K- Shell Crown Mtn. 80(1)A

ASSESSMENT REPORT

C.L.'s 305-313, 345-347, 371, 372, 408

Crown Mtn. - Shell - 1980

Shell Canada Resources Ltd.

by J.E. Bell

April 30, 1981

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K. Shell Crown Mtn 80(1)A

CROWN MOUNTAIN

COAL EXPLORATION

1980

OPEN FILE

Coal Licences 305-313 Inclusive, 365, 366, 367, 371, 372
408 (15 licences, 2,561 ha)

Kootenay Land District, Southeast British Columbia

National Topographic Series: 82 G/15 (Toronado Mountain)
and 82 G/10 (CrowsNest)

Latitude and Longitude: 49 degrees, 47 minutes north, 114 degrees,
44 minutes west

Owner: Shell Canada Resources Limited

Operator: Crows Nest Resources Limited

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

Field Work: September, 1980

Submission Date: 30-04-81

CNRL Coal Land Disposition Maps HH 36D and HH 36E

2/Wa.1

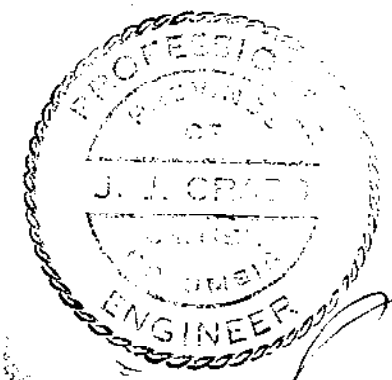
PROFESSIONAL VERIFICATION REPORT

Entitled: Crown Mountain Coal Exploration, 1980
Kootenay Land District
Southeast British Columbia
B.C. Coal Licences 305-313 Inclusive and 365, 366
367, 371, 372, 408 (15 total)

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

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

I consider the aforementioned geologist to be well qualified to have undertaken the responsibilities he was assigned for this project. I am satisfied that the attached report dated April 30, 1981, has been competently prepared and justly represents the information obtained from this report.



J.J. Crabb, P. Eng.

April 30, 1981

2/Wa.2

TABLE OF CONTENTS

1.0	Summary		2
2.0	Introduction		4
	2.1	Coal Land Tenure	4
	2.2	Location, Geography, and Physiography	6
	2.3	Access	9
	2.4	Environment	11
3.0	Work Done		12
	3.1	Summary of Previous Work	12
	3.2	Scope and Objective of 1980 Exploration	13
	3.3	Work Done in 1980	14
	3.4	Costs of Work Done in 1980	15
4.0	Geology		18
	4.1	Regional Geology } see also Shell Can Mtn. 79-1-A	18
	4.2	Stratigraphy }	18
	4.3	Structural Geology	21
		4.3.1 Structural Setting	22
		4.3.2 Results of the Mapping Program	24
5.0	Recommendations		28
6.0	Bibliography		30

ILLUSTRATIONS

		SCALE	CNRL NO.	PAGE
FIG. 1	LOCATION MAP	1:800,000	BA-259	1
FIG. 2	LICENCES TENURE STANDING			5
FIG. 3	INDEX MAP	1:125,000	HD-44B	7
FIG. 4	FORMATIONAL DIAGRAM		HF-42	19
FIG. 5	STRATIGRAPHIC SECTION	1:2,000	HD-44C	20

APPENDICES

APPENDIX A ABBREVIATIONS LEGEND, GEOLOGIC BASE MAP 1:5,000

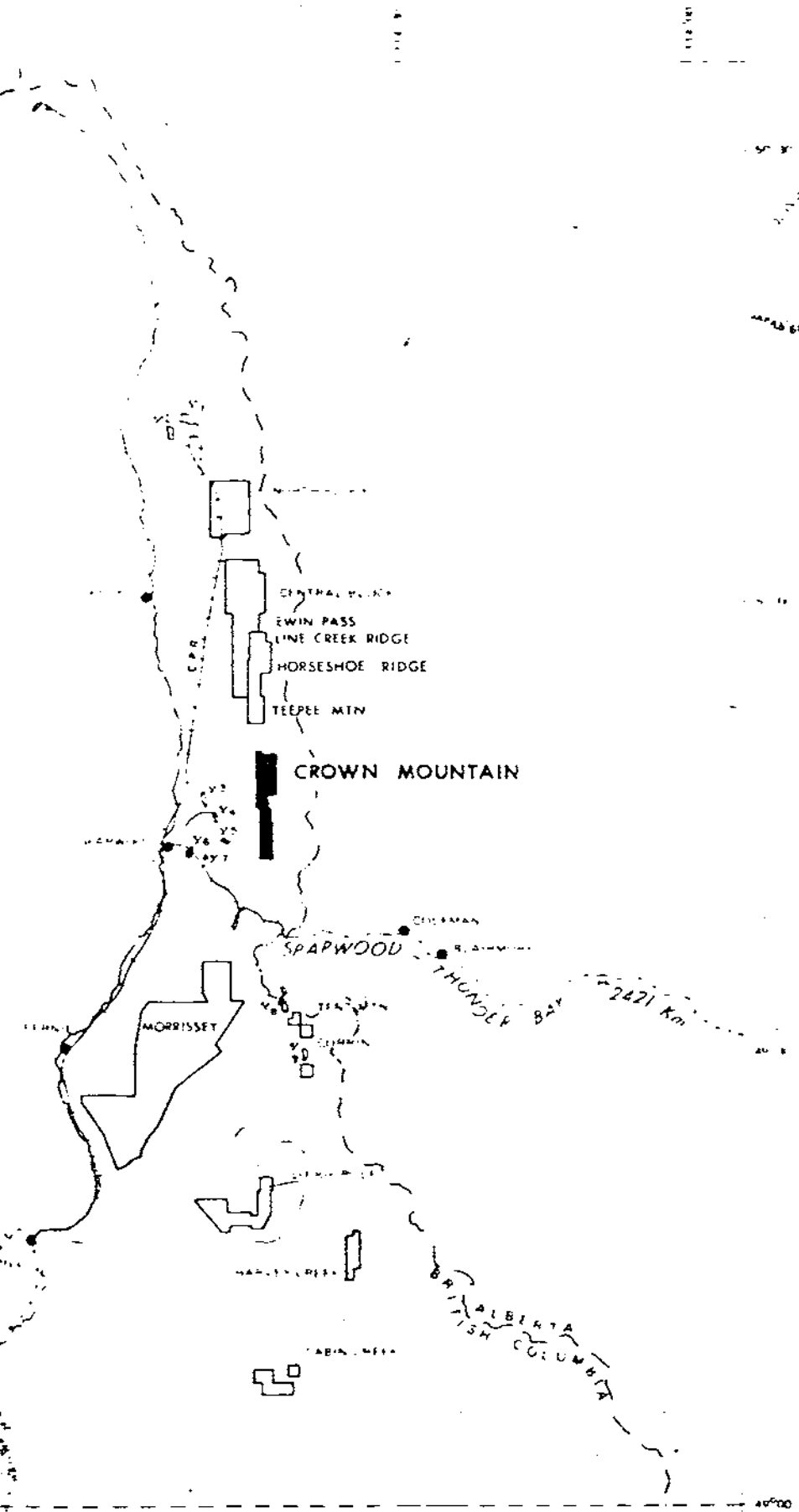
APPENDIX B 1:50,000 INDEX AND GEOLOGICAL COMPILATION MAP HE-50C ✓

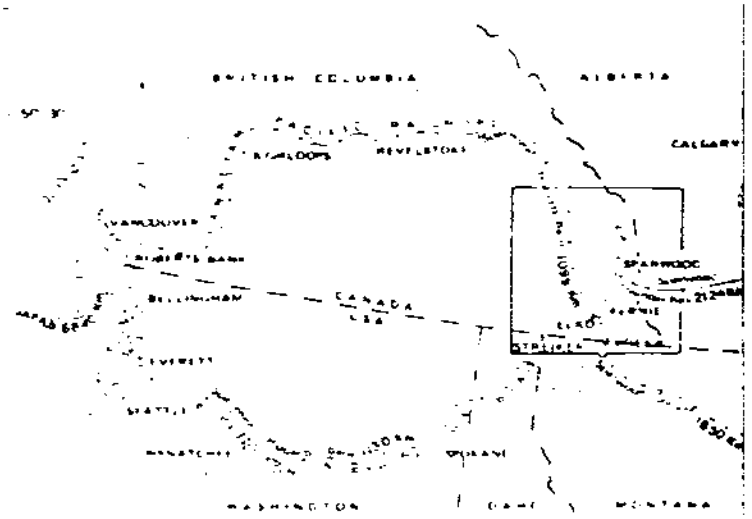
APPENDIX C 1:5,000 GEOLOGIC BASE MAP (ONE) ✓

APPENDIX D 1:5,000 STRUCTURAL CROSS SECTIONS (TWO) ✓

APPENDIX E 1:50,000 COAL LAND DISPOSITION MAPS (TWO) HH-36 AND HH-36E

APPENDIX F 1979 DRILL HOLE CORE SAMPLE ANALYSES SEE 1975 REPORT





LEGEND

OPERATING MINES

[illegible] COAL LTD

[illegible] POD PIT

[illegible] GREENHILLS PIT

BALMER RESOURCES LTD

3 HAMMER PITS 1 & 2

4 ADIT 29 PIT

5 CAMP 2 & ADIT 604 PITS

6 BALMER SOUTH HYDRAULIC UNDERGROUND MINE

BALMER NORTH CONVENTIONAL UNDERGROUND MINE

COLEMAN COLLIERIES LTD

8 TENT MOUNTAIN PITS

BYRON CREEK COLLIERIES LTD

9 CORBIN PIT

COAL RIGHT OWNED LICENCED BY

SHELL CWNL

Crows Nest Resources Limited

EXPLORATION

CROWN MOUNTAIN

SOUTHEAST B C

LOCATION MAPS

Figure 1

[illegible] Mottonhegyi SCALE 1:800000

DATE Feb 21 1979 ISSUED DEC 1979

DRAWING BA-259

1.0 SUMMARY

In September, 1980 the author spent thirteen days, including mobilization, demobilization, and bad weather, doing a combination of reconnaissance and detail geologic mapping on the southernmost seven licences of the Crown Mountain area, southeast British Columbia.

