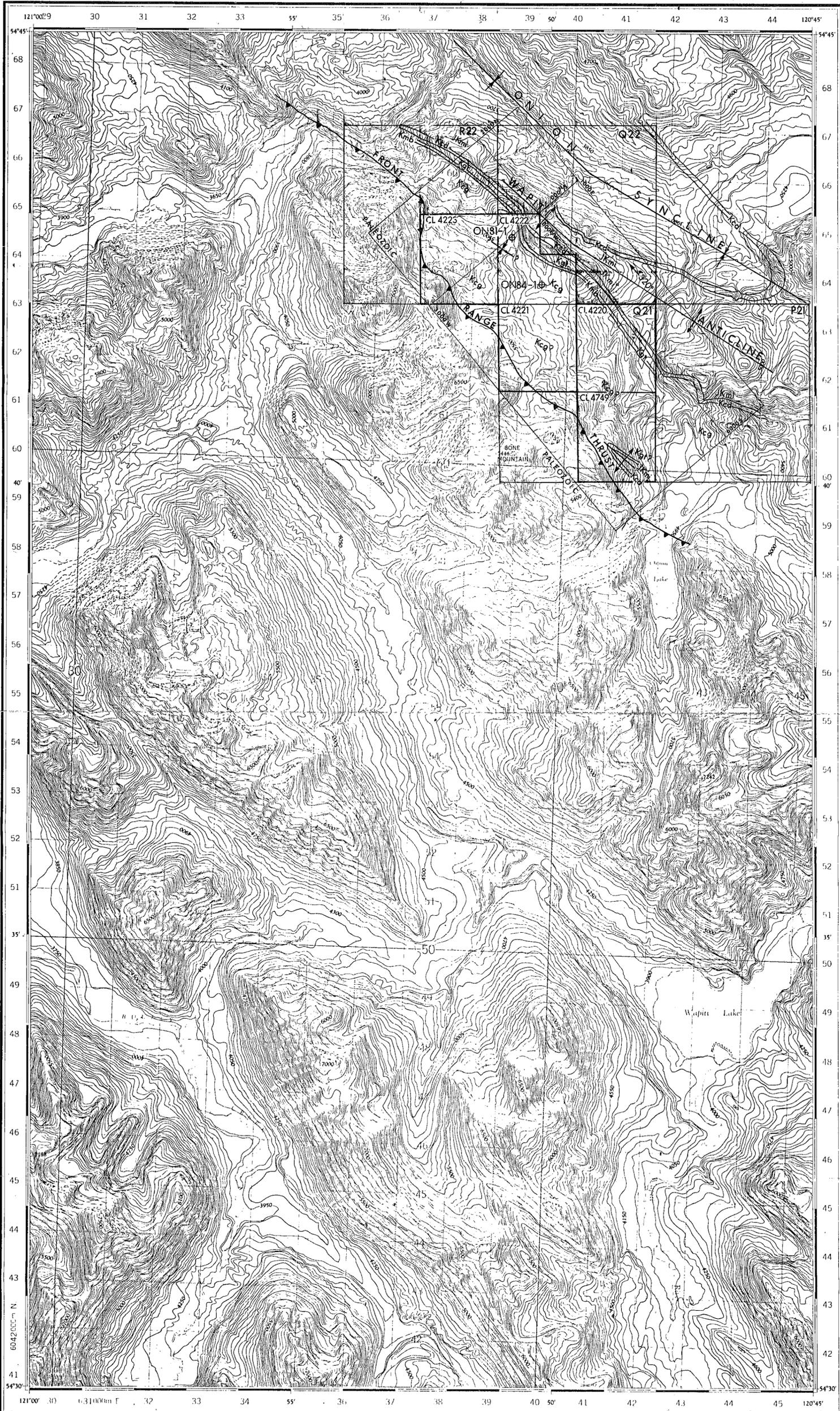
AFTER STOTT, 1968



-  COAL
-  SHALE
-  SANDSTONE
-  CONGLOMERATES
-  SANDSTONE, SILTSTONE MUDSTONE INTERBEDDED

\*REF PETRO CANADA DRILL HOLE DDH: BBD-76-1

 <b>Crows Nest Resources Limited</b> EXPLORATION		
N.E. BRITISH COLUMBIA SECUS MOUNTAIN TYPICAL STRATIGRAPHIC SECTION FIGURE 4		
AUTHOR D. BELL	SCALE 1" = 5000'	DRAWN BY
DATE 81 03	REVISED 83 10 (D.F.)	DRAWING NO. AA-534
<small>Tr. Accompany</small>		



