

OPEN FILE

1979 REPORT OF EXPLORATION ACTIVITIES ON  
NORTH CARBON CREEK COAL PROPERTY

Coal Licences 4124 to 4128. Inclusive

Located In  
Peace River Land District  
and Liard Mining Division

National Topographic System  
Designation            94            B            2

Centred on Lat.  $56^{\circ} 02' 45''$ N; Long.  $122^{\circ} 46'$ W

Owned and Operated by Utah Mines Ltd.

Report by: A. T. Armstrong  
Utah Mines Ltd.

Field Work Done June 15, 1978 and June 17 and 18, 1979

Report Submitted August 3, 1979.

*Received for filing Aug 16<sup>th</sup>, 79.*

TABLE OF CONTENTS

	<u>Page No.</u>
Introduction	1
Property and Title	1
Location and Access	5
Exploration of North Carbon Creek Property	6
i Previous Exploration	6
ii 1978 and 1979 Exploration Activities	6
Physiography	7
Geology, General and Local	9
Conclusions and Recommendations	13
References	16
Appendices	18
i Statement of Qualifications	18
ii Statement of Costs	19

## ILLUSTRATIONS

<u>Figure</u>	<u>Page No.</u>
1. North Carbon Creek - Coal Licences	2
2 Location Map - British Columbia	3
3 Location Map - Local Area	4
4 Physiographic Subdivisions - Northeast B.C.	8
5 Regional Geology - Carbon Creek Area	10

### Table

1 Nomenclature of the Lower Cretaceous Bullhead and Fort St. John Groups	11
---	----

### Maps

1 Geology - North Carbon Creek Property @ 1:10,000 Scale	(In Pocket)
---	-------------

## INTRODUCTION

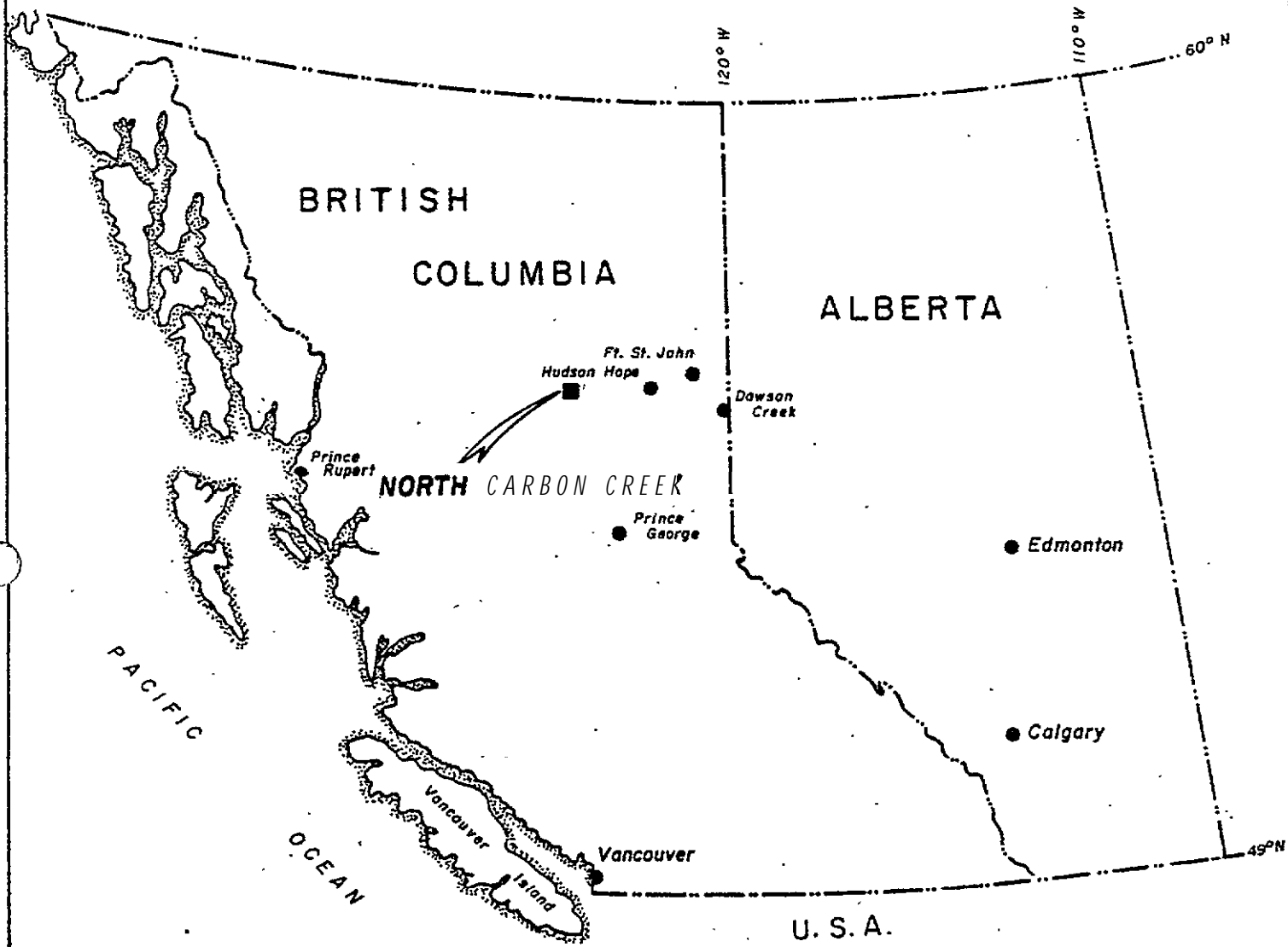
Five coal licences numbered 4124 to 4128 inclusive were added along the northern boundary of the main Carbon Creek Property in order that the anticipated northward extension of coal-bearing Gething Formation sediments along the west side of "Carbon Arm" might be secured. Geological mapping on and immediately adjacent to the property was undertaken to test this continuity and thereby assess the economic potential of the property.

