

PR-Shell-Five Cabin Creek 80(1)A

93E114E
 93E115W
 July 81
 Five Cabin Creek 1980
 Geological Report
 Shell Canada Resources Ltd.
 C.L.# 6137-6143 inc.
 Dennis E. Bell

635

FIVE CABIN CREEK

COAL EXPLORATION

- 1980 -

OPEN FILE

Coal Licences 6137-6143 Inclusive (7 Total)

Peace River Land District, Northeast British Columbia

National Topographic Series 93 I/14 E (Kinuseo Falls)

93 I/15 W (Kinuseo Creek)

Latitude and Longitude 54 degrees, 51 minutes north
121 degrees, 01 minutes west

Owner: Shell Canada Resources Limited

Operator: Crows Nest Resources Limited

Consultant and Author: Dennis E. Bell, P. Geol. (Alberta)

Max Air Exploration Limited

P.O. Box 878

Jasper, Alberta, T0E 1E0

Field Work: June 9th through August 29, 1980

Submission Date: July 6, 1981

GNRL Coal Land Disposition Maps HC-18C, HC-18D

GEOLOGICAL BRANCH
ASSESSMENT REPORT

00 635

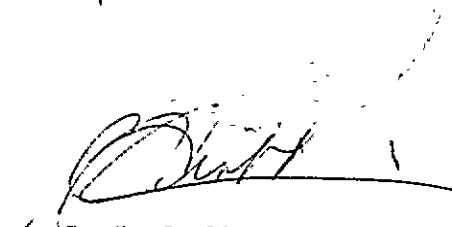
PROFESSIONAL VERIFICATION OF REPORT

Entitled: Five Cabin Creek Coal Exploration, 1980
Peace River Land District
Northeast British Columbia
B.C. Coal Licences 6137-6143 Inclusive (7 Total)

Mr. Dennis E. Bell carried out the 1980 geological field program on the Five Cabin Creek, northeast British Columbia coal licences held by Shell Canada Resources Limited and operated by Crows Nest Resources Limited.

Dennis E. Bell, B.Sc., graduated in Geology from Dalhousie University in 1965. Since 1968 he has specialized in basic field mapping, structural interpretation, and exploration supervision in the coking coal belt of British Columbia and Alberta. He has worked on projects similar to this property for this Company and for such major coal companies as Manalta Coal Ltd., Luscar Ltd., Fording Coal Ltd., and Petro-Canada. Mr. Bell is registered as a Professional Geologist in the Association of Professional Engineers, Geologists and Geophysicists of Alberta.

I consider the aforementioned geologist to be well qualified to have undertaken the responsibilities he was assigned for this project. I am satisfied that the attached report dated July 7, 1981, has been competently prepared and justly represents the information obtained from this project.



J. J. Crabb, P. Eng.

July 7, 1981

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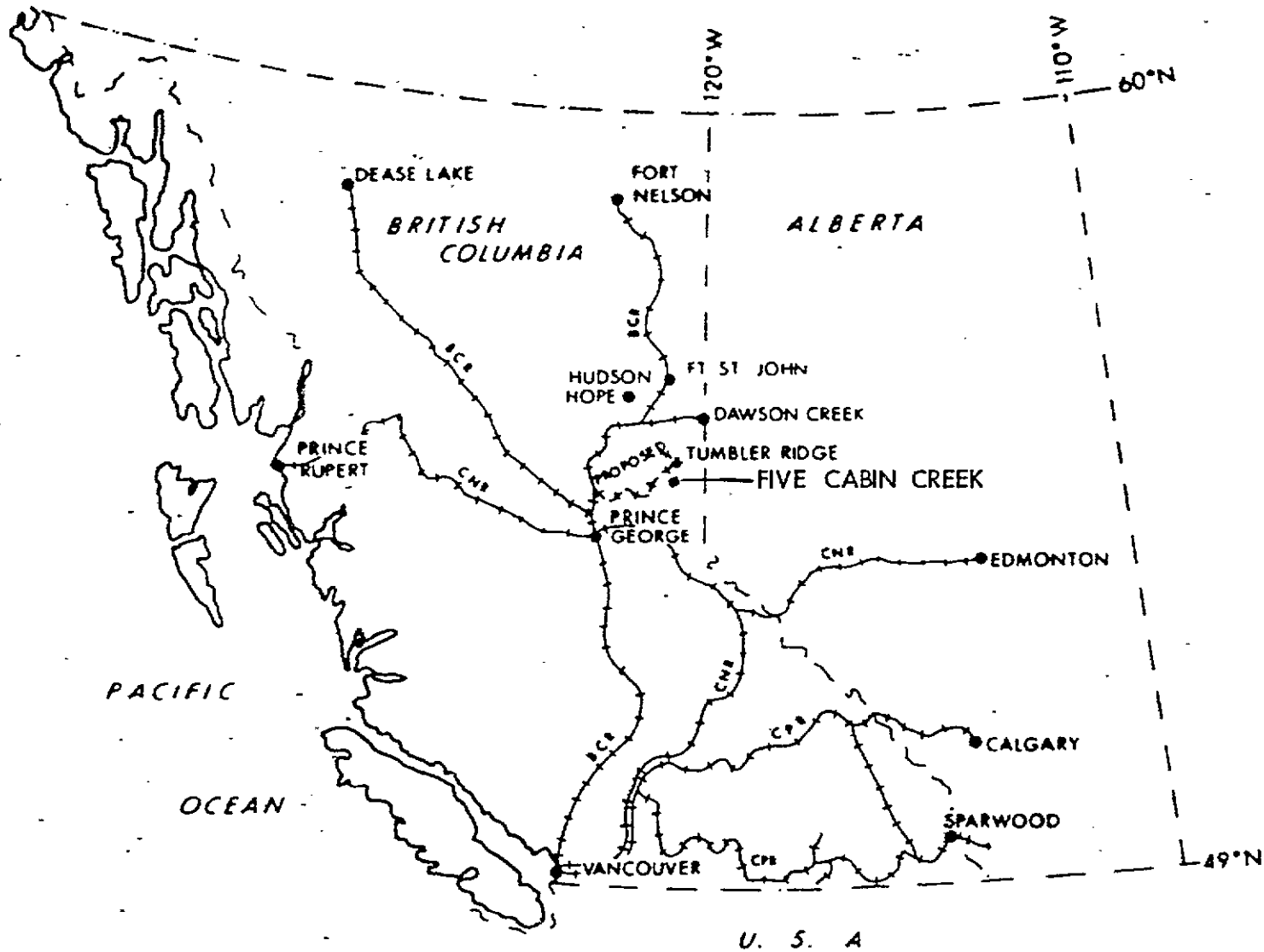
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Crows Nest Resources Limited		
EXPLORATION		
FIVE CABIN CREEK NE BC		
LOCATION MAP		
FIGURE 1		
AUTHOR: A WHITE	SCALE	ENCLOSURE NO.
DATE: 01 03 05	REVISED	DRAWING NO. AA-540
To Accompany		

1.0 SUMMARY

During the field season of 1980, Crows Nest Resources Limited conducted a surface detail geological mapping program over a 6 km x 7 km stretch of the coking coal belt of northeastern British Columbia. The area is called Five Cabin Creek after the creek of the same name which drains more than half of the area and flows southeast down to Kinuseo Creek. Cost of the project was \$28,119.30.

Two mapping pairs, led by Dennis Bell, consultant, and Alan White, geologist, Crows Nest Resources Limited, spent two weeks in the area, mapping on a base of 1:20,000. As the region has not been mapped by the Geological Survey of Canada on a 1:50,000 basis, the particular objective was to define and map the two known coal-containing formations - the Gething and the Commotion - as they may or may not exist under the five licences composing the property.

The Five Cabin Creek area is bordered on the north and south by Denison Mines licences. On the east and west is ground underlain by the older Minnes Group sediments, regarded as unprospective at this time. The area forms the western part of the Quintette Mountain foothill, is almost entirely above treeline, and is situated directly west from Denison's proposed Quintette mine.

1.0 Summary (continued)

Mapping shows that somewhat over half of the licenced ground contains a complete section of the Gething and Commotion formations folded into a structurally uncomplicated syncline of broad and easily defineable dimensions.

Only one trail - the old main access to the Quintette Babcock camp of Denison Mines - reached into the area, but this road is presently abandoned and touches only the easternmost fringe of the area. The work was helicopter-supported from the Kinuseo Creek-Duke Mountain (Monkman) Petro-Canada camp 16 km to the east, where the crew stayed as guests.

The geologic mapping was plotted on a 1:20,000 topographic base. At the time of the work a smaller base was not available, but a 1:5,000 base is being prepared for the 1981 season. Alan White did the detail mapping and composed the geologic map and the structural cross-section, which together form the foundation of this report. Dennis Bell has composed the text.

With this 1980 basic detail mapping program completed, Crows Nest is planning a first diamond drill hole, helicopter supported, for the 1981 season. Further detail mapping, on a 1:5,000 scale, by two mapping pairs is also planned.

2.0 INTRODUCTION

2.1 Coal Land Tenure

Seven licences (6137-6143 inclusive), ungrouped, compose Five Cabin Creek, 2,015 hectares. The project is named after the creek of the same name.

The following table entitled "B.C. Coal Licences Tenure Standing, Five Cabin Creek" gives details of tenure.

FIG. 2

CROWS NEST RESOURCES LIMITED
EXPLORATION

B. C. COAL LICENCES
TENURE STANDING

BLOCK: FIVE CABIN CREEK
GROUP: UNGROUPED

PROJECT: YEAR: 1980 - 1981
DATE: JUNE, 1981
FIVE CABIN CREEK
PEACE RIVER LAND DISTRICT

PROJECT NAME	PROJECT		BLOCK		GROUP			LICENCE		ACO/ADM		RENTALS		REQUIREMENT WORK					BUDGET		EXP	POTL	COMMITMENTS J. V.	REMARKS			
	FILE NO.	AREA TOTAL AC/HR	NAME	LIC. TOTAL NO.	AREA TOTAL AC/HR	NO.	LIC. TOTAL NO.	AREA TOTAL AC/HR	YEAR	NO.	LEGAL DESCRIPTION	AREA TOTAL AC/HR	YEAR	FFTS	ADH	ANNUAL \$	TO DATE \$	PAID \$	CURRENT YEAR \$	PREVIOUS YEAR \$	FILM \$	AMMUNITION \$	DATE		CURRENT YEAR AFE	YEAR \$	TOTAL \$
FIVE CABIN CREEK	7	2015	FIVE CABIN CREEK	7	2015								80	70	10,075	20	15,1	1	15,113	1/2	13,006	APRIL 7			48.3	Y	
											6137	93-1-14-H 1, 2, 11, 12	299														
											6138	3, 4, 13, 14	299														
											6139	5, 6, 15, 16	299														
											6140	21,22,31,32	298														
											6141	23,24,33,34	298														
											6142	41,42,51,52	298														
											6143	93-1-15-E 29, 39, 40	224														
												WORK DONE															
													1980														
															28,119												

GENERAL REMARKS: FILL IN NECESSARY LINES AND COLUMNS ONLY. COAL DEVELOPMENT POTENTIAL IS 'Y' (PRIME) UNLESS OTHERWISE STATED. LICENCES HELD BY SUNT CANADA RESOURCES LTD. ARE NOT TO BE OPERATED.

2.2 Location, Geography and Physiography

Five Cabin Creek is a more or less square-shaped area measuring approximately 6 km along the northwest-southeast common trend of the formations of the foothills, and 7 km across this trend.