These licences cover part of what are physiographically the east-facing lower slopes of Erickson Ridge, a massive main-range Rocky Mountain. This part of the Crown Mountain licences is that half not mapped during the 1979 field season (that part is covered in the 1979 Crown Mountain report), and it is separated from the 1979-examined licences by West Alexander Creek, which has cut down to almost the base of the coal section and effectively makes Crown Mountain two separate properties. The peak of Crown Mountain occurs in those eight northern, 1979-examined licences. The seven licences covered in this report (totalling fifteen for the group) are referred to as the "Erickson Ridge Crown licences."

The purpose of the mapping was to determine if enough Coal-Bearing Member of the Kootenay Formation (i.e. if enough Mist Mountain Formation of the Kootenay Group, using Gibson's 1979 Geological Survey of Canada latest classification) was present to warrant further mapping, or drilling, or other geologic work from an open pit or strip mine potential point of view. The licences had not been regarded as particularly prospective, because the topography is severely adverse,

relative to the other Crows Nest coal properties in southeast British Columbia.

The mapping was done on foot, in traverses up from the valley bottom to reach the section, by the author and one companion. The terrain is steep, awkward, and brush-choked.

The results indicate that there is approximately 50% less of the coal section present than even the minimum amount hoped for; it is severely limited on the top by the Crown Mountain Thrust, a fault subsidiary to the main Erickson Thrust, a regional fault, which is responsible for the mass of Paleozoic Erickson Ridge above.

This unexpected restriction of the available coal section combined with the already known adverse topography and general thinness of coal seams (thinness if the 1979-studied nearby northern half of the licences is used as a guide) leads to an author's recommendation involving a short, limited amount of exploration aimed at dropping two to three licences from the seven, and a further, slightly more elaborate plan on the narrow 200 m by 3 km prospective band within the other four licences. The author expects no great coal news from either plan.

2.0 INTRODUCTION

2.1 Coal Land Tenure

Fifteen licences (305 - 313 inclusive, and 365, 366, 367, 371, 372, 408) compose Group 265, 2,561 hectares. The area is called Crown Mountain, after the name for a subsidiary small peak within the northern part of the licences.

The following table entitled "B.C. Coal Licences Tenure Standing, Crown Mountain" gives details of tenure.

CROWS NEST RESOURCES LIMITED
EXPLORATION

B. C. COAL LICENCES
TENURE STANDING

BLOCK: CROWN MOUNTAIN
GROUP: #265

PROJECT: CROWN MOUNTAIN
KOOTENAY LAND DISTRICT

YEAR: 1980
DATE: APRIL, 1981

PROJECT			BLOCK			GROUP				LICENCE			ACQ/ADM		RENTALS		REQUIREMENT WORK						BUDGET		EXP	POTL	COMMITMENTS, J. V.	REMARKS
NAME	LICS. TOTAL NO.	AREA TOTAL AC/HA	NAME	LIC. TOTAL NO.	AREA TOTAL AC/HA	NO.	LICS. TOTAL NO.	AREA TOTAL AC/HA	YEAR	NO.	LEGAL DESCRIPTION	AREA TOTAL AC/HA	FEES YEAR	$	ANNUAL $	TOTAL TO NEXT ANN. $10.3	EXPIRED $10.3	CURRENT YEAR LIC. YEAR	$	PRE-EXP. YEAR	EXPENDITURE $	ANNIVERSARY DATE	CURRENT YEAR AFE	$10.3	TOTAL $10.3	SHELL CLAIMS	OTHER THAN B.C. GOV'T OBLIGATION	
CROWN MTN.	15	2561				265	15	2561					79 75	170.0	12,805	63.7	151.5	667	128,050	14	190,513	JAN. 31			575.2	Y		
										305	LOT 8289	259	75					6										
										306	LOT 8518	259	75					6										
										307	W½ 8519	130	75					6										
										308	W½ 8520	130	75					6										
										309	E½ 8521	130	75					6										
										310	E½ 8522	130	75					6										
										311	LOT 8290	259	75					6										
										312	LOT 6443	259	75					6										
										313	S.of 8289	259	75					6										
										365	W½ 6440	130	74					7										
										366	W½ 6441	130	74					7										
										367	LOT 6442	182	74					7										
										371	E½ 6781	130	74					7										
										372	E½ 8520	130	74					7										
										408	SOUTH OF 6440 & 6443	±±	74					7										
														WORK DONE	PRIOR TO '78	1978	1979		1980									
CROWN MTN.		2561 Ha 6317 Ac												$	141,627	23,920	164,118		12,456									

GENERAL REMARKS: FILL NECESSARY LINES AND COLUMNS ONLY. COAL DEVELOPMENT POTENTIAL IS "Y" (PRIME) UNLESS OTHERWISE STATED. LICENCES HELD BY SHELL CANADA RESOURCES LTD. / CNRL IS THE OPERATOR.

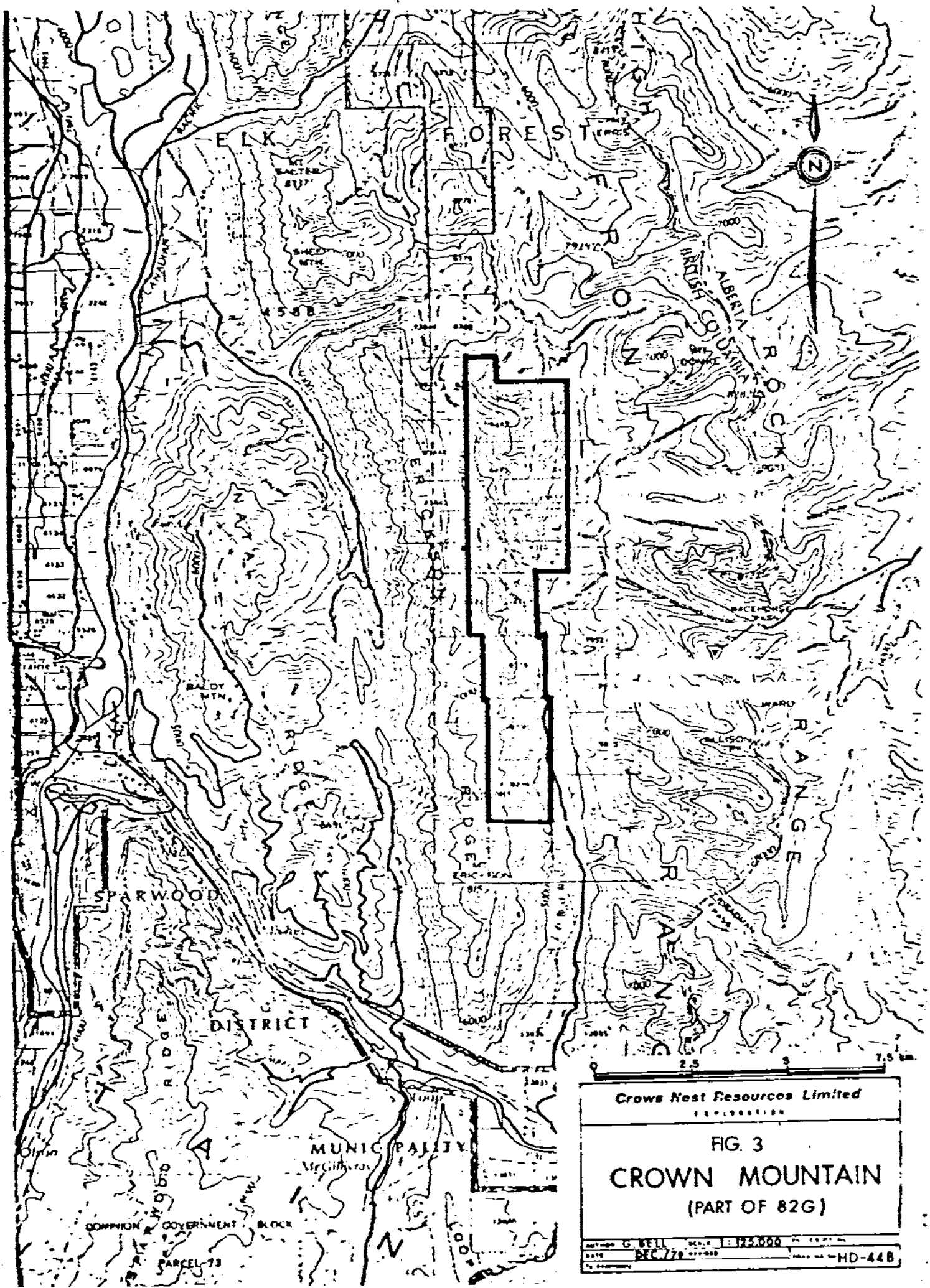
CDO13M
File 82-2/8

2.2 Location, Geography, and Physiography

The portion of the Crown Mountain licences that was mapped in 1980 consists of the seven southernmost licences only. These were not mapped in 1979, as they form a distinct physiographic unit apart from the main area of the property, and topography was obviously adverse in a general sense over these licences.

As this 1980 report deals with the results of less than two weeks mapping by a single geologist, the reader is referred to the 1979 report for more details on location, trail mileages, etc. This referral is intended to cover any other questions the reader may have on the property as a whole.