Sediments of the basal part of the Gething Formation do extend across the southern boundary of the licence group. Although carbonaceous in character, this section of Gething sediments is somewhat atypical in that it is made up of a preponderance of moderately thick sandstone beds. Continuing northward, the property is underlain by progressively older sediments including the Lower Cretaceous Cadomin Formation, the Jurassic? to Lower Cretaceous Minnes Group and the Triassic Fernie Group.

### Property and Title

The North Carbon Creek Coal Property comprises five contiguous coal licences numbered 4124 to 4128 inclusive. These licences encompass 1450 hectares (rounded upward from, more precisely, 1445.56 hectares). They are located within that area of British Columbia referred to as the "Northeast Coal Block" in the Liard Mining Division and the Peace River Land District, (See figure 1, page 2)

Application was made, in the prescribed manner, by Utah Mines Ltd. for those coal licences included in North Carbon Creek Property during the spring of 1978. The coal licences were issued on August 15, 1978 and subsequently signed by the



UTAH MINES LTD.  
NORTH CARBON CREEK  
LOCATION MAP

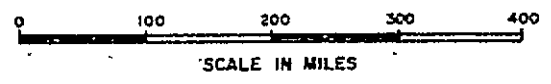


FIGURE - I.

FIGURE - 2

**PROPERTY LOCATION MAP**

- 1 CARBON CREEK PROPERTY
- 2 EAST MT. GETHING PROPERTY
- 3 SOUTH MT. GETHING PROPERTY
- 4 WEST CARBON CREEK PROPERTY
- 5 BRI COAL PROPERTY
- 6 NORTH CARBON CREEK