Some location descriptions are:

- A) Situated on the western side of the Quintette Mountain, an inner foothills upland area of knobs and high ground, overlooking the broad Kinuseo Creek valley immediately to the south.
- B) Centered about latitude 54 degrees, 51 minutes north, longitude 121 degrees, 01 minute west.
- C) 30 km due south from the proposed Tumbler Ridge townsite.
- D) 140 km west-southwest from Grande Prairie, Alberta.
- E) 150 km northeast of Prince George, British Columbia.

Relief in the licences varies from 1,120 m (3,675 feet) to 1,934 m (6,346 feet), a total of 814 m (2,670 feet). The area containing the coal formations, however, is almost all between 1,500 m and 1,900 m (4,920' to 6,230').

The terrain is almost entirely above treeline, and supports only mosses and lichens. Although the slopes can be steep, they do not tend to cliffs, and exposure for the geologist is excellent.

2.2 Location, Geography and Physiography (cont'd)

The upper, northwest end of Five Cabin Creek drains the major part of the area, and its gentle valley supports an alpine meadow environment. The rest of the ground underlain by the coal measures is barren alpine and wind-blown.

In this region it is normal to have snow still on the ground into late May. On these particular Five Cabin Creek licences, however, exposure to wind is such that most of the ground stays blown clear, with only the small topographic recessions infilling and leaving small cornices in the spring.

2.3 ACCESS

This 1980 detail geological mapping was done by two pairs from helicopter, although the bulk of this work was done by Alan White in particular. The area may be reached by driving the abandoned former main trail up from the Kinuseo Creek valley below to the south to the old Denison Quintette Babcock Creek camp. The distance is approximately 8 km from the valley to the southeastern corner of the area; the trail then continues north along the eastern edge of the area, crosses a small divide and then descends northeastwards into the Babcock Creek drainage and on to the abandoned Denison camp.

Any future trail construction within the area would logically use this present trail as access. It was well-constructed for exploration use and would require only water bar removal by bulldozer.

It is only a short five minute flight from the Petro-Canada Monkman camp to Five Cabin Creek, and so the area is well-located for helicopter access. As the terrain is mostly barren of trees, landing sites are plentiful.

2.3 (continued)

The camp is located in the Kinuseo Creek valley, which has a 40 kmph all-weather gravel road, although it is not being maintained at the moment by the B.C. Government. Service for the camp is from Grande Prairie, 158 km northeast down the Redwillow River. The turn-off from the Grande Prairie-Dawson Creek highway is 37 km west of Grande Prairie at Beaverlodge, Alberta. The drive is approximately 2-1/2 hours in dry weather.

2.4 Environment

Five Cabin Creek is relatively high, cold and windy compared to the average terrain covering the coal belt in this region of northeastern British Columbia. Experience indicates that June 15th is the earliest average post-break-up date for work. Snow will cover all ground that is not wind-exposed until late May.

The 1980 geological mapping ended for the season on August 24th, when the oncoming winter's snowline descended to 1450 m.

Due to the area's position at or above the treeline zone, the year-round quality of the climate is barren alpine. A summary of the mapping crew's traverse notes shows that high winds and a temperature of +4 degrees Celsius are a common morning condition in July and August.

3.4 Costs of Work Done in 1980

Detailed costs of the 1980 Five Cabin Creek geologic mapping program are contained in the Application to Extend Term of Licence on the following two pages.

Total cost of the 1980 program is calculated to be \$28,119.30.

3.0 WORK DONE

3.1 Summary of Previous Work

Previous work on Five Cabin Creek is essentially confined to one geologic study.

This is the 1:50,000 regional geologic map (CNRL No. HJ-21A) from company files. The 1980 work refines and fleshes out this regional mapping to a 1:20,000 scale, but changes no part of the basic structural interpretation (that of a broad, asymmetric syncline uncluttered by more minor structures).

It is notable that the Geological Survey of Canada has not mapped this region of Northeastern British Columbia on a scale as small as 1:50,000; therefore the 1980 mapping commenced with reconnaissance and mapping of a nature intended to provide this scale.

3.2 Scope and Objective of 1980 Exploration

With 1:50,000 reconnaissance mapping in hand and a stratigraphic framework as outlined in Section 4 of this report, the 1980 geologic program was intended to provide detail mapping for a 1:20,000 scale. This work was designed to fit with the 1981 program, which will be done on the new 1:5,000 topographic base which is being prepared.

An immediate objective was to do sufficient ground work to identify a drill site for a single diamond drill hole in 1981.

The detail mapping was oriented to three purposes: outlining of the structural setting; the lithologic nature of the rock units; and an outlining of the most prospective parts of the licences from a mining point of view.

3.3 Work Done in 1980

With the help of average weather, a good base camp, and the experience carried into the area from the other parts of the coal belt nearby by the mapping crew, the program was a success.

Outcrop exposure is excellent. Tree cover is missing or minimal. The terrain, while steep, is not overly rugged.

Potential diamond drill sites are numerous. The precise location for the planned 1981 hole will be picked later, when the type of drill equipment and the hole depth is specified.

P/C



Province of British Columbia
Ministry of Energy, Mines and Petroleum Resources

APPLICATION TO EXTEND TERM OF LICENCE

BOLTON AGNEW agent for SHELL CANADA RESOURCES LIMITED
(Name) (Name)
P. O. BOX 100 (Address)
(Address) ALBERTA T2P 2H5
CALGARY
Valid FMC No. 207568

hereby apply to the Minister to extend the term of Coal Licence(s) No(s). 6137 to 6143 inclusive,
Seven B.C. Coal Licences, 2015 Hectares
for a further period of one year.

2. Property name Five Cabin Creek, 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 April 8th, 1980 to
April 7th, 19 81, work to the value of at least \$ \$28,119.30

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

CATEGORY OF WORK	Licence(s) No(s).	Apportioned Cost
Geological mapping	6137-6143	\$27,719.30
Surveys: Geophysical		
Geochemical		
Other		
Road construction		
Surface work		
Underground work		
Drilling		
Logging, sampling, and testing		
Reclamation		
Other work (specify)		
Off-property costs		400

5. I wish to apply \$ 28,119.30 of this value of work on Coal Licence(s) No(s). 6137 to
6143 inclusive

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 The Geological
Report will be submitted in 90 days.

..... (Date) (Signature)
Land Supervisor
(Position)

CATEGORY OF WORK

GEOLOGICAL MAPPING

Yes No

Area (Hectares) 2200 Scale 1:20000 Duration 35 1/2 man-days
 Reconnaissance
 Detail: Surface
 Underground
 *Other (specify)
 Total Cost \$ 27,719.30

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
Wireline
Rotary: Conventional
Reverse circulation
*Other (specify)
Contractor				
Where is the core stored?				
				Total Cost \$

LOGGING, SAMPLING AND TESTING

Yes No

Lithology: Drill samples	<input type="checkbox"/>	Core samples	<input type="checkbox"/>	Bulk samples	<input type="checkbox"/>
Logs: Gamma-neutron	<input type="checkbox"/>	Density	<input type="checkbox"/>		
*Other (specify)				
Testing: Proximity analysis	<input type="checkbox"/>	FSI	<input type="checkbox"/>	Washability	<input type="checkbox"/>
Carbonization	<input type="checkbox"/>	Petrographic	<input type="checkbox"/>	Plasticity	<input type="checkbox"/>
*Other (specify)				

OTHER WORK (specify details)

.....

 Total Cost \$ 27,719.30
 On-property costs 400.00
 Off-property costs
 Total Expenditures \$ 28,119.30

(Date)

L. V. T. Kennelstein
 (Signature)

Manager-Accounting
 (Position)

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

4.0 GEOLOGY

4.1 Regional Geology

During the season of 1980, Crows Nest Resources' mapping crew mapped the three properties of Five Cabin Creek, Onion Lake, and Secus Mountain together.

A problem encountered in planning exploration on these properties was that there existed no Geological Survey of Canada detail 1:50,000 geologic maps covering this portion of the coking coal belt in northeastern British Columbia. The G.S.C. has done detail work to the northwest up the belt, as have other coal exploration companies, but distance and facies changes have confused identification of mappable units in this region.

The generally accepted nomenclature is that of the Survey's Stott (Bulletin 152, 1968) dividing the section of interest into the Bullhead and Minnes Groups, with further subdivisions into formations and members. This is as reproduced on the two following pages in formational diagrams of both groups.

FORMATIONAL DIAGRAM
LOWER CRETACEOUS SERIES
BULLHEAD & MINNES GROUP

Nomenclature Bullhead Group

MCLEARN 1918 UPPER MEMBER BULLHEAD MOUNTAIN FORMATION	GETHING MEMBER	LOWER MEMBER	FERNIE FORMATION
MCLEARN 1923 GETHING MEMBER BULLHEAD MOUNTAIN FORMATION	GETHING MEMBER	LOWER MEMBER	FERNIE FORMATION
WICKENDEN AND SHAW 1943 GETHING MEMBER BULLHEAD GROUP	GETHING MEMBER	LOWER CONGLOMERATIC MEMBER	FERNIE FORMATION
BEACH AND SPIVAK 1944 GETHING FORMATION BULLHEAD GROUP	GETHING FORMATION	DUNLEVY FORMATION	FERNIE FORMATION
MATHEWS 1947 BULLHEAD GROUP MARINE BULLHEAD NON MARINE BULLHEAD	GETHING FORMATION	MONACH FORMATION BEATTIE PEAKS FORMATION MONTEITH FORMATION	FERNIE FORMATION
ALBERTA STUDY GROUP 1954 BULLHEAD GROUP GETHING FORMATION	GETHING FORMATION	CADOMIN FORMATION NIKANASSIN FORMATION	FERNIE FORMATION
WARREN AND STELCK 1958 BULLHEAD GROUP LOWER BULLHEAD SIALY BEDS NIKANASSIN FORMATION	GETHING FORMATION	DUNLEVY FORMATION MONACH FORMATION BEATTIE PEAKS FORMATION MONTEITH FORMATION SIALY BEDS NIKANASSIN FORMATION	FERNIE FORMATION
ZIEGLER AND POCOCK 1960 BULLHEAD GROUP MINNES FORMATION NIKANASSIN FACIES	GETHING FORMATION	CADOMIN FORMATION KOOTERAY FACIES NIKANASSIN FACIES	FERNIE FORMATION
STOTT (this report) BULLHEAD GROUP MINNES GROUP GETHING FORMATION CADOMIN FORMATION UNNAMED MONACH FORMATION BEATTIE PEAKS FORMATION MONTEITH FORMATION	GETHING FORMATION	CADOMIN FORMATION UNNAMED MONACH FORMATION BEATTIE PEAKS FORMATION MONTEITH FORMATION	FERNIE FORMATION

GSC
This nomenclature (Stott, Geological Survey of Canada Bulletin 152) is used in this report and on all maps and sections.