The licences cover steep, difficult-to-traverse ground somewhat above Mount Erickson's lower-slope intersection with the wide alluvial flats of Alexander Creek. The mountain is so long and so high, and the upper cliffs to the peak-ridge so massive, that the geologist has a sense that he is working on part of a "wall". Within this context, the licences consist of a mixture of ledge-slopes and cliff-slopes too steep to hold much soil, deeply-incised stream and avalanche gullies and chutes, and dense, thick stands of fir, spruce, and avalanche brush, in which visibility is often only 3 m. As the land faces steeply east; it has that general Rockies northeast-facing character of thick, wet


ELK FOREST RESERVE
ALBERTA
BRITISH COLUMBIA
ROCKY MOUNTAIN TRENCH
CROWSNEST PASS
BALDY MTN.
SPARWOOD
DISTRICT
MUNICIPALITY
DOMINION GOVERNMENT BLOCK
PARCEL 73
Crows Nest Resources Limited
EXPLORATION
FIG. 3
CROWN MOUNTAIN
(PART OF 82G)
HD-44B

timber and deep soil as compared with the sunnier, drier, sparser, more rocky west and southwest character (and which typifies the 1979-examined more northerly Crown Mountain licences).

The barren alpine zone does not commence until well above the prospective part of the licences. The treeline is generally at or near the base of the cliffs, 2,000 m or above. The prospective ground within the licences is generally at elevations 1500 to 1800 m.

2.3 Access

The fastest way by trail to the area is to leave Highway No. 3 between Sparwood and the Alberta-British Columbia border at the pipeline station and drive north 11 km on a second-class provincially-maintained dirt road up Alexander Creek's alluvial flats to the valley bottom nearest the southernmost licence. The road, however, is single lane and very slow; 15 km per hour is maximum, and the trip takes about 45 minutes. In wet weather it is frequently impassable in four-wheel drive due to deep rutting. Four-wheel drive is mandatory in even dry weather; the mud holes are long and deep.

It is a further 5 km north up the valley bottom on the same trail to the north end of these Erickson Ridge Crown licences, and this is the stretch of mudholes that is worst. At this point is the intersection of West Alexander Creek with the main branch of the Creek, and the trail begins its northerly 17.3 km wind up and over and down the main mass of Crown Mountain itself to the Grave Creek intersection with the Teepee road.

At present there are only two possible helicopter landings within the whole of the licences, and one of these is into an old sawdust pile. Better landing sites could be made by chain saw, although the lack of flat ground means that any of these would have to be on the narrow ridges.

There are three old, caved logging trails up the major sub-valleys within the area; these serviced small mill operations in which skidding was done by horse, and so the grades are steep and the right-away narrow. They could, however, be up-graded to use as access routes to exploration trails. Any equipment work could best be preceeded by several days bulldozer and grader work on the main trail down the valley to the highway.

In the southwest portion of licence 307 there is a set of old, curving exploration trails; the author feels that they were done by the bulldozer used in the many km of trench-trails on the main mass of Crown Mountain itself. Although caved along much of their high sides, they still expose enough outcrop to have been very useful, and would provide good up-gradeable access in this licence.

2.4 Environment

Crown Mountain licences have the typical southern Canadian Rockies' harsh alpine climate, probably identical to that which will be experienced in the new Line Creek mine.

These southernmost Crown licences are sheltered, relatively, by the massive barrier of Erickson Ridge above, and so high winds are not so common. Due to the east-facing direction of the ground, relatively deep and long-lasting snow may be expected, although the 1500 - 1800 m situation of the prospective ground within the licences is quite low for this region, and snow should be gone by late May.

None of the prospective ground within the licences is at or near treeline, and so any future mining operation would not be located in any part of an alpine meadow or barren zone.

3.0 WORK DONE

3.1 Summary of Previous Work

There has been, to the author's knowledge, no previous work done by any coal crew on these Erickson Ridge Crown licences, other than the bulldozed trail-trenching of licence 307.

The appropriate Geological Survey of Canada map is Price's one inch to two mile 1961 Map 35-1961, on which the 14 km length of the Crown Mountain area licences measures as 5 cm.

Prior to the 1979 season Crows Nest Resources had W. Drew of Sproule Associates draw up a 1:5,000 air photo interpretation covering all of the Crown licences. The author finds that this interpretation is essentially valid, and his mapping serves to flesh it out and refine its dimensions.

3.2 Scope and Objective of 1980 Exploration

The general intent of the author in mapping on the Erickson Ridge licences of Crown Mountain was to determine how much space there was, in a structural sense, for coal section to possibly be found within; in mapping terms this meant putting a top and bottom on the space by identifying units which are above and below the known Kootenay coal-bearing section. Due to the overall steepness of the topography, emphasis had to be placed on altitudes.

Within this context, the specific intention of Crows Nest Resources was to try to find, all the while recognizing that the topographic slope is generally adverse to the rock dip, places where enough coal bearing section exists to include the thick No. 8 Seam in considerable volume under the Crown Mountain Thrust Fault. Situations where there may be open pit strippable reserves are of particular importance. These were thought to possibly occur where the major sub-valleys deeply incise the basic east-facing lower slopes of Erickson Ridge. There are also unconfirmed indications for folding of the coal bearing strata under the Erickson Thrust. Such occurrence, especially if voluminous, would be very propective.

3.3 Work Done in 1980

In the less than two weeks of mapping, the author did reconnaissance mapping over the whole of these Erickson Ridge Crown licences, and some detail mapping on the 1:5,000 base on selected parts.

He feels that this work is sufficient for Crows Nest Resources to decide whether or not to plan equipment work. If machinery work is commenced, then continued detail 1:5,000 mapping would be in order at the same time.

The southernmost licence and a half is not presently covered by Crows Nest Resources 1:5,000 topographic base, although the author did have an unidentified preliminary 1:5,000 base covering part of this stretch. The mapping notes for this stretch will remain part of the field file, and can be transferred in the future to the appropriate topographic base when it becomes available (it is in the process of being prepared as this report is being written).

There is average exposure of the rock units. The mapping pair encountered average weather during the work, and the results, the author feels, are adequate for efficient planning of any future initial equipment exploration.

3.4 Costs of Work Done in 1980

Detailed costs of the 1980 Crown Mountain geologic program are contained in the Application To Extend Term Of Licence on the following pages.

Total cost of the 1980 program is calculated to be $12,456.27.

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

APPLICATION TO EXTEND TERM OF LICENCE

I, Bolton Agney (Name) agent for Shell Canada Resources Limited (Name)

P.O. Box 100 (Address) (Address)

Calgary, Alberta, T2P 2H5

Valid FMC No. 207568

hereby apply to the Minister to extend the term of Coal Licence(s) No(s). 305 to 313 Inclusive, 365, 366, 367, 371, 372, 408; 15 Licences; 2561 Hectares

for a further period of one year.

2. Property name Crown Mountain, Group No: 265, Kootenay 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 January 30, 1980 to January 31, 1981, work to the value of at least $ 12,456.27

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

CATEGORY OF WORK	Licence(s) No(s).	Apportioned Cost
Geological mapping	305,306,307,309,310,311,313	$7,237.21
Surveys: Geophysical		
Geochemical		
Other		
Road construction		
Surface work		
Underground work		
Drilling		
Logging, sampling, and testing	308,312,366,371	1,556.00
Reclamation		
Other work (specify)		
Off-property costs	Crown Mountain Geol. Report '79	3,663.06

5. I wish to apply $ 12,456.27 of this value of work on Coal Licence(s) No(s). 305 to 313 Incl., 365, 366, 367, 371, 372, 408

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 Crown Mountain Geological Report '79 was submitted in April, 1980, Crown Mountain Geological Report 1980 will be submitted in ninety days.

1981.01.28 (Date)

(Signature)

Land Supervisor (Position)

(FORMS AND REPORT TO BE SUBMITTED IN DUPLICATE)

CATEGORY OF WORK

GEOLOGICAL MAPPING Yes ☒ No ☐

		Area (Hectares)	Scale	Duration
Reconnaissance		1500	1:5,000	26
Detail:	Surface			
	Underground			
*Other (specify)				

Total Cost $ 2,237.21

GEOPHYSICAL/GEOCHEMICAL SURVEYS Yes ☐ No ☒

Method
Grid
Topographic
*Other (specify)

Total Cost $

ROAD CONSTRUCTION Yes ☐ No ☒

Length Width
On Licence(s) No(s).
Access to

Total Cost $

SURFACE WORK Yes ☐ No ☒

	Length	Width	Depth	Cost
Trenching				
Seam Tracing				
Crosscutting				
*Other (specify)				

Total Cost $

UNDERGROUND WORK Yes ☐ No ☒

	No. of Adits	Maximum Length	No. of Holes	Total Metres	Cost
Test Adits					
*Other workings					

Total Cost $

DRILLING Yes ☐ No ☐

		Hole Size	No. of Holes	Total Metres	Cost
Core:	Diamond				
	Wireline				
Rotary:	Conventional				
	Reverse circulation				
*Other (specify)					

Contractor
Where is the core stored?

