PR- SHELL 5 CABIN CREEK 81(1)A

REPORT ON FIVE CABIN CREEK NORTH EAST B.C.

by
DENNIS E. BELL
(CROWSNEST RESOURCES)

VOLUME 1

636

Crows Nest Resources LIMITED
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April 12, 1982

Ministry of Energy, Mines and Petroleum Resources

British Columbia

Dear Sirs:

SUBJECT: FIVE CABIN CREEK PROJECT

Enclosed please find our report on the Five Cabin Creek Project. Mr. Dennis E. Bell planned and supervised the 1981 geological field program on Five Cabin Creek B.C. Coal Licences held by Shell Canada Resources Limited and operated by Crows Nest Resources Limited. Gary Cox assisted with the field work.

Mr. Dennis E. Bell, B.Sc., graduated in Geology from Dalhousie University in 1965. Since 1968 he has specialized in 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 a number of other major coal companies. Mr. Bell is registered as a Professional Geologist in the Association of Professional Engineers, Geologists, and Geophysicists of Alberta.

Gary Cox, B.Sc., graduated in Geology from the University of Alberta in 1981.

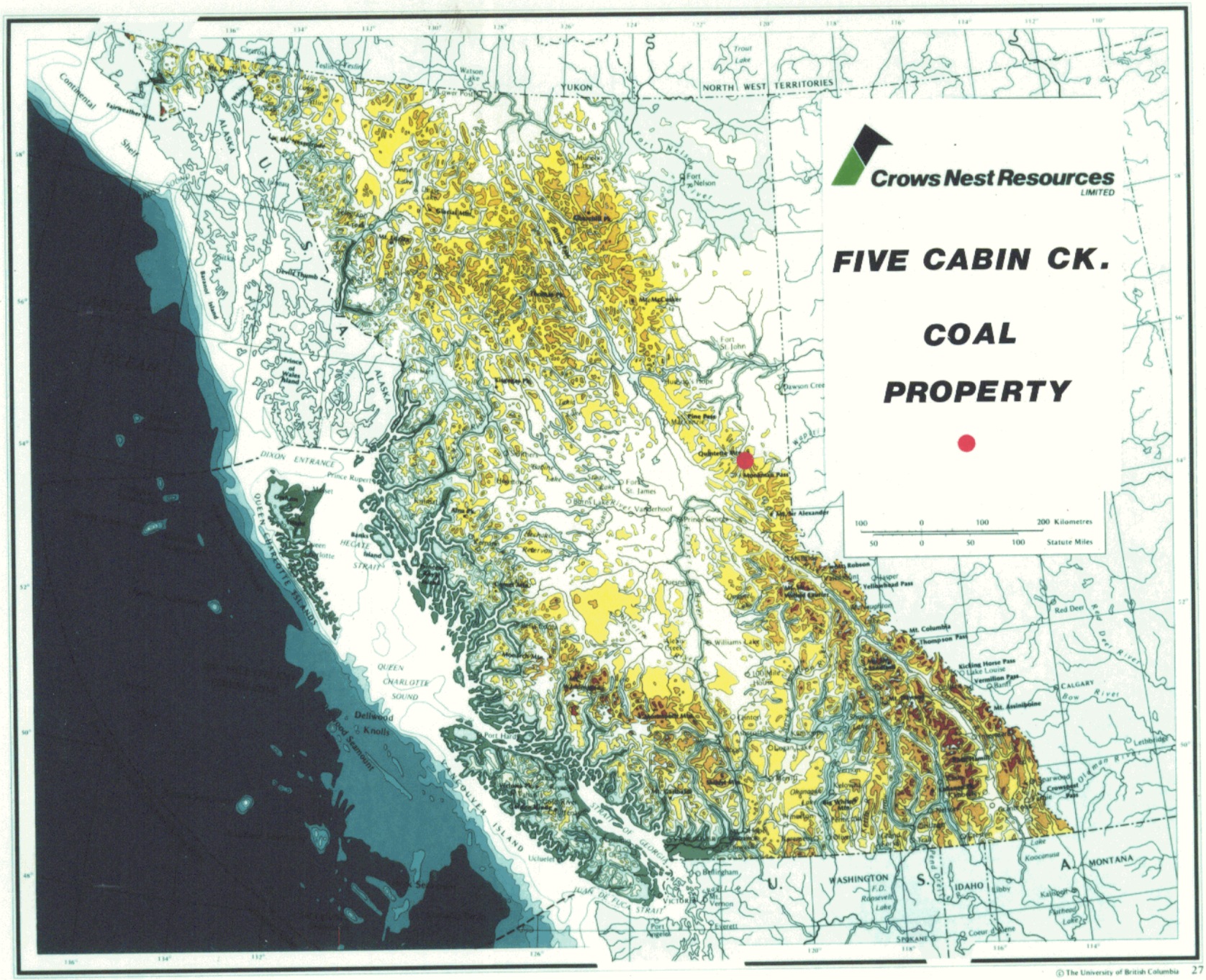
Their work was carried out under the supervision of our District Manager, British Columbia, Mr. Frank Martonhegyi.

Sincerely,

H.G. Rushton, P. Geologist
Vice President, Exploration

Enclosure

2-DSc.0



1981

FIVE CABIN CREEK

N.E. B.C.

VIEW NORTH

The first drill hole on Five Cabin Creek. The site is above treeline on a mid-Gates sandstone ledge on the west limb of Five Cabin Syncline. The rig's mast is aluminum and all equipment was helicopter transported. Note the stiff prevailing westerly wind, as evidenced by the orange "wind-sock" flagging tape tied to the rig top. The snow bank is normal even though the photo was taken in mid-July.

CONFIDENTIAL

Five Cabin Creek

Coal Exploration

1981

Coal Licences 6137-6143 inclusive (7 total), Peace River Land District, Northeast British Columbia

B.C. Coal Licences held by Shell Canada Resources Limited and Operated by Crows Nest Resources Limited.

National Topographic Series 93 I/14E Kinuseo Falls
93 I/15W Kinuseo Creek

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

Consultant and Author: Dennis E. Bell, P. Geol. (Alberta)
Max Air Exploration Limited
P. O. Box 878
Jasper, Alberta, T0E 1E0

Field Work: July and August, 1981

SUBMITTED: APRIL 12, 1982.

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1.0 SUMMARY

During the 1981 field season, Crows Nest Resources Limited conducted a geologic program consisting of 1:5,000 detail surface mapping and the drilling of one helicopter-supported diamond drill hole on Five Cabin Creek, northeast British Columbia coal licences. The author did the mapping; Gary Cox assisted with drilling and core logging.

Prospective Gething and Commotion Formation coal-bearing strata are contained in a broad, flat-bottomed fold of easily-followable dimensions named Five Cabin Syncline. Crows Nest licences cover a width of 4 km across the syncline and 4 to 4 1/2 km along its length. Denison Mines holds ground to both the northwest and southeast along the fold.

During 1980 the author and one assistant mapped the area on 1:20,000 scale and analyzed the setting of the syncline. 1981 1:5,000 mapping refined the 1:20,000 work, and was oriented to measuring formational thicknesses.

The single 1981 drill hole is the first at Five Cabin, and it tested the lower half of the prospective Commotion section contained in the Gates Member. One seam of 4.6 m was discovered, as were several more of 1 to 3 m.

Immediately to the east and west is older Minnes Group section, generally regarded as unprospective at this time. Further northeast is Denison's Quintette area, containing its proposed mine.

For the present, Five Cabin Creek remains an underground prospect. Further work may include both drilling and trenching, within the structural framework established in both this report and the 1980 report. Cost of 1981 work was $127,617.

2.0 INTRODUCTION

2.1 Coal Land Tenure

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

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

CROWS NEST RESOURCES LIMITED (Exploration)

B.C. COAL LICENCES — BLOCK: FIVE CABIN CREEK — PROJECT: — YEAR: 1981-1982

TENURE STANDING — GROUP: UNGROUPED — FIVE CABIN CREEK — DATE: APRIL 1982

LICENCE			ACQ/ADM		RENTALS		REQUIREMENT WORK						BUDGET		EXP	POTL	REMARKS
NO.	LEGAL DESCRIPTION	AREA TOTAL AC/HA.	FEES YEAR	FEES $	ANNUAL $	TOTAL TO NEXT ANN. $ 10^3	EXPIRED $ 10^3	CURRENT YEAR LIC. YEAR	CURRENT YEAR $	PRE-FULFILMENT YEAR	PRE-FULFILMENT $	ANNIVERSARY DATE	CURRENT YEAR AFE	CURRENT YEAR $ 10^3	TOTAL $ 10^3	SHELL CLASS.	
7 LICENCES		2015	80	70	10,075	30.2	39.2	2	24,180	2½	115,419	APRIL 7	-	-	185	Y	THE LICENCES
6137	93-I-14-H 1,2,11,12	299															ARE IN GOOD
6138	3,4,13,14	299															STANDING UNTIL
6139	5,6,15,16	299															APRIL 7, 1984
6140	21,22,31,32	298															PLUS $19.78/HA
6141	23,24,33,34	298															FOR THE SUB-
6142	41,42,51,52	298															SEQUENT TERM
6143	93-I-15-E 29,39,40	224															
				WORK DONE	1980	1981											
				$	28,119	127,617											

BA - 312

2.2 Location, Physiography and Environment

The part of Five Cabin Creek licences containing coal formations is a more or less square area measuring approximately 4 km along the northwest-southeast common trend of the foothills and 4 km across this trend.

Some location descriptions are:

A) Situated on the western side of 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 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

coal strata, however, is almost all between 1,500 m and 1,900 m (4,920 feet to 6,230 feet).

The terrain is almost entirely above treeline, and supports only alpine fir brush. Although slopes can be steep, they do not tend to high cliffs, and exposure of resistant units is excellent.

The upper, northwest end of Five Cabin Creek drains the major part of the area, and its gentle valley supports an alpine meadow environment.

Five Cabin Creek area is relatively high, cold and windy, compared to 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 May. Year-round quality of the area is barren alpine, and is very similar to that of the proposed Quintette mine directly to the northeast.

2.3 Access

Helicopter access was used for the 1981 detailed geological mapping program. As terrain is mostly barren, landing sites are plentiful.

The area may also be reached by driving the abandoned former main trail up from Kinuseo Creek valley to the south to the Denison Quintette Babcock Creek camp. The distance is approximately 8 km from the valley to the southeastern corner of Five Cabin area; the road 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 Quintette 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.

Petro-Canada's Monkman facility, used as a support camp for the 1981 programme, is located in the Kinuseo Creek valley. A 40 kmph all-weather gravel road provides access to the camp from Dawson Creek. The turn-off from the Grande Prairie-Dawson Creek highway is 1 km west of the border on Boundary Road. The drive is approximately 2 hours in dry weather.

3.0 WORK DONE

3.1 Summary of Previous Work

Stott's G.S.C. Bulletin 152 included a large scale (1:250,000) geology map that included the Five Cabin Creek area. Subsequent G.S.C. open file maps of the Monkman Map Area (93I) made available in 1975 and 1978 provided a 1:125,000 geology map for the subject area. The B. C. Ministry of Energy, Mines and Petroleum Resources published compilation maps of the area at a scale of 1:50,000 in 1977. Regional geology maps (originally at a scale of 1:63,360, but later enlarged to 1:50,000) were compiled by Shell Oil et al in 1962.

1980 work by Crows Nest consisted of mapping the licences to 1:20,000 scale, the only smaller-scale topographic base available at the time. This work, reported in the 1980 Five Cabin Creek geological report and costing $28,119.30, confirmed the basic structural interpretation of a broad, assymmetric syncline containing both of the known coal-bearing formations (Gething and Commotion) in their entirety.

3.2 Scope and Objective of 1981 Exploration

With 1980 1:20,000 geologic mapping in hand, the 1981 program was intended to flesh out this work on the new 1:5,000 base and to drill a first Five Cabin hole, targeted at the lower half of the coal-bearing part of the Gates Member of the Commotion Formation.

1:5,000 detail mapping was oriented to three purposes: outlining of the structural setting; gaining further familiarity with the lithologic nature of the rock units; and outlining the most prospective parts of the licences from a mining point of view.

3.3 Work Done in 1981

One diamond drill hole, FC81-01 (Five Cabin Creek 1981 No. 1), was completed to 241 metres. The top of the Torrens Sandstone, which forms the base of the prospective part of the Gates, was found at 209.0 m, 10 cm less than that anticipated in planning. Coal samples were sent to the Fernie Crows Nest laboratory for analysis, and results are tabulated in a following section. The hole's location and altitude were surveyed by a Petro-Canada contract crew working in the region at the time.

The written core log, a drafted strip log,, and geophysical logs of this hole are included in the enclosures of this report.

A restricted program of mapping was carried out by the author. The summer of 1981 turned out to be the hottest, driest on record in northeast British Columbia, and forest travel bans prevented a full program. This work is presented on the 1:5,000 geologic map sheets included in the enclosures of this report, and was oriented to chain measurement of the nature of the overall structure.

Sufficient detail mapping was done to establish a grid and cross section plan, and the overall thicknesses and positions of the formations within this block. Two 1:5,000 sections, one including the 1981 drill hole, are presented in the enclosures.

3.4 Cost of Work Done in 1981

Detailed costs of the 1981 Five Cabin Creek geologic mapping and drilling program are contained in the Application to Extend Term of Licence on the following two pages.

Total cost of the 1981 program is calculated to be $127,617.

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

APPLICATION TO EXTEND TERM OF LICENCE

I, Leslie Gramantik (Name) agent for Shell Canada Resources Limited, (Name)
P.O. Box 100, (Address) Calgary, (Address)
Alberta T2P 2M7
Valid FMC No. 244 642
hereby apply to the Minister to extend the term of Coal Licence(s) No(s). 6137 to 6143
Seven 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 N/A

4. I have performed, or caused to be performed, during the period April 7th, 1981 to April 6th, 19 82, work to the value of at least $ 127,617 on the location of coal licence(s) as follows:

CATEGORY OF WORK	Licence(s) No(s).	Apportioned Cost
Geological mapping	6137, 6138, 6139, 6140, 6141	31,742
Surveys: Geophysical		
Geochemical		
Other		
Road construction		
Surface work		
Underground work		
Drilling	6138	81,588
Logging, sampling, and testing	6130	12,107
Reclamation		
Other work (specify)		
Off-property costs		2,180

5. I wish to apply $ 127,617 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 $ N/A 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

April 2/82 (Date)

(Signature)

Assistant Landman (Position)

(FORMS AND REPORT TO BE SUBMITTED IN DUPLICATE)

GEOLOGICAL MAPPING Yes ☒ No ☐

	Area (Hectares)	Scale	Duration
Reconnaissance			
Detail: Surface	2,000	1:5,000	43 man days
Underground			
Other* (specify)			

Total Cost $ 31,742

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	NQ	1	241	
Wireline				
Rotary: Conventional				
Reverse circulation				
Other* (specify)				

Contractor Mid-West Drilling
Where is the core stored? B.C. Provincial Core Storage, Charlie Lake, B.C.

Total Cost $ 81,588

LOGGING, SAMPLING, AND TESTING Yes ☒ No ☐

Lithology: Drill samples ☒ Core samples ☒ Bulk samples ☐
Logs: Gamma-neutron ☒ Density ☒

Other* (specify) Caliper, Directional and Density logs on drill hole

Testing: Proximate analysis ☐ FSI ☐ Washability ☐
Carbonization ☐ Petrographic ☐ Plasticity ☐

Other* (specify)

Total Cost $ 12,107

RECLAMATION Yes ☐ No ☒

Details Total Cost $

OTHER WORK (Specify details) Yes ☐ No ☒ Cost

Total Cost $

OFF–PROPERTY COSTS Yes ☒ No ☐

Details Geological Report Total Cost $ 2,180

Total Expenditures $127,617

April 2, 1982 (Date)

(Signature)

Manager, Accounting, CNRL (Position)

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

4.0 GEOLOGY

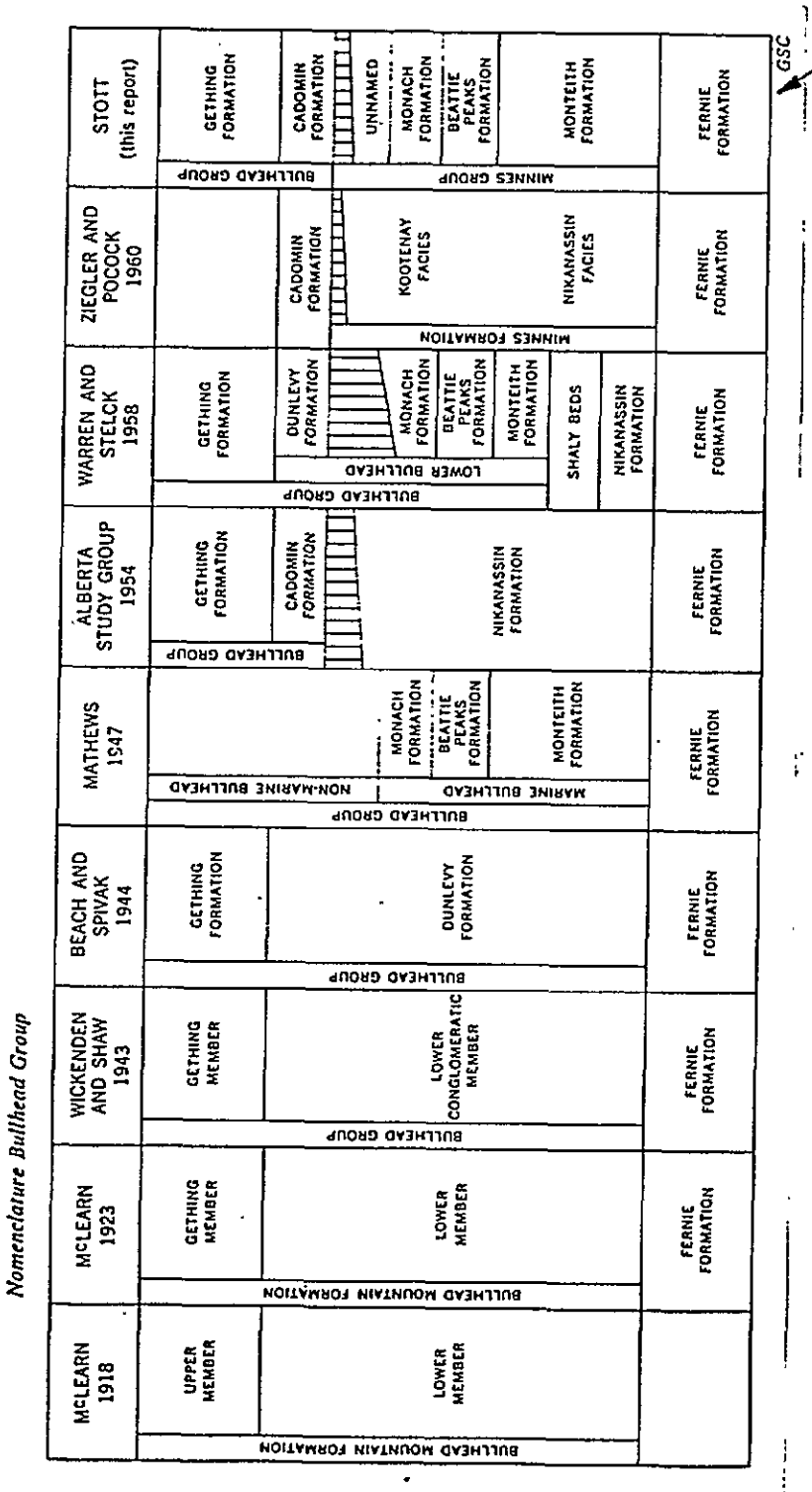
4.1 Regional Geology and Nomenclature

The Geological Survey of Canada has mapped the area containing Five Cabin Creek on a regional basis, but not on a scale as small as 1:50,000. It has, however, established a fairly complete framework for the coking coal belt and the work of this report has been carried out within this framework. The general nomenclature used is that of Stott, Bulletin 152, with several modifications to fit the particular area.

