PR. Goodrich 81(1)A

GULF CANADA RESOURCES INC.

COAL DIVISION

GOODRICH COAL PROJECT

Geological Report

December, 1981

GOODRICH COAL PROJECT 1981

MAP AND LICENCE NUMBERS

Map Numbers:	93-O-1-E
	93-O-8-E
	93-O-8-W
	93-O-9-E
	93-O-9-W
	93-O-10-E
	93-O-15-E
	93-O-15-W
	93-O-16-W
	93-P-4-W
	93-P-5-E
	93-P-5-W

Licence Numbers:	4750,4751
	5521 - 5632
	5670 - 5739
	5742 - 5769
	5778 - 5783
	5800 - 5828
	5886,5887,5889
	5823,5824,5826
	5931 - 5935
	6605 - 6713

Approximate Centre of Goodrich Property:

Latitude N55°35' Longitude 122°25'

Prepared By
Gulf Canada Resources Inc.
Norwest Resources Consultants Ltd.
December, 1981

PREFACE

The 1981 Geological Report represents Gulf's second year exploration efforts on its Goodrich Coal Property in northeastern British Columbia.

The 1981 Goodrich Geological Report encompasses current results and interpretations of Gulf's most ambitious drilling exploration and mapping project.

The 1981 Report, in part, consists of drilling data obtained after the November 7, 1980 anniversary date of some Goodrich licences which could not be included in the 1980 Geological Report. The 1980 drill holes reported in the 1981 Geological Report are: DDH 80-37 to DDH 80-44 and RDH 80-51 to RDH 80-59. Similarly, geophysical work and road construction carried out after the November 7, 1980 date have also been included herein.

GOODRICH COAL PROJECT 1981

TABLE OF VOLUMES AND APPENDICES

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* VOLUME II	Geological Report
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APPENDIX A, PART 2	Geology Maps and Cross Sections: Goodrich East, Goodrich Lossan and Goodrich South
APPENDIX A, PART 3	Geophysical Log Correlations, Typical Geophysical Log Response to Formation Stratigraphy
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APPENDIX B, PART 4	Diamond Drill Hole Data: DDH 81-05 to DDH 81-07
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APPENDIX B, PART 6	Diamond Drill Hole Data: DDH 81-10 to DDH 81-13
APPENDIX B, PART 7	Diamond Drill Hole Data: DDH 81-14 to DDH 81-17
APPENDIX B, PART 8	Diamond Drill Hole Data: DDH 81-18 to DDH 81-22
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* This Volume

GOODRICH COAL PROJECT

VOLUME II

Geological Report 1981

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Appendix	Description
1.1	Listing of Goodrich Coal Licences

LIST OF MAPS

INCLUDED WITH VOLUME II

Map No.	Title
1	Coal Licence Map (1:100,000)
2 a, b, c, d	Drill Hole Locations, 4 sheets (1:20,000)
3 a, b	Geological Compilation 2 sheets, (1:50,00

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
A	1	GEOLOGY MAPS

1:25,000 scale:
Moberly

1:10,000 scale:
White Rabbit

93 O/10 I
93 O/10 J
93 O/15 B
93 O/15 C
93 O/15 F

Goodrich Central

93 O/9W C
93 O/9W D
93 O/9W E
93 O/9W L
93 O/10E H
93 O/10E I

1:5,000 scale:
Goodrich Central

~~1S44~~
~~1T44~~ In Goodrich Lossan
1U44
1V44
1S45
1T45
1U45
1V45
1U46
1V46
~~1W46~~

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
A (cont'd)	1	GEOLOGICAL CROSS-SECTIONS

1:25,000 scale:
Moberly

14a P-P'
14b Q-Q'
14c R-R'
14d S-S'

1:10,000 scale:
White Rabbit

10 T-T'
11 U-U'
12 V-V'
13 W-W'
14 X-X'
15 Y-Y'

Goodrich

22 E-E'
23 F-F'
24 G-G'
25 H-H'
26 I-I'
27 J-J'
28 K-K'
29 L-L'
30 M-M'
31 N-N'
32 O-O'

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
A (cont'd)	2	GEOLOGY MAPS

1:5,000 scale:
Goodrich East

44 1P42
45 1Q42
46 1P43
47 1Q43
48 1Q44
49 1R44
50 1Q45
51 1R45

Goodrich Lossan

59 1R42
60 1S42
61 1T42
62 1U42
63 1R43
64 1U43
65 1V43
66 1S44
67 1T44
64a 1T43 } Also in report
64b 1S43
Goodrich South

70 1P39
71 1Q39
72 1P40
73 1Q40
74 1R40
75 1P41
76 1Q41
77 1R41

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
A (cont'd)	2	GEOLOGICAL CROSS-SECTIONS
		1:5,000 scale:
		Goodrich East
		52 AA-AA'
		53 BB-BB'
		54 CC-CC'
		55 DD-DD'
		56 EE-EE'
		57 FF-FF'
		58 GG-GG'
		Goodrich Lossan
		68 N3250
		69 N8000
		Goodrich South
		78 A-A'
		79 B-B'
		80 C-C'
		81 D-D'
A	3	1980 and 1981 DRILL HOLES: GEOPHYSICAL LOGS CORRELATIONS
		1:400 Scale:
		82 Lines N0500
		83 N1500
		84 N1750
		85 N2000
		86 N2500
		87 N2750

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
A (cont'd)	3	✓88 Line N3250/3500
		missing 89 N4250
		✓90 N5500
		✓91 N6500
		✓92 N7500
		✓93 N8000
		✓94 Axis Syncline-West Limb Sheet 1
		✓95 Axis Syncline-West Limb Sheet 2
		✓96 Lossan Syncline-East Limb Sheet 1
		✓97 Lossan Syncline-East Limb Sheet 2
		TYPICAL GEOPHYSICAL LOG RESPONSE TO STRATIGRAPHY
		✓98 1:400 Scale

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
B		NOTE: Drill Hole Data includes: 1) Data Source Record 2) Directional Survey-Input Parameters * 3) Plan View of Deviation of Drill Hole * 4) Horizontal Displacement Plot for Drill Hole * 5) Legend for Coal Seam Data Sheets * 6) Cost Seam Data Sheets * 8) Head Analysis * 9) Drill Core Log * May not be available or applicable
B	1 ✓	Diamond Drill Hole Data DDH 80-37 to DDH 80-40
B	2 ✓	Diamond Drill Hole Data DDH 80-41 to DDH 80-44
B	3 ✓	Diamond Drill Hole Data DDH 81-01 to DDH 81-04
B	4 ✓	Diamond Drill Hole Data DDH 81-05 to DDH 81-07
B	5 ✓	Diamond Drill Hole Data DDH 81-08, DDH 81-09
B	6 ✓	Diamond Drill Hole Data DDH 81-10 to DDH 81-13
B	7 ✓	Diamond Drill Hole Data DDH 81-14 to DDH 81-17

GOODRICH COAL PROJECT 1981

LIST OF APPENDICES IN SEPARATE COVERS

Appendix	Part	Description
B	8	Diamond Drill Hole Data DDH 81-18 to DDH 81-22
C		Rotary Drill Hole Data RDH 80-51 to RDH 80-59 and RDH 81-01 to RDH 81-10
D		Coal Trench Log Trench Location Map - (2) 1:50,000 Scale
E		Other Surveys: 1) Electromagnetic 2) Gravity 3) MINI-SOSIE

1.0 SUMMARY

Gulf's Goodrich Coal Property is located in northeastern British Columbia, some 60 road kilometres west of Chetwynd.

Until the end of the summer exploration season, the Goodrich property consisted of 367 Crown coal licences totalling some 107,741 gross hectares.

The Goodrich property is underlain by northwesterly trending folded and faulted strata of Lower Cretaceous age. Two years of field operation, that included detailed mapping and extensive hand trenching, has delineated the non-coal bearing strata of the Fernie to Monach Formations and the coal-bearing strata of the Brenot to Gething Formations.

The 1981 exploration drilling programs amounted to 49 test holes for a total of 14,800 metres. Nineteen holes were rotary drilled for 5,073 metres and 30 were diamond drilled for 9,727 metres.

Continuation of drilling in the Goodrich Lossan area, where surface mineable coal potential exists, comprised the main exploration objective in 1981.

To date, approximately 100 million tonnes of potentially surface mineable coal has been estimated from two of four seams within the upper Gething Formation.

The uppermost No. 1 seam with 80 million tonnes in-situ coal is contained within the Lossan-Axis syncline pair and averages a true seam thickness of approximately 8 metres. The No. 3 coal seam constitutes the second open pit potential with some 20 million tonnes in-situ.

In the northern half of the Goodrich Lossan area, where the No. 1 seam is absent, the No. 3 seam attains a mineable thickness of approximately 4 metres.

The aggregate true seam thickness of the four Gething coal seams is approximately 16 metres over 180 metres.

In-fill rotary drilling of 5 test holes in the "Brenot" syncline at Goodrich East delineated surface coal potential of less than 1 million tonnes.

The Goodrich property is conservatively estimated to contain some 1.25 billion tonnes of in-situ coal resources within the Brenot and Gething formations. Estimates show both formations sharing an equal potential of the coal resource.

Coal quality determinations that include clean coal analyses are being made on coal samples from 30 core test holes.

Preliminary results indicate both Gething and Brenot coal seams to be of bituminous rank for metallurgical and export thermal markets.

The Gething coal is a medium to high volatile metallurgical coal with an average quality as follows:

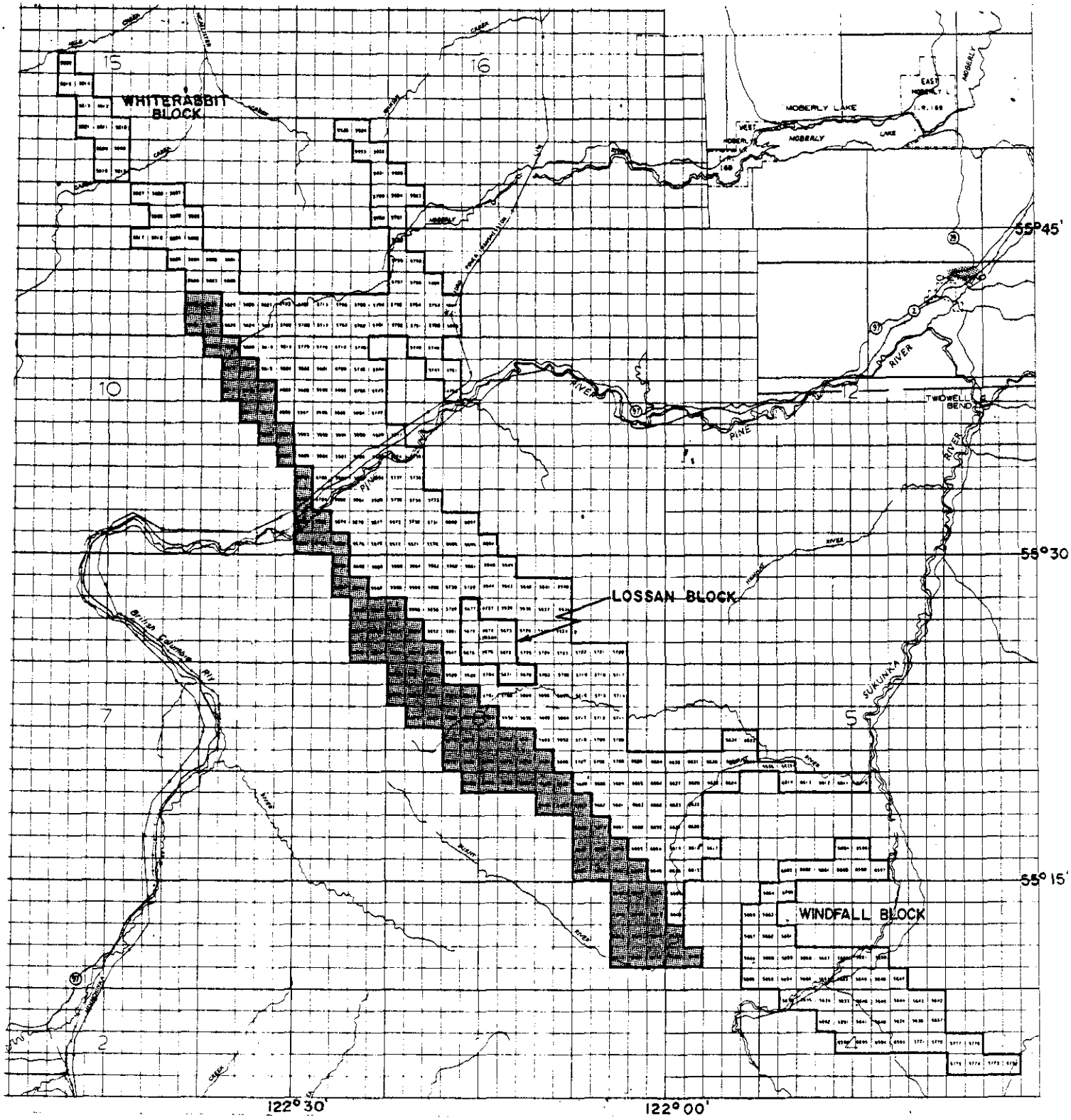
	Ash	FSI	VM
d.m.m.f.	10%	7-8	30-31%

Future exploration drilling and geological mapping is recommended over the next few years in not only the potential surface mining areas, but also in those areas not yet fully explored.

2.0 RECOMMENDATIONS

1. Based on the 1980 and 1981 mapping programs it is recommended that G.C.R.I. relinquish 95 crown coal licences totalling 27,969 hectares which cover mostly non-coal bearing strata. The licences listed in Table 2.0.1 are situated along the western edge of the Goodrich property as shown in Figure 2.0.1 (The licences listed in Table 2.0.1 were surrendered at the conclusion of the 1981 field season).

2. Further exploration drilling and mapping is recommended on the Goodrich property.



scale in miles

0 5 10

0 8 16

scale in kilometres

LICENCES RELENQUISHED 1981

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

Figure 2.0.1
GOODRICH
COAL LICENCE MAP

PREPARED BY:	SCALE
APPROVED BY: DATE: NOV. 81	DRAWING No.

TABLE 2.0.1

GOODRICH COAL PROPERTY

SUMMARY OF COAL LICENCES SURRENDERED FALL 1981

Licence No.	Hectares	Date of Acquisition
5679	295	November 19, 1979
5680	295	November 19, 1979
5683	295	November 19, 1979
5687	295	November 19, 1979
5688	295	November 19, 1979
5689	295	November 19, 1979
5691	295	November 19, 1979
5548	294	November 26, 1979
5549	294	November 26, 1979
5550	294	November 26, 1979
5553	294	November 26, 1979
5554	294	November 26, 1979
5557	294	November 26, 1979
5566	294	November 26, 1979
5567	294	November 26, 1979
5521	295	November 26, 1979
5522	295	November 26, 1979
5523	295	November 26, 1979
5524	294	November 26, 1979
5526	294	November 26, 1979
5527	294	November 26, 1979
5530	294	November 26, 1979
5531	294	November 26, 1979
5533	294	November 26, 1979
5606	293	November 26, 1979
5607	293	November 26, 1979
5608	293	November 26, 1979
5610	293	November 26, 1979
5611	293	November 26, 1979
5612	293	November 26, 1979
5613	293	November 26, 1979
5614	293	November 26, 1979
5616	293	November 26, 1979
5617	293	November 26, 1979
5621	292	November 26, 1979
5622	292	November 26, 1979
5626	292	November 26, 1979
5630	292	November 26, 1979
5631	292	November 26, 1979
5632	292	November 26, 1979

Licence No.	Hectares	Date of Acquisition
6605	296	September 29, 1980
6606	296	September 29, 1980
6607	296	September 29, 1980
6637	296	September 29, 1980
6638	296	September 29, 1980
6639	296	September 29, 1980
6640	296	September 29, 1980
6641	296	September 29, 1980
6642	296	September 29, 1980
6643	296	September 29, 1980
6644	296	September 29, 1980
6645	296	September 29, 1980
6646	296	September 29, 1980
6647	296	September 29, 1980
6648	296	September 29, 1980
6650	295	September 29, 1980
6651	295	September 29, 1980
6652	295	September 29, 1980
6653	295	September 29, 1980
6656	295	September 29, 1980
6657	295	September 29, 1980
6658	295	September 29, 1980
6666	295	September 29, 1980
6667	295	September 29, 1980
6668	295	September 29, 1980
6669	295	September 29, 1980
6670	295	September 29, 1980
6671	295	September 29, 1980
6672	295	September 29, 1980
6673	295	September 29, 1980
6674	295	September 29, 1980
6675	295	September 29, 1980
6676	295	September 29, 1980
6677	295	September 29, 1980
6678	295	September 29, 1980
6679	295	September 29, 1980
6680	295	September 29, 1980
6681	295	September 29, 1980
6682	295	September 29, 1980
6683	295	September 29, 1980
6686	294	September 29, 1980
6687	294	September 29, 1980
6688	294	September 29, 1980
6689	294	September 29, 1980
6690	294	September 29, 1980
6691	294	September 29, 1980
6693	294	September 29, 1980
6699	294	September 29, 1980

Licence No.	Hectares	Date of Acquisition
6700	294	September 29, 1980
6701	294	September 29, 1980
6702	293	September 29, 1980
6703	293	September 29, 1980
6705	293	September 29, 1980
6707	293	September 29, 1980
Total 95	27,969	

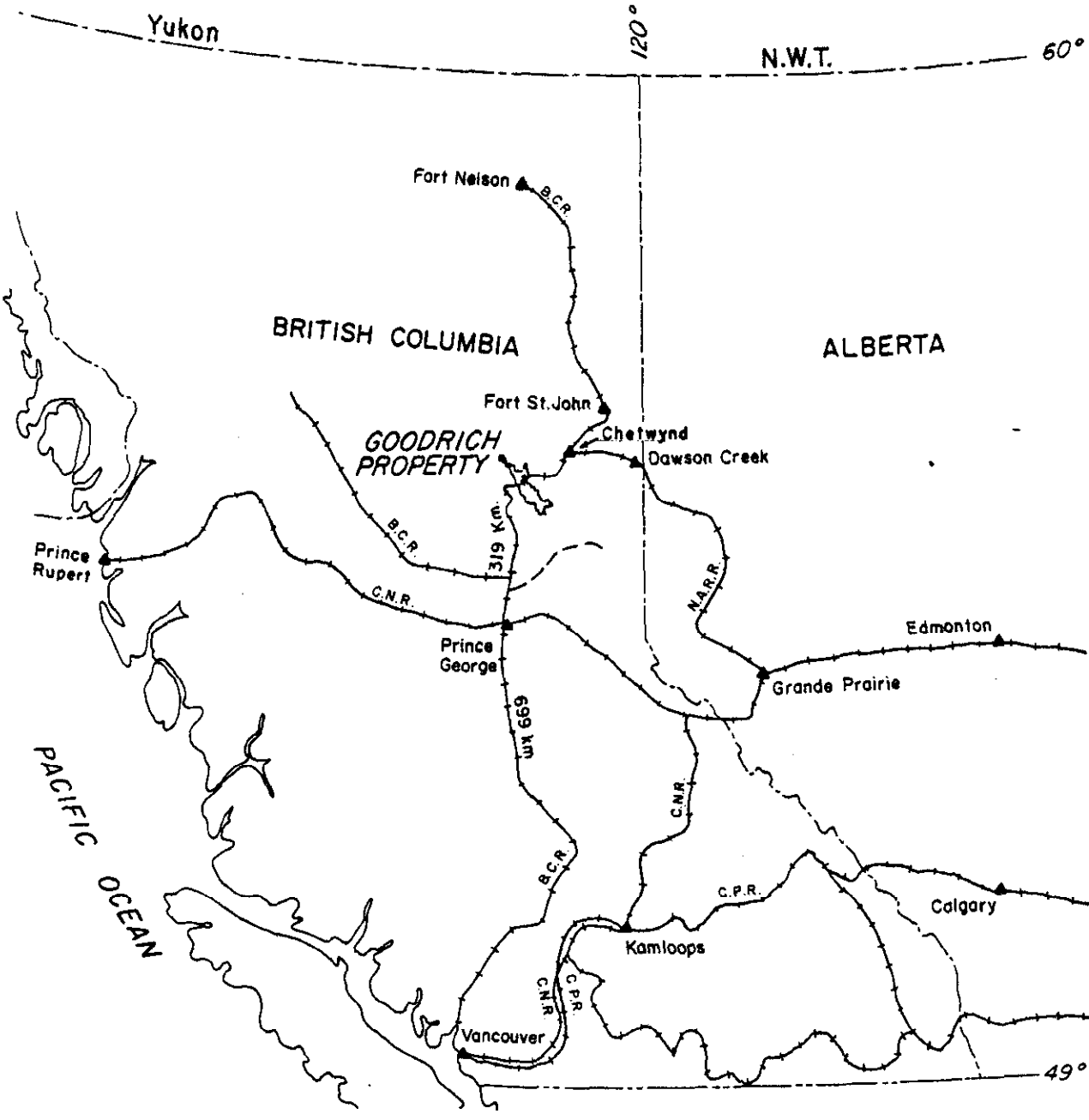
3.0 INTRODUCTION

3.1 Property Location, Size and Access

Gulf's Goodrich coal property is situated within the Inner Foothills region of northeastern British Columbia, approximately 60 road kilometres west of Chetwynd. The town of Chetwynd and the approximate Goodrich block location is illustrated in Figure 3.1.1. The city of Dawson Creek is located roughly 100 road kilometres east of Chetwynd.

The Goodrich property consists of 367 Crown coal licences which cover an area of approximately 107,471 hectares. Figure 3.1.3 and the 1981 Goodrich Coal Licence Map (included with Volume II) show the distribution of licences held by Gulf that made up the summer 1981 Goodrich coal property. The licences were acquired, in several stages, to cover the northwest trending coal-bearing Lower Cretaceous strata extending from the Burnt River in the south to Eleven Mile Creek in the north, a distance of approximately 90 kilometres. The distribution of licences held by Gulf with respect to other northeastern coal properties is shown in Figure 3.1.2.

The Goodrich property straddles the Pine River Valley transportation corridor comprised of the B.C. Railway and the John Hart Highway. Access to within the north and south portion of the Goodrich block, however, is limited.



LEGEND

Railroad

Anzac Railroad

0 40 80 120 160 200 KMS (APPROXIMATE)

GULF CANADA RESOURCES INC.

Coal Division

CALGARY ALBERTA

Gulf

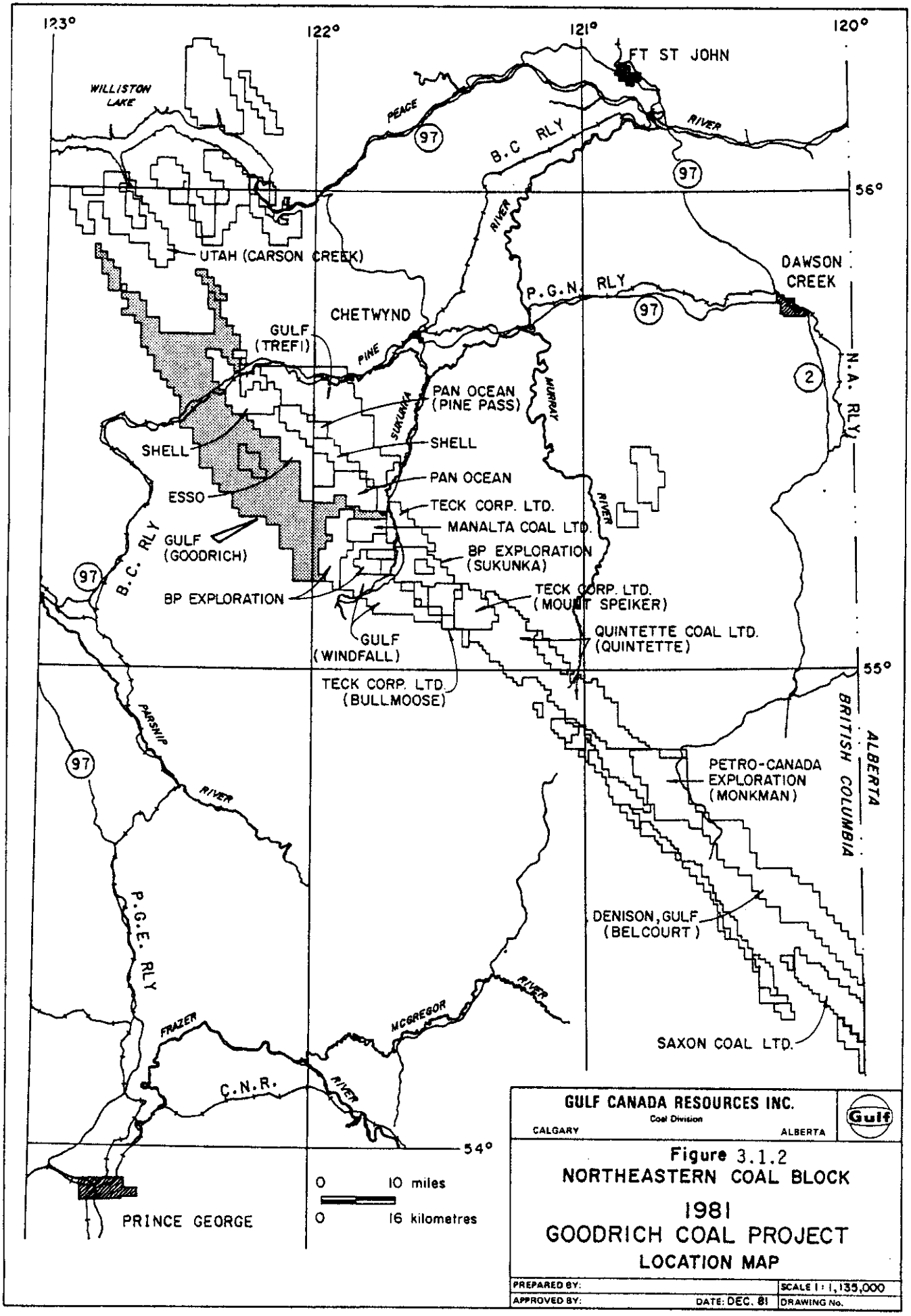
Figure 3.1.1

1981

GOODRICH COAL PROPERTY

LOCATION MAP

PREPARED BY:	SCALE
APPROVED BY: H. D. Z. DATE: NOV. 81	DRAWING No.



GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 3.1.2
NORTHEASTERN COAL BLOCK
1981
GOODRICH COAL PROJECT
LOCATION MAP

PREPARED BY:	SCALE 1 : 1,135,000
APPROVED BY: DATE: DEC. 81	DRAWING No.

122°30'

122°00'

55°45'

55°30'

55°15'

MOBERLY LAKE

WEST MOBERLY L.

EAST MOBERLY L.

I.R. 169

I.R. 168

CHETWYND

TWO WELL BEND

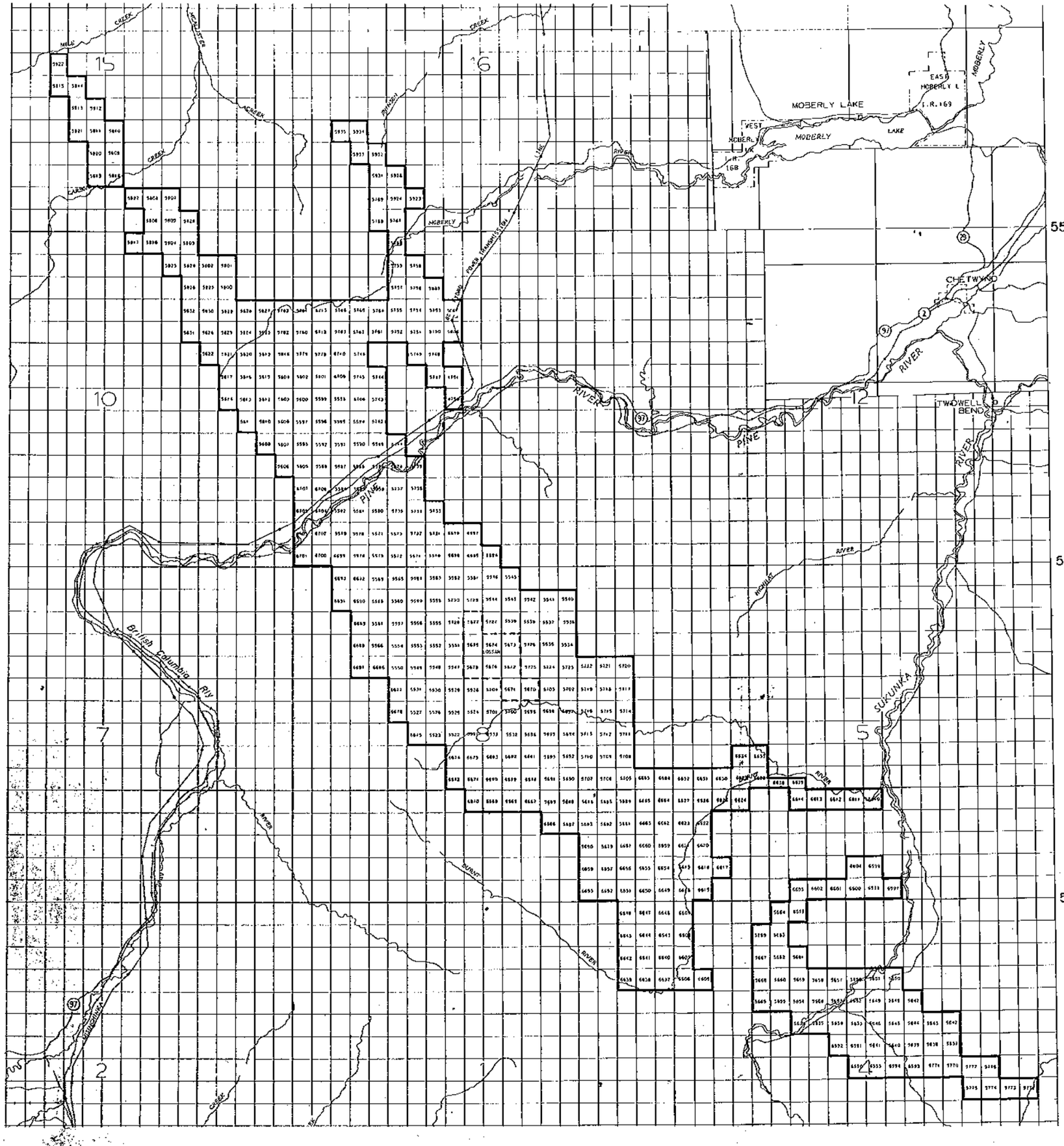
MOBERLY

PINE

RIVER

SUKUNKA

British Columbia Rly



GULF CANADA RESOURCES INC. Coal Division	
CALGARY	ALBERTA

Figure 3.1.3

1981

GOODRICH PROJECT

COAL LICENCE MAP

PREPARED BY: H. ZSCHACH	SCALE
APPROVED BY: DATE: NOV. 81	DRAWING No.

Access to the south, within the Goodrich Lossan area, is only possible by the all-weather gravel road owned and maintained by Canfor Limited of Chetwynd. The Hasler Creek Road, as it's known, turns off the John Hart Highway some 27 kilometres west of Chetwynd. The gravel road parallels the Hasler Creek southward and turns west along Brazion Creek where it continues through the Gulf coal property and then turns north behind Mount Stephenson, where Canfor is opening up new logging areas. A number of other Canfor Ltd. cut-blocks, off the Hasler Creek Road, provide additional but limited four-wheel drive access to some areas in the Goodrich Lossan and Goodrich East mapping blocks.

North of the John Hart Highway, the only vehicle access to the Moberly area is afforded by the generally restricted service roads for B.C.'s transmission power lines.

Access to a large portion of the Goodrich property is primarily by helicopter.

3.2 Biophysical Environment

The Goodrich property is situated in the Rocky Mountain Inner Foothills physiographical region. The topography of the region is dominated by north-westerly trending ridges. Elevations in the area range from 2100 m at Mount Stephenson to 680 metres at the Pine River Valley. Portions of the Pine,

Moberly and Sukunka river watersheds cut across and drain the Goodrich property. In addition, glaciation appears to have had a large influence in shaping the topography of the licence areas.

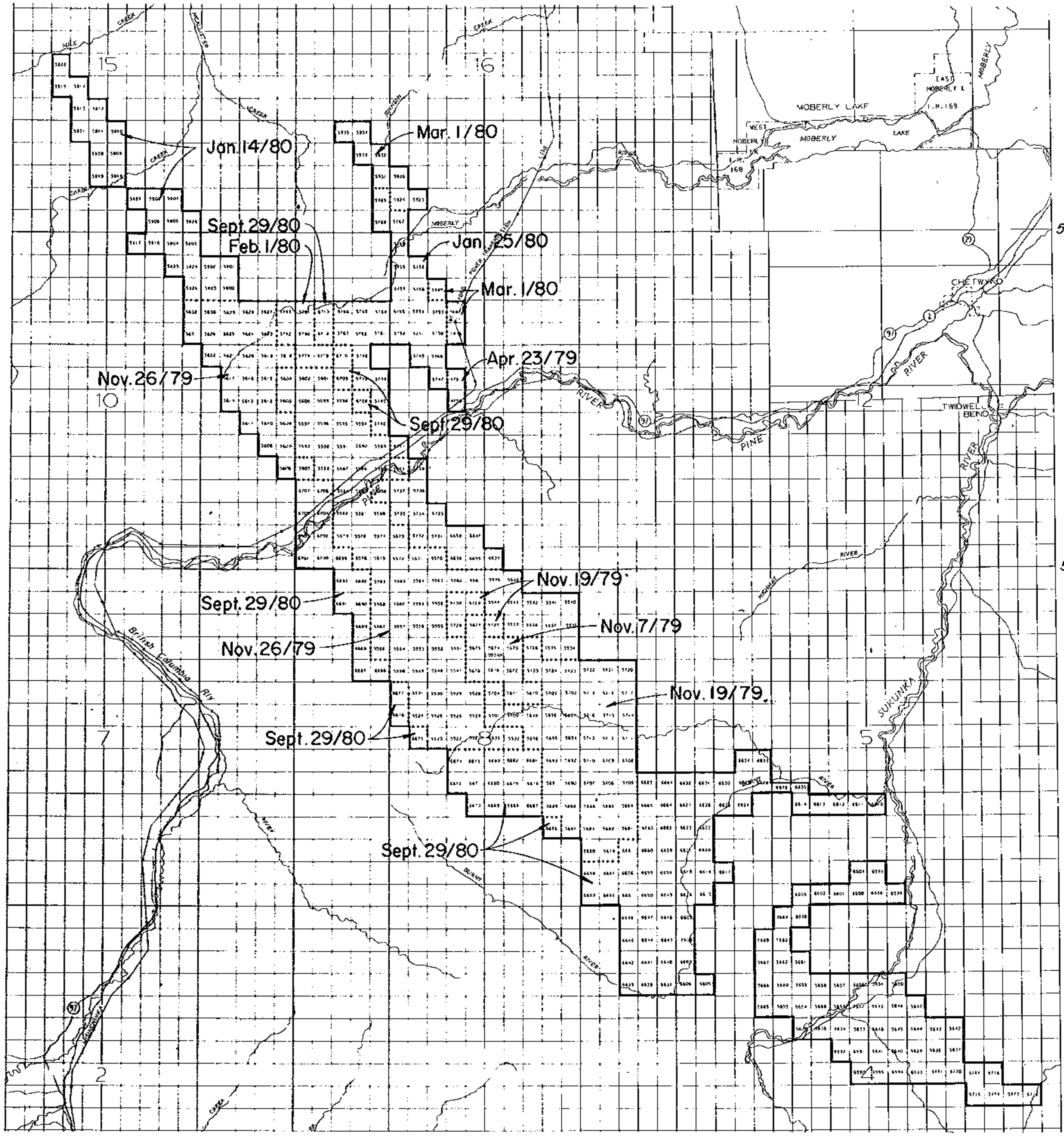
Vegetation in the River valleys of the Goodrich property consists of spruce, birch and fir. The uplands adjacent to these valleys contain subalpine, spruce and fir. Alpine tundra is present but the type of vegetation is not known at this time.

Wildlife noted in the Goodrich area consist of grizzly bear, black bear, moose, caribou, deer and wolves. Fish present in the licence areas have been reported to include dolly varden, mountain whitefish, arctic grayling, and rainbow trout.

3.3 History of Land Tenure

During the summer of 1979, a reconnaissance exploration and mapping program was carried out by Norwest Resource Consultants for GCRI, in the Rocky Mountain Foothills of northeastern B.C. This program was based on reported surface observations of Minnes Group coals in the above mentioned area.

The investigation of the area between the Moberly River in the north and the Burnt River to the south led to the collection of a large amount of data. This data indicated possible



GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 3.3.1
1981
GOODRICH PROJECT
HISTORY OF LICENCE ACQUISITION

PREPARED BY: V. ODEGAARD
APPROVED BY: H. ZSCHACH DATE: AUG. 81
SCALE
DRAWING No.

mistakes in published geological maps, resulting in a misinterpretation of younger Cadomin and Gething strata for older Minnes Group sediments. Since the Gething Formation has historically been considered one of the formations with the greatest coal potential, GCRI acquired 184 coal licences (53,900 hectares) in 1979. In 1980, GCRI applied for and received another 172 licences (50,400 hectares), which included 40 licences optioned from M. Suska. An additional 11 licences (3,200 hectares) were transferred from Gulf's Trefi Property to Goodrich, to bring the total to 367 coal licences equalling 107,500 hectares. Figure 3.3.1 illustrates the group of coal licences acquired on the above mentioned dates.

3.4 Exploration History

The following exploration projects were undertaken by Gulf prior to the 1981 field season:

1979: A regional geological reconnaissance program was conducted by Norwest Resource Consultants Ltd. on behalf of G.C.R.I.

The investigation generally confirmed previously unknown coal-bearing strata between the Moberly River and Burnt River. Consequently, Norwest recommended the acquisition of 209 Goodrich coal licences (61,325 hectares) to cover

sediments of the Minnes Group to Gething Formation. Exploration for 1980 was planned subsequently.

1980: The first year, full scale coal exploration drilling and mapping program was conducted from June 1 to November 7, 1980, consisting of the following:

1) reconnaissance mapping on 1:10,000 scale maps and 1:5,000 scale air photographs;
2) airphotos were flown on a 1:30,000 scale for most of the Goodrich property;
3) 197 trenches were exposed, measured, and logged in detail;
4) 17 rotary holes for a total of 3,645 metres;
5) 19 HQ diamond holes for a total of 3,645 metres;
6) all drill holes were geophysically logged and their locations and elevations surveyed;
7) coal quality analysis of raw coal and clean coal samples; and,
8) approximately 2 km of electrical (resistivity) surveys along Brazion Creek road to test the feasibility of alternate subsurface coal investigation techniques.

Encouraging results recommended further drilling, exploration and mapping to proceed in 1981.

3.5 Regional Activity

Gulf's Goodrich property is favourably situated within the northeast British Columbia coal block. Other well known projects in the area are Quintette (Denison Mines), Monkman (Petro-Canada), Bullmoose Mountain (Teck Corporation), and Belcourt (Denison/Gulf).

Increased coal exploration activity, in the form of drilling and mapping, has taken place in areas closer to the Goodrich property. The companies involved are Esso Resources Ltd., Shell Canada Resources Ltd., Utah Mines Ltd., J.W. MacLeod and Semper Resources, Teck Corporation, and BP Exploration Canada Ltd.

In addition to the Goodrich coal project, Gulf carried out exploration drilling and mapping programs on its Trefi and Windfall properties.

Figure 3.1.2 illustrates the distribution of coal licences held by various companies.

4.0 1981 EXPLORATION PROGRAM

4.1 Objectives

The objectives of the second year exploration program were largely based on those established for the successful 1980 program. These are:

1) To further delineate the coal potential of the Goodrich property by geological mapping and drilling programs.

2) To largely concentrate the rotary and diamond drilling exploration on the possible open pit mining potential of the Goodrich Lossan block and, to a lesser extent, the "Brenot syncline" on the Goodrich East block.

   a) Diamond drilling in the Goodrich Lossan area was planned to further identify and delineate the Gething coal seam stratigraphy and structures, and to obtain core samples for coal quality assessment.

   b) Rotary drilling was undertaken as infill stratigraphic tests to check on coal seam continuity.

3) To initiate a small regional diamond drilling program outside the Goodrich Lossan area to test other coal potential areas delineated by geological mapping.

4) To continue and expand on previous geological mapping efforts with the overall objective of isolating the coal bearing and non-coal bearing strata covered by the Goodrich coal licences.

   a) Reconnaissance mapping was undertaken on the newly acquired licences and in areas previously not investigated.

   b) Detail mapping on a 1:5,000 scale was initiated in the northern half of Goodrich South, Goodrich East, Goodrich Lossan, and Goodrich Central south of the Pine River.

5) To trench, measure, and log all coal seam exposures.

4.2 Field Camp and Logistics

The 1981 Goodrich Coal Project commenced on May 3, 1981. Field personnel were accommodated in motels and meals were obtained from several restaurants in Chetwynd, British Columbia.

The geological mapping and drilling programs were planned and operated out of the Stagecoach Motel in Chetwynd. The Geological and Support Staff of the Goodrich project are listed in Table 4.2.1.

The geological field party consisted of 11-2 man crews and 4 trenchers who worked on the Goodrich property from May to September.

Diamond and rotary drilling was carried out during most of the summer; all proposed holes were completed by Oct. 16, 1981.

A one-week break at staggered intervals for the geological and drilling teams proved helpful in maintaining their overall high performance and morale.

All field operations were coordinated by T. Sampietro.

Round-the-clock radio communication was maintained with all field crews via a battery-operated repeater station, located on Mt. LeHudette, and small portable field radios.

Transportation to and from town base and field areas was provided by four-wheel drive vehicles (from West Wheels Leasing, Calgary, Alberta) and helicopters (by Northern Mountain Helicopter, Prince George, B.C.). Helicopter support consisted of

2-Bell 206 helicopters and/or one A-Star Helicopter. Diamond drill rigs were airlifted and moved by a Bell 205 helicopter.

Indoor core storage facilities are maintained at Northland Storage in Chetwynd.

Field supplies and service procurements were obtained wherever feasible from local outlets. A listing of all suppliers, service agents, and contractors is given in Table 4.2.2.

The road construction undertaken during the program was carried out by a number of sub-contractors under the supervision of P. Demuellermeester of Chetwynd, B.C. A small trailer camp was established in November, 1980, at the road construction site.

4.3 Surveying and Photogrammetry

Topographic map coverage on a 1:10,000 scale was provided by R.M. Hardy & Associates for the 1980 exploration program. Maps at 1:25,000 scale were prepared for the areas not covered by the 1:10,000 maps. The 1:25,000 topographic base maps were derived from 1:50,000 map coverage of areas such as the White Rabbit block and the Moberly block.

Table 4.2.1

PERSONNEL EMPLOYED

Gulf Personnel

G. D. Childs, P. Geol.	Manager, Coal Exploration
A. E. Bienia, P. Geol.	Project Supervisor
H. D. Zschach, P. Geol.	Project Geologist
L. Callow	Coordinator, Environmental Planning
G. E. Seve	Geologist
A. Rahmani	Geologist
D. R. Dauphinee	Geologist
J. B. Davidson	Geologist
J. LaMarre	Geologist
V. Odegaard	Geologist
A. Petzold	Geologist
V. Tapley	Geologist
L. Klatzel	Geologist
E. Bogoslowski	Geological Assistant
S. McKenzie	Geological Assistant
F. Pedersen	Geological Assistant
R. Inkster	Geological Assistant
D. Goer	Geological Assistant
R. McIntosh	Geological Assistant
C. Fitzgerald	Geological Assistant
M. A. Dagenais	Geological Assistant
D. Cruji	Geological Assistant
W. Pedersen	Geological Assistant
D. Dolph	Geological Assistant
T. Holmes	Geological Assistant
P. Howe	Geological Assistant
M. Johnson	Trencher
S. Hansen	Trencher
M. Cassidy	Trencher
G. Love	Assistant Expeditor/Trencher
P. Byrne	Assistant Expeditor
O. Betz	Assistant Expeditor
D. Dales	Secretary
J. Dreysko	Secretary
L. Leonard	Secretary
M. Sparks	Technologist
C. James	Keypunch Operator
G. Ingram	Systems Analyst
G. Erikson	Systems Analyst

PERSONNEL EMPLOYED (cont'd)

Consultants

Norwest Resource Consultants Ltd.:

G. Hoffman	Professional Geologist
G. Jordan	Professional Geologist
I. Delas	Geologist
J. Loader	Geologist
C. Williams	Geologist

(Mr. Williams joined the GCRI coal staff on November 1, 1981.)

Independent Consultants

J. E. Hughes	Professional Engineer
W. Heck	Accountant
T. Sampietro	Expeditor
G. Hellyer	Field Reclamation Officer

Report Preparation

G.C.R.I.	Drafting Department

Table 4.2.2

LIST OF CONTRACTORS AND SERVICES

Accommodation

Westward Inn	Calgary, Alberta
Stagecoach Inn	Chetwynd, B.C.

Aircraft

Northern Mountain Helicopters	Prince George, B.C.

Coal Quality Studies

Loring Laboratories	Calgary, Alberta

Equipment and Fuel

P. Demuellermeester	Chetwynd, B.C.
W. J. Schilling	" "
Petro-Canada (Chetwynd-Pacific)	" "
Esso	" "
Gulf	" "
Texaco	" "

Geophysical Logging

Roke Oil Enterprises	Calgary, Alberta

Mapping Services

R. M. Hardy & Associates	Calgary, Alberta
D. E. Watson Surveys Ltd.	Delta, B.C.

Truck Rentals

Western Truck Rentals	Calgary, Alta.

LIST OF CONTRACTORS AND SERVICES (cont'd)

Trucking

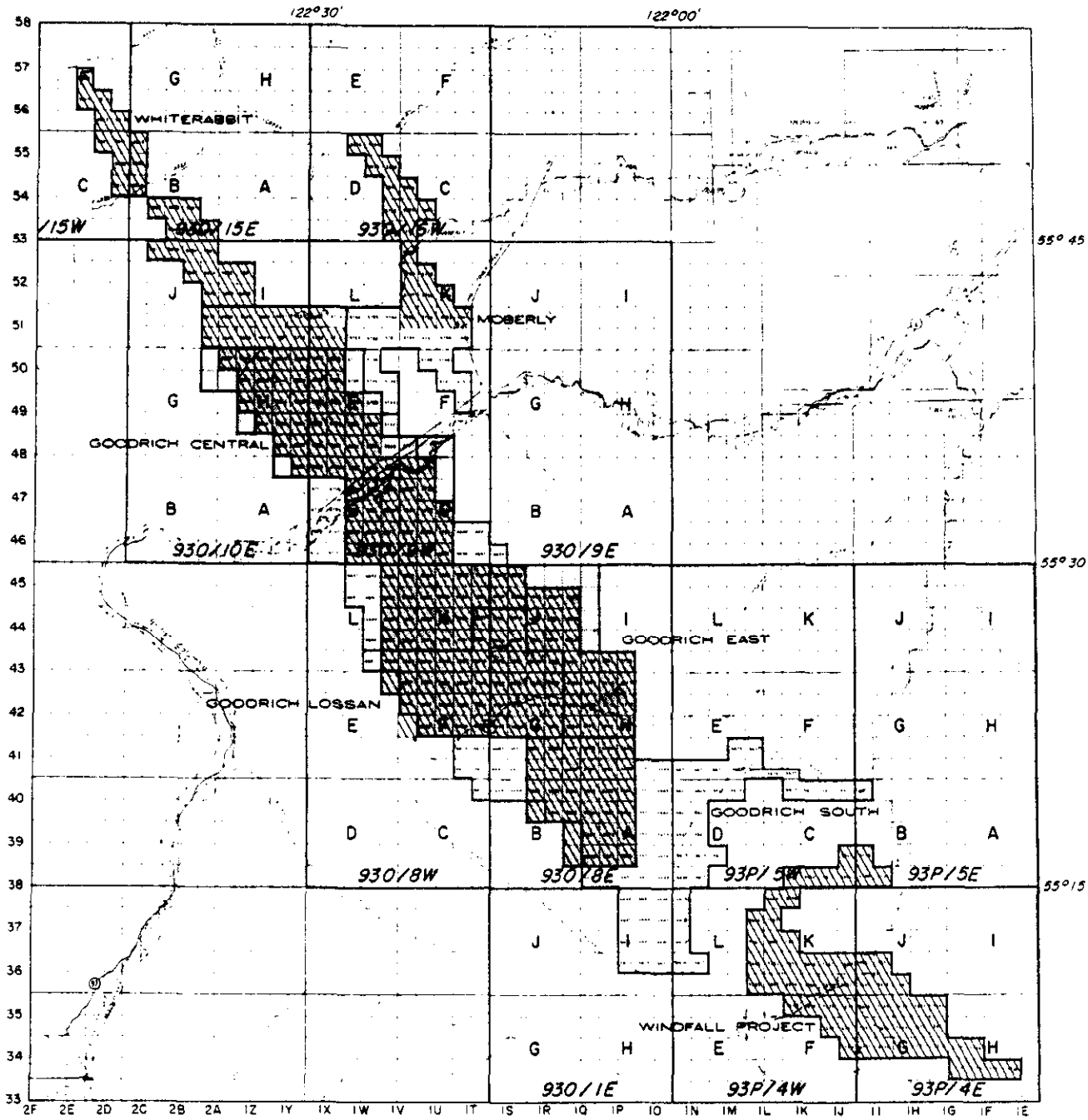
Tortor Trucking	Chetwynd, B.C.

Communications

A.G.T.	Calgary, Alta.
B.C. Telephones	Vancouver, B.C.
West Can Electronics	Calgary, Alta.

Miscellaneous

Bassani Shothole Plug & Control Services Ltd.	Edmonton, Alberta
Northland Storage	Chetwynd, B.C.
Territorial Leasing	Prince George, B.C.
Economy Bookbinding Co.	Calgary, Alberta



AREA COVERED BY 1:5000 MAPS

AREA COVERED BY 1:10,000 MAPS

Remaining areas covered by 1:50,000

Figure 4.3.1

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

1981
GOODRICH PROJECT
COAL LICENCE MAP
SHOWING
TOPOGRAPHIC MAP COVERAGE

PREPARED BY | SCALE
APPROVED BY | DATE JAN. 82 | DRAWING No.

In October, 1980, a new set of aerial photographs were flown for the Goodrich property and produced by R.M. Hardy at a scale of 1:30,000.

In preparation for the 1981 exploration season, R.M. Hardy produced 49 topographic base maps at a scale of 1:5,000. Figure 4.3.1 illustrates the various scaled topographic map coverage of the Goodrich property.

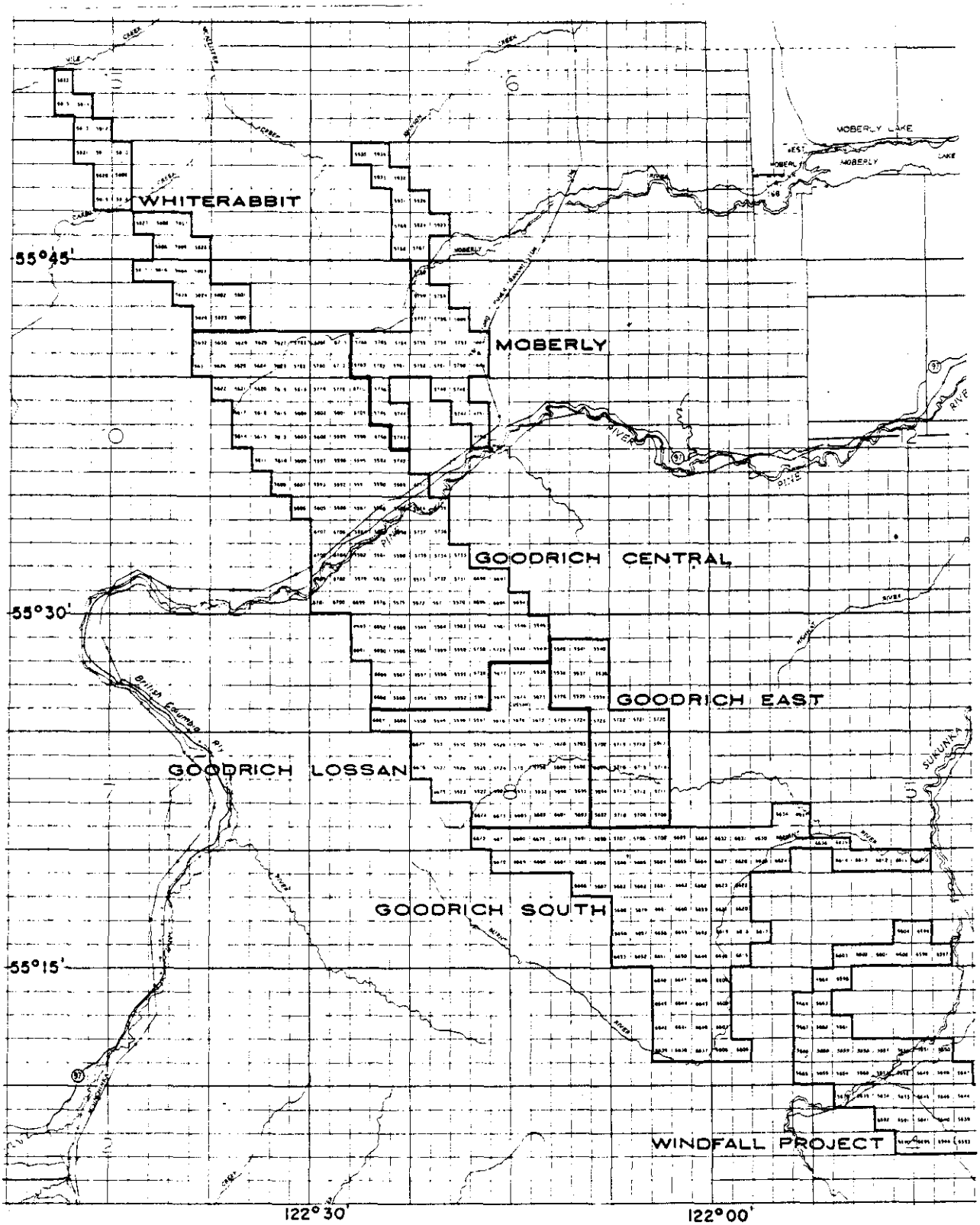
Don E. Watson Surveys Ltd. of Delta, B.C., provided the survey control for all drill sites, as well as control for the 1:30,000 air photogrammetry. Table 4.6.1 lists all drill hole location coordinates and ground elevations.

4.4 Geological Mapping

The 1981 mapping program was largely undertaken by Gulf's summer staff, consisting of geology graduates and students who worked under the direction and guidance of Gulf's permanent coal staff. Further assistance was provided by Norwest Resource Consultants Ltd. and J.E. Hughes, Consultant.

The 1981 mapping program was carried out by groups of field parties assigned to specific mapping blocks.

