

710



MOUNT KLAPPAN
COAL PROJECT
GEOLOGICAL REPORT
SUMMIT - NASS - SKEENA
AREA
1984

GEOLOGICAL REPORT

APPENDIX I

1:50 000 MAPS

1:200 MEASURED SECTIONS

GULF CANADA RESOURCES INC.

COAL DIVISION

MOUNT KLAPPAN COAL PROJECT
GEOLOGICAL REPORT

1984

SUMMIT - NASS - SKEENA
AREA



GULF CANADA RESOURCES INC.

COAL DIVISION

710

GULF CANADA RESOURCES INC.

Mount Klappan Coal Project Geological Report
Summit-Nass-Skeena Area

1984

Coal Project Licence Numbers

7118 to 7177

7381 to 7392

7416 to 7432

7487 to 7539

7559 to 7561

and

7714 to 7757

Cassiar Land District

NTS Map Number 104 H

Latitude Between $57^{\circ} 06'$ and $57^{\circ} 23'$
Longitudes Between $128^{\circ} 37' 30''$ and $129^{\circ} 15'$

Gulf Canada Resources Inc.

January, 1985

PREFACE

To simplify formal report writing procedures during the 1984 exploration program, the property was divided into five areas. As a result three separately bound reports have been completed and are named the Lost-Fox, the Hobbit-Broatch, and the Summit-Nass-Skeena Geological Reports. Each report compiles all previous area specific exploration data into a common text.

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Appendix III

Volume I: Diamond Drill Hole Data and Coal Quality
Volume II: Coal Trench Data and Coal Quality ✓

✓ } PAGES
CONTAINING
CONFIDENTIAL
DATA HAVE
BEEN SEPERATED
FROM REPORT

APPENDIX I

1:50 000 Maps and Measured Sections

Drawing No.

1:50 000 Maps:

1984 Geology Map	KPN84A01 ✓
1984 Coal Resource Map	KPN84A02 ✓
1984 Coal Licence Map	KPN84B01 ✓
1984 Traverse Location Map	KPN84B02 ✓
1984 Trench Location Map	KPN84A05 ✓

Measured Sections:

KPNSNOTC84001
KPNNROTC84002
KPNSNOTC84003 ✓
KPSS0TC84004 ✓
KPSS0TC84005 ✓
KPSS0TC84006 ✓
KPSS0TC84007 ✓
KPNNROTC84008 ✓

APPENDIX II

GEOLOGY MAPS AND CROSS-SECTIONS

Summit Area			Drawing Number		
1:5 000	Map	J10 ✓	KPN84SU-21		
		J11 ✓	KPN84SU-22		
		J12 ✓	KPN84SU-23		
		K10 ✓	KPN84SU-24		
		K11 ✓	KPN84SU-25		
		K12 ✓	KPN84SU-26		
		L10 ✓	KPN84SU-27		
		L11 ✓	KPN84SU-28		
		L12 ✓	KPN84SU-29		
		M11 ✓	KPN84SU-30		
		M12 ✓	KPN84SU-31		
		1:10 000	Map	104 H/6 G ✓	KPN84SU-41
				104 H/6 H ✓	KPN84SU-42
104 H/6 B ✓	KPN84SU-43				
104 H/6 A, 104 H/7D ✓	KPN84SU-44				
1:5 000	Cross-Section	15 000 N (E+W) ✓	KPN84SU-51		
		13 000 N (E+W) ✓	KPN84SU-52		
		11 000 N (E+W) ✓	KPN84SU-53		
		10 500 N (E+W) ✓	KPN84SU-54		
		10 000 N (E+W) ✓	KPN84SU-55		
		9 500 N (E+W) ✓	KPN84SU-56		
		9 000 N (E+W) ✓	KPN84SU-57		
		7 000 N (E+W) ✓	KPN84SU-58		
		6 000 N (E+W) ✓	KPN84SU-59		
		5 500 N (E+W) ✓	KPN84SU-60		
1:10 000	Cross-Section	27 000 N (W) ✓	KPN84SU-61		
		25 000 N (W) ✓	KPN84SU-62		
		23 000 N (E+W) ✓	KPN84SU-63		
		21 000 N (E+W) ✓	KPN84SU-64		
		19 000 N (E+W) ✓	KPN84SU-65		
		17 000 N (E+W) ✓	KPN84SU-66		
		15 000 N (E+W) ✓	KPN84SU-67		
		13 000 N (E+W) ✓	KPN84SU-68		

Nass Area

**Drawing
Number**

1:5 000	Map	F12	KPN84NA-21
		F13	KPN84NA-22
		F14	KPN84NA-23
		G10	KPN84NA-24
		G11	KPN84NA-25
		G12	KPN84NA-26
		G13	KPN84NA-27
		G14	KPN84NA-28
		G15	KPN84NA-29
		H10	KPN84NA-30
		H11	KPN84NA-31
		H12	KPN84NA-32
		H13	KPN84NA-33
		H14	KPN84NA-34
		H15	KPN84NA-35
		I11	KPN84NA-36
		I12	KPN84NA-37
		I13	KPN84NA-38
		I14	KPN84NA-39
		I15	KPN84NA-40
		J13	KPN84NA-41
		J14	KPN84NA-42

1:5 000 Cross-Section

11 000 N (W)	KPN84NA-51
9 000 N (W)	KPN84NA-52
7 000 N (W)	KPN84NA-53
5 000 N (W)	KPN84NA-54
3 000 N (W)	KPN84NA-55
1 000 N (W)	KPN84NA-56
1 000 S (W)	KPN84NA-57

Skeena Area

Drawing
Number

1:5 000	Map	E4	KPN84SK-21
		E5	KPN84SK-22
		E6	KPN84SK-23
		E7	KPN84SK-24
		F4	KPN84SK-25
		F5	KPN84SK-26
		F6	KPN84SK-27
		F7	KPN84SK-28
		F8	KPN84SK-29
		G4	KPN84SK-30
		G5	KPN84SK-31
		G6	KPN84SK-32
		G7	KPN84SK-33
		G8	KPN84SK-34
		G9	KPN84SK-35
1:10 000	Map	104 H/2 G, J	KPN84SK-41
1:5 000	Cross-Section		
		3 000 S (W)	KPN84SK-51
		5 000 S (W)	KPN84SK-52
		7 000 S (W)	KPN84SK-53
		9 000 S (W)	KPN84SK-54
		11 000 S (E+W)	KPN84SK-55
		13 000 S (E+W)	KPN84SK-56
		15 000 S (E+W)	KPN84SK-57
		17 000 S (E+W)	KPN84SK-58
		19 000 S (E+W)	KPN84SK-59
1:10 000	Cross-Section		
		13 000 S (E)	KPN84SK-60
		15 000 S (E)	KPN84SK-61

APPENDIX III
VOLUME I

DIAMOND DRILL HOLE DATA
AND
COAL QUALITY

Location Map
Data Source Summary
Generalized Strip Log
Lithologic Description
Sample Summary
Apparent and True Thickness Coal Seam Data Sheets
 Coal Quality Analyses
Drill Hole Strip Log (1:200)
Geophysical Logs (Deviation, printout and plot, 1:40, 1:200)

APPENDIX III
VOLUME II

TRENCH DATA AND COAL QUALITY

Summit Area

Location Map
Header Data
Sample Summary
Trench Logs
 Trench Description
 Head Analysis
 Reflectance

Nass Area

Location Map
Header Data
Sample Summary
Trench Logs
 Trench Description
 Head Analysis
 Reflectance

Skeena Area

Location Map
Header Data
Sample Summary
Trench Logs
 Trench Description
 Head Analysis
 Reflectance

1.0 SUMMARY

Gulf Canada Resources Inc. Mount Klappan Coal Project is located in the Bowser Basin of northwestern British Columbia, approximately 228 kilometers north of Smithers and 150 kilometers northeast of Stewart. The property is composed of 189 crown coal licences totalling 50 014 hectares of land.

To facilitate expanded exploration and subsequent logistics in 1984, the Mount Klappan property was divided into three main areas: the Lost-Fox Area, the Hobbit-Broatch Area and the Summit-Nass-Skeena Area, the latter to which this report pertains. Two separate reports covering exploration activities on the other areas have also been completed.

Combined exploration activity on the Mount Klappan property during 1984 comprised eight diamond drill holes totalling 1507 metres, 17 rotary drill holes totalling 897 metres and 233 mechanical and hand trenches totalling 1457 metres. New air photo coverage was produced for the Lost-Fox and Hobbit-Broatch Areas at scales of 1:8 000 and 1:20 000. The property was mapped at scales of 1:2500 and 1:5 000 or 1:10 000 of which the latter two pertain to the Summit-Nass-Skeena Area. Geologic mapping was the primary concern in the Summit-Nass-Skeena Area involving aerial reconnaissance and ground traverses in both unmapped and previously mapped regions surrounding the Lost-Fox and Hobbit-Broatch Areas.

The sediments underlying the property have been subdivided into the following four sequences; the Spatsizi, Klappan, Malloch and Rhondda, in ascending order. These exploration units range in age from

Upper Jurassic to Lower Cretaceous, respectively. The Klappan Sequence is the main coal-bearing unit and is presently interpreted as ranging from 400 to 900 metres thick. The Summit-Nass-Skeena Area has exposures of all 4 sequences though the Klappan is by far the most predominant. In further defining these sequences, measured sections were logged and resulted in a better understanding of the transitional nature of the Klappan contacts. In addition, thin section work and flora and fauna sample identifications will occur in the upcoming year in hopes that mineralogical variations, depositional environments or key fossils may also aid in defining the stratigraphy.

Structurally, the area has been subjected to two phases of compressional deformation resulting in northwest-southeasterly trending folds of the first phase and either north-south or east-west trending folds of the second phase. Generally, thrust faults can be associated with both compressional episodes but, on a lesser scale, any normal or strike-slip faults are a result of second phase folding only.

The Mount Klappan property contains a total resource of 5.3 billion tonnes of coal based on up to 16 seams ranging in thickness up to 8.13 metres. The Summit-Nass-Skeena Area contributes 3 214 million tonnes of the total resource on the Mount Klappan Property of which 41.4 million tonnes is inferred and the remainder is designated as speculative.

COAL RESOURCES
(in millions of tonnes)

	Mount Klappan Property	Summit-Nass-Skeena Area
Measured	43.9	
Indicated	69.7	
Inferred	623.1	41.4
Speculative	4 622.4	3 214.1

The Mount Klappan coal is an anthracite and can be cleaned to simultaneously produce a variety of sized products ranging in ash content from 5 percent ash premium coals to briquetting coals of 25 percent ash or greater. The anthracite products are characterized by low sulphur values (less than 1% and usually 0.5%), high calorific values and only traces of chlorine.

Coal samples collected in the Summit-Nass-Skeena Area were analysed for proximate, sulphur and calorific values as well as for reflectance determinations. No washability studies were undertaken. The reflectance values were used as an aid in determining the stratigraphic positioning of various outcrops.

2.0 RECOMMENDATIONS

Based on the exploration work completed in the Summit-Nass-Skeena Area of the Mount Klappan Coal Project, the following recommendations are suggested:

1. to further evaluate the resource potential of the Summit and Nass Areas utilizing the better understanding of the property geology and coal quality,
2. to further define the property stratigraphy using a combination of lithologic, environmental, reflectance and measured section information,
3. to initiate a mechanical trenching program in the Summit Area to trace seams in the two northernmost resource areas,
4. to geologically map the additional licences applied for in the Nass and Summit Areas.

3.0 INTRODUCTION

3.1 Mount Klappan Coal Project

3.1.1 Location

The Mount Klappan coal licences are situated in northwest British Columbia approximately 930 kilometers north of Vancouver, 150 kilometres northeast of Stewart and 530 kilometers northwest of Prince George (Figure 3.1).