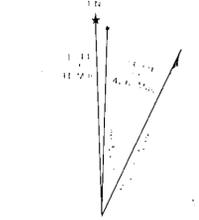
**GEOLOGICAL LEGEND**

- LOWER CRETACEOUS
- Kcg COMMOTION FORMATION (Gates Member)
  - Kmb MOOSEBAR FORMATION
  - Kgt GETHING FORMATION
  - Kcd CADOMIN FORMATION
- JURASSIC-CRETACEOUS
- JKml MINNES GROUP

FORT ST. JOHN GROUP

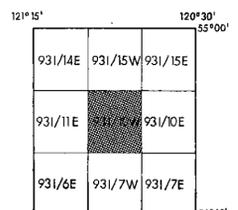
**GEOLOGICAL SYMBOLS**

- ANTICLINE
- SYNCLINE
- THRUST FAULT
- 1981 DRILL HOLE



U. T. M. ZONE 10

**INDEX MAP**



**WAPITI LAKE**  
PEACE RIVER DISTRICT  
BRITISH COLUMBIA  
SCALE 1:50,000 ÉCHELLE

Contour interval 100 feet	Équidistance des courbes 100 pieds
Elevations in Feet above Mean Sea Level	Élévations en pieds au-dessus du niveau moyen de la mer
Transverse Mercator Projection	Projection transversale de Mercator
North American Datum 1927	Réseau géodésique nord-américain unifié 1927
Magnetic Declination 26°15' East	Déclinaison magnétique au centre de la feuille en 1965: 26°15' Est
At Centre of Map 1965	De la feuille en 1965: 26°15' Est
Annual Change decreasing 4.1'	Variation annuelle décroissante 4.1'

**Crows Nest Resources Limited**  
EXPLORATION

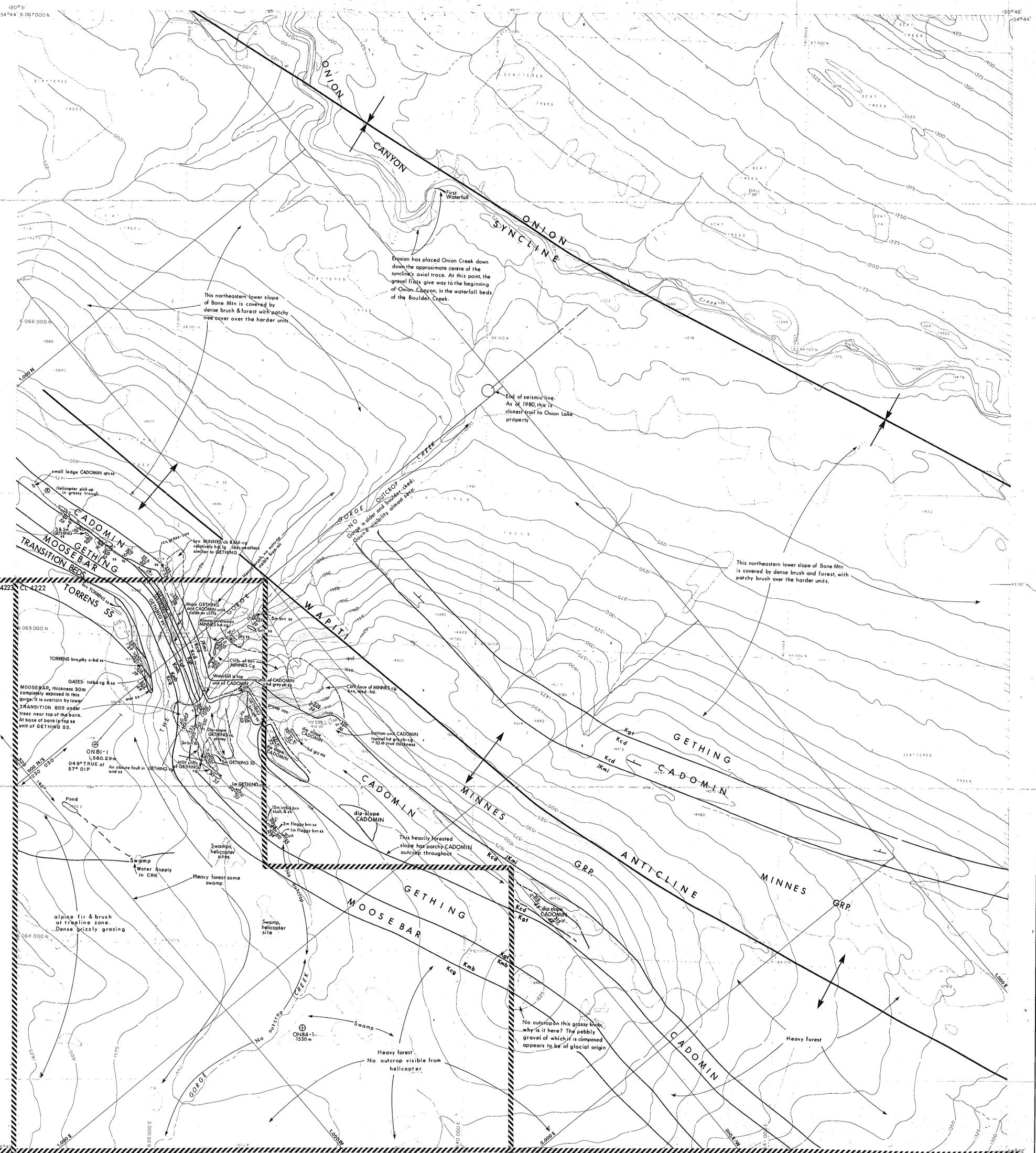
ONION LAKE  
N.E. B.C.