SCALE: 1 inch = 16 miles

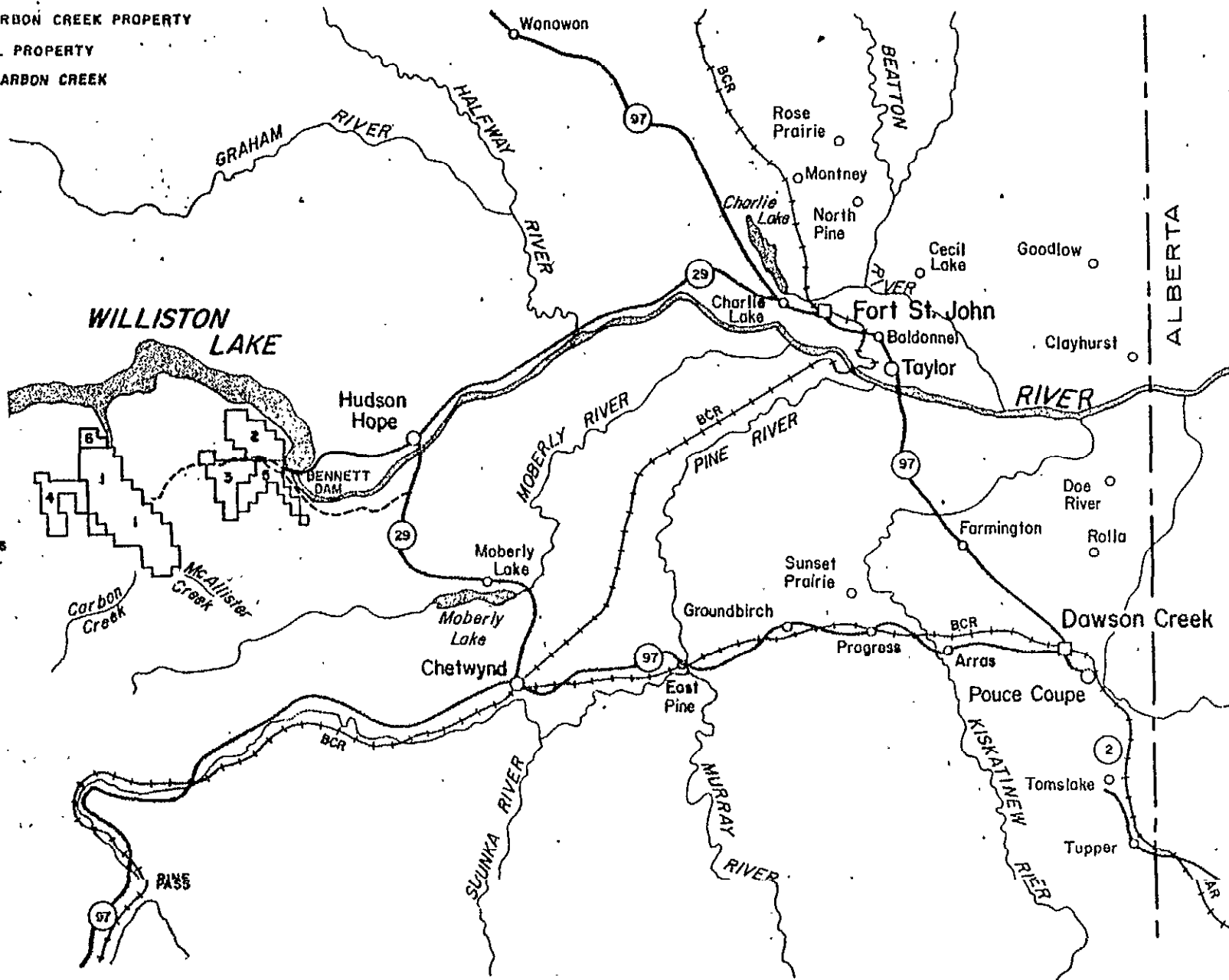


FIGURE - 3

**NORTH CARBON CREEK**  
**COAL LICENCES**

Scale - 1:50,000



WILLISTON

LAKE

122°50'  
56°05'

122°45'  
56°05'

4128      4127

NORTH  
CARBON  
CREEK

4126      4125      4124

PROPERTY

CARBON  
ARM

3505      3504      3501      3500

CARBON CREEK PROPERTY

3503      3502      3499      3498

MOUNT  
△  
BARR

FREEHOLD

122°50'  
56°00'

122°45'  
56°00'

Minister of Energy, Mines and Petroleum Resources. The property adjoins the main Carbon Creek Property of Utah Mines Ltd. on the north side.

#### Location and Access

The five coal licences comprising North Carbon Creek Property are arranged in a block, approximately centred at Latitude  $56^{\circ} 02' 45''N$ ; Longitude  $122^{\circ} 46'W$ . They are located within the area covered by the National Topographic designation 94-B-2.

The licence group lies on the west side of "Carbon Arm" on the south side of Williston Lake, approximately 36 kilometres west from W.A.C. Bennett Dam. The south boundary of the licence group adjoins the northernmost licences of the main Carbon Creek Property (see Figure 1, page 2). The town of Hudson's Hope is located approximately 57 kilometres to the east and the town of Chetwynd lies approximately 84 kilometres to the southeast. Vancouver is approximately 770 kilometres almost due south from the property (see figures 1, page 2 ; 2, page 3 ; 3, page 4 ).

Direct access to the property is readily attainable by helicopter, The eastern property boundary may be reached by boat on Williston Lake. Travel on the property is by-necessity on foot.



## Exploration of North Carbon Creek Property

### i. Previous Geological Investigations

The geology of the "Northeast Coal Block" has been investigated and described by numerous workers (eg. McLearn and Kindle, 1950; Muller, 1961; Hughes, 1964; Irish, 1968; Stott, 1968). This work, although of a general nature or applicable to a specific area at some distance from North Carbon Creek Property, nevertheless provides information valuable in the understanding of the areal geology..

Work by Mathews, 1947; Irish 1968; Rayner, 1975, and le Nobel, 1976 and 1977 was undertaken in the immediate area of the property or in close proximity to the property' and therefore is directly applicable to any geological interpretation within the property area. Major exploration programs conducted by Utah Mines Ltd. on its Carbon Creek Property have contributed greatly to the general knowledge of the Gething Formation and in particular to the knowledge of the geology of Carbon Creek Valley.

### ii. 1978-79 Exploration Activities.

Application for the coal licences comprising North Carbon Creek Property and subsequent field mapping and air photo interpretive work were undertaken in response to the possibility that coal--bearing Gething Formation sediments were continuous beyond the northern boundary of Carbon Creek Property..

On June 15, 1978, traverses were conducted by A. T. Armstrong and R. Hill,. assisted by M. Carr and D. Schmidt. Further traverses were conducted on 'June 17, 1979 by P. Cowley and J. Ridley, assisted by J. Kozak and K. Broadbent and

again on June 18, 1979 by P. Cowley assisted by J. Kozak. Field data combined with air photo data and literature research facilitated the present geological interpretation presented on Map 1 (in the map pocket).

A 1:10,000 scale topographic map, prepared in past by McElhanney Surveying and Engineering Ltd., covering the area of the property, provided an excellent base for this mapping. Transportation of field crews to and from the property was in all cases provided by Maple Leaf Helicopters Ltd. using Bell 206 Jet Rangers.