The author has continued nomenclature from his 1980 Five Cabin Creek report, with no changes; the nomenclature was picked primarily to match that in use by Petro-Canada, the major land holder in the area (Crows Nest properties of Five Cabin Creek, Onion Lake, and Secus Mountain are situated on margins of larger Petro-Canada holdings).

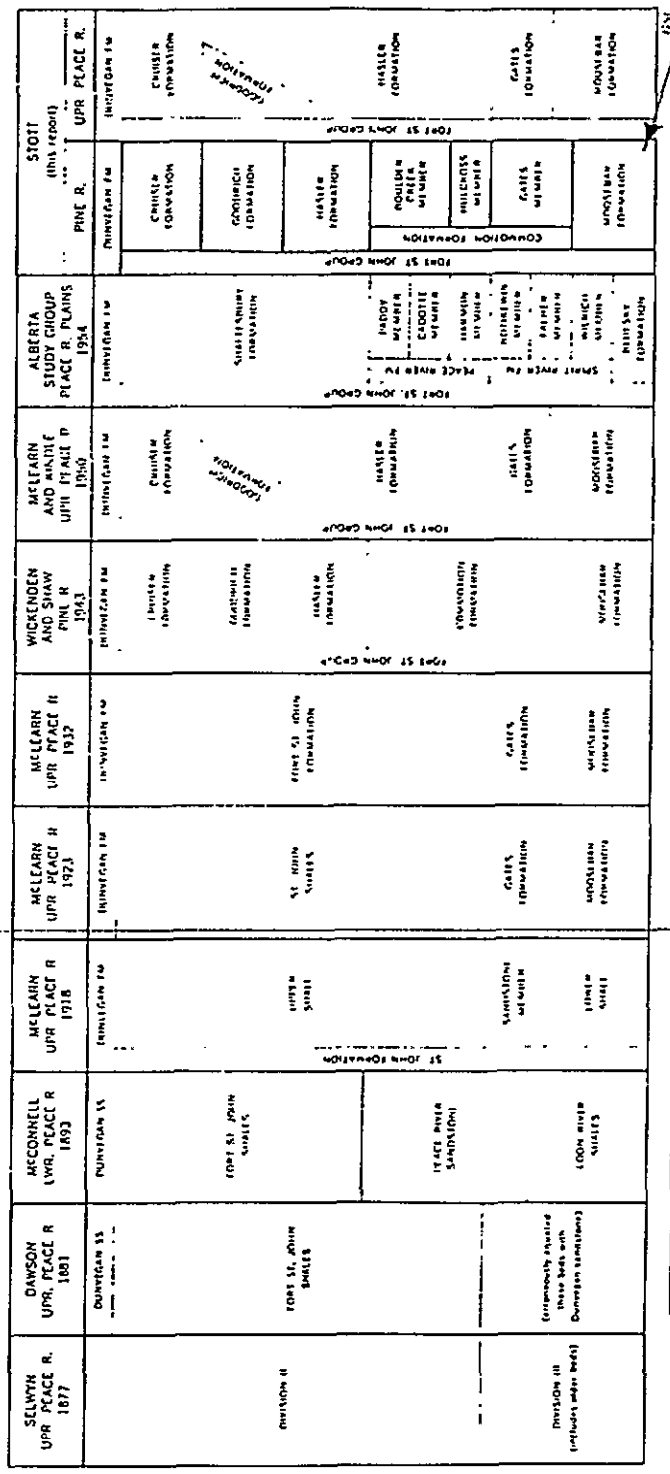
Formational Diagrams and a Stratigraphic Section for Five Cabin Creek are presented in diagrams on following pages. The broader stratigraphic term Shaftesbury Formation is used rather than the more restrictive Hasler Formation (to match Petro-Canada usage). The Gates Member of the Commotion Formation, the target for the 1981 drill hole, is subdivided into several units, as discussed in the following section on stratigraphy. The usage of the Torrens

FORMATIONAL DIAGRAM
LOWER CRETACEOUS SERIES
BULLHEAD & MINNES GROUP



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

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



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

Nomenclature of Fort St. John Group

Sandstone as the lowermost prominent unit within the Gates matches Petro-Canada geology. Other nomenclature on the maps and sections of this report is that used by the author to denote units mappable on the ground, and identifiable on the geophysical logs and in core.

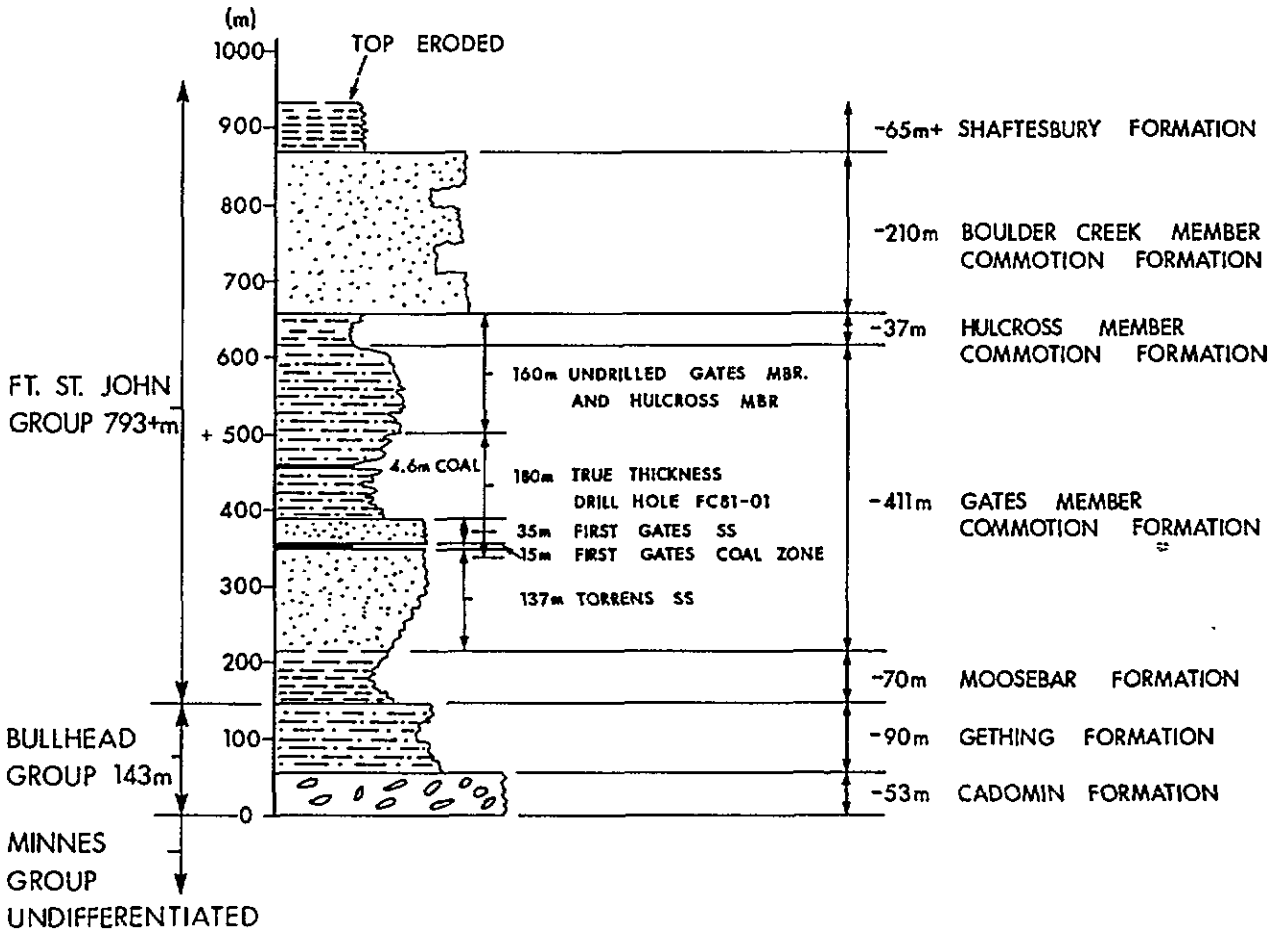
4.2 Stratigraphy

In the 1980 Five Cabin Creek geologic report the author discussed in detail the stratigraphy of the Bullhead and Fort St. John Groups as encountered in mapping and included a generalized stratigraphic section in diagram form which covered the three properties of Secus Mountain, Onion Lake, and Five Cabin Creek.

A new stratigraphic diagram, on the following page, is drawn for Five Cabin Creek, and it supercedes the 1980 diagram. This new work is based on the 1981 1:5,000 detail mapping, which was oriented to measuring by chain the particular formational thicknesses at Five Cabin Creek property.

A correlation chart showing the stratigraphy in the 1981 Five Cabin Onion and Secus drill holes can be found in the enclosures.

The stratigraphic description remains unchanged and is repeated on the following pages in this 1981 report.



SANDSTONE, prominent

COAL SEAM or ZONE, recessive

SANDSTONE, SILTSTONE, SHALE COAL SEAMS

MARINE SHALE, recessive

CONGLOMERATE, prominent

Crows Nest Resources Limited
EXPLORATION

FIVE CABIN CREEK
N.E. BRITISH COLUMBIA

STRATIGRAPHIC SECTION

AUTHOR D. BELL	SCALE 1:10 000	ENCLOSURE No.
DATE MAR. 82	REVISED	DRAWING No. AA-885
To Accompany		

Stratigraphy from 1980 Report

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, have been hindered by the vastly increased thicknesses 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 mapability of the standard nomenclature, but the number of conglomerate occurrences remains high.

Secus Mountain itself, situated right next to Mt. Belcourt, has a long, striking west slope composed of dip-slope units of conglomerates, deeply incised by small canyons and gorges, all of it basically exposed and barren. The general problem of dividing and following the conglomerates has thus become known as "the Secus Mountain conglomerates."

The effect of the conglomerates has been to defeat identification of the standard formations and members, to the point that over the years various crews making quick geological examinations with the idea of locating drill sites to prospect the Gething and Gates ended up often by drilling a completely wrong formation.

The problem is mostly centered along the part of the belt containing Five Cabin Creek, Onion Lake, and Secus Mountain, which are all located along the innermost line of inner foothills. Those properties situated along the outer side of the inner foothills (i.e. the Duke Mountain Block of Petro-Canada, as well as the Belcourt and Saxon properties of Denison Mines) on the east flank of the Wapiti Anticline have less conglomerate.

Minnes Group

The Minnes Group is the term used for any section lying stratigraphically beneath the Cadomin Formation, the base of the overlying Bullhead Group and above the Fernie shales. 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.

Cadomin Formation

In this program a definition of the Cadomin somewhat different than that used by both past coal company workers and the Geological Survey was used. It was found that by restricting the name to a particular conglomerate within the overall succession, it was possible to divide "the Secus Mountain Conglomerates" into Minnes conglomerate, Cadomin conglomerates, and Gething conglomerates.

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 strata, she states "mapping problems ... indicate that a more consistent unit for this area is the Bullhead Group as a whole". If all conglomerates are included in the Cadomin Fm, very little strata is left to be included in the Gething Fm.

In this mapping program, the name Cadomin was restricted to a mostly conglomeratic unit which can be distinguished from all other conglomerates within the Minnes-Bullhead-Fort St. John succession by the following characteristics. The conglomerate is light-gray weathering, extremely hard-rings upon impact, tough fractures through clasts and is the most resistant unit in the whole succession (Minnes to Boulder Creek) usually forming the

dominant ridges in the topography. It is a siliceous, extremely well indurated conglometrate.

In addition, it contains chert clasts with particular shades of rosey pink, a jade-like green, and a particular smooth, light gray. Cadomin sandstones contain these particular colours, within the sand grain sizes as well. 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 much like the Cadomin anywhere through the Luscar and McIntyre Mines properties.

All sections 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 contain the pink and green constituents.

The top of the Cadomin is taken at that point where the tough, light-gray, massive conglomerate or sandstone changes to softer and browner sandstones and/or conglomerates.

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, one may 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 area from Five Cabin Creek southeast through Secus, one may expect 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.)

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 Fm, lying some distance above.

Moosebar Formation

The Moosebar is notable mostly because of its very characteristic recessive effect on the topography. It is thicker in the Sukunka area to the northwest, and thins southwards towards Onion Lake, where it is 30 m, and is thinnest in the Secus area. At Secus, 23 m was used for the Moosebar in constructing the cross-sections, as the actual marine beds in two rare complete exposures were that thickness. The exposure measured at Onion Lake (in The Gorge) is the only other complete exposure known in the region.

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.

Mapping was generally stopped in the base of the Boulder Creek, as there is no prospective coal known above the Gates.

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. It is composed of alternating sequences of conglomerates, sandstones, siltstones, mudstones, and coal beds. As a general rule the coal seams, while remaining numerous, become thinner towards the top of the member. Individual conglomerate 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.

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 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 in southeast British Columbia.

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

Transition Beds, Gates Member, Commotion Formation

The Transition Beds are "transitional" or "passage" from the distal marine shales of the lower Moosebar into the paralic 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 almost 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 striking moosebar topographic recession.

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

Mapping (and the logs of the Petro-Canada holes) shows that the thickest coal in the Gates may be found in the 20 to 30 meters above the Torrens Sandstone. In places the coal lies directly on top of it. 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 will be placed to end in the Torrens, and so the seams above the No. 1 Zone can be catalogued at the same time.

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.

Boulder Creek Member, Commotion Formation

The Boulder Creek is a prominent sandstone unit above the Gates. The contact (where the Hulcross is not present) 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. Only once was its top mapped, although often it can be seen from the air to be giving away to Shaftesbury shales.

4.3 1981 Mapping and Drilling

1981 geologic work at Five Cabin Creek was done in two parts: a single diamond drill hole, based on 1980 1:20,000 mapping, and a separate short program of detailed 1:5,000 mapping, by the author with one companion.

The drill hole successfully penetrated the lower half of the coal bearing section of the Gates Member. The site was chosen to allow the available length of stem (220 m) to reach the top of the Torrens Sandstone, which forms the base of the coal section in the Gates. Five coal seams totalling 12.2 m. true thickness were penetrated, the thickest being 5.1 m.

The Torrens Sandstone should form a reliable basement to future drilling in the Gates. As shown on the stratigraphic diagram, there remain 160 m of upper Gates and Hulcross left untested; this section would be the logical target fo the next Five Cabin drill hole. The contact between Gates and Hulcross was found to be covered in the 1981 traversing, and so the Hulcross thickness is not definitely know. It is, however, exposed elsewhere on the the licences and may be measured in future mapping.

Mapping consisted of a program shortened by forest fire traverse bans. The closure was announced as mapping started, and so the

author studied particular objectives and did not conduct mapping spread throughout the licences, as was done in the 1980 1:20,000 mapping.

1980 mapping consisted of following the more resistant formations about the property, outlining at 1:20,000 scale the extent and character of Five Cabin Syncline. No significant structural complications were encountered.

1981 mapping was directed to carefully-chained traverses across the syncline at its widest point within the licences, the particular objective being to measure unit thicknesses. In addition, bedding attitudes were studied stereographically to produce a structural grid oriented to reduce distortion in cross section thicknesses. Thicknesses calculated are presented on the two 1:5,000 structural cross sections included in the enclosures of this report. These sections replace the 1980 sketched 1:20,000 cross section.

One 1:5,000 map covering the central part of the syncline is included in the enclosures of this report. Only 1981 traversing is drawn; the remainder of geology on the 1980 1:20,000 map is valid and remains unchanged. This 1:20,000 sheet is also included in the enclosures of this report, with the addition of the grid, the cross-section locations, and the position of the drill hole.

4.3.1 1981 1:5,000 Geologic Maps

Mapping was done by the author directly onto 1:5,000 topgraphic base sheets using a hand-held plane table. Directions of chain measurements were made by compass and altitudinal adjustments to chain lengths were made using hand-held clinometer. Traverse starts and finishes were made at identifiable points on the topography.

Work was divided equally between the east and west limbs of Five Cabin Syncline, in an attempt to compare the character and thicknesses on each side. Whereas there is some difference in unit thickness between east and west, there is sufficient agreement such that the thickness as presented on the stratigaraphic diagram (which represents an average of the two limbs) may be used in all future planning.

The Cadomin Formation is mostly conglomerate. Contact with the relatively recessive Gething Formation was taken at the top of the last dip-slope conglomerate bed on either limb.

Although the Gething is mostly covered, some sandstone units appear. It remains prospective, although conventional thought amongst workers in the area is that it is less so than the Commotion Formation. A thickness of 90 m was measured on both limbs.

The Moosebar Formation was not exposed in the line of traversing, although its topographic recession is as distinctive as usual. Contact with the Gething is therefore arbitrary for the present, and is taken at the top of the last topographic prominence before the shaly recession. The top of the Moosebar grades into the bottom of the Torrens Sandstone, and this contact is similarly arbitrary. Moosebar thickness of 70 m is used for both limbs.

The Torrens Sandstone stands out prominently. Its top is definable to 10 m in outcrop and as elsewhere in the coal field it can be divided into brown and gray sandstone beds. The gray coarser-grained and pebble-bearing sediments appear at the top.

Torrens thickness on both limbs measured 130 to 140 m. In the drill hole, the top 37 m of Torrens was penetrated. Coaly blebs and pebbles were found in core. Grain size diminished downwards and siltstone and shale interbeds were appearing near the bottom.

The drill hole penetrated approximately 180 m true thickness of Gates above the Torrens. The section is composed of sandstones, siltstones, shales, and coal beds. Many of the sandstones are relatively prominent and are traceable over considerable distances.

Hulcross Member recessive shales and siltstones are exposed on the east limb but not on the west limb. The thickness of 37 m drawn on the stratigraphic diagram and cross sections is representative only, but there is not much more room between the nearest underlying Gates sandstone and overlying massive Boulder Creek sandstone.