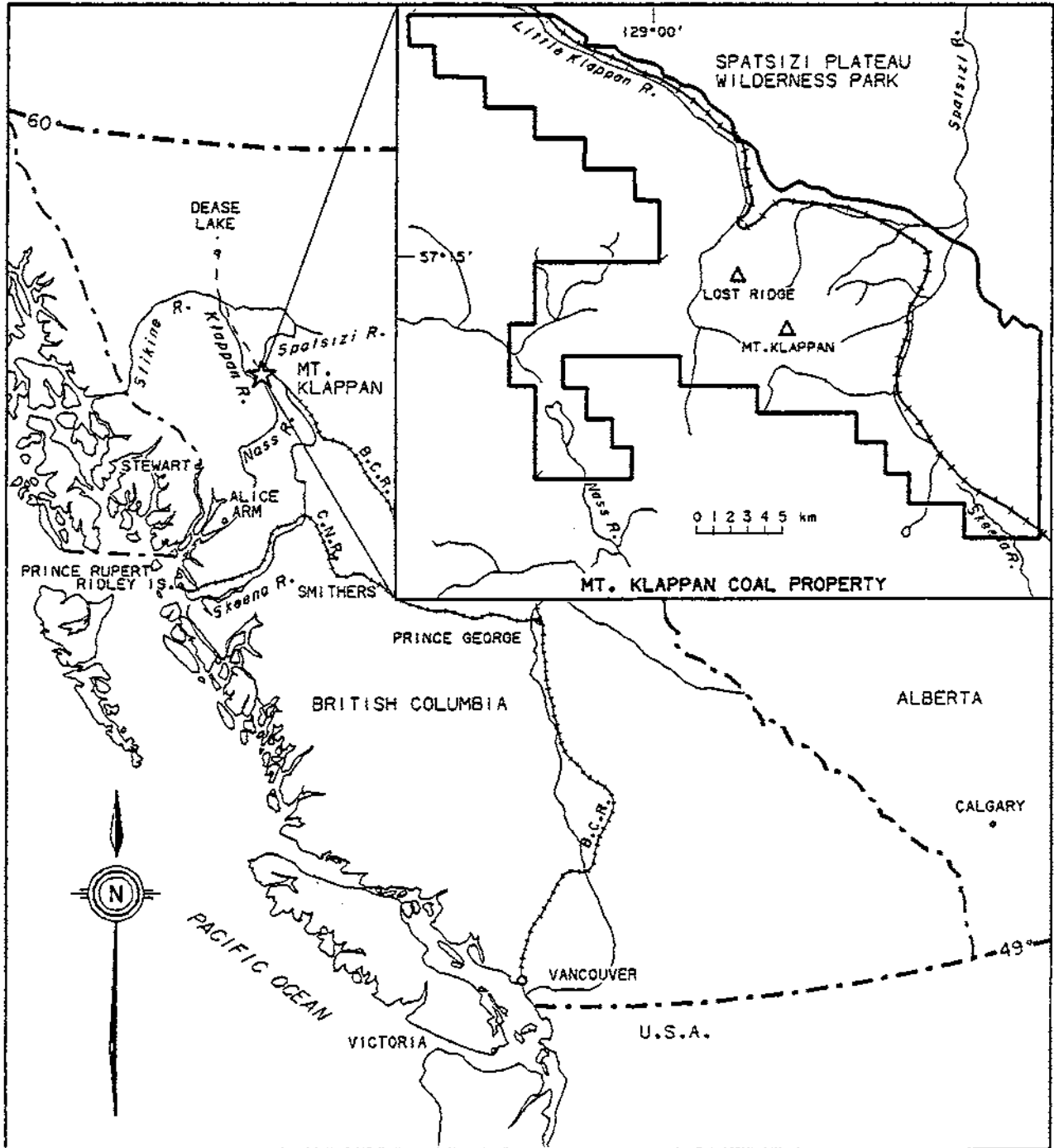
Geographically the coal licences are at the northern extremity of the Skeena Mountains between 57° 06' and 57° 23' north latitude, and 128° 37' and 129° 15' west longitude. The property covers the headwaters of the Klappan, Little Klappan, Spatsizi, Skeena and Nass Rivers.

The nearest community to the property is the native community of Iskut (population 500) located 100 kilometers to the northwest on the Stewart-Cassier Highway.

3.1.2 Access

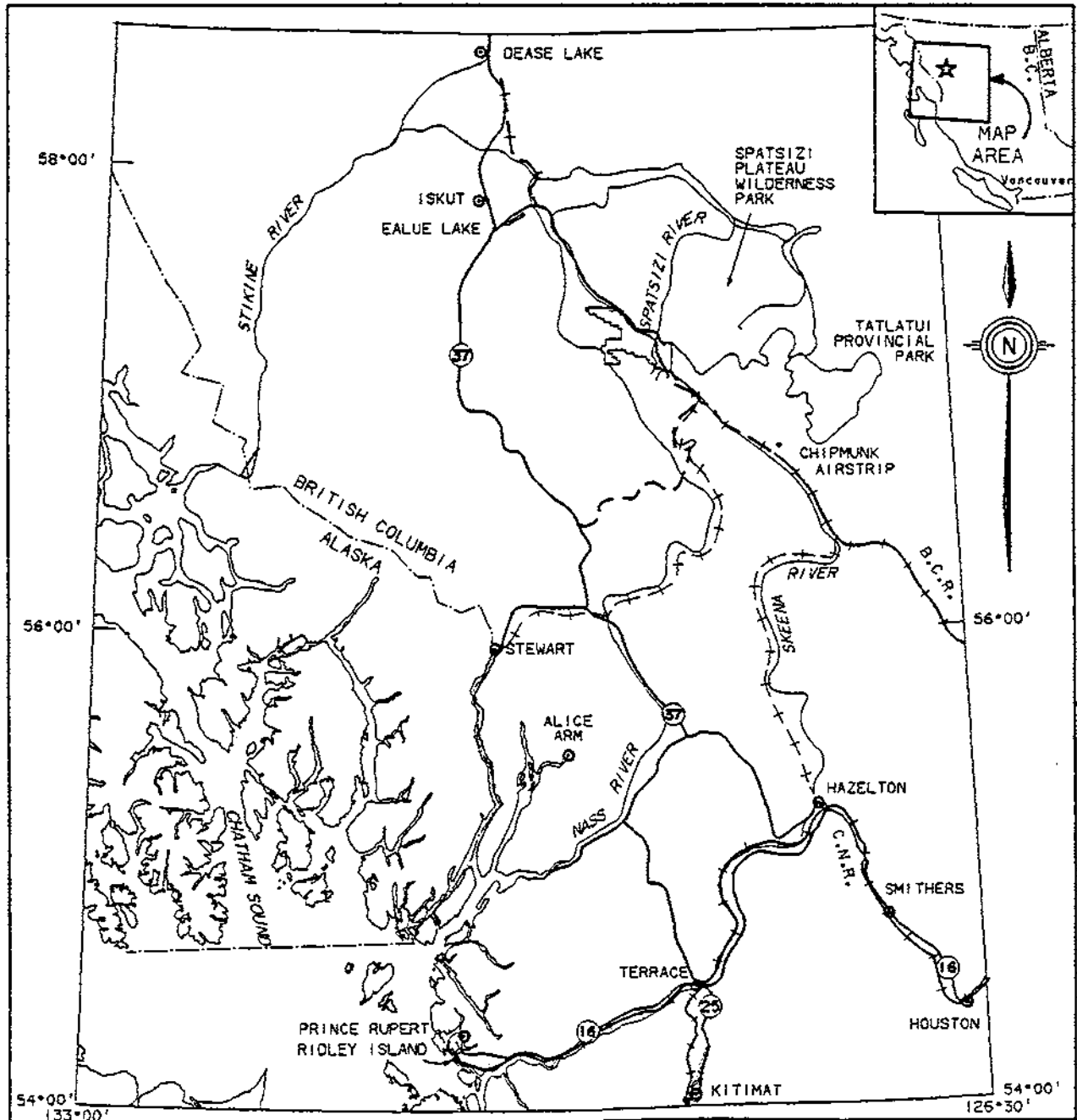
The Mount Klappan property straddles the partially completed British Columbia Railway line between Prince George and Dease Lake (Figure 3.2). Prior to cessation of work on the construction of the line, steel was laid to within 80 kilometers of the property. With the exception of a 24 kilometer stretch north of the Klumatantan River, the subgrade was constructed through and beyond the property to the

FIGURE 3.1
MOUNT KLAPPAN COAL PROPERTY
LOCATION MAP



<p>— MT. KLAPPAN LICENCE AREA</p>	<p>GULF CANADA RESOURCES INC. 10/01/85</p>
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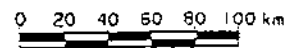
FIGURE 3.2 MOUNT KLAPPAN COAL PROPERTY PROPERTY ACCESS



LEGEND

- ROAD ACCESS
- - - PROPOSED ROAD ACCESS
- + + + EXISTING RAILWAY
- - - EXISTING RAILWAY SUBGRADE
- + + + POSSIBLE RAILWAY ROUTES
- MT. KLAPPAN LICENCE AREA

SCALE



Stikine River just south of Dease Lake.

Road access to the property from Highway 37 via the Ealue Lake road, is provided along the British Columbia subgrade. Road distances from Terrace and Stewart to the property are 575 kilometers and 426 kilometers respectively. A 1000 metre gravel airstrip is located on the property.

3.1.3 Property Description

The Mount Klappan property comprises 189 coal licences totalling 50 014 hectares of land. The property was acquired in four separate applications from 1981 to 1984 (Figure 3.3).

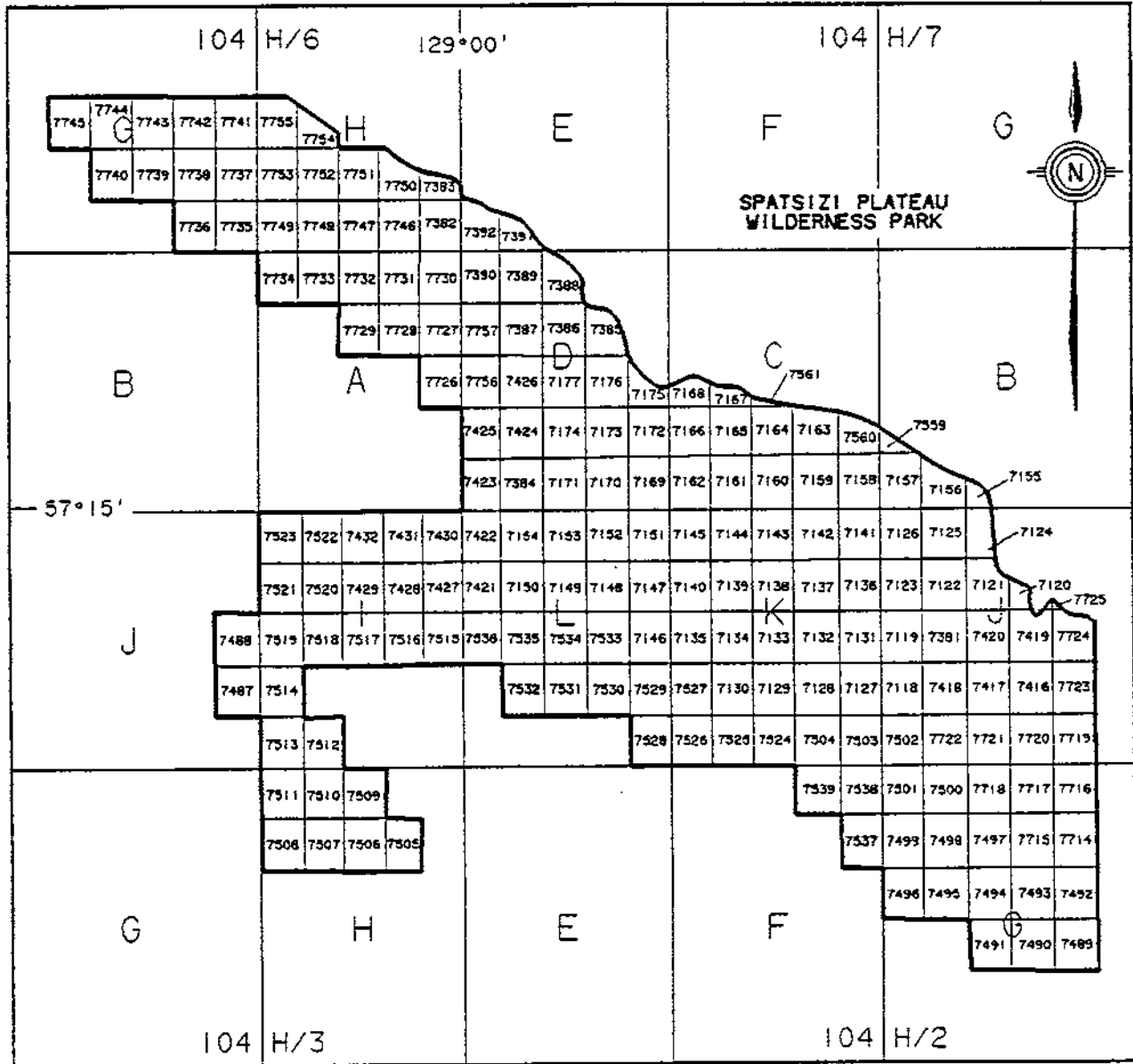
3.1.4 Ownership

Gulf Canada Resources Inc., wholly owns the coal licences comprising the Mount Klappan property.