FIG. 3

FORMATIONAL DIAGRAM
UPPER/LOWER CRETACEOUS SERIES
FORT ST. JOHN GROUP

Nomenclature of Fort St. John Group

SELWYN UPR. PEACE R. 1877	DAWSON UPR. PEACE R. 1881	MCCONNELL LWR. PEACE R. 1893	MCLLEARN UPR. PEACE R. 1918	MCLLEARN UPR. PEACE R. 1923	MCLLEARN UPR. PEACE R. 1932	WICKFINDER AND SHAW PINE R. 1933	MCLLEARN AND McLEAF UPR. PEACE R. 1934	ALBERTA STUDY GROUP PINE R. PLAINS 1944	STOTT (this report)	
									PINE R.	UPR. PEACE R.
Division II (includes older beds)	Division III (originally included these beds with Dunvegan sandstones)	Fort St. John Shales Looten Hill Shales	Fort St. John Shales Lower Shale Sandstone Member Lower Shale	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales	Fort St. John Shales Fort St. John Shales Fort St. John Shales Fort St. John Shales

This Pine River nomenclature (Stott, Geological Survey of Canada Bulletin 152) is used in this report and on all maps and sections.

FIG. 4

4.1 Regional Geology (cont'd)

The Petro-Canada staff has fit its intensive Duke Mountain drilling into this nomenclature and also used it for its six drill holes of previous years in the Secus Mountain area.

The 1980 Crows Nest mapping crew decided to continue this nomenclature, to fit in with the work of G.S.C. and Petro-Canada as Crows Nest and Petro-Canada may continue to exchange some parts of their information in the future. The Secus Mountain area in particular is one logical mining area, but it is divided into intertwined fashion between the two companies.

The 1980 mapping crew divided the total section yet further into units mappable through all three Crows Nest properties and throughout the Petro-Canada licences (including the Duke Mountain Block). Should Petro-Canada institute a detailed mapping program on any of its properties in this region of northeast British Columbia (it has not done so in the past), continuity between the companies exploring and developing in the same belt can be maintained.

4.2 Stratigraphy

Minnes, Bullhead, and lower Fort St. John Group strata in the region stretching from Secus Mountain through Onion Lake and Five Cabin Creek contain an unusually high proportion of conglomerate. Identification and mappability of the two target units, the Gething Formation in the Bullhead Group and the Gates Member of the Commotion Formation of the Fort St. John Group, has been hindered by the vastly increased footages of conglomerate they contain, compared to the remainder of the better-studied part of the coal belt to the northwest (which also contains the type section for the nomenclature).

In fact, not only the Gates and Gething contain many thick conglomerates, but the Minnes, Cadomin and Boulder Creek also contain unusually thick units of conglomerate. This character is unique to this part of the coal belt and Stott treats it with some attention in his 1968 bulletin.

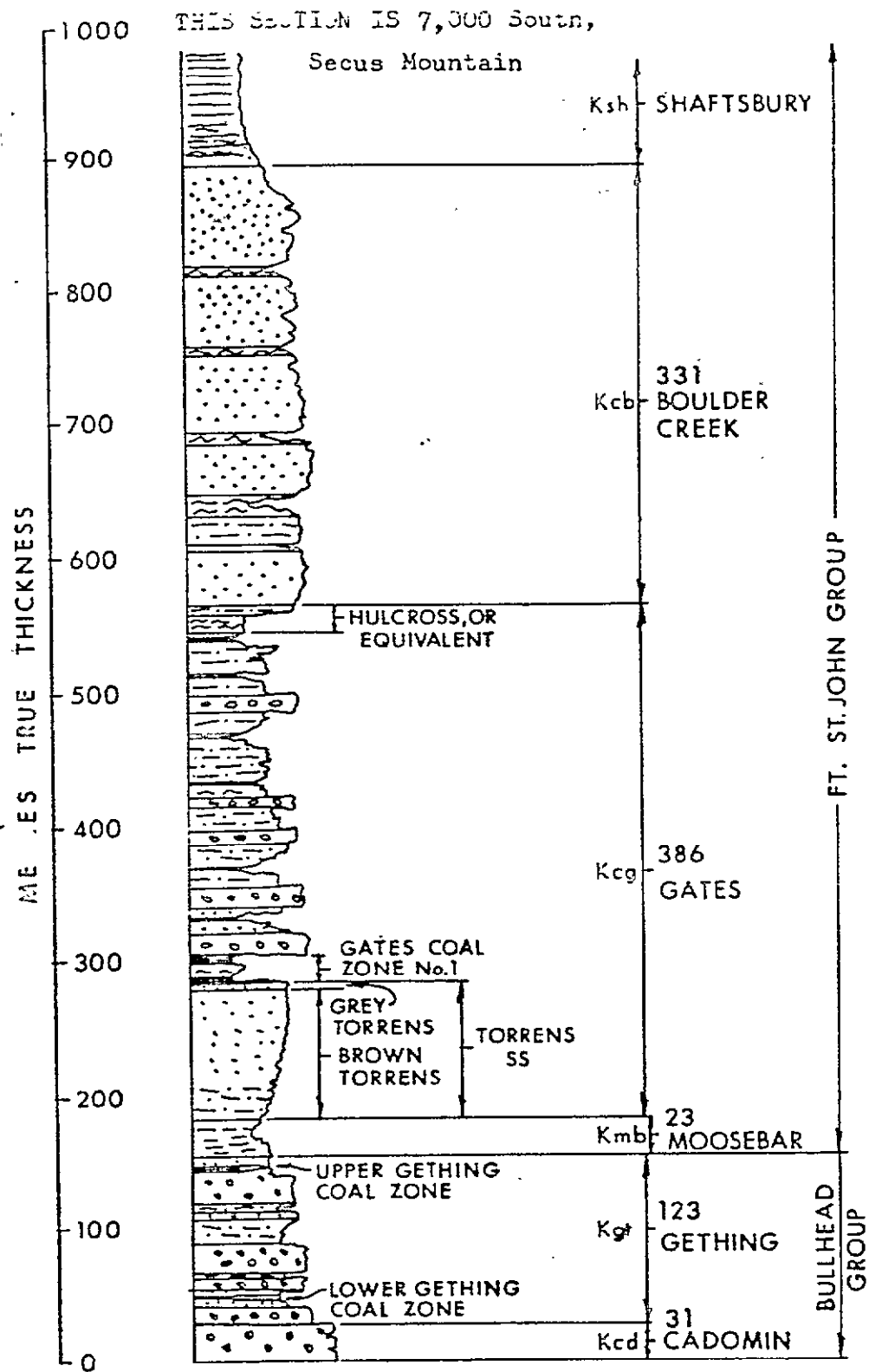
The most noticeable conglomerate thicknesses have been centered around Mt. Belcourt, one of the four foothills in the Secus area. To the northwest, at Onion Lake and Five Cabin Creek, the total mass of conglomerate is less and it has less effect on the mappability of the standard nomenclature, but the number of conglomerate occurrences remains high.

4.2 Stratigraphy (cont'd)

As the exposure of the rock units is generally excellent at Five Cabin Creek, and as the area is structurally uncomplicated, the mapping of the standard units went easily and swiftly. The property is just far enough north in the coal belt that the conglomerate problem to the south at Secus Mountain is ceasing to be of concern.

4.2.1 The Stratigraphic Section

The two pages of stratigraphic section following are meant to be used by the reader for six different locations: four within the Secus Mountain area, and one each at Onion and Five Cabin Creek. The nomenclature remains the same, but the reader must substitute the appropriate thickness for each location from the table. The sketch presented is for the 7,000 South structural cross-section on the west slope of Secus Mountain itself.



Marine : shales, siltstones, some minor sandstone and pebbles ; recessive.

Non-marine : sandstones, minor conglomerates, siltstones, mudstones, sometimes coaly, relatively prominent

Marine shale

Sandstones, conglomerates, siltstones, mudstones, coal. Neither prominent nor recessive.

Sandstone ; particularly prominent and distinctive ; transitional marine to non-marine environment.

Grey marine shale ; very recessive

Non-marine sandstones and conglomerates, minor siltstones, mudstones, coal ; often prominent.

Non-marine massive conglomerates, minor coarse sandstones ; extremely prominent

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

Cross Key Resources Limited		
EXPLORATION		
N.E. BRITISH COLUMBIA		
FIG. 5		
STRATIGRAPHIC SECTION		
AUTHOR: D.E. ELL	SCALE: 1:10000	INCHARGE BY:
DATE: 8/1/63	REVISED:	NUMBER: AA-534

STRATIGRAPHIC THICKNESSES BY AREA

UNIT	Kcd	Kgt		Kmb	Kcg	Kbc	Torrens SS*	TOTALS
		T	B					
SECUS MOUNTAIN	7,000 S	31	123	23	386	331	50	894
	000 N/S	77	104	23	396	204	51	804
	4,000 N	SAXON THRUST PLATE: T = Top Plate (Dumb Goat); B = Bottom Plate (Whatley) T B T B T B T B T B T B 152 165 260 184 23 23 435 - 77 - 43 79 947 -						
9,000 N	96	58	23	362	61	64		600
ONION LAKE	36	100	30	Top Missing	Missing	Gray 6.5 Brown 166		-
FIVE CABIN CREEK	30	90	40	310	(HULCROSS 100) 140	50		710

* NOTE: Torrens sandstone figures include Transition Beds

FIG. 6

4.2.2 Stratigraphic Descriptions

4.2.2.1 Minnes Group

The Minnes Group is the term used for any section stratigraphically beneath the Cadomin Formation, the base of the overlying Bullhead Group. Minnes strata throughout this portion of northeastern British Columbia have not been mapped in detail, and the group is undivided.

The Minnes Group is composed of a sequence of both marine and non-marine sediments; often coal or coaly beds occur, but they are rarely thicker than one or two meters and seem to have little extent laterally.

The nature of the Minnes section immediately beneath the Cadomin at any particular location is often different from the last. At Onion Lake there are massive, thick conglomerates beneath the Cadomin; along the 30 km of Secus it varies from conglomerates to interbedded sandstones, siltstones, and shales with coal often showing up. At Five Cabin Creek there are also conglomerates beneath the Cadomin at several locations.

4.2.2.2 Cadomin Formation

The 1980 Crows Nest Resources crew used a definition of the Cadomin somewhat different than that used by both past coal company workers and the Geological Survey. It was found that by restricting the name to a particular conglomerate within the overall succession, it was possible to divide the question of Minnes and Bullhead conglomerates into Minnes conglomerates, Cadomin conglomerates and Gething conglomerates. Each of the three has distinct and unique mappable characteristics.

The problem has been that if the geologist includes all thick massive conglomerates in the Cadomin, he will have almost no Gething before the Moosebar is encountered. Georgia Hoffman, in her 1979 "Onion Lake Coal Property", states that "the Cadomin is ... unusually thick ... in the Onion Lake area". Also, in regard to the Cadomin-Gething part of the problem, she states "mapping problems ... indicate that a more consistent unit for this area is the Bullhead Group as a whole". The trouble is that if all conglomerates are called Cadomin, then there is very little left to call Gething, and the Gething is what is supposed to be drilled at it contains coal.

4.2.2.2 (continued)

Crows Nest Resources' crew restricts the name Cadomin to a unit mostly conglomeratic which stands apart in a set of fundamental mapping characteristics from all other conglomerates within the Minnes-Bullhead-Fort St. John succession. The conglomerate must be light gray-weathering, ring hard to the pick, be so tough that the rock breaks off through the pebbles, cobbles, and boulders, rather than around them, and must always form the basic backbone for the whole succession (Minnes to Boulder Creek) in the topography and structure.

In addition, it must contain particular shades of rosey pink, a jade-like green, and a particular smooth, light gray in the constituents. Cadomin sandstones contain these particular colours, within the sand grain sizes. This character of the Cadomin is the same, in the author's view, as he has seen in the Cadomin from the Alberta town of Cadomin north through the coking coal belt as far as the Peace River. It is very like the Cadomin anywhere through the Luscar and McIntyre Mines properties.