Boulder Creek Member outcrop is well exposed on both limbs in massive sandstone cliff-ledges which are followable throughout the licences and which form a convenient top to the coal-bearing Gates. These sandstone units are often pebbly and coarse-grained.

Shaftesbury Formation outcrop is exposed in the center of Five Cabin Syncline, although in the line of traversing it was not encountered. While its maximum remaining thickness on the two cross-sections is 65 m., it is probably thicker in total under the high ground at the center of the syncline slightly to the northwest. It is black, chippy, and shaly in outcrop, and may be easily separated from Boulder Creek by topographic expression.

1981 1:5,000 Cross Sections

Two 1:5,000 cross sections are included in the enclosures of this report, one for each limb of Five Cabin Syncline. Their locations are traced on the 1:5,000 and 1:20,000 geologic maps. The sections are balanced vertical structural sections, oriented at right angles to the plunge direction of 137 degrees (determined stereographically for the syncline).

The east limb section is 300 m North on the grid; the west limb section is 750 m north. The two sections are drawn 2 km in width, but extend only across one-half of the syncline in each case. Although they are spaced 450 m apart along strike (due to the traverse line followed and to avoid projecting bedding attitudes more than a couple of hundred metres along strike) they may be joined together to provide one single section across the whole of the structure, as the plunge (04 degrees southeast) is essentially negligible over this distance.

The sections have been drawn using dips measured in the mapping; these are drafted along the surface profile. Unit thicknesses agreed to plus or minus ten per cent for both limbs, and no major structural complications are apparent.

Diamond drill hole FC81-01 is drafted in its surveyed position on section 750 North. It was located only 17 m south of the section. The 20 m difference in position of the top of the Torrens Sandstone between that projected from the surface and that drawn in the drill hole is accounted for by error intrinsic in the mapping method, map construction, and section drafting.

4.4 Structural Geology

1981 1:5,000 detail mapping at Five Cabin Creek has revealed no change in structural setting from the 1980 report. Prospective Gething and Commotion section is contained in a relatively simple gently-bottomed broad assymetric syncline. The fold is known locally as Five Cabin Syncline and is the major structure immediately west of the Quintette property.

The width from Gething to Gething within the licences across the structure is 4 km. Gething length along the structure is 4 to 4 1/2 km. To the northwest the fold is increasingly bevelled by erosion and covered by Quintette licences; to the southeast is a similar erosional bevelling, covered by Petro-Canada and Quintette licences.

Forty-eight bedding attitudes collected during 1:5,000 mapping across the syncline were plotted sterographically as scatter and contour point diagrams. The title of the set is FCALL81 - Five Cabin Creek All Attitides 1981. These are presented on the following pages.

Results are very similar to the stereographic analysis presented in the 1980 report, which incorporated all attitudes measured throughout the licences (except for Minnes attitudes).

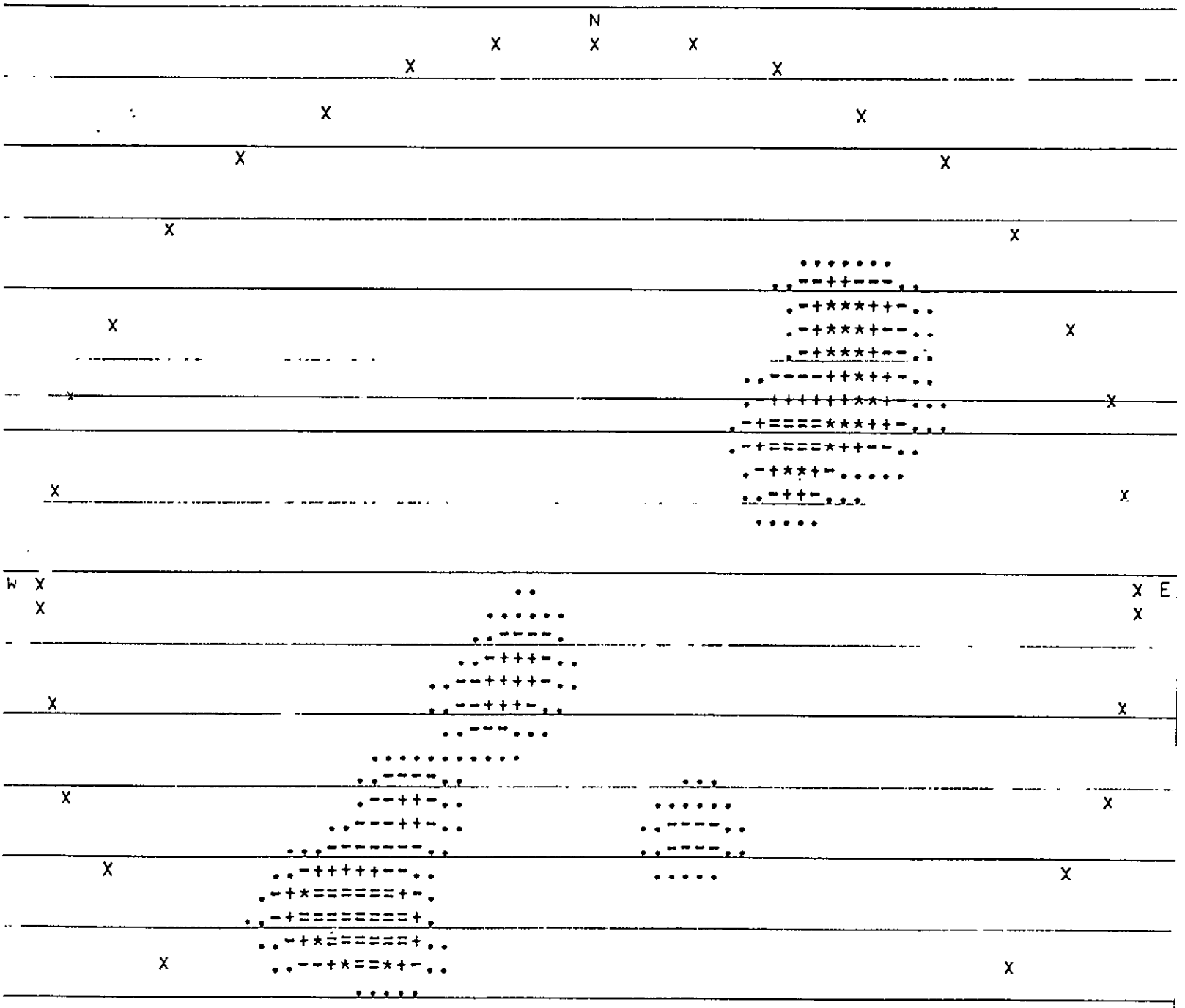
Plunge of Five Cabin Creek Syncline is definitely less than 10 degrees; a figure of 04 degrees is continued from 1980 work, although the direction is to the southeast and not the northwest, as erroneously reported in 1980.

The plunge direction of 137 degrees true has been used as the baseline for the grid and cross sections. This has eliminated virtually all distortion in thickness of units on the cross sections, and provided for accurate outcrop projection on the sectional planes.

STEREO 8121587 -- CROWSNEST RESOURCES LTD -- STRUCTURAL MAPPING DATA.

TRAVERSE - FCALL81

48 ORIGINAL POLES



DENSITY CONTOUR LEVELS (PERCENT)

1 5 10 15 20 MAX

. - + * =

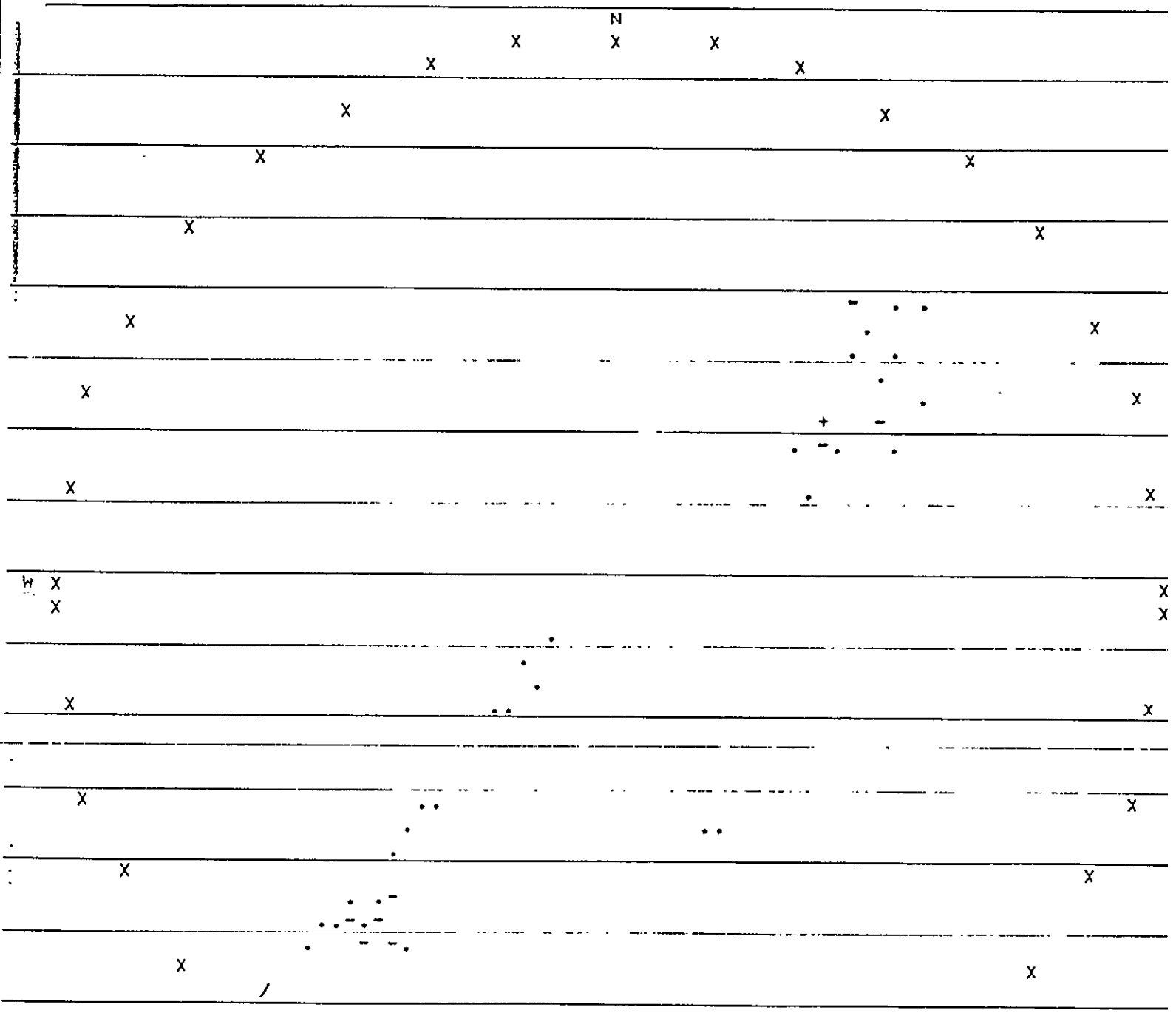
CONTOUR PLOT
LOWER HEMISPHERE
EQUAL AREA PROJECTION

MAXIMUM DENSITY = 51.16 PERCENT

STEREO 8121587 -- CROWSNEST RESOURCES LTD -- STRUCTURAL MAPPING DATA.

TRAVERSE - FCALL81

48 ORIGINAL POLES



LEGEND

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

SCATTER DIAGRAM
LOWER HEMISPHERE
EQUAL AREA PROJECTION

/ MEAN VECTOR = 82.54/ 401.06

5.0 1981 DRILL PROGRAM

Crows Nest Resources drilled one NQ diamond drill hole at Five Cabin Creek in 1981 as part of a four-hole series. One hole was drilled at Onion Lake and the other two at Secus Mountain. General hole data for the series are tabulated on the following page ("General Drill Hole Data 1981").

The hole was situated to drill the west limb of the Five Cabin Creek Syncline. The section penetrated is the coal-bearing part of the Gates Member above the Torrens Sandstone. The Torrens was the target as it forms the base of the coal-bearing sequence of the Commotion Formation.

The west limb, as opposed to the east limb, of the syncline was chosen as it is furthest from the existing trail access to the property, which touches the eastern limb at the east edge of the property. The hole was completely helicopter-supported and involved no trail construction.

The site is located above the treeline on a bare sandstone ledge. No surface disturbance or brush clearing was required. From the time of setting the casing through to the completion of the geophysical logging, the hole was notable in that no drilling fluid pumped into the hole returned to the surface. Water supply was a major problem and involved several small ponds and an auxiliary line running 700 m to a small

year-round stream. All cement pumped down the hole disappeared. The hole was abandoned with the casing left in the hole. The disappearance of all fluid is presumed by the geological crew to be related the hole's position high in rugged topography above most normal surface stream flow. Local forestry personnel have approved the site clean-up and no work remains to be done.

2-DSc.46

TABLE NO. 2

GENERAL DRILL HOLE DATA 1981

Secus Mountain, Onion Lake, and Five Cabin Creek

Note: All four holes drilled by Mid-West Drilling using two Boyles Brothers lightweight helicopter-transportable NQ diamond drill rigs.

	Drill Hole and Area			
	South Secus	Dumb Goat	Onion Lake	Five Cabin Creek
Total Depth (m)	194	257	236	241
Bearing (true degrees)	059	051	049	227
Dip (degrees from horizontal)	69	64	57	57
Casing depth (m)	6.1	7.9	6.1	3.0
Altitude (m)	1,323.66	1,689.69	1,580.29	1,752.81

	Depth of Top of Torrens Sandstone			
	South Secus	Dumb Goat	Onion Lake	Five Cabin Creek
Projection (m)	152.0	200.0	210.0	210.0
Actual (m)	145.5	213.0	183.6	209.9
Error (m)	-6.5	+13.0	-26.4	-0.1

5.1 Geophysical Logging

Roke Oil Enterprises Ltd. of Calgary used a helicopter-transportable geophysical logging unit for the 1981 Five Cabin Creek drill hole. The total load was approximately 550 kg and was slung in two trips by the Hughes 500D helicopter used for the drilling operation.

The log suite for Five Cabin Creek consisted of gamma-neutron, gamma-sidewall densilog (L.S.D.)-caliper, focused beam, and directional survey. All logs are included in the enclosures.

5.1.1 Gamma-Neutron

This log was run first, through the rods and with the drill crew maintaining the water level near the surface. It makes little difference in the gamma-neutron whether or not it is run through the string or in the open hole; therefore running the log through the rods avoided the possibility of the hole partially or totally caving upon withdrawal of the string and no logs being obtained. For consistent interpretation the gamma-neutron must be run in fluid, and so the pumps were used.

The log was run to the hole's bottom. On the left side of the depth track the coal beds have been drawn based on interpretation

of the gamma-neutron alone. As a following step, the same coal beds were drawn in from the density log, traced through on a light table. The general effect is that coal thicknesses are slightly reduced on the density log, a normal occurrence as the density provides better detail. At this beginning level of exploration, however, no attempt was made to resolve interpretations smaller than approximately 20 cm. Thin coal beds are shown by a dashed line across the depth track; they also have been traced from the density log.

5.1.2 Sidewall Densilog (L.S.D.)-Caliper

This log was run to 212 m only; the final 29 m to hole bottom at 241 m may have caved during the withdrawal of the stem, as the tool could not make it further down the inclined hole on either of two runs. This missing 29 m has no effect on coal bed interpretation, as the top of the Torrens Sandstone is at 219 m, so all coal beds were logged. It is notable that the title page of the log shows that the fluid type was "air". In the short time covering the withdrawal of the stem after the running of the gamma-neutron until the density could be run open hole, all fluid in the hole had disappeared, illustrating the circulation problem. The log includes expanded runs at 20:1 through the thicker coal seams. The caliper shows no significant caving.

5.1.3 Focused Beam

This log was not run, as it cannot be run in air, and it was not possible to maintain any fluid in the open hole, even with the pumps operating.

5.1.4 Directional Survey

The Five Cabin Creek hole started at a dip of 59 degrees from the horizontal and decreased to 56 degrees at its bottom. A dip of 60 degrees had been planned.

The hole bearing started at 227 degrees true and ended at 226. A bearing of 227 degrees true had been planned, as this is the stereographically-determined cross-structure direction of Five Cabin Syncline. The correction in the strike component in determining true thicknesses from the apparent thicknesses found in the hole is therefore only 0.5% and so may be disregarded. The average bedding-to-core angle is approximately 63 degrees, and so the multiplication factor for correction to the dip component of distortion in thickness of the beds is 0.89.

5.2 Diamond Drill Core Logging

Diamond drill core from the 1981 Five Cabin Creek hole was examined briefly on the site and then stacked until geophysical logging and cementing operations were completed. The core was then flown inside from a larger helicopter (Bell 212) in one trip to base camp. This procedure avoided (a) the possibility of losing core being slung in small amounts by the smaller service helicopter and (b) the cost of flying core logging personnel back and forth from the site.

The core log enclosures show that recoveries were generally good. There has been no problem in correlating amongst the geophysical logs, the core logs, and surface outcrop.

Coal core samples were sent for analysis to Crows Nest Resources' Fernie, B.C. laboratory.

The remaining core was shipped to the Charlie Lake, B.C. permanent core storage facility of the B.C. Ministry of Energy, Mines, and Petroleum Resources, as provincial geological personnel requested the hole for their collection of core from unexplored areas.

5.3 Strip Log

A lithologic strip log of the 1981 Five Cabin Creek drill hole has been prepared (enclosures) at a vertical scale of 1:20. Bedding-to-core angles are printed down the right side of the depth track.

As the hole uncovered no recognizable structural irregularities and the top of the Torrens Sandstone was found where planned (10 cm too shallow), calculations show that all thicknesses on the strip log (and on the geophysical and core logs) must be multiplied by an average 0.89 for true thickness.

Small differences in the depths to beds between the strip and geophysical logs are due to interpretation and the fact that the core, from which the strip log was made, inevitably has drilling loss.

6.0 COAL SEAMS AND ANALYSES

A total of seven coal seams were intersected in the drillhole. Three seams, all under one meter in thickness were not sampled. The four remaining seams range in thickness from 1.69 to 4.8 meters in thickness. The uppermost seam occurs at 4.5 m depth, is 4 meters in true thickness and has upper and lower benches of 1.42 meters and 1.69 meters respectively and a 0.89 meter thick parting. The thickest seam, 4.8 meters true thickness, occurs at 65 meters depth in the hole and lies 140 meters stratigraphically above the Torrens Sandstone. A third seam 1.87 meters in thickness lies at 92 meters in the hole and a fourth seam 1.69 meters in thickness lies at 206.7 meters and, save for slightly less than 2 meters of siltstone and coal, it lies directly above the Torrens Sandstone.