3.1.5 Property Geography and Biophysical Environment

The Mount Klappan property is located at the headwaters of the Little Klappan, Klappan, Nass, Skeena, and Spatsizi Rivers (Figure 3.1). This area is within the northern extremity of the Skeena Mountains physiographic region. The regional physiography is of mountainous terrain and broad northwest to southeast trending river valleys of the Little Klappan, Klappan, Nass, Spatsizi and Skeena Rivers, and Didene Creek.

FIGURE 3.3 MOUNT KLAPPAN COAL PROPERTY LICENCES




LEGEND

 LICENCE AREA
 LICENCE NUMBER

SCALE

0 1 2 3 4 5 km



GULF CANADA RESOURCES INC.
05/12/84



Elevations on the property range from 1127 metres in the Spatsizi River Valley to over 2000 metres on Mount Klappan and the adjacent ridge tops.

The climatic regime of the area is in the Northern and Central Plateau and Mountain Zone. Precipitation values average 300 to 400 mm per year with the mean daily temperatures comparable to Fort Nelson and Prince George. This information is derived from a weather station located on the northeastern edge of the property. The station has been monitored monthly since its installation three years ago.

Tree line in the area is at approximately 1500 metres. Valley bottoms are partially covered with scattered coniferous forests, grasses, shrubs, meadows, and bogs. The higher elevations are characterized by alpine tundra.

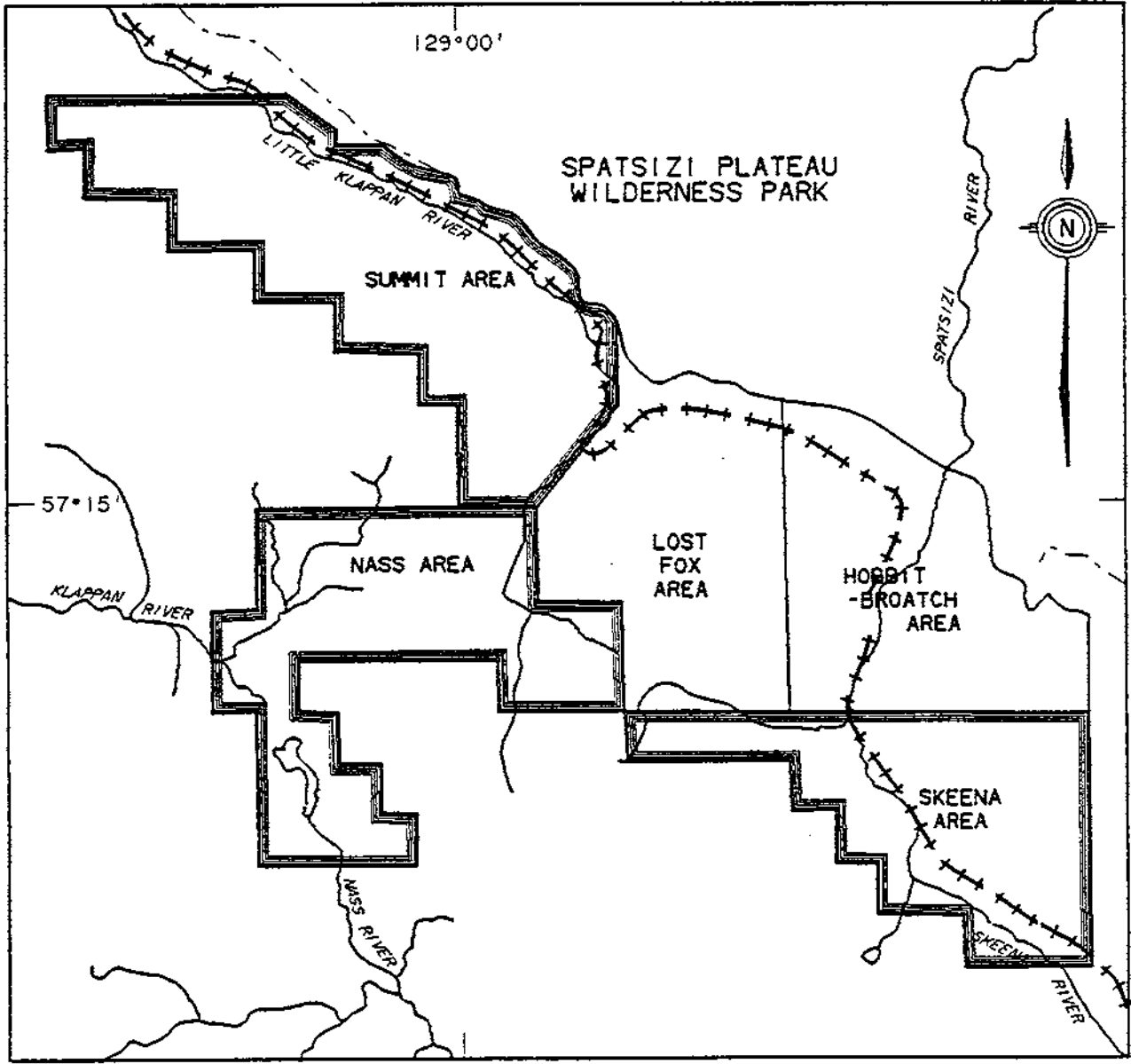
3.2 Summit-Nass-Skeena Area

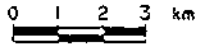

3.2.1 Location

The Summit-Nass-Skeena Area represents those portions of the property to the extreme northwest, southwest and southeast (Figure 3.4).

Both the Nass and Skeena Areas are dominated by the drainage valleys of the Klappan and Nass, and the Skeena Rivers, respectively. The Summit Area is cut by the Little Klappan River to the northeast and is dominated by a series of prominent ridges to the southwest.

FIGURE 3.4
MOUNT KLAPPAN COAL PROPERTY
 SUMMIT - NASS - SKEENA
 1984 EXPLORATION AREAS



<p>LEGEND</p> <ul style="list-style-type: none"> ---+---+--- PREPARED RAIL BED - - - - - PROVINCIAL PARK BOUNDARY ———— LICENCE AREA 	<p>SCALE</p> <p style="text-align: center;">0 1 2 3 km</p>  <p style="text-align: right;">GULF CANADA RESOURCES INC. 10/12/84</p> 
---	---

3.2.2 Access

The low lying portions of the Summit and Skeena Areas are accessible by truck along the British Columbia Railway subgrade. Exploration in the higher elevations of Summit and Skeena, as well as all of Nass, require helicopter support from the Didene Creek Camp.

3.2.3 Area Description

In total, the Summit-Nass-Skeena area comprises 122 coal licences over an area of 33 079.5 hectares. The Summit block contains 52 coal licences and covers an area of 13 410.5 hectares; the Nass block consists of 38 coal licences covering an area of 10 678 hectares and the Skeena block consists of 32 coal licences and covers an area of 8 991 hectares. Appendix B contains a listing of all licences for the Mount Klappan Coal Project.

3.2.4 Biophysical Environment

The regional physiography of the Summit-Nass-Skeena Area is one of mountainous terrain and broad northwest to southeast trending river valleys. The headwaters of the Little Klappan, Klappan, Nass, Skeena and Spatsizi Rivers all occur within the licence boundary.

Treeline in the area is at approximately 1500 metres. Alpine tundra characterizes the higher elevations while the valley floors are partially covered with scattered coniferous forests, grasses, shrubs, meadows and swamps. Elevation ranges from 1250 metres in the Skeena valley to over 2100 metres in the Summit area. Portions of the Summit Area, depending on weather conditions, may remain snow covered year round. Several small ice fields are located just beyond the western property boundary in Summit.

4.0 EXPLORATION HISTORY

4.1 Mount Klappan Coal Project

4.1.1 Exploration Prior to Gulf's Acquisition

V.H. Dupont made the first published description of coal in the Northern Bowser Basin in 1900 for the Canadian Department of Railways and Canals. In his report, he describes a coal outcrop near the confluence of Didene Creek and the Spatsizi River. This outcrop is now recognized as part of the Klappan Sequence coal occurrences.

The Geological Survey of Canada has initiated five exploration programs into the area. The first, in 1911, was led by G.S. Malloch (Malloch, 1914) who undertook a geological evaluation of the Bowser Basin concentrating 55 miles to the south of Mount Klappan in the Groundhog Coal Measures. The second, in 1948, was led by Buckham and Latour (Buckham and Latour, 1950) which also concentrated in the Groundhog area. The third study in 1957 was called "Operation Stikine". The fourth and fifth programs, which broadly covered the Klappan Coal Measures, were led by Eisbacher in 1974 and in 1981. These studies resulted in some of the first stratigraphic and structural interpretations of the area. In addition, Eisbacher tried to relate the depositional history of the Bowser Basin to the tectonic history of the area.

In 1979, Richards and Gilchrist from the B.C. Department of Mines published stratigraphic studies primarily in the Groundhog area. However, they also included reference to the coal sequences of the Northern Bowser Basin.

Further interest in the Klappan coal occurrences during the late 1970's resulted in both Esso Minerals and Petrofina acquiring licences in the area. These licences were allowed to lapse in 1980 following minimal geological exploration of the area.

Initially, Gulf entered the Bowser Basin in 1979 concentrating in the Panorama-Groundhog Coal Measures. This was followed in 1981 by the acquisition of the Mount Klappan property.

4.1.2 Summary of Exploration 1981-1983

Prior to 1984, Gulf undertook three separate exploration programs on the Mount Klappan property. The exploration included geological mapping, hand trenching, diamond drilling and adit driveage (Table 4.1). The results of these exploration activities have been documented in three separate reports: Mount Klappan Coal Project - Geological Report 1981, 1982 and 1983.

Table 4.1

MOUNT KLAPPAN COAL PROJECT
EXPLORATION SUMMARY
1981 - 1983

	1981	1982	1983	Total	
Adits					
Number	--	--	1	1	Adit
Tonnes	--	--	39.2	39.2	Tonnes
Diamond Drill Holes					
Number (HQ)	--	7	3	10	Diamond Drill Holes
Total Metres	--	1223	603	1 826	Metres
Number (AIX)	--	--	6	6	Winkie Drill Holes
Total Metres	--	--	126	126	Metres
Hand Trenching					
Number	24	51	93	168	Hand Trenches
Total Metres	89	289	527	905	Metres
Geological Mapping					
Scales	1:10 000	1:10 000	1:5 000		
			1:10 000		

4.2 Summit - Nass - Skeena Area

4.2.1 Summary of Exploration 1981-1983

The majority of exploration work completed in the Summit-Nass-Skeena Area between 1981 and 1983 has involved geologic mapping, coal seam trenching, air photo interpretation and some diamond drilling. These activities are summarized on Table 4.2.

The trench and drill hole information collected during this three year period is included within this report.