The following six mapping blocks were established as shown in Figure 4.4.1.



scale in miles

0 5 10

0 8 16

scale in kilometres

GULF CANADA RESOURCES INC.
Coal Division
CALGARY Figure 4.4.1 ALBERTA

Gulf

1981
GOODRICH PROJECT
COAL LICENCE MAP
SHOWING
GEOLOGICAL STUDY BLOCKS

PREPARED BY:		SCALE
APPROVED BY:	DATE: NOV. 81	DRAWING No.

White Rabbit
Moberly
Goodrich Central
Goodrich East
Goodrich Lossan
Goodrich South

Mapping was done on various scales depending on map coverage. Reconnaissance mapping was carried out on the White Rabbit and Moberly blocks on a 1:25,000 scale and on the southern portion of the Goodrich South on a 1:50,000 scale. Some greater detail of reconnaissance was afforded by 1:10,000 scale coverage of the northern two-thirds of the Goodrich Central block. Detail mapping on a 1:5,000 scale is available for the remainder of the Goodrich Central and Goodrich South blocks, and for all of the Goodrich Lossan and Goodrich East blocks.

All geology is interpreted on cross-sections for their respective map scale coverage except for the southernmost Goodrich Central cross-sections which are drawn at 1:10,000 scale with maps at 1:5,000 scale. All geology is subsequently compiled on a 1:50,000 topographic base map.

4.5 Trenching

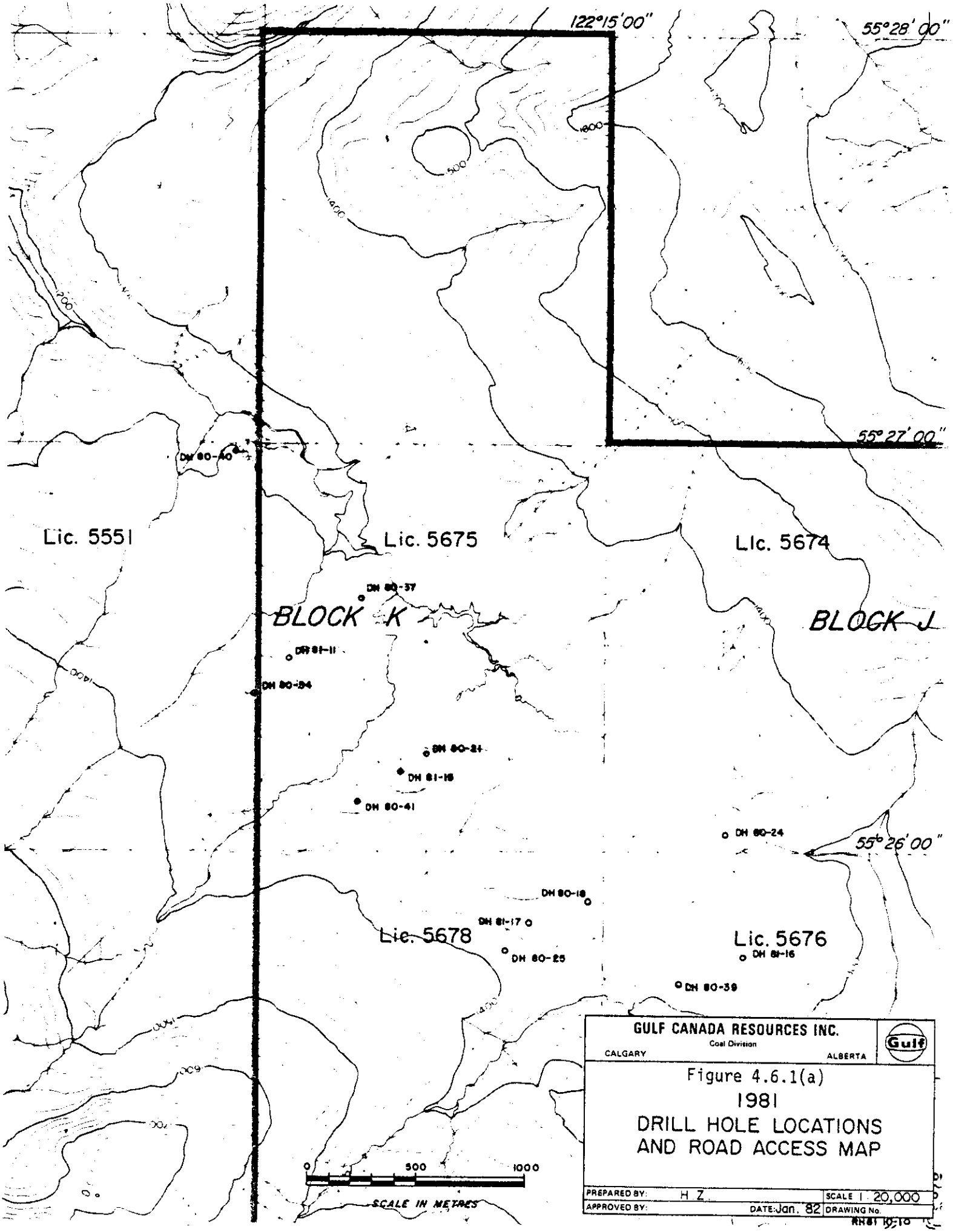
A hand trenching program was undertaken by up to two 2-man teams under the direction of geologists responsible for their particular mapping areas. The trenches were approximately 0.5 metres wide, cut to a depth of 1.0 metres with lithologies

logged in detail. Trench logs for the 1981 trenches with locations and coal/coal + rock ratios are given in Appendix D. A 1:50,000 trench location map can also be found in the same Appendix. The 1980 trenches are plotted as approximate locations, whereas the majority of the 1981 trenches were surveyed using chain and compass. A total of 153 hand trenches were dug and logged in 1981, supplementing 197 logged trenches completed during 1980. During the Lossan road maintenance program, where ditching was undertaken, the number 1 Gething coal seam was exposed in two locations. Overall, 100 trenches were dug on Goodrich South, 93 on Goodrich Central, 66 on Goodrich-Lossan, 42 on Goodrich East, 37 on White Rabbit, and 13 on Moberly.

4.6 Drilling

The 1981 Goodrich project included 49 drilled coal test holes totalling 14,800 metres of drilling. Nineteen holes were rotary drilled for 5,073 metres and 30 were diamond drilled for 9,727 metres. Of the 49 holes, 9 rotary drilled holes and 8 diamond drilled holes were completed in 1980 after the November 7 deadline for inclusion in the 1980 Geological Report.

The locations of the Goodrich drill holes are shown in Figures 4.6.1 (a-c), 4.6.2, 4.6.3, on the Drill Hole Location map included with this Volume, and listed in Table 4.6.1. Drill hole locations are shown on all geological maps and cross-



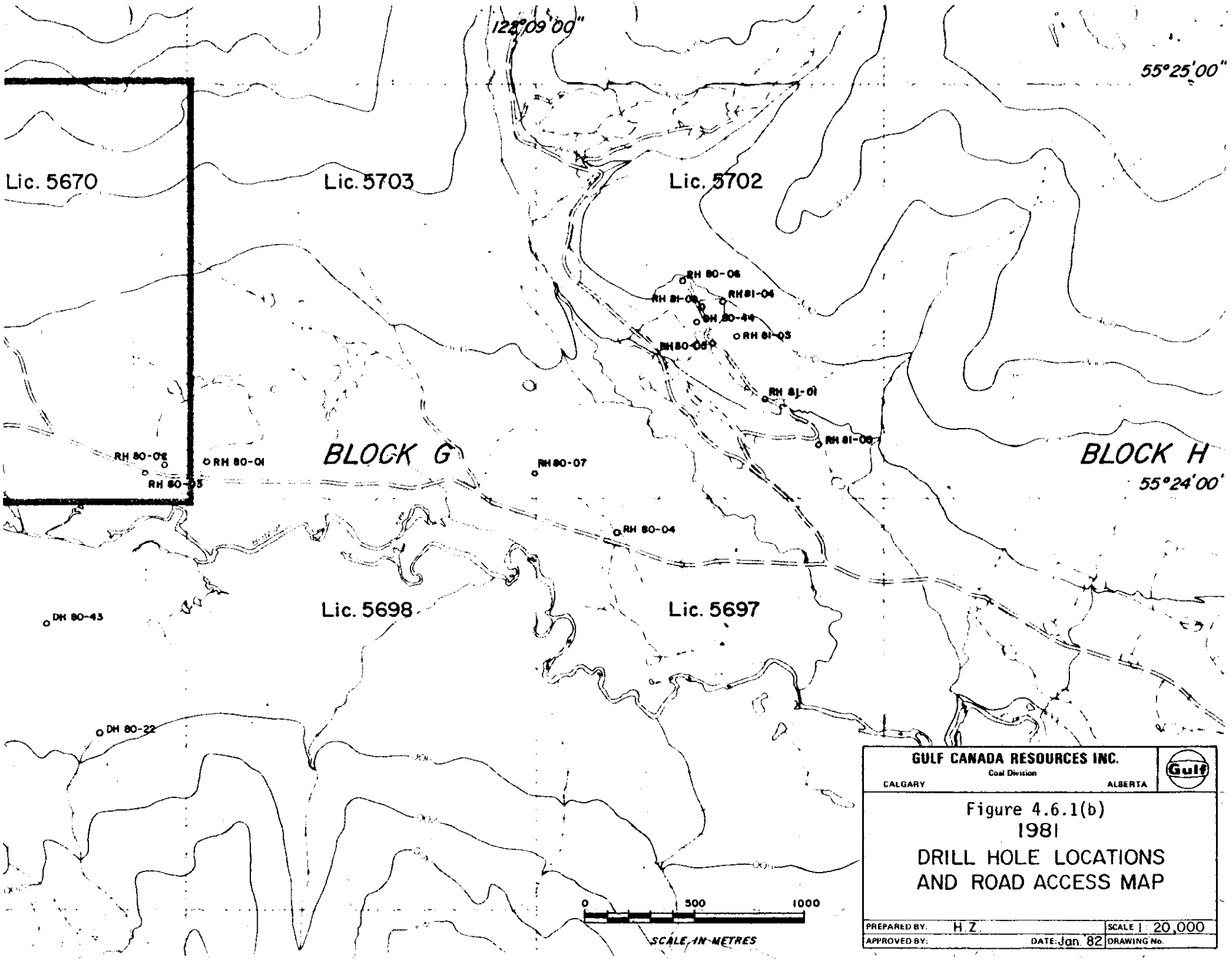
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 4.6.1(a)

1981

DRILL HOLE LOCATIONS AND ROAD ACCESS MAP

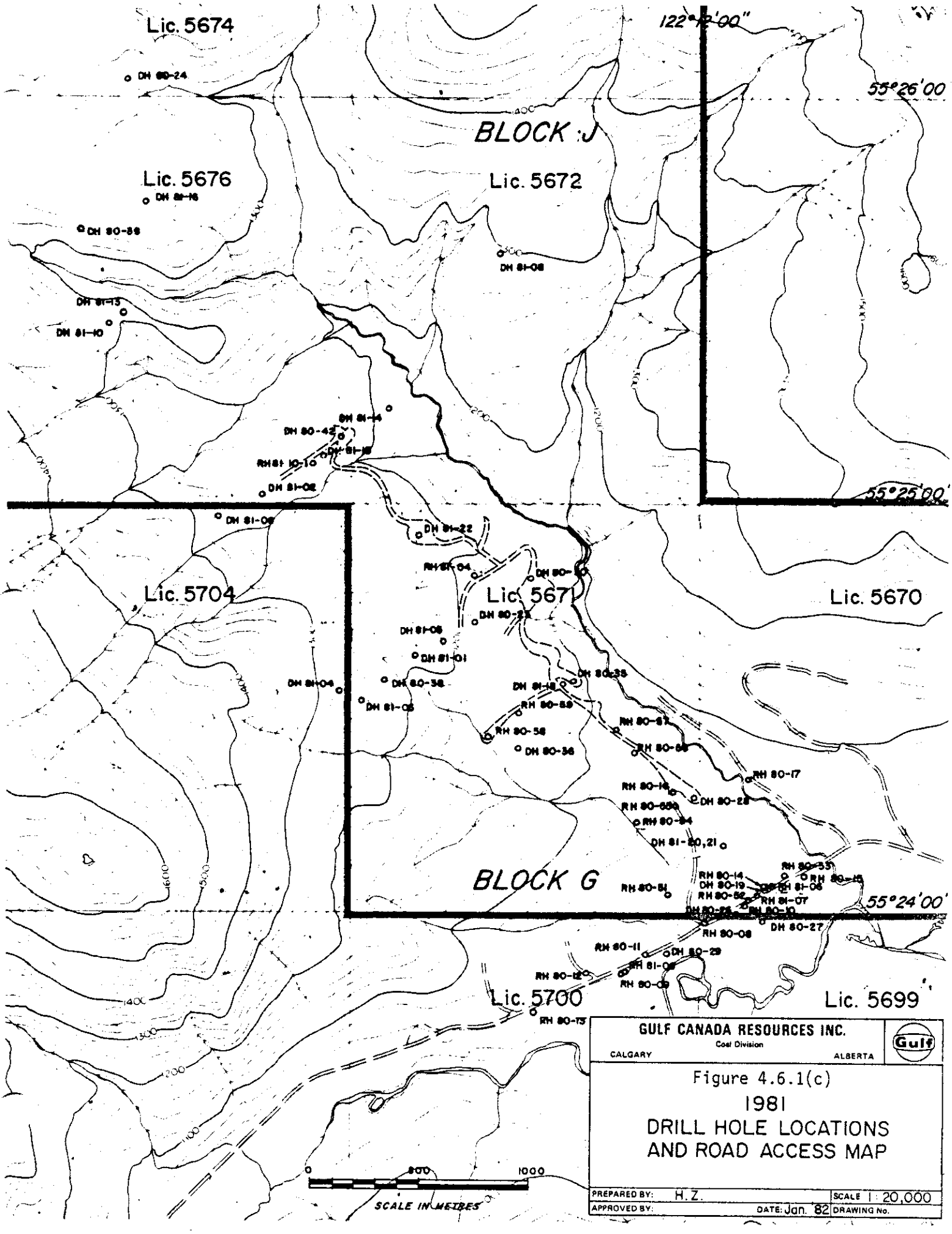
PREPARED BY:	H Z	SCALE	1 : 20,000
APPROVED BY:		DATE: Jan. 82	DRAWING No.



GULF CANADA RESOURCES INC. Coal Division	
CALGARY ALBERTA	Gulf

Figure 4.6.1(b)
1981
DRILL HOLE LOCATIONS
AND ROAD ACCESS MAP

PREPARED BY:	H.Z.	SCALE	1 : 20,000
APPROVED BY:		DATE: Jan. 82	DRAWING No.



GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 4.6.1(c)

1981
DRILL HOLE LOCATIONS
AND ROAD ACCESS MAP

PREPARED BY: H. Z.		SCALE 1 : 20,000
APPROVED BY:	DATE: Jan. 82	DRAWING No.

122°24'00"

122°21'00"

55°42'00"

Lic. 5764

Lic. 5755

55°41'00"

Lic. 5761

DH 81-12

Lic. 5752

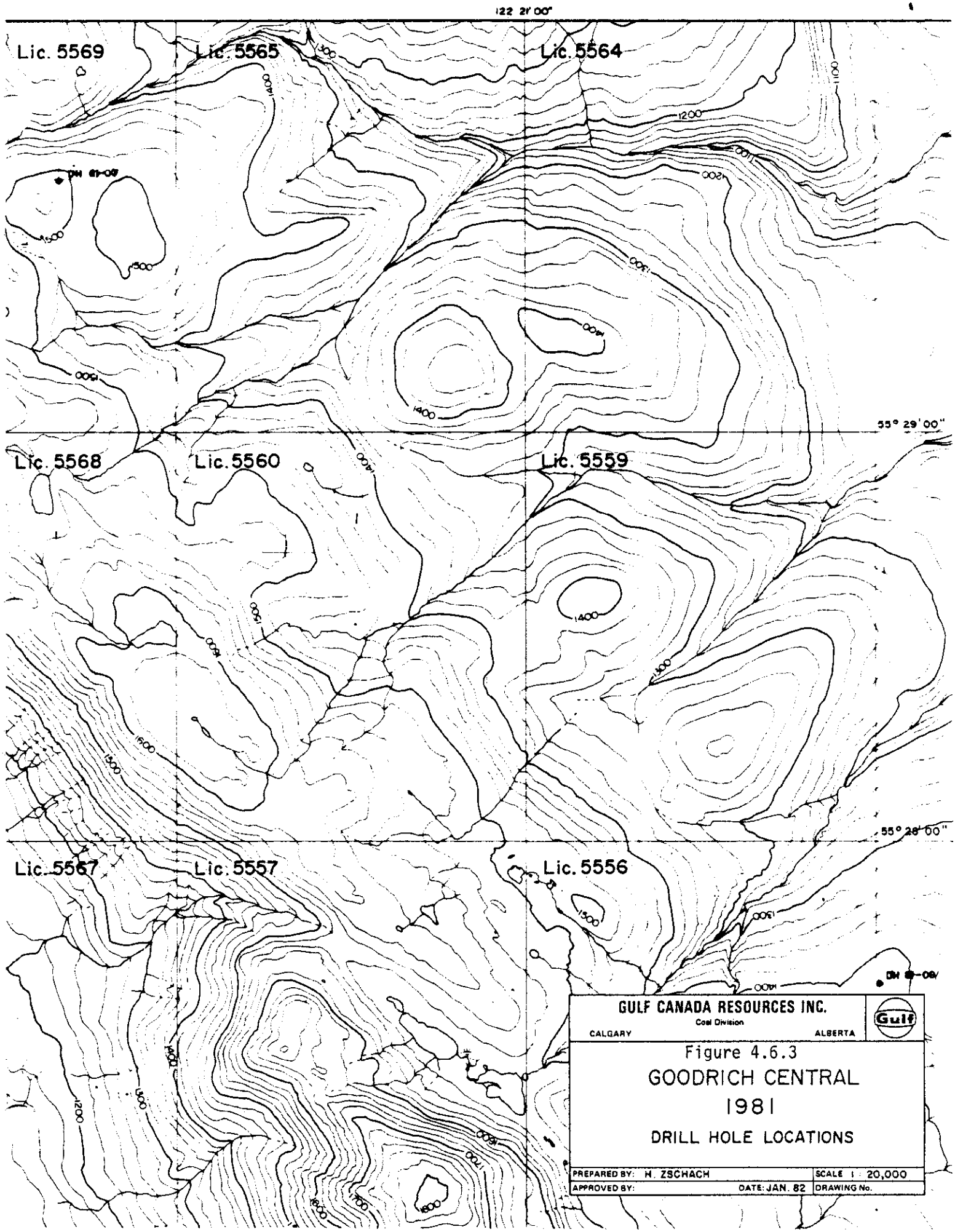
55°40'00"

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 4.6.2

MOBERLY BLOCK
1981
DRILL HOLE LOCATIONS

PREPARED BY: H. ZSCHACH	SCALE 1 : 20,000
APPROVED BY: DATE: JAN. 82	DRAWING No.


122 21' 00"
Lic. 5569
Lic. 5565
Lic. 5564
55° 29' 00"
Lic. 5568
Lic. 5560
Lic. 5559
55° 28' 00"
Lic. 5567
Lic. 5557
Lic. 5556
GULF CANADA RESOURCES INC.
Coal Division
CALGARY
ALBERTA
Gulf
Figure 4.6.3
GOODRICH CENTRAL
1981
DRILL HOLE LOCATIONS
PREPARED BY: H. ZSCHACH
SCALE 1 : 20,000
APPROVED BY:
DATE: JAN. 82
DRAWING No.

sections, except for the 1:50,000 scale Geological Compilation map. Goodrich Property 1980 and 1981 Drill Hole Locations' map, on a 1:20,000 scale, is included in Volume II to show the geographic locations of all 1980 and 1981 drill holes.

Table 4.6.1 summarizes the general drilling statistics for the diamond and rotary drill holes.

All drilling was supervised by Gulf personnel. The drilling contractors maintained two twelve-hour shifts each twenty-four hour period, seven days per week.

Following geophysical logging, cementing procedures were undertaken for only one drill hole, RHD-81-10, to stop a flowing aquifer. Upon abandonment, each drill hole site was attended to by reclamation personnel to the extent that seasonal conditions permitted.

4.6.1 Diamond Drilling

D.W. Coates Enterprises Ltd., of Kamloops, British Columbia conducted the 1980 and 1981 drilling programs reported herein. The 1980 drill holes included in the 1981 Geological Report were drilled during the Period November 7 to December 6, 1980. In 1981, the program commenced on June 19 and was completed on October 17.

Three Longyear 44 drill rigs, each equipped with a ten foot wireline core barrel, were utilized to obtain 'HQ' size (6.5 cm) core which was placed in wooden 10 ft (3.05 m) capacity core boxes after retrieval from the borehole.

Diamond holes 80-37 to 80-43 inclusive, were drilled in the Goodrich Lossan block and 80-44 was drilled in the Goodrich East block. All but three of the 1981 diamond holes were drilled in the Goodrich Lossan block. Diamond holes 81-07 and 81-09 were drilled in the Goodrich Central block and 81-12 was drilled in the Moberly block.

The diamond drilling was mainly helicopter-supported, and support to drill holes adjacent to road access was supplemented by ground vehicles.

All diamond drill core was logged in detail by geologists assigned by Gulf's Coal Division. The core description and geophysical logs are presented in Appendix B.

4.6.2 Rotary Drilling

Alberta Southern Exploration Drilling Ltd., of Calgary, Alberta, conducted the 1980 and 1981 drilling

programs reported herein. The 1980 drill holes included in the 1981 Geological Report were drilled during the period November 20 to December 16, 1980. In 1981, the program was completed in two drilling sessions; the first commencing July 7 and ending July 14, the second commencing August 8 with completion of the 1981 drilling program on September 2. During the period July 24 to August 5, the drilling rig was utilized on Gulf's Windfall project area to complete drilling requirements there.

A truck-mounted TH60 Cyclone air/water combination rig with a DHD Ingersoll-Rand downhole hammer was utilized to drill 13 to 15 cm hole.

Rotary holes 81-01 to 81-05, inclusive, were drilled in the Goodrich East block accessed via logging roads previously constructed by Canfor Ltd. Rotary holes 80-51 to 80-59, inclusive, were drilled in the Goodrich-Lossan block accessed via roads constructed by Gulf Canada Resources Inc. for coal exploration purposes.

No coring operations were undertaken during rotary drilling as the holes were used for exploratory purposes only and geophysical logging was expected to provide sufficient data.

The geophysical logs and drill hole summaries for the rotary holes are presented in Appendix C.

Table 4.6.1

DRILL HOLE SUMMARY

1980 ROTARY DRILL HOLES

(1981 GEOLOGICAL REPORT)

HOLE #	LOCATION (UTM)	LICENCE	ELEVATION (m)	TOTAL DRILLED (m)	OVERBURDEN (m)
RDH 80-51	6 139 460.09 N 550 520.58 E	5671	1033.40	243.80	16.46
" 80-52	6 139 447.92 N 550 889.69 E	5670	1030.60	256.00	22.55
" 80-53	6 139 549.96 N 551 051.65 E	5670	1030.80	280.40	50.28
" 80-54	6 139 790.18 N 550 378.94 E	5671	1066.00	237.80	4.27
" 80-55	6 139 866.54 N 550 554.70 E	5671	1045.00	304.00	16.76
" 80-56	6 140 120.72 N 550 362.06 E	5671	1081.80	335.87	27.43
" 80-57	6 140 212.90 N 550 287.11 E	5671	1089.80	292.50	16.15
" 80-58	6 140 175.89 N 549 704.61 E	5671	1139.90	299.30	6.10
" 80-59	6 140 269.72 N 549 837.67 E	5671	1130.46	243.80	6.09

DRILL HOLE SUMMARY (cont'd)

1980 DIAMOND DRILL HOLES
(1981 GEOLOGICAL REPORT)

HOLE #	LOCATION (UTM)	LICENCE	ELEVATION (m)	TOTAL DRILLED (m)	OVERBURDEN (m)
DDH 80-37	6 144 199.02 N 546 336.51 E	5675	1307.19	385.00	7.07
" 80-38	6 140 420.31 N 549 218.35 E	5671	1223.10	465.20	26.96
" 80-39	6 142 463.15 N 547 816.38 E	5676	1345.10	477.30	3.67
" 80-40	6 144 859.05 N 545 734.23 E	5551	1303.35	344.40	20.42
" 80-41	6 143 277.80 N 546 323.44 E	5675	1349.94	272.10	12.19
" 80-42	6 141 524.14 N 549 044.21 E	5676	1213.73	215.20	26.72
" 80-43	6 138 835.69 N 551 611.15 E	5699	1068.27	320.00	6.10
" 80-44	6 140 227.05 N 554 554.67 E	5702	1154.10	193.00	4.13

DRILL HOLE SUMMARY (cont'd)

1981 ROTARY DRILL HOLES

HOLE #	LOCATION (UTM)	LICENCE	ELEVATION (m)	TOTAL DRILLED (m)	OVERBURDEN (m)
RDH 81-01	6 139 880.25 N 554 877.02 E	5702	1114.28	212.00	9.00
" 81-02	6 140 290.32 N 554 585.21 E	5702	1173.55	213.00	21.30
" 81-03	6 140 166.16 N 554 735.38 E	5702	1158.56	182.00	2.50
" 81-04	6 140 306.96 N 554 671.19 E	5702	1173.55	222.00	2.50
" 81-05	6 139 687.54 N 555 118.65 E	5702	1071.00	211.00	18.50
" 81-06	6 139 524.98 N 551 001.84 E	5670	1029.73	286.50	41.50
" 81-07	6 139 469.70 N 550 927.57 E	5670	1030.85	317.00	30.50
" 81-08	6 139 110.61 N 550 329.45 E	5700	1042.25	290.00	36.50
" 81-09	6 140 899.06 N 549 622.47 E	5671	1189.86	366.00	43.60
" 81-10-1	6 141 423.50 N 548 923.89 E	5676	1224.98	abandoned	25.75
" 81-10-2	6 141 416.37 N 548 897.84 E	5676	1226.98	280.00	25.75

DRILL HOLE SUMMARY (cont'd)

1981 DIAMOND DRILL HOLES

HOLE #	LOCATION (UTM)	LICENCE	ELEVATION (m)	TOTAL DRILLED (m)	OVERBURDEN (m)
DDH 81-01	6 140 535.09 N 549 360.18 E	5671	1230.6	385.55	8.50
" 81-02	6 141 262.56 N 548 649.78 E	5676	1249.6	331.30	21.30
" 81-03	6 140 345.03 N 549 123.79 E	5671	1244.1	440.40	8.00
" 81-04	6 140 363.69 N 549 019.91 E	5704	1267.3	243.50	11.80
" 81-05	6 140 603.32 N 549 501.43 E	5671	1212.1	427.00	13.40
" 81-06	6 141 169.73 N 548 456.74 E	5704	1273.2	325.00	19.50
" 81-07	6 149 684.34 N 538 966.22 E	5569	1504.0	296.00	6.75
" 81-08	6 142 369.36 N 549 726.17 E	5672	1296.9	478.30	5.00
" 81-09	6 146 075.75 N 542 703.70 E	5555	1409.8	342.60	16.30
" 81-10	6 142 022.10 N 547 965.50 E	5676	1309.9	280.00	25.75
" 81-11	6 143 916.40 N 545 999.10 E	5675	1335.6	339.00	12.50
" 81-12	6 170 582.90 N 538 839.30 E	5761	1158.0	227.00	5.50
" 81-13	6 142 083.50 N 548 002.40 E	5676	1309.6	130.00	4.00
" 81-14A	6 141 669.00 N 549 201.80 E	5672	1188.3	abandoned	----

DRILL HOLE SUMMARY (cont'd)

1981 DIAMOND DRILL HOLES (Page 2)

HOLE #	LOCATION (UTM)	LICENCE	ELEVATION (m)	TOTAL DRILLED (m)	OVERBURDEN (m)
DDH 81-14B	6 141 658.90 N 549 233.50 E	5672	1185.8	303.00	43.30
" 81-15	6 143 410.50 N 546 520.70 E	5675	1329.2	193.80	12.50
" 81-16	6 142 588.40 N 548 104.50 E	5676	1342.0	374.00	7.50
" 81-17	6 142 726.60 N 547 126.40 E	5678	1372.0	412.00	9.00
" 81-18	6 140 416.80 N 550 034.60 E	5671	Top of Casing 1118.4	384.00	15.90
" 81-19	6 141 437.50 N 548 935.40 E	5676	1223.3	380.00	29.00
" 81-20	6 139 699.80 N 550 778.20 E	5670	1039.5	248.00	46.30
" 81-21	6 139 699.80 N 550 778.20 E	5670	1039.5	245.00	44.50
" 81-22	6 141 081.30 N 549 372.20 E	5671	1217.5	269.00	36.60

4.7 Geophysical Logging

All rotary and diamond drill holes were geophysically logged by Roke Oil Enterprises of Calgary. The following suite of logs were run:

1) Gamma Ray-Neutron
2) Sidewall Density
3) Focus Beam Electric
   - 20 cm tool spacing for the entire length of the hole
   - 5 cm tool spacing wherever possible for detail of coal seams
4) Caliper Tool
5) Deviation Survey

Where unstable hole conditions prevented open hole logging, only the logs for gamma ray-neutron, density and deviation were run. To filter out the effects of the pipe joint in the rotary hole, the gamma ray-neutron tool was run a second time (to produce an overlay) after the pipe string was pulled off bottom by 1 to 2 metres.

The geophysical tool response was recorded on 1:100 scale mylar for the full length of the drill hole, and all significant coal zones were recorded on an expanded 1:40 scale in a repeat test run. Expanded scales are available for the density and focus beam electric logs. Paper prints were furnished as soon after the geophysical log tests were completed to permit preliminary stratigraphic correlations, as well as to aid in selecting the core intervals for coal quality sample analysis.

A set of logs is provided in Appendices B and C.

The deviation survey results were given to Gulf's computer group for 1:5,000 scale plan and sideview plots. These plots are attached for each drill hole data package in Appendix B and C.

Reduction of the 1:100 scale geophysical logs to 1:400 scale were also made to facilitate drill hole correlations. This scale of log was used in the geophysical log correlations found in Appendix A, Part 3.

4.8 Other Surveys

In conjunction with the 1981 drilling and mapping programs, several other surveys were conducted. Three geophysical surveys were run primarily to test the effectiveness of different geophysical survey methods on coal deposits. If the surveys were effective, they would then be utilized to help delineate the coal deposits and define future drill targets.

A total of 3 types of reconnaissance surveys were run:

1) Gravity Survey
2) Electromagnetic Survey
3) High Resolution Seismic Survey (Mini-Sosie)

The results of these surveys are given in detail in Appendix E and are described briefly below.

4.8.1 Gravity Survey

Ager, Berretta & Assoc. from Vancouver, B.C. conducted the survey during November, 1980.

Three gravity lines were completed in the Goodrich Lossan area (see map, Appendix E) for a total length of 1,560 metres. A total of four anomalies were outlined. These anomalies have been confirmed through diamond drilling.

Although four anomalies were identified and confirmed, other anomalies that exist (as determined by diamond drilling) were not identified by the survey.

The effectiveness of the system is limited. The survey can give a general indication of dip of beds and some indication of the magnitude of thickness. The limiting factors are overburden, thickness, and steepness of strata.

Overall, the survey is of limited use. Its primary use could indicate the presence of coal deposits in a reconnaissance program. However, placement of any drill targets other than a reconnaissance type drill target would not be possible based on the type of generalized anomalies obtained as a result of the survey.

4.8.2 Electromagnetic Survey

A resistivity survey was conducted by E.M. Electromag Exploration Ltd. from Calgary, Alberta, over one line on the Goodrich Property during November for a total of approximately 1600 metres. The results have been reported in the 1980 Goodrich Geological Report. At that time, an interpretation of the data was not possible and E.M. Electromag Exploration Ltd. were preparing to re-run the survey. The results of the second survey, which was run in the early part of 1981, were similar to the first run. A definite increase in resistivity occurred at depths ranging from 300 - 500 metres. This indicates a resistivity contrast at 300 metres and again at 500 metres. However, coal, fresh water and/or hydrocarbons are all resistive and if found at the same depth, it is impossible to distinguish which is causing the response and an averaging effect may take place. As well, shales which are anisotropic will mask coal lying directly below any sizeable thicknesses.

The system seems to be of limited use in ideal conditions. In the Goodrich area, the results of the survey did not help detect coal deposits or outline structure. The steep dips found in the area result in an averaging of responses from station to station, and the presence of water and shales mask any indication of the presence of coal.

4.8.3 Mini Sosie

A high resolution seismic survey was conducted by CGG - General Geophysics from Calgary, Alberta, on the Goodrich Coal Property in April, 1981. One line was completed for a total length of approximately 8500 metres.

The survey was run over several different types of geological settings; from relatively flat lying strata in the east to highly complicated strata characterized by thrusting, folding, and steep dips in the west.

The field results of this program were of varying quality, which is partially dependent on depth of overburden. Discontinuous to moderately continuous shallow reflections were observed on the eastern half of the line, reflecting generally moderate dips of 35-45°.

The results of the western half of the line run are uncorrelatable. Even when data was screened, it remained very discontinuous. Resolution on this part of the line is very poor and no correlation of coal seam or structure can be made.

The poor response of this survey can be attributed to a) thickness of overburden

b) steep dips (> 45°)

c) complex folding and faulting.

The Mini-Sosie Survey appears to give a good response in flat-lying strata. However, in areas of complex structures as in the Goodrich Lossan area, the survey yields little or no useful data.

4.9 Road Construction and Maintenance

Road construction on the Goodrich Project was solely concentrated in the Goodrich Lossan area to access the potential open pit site. Prior planning with the B.C. Forestry Service, Gulf Environmental Planning Division, Road Construction Supervisor, and the Goodrich Project Group resulted in the decision to open up approximately 4.1 km of logging grade road. Canfor Ltd. was also consulted prior to the construction phase for advisement on where they would have built their road if the

decision had been made to open up the planned for cut-blocks prior to Gulf's coal drilling requirements. The final layout of Gulf's Lossan road was found to suit Canfor's requirements.

Road construction commenced in late October and halted in mid-December of 1980. The final construction phase was completed in May, 1981, with the installation of drainage ditches and culverts.

A small trailer camp was installed off the Hasler Creek to avoid travel to town for the construction crews during the cold November and December (1980) winter season.

The layout of the Lossan road is shown in Figure 4.6.1 (a-c). Road construction began in the vicinity of RDH 80-16.

Maintenance of the newly built road, in part, entailed the hydroseeding of the road embankments and ditches towards the close of the 1981 field season.

4.10 Baseline Environmental Studies

Baseline environmental studies commenced in 1980 and have since been an ongoing and integral part of the Goodrich coal exploration projects. The following environmental studies and available reports in preparation for the Stage 1 development application include:

1980 - Baseline fisheries, benthos, surface water quality and hydrology surveys - Gulf.

- Early and late winter ungulate range surveys - Gulf.

- Preparation of 1:50,000 semi-controlled airphoto mosaic- R.M. Hardy and Associates Ltd.

- Preliminary vegetation mapping from airphotos - Biocon Research Ltd.

- Preliminary soils mapping from airphotos - Pedology Consultants Ltd.

- Preliminary wildlife habitat mapping from airphotos - Glen Smith Wildlife Consultants Ltd.

- Archaeology overview map and report - Lifeways of Canada Ltd.

- Surficial geology mapping and report - Karl Rieker Surficial Geology Ltd.

- Hydrogeological mapping and report - Stevenson International Hydrology Ltd.

1981 - Controlled 1:20,000 orthophoto preparation - The Orthoshop.

- Preparation of 1:50,000 orthophoto mosaic - Foto Flight Surveys Ltd.

- Detailed soils and vegetation mapping and report - Pedology Consultants Ltd.

- Preliminary recreation potential mapping - Pedology Consultants Ltd.

- Seasonal surface water quality, hydrology, and benthos monitoring - Gulf.

- Early and late winter ungulate range surveys - Gulf.

- Wildlife habitat mapping and report - Glen Smith Wildlife Consultants Ltd.

- Landsat snow-free area survey for wildlife winter range mapping - Pegasus Earth Sensing Corporation.

- Spring rare and endangered raptor survey, habitat mapping and report - Lyndhurst Environmental Management Ltd.

- Piezometer installation, monitoring, and reporting - Stevenson International Hydrogeology Ltd.

4.11 Reclamation

Surface disturbance as a result of the 1980 and 1981 coal exploration drilling, road construction and coal trenching programs are limited, totalling roughly 36.7 hectares. Approximately 25 hectares of surface disturbance was incurred in 1981. Road construction of approximately 4.1 km, in consultation with Gulf's Environmental Planning Division and the Chetwynd Branch Forestry Division, kept the surface disturbance to 7.5 hectares.

Reclamation of all drill sites and back-filling of trenches is generally initiated as soon after activity has been completed in the area. The reclamation program is under the direct supervision of Gulf's Environmental Planning Division. Surface

disturbances are reclaimed in accordance with the British Columbia "Guidelines for Coal and Mineral Exploration".

Reclamation of helicopter drill sites generally entails cut timber to be "bucked-up" and laid on the ground. Soil exposure is rare as no heavy equipment was utilized in the site preparation. Timber cutting is kept to a minimum and generally depends on a combination factor of site location, forest cover, and landing area required for the helicopters.

Reclamation of disturbed surface areas along the road consisted of installation of additional culverts and ditches, subsequent to the main road construction phase in late 1980, to allow proper drainage and therefore, road stability. Hydroseeding with a standard B.C. Forestry grass mixture was undertaken at the end of the summer to stabilize the road embankments and drainage ditches.

4.12 Cost Analysis and Application of Work Credits

The 1981 Geological Report covers the period from November 8, 1980 to January, 1982, for which exploration expenditures total $4,988,527.50.

The summary of exploration expenditures incurred in the 1981 Goodrich programmes is given in Table 4.12.1.

The application for work credits on the Goodrich coal licences is outlined in Table 4.12.2 and illustrated in Figure 4.12.1.

TABLE 4.12.1

GOODRICH COAL PROJECT

SUMMARY OF EXPENDITURES (NOV. 1980 - JAN. 1982)

SURVEYS	Sub-Total	$141,142.69
PRE & POST FIELD STUDIES		
- Wages & Salaries		95,626.55
- Supplies & Services		48,495.39
- Drafting & Reprographics		91,099.52
- Consultant Fees		112,491.01
	Sub-Total	$347,712.47
FIELD EXAMINATION		
- Wages & Salaries		418,736.99
- Equipment Rentals		87,651.11
- Supplies & Services		13,961.87
- Helicopter (Mapping)		248,811.00
	Sub-Total	$769,160.97
FIELD CAMP		
- Equipment Rental		50,544.81
- Supplies & Services		21,242.12
- Expeditor		43,823.54
- Personel - Accommodation, etc.		213,328.39
	Sub-Total	$328,938.86
DRILLING		
- Slashers		44,652.00
- Supplies & Services		40,907.74
- Catwork		4,784.80
- Mini-Sosie (Test)		82,320.35
- Helicopter (Drill Moves)		568,219.70
- Drilling		1,392,387.28
- Sample Analysis		53,855.40
	Sub-Total	$2,187,127.27
GEOPHYSICAL LOGGING	Sub-Total	$215,442.36
ROAD CONSTRUCTION	Sub-Total	$256,686.46

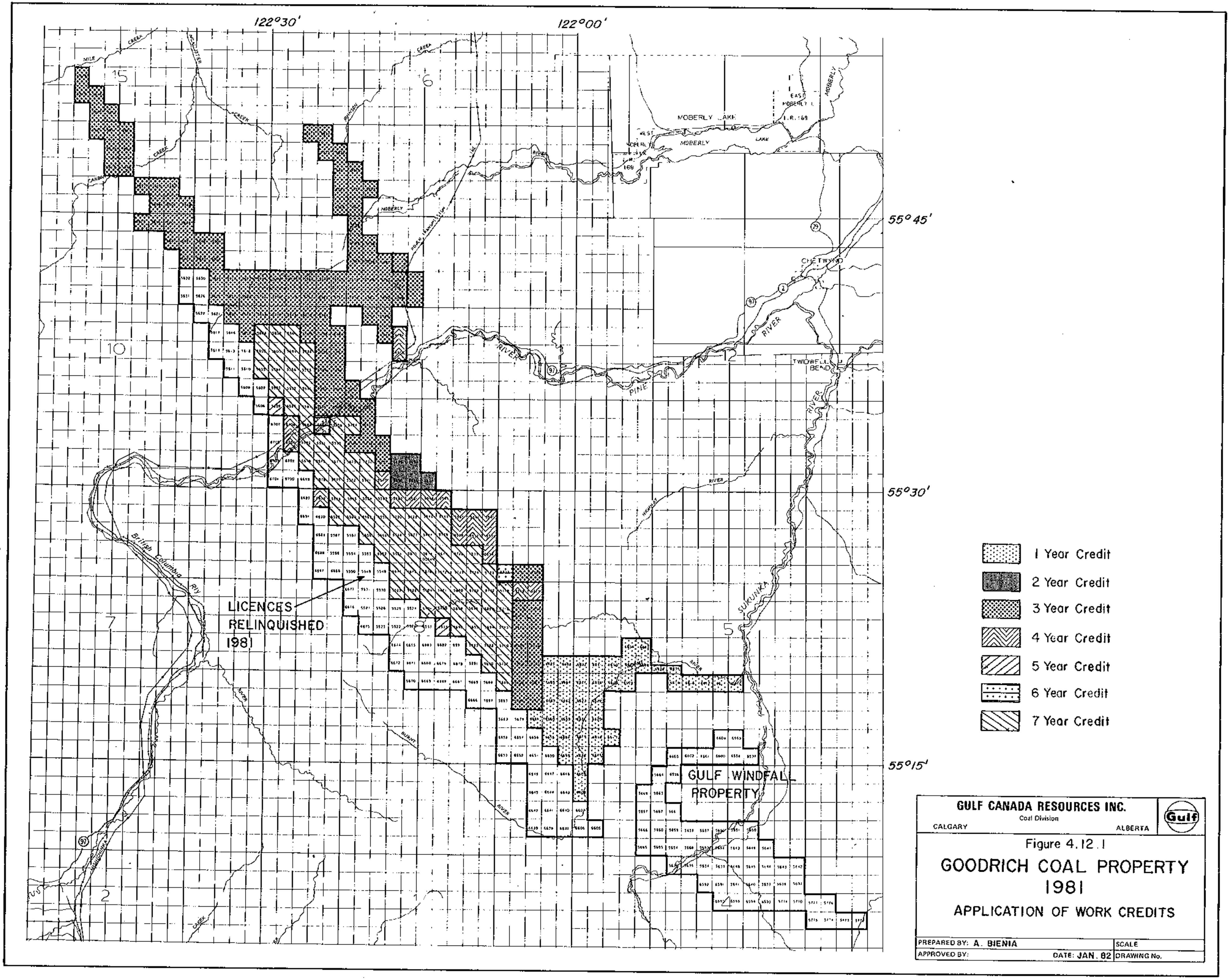
RECLAMATION

-	Aircraft Charter		9,472.00
-	Contractor & Slashers		34,412.27
-	Environmental Studies		192,000.00
		Sub-Total	$235,884.27

GENERAL COSTS AND OVERHEAD

-	Salaries, Report Preparation, etc.	Sub-Total	$506,432.15

TOTAL EXPENDITURES **$4,988,527.50**



GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 4.12.1
GOODRICH COAL PROPERTY
1981
APPLICATION OF WORK CREDITS

PREPARED BY: A. BIENIA		SCALE
APPROVED BY:	DATE: JAN. 82	DRAWING No.

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
4750	Apr. 23/79	293	X	X	X	7,325	-	-	-	7,325
4751	Apr. 23/79	293	X	X	X	7,325	-	-	-	7,325
5528	Nov. 26/79	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5529	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5532	" "	295	X	3,687.50	3,687.50	7,375	7,375	-	-	22,125
5534	" "	294	X	X	3,675.00	7,350	-	-	-	11,025
5535	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5536	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5537	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5538	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5539	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5540	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5541	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5542	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5543	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5544	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5545	" "	294	X	3,675.00	3,675.00	7,350	7,350	-	-	14,700
5546	" "	294	X	3,675.00	3,675.00	7,350	7,350	-	-	14,700
5547	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5551	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5552	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5555	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5556	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5558	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5559	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5560	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5561	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5562	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5563	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (2)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5564	Nov. 26/79	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5565	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5568	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5569	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5570	" "	294	X	3,675.00	3,675.00	7,350	-	-	-	14,700
5571	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5572	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5573	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5574	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5575	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5576	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5577	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5578	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5579	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5580	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5581	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5582	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5583	" "	293	X	X	3,662.50	7,325	7,325	14,650	-	32,962.50
5584	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5585	" "	293	X	X	3,662.50	-	-	-	-	3,662.50
5586	" "	293	X	X	3,662.50	-	-	-	-	3,662.50
5587	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5588	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5589	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5590	" "	293	X	X	3,662.50	-	-	-	-	3,662.50
5591	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5592	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5593	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5594	" "	293	X	X	3,662.50	-	-	-	-	3,662.50
5595	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (3)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5596	Nov. 26/79	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5597	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5598	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5599	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5600	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5601	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5602	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5603	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5604	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5605	" "	293	X	3,662.50	3,662.50	7,325	7,325	-	-	21,975
5609	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5615	" "	293	X	X	X	-	-	-	-	-
5618	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5619	" "	292	X	X	X	-	-	-	-	-
5620	" "	292	X	X	X	-	-	-	-	-
5623	" "	292	X	X	X	-	-	-	-	-
5624	" "	292	X	X	X	-	-	-	-	-
5625	" "	292	X	X	X	-	-	-	-	-
5627	" "	292	X	X	X	-	-	-	-	-
5628	" "	292	X	X	X	-	-	-	-	-
5629	" "	292	X	X	X	-	-	-	-	-
5670	Nov. 7/79	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5671	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5672	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5673	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5674	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5675	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5676	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5677	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5678	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (4)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5681	Nov. 19/79	295	X	X	3,687.50	-	-	-	-	3,687.50
5682	" "	295	X	X	3,687.50	-	-	-	-	3,687.50
5684	" "	295	X	X	3,687.50	-	-	-	-	3,687.50
5685	" "	295	X	X	3,687.50	-	-	-	-	3,687.50
5686	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5690	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5692	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5693	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5694	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5695	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5696	" "	295	X	X	X	7,375	7,375	14,750	14,750	44,250
5697	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5698	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5699	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5700	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5701	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5702	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5703	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5704	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5705	" "	294	X	X	3,675.00	-	-	-	-	3,675
5706	" "	294	X	X	3,675.00	-	-	-	-	3,675
5707	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5708	" "	294	X	X	3,675.00	-	-	-	-	3,675
5709	" "	294	X	X	3,675.00	-	-	-	-	3,675
5710	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5711	" "	294	X	X	3,675.00	-	-	-	-	3,675
5712	" "	294	X	X	3,675.00	-	-	-	-	3,675
5713	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5714	" "	294	X	X	3,675.00	-	-	-	-	3,675
5715	" "	294	X	X	3,675.00	-	-	-	-	3,675

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (5)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5716	Nov. 19/79	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5717	" "	294	X	X	3,675.00	7,350	-	-	-	11,025
5718	" "	294	X	X	3,675.00	7,350	-	-	-	11,025
5719	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5720	" "	294	X	X	3,675.00	942.40	-	-	-	4,617.40
5721	" "	294	X	X	3,675.00	-	-	-	-	3,675
5722	" "	294	X	X	2,432.60	7,350	7,350	14,700	-	31,832.60
5723	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5724	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5725	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5726	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5727	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5728	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5729	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5730	" "	294	X	X	X	7,350	7,350	14,700	14,700	44,100
5731	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5732	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5733	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5734	" "	293	X	X	X	-	-	-	-	-
5735	" "	293	X	X	X	-	-	-	-	-
5736	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5737	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5738	" "	293	X	X	X	7,325	7,325	14,650	14,650	43,950
5739	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5742	Jan. 25/80	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5743	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5744	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5745	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5746	" "	293	X	3,662.50	3,662.50	-	-	-	-	7,325
5747	" "	293	X	X	3,662.50	-	-	-	-	3,662.50
5748	" "	292	X	X	3,650.00	-	-	-	-	3,650

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (6)

(X = Work Credits Applied in 1980)

cence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5749	Jan. 25/80	292	X	X	3,650.00	-	-	-	-	3,650
5750	" "	292	X	X	3,650.00	-	-	-	-	3,650
5751	" "	292	X	X	3,650.00	-	-	-	-	3,650
5752	" "	292	X	X	3,650.00	-	-	-	-	3,650
5753	" "	292	X	X	3,650.00	-	-	-	-	3,650
5754	" "	292	X	X	3,650.00	-	-	-	-	3,650
5755	" "	292	X	X	3,650.00	-	-	-	-	3,650
5756	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5757	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5758	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5759	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5760	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5761	" "	292	X	X	3,650.00	-	-	-	-	3,650
5762	" "	292	X	X	3,650.00	-	-	-	-	3,650
5763	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5764	" "	292	X	X	3,650.00	-	-	-	-	3,650
5765	" "	292	X	X	3,650.00	-	-	-	-	3,650
5766	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5767	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5768	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5769	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5778	Feb. 1/80	293	X	3,622.50	3,622.50	-	-	-	-	7,325
5779	" "	293	X	3,622.50	3,622.50	-	-	-	-	7,325
5780	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5781	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5782	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5783	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (7)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5800	Jan. 14/80	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5801	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5802	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5803	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5804	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5805	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5806	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5807	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5808	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5809	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5810	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5811	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5812	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5813	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5814	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5815	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5816	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5817	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5818	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5819	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5820	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5821	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5822	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5823	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5824	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5825	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5826	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5827	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5828	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (8)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
5886	Mar. 1/80	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5887	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5889	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5923	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5924	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5926	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5931	" "	292	X	3,650.00	3,650.00	-	-	-	-	7,300
5932	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5933	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5934	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275
5935	" "	291	X	3,637.50	3,637.50	-	-	-	-	7,275

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
6608	Sept. 29/80	296	2,220.00	-	-	-	-	-	-	2,220.00
6609	" "	296	2,220.00	-	-	-	-	-	-	2,220.00
6610	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6611	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6612	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6613	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6614	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6615	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6616	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6617	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6618	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6619	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6620	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6621	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6622	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6623	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6624	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6625	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6626	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6627	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6628	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6629	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6630	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6631	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6632	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6633	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6634	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6635	" "	148	1,110.00	-	-	-	-	-	-	1,110.00
6636	" "	148	1,110.00	-	-	-	-	-	-	1,110.00
6649	" "	295	2,212.50	-	-	-	-	-	-	2,212.50

TABLE 4.12.2 - APPLICATION OF WORK CREDITS - GOODRICH COAL PROPERTY (10)

(X = Work Credits Applied in 1980)

Licence No.	Effective Date	Hectares	1st Year ($7.50)	2nd Year ($12.50)	3rd Year ($12.50)	4th Year ($25.00)	5th Year ($25.00)	6th Year ($50.00)	7th Year ($50.00)	Total
6654	Sept. 29/80	295	2,212.50	-	-	-	-	-	-	2,212.50
6655	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6659	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6660	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6661	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6662	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6663	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6664	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6665	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6684	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6685	" "	295	2,212.50	-	-	-	-	-	-	2,212.50
6692	" "	294	2,205.00	3,675.00	3,675.00	7,350	-	-	-	16,950
6694	" "	294	2,205.00	3,675.00	-	-	-	-	-	5,880
6695	" "	294	2,205.00	3,675.00	-	-	-	-	-	5,880
6696	" "	294	2,205.00	3,675.00	-	-	-	-	-	5,880
6697	" "	293	2,197.50	3,675.00	-	-	-	-	-	5,872.50
6698	" "	293	2,197.50	3,675.00	-	-	-	-	-	5,872.50
6704	" "	293	2,197.50	3,662.50	3,662.50	7,325	-	-	-	16,847.50
6706	" "	293	2,197.50	3,662.50	3,662.50	7,325	-	-	-	16,847.50
6708	" "	293	2,197.50	3,662.50	3,662.50	-	-	-	-	9,522.50
6709	" "	293	2,197.50	3,662.50	3,662.50	-	-	-	-	9,522.50
6710	" "	293	2,197.50	3,662.50	3,662.50	-	-	-	-	9,522.50
6711	" "	293	2,197.50	3,662.50	3,662.50	-	-	-	-	9,522.50
6712	" "	292	2,190.00	3,650.00	3,650.00	-	-	-	-	9,490
6713	" "	292	2,190.00	3,650.00	3,650.00	-	-	-	-	9,490

5.0 GEOLOGY

5.1 Summary

The Goodrich coal licences are situated west of Chetwynd, B.C. and lie within the Rocky Mountain Foothills. The property extends from the Burnt River in the south to Eleven Mile Creek in the north.

Geologically, the area consists of an elongated, north-west trending, tectonic slice of coal bearing and non-coal bearing Lower Cretaceous-Jurassic sediments. The property exposes strata of the Fernie Formation and the Beaudette, Crassier, and Fort St. John Groups.

The regional geology of the Goodrich property is illustrated on a 1:50,000 geological compilation map included with Volume II. All major structures referred to by name in the text have also been identified on the 1:50,000 geology map.

Coal measures are found in the Brenot, Dresser, and Gething formations of the Crassier Group.

Three areas with open pit potential have been identified in synclinal structures. To date, the thicker coal seams come from the upper Gething Formation in two areas in the Goodrich Lossan block. Extensive drilling confirms the continuity of at

least four upper Gething coal zones, with an aggregate true thickness of 16 metres over a 180 metre interval.

The third area of open pit potential exists in the Brenot Formation in Goodrich East, but is of lesser economic significance.

Other areas of open pit potential may be opened up with significant drill intersections at Moberly (DDH 81-12) and Goodrich Central (DDH 81-07).

5.2 Regional Stratigraphy

Cretaceous rocks are exposed along the entire foothills belt of the Rocky Mountains within northeastern British Columbia. These rocks contain deposits of several major deltas and reveal a complex interrelationship of continental to marine sediments (Stott, 1973).

The Goodrich property is underlain by the Jurassic Fernie Formation, the Jurassic-Cretaceous Beaudette Group, and the Lower Cretaceous Crassier and Fort St. John Groups. A table of formations is presented in Table 5.2.1. J.E. Hughes' classification of the Upper Jurassic, Lower Cretaceous strata has been adopted in this report, generally because of the clear field mapping distinction between the non-coal bearing Beaudette Group and the coal bearing Crassier Group.

TABLE 5.2.1

TABLE OF FORMATIONS

Series	Group 1	Group 2	Formation	Approx. Thickness (m)	Lithology
Lower Cretaceous	Fort St. John	Fort St. John	Moosebar	150 - 250	Mudstone, minor siltstone, marine.
			Bluesky	2 - 5	Fine to medium grained sandstone, mudstone, thin conglomerate unit at top with or without glauconite
	Crassier	Bullhead	Gething	150 - 450	Cyclothems; dark grey mudstone, siltstone; very fine to medium grained sandstone, carbonaceous silty, sandy mudstones; coalified plant debris, minor bentonite, black shale and occasional minor tuffs in upper unit. COAL
			Dresser	125 - 250	Incomplete cyclothems, discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits and conglomerate.
Transitional	Beaudette	Minnes	Brenot	300 - 500	Lithic "salt & pepper" sandstone, siltstone, mudstone, carbonaceous mudstone. COAL
			Monach	150 - 225	Marine lithic & quartzose sandstone, with thick beds of clean, coarse grained white quartzite at top. Minor shales, siltstones, and sandstones, with occasional thin conglomerate.
			Beattie Peaks	250 - 300	Buff to brownish sandstones, fine to medium grained, thinly bedded black & dark grey shales, siltstones; thin sandstones with ironstone banding.
			Monteith	350 - 450	Grey & brown sandstones, fine to medium grained. Fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone & sandstone partings, with occasional thin conglomerate.
Jurassic	Fernie	Fernie	Fernie	Incomplete Section	Dark grey to black shale, mudstone, siltstone, sandstone, marine.