Proximate analyses were run on all samples, both on the raw coal (air dried) and a 1.6 S.G. float product. Two tests (Table 4) were run for all float analyses and these have been averaged for presentation in the summary (Table 3). F.S.I.'s were run on both raw coal and floats. Sulphur and thermal values were run on the floats. Yields are shown for the float sink tests at 1.6 S.G.

Individual samples (#1-3) were taken for both benches and the split in the uppermost seam and presented separately in Table 3. Low F.S.I.'s are most likely due to the close proximity to the surface and associated oxidation.

The thickest seam (Sample #4) shows very low ash (10.88% on raw coal) and only 6.6% ash at a 1.6 S.G. cut point with 85% yield. Presumably a 9-10% ash product could be gained with an in seam yield substantially higher than 85%. Coking quality, in terms of F.S.I. are good at 7 and a very low sulphur 0.32% is shown. The third seam, sample #5 is somewhat dirtier with a raw coal ash of 26.94% and an in seam yield of only 60%. The lowest seam, sample #6, has a low ash of 4.43% (float), a high F.S.I. (8.5) and somewhat higher volatile 33% d.m.m.f., than the higher seams (30.3 - 32.2%).

FIVE CABIN CREEK

SUMMARY OF COAL SEAMS AND ANALYSES

TABLE #3

INTERVAL		TRUE THICKNESS (x0.89)	SAMPLE No.	RAW COAL ANALYSIS (AIR DRIED)		FLOAT @ 1.6 S.G.								CALC. D.M.M.F.	+RECOVERY
CORE MEAS.	DENS. LOG			% MOIST	% ASH	% MOIST	% ASH*	% V.M.*	% F.C.*	F.S.I.	% SULPHUR	% YIELD	Kcal/kg	% V.M.	
5.83-7.77	4.5-6.1	1.42	1 (81-1762)	1.77	12.82	1.78	7.12	27.88	64.11	0	0.47	79	7038	30.3	
7.77-8.28	6.1-7.1	0.89	2 (81-1763)	1.24	77.34	2.08	9.48	27.32	62.15	1½	0.49	7	7001	30.53	85.3
8.28-9.81	7.1-9.0	1.69	3 (81-1764)	1.69	13.24	1.96	9.56	28.04	61.41	½	0.44	83	7257	31.3	
65.99-71.75	65.0-70.4	4.8	4 (81-1765)	0.80	10.88	1.60	6.60	29.89	62.71	7	0.32	85	7925	32.2	84.6%
93.12-95.46	92.0-94.1	1.87	5 (81-1766)	0.75	26.94	0.73	9.49	27.86	62.29	7½	0.51	60	7575	30.9	89%
207.75-209.87	206.7-208.6	1.69	6 (81-1767)	0.74	12.54	0.71	4.43	31.08	63.12	8½	0.53	83	8126	33.0	100%

*Average of two tests

+%Coal Core Recovery = $\frac{\text{Thickness of Coal from Density Logs - Total Core loss from Core Runs with Coal x 100}}{\text{Thickness of Coal from Density Logs}}$

CROWS NEST RESOURCES ANALYSIS REPORT

TABLE #4

AREA: 5 CABIN HOLE NO. 81-1 DATE: MAR. 10/82 ANALYST

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	Kcal/kg	CALC BASI
				RAW	4.13	1.77	12.71			0				ADB
	1		5.83→											ARB
			7.77				12.94							DB
81				1.6 FLOAT		1.78	7.05	27.63	63.54	0		79	6975	ADB
1762							7.18	28.13	64.69				7101	DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				RAW	3.49	1.24	77.25			0				ADB
81 -	1 (2)		7.77→											ARB
1763			8.28				78.22							DB
				1.6 FLOAT		2.08	9.38	27.04	61.50	1½		7	6928	ADB
							9.58	27.61	62.81				7075	DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB
				RAW	4.96	1.69	13.24			½				ADB
81 -	3		8.28→											ARB
1764			9.81				13.47							DB
				1.6 FLOAT		1.96	9.47	27.77	60.80	½		.83	7185	ADB
							9.66	28.32	62.02				7329	DB
				FLOAT										ADB
														DB
				FLOAT										ADB
														DB

CROWS NEST RESOURCES — ALYSIS REPORT

AREA: 5 CABIN HOLE NO. 81-1 DATE: MAR. 10/82 ANALYST

LAB. NO.	SAMPLE NO.	SEAM	INTERVAL (METRES)	FRACTION	% AIR DRY LOSS	% MOISTURE	% ASH	% V.M.	% F.C.	F.S.I.	SULFUR	% YIELD	Kcal/ kg	CALC BAS
				RAW	2.62	.80	10.88			7				ADB
81-	4		65.99→											ARB
1765			71.75				10.97							DB
				1.6 FLOAT		1.60	6.54	29.65	62.21	7		85	7861	ADB
							6.65	30.13	63.22				7989	DB
				FLOAT										AD
														DB
				FLOAT										AD
														DB
				RAW	1.89	.75	26.94			5½				AD
81-	5		93.12→											AR
1766			95.46				27.14							DB
				1.6 FLOAT		.73	9.45	27.76	62.06	7½		60	7547	AD
							9.52	27.96	62.52				7603	DB
				FLOAT										AD
														DB
				FLOAT										AD
														DB
				RAW	0.77	.74	12.54			8				AD
81-	6		207.75→											AR
1767			209.87				12.63							DB
				1.6 FLOAT		.71	4.41	30.97	63.91	8½		83	8097	AD
							4.44	31.19	64.37				8155	DB
				FLOAT										AD
														DB
				FLOAT										AD
														DB

TABLE #5 .55

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

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

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

Certificate of ASSAY of
LORING LABORATORIES LTD.

SAMPLE No.	% S
"Coal Analysis" "Air Dried" 5-Cabin Hole # 81-1 1.60 Flt	
81-1762	.47
1763	.49
1764	.44
1765	.32
1766	.51
1767	.53

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

7.0 RECOMMENDATIONS

Geologic work to the end of 1981 has established the extent of prospective Gething and Commotion section in a broad, flat-bottomed assymmetric syncline 4 km in width. Mapping has been completed to 1:20,000 scale, and started at 1:5,000 scale. One diamond drill hole has been completed, testing the lower half of the prospective section within the Commotion Formation. One coal seam of 4.6 m. has been identified and sampled; several others of 1 to 3 m thickeness have also been discovered.

Future mapping may be continued on the 1:5,000 base, although the 1:20,000 map is sufficiently accurate for further drill and trench planning. Mapping is advanced enough to continue it in conjunction with, rather than in advance of, future equipment work, within the framework of the grid.

The next drill hole would be logically situated up-section from the 1981 hole, placed on the Hulcross and drilled to overlap the top of the 1981 hole. This will complete drilling of the entire prospective part of the Gates Member of the Commotion Formation. Further, two drill holes would test the same section on the east limb. Section 300 North, included in this report, can be used for planning.

Two additional drill holes could be situated to test the Gething Formation on either limb. Should results be negative, the width of

prospective ground across the syncline is considerably reduced. This should be known for further mine and environmental planning.

There remains considerable scope for machine and hand trenching.

At present, Five Cabin Creek must be regarded as an underground prospect, most logically developed in conjunction with Denison and Petro-Canada reserves southeast along the syncline and Quintette reserves northwest along the fold. The broad, gentle aspect of the structure may lend itself to hydraulic mining.

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FIVE CABIN CREEK

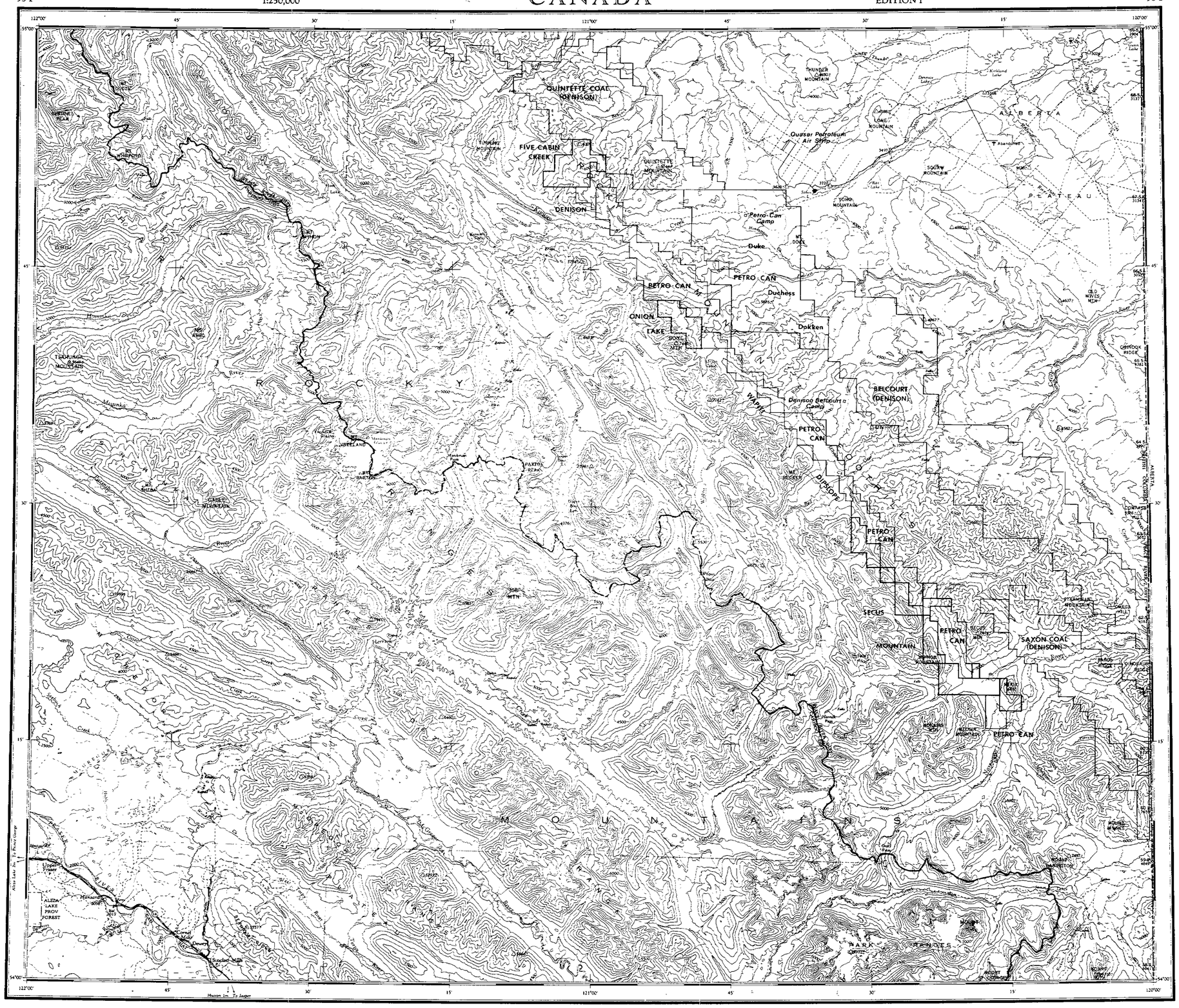
NORTH EAST B.C.

1981

ENCLOSURES

VOLUME 2

93 I 1:250,000 **CANADA** EDITION 1 93 I



COMPILATION DIAGRAM—SOURCES UTILISÉES

A- Large scale topographic manuscripts, photogrammetric, 1956-59
B- Large scale topographic maps, photogrammetric, 1961
A- Manuscrits topographiques et photogrammétriques à grande echelle, de 1956-59
B- Cartes topographiques et photogrammétriques à grande echelle, de 1961

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' easterly at the centre of the west edge to 26° 24' easterly at the centre of the east edge Annual change decreasing 3 7'

Publiée par le **SERVICE TOPOGRAPHIQUE DE L'ARMÉE, (G.R.C.)** Renseignements à jour en 1963 Imprimée 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'

Roads	Routes	
Hard surface, all weather	Pavée, toute saison	
Loose surface, all weather	De gravier, toute saison	
Cart track or trail	De terre ou sentier	
Railway, normal gauge	Chemin de fer, écartement normal	
Township or Parish	Canton ou Paroisse	
Depression contours	Courbes de cuvette	
Spot elevation, precise, approximate	Point coté, précis, approximatif	950 950 *
Power transmission line	Ligne de transport d'énergie	

Scale 1:250,000 Échelle

Miles 5 0 5 10 15 20 Miles
Kilometres 5 0 5 10 15 20 25 30 Kilomètres

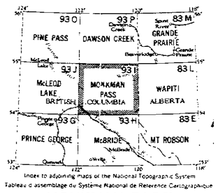
Transverse Mercator Projection
North American Datum 1927
Contour Interval 500 feet
Elevations in feet above Mean Sea Level

Copies may be obtained from the Map Distribution Office, Department of Mines and Technical Surveys, Ottawa

Projection transverse de Mercator
Réseau géodesique nord américain unifié 1927
Equidistance des courbes 500 pieds
Elevations en pieds au dessus du niveau moyen de la mer

Ces cartes sont en vente au Bureau de distribution des cartes, ministère des Mines et des Relevés techniques Ottawa

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



Index to adjoining Maps of the National Topographic System
Tableau d'assemblage du Système National de Référence Cartographique

MONKMAN PASS
93 I
EDITION 1

PR- Five Cabin Creek 81(2)A

Crows Nest Resources Limited

EXPLORATION

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

INDEX MAP

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

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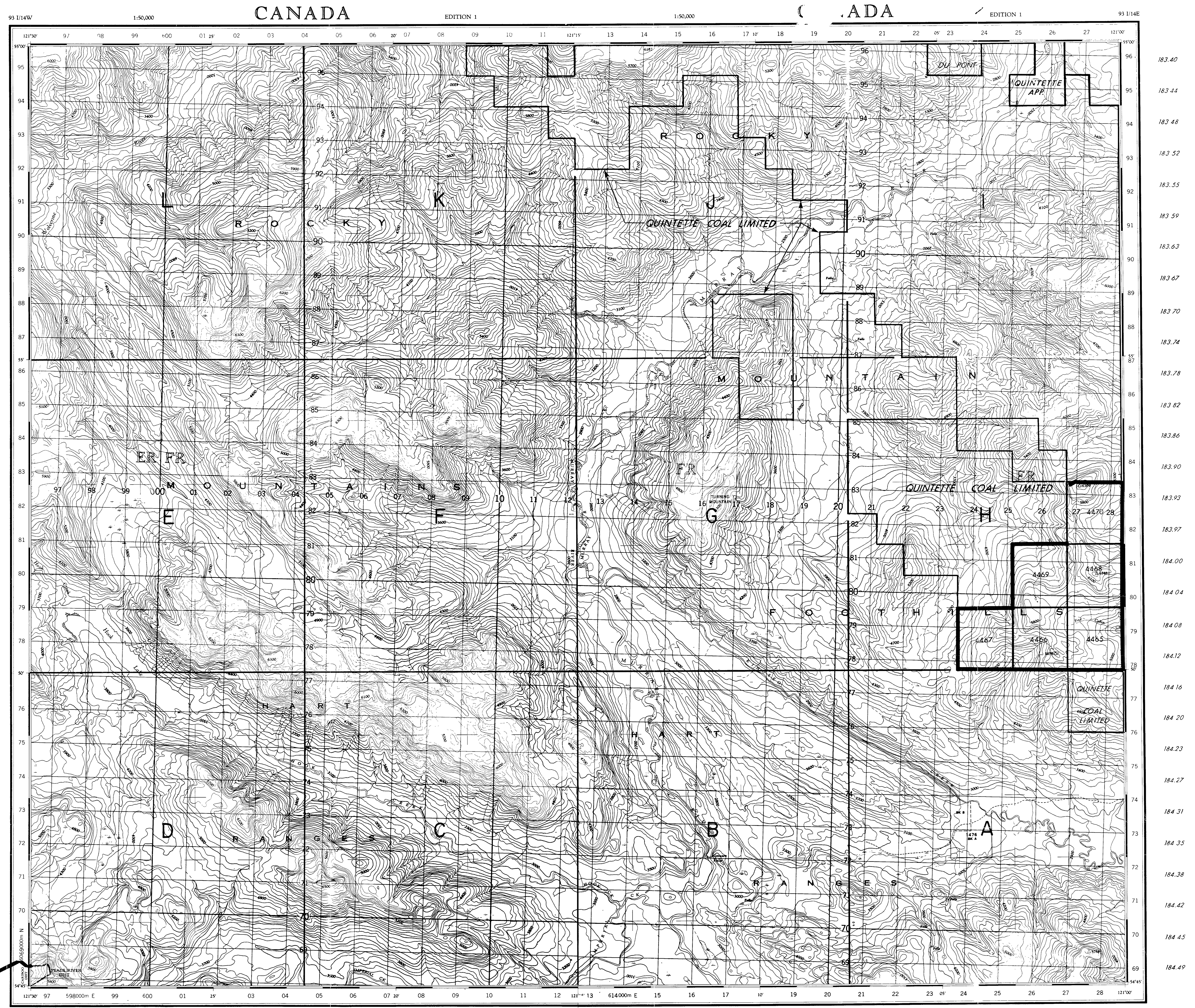
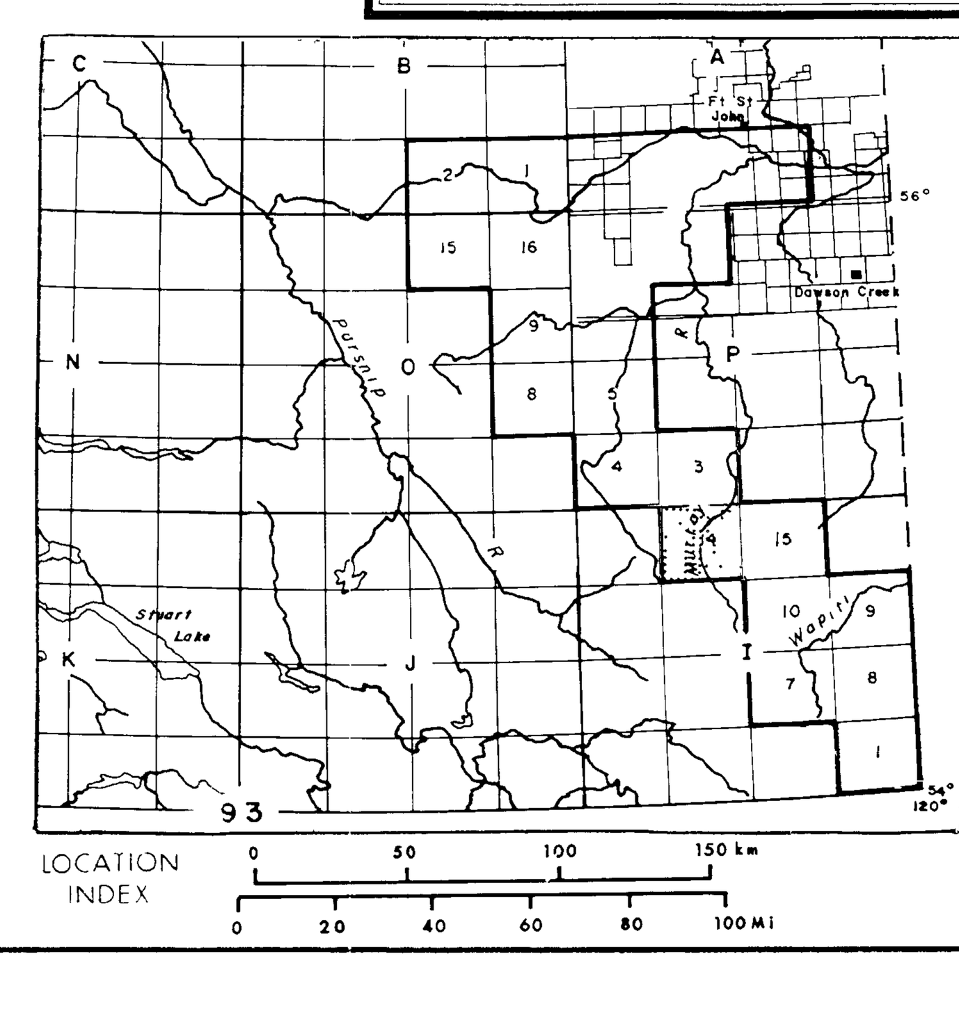
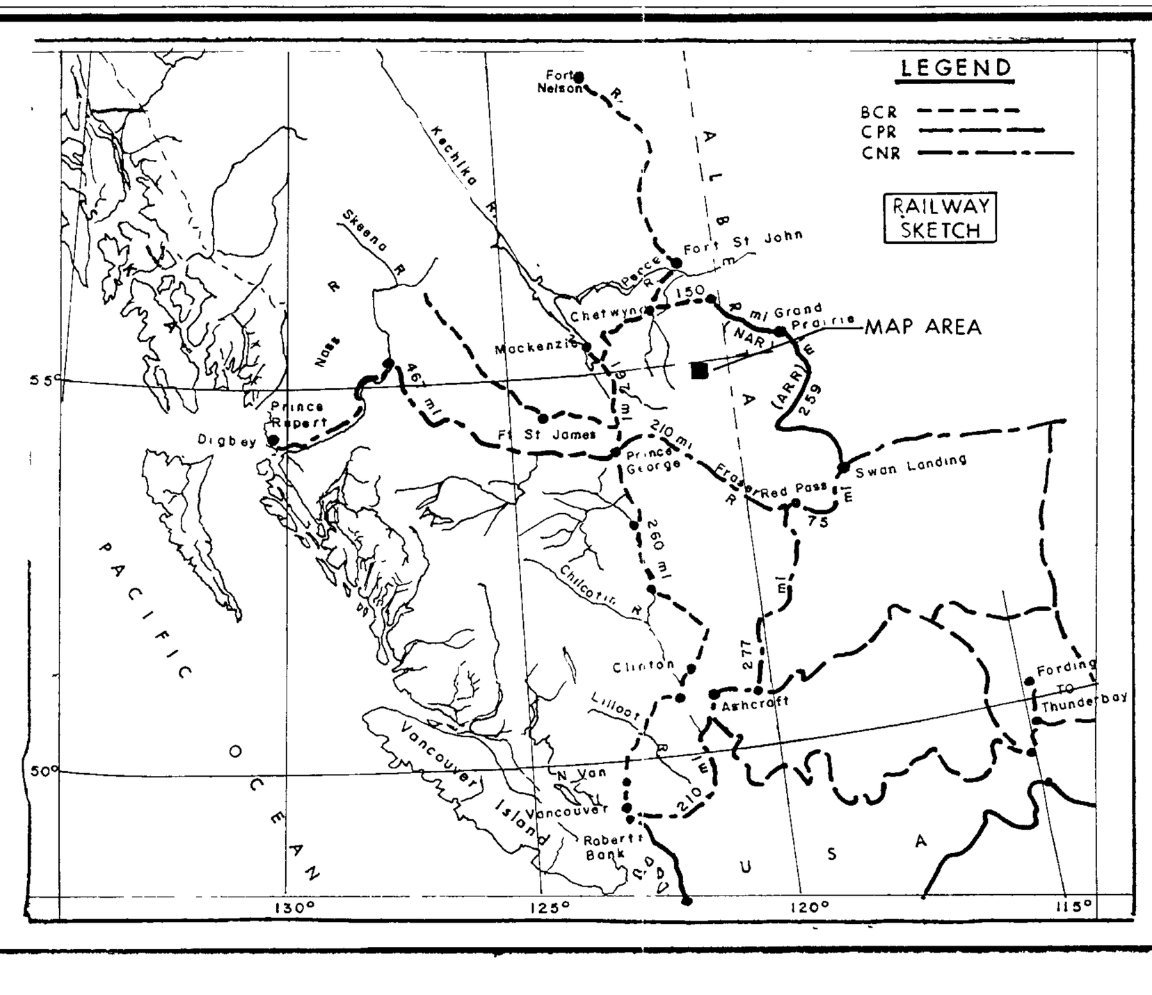