Total Cost $

LOGGING, SAMPLING AND TESTING Yes ☒ No ☐

Lithology:	Drill samples	☐	Core samples	☐	Bulk samples	☐
Logs:	Gamma-neutron	☐	Density	☐		
*Other (specify)						
Testing:	Proximity analysis	☒	FSI	☒	Washability	☒
	Carbonization	☐	Petrographic	☒	Plasticity	☐
*Other (specify)						

Total Cost $ 1,556.00

OTHER WORK (specify details)

	Cost
None	

Total Cost $

On-property costs $ 8,793.21
To Date Off-property costs 3,663.06
To Date Total Expenditures $ 12,456.27

1981.01.28
(Date)

W.S. Kennedy
(Signature)

Manager - Accounting CNRL
(Position)

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

4.0 GEOLOGY

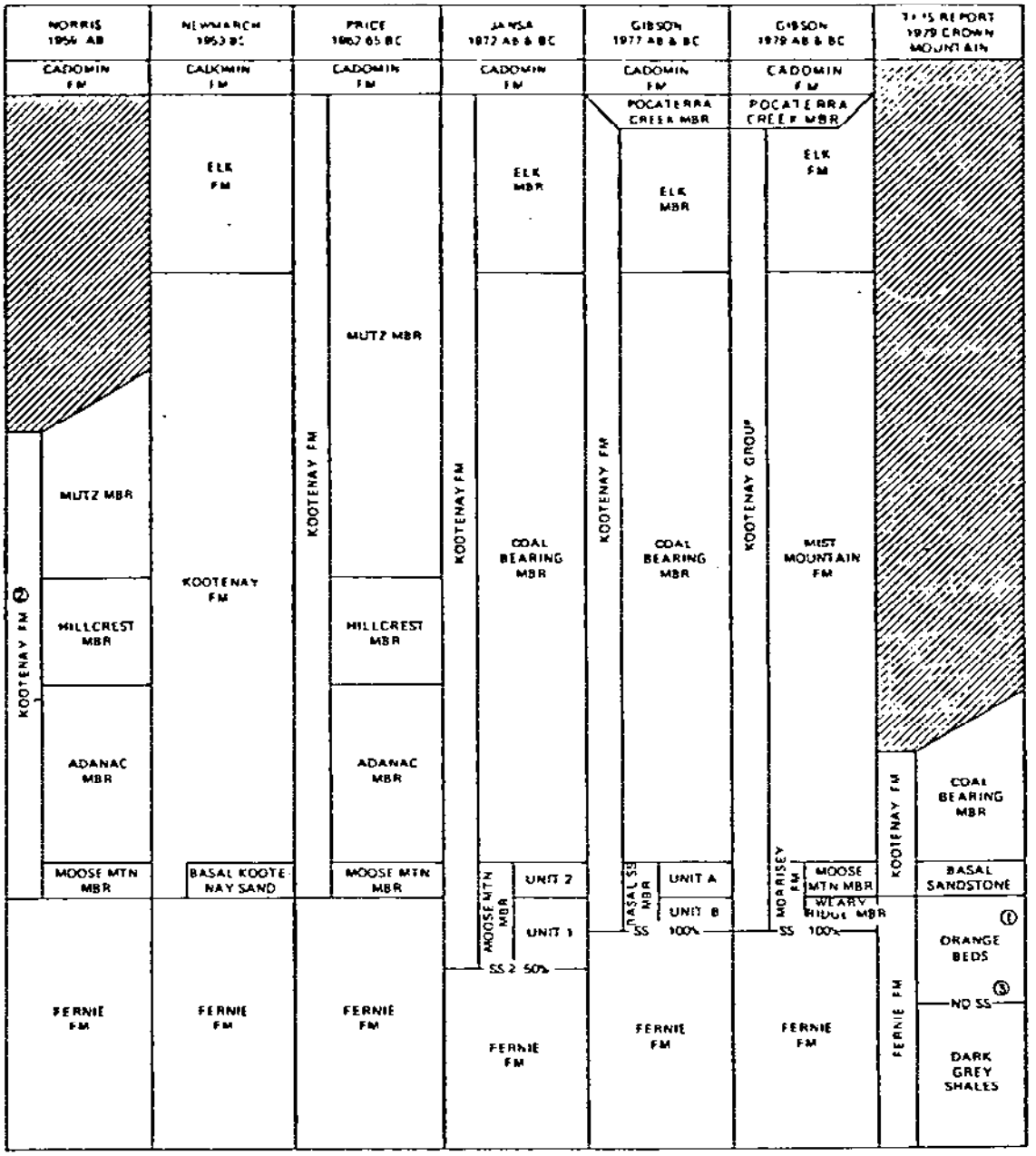
4.1 Regional Geology

and

4.2 Stratigraphy

As this 1980 mapping of less than two weeks' duration is a continuation of 1979's Crown Mountain mapping program, details of regional and stratigraphic geology are not reproduced here. The reader is referred to the 1979 report.

On the following two pages the formational diagram and the stratigraphic section from that report are reproduced.



① "Orange Beds" – Gibson (1977, pp 772) describes colour as "weathering to a distinctive orange to yellow-brown colour".

② Name "Kootenay" from Dawson, 1886.

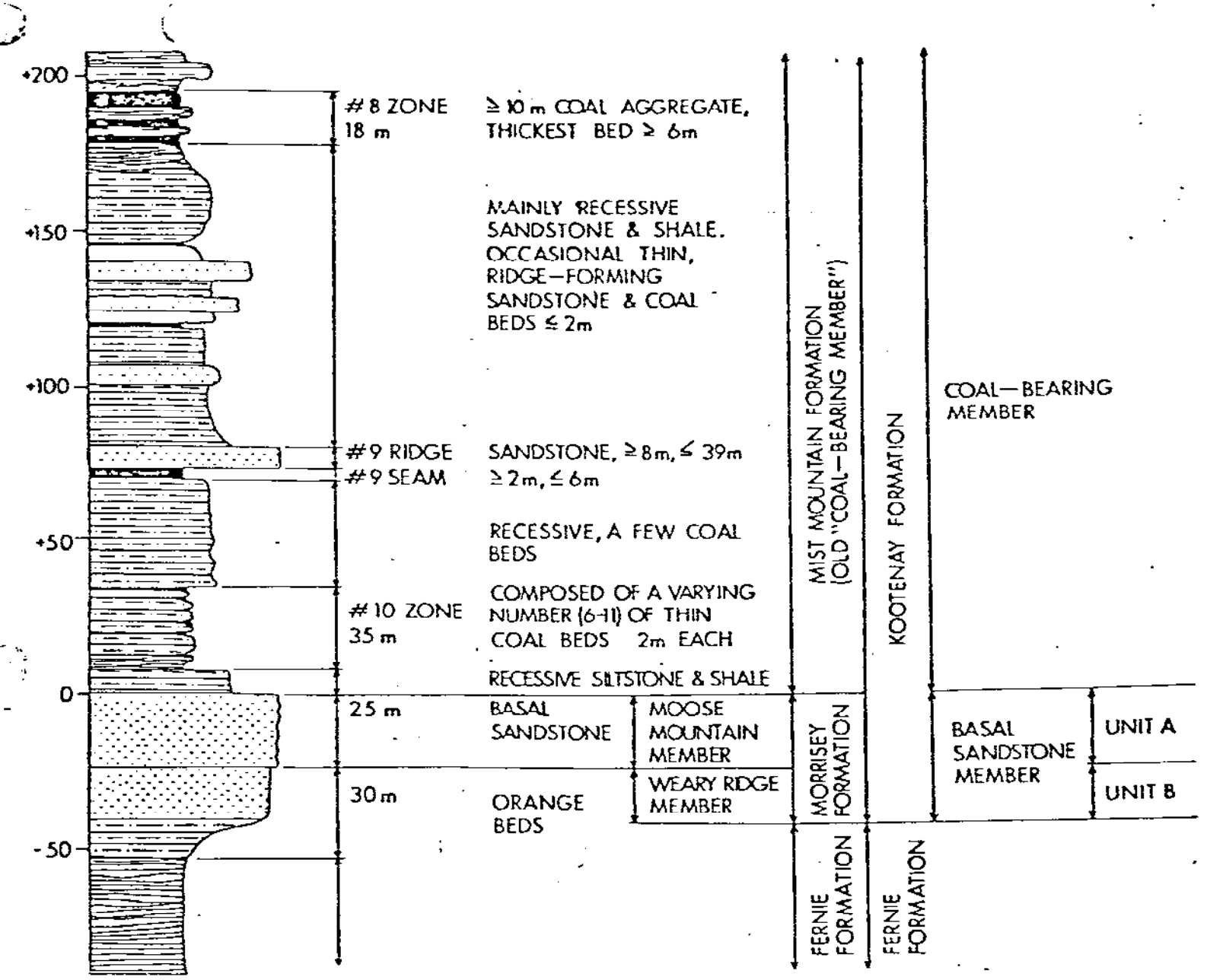
③ Contact between Orange Beds and dark grey shales taken where the colour on weathering changes from orange-brown to dark brownish-grey, which is approximately where interbedded fine ss, slt, and sh becomes entirely slt and sh.

Crows Nest Resources Limited
EXPLORATION
SE BRITISH COLUMBIA
FORMATIONAL DIAGRAM
CROWN MOUNTAIN
FIG. 4
D E BEEL N.T.S.
DEC /79 HF-47

STRUCTURAL CROSS SECTIONS
THIS REPORT

GIBSON, 1979

GIBSON, 1977



LEGEND

COAL

SANDSTONE; HARD, MASSIVE, & PROMINENT

FINE SANDSTONE, SILTSTONE, & SHALE INTERBEDDED

SHALE

FIG. 5

CROWN MOUNTAIN
STRATIGRAPHIC SECTION
D.BELL SCALE(VERTICAL)1:2000

80 03 03

4.3 Structural Geology

Crows Nest Resources has not in the past done any scale of on-the-ground geologic mapping on the Erickson Ridge Crown licences, situated on the lower east-facing Erickson Ridge slopes. The licences are separated from the main area of the licences covering Crown Mountain itself by the deep gorge of West Alexander Creek.

The author's purpose was first to do enough reconnaissance mapping on the 1:5,000 base to establish the general amount of space structurally open to the Kootenay's coal-bearing section.

It was secondly, with any time left over, to look with some detail at whatever appropriate section turned up. The results could then form a basis for decisions on the beginning of any future equipment work and a continuation of detail mapping within an established framework. The constant steepness of the terrain means any equipment work will have to be especially well planned.