5.0 1984 EXPLORATION PROGRAM

5.1 Program Objectives

In summary, the objectives of the 1984 Summit-Nass-Skeena Area exploration program were:

1. To geologically map the Summit-Nass-Skeena Area at a 1:5,000 or 1:10,000 scale.
2. To delineate the surface exposure of all coal occurrences through hand trenching and detailed mapping.
3. To further define the property stratigraphies.
4. To delineate areas with surface mineable coal potential.

5.2 Summary of Exploration

5.2.1 Mount Klappan Coal Project

In four years of exploration programs on the Mount Klappan property, Gulf has advanced through regional investigations to seam tracing, drilling, and adit driveage. While new areas are constantly being investigated, intense exploration is proceeding on those areas which have immediate economic interest. During 1984, geological mapping and hand trenching were undertaken on all areas of the property. In addition, diamond and rotary drilling, mechanical trenching and seam tracing were undertaken in the Lost-Fox and Hobbit-Broatch Areas. (Table 5.1).

Table 5.1
MOUNT KLAPPAN COAL PROJECT
EXPLORATION SUMMARY
1984

	<u>1984</u>	<u>1981 - 1984 Total</u>	
Diamond Drill Holes Number (HQ)	8	18	Diamond Drill Holes
Total Metres	1507	3333	Metres
Rotary Drill Holes Number (HQ)	17	17	Rotary Drill Holes
Total Metres	897	897	Metres
Mechanical Trenches (Seam Tracing) Number	128	128	Mechanical Trenches
Total Metres	1041	1041	Metres
Hand Trenches Number	95	263	Hand Trenches
Total Metres	416	1321	Metres
Geological Mapping Scales	1:2 500 1:5000 1:10 000		

During the first three years, the exploration programs were supported by air transport and personnel were housed in tent camps. In early 1984 Gulf constructed three bridges along the British Columbia Railway subgrade providing road access to the property from Highway 37. Gulf purchased and erected a trailer camp along the subgrade 10 kilometers south of the Summit Airstrip, next to Didene Creek. The Didene Creek Camp (Figure 3.5) provided lodging and working space for over 50 Gulf and support personnel throughout the exploration program. The construction of a road, to facilitate exploration of the Lost-Fox Area commenced in mid-November and was completed by mid-December. Construction and support personnel were based in the Didene Creek Camp.

During the 1984 exploration program, geological as well as drill and support crews were transported to their work stations from camp by helicopter when road access was not available. A Hughes 500D, as well as a Bell 206B on occasion, were used for crew transport within the property area. A larger Bell 204 or 205 helicopter was utilized for transporting heavy equipment and drilling rigs. At all times a helicopter was available on site equipped with a stretcher carrying kit for medical emergencies. A four wheel drive Emergency Transportation Vehicle was on standby at all times. Four wheel drive trucks were used for crew transport where the B.C.R. subgrade provided access to areas of activity (Figure 3.3).

Commerical, as well as charter fixed wing aircraft, linked the Summit Airstrip on the property to major centres providing convenient air transportation for personnel and cargo throughout the exploration program.

5.2.2 Summit-Nass-Skeena Area

During the 1984 field program each of the three blocks of the Summit-Nass-Skeena Area were explored using both ground traverses (Appendix I - Drawing No. KPN84B02) and aerial reconnaissance. A brief summary of the resulting mapping and trenching activities is outlined in Table 5.2.

The 1984 Summit-Nass-Skeena Area Geological Report contains all the accumulated exploration data from drilling, trenching and measured sections collected, to date, within these mapping areas.

5.3 Cartography

The topographic maps used for geological interpretation were on scales of 1:5 000 and 1:10 000. The 1:5 000 scale maps were produced from 1:30 000 British Columbia Government airphotos flown before the subgrade construction. In the fall of 1982, Gulf Canada Resources Inc. had the Mount Klappan property re flown at a scale of 1:30 000.

Additional 1:10 000 map coverage was used in areas lacking 1:5000 coverage and was provided by enlarging 1:50 000 government topographic maps.

Table 5.2
 SUMMIT-NASS-SKEENA AREA
 EXPLORATION SUMMARY
 1984

	<u>1984</u>	<u>1981 - 1984 Total</u>
Diamond Drill Holes		
Number (HQ)	--	2
Total Metres	--	322.8
Hand Trenches		
Number	32	80*
Total Metres	132.2	425.7
Measured Sections		
Number	8	8
Total Metres	1368.0	1368.0
Geological Mapping Scale	1:5000, 1:10,000	

*Includes four trenches that have been relogged.

5.4 Geological Mapping

Reconnaissance and detailed mapping were carried out at scales of 1:5,000 and 1:10,000. Geologic mapping concentrated in areas of high coal potential, primarily the southern Summit Area and the northern Nass Area.

Three crews, each consisting of a geologist and a geological assistant, were jointly responsible for the Summit-Nass-Skeena Area.

Transportation to the field was provided by either helicopter or, if possible, truck. Position location in the field was determined through the use of airphotos.

Geological maps and cross-sections are included in Appendix II of this report.

5.5 Trenching

Thirty-two hand trenches were excavated during the exploration program (Appendix I, Drawing No. KPN84A05) comprising a total length of 134.2 metres. Trenches were dug during routine traverses, were logged true thickness and the coal seams sampled for later analysis. Only those seams in excess of 0.5 metres were considered.

All trench information from this and previous years work are presented in Appendix III Volume II together with any coal quality analyses conducted on collected samples. Trench summary tables are presented for each area within Section 6.0 of this report.

5.6 Data Management

During the 1984 field season, an HP 9816 computer was used in the field for budget purposes and for the storage of trench and measured section data. This data was then uploaded to Gulf's main Coal Data Base. All data stored to date in Calgary is accessible using Gulf's AMDAHL V6 computer. The data stored includes detailed logs of each measured section and trench, complete descriptions of all samples collected and all coal quality and washability data. The coal data base utilizes the System 2000 data base management system and Act 1 software to provide easy on-line data entry and screen retrieval of stored data.

5.7 Reclamation

Only very minor environmental disturbance resulted from the exploration program in the Summit-Nass-Skeena Area. All trenches that were excavated have been backfilled. The permanent trailer camp constructed on a gravel site near Didene Creek was entirely self contained. Refuse which could not be incinerated was buried in a designated area within the camp boundary.

5.8 Additional Studies

Data and samples were collected from throughout the Mount Klappan property for paleontological and sedimentological studies. Results will be available in early 1985 and will be incorporated into an exploration approach for upcoming field seasons.

5.9 Project Management and Contractors

The 1984 exploration program was managed by B.P. Flynn of Gulf Canada Resources Inc. Field operations in the Summit-Nass-Skeena Area were supervised by E. Swanbergson with assistance from S. McKenzie. Coal quality analyses were interpreted by J. Innis and conducted by Loring Laboratories. Coal petrology studies were performed by D.E. Pearson and Associates Ltd. The report was written by E. Swanbergson and S. McKenzie.

The following additional personnel contributed to the exploration in the Summit-Nass-Skeena Area.

B.P. Flynn	Coordinator, Coal Projects
E. Swanbergson	Geologist
F.S. McKenzie	Geologist
G. Dix	Geologist
S. Dakin	Geological Assistant
R. Kong	Geological Assistant
L. Savoie	Geological Assistant
S. Fawcett	Geological Assistant
A. Sali	Administrator
G. Gillik	Helicopter Pilot
C. Earle	Field Accountant
T. Sampietro	Expeditor
C. Jacobs	Camp Maintenance

R. Bonag	Cook
D. Anderson	Cooks' Helper
D. Pederson	Bull Cook
J. Majetic	Bull Cook
S. Bregazzi	Computer Operator
G. Barclay	First Aid Attendent
D. Fedderly	First Aid Attendent
D. Dennis	Trencher
F. Louie	Trencher

The following is a list of the service companies and suppliers used during the Summit-Nass-Skeena Area program.

Services

AGT	Calgary
Avcon Aviation Consulting Ltd.	Calgary
Aero Expediting	Smithers
B.C. Tel	Vancouver
Canadian Freightways Ltd.	Calgary/Terrace
Calgary Shoe Hospital	Calgary
Central Mountain Air Services Ltd.	Smithers
Cullen Detroit Diesel	Houston
Dease Lake Contractors Ltd.	Dease Lake
Dieterich Post	Calgary
Don Davidson Trucking	Smithers
Forty Mile Flats	Iskut
Higgins Lake Contractors	Dawson Creek

Hudson Bay Lodge	Smithers
Iskut Band Council	Iskut
Loring Laboratories Ltd.	Calgary
Lindsay's Cartage & Storage	Terrace
Orville McLean Services Ltd.	Dease Lake
Northern Mountain Helicopters	Prince George
Northwestel Inc.	Whitehorse
Northmount Camp Services Ltd.	Prince George
Pacific Western Airlines	Vancouver
D.E. Pearson and Associates	Victoria
Starr Industries Ltd.	Ft. St. John
Southern Frontier Airlines	Calgary
Smithers Transport	Smithers
Trans Provincial Airlines	Terrace
T & R Services Ltd.	Dease Lake

Suppliers

Alpine Wiring & Plumbing Ltd.	Smithers
Aqua North Plumbing Ltd.	Smithers
Apollo Automotive Parts	Smithers
Able Electric	Terrace
Best Caps & Sportswear Ltd.	Calgary
Chevron Canada Ltd.	Smithers
Fleck Brothers	Kitimat
Gulf Canada Ltd.	Terrace
HGL Data Systems Ltd.	Calgary
Helicom Avionics	Prince George
Iskut Coop	Iskut
ICG Liquid Gas Ltd.	Terrace
Monroe Systems for Business	Calgary

Mountain Equipment Coop	Calgary
Northland Communications	Terrace
Neville Crosby Inc.	Vancouver
Omineca Building Supplies	Terrace
Permasteel Construction	Vancouver
Petrocraft Products Ltd.	Calgary
Ribtor Distributors	Calgary
Smithers Lumber	Smithers
Terrace Builders Centre Ltd.	Terrace
Territorial Trailers Ltd.	Prince George
Terrace Coop Association	Terrace
Terrace Totem Ford	Terrace
Wayside Industrial Supply Ltd.	Smithers
Westcan Electronic Services Ltd.	Calgary

6.0 GEOLOGY

6.1 Summary

The Mount Klappan property lies within the Bowser Basin and is underlain by sediments ranging in age from the Upper Jurassic to the Lower Cretaceous. This sedimentary package has been subdivided into four informal exploration sequences which are, in ascending order, the Spatsizi, Klappan, Malloch and Rhondda Sequences. The main coal-bearing unit is the Klappan Sequence which ranges in thickness from 400 - 900 metres and underlies the majority of the property.

The exploration of the Summit-Nass-Skeena Area comprised geological mapping, at scales of 1:5 000 or 1:10 000, and the manual excavation of coal exposures to determine seam thickness and quality parameters. Most of the coals delineated correlate to the basal half of the Klappan Sequence as understood in the Lost-Fox Area.

Structurally, two deformational events have resulted in broad upright to tightly overturned folds that display an overall southeasterly plunge direction.