KINUSEO FALLS

BRITISH COLUMBIA

SCALE 1 50,000 ÉCHELLE

CONTOUR INTERVAL 100 FEET
Elevations in Feet above Mean Sea Level

Transverse Mercator Projection
North American Datum 1927

MAGNETIC DECLINATION 25°59′ EAST
AT CENTRE OF MAP 1965
Annual change decreasing 4 1′

ÉQUIDISTANCE DES COURBES 100 PIEDS
Élévations en pieds au-dessus du niveau moyen de la mer

Projection transverse de Mercator
Réseau géodésique nord-américain unifié 1927

DÉCLINAISON MAGNÉTIQUE AU CENTRE
DE LA FEUILLE EN 1965 25°59′ EST
Variation annuelle décroissante 4 1′

TABLEAU D'ASSEMBLAGE DU SYSTÈME NATIONAL
DE RÉFÉRENCE CARTOGRAPHIQUE

93 P/3W	93 P/3E	93 P/2W
93 I/14W	93 I/14E	93 I/15W
93 I/11W	93 I/11E	93 I/10W

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

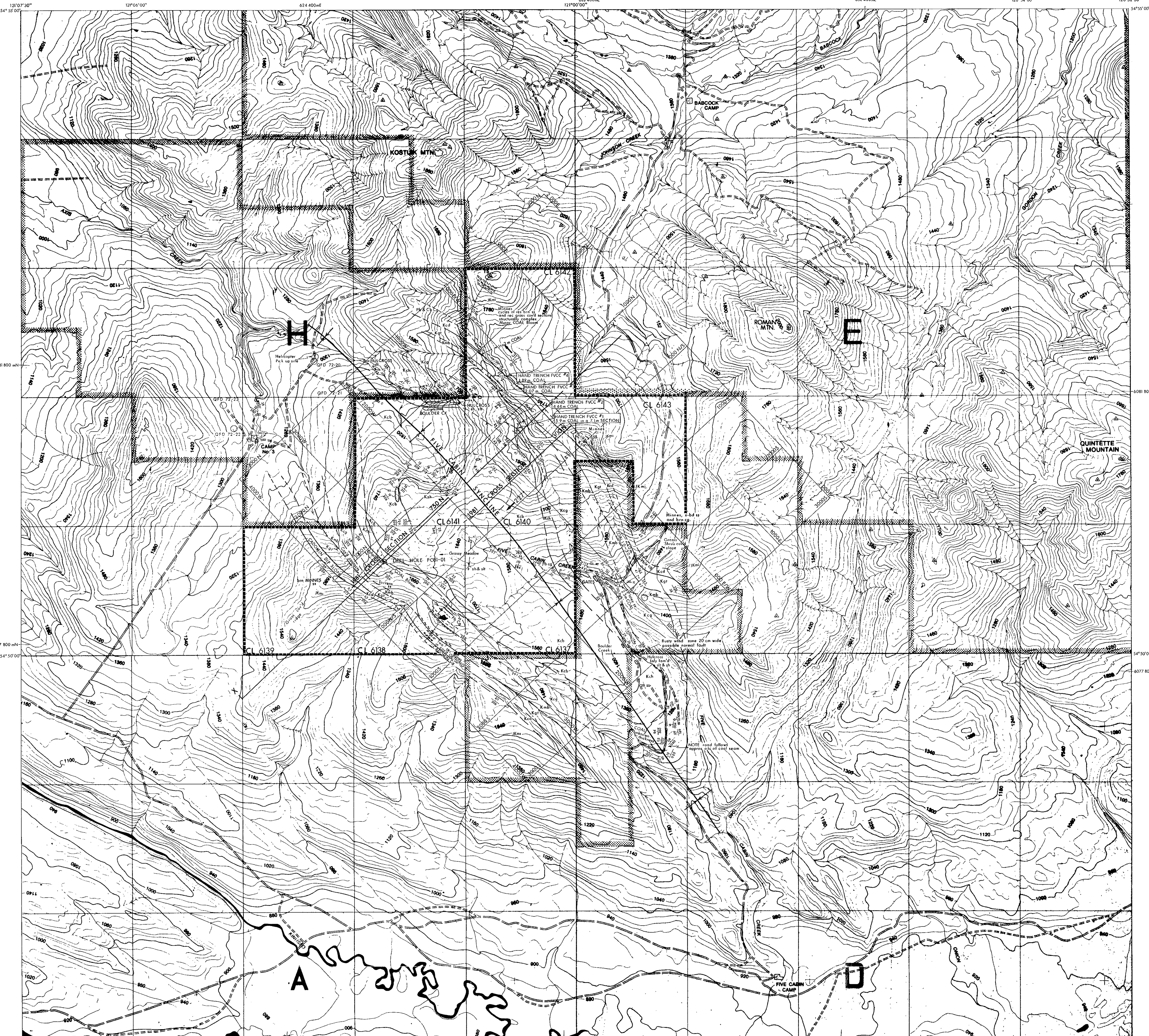
SHELL- CNRL LICENCES FIVE CABIN CREEK
NTS 93-I-14 BLK H
MAP 1 OF 2

NTS 93 I/14

AUTHOR: OLSON-MARTONHEGYI	SCALE: 1:50000	ENCLOSURE No: 2
DATE. DEC 1979	REVISED:	DRAWING No: HC-18C
To Accompany		

636

PR- Five Cabin Creek 81(2)A



GEOLOGICAL LEGEND

LOWER CRETACEOUS

Symbol	Formation	Group
Ksh	SHAFTESBURY FORMATION (HASLER FM)	FORT ST. JOHN GROUP
Kcb	COMMOTION FORMATION (Boulder Creek Member)	FORT ST. JOHN GROUP
Kch	COMMOTION FORMATION (Hulcross Member)	FORT ST. JOHN GROUP
Kcg	COMMOTION FORMATION (Gates Member)	FORT ST. JOHN GROUP
Kmb	MOOSEBAR FORMATION	BULLHEAD GROUP
Kgt	GETHING FORMATION	BULLHEAD GROUP
Kcd	CADOMIN FORMATION	BULLHEAD GROUP

JURASSIC – CRETACEOUS

Symbol	Formation	Group
JKmi	MINNES GROUP	

PALEOZOIC

Symbol	Formation	Group
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

500 0 500 1000 1500 2,000
SCALE IN METRES

1981 FIVE CABIN CREEK DRILL HOLE FC81-01
EASTING 625,612.39
NORTHING 6,079,119.81
ELEVATION (m) 1,752.81

636

Crows Nest Resources Limited
EXPLORATION

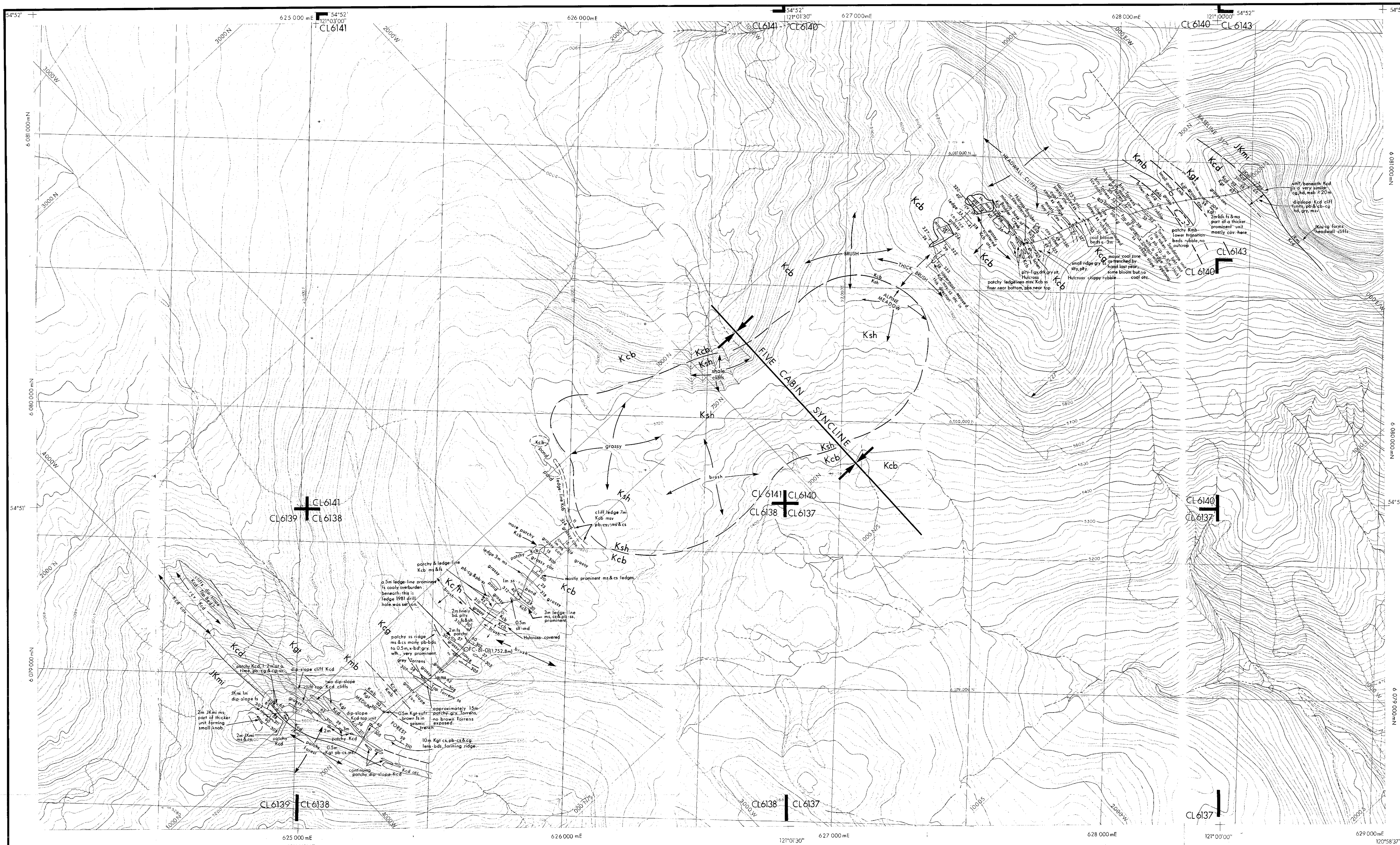
FIVE CABIN CREEK
N E B.C.

GEOLOGY MAP

KINUSEO FALLS 93 I/14E
KINUSEO CREEK 93 I/15W FIG.

AUTHOR A WHITE	SCALE 1:20 000	ENCLOSURE No. 3
DATE MAY 1981	REVISED D BELL-MAR./82	DRAWING No HA-100D
To Accompany 1981 FIVE CABIN CK. REPORT		

PR-5 Cabin Creek 81(2)A



REFERENCE

Wall		Control-Monument	△ T-12
Cut line		Control-Photo	△ 22003
Tree area		Spot elevation	4567
Tree line		Photo point	+18-162

piled by
NORTH EST SURVEY CORP. LTD.

MAP INDEX AND
AERIAL PHOTO INDEX

93 I/14-15

GEOLOGICAL LEGEND

CRETACEOUS

Ksh	Shaftesbury Formation
	Fort St. John Group
Kc	Commotion Formation
Kcb	Boulder Creek Member
Kch	Hulcross Member
Kcg	Gates Member
	Bullhead Group
Kmb	Moosebar Formation
Kcd	Cadomin Formation

JURASSIC - CRETACEOUS

JKmi	Minnes Group

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).