Average September weather in the region allowed both purposes to be fulfilled.

4.3.1 Structural Setting

The air photo interpretation showed a band of possible coal-bearing section up to 400 m wide in plan view running approximately 6 km of the 9 km stetch of the licences. The foundation of the interpetation is a particular cliff line of Moose Mountain (or Basal) Sandstone. The top (west side) of the band is a thrust, which has brought up the overlying Fernie Formation shales, visible as steep, barren shale banks. Further above, the Fernie is itself topped by the Erickson Thrust, a major regional thrust responsible for the Paleozoics forming the main mass of the mountain.

This band of prospective Kootenay may be seen by the reader on the 1979 1:50,000 geologic compilation map, which is included in this report in the appendices.

The band as shown is 6 km in length; it is the southernmost 3.5 km, stretching through three licences: 311, 306 and 307, that is the part of interest. The northern 2.5 km of this band (the part of the Kootenay that is on the west side of West Alexander Creek in this area) is deeply covered by morainal sediments and avalanche deposits and may or may not contain remnants of Kootenay.The view on the ground indicates that the erosion of West Alexander Creek has removed any Kootenay that was present, save

for one or several small scatterings of Basal Sandstone. The absence of outcrop here makes judgement difficult.

The air photo interpretation includes a continuation of the band south of its indicated end on the geological compilation for a distance of another 2 km maximum. While the band may continue this far south, the author can see that it was placed so to provide continuity for an interpretation that the thrust overlying is coming down and converging with the line of the Basal Sandstone beneath (and therefore the band will be pinched progressively southwards). There is, however, no real evidence on the ground that the pinch-out doesn't happen at the south end of licence 311 where the topography indicates so.

These southernmost two licences have very bland topography, and the author was not able to spot any outcrop within them from a helicopter. It would be necessary to forage on an almost "blind" basis through the heavy forest of these licences in an attempt to find outcrop.

The author agrees with identifying the thrust separating the Kootenay band from the overlying Fernie shales as the Crown Mountain Thrust, which was mapped over Crown Mountain itself during the 1979 mapping. The view and the appropriate rock altitudes at various points on the east and west sides of West Alexander Creek indicate so. The stream has almost paralled the strike of the fault.

4.3.2 Results of the Mapping Program

With the geologic setting outlined, the mapping concentrated on establishing the line of the Crown Mountain Thrurst above (west of) the Kootenay and the foundation of Basal Sandstone at its base. This reconnaissance was done by foot traverse, with outcrop placed as accurately as possible on the 1:5,000 contours by sight. This method worked particularly well because of the steep and rapidly-changing topography.

The Basal Sandstone and the underlying orange-weathering fine-grained sandstone of the Weary Ridge (the Passage Beds of the upper Fernie in older terminology) are easily identifiable along much of the 3.5 km of the band. As a traverse is commenced up the "wall" of the band it is the first ledge and cliff sandstone to be encountered. Usually both Basal Sandstone and the orange Passage Beds beneath are present. The presence of the two in combination easily establishes the Basal Sandstone apart from other ridge- and cliff-forming sandstones within the Kootenay with which it might first be confused.

These two units dip west into the adverse topographic slope. Above them there is often steep ledge and cliff outcrop, usually of channel sandstones, often coarse grained, and which are called "ridge" sandstones, after the practice of 1979. These sandstones

each occur over a kilometer or so, and are broadly lens-like in character. They interfinger laterally into other, usually covered units.

Occasionally some of the more recessive intervening units are exposed in a steep cut; these are of softer sandstones, siltstones, shales, and some coaly beds. Nowhere could the author see any topographic indication of the hidden presence of a thick coal bed; it appears that any coal forming the equivalents of the Line Creek 9 or 10 seams will be thin and separated, as the 1979 work over the mass of Crown Mountain itself demonstrated.

Higher to the west up the slope, banks of dark grey Upper Fernie shales and yellow-brown Middle Fernie calcareous shales establish the upper limit of the Kootenay. The Crown Mountain Thrust is drawn between the shales and the Kootenay section.

There is considerable structural movement on a smaller scale, as may be seen by observing the breaks in continuity of altitude in the Basal Sandstone along the 3.5 km of the band. There is one break in particular in the Basal Sandstone, in central south-western licence 307. The Sandstone is faulted up 50 m in altitude, which moves it 100 m west in plan view, and as this width is almost the whole width of the band in this area, the room

for coal between the sandstone and the Fernie is almost nil. This effectively cuts the length of the prospective part of the band to that part of it within licences 306 and 311 to the south, a length of 2.9 km.

It may be noted that in licence 307, the Basal Sandstone is further west, up-slope from the position shown on the air photo. The Fernie comes down, further east than shown, and so the band in plan view is no more than effectively 200 m, as opposed to the 300 to 400 m hoped for.

Southwards through licences 306 and 311, the band reaches 300 m in maximum width, which is 100 m less than that drawn on the air photo interpretation. This is a result of the Fernie and the Crown Mountain Thrust being situated further down-slope than thought. (The vertical rise west and up this 300 m width is 250 m, which affords the reader a glimpse of the steepness of the adverse slope).

Virtually everywhere throughout the band there is evidence of faulting and small-scale structural disruption. Intricate faulting within single outcrops was found several times. Attitudes beneath the Crown Mountain Thrust at the south end of the band in licence 311 indicate a steep-limbed syncline may be lying as a drag fold beneath the fault (this was the only

larger-scale fold definitely established within the section).

The structural cross sections in the appendices show the amount of room available for Kootenay section. As a general conclusion, there appears to be a band of kootenay averaging 200 m in width over a north-south length of 3 km. There is room for the No. 10 Zone as it is established in the northerly Crown licences in 1979, and possibly some No. 9 seam. The total prospective section is thus unfortunately quite thin.

5.0 RECOMMENDATIONS

With the knowledge that the width of the band of prospective Kootenay is approximately half that indicated by previous geologic study, and that the band is also structurally frequently broken, Crows Nest can now reassess its position on the Erickson Ridge portion of the Crown Mountain coal licences.

It may be possible to drop one or several licences. A further two weeks or so of detail mapping could help in these decisions at renewal time in 1982. The author is thinking specifically of the last two licences on the south, and licence 309 at the north end of the band. But it is conceivable that there exists some structural repetition of coal-bearing section within these areas that the author has neither seen nor anticipated, and the air photo interpretation has missed.

Trenching on selected old trails by back-hoe could further and inexpensively yield much information on the more recessive parts of the Kootenay section, bounded by Fernie shales above and Basal Sandstone beneath.

Relatively shallow rotary holes could be placed using upgraded old trail access at several points. Two or three of these drilled to produce good gamma-neutron logs through the whole of the section, from Fernie above the Crown Mountain Thrust down through the Basal Sandstone, would establish the existence or non-existence of mineable seams. A one to

two month program of combined trenching, several hundred meters of drilling spread through two or three locations, and accompanying detail mapping by one geologist could be all that is needed to allow Crows Nest to complete evaluation of these seven of the fifteen Crown Mountain licences.

6.0 BIBLIOGRAPHY

Bell, Dennis E., 1979: "Crown Mountain Geological Report"; internal Crows Nest Resources Limited and filed at the B.C. Ministry of Energy, Mines, and Petroleum Resources.

The reader is referred to the bibliography in this 1979 report, which lists eight publications relevant to the geology of the coal-bearing Kootenay section of southeastern British Columbia.

APPENDIX A

Abbreviations Legend, Geological Base Maps 1:5,000

This part of the legend for the 1:5,000 map sheets is inserted here due to space limitations on the sheets themselves.