**COAL LAND DISPOSITION,  
INDEX AND  
GEOLOGICAL COMPILATION MAP**

FIGURE 3 WAPITI LAKE 93/10W

AUTHOR D. BELL	SCALE 1 : 50,000	ENCLOSURE No.
DATE MARCH 81	REVISED 84-12	DRAWING No <b>OL5U01</b>
To Accompany		

567



**LEGEND**

Improved road  
Secondary road  
Track or trail  
Cut line  
Tree area  
River  
Stream  
Intermittent stream  
Swamp  
Contours  
Horizontal control  
Vertical control  
Spot elevation  
Iron pin

CONTOUR INTERVAL: 5 METRES  
DATE OF PHOTOGRAPHY: SEPTEMBER 1975  
DATE OF SURVEY: 1977-1978  
DATE OF MAPPING: 1977-1978

**SURVEY NOTE**  
The Horizontal and Vertical Co ordinates were established by D. W. Watson, B.C.I.S. using conventional and EDM survey equipment. Horizontal and vertical co ordinates and elevations are derived following the National Geodetic Survey (N.G.S.) datum. All co ordinates referred to Universal Transverse Mercator Grid Zone 18. Elevations are above Mean Sea Level unless otherwise stated. Spot elevations are given at both ends of each course simultaneously.

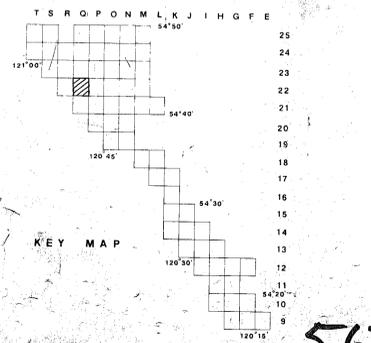
**LOWER CRETACEOUS**  
Ksh Shaftesbury  
Kcb Boulder Creek  
Kcg Gates (includes overlying Transition Beds & Torrens Sandstone)  
Kmb Moosebar  
Kgt Gething  
Kcd Cadomin

**JURASSIC - CRETACEOUS**  
JKmt Minnes Group (undivided)

Thrust fault, position exposed  
Thrust fault, position approximate  
Fault other than thrust  
Anticline  
Syncline

Isolated outcrop, sketched to extent and size  
Strike & dip where strike line of symbol touches outcrop outline  
Strike & dip where strike & dip lines of symbols intersect  
Patchy, indeterminate outcrop  
Outcrop with exposed contact  
Chain-and-compass line (tick marks are stations) with outcrop sketched to size and limits along chained line; strike & dip where strike line of symbol touches chained line  
Chain & compass line; attitudes refer to strike & dip at nearest tick (chain station)