1. Gulf Canada Resources Classification (J. E. Hughes).
2. Geological Survey of Canada Classification.

A cross-section of typical geophysical log response to formation stratigraphy from the upper Brenot and upper Moosebar is included in Appendix A, Part 3.

5.2.1 Fernie Formation

The Fernie Formation of Jurassic age is the oldest unit exposed on the property and consists of dark grey to black shales, mudstones, siltstones and sandstones; shales and mudstones are generally the predominant lithologies. The Fernie Formation was deposited under marine conditions and represents a transgressive phase (Stott, 1973). The formation thickness was not recorded in the field, as there was no complete section exposed in the Goodrich area.

On the Goodrich property the Fernie is primarily found south of the Pine River. There, a southwesterly trending belt of Fernie is exposed and upthrusted by the sub-parallel trending Gilliland thrust. In the north, the formation caps a minor southeasterly plunging anticline which crosses the Moberly River just west of Frank Roy Creek. The areal exposure of the formation is considered minor, due to its recessive nature. Limited exposure makes it difficult to determine its stratigraphic thickness. Much of the formation was tree covered and in most cases, it formed valleys.

5.2.2 Beaudette Group

The Upper Jurassic-Lower Cretaceous Beaudette Group transitionally overlies the Fernie Formation and is comprised of the Monteith, Beattie Peaks, and Monach Formations. The group has a maximum thickness of approximately 1000 metres between the Burnt and Peace River areas, and is exposed throughout the Goodrich property. The group forms positive areas like Mount Bickford north of the Pine Valley, Mount Stephenson, Mount Gilliland south of the Pine Valley, and Mount LeHudette in Goodrich East area. The Beaudette Group can be categorized as mostly non-coal bearing.

5.2.2.1 Monteith Formation

The Monteith Formation is the oldest of the Beaudette Group and consists of predominantly fine to medium grained sandstones of delta front origin (Stott, 1973). The formation is characterized by some thick intervals of fine to coarse grained quartzites at the top. This resistant unit is interbedded with minor recessive beds of shale and thin beds of conglomerate. The Monteith Formation is generally finer grained than the Monach (especially the quartzites) and the two can usually be distinguished on that basis (Karst, 1980). The formation varies in thickness from 350 to 450 metres, and is predominantly exposed along the west edge of the property and in other isolated locations.

5.2.2.2 Beattie Peaks Formation

The Beattie Peaks conformably overlies the Monteith. The formation consists of fine to medium grained, brown to medium grey sandstones with minor iron- stain. Tidal flat, pro-deltaic, and mid-basin deposits are represented in the thinly bedded marine shales and siltstones facies (Stott, 1973). Thin, fine-grained sandstones with ironstone banding were also found during mapping.

The formation varies in thickness from 250 metres in the east, to 300 metres to the west of the property. The Beattie Peaks is very well exposed throughout the property, and its contact with the underlying Monteith Formation forms the majority of the peaks and the ridges that lie within the property.

5.2.2.3 Monach Formation

The Monach Formation represents the top of the Beaudette Group and consists of marine lithic and quartzose sandstones. Thin resistant beds of clean, coarse grained white quartzites are found at the top, along with minor shales, siltstones and sandstones with occasional thin conglomerates. The quartzose to argillaceous sandstone facies of the Monach Formation represents delta-front deposits (Stott, 1973).

This formation conformably overlies the Beattie Peaks Formation and varies in thickness from 150 to 225 metres. Exposures of the formation are widespread throughout the property due to its resistance to erosion.

5.2.3 Crassier Group

The Crassier Group, of Lower Cretaceous age, represents a period of coal measure deposition. It is subdivided into three formations: the Brenot, Dresser, and Gething Formations (Hughes, 1964). The Crassier Group is equivalent to the Bullhead Group, excluding the Brenot Formation.

The Crassier Group has a complex lithology shown by assemblages and cyclothems of shales, mudstones, coals, siltstones, sandstones, grits, and conglomerates. In the eastern foothills, and as far west as Mount Bickford in the Pine Valley, the formations of the Crassier Group are more clearly differentiated than further west (Hughes, 1964).

The group covers the majority of Goodrich property, and is involved in a series of folds and faults. Many of the valleys and associated drainage systems run through bedrock of this group.

The group varies in thickness from 345 to 1015 metres. The variation in thickness is due to facies changes and depositional factors, particularly the Dresser and Cadomin relationship.

5.2.3.1 Brenot Formation

The continental rocks and the coal measures that underlie the Dresser Formation, were first recognized by J.E. Hughes in 1964. He proposed that these rocks be called the Brenot Formation.

This formation was left unnamed by Stott, 1973, as he refers to it as a succession of continental strata that lies above the Monach Formation. The formation lies between the Beaudette Group and the Dresser Formation above, in the Goodrich area. The upper part of the Brenot Formation consists of salt and pepper, very fine to fine grained sandstones, and coal. Carbonaceous mudstones, dark grey siltstones, thin coals, and occasional medium grained sandstones comprise the lower part of the formation. According to Hughes, 1964, cyclic deposition was common in the order: fine grained, argillaceous sandstones, thin beds of silty and sandy mudstones with coarse plant debris (floor); thin, fissile, carbonaceous shales (roof) passing upward to mudstones and shales; thinly interbedded shales and sandstones. The formation differs from the Gething Formation in its greater proportion of sand and silt, and thinner bedding (Hughes, 1964).

The Brenot Formation varies in thickness from 300 to 500 metres, and is exposed everywhere in the property. Maximum exposure of the formation occurs in the area between the Pine and Burnt Rivers.

5.2.3.1.1 Coal Occurrences

In the Brenot Formation, coal seams have been found in the White Rabbit, Goodrich East, Goodrich Lossan and Goodrich South blocks. The seams occur in the upper and middle Brenot in the north and in the middle and lower Brenot in the south. The coal/coal + rock ratio ranges from 0.04 m/0.04 m to 2.18 m/2.18 m. The coal is fairly clean with minor rock splits. A coal seam with a coal/coal + rock ratio of 5.52 m/5.52 m, true thickness, (BCT-80-Sp3-B1) was trenched in 1980. The seam occurs in the Goodrich East block approximately 5 m east of the Beaudette thrust and therefore, may be fault thickened.

5.2.3.2 Cadomin/Dresser Formation

The Cadomin/Dresser Formation of the Lower Cretaceous Crassier Group conformably overlies the Brenot Formation, and its upper contact with the Gething Formation is gradational.

South of the property, the formation is known as the Cadomin Formation and is defined by Stott, 1965, as:

> "massive conglomerates containing well rounded pebbles, cobbles, and boulders of extremely resistant rocks. Some coarse-grained sandstone, minor coal, and shale are included within the formation at some localities."

Further north, according to Stott, 1965, the conglomerate is more lenticular and much less prominent, and disappears south of the Pine River. Pebbly, coarse grained sandstone in a similar stratigraphic position within the Peace River foothills is considered equivalent.

J.E. Hughes, 1964, defined the Cadomin Formation north of Goodrich property, and in the vicinity of the Peace River Canyon region, as:

> "very coarse to medium grained sandstones and grits. They form beds of 3 to 12 metres thick. The formation may contain one or a few beds of conglomerates more than 3 metres thick, but these are absent at some localities. Altogether, the sandstone makes up more than two-thirds of the formation. The

> coarse sandstone and grits form more than one-third, or as much as one-half of the formation. The intervening coal measures consisting of shale, siltstone, medium and fine grained sandstone, form units up to 30 metres thick."

The clastic sediments that were described byStott in the Peace River region, are essentially the samesediments that were described by Hughes in the same area. J.E. Hughes called the sediments that occupy this stratigraphic position, the Dresser Formation. These sediments are deposited in a series of alluvial fans (Bajada-like distribution) as shown in Figure 5.2.3.2.1.

According to the descriptions of these formations by both authors, the Cadomin Formation falls within the proximal to mid-fan part of the alluvial fan, whereas the Dresser Formation falls within the distal part of the fan.

On the Goodrich Property, the formation consists of medium to very coarse grained sandstone, grits, conglomerates, and discontinuous coal measures of varying thicknesses. The definition of these clastic sediments in the Goodrich property fits the distal part facies of the fan, in other words, the Dresser Formation. The

discrepancy in opinions as to what to call this formation is directly linked to the lateral accretion as to which sediments are laid down in a down dip pattern, as shown in Figure 5.2.3.2.1, which is characteristic of fan deposits. Therefore, it depends on where the study area is located on the fan. If the location falls within the distal part of the fan, as is the case with the Goodrich property, the problem could then be solved by adopting the stratigraphic term "Dresser Formation". If it falls within the proximal or mid-fan area, then one should adopt the stratigraphic term "Cadomin Formation". The thickness of the Dresser Formation varies from 125 to 250 metres, with an increase in thickness toward the north-west of the property. DDH 81-08 intersected a full section of the Dresser Formation north of the Goodrich Lossan block. The logs of DDH 81-08 have been included in the illustration of typical geophysical log response to formation stratigraphy in this case the Dresser Formation, found in Appendix A, Part 3. The formation is very resistant to erosion, therefore the exposures are widely distributed throughout the Goodrich property.

To the south of the property, and particularly in the Goodrich South Block, (i.e. Goodrich Peak Saddle) the Cadomin/Dresser-like clastic sediments core exist. The name "Cadomin Formation" has been applied in this case.

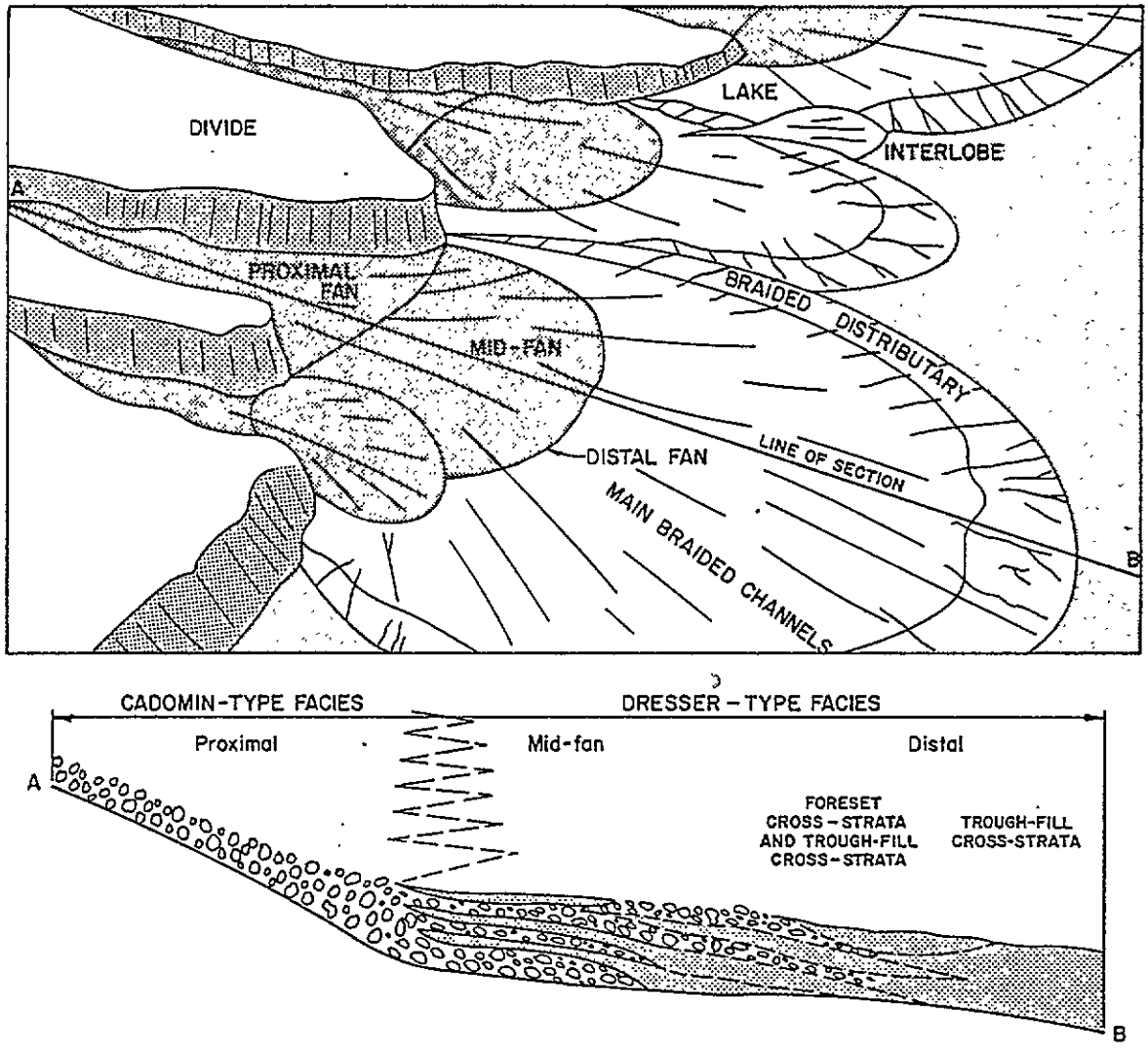


Figure 5.2.3.2.1

ALLUVIAL FAN MODEL TO ILLUSTRATE
CADOMIN-DRESSER FACIES RELATIONSHIP

5.2.3.2.1 Coal Occurrences

In the Cadomin/Dresser Formation, coal seams have been found and trenched in the Moberly, White Rabbit, and Goodrich Central blocks. These occur in the upper part of the formation. The coal/coal + rock ratio averages from 0.24 m/0.70 m to 2.36 m/2.88 m with seams thickening and becoming cleaner (fewer rock bands) toward the north. The coal seams found in the White Rabbit block were trenched on the east limb of a syncline which has an apparent 1 to 2 km strike length.

5.2.3.3 Gething Formation

The non-marine Gething Formation also of the Crassier Group, conformably overlies the Dresser Formation, and underlies the Bluesky Formation of the Fort St. John Group. It consists of multiple fining upward cyclothems that suggest a strong fluvial environment. DDH 81-08 and DDH 80-39 illustrate the depositional cycle of the Gething Formation.

The Gething Formation is distinguished from the Brenot Formation by its greater proportion of shales and numerous coal measures (Hughes, 1964). It consists of dark grey mudstones; siltstones; lithic, very fine to coarse grained sandstones; carbonaceous, silty and sandy

mudstones; coalified plant debris; minor bentonite, black shale; occasional minor tuffs in the upper part; and coals. Drill holes of the Goodrich Lossan area indicate that below the Bluesky Formation the upper Gething is made up of distinctive, interbanded, dark grey mudstones and lighter grey siltstones approximately 30 - 40 metres thick. The sandstones in the upper portion of the formation contain pebbles and coal stringers. They are cross-bedded, bioturbated, and show evidence of soft sediment deformation. Fossil bivalves and worm burrows are also found in some parts of the formation. The formation varies in thickness from 150 to 450 metres. Variations in thickness are due to both paleotopography and to facies changes. According to Hughes, 1964, the formation is 320 metres thick in the Peace River Canyon, and is between 485 and 550 metres thick in its eastern outcrops in the Pine Valley. In the Goodrich Lossan area, drill holes intersected approximately 380 to 430 metres of Gething. Much of the formation is exposed in the central part of the property and is commonly folded and faulted.

5.2.3.3.1 Coal Occurrences

In the Gething Formation, coal seams have been found and trenched throughout the whole of the Goodrich Property. The majority of the seams occur in the upper

and middle Gething, with some in the lower Gething Formation. The majority of the seams trenched were over one metre thick with fewer rock splits towards the north. Generally, the coal/coal + rock ratio averages from 0.50 m/0.50 m to 4.73 m/7.19 m. In the north, the coal/coal + rock ratio averages from 0.20 m/0.20 m to 3.91 m/4.12 m. In the White Rabbit block, a seam with a coal/coal + rock ratio of 3.08 m/3.79 m (true thickness) was trenched and found to be on the west limb of the White Rabbit syncline, which has an apparent 1 to 2 km strike length.

5.2.4 Fort St. John Group

The Lower Cretaceous Fort St. John Group of the Pine River foothills include the Bluesky, Moosebar, Commotion, Goodrich, and Cruiser Formations. The marine shale to marine sandstone, and non-marine rocks caused by both vertical and lateral facies changes are a characteristic feature of the group (Stott, 1960).

The Bluesky and Moosebar are the only two formations outcropping in the central region of the Goodrich property. High elevations and extensive differential erosion were the major factors contributing to the disappearance of most of the younger formations of this group on the Goodrich property.

5.2.4.1 Bluesky Formation

The Bluesky Formation represents the basal unit of the Fort St. John Group in Northeast British Columbia. The formation consists of fine to medium grained sandstone, mudstone, and thin, very coarse conglomerates having well rounded quartzite phenoclasts of up to 15 centimetres across in a sandstone matrix (R.H. Karst, 1980). The Bluesky is glauconitic and in the Goodrich Lossan Block, drill hole intersections show the unit thickness to range from 2 - 5 metres. According to R.H. Karst et al, 1979, the Bluesky represents shoreline deposition of the rapidly transgressing Clearwater sea from the north. Therefore, the Bluesky is a transitional unit, causing a discrepancy as to where the formation should be placed - within the Moosebar or the Gething Formations. R.H. Karst, 1980, placed the Bluesky in the Gething Formation because of its coarse clastic character and because it is easy to recognize on geophysical logs. An example of typical geophysical log response to the formation is given in Appendix A, Part 3.

Recent studies, according to Stott, 1965, particularly of data from wells, indicates that the Bluesky is more probably equivalent to the upper beds of the Gething Formation. Nevertheless, coal geologists of Gulf Canada Resources assigned a formation status to this

horizon, and assigned it to the Fort St. John Group. Geophysical log correlation of this unit is the main reason for the formational status given.

The formation is exposed in various areas along the limbs of the Lossan and Axis synclines.

5.2.4.2 Moosebar Formation

The Moosebar Formation is the youngest formation exposed on the property. The marine Moosebar Formation consists of dark to medium grey mudstones, grading upward to dark grey siltstones. Highly glauconitic beds occur near the base of the formation and its contact with the Bluesky.

The upper beds of the Moosebar, according to Stott, 1965, are gradational and the upper boundary with the Commotion Formation is drawn at the base of the first thick succession of sandstone.

The formation decreases in thickness southward from Peace River toward upper Smoky River, and reaches its maximum thickness of 250 metres on the south side of Peace River at Contact Point (McLearn and Kindle, 1950).

Diamond Drill Hole 81-02 intersected approximately 270 metres of the Moosebar. As many as 6 tuff bands up to 10 cm in thickness have been identified in the core and on the geophysical logs. Three of these bands are contained within 20 - 30 metres above the Moosebar-Bluesky contact.

Exposure of this formation is limited, due to its recessive nature. South of the Pine Valley, the main exposure occurs at the headwaters of Brazion Creek. North of the Pine Valley, the formation is exposed along Fisher Creek west and Crassier Creek east.

The Boulder Creek member consists of fine grained, well sorted sandstones, massive conglomerates, and non-marine mudstones and sandstones. The upper part of the member is continental and contains coal seams, and the basal part of the member consists of a thick, sandstone-conglomerate unit that coarsens upward (Karst, 1980). The member varies in thickness from 80 to 110 metres.

The Walton member, or previously known as member IV (Hughes, 1967), is the upper part of the Commotion Formation. The member varies in thickness from 50 to 80 metres and consists of siltstones, thin sandstones, and coal.

The Commotion Formation was not mapped in great detail in the Goodrich area, as this formation exposure is limited and occurs outside of the licence's northeastern boundary.

5.2.4.3 Hasler Formation

The Hasler Formation comprises marine shales, minor sandstones, and siltstones. The formation was defined by Wickenden & Shaw (1943, P. 6) as those shales overlying the Commotion Formation. The formation varies in thickness from 210 - 340 metres and is exposed outside and along the northeastern part of the licence, where detailed mapping was very limited. This marine origin formation is very recessive and exposed only in low altitude areas.

5.2.4.4 Commotion Formation

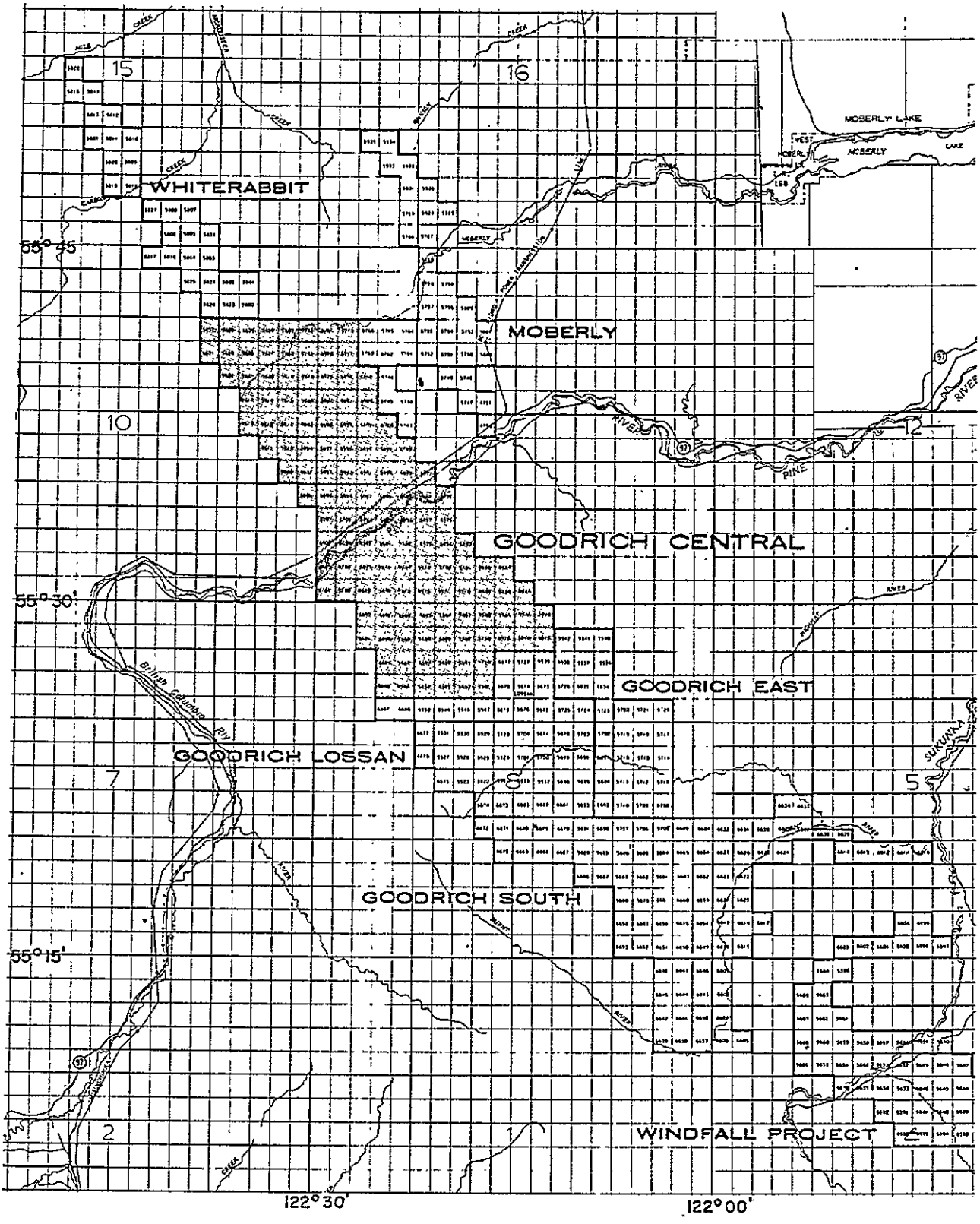
The Commotion Formation was defined by Wickenden & Shaw (1943, P. 5) as a succession of sandstones, shales, and conglomerates, followed by thin coal measures conformably overlying the Moosebar Formation. The Commotion Formation is composed of four distinct members; the Gates, Hulcross, Boulder Creek, and the Walton member.

The Gates member is comprised of black, fissile carbonaceous shales, dark rubbly mudstones, sandstones and siltstones, and thin coal measures. The contact with the overlying Hulcross is abrupt and defined by the first influx of sand and carbonaceous sediments. There is often a thin, coarse conglomerates at the top of the formation, followed by thin sandstones, carbonaceous shales, and thin coals. The coarse sandstone-conglomerate units often coarsen upward suggesting a prograding delta (Karst, 1980). The member varies in thickness from 80 to 200 metres.

The Hulcross member is made up of recessive marine mudstones, which often display laminae of very fine grained sand. Ripple marks in some sand laminae suggest that the water depth was not great (Karst, 1980). The member conformably overlies and is overlain by the Gates and the Boulder Creek members, respectively. The Hulcross member varies in thickness from 90 to 120 metres.

FOR THE TABLE OF FORMATIONS

Formation	Thickness		Lithology
Hasler	210 - 340		Claystones, siltstones, thin sandstones, marine.
Commotion	320 - 520	Walton Mbr.	Siltstones, sandstones, claystones, Carbonaceous claystones, COAL.
		Boulder Ck. Mbr.	Fine grained, well sorted sandstones, massive conglomerates, non-marine sandstones & mudstones.
		Hulcross Mbr.	Dark grey marine shales with sideritic concretion.
		Gates Mbr.	Fine grained, marine & non-marine sandstones, conglomerates, mudstones, COAL.



scale in miles

0 5 10

0 8 16

scale in kilometres

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Coal Division
CALGARY ALBERTA

Figure 5.6.1.1
1981
GOODRICH PROJECT
GEOLOGICAL STUDY BLOCKS
GOODRICH CENTRAL

PREPARED BY:	SCALE
APPROVED BY: H.Z. DATE: JAN. 82	DRAWING No.

5.3 Goodrich South

5.3.1 Summary

The Goodrich South block is in the southernmost portion of licences located south of Brazion Creek and west of the Burnt River as shown in Fig. 5.3.1.1.

Reconnaissance mapping at 1:10,000 and 1:50,000 scale was undertaken in the peripheral areas of the block and 1:5,000 scale plane table surveys were conducted in the northern half. The geology maps and cross-sections at 1:5,000 and 1:10,000 scale can be found in Appendix A, Part 2.

No drilling has been done on the block to date.

The 1:50,000 scale geological compilation map, included with Volume II, illustrates the regional and structural trend of the Minnes and Bullhead strata. Generally, the area can be conceptualized as a sequence of folded and faulted sediments trending in a northwesterly direction.

5.3.2 Detail Geology

Goodrich South can be geologically characterized by 4 major folds and 3 major thrust faults situated within the general northwest-southeast trend.

5.3.2.1 Folds

In the most western area of Goodrich South, the LeMoray syncline (J.E. Hughes, 1967) extends thoughout LeMoray Creek and southwards from the Pine River. The syncline plunges to the north thus exposing the older formations in the south. All exposed strata is totally non-coal bearing as shown on cross-sections C-C' and D-D' in Appendix A, Part 2.

Northeast of the LeMoray syncline is another extensive, continuous fold: the Stephenson anticline, extending south to the North Burnt River. This fold plunges to the south at a low angle and also exposes totally non-coal bearing strata of the lower Minnes Group as shown on cross-sections A-A', B-B', C-C' and D-D' in Appendix A, Part 2.

The Goodrich South syncline is a prominent but not extensive fold and represents the first major structure on the west within coal-bearing strata. It extends through the Goodrich Peak saddle, exposing the Gething

Formation which includes some trenched coal measures. The Gething is underlain by prominent Cadomin strata to the east and approximately 20 m. are exposed. The fold is not complete, however, as this Cadomin is faulted out to the west of syncline axis. Fault displacement is not great; approximately 50 m. and Cadomin boulders can be traced along the contact of the fault as shown on cross-sections C-C' and D-D' in Appendix A, Part 2.

The Goodrich South anticline extends northeast of Goodrich Peak. It originates at Brazion Creek and extends to the Burnt River. It exposes the Brenot Formation but locally near Goodrich Peak, exposes older Monach and Beattie Peaks strata as shown on cross-sections B-B', C-C', and D-D' in Appendix A, Part 2.

5.3.2.2 Faults

Thrust faults on the Goodrich South block have limited the area of distribution of coal bearing strata. The Gilliland and the associated splay thrusts are extensive throughout the Goodrich licences, south of the Pine River. The most important aspect of these thrusts is that they expose, by fault displacement, the oldest rocks on the property. These are the Beattie Peaks, Monteith, and Fernie Formations. In mapping the extension of these major thrust faults, a boundary is determined separating the coal bearing strata (east of

the fault) from the non-coal bearing strata (west of the fault). A complete section of the Fernie Formation including the basal Nordegg unit is exposed along the western flank of Goodrich South as shown on cross-sections A-A', B-B', C-C' and D-D' in Appendix A, Part 2.

The Burnt thrust originates at Mt. Stephenson and extends south to the North Burnt River; strike length of 9-10 km. Fault displacement of this structure is not great; approximately 50 m. Generally, lower Gething, Cadomin, or upper Brenot has been thrust upon middle or lower Brenot in the vicinity of this fault as shown on cross-sections A-A', B-B', C-C' and D-D' in Appendix A, Part 2.

5.3.3 Coal Occurrences

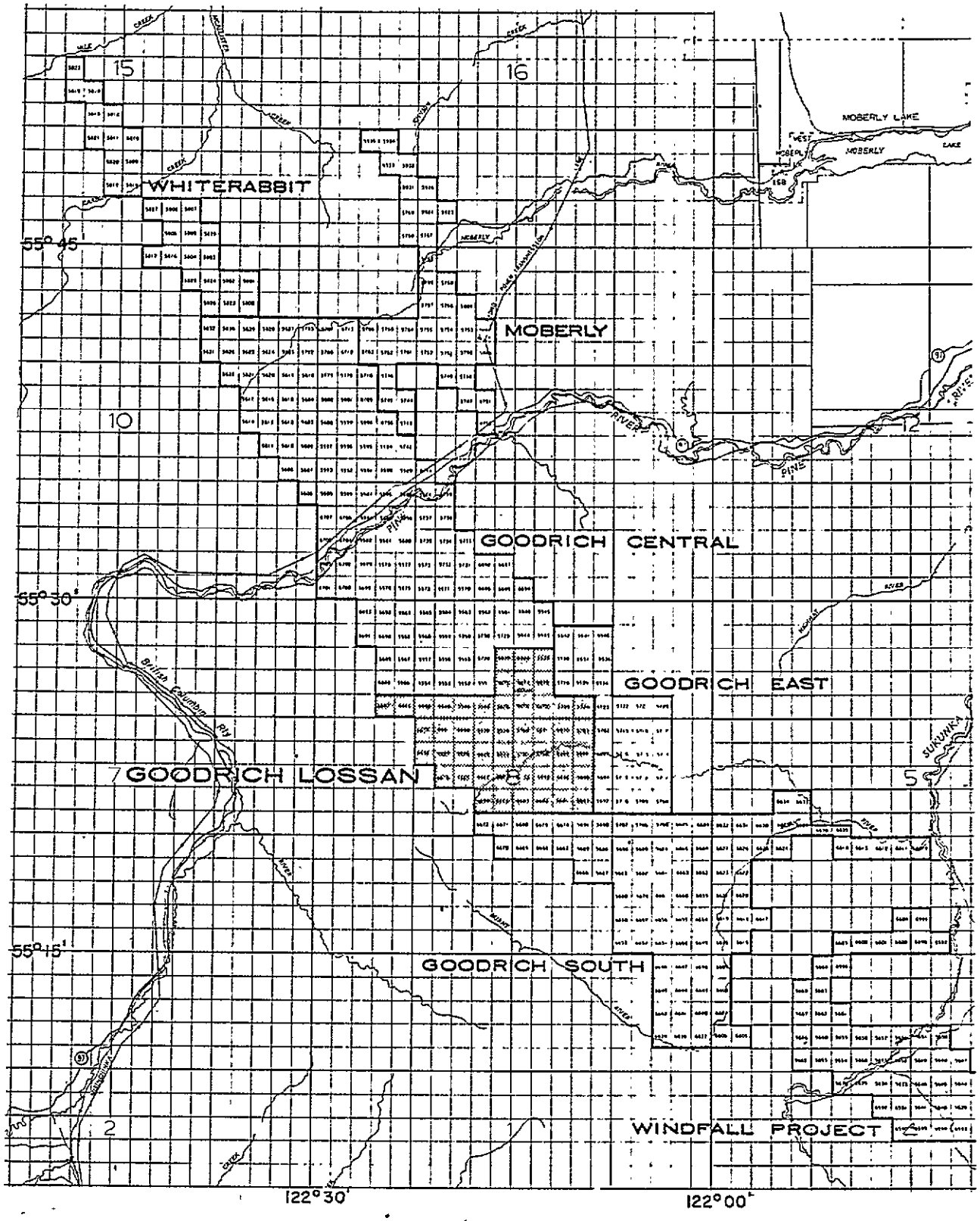
The middle and upper Brenot and lower Gething represent the prominent stratigraphic setting for the major coal occurrences in Goodrich South. Most trenching and seam logging on the block were completed in 1980 and are located on the Goodrich Peak saddle. Some 38 coal trenches were logged in the Brenot, ranging from 0.06 m. to 3.16 m.; although the average is less than 0.50 m. Of these 38 seams, seven have a coal to coal + rock ratio ranging from .19/.58 to 1.11/1.23; with an average of less than 1.0/2.0. Also, in the same location, some 30

coal trenches were logged in the Gething in the Goodrich South syncline. Their thicknesses range from 0.06 m. to 1.41 m.; with an average of less than 0.50 m. Of these 30 intersections, twelve have a coal to coal + rock ratio ranging from 0.88/4.26 to 1.41/1.94; with an average of less than 1.0/2.0.

Other logged coal seams in Goodrich South are located along the North Burnt River and the eastern Brazion Creek. The former exposes 7 coal outcroppings; the thickest is 1.41 m., and exposures have an average 1.0/2.0 coal to coal + rock ratio. The latter exposes 9 coal outcroppings; the thickest 1.07 m., with an average of 0.60/0.80 coal to coal & rock ratio.

The thickest seam on the block was identified in the Brenot on Goodrich Peak Ridge. It is 3.16 m. true thickness. The exposure of some 68 coal shows on Goodrich Peak Ridge, in the Goodrich South syncline, are only of limited extent. Off the ridge, the topography decreases by more than 300 m.; thus most of the coal bearing strata may have been eroded.

Continuity of the coal seams found on the Goodrich Peak Ridge would have to be tested by drilling, due to lack of exposure.



scale in miles

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scale in kilometres

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Figure 5.4.1.1
1981
GOODRICH PROJECT
GEOLOGICAL STUDY BLOCKS
GOODRICH LOSSAN

PREPARED BY:	SCALE
APPROVED BY: H.Z. DATE: JAN. 82	DRAWING No.

5.4 Goodrich Lossan Block

5.4.1 Summary

The Goodrich Lossan block is located approximately central to those Goodrich licences situated south of the Pine Pass as shown in Figure 5.4.1.1. Access was afforded by the Hasler Creek road.

Initial geological conclusions, as to the open pit coal mining potential west of Axis Creek, have so far resulted in the concentration of exploration drilling and detailed mapping on a 1:5,000 scale in the Goodrich Lossan area.

Geology maps and cross-sections at a 1:5,000 scale are provided in Appendix A, Part 2. A generalized geological compilation map at 1:50,000 scale, covering all of the Goodrich property, is included with Volume II.

Results of the 1980 and 1981 drilling and mapping data indicate a much more tightly folded and faulted coal bearing sequence than what was suggested in the pre-1980 surface and airphoto geology interpretation.

To date, the drill hole intersections of the uppermost Gething No. 1 seam constitutes the bulk of the possible open pit coal reserves. The No. 1 coal seam has been successfully correlated and traced as far as 5.5 km along the strike of the Lossan syncline. The true seam thickness over most of the syncline averages approximately 8 metres but ranges from 10 metres in the south to 1 metre in the north, where it appears to thin as the seam comes to the surface.

Along strike, and to the north of the Lossan and Axis syncline pair, exists another area with open pit potential. The No. 3 seam here attains a true thickness of up to 4 metres.

5.4.2 Detail Geology

5.4.2.1 Folds

The four northwesterly trending fold structures mentioned in Goodrich South continue through the Goodrich Lossan block and into Goodrich Central. These are from west to east, the LeMoray syncline, Stephenson anticline, Goodrich syncline, and the Goodrich anticline which form part of the Goodrich synclinorium. In addition, several other folds have been identified in the Goodrich synclinorium by surface mapping and drilling. These are from west to east, the Lossan anticline and

Syncline, Goodrich anticline, Axis Creek syncline, and the Brazion Creek anticline. A further syncline being adjacent to and west of the Lossan anticline may exist; however, if present it is obscured by the Brazion Creek thrust and the lack of reliable surface and subsurface data.

The north plunging LeMoray syncline exposes a section of the non-coal bearing Beaudette Group and some of the Jurassic Fernie Formation. The east limb of the syncline is terminated by the combination of the NW-trending Gilliland thrust. It is this thrust which cuts through the Fernie Formation, limiting its exposure.

The Stephenson anticline continues NW of Mt. Stephenson to a point where it is terminated by the Gilliland thrust. The strata exposed by the Stephenson anticline includes the quartzites and sandstones of the Monteith and Monach Formations; the sandstones and shales of the Beattie Peaks Formation; and some of the coal bearing Brenot Formation. A partial section of the above mentioned formations may be observed in vertical to overturned strata on the Brazion Creek road.

The Goodrich synclinorium is a continuation of the NW-trending Goodrich syncline. This synclinorium undergoes increasing structural modification and complexity on

the Goodrich Lossan block. These alterations are in the form of tight folds which developed later, or contemporaneously, with faulting. The Goodrich synclinorium is a double plunging syncline with the plunge reversal estimated to be in the vicinity of cross-section line N3250 (Appendix A, Part 2). The southern portion of the structure plunges north at 20° to 30° to the Brazion Creek valley. North of Brazion Creek, it shallows to 6°. The northern portion of the structure has a southern plunge of 7° south.

The marine Moosebar and coal-bearing Gething Formations are contained in the Lossan anticline, Lossan syncline, and the Axis Creek syncline. Middle Gething strata is present in the Goodrich anticline.

The oblique and northwest trending Brazion Creek anticline has a limited, if not significant, impact on the Goodrich synclinorium in several ways. One, it brings to surface lower Gething, Dresser and Brenot stratigraphy. Two, it reveals its impact in the steep and overturned limbs of the Goodrich anticline. Three, it has partial if not total control of the East Brazion Creek thrusts and associated splays.

5.4.2.2 Faults

As on the Goodrich South block, the Gilliland thrust maintains its northwest-southeast structural trend on the Goodrich Lossan block. Stratigraphic displacement of the Fernie Formation onto the Beattie Peaks or Monteith Formation is estimated in the order of 200 to 300 metres. The Gilliland thrust contributes to the failed limb of the Stephenson anticline.

The Pyramis thrust plate contains numerous secondary folds and fault splays that give rise to a complex structural pattern. On the Goodrich Lossan block, the leading edge of the overthrust changes stratigraphically southeastward from the Fernie Formation through the Beaudette Group, to the Brenot Formation. The Gething Formation comprises the footwall of the Pyramis thrust.

An easterly located splay of the Pyramis thrust, although limited in length, is significant to the Goodrich Lossan area in that it overrides the younger Moosebar Formation contained in the Lossan-Axis synclinorium. The splay is interpreted as a relatively high angle fault of considerable movement. Correlation of drill hole data (DDH 81-04, RDH 80-12, RDH 81-08, and RDH 80-11) indicates the removal of the Upper Gething strata in the overthrust. In the upper Gething footwall, folding occurred concurrently with the Pyramis thrust

splay resulting in imbricate thrust. This structure is recognized in DDH 80-38 on cross-section line N3250 (Appendix A, Part 2) where the stacking of smaller thrust plates repeated the Bluesky Formation.

The broadening of the Goodrich syncline and northward development of secondary folding produced a tightly folded and faulted synclinorium.

The West and East Brazion thrusts encompass a set of relatively small, narrow fault slices that cut the coal bearing section of the Gething Formation and marine Moosebar Formation. Displacement of the individual thrusts is estimated to be between 50 to 100 metres.

Deviation of the fault traces from regional strike suggests that the southern extensions of the West and East Brazion thrust plates consist of a set of four tear faults. Differential movement probably forced a separation in the Brazion thrust plate while further, relative movement caused some rotation and overlap of the individual plates. Although displacement is considered minor and relatively localized, the oblique trending fault traces are readily evident in the surface configuration of Brazion Creek and subcrop pattern of the Dresser Formation.

The Brazion thrust contributes to fault repeated coal sections in the west limb of the Lossan anticline, and the west limb of the Lossan syncline.

Several drill intersections (DDH 80-19, DDH 81-20, 21, DDH 81-18, DDH 80-33, and DDH 81-22), along the west limb of the Lossan syncline, point to the possibility of folded or overturned thrust repeats in steep to overturned upper Gething strata.

5.4.3 Coal Occurrences in the Goodrich Lossan Block

Coals occur throughout the Crassier sequence on the Goodrich Lossan block. However, seams that may be of commercial value were only encountered in the upper portion of the Gething Formation. The coal seams trenched in the 1981 program are recorded on trench logs presented in Appendix D.

5.4.3.1 Brenot Formation

Numerous coal occurrences in Brenot strata were noted on the Goodrich Lossan block. In most cases, the thicknesses of the coal seams were too small to be significant. The thickest coal seam trenched has a true coal to coal + rock ratio of 1.17 to 1.17 m (LB-8109). This

seam was trenched on the eastern limit of Goodrich Lossan adjacent to Goodrich East.

The greater portion of Brenot outcrops lie on the eastern edge of Goodrich Lossan adjacent to Goodrich East.

Approximately 150 m of upper Brenot sediments were cored and logged from diamond hole D-8108. The coal seams were found to be numerous but less than one metre in thickness.

5.4.3.2 Dresser Formation

Coal seams were noted within the Dresser Formation at several locations. However, none were trenched due to time constraints in 1981.

A complete section of the Dresser Formation was cored in DDH 81-08 on the eastern edge of Goodrich Lossan. Coal seams again are numerous but thicknesses rarely approached one metre.

Outcrops of the coal-bearing Dresser Formation are confined largely to the area south of the Brazion Creek, and to the western slope of Mt. LeHudette.

5.4.3.3 Gething Formation

Coal occurrences in the Gething Formation may be divided into three stratigraphic intervals. These are the lower, middle and upper Gething sequences. The divisions are based on the presence of probable economic coal seams, sand to shale ratios, and the frequency and nature of the cyclothems. The upper and middle Gething contain the first four correlatable coal seams. Seams 1 and 2 lie in the upper Gething, while Seams 3 and 4 lie in the younger portion of the middle Gething. The aggregate true seam thickness for the four seams is approximately 16 metres over 180 m.

The coal seam stratigraphy is illustrated on the geophysical log correlations presented in Appendix A, Part 3. Depositionally, the coal stratigraphy changes from south to north. The Number 1 seam remains the thickest seam until approximately cross-section line N5500 shown on the 1:5,000 geology map (Appendix A, Part 2), where it begins to thin substantially. North of line N5500, Seam 3 begins to increase in thickness.

The lowermost section of the Gething Formation ranges in thickness from 130 m to 180 m. It is characterized by abundant, thin coals ranging from 0.50 m to 3.0 metres in thickness. Cyclothems are well developed;

tend to be complete and fairly regular, ranging from one metre to twelve metres between cycles. Exposures of this sequence can be observed on the second Canfor logging road east of Axis Creek. Additional exposures are found in Beaudette Creek and several of the creeks flowing on the west slope of Mt. LeHudette.

The six trenches completed in lower Gething strata for 1981 were located in the general area of the above mentioned exposures. The two greatest seam thicknesses trenched were:

Trench	Coal/Coal + Rock	Location
LB 8101	2.89 m / 2.89 m	S.W. Mt. LeHudette
LB 8102	2.84 m / 2.84 m	" " "

Diamond hole DDH 81-08 encountered what is believed to be a complete sequence of lower Gething sediments. In addition, a three metre seam was cored at what is regarded as the Gething-Dresser contact. This seam probably corresponds to the above mentioned trenches.

The middle Gething interval of approximately 250 m is characterized by a definite increase in the sand to shale ratios, and decrease in the number of coal seams. Sandstones range in thickness from five to twenty-five metres and coal seams from 0.50 m to approximately 4.0 m.

Cyclothems are generally large where complete. This interval, as previously mentioned, contains the Number 3 and 4 seams in its upper interval.

Surface exposures of this largely arenaceous horizon can be seen in the upper portions of Axis Creek, and several of its western flowing tributaries. Additional exposures lie on the eastern slope of Mt. Stephenson.

Trenches believed to be in middle Gething sediments are confined to the upper reaches of Axis Creek and just south of DDH 81-16. These four trenches are listed below:

Trench	Coal/Coal + Rock
LBT 8107	3.12 m / 3.64 m
" 8108	0.35 m / 0.61 m
" 8115	1.86 m / 2.22 m
" 8116	1.90 m / 2.40 m

The middle Gething coal seams have been intersected in at least three drill holes: DDH 81-05, DDH 81-14, and DDH 81-17.

The upper Gething sequence is characterized by approximately 90 metres of sediments and coal seams 1 and

2. Coal seam 1 ranges from 2 to 10 metres in thickness, depending on the location within the property.

Outcrops of coal seams 1 and 2 can be seen in Axis Creek, north of the Brazion Creek road.

The number 1 seam has been trenched by backhoe in two places. These locations were both on the Lossan block road and on the west limb of the Goodrich anticline. Trench LB 81-13 had a coal to coal + rock ratio of 6.45 m/10.75 m, while LB 81-14 had a ratio of 6.75 m/12.23 m.

Additional outcrops of the number 1 seam have been difficult to locate due to the heavy vegetation cover.

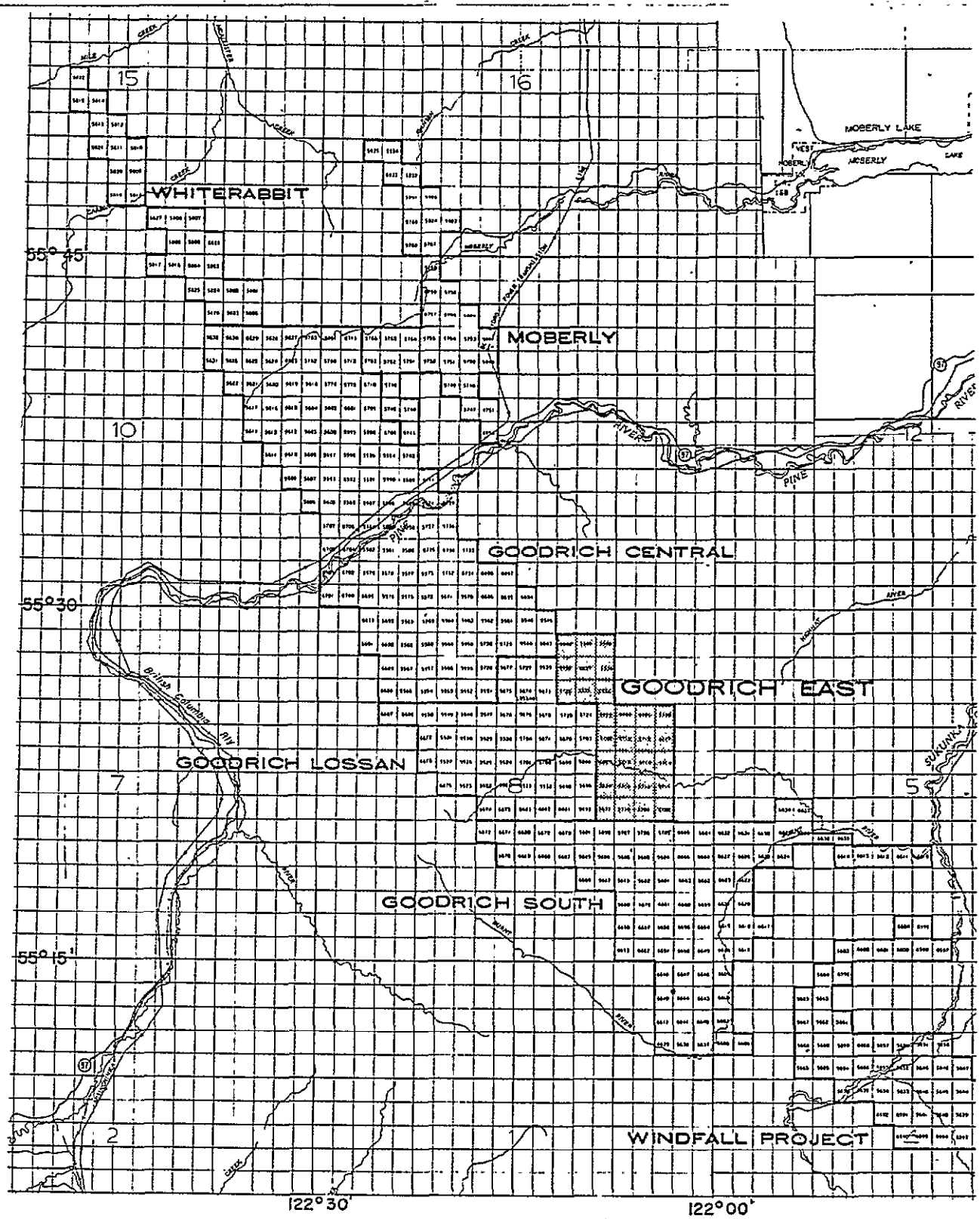
Trench data and drill hole intersections (DDH 81-10, DDH 81-06, DDH 81-05, and DDH 81-01) show good seam continuity of the number 1 seam along the east limb of the Lossan syncline.

The structural complexity of the Goodrich Lossan block is clearly demonstrated in the geophysical log correlations that have been prepared across and along strike of the Lossan-Axis syncline pair. (Appendix A, Part 3).

Evidence of thrust faulting has been found in drill holes DDH 80-38, DDH 80-28, and DDH 80-19 where the number 1 seam is repeated.

The geological cross-section line N3250, provided in Appendix A, Part 2 illustrates the thrust repeat of the number 1 seam in DDH 80-38 located in the Lossan syncline.

Diamond drill holes DDH 81-22, DDH 80-33, and DDH 81-18, and a number of rotary holes along the west limb of the Axis syncline indicate that the number 1 seam is thrusted and overturned.



scale in miles

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scale in kilometres

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Figure 5.5.1.1
1981
GOODRICH PROJECT
GEOLOGICAL STUDY BLOCKS
GOODRICH EAST

PREPARED BY:	SCALE
APPROVED BY: H.Z. DATE: JAN.82	DRAWING No.

5.5 Goodrich East Block

5.5.1 Summary

The Goodrich East block is located east of the Goodrich Lossan block and extends from Brazion Creek in the south, to just north of Falling Creek, as shown in Figure 5.5.1.1.

Geology maps and cross-sections at a 1:5,000 scale are provided in Appendix A, Part 2. A generalized geological compilation map at 1:50,000 scale, covering all of the Goodrich property is included with Volume II.

The structure of the area is dominated by folding, normal and thrust faulting, and associated shearing in minor structures created by southwesterly tectonic movement. Folding generally becomes more moderate towards the eastern border of the block. Geological cross-section AA-AA' typifies the tectonic style of the Goodrich East block.

With the discovery of near surface coal of approximately 2.2 metres true thickness, additional drilling was undertaken in 1981 to further delineate the coal bearing, southeast plunging "Brenot" syncline.

A total of 8 drill holes were drilled in the "Brenot" syncline to date; 5 holes in 1981 and 3 holes in 1980, totalling 1,642.5 metres. The locations of the drill holes are shown on Map 1Q43 in Appendix A, Part 2.

At present, less than 1 million tonnes of in-situ coal have been identified. The continuation of the coal seam is a possibility towards the northwest, where higher ground exists.

5.5.2 Detail Geology

5.5.2.1 Folds

The strata are folded into structures with fold axes oriented northwest to southeast, and plunges oriented slightly to the southeast. The general structures on the block consist of regional anticlines and a syncline, with associated minor synclines and anticlines.

The Falling Creek anticline, a major fold in the area, plunges slightly to the southeast. The fold is contained within the Brenot Formation, except in the south where the fold exposes the stratigraphically younger Dresser Formation, as illustrated in cross-sections BB-BB' and CC-CC' in Appendix A, Part 3. To the west, the Burnt anticline plunges steeply to the

southeast, exposing the oldest strata in the area, the Monteith Formation, northwest of the property. Exposing the Brenot Formation to the southeast, the fold gradually terminates against the westerly dipping thrust fault.

The main coal seam is found on the eastern limb of the "Brenot" syncline, as thrusting and erosion have apparently removed the coal-bearing western limb of the syncline. The southeastern end of the fold terminates against the adjacent thrust fault.

5.5.2.2 Faults

The Burnt Normal fault strikes northwest to southeast across the center of the block. The fault zones are believed to dip to the southwest. The inferred location is shown on the 1:5,000 scale Goodrich East maps in Appendix A, Part 2, and on the 1:50,000 scale geological compilation included with Volume II. To the northwest, the fault exposes stratigraphically older strata than that of the southeast. Two reasons why this can occur are either the vertical displacement of the footwall to the northwest is greater than that of the southeast, or because of uniform displacement with extensive erosion in the northwest as compared to the southeast.

The West Brazion Creek thrust strikes northwest to southeast across the western part of the block. The dip-slip displacement of the thrust is small, and this is evident here as the up-thrusted and downthrusted strata on both sides of the fault consist of the Brenot Formation.

Deviation from the regional trend is evident in the east ~~Brazion Creek~~ Boundary Fault. thrust, as this thrust strikes north to south and dips toward the west.

The Falling Creek thrust dipping west and striking northwest to southeast, has the greatest displacement in the area, as shown on cross-section R-R' in Appendix A, Part 2. The non-coal bearing Beattie Peaks Formation has been up-thrusted onto the stratigraphically younger Brenot Formation. The dipslip displacement of the fault has a magnitude of approximately 400 metres.

Thrust faults of minor scale are present in the area, especially near the crest of the folds. These minor thrust faults may be of limited extent, as faulting often grades laterally into folds and vice versa.