ABBREVIATIONS LEGEND

GEOLOGICAL BASE MAPS

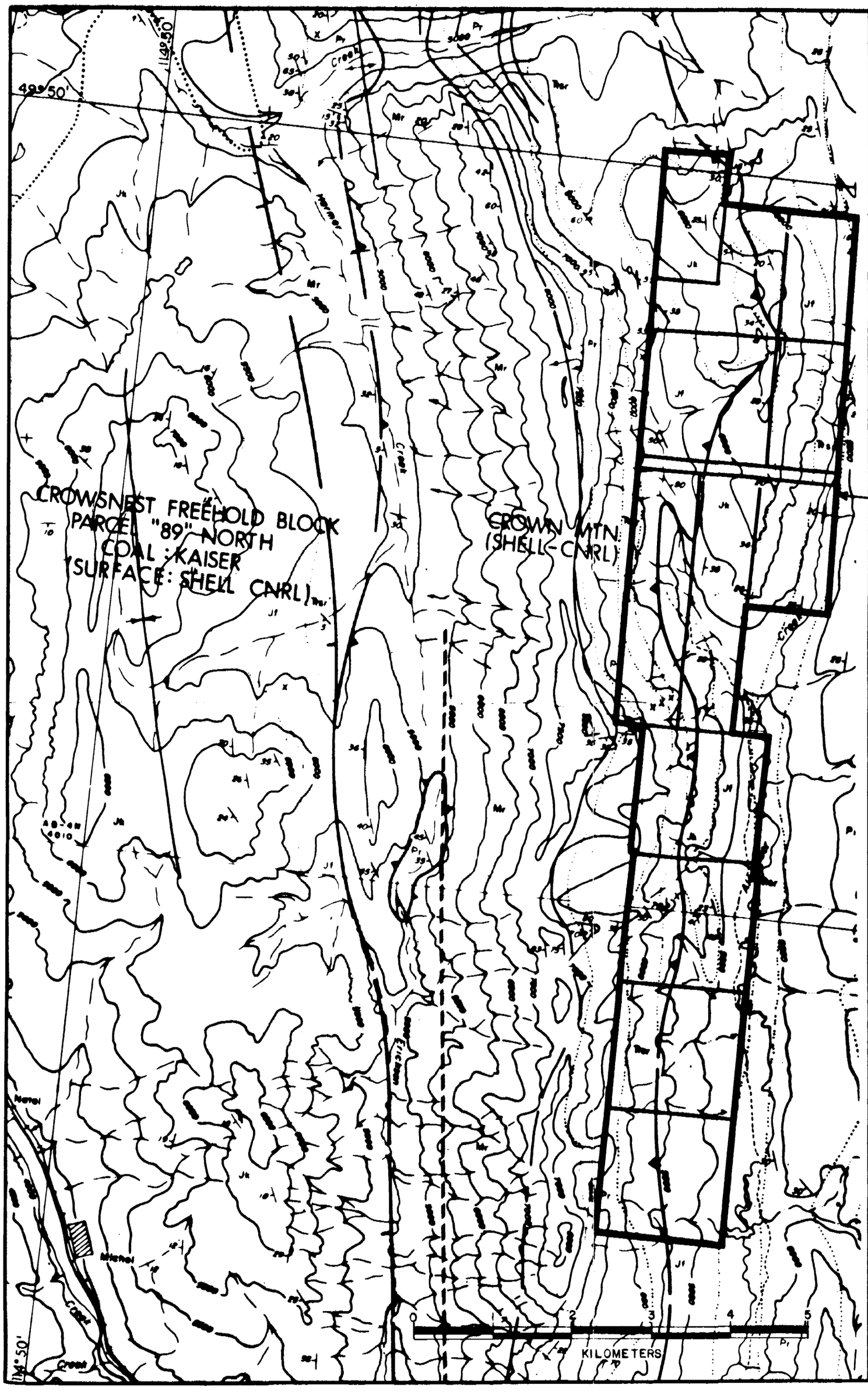
SCALE 1:5 000

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
5.	Bedding	bd, bds	bed, -s
		intbd	interbedded
		x-bd	cross-bedded
6.	Colours	blk	black
		brn	brown
		grn	green
		gry	gray
		rsty	rusty
		lt	light
		drk	dark
7.	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

APPENDIX B

1:50,000 Index and Geological Compilation Map

CNRL Map HC-50D



49°50'

CROWN MTN.
PROJECT

GROUP # 265

LEGEND

MESOZOIC
- JURASSIC & CRETACEOUS
- Jk KOOTENAY FORMATION
- J JURASSIC
- Jf FERNIE GROUP
- T TRIASSIC
- Sr SPRAY RIVER FORMATION

PERMIAN & (?) PENNSYLVANIAN
- Pr ROCKY MOUNTAIN FORMATION
- M MISSISSIPIAN
- Mr RUNDLE GROUP
- Met ETHERINGTON FORMATION
- Mmh MOUNT HEAD FORMATION
- Mlv LIVINGSTONE FORMATION

GEOLOGICAL BOUNDARY (certain, assumed)

12 STRIKE & DIP OF BEDDING

PLUNGING SYNCLINE (symmetrical, overturned)

PLUNGING ANTICLINE (symmetrical, overturned)

THRUST FAULT (teeth on upper plate)

NORMAL FAULT (lines on downthrown plate)

FAULT OF UNKNOWN RELATIVE MOVEMENT

x SHELL MEASURED OUTCROP SECTION

METRES

1000 0 1000 2000

Crows Nest Resources Limited

EXPLORATION

CROWN MOUNTAIN
S.E. BRITISH COLUMBIA

INDEX AND GEOLOGICAL COMPILATION MAP

AUTHOR C. BEAVAN | SCALE 1:50 000 | ENCLOSURE No. APP. B
DATE APRIL, 1980 | REVISED | DRAWING No. HC-50D
To Accompany

K. Shell-Crown Mtn. 80 (2) A * (1)

392

(1)

APPENDIX C

1:5,000 Geologic Base Map (one)

CNRL Map HH 74

1979 EXPLORATION

PEAK OF CROWN MOUNTAIN ON NEXT SHEET

CL 310 | CL 308 | CL 372

CL 309 | CL 307

CL 306

CL 311

ERICKSON RIDGE

ERICKSON CLIFFS

ERICKSON THRUST

CROWN MOUNTAIN

ALEXANDER CREEK

HEAVY FOREST

PATCHY FOREST

MEDIUM FOREST SOME MORAINAL

BARREN MORAINAL

AVALANCHE

PALEOZOIC RUBBLE

MAIN TRAIL

OLD SEISMIC LINE

347°

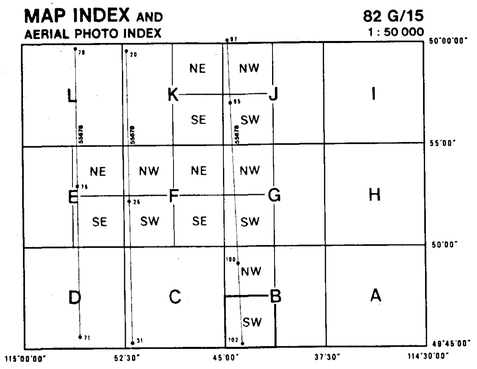
257°

5000 S

END OF KOOTENAY OUTCROP ~1 KM. SOUTH; TOPO BASE 1:5000 IS BEING PREPARED AS OF SPRING / 81.

MAP INDEX AND AERIAL PHOTO INDEX

82 G/15
1 : 50 000



REFERENCE

MAIN ROAD
SECONDARY ROAD
TRACK OR TRAIL
RAILWAY
HEDGE FENCE
BRIDGE CULVERT
CUT FILL
SWAMP
DRILL HOLE

RIVER, LAKE
INTERMITTENT RIVER
TREED AREA
LINE OF TREES
INDIVIDUAL TREES
VERTICAL INTERVAL
DEPRESSION
SPOT HEIGHT
CONTROL POINT

MAP PROJECTION : UNIVERSAL TRANSVERSE MERCATOR
CENTRAL MERIDIAN REFERENCE 117° W.

PREPARED BY :
NORTH WEST SURVEY CORPORATION (YUKON) LTD.
JOB NO : 78-109

METRES
100 50 0 100 200 300 400 500

LEGEND

JURASSIC - CRETACEOUS

JKk Kootenay Formation

JURASSIC

Jf Fernie Formation
(Fsh Fernie shales)

Thrust fault, position defined
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 chain line; strike & dip where strike line of symbol touches chained line
Chain & compass line; attitudes refer to strike & dip at nearest tick (chain station)

NOTE: See 1979 Report, pp. 38 for detailed Legend, and 1980 Report Appendix A for Abbreviations Legend.

00392 (2)(a)

663 000 mE | 663 500 mE | 664 000 mE | 664 500 mE | 665 000 mE | 665 500 mE | 666 000 mE | 114°41'15" 49°47'30"

PEAK OF CROWN MOUNTAIN ON NEXT SHEET

1979 EXPLORATION

CL 308 | CL 307 | CL 372

CROWN MOUNTAIN TRAIL

PATCHY MORAINAL

ALEXANDER CROWN CREEK

HEAVY FOREST

BARREN MORAINAL

AVALANCHE FAN

MAIN TRAIL

OLD SEISMIC

ALEXANDER CREEK

347°

257°

MOUNTAIN CLIFFS

PALEOZOIC RUBBLE

MEDIUM FOREST SOME MORAINAL

THRUST

Trail ends

Trail network of old horse-skid logging trails, almost overgrown

Sawdust Pile

Trail disappears

Obvious kinking visible in cliff line attitudes

Extensive of synclinal hor. certain

Cliff line disappearing

Ridge of Basal Orange Beds

Basal ~7M thick in cliff; contact with ~20M dashed Orange Beds

END OF KOOTENAY OUTCROP ~1 KM. SOUTH; TOPO BASE 1:5000 IS BEING PREPARED AS OF SPRING/81.

5 547 500 mN | 5 541 000 mN | 5 535 000 mN | 5 528 000 mN | 5 521 500 mN

REFERENCE

MAIN ROAD		RIVER, LAKE	
SECONDARY ROAD		INTERMITTENT RIVER	
TRACK OR TRAIL		TREED AREA	
RAILWAY		LINE OF TREES	
HEDGE FENCE		INDIVIDUAL TREES	
BRIDGE CULVERT		VERTICAL INTERVAL	1812 1810 1808
CUT FILL		DEPRESSION	
SWAMP		SPOT HEIGHT	+ 1507 S
DRILL HOLE		CONTROL POINT	

MAP PROJECTION: UNIVERSAL TRANSVERSE MERCATOR
CENTRAL MERIDIAN REFERENCE 117° W.

PREPARED BY:
NORTH WEST SURVEY CORPORATION (YUKON) LTD.
JOB NO. 78-109

METRES
100 50 0 100 200 300 400 500

LEGEND

JURASSIC - CRETACEOUS

JKk Kootenay Formation

JURASSIC

Jf Fernie Formation
(Fsh Fernie shales)

Thrust fault, position defined
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 chain line; strike & dip where strike line of symbol touches chained line
Chain & compass line; attitudes refer to strike & dip at nearest tick (chain station)

NOTE: See 1979 Report, pp. 38 for detailed Legend, and 1980 Report Appendix A for Abbreviations Legend.

Crows Nest Resources Limited
EXPLORATION

CROWN MOUNTAIN
S.E., B.C.