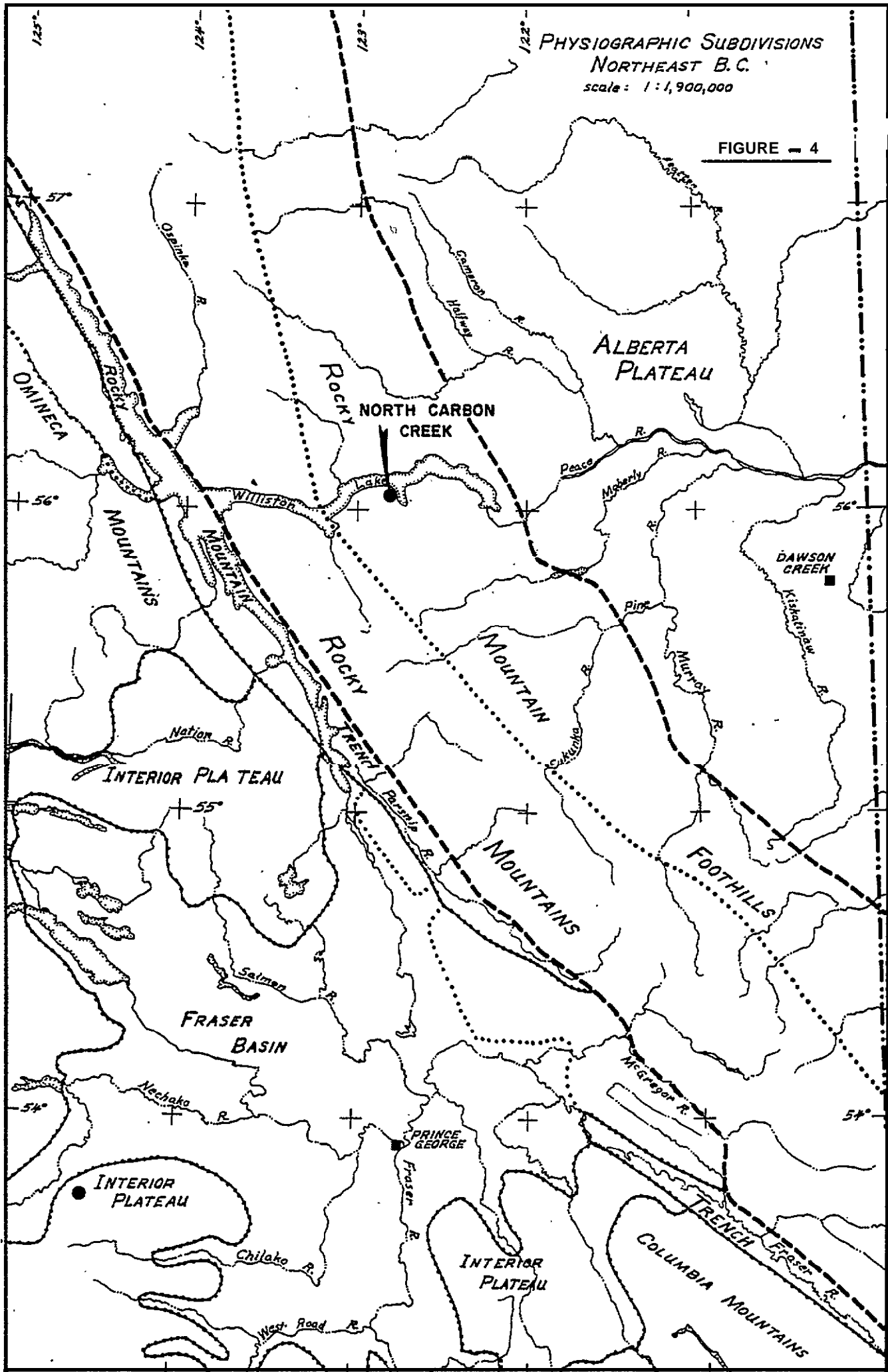
#### Physiography

North Carbon Creek Property is located within the western half of the Rocky Mountain Foothills Belt (see map, figure 4, page 8 ). Topography throughout the area varies from the rugged mountain slopes east and west of the main Carbon Creek Property to moderate slopes within Carbon Creek Valley. Major fold axes and thrust faults trend in a northerly to north-westerly direction and impart a gross linearity to the landscape. Within Carbon Creek Valley, bedrock structure and lithology are commonly reflected by the topography.

North Carbon-Creek Property straddles a rounded, low relief ridge which extends north from within the main Carbon Creek Property to Williston Lake. This ridge is bounded on the east by "Carbon Arm" of Williston Lake and on the west by a well defined stream valley. A weakly defined arcuate terraced character is imparted to the land surface by numerous massive, resistant outcropping and subcropping sandstone beds of the formations underlying the property. Streams are generally of