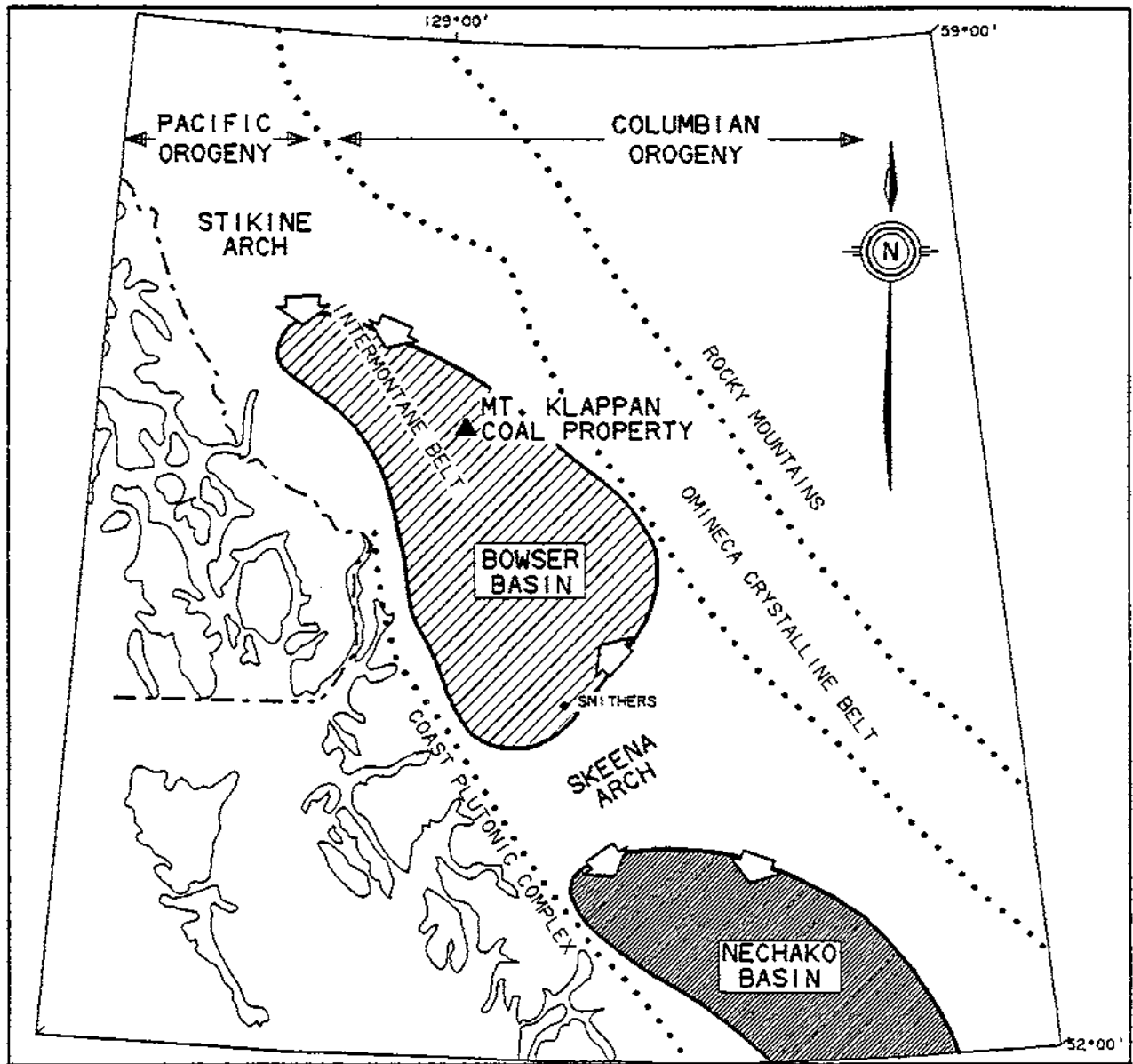
6.2 Regional Geological Setting

The coal measures of the Mount Klappan property are contained within a series of sediments ranging in age from Upper Jurassic to Lower Cretaceous. These sediments were deposited in the Bowser Basin, a successor basin to the volcanogenic Hazelton Trough (Tipper and Richards 1976). The Bowser Basin is bounded to the north and south by the Stikine and Skeena Arches respectively, and to the east by the Columbia Orogen (Omineca Crystalline Belt). The western margin is thought to have been open to the sea at the time of Bowser sediment deposition (Figure 6.1).



The formation and development of the Bowser Basin was controlled by the "collision and subsequent isostatic uplift of several crustal blocks in the Cordilleran Orogen of western Canada" (Eisbacher, 1981). These crustal blocks include the Stikine Terrane (volcanic arc complex) which directly underlies the Bowser sediments, the Atlin Terrane (remnant oceanic crust) and the Omineca Crystalline Belt (western margin of the North American Craton).

During the Middle Jurassic, the Skeena arch was uplifted and the subsidence of the Stikine Terrane divided the Hazelton Trough into the Bowser Basin to the north and the Nechako Basin to the south. Uplift of the Atlin Terrane to the north and northeast of the Bowser Basin, coupled with continued subsidence of the Stikine Terrane and collision and suturing of both these terranes with the

FIGURE 6.1
MOUNT KLAPPAN COAL PROPERTY
JURASSIC-CRETACEOUS BOWSER BASIN

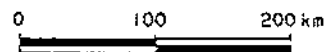


LEGEND

-  BOWSER BASIN
-  NECHAKO BASIN

(AFTER TIPPER AND RICHARDS, 1976)

SCALE



GULF CANADA RESOURCES INC.
 15/06/84



Omineca Crystalline Belt (Eisbacher, 1981) resulted in a progradation of non-marine over marine sediments within the basin.

Paleocurrent measurements indicate a centripetal flow into the Bowser Basin from highlands to the north, northeast, and south.

Bowser sediment source rocks originate within the Atlin Terrane (high chert; low volcanic content) for the north and northeastern margins of the Basin, and from the remnant volcanic arc assemblage of the Stikine Terrane, (high volcanic; low chert content) for the southern portion of the Basin. Sediments from the Lower Cretaceous (youngest marine succession of the Bowser Basin) through to the Paleocene are found only on the eastern, and in part, the southern margins of the Basin.

In the southern portion of the Bowser Basin, the assemblage has been subdivided into three groups by Tipper and Richards (1976). These groups, in ascending order are: the Early Jurassic to Middle Jurassic Hazelton Group, the Upper Jurassic Bowser Lake Group, and the Early Cretaceous Skeena Group. In the area discussed by Tipper and Richards (1976), the Skeena Group contains the major coal occurrences with some coal occurring at the top of the Bowser Lake Group.

In the Northern Bowser Basin comprehensive work has not been done and the sedimentary package associated with the coal in the Klappan Area has been variously named:

the Skeena Series (Malloch, 1914); Upper Hazelton (Buckham and Latour, 1950); Groundhog-Gunanoot (Eisbacher, 1974a), and has been dated as Lower Cretaceous (Malloch, 1914; Buckham and Latour, 1950) and Upper Jurassic to Lower Cretaceous (Eisbacher, 1974a) (Table 6.1).

Structural deformation of Bowser Basin sediments resulted from intermittent tectonic stresses at the western cratonic margin from Cretaceous to recent time. The deformation caused an extensive, shallow decollement, recumbent folds, and local thrust faults extending a few kilometers along strike (Eisbacher, 1976).

The large scale forces resulting from collision of a remnant volcanic arc and cratonic margin subjected the area to northeast-southwest compression (F_1) creating the general structural trend of northwest-southeast.

Later positioning of the former volcanic arc terrain northwards along interlaced right lateral high angle faults (Eisbacher, 1981) may account for the later north-south compressional (F_2) event. This deformation event resulted in generally broad, open NE to SW trending folds with relatively rare, flat lying thrusts expressed in several Klippen fault structures.

The final deformational event which produced strike-slip and some dip-slip faulting may have resulted from a change in the rotational component of the western crustal block, terminating compression.

TABLE 6.1
MOUNT KLAPPAN COAL PROPERTY
 REGIONAL STRATIGRAPHY - TABLE OF FORMATIONS

AGE	SUBDIVISION OF AGE	GROUP	LITHOLOGY
TERTIARY	LOWER		QUARTZ PEBBLE CONGLOMERATE, TO PEBBLY SANDSTONE, SANDSTONE SUB QUARTZOSE FELDSPATHIC, DARK GREY TO REDDISH MUDSTONE, THIN COAL SEAMS, SHALE, AND ASH FALL TUFFS IN UPPER PORTION OF UNIT.
	UPPER		
CRETACEOUS	MIDDLE		
	LOWER	SKEENA	CHERT PEBBLE RICH; BROWN-GREY CONGLOMERATE, BLACK, BROWN, AND ORANGEY CLAYSTONE, SILICEOUS AND CLAYEY SANDSTONE, WITH SILTSTONE, CLAYSTONE AND COAL INTERBEDS. BASE OF UNIT DARK GREY TO BLACK TUFFS, TUFFACEOUS SANDSTONE AND CARBONACEOUS SHALE.
	UPPER	BOWSER BASIN	FELDSPATHIC TO QUARTZOSE SANDSTONE, DARK GREY TO BLACK SHALE, SILTSTONE, GREYWACKE, CHERT PEBBLE CONGLOMERATE AND MINOR COAL SEAMS.
MIDDLE			
JURASSIC	LOWER	HAZELTON	REDDISH, PURPLE, GREY AND GREEN PYROCLASTIC AND FLOW VOLCANICS, WITH CALC-ALKALINE CHEMICAL AFFINITIES, REDDISH SANDSTONE, SILTSTONE, MUDSTONE, MINOR CONGLOMERATE, AND LIMESTONE AND THEIR TUFFACEOUS EQUIVALENTS.
TRIASSIC	UPPER	TAKLA	GREY-GREEN TO DARK GREEN FLOW AND PYROCLASTIC, BASALTIC AND ANDESITIC VOLCANIC ROCKS, PELITIC SEDIMENTARY ROCKS AND MINOR CARBONATE ROCKS.
	MIDDLE		



6.3 Mount Klappan Coal Project Geology

6.3.1 Stratigraphy

The Upper Jurassic to Lower Cretaceous sedimentary package underlying the Mount Klappan property has been subdivided into four sequences which, in ascending order, are the Spatsizi, Klappan, Malloch and Rhondda Sequences, (Figure 6.2). These sequences have a combined estimated thickness of about 3400 metres and together represent a gradual overall marine regression.

The Spatsizi Sequence, which represents the lowest stratigraphic sequence within the Mount Klappan property, is generally comprised of sediments deposited under open marine conditions with minor coastal marine environment influences. Strata consist of mudstone, siltstones, sandstones, and discontinuous massive conglomerates in the upper portion of the sequence. Exposures of the Spatsizi Sequence are located in the northern Summit Area and the southwestern Nass Area of the Mount Klappan property (Figure 3.4)

The Klappan Sequence, the main coal-bearing unit on the property, was deposited in a coastal marine environment in which extensive peat marshes had developed. Evidence of marine influence increases toward the base of the sequence. Strata consist of fine to coarse grained sandstones interbedded with mudstones, siltstones, conglomerates, and abundant coal seams. The Klappan Sequence attains thicknesses of approximately 400 - 900 metres and is exposed throughout the Mount Klappan property. To date, at least 16 seams have been delineated and range in thickness up to 8.13 metres.

The Malloch Sequence is exposed in the Nass, Skeena, Hobbit-Broatch, and Lost-Fox Areas of the Mount Klappan property. The strata consist of interbedded argillaceous sandstone, siltstone, mudstone, thick bedded to massive lenticular chert pebble conglomerates and minor coal increasing towards the base of the sequence. The sequence is interpreted to be approximately 700 metres in thickness.

The Rhondda Sequence is exposed in the Skeena Area only and consists primarily of thick and laterally extensive chert pebble conglomerates interbedded with lesser amounts of sandstone, siltstone, and mudstone; the finer sediments increase in abundance towards the base of the sequence. The sediments were deposited in an alluvial environment and the sequence attains a thickness of about 500 metres.

Table 6.2 briefly outlines the lithologies and sedimentary features observed within each sequence.

6.3.2 Structure

The fold style on the Mount Klappan property is the result of two phases of non-coaxial deformation, both of which postdate the deposition of the youngest sediments in the area.

The original, and major, compressional event resulted in the development of first phase folds (F_1) trending in a northwest to southeast direction. The result of this was the formation of two major folds that transect the property; the Beirnes Synclinorium (Richards and Gilchrist 1979) and the

TABLE 6.2
MOUNT KLAPPAN COAL PROPERTY
TABLE OF FORMATIONS

JKr

RHONDDA SEQUENCE

SEQUENCE OF THICK MASSIVE CONGLOMERATES AND MINOR GRITTY SANDSTONES INTERBEDDED WITH AN INCREASING ABUNDANCE OF SILTSTONES AND MUDSTONES TOWARDS THE BASAL CONTACT.