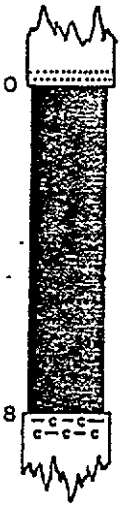
5.5.3 Coal Occurrences

Drilling on the "Brenot" syncline was initated in 1980 with the discovery of a coal outcrop of approximately 2.18 metres. Trench BCT-80-Sp3-B2 as shown in Figure 5.5.3.1 was logged in 1980 and illustrates the coal seam thickness. One diamond and two rotary drill holes were drilled at that time. The 1981 drilling program also concentrated on the "Brenot" syncline. A total of 5 rotary drill holes were drilled. The coal zone and major intersections of these holes, including RDH 80-05 and RDH 80-06 drilled in the previously reported 1980 program, are shown in Table 5.5.3.1.

Seven drill holes of eight successfully intersected a 1.42 to 2.79 metres thick correlatable coal seam in the "Brenot" syncline. This seam has been labelled the B1 seam.

The B1 seam occurs within the upper third of the Brenot Formation. The seam reaches a gross thickness of 2.79 metres in DDH 80-44. The minor variation in thickness of the B1 seam is structurally controlled, as the seam reaches its maximum thickness at the fold axes of the syncline in DDH 80-44, and decreases in thickness toward the eastern limb as defined by RDH 80-06 and RDH 81-04. Toward the southeast, RDH 81-05 defines the southern limit of the seam, as this hole showed no coal

TRUE THICKNESS



ROOF

Sandstone: light grey, medium grained, cross bedding

Coal: dull-bright, semi-hard, breaks into small blocks, shearing evidence

Mudstone: medium grey, carbonaceous, fissile

FLOOR

COAL/ROCK = 2.18 / 2.18.

STRIKE - 310°
DIP - 58° NE
TRENCH BEARING - 221°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY Figure 5.5.3.1 ALBERTA

GOODRICH COAL PROJECT

TRENCHING LOGS
BRAZION CREEK
BCT-80-Sp3-B2

DRAWN BY: L. CHILD DATE: 06 7 80 SCALE
PREPARED BY: A. BIENIA DRAWING No.
APPROVED BY: DATE:

TABLE 5.5.3.1

DRILL HOLE SUMMARY - GOODRICH EAST (Hasler Creek - 1982)

Hole No.	T.D.	Seam	Coal Zone - Major Intersections (m)		
DDH-80-44	193.0 m	B1	28.50	- 31.29	(2.79)
			34.55	- 35.20	(0.65)
RH-80-05	193.55 m	B1	42.20	- 44.94	(2.74)
			50.52	- 51.67	(1.14)
			98.58	- 99.01	(0.43)
			116.65	- 178.65	(2.00)
			183.33	- 186.28	(2.95)
RH-80-06	178.31 m	B1	3.12	- 4.54	(1.42)
			18.05	- 18.80	(0.75)
			62.09	- 62.66	(0.57)
			64.18	- 65.94	(1.76)
			153.79	- 160.65	(6.86)
RH-81-01	219.40 m	B1	30.47	- 32.63	(2.16)
			67.31	- 68.05	(0.74)
			146.72	- 147.67	(0.95)
			153.86	- 154.75	(0.89)
			160.45	- 163.90	(2.45)
RH-81-02	213.70 m	B1	28.68	- 31.18	(2.50)
			34.85	- 35.52	(0.67)
RH-81-03	201.20 m	B1	42.86	- 45.20	(2.34)
			48.31	- 49.19	(0.88)
RH-81-04	224.0 m	B1	37.67	- 39.54	(1.87)
			46.04	- 46.96	(0.92)
			197.00	- 198.40	(1.40)
RH-81-05	219.40 m	---	Seam Eroded		

intersections. Sandy to silty materials overlie the seam (roof), and the seam is underlain by shaley to muddy materials (floor).

Other coal zones of minor significance were intersected. The coal zones are discontinuous, very thin, and of a low coal to coal + rock ratio.

Seven trenches were measured and logged in the Gething Formation in the 1981 exploration program. Five of these trenches were located just northeast of East Brazion Creek thrust, in the vicinity of the Gulf-Esso property boundary to the east, and two trenches are located east of Falling Creek thrust. Their coal thicknesses range from 0.35 to 2.17 metres, and have an average thickness of 1.4 metres. The ratio of coal/coal + rock ranges from 0.35/0.35 to 2.17/2.17, and averages 1.4/1.7. The coal trench logs and a trench location map can be found in Appendix D.

Trench		Licence
MSE-81-	01	5704
	02	"
	03	"
	04	"
	05	"
	06	"
	07	"
LB-81-	01	5672
	02	"
	03	5551
	04	"
	05	5552
	06	"
	07	5676
	08	"
	09	5703
	10	5670
	11	"
	12	5671
	13	"
	14	"
	15	5676
	16	"
	17	5671
BCN-81-	01	5719
BC-81-	01	6633
	02	"
	03	"
	04	"
	05	"
	06	"
	07	"
	08	"

Trench		Licence
HCW-81-	01	5720
	02	"
	03	"
	04	"
	05	"
CRT-81-	01	5699
GDE-81-	01	5710
	02	5695
	03	5534
	04	"
MGN-81-	01	5696
GCT-81-	01	5707
	02	5692
	03	"
	04	"
GPS-81-	01	5686
	02	"
	03	"
	04	"
	05	"
NBRT-81-	01	6660
	02	"
	03	6659
	04	"
	05	"
	06	"
	07	"

MS-cbb/82-08-04

1981 TRENCHES

Trench	Licence
WR-81- 01	5810
02	"
03	"
04	5811
05	"
06	"
07	5821
08	5813
09	"
10	"
11	"
12	"
13	"
14	"
15	5826
16	5631
17	5817
18	"
19	"
20	"
21	"
22	"
23	"
24	"
25	"
26	"
27	"
28	"
29	5806
30	"
31	"
32	5805
33	"
34	"
35	5813*
36	5806
37	5827
GNPL-81-01	6711
02	"
03	"
04	"
05	"
06	"
GNN-81- 01	5607
02	5619
03	"
04	"

Trench	Licence
GNN-81- 05	5619
06	"
MB-81- 01	5759
02	5758
03	5764
04	"
05	5758
06	"
07	5761
08	"
09	"
10	"
11	"
12	5764
BCET-81-01	5729
BCWT-81-01	5560
02	"
03	"
04	"
05	"
06	"
07	"
08	"
09	"
10	"
11	"
12	"
13	5569
14	5568
15	5576
16	5556
17	"
18	"
19	"
20	5575
21	"
22	"
23	5576
24	"
25	"
26	5572
27	5569
28	5565
29	"
30	"
31	"

* Off Property
MS-cbb/82-08-04

Trench		Licence
BCT-80-	Sp4B8	5697
	Sp4B9	"
	Sp4B10	"
	Sp4B11	"
	Sp4B12	"
	Sp4B13	"
	Sp4B14	"
	Sp4B15	"
	Sp4B16	"
	Sp4B17	"
	Sp4B18	"
	Sp4B19	"
	Sp4B20	"
	Sp4B21	"
	Sp4B22	"
	Sp4B23	"
	Sp4B24	"
	Sp4B25	"
ACT-80-	G1A	5671
	G2B	"
	G3C	"
	G4D	"
BDCT-80-	B1	5675
	B2	"
	B3	"
	B4	"
	B5	"
BDCT-80-	B6	"
	B7	"
	B8	"
	B9	"
MLHT-80-	G1	5536
	G2	"
MST-80-	B1	5556
	B2	"
	B3	"
	B4	"
	B5	"
	B6	"
	B7	"
	B8	"
	B9	"
	B10	"
	B11	"
	B12	5560
	B13	"
BNWT-80-	G1	5619
	G2	"
	G3	"
	G4	"
	G5	"
	G6	"
	G7	"

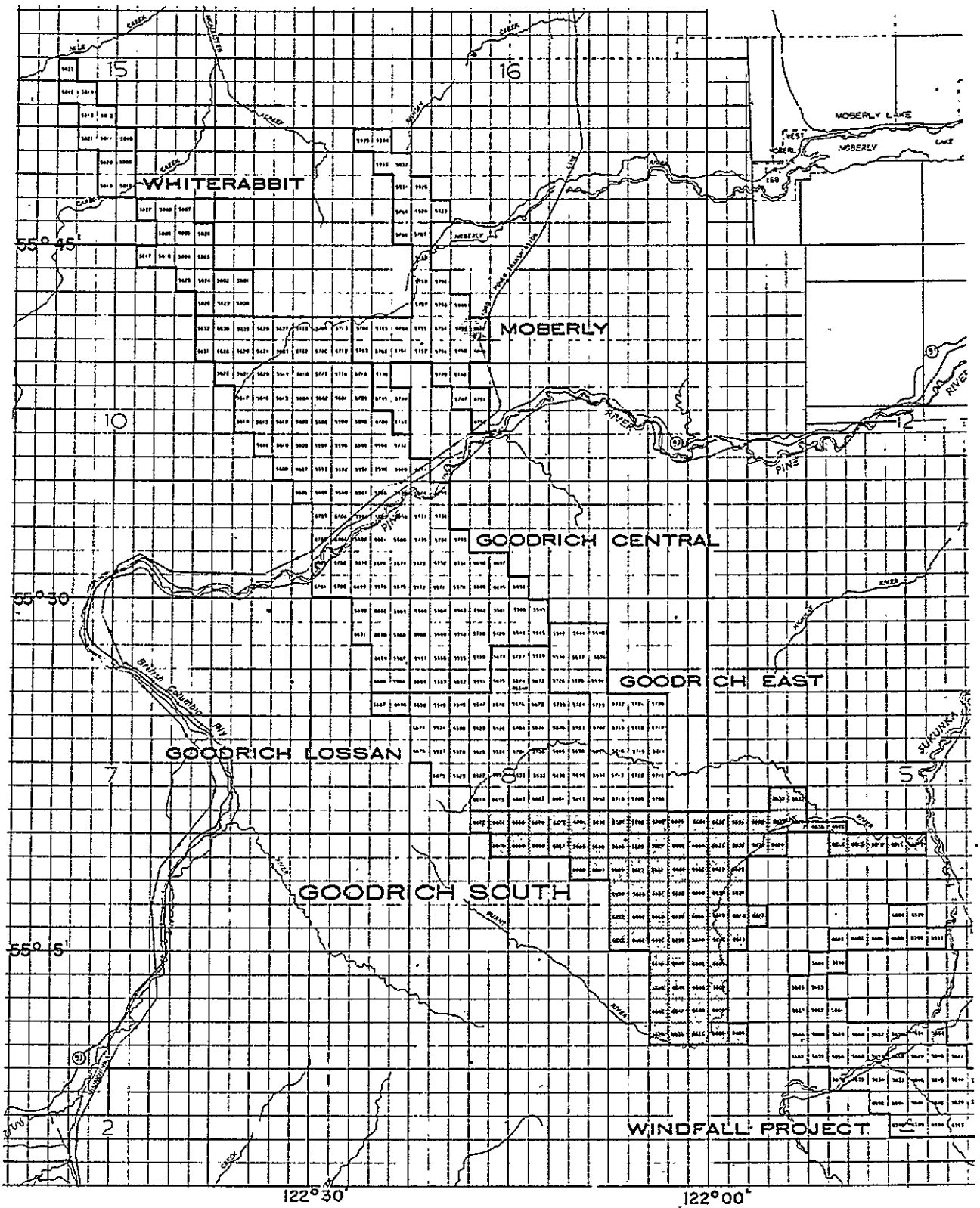
MS-cbb/82-08-04

1981 TRENCHES

Trench	Licence
MBT-80-GR1	5595
GR2	"
GRT-80-G1	5706
G2	"
G3	"
G4	"
G5	"
G6	"
G7	"
G8	"
G9	"
G10	"
G11	5685
G12	"
G13	"
G14	"
G15	"
G16	"
G17	"
G18	"
G19	"
G20	"
G21	"
G22	"
G23	"
G24	"
G25	"
G26	"
G27	"
G28	"
G29	"
G30	"
GRT-80-B1	5706
B2	"
B3	"
B4	"
B5	"
B6	"
B7	"
B8	"
B9	"
B10	"
B11	"
B12	"
B13	"
B14	"
B15	"
B16	"

Trench	Licence
GCT-80-B18	5706
B19	"
B20	"
B21	"
B22	"
B23	"
B24	"
B25	"
B26	"
B27	"
B28	"
B29	"
B30	"
B31	"
B32	"
B33	"
B34	"
B35	"
B36	"
B37	"
B38	"
GLT-80-B1	5693
B2	"
B3	"
B4	"
B5	"
B6	"
B7	"
B8	"
B9	5696
B10	"
B11	"
BCT-80-B1	5670
B2	"
B3	"
BCT-80-Sp3B1	5702
Sp3B2	"
Sp3B3A	"
Sp3B3B	"
Sp3B3C	"
BCT-80-Sp4B1	5697
Sp4B2	"
Sp4B3	"
Sp4B4	"
Sp4B5	"
Sp4B6	"

MS-cbb/82-08-04



scale in miles

0 5 10

0 8 16

scale in kilometres

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CALGARY ALBERTA

Figure 5.3.1.1
1981
GOODRICH PROJECT
GEOLOGICAL STUDY BLOCKS
GOODRICH SOUTH

PREPARED BY:	SCALE
APPROVED BY: H Z. DATE: JAN 82	DRAWING No.

5.6 Goodrich Central

5.6.1 Summary

The Goodrich Central block constitutes the largest mapping block in the property. The block extends south from the Moberly River, across the Pine Pass, to the Mount Stephenson area. The area covered by the Goodrich Central block is shown in Figure 5.6.1.1.

Reconnaissance mapping was carried out on a 1:10,000 scale for the northern two thirds of the property while 1:5,000 map coverage exists in the southern area.

The geological maps and cross-sections can be found in Appendix A, Part 1.

Exploration drilling of two diamond holes was undertaken in a previously undrilled Gething syncline. Seam thicknesses intersected and numerous coal trenches in the area suggest this area to contain good coal potential.

5.6.2 Detail Geology

5.6.2.1 Folds

All folds on Goodrich Central have a general northwest to southeast trend. The folds south of the Pine River Valley have a gentle southern plunge, while those north of the Pine have a northern plunge. Exposure of the younger Gething strata southwards and northwards is illustrated in cross-sections GG to FF' and HH' to II', respectively (Appendix A, Part 1).

The southern portion of Goodrich Central lying between the Pine River Valley to the north and the Lossan Block to the south, consists of four major folds and numerous small folds. The four major folds are, from west to east, the Lossan anticline and syncline, the Big Boulder anticline, and the LeHudette monocline.

The numerous fold pairs due east of Pyramis Peak to the Lossan anticline expose Brenot sediments from the Pine River south for approximately four kilometres. South of this point, they may expose Brenot, Cadomin or Gething sediments because of the southest deepening of the synclinorium.

Approximately 2.5 kilometres east of Pyramis Peak lie the Lossan anticline-syncline pair. These southward plunging structures are traceable from the Lossan block in the south to the Pine River in the north. They may continue north of the Pine River, but information is lacking. These two structures plunging southeast expose first Brenot sediments and then Cadomin/Dresser, Gething and Moosebar strata, south of the Pine.

The Big Boulder anticline (J. Hughes, 1967) bisects Goodrich Central in a north-south direction, lying on both sides of the Pine River. South of the Pine, it lies roughly 4.5 kilometres east of Pyramis Peak. It exposes Beaudette Group sediments for four kilometres. Following this, it exposes the coal bearing Brenot followed by more Beaudette Group strata.

Eight kilometres east of Pyramis Peak, the westerly dipping LeHudette monocline is exposed. This structure could be the western limb of the failed Bickford anticline, which lies north of the Pine Valley. This structure exposes Monach, Beattie Peaks, and Monteith sediments.

As previously stated, the structures north of the Pine Valley have a gentle plunge to the north. The folds lying west of the Pyramis thrust expose Beaudette

sediments. East of this thrust the folds expose sediments of the coal bearing Crassier Group.

Three kilometres to the east of the Pyramis thrust lies the northward continuation of the Big Boulder anticline (J. Hughes, 1967). This anticline continues north of the Pine Valley for 11.5 kilometres before dying out. Monteith, Beattie Peaks, and Monach sediments are exposed in the vicinity of the Pine Valley. To the north, members of the Crassier Group are exposed.

The Coyote syncline, located west of Mt. Bickford and named by J. Hughes (1967) is a long and narrow, regionally trending syncline confined almost exclusively within the Dresser Formation.

The Bickford anticline, located along Mt. Bickford, brings to surface, portions of the non-coal bearing Beaudette Group. Structurally, the west limb of the Bickford anticline may be equivalent to the westerly dipping LeHudette monocline. Southeastward, the monocline is interrupted by the Burnt Normal Fault.

5.6.2.2 Faults

The five major thrust faults within the Goodrich Central block are the Burnt, Beaudette, LeHudette South,

the Little Boulder thrust to the north of the Pine River, and the Pyramis thrust extending from the north to south of the Pine River. To the south of the Pine River, the Burnt thrust strikes northwest-southeast and dips to the west. Southwest of the LeMoray Creek watershed, the fault thrusts the stratigraphically older Dresser Formation over the Gething Formation. As shown by cross-section E-E', the total dip-slip displacement of the thrust is about 140 metres. To the north, and close to cross-section F-F', the fault cuts the Gething Formation. South of the Pine River, the thrust is totally contained within the Brenot Formation and maintains displacement of about 140 metres, as seen in cross-section G-G'.

The Beaudette thrust is located approximately in the center of the block, and runs through the Brenot Formation. The fault has thrust the Monach Formation over the Brenot Formation in two separate locations; one just south of cross-section F-F' and the second location is at cross-section G-G'. The dip-slip displacement of the fault at cross-section F-F' is 100 metres and it increases towards the north where it reaches its maximum magnitude of 500 metres, as shown by cross-section G-G'.

The LeHudette thrust runs along the eastern edge of the block; it has a very minor effect on the geology

of the area. Fault displacement is considered minor. From the west, the Beattie Peaks and Monteith Formations terminate against the southern and the northern part of the thrust, respectively. North of the Pine River, the Little Boulder thrust extends to the White Rabbit north and the Pine River south, upthrusting older strata over stratigraphically younger sediments. Between cross-sections I-I' and M-M', the Monteith Formation has been thrust onto itself. The dip-slip displacement of the fault is 80 metres, as shown on cross-section I-I', and maintains the same sense and magnitude of displacement as illustrated by cross-section M-M'.

The Pyramis thrust is a major fault that extends south of the White Rabbit block to just north of Mount Stephenson. North of the Pine, the stratigraphically older strata of the Monach and Beattie Peaks Formations are thrust over the younger strata of the Brenot and Gething Formations. If one can add the total stratigraphic thicknesses of the overthrusted and eroded formations, namely the Monach, Brenot, and the Dresser Formations, then roughly 700 metres of displacement can be assigned to this major thrust. South of the Pine River, the Monteith Formation has been thrust over the stratigraphically younger Brenot Formation.

Other thrust faults are present in the area, but they have a limited effect on the geology of the Goodrich Central block.

5.6.3 Coal Occurrences

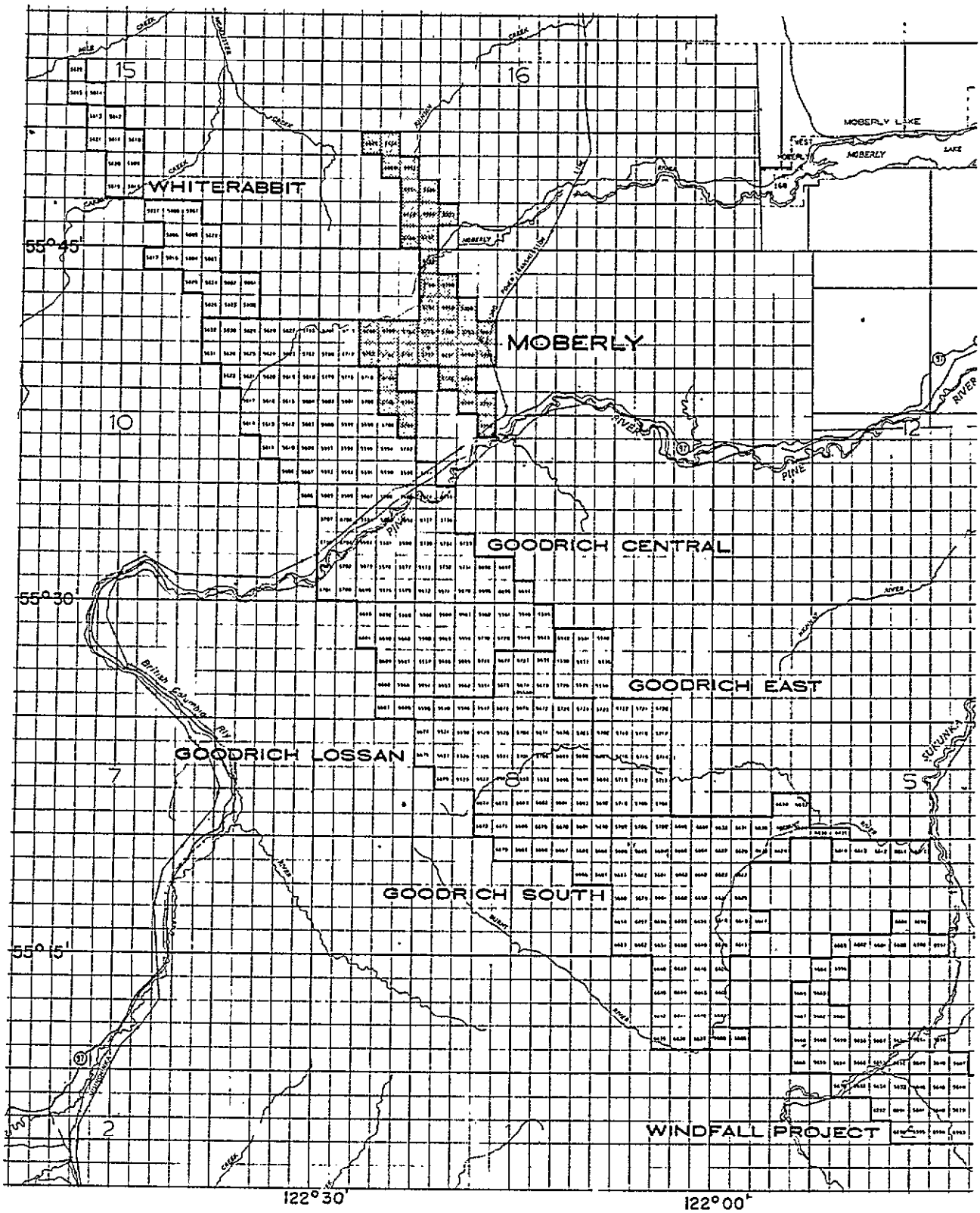
In the 1981 program, numerous coal occurrences were noted throughout the Crassier Group with the Brenot and Gething Formations showing the best potential. The net measured coal thicknesses ranged from 0.15 m to 3.08 m, with an average thickness of 0.95 m.

Trench data in Appendix D shows that numerous coal seams were located in Goodrich Central. The greatest thickness was noted in a trenched Gething seam on Eagle Creek. This trench lies northwest of DDH 81-07 and has a true seam thickness of 3.08 m. Other trenches in the area reveal true seam thicknesses ranging from 1.0 m to 2.0 metres.

Two diamond holes, DDH 81-07 and DDH 81-09, were drilled in Goodrich Central. Both drill holes encountered numerous seams with the thickest seams as follows:

Hole	True Thickness-Coal/Coal + Rock	Depth
D 8107	2.02 / 2.13	185.62-190.30
D 8109	1.98 / 1.98	52.79- 55.22
	1.49 / 1.49	126.31-130.71

It should be noted that cross-section lines E-E' and F-F' do not indicate the true potential of the Gething in the area. As previously stated, additional seams from 1.0 m to 2.0 m do exist and are not shown on the cross-sections. As a result, more work is required in the area.



scale in miles

0 5 10

0 8 16

scale in kilometres

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Coal Division
CALGARY ALBERTA

Figure 5.7.1.1
1981
GOODRICH PROJECT
GEOLOGICAL STUDY BLOCKS
MOBERLY

PREPARED BY:	SCALE
APPROVED BY: H.Z	DATE: JAN. 82 DRAWING No.

5.7 Moberly Block

5.7.1 Summary

The Moberly block is situated in the outer foothills of the Rocky Mountains. The licences cover an area extending northwest from the Pine River to just south of Mount McAllister. The block is situated northeast and adjacent to the Goodrich Central block, as shown in Figure 5.7.1.1.

Reconnaissance mapping was continued from 1980 on a 1:25,000 scale. Airphoto interpretation was utilized for inaccessible areas on the Moberly block. The 1:25,000 geology map and cross-sections can be found in Appendix A, Part 1.

The structure of the area is dominated by northwesterly trending and westerly dipping thrust faults and folds. Some of these faults and folds have a major effect on the Moberly land forms.

The major structures within the Moberly block are the Bickford, Crassier and Fisher anticlines, and the Fisher syncline to the south of the Moberly River. North of the Moberly River, the Carbon and Moberly thrusts form the major structure.

The Moberly block exposes strata from Monteith up to the youngest strata found anywhere on the Goodrich property, namely the Commotion and Hasler Formations of the Fort St. John Group. To date, no coal showings have been reported from these two formations.

Coal measures of the Crassier Group are exposed along the major folds in the area.

5.7.2 Detail Geology

5.7.2.1 Folds

The strata is folded into regional and local anticlines and synclines with the fold axes oriented northwest to southeast. The folds are plunging slightly to the southeast.

The Bickford anticline is located between the Pine and Moberly Rivers. South of the Moberly River, the axis of the fold runs along the western edge of the property and is contained within the Monteith Formation. The fold terminates against a westerly dipping thrust, just south of Mt. Bickford. The Crassier anticline, plunging slightly to the northeast, deviates from the regional trend exposing the stratigraphically younger Dresser

Formation to the north and the Brenot Formation to the south. The fold grades laterally to a fault and joins the Carbon thrust at its northern tip.

In the center of the block and between the Pine and Moberly Rivers, the Fisher anticline strikes northwest-southeast with the upper part adjacent to the Moberly River. This anticline, plunging very steeply towards the southeast, exposes, in a relatively short horizontal distance, the stratigraphically younger Brenot Formaton to the south and the Monteith Formation to the north.

The Fisher syncline is the only major fold in the area. The syncline strikes northwest-southeast and is contained within the Gething Formation. Secondary folds occur in areas that contain incompetent beds of argillaceous sediments. These folds are compressional and considered discontinuous.

5.7.2.2 Faults

The Carbon thrust strikes northwest to southeast across the west edge of the property. The fault zone originates at the termination point of the Crassier anticline, south of the Moberly River. The fault dips to the west and the dip-slip displacement has a magnitude of

approximately 200 metres. Due to erosion, the younger beds of the Crassier Group are removed from the upthrown western side of the fault, but are preserved on the downthrown eastern side.

The trace of the Moberly fault is inferred to lie within the regional trend of the Moberly block structures, as shown on the 1:50,000 geological map. Dipping to the west, the thrust has a very small angle of hade, and has the appearance of a normal fault as the outcrop pattern is relatively uniform and shows no change in topography. The upthrown and downthrown sides of the fault belong to the Gething Formation, therefore the dip-slip displacement of the fault does not exceed the stratigraphic thickness of the formation which is 200-450 metres. Cross-section S-S' in Appendix A, Part 1, shows that the dip-slip displacement is in the neighbourhood of 50 to 70 metres maximum. Other local faults are present in the area, but they are considered to be of minor importance.

5.7.3 Coal Occurrences

In the 1981 exploration program, a total of 12 trenches were hand dug, measured and logged to supplement existing data on coal seam exposures previously reported in the 1980 Geological Report. The trench logs can be

found in Appendix D, and the locations of the trenches are shown on the trench location map in Appendix D.

One diamond drill hole, DDH 81-12 was drilled to a depth of 227 m to confirm the seam continuity of a nearby trench (MB 81-09), located west of the Fisher Creek syncline. The coal/coal + rock thickness of the trench measured 3.91/4.12 m. In comparison, the Gething coal seam intersections of DDH 81-12 are as follows:

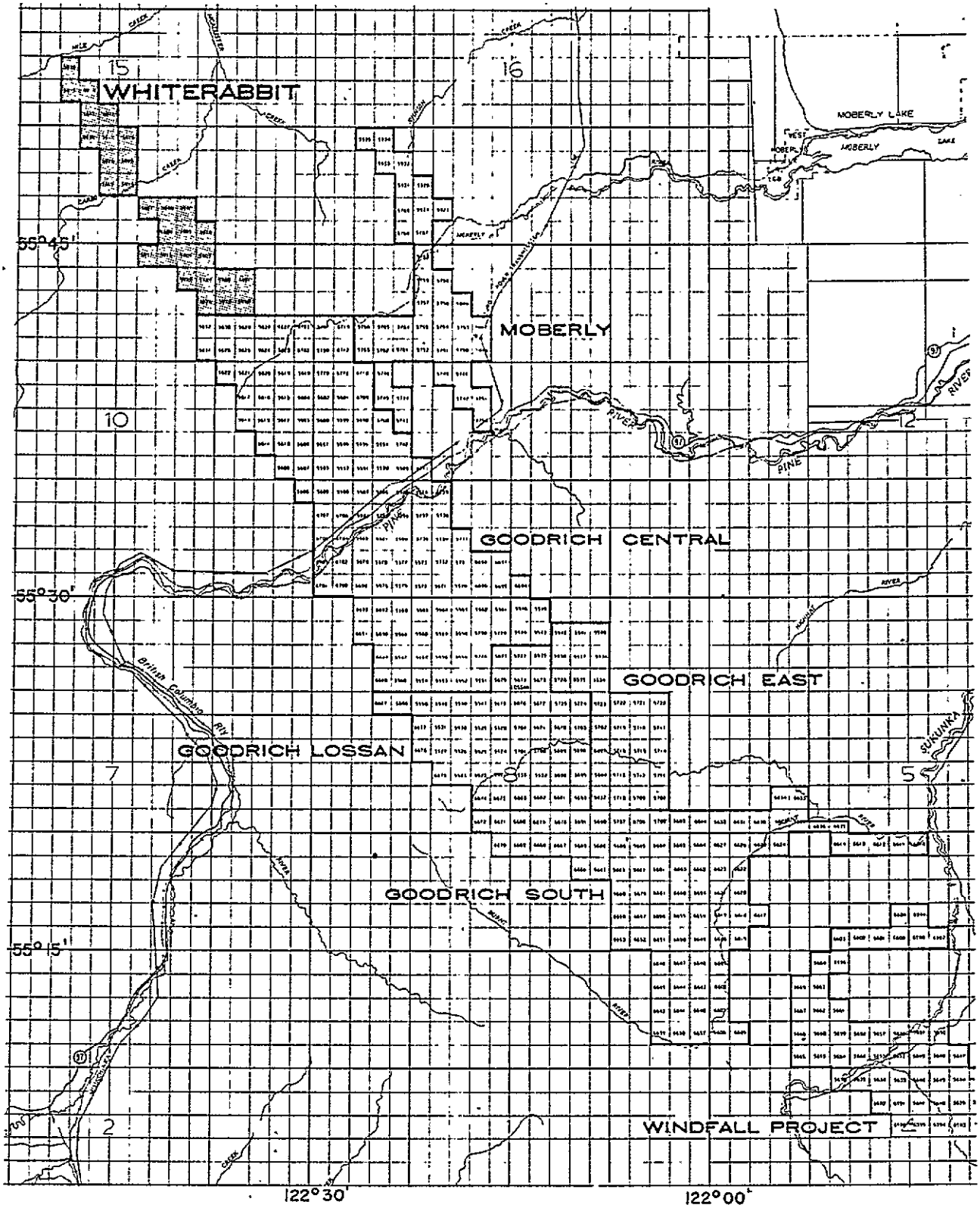
Depth Interval	Seam Thickness
9.79 - 12.79 m	3.0 m
50.58 - 52.33 m	1.75 m
171.49 - 172.66 m	1.17 m

A second trench (MB 81-01) with notable Gething coal thickness was found south of the Moberly River on the B.C. Hydro Power Line service road. The seam attains a coal/coal + rock thickness of 3.60/4.09 m. The seam is presently mapped on the west limb of an anticline located east of the Carbon thrust.

Approximately 25 metres to the south, trench MB 81-02 is thought to contain the same seam intersected in trench MB 81-01. However, the abnormal thickness of a rock split in the middle of the seam is subject to further investigation. The coal/coal + rock true thick-

ness is 5.34 m/ 8.54 m. The proximity of the Carbon thrust may have repeated the seam at trench location MB 81-02.

Another coal exposure of 2.96 m thickness has been mapped in the northern area of the Moberly Block in the vicinity of the Moberly thrust. Further work is warranted here to trace the extent of the coal seam.



scale in miles

0 5 10

0 8 16

scale in kilometres

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

Figure 5.8.1.1
1981
GOODRICH PROJECT
GEOLOGICAL STUDY BLOCKS
WHITERABBIT

PREPARED BY:	SCALE
APPROVED BY: H Z. DATE: JAN. 82	DRAWING No.

5.8 White Rabbit

5.8.1 Summary

The White Rabbit block consists of the northernmost licences of the Goodrich property as shown in Figure 5.8.1.1. The block is located south of Eleven Mile Creek and north of the Moberly River.

Reconnaissance mapping was undertaken on a 1:10,000 scale. Generalized cross-sections were constructed at the same scale and can be found, along with the geology maps of White Rabbit, in Appendix A, Part 1.

To date, only one diamond drill hole (DDH 80-32) exists on the property which was reported on in the 1980 Geological Report.

Formation exposure in the White Rabbit block is better than average in the deeply incised stream valleys, displaying excellent examples of tight folding and faulting.

To date, the most encouraging coal find exists in the Gething Formation, where trench WR-81-02 exposed a 3.07 m seam. The trench logs can be found in Appendix D; locations of trenches on the map in Appendix D.

5.8.2 Detail Geology

5.8.2.1 Folds

The areas of all major folds trend northwest-southeast and are horizontal, or plunge shallowly. The Moberly anticline which occurs along the western ridge can be traced from a splay of the Little Boulder thrust, about seven km north of the highway in Goodrich Central, to about six km north of the Moberly River in White Rabbit. In the White Rabbit block; Beattie Peaks, Monach and Brenot Formations are exposed along this northward plunging anticline.

The White Rabbit anticline, which occurs along the eastern ridge, can be traced from about four km due west of Mt. Bickford in Goodrich Central, to about two km south of Carbon Creek in White Rabbit. Future mapping may show that this anticline is actually the northern continuation of the Big Boulder anticline (J. Hughes, 1967). In the White Rabbit block, this anticline exposes the Monach, Brenot and Dresser Formations.

The White Rabbit syncline runs down the center of the block as shown in cross-sections YY' and XX', and is traceable to the White Rabbit thrust (which terminates the syncline in the south), about four km north of the Moberly River to the property boundary in the north. This syncline exposes Brenot, Dresser and Gething and plunges shallowly south, south of Carbon Creek.

5.8.2.2 Faults

All major faults are northwest-southeast trending, with southwest dips. The probable continuation of the Pyramis thrust is traceable from about four km northwest of the Moberly River to two km northwest of Carbon Creek, running almost entirely outside of, but subparallel to, the western boundary of the property. The Pyramis thrust proper is exposed only in the extreme southwest edge of the property.

The White Rabbit thrust outcrops in the center of the property, south of Carbon Creek and in the west-central region, north of Carbon Creek. It is traceable from two km south of the Moberly River in Goodrich Central, to five and one-half km south of Eleven Mile Creek in the north. There are several splays off the White Rabbit thrust, most of which are north of Carbon Creek. Brenot and Dresser Formations are thrust onto Dresser by this fault. The White Rabbit syncline is cut off in the south by the White Rabbit thrust.

To date, a greater amount of structural data is available from the central area of the White Rabbit block (just south of Carbon Creek), as this area was concentrated upon during mapping.

6.0 COAL RESOURCES

6.1 Potential Regional Coal Resources

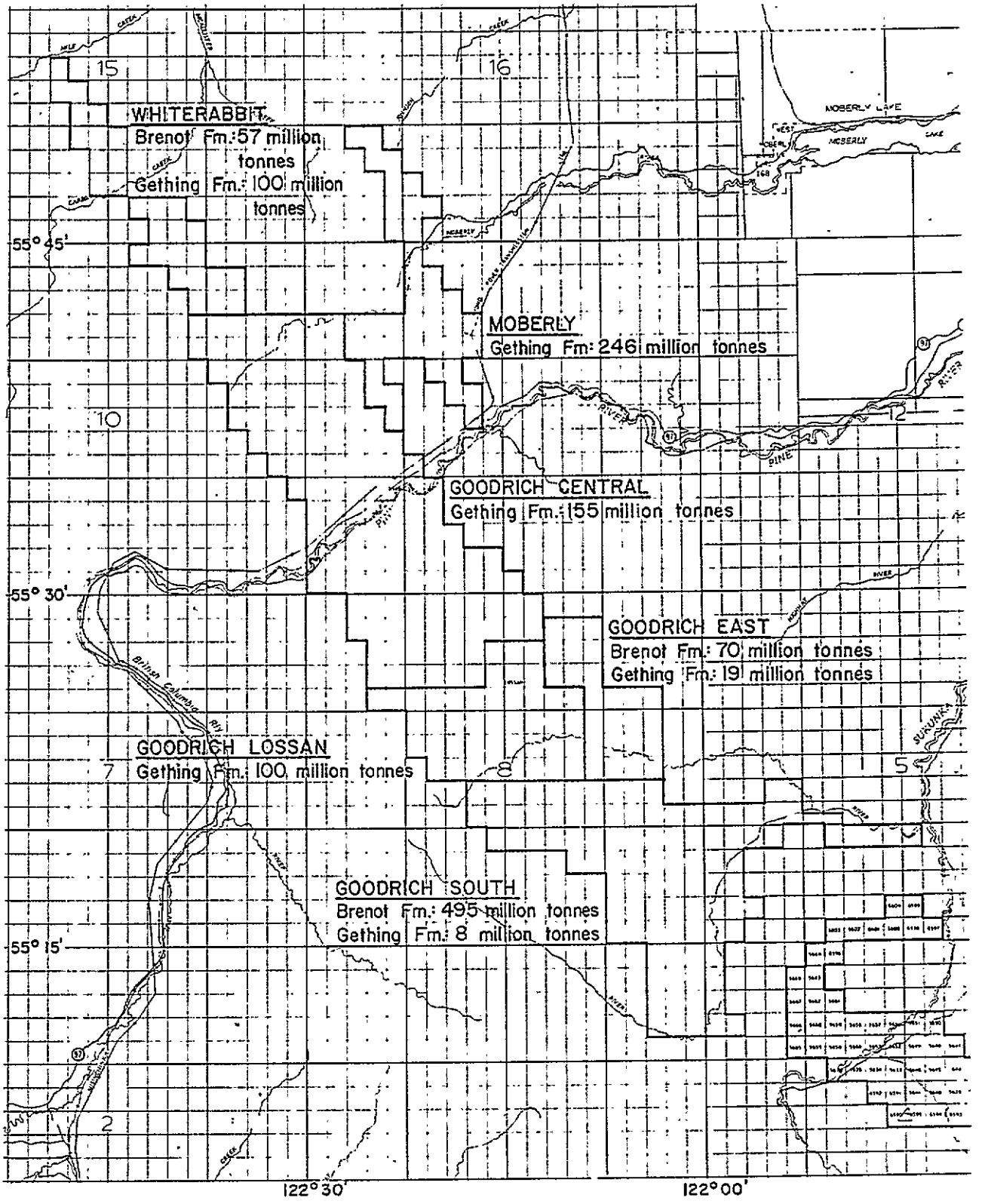
Exploration on the Goodrich property to date has identified potential in-situ coal resources within the Brenot and Gething Formations conservatively estimated at approximately 1.25 billion tonnes.

The in-situ regional reserves of the Goodrich property have been calculated for each geological mapping area, as shown in Figure 6.1.1. Table 6.1.1 shows the range of true seam thicknesses used that comprise the coal resource base of the Brenot and Gething Formations. Drill hole intersections and/or coal trench measurements constitute the coal seam data base used in the reserve estimates. The in-situ coal resources were calculated by the geological cross- section method to a vertical depth of 500 metres. A specific gravity of 1.5 was used for the tonnage calculations.

6.2 Potential Resources of Surface Mining Prospects

6.2.1 Goodrich Lossan Block

The 1980 and 1981 exploration drilling efforts have mainly been directed towards delineating the surface mining potential of the upper Gething coal seams in the



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CALGARY	ALBERTA

Figure 6.1.1

1981

GOODRICH PROJECT

REGIONAL COAL RESOURCES

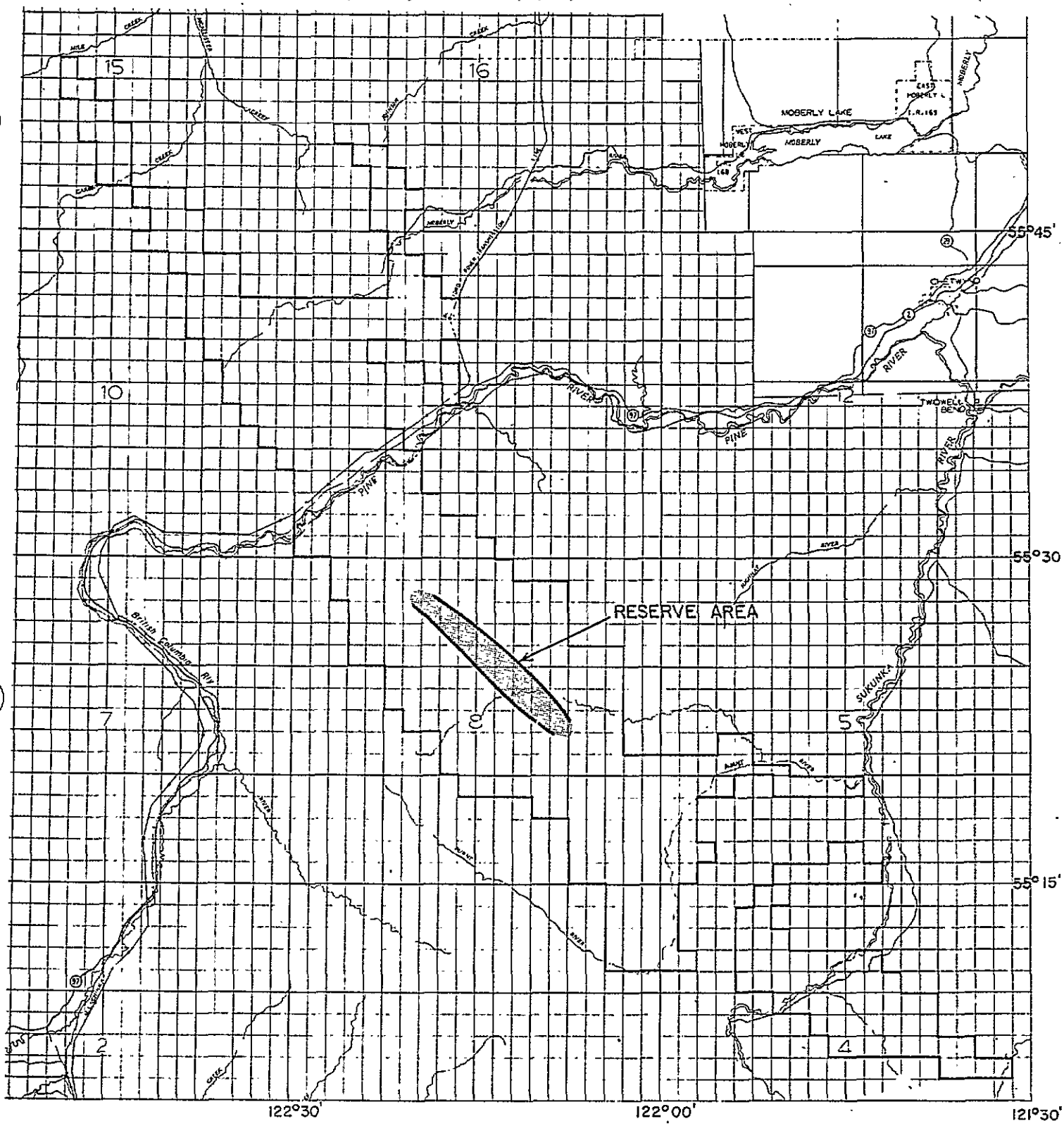
PREPARED BY:	SCALE
APPROVED BY: DATE: JAN. 82	DRAWING No.

TABLE 6.1.1

SUMMARY OF POTENTIAL IN-SITU REGIONAL COAL RESOURCES
FOR THE BRENOT AND GETHING FORMATIONS

Geol. Blk.	BRENOT Fm. (in million tonnes) True Seam Thickness >0.5m (0.5 m - 1.0)	>1.0m (1.0-2.0)	>2.0m (2.0-3.0)	>3.0m (3.0 -)	Subtotal	GETHING Fm (in million tonnes) True Seam Thickness >0.5m (0.5 - 1.0)	>1.0m (1.0 - 2.0)	>2.0m (2-0-3.0)	>3.0m	Subtotal	Brenot Fm. & Gething Fm. Subtotal
White Rabbit	15	42	—	—	57	—	68	—	32	100	157
Moberly	—	—	—	—	—	—	148	—	97	246	246
Goodrich Central	—	—	—	—	—	—	74	58	23	155	155
Goodrich Lossan	—	—	—	—	—	—	—	20	80	100	100
Goodrich East	—	—	70	—	70	—	—	10	9	19	89
Goodrich South	—	121	—	374	495	—	—	8	—	8	503
TOTAL	15	163	70	374	622		290	96	241	627	1,250

(p 138 does not exist - you are not going crazy)



scale in miles

0 5 10

0 8 16

scale in kilometres

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Figure 6.2.1
1981
GOODRICH COAL PROPERTY
AREA OF OPEN PIT POTENTIAL

PREPARED BY:	SCALE
APPROVED BY: DATE: NOV. '81	DRAWING No.

Goodrich Lossan block. The general area with possible open pit coal potential is illustrated in Figure 6.2.1.

The open pit resources were calculated by the cross-section method and a specific gravity of 1.5 was applied in the tonnage calculations.

Two areas of open pit potential are defined by the No. 1 and No. 3 coal seams.

6.2.1.1 No. 1 Seam

Preliminary resources from the Lossan-Axis syncline pair have been calculated at roughly 80 million tonnes of coal in place. Mineable coal thicknesses range from 1.14 metres in the north to over 10 metres in the south. The No. 1 seam thickness averages approximately 8 metres.

The subcrop trend of the No. 1 seam is shown on the 1:5,000 geology maps included in Appendix 1, Part 2.

6.2.1.2 No. 3 Seam

The preliminary resources from the No. 3 seam have been estimated at 20 million tonnes of coal in place. The true thickness averages approximately 4 metres.

No attempt has been made at this time to define the limits of the possible open pit area. Additional drilling is required, particularly in the northern area to delineate the subcrop trend of the No. 3 seam.

7.0 COAL QUALITY

7.1 Summary

Loring Laboratories of Calgary are presently continuing the coal quality assessment of the 1981 core samples. The individual ply samples are at this time, being combined for washability and clean coal analyses. Petrographic analysis is not available at this time. This data will be reported under separate cover when it becomes available.

To date, proximate analyses were completed on 241 sampled core intervals taken from 22 test holes. The following is a typical range of coal quality results from the Gething No. 1 seam on an air-dried basis.

TABLE 7.1.1

TYPICAL RANGE OF PROXIMATE ANALYSIS (AIR-DRIED BASIS)

Total Moisture %	Ash %	Volatile Matter %	Fixed Carbon %	Sulphur %	Gross Calorific Value	FSI
1.1-2.4	11.1-16.9	23.2-28.6	58.6-64.5	0.2-0.28	Btu/lb 12,500-13,300 MJ/kg 29.08-30.94	8.0

The results of the individual ply samples (raw head analysis) are included with each drill hole data set in Appendix B. Coal seam data sheets have been prepared, and included in Appendix B, to allow ready comparison between the geophysical tool response, coal core description, and laboratory analyses.

Clean coal analyses of the 8 core holes (DDH 80-37 to DDH 80-44) drilled after November 7, 1980, are included with each drill hole package in Appendix B. The results indicate that the Gething coal is of bituminous rank, suitable for metallurgical and export thermal markets. The Gething No. 1 seam has an average ash of less than 10%, Volatile Matter of 30-31%, and FSI between 7-8.