PHYSIOGRAPHIC SUBDIVISIONS  
NORTHEAST B.C.  
scale: 1:1,900,000

FIGURE - 4



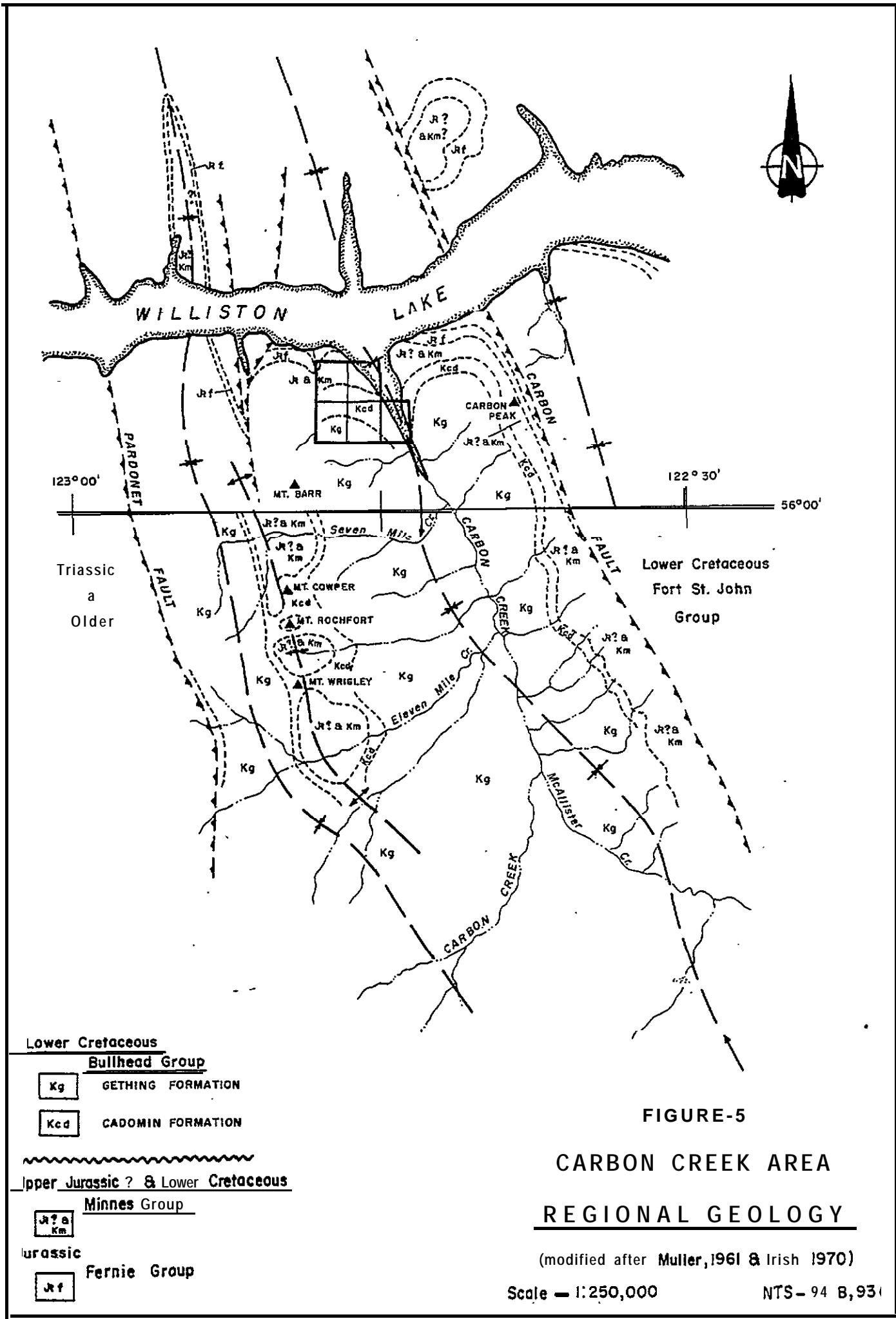
shallow to moderate gradients but several' have cut'small but sharply incised canyons along short lengths of their courses.

### Geology - General and Local

North Carbon Creek Property lies within the structural area commonly referred to as Carbon Syncline. The axis of the syncline is moderately sinuous and extends'approximately south-southeasterly from Williston Lake along Carbon Creek and McAllister Creek valleys. Additionally, the axis is doubly plunging from the north and south, imparting a basin-like form to the area.

The property lies at the northern-most end of this basin, immediately to the west of and along the axis of Carbon Syncline (see figure 5 , page 10). Work by Irish, 1970, indicates that the northwestern corner of the property is underlain by sediments of the Jurassic Fernie Group. Sediments underlying the remainder of the property including the Jurassic? to Lower Cretaceous Minnes Group. and the Lower Cretaceous Bullhead Group have not 'been differentiated by Irish. (See Table 1, page 11) On figure 5 , page 10 the writer has indicated approximate contactsfor these units within the immediate property area and along the east and west flanks of the syncline.


Irish, (1970, p. 63) describes the Passage Beds which form the upper part of the Fernie Group as, "dark, silty or sandy shales interbedded with thin, grey, non-calcareous, buff-weathering, fine-grained sandstone". He further states that, "the proportion of sandstone to shale increase upward forming a transition into the, overlying Minnes Group". The section of exposed sediments near the creek mouth at the northwest