SCALE 1:5 000
100 0 100 200 300

CONTOUR INTERVAL 20'
DATE OF PHOTOGRAPHY JULY, 1971
DATE OF MAPPING DECEMBER, 1971

ABBREVIATIONS LEGEND,
MAPS AND CROSS SECTIONS

1.	Sizes	cm	centimeters true thickness
		m	meters true thickness
2.	Lithologic Types	cg, cgs	conglomerate, -s
		md	mudstone
		sh	shale
		slt	siltstone
		ss	sandstone
		qzt	quartzite, -itic
3.	Grain Sizes	bld, blds	boulder, -s
		cb, cbs	cobble, -s
		pb, pbs	pebble, -s
		cs	coarse-grained sandstone
		ms	medium-grained sandstone
		fs	fine-grained sandstone
		vfs	very fine-grained sandstone
4.	Bed Thickness	fiss	fissile
		flgy	flaggy
		msv	massive
		plty	platey
4.	Bedding	bd, bds	bed, -s
		intbd	interbedded
		x-bd	cross-bedded
5.	Colours	blk	black
		brn	brown
		grn	green
		gry	gray
		rsty	rusty
		lt	light
		drk	dark
6.	Miscellaneous	otc, otcs	outcrop, -s
		occ	occasional
		mnr	minor
		cov	covered
		rcv	recessive
		res	resistant
		hd	hard
		ovln	overlain
		unln	underlain
		wth, wthg	weathers, weathering

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Crows Nest Resources Limited
EXPLORATION

FIVE CABIN CREEK
N.E. BRITISH COLUMBIA

GEOLOGY MAP

N.T.S. 93I/14-15 U.T.M ZONE 10

AUTHOR: D. BELL	SCALE: 1:5 000	ENCLOSURE No: 4
DATE: 82 03	REVISED:	DRAWING No: HA-100
To Accompany		

PR - FIVE CABIN CREEK 81 (2) A

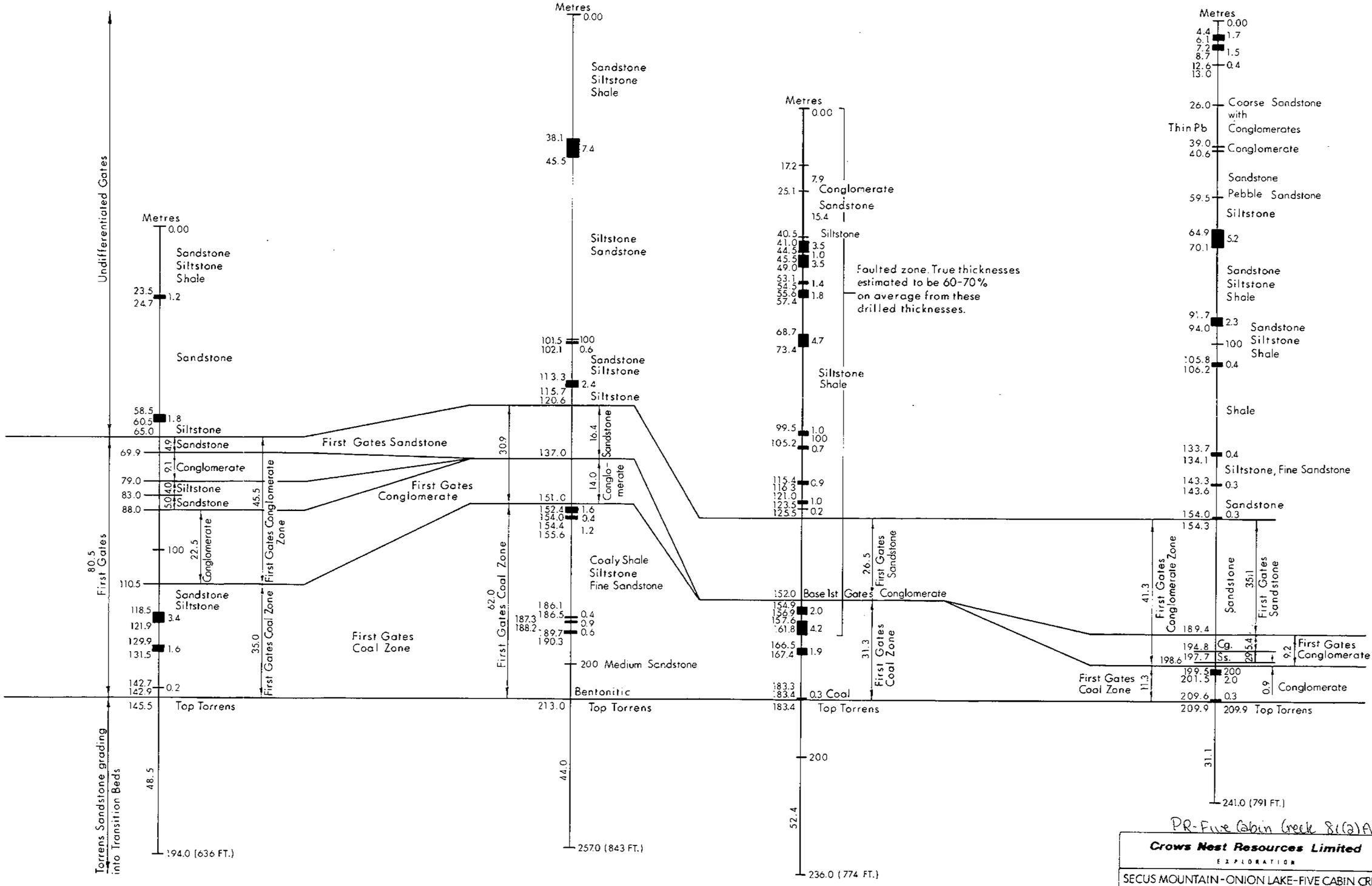
[redacted]

SECUS MOUNTAIN
SC81-1
SOUTH SECUS

SECUS MOUNTAIN
DG81-1
DUMB GOAT

ONION LAKE
ON81-1

FIVE CABIN CREEK
FC81-1



PR-Five Cabin Creek 8(2)A

Crows Nest Resources Limited
EXPLORATION

SECUS MOUNTAIN-ONION LAKE-FIVE CABIN CREEK
NORTH EAST, BRITISH COLUMBIA

CORRELATION DIAGRAM

AUTHOR: D. BELL	SCALE: 1:1000	ENCLOSURE No. 5
DATE: MAY / 82	REVISED	DRAWING No. CA-256
To Accompany		

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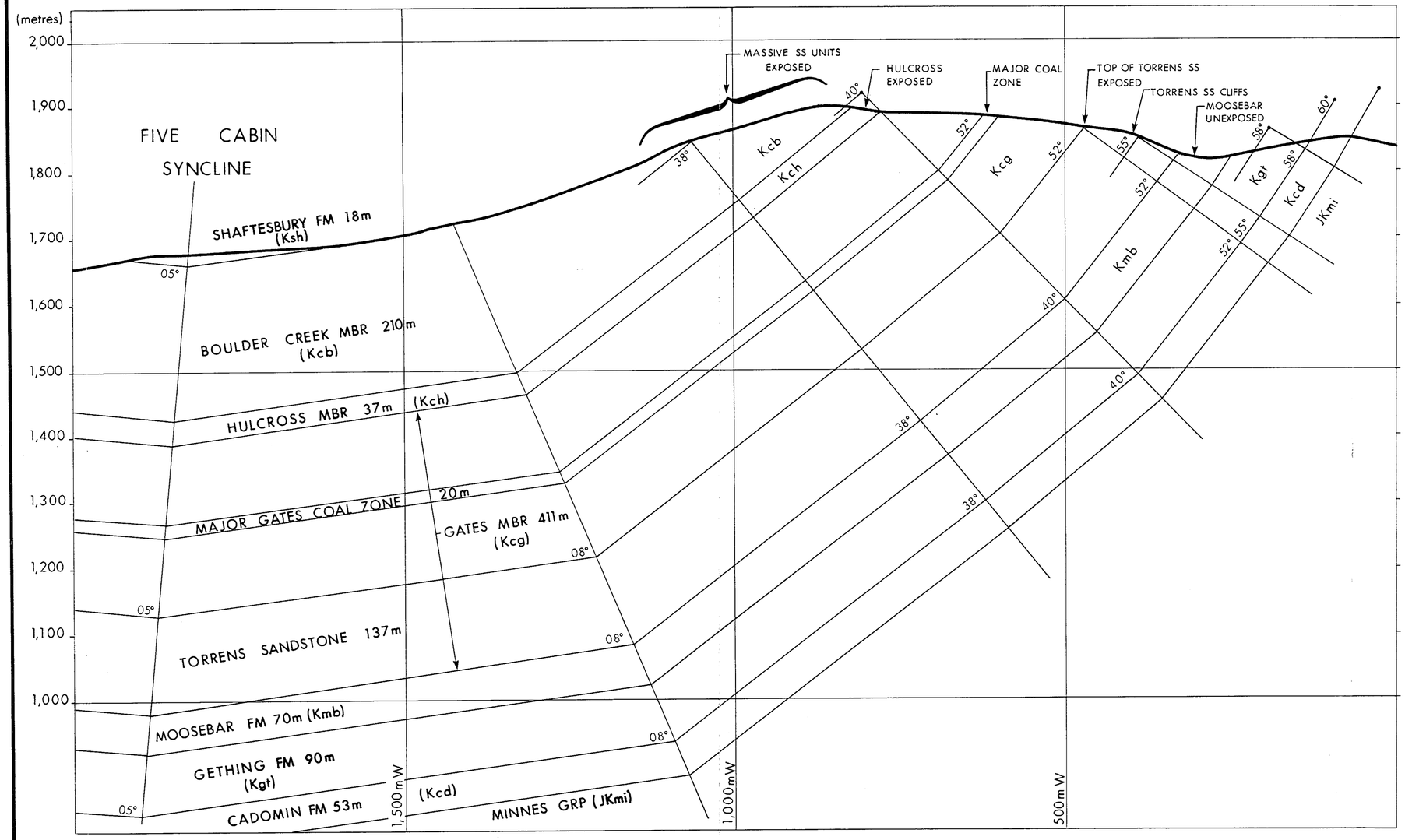

SCALE 1:5 000

100 0 100 200 300

GEOLOGICAL LEGEND

CRETACEOUS

- Ksh — Shaftesbury Formation
- Fort St. John Group
- Kc — Commotion Formation
- Kcb — Boulder Creek Member
- Kch — Hulcross Member
- Kcg — Gates Member
- Bullhead Group
- Kmb — Moosebar Formation
- Kcd — Cadomin Formation

JURASSIC - CRETACEOUS

- JKmi — Minnes Group

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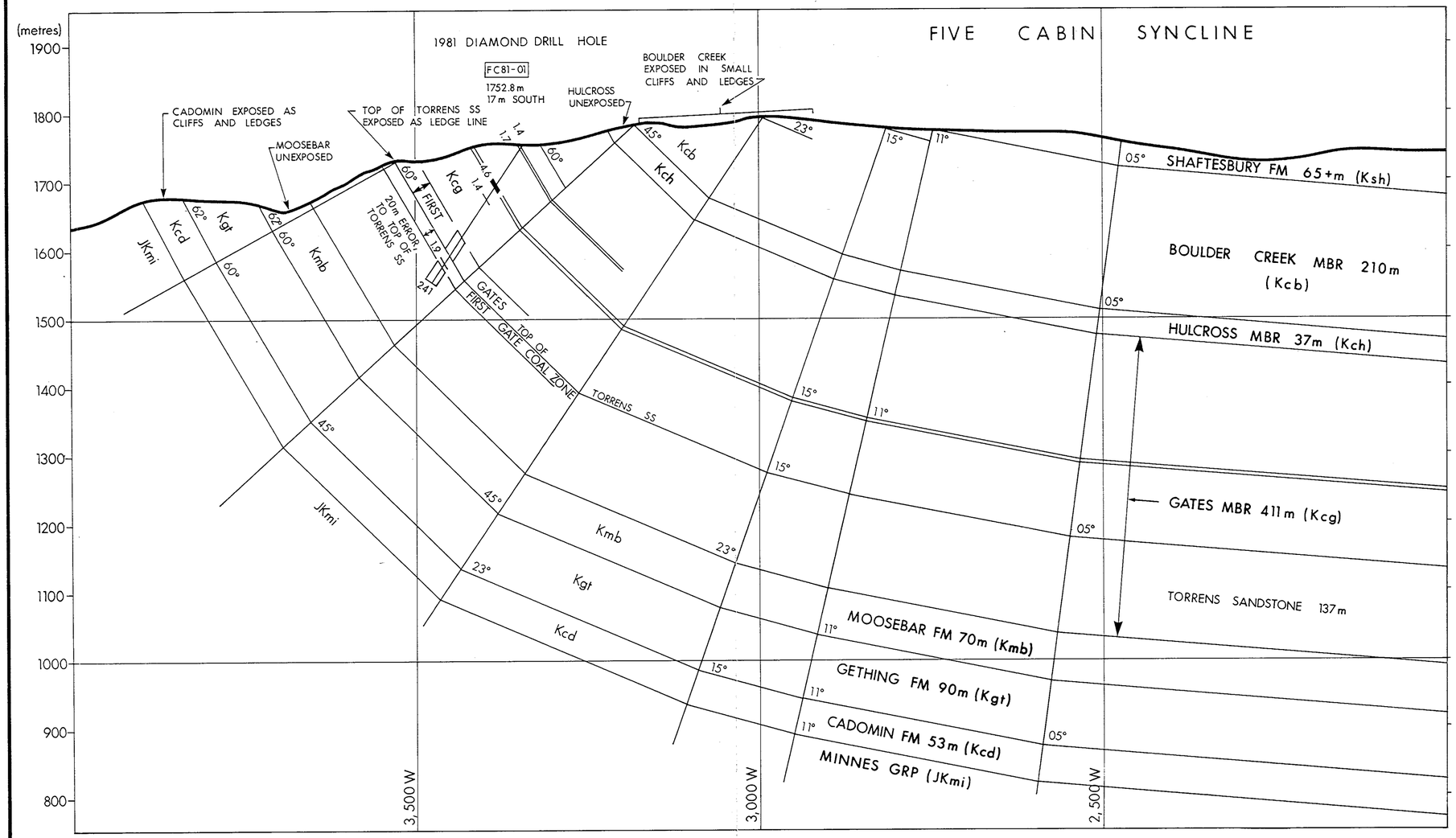
Pr - Five Cabin Creek 81(21)A

Crows Nest Resources Limited
EXPLORATION

FIVE CABIN CREEK
N.E B.C.

STRUCTURAL CROSS SECTION
300 NORTH

AUTHOR: D BELL	SCALE: 1:5000	ENCLOSURE No: 62
DATE: MAR./82	REVISED:	DRAWING No: HA-100A
To Accompany		



SCALE 1:5 000

100 0 100 200 300

GEOLOGICAL LEGEND

CRETACEOUS

Ksh	Shaftesbury Formation
	Fort St. John Group
Kc	Commotion Formation
Kcb	Boulder Creek Member
Kch	Hulcross Member
Kcg	Gates Member
	Bullhead Group
Kmb	Moosebar Formation
Kcd	Cadomin Formation

JURASSIC - CRETACEOUS

JKmi	Minnes Group

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PR - Five Cabin Creek 81(2)A

Crows Nest Resources Limited

EXPLORATION

FIVE CABIN CREEK

N. E. B.C.

STRUCTURAL CROSS SECTION

750 NORTH

AUTHOR: D. BELL	SCALE: 1:5 000	ENCLOSURE No: 66	
DATE: MAR. 82	REVISED:	DRAWING No: HA-100B	
To Accompany			

Pr. Five Cabin Creek 81(3-)A -(2)

871

Enc 7a

ROKE

OIL ENTERPRISES LTD. CALGARY, ALBERTA

GAMMA RAY NEUTRON LOG

FILE NO.

LSD
SEC
TWP
RGE
W. M

COMPANY: CROWS NEST RESOURCES LTD.
WELL: FIVE CABIN CREEK # 1 FCBH-
LOCATION: WEST LIMB, FIVE CABIN SYNCLINE
FIELD: NE. B.C.
PROVINCE: BRITISH COLUMBIA

Other Services: DENS-CAL, DIR

Permanent Datum: GROUND LEVEL Elev.
Log Measured from: GROUND LEVEL Above Perm. Datum
Well Depths Measured from: GROUND LEVEL

K.B.
CSG
G.L.
METRIC

Run No.	ONE
Date	9 JULY 1981
First Reading	238.5 M
Last Reading	0
Footage Logged	238.5
Depth Reached	239
Depth Driller	241
Casing Roke	3
Casing Driller	3
Fluid Type	WATER
Liquid Level	FULL
Min. Diam.	NQ
Rm @	
Operating Time	1½ HOURS
Truck No.	FU #3

Recorded By: FAGERNESS
Witnessed By: BELL

636

EQUIPMENT DATA

GAMMA RAY		NEUTRON	
RUN NO.	ONE	RUN NO.	ONE
TOOL MODEL NO.		LOG TYPE	NEUTRON/NEUTRON
DIAMETER	3,18 CM	TOOL MODEL NO.	
DETECTOR MODEL NO.		DIAMETER	3,18 CM
TYPE	SCINTILLATION	DETECTOR MODEL NO.	
LENGTH	10,16 CM	TYPE	PROPORTIONAL
DISTANCE TO N. SOURCE	2 M	LENGTH	15,24 CM
		SOURCE MODEL NO.	MRC-N-SS-W
GENERAL		SERIAL NO.	127
HOIST TRUCK NO.	FU # 3	SPACING	38,1 CM
INSTRUMENT TRUCK NO.	FU # 3	TYPE	AmBe
TOOL SERIAL NO.	RGRN 125A002	STRENGTH	3 CURIES

LOGGING DATA

GENERAL				GAMMA RAY				NEUTRON			
RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED M/MIN	T.C. SEC	SENS SETTINGS	ZERO DIV. L OR R	API G.R. UNITS PER LOG DIV.	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API N. UNITS PER LOG DIV.
1	0	238,5	4	3	500	0	15	3	5000	0	170

REMARKS: LOGGED THROUGH NQ DRILL RODS
HOLE DRILLED AT 60°

GAMMA RAY	DEPTHS	NEUTRON
GAMMA RAY INCREASES → API 15; 0 – 150		NEUTRON INCREASES → API 170; 0 – 1700 – 3400

Pr - Five Cabin Creek 8(13)A *(2)

81-1
Enc 76

ROKE OIL ENTERPRISES LTD. CALGARY, ALBERTA

SIDEWALL DENSILOG
CALIPER

FILE NO	
COMPANY	CROWS NEST RESOURCES LTD.
WELL	FIVE CABIN CREEK # 1 FC81-1
LOCATION	WEST LIMB, FIVE CABIN SYNCLINE
FIELD	NE B.C.
PROVINCE	BRITISH COLUMBIA
Other Services	GEN. DIR
Permanent Datum	GROUND LEVEL
Log Measured from	GROUND LEVEL
Drill Depths Measured from	GROUND LEVEL
KB / CSG / GL	METRIC
Run No.	ONE
Date	9 JULY 1981
First Reading	211 M
Last Reading	0
Footage Logged	211
Depth Reached	212
Depth Driller	241
Casing Roke	3
Casing Driller	3
Fluid Type	AIR
Fluid Level	NO WATER
Max. Diam.	NO
Operating Time	2 HOURS
Truck No	TU 43
Recorded By	PEACHENNESS
Witnessed By	HOLL

GENERAL				GAMMA RAY				SIDEWALL DENSILOG			
RUN NO	DEPTHS FROM	DEPTHS TO	SPEED M/MIN	T.C. SEC.	SENS SETTINGS	ZERO DIV. L OR R	API G.R. UNITS PER LOG DIV	T.C. SEC	SENS SETTINGS	ZERO DIV. L OR R	CPS/DIV
1	0	211.0	8					0.5	5000	1.37 R	199.61
1	0	211.0	8		CALIPER						

REMARKS HOLE DRILLED AT 60

DENS TOOL # 241AS
CAL TOOL # 857

CALIPER
DIAMETER — CM
5 7.5 10 12.5

DEPTHS

GAMMA RAY
API

BULK DENSITY
(GRAMS/CC)

ROKE DIRECTIONAL SURVEY

OIL ENTERPRISES LTD.

FC81-1

Enc 7c

COMPANY CROWS NEST RESOURCES LATITUDE _____ DATE SURVEYED 9 JULY 81

DRILLHOLE FINE CABIN CREEK #1 DEPARTURE _____ SURVEY BY FAGERNESS

LOCATION _____ ELEVATION _____ WITNESSED BY BELL

FIELD _____ MAGNETIC DECLINATION 25° E CALCULATIONS BY _____

PROVINCE BC N.E. B.C. CORRECTION OF _____ FOR _____ GRID

SLANT ANGLE FROM VERTICAL, BEARING FROM MAGNETIC NORTH

Number	Cable Depth M	Slant Angle°	Slant Angle Bearing°	Number	Cable Depth	Slant Angle	Slant Angle Bearing	Number	Cable Depth	Slant Angle	Slant Angle Bearing
0	0	31.5	202	11	165	33.5	200	22			
1	15	31.8	202	12	180	33.5	201	23			
2	30	31.8	203	13	195	33.8	201	24			
3	45	32.0	203	14	210	34.0	201	25			
4	60	32.1	202	15				26			
5	75	32.5	202	16				27			
6	90	32.5	202	17				28			
7	105	33.0	201	18				29			
8	120	33.1	201	19				30			
9	135	33.2	201	20				31			
10	150	33.5	200	21				32			

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Pr- Five Cabin Creek 81 (3*)A *(2) Enc 8

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CROWS NEST RESOURCES LIMITED

PROJECT: NORTH EAST B.C.
FIVE CABIN CREEK

AREA: FIVE CABIN CREEK N.T.S. 93 I/14E

HOLE I.D: FC-81-1

ZONE: 10

GRID TYPE: U.T.M.