JKm

MALLOCH SEQUENCE

THICK INTERBEDS OF MUDSTONES, ARGILLACEOUS SILTSTONES, FINE GRAINED ARGILLACEOUS SANDSTONES AND THIN BEDS OF ORANGE WEATHERING SILICEOUS NODULAR SILTSTONES. CONGLOMERATE BEDS TEND TO BE Laterally DISCONTINUOUS. THICK CLEAN SANDSTONE BEDS AND THIN COAL SEAMS INCREASE IN ABUNDANCE TOWARDS THE BASAL GRADATIONAL CONTACT. SEQUENCE CAN CONTAIN PETRIFIED WOOD AND PLANT FOSSILS. BIVALVES ARE RARE.

JKk

KLAPPAN SEQUENCE (MAIN COAL-BEARING UNIT)

SEQUENCE OF FINE TO COARSE GRAINED SANDSTONES INTERBEDDED WITH MUDSTONES, SILTSTONES, OCCASIONAL THIN BANDS OF ORANGE WEATHERING CALCAREOUS SILTSTONES, CONGLOMERATES AND ABUNDANT COAL SEAMS. CONGLOMERATE BEDS GRADE Laterally INTO SANDSTONE. SANDSTONES OFTEN DISPLAY TABULAR OR TROUGH CROSS-BEDDING. SEVERAL SPECIES OF PELECYPODS AND PLANTS ARE COMMON. BELEMNITES AND AMMONITES ARE RARE.

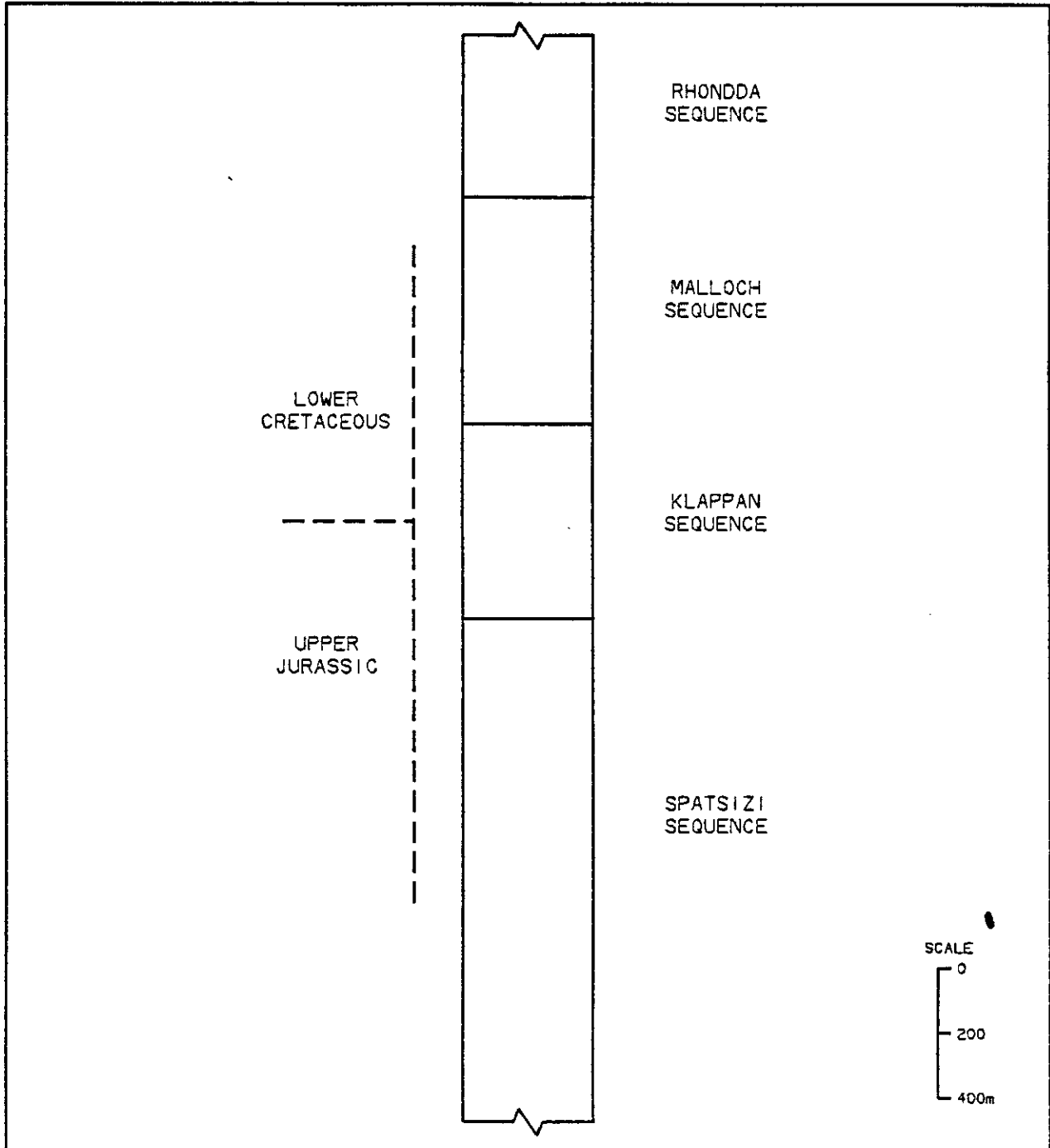
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SPATSI SEQUENCE

PREDOMINANTLY A MARINE SEQUENCE COMPRISED OF BEDS OF MUDSTONES, SILTSTONES AND LESSER AMOUNTS OF SANDSTONES AND CONGLOMERATES. THE UPPER CONTACT IS DEFINED AS THE FIRST OCCURRENCE OF A NON-MARINE BED. DISCONTINUOUS MASSIVE CONGLOMERATE BEDS LIE IN THE UPPER PORTION OF THE SEQUENCE. BIVALVES ARE ABUNDANT AND BELEMNITES ARE RARE.



FIGURE 6.2
MOUNT KLAPPAN COAL PROPERTY
SCHEMATIC STRATIGRAPHIC COLUMN



Nass River Anticlinorium (Moffat and Bustin 1983, (Appendix I, Map KPN84A01). Parasitic folds within these structures are upright to overturned to the northeast on the eastern limb of the synclinorium and to the southwest on the western limb. Fold vergence swings back to the northeast on the western limb of the anticlinorium. It is the vergence of these folds that has determined the approximate positioning of the major fold axial traces. The majority of the Mount Klappan property lies to the northeast of the Beirnes Synclinorium. Southwest dipping thrust faults have also developed from this stage and display varying displacements in the order of tens to hundreds of metres.

A second, less intense, deformational period resulted in broad open second phase folds (F_2) that trend in a northeast to southwest direction. The imprint of these folds on the F_1 folds is seen as a series of plunge changes approaching maximum regional measured values of between 14 degrees northeast and 22 degrees southeast. Low angle north dipping thrust faults, of undetermined displacement, are associated with this event as are north to northeast trending high angle strike slip faults. These strike slip faults formed either during the F_2 event or were the result of post F_2 relaxation and suggest minimal displacement.

6.4 Summit-Nass-Skeena Area Geology

6.4.1 Summary

Exploration in the outer areas, namely Summit, Nass

and Skeena have resulted in a better understanding of the regional geology. The Spatsizi, Klappan, Malloch and Rhondda Sequences all outcrop over the area with the Klappan being, by far, the most widespread.

Work concentrated on determining variations between the major sequences as well as delineating the coal resource potential of the main coal-bearing unit.

6.4.2 Summit Area

The Summit Area comprises the northwestern extension of the Mount Klappan licence area. Underlying the vast majority of the block are Klappan Sequence sediments in association with a minor exposure of the Spatsizi Sequence.

6.4.2.1 Spatsizi Sequence

The Spatsizi Sequence, which represents the lowest stratigraphic level within the Summit Area, is exposed in the northern Summit Area and outside the property boundary to the north, east, and west. This sequence is comprised of lithologies and faunas which represent conditions consistent with sedimentation under open marine conditions. Only the uppermost portion of the Spatsizi Sequence has been observed within the Summit Area. A strict lithofacies identification of the upper contact of this sequence is not possible in this area due to the variable nature of

the sub-environments which existed prior to the deposition of the overlying Klappan Sequence sediments.

In the southern Summit region, the upper Spatsizi Sequence outcrops to the east of the property boundary and is represented by a series of massive conglomerates and coarse sands interbedded with mudstones, siltstones and sandstones which contain a variety of pelecypod and belemnite species. A measured section of this sequence (and upwards into the Klappan Sequence) may be seen in the descriptive log OTC84005 (Appendix E and I).

In the northern Summit Area, the upper portion of the Spatsizi Sequence does not contain the massive conglomerate and sandstone beds observed in the Southern Summit Area but is represented by a series of massive mudstone, siltstone and minor sandstone beds. This has led to the conclusion that the massive coarsening upwards, coarse-grained units are associated with localized sedimentation events. This variability of lithotypes at the top of the Spatsizi Sequence has resulted in the arbitrary placement of its upper contact at the base of the lowermost non-marine bed of the Klappan Sequence.

6.4.2.2 Klappan Sequence

The Klappan Sequence, which underlies the

majority of the Summit Area, contains from 400 to 900 metres of section. This sequence may be sub-divided into three units in the Summit Area informally defined as the lower, middle and upper Klappan Sequence. This sub-division may or may not be applicable to the other exploration areas within the Klappan coal property. The strata of the lowermost portion of the Klappan Sequence, which ranges in thickness from a few tens of metres to over two hundred metres, represents the transition from sedimentation under open marine conditions to that of marginal marine and non-marine conditions. Minor coals, mudstones, siltstones and minor sandstones are the predominant lithologies associated with this unit. Belemnites and large pelcy pods are found at several stratigraphic levels within the lower unit.

The middle unit, which ranges in thickness from 200 to 450 metres in the Summit Area, is the result of punctuated sedimentation processes which occurred in several sub-environments within a coastal plain environment. It is this unit that is considered to have the most economic potential in the Klappan Sequence. Lithologies comprising the middle Klappan unit include coal, mudstones, siltstones, massive sandstones and minor conglomerates and are the result of quiet bayfill sedimentation and marsh development punctuated by periods of alluvial and submarine fan progradation.

The upper Klappan Sequence unit which ranges in thickness from approximately 50 to 250 metres in the Summit Area, is the result of fluvial, deltaic and minor shallow water depositional processes. Minor discontinuous coals, mudstones, siltstones, sandstones, and conglomerates are the predominant lithologies associated with this unit.

The overall trend of the Klappan Sequence is a gradual thinning in total stratigraphic thickness from the northeast towards the southwest. The highest potential for thick, laterally extensive coal is in the southern Summit Area.

The upper contact of the Klappan Sequence was not observed within the Summit mapping area.

6.4.2.3 Coal Seam Development

6.4.2.3.1 Klappan Sequence

Forty-eight trenches have been dug in the Summit Area and range in coal/coal + rock thickness up to 6.60/7.00 metres (Table 6.3). In addition two drill holes were completed during the two previous exploration years.

The three coal seams, B, C, and D that were intersected in DDH82007 have a total true thickness of 7.91 metres. Maximum

and minimum thicknesses are 3.91 metres and 1.29 metres respectively with an average thickness of 2.64 metres. The average inter-seam thickness is 35.4 metres (Table 6.4).

The four coal seams, E upper, E lower, G upper and G lower, intersected in DDH83003, have a total thickness of 7.58 metres. The maximum and minimum thicknesses of the coal seams are 3.20 metres and 1.26 metres respectively with an average of 1.90 metres. The interseam thickness separating E lower from G upper is interpreted to be 77.10 metres (Table 6.4)

Additional trenching (specifically trenches TRC84026 and TRC84027) during the 1984 field season has delineated two additional, shallowly dipping, near surface coal seams. These seams, as shown in sections 9500N and 10,000N are structurally separated by a low angle thrust fault, from the other five seams (E upper and lower, G upper and lower and H). A strict stratigraphic correlation between these seams is not yet possible. The sedimentological character of the associated lithologies suggests that these seams lie at approximately the same stratigraphic level as seams G and H.