4.2.2.2 (continued)

All section below this unit, including conglomerates, is called Minnes. The conglomerates tend to be less tough, browner in overall aspect, slightly less topographically prominent, and they do not ever contain the pink and green constituents.

The top of the Cadomin is taken at that centimeter where the tough, light-gray, massive conglomerate or sandstone gives way to something softer and browner; it may be a conglomerate or a sandstone, but it will be much browner, pebbles and cobbles can be more easily extracted, and the pick hits with a thud. This is Gething Formation.

4.2.2.3 Gething Formation

In addition to colour and hardness, Gething conglomerates bear another relation to the Cadomin beds beneath: whatever the average largest constituent size in the Cadomin, the Gething will have similarly large sizes, but always slightly smaller. For example, if the Gething has boulders to 20 cm in length, expect 25 cm in the Cadomin beneath.

Up to half of the Gething at any point along the length of the region can be expected to be conglomerate, occurring in one or more massive, prominent units. Gething cliffs can often be followed for several kilometers at a time.

It would appear that in the stretch covering Five Cabin Creek all the way southeast through Secus, there may be expected to be only two coal zones - an upper and a lower - within the Gething. The crew did not find any place where it seemed there could be room for more than that, and each of these zones probably contains no more than a meter or two each. (The lately-acquired Petro-Canada drill logs from Secus are now known to bear this out.)

4.2.2.3 (continued)

The Gething is thus judged to be less prospective at this point, and therefore the first drilling on these properties by Crows Nest Resources will be aimed at the Gates Member of the Commotion, lying some distance above.

4.2.2.4 Moosebar Formation

The Moosebar Formation is notable mostly because of its very characteristic recessive effect on the topography. It is thicker in the Sukunka area to the northwest, is thinning southwards from Five Cabin Creek towards Onion Lake, where it is 30 m, and is thinner in the Secus area. At Secus the crew used 23 m for the Moosebar in constructing the cross-sections, as the actual marine beds in two complete exposures (complete exposures of the Moosebar are almost unheard of, and warrant special examination anytime) were that thickness. The exposure measured at Onion Lake (in The Gorge) is the only other complete exposure known in the region.

Coal crews through the years have followed "the Moosebar recession" in the topography and through Crows Nest Resources licences the effect remains.

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Coal crews through the years have followed "the Moosebar recession" in the topography and through Crows Nest Resources licences the effect remains.

4.2.2.5 Commotion Formation

The Commotion Formation is divisible into a coal-bearing Gates Member, a marine Hulcross Member overlying the Gates, and then the Boulder Creek Member, an often-coaly sandstone unit.

The Hulcross was found to be almost non-identifiable in the Secus area (it was found near the peak of Mt. Belcourt). A section this high has not been identified in the Onion Lake area, but it is thick at Five Cabin Creek and thickens northwestward.

4.2.2.5.1 Gates Member, Commotion Formation

The Gates Member is perhaps the most consistent in thickness of all the units between Secus Mountain area and Onion Lake; the range appears to be 362 to 435 m. At Five Cabin Creek thickness is estimated to be 310 m. It is composed of alternating sequences of conglomerates, sandstones, siltstones, mudstones, and coal beds. As a general rule the coal seams, while remaining numerous, get uninterestingly thinner towards the top of the member. Individual conglomerate

4.2.2.5.1 (continued)

units, while massive and often prominent, are thinner and more well-bedded than Gething and Cadomin conglomerates. The constituents remain the same, but at smaller diameters. The crew found that it could not distinguish between Gates conglomerates individually, but it could generally differentiate them from Gething conglomerates.

4.2.2.5.1.1 Torrens Submember, Gates Member, Commotion Formation

The Torrens Submember consists of an extremely distinctive sandstone occurring at the bottom of the Gates. It is the most prominent unit in the succession besides the Cadomin. Typically, the top five or ten meters of Torrens may be followed for kilometers at a stretch. The upper unit within the Torrens is a hard gray sandstone, which overlies and is always thinner than the underlying softer brown main part of the unit. The brown sandstones have an extremely distinctive weathering which etches out a particular cross-bedding. The sequence from Moosebar through the Torrens and into the coal above is very reminiscent of the Weary Ridge - Moose Mountain - coal member sequence

4.2,2.5.1.1 (continued)

in southeast British Columbia. At Five Cabin Creek the Torrens is thickest and in addition the brown-gray weathering character alternates several times distinctively, but gray is still on top.

The combination of distinctive topography, distinctive outcrop and distinctive colouring make the Torrens an ideal marker.

4.2.2.5.1.2 Transition Beds, Gates Member, Commotion Formation

The Transition Beds are both part real outcrop and part a notion of conception. The name is applied by the crew to those beds which are "transitional" or "passage" from the marine Moosebar into the terrestrial cross-bedded Torrens sandstones above.

They are composed of very evenly-bedded siltstones and very fine sandstones, which grade upwards into the Torrens. The cross-bedding and increased grain sizes appear imperceptibly. Nothing else in the sequence is as evenly-bedded.

This unit is quite recessive, and always forms the gentler ground where the Moosebar is rising up to the Torrens prominence above. It is not included in the Moosebar as that name is reserved for the actual marine beds of the striking Moosebar topographic recession. The Transition Beds are treated as lowermost Torrens beds.

4.2.2.5.1.3 Gates Coal Zone No. 1, Gates Member,
Commotion Formation

Mapping and the logs of the Petro-Canada holes show that generally the thickest coal in the Gates may be found in the 20 to 30 meters above the Torrens Sandstone. At Five Cabin Creek though, the thicker coal can be found somewhat higher. In places the coal lies directly on top of the Torrens. Sometimes there is one thick bed (estimated at 14 m at one ridge on Mt. Belcourt); more often there are two or more thinner beds.

No further seam or zone designations have been made above this lowermost No. 1 Zone, as in the 1980 season the crew did not conduct more than a few traverses to describe the Gates to that level of detail. This can be done as drilling and future work progresses. Any drilling will be placed to end in the Torrens, and so the seams above the No. 1 Zone can be catalogued at the same time.

4.2.2.5.1.4 First Gates Conglomerate, Gates Member,
Commotion Formation

Very often there is a somewhat prominent Gates conglomerate forming a massive unit above the Coal Zone No. 1. It is often mappable through a kilometer at a time, and forms a convenient top to the recessive coal zone. It has been mapped where appropriate.

4.2.2.5.2 Hulcross Member, Commotion Formation

The marine Hulcross Member forms an easily-identifiable recessive unit above the Gates Member. It is thickening northwards from Five Cabin Creek towards the Sukunka region.

4.2.2.5.3 Boulder Creek Member, Commotion Formation

The Boulder Creek is a prominent sandstone unit above the Hulcross. The contact is drawn at the beginning of hard, generally gray-weathering, massive, often pebbly sandstone.

The Boulder Creek can often also be followed through many kilometers and forms the cap on the mapping.

4.2.2.6 Shaftesbury Formation

The Shaftesbury marine unit is the thick, recessive unit which caps the sequence at Five Cabin Creek. The top is eroded and the unit occurs only at the centre of the Five Cabin Syncline.

4.3 Geological Structure

The Crows Nest Resources-operated areas in the Five Cabin Creek-Onion Lake-Secus Mountain region of northeastern British Columbia were licenced because of their possibility of containing considerable mileage of the two known prospective formations, the Gething and the Commotion.

The region is approximately 90 km in length. To cover this distance in 64 days of field season, counting all time lost to mobilization and demobilization, weather in a northern Rocky Mountain climate, and incidental losses, the two mapping pairs decided to take a structural approach to the mapping, treating the belt as a whole. This meant acquiring actual, measured thickness on the formations and their parts individually. In this manner, drilling with reasonable expectations of being at about the right sites could be planned for the future with no extra effort - the proper positions would become revealed.

Efforts were concentrated in the beginning at traverses across the formations, from Minnes up to Boulder Creek. As the units became clearer, they were extended longitudinally. In this fashion, by chain-measuring selected good exposures across the sequence, and then rapidly following their longitudinal extensions in the topography, the thicknesses for the formations and their parts as expressed in the cross-sections became apparent.

4.3 (continued)

There is a natural rhythm apparent in the thickening and thinning of the formations along the belt.

In the latter part of the season, efforts were directed at refining the sections in the lower part of the Gates, so that the excellent Torrens marker can be used as a guide for the Gates Coal Zone No. 1 immediately above it.

4.3.1 Structural Setting

The Five Cabin Creek area covers a length of approximately 6 km of a relatively large syncline which runs for at least 40 km along the coal belt. The coal measures are some of the youngest units within the overall succession within the syncline, and the Shaftesbury has had its top eroded above its position at the centre of the syncline.

In addition, the Crows Nest part of the syncline is also, topographically, its peak, and so it has the highest (or youngest) rock in the section along the length of the structure. The formations, then, are increasingly bevelled by erosion and are missing to the northwest and southeast.

The syncline has been named the Five Cabin Syncline, and this name is in general use amongst the coal crews locally. South, across the Kinuseo Valley and on Petro-Canada land, the syncline is called the Onion Syncline. The structure forms an echelon within the northern end of the Wapiti Anticline as it dies passing Crows Nest's Onion Lake property (see 1980 Onion Lake report). The erosion of the Kinuseo valley has removed all section above the Moosebar at the level of Kinuseo Creek.

4.3.1 (continued)

Northwest of the Crows Nest land the syncline continues on to the Murray River area, but the author does not know if it continues further.

The Crows Nest mapping crew in 1980, in order to achieve the objectives as outlined in Section 3.2 of this report for Five Cabin Creek, followed a short program of mapping by chain across selected ridge routes. This established the formational thicknesses, and the width of the coal measures across both limbs of the syncline. The traverses were placed so that representative strikes and dips could be taken from all parts of the syncline for stereographic study to determine the syncline's angular dimensions and character.

Since the exposure is so good, and since there are no structural complications large enough to be considered on a 1:20,000 scale, the crew moved on to the more complex problems in the structure on Secus Mountain and Onion Lake areas.

With most of the area above treeline, and with a relatively simple setting, the selection of a diamond drill site at the proper horizon within the structure will not be difficult.

In 1981 there will be a 1:5,000 topographic base available and continued detail mapping is planned.

4.3.2 Stereographic Analysis

148 bedding attitudes (strikes and dips) were plotted by computer in scatter and pole plot contour diagrams.

The title of the set is FVCC (Five Cabin Creek), and the two plots are presented on the following two pages.

The small area of the property compared to the overall larger size of the Five Cabin Syncline can be seen in the grouping of either limb's attitudes into narrow strike ranges. As erosion has provided access around the bottom of the syncline, the attitudes are spread evenly through a wide range of dips. The west limb is also noticeably steeper than the eastern limb, a normal occurrence for an en echelon fold in the foothills.