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APPENDIX 1.1

LISTING OF GOODRICH COAL LICENCES

GOODRICH-LOSSAN

Licence	Map	Block	Units	Hectares
5521	93-O-8	F	41,42,51,52	295
5522	93-O-8	F	43,44,53,54	295
5523	93-O-8	F	45,46,55,56	295
5524	93-O-8	F	61,62,71,72	294
5525	93-O-8	F	63,64,73,74	294
5526	93-O-8	F	65,66,75,76	294
5527	93-O-8	F	67,68,77,78	294
5528	93-O-8	F	81,82,91,92	294
5529	93-O-8	F	83,84,93,94	294
5530	93-O-8	F	85,86,95,96	294
5531	93-O-8	F	87,88,97,98	294
5532	93-O-8	G	47,48,57,58	295
5533	93-O-8	G	49,50,59,60	295
5539	93-O-8	J	47,48,57,58	294
5547	93-O-8	K	3, 4,13,14	294
5548	93-O-8	K	5, 6,15,16	294
5549	93-O-8	K	7, 8,17,18	294
5550	93-O-8	K	9,10,19,20	294
5670	93-O-8	G	85,86,95,96	294
5671	93-O-8	G	87,88,97,98	294
5672	93-O-8	J	7, 8,17,18	294
5673	93-O-8	J	27,28,37,38	294
5674	93-O-8	J	29,30,39,40	294
5675	93-O-8	K	21,22,31,32	294
5676	93-O-8	J	9,10,19,20	294
5677	93-O-8	K	41,42,51,52	294
5678	93-O-8	K	1, 2,11,12	294
5695	93-O-8	G	43,44,53,54	295
5696	93-O-8	G	45,46,55,56	295
5698	93-O-8	G	63,64,73,74	294
5699	93-O-8	G	65,66,75,76	294
5700	93-O-8	G	67,68,77,78	294
5701	93-O-8	G	69,70,79,80	294
5703	93-O-8	G	83,84,93,94	294
5704	93-O-8	G	89,90,99,100	294
5724	93-O-8	J	3, 4,13,14	294
5725	93-O-8	J	5, 6,15,16	294
5727	93-O-8	J	49,50,59,60	294
6675	93-O-8	F	47,48,57,58	295
6676	93-O-8	F	69,70,79,80	295
6677	93-O-8	F	89,90,99,100	295
6686	93-O-8	L	1, 2,11,12	294
6687	93-O-8	L	3, 4,13,14	294

GOODRICH-SOUTH

Licence	Map	Block	Units	Hectares
5679	93-O-8	A	47,48,57,58	295
5680	93-O-8	A	49,50,59,60	295
5681	93-O-8	A	65,66,75,76	295
5682	93-O-8	A	67,68,77,78	295
5683	93-O-8	A	69,70,79,80	295
5684	93-O-8	A	85,86,95,96	295
5685	93-O-8	A	87,88,97,98	295
5686	93-O-8	A	89,90,99,100	295
5687	93-O-8	B	61,62,71,72	295
5688	93-O-8	B	81,82,91,92	295
5689	93-O-8	B	83,84,93,94	295
5690	93-O-8	G	1, 2,11,12	295
5691	93-O-8	G	3, 4,13,14	295
5692	93-O-8	G	21,22,31,32	295
5693	93-O-8	G	23,24,33,34	295
5705	93-O-8	H	5, 6,15,16	294
5706	93-O-8	H	7, 8,17,18	294
5707	93-O-8	H	9,10,19,20	294
5708	93-O-8	H	25,26,35,36	294
5709	93-O-8	H	27,28,37,38	294
5710	93-O-8	H	29,30,39,40	294
6605	93-P-4	L	27,28,37,38	296
6606	93-P-4	L	29,30,39,40	296
6607	93-P-4	L	49,50,59,60	296
6608	93-P-4	L	69,70,79,80	296
6609	93-P-4	L	89,90,99,100	296
6610	93-P-5	B	89,90,99,100	296
6611	93-P-5	C	81,82,91,92	295
6612	93-P-5	C	83,84,93,94	295
6613	93-P-5	C	85,86,95,96	295
6614	93-P-5	C	87,88,97,98	295
6615	93-P-5	D	7, 8,17,18	295
6616	93-P-5	D	9,10,19,20	295
6617	93-P-5	D	25,26,35,36	295
6618	93-P-5	D	27,28,37,38	295
6619	93-P-5	D	29,30,39,40	295
6620	93-P-5	D	47,48,57,58	295
6621	93-P-5	D	49,50,59,60	295
6622	93-P-5	D	67,68,77,78	295
6623	93-P-5	D	69,70,79,80	295
6624	93-P-5	D	83,84,93,94	295
6625	93-P-5	D	85,86,95,96	295
6626	93-P-5	D	87,88,97,98	295
6627	93-P-5	D	89,90,99,100	295
6628	93-P-5	E	1, 2,11,12	295
6629	93-P-5	E	3, 4,13,14	295
6630	93-P-5	E	5, 6,15,16	295
6631	93-P-5	E	7, 8,17,18	295
6632	93-P-5	E	9,10,19,20	295

GOODRICH-SOUTH (CONT'D)

Licence	Map	Block	Units	Hectares
6633	93-P-5	E	21,22,31,32	295
6634	93-P-5	E	23,24,33,34	295
6635	93-P-5	F	7,8	148
6636	93-P-5	F	9,10	148
6637	93-O-1	I	21,22,31,32	296
6638	93-O-1	I	23,24,33,34	296
6639	93-O-1	I	25,26,35,36	296
6640	93-O-1	I	41,42,51,52	296
6641	93-O-1	I	43,44,53,54	296
6642	93-O-1	I	45,46,55,56	296
6643	93-O-1	I	61,62,71,72	296
6644	93-O-1	I	63,64,73,74	296
6645	93-O-1	I	65,66,75,76	296
6646	93-O-1	I	81,82,91,92	296
6647	93-O-1	I	83,84,93,94	296
6648	93-O-1	I	85,86,95,96	296
6649	93-O-8	A	1, 2,11,12	295
6650	93-O-8	A	3, 4,13,14	295
6651	93-O-8	A	5, 6,15,16	295
6652	93-O-8	A	7, 8,17,18	295
6653	93-O-8	A	9,10,19,20	295
6654	93-O-8	A	21,22,31,32	295
6655	93-O-8	A	23,24,33,34	295
6656	93-O-8	A	25,26,35,36	295
6657	93-O-8	A	27,28,37,38	295
6658	93-O-8	A	29,30,39,40	295
6659	93-O-8	A	41,42,51,52	295
6660	93-O-8	A	43,44,53,54	295
6661	93-O-8	A	45,46,55,56	295
6662	93-O-8	A	61,62,71,72	295
6663	93-O-8	A	63,64,73,74	295
6664	93-O-8	A	81,82,91,92	295
6665	93-O-8	A	83,84,93,94	295
6666	93-O-8	B	63,64,73,74	295
6667	93-O-8	B	85,86,95,96	295
6668	93-O-8	B	87,88,97,98	295
6669	93-O-8	B	89,90,99,100	295
6670	93-O-8	C	81,82,91,92	295
6671	93-O-8	F	1, 2,11,12	295
6672	93-O-8	F	3, 4,13,14	295
6673	93-O-8	F	21,22,31,32	295
6674	93-O-8	F	23,24,33,34	295
6678	93-O-8	G	5, 6,15,16	295
6679	93-O-8	G	7, 8,17,18	295
6680	93-O-8	G	9,10,19,20	295
6681	93-O-8	G	25,26,35,36	295
6682	93-O-8	G	27,28,37,38	295
6683	93-O-8	G	29,30,39,40	295

GOODRICH-CENTRAL

Licence	Map	Block	Units	Hectares
5543	93-O-8	J	67,68,77,78	294
5544	93-O-8	J	69,70,79,80	294
5545	93-O-8	J	87,88,97,98	294
5546	93-O-8	J	89,90,99,100	294
5551	93-O-8	K	23,24,33,34	294
5552	93-O-8	K	25,26,35,36	294
5553	93-O-8	K	27,28,37,38	294
5554	93-O-8	K	29,30,39,40	294
5555	93-O-8	K	45,46,55,56	294
5556	93-O-8	K	47,48,57,58	294
5557	93-O-8	K	49,50,59,60	294
5558	93-O-8	K	65,66,75,76	294
5559	93-O-8	K	67,68,77,78	294
5560	93-O-8	K	69,70,79,80	294
5561	93-O-8	K	81,82,91,92	294
5562	93-O-8	K	83,84,93,94	294
5563	93-O-8	K	85,86,95,96	294
5564	93-O-8	K	87,88,97,98	294
5565	93-O-8	K	89,90,99,100	294
5566	93-O-8	L	21,22,31,32	294
5567	93-O-8	L	41,42,51,52	294
5568	93-O-8	L	61,62,71,72	294
5569	93-O-8	L	81,82,91,92	294
5570	93-O-9	C	5, 6,15,16	294
5571	93-O-9	C	7, 8,17,18	294
5572	93-O-9	C	9,10,19,20	294
5573	93-O-9	C	29,30,39,40	293
5574	93-O-9	C	89,90,99,100	293
5575	93-O-9	D	1, 2,11,12	294
5576	93-O-9	D	3, 4,13,14	294
5577	93-O-9	D	21,22,31,32	293
5578	93-O-9	D	23,24,33,34	293
5579	93-O-9	D	25,26,35,36	293
5580	93-O-9	D	41,42,51,52	293
5581	93-O-9	D	43,44,53,54	293
5582	93-O-9	D	45,46,55,56	293
5583	93-O-9	D	63,64,73,74	293
5584	93-O-9	D	65,66,75,76	293
5585	93-O-9	D	81,82,91,92	293
5586	93-O-9	D	83,84,93,94	293
5587	93-O-9	D	85,86,95,96	293
5588	93-O-9	D	87,88,97,98	293
5589	93-O-9	E	1, 2,11,12	293
5590	93-O-9	E	3, 4,13,14	293
5591	93-O-9	E	5, 6,15,16	293
5592	93-O-9	E	7, 8,17,18	293
5593	93-O-9	E	9,10,19,20	293
5594	93-O-9	E	23,24,33,34	293

GOODRICH-CENTRAL (CONT'D)

Licence	Map	Block	Units	Hectares
5595	93-O-9	E	25,26,35,36	293
5596	93-O-9	E	27,28,37,38	293
5597	93-O-9	E	29,30,39,40	293
5598	93-O-9	E	45,46,55,56	293
5599	93-O-9	E	47,48,57,58	293
5600	93-O-9	E	49,50,59,60	293
5601	93-O-9	E	67,68,77,78	293
5602	93-O-9	E	69,70,79,80	293
5603	93-O-10	H	41,42,51,52	293
5604	93-O-10	H	61,62,71,72	293
5605	93-O-9	D	89,90,99,100	293
5606	93-O-10	A	81,82,91,92	293
5607	93-O-10	H	1, 2,11,12	293
5608	93-O-10	H	3, 4,13,14	293
5609	93-O-10	H	21,22,31,32	293
5610	93-O-10	H	23,24,33,34	293
5611	93-O-10	H	25,26,35,36	293
5612	93-O-10	H	43,44,53,54	293
5613	93-O-10	H	45,46,55,56	293
5614	93-O-10	H	47,48,57,58	293
5615	93-O-10	H	63,64,73,74	293
5616	93-O-10	H	65,66,75,76	293
5617	93-O-10	H	67,68,77,78	293
5618	93-O-10	H	81,82,91,92	292
5619	93-O-10	H	83,84,93,94	292
5620	93-O-10	H	85,86,95,96	292
5621	93-O-10	H	87,88,97,98	292
5622	93-O-10	H	89,90,99,100	292
5623	93-O-10	I	3, 4,13,14	292
5624	93-O-10	I	5, 6,15,16	292
5625	93-O-10	I	7, 8,17,18	292
5626	93-O-10	I	9,10,19,20	292
5627	93-O-10	I	23,24,33,34	292
5628	93-O-10	I	25,26,35,36	292
5629	93-O-10	I	27,28,37,38	292
5630	93-O-10	I	29,30,39,40	292
5631	93-O-10	J	1, 2,11,12	292
5632	93-O-10	J	21,22,31,32	292
5728	93-O-8	K	43,44,53,54	294
5729	93-O-8	K	61,62,71,72	294
5730	93-O-8	K	63,64,73,74	294
5731	93-O-9	C	25,26,35,36	293
5732	93-O-9	C	27,28,37,38	293
5733	93-O-9	C	45,46,55,56	293
5734	93-O-9	C	47,48,57,58	293
5735	93-O-9	C	49,50,59,60	293
5736	93-O-9	C	67,68,77,78	293
5737	93-O-9	C	69,70,79,80	293

GOODRICH-CENTRAL (CONT'D)

Licence	Map	Block	Units	Hectares
5738	93-O-9	D	61,62,71,72	293
5739	93-O-9	C	87,88,97,98	293
5742	93-O-9	E	21,22,31,32	293
5778	93-O-9	E	87,88,97,98	293
5779	93-O-9	E	89,90,99,100	293
5780	93-O-9	L	9,10,19,20	292
5781	93-O-9	L	29,30,39,40	292
5782	93-O-9	I	1, 2,11,12	292
5783	93-O-9	I	21,22,31,32	292
6688	93-O-8	L	23,24,33,34	294
6689	93-O-8	L	43,44,53,54	294
6690	93-O-8	L	63,64,73,74	294
6691	93-O-8	L	65,66,75,76	294
6692	93-O-8	L	83,84,93,94	294
6693	93-O-8	L	85,86,95,96	294
6694	93-O-9	B	9,10,19,20	294
6695	93-O-9	C	1, 2,11,12	294
6696	93-O-9	C	3, 4,13,14	294
6697	93-O-9	C	21,22,31,32	293
6698	93-O-9	C	23,24,33,34	293
6699	93-O-9	D	5, 6,15,16	294
6700	93-O-9	D	7, 8,17,18	294
6701	93-O-9	D	9,10,19,20	294
6702	93-O-9	D	27,28,37,38	293
6703	93-O-9	D	29,30,39,40	293
6704	93-O-9	D	47,48,57,58	293
6705	93-O-9	D	49,50,59,60	293
6706	93-O-9	D	67,68,77,78	293
6707	93-O-9	D	69,70,79,80	293
6708	93-O-9	E	43,44,53,54	293
6709	93-O-9	E	65,66,75,76	293
6710	93-O-9	E	85,86,95,96	293
6711	93-O-9	F	9,10,19,20	293
6712	93-O-9	L	7, 8,17,18	292
6713	93-O-9	L	27,28,37,38	292

GOODRICH-EAST

Licence	Map	Block	Units	Hectares
5534	93-O-8	J	21,22,31,32	294
5535	93-O-8	J	23,24,33,34	294
5536	93-O-8	J	41,42,51,52	294
5537	93-O-8	J	43,44,53,54	294
5538	93-O-8	J	45,46,55,56	294
5540	93-O-8	J	61,62,71,72	294
5541	93-O-8	J	63,64,73,74	294
5542	93-O-8	J	65,66,75,76	294
5694	93-O-8	G	41,42,51,52	294
5697	93-O-8	G	61,62,71,72	294
5702	93-O-8	G	81,82,91,92	294
5711	93-O-8	H	45,46,55,56	294
5712	93-O-8	H	47,48,57,58	294
5713	93-O-8	H	49,50,59,60	294
5714	93-O-8	H	65,66,75,76	294
5715	93-O-8	H	67,68,77,78	294
5716	93-O-8	H	69,70,79,80	294
5717	93-O-8	H	85,86,95,96	294
5718	93-O-8	H	87,88,97,98	294
5719	93-O-8	H	89,90,99,100	294
5720	93-O-8	I	5, 6,15,16	294
5721	93-O-8	I	7, 8,17,18	294
5722	93-O-8	I	9,10,19,20	294
5723	93-O-8	J	1, 2,11,12	294
5726	93-O-8	J	25,26,35,36	294

GOODRICH-MOBERLY

Licence	Map	Block	Units	Hectares
4750	93-O-9	F	43,44,53,54	293
4751	93-O-9	F	63,64,73,74	293
5743	93-O-9	E	41,42,51,52	293
5744	93-O-9	E	61,62,71,72	293
5745	93-O-9	E	63,64,73,74	293
5746	93-O-9	E	83,84,93,94	293
5747	93-O-9	F	65,66,75,76	293
5748	93-O-9	F	85,86,95,96	292
5749	93-O-9	F	87,88,97,98	292
5750	93-O-9	K	5, 6,15,16	292
5751	93-O-9	K	7, 8,17,18	292
5752	93-O-9	K	9,10,19,20	292
5753	93-O-9	K	25,26,35,36	292
5754	93-O-9	K	27,28,37,38	292
5755	93-O-9	K	29,30,39,40	292
5756	93-O-9	K	47,48,57,58	292
5757	93-O-9	K	49,50,59,60	292
5758	93-O-9	K	67,68,77,78	292
5759	93-O-9	K	69,70,79,80	292
5760	93-O-9	K	89,90,99,100	292
5761	93-O-9	L	1, 2,11,12	292
5762	93-O-9	L	3, 4,13,14	292
5763	93-O-9	L	5, 6,15,16	292
5764	93-O-9	L	21,22,31,32	292
5765	93-O-9	L	23,24,33,34	292
5766	93-O-9	L	25,26,35,36	292
5767	93-O-16	C	9,10,19,20	292
5768	93-O-16	D	1, 2,11,12	292
5769	93-O-16	D	21,22,31,32	292
5886	93-O-9	K	3, 4,13,14	292
5887	93-O-9	K	23,24,33,34	292
5889	93-O-9	K	45,46,55,56	292
5923	93-O-16	C	27,28,37,38	292
5924	93-O-16	C	29,30,39,40	292
5926	93-O-16	C	49,50,59,60	292
5931	93-O-16	D	41,42,51,52	292
5932	93-O-16	D	61,62,71,72	291
5933	93-O-16	D	63,64,73,74	291
5934	93-O-16	D	83,84,93,94	291
5935	93-O-16	D	85,86,95,96	291

GOODRICH-WHITE RABBIT

Licence	Map	Block	Units	Hectares
5800	93-O-10	I	47,48,57,58	292
5801	93-O-10	I	67,68,77,78	292
5802	93-O-10	I	69,70,79,80	292
5803	93-O-10	J	81,82,91,92	292
5804	93-O-10	J	83,84,93,94	292
5805	93-O-15	B	3, 4,13,14	292
5806	93-O-15	B	5, 6,15,16	292
5807	93-O-15	B	23,24,33,34	292
5808	93-O-15	B	25,26,35,36	292
5809	93-O-15	B	69,70,79,80	291
5810	93-O-15	B	89,90,99,100	291
5811	93-O-15	C	81,82,91,92	291
5812	93-O-15	F	1, 2,11,12	291
5813	93-O-15	F	3, 4,13,14	291
5814	93-O-15	F	23,24,33,34	291
5815	93-O-15	F	25,26,35,36	291
5816	93-O-10	J	85,86,95,96	292
5817	93-O-10	J	87,88,97,98	292
5818	93-O-15	B	49,50,59,60	292
5819	93-O-15	C	41,42,51,52	292
5820	93-O-15	C	61,62,71,72	291
5821	93-O-15	C	83,84,93,94	291
5822	93-O-15	F	45,46,55,56	291
5823	93-O-10	I	49,50,59,60	292
5824	93-O-10	J	61,62,71,72	292
5825	93-O-10	J	63,64,73,74	292
5826	93-O-10	J	41,42,51,52	292
5827	93-O-15	B	27,28,37,38	292
5828	93-O-15	B	1, 2,11,12	292

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

NORTHEASTERN BRITISH COLUMBIA

GOODRICH COAL LICENCES

PREPARED BY:
APPROVED BY: DATE: MAY, '81
SCALE 1:100,000
DRAWING No.

SURVEY NOTE

The map data was compiled photogrammetrically and is based on the Universal Transverse Mercator grid and geodetic datum.

SCALE 1:20,000

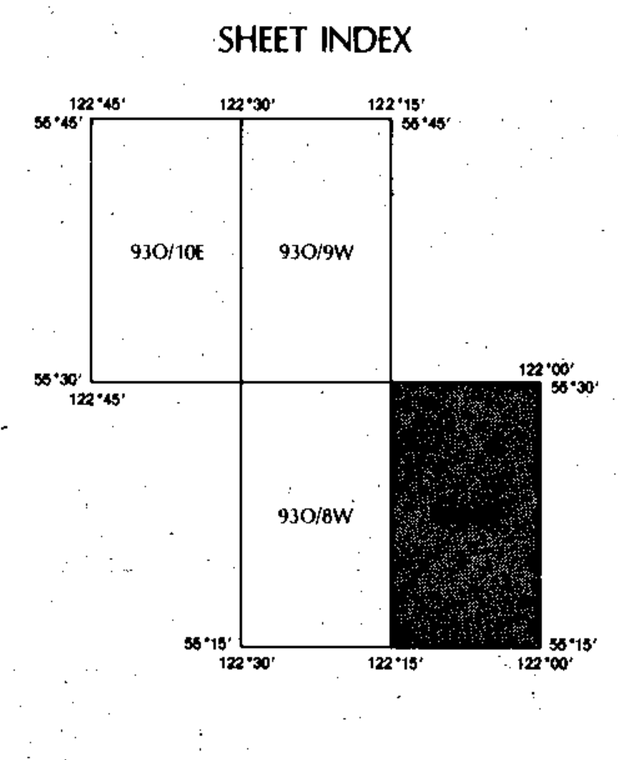
Metres 500 0 500 1000 1500 2000 2500 3000 Metres

CONTOUR INTERVAL 20m
N.T.S. SHEET 93O/8E

LEGEND

- MAIN ROAD
- SECONDARY ROAD
- TRACK or TRAIL
- CUT LINE
- RIVER
- STREAM
- LAKE
- CONTOURS

SHEET INDEX



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VOLUME II

PR-Goodrich 81(3)A *(1)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

93 O/8E
GOODRICH COAL PROJECT
Northeast British Columbia
GOODRICH PROPERTY
1980 & 1981 DRILL LOCATIONS

DRAWN BY: Hardy Assoc. Ltd. DATE: Sept. 1981	SCALE 1:20,000
PREPARED BY:	DRAWING No. 2a
APPROVED BY: DATE:	

FILE No.

SURVEY NOTE

The map data was compiled photogrammetrically and is based on the Universal Transverse Mercator grid and geodetic datum.

LEGEND

- MAIN ROAD
- SECONDARY ROAD
- TRACK or TRAIL
- CUT LINE
- RIVER
- STREAM
- LAKE
- CONTOURS

SCALE 1:20,000

Metres 500 0 500 1000 1500 2000 2500 3000 Metres

CONTOUR INTERVAL 20m
N.T.S. SHEET 93O/8W

SHEET INDEX

93O/10E	93O/9W	
	(93O/8W)	93O/8E

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VOLUME II

PR-Goodrich 81(a)A *(1)

GULF CANADA RESOURCES INC. Coal Division	
CALGARY ALBERTA	Gulf

93 O/8W
GOODRICH COAL PROJECT
Northeast British Columbia
GOODRICH PROPERTY
1980 & 1981 DRILL LOCATIONS

DRAWN BY: Hardy Assoc. Ltd. DATE: Sept. 1981	SCALE 1:20,000
PREPARED BY:	DRAWING No. 2b
APPROVED BY: DATE:	

FILE No.

SURVEY NOTE

The map data was compiled photogrammetrically and is based on the Universal Transverse Mercator grid and geodetic datum.

LEGEND

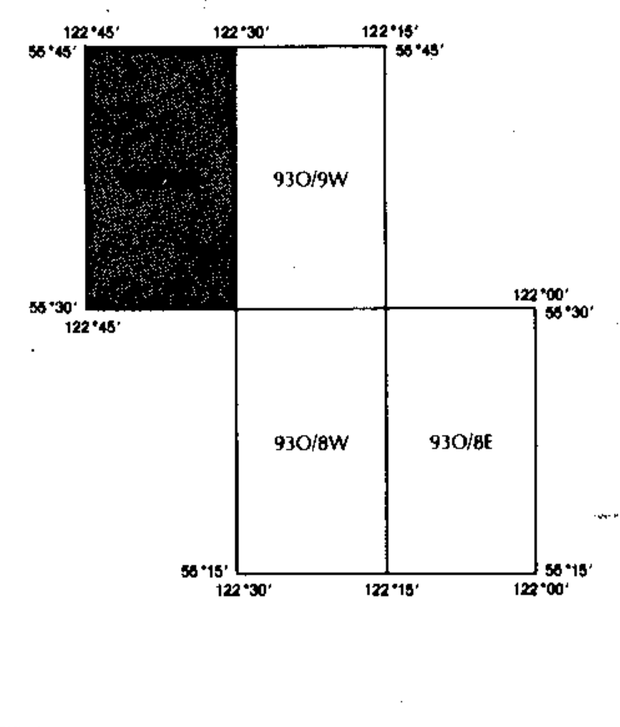
MAIN ROAD
SECONDARY ROAD
TRACK or TRAIL
CUT LINE
RIVER
STREAM
LAKE
CONTOURS

SCALE 1:20,000

Metres 500 0 500 1000 1500 2000 2500 3000 Metres

CONTOUR INTERVAL 20m
N.T.S. SHEET 93O/10E

SHEET INDEX



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VOLUME II

PR-Goodrich 81(3)A (1)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

93 O/10E
GOODRICH COAL PROJECT
Northeast British Columbia
GOODRICH PROPERTY ✓
1980 & 1981 DRILL LOCATIONS

DRAWN BY: Hardy Assoc. Ltd. **DATE:** Sept. 1981	**SCALE** 1:20,000
PREPARED BY:	**DRAWING No.** 2d
APPROVED BY: **DATE:**	
	FILE No.

532 000 mE | 536 000 mE | 540 000 mE | 544 000 mE

122°30'00" | 122°27'00" | 122°24'00" | 122°21'00" | 122°18'00" | 122°15'00"

55°45'00"

6 176 000 mN

55°42'00"

6 172 000 mN

DH 81-12

6 168 000 mN

55°39'00"

DH 80-35

55°37'30"

6 164 000 mN

DH 80-31

Mt. Blickford

55°36'00"

6 160 000 mN

6 156 000 mN

55°33'00"

Pyramis Peak

6 152 000 mN

55°30'00"

532 000 mE | 536 000 mE | 540 000 mE | 544 000 mE

SURVEY NOTE

The map data was compiled photogrammetrically and is based on the Universal Transverse Mercator grid and geodetic datum.

LEGEND

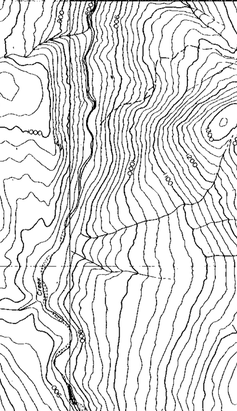
- MAIN ROAD
- SECONDARY ROAD
- TRACK or TRAIL
- CUT LINE
- RIVER
- STREAM
- LAKE
- CONTOURS

SCALE 1:20,000

Metres 500 0 500 1000 1500 2000 2500 3000 Metres

CONTOUR INTERVAL 20m
N.T.S. SHEET 93O/9W

SHEET INDEX



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VOLUME 11

AR-Goodrich 84(2)A *(1)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

93 O/9W

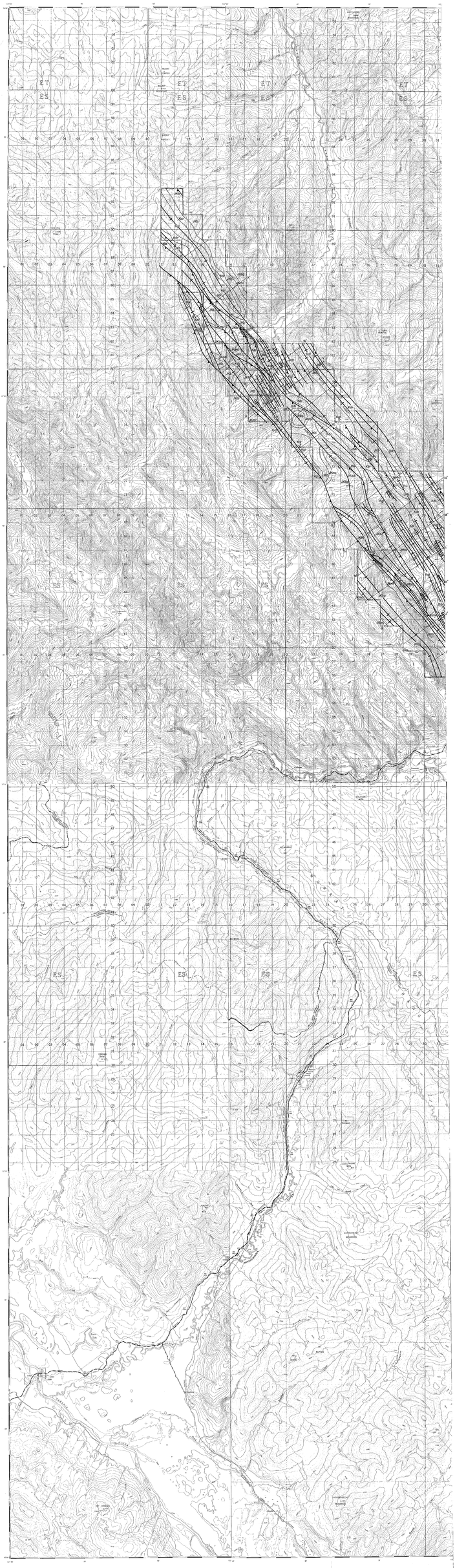
GOODRICH COAL PROJECT

Northeast British Columbia

GOODRICH PROPERTY

1980 & 1981 DRILL LOCATIONS

DRAWN BY: Hardy Assoc. Ltd. DATE: Sept. 1981	SCALE 1:20,000
PREPARED BY:	DRAWING No. 2C
APPROVED BY: DATE:	FILE No.



VOLUME II

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

WEST SHEET
GOODRICH COAL PROPERTY
GEOLOGY
1981

(FOR LEGEND SEE EAST SHEET)

DRAWN BY: DATE: SCALE 1" = 1,500.00'
PREPARED BY: K. PETTOLD
APPROVED BY: R. STONICH DATE: DEC. 81 DRAWING No. 3A

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TABLE OF FORMATIONS

Period	Group	Symbol	Formation
		Q	**QUATERNARY** Glacial deposits and alluvium
Lower Cretaceous		KCm	**COMMOTION FORMATION** Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Lower Cretaceous		KmB	**MOOSEBAR FORMATION** Mudstones, minor siltstones, marine
Lower Cretaceous		Kbs	**BLUESKY** Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Lower Cretaceous	CRASSIER GROUP	Kgt	**GETHING FORMATION** Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Lower Cretaceous	CRASSIER GROUP	Kdr / Kcd	**DRESSER FORMATION** Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
Lower Cretaceous	CRASSIER GROUP	JKb	**BRENOT FORMATION** Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	BEAUDETTE GROUP	JKmc	**MONACH FORMATION** Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
Transitional	BEAUDETTE GROUP	JKbp	**BEATTIE PEAKS FORMATION** Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
Transitional	BEAUDETTE GROUP	JKmt	**MONTIETH FORMATION** Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
Jurassic		Jf	**FERNIE FORMATION** Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

VOLUME II

PR-Goodrich 81(2)A *(1)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

EAST SHEET
GOODRICH COAL PROPERTY
GEOLOGY
1981

532

DRAWN BY: DATE:	SCALE: 1 : 50,000
PREPARED BY: A. PETZOLD	DRAWING No. 3b
APPROVED BY: H. ZSCHACH DATE: DEC. 81	

LEGEND

	Q	QUATERNARY Glacial deposits and alluvium
LOWER CRETACEOUS	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	Kmb	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
TRANSITIONAL / BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
JURASSIC	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

(2) COAL SEAM (line represents seam top)

0 200 400 600 800 1000
scale in metres

APPENDIX A PART 2

PR-Goodrich 80(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH SOUTH
CROSS SECTION D - D'

PREPARED BY: A. PETZOLD		SCALE 1 : 5000
APPROVED BY: H. ZSCHACH	DATE: NOV. 81	DRAWING No. 81

532

LEGEND

Q	*QUATERNARY* Glacial deposits and alluvium
KCm	*COMMOTION FORMATION* Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Kmb	*MOOSEBAR FORMATION* Mudstones, minor siltstones, marine
Kbs	*BLUESKY* Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Kgt	*GETHING FORMATION* Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Kdr	*DRESSER FORMATION* Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
JKb	*BRENOT FORMATION* Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
JKmc	*MONACH FORMATION* Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
JKbp	*BEATTIE PEAKS FORMATION* Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
JKmt	*MONTIETH FORMATION* Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
Jf	*FERNIE FORMATION* Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC — TRANSITIONAL — LOWER CRETACEOUS

BEAUDETTE GROUP | CRASSIER GROUP

(2) COAL SEAM (line represents seam top)

0 100 200 300 400 500

scale in metres

APPENDIX A PART 2

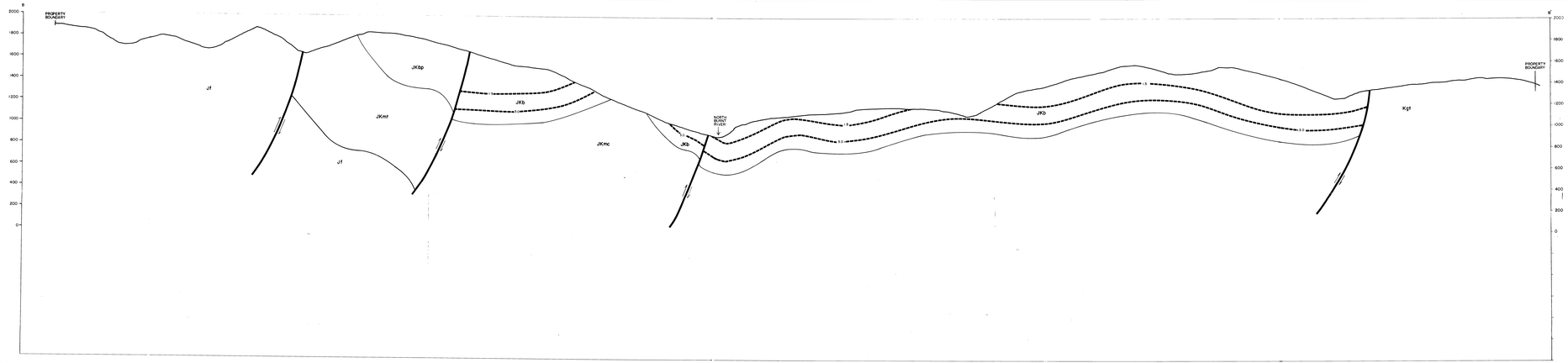
PR Goodrich 8(12)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

GOODRICH COAL PROPERTY
1981
GOODRICH SOUTH
CROSS SECTION C – C'

PREPARED BY:	SCALE 1 : 5000
APPROVED BY: DATE: NOV. 81	DRAWING No. 80

532



LEGEND

- Q — QUATERNARY
  Glacial deposits and alluvium
- KCm — COMMOTION FORMATION
  Siltstones, sandstones interbedded, claystones of marine origin, COAL at the kp member, and conglomerates
- Kmb — MOOSEBAR FORMATION
  Mudstones, minor siltstones, marine
- Kbs — BLUESKY
  Light to medium grained sandstones, mudstones, thin conglomerate unit at top with a chert pebble
- Kgt — GETHING FORMATION
  Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, ironshot plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit, COAL
- Kdr — DRESSER FORMATION
  Cyclothems, sandstones, discontinuous coal measures in varying thicknesses, medium to coarse grained sandstones, grits, and conglomerates
- JKb — BRENOT FORMATION
  Lithic salt and pepper sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
- JKmf — MONACH FORMATION
  Marine lithic and quartzose sandstones with thick beds of clean, coarse grained sandstone at the base of the member. Minor shales, siltstones and sandstones with occasional thin conglomerate beds
- JKbp — BEATTIE PEAKS FORMATION
  Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
- JKmt — MONTEITH FORMATION
  Grey and brown sandstones, fine to medium grained, fine to very coarse grained sandstone at the base of the unit, interbedded with siltstone and sandstone partings, accessory thin conglomerate beds
- Jf — FERNIE FORMATION
  Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC to TRANSITIONAL — BEATTIE PEAKS GROUP — CRASSIER GROUP — LOWER CRETACEOUS

COAL SEAM (-no represents seam top)

0 100 200 300 400 500
SCALE 1:5000 metres

APPENDIX A PART 2

February 6/1990

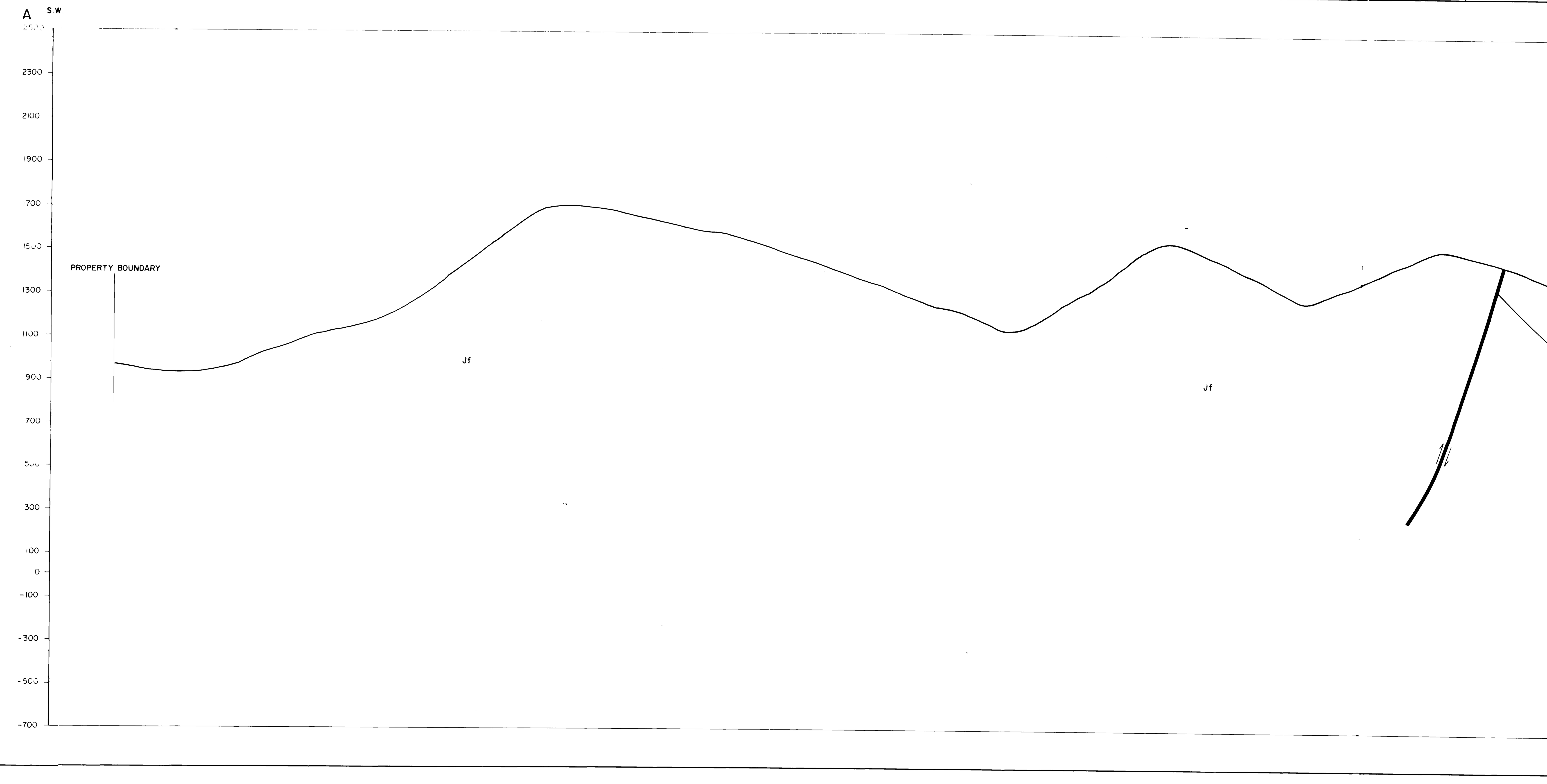
Since there is no 1:5,000 Geology coverage for this area, B-B' cross-section has been taken from a 1:50,000 Geology map.

532

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH SOUTH
CROSS SECTION B-B'

PREPARED BY A. PETTOLO, I. DELAS — SCALE 1:5000
APPROVED BY W. ZYCHACH — DATE JAN 82 — DRAWING No. 1/7



LEGEND

- **LOWER CRETACEOUS**
- **TRANSITIONAL**
- **JURASSIC**
- **CRASSIER GROUP**
- **BEAUDETTE GROUP**

Symbol	Unit
Q	*QUATERNARY* Glacial deposits and alluvium
KCm	*COMMOTION FORMATION* Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Kmb	*MOOSEBAR FORMATION* Mudstones, minor siltstones, marine
Kbs	*BLUESKY* Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Kgt	*GETHING FORMATION* Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Kdr	*DRESSER FORMATION* Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
JKb	*BRENOT FORMATION* Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
JKmc	*MONACH FORMATION* Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
JKbp	*BEATTIE PEAKS FORMATION* Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
JKmt	*MONTIETH FORMATION* Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
Jf	*FERNIE FORMATION* Dark grey and black shales, mudstones, sandstones, siltstones, marine

— (2) — COAL SEAM (line represents seam top)

0 200 400 600 800 1000

scale in metres

APPENDIX A PART 2

NOTE:

Since there is no 1:5,000 Geology coverage for this area, A-A' cross-section has been taken from a 1:50,000 Geology map.

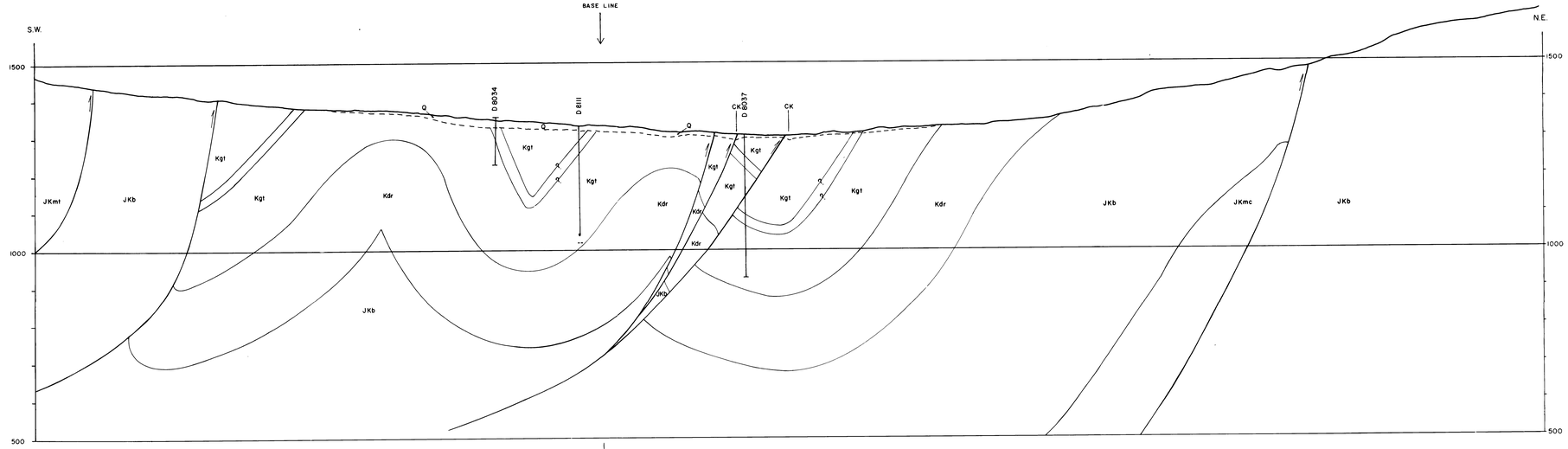
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

GOODRICH COAL PROPERTY
1981
GOODRICH SOUTH
CROSS SECTION A-A'

PREPARED BY: J. Loader, I. Delas	SCALE 1:10,000
APPROVED BY: H. Zschach DATE: JAN. 82	DRAWING No. 78

532

from Appendix A. Part 2



LEGEND

	Q	QUATERNARY Glacial deposits & alluvium
	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	Kmb	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
LOWER CRETACEOUS	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
CRASSIER GROUP	Kdr	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
TRANSITIONAL	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones, with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
JURASSIC	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

THEORETICAL PIT WALL

BASELINE LOCATION

(2) COAL SEAM (line represents seam top)

NOTE Section number indicates distances in metres along baseline from south to north to include all 1980 and 1981 drill holes.

SCALE 1:5000

METRES 0 200 400 METRES

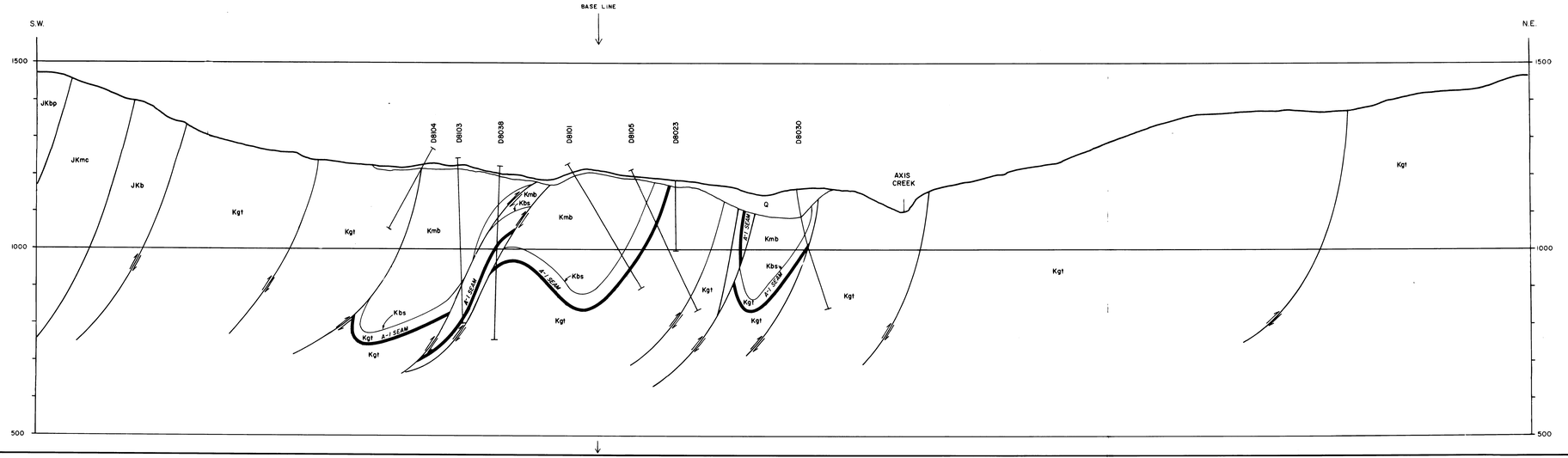
532

GULF CANADA RESOURCES INC
CALGARY ALBERTA

GOODRICH 1981
GEOLOGICAL CROSS-SECTION
N 8000

APPROVED: H.D.Z DATE JAN 82 SCALE HORIZ. 1:5000 VERT. 1:5000

69



LEGEND

- Q — *QUATERNARY* — Glacial deposits & alluvium
- KCm — *COMMOTION FORMATION* — Siltstone, sandstone interbedded, claystones of marine origin, COAL at the top member, and conglomerates
- Kmb — *MOOSEBAR FORMATION* — Mudstones, minor siltstones, marine
- Kbs — *BLUESKY* — Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
- Kgt — *GETHING FORMATION* — Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
- Kdr — *DRESSER FORMATION* — Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
- JKb — *BRENOT FORMATION* — Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
- JKmc — *MONACH FORMATION* — Marine lithic and quartzose sandstones, with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates.
- JKbp — *BEATTIE PEAKS FORMATION* — Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
- JKmt — *MONTIETH FORMATION* — Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
- Jf — *FERNIE FORMATION* — Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC — TRANSITIONAL — LOWER CRETACEOUS
BEAUDETTE GROUP — CRASSIER GROUP

THEORETICAL PIT WALL

BASELINE LOCATION

COAL SEAM (line represents seam top)

NOTE Section number indicates distances in metres along baseline from south to north to include all 1980 and 1981 drill holes.

SCALE 1:5000

METRES 0 200 400 METRES

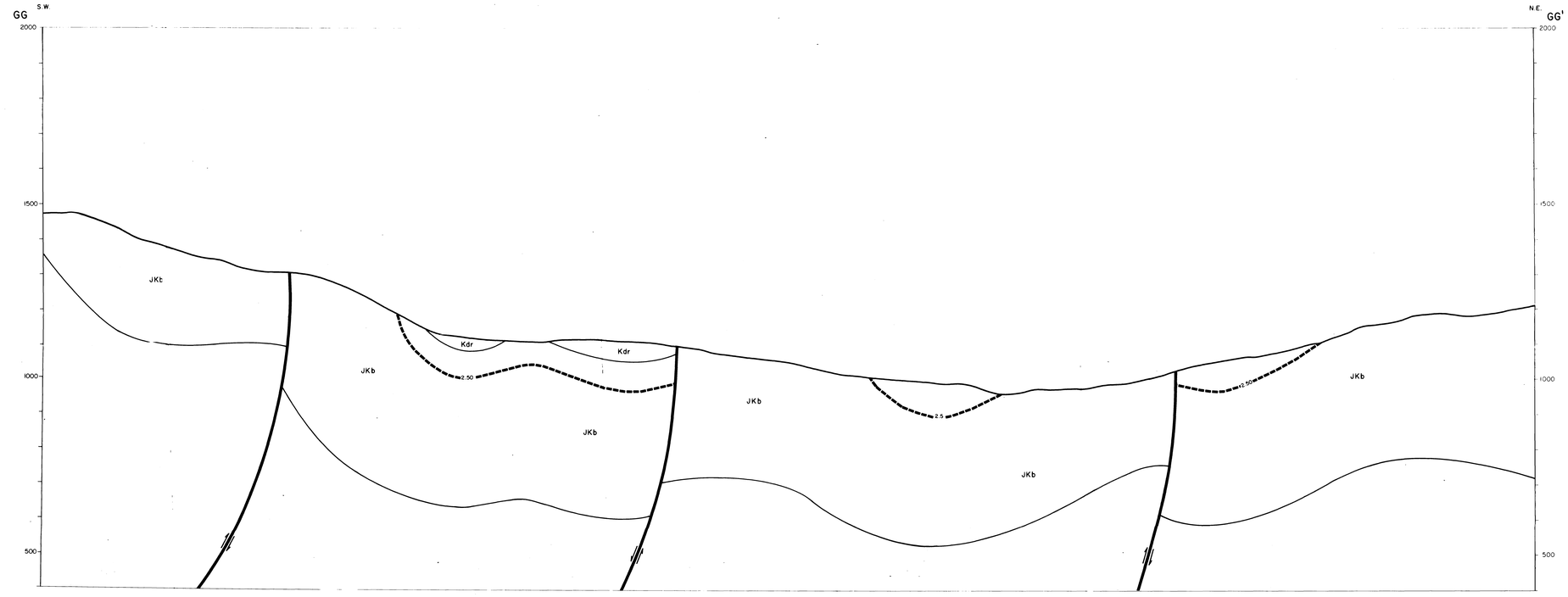
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH 1981
GEOLOGICAL CROSS-SECTION
N 3250

PREPARED BY
APPROVED BY
DATE JAN 82
SCALE HORIZ. 1
VERT. 1

68

532



LEGEND

- Q — QUATERNARY
  Glacial deposits and alluvium
- KCm — COMMOTION FORMATION
  Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
- Kmb — MOOSEBAR FORMATION
  Mudstones, minor siltstones, marine
- Kbs — BLUESKY
  Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
- Kgt — GETHING FORMATION
  Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
- Kdr — DRESSER FORMATION
  Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
- JKb — BRENOT FORMATION
  Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
- JKmc — MONACH FORMATION
  Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
- JKbp — BEATTIE PEAKS FORMATION
  Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
- JKmt — MONTEITH FORMATION
  Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
- Jf — FERNIE FORMATION
  Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC — TRANSITIONAL — LOWER CRETACEOUS — BEAUDETTE GROUP — CRASSIER GROUP

COAL SEAM (line represents seam top)

0 100 200 300 400 500
scale in metres

APPENDIX A PART 2

Pr Goodrich 5-1-312

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH EAST
CROSS SECTION GG-GG'

PREPARED BY J. Loader L. Delas SCALE 1:5000
APPROVED BY M. Zschech DATE NOV 81 DRAWING No 20

532

LEGEND

Q	*QUATERNARY* Glacial deposits and alluvium
KCm	*COMMOTION FORMATION* Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Kmb	*MOOSEBAR FORMATION* Mudstones, minor siltstones, marine
Kbs	*BLUESKY* Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Kgt	*GETHING FORMATION* Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Kdr	*DRESSER FORMATION* Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
JKb	*BRENOT FORMATION* Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
JKmc	*MONACH FORMATION* Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
JKbp	*BEATTIE PEAKS FORMATION* Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
JKmt	*MONTIETH FORMATION* Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
Jf	*FERNIE FORMATION* Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC — TRANSITIONAL — LOWER CRETACEOUS
BEAUDETTE GROUP — CRASSIER GROUP

COAL SEAM (line represents seam top)

0 100 200 300 400 500
scale in metres

APPENDIX A PART 2

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

GOODRICH COAL PROPERTY
1981
GOODRICH EAST
CROSS SECTION FF-FF'

PREPARED BY: J. Loader, I. Delas	SCALE 1 : 5000
APPROVED BY: H. Zschach DATE: NOV. 81	DRAWING No. 57

532

LEGEND

Q	*QUATERNARY* Glacial deposits and alluvium
KCm	*COMMOTION FORMATION* Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Kmb	*MOOSEBAR FORMATION* Mudstones, minor siltstones, marine
Kbs	*BLUESKY* Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Kgt	*GETHING FORMATION* Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Kdr	*DRESSER FORMATION* Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
JKb	*BRENOT FORMATION* Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
JKmc	*MONACH FORMATION* Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
JKbp	*BEATTIE PEAKS FORMATION* Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
JKmt	*MONTIETH FORMATION* Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
Jf	*FERNIE FORMATION* Dark grey and black shales, mudstones, sandstones, siltstones, marine

LOWER CRETACEOUS — CRASSIER GROUP
JURASSIC — TRANSITIONAL — BEAUDETTE GROUP

COAL SEAM (line represents seam top)

0 100 200 300 400 500
scale in metres

APPENDIX A PART 2

PR-Goodrich 81(3)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH EAST
CROSS SECTION EE-EE'

PREPARED BY	J. Loader, I. Delas	SCALE	1 : 5000
APPROVED BY	H. Zschach DATE NOV. 81	DRAWING No.	56

532

LEGEND

LOWER CRETACEOUS — TRANSITIONAL — JURASSIC

CRASSIER GROUP — BEAUDETTE GROUP

Q	QUATERNARY	Glacial deposits and alluvium
KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Kmb	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Kgt	GETHING FORMATION	Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Kdr	DRESSER FORMATION	Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

COAL SEAM (line represents seam top)

0 100 200 300 400 500

scale in metres

APPENDIX A PART 2

PR-Goodrich 81(3)A

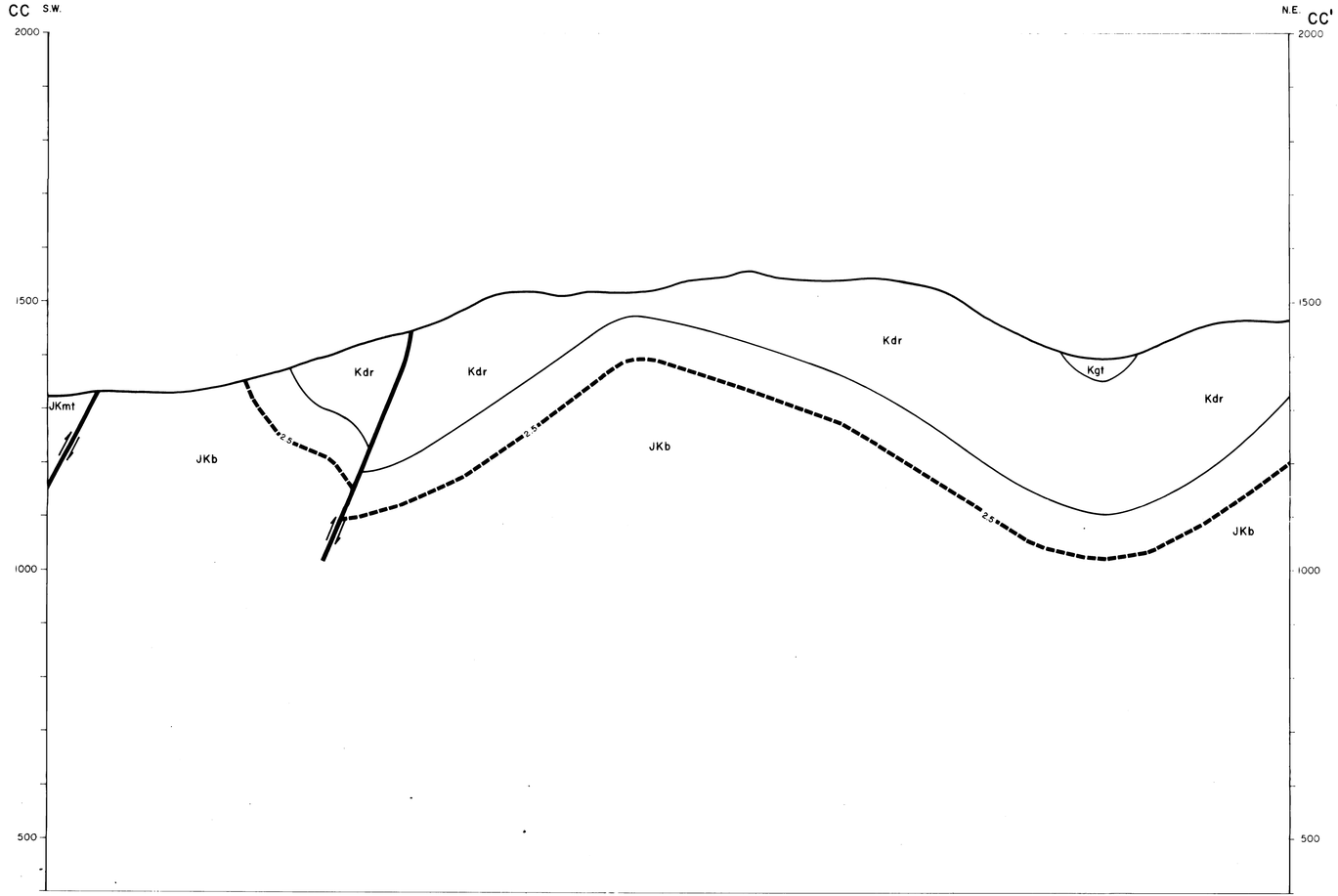
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

GOODRICH COAL PROPERTY 1981
GOODRICH EAST
CROSS SECTION DD-DD'

PREPARED BY J. Loader, I. Delas — SCALE 1:5000
APPROVED BY H. Zschach — DATE NOV 81 — DRAWING No 55

532



LEGEND

- Q — *QUATERNARY*
  Glacial deposits and alluvium
- KCm — *COMMOTION FORMATION*
  Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
- Kmb — *MOOSEBAR FORMATION*
  Mudstones, minor siltstones, marine
- Kbs — *BLUESKY*
  Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
- Kgt — *GETHING FORMATION*
  Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
- Kdr — *DRESSER FORMATION*
  Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates
- JKb — *BRENOT FORMATION*
  Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
- JKmc — *MONACH FORMATION*
  Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
- JKbp — *BEATTIE PEAKS FORMATION*
  Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
- JKmt — *MONTIETH FORMATION*
  Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.
- Jf — *FERNIE FORMATION*
  Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC — TRANSITIONAL | BEAUDETTE GROUP | CRASSIER GROUP | LOWER CRETACEOUS

2.5 COAL SEAM (line represents seam top)

0 100 200 300 400 500

scale in metres

APPENDIX A PART 2

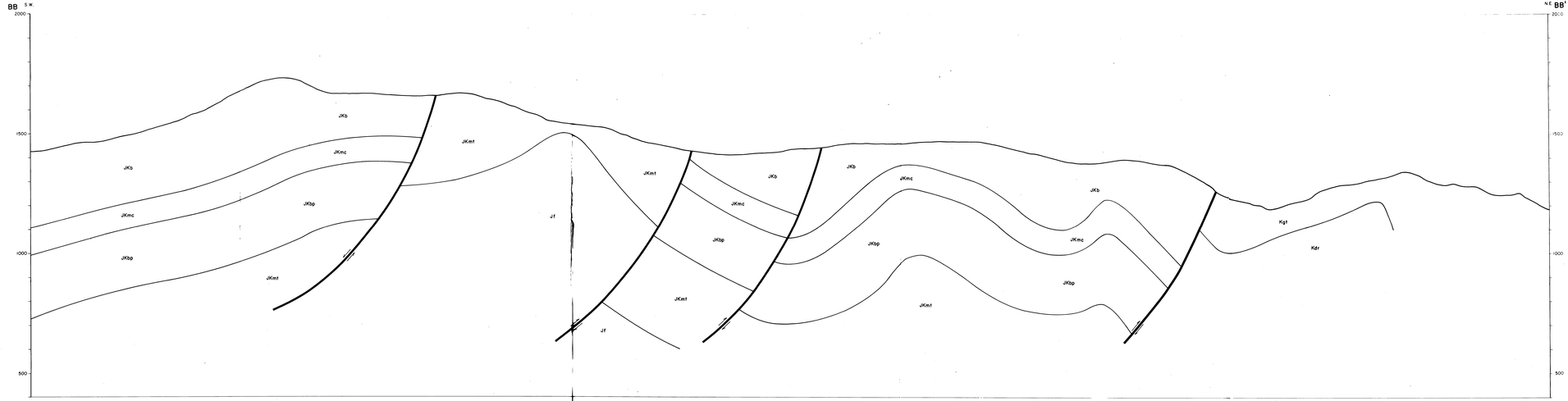
PA Geotech Kit 19

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH EAST
CROSS SECTION CC-CC'