Table 6.3

SUMMIT AREA TRENCH SUMMARY

Year	Trench	C/C + R (m)	Sequence
1981	81007	3.98/4.97	K1 appan
	81008	3.07/4.45	K1 appan
1982	82035	3.29/3.48	K1 appan
	82039	6.36/7.72	K1 appan
1983	83048	6.60/7.00	K1 appan
	83049	0.87/1.37	K1 appan
	83051	1.36/1.46	K1 appan
	83052	3.50/3.50; 4.83/5.20	K1 appan
	83054	1.71/1.91	K1 appan
	83055	2.32/2.74	K1 appan
	83056	1.92/2.32	K1 appan
	83057	1.93/2.54	K1 appan
	83058	5.33/5.68	K1 appan
	83059	0.91/1.13; 1.89/2.27	K1 appan
	83060	7.68/9.24; 0.90/0.90	K1 appan
	83061	1.40/1.90	K1 appan
	83062	1.79/1.89	K1 appan
	83063	0.00/4.20	K1 appan
	83064	0.50/0.70	K1 appan
	83065	0.08/0.08	K1 appan
	83066	6.18/7.02	K1 appan
83067	1.10/1.81	K1 appan	
83074	1.53/2.95	K1 appan	

Year	Trench	C/C + R (m)	Sequence
1983 (cont'd)	83075	3.15/3.25	Klappan
	83078	0.60/0.60	Klappan
	83079	0.70/0.70	Klappan
	83080	0.50/0.50	Klappan
	83081	0.80/0.80	Klappan
	83089	0.15/0.15	Klappan
	83090	3.75/4.85	Klappan
1984	84001	0.80/0.80	Klappan
	84002	0.75/0.75	Klappan
	84008	0.54/0.80	Klappan
	84009	0.48/0.48	Klappan
	84013	0.72/1.55	Klappan
	84016	0.59/2.13	Klappan
	84017	0.85/0.86	Klappan
	84020	1.53/2.91	Klappan
	84021	0.82/0.97	Klappan
	84022	2.55/2.65	Klappan
	84023	1.20/1.44	Klappan
	84024	0.75/0.75	Klappan
	84025	0.89/1.72	Klappan
	84026	1.63/1.83	Klappan
	84027	2.69/3.32	Klappan
	84028	0.75/1.58	Klappan
84029	2.52/2.88	Klappan	
84030	0.32/0.43	Klappan	

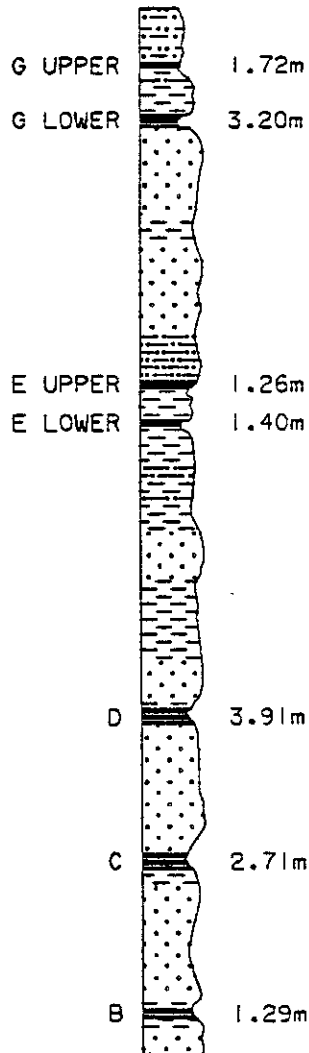
Table 6.4

SUMMARY OF SUMMIT AREA
DRILLED SEAM INTERSECTIONS

Drill Hole	Seam	Drilled Interval (m)	Seam True Thickness (m)	Interseam True Thickness (m)	Coal (m)/Coal + Rock (m)
82007	D	19.19- 23.10	3.91		2.31/3.91
	C	57.14- 59.85	2.71	33.85	1.95/2.71
	B	96.56- 97.85	1.29	36.55	0.80/1.29
83003	H	in casing	0.47*	31.12	0.47/0.47*
	G Upper	40.30- 42.05	1.72		1.05/1.72
	G Lower	44.80- 48.00	3.20	2.71	1.93/3.20
	E Upper	126.95-128.24	1.26	77.10	1.06/1.26
	E Lower	137.68-139.10	1.40	9.15	1.09/1.40

* Spudded into seam, coal unconsolidated and represents a minimum thickness.

FIGURE 6.3
MOUNT KLAPPAN COAL PROPERTY
SUMMIT AREA COAL SEAM DISTRIBUTION



SCALE: 1:2000

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10/01/85



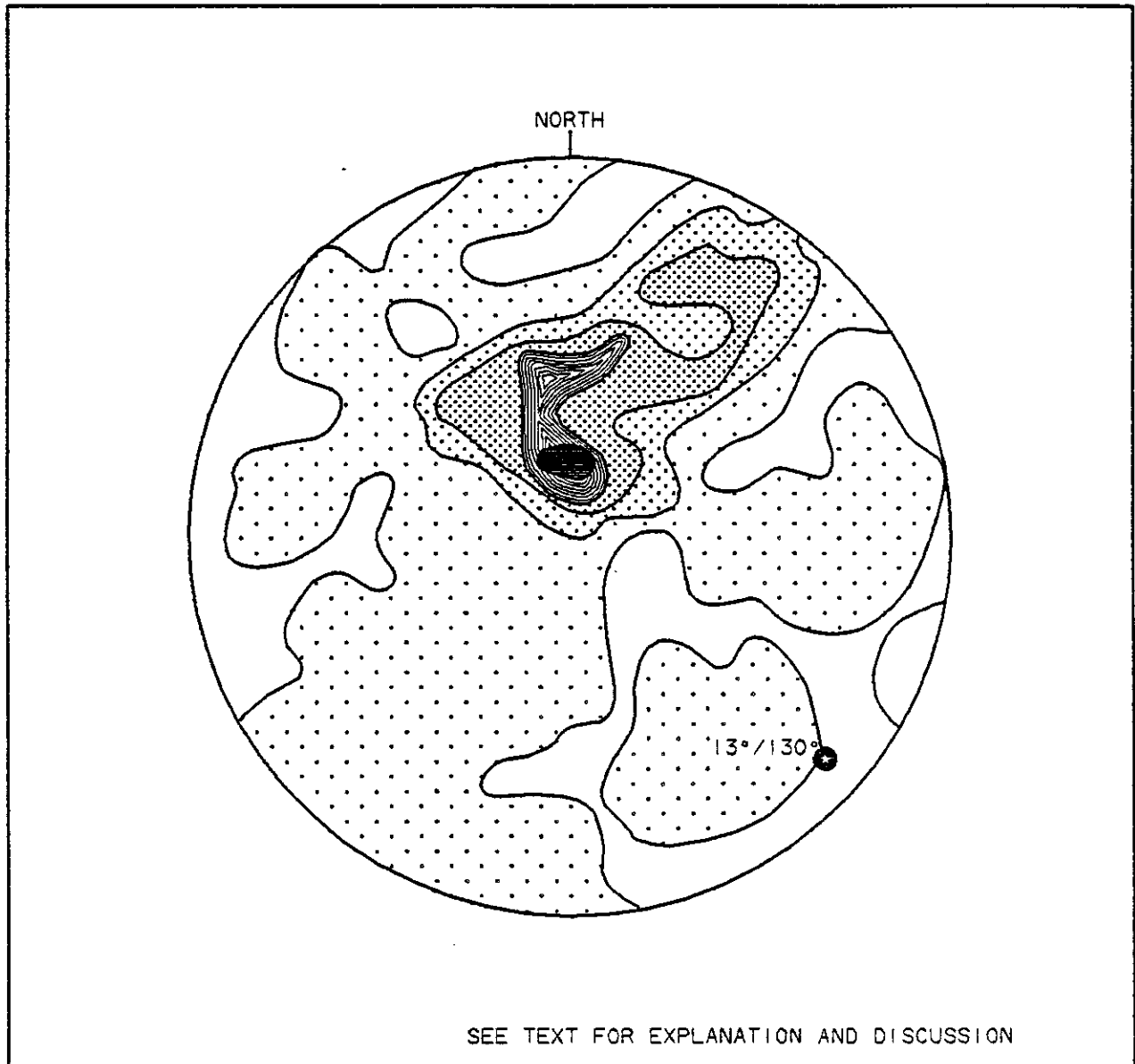
If this is the case, there is the potential for additional seams, B through E, being present in the subcrop.

6.4.2.4 Structure

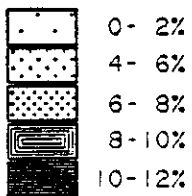
The strata of the Summit Area has been faulted and folded during two phases of non-coaxial deformation. The first phase of deformation resulted in shallow dipping to overturned northwest-southeast trending folds (F_1). The second phase of deformation appears to have resulted in folds (F_2) trending in a north-east-southwest direction. As may be seen in an equal area plot of poles to bedding planes (Figure 6.4) the dominant tectonic trend in the Summit Area is southeasterly. This plot also reveals a gentle to moderate plunge averaging 13° towards 130° . Vergence of these folds is toward the northeast with the majority of folds having steeper easterly dipping limbs than westerly dipping limbs. Fold related fracture cleavages have suggested the axial planes trend towards the southeast and dip moderately to steeply towards the southwest. A second, minor, northeasterly bearing tectonic trend is represented by folds plunging moderately to either the northeast or the southwest.

Faulting, other than thrust faulting associated with F_1 or F_2 , is usually of a dextral strike slip nature with only very minor normal faulting observed in the Summit Area.

FIGURE 6.4
**MOUNT KLAPPAN COAL PROPERTY
 SUMMIT AREA**
 EQUAL AREA PLOT OF POLES TO BEDDING PLANES



LEGEND



n = 151

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 04/12/84



6.4.3 Nass Area

The Nass Area, as part of the Summit-Nass-Skeena Report, comprises the southwestern extension of the Mount Klappan Coal Project. Underlying the majority of the area are sediments of the Klappan Sequence. The south central highlands in the vicinity of the Beirnes Synclinorium consist of lithologies common to the Malloch Sequence. Structures and sequences along the western licence boundary area are based on minimal geologic ground work.

6.4.3.1 Spatsizi Sequence

The marine Spatsizi Sequence is Upper Jurassic in age and has an undetermined thickness in the Nass Area. This unit is interpreted to underlie the southwestern licence area and, based on a pelecypod sample identification (Rowe pers com.), is believed to also extend further west. Initial reconnaissance into the area identified minor conglomerates interbedded with silts and shales. Fern fossils (Cladophlebis virginienensis, S. Dakin pers com.) were also observed and suggest minor coastal environment pulses that would be expected towards the upper transitional contact. No coal seams have, as yet, been delineated.

6.4.3.2 Klappan Sequence

The Lower Cretaceous/Upper Jurassic Klappan Sequence underlies the majority of the Nass block and

commonly occupies the low lying areas. Abundant cover prevents any section measurements and it is presently assumed that the unit has thinned to about 400 metres. The upper contact is transitional and the lower contact has only been observed in the Summit Area.

Klappan sediments represent deposition in both marginal marine and non-marine conditions and consist of fine to medium-grained sandstone, siltstone, dark grey mudstone and coal. Chert pebble conglomerates up to seven metres thick and of limited lateral extent are also in evidence. Five metre cycles of either fining upward or coarsening upward sections are observable as are minor channeling, rippling, cross bedding, burrowing, rootlets and branch fragments. Flora and fauna samples collected have, as of the writing of this report, not yet been identified.

Lying four kilometers due west of Lost Ridge is a shallow subcrop boulder field extending for several kilometres. This field consists of massive medium grained, light grey weathering sandstone similar, and likely equivalent, to another sandstone at the base of the north side of Lost Ridge. This sand is also traceable to northwest of the airstrip in the Summit Area. This lithologic correlation in conjunction with the evidence of marine sediment influxes supports the belief that the central Nass Area lithologies are stratigraphically equivalent to a

basal portion of the Klappan Sequence defined on Lost Ridge.