**NOTE:** See Report for Legend of Abbreviations



**DRILL HOLE SURVEY COORDINATES**

	ONB151	ONB41
UTM NORTHING	6 064 843.44m	6 053 746.0m
UTM EASTING	638 777.66m	638 476.0m
ELEVATION	1560.28m	1536.0m

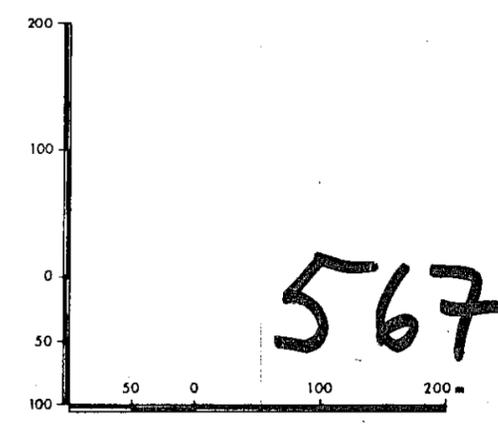
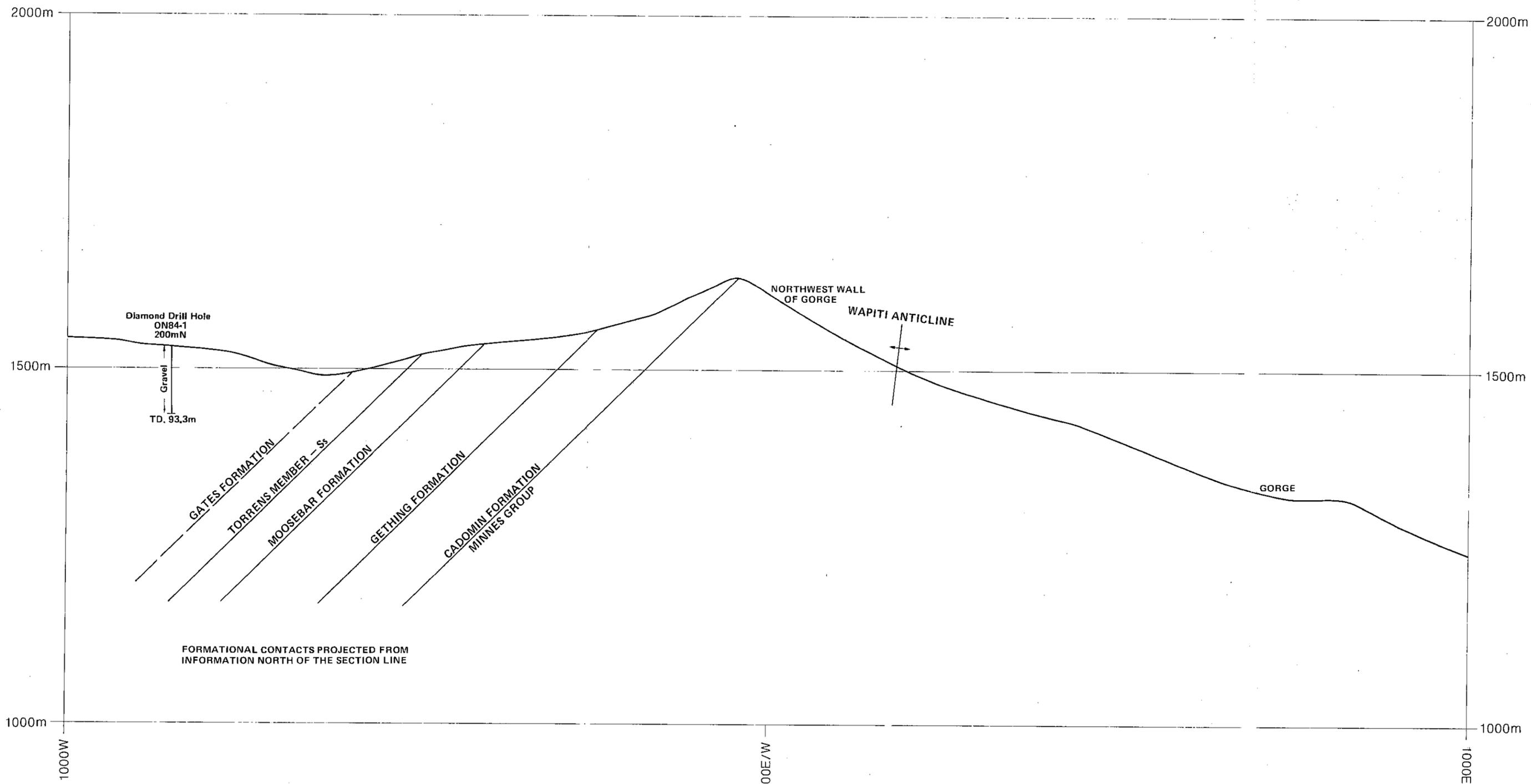
**Crows Nest Resources Limited**  
EXPLORATION  
PR-ONION LAKE (B4) (A 12)  
567-022 OC map 1d  
N.T. 1980C  
N.E. BRITISH COLUMBIA  
MAY 1978