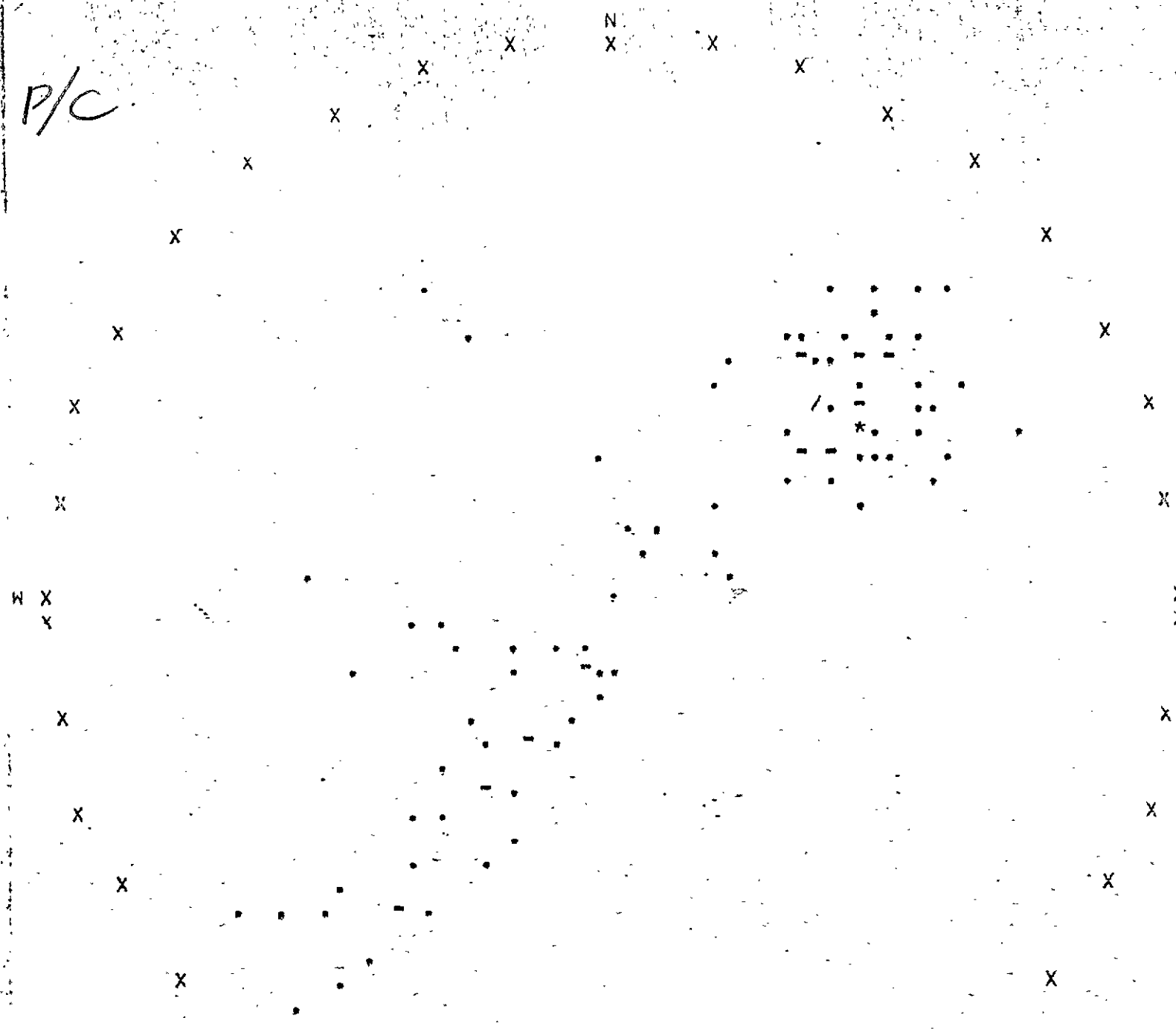
The fold is calculated to plunge northwestwards (317 degrees true) at 4 degrees.

When the 1:5,000 base becomes available in 1981, the plunge direction of 317 degrees true will be taken as the baseline for a grid and structural cross-sections.

TRAVERSE - FVCC

98 ORIGINAL POLES

P/C



LEGEND

- 1 POLE
- 2
- + 3
- * 4
- S-9 5, 6, 7, 8, 9
- A-Z 10, 11, ...

SCATTER DIAGRAM
LOWER HEMISPHERE
EQUAL AREA PROJECTION

/ MEAN VECTOR = 40.86 / 223.95

FIG. 7

TRAVERSE - FVCC

98 ORIGINAL POLES



DENSITY
CONTOUR
LEVELS
(PERCENT)

1 5 10 15 20 MAX

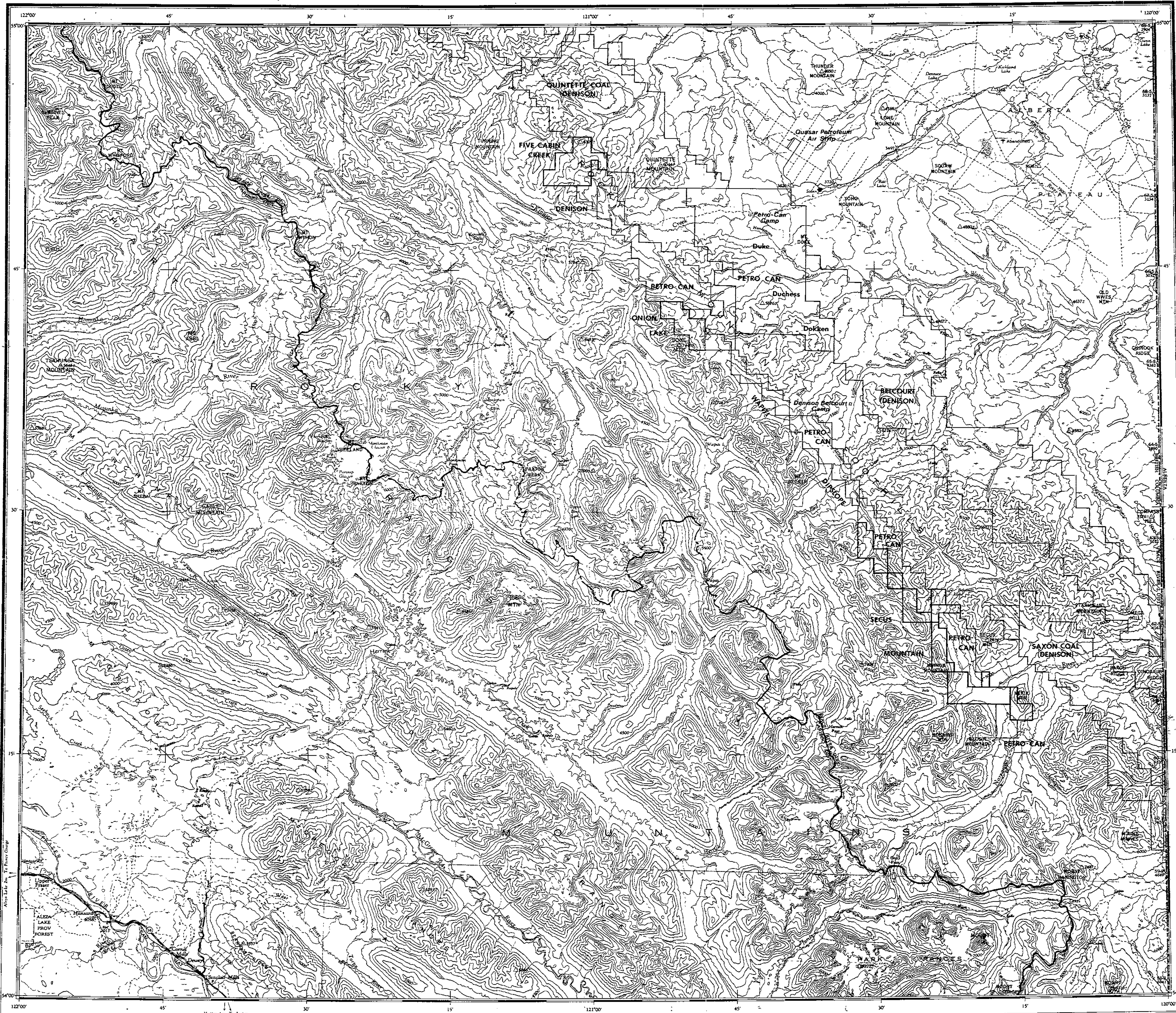
- + * =
MINIMUM DENSITY = 20.17 PERCENT

CONTOUR PLOT
LOWER HEMISPHERE
EQUAL AREA PROJECTION

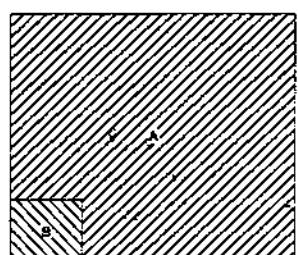
FIG. 8

5.0 BIBLIOGRAPHY

Stott, D.F., 1968: "Lower Cretaceous Bullhead and Fort St. John Groups, Between Smoky and Peace Rivers, Rocky Mountain Foothills, Alberta and British Columbia"; Geological Survey of Canada Bulletin 152.

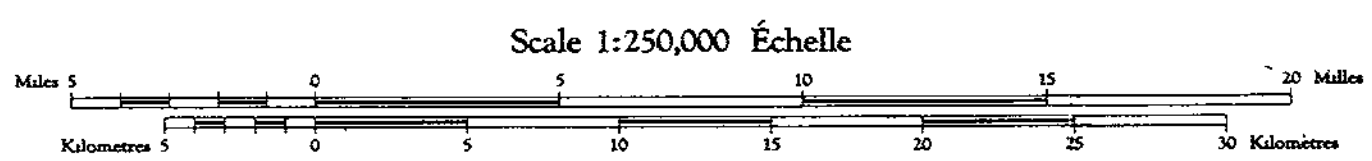


COMPILATION DIAGRAM—SOURCES UTILISEES



Produced by the ARMY SURVEY ESTABLISHMENT, R.C.E.
 Information depicted current as of 1963. Printed 1966
 1964 Magnetic declination for this map varies from 26° 44' westerly at the centre of the west edge to 26° 24' easterly at the centre of the east edge. Annual change decreasing 3 7'

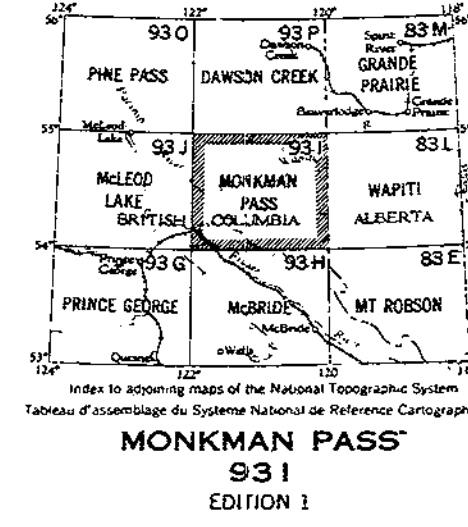
Roads hard surface, all weather	Rivieres paves, toute saison	1:250,000	1:250,000
Roads loose surface, all weather	de granier toute saison	1:250,000	1:250,000
Railways normal gauge	Chemins de fer a carterement normal	1:250,000	1:250,000
Township or Parish	Canton ou Paroisse	1:250,000	1:250,000
Depression contour	Courbes de cotelette	1:250,000	1:250,000
Spot elevation precise	Point cote precise, approximatif	1:250,000	1:250,000
Power transmission line	Ligne de transport d'energie	1:250,000	1:250,000



Scale 1:250,000 Échelle
 Transverse Mercator Projection
 North American Datum 1927
 Contour Interval 500 feet
 Elevations in feet above Mean Sea Level
 Projection transverse de Mercator
 Réseau géodésique nord américain unifié 1927
 Équidistance des courbes 500 pieds
 Elevations en pieds au dessus du niveau moyen de la mer
 Copies may be obtained from the Map Distribution Office
 Department of Mines and Technical Surveys, Ottawa