**NOMENCLATURE OF THE' LOWER CRETACEOUS BULLHEAD**

**AND FORT ST. JOHN. GROUP**

**TABLE -1**

		<b>Muller 1961</b>	<b>stott 1968 Pine River Foothills</b>	<b>( used in this report) stott 1968 Upper Peace River</b>	<b>Flynn 1976</b>			
<b>Upper Cretaceous</b>		Dunvegan Fm	Dunvegan Fm.	Dunvegan F m .				
			Cruiser Fm	Cruiser Fm.				
<b>Lower Cretaceous</b>	<b>Fort St John Group</b>	Cruiser Fm.	<b>Fort St. John Group</b>	<b>Fort St. John Group</b>	<b>Fort St. John Group</b>			
		Goodrich Fm.				Goodrich Fm.		
		Hasler Fm.				Hasler F m .		
		Commotion Fm				Commotion Fm	Boulder Creek Member	Hasler Fm.
							Hulcross Member	
	Moosebar F m	Moosebar Fm.	Gates Fm.	Moosebar Fm.				
	<b>Bullhead Group</b>	Gething Fm.	<b>Bullhead Group</b>	<b>Bullhead Group</b>	<b>Bullhead Group</b>	Gething Fm.		
		 Monach Fm.				Cadamin Fm	Cadamin Fm.	
		Beattie Peaks Fm Montieth Fm				Cadamin Fm	Cadamin Fm	
	<b>Cretaceous &amp; Jurassic</b>	Fernie Group	Minnes Group	Minnes Group	Minnes Group			
<b>Jurassic</b>		Fernie Group	Fernie Group					

corner of the property closely resembles Irish's upper Fernie Group transitional units.

The Minnes Group consists predominantly of sandstones,- These sandstones are thick-bedded, hard, fine to medium-grained and quartzitic. They occur interbedded with argillaceous sandstones and carbonaceous shales. They are grey to dark grey in colour and weather light grey and grey-brown. Massive units up to 60 feet (18.3 metres) thick occur interbedded with units that are well bedded; flaggy and up to 10 feet. (3 metres) thick.. Ripple-marks and cross bedding are common (Irish, 1970). Only one traverse was completed along which a significant exposure was observed but the thick, resistant sandstone beds are 'clearly evident on air photos.

The Cadomin Formation of the Bullhead Group which unconformably overlies the Minnes Group is, in the property area, atypical, Massive, quartz and chert, pebble to boulder conglomerate normally associated with the formation is not present but in its place occurs massive to coarsely bedded and cross-bedded, coarse-grained sandstone with occasional thin laminations and lenses of quartz and chert pebble conglomerate. These hard, resistant beds form numerous well defined terraces where they outcrop or subcrop on the property.

The Gething Formation overlies the Cadomin Formation and forms the upper part of the Bullhead Group. The base of the Gething Formation is placed at "the top of the uppermost thick conglomerate which is separated from the basal-conglomerates by no more than a few tens of feet of finer sediments" (Stott, 1968, p. 30). In Peace River Canyon where the Cadomin Formation is represented by coarse-grained, conglomeratic sandstones,

intertonguing of these sands with basal Gething sediments occurs, indicating they are in part lateral equivalents. This relationship may also exist in Carbon Creek Basin where the Cadomin Formation is largely composed of massive, coarse-grained sandstones.

Gething Formation sediments occur near the southern property boundary. Irish, (1970, p. 68) described the Gething Formation as a sequence of "interbedded, grey and buff-weathering, medium to fine-grained grey to dark brown sandstones, grey to black shales, dark siltstones and coal seams." On North Carbon Creek Property outcrop is sparse and is dominantly of the more resistant rocks types. Within the area of the property assigned to the Gething Formation most outcrops are of fine- to medium-grained carbonaceous sandstones. The shales, siltstones and coal seams typical of the Gething Formation were not seen in outcrop.

Geological mapping, undertaken by Utah Mines Ltd. during the summers of 1978 and 1979, although not conclusive in defining exact formational contacts, has certainly allowed more precise definition of these contacts. Rock types and textural features assignable to particular formations have been noted, as have any structural features useful in defining the geological form of the area (see Map 1, in pocket).

#### Summary and Conclusions

Title to five coal licences, adjoining the Carbon Creek Property on the north, was acquired by Utah Mines Ltd. to cover an area thought to be underlain by Gething Formation sediments. These sediments are of deltaic origin and are a prominent



host for coal seams. North Carbon Creek Property is underlain by the up dip continuation of the sedimentary sequence underlying the Carbon Creek Property at depth. The sequence includes, from the southern property boundary northward, carbonaceous and coaly sandstones and siltstones of the basal part of the Gething Formation, coarse-grained conglomeratic sandstones of the Cadomin Formation, marine and non-marine quartzitic sandstones argillaceous sandstones and carbonaceous shales of the Minnes Group and shales, siltstones and marine sandstones of the Fernie Group,.

Preliminary mapping and air photo interpretive work have been completed to prepare this evaluation of the property. The areal extent of those formations underlying the property is shown on Map 1 (in the map pocket) but must be considered somewhat speculative at this time. Additional work is required to make a more complete appraisal of the property.,

It is recommended that title to coal licences.4125 and 4126 be retained. The areal extent of the Gething Formation underlying these licences has not been precisely established nor has the property been tested to ascertain the presence, or absence of coal of economic significance.

Further mapping should be undertaken using cut grid or chain and compass control to establish the position of the Gething-Cadomin contact as near as is possible. An adequate preliminary test for contained coal in the Gething Formation could be made at relatively small cost by drilling one or possibly two small diameter holes using a light weight easily mobilized drill (possibly a Winkie Drill). Drilling adjacent

to the southern property boundary would test the maximum thickness of Gething sediments underlying the property. If a coal seam or seams of significant thickness and quality were intersected the cost of mobilizing a larger diamond drilling rig could be more easily justified.