1980 GEOLOGIC MAP

CONTOUR INTERVAL: 5m
DATE OF PHOTOGRAPHY: JUNE/JULY, 1978

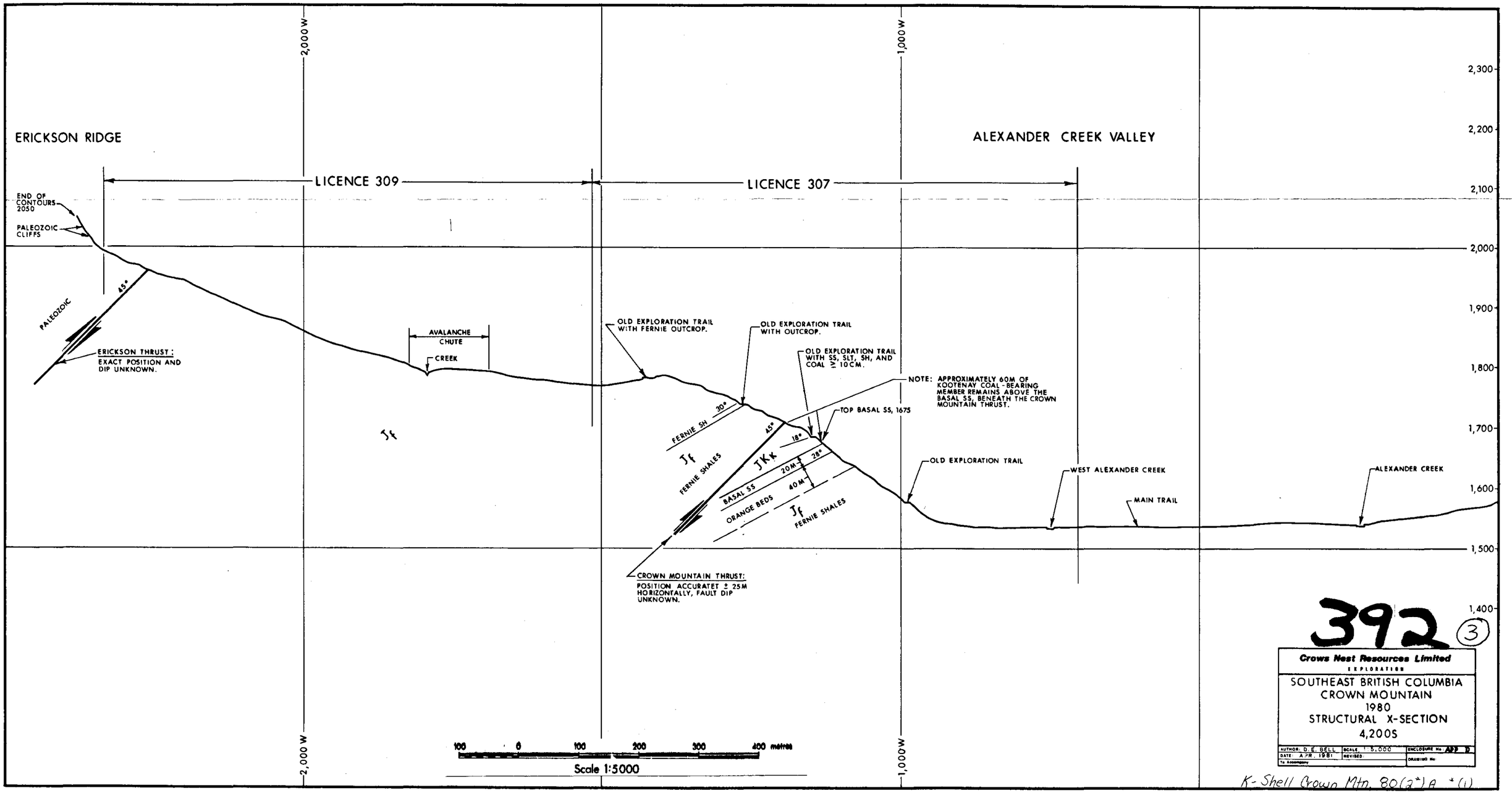
AUTHOR: D.E. BELL	SCALE: 1 : 5000	ENCLOSURE No: APPENDIX 'C'
DATE: APRIL, 1981	REVISED:	DRAWING No: HH-74
To Accompany		

K-Shell Crown Mtn. 80(2#)A *(1)

(2)(b) 392

APPENDIX D

1:5,000 Structural Cross Sections (two)



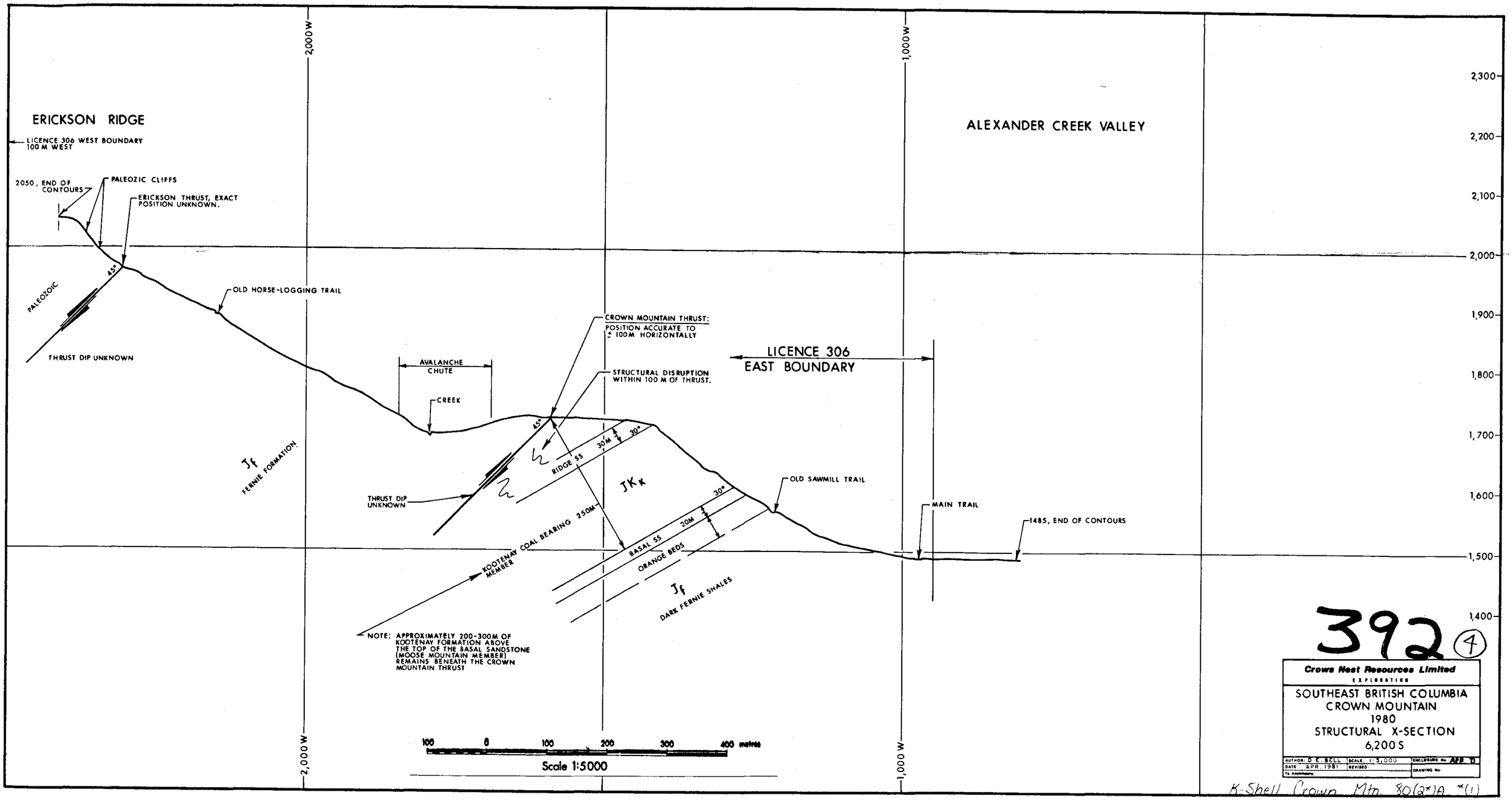
392 (3)

Crows Nest Resources Limited
EXPLORATION

SOUTHEAST BRITISH COLUMBIA
CROWN MOUNTAIN
1980
STRUCTURAL X-SECTION
4,200S

AUTHOR: D. E. BELL	SCALE: 1" = 5,000	ENCLOSURE No: APP 10
DATE: APR. 1981	REVISED:	DRAWING No:
To Accompany		

K-Shell Crown Mtn. 80(2*)A *(1)



392 (4)

Crows Nest Resources Limited
EXPLORATION

SOUTHEAST BRITISH COLUMBIA
CROWN MOUNTAIN
1980
STRUCTURAL X-SECTION
6,200 S

AUTHOR: D. E. BELL	SCALE: 1:5,000	ENCLOSURE No: APP 11
DATE: APR. 1981	REVISED:	DRAWING No:
To Accompany		

K-Shell Crown Mtn. 80(2*)A *(1)

APPENDIX E

1:5$^{0}_{,}$000 Coal Land Disposition Maps (two)

CNRL Maps HH 36D and HH 36E

82 G/15 — 1:50,000 — CANADA — EDITION 2 — 82 G/15

115°00' — 50°00' — Joins 82 J/2 — R 5 — R 4 — 114°30' — 50°00'

CROWSNEST FREEHOLD BLOCK
PARCEL 35
COAL : KAISER
SURFACE : SHELL CNRL

MOUNT MICHAEL PROSPECTS

EWIN PASS PROJECT

CL 285 | CL 286 | CL 287 | CL 1300
CL 304 | CL 289 | CL 288
CL 290 | CL 291
CL 292 | CL 368
CL 293
CL 294 | CL 295 | CL 373
CL 297 | CL 296 | CL 369
CL 298 | CL 299
CL 301 | CL 300
CL 302
CL 303
CL 370

CENTRAL BLOCK
(SHELL - CNRL)
GROUP # 264

GROUP # 263

LINE CREST RIDGE PROJECTS
PIT AREA NORTH
CNRL MITSUI J.V.