EASTINGS: 625,612.39

NORTHINGS: 6,079,119.81

ELEVATION (m): 1,752.81

TOTAL DEPTH DRILLED: 241 m DRILLER: MID-WEST DRILLING

AZIMUTH: 227° TRUE

INCLINATION: 59° to 56°

DRILL TYPE: DIAMOND CORE OVERBURDEN: 3.0 m

CORE DIAMETER: NQ CASING LEVEL: 3.0 m

LENGTH CORED: 241 m WATER LEVEL: NO WATER

LOGS RUN: GAMMA-NEUTRON, GAMMA-SIDEWALL DENSILOG (L.S.D.) FOCUSED BEAM (TWO), CALIPER, AND DIRECTIONAL SURVEY

LOGS USED: GAMMA-SIDEWALL DENSILOG

LOGGED BY: ROKE, RECORDED BY: J. FAGERNESS LENGTH LOGGED: 211 m

CORE EXAMINED BY: G. COX, P. DUDZINSKI, J. MacDONALD

DATE EXAMINED: JULY 20, 1981

CORE SHEET LEGEND

CR	- Core recovered	Elev Bot	- Elevation of bottom of main lithology
CI	- Core interval	Lith. % R	- % recovery of main lithology
M-M %/R	- % recovery between marker blocks	Geop Pick	- Pick using geophysical logs
Mn Lith	- Main lithology	Lith % R	- Recovery for each main lithology from geophysical logs
Sm Des	- Seam designation		
MTh	- Measured thickness in m.	C/B	- Core to bedding angle
ETh	- Expected thickness in m.	El	- Elevation of reading

PROJECT: FIVE CABIN CREEK | AREA: N.E. B.C. | HOLE no. FC-81-1 | BOX nos | GEOP. PICK | PAGE 1 OF 14

Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des [4]	M Th / E Th [5]	Elev Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures [10]	Sample No. Y	C/B El. [11]	C/B Code [12]
											Hole is spudded in the undifferentiated gates member of the commotion formation of the Fort St. John group. Note 3m of casing			
5m			SST		5.42m						Medium grained, grey, Iron stained throughout, stick to semi-stick		67° / 5.42	
			SLST								Grey, some fine grained sandstone laminations; semi-stick to stick to rubble; Iron staining throughout. Lost .09m rubble to powdered shaley siltstone			
			SLST		5.83m		4.4							
			COAL		7.77m		6.1	97			Bright and dull bands, clean, iron staining throughout; semi stick			
8m	2.83 / 3.00	94	SLST								Shaly; semi-stick to rubble; slickensides and iron staining throughout			
			SLST		8.28		7.2				7.77m to 7.92m semi-stick to powder			
			COAL		9.81		8.7				Bright and dull bands, slickensides and iron staining throughout; 9.01m to 9.81 m rubble, sheared and slickensided throughout.			
11	2.53 / 3.00	84	SLST								Grey with coal stringers; stick to semi-stick; iron staining			
14	2.48 / 3.00	83			14.14		12.6				13.29m to 13.53m slickensides; 100% recovery of siltstone			
			COAL		14.57		13.0	111			Dull with bright bands, slickensides and iron staining; 14.37m shale stringer .035m thick			
			SLST								Grey to dark grey, carbonaceous with coal stringers; slickensides and iron staining		60° / 15.4	
			SLST		16.09m						14.57m to 15.14m rubble to semi-stick; iron staining, slickensides			
17	2.98 / 3.00	99	SHALE		16.80						Highly carbonaceous, stick to rubble; iron staining; coal stringers			
20	3.01 / 3.00	100	SLST								Light grey, some iron staining, stick			
23	3.80 / 3.00	127	SLST								Light grey, some iron staining, stick			
26	2.94 / 3.00	98	SLST		26.46m						Light grey, some iron staining, stick		61° / 25.1	
													57°	

26.46

PROJECT: FIVE CABIN CREEK | AREA: N.E. B.C. | HOLE no: FC81-1 | BOX nos: | GEOP PICK | PAGE 2 OF 14

Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures	Sample No. [10]	C/B El. [11]	C/P Code [12]
			SST								Light grey; coarse to very coarse grained; interbeds of comglomerate (pebble): stick			
			SST								-26.44 to 27.20m Siltstone clasts up to .02m long; -26.84 to 27.20m Siltstone and fine grained sandstone clasts up to 0.06 m conglomerate			
			SST								-27.2m to 27.38m rubble zone.			
29	3.12 / 3.00	104	SST								At 27.38m 0.27m pebble conglomerate -Pebble conglomerate at 28.41 to 28.83m carbonaceous stringers		70° / 28.83	
32	3.13 / 3.00	104	SST								-Pebble conglomerate at 30.23 to 31.39m minor carbonaceous stringers -Pebble conglomerate at 32.40 to 33.11m		48° / 33.10	
35	2.98 / 3.00	99	SST								Pebble conglomerate at 33.89 to 34.46m minor carbonaceous stringers minor iron stains			
			SST		38.4						-Pebble conglomerate at 36.04m to 37.10m minor carbonaceous stringers, stick		52° / 37.8	
38	3.00 / 3.00	100	CONGL								-Pebble conglomerate, dark to light grey, tan and light green clasts; stick			
			CONGL		39.99						-Grades to granule conglomerate at 39.20m; -Grades back to coarser pebble conglomerate at 39.50m			
41	2.94 / 3.00	98	SST								-Coarse grained light grey, stick; -Granule conglomerate 40.04m to 40.08 and 40.25 to 40.33 minor iron stains		75° / 40.3	
			SST											
			SST								-41.75m to 44.08m Very coarse grained, light grey to grey, coaly stringers, interbedded with pebble and granule conglomerates.			
			SST								-43.51m to 43.85m Very fine grained grey sandstone; stick		57° / 43.6	
44	3.00 / 3.00	100	SST								44.08m coarse grained; interbedded with granule and pebble conglomerate with siltstone and carbonaceous stringers			
			SST								46.50 to 46.92m granule conglomerate with coal stringers			
			SST								47.63m to 48.12m granule conglomerate with coal stringers; stick			
47	3.00 / 3.00	100	SST								46.92m to 48.12m iron staining along fractures			

PROJECT: FIVE CABIN CREEK | AREA: N.E. B.C. | HOLE no: FC-81-1 | BOX nos: | GEOP. PICK | PAGE: 3 OF 14

Marker Bl. [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures	Sample No. [10]	C/B / El. [11]	C/P / Code [12]
			SST								48.45 to 48.77m pebble conglomerate; minor carbonaceous stringers stick			
			SST								48.77 to 49.41 grey siltstone 49.41 to 49.92 pebble conglomerate; stick		76° 49.8	
50	3.00 3.00	100	SST								51.61 to 53.89m granule conglomerate with large coaly and siltstone clasts.		62° 54.0	
53	2.97 3.00	99	SST								54.31 to 54.42m pebble conglomerate medium grained sandstone, cross bedded (right way up) stick to 56.19m			
56	2.89 3.00	96	SST								58.22 cobble conglomerate; clasts grey, dark grey, and blue-grey, bluish green; stick, minor coal stringers, interbedded with medium to coarse sandstone to coarse sandstone to 59.51m; very minor calcium		83° 58.10	
59	3.00 3.00	100	SST										88° 39.6m	
			SST		60.69								68° 60.69	
59	3.00 3.00	100	SLST								Grey with very fine grained sandstone interbeds, Minor calcium veins and some pyrite; stick			
62	2.97 3.00	99	SLST											
65	2.99 3.00	100	SLST		64.86									
			SLST		65.99		64.99				Dark grey; carbonaceous; coal stringers; stick to semi-stick. At 65.68m very minor calcium veins		72° 69.90	
68	2.98 3.00	99	COAL								Dull with bright bands		70° 66.20	
			COAL								66.31m to 66.41m light grey very fine-grained sandstone; semi-stick			
			COAL								66.41m to 66.84m dull with bright bands; high ash; semi stick to 66.97m			
			COAL								66.97m to 67.15m bright; semi-stick 67.15m to 67.79m bright with dull interbands; light weight			
			COAL								67.79m to 68.47 m bright with dull bands, very hard; light weight, semi stick			
			COAL								68.41 to 68.95 rubble			

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Marker Bl.	CR / CI	M-M %R	Mn Lith (Sm Des)	M Th / E Th	Elev. Bot	Lith %R	Geop Pick	Lith %R	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures	Sample No.	C/B El.	C/P Axe Code
			COAL								*68.85m to 69.24 m semi-stick; slickensides* 69.24m to 69.99 m rubble, slickensides			
71	2.53 / 3.00	84	COAL								69.99m to 70.13 m powder, very poor recovery 70.13m to 70.91 m rubble to semi-stick; slickensides			
			COAL		71.75		70.1	111			1.12 m thick to 70.59 m very light, soft and dull coal.			
													76° / 10.91	
74	2.66 / 3.00	89	SLST								Grey with shale and sandstone interbeds; iron staining throughout; some semi-stick, stick			
			SLST								72.03 m to 72.20 m - light grey fine-grained sandstone, cross bedded (right way up)			
			SLST								72.20 m to 73.29m - grey shale 73.80 m - slickensided, calcium filled fracture, stick		73° / 73.6	
			SLST								74.19m to 74.6 m - grey shale, iron staining, stick			
			SLST								74.83m good slickensides with striae and cacium, stick			
77	2.88 / 3.00	96	SLST								75.21m same as at 74.83m 78.60m to 79.48 m very fine grained sandstone, light grey, cross		72° / 75.9	
			SLST								bedded (right way up), iron staining; stick		65° / 78.2	
80	3.11 / 3.00	104	SLST		80.18						79.93m to 80.18 m very fine grained light grey sandstone, minor calcium veins		63° / 80.18	
			SST								*80.18 to 80.52 m* Medium grained light grey sandstone with coal stringers, calcium veins, stick			
			SST		80.83						80.52m to 80.83 m Very fine grained sandstone, very minor lamination displacement; calcium veins, stick		65° / 83.30	
			SHALE		82.80						Grey massive, stick			
83	3.00 / 3.00	100	SLST	—	83.53						Grey interbedded with light grey sandstone 83.14 m - calcium filled fracture 83.46 m - slickenside striae with calcium, stick			
			SLST		83.53									

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Marker Bl. [1]	CR / CI [2]	M-M % R [3]	Mn Lith (Sm Dec) [4]	M Th / E Th [5]	Elev. Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures	Sample No. Y [10]	C/B El. [11]	C/P A Code [12]
			SHALE		84.12						Dark grey to grey, massive, shale and sandstone interbeds; stick		76° 84.12	
			SLST								Dark grey, massive, some iron staining; stick 84.66m to 85.08m light grey sandstone; minor fault displacement; laminations present.; calcium veins; slickensides; stick.			
			SLST											
			SLST								85.08m to 85.30m Siltstone 85.30m to 85.43m Dark grey shale, semi-stick 85.43m to 85.48m Siltstone			
86	2.91 / 3.00	97	SLST								86.18m Stick, slickensides			
89	3.00 / 3.00	100	SLST								86.53m to 86.78m Stick, slickensides 87.65m to 88.13m Grey silty shale, calcium filled fractures; Stick to semi stick			
92	3.08 / 3.00	103	SLST								88.73 m Stick, slickensides			
			SLST		93.12		91.7				92.46m to 93.12m Stick to semi-stick, slickensides			
			COAL								93.12m to 93.86m Dull with bright bands; slickensides throughout 93.68m to 94.22m High ash-bone coal			
			COAL								94.22m to 95.10m Dull with bright bands; soft and light, calcium, slickensides, semi-stick to rubble			
			COAL								95.10m to 95.20m Carbonaceous shale 95.20m to 95.24m Dull with bright bands, hard,			
			COAL		95.46		94.0	102			95.24m to 95.32m Carbonaceous silty shale with coal stringers 95.32m to 95.46m bright with dull bands; semi-stick			
			SST								Fine grained light grey; slickensides; some calcium; stick 96.52m to 96.72m Coal with shale stringers; rubble, slickensides			
			SST		96.72								67° 97.2	
			SHALE								Dark grey, semi-stick 97.73m to 98.01m Light grey siltstone interbedded			
98	5.77 / 6.00	96	SHALE								98.01m to 98.73m Highly carbonaceous shale, coal stringers throughout, stick to semi stick			
			SHALE		98.73									

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Marker Bl. [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures. Sample No. Y [10]	C/B El. [11]	C/P Abs Code [12]
			SLST		99.33m						Grey, stick to semi-stick 99.10m to 99.33m Poor slickensides; semi stick to rubble	74° 99.30	
101	2.67 3.00	89	SST								Medium grained with coal wisps 101.51m to 101.56m Shale	75° 100.4	
			SST								101.56m to 102.06m Dark grey siltstone, minor calcium veins, stick 102.06m to 102.96m Medium to fine grained sandstone; minor calcium (102.20 to 102.25); stick		
			SST									65° 102.15	
			SST		102.96								
			SST		103.4						Medium to fine sandstone Stick		
104	3.00 3.0		CARB SHALE	.64	104.04						With coal wisps, Semi-stick to stick, one rubble zone		
			CARB SHALE	1.11	105.15						Medium sandstone band, 0.06m thick. Shows soft sediment deformation. Occasional coal bands		
			COALY SHALE	.14	105.29						Rubble to broken stick		
			SST	1.61	106.9						Fine grained. Interbedded siltstone. Shows soft sediment deformation, broken stick to stick	74° 105.6	
107	3.065 3.0	102	CARB SHALE	.20	107.0						With coal wisps		
			COALY SHALE	.13	107.13		105.8				Overlying carbonaceous shale grades downward into coaly shale. Abundant coal wisps		
			COAL	.09	107.22						High ash coal. Dull with bright bands, rubble to mesh		
			COAL	.2	107.42						Bright coal with carbonaceous shale bands, very brittle, spherical inclusions present. Broken stick to rubble		
			COAL	.05	107.47						Dull, mesh		
	—		COAL	.04	107.51						Dull, broken stick		
			SHALEY COAL	.11	107.62						Dull with a few bright bands, broken stick to rubble		

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Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot. [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures	Sample No. Y [10]	C/B El. [11]	C/P Code [12]
			SHALEY COAL	.06	107.68		106.2	138			Dull, broken stick			
			CARB SHALE	.03	107.71						With coal bands to .01m thick, broken stick			
			COALY SHALE	.05	107.76						Bright coal, rubble			
			CARB SHALE	.075	107.84						With coal wisps, broken stick			
			SHALEY COAL	.09	107.93						Bright, fossiliferous, fern impressions, rubble			
			SHALEY COAL	.06	107.99						Broken stick			
			CARB SHALE	1.35	109.34						With abundant coal bands and wisps. Coaly shale in places, coal bands up to .02 m thick			
			COAL	.14	109.48						Dull with interbanded bright, slightly shaley coal			
			COALY SHALE	.06	109.54						Broken stick			
			COAL	.11	109.65						Bright with shale bands, broken stick to rubble			
			COAL	.07	109.72						Dull, rubble			
			CARB SHALE	.05	109.77						With coal wisps, broken stick			
			COAL	.05	109.82						Bright, broken stick to rubble			
			CARB SHALE	.29	110.11						With abundant coal wisps, broken stick			
110	3.2 / 3.00	107	COALY SHALE	1.7	110.28						With a bright coal band .02m thick, broken stick			
	—		SLST	.39	110.445						With coal bands grading into carbonaceous shale at the base, soft sediment deformation present, stick to broken stick			
			CARB SHALE	1.48	111.93						With coal bands .02 m thick, slickensides present, stick to broken stick			

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Marker Bl [1]	CR / CI [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures	Sample No. [10]	C/B / El. [11]	C/P A / Code [12]
			COALY SHALE	.43	112.36			–			Interbedded carbonaceous shale. Bright and dull coal bands present throughout.			
			CARB SHALE	.42	112.83						With coal bands and wisps. Grades into fine sandstone at base			
113	2.99 / 3.00	100	SST	.68	113.52						Grades into carbonaceous shale at the base. Calcite breccia along bedding. One calcite lined fracture. Three calcite filled		61° / 115.5	
116	3.035 / 3.00	101									fractures. Trough crossbedding indicates right way up. Occasional coal wisps.			
119	3.065 / 3.00	102	CARB SHALE	6.615	120.135						Carbonaceous shale with interbedded fine sandstone and shale. One zone of displaced bedding shows soft sediment deformation.		72° / 119.8	
122	3.1 / 3.0	103									Occasional calcite stringers and coal wisps. Stick to broken stick.			
			CARB SHALE	3.67	123.55						Dark grey, massive, some slickensides, stick to broken stick			
			COALY SHALE	.06	123.61						Rubble			
			COAL	.04	123.65						Dull, mesh			
125	2.88 / 3.0	96	SHALE	2.17	125.82						Light grey, non-carboniferous, with thin laminations of siltstone. Grades into carbonaceous shale at the base. Stick to broken stick		72° / 125.19	
128	3.09 / 3.0	103												
			CARB SHALE	4.635	130.495						Massive, becomes highly fractured towards the base. One Calcite lined fracture. Two calcite filled fractures. Slicken-		58° / 130.06	
131	3.065 / 3.00	102	CARB SHALE	.255	130.75						sides present, stick to broken stick. Rubble to mesh, strongly weathered, calcite present			
			CARB SHALE	4.73	135.43		133.7				Fractured throughout, highly fractured in places, slickensides present, occasional mud clasts present. Structure indicates right way up. Fossil ferns present.		55° / 135	
134	2.98 / 3.00	99	COAL	.335	135.92		134.1				Interbanded bright and dull becoming dull at the base. Some carbonaceous shale clasts present. Rubble to mesh.			
137	2.96 / 3.00	99	SLST	2.16	138.08						With interbedded carbonaceous shale, occasional coal wisps and bands. Two calcite filled fractures. Joint plane lined with			
140	3.02 / 3.00	100									calcite, 30° core to bedding angle.			