Publié par le SERVICE TOPOGRAPHIQUE DE L'ARMÉE,
 (G.R.C.) Renseignements à jour en 1963. Imprimé en 1966
 La déclinaison magnétique (1964) varie de 26° 44' vers l'est au centre de la bordure ouest de la feuille à 26° 24' vers l'est au centre de la bordure est. Variation annuelle décroissante 3 7'

Town	Ville	□	Seash	Cours d'eau
Village or Settlement	Village ou hameau	○	intermittent or dry	intermittent ou à sec
Post Office	Bureau de poste	○	Intermittent lake	Lac intermittent
Church	Eglise	○	Rapids, falls	Rapides, chute
School	École	○	Marsh or Swamp	Marais ou marécage
Boundary monument	Borne-frontière	○	Lighthouse	Phare
Airport	Aéroport	○	Horizontal control point	Point géodésique
Seizure base	Base d'hydravions	○	Landing ground	Piste d'atterrissage
		○	Seaplane anchorage	Amarrage d'hydravions



635

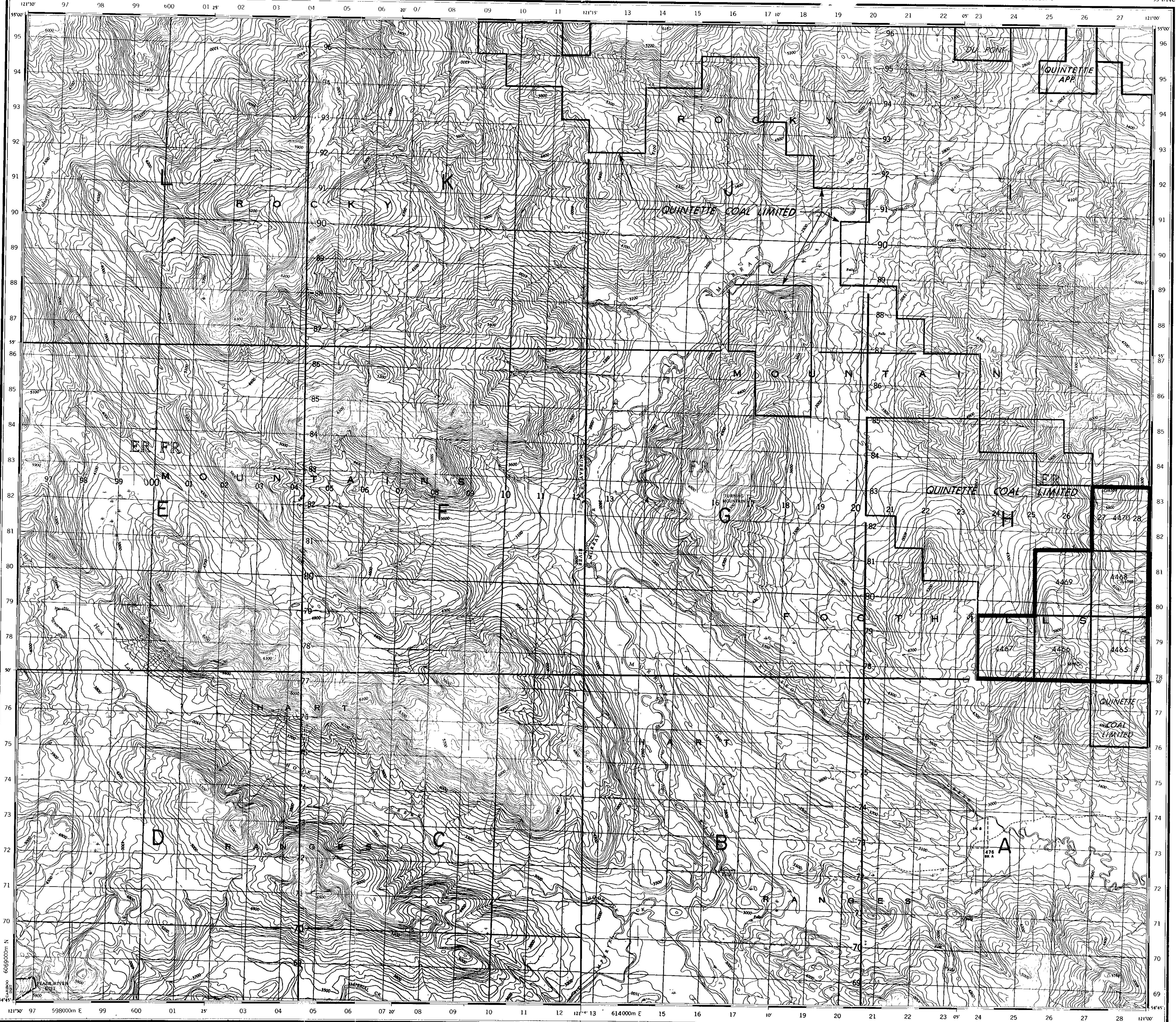
Crows Nest Resources Limited
 EXPLORATION

SECUS MTH
 ONION LAKE
 FIVE CABIN CREEK
 NE B.C.

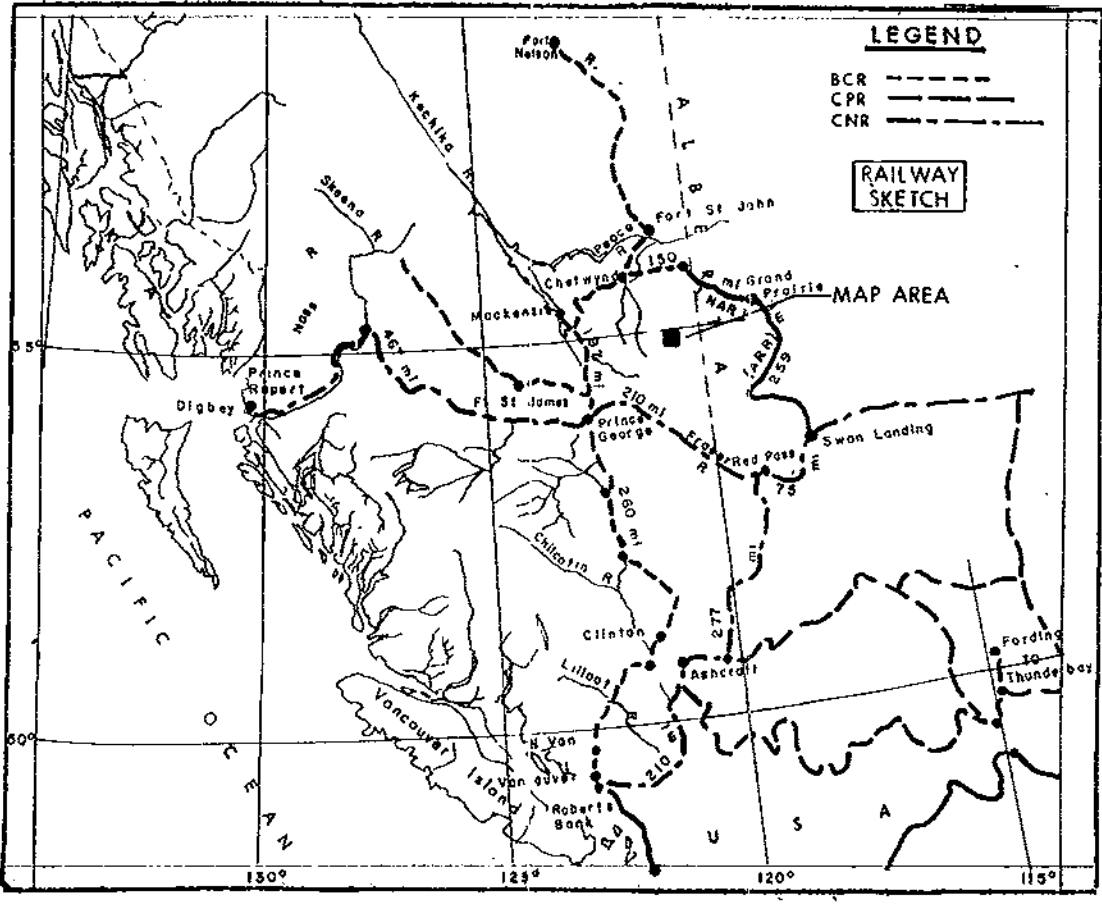
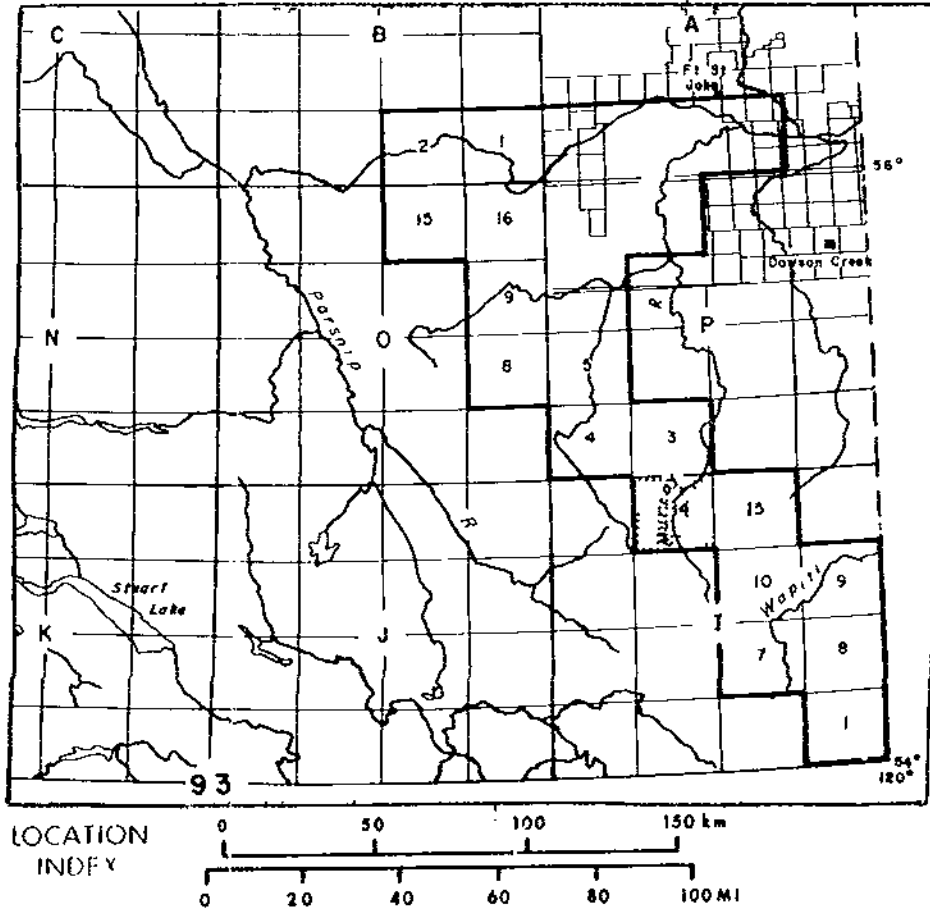
INDEX MAP

AUTHOR: D. BELL	SCALE: 1:250,000	ENCLOSURE No: /
DATE: MARCH, 1981	REVISED	DRAWING No: HJ-78

PR-Swell-Five Cabin Creek
 802A



183.40
183.44
183.48
183.52
183.55
183.59
183.63
183.67
183.70
183.74
183.78
183.82
183.86
183.90
183.93
183.97
184.00
184.04
184.08
184.12
184.16
184.20
184.23
184.27
184.31
184.35
184.38
184.42
184.45
184.49