PREPARED BY J. Loader, I. Delos — SCALE 1:5000
APPROVED BY H. Zschach — DATE NOV. 81 — DRAWING No. 54

532



LEGEND

	Q	QUATERNARY Glacial deposits and alluvium
	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the Ng member, and conglomerates
	Kmb	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit, COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
	JKmc	MONACH FORMATION Massive lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTEITH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

JURASSIC — TRANSITIONAL — LOWER CRETACEOUS
BEAUDETTE GROUP — CRASSIER GROUP

COAL SEAM (line represents seam top)

0 100 200 300 400 500
SCALE in metres

APPENDIX A PART 2

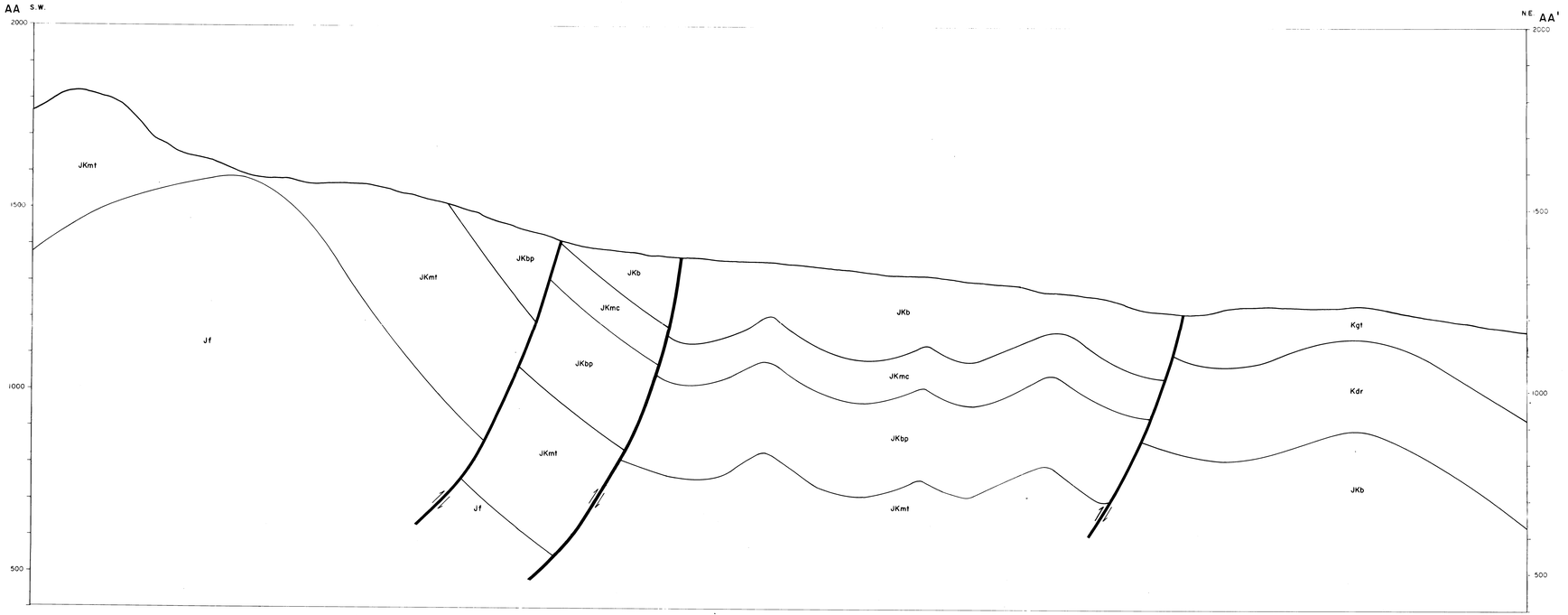
Revised: 5/81/M

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH EAST
CROSS SECTION BB-BB'

PREPARED BY: J. Looder / I. Deros — SCALE: 1:5000
APPROVED BY: W. Zechesh — DATE: JAN 82 — DRAWING No. 532

532



LEGEND

	Q	*QUATERNARY* — *Glacial deposits and alluvium*
LOWER CRETACEOUS — CRASSIER GROUP	KCm	*COMMOTION FORMATION* — *Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates*
	Kmb	*MOOSEBAR FORMATION* — *Mudstones, minor siltstones, marine*
	Kbs	*BLUESKY* — *Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite*
	Kgt	*GETHING FORMATION* — *Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL*
	Kdr	*DRESSER FORMATION* — *Incomplete cyclothems, discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates*
JURASSIC — TRANSITIONAL — BEAUDETTE GROUP	JKb	*BRENOT FORMATION* — *Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL*
	JKmc	*MONACH FORMATION* — *Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates*
	JKbp	*BEATTIE PEAKS FORMATION* — *Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding*
	JKmt	*MONTIETH FORMATION* — *Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates.*
	Jf	*FERNIE FORMATION* — *Dark grey and black shales, mudstones, sandstones, siltstones, marine*

COAL SEAM (line represents seam top)

0 100 200 300 400 500

scale in metres

APPENDIX A PART 2

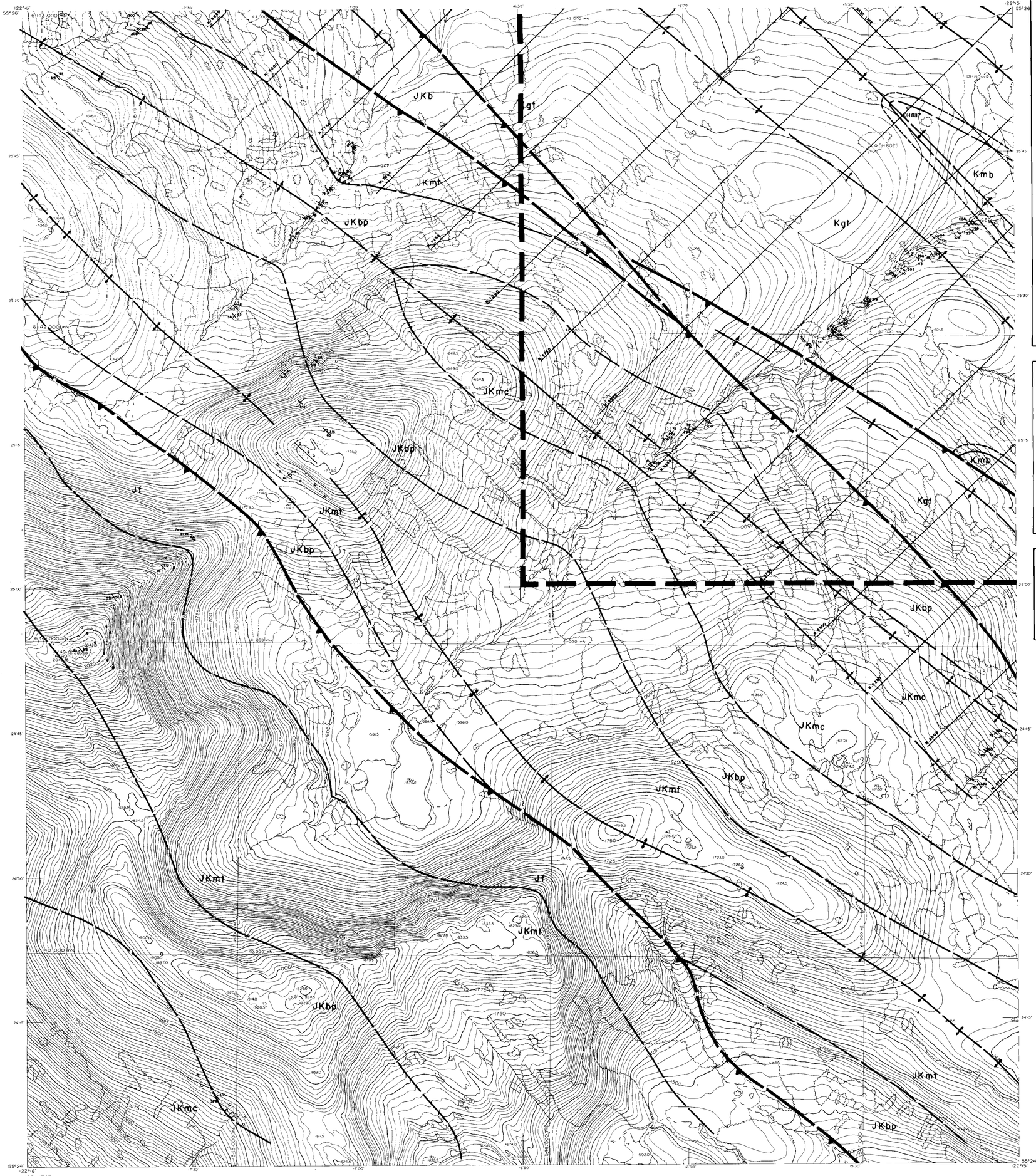
Re Secs 10, 2, 10, 11A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
1981
GOODRICH EAST
CROSS SECTION AA-AA'

PREPARED BY: J. Looder, I. Delas — SCALE 1:5000
APPROVED BY: H. Zschach — DATE: JAN 82 — DRAWING No. 532

532



185 IT43

TABLE OF FORMATIONS

- Lower Cretaceous
  - CRASSIER GROUP
    - Q — QUATERNARY: Glacial deposits and alluvium
    - KCm — COMMOTION FORMATION: Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
    - KmB — MOOSEBAR FORMATION: Mudstones, minor siltstones, marine
    - Kbs — BLUESKY: Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
    - Kgt — GETHING FORMATION: Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
    - Kdr — DRESSER FORMATION: Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
    - Kcd
    - JKb — BRENOT FORMATION: Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
  - BEAUDETTE GROUP
    - JKmc — MONACH FORMATION: Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
    - JKbp — BEATTIE PEAKS FORMATION: Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
    - JKmt — MONTIETH FORMATION: Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
- Transitional
- Jurassic
  - Jf — FERNIE FORMATION: Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location (A — A')
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours (2100)
- Horizontal control (A-2)
- Vertical control (V-6, V-5446, 2635)
- Spot elevation

SCALE 1:5,000

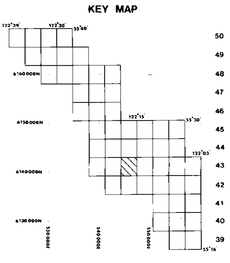
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



532

APPENDIX A PART 2

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C. WILLIAMS	DRAWING No. 185 - IT43
APPROVED BY: H. ZSCHACH DATE: OCT., 1981	FILE No.

64a

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium	
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin COAL at the top member, and conglomerates	
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine	
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite	
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tuffs in upper unit, COAL	
	Kdr Kcd	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates (Kcd mostly conglomerates)	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones carbonaceous mudstones, COAL	
Transitional — BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates	
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding	
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates	
Jurassic	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine	

LEGEND

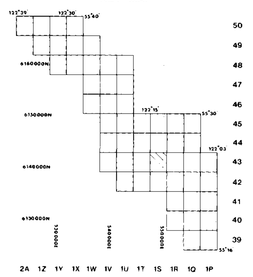
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location (A — A')
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

Conglomerate	Claystone/Mudstone
Sandstone	Coal
Siltstone	Silty Claystone
Quartzite	Carbonaceous Claystone

KEY MAP



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APPENDIX A PART 2

For Goodrich 1981 Report

186-1S43

LEGEND

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

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY:	DATE:	SCALE	1:5,000
PREPARED BY: C. W.		DRAWING No.	
APPROVED BY: H. P. Z.	DATE: OCT., 1981		186-1S43
		FILE No.	

64

TABLE OF FORMATIONS

Period	Group	Symbol	Formation
		Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous		KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Lower Cretaceous		KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
Lower Cretaceous		Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Lower Cretaceous	CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tufts in upper unit, COAL
Lower Cretaceous	CRASSIER GROUP	Kdr, Kcd	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
Lower Cretaceous	CRASSIER GROUP	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
Transitional	BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
Transitional	BEAUDETTE GROUP	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales and shales with siltstone and sandstone partings; occasional thin conglomerates
Jurassic		Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

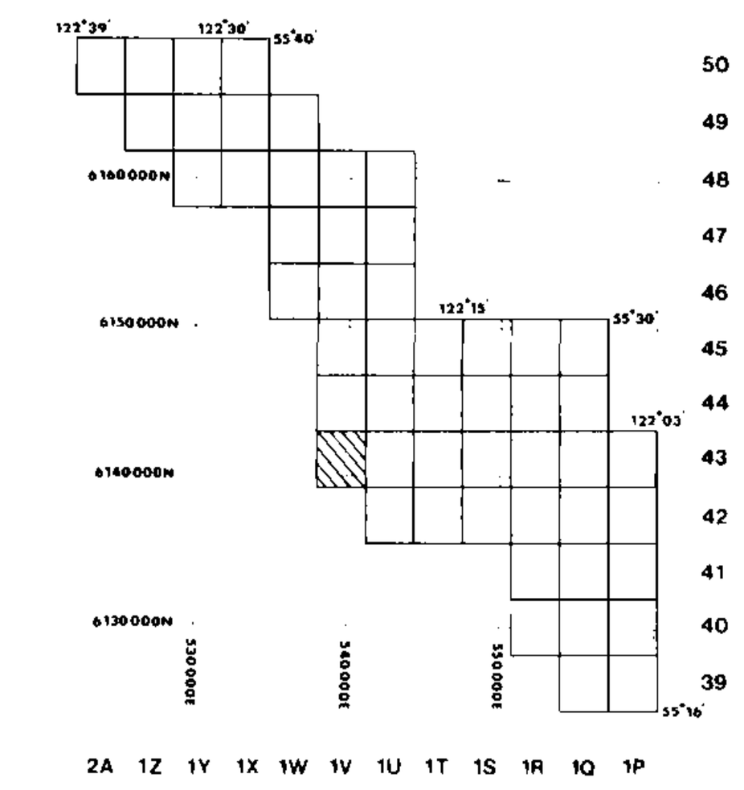
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

Conglomerate	Claystone/Mudstone
Sandstone	Coal
Siltstone	Silty Claystone
Quartzite	Carbonaceous Claystone

KEY MAP



532 APPENDIX A PART 2

PR Goodrich 81(2)A

LEGEND

Improved road		River	
Secondary road		Stream	
Track or trail		Intermittent stream	
Railway		Swamp	
Fence		Contours	2100
Wall		Horizontal control	△ H-12
Cut line		Vertical control	V-6 2346
Tree area		Spot elevation	2634.5

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

No o/c May21/91 JC. Omap Jan17/91

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C WILLIAMS		DRAWING No. 183-IV43
APPROVED BY: H ZSCHACH	DATE: OCT., 1981	FILE No. 65

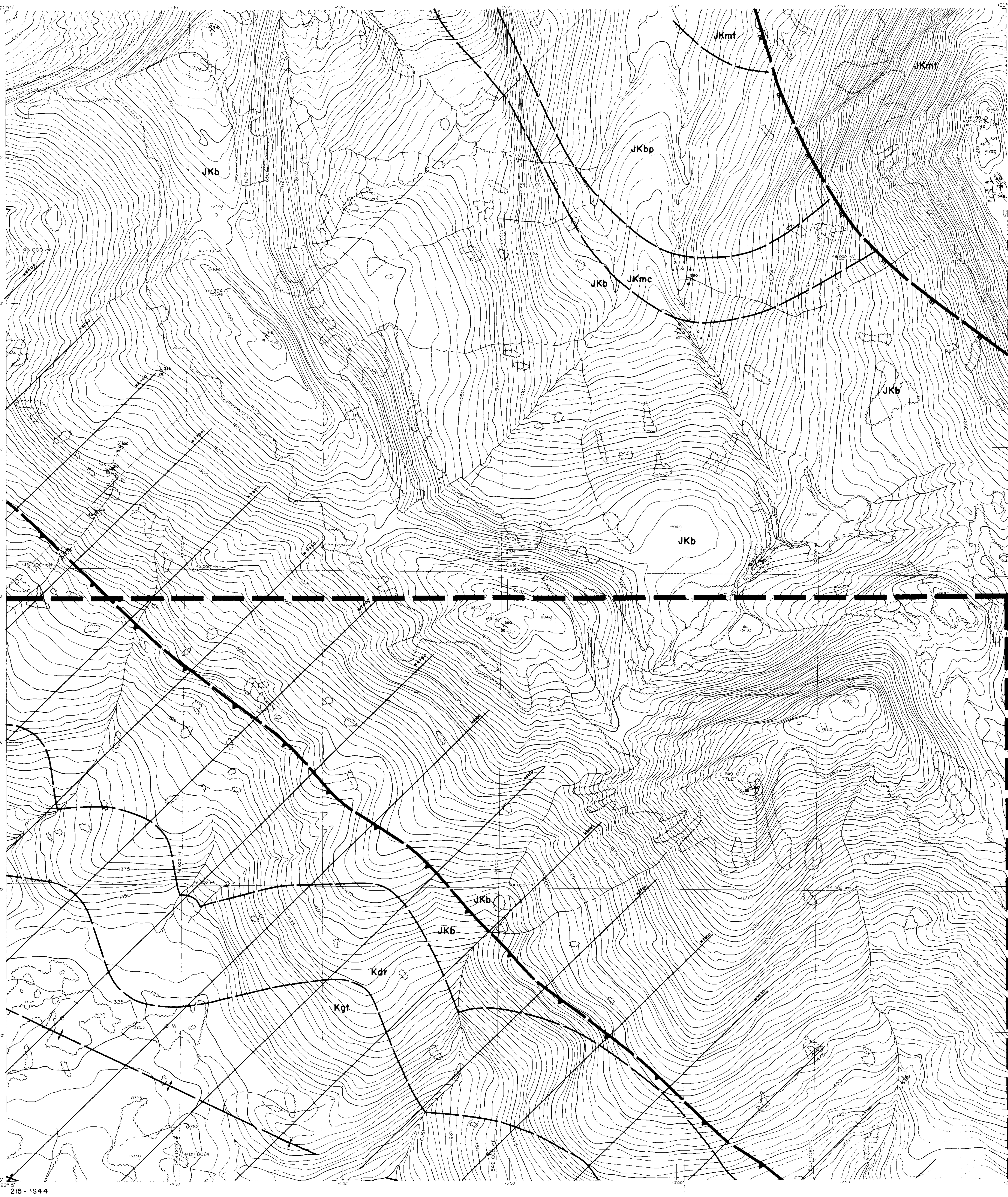


TABLE OF FORMATIONS

Age	Group	Symbol	Formation
		Q	**QUATERNARY** Glacial deposits and alluvium
Lower Cretaceous		KCm	**COMMOTION FORMATION** Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Lower Cretaceous		KmB	**MOOSEBAR FORMATION** Mudstones, minor siltstones, marine
Lower Cretaceous		Kbs	**BLUESKY** Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Lower Cretaceous	CRASSIER GROUP	Kgt	**GETHING FORMATION** Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit. COAL
Lower Cretaceous	CRASSIER GROUP	Kdr, Kcd	**DRESSER FORMATION** Incomplete cyclothems; discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
Lower Cretaceous	CRASSIER GROUP	JKb	**BRENOT FORMATION** Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	BEAUDETTE GROUP	JKmc	**MONACH FORMATION** Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
Transitional	BEAUDETTE GROUP	JKbp	**BEATTIE PEAKS FORMATION** Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
Transitional	BEAUDETTE GROUP	JKmt	**MONTIETH FORMATION** Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
Jurassic		Jf	**FERNIE FORMATION** Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

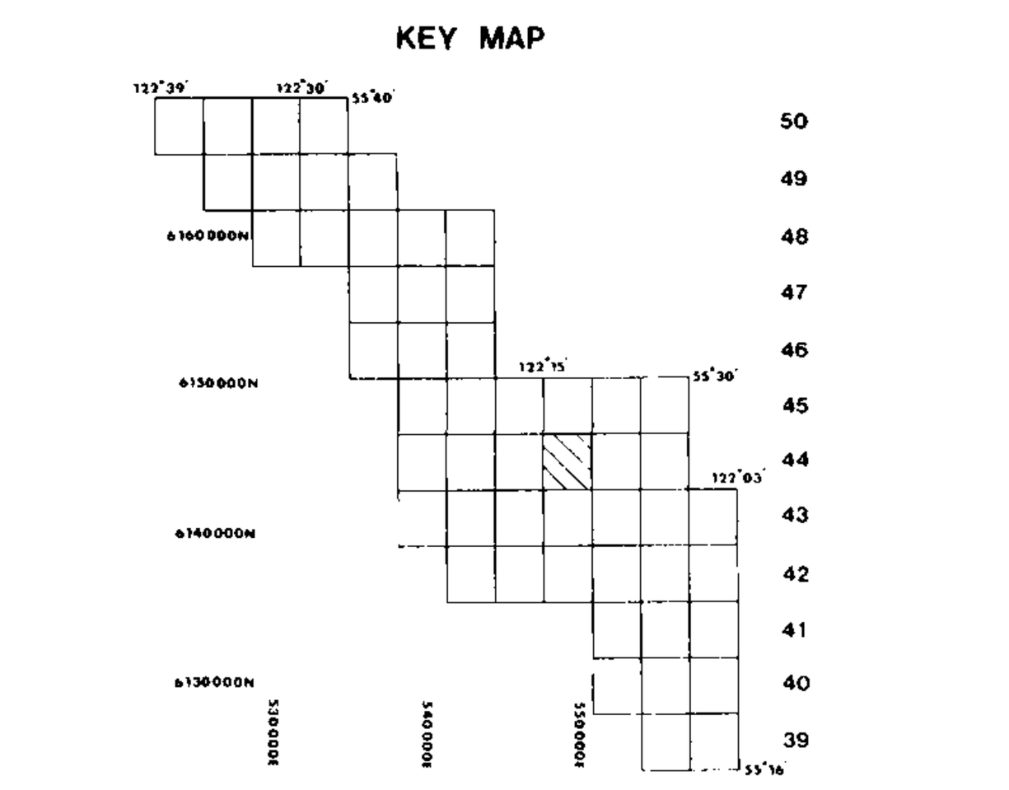
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location (A – A')
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



532 APPENDIX A PART 2

PR-Goodrich 81(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY

Northeast British Columbia

1981 GEOLOGY MAP

GOODRICH LOSSAN BLOCK

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C. WILLIAMS	DRAWING No. 215 - 1S44
APPROVED BY: H. ZSCHACH DATE: OCT., 1981	

FILE No. 66

LEGEND

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

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous — CRASSIER GROUP	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin. COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tuffs in upper unit. COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. **(Kcd mostly conglomerates)**
	Kcd	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones. COAL
Jurassic — Transitional — BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours — 2100 —
- Horizontal control · H-12
- Vertical control · V-6
- Spot elevation

SCALE 1:5,000

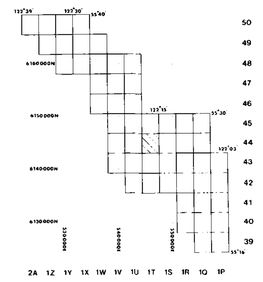
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



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APPENDIX A PART 2

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY:	DATE: OCT , 1981	SCALE 1:5,000
PREPARED BY: C.WILLIAMS		DRAWING No. 216 - 1T44
APPROVED BY: H ZSCHACH	DATE: OCT , 1981	FILE No.

67

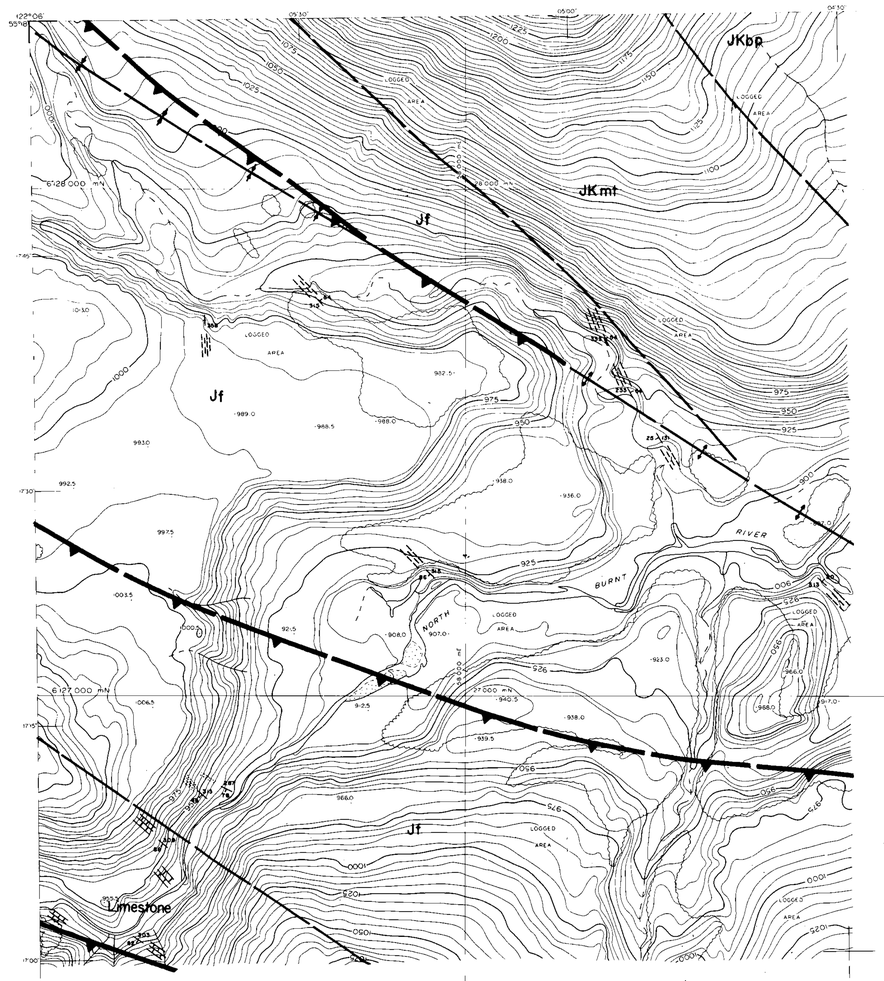


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
CRASSIER GROUP	Kdr Kcd	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. **(Kcd mostly conglomerates)**
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
Transitional - Jurassic	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours (2100)
- Horizontal control (△ H-12)
- Vertical control (V-6, 2,514.6)
- Spot elevation (2634.5)

SCALE 1:5,000

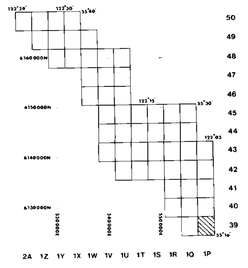
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



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GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY: DATE: OCT. 1981	SCALE 1:5,000
PREPARED BY: B DAVIDSON, A. PETZOLD	DRAWING No. 109 - IP39
APPROVED BY: H ZSCHACH DATE: OCT., 1981	FILE No. 70

APPENDIX A PART 2

109 - IP39

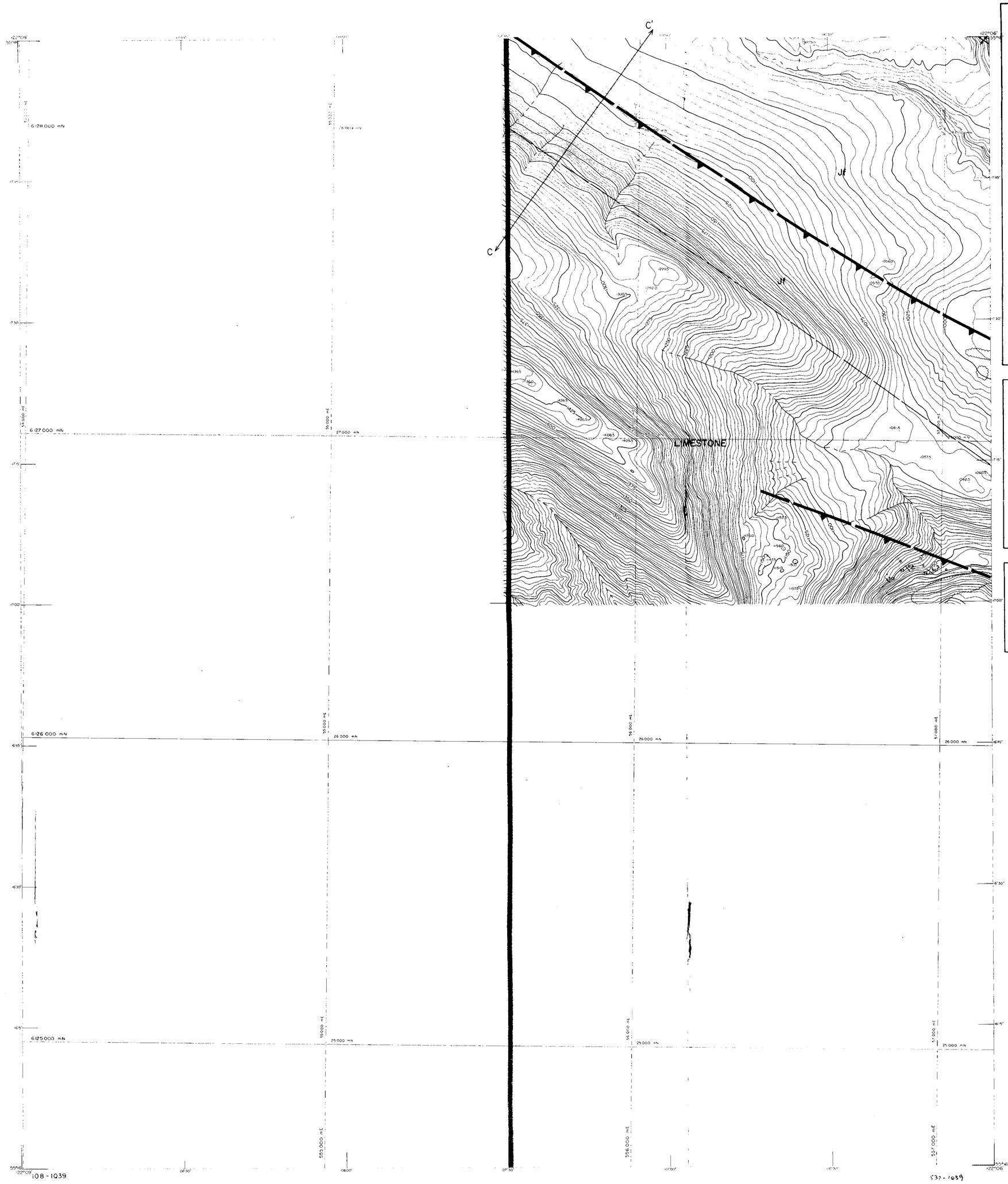


TABLE OF FORMATIONS

Lower Cretaceous — Transitional — Jurassic

	Q	QUATERNARY Glacial deposits and alluvium
	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
CRASSIER GROUP	Kdr	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. **(Kcd mostly conglomerates)**
CRASSIER GROUP	Kcd	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
BEAUDETTE GROUP	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location (A — A')
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

Conglomerate	Claystone/Mudstone
Sandstone	Coal
Siltstone	Silty Claystone
Quartzite	Carbonaceous Claystone

LEGEND

Improved road	River	
Secondary road	Stream	
Track or trail	Intermittent stream	
Railway	Swamp	
Fence	Contours	2100
Wall	Horizontal control	H-12
Cut line	Vertical control	V-6
Tree area	Spot elevation	

SCALE 1:5,000

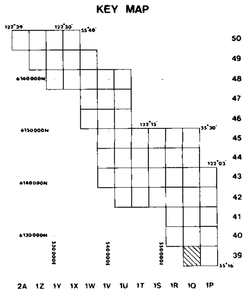
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



532

Dr. Goodrich 81/12/A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Dig. trace May 21/81 JE GOODRICH 532-1039 RMAP Jan 14/82

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: B DAVIDSON, A PETZOLD		DRAWING No. 108 - 1039
APPROVED BY: H ZSCHACH	DATE: OCT., 1981	FILE No. 71

TABLE OF FORMATIONS

Lower Cretaceous — CRASSIER GROUP

- **Q** — QUATERNARY
  Glacial deposits and alluvium
- **KCm** — COMMOTION FORMATION
  Siltstones, sandstones interbedded, claystones of marine origin
  COAL at the top member, and conglomerates
- **KmB** — MOOSEBAR FORMATION
  Mudstones, minor siltstones, marine
- **Kbs** — BLUESKY
  Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
- **Kgt** — GETHING FORMATION
  Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tuffs in upper unit; COAL
- **Kdr** / **Kcd** — DRESSER FORMATION
  Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits and conglomerates, **(Kcd mostly conglomerates)**
- **JKb** — BRENOT FORMATION
  Lithic "salt and pepper" sandstones, siltstones, mudstones carbonaceous mudstones, COAL

Transitional — BEAUDETTE GROUP

- **JKmc** — MONACH FORMATION
  Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
- **JKbp** — BEATTIE PEAKS FORMATION
  Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
- **JKmt** — MONTIETH FORMATION
  Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales and shales with siltstone and sandstone partings, occasional thin conglomerates

Jurassic

- **Jf** — FERNIE FORMATION
  Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours — 2100
- Horizontal control — H-12
- Vertical control — V-6
- Spot elevation

SCALE 1:5,000

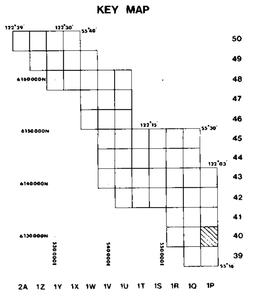
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



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GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY:	DATE: OCT , 1981	SCALE	1:5,000
PREPARED BY: B DAVIDSON , A.PETZOLD		DRAWING No.	132 - IP40
APPROVED BY: H ZSCHACH	DATE: OCT , 1981	FILE No.	

132 - IP40

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous — Transitional — Jurassic	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin; COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
	Kdr Kcd	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. **(Kcd mostly conglomerates)**
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Inferred Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours — 2100
- Horizontal control
- Vertical control
- Spot elevation

SCALE 1:5,000

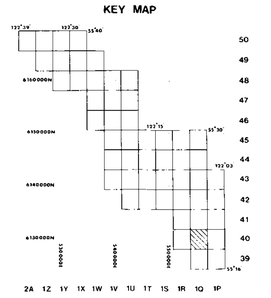
METRIC 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



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GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY: DATE: OCT, 1981	SCALE 1:5,000
PREPARED BY: R.DAVIDSON, A PETZOLD	DRAWING No. 133 - 1Q40
APPROVED BY: H. ZSCHACH DATE: OCT, 1981	FILE No.

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous — Transitional — Jurassic	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin. COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tufts in upper unit; COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. **(Kcd mostly conglomerates)**
	Kcd	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours — 2100 —
- Horizontal control H-12
- Vertical control V-6
- Spot elevation 2114

SCALE 1:5,000

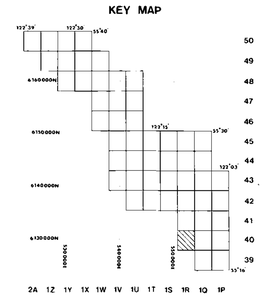
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



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GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: B DAVIDSON, A PETZOLD		DRAWING No. 134 - IR40
APPROVED BY: H ZSCHACH	DATE: OCT., 1981	FILE No. 74

134 IR40

TABLE OF FORMATIONS

	Q	QUATERNARY	Glacial deposits and alluvium
Lower Cretaceous — CRASSIER GROUP	KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
	Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
	Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit, COAL
	Kdr	DRESSER FORMATION	Incomplete cyclothems, discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
	Kcd		
	JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional — BEAUDETTE GROUP	JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours
- Monzontal control
- Vertical control
- Spot elevation

SCALE 1:5,000

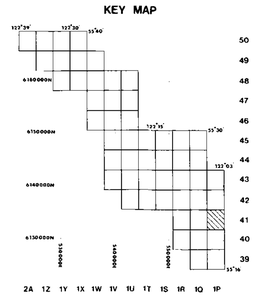
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



532 P.R. Goodrich 91/01/9

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY: DATE: OCT, 1981	SCALE 1:5,000
PREPARED BY: B.DAVIDSON, A.PETZOLD	DRAWING No. 149 - IP41
APPROVED BY: H. ZSCHACH DATE: OCT, 198.	FILE No.

149 - IP41

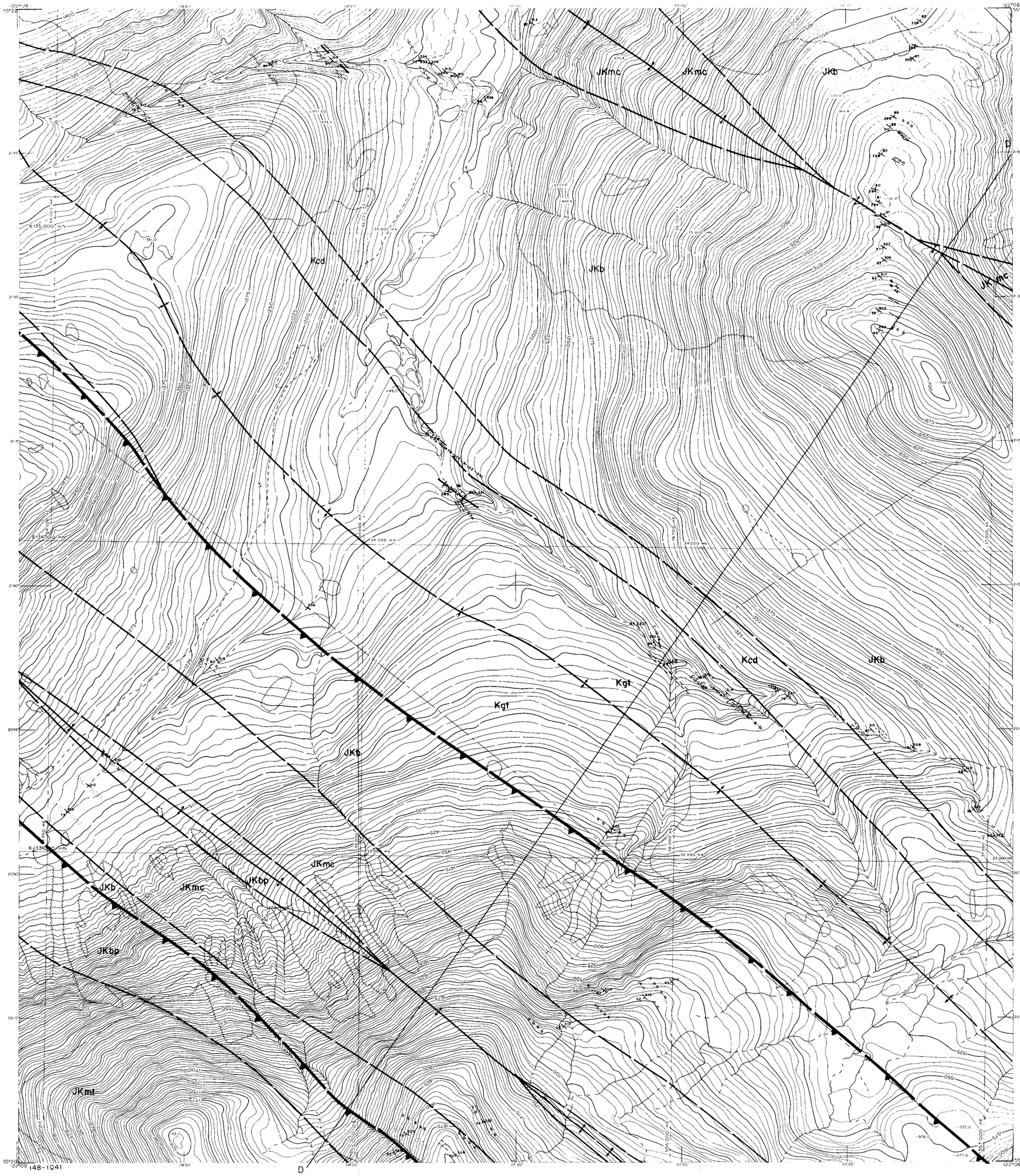


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
	Kcd	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones; COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic — Transitional	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours (2100)
- Horizontal control (H-42)
- Vertical control (V-6)
- Spot elevation (1545)

SCALE 1:5.000

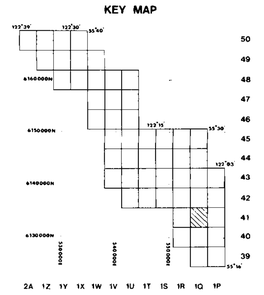
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



532 Re Goodrich $1/2 J-A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH ✓

DRAWN BY:	DATE: OCT, 1981	SCALE 1:5,000
PREPARED BY: B DAVIDSON, A PETZOLD		DRAWING No. 148-1041
APPROVED BY: H ZSCHACH	DATE: OCT, 1981	FILE No. 76

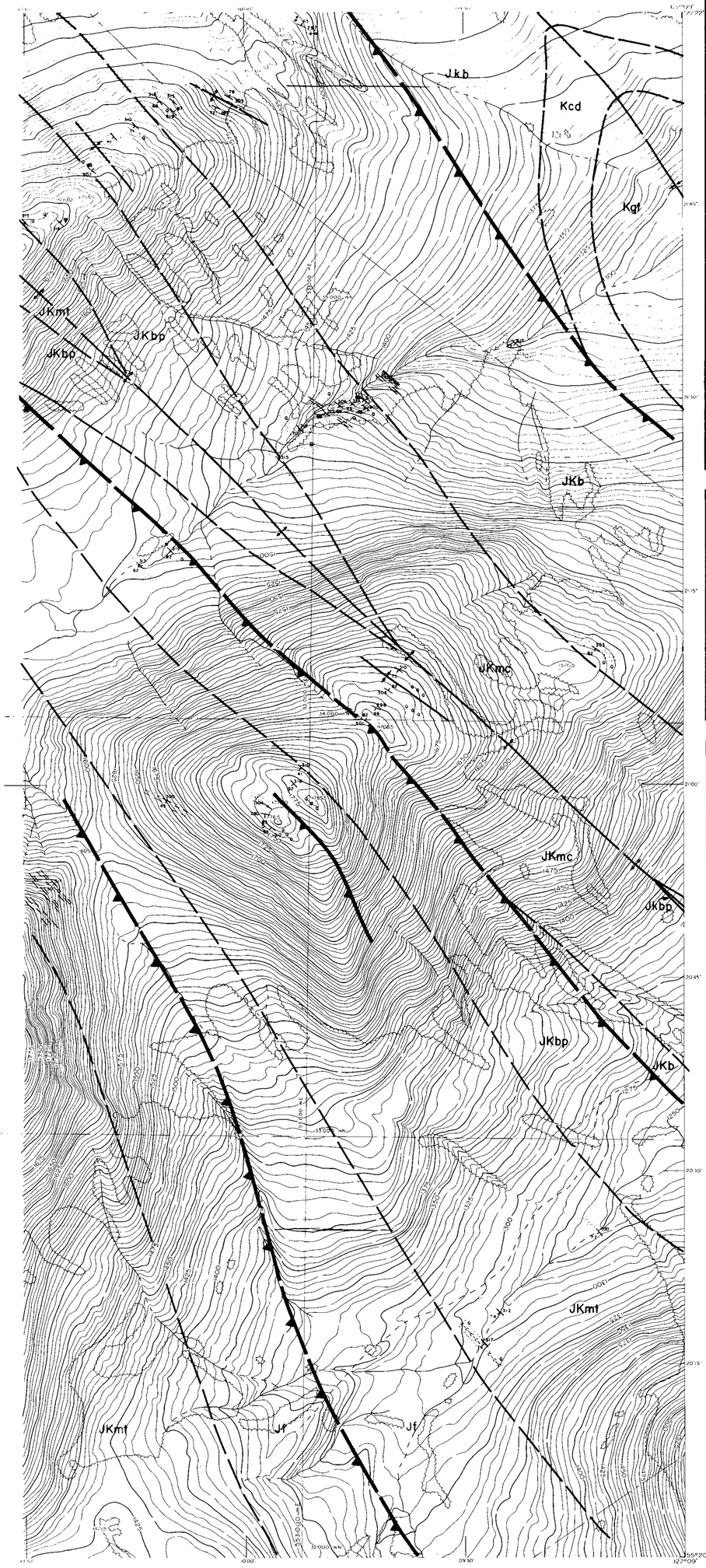


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit, COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
	Kcd	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic — Transitional	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

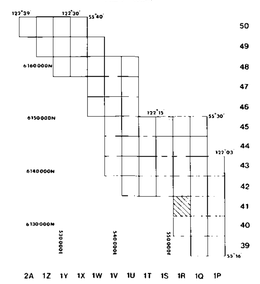
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

Conglomerate	Claystone/Mudstone
Sandstone	Coal
Siltstone	Silty Claystone
Quartzite	Carbonaceous Claystone

KEY MAP



LEGEND

Improved road		River	
Secondary road		Stream	
Track or trail		Intermittent stream	
Railway		Swamp	
Fence		Contours	2100
Wall		Horizontal control	H 12
Cut line		Vertical control	V 6
Tree area		Spot elevation	1425

SCALE 1:5,000

0 100 200 400 600 800 1000 Metres

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

532 P.K. Geothwaite 8/1/19

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH SOUTH

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: B DAVIDSON, A.PETZOLD	DRAWING No.
APPROVED BY: H.ZSCHACH DATE: OCT., 1981	147 - 1R41
	FILE No.

147 - 1R41

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous — CRASSIER GROUP	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin. COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit. COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
	Kcd	
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional — BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

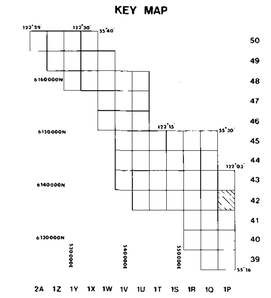
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



LEGEND

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

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

174-1P42

532

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY: DATE: OCT, 1981	SCALE 1:5,000
PREPARED BY: V. LOADER, G HOFFMAN	DRAWING No. 174 - 1P42
APPROVED BY: H. ZSCHACH DATE: OCT, 1981	FILE No. 44

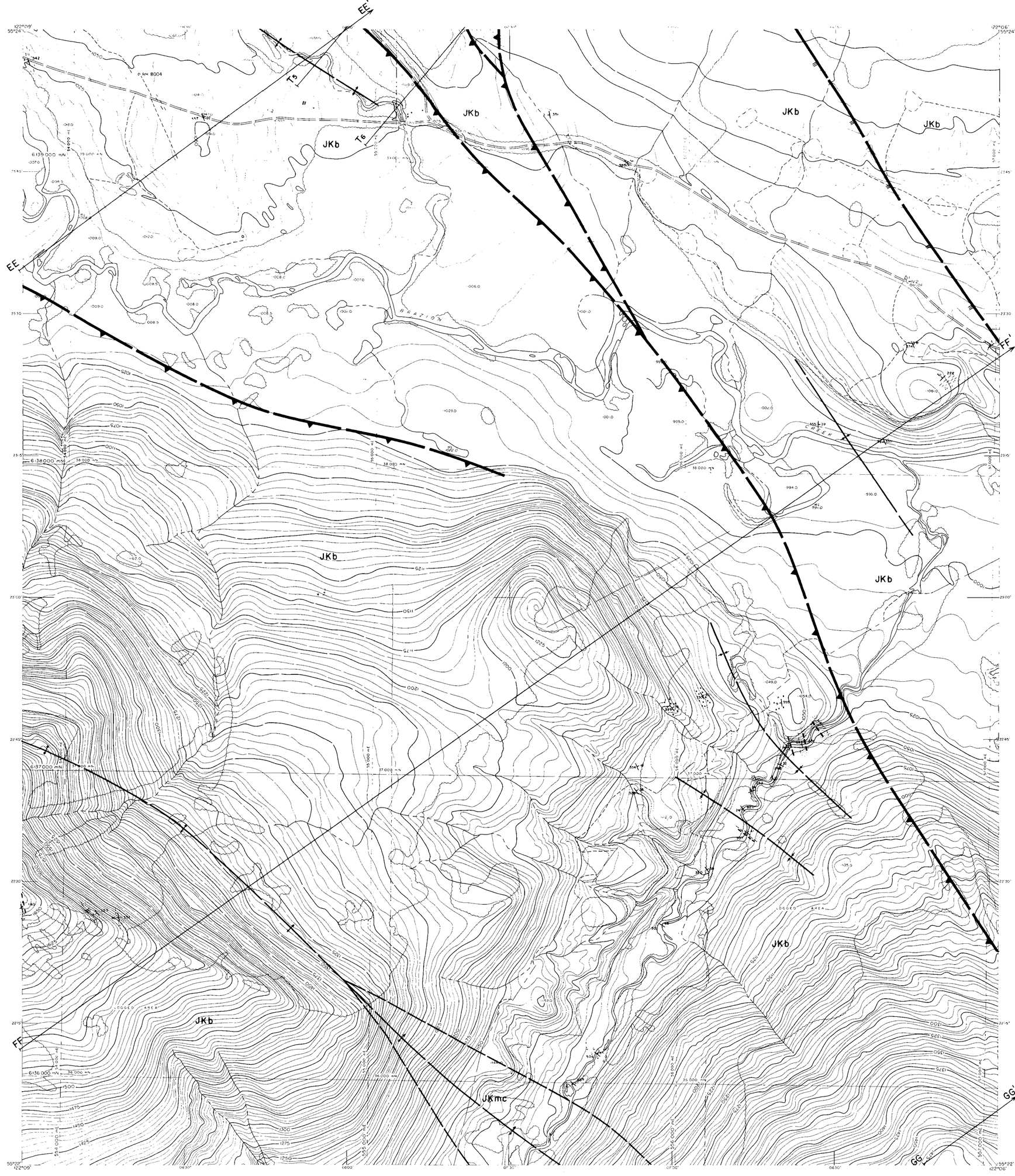


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin. COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit. COAL
	Kdr Kcd	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. [Kcd mostly conglomerates]
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones. COAL
Transitional	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

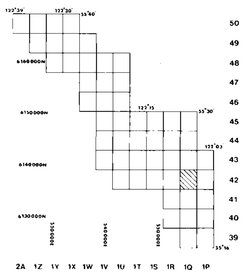
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



173-1042

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours 2100
- Horizontal control H-12
- Vertical control V-6
- Spot elevation

SCALE 1:5,000

Metres 100 0 200 400 600 Feet 500 1000 2000

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donard E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

532 PR Goodrich 5/1/79

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY:	DATE: OCT 1981	SCALE	1:5,000
PREPARED BY: J. LOADER, G. HOFFMAN		DRAWING No.	
APPROVED BY: H. ZSCHACH	DATE: OCT 1981		173-1042

FILE No. 45

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous — CRASSIER GROUP	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
	Kgt	*GETHING FORMATION* Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit, COAL
	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates (**Kcd mostly conglomerates**)
	Kcd	
Jurassic — Transitional — BEAUDETTE GROUP	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

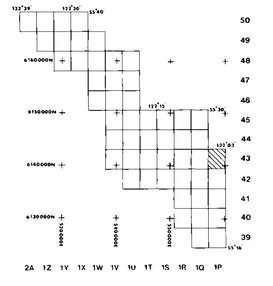
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



189 - IP43

LEGEND

Improved road		River	
Secondary road		Stream	
Track or trail		Intermittent stream	
Railway		Swamp	
Fence		Contours	2100
Wall		Horizontal control	H12
Cut line		Vertical control	V-6
Tree area		Spot elevation	

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

532

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: J LOADER, G HOFFMAN	DRAWING No. 189 - IP43
APPROVED BY: H ZSCHACH DATE: OCT., 1981	FILE No. 46

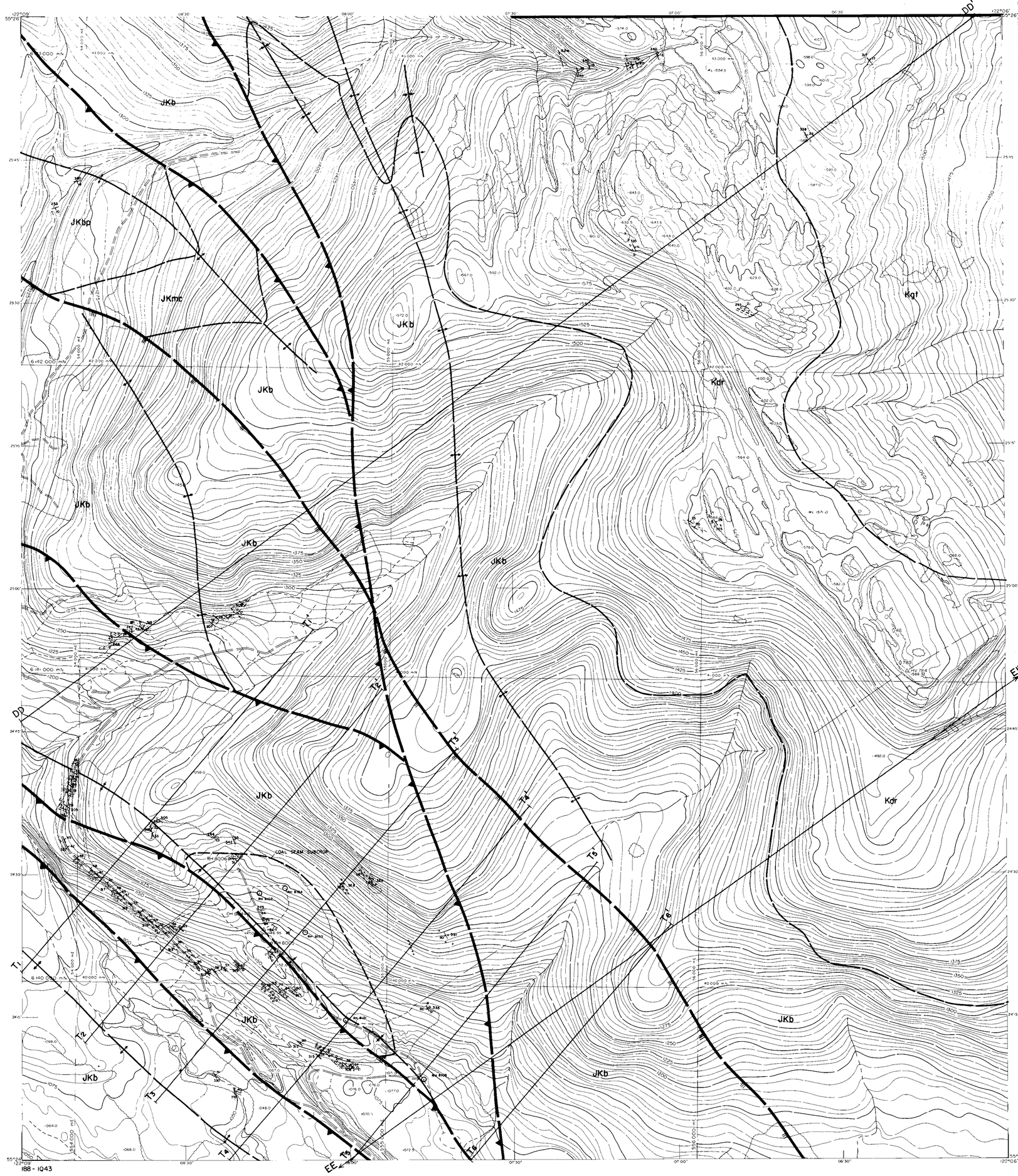


TABLE OF FORMATIONS

	Q	QUATERNARY	Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin; COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
	Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
	Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
CRASSIER GROUP	Kdr	DRESSER FORMATION	Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
	Kcd		
	JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional - Jurassic	JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
	Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

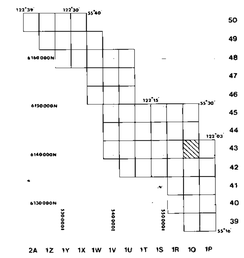
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location (A — A')
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours
- Horizontal control
- Vertical control
- Spot elevation

SCALE 1:5.000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

188 - 1043

APPENDIX A PART 2

532 PR Geology File P

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: J. LOADER, G. HOFFMAN	DRAWING No. 188 - 1043
APPROVED BY: H. ZSCHACH DATE: OCT., 1981	FILE No. 47

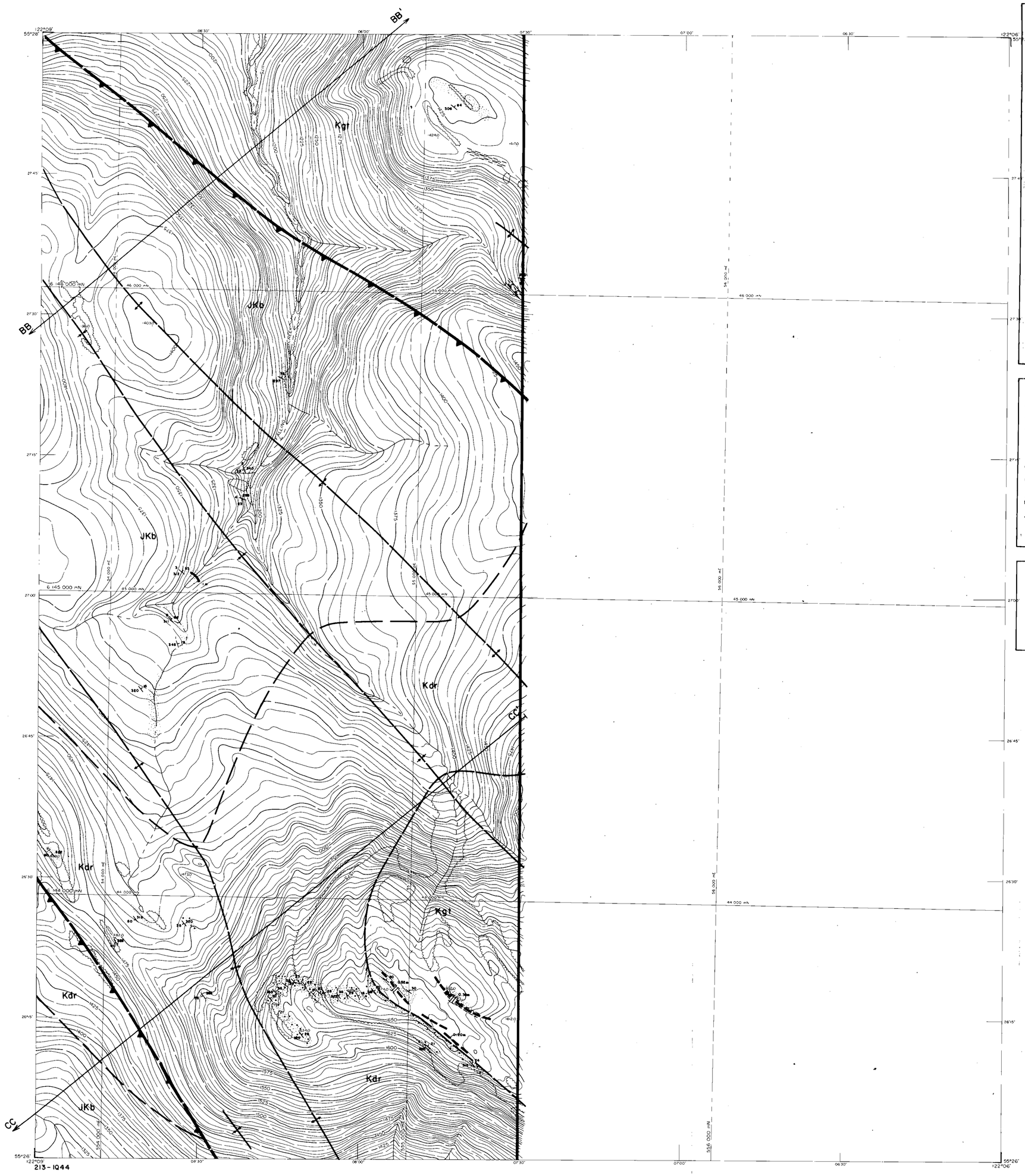


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous — Transitional — Jurassic	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
CRASSIER GROUP	Kdr	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
CRASSIER GROUP	Kcd	
CRASSIER GROUP	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones; thin sandstones with ironstone banding
BEAUDETTE GROUP	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

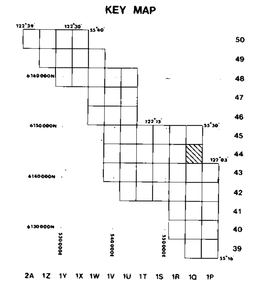
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



532

APPENDIX A PART 2

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours 2100
- Horizontal control △ H-12
- Vertical control V-6 2346
- Spot elevation 2634.5

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: J.LOADER, G.HOFFMAN		DRAWING No. 213-1Q44
APPROVED BY: H.ZSCHACH	DATE: OCT., 1981	

FILE No.