## REFERENCES

Armstrong, A. T.

- 1979: 1978 Report of Exploration Activities on the West Carbon Creek Property: private Utah Mines Ltd. report.

Holland, S. S.

- 1976: Landforms of British Columbia, A Physiographic Outline; British Columbia Department-of Mines and Petroleum Resources, Bulletin 48.

Irish, E.J.W.

- 1965: Geology of the Rocky Mountain Foothills, Alberta. (between latitudes  $53^{\circ}15'$  and  $54^{\circ}15'$ ); Geological Survey of Canada, Memoir 334.
- 1968: Structure of the Northern Foothills and Eastern Mountain Ranges, Alberta and British Columbia (between latitudes  $53^{\circ}15'$  and  $57^{\circ}20'$ ); Geological Survey of Canada, Bulletin 168.
- 1970 : Halfway River Map-Area, British Columbia; Geological Survey of Canada, Paper 69-11.

le Nobel, D. N.

- 1976: Report of Exploration Activities on the Carbon Creek Property; private Utah Mines Ltd. report.,.
- 1977: Summary Report - Geology, Carbon Creek; private Utah Mines Ltd. report.

McLearn, F.H. and Kindle, E.D.

- 1950: Geology of Northeastern British Columbia: Geological Survey of Canada, Memoir 259.

Mathews, W.H.

1947: Geology and Coal Resources of Carbon Creek - Mount Bickford Map-Area, British Columbia; British Columbia Department of Mines, Bulletin 24.

Muller, J.E.

1961: Pine Pass Map-Area, B.C.; Geological Survey of  
. . . . . Canada, Map 11-1961. . . . .

Rayner, G.H.

1975: Carbon Creek Project - Supplementary Geological Investigations; private Utah Mines Ltd. report.

Stott, D.F.

1968: Bullhead and Fort St. John Groups, Rocky Mountain Foothills; Geological Survey of Canada, Bulletin 152.

1969: The Gething Formation at Peace River Canyon, British Columbia; Geological Survey of Canada, Paper 68-28.

CERTIFICATION

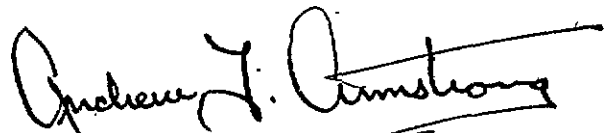
I, ANDREW T. ARMSTRONG of #105 - 1001 Mount Seymour Parkway,  
North Vancouver, British Columbia, do hereby certify that:

I was granted a Bachelor of Science Degree in  
Geology by the University of British Columbia  
in 1970.

I have been continuously employed in various  
mining exploration activities from May 1970 to  
the present, throughout British Columbia.

I am an Associate of the Geological Association  
of Canada.

Vancouver, B. C.

A handwritten signature in cursive script that reads "Andrew T. Armstrong". The signature is written in black ink and is positioned above the printed name.

Andrew T. Armstrong

Geologist

APPENDIX II

Cost Statement

Salaries

1. Field Mapping

A.T. Armstrong	1 day x \$65.38/day (1978)	\$ 65.38
R. Hill	1 day x \$66.35/day	66.35
M. Carr	1 day x \$42.31/day	42.31
D. Schmidt	1 day x \$26.92/day	26.92
P. Cowley	2 daysx \$55.77/day	111.54
J. Kozak	2 daysx \$41.35/day	82.70
J. Ridley	2 daysx \$35.58/day	71.16
K. Broadbent	2 daysx \$34.62/day	69.24
		<u>\$535.60</u>

2. Report Preparation

A.T. Armstrong (July 20 to 29/79)		
10 days @ 79.62		\$796.20
T. Drews (drafting)		
4 days @ 62.70		250.80

3. Field Support - Room and Board

12 man days @ \$20.00* per day	240.00
--------------------------------	--------

(\*Assumed average cost per man per day)

4. Administration and Project Supervision

R. Anderson - 5 days @ \$82.70/day	413.50
------------------------------------	--------

5. Typing

L. Gerling - 2 days @ 33.84/day	<u>67.68</u>
---------------------------------	--------------

6. Office Overhead - Sub total (+ 15%)

2,303.78
345.57
<u>2,649.35</u>

7. Helicopter Charters:

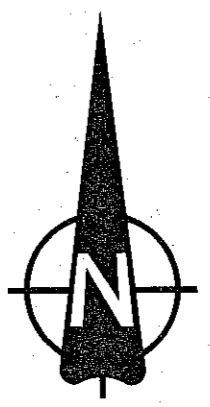
Maple Leaf Helicopters:-

Flight Report #255 - 2.0 hours  
Flight Report #586 - 2.4 hours  
Flight Report #587 - 2.2 hours

2 hours @ \$300/hr. + fuel (22 gal/hr. x \$1.65/gal)	672.60
4.6 hrs @ \$315/hr. + fuel (22 gal/hr. x \$1.65/gal)	1,616.00
	<u>2,288.60</u>