KINUSEO FALLS
BRITISH COLUMBIA
SCALE 1:50,000 ÉCHELLE

CONTOUR INTERVAL 100 FEET
Elevation in Feet above Mean Sea Level
Transverse Mercator Projection
North American Datum 1927
MAGNETIC DECLINATION 29°59' EAST
AT CENTRE OF MAP 1960
Annual change decreasing 4 1'

ÉQUIDISTANCE DES COURBES 100 PIEDS
Élévation en pieds au-dessus du niveau moyen de la mer
Projection transverse du Méridien
Réseau géodésique nord-américain unifié 1927
DÉCLINAISON MAGNÉTIQUE AU CENTRE
DE LA FEUILLE EN 1960 29°59' EST
Variation annuelle décroissante 4 1'

TABLAU D'ASSEMBLAGE DU SYSTÈME NATIONAL DE RÉFÉRENCE CARTOGRAPHIQUE

93I/13W	93I/14W	93I/15W
93I/13N	93I/14N	93I/15N

INDEX TO ADJOINING MAPS OF THE NATIONAL TOPOGRAPHIC SYSTEM
93 I/14

Crows Nest Resources Limited
EXPLORATION

KINUSEO FALLS
NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

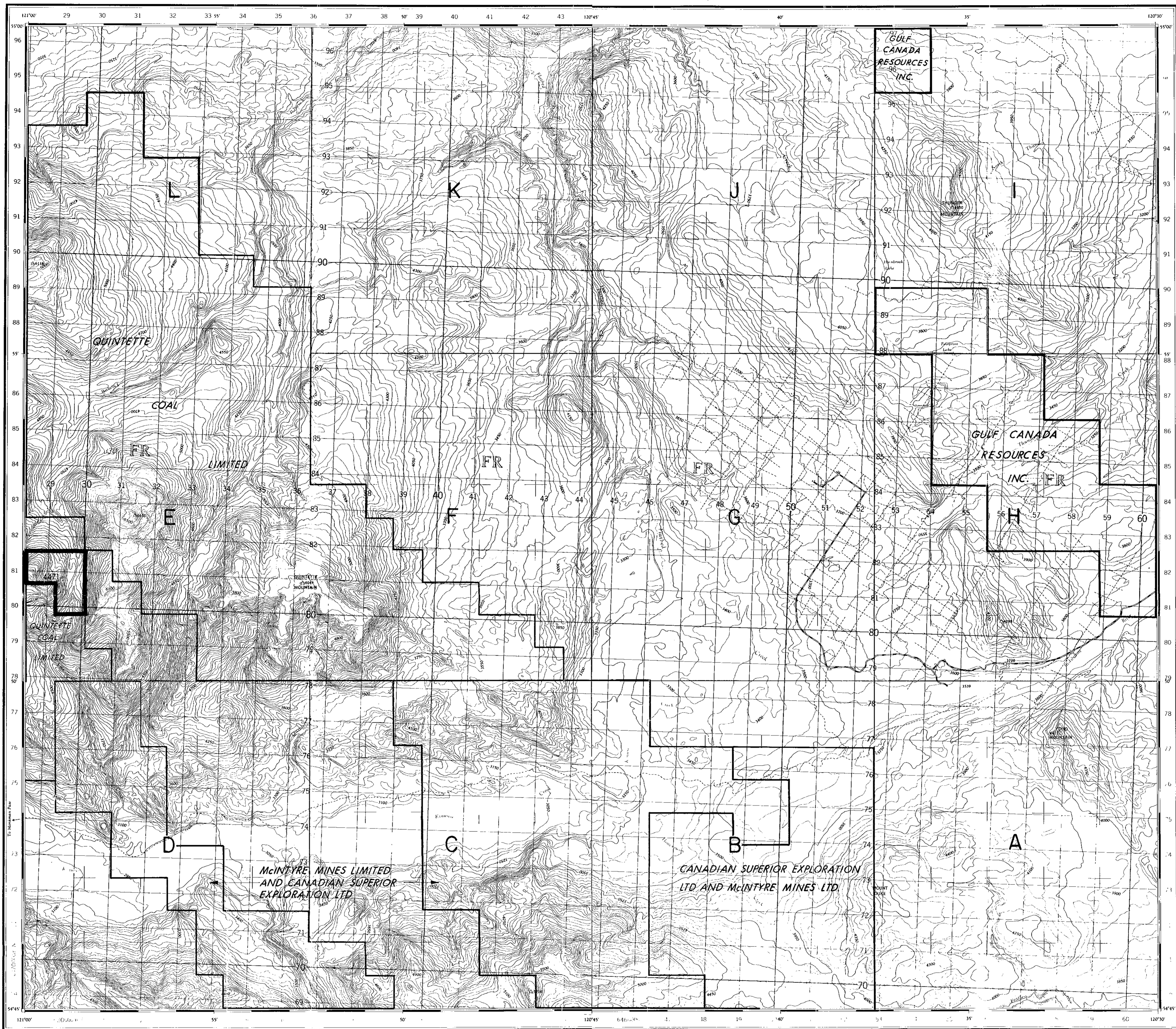
COAL LAND DISPOSITION MAP

SHELL-CNRL LICENCES FIVE CABIN CREEK
NTS-93-14 BLK H
MAP 1 OF 2

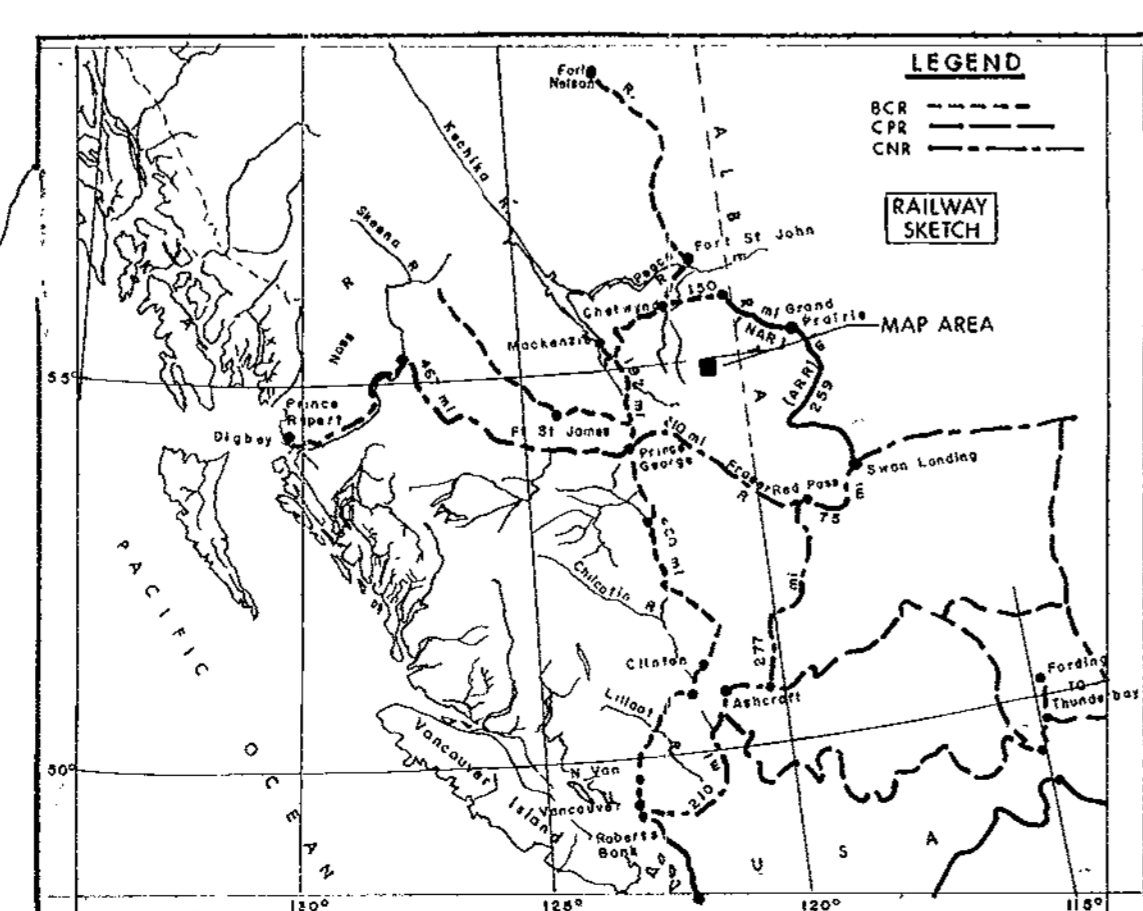
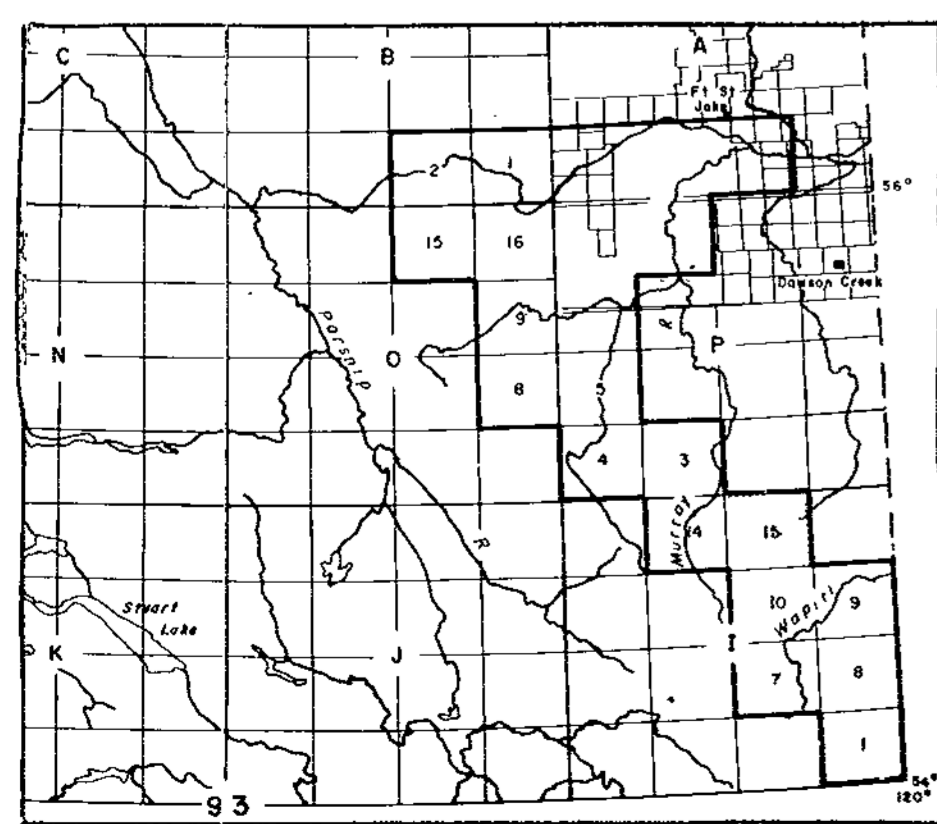
AUTHOR OLSON-MARTONHEGYI	SCALE 1:50,000	ENCLOSURE No 2
DATE DEC 1979	REVISED	DRAWING No HC-18C