**ONION LAKE**  
N.E. BRITISH COLUMBIA  
FIGURE 5

**Q22**

AUTHOR	SCALE	ENCLOSURE NO.
D. BELL	1:5000	
DATE: MAR/81	REVISED: 84-12	DRAWING NO. OL2U02

567



**Crows Nest Resources Limited**  
EXPLORATION

ONION LAKE  
N.E. B.C.  
PR-ONION LK 84(1)A (2)

**SECTION 1000S**

NTS-931		FIGURE 6	UTM ZONE 10
AUTHOR: WHITE/FIETZ	SCALE: 1:5000	DRAWN BY: RGP	
DATE: 84-12	REVISED:	DRAWING No: OL2X05	
To Accompany			

Report on the Sealing of Drillholes

Inspection District PRINCE GEORGE Date of Report \_\_\_\_\_

Company CROWS NEST RESOURCES LTD Land District PEACE RIVER

Coal Map Number 93I/10 Licence Number C.I. 4222

1. Number of Drillhole DNBHD-01 Bags of Cement \_\_\_\_\_

2. Surface elevation 1530m

3. Type (Vertical, diamond, rotary, size etc.) HQ, VERTICAL, DIAMOND HOLE

4. Drilled by: Name of Contractor: FRANK KERKOFF (DRILLER/FOREMAN)

Name of Exploration Company TONTU DRILLING COMPANY

5. Date of Completion: July 8, 1984

6. Date of Sealing: July 8, 1984

7. Sealed by: Name of Contractor: FRANK KERKOFF (DRILLER/FOREMAN)

Name of Exploration Company TONTU DRILLING COMPANY

8. (a) Has any casing, drill pipe, drill bits, core barrel, etc. been left in the hole?

(b) If so, give details and location: YES ; 46 meters of casing left in hole (stuck) from collar to 46.0 meters

9. (a) Was the drillhole sealed in the manner outlined in the Chief Inspectors Instructions? YES

(b) If no, give reasons and details of variation: \_\_\_\_\_

10. (a) Was the sealing effective? YES

(b) Details of any tests carried out: \_\_\_\_\_

11. I certify that the above drillhole has been effectively sealed in accordance with the instructions of the Chief Inspector of Mines.

Signature: Frank J. Kerkoff

Designation: Tonto Drilling Foreman

Date: July 9-84

Countersignature: Alan White

Designation: P.N.R. Geologist

Date: July 9/84

CROWS NEST RESOURCES LIMITED

ONION LAKE PROSPECT: GROUP 242

1984 Tenure Status

<u>Licence No.</u>	<u>Hectares</u>	<u>Term</u>	<u>Base Date</u>	<u>Work Requirements/Credits (per hectare)</u>			
				<u>Previous Credits</u>	+ <u>Current Credits</u>	- <u>Work Requirements</u>	= <u>Credits Forwarded</u>
4220	300	6	December 31, 1978	38.59	52.57	50.00	41.16
4221	300	6	"	38.59	52.57	50.00	41.16
4222	225	6	"	38.59	52.57	50.00	41.16
4223	300	6	"	38.59	52.57	50.00	41.16
4749	300	5	December 31, 1979	56.09	NIL	25.00	31.09
	<u>1425</u>						

Future Work Requirements

1985	\$15,618.00
1986	\$71,250.00
1987	\$71,250.00
1988	\$71,250.00

567

PR-ONION LAKE 84(1)A (3)



BOREHOLE ON84D-1  
CLIENT GROUS NEST RESOURCES LTD.