213-1Q44

48

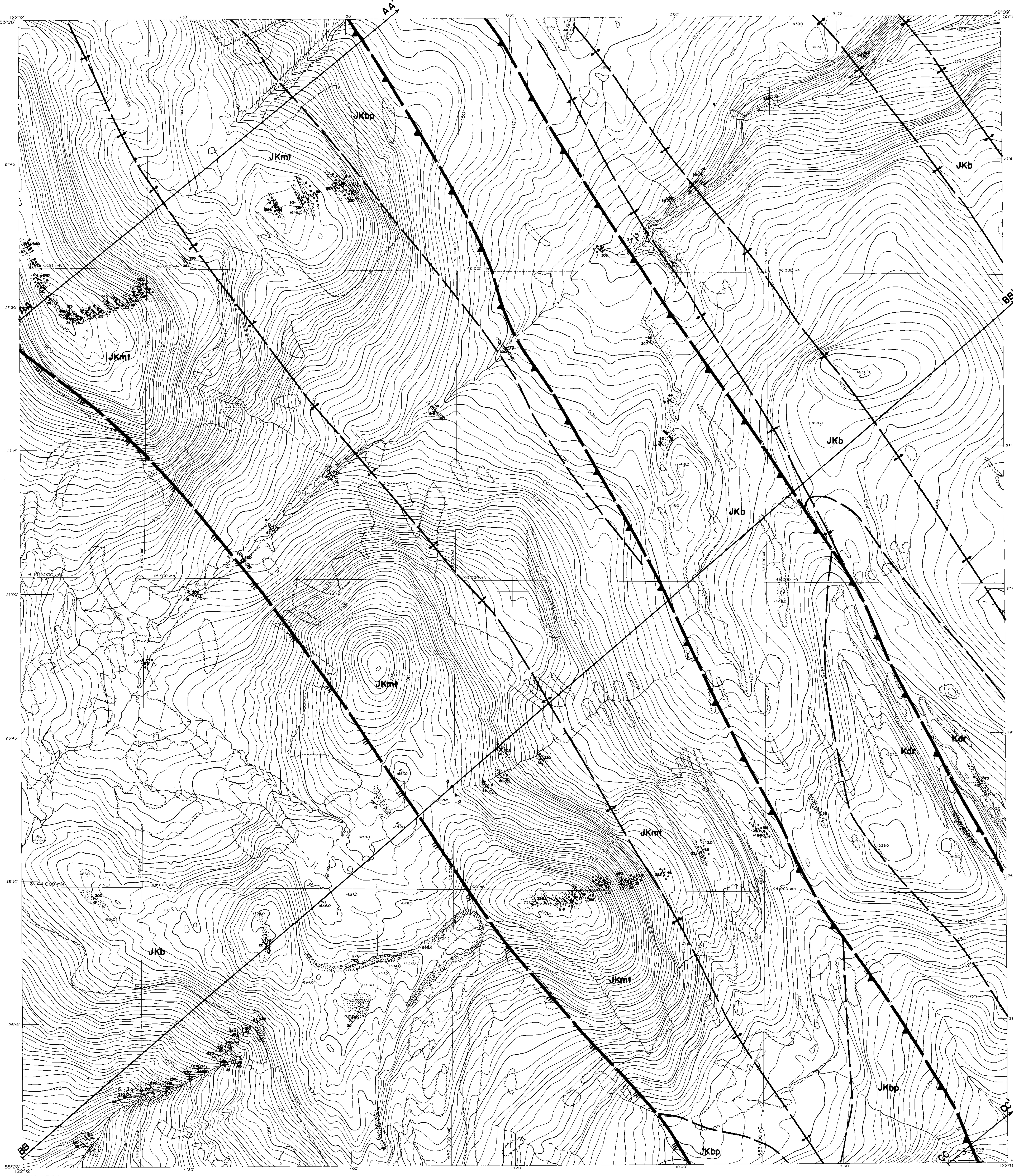


TABLE OF FORMATIONS

Age	Group	Symbol	Formation
		Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous		KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Lower Cretaceous		KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
Lower Cretaceous		Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Lower Cretaceous	CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones; coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit; COAL
Lower Cretaceous	CRASSIER GROUP	Kdr / Kcd	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
Lower Cretaceous	CRASSIER GROUP	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
Transitional	BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
Transitional	BEAUDETTE GROUP	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
Jurassic		Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

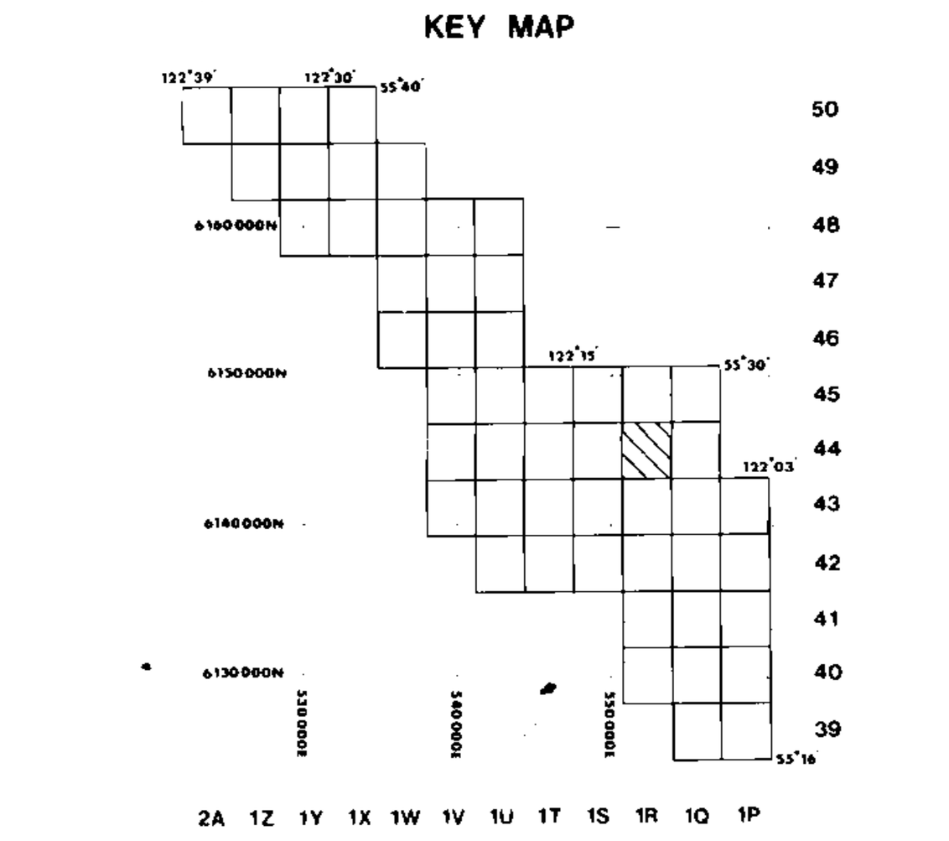
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours
- Horizontal control
- Vertical control
- Spot elevation

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

532 PR Goodrich 81(2)19

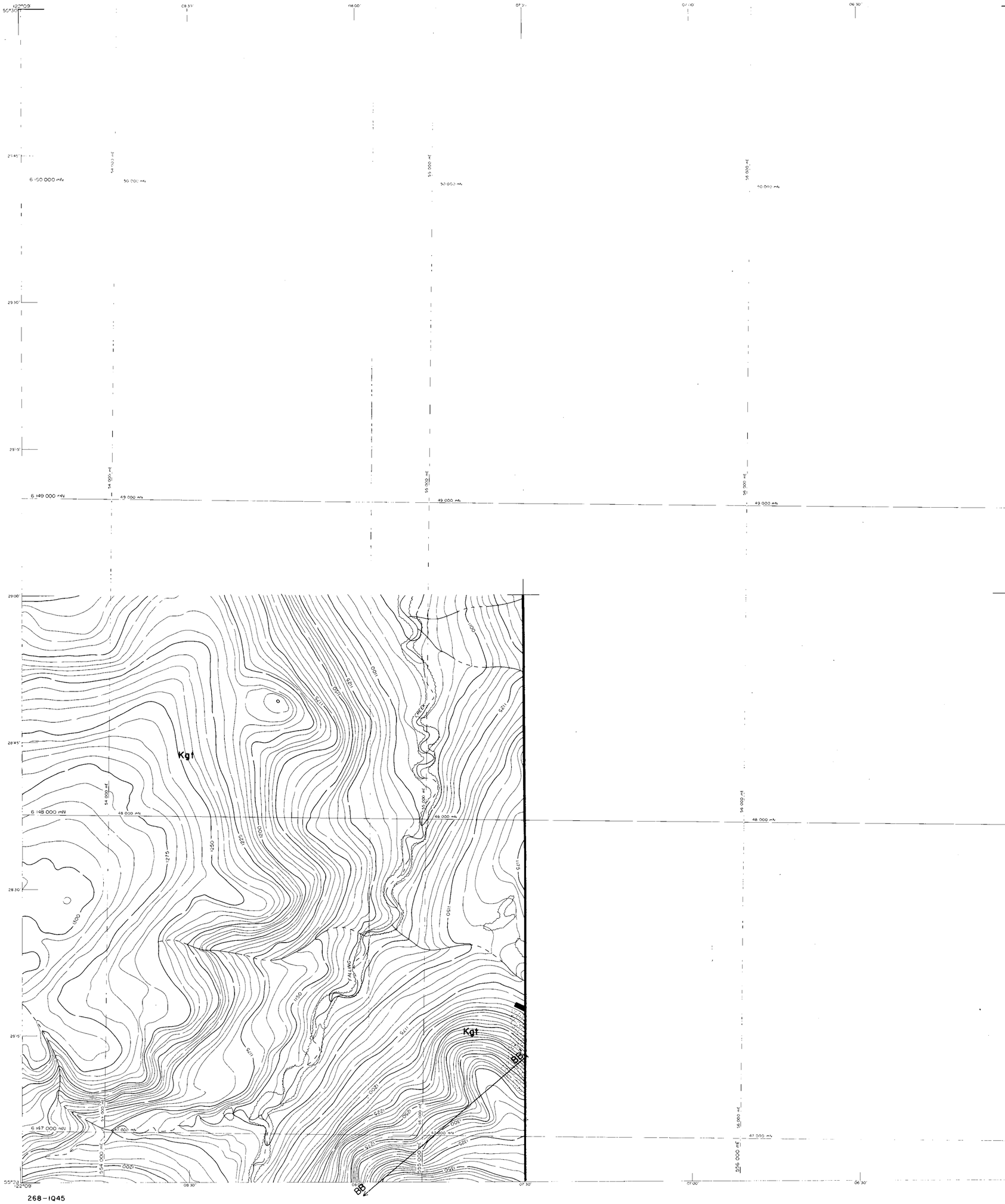
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: J. LOADER, G.HOFFMAN		DRAWING No. 214 - IR44
APPROVED BY: H.ZSCHACH	DATE: OCT., 1981	FILE No.

49



268-1Q45

TABLE OF FORMATIONS

	Q	QUATERNARY	Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin. COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
	Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tuffs in upper unit, COAL
	Kdr	DRESSER FORMATION	Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
	Kcd		
	JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones carbonaceous mudstones, COAL
Transitional — BEAUDETTE GROUP	JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

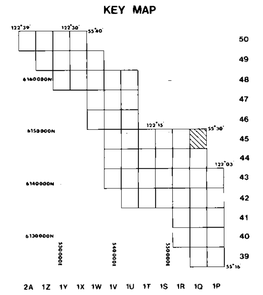
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, aprox. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



LEGEND

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

SCALE 1:5,000

METRES 0 200 400 600 FEET

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

532 RE Goodrich 5/1/81A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: J. LOADER, G. HOFFMAN		DRAWING No. 268 - 1Q45
APPROVED BY: H. ZSCHACH	DATE: OCT., 1981	FILE No.

TABLE OF FORMATIONS

	Q	QUATERNARY	Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin. COAL at the top member, and conglomerates.
	KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
	Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tuffs in upper unit. COAL
	Kdr	DRESSER FORMATION	Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
	Kcd		
	JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

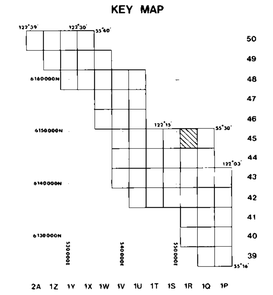
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



LEGEND

Improved road		River	
Secondary road		Stream	
Track or trail		Intermittent stream	
Railway		Swamp	
Fence		Contours	2100
Wall		Horizontal control	H-12
Cut line		Vertical control	V-6 73-46
Tree area		Spot elevation	2634.5

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

267-IR45

532

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH EAST

DRAWN BY:	DATE: OCT., 1981	SCALE	1:5,000
PREPARED BY: J. LOADER, G. HOFFMAN		DRAWING No.	267 - IR45
APPROVED BY: H. ZSCHACH	DATE: OCT., 1981	FILE No.	

51

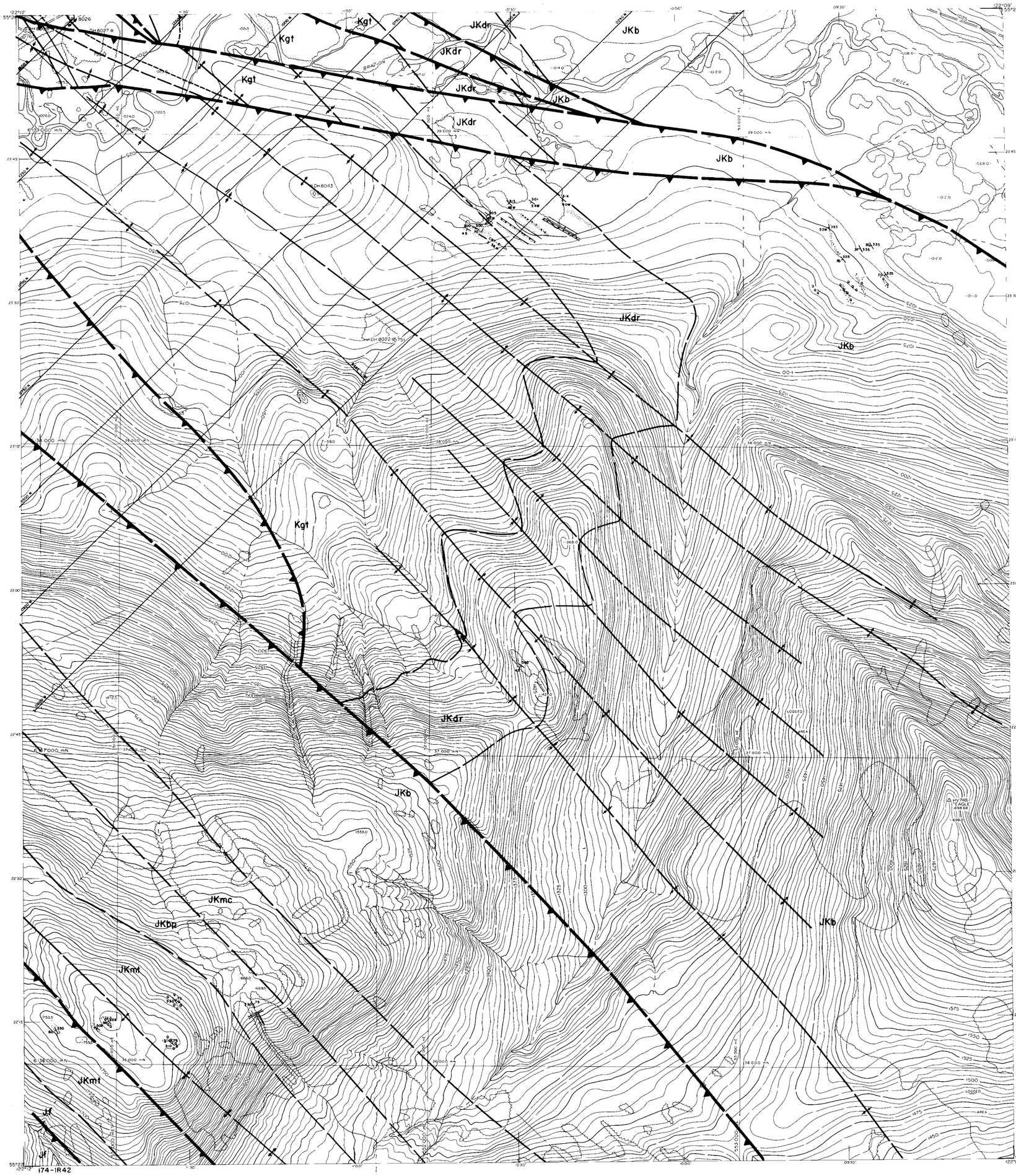


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems; dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentomite, black shales, and occasional minor tufts in upper unit; COAL
	Kdr Kcd	DRESSER FORMATION Incomplete cyclothems; discontinuous coal measures in varying thicknesses; medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional — BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained; fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings; occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, aporox. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours 2100
- Horizontal control △H-42
- Vertical control V.6 / 2546
- Spot elevation 2634.5

SCALE 1:5,000

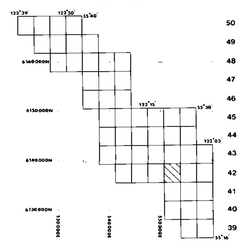
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations *Bickford West*, *Bickford East*, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



APPENDIX A PART 2

532 R. Goodrich 81/2/19

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C. WILLIAMS		DRAWING No. 174-IR42
APPROVED BY: H. ZSCHACH	DATE: OCT., 1981	

FILE No. 79

TABLE OF FORMATIONS

	Q	QUATERNARY	Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION	Siltstone, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
	Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
	Kdr	DRESSER FORMATION	Incomplete cyclothems; discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
	Kcd		
	JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic - Transitional	Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Inferred Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location (A — A')
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

Conglomerate	Claystone/Mudstone
Sandstone	Coal
Siltstone	Silty Claystone
Quartzite	Carbonaceous Claystone

LEGEND

Improved road		River	
Secondary road		Stream	
Track or trail		Intermittent stream	
Railway		Swamp	
Fence		Contours	2100
Wall		Horizontal control	△ H-12
Cut line		Vertical control	▽ V-6 2346
Tree area		Spot elevation	2634.5

SCALE 1:5,000

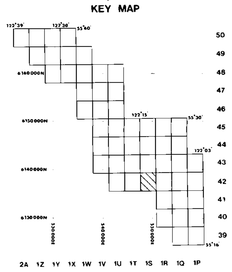
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



APPENDIX A PART 2

532

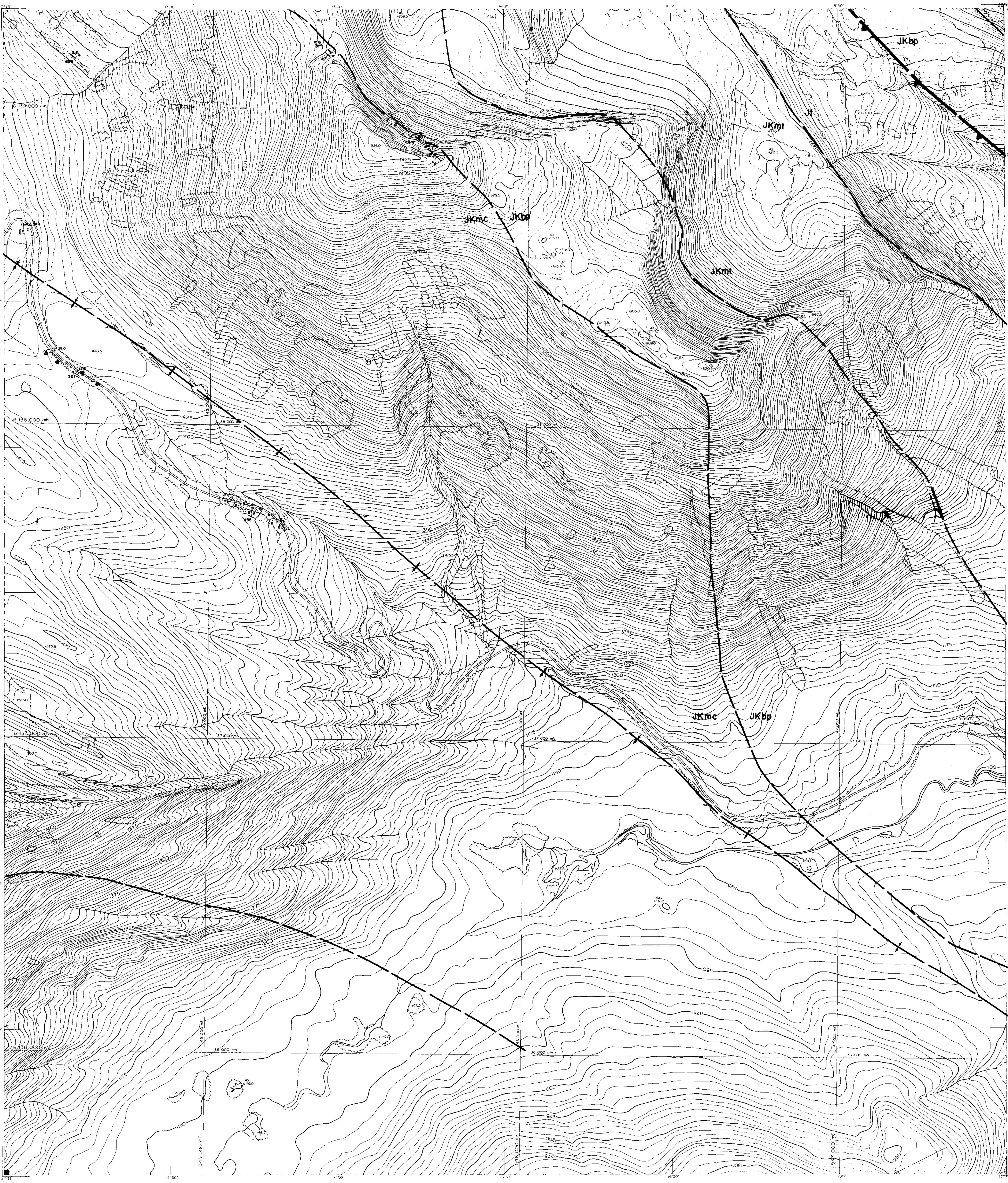
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C. WILLIAMS	DRAWING No. 175 - 1S42
APPROVED BY: H. ZSCHACH DATE: OCT., 1981	FILE No.

60

175 1S42



176-IT42

TABLE OF FORMATIONS

Symbol	Formation	Description
Q	QUATERNARY	Glacial deposits and alluvium
KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tufts in upper unit, COAL
Kdr / Kcd	DRESSER FORMATION	Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (Kcd mostly conglomerates)
JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained; thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

Lower Cretaceous — CRASSIER GROUP; Transitional — BEAUDETTE GROUP; Jurassic

LEGEND

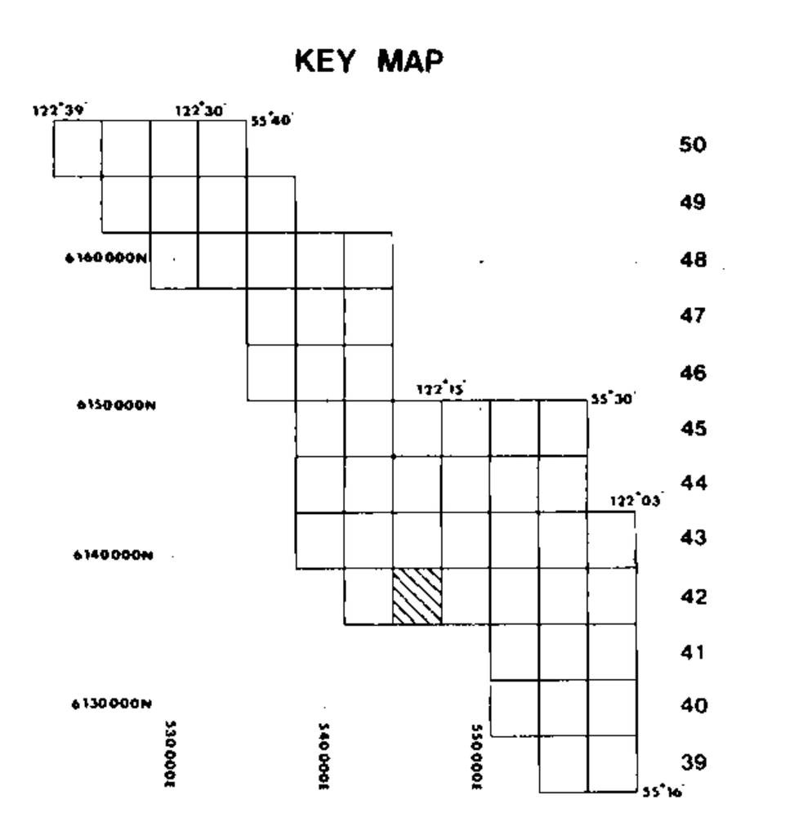
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours
- Horizontal control
- Vertical control
- Spot elevation

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

APPENDIX A PART 2

532 PR-Goodrich 81(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

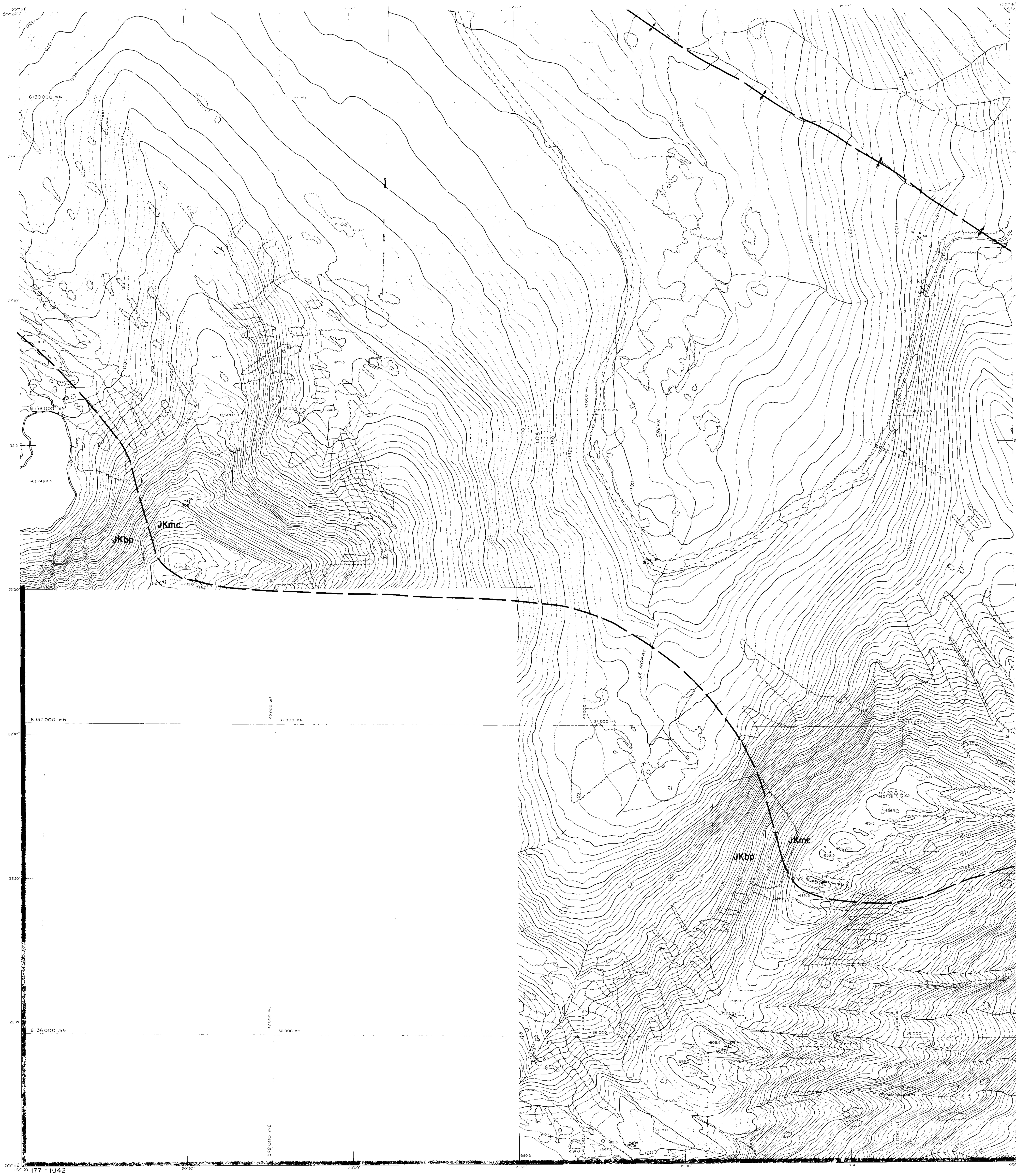
digitized May 15/91 - JC file GOODGULF Map10 532-1T42 QMAP Jan 16/92

GOODRICH COAL PROPERTY
Northeast British Columbia

1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY:	DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C WILLIAMS		DRAWING No. 176-1T42
APPROVED BY: H. ZSCHACH	DATE: OCT., 1981	FILE No.

61



177 - 1042

TABLE OF FORMATIONS

Age	Group	Symbol	Formation	Description
		Q	QUATERNARY	Glacial deposits and alluvium
Lower Cretaceous		KCm	COMMOTION FORMATION	Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
Lower Cretaceous		KmB	MOOSEBAR FORMATION	Mudstones, minor siltstones, marine
Lower Cretaceous		Kbs	BLUESKY	Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
Lower Cretaceous	CRASSIER GROUP	Kgt	GETHING FORMATION	Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit. COAL
Lower Cretaceous	CRASSIER GROUP	Kdr, Kcd	DRESSER FORMATION	Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates (Kcd mostly conglomerates)
Lower Cretaceous	CRASSIER GROUP	JKb	BRENOT FORMATION	Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	BEAUDETTE GROUP	JKmc	MONACH FORMATION	Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
Transitional	BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION	Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
Transitional	BEAUDETTE GROUP	JKmt	MONTIETH FORMATION	Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic		Jf	FERNIE FORMATION	Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

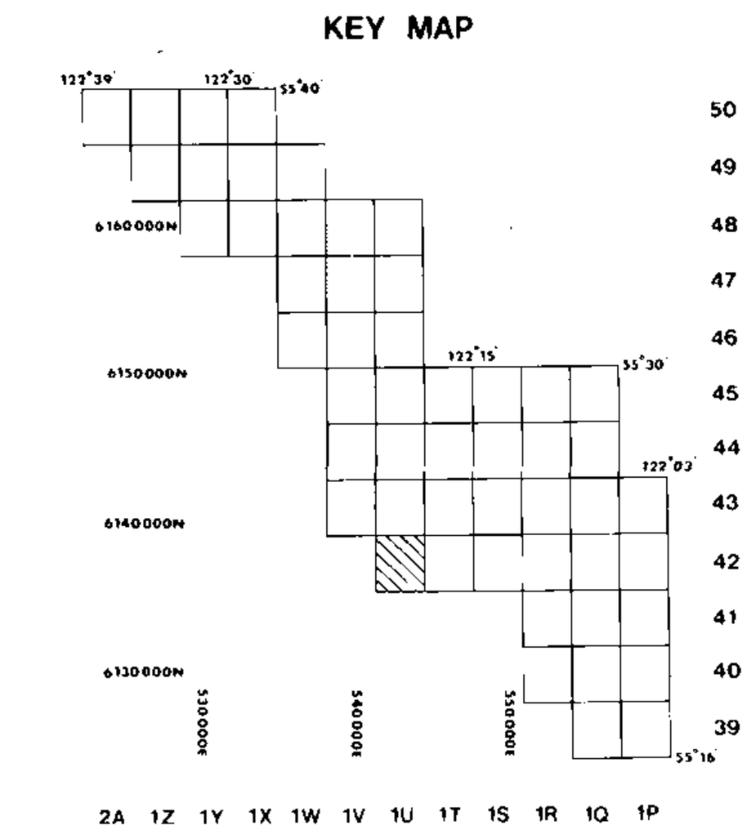
GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

KEY MAP



532 APPENDIX A PART 2

PR- Goodrich 81(a)A

LEGEND

Improved road		River	
Secondary road		Stream	
Track or trail		Intermittent stream	
Railway		Swamp	
Fence		Contours	2100
Wall		Horizontal control	H-12
Cut line		Vertical control	V-6
Tree area		Spot elevation	

SCALE 1:5,000

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Jan 16/92 FILE "GOODGULF" MAP ID 532-1042

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY:	DATE: OCT , 1981	SCALE	1:5,000
PREPARED BY: C WILLIAMS		DRAWING No.	177 - 1042
APPROVED BY: H ZSCHACH	DATE: OCT , 1981	FILE No.	62

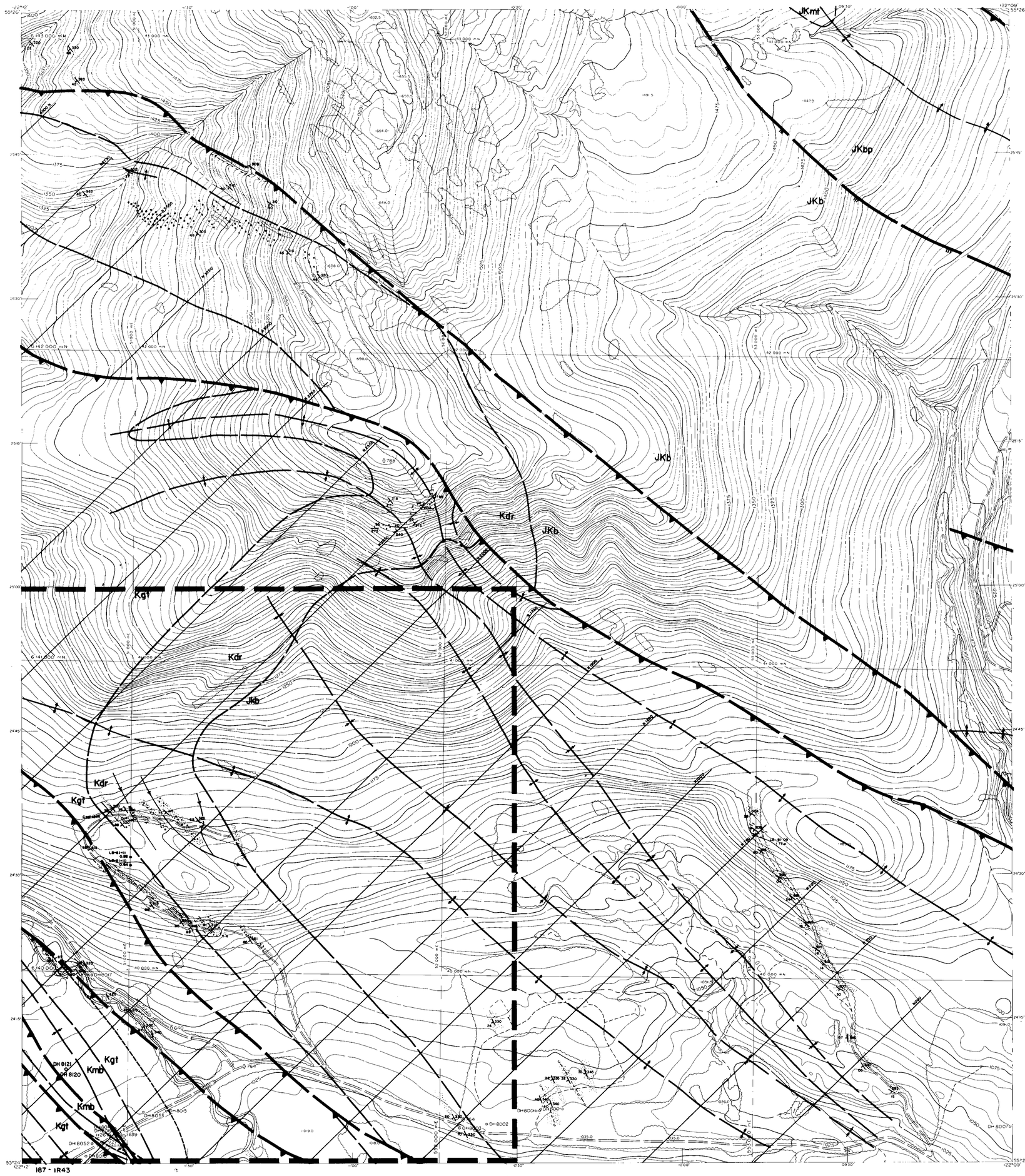


TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous – Transitional – Jurassic	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin; COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY *Fine to medium grained* sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous, silty, sandy mudstones, coalified plant debris, minor bentonite, black shales, and occasional minor tuffs in upper unit; COAL
	Kdr Kcd	DRESSER FORMATION Incomplete cyclothems, discontinuous coal measures in varying thicknesses, medium to very coarse grained sandstones, grits, and conglomerates. (**Kcd mostly conglomerates**)
	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
BEAUDETTE GROUP	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean, coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales and shales with siltstone and sandstone partings, occasional thin conglomerates
	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

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- Anticline (defined, approximate)
- Syncline (defined, approximate)
- Anticline and Syncline (overturned)
- Fault (defined showing dip, approx. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- A — A' Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone/Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours
- Horizontal control
- Vertical control
- Spot elevation

SCALE 1:5,000

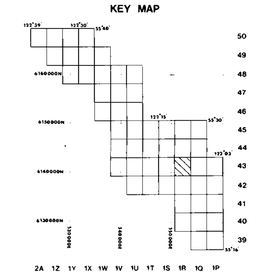
METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

The horizontal and vertical coordinates were established by Donald E. Watson Surveys Ltd. and are derived from government trig. stations Bickford West, Bickford East, Nipple, Pyramid, Wolf, Tat, Smokey, Herd, Early, and Bird. All coordinates are on the Universal Transverse Mercator grid, Zone 10. Datum is geodetic and derived from the above trig. stations.

KEY MAP



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APPENDIX A PART 2

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C.WILLIAMS	DRAWING No. 187 - IR43
APPROVED BY: H.ZSCHACH DATE: OCT., 1981	FILE No.

63

TABLE OF FORMATIONS

	Q	QUATERNARY Glacial deposits and alluvium
Lower Cretaceous	KCm	COMMOTION FORMATION Siltstones, sandstones interbedded, claystones of marine origin, COAL at the top member, and conglomerates
	KmB	MOOSEBAR FORMATION Mudstones, minor siltstones, marine
	Kbs	BLUESKY Fine to medium grained sandstones, mudstones, thin conglomerate unit at top with or without glauconite
CRASSIER GROUP	Kgt	GETHING FORMATION Cyclothems, dark grey mudstones, siltstones, carbonaceous silty, sandy mudstones, coalified plant debris, minor bentonite black shales, and occasional minor tuffs in upper unit, COAL
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	JKb	BRENOT FORMATION Lithic "salt and pepper" sandstones, siltstones, mudstones, carbonaceous mudstones, COAL
Transitional	JKmc	MONACH FORMATION Marine lithic and quartzose sandstones with thick beds of clean coarse grained white quartzites at top. Minor shales, siltstones and sandstones with occasional thin conglomerates
BEAUDETTE GROUP	JKbp	BEATTIE PEAKS FORMATION Buff to brownish sandstones, fine to medium grained, thinly bedded black and dark grey shales, silty shales, siltstones, thin sandstones with ironstone banding
	JKmt	MONTIETH FORMATION Grey and brown sandstones, fine to medium grained, fine to very coarse grained quartzite. Minor beds of shales, and shales with siltstone and sandstone partings, occasional thin conglomerates
Jurassic	Jf	FERNIE FORMATION Dark grey and black shales, mudstones, sandstones, siltstones, marine

LEGEND

GEOLOGICAL SYMBOLS

- Coal Seam Subcrop
- Geological Boundary, (defined, approximate)
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- Anticline and Syncline (overturned)
- Fault (defined showing dip, aprox. position of fault)
- Normal Fault
- Strike and Dip (bedding, overturned bedding)
- Cross Section Location
- Monocline
- Bedding (vertical, horizontal)
- Trench Location

LITHOLOGICAL SYMBOLS

- Conglomerate
- Sandstone
- Siltstone
- Quartzite
- Claystone Mudstone
- Coal
- Silty Claystone
- Carbonaceous Claystone

LEGEND

- Improved road
- Secondary road
- Track or trail
- Railway
- Fence
- Wall
- Cut line
- Tree area
- River
- Stream
- Intermittent stream
- Swamp
- Contours
- Horizontal control
- Vertical control
- Spot elevation

SCALE 1:5,000

METRES 100 0 200 400 600 800 METRES

CONTOUR INTERVAL 5 metres
DATE OF PHOTOGRAPHY 1980
DATE OF MAPPING 1981 by HARDY ASSOC. (1978) LTD.

SURVEY NOTE

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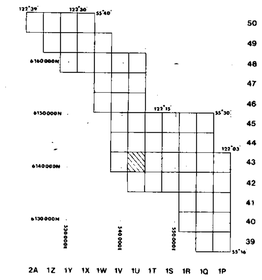
KEY MAP



532

APPENDIX A PART 2

AR Goodrich 5(13)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

digitized map 21/91 GOODRICH 532-1043 SMAP Jan 17

GOODRICH COAL PROPERTY
Northeast British Columbia
1981 GEOLOGY MAP
GOODRICH LOSSAN BLOCK

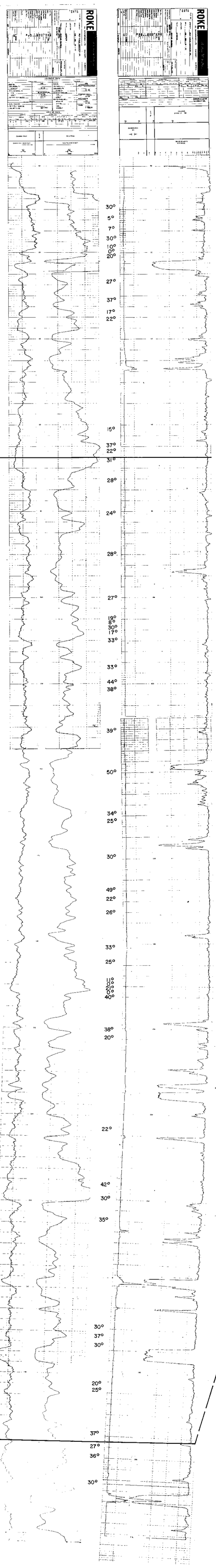
DRAWN BY: DATE: OCT., 1981	SCALE 1:5,000
PREPARED BY: C. WILLIAMS	DRAWING No. 184 - 1043
APPROVED BY: H. ZSCHACH DATE: OCT., 1981	FILE No.