To Accompany

635



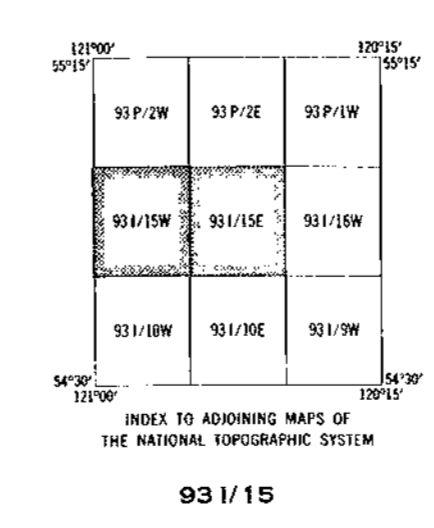
183 40
183 44
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183 74
183 78
183 82
183 86
183 90
183 93
183 97
184 00
184 04
184 08
184 12
184 16
184 20
184 23
184 27
184 31
184 35
184 38
184 42
184 45
184 49



KINUSEO CREEK
PEACE RIVER DISTRICT
BRITISH COLUMBIA
SCALE 1:50,000 ÉCHELLE

CONTOUR INTERVAL 50 FEET
Elevations in Feet above Mean Sea Level
IGNIFICANT MONTAGNE PROJECTION
North American Datum 1927
MAGNETIC DECLINATION 20°54' EAST
AT CENTRE OF MAP 1965
Annual change decreasing 4 1'

ÉQUIDISTANCE DES COURBES 50 PIEDS
Élévations en pieds au dessus du niveau moyen de la mer
Projection Métrique de Montagne
Réseau géodésique nord américain année 1927
DÉCLINAISON MAGNÉTIQUE AU CENTRE
DE LA FEUILLE EN 1965 20°54' EST
Variation annuelle décroissante 4 1'



Crows Nest Resources Limited
EXPLORATION

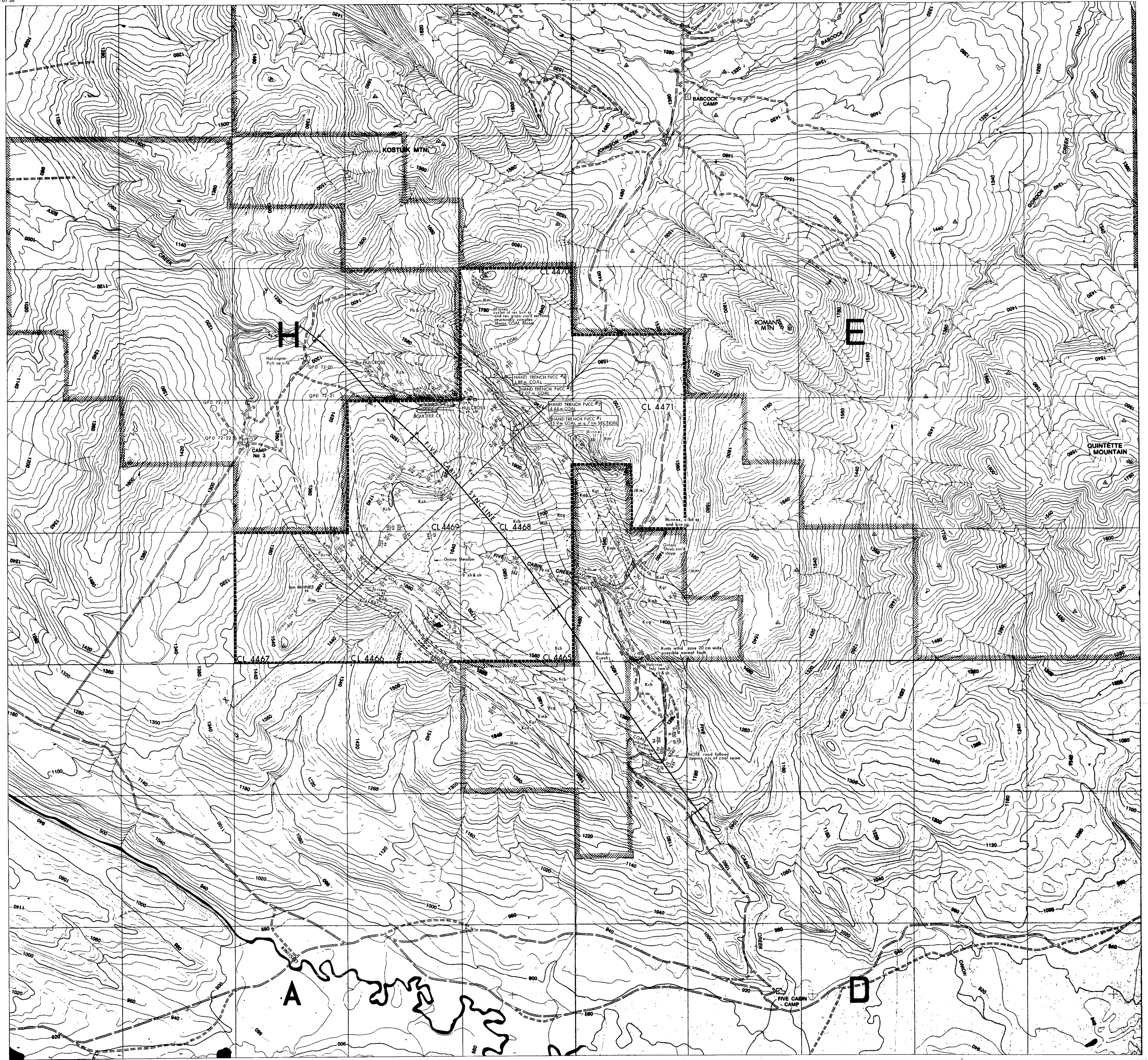
KINUSEO CREEK
NORTHEASTERN B.C.
PEACE RIVER LAND DISTRICT

COAL LAND DISPOSITION MAP

SHELL-CNR LICENCES FIVE CABIN CREEK
NTS-93/15 BLK E
MAP 2 OF 2
NTS 93 1/15

AUTHOR OLSON-MARTONHEGYI	SCALE 1:50,000	ENCLOSURE No. 2
DATE DEC 1979	REVISED	DRAWING No. HC-18D
To Accompany		

625



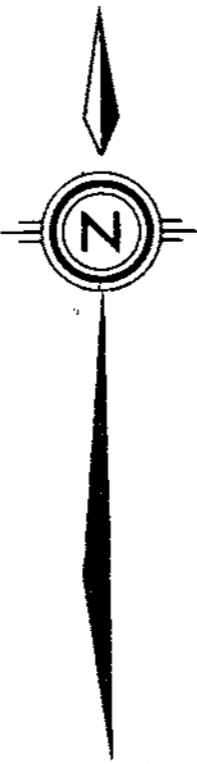
GEOLOGICAL LEGEND

LOWER CRETACEOUS

- [Ksh] SHAFESBURY FORMATION
 - [Kcb] COMMOTION FORMATION (Boulder Creek Member)
 - [Kch] COMMOTION FORMATION (Hidreous Member)
 - [Kcg] COMMOTION FORMATION (Gates Member)
 - [Kmb] MOOSEBAR FORMATION
 - [Kgt] GETHING FORMATION
 - [Kcd] CADOMIN FORMATION
- FORT ST JOHN GROUP
- BULLHEAD GROUP
- JURASSIC - CRETACEOUS
 - [Jm] MINNES GROUP
 - PALEOZOIC
 - [P] DEVONIAN, MISSISSIPPIAN

SYMBOLS

- GEOLOGICAL CONTACT
- DIP AND STRIKE REGULAR
- VERTICAL
- HORIZONTAL
- OVERTURNED
- THRUST FLAGS SHOW DIP DIRECTION
- NORMAL FAULT
- ANTICLINE, SYNCLINE
- DRILL HOLE COLLAR
- TRENCH
- ADIT



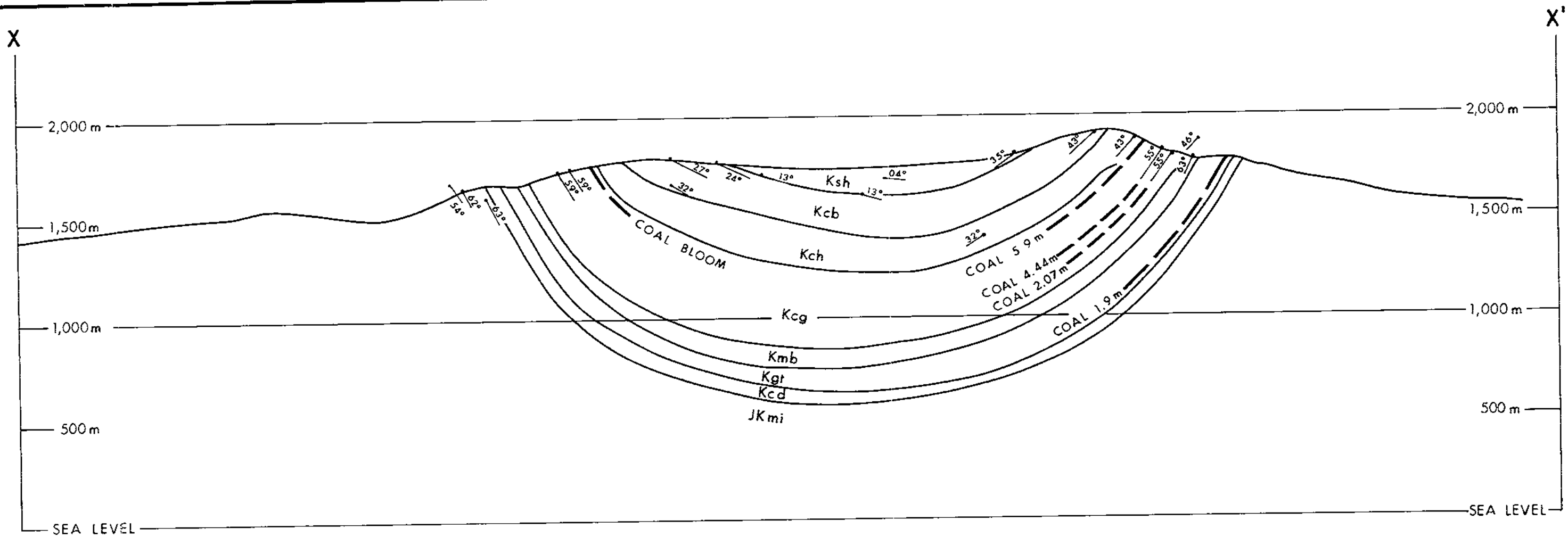
Crows Nest Resources Limited
EXPLORATION

FIVE CABIN CREEK
NE BC

GEOLOGY MAP

KINUSEO FALLS 93/1/14E
KINUSEO CREEK 93/1/15W FIG
AUTHOR: A. WHITE SCALE: AS SHOWN ENCLOSURE No. 3
DATE: MAY 1981 REVISED
To Accompany 1980 FIVE CABIN CK REPORT DRAWING No. HH-81

635



Crows Nest Resources Limited
EXPLORATION

FIVE CABIN CREEK
NE B.C.
CROSS-SECTION
X-X'
FIG

AUTHOR A WHITE	SCALE AS SHOWN	ENCLOSURE No 4
DATE MAY '81	REVISED	DRAWING No HH-81A
To Accompany		

K-Shell-Five Cabin Creek 8062/PA *1

635