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Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Dec) [4]	M Th / E Th [5]	Elev Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures	Sample No. Y [10]	C/B / El. [11]	C/P / Code [12]
143	2.955 /	99	SST	5.54 /	143.645						Fine grained with interbedded carbonaceous shale and siltstone. One coarse sandstone bed .015m thick. Carbonaceous shale beds up to .84m thick. Coal bands up to .03m thick. Abundant coal wisps within the carbonaceous shale. One calcite filled fracture. Shows soft sediment deformation throughout. Stick to broken stick.		69° / 140.1	
	/		CARB SHALE	1.09 /	144.735		143.3				Massive with coal wisps. Upper contact gradational. Stick to broken stick becoming rubble at the base.		/	
	/		COAL	.33 /	145.13		143.6	132			Rubble to mesh		/	
146	2.875 / 3.0	96	CARB SHALE	.175 /	145.3						Calcite stringer .01 m thick at the top, broken stick		71° / 145.8	
	/		COAL	.025 /	145.33						Interbanded bright and dull		/	
	/		CARB SHALE	.695 /	146.02						Interbedded medium to coarse sandstone up to .35m thick. Shows displaced bedding. Stick to broken stick to broken stick		60° / 149.2	
149	3.11 / 3.00	104		/									85° / 149.5	
152	3.04 / 3.00	101	SST	9.25 /	155.21						Medium to coarse grained. Large scale truncated trough cross bedding indicates right way up. Carbonaceous shale rip up		77° / 155.03	
155	3.02 / 3.00	101		/							clasts present. Coal wisps present. Occasional coal bands		/	
	/		CARB SHALE	.145 /	155.36						Rubble to broken stick		/	
	/		COALY SHALE	.06 /	155.415		154.0				Rubble to mesh		/	
	/		COAL	.05 /	155.465						Dull, broken stick		/	
	/		COAL	.07 /	155.535						Dull with bright bands, broken stick		/	
	/		COAL	.04 /	155.575		154.3	53			Bright with dull bands, iron stains present, broken stick		/	
	/		CARB SHALE	.05 /	155.625						Broken stick		/	
	/		SHALEY COAL	.04 /	155.665						Broken stick		/	

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Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des [4]	M Th / E Th [5]	Elev. Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures	Sample No. [10]	C/B El. [11]	C/P Code [12]
			COAL	.02	155.685						Interbanded bright and dull			
			COAL	.015	155.7						Bright			
			COAL	.07	155.71						Dull with bright bands			
			COAL	.05	155.82						Bright with a few Limonite inclusions			
			COAL	.07	155.85						Interbanded bright and dull			
			COAL	.025	155.95						Dull with bright bands			
			COAL	.105	156.02						Dull			
			COAL	.06	156.06						Bright with dull bands			
			COAL	.04	156.12						Interbanded bright and dull			
			COALY SHALE	.025	156.145						Broken Stick			
158	2.835 / 3.00	95	CARB SHALE	1.97	158.115						With numerous coal bands and wisps up to .02m thick. Bioturbated (worm burrows present). Stick to broken stick			
			SST	.47	158.58						Fine to medium grained. Stick			
			COAL	.12	158.7						Interbanded bright and dull. Rubble to broken stick			
			CARB SHALE	.025	158.73						Broken Stick			
			COAL	.065	159.38						Bright with a few dull bands, a few thin shale streaks		78° / 159.3	
	—		CARB SHALE	.015	159.39						Broken stick			
			COAL	.03	159.43						Interbanded bright and dull			

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Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev Bot [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary - Tectonic Structures [10]	Sample No. Y	C/B El. [11]	C/P Code [12]	
161	3.02 / 3.00	101	CARB SHALE	.34	159.765						A few bright coal bands and abundant coal wisps present. Broken stick to rubble.				
164	3.00 / 3.00	100	SLST	1.525	160.79						With interbedded medium to fine sandstone. Load structures indicate right way up. Gradational lower contact. Stick to broken stick				
165	2.995 / 3.00	100													
167	3.035 / 3.00	101	CARB SHALE	1.105	161.92		160.06				With interbanded siltstone, abundant coal wisps and streaks present				
173	3.12 / 3.00	104	COAL	.15	162.07						Hard coal, dull with bright bands, broken stick to rubble				
176	3.175 / 3.00	106	COAL	.015	162.085						Bright, broken stick to rubble				
179	3.005 / 3.00	100	COAL	.27	162.355						Dull with bright bands				
with 182	3.065 / 3.00	102	COAL	.085	162.44		161	130			Interbanded bright and dull Top of First Gates Conglomerate Zone		64° / 164.8		
185	3.05 / 3.00	102	SST	27.46	189.9						Medium to coarse grained, light grey, Interbeds of granule conglomerate. Coal wisps and occasional coal bands less than		82° / 170.		
188	3.09 / 3.00	103									.01m thick present. Occasional pebbles and shale bands. Sharp upper contact cross bedding indicates right way up.		32° / 174.9		
											Displays channel scour features Calcite along bedding. 22 calcite filled fractures, 12 calcite		62° / 176.5		FIRST GATES CONGLOMERATE ZONE
											lined fractures, 2 calcite line joint planes with core axis to		85° / 179.3		
											plane angles of 21° and 11°.		83° / 185.5		
											Stick to broken stick. Rubble in highly fractures zones from		79° / 188.2		
											172.28m to 172.38m and 174.38m to 177.62m.		79° / 189.20		
191	2.93 / 3.00	98	CONGL.								Granule, light grey to dark grey and tan clasts with light grey fine grained sandstone interbeds, stick.				
194	2.93 / 3.00	98	CONGL.								192.0m - some green clasts, stick; some minor shale stringers (.003m thick)		84° / 192.10		

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Marker Bl [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des [4]	M Th / E Th [5]	Elev. Bor [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures	Sample No. Y [10]	C/B / El. [11]	C/P / A / Code [12]
			CONGL.		194.76						193.93m to 194.30m - pebble conglomerate with minor calcium veins			
			SST								Medium grained, light grey with pebble conglomerate interbeds, stick.		84° 194.6	
			SST								194.80m - stick, slickensides 195.20m - poor slickensides with calcium			
197	3.02 / 3.00	101	SST								195.20m to 195.31m - pebble conglomerate, clasts as before 196.11m to 196.21m - good slickensides, semi stick 197.0 m to 197.05m - pebble conglomerate, clasts as before		80° 197.0	
			SST										80° 199.2	
200	3.14 / 3.00	105	CONGL.		200.13						Pebble conglomerate, light and dark grey clasts, minor pyrite crystals, stick.		85° 200.13	
			SST		201.00						Medium to coarse-grained, light grey with slickensided carbonaceous stringers, stick			
			SHALE								Carbonaceous shale with coal stringers, slickensides, stick to semi-stick			
			SHALE		201.4		199.5				201.36m to 201.40m - soft powdery coal			
			COAL		201.45		200.10				201.40m to 201.45m - coal; bright with dull bands, hard			
			SHALE		201.75		201.3				201.45m to 201.75m - carbonaceous shale 201.75m to 201.90m - coal; bright, soft with shale laminations			
			COAL		201.9		201.5	75			201.90m to 202.48m - carbonaceous shale; semi-stick, some rubble		65° 202.48	
203	3.15 / 3.00	105	SST								Fine grained, light grey to grey, stick. 203.00m - calcium and slickensides, stick			
			SST								203.15m - coal stringer 204.60m - grades into medium grained sandstone with minor calcium veins		66° 206.0	
			SST								206.20m to 206.35m - minor carbonaceous stringers and calcium veins throughout. 207.75m - poor slickensides, minor pyrite			
			SST		207.75		206.4				207.75m to 207.93m - medium grey siltstone; pyrite on fractures			
			COAL								207.75m to 208.45m - bright, soft; pyrite and iron staining throughout, slickensides, semi-stick			

FIRST GATES CONGLOMERATE ZONE

FIRST GATES COAL ZONE

PROJECT: FIVE CABIN CREEK | AREA: N.E. B.C. | HOLE no: FC81-1 | BOX nos: | GEOP. PICK | PAGE 13 OF 14

Marker Bl. [1]	CR / CI [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot. [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures	Sample No. [10]	C/B El. [11]	C/P A Code [12]
209	3.00 / 3.00	1.00									308.45m to 209.00m - bright and dull interbands; pyrite throughout; hard, some clasts of boney coal; semi stick			FIRST GATES COAL ZONE
			COAL								209.00m to 209.87m - bright and dull interbeds; no clasts; pyrite throughout; slickensides, semi-stick to rubble			
			COAL		209.87		208.5	101						
			SLST		211.01		209.6				Dark grey with slickensided coal stringers, stick		62° / 210.	
			COAL								211.01m to 211.36m - bright with dull bands, hard, semi-stick to rubble.			
			COAL		211.36		209.9	117			211.36m to 211.60m - shale with coal stringers Top of Torrens Sandstone		60° / 211.64	
212	2.99 / 3.00	100	SST								Medium grained, light grey, with some carbonaceous stringers 214.52m to 214.59m - coaly lamination, with minor displacement		75° / 214.52	TORRENS SANDSTONE GRADING INTO TRANSITION BEDS
			SST								214.85m - slickensided striae with calcium 215.20m - slickensides with calcium, stick			
215	2.94 / 3.00	98	SST								216.51m to 216.80m - zone of minor lamination displacement; fractured; calcium veins, stick.		85° / 217.24	
218	3.09 / 3.00	103	SST								218.13m to 218.18m - poor slickensides, calcium veins. 218.84m to 219.19m - faulted zone, calcium veins, good slickensides, stick to semi-stick		19° / 218.86	
221	3.00 / 3.00	100	SST								219.67m - poor slickensides with calcium. 226.08m to 226.52m - cross beds, right way up; poor slickensides		76° / 223.85	
224	2.46 / 3.00	82	SST										69° / 226.06	
227	2.98 / 3.00	99	SST								227.05m - grades to fine grained standstone 228.16m to 229.07m - slickensides with calcium veins, stick to semi-stick			
			SST								228.80m to 228.86m - minor displacement in laminations 228.89m to 229.00m - fault gouge, powder to rubble, some calcium 229.28m to 229.72m - slickensides and calcium, stick			
230	2.94 / 3.00	98	SST								230.0m to 230.34m - slickensides and calcium 230.62m to 234.02m - interbeds of siltstone, slickensides and minor calcium veins, semi stick to stick		74° / 230.0	
233	3.07 / 3.00	102	SST										74° / 233.0	
236	3.05 / 3.00	102	SST								237.2m to 238.87m - interbeds of siltstone, good slickensides, stick to semi-stick		82° / 237.2	

PROJECT: FIVE CABIN CREEK | AREA: N.E. B.C. | HOLE no: FC81-1 | BOX nos: | GEOP. PICK | PAGE 14 OF 14

Marker Bl. [1]	CR / Cl [2]	M-M % R [3]	Mn Lith (Sm Des) [4]	M Th / E Th [5]	Elev. Bot. [6]	Lith % R [7]	Geop Pick [8]	Lith % R [9]	Minor Lith	Th	REMARKS Lithology, Sedimentary-Tectonic Structures	Sample No.- Y [10]	C/B / El. [11]	C/P / Code [12]
239	3.01 / 3.00	100	SST								239.0 m to 241.0 m - siltstone interbeds, minor displacement, calcium, some slickensides, stick.		84° / 240.82	
241	1.82 / 2.00	91	SST											

Pr- Five Cabin Creek 81(2)A   Enc 9

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HOLE: FC-81-1
NORTHINGS: 6,079,119.81
EASTINGS: 625,612.39
ELEVATION: (m) 1,752.81

STRATIGRAPHIC SECTION

PROJECT:	FIVE CABIN CREEK
AREA:	N.E. B.C.
LOCATION:	WEST LIMB, FIVE CABIN CREEK SYNCLINE
DESIGNATION:	FC81-1
PART	1 OF 1
AUTHOR:	D. BELL
DATE:	1981 JULY
SOURCE OF DATA:	FIVE CABIN CREEK DRILL HOLE #1,1981 DIAMOND CORE GEOLOGY LOG FC81-1

HD-90 B

NOTES:
1. HOLE SPUDDED IN GATES MEMBER 211.6m ABOVE TORRENS SANDSTONE
2. STRUCTURE IS UNDISTURBED
3. CORE THICKNESSES BELOW ARE APPARENT BE A CALCULATED AVERAGE OF 27°; THEREFORE FOR TRUE THICKNESS MULTIPLY BY 0.89.

SCALE [m] / CONTROL POINT	INTERVAL	STRIKE & DIP	DESCRIPTION MAIN	DESCRIPTION AMPLIFIED (LITHOLOGY)	STRUCTURE
0			Sandstone	Grey,medium grained	Stick to semi-stick,iron staining throughout
	5.42	60° 5.83	Siltstone	Grey,fine grain sandstone laminations.	Semi-stick,rubble to powder Iron staining throughout
1.94m	7.77		COAL	Bright and dull interbeds	Iron staining,poor cleat
		8.28	Siltstone	Shaly	Semi-stick to rubble,slickensides and iron staining throughout
1.53m	9.81	powder	COAL	Bright and dull intervals	Semi-stick to rubble,slickensides and iron staining throughout
			Siltstone	Grey with coal stringers	Stick to semi-stick,iron staining 13.29m to 13.53m slickensides
0.43m	14.57	slicks. 14.14	COAL	Dull with bright bands	Slickensides and iron staining throughout
		60° 15.40	Siltstone	Grey to dark grey, coal stringers	Slickensides and iron staining
	16.8	16.09	Carbonaceous Shale	coal stringers	Stick to semi-stick,some rubble, iron staining throughout
			Siltstone	Light grey to grey	Stick,some iron staining
		61° 25.10m; 57° 26.46m; 70° 28.83m; 48° 33.10m; 52° 37.80m	Sandstone	Light grey very coarse grain with conglomerate interbeds (coal stringers)	Stick
	38.4 m	39.99	Conglomerate	Pebble conglomerate; light grey,tan and green clasts	Stick
	41.75m	75° 40.30m; 59° 41.0 m	Sandstone	Light grey coarse grain with interbeds of granule conglomerate	Stick,minor iron staining
		57° 43.60m; 44.08	Sandstone	Light grey to grey,very coarse grain with granule conglomerate interbeds	Stick
		78° 49.80m; 62° 54.0m; 83° 58.70m; 88° 59.60m	Sandstone	Light grey coarse grained with granule and pebble conglomerate and siltstone interbeds,coal stringers	Stick
	60.69	69° 60.69m; 72° 62.9m	Siltstone	Grey interbedded with light grey very fine grain sandstone	Stick,minor calcite and pyrite
	65.99	64.84; 70° 66.2m	Siltstone	Dark grey carbonaceous with coal stringers	Stick to semi-stick,slickensides and minor calcite
5.76m		76° 70.91	COAL		
162.4m UNDIFFERENTIATED GATES		71.75; 73° 73.60m; 72° 75.90m; 65° 78.2m; 63° 80.18m	Siltstone	Grey with shale and sandstone interbeds	Stick with some semi-stick iron staining throughout slickensides with calcite cff
	80.83	65° 81.51	Siltstone		Stick to semi-stick,slickensides and striae calcium veins
	82.8		Shale		
	84.12	83.53 76°	Siltstone Shale		
		93.12	Siltstone	Dark grey	Stick,massive,some iron stains, slickensides,calcium veins,minor displacements ≈ .004m
2.34m	95.46		COAL		
		96.72	Sandstone	Light grey fine grained with coal stringers	Stick,some calcium slickensides
	98.73	67° 97.20m	Shale	Dark grey with siltstone and coal interbeds	Semi-stick to stick
		74° 99.33	Siltstone	Grey	Stick to semi-stick
	103.4	75° 100.4m; 65° 102.15	Sandstone	Light grey medium grained grading to fine grain with siltstone interbeds	Stick,minor calcium veins
		105.29	Shale	Carbonaceous with coal stringers	Rubble to semi-stick
	106.9	74° 105.60	Sandstone	Fine grained	Stick to semi-stick
0.86m		107.13	Shale	Carbonaceous	
	107.99		COAL		
		109.34	Shale	Carbonaceous	Semi-stick
0.94m	110.78	78° 110.28	COAL		
		110.45	Siltstone		
	112.83		Shale	Carbonaceous with coal interbeds	Stick to semi-stick
		113.52	Sandstone	Fine grained	Stick,calcium
		61° 115.54; 72° 119.75	Shale	Carbonaceous with coal stringers	Semi-stick to stick,calcium veins throughout
	123.65	72° 125.19	Shale	Carbonaceous with siltstone laminations	Semi-stick
		58° 130.06	Shale	Carbonaceous some coal stringers	Semi-stick to rubble
0.49m	135.43	55° 134.99; 135.92	COAL		
	138.08		Siltstone	Interbedded with coal and siltstone	Semi-stick to stick
		69° 140.08	Sandstone	Fine grained interbedded with siltstone and carbonaceous shale	Semi-stick to stick
	146.02	143.65; 71° 145.82	Shale	Carbonaceous interbedded with siltstone	Stick to semi-stick,some powder calcium throughout
	77° 155.03	60° 149.22; 85° 149.53	Sandstone	Medium to coarse grained with coal stringers	Stick
	158.1	155.21	Shale	Carbonaceous with coal stringers	Stick to semi-stick
		158.6	Sandstone	Fine to medium grained	Stick
	159.76	78° 159.33	Shale	Carbonaceous	Stick
		161.92	Siltstone	Coal and shale interbeds	Semi-stick
162.4	0.52m 162.44				
FIRST GATES - 37.7 m CONGLOMERATE ZONE		64° 164.82m; 82° 170.03; 32° 174.88; 62° 176.50; 85° 179.30; 83° 185.54; 79° 188.15; 79° 188.20; 189.9	Sandstone	Light grey medium grained with interbeds of granule conglomerate	Stick
	194.76	84° 192.10; 84° 194.60	Conglomerate	Pebble conglomerate	Stick,minor pyrite
		80°; 80° 199.2	Sandstone	Light grey medium grained with pebble conglomerate interbeds	Stick,poor slickensides,calcium
200.1	200.13	85°	Conglomerate	Pebble conglomerate	Minor pyrite
		201.0	Sandstone	Light grey medium to coarse grained	Stick,slickensides
	202.48	65°	Shale	Carbonaceous,coal stringers and interbeds throughout	Stick to semi-stick,some powder slickensides
FIRST GATES -11.5m COAL ZONE		66° 206.0	Sandstone	Light grey to grey fine grained with coal stringers	Stick,calcium and slickensides
2.12m	209.87	207.75	COAL		
		62° 210.0	Siltstone	Dark grey with coal stringers	Stick,slickensides
211.6	0.63m 211.64	60° 211.01	COAL		
TOP OF TORRENS SANDSTONE					
-29.4 TORRENS SANDSTONE GRADING INTO TRANSITION BEDS		85° 217.24m; 19° 218.86m; 76° 223.85m; 69° 226.06m; 74° 230.0m; 74° 233.0m; 82° 237.20m	Sandstone	Light grey medium grained with fine grained sandstone and siltstone interbeds	Stick,slickensides,calcium
240	84° 240.82m	241			

ORIGINAL FILE NO.
VQ-24?
HD-90 B