AREA ONTARIO LAKE  
COUNTRY CANADA

DATE LOGGED 08 JULY 1984

DEPTH SCALE 1 OF 2 LOGS

COAL LITHOLOGY LOG

SONDE TYPE: COAL COMBINATION SONDE

LOG SUITE: GAMMA RAY L.S. DENSITY

WITNESSES

**BOREHOLE DATA**  
PERMANENT LOG NO. C-10001  
ELEVATION OF P.O. 848  
MEASUREMENTS FROM G.L. G.L.  
DEPTH REACHED 92.5m 92.27m  
CASING SHOE 46.3m 46.0m  
BIT SIZES 1 3/8" TO 4 1/2" 2 7/8" TO 1 1/2"  
CASING SIZES 1 3/4" TO 4 1/2" 2 TO

**OPERATION DATA**  
FIRST READING 90m  
LAST READING 90m  
INTERVAL LOGGED 90m  
UNIT-TRUCK NO. 35/211  
ENGINEER D. J. STUBBS

**EQUIPMENT AND RECORDING DATA**

LOG	EQUIPMENT		TAPING			PANEL	CAL	DEPTHS		SEAM LOG RUN			
	SONDE	SOURCE	LOG TAPE	RECORD SPEED	DIRECT OF REPLAY			COEFF	FROM		TO		
GAMMA RAY L.S. DENSITY CALIPER	184B	5851	81	Y	9	D	9	1	1.53	90	00	90	N
			0041	Y	9	D	9	1/3	6.68	90	00	90	N

COAL QUALITY/SEAM THICKNESS LOG INTERVALS (Refer to relevant log)

FROM	TO	INTERVAL	TOTAL

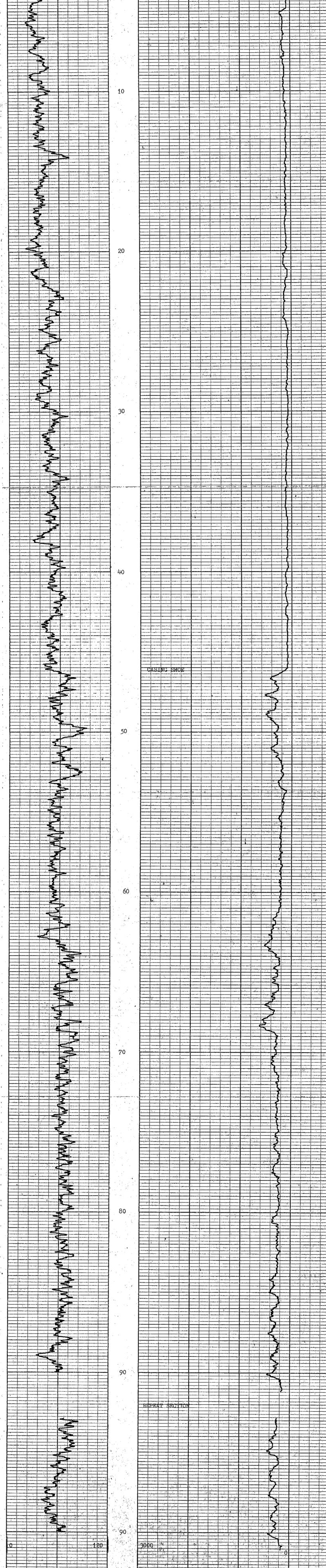
ADDITIONAL SONDES RUKI

SONDE	LOG	GENERAL SCALE LOG	DETAIL SCALE LOG	REFER TO ADDITIONAL HEADINGS	REMARKS
217	N-N	1:100			RODS IN HOLE to T.D.