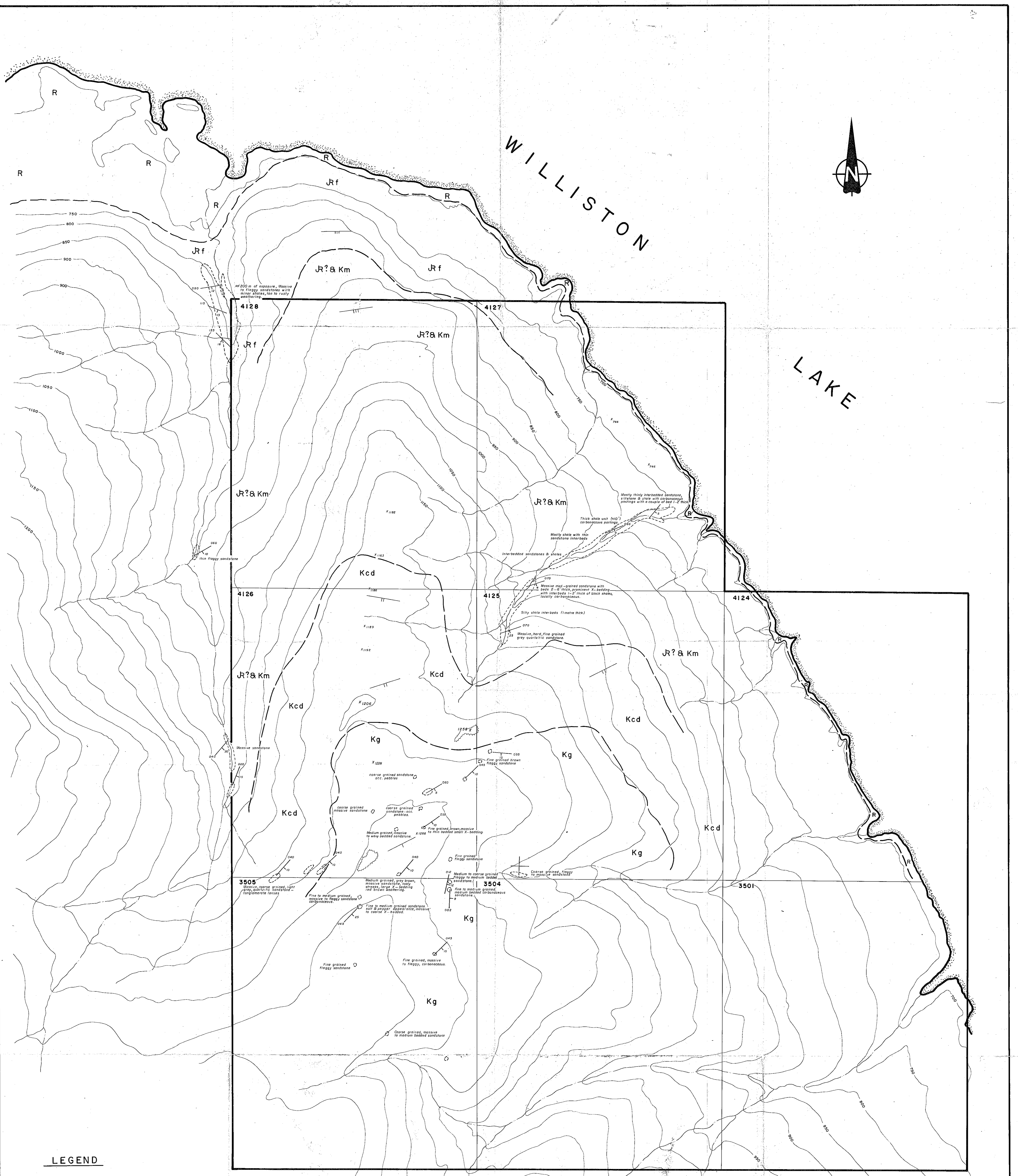
TOTAL EXPLORATION EXPENDITURE

4,937.95



WILLISTON

LAKE



LEGEND

- R Recent Sediments
- Lower Cretaceous
- Kg Bullhead Group  
Gething Formation
- Kcd Cadamin Formation
- Upper Jurassic & Lower Cretaceous
- Jr? & Km Minnes Group
- Jurassic
- Jr f Fernie Group
- OUTCROP
- BEDDING ORIENTATION (dipping, horizontal)
- GEOLOGICAL CONTACT (approx. from field data & airphotos)
- BEDDING ORIENTATION (from airphotos, 5-10°, 10-15°, 15-25°)

Note: Contour Interval = 50 metres  
 — Data Derived From Field Mapping And  
 Airphoto Interpretation.  
 X 1192 — Spot Elevations

505

*PR. CARBON CR. (NORTH) 79(2)A*

**UTAH MINES LTD.**  
 EXPLORATION DEPARTMENT  
 VANCOUVER BRITISH COLUMBIA

NORTH CARBON CREEK  
 GEOLOGY

Work by: A.T. Armstrong	Date: August 1979	NTS Ref: 94 B-2
Drawn by: T. Drews	Revised:	Scale: 1:10,000

MAP — I