64

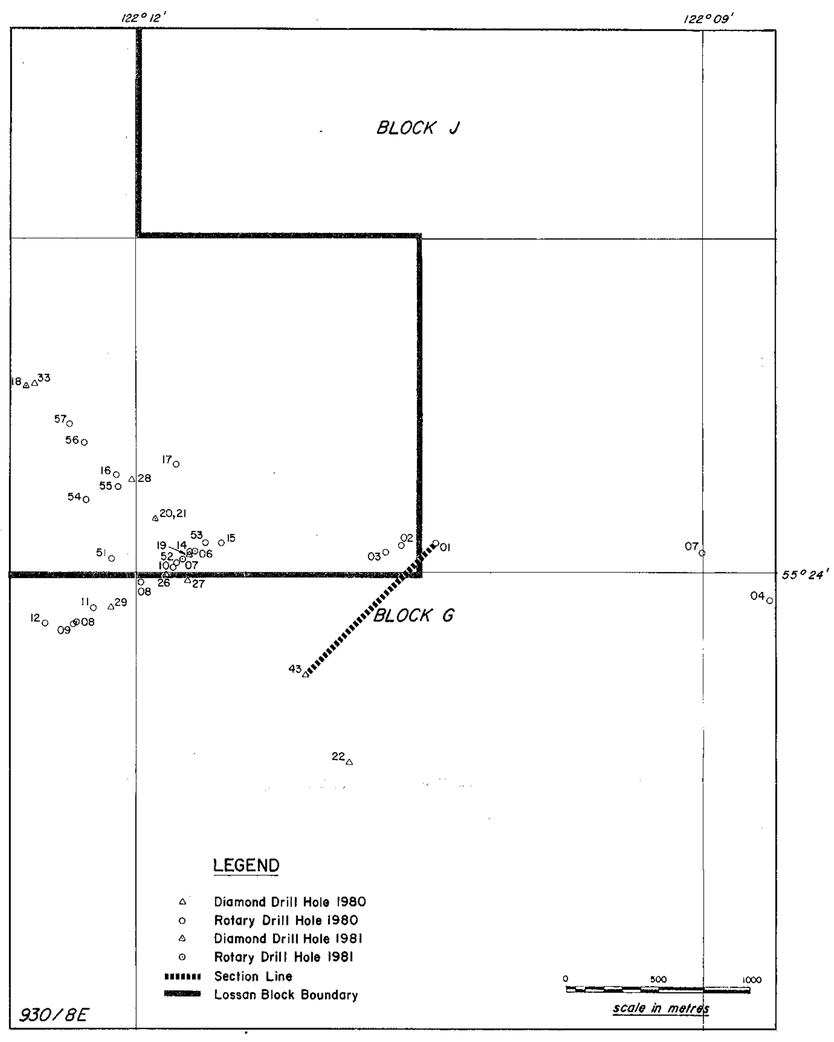
DDH 80-43
ELEV. 1068.27 m

RDH 80-01
ELEV. 1038.40 m

1020 m



DATUM LINE



INDEX MAP
scale — 1 : 20,000

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APPENDIX A PART 3

PR-Goodrich 81(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
LINE N 0500

PREPARED BY: C.W., H.D.Z.	SCALE : 1 : 400	DRAWING No. 82
APPROVED BY: H. D. Z.	DATE: JAN. 1982	

140 m | 54 m | 124 m | 140 m | 45 m | 40 m | 9 m | 50 m | 55 m | 75 m

DATUM LINE

DDH 80-26
ELEV. 1030.80 m

RDH 80-10
ELEV. 1032.15 m

GR 80-08
ELEV. 1029.91 m

RDH 80-52
ELEV. 1030.60 m

DDH 80-27
ELEV. 1028.14 m

RDH 81-07
ELEV. 1030.85 m

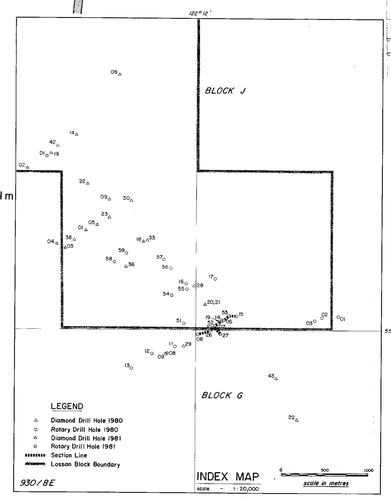
RDH 80-14
ELEV. 1031.48 m

DDH 80-19
ELEV. 1031.11 m

RDH 81-06
ELEV. 1029.73 m

RDH 80-15
ELEV. 1030.09 m

RDH 80-53
ELEV. 1030.80 m



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APPENDIX A PART 3

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
LINE N 1500

PREPARED BY: C.W., H.D.Z. | SCALE: 1:400 | DRAWING No. 83
APPROVED BY: H.D.Z. | DATE: JAN. 1982

RDH 80-13
ELEV. 1047.67 m

RDH 80-12
ELEV. 1045.47 m

RDH 81-08
ELEV. 1042.25 m

RDH 80-11
ELEV. 1038.91 m

DDH 80-29
ELEV. 1031.51 m

RDH 80-51
ELEV. 1033.40 m

DDH 81-21
ELEV. 1039.50 m

DDH 81-20
ELEV. 1039.50 m

235 m | 170 m | 116 m | 90 m | 270 m | 311 m | 0 m

DATUM LINE

4

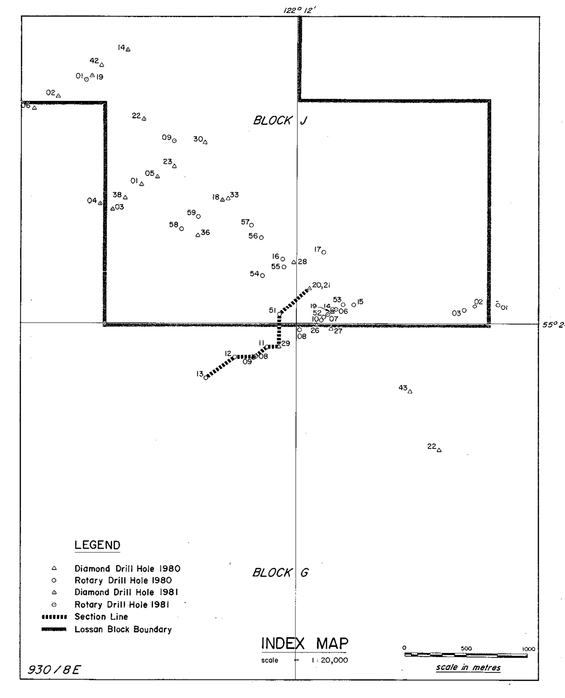
5

4

1

1

1



532
20 Goodrich 5620

APPENDIX A PART 3

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
LINE N 1750

PREPARED BY: C.W., H.D.Z.	SCALE: 1:400	DRAWING No.	8
APPROVED BY: H.D.Z.	DATE: JAN. 1982		

N 1750

RDH 80-54
ELEV. 1066.00 m

RDH 80-55
ELEV. 1045.00 m

RDH 80-16
ELEV. 1049.26 m

DDH 80-28
ELEV. 1047.84 m

RDH 80-17
ELEV. 1052.66 m

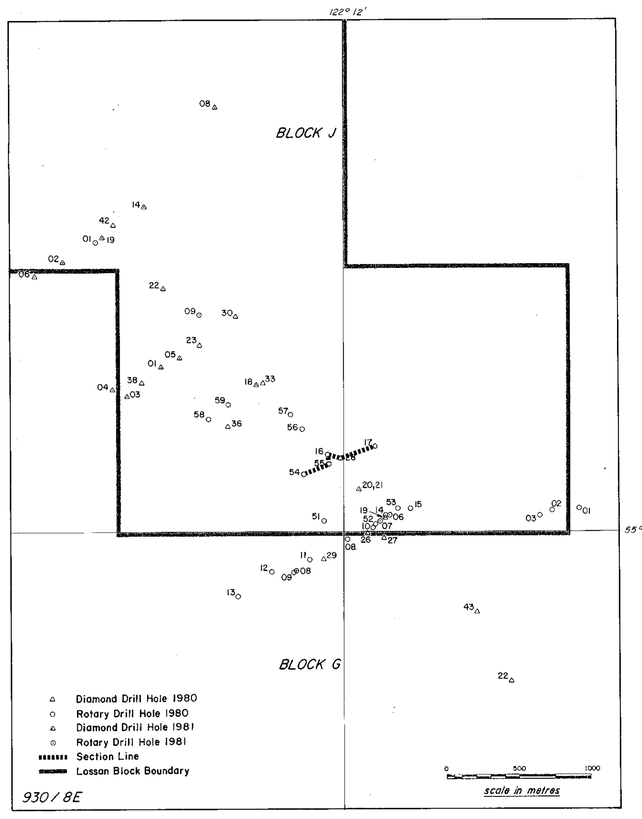
194 m | 70 m | 105 m | 262 m

DATUM LINE

1

2

47°
40°
50°
40°
50°
45°
45°
50°
50°
45°
70°
75°
70°
80°
80°
75
75°
70°
80°
65°
70°
85°
40°
55°
30°
30°
60°
65°
50°
50°
65°
70°
12°



INDEX MAP
scale – 1 : 20,000

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APPENDIX A PART 3

PR-Goodrich 81@19

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROJECT

Northeast British Columbia

1980 & 1981 DRILL HOLES

GEOPHYSICAL LOG CORRELATION

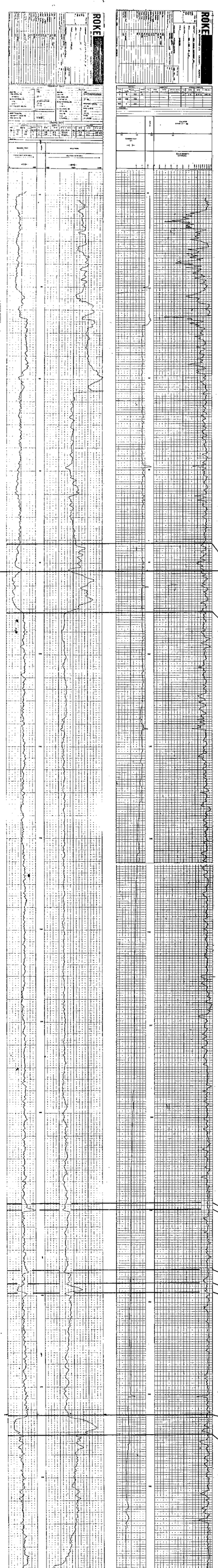
LINE N 2000

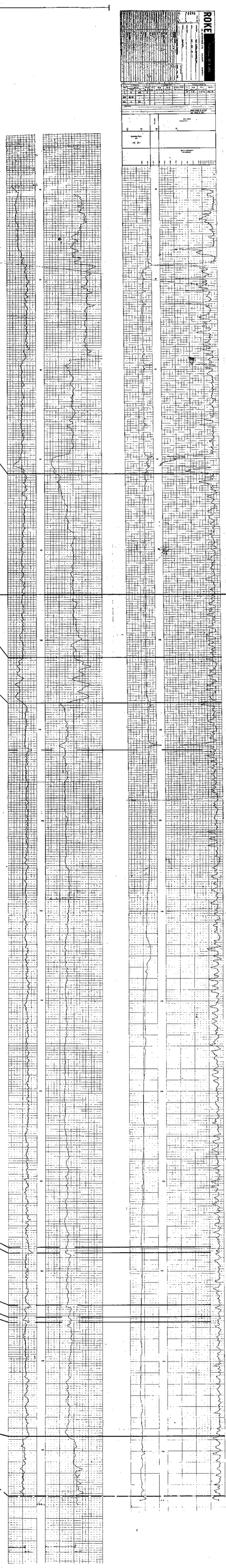
PREPARED BY: C.W., H.D.Z.	SCALE : 1 : 400	DRAWING No.	85
APPROVED BY: H.D.Z.	DATE: JAN. 1982		

RDH 80-56

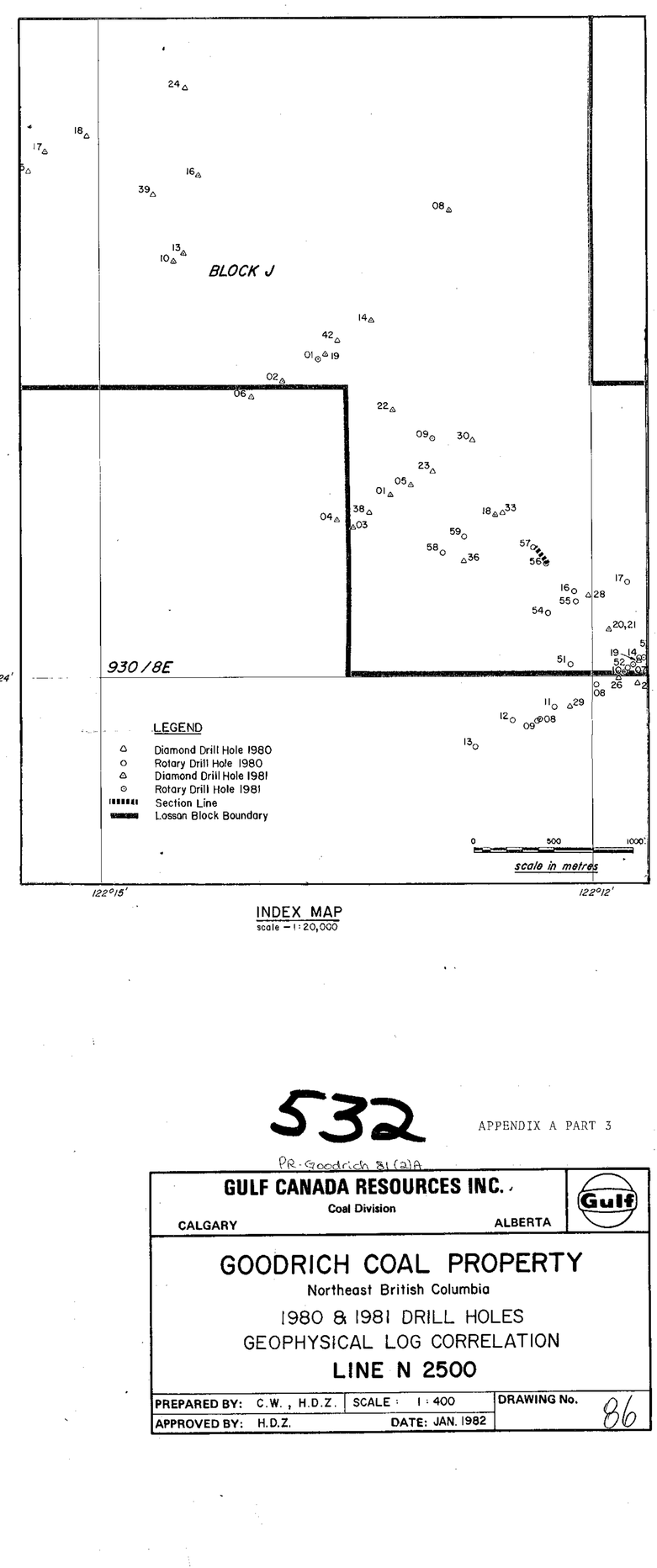
RDH 80-57

120 m





DATUM LINE



INDEX MAP
scale – 1:20,000

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APPENDIX A PART 3

PR-Goodrich 81(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY

Northeast British Columbia

1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION

LINE N 2500

PREPARED BY: C.W., H.D.Z.	SCALE: 1:400	DRAWING No. 86
APPROVED BY: H.D.Z.	DATE: JAN. 1982	

RDH 80-58
ELEV. 1139.90 m

DDH 80-36
ELEV. 1125.87 m

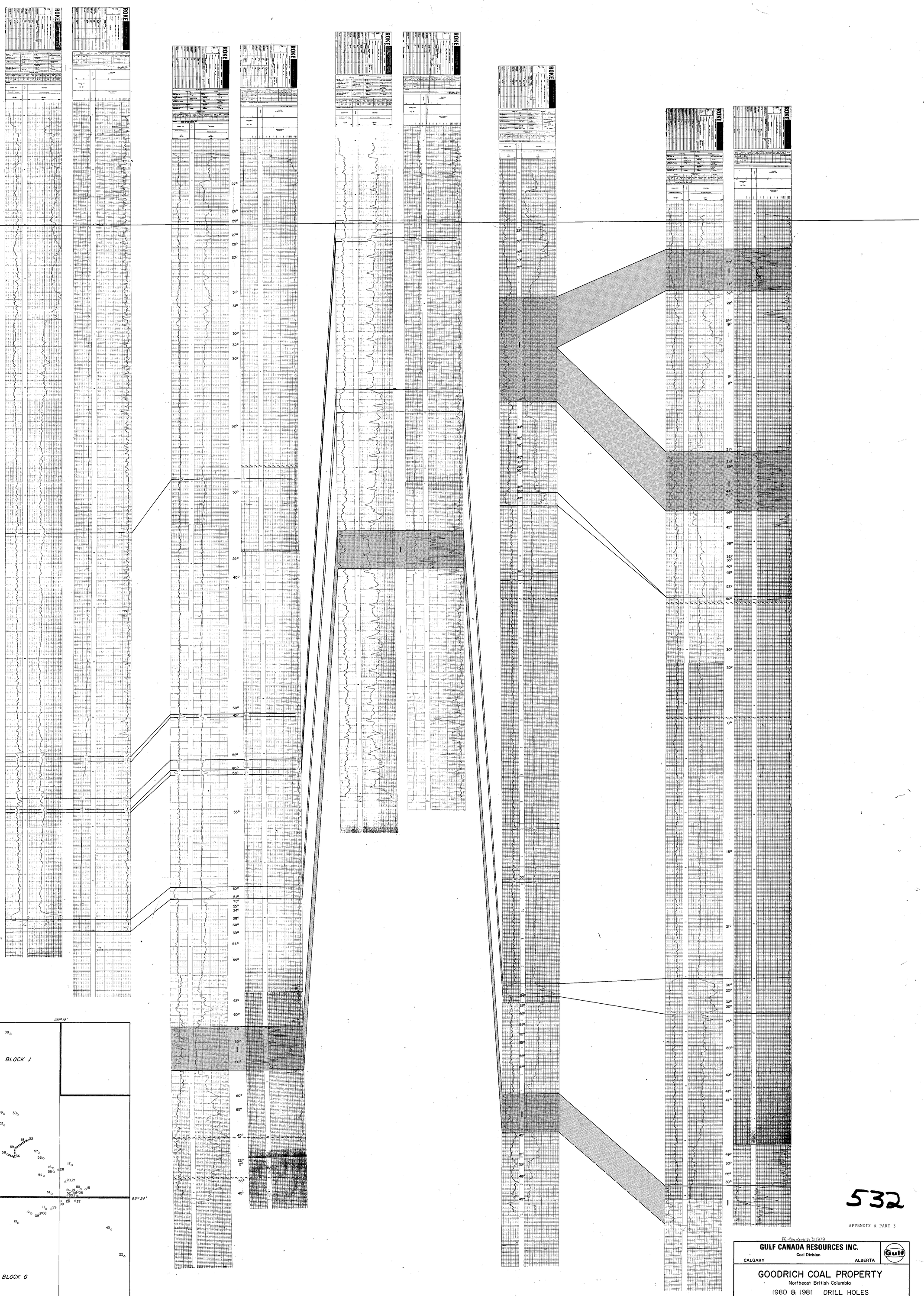
RDH 80-59
ELEV. 1130.46 m

DDH 81-18
ELEV. 1118.40m

DDH 80-33
ELEV. 1102.58 m

144 m | 150 m | 142 m | 54 m

DATUM LINE



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APPENDIX A PART 3

PP-Goodrich 8(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY

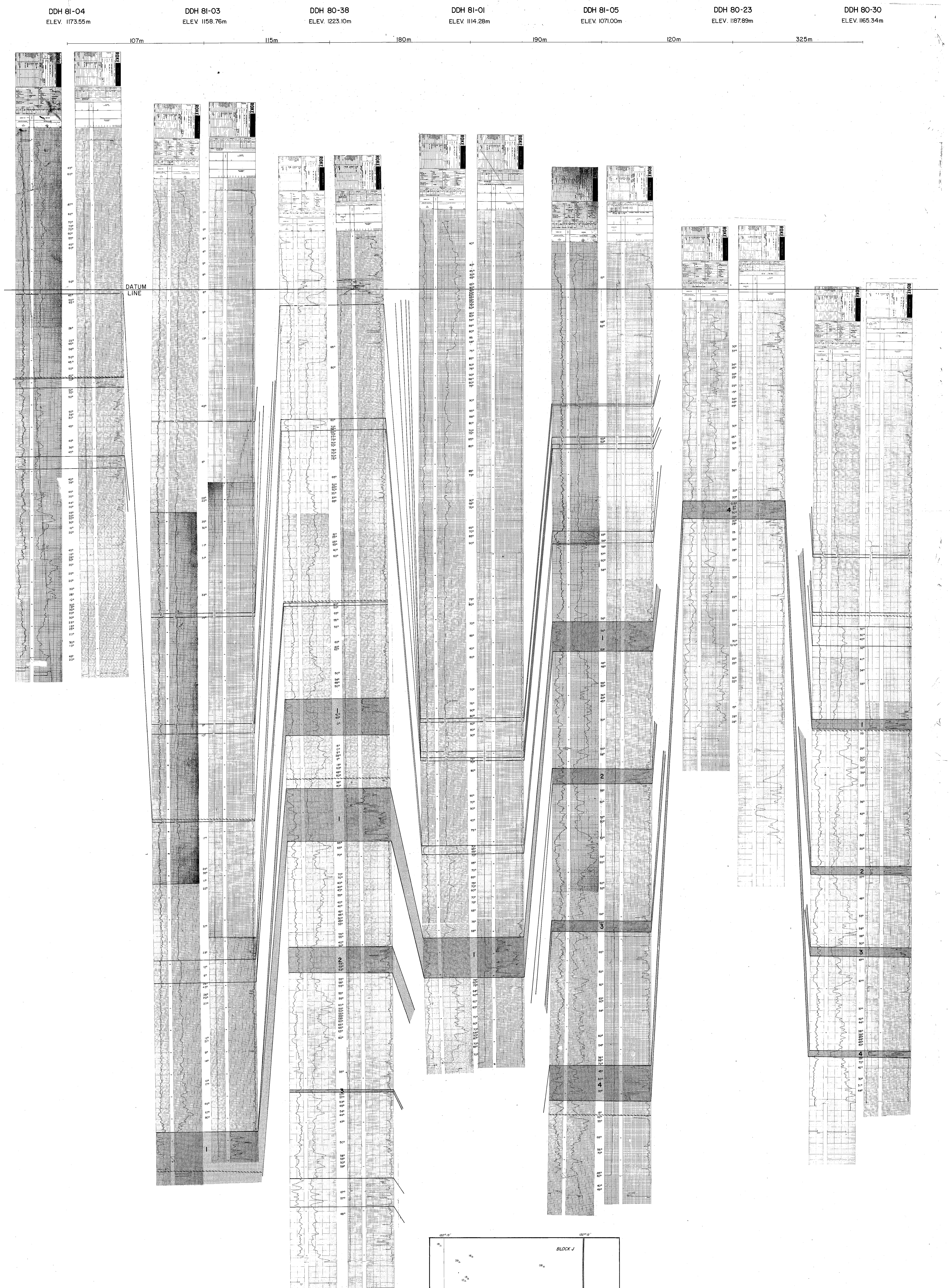
Northeast British Columbia

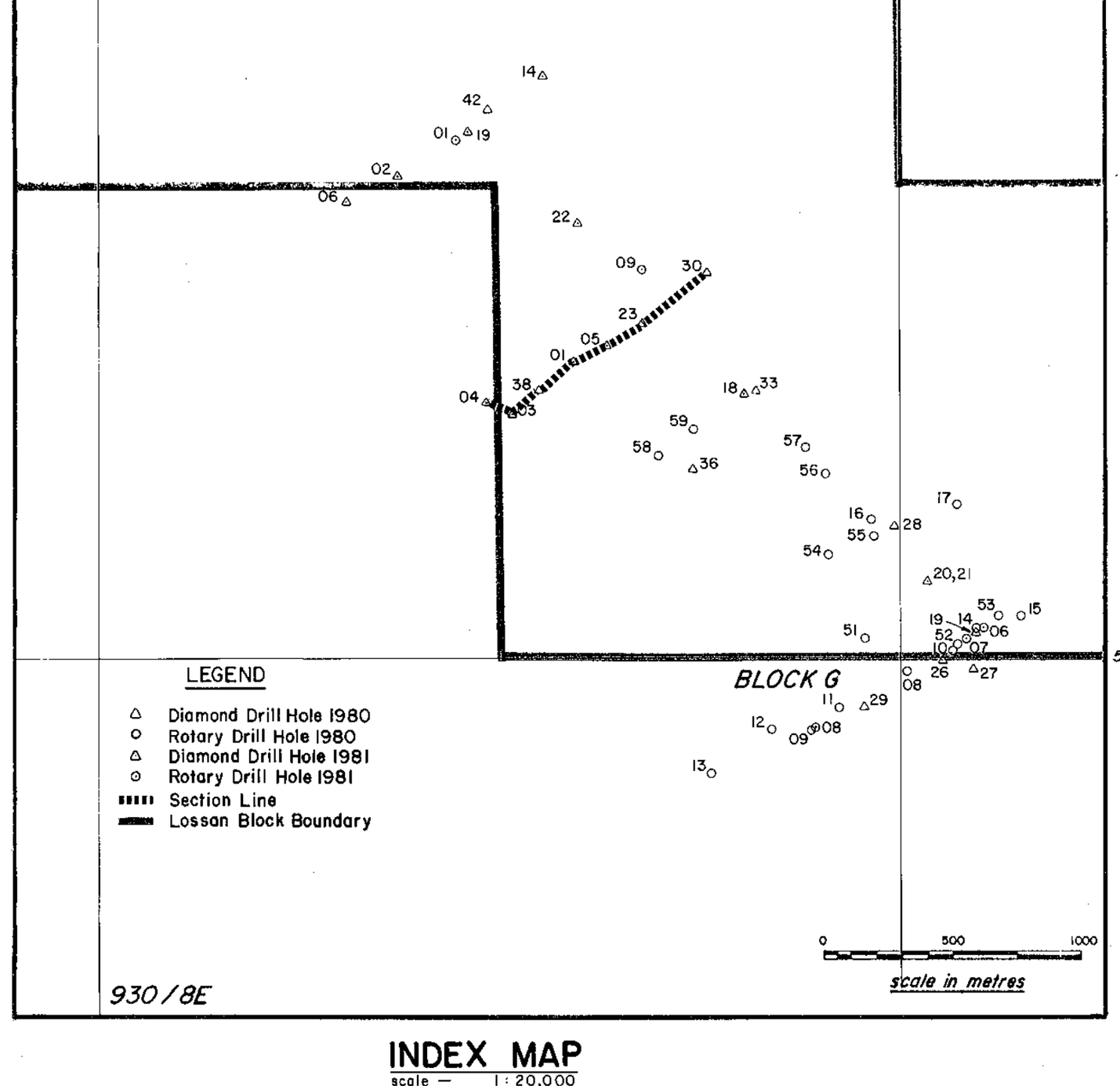
1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION

LINE N 2750

PREPARED BY: C.W., H.D.Z.	SCALE : 1:400	DRAWING No. 87
APPROVED BY: H.D.Z.	DATE: JAN. 1982	

N 2750





INDEX MAP
scale — 1:20,000

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APPENDIX A PART 3

PR-Goodrich 81(2)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

GOODRICH COAL PROPERTY
Northeast British Columbia
1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
LINE N 3250 - 3500

PREPARED BY: C.W., H.D.Z.	SCALE 1:400	DRAWING No. 88
APPROVED BY: H.D.Z.	DATE: JAN. 1982	

DDH 81-10
ELEV. 1310.69

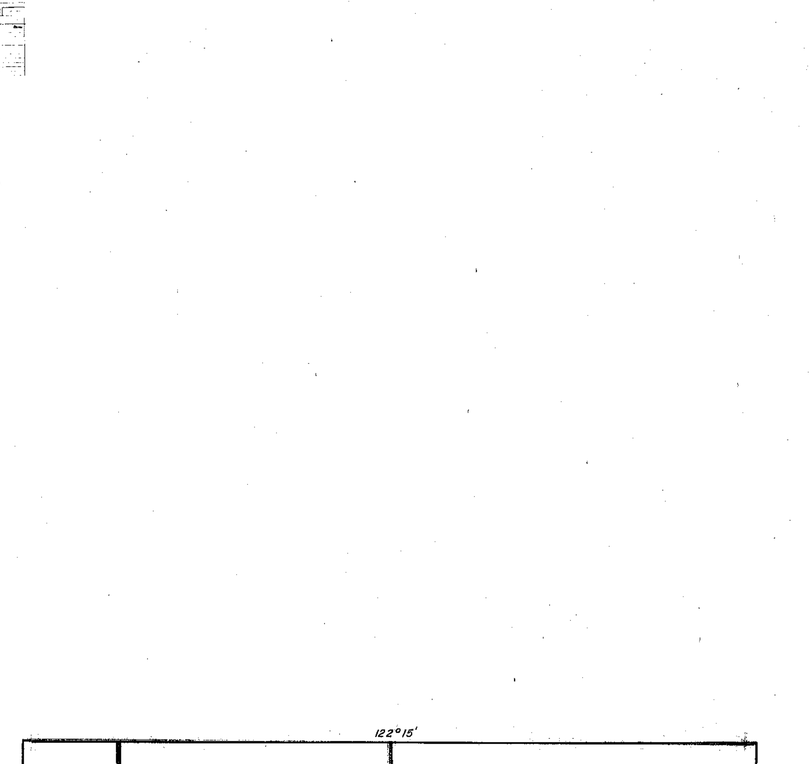
DDH 81-13
ELEV. 1309.70

DDH 81-16
ELEV. 1342.00

DATUM LINE

1

2



INDEX MAP
scale — 1: 20,000

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APPENDIX A PART 3

PR Goodrich 81(a)9

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
LINE N 5500

PREPARED BY: C.W., H.D.Z.	SCALE: 1:400	DRAWING No. 90
APPROVED BY: H.D.Z.	DATE: JAN. 1982	

DDH 80-25
ELEV. 1387.22

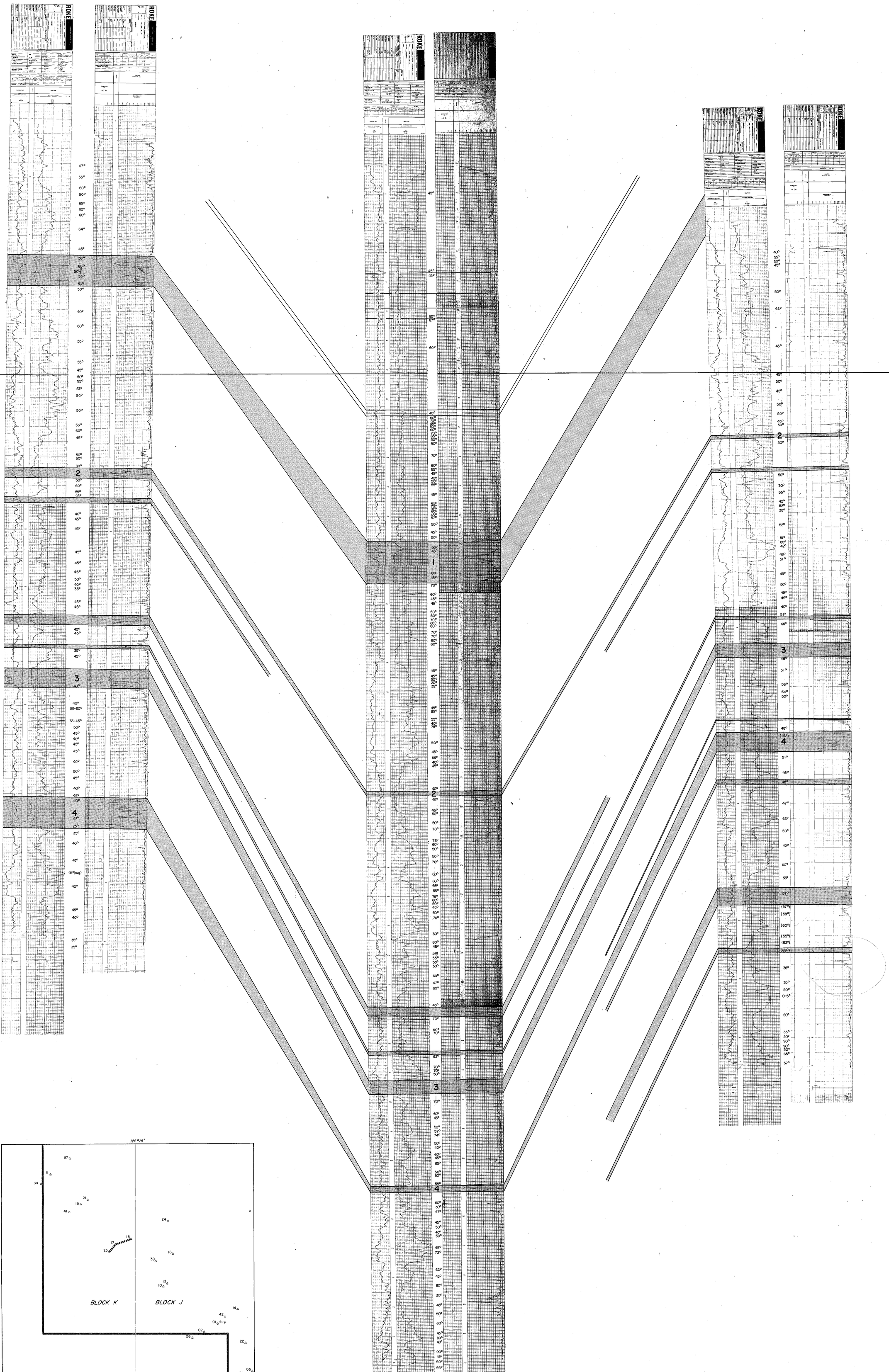
18.5 m

DDH 81-17
ELEV. 1372.20

28 m

DDH 80-18
ELEV. 1352.60

DATUM LINE



INDEX MAP
scale ~ 1 : 20,000

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APPENDIX A PART 3

PR-Goodrich 81(3)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY

Northeast British Columbia

1980 & 1981 DRILL HOLES

GEOPHYSICAL LOG CORRELATION

LINE N 6500

PREPARED BY:	C. W. , H.D.Z.	SCALE: 1 : 400	DRAWING No. 91
APPROVED BY:	H. D. Z.	DATE: JAN. 1982	

DDH 80-41
ELEV. 1349.94 m

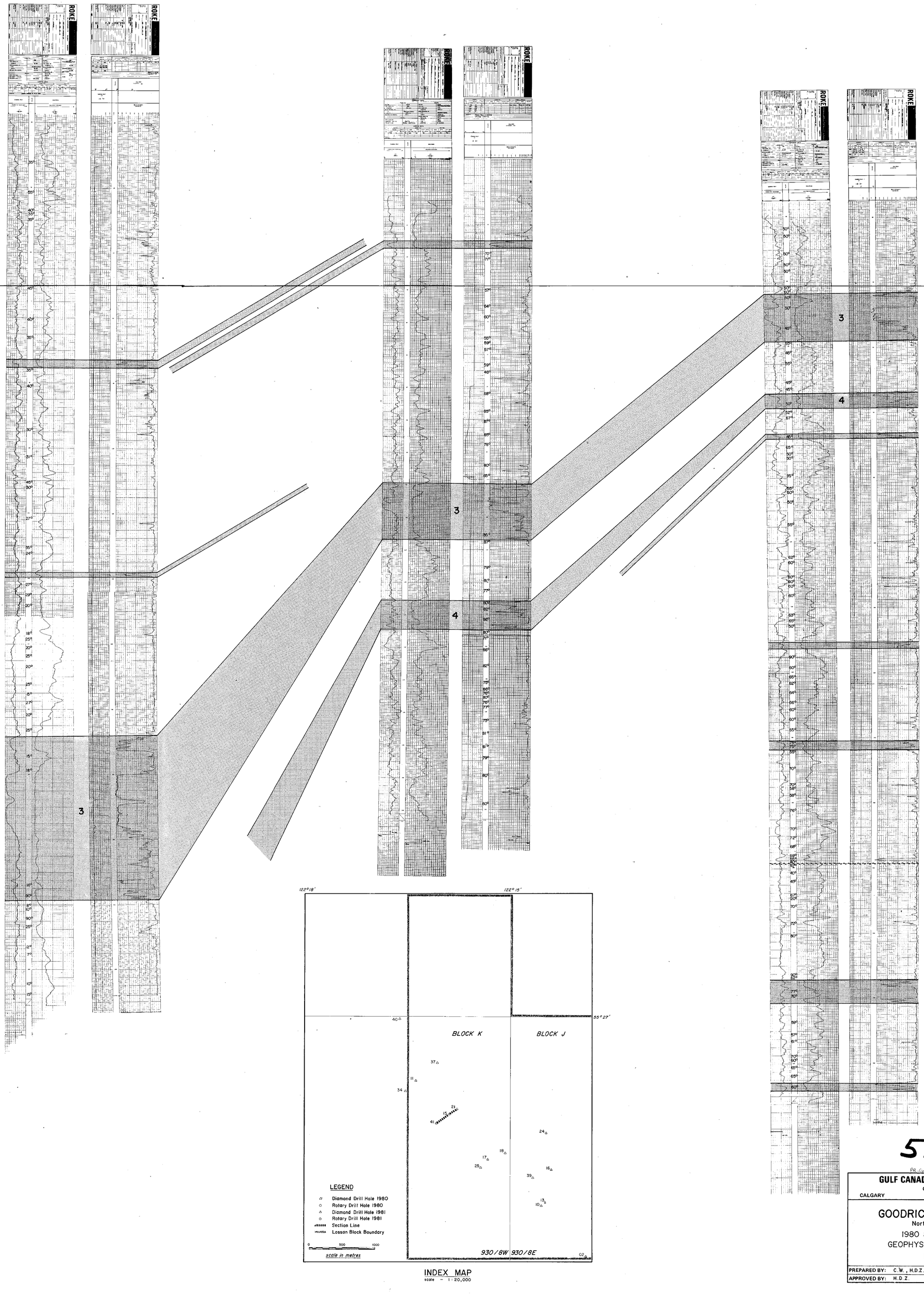
DDH 81-15
ELEV. 1329.2 m

DDH 80-21
ELEV. 1321.24 m

25 m

14 m

DATUM LINE



INDEX MAP
scale - 1:20,000

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APPENDIX A PART 3

PR. Goodrich 81(6)A

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1980 & 1981 DRILL HOLE
GEOPHYSICAL LOG CORRELATION
LINE N 7500

PREPARED BY: C.W., H.D.Z.	SCALE: 1:400	DRAWING No.	92
APPROVED BY: H.D.Z.	DATE: JAN. 1982		

DDH 80-34

ELEV. 1357.00m

DDH 81-11

ELEV. 1335.20m

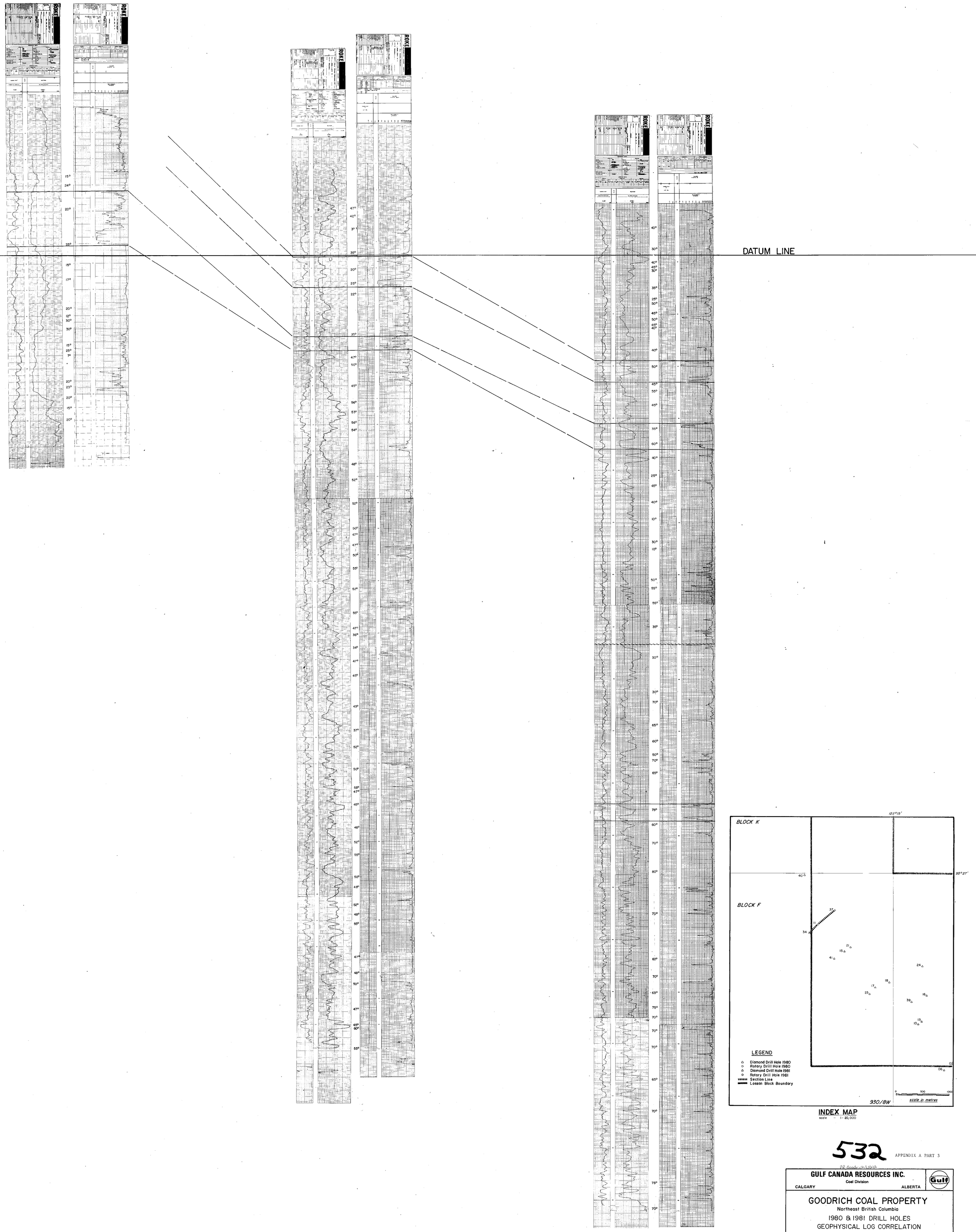
DDH 80-37

ELEV. 1307.19m.

225 m

440m

DATUM LINE



LEGEND

- Diamond Drill Hole 1980
- Rotary Drill Hole 1980
- Diamond Drill Hole 1981
- Rotary Drill Hole 1981
- Section Line
- Lossan Block Boundary

INDEX MAP

scale — 1 : 20,000

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APPENDIX A PART 3

PR-Goodrich 3 (6) A

GULF CANADA RESOURCES INC.

Coal Division

CALGARY — ALBERTA

Gulf

GOODRICH COAL PROPERTY

Northeast British Columbia

1980 & 1981 DRILL HOLES

GEOPHYSICAL LOG CORRELATION

LINE N 8000

PREPARED BY: C.W., H.D.Z.	SCALE : 1 : 400	DRAWING No. 93
APPROVED BY: H.D.Z	DATE: JAN. 1982	

DDH 80-19
ELEV. 1031.11 m

RDH 80-55
ELEV. 1045.00 m

DDH 80-28
ELEV. 1047.84 m

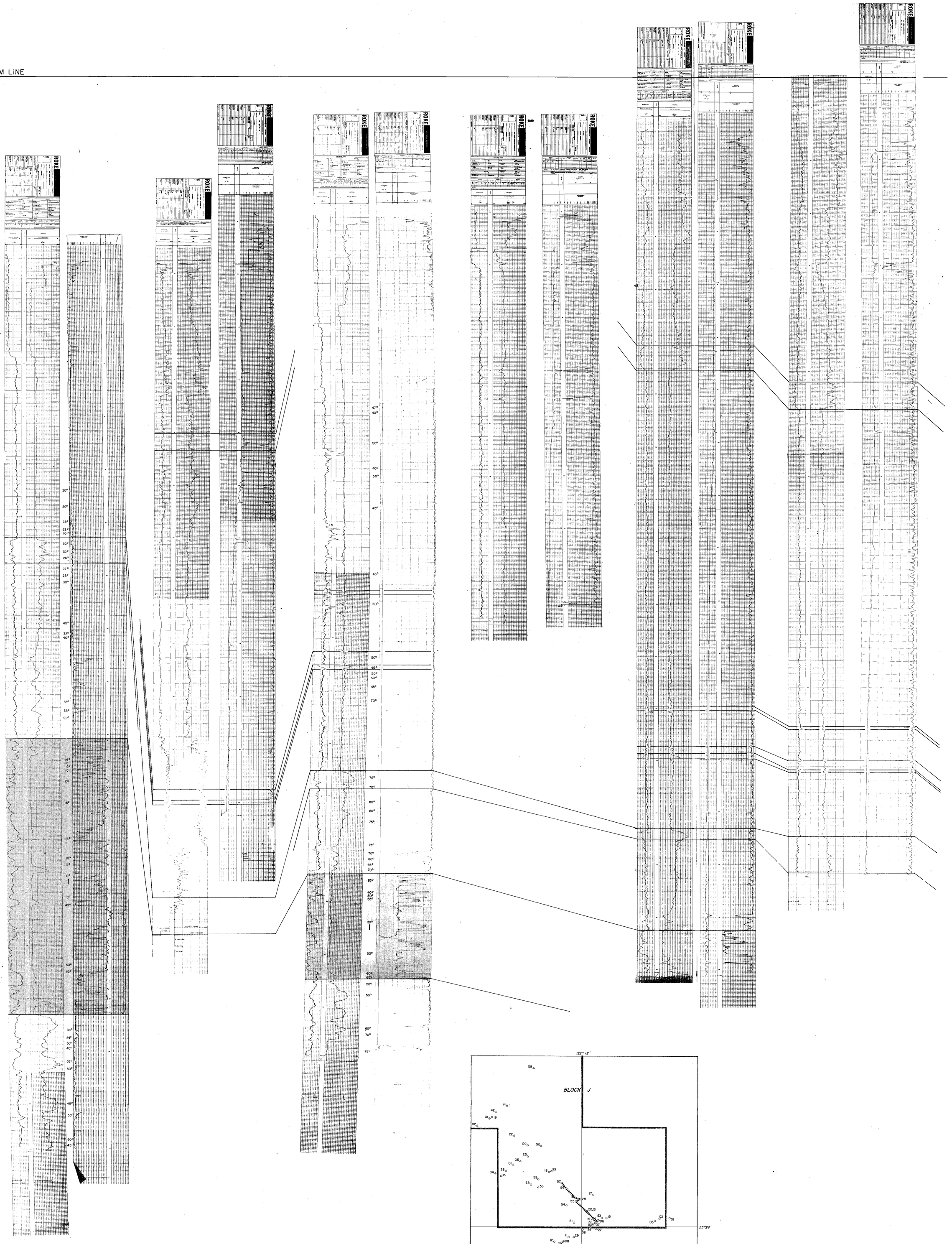
RDH 80-16
ELEV. 1049.26 m

RDH 80-56
ELEV. 1081.80 m

RDH 80-57
ELEV. 1089.80 m

555 m | 85 m | 104 m | 256 m | 120 m

DATUM LINE



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APPENDIX A PART 3

PR. Goodrich 81(a)(b)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
AXIS SYNCLINE - WEST LIMB (SHT. 1)

PREPARED BY: C.W., H.D.Z.	SCALE: 1 : 400	DRAWING No. 94
APPROVED BY: H.D.Z.	DATE: JAN. 1982	

DDH 81-18
ELEV. 1118.40 m

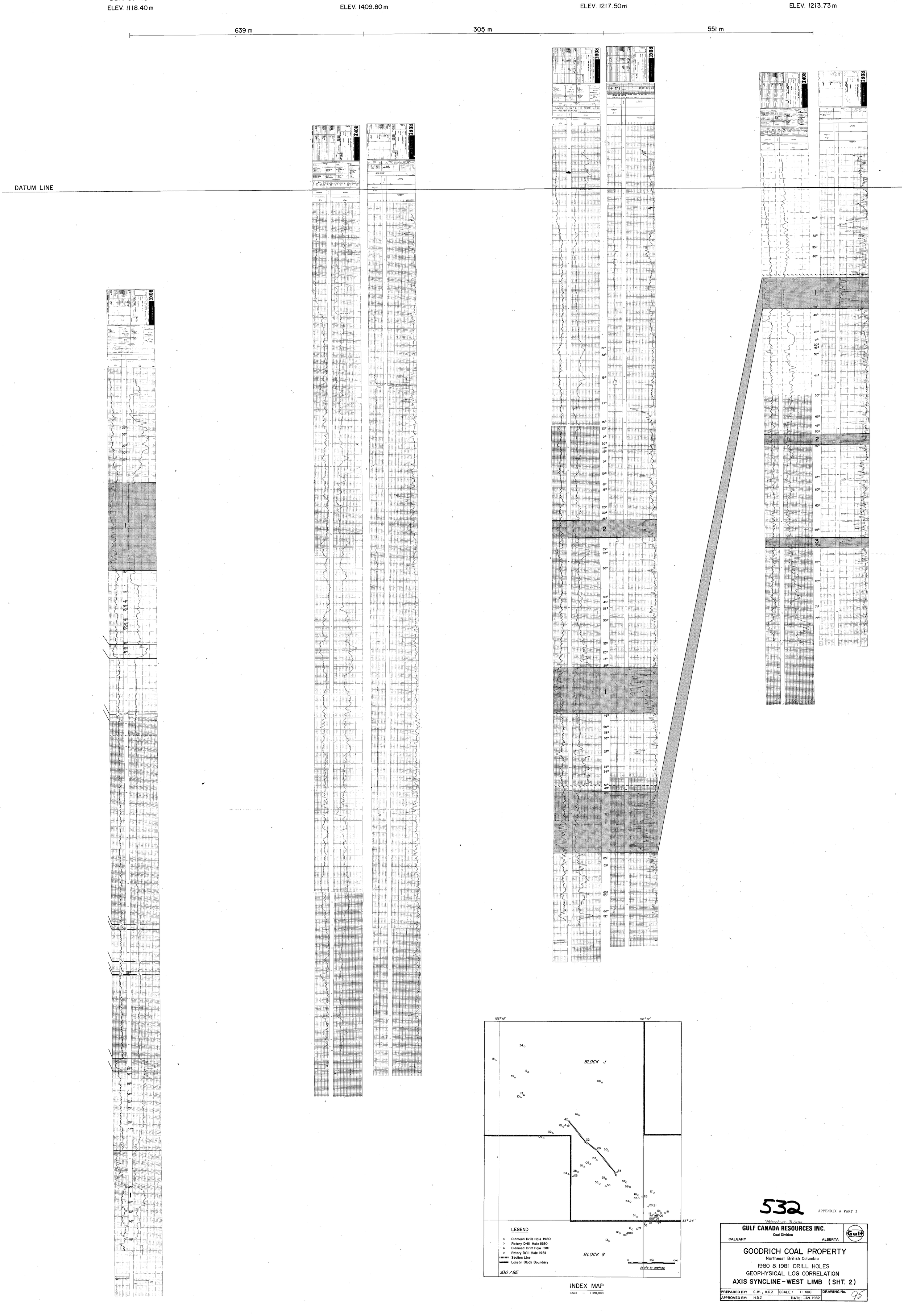
RDH 81-09
ELEV. 1409.80 m

DDH 81-22
ELEV. 1217.50 m

DDH 80-42
ELEV. 1213.73 m

639 m | 305 m | 551 m

DATUM LINE



INDEX MAP
scale — 1:20,000

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APPENDIX A PART 3

Prepared 81/09

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
AXIS SYNCLINE – WEST LIMB (SHT. 2)

PREPARED BY: C.W., H.D.Z.	SCALE: 1:400	DRAWING No.	95
APPROVED BY: H.D.Z.	DATE: JAN. 1982		

RDH 80-08
ELEV. 1029.91 m

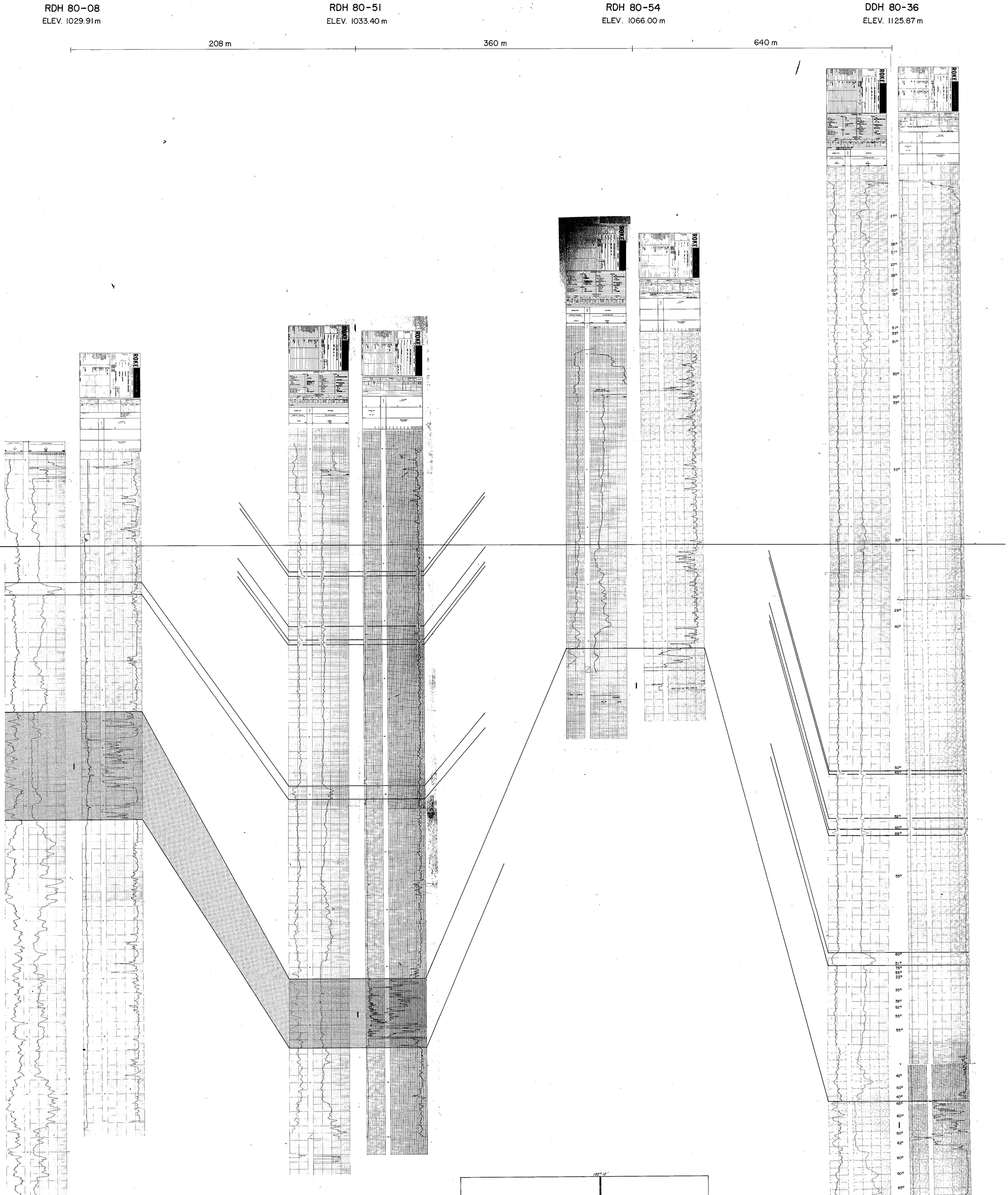
RDH 80-51
ELEV. 1033.40 m

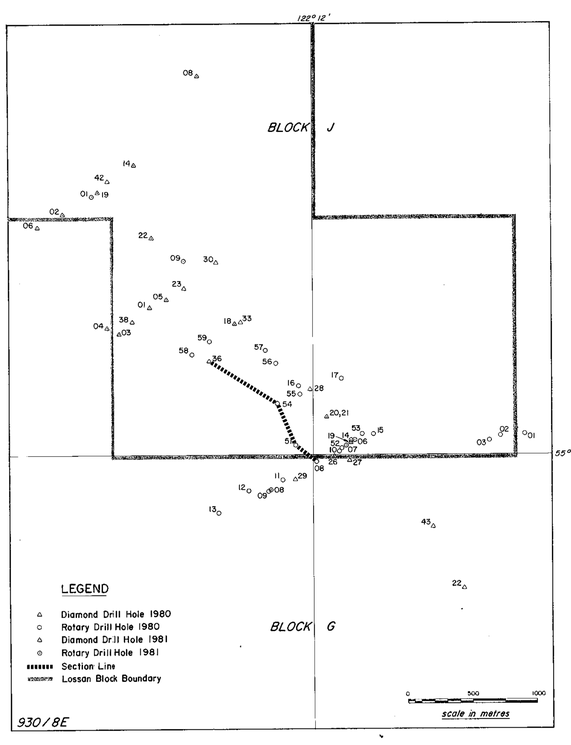
RDH 80-54
ELEV. 1066.00 m

DDH 80-36
ELEV. 1125.87 m

208 m | 360 m | 640 m

DATUM LINE





INDEX MAP
scale – 1 : 20,000

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APPENDIX A PART 3

PR Goodrich 81(a)a

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia
1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION
LOSSAN SYNCLINE – EAST LIMB (SHT. 1)

PREPARED BY: C.W., H.D.Z.	SCALE : 1 : 400	DRAWING No.	96
APPROVED BY: H.D.Z.	DATE: JAN. '82		

INDEX MAP
scale — 1 : 20,000

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APPENDIX A PART 3

PR Goodrich 81(2)A

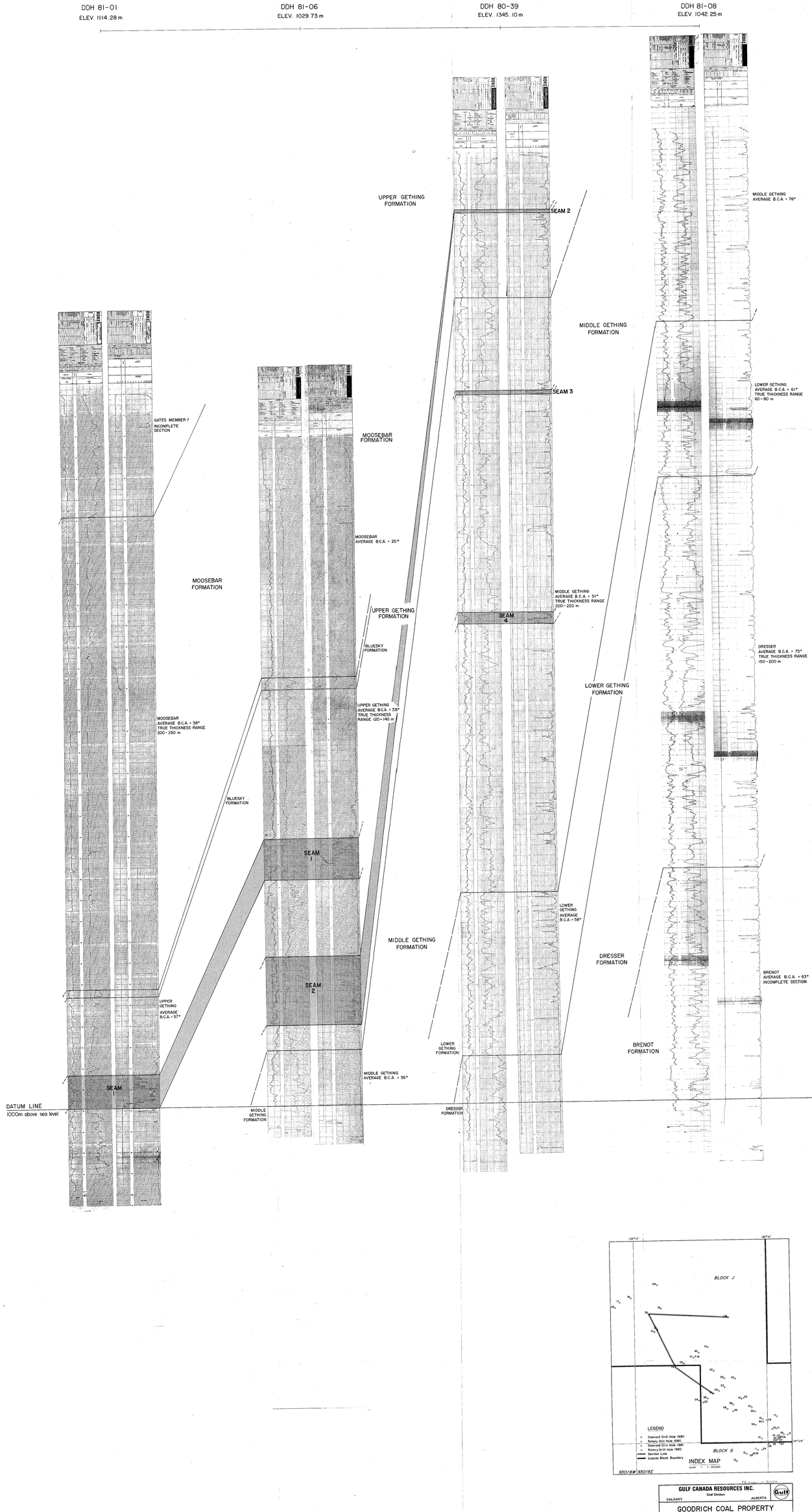
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

1980 & 1981 DRILL HOLES
GEOPHYSICAL LOG CORRELATION

LOSSAN SYNCLINE – EAST LIMB (SHT. 2)

PREPARED BY: C.W., H.D.Z.	SCALE: 1 : 400	DRAWING No. 91
APPROVED BY: H.D.Z.	DATE: JAN. 82	



GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

GOODRICH COAL PROPERTY
Northeast British Columbia

TYPICAL GEOPHYSICAL LOG
RESPONSE OF FORMATION STRATIGRAPHY

PREPARED BY:	A.R.	SCALE : 1 : 400	DRAWING No. 98
APPROVED BY:	R.S.Z.	DATE: JAN. 1982	

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