**BPB COAL LITHOLOGY LOG**

**CALIBRATION DATA**

JIG No.	VALUE @ 5" DIAM	JIG CAL DATE	JIG VALUE	SDU @	g/cm <sup>3</sup>	ins	cps
JIG MARK SHOWN AT ABOVE VALUE -			SPAN	NORM	SDU =	ins	cps



GAMMA RAY	DEPTH	DENSITY
0	0	0
120	3000	0



BOREHOLE ON84D-1 AREA ONION LAKE  
CLIENT GROUS NEST RESOURCES LTD. COUNTRY CANADA

**COAL LITHOLOGY LOG**

567

PR ONION LAKE 8/11/84 (3)



GAMMA RAY & NEUTRON-NEUTRON

BOREHOLE ON84D-1  
CLIENT CROWS NEST RESOURCES LTD.

AREA ONION LAKE  
COUNTRY CANADA  
DATE LOGGED JULY 1984

DEPTH SCALE  
1:100

2 OF 2 LOGS

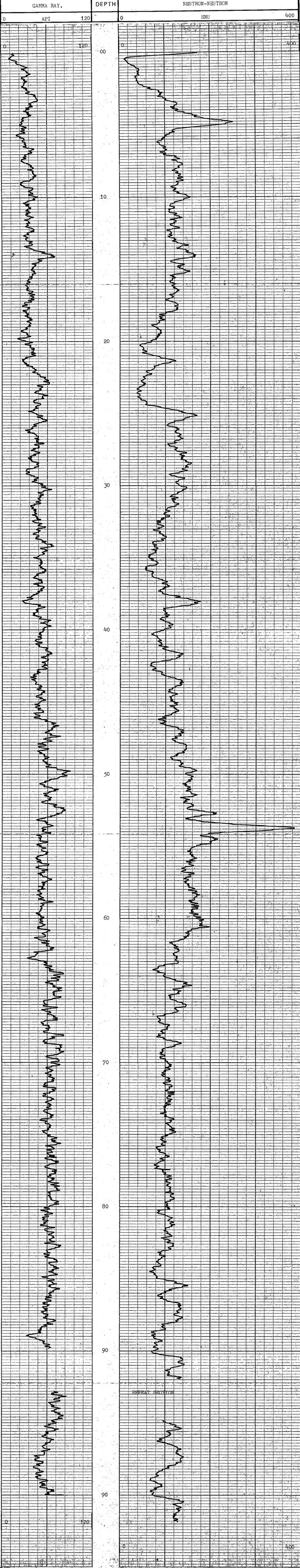
BOREHOLE DATA REFER TO Lithology LOG  
OPERATION DATA REFER TO Lithology LOG

EQUIPMENT AND RECORDING DATA

LOG	TAPING	PANEL	CAI
LOG	RECORD	SPEED	NORM
LOG	RECORD	SPEED	NORM
N-X	Y	9	1
Gamma	Y	9	1
	R	9	1
		1.53	
	SONDE	212	SONDE 6287

REMARKS

RODS IN HOLE TO T.D.



0	API	120	0	SNU	400
GAMMA RAY			NEUTRON-NEUTRON		
DEPTH			DEPTH		



BOREHOLE ON84D-1  
CLIENT CROWS NEST RESOURCES LTD.  
AREA ONION LAKE  
COUNTRY CANADA

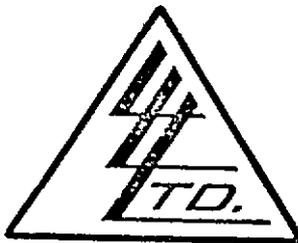
PP-ONTON LK. 84A

CONFIDENTIAL COAL  
ANALYSIS

ENCLOSURE 1

567

To: CROWSNEST RESOURCES LTD.,  
525 - 3rd Avenue S.W.,  
Calgary, Alberta T2P 2M7  
ATTN: T. Cole



File No. 23408  
Date April 13, 1982  
Samples Coal Pulp  
P.O. # CN 24098

cc: K. McCullough - Fernie, B.C.

*Certification of*  
**ASSAY OF**  
**LORING LABORATORIES LTD.**

Page # 6

SAMPLE No.	% S
<u>"Coal Analysis"</u> <u>"Air Dried"</u> <u>Onion Lake</u> <u>Hole # 81-1</u> <u>1.60 Ft</u>	
81-1768	.35
1769	.23
1771	.26
1772	.52
1773	.98
1774	.56
1775	.41
1777	.38
1779	.50
1780	.35

**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.

Assayer