HORSESHOE RIDGE PROJECT

CENTRAL BLOCK
(SHELL - CNRL)
GROUP # 266

TEEPEE MTN PROJECT

F R O N T

E L K P R O V I N C I A L F O R E S T

R O C K Y M O U N T A I N S

R A N G E S

CL 371
CL 367 | CL 366
CL 312 | CL 365
CL 408
CL 310 | CL 308 | CL 372
CL 307
CL 309
CL 306
CL 311

CROWSNEST FREEHOLD BLOCK
PARCEL 89 NORTH
COAL : KAISER
(SURFACE - SHELL CNRL)

CROWN MTN. PROSPECT
(SHELL — CNRL)
GROUP # 265

Tp 12 — Tp 11 — Tp 10 — Tp 9

Joins 82 G/14 — Joins 82 G/10

49°45' — 115°00' — 55' — 50' — 45' — 40' — 35' — 114°30' — 49°45'

SCALE 1:50,000

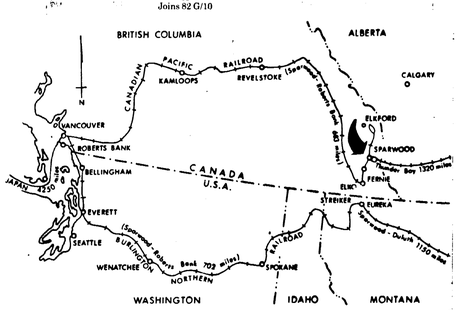
MILES 1 0 1 2
METRES 1000 0 1000 2000 3000

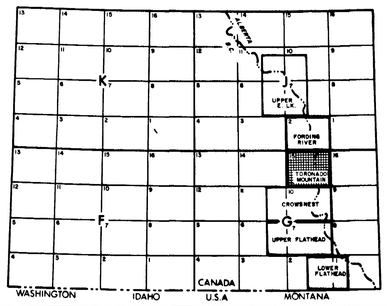
COMPANY COLOR CODE

- SHELL - CNRL
- SAGE CREEK COAL LTD.
- KAISER RESOURCES LTD.
- DOMINION OF CANADA
- BYRON CREEK COLLIERIES LTD.
- COLEMAN COLLIERIES LTD.
- FORDING COAL LTD AND OTHER CP COMPANIES
- ELCO MINING LTD.

COAL LAND TENURE

FREEHOLD	LICENCES	
		BORDER OF SHELL-CURL GROUPS BLOCK ETC.
		APPLICATION FOR ABOVE
		OUTLINE OF HOLDINGS BY OTHER THAN SHELL-CURL
		APPLICATION FOR B.C. COAL LICENCE BY OTHER THAN SHELL-CURL
		B.C. COAL LICENCE BORDER SHELL-CURL ONLY.





SHELL CANADA RESOURCES LIMITED
COAL DEVELOPMENT

LICENCE GROUPS
#266 1 of 2
#264 1 of 2
#263 1 of 1
#265 2 of 2

PROJECTS
EWIN PASS 1 of 2
MT MICHAEL 1 of 2
LINE CREEK 1 of 1
HORSESHOE RIDGE 1 of 1
TEEPEE MTN. 1 of 1
CROWN MTN. 2 of 2

TORONADO MOUNTAIN
KOOTENAY LAND DISTRICT
SOUTHEASTERN B.C.

LAND MAP

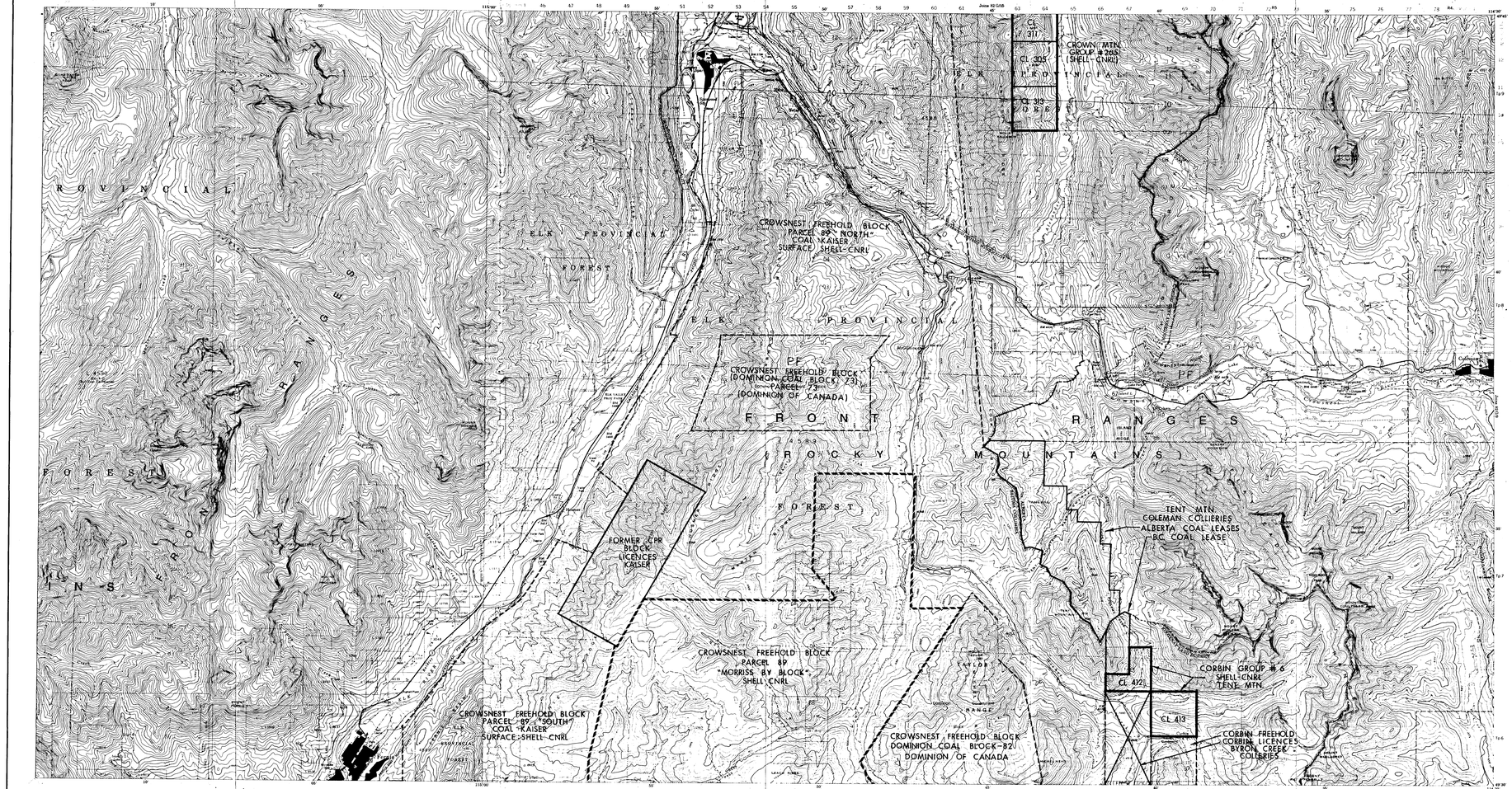
NTS 82 G/15

AUTHOR: F. Martonhegyi	SCALE: 1:50 000	DRAWING No.: HH-36D
DATE: Sept. 1977	REVISED: March 1980	ENCLOSURE No.: APPENDIX E
To Accompany		

REMAINING OVERLAYS IN VU-24

K: Shell Crown Mtn 80(2)A-11 (5)

392



COMPANY COLOR CODE

SHELL - CNRL

SAGE CREEK COAL LTD.

KAISER RESOURCES LTD.

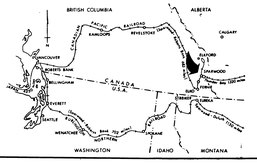
DOMINION OF CANADA

BYRON CREEK COLLIERIES LTD.

COLEMAN COLLIERIES LTD.

FORDING COAL LTD AND OTHER CP COMPANIES

ELCO MINING LTD.



COAL LAND TENURE

FREEHOLD — LICENCES

BORDER OF SHELL-CNRL GROUPS BLOCK ETC.

APPLICATION FOR ABOVE

OUTLINE OF HOLDINGS BY OTHER THAN SHELL-CNRL

APPLICATION FOR B.C. COAL LICENCE BY OTHER THAN SHELL-CNRL

B.C. COAL LICENCE BORDER SHELL-CNRL ONLY.

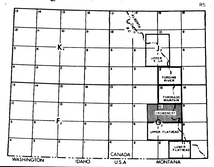
NOTE

B.C. COAL LICENCES WERE ISSUED AND REVOKED COVERING MOST PARTS OF THE DOMINION COAL BLOCK PARCEL 82 AND ALL OF PARCEL 73. THESE OLD LICENCES ARE NOT SHOWN ON THE MAP.

SCALE 1:50,000

MILES 0 1000 2000 3000

METRES 1000 0 1000 2000 3000



SHELL CANADA RESOURCES LIMITED

COAL DEVELOPMENT

SHELL-CNRL GROUPS
#82 #89
#73 #89
PROJECTS
CROWN MTN.
CORBIN TENT MTN.

CROWSNEST

KOOTENAY LAND DISTRICT

SOUTHEASTERN B.C.

LAND MAP

NTS 82 G/10, G/11E

AUTHOR: F. Morrisshegyi	SCALE: 1:50 000	DRAWING No. HM 306
DATE: Sept. 1977	REVISED: March 1980	ENCLOSURE No.: APPENDIX E
To Accompany		

REMAINING OVERLAYS IN V.24

392