6.4.3.3 Malloch Sequence

The majority of this sequence is comprised of interbedded argillaceous sandstone, argillaceous siltstone, mudstone, thick bedded to massive lenticular chert pebble conglomerates, and minor coal. Thin orange weathering siliceous nodular siltstone beds occur in the upper portion of the sequence.

The Malloch is approximately 700 metres thick based on the 500 metre long measured section OTC84002 (Appendices E and I). Neither contact was observed though gradual lithologic transitions are apparent. Towards the basal contact with the Klappan Sequence the sands and silts become increasingly less argillaceous and thin coal seams become apparent. Reflectance values within the seams increase with depth and may be used to indicate approximate stratigraphic levels (see Sections 2.0 and 8.0).

Lacking within this unit, especially in the younger strata, are flora and fauna remnants or any primary sedimentary structures beyond simple bedding planes. These sediments are non-marine and likely reflect a lacustrine depositional environment.

6.4.3.4 Coal Seam Development

6.4.3.4.1 Klappan Sequence

Thirty-one trenches representing 27 coal seams have been hand dug in the Nass Area. Of these, twenty-two occur within the Klappan Sequence and range in coal/coal plus rock thicknesses from 0.63/0.86 to 3.62/3.96 metres (Table 6.5).

The lack of outcrop and drill hole information makes seam correlations tenuous at this time. As was outlined in Section 6.4.3.2 these sediments are equivalent to the basal coal-bearing sequence on Lost Ridge which suggests that the Nass seam designation could range from seam C to G. Further discussions of these coal occurrences are presented in Section 8.0.

6.4.3.4.1 Malloch Sequence

Five trenches have been dug in the Malloch and none exceed 2.0 metres in length. Seams and spoil are more prevalent in the basal portion of the unit but less than one metre in thick and therefore of limited importance.

Table 6.5

NASS AREA TRENCH SUMMARY

Year	Trench	C/C + R (m)	Sequence
1982	82021	3.26/3.57	Klappan
	82022	1.13/2.60	Klappan
1983	83068	0.63/0.86	Klappan
	83069	0.91/0.91	Klappan
	83070	0.67/0.95	Klappan
	83071	3.62/3.96	Klappan
	83072	3.13/3.51	Klappan
	83073	3.01/3.36	Klappan
	83076	1.20/1.54	Malloch
	83077	1.32/1.48	Malloch
	83082	1.00/1.27	Klappan
	83083	1.13/1.50	Klappan
	83084	0.90/1.59	Klappan
	83085	0.80/0.90	Klappan
	83086	1.51/1.96	Klappan
	83087	0.70/0.80	Klappan
	83088	1.15/1.50	Klappan
83091'	3.26/3.57	Klappan	
1984	84003	1.50/1.50	Malloch
	84004	0.74/1.39	Klappan(?)
	84005*	2.58/2.95	Klappan
	84006	1.31/1.46	Klappan
	84007	0.90/0.90	Klappan

Table 6.5 (cont'd)

Year	Trench	C/C + R (m)	Sequence
1984 (cont'd)	84010	1.05/1.05	Malloch
	84011	3.36/3.74	Klappan
	84012	1.00/1.00	Klappan
	84014	1.95/2.16	Klappan
	84015	1.55/1.70	Klappan
	84018	1.10/1.68	Malloch
	84031+	0.95/1.09; 0.97/1.00	Klappan
	84032°	1.55/1.82	Klappan

' retrench of 82021

* retrench of 83073

+ retrench of 83071

° retrench of 82072

6.4.3.5 Structure

The dominant structural features in the Nass Area are the Beirnes Synclinorium and the Nass Lake Anticlinorium. The tectonic history in the area (Section 6.3.2) has resulted in broad upright to overturned fold pairs with vergences varying depending on the fold position relative to the anticlinorium - synclinorium pair. No overturned beds have been recorded in the Klappan sediments in the area. The plunge changes in the primary F_1 structures range vary from 14 degrees northwest to about 10 degrees southeast but generally exhibit a shallow southeasterly plunge direction.

Major thrust faults are evident along the western property margin and have vertical displacements of up to several hundred metres. These faults, which closely parallel axial traces, define the Nass Valley's western edge and thrust the uppermost Spatsizi Sequence to surface in the mountainous terrain further west.

Additional to these thrusts are strike slip faults that displace beds up to 75 metres. Four major strike slip faults were located in central Nass. These faults represent first and second order patterns and trend either at 10 degrees east or 40 degrees east. On a smaller scale a series of parallel strike slip faults with vertical displacements of two to

thirty metres outcrop in a drainage channel just southeast of the major faults and complicate the correlation of several local coal trenches. These smaller faults could not be properly presented on the 1:5000 base maps.

6.4.4 Skeena Area

The Skeena area comprises the southeastern extreme of the Mount Klappan Coal Project. The mapping area is transected by Tahtsedle Creek and the headwaters of the Skeena River. The Malloch and Klappan Sequences underlie the Skeena Area as do the only exposures of the Rhondda Sequence over the entire property.

6.4.4.1 Klappan Sequence

The Klappan Sequence has been inferred to subcrop within the major drainage valley in the vicinity of Tahtsedle Creek. Outcroppings are rare but based on the overlying ridge lithologies it is known that these sediments lie high in the stratigraphic section. The Klappan consists of a series of vague coarsening upward sequences comprised of dark grey mudstone, siltstone, medium to coarse grained sandstone and carbonaceous mudstone or coal. Abundant flora are contained within the finer sediments and petrified wood can occur within the sandy beds. The thickness of the Klappan Sequence in the Skeena Area has not been determined.

6.4.4.2 Malloch Sequence

The Malloch Sequence is approximately 700 metres thick and occurs along the ridges both east and west of the Skeena River. The unit consists of interbedded fine to medium grained dark grey sandstone, siltstone and dark grey mudstone. Abrupt and laterally discontinuous, channel infill, chert pebble conglomerates occur in increasing abundance towards the top of the sequence and may at that point represent a braided stream environment. The lower contact is unobserved but is likely similar to that outlined in the Nass Area.

6.4.4.3 Rhondda Sequence

Overlying the Malloch is the Rhondda Sequence which is exposed along the eastern Skeena Area margin. The Rhondda consists primarily of thick and laterally extensive chert pebble conglomerates interbedded with lesser amounts of sandstone, siltstone and mudstone. These finer sediments become thicker and more abundant towards the base of the unit.

The Rhondda conglomerates consist of sub-rounded grey and green cherts within a sand matrix that represents 10 percent or less of the rock. Clasts are either equigranular or bimodal and can range in diameter from less than one centimeter up to 15 centimeters.

The contact with the Malloch is chosen as the base of a thick succession of laterally continuous conglomerates interbedded with minor coarse sands and silts.

The Rhondda Sequence is about 500 metres thick and is the result of an alluvial depositional environment.

6.4.4.4 Coal Seam Development

6.4.4.4.1 Klappan Sequence

Skeena Area coals are not well documented due to a high degree of cover along the valley floor. One seam (Table 6.6) occurs along Tahtsedle Creek and cannot be traced laterally. Several spoil locations suggest additional thin seam development further upstream.

6.4.4.4.2 Malloch Sequence

Seam development is largely restricted to the basal portion of the sequence. To date, no seams in excess of 0.50 metres have been encountered.

Table 6.6

SKEENA AREA TRENCH SUMMARY

Year	Trench	C/C + R (m)	Sequence
1984	84019	1.81/3.67	Klappan

NOTE: In 1981 six grab samples were taken from coal spoil locations for reflectance.

6.4.4.5 Structure

The outcropping of the Rhondda Sequence in the area is due to the southeasterly plunging Beirnes Synclinorium. The plunge on the major structure has preserved the sequence in the south and eroded it elsewhere on the Mount Klappan property.

The Rhondda and uppermost Malloch Sequences are characterized by broad open folds with low angle limbs. Stratigraphically lower in the Malloch fold amplitudes increase and overturns or high angle limbs are apparent. This change in deformational style is attributed to variations in rock competency between the conglomerates and finer sediments. Moffat and Bustin (1983) indicate the presence of a "structural detachment surface" within Gulf's Malloch Sequence equivalent in the Skeena mapping area.

This open fold style is observed on the ridges east of the Skeena and suggest the presence of more competent lithologies as might be expected in the uppermost Malloch Sequence.

7.0 RESOURCES

7.1 Mount Klappan Coal Project

7.1.1 Summary

The coal resources of the Mount Klappan Coal Project total 5.3 billion tonnes in seams greater than 0.5 metres in thickness to a maximum depth of 500 metres below surface. The following table summarizes the resource contributions from each area of the property as well as the representation by resource category. A 1:50 000 Coal Resource Map (Appendix I) presents the distribution of resources over the Mount Klappan property.

Table 7.1

Area	Measured	Category		Speculative	Total
		Indicated	Inferred		
Lost-Fox	32.1	46.3	194.1	794.9	1 066.0
Hobbit-Broatch	12.1	24.5	369.1	613.3	1 037.0
Summit	--	--	41.4	1,860.1	1 901.5
Nass	--	--	--	1,121.8	1 121.8
Skeena	--	--	--	232.3	232.3
Total	44.2	70.8	604.6	4,622.4	5 342.0

Mount Klappan Coal Project Total Coal Resources: 5 342.0 mt

The coal seams are contained within the strata of the Klappan Sequence. There are also coal measures in the Malloch Sequence, however, they are not presently considered of economic importance.

The parameters within which the coal resources were classified and the procedures utilized in resource calculations are outlined in Section 7.3.

7.2 Summit-Nass-Skeena Area

7.2.1 Summary

The coal resources for the Summit-Nass-Skeena Area total 3.2 billion tonnes of which the majority is at the speculative level (Table 7.2).

At the inferred level, 41.4 million tonnes of resources has been calculated to lie within three separate resource areas of the Summit Area. Two resource areas are based on single diamond drill hole coal intersections (DDH82007 and DDH83003) that represent different stratigraphic levels of the Klappan Sequence. The third resource area overlaps the influence of DDH83003 but is separated by a shallow thrust of unknown displacement. Thus, the three trenches correlated within this area could not be tied stratigraphically to the other resource areas due to a lack of information (Table 7.3).

Speculative resources were calculated over the remainder of the Summit-Nass-Skeena Area and total 3.18 billion tonnes (Table 7.2)

Table 7.2

**SUMMIT-NASS-SKEENA AREA
COAL RESOURCES
(in millions of tonnes)**

	Measured	Indicated	Inferred	Speculative	Total
Summit	--	--	41.4	1 860.1	1 901.5
Nass	--	--	--	1 121.8	1 121.8
Skeena	--	--	--	232.3	232.3
Total	--	--	41.4	3 214.2	3 255.6

7.3 Procedures and Parameters

7.3.1 Introduction

In-situ coal resources are defined as the in place coal (coal and partings) that is contained in seams occurring coal (coal and partings) that is contained in seams occurring

Table 7.3

SUMMIT AREA INFERRED RESOURCE DATA POINTS

Data Source	Seam	Drilled Interval	Seam True Thickness	Interseam True Thickness	Coal (m)/ Coal + Rock
DDH82007	D	19.19-23.10	3.91		2.31/3.91
				33.85	
	C	57.14-59.85	2.71		1.95/2.71
				36.55	
	B	96.56-97.85	1.29		0.80/1.29
DDH83003	G Upper	40.30-42.05	1.72		1.05/1.72
				2.71	
	G Lower	44.80-48.00	3.20		1.93/3.20
				77.10	
	E Upper	126.95-128.24	1.26		1.06/1.26
				9.15	
	E Lower	137.68-139.10	1.40		1.09/1.40
TRC84026			1.83*	--	1.63/1.83
TRC84027			3.48*	--	2.85/3.48
TRC83060			6.93'	--	5.76/6.93
			0.68'	1.35	0.68/0.68

' - Structurally thickened seam that has been conservatized by 25 percent

* - Represent same seam (both of which did not reach floor mark)

- TRC84027 was assigned the minimum seam thickness

within specified limits of thickness and depth from surface. Resources are further defined through classification into "measured", "indicated", "inferred", and "speculative" categories based on the existence and relative spacing of coal seam exploration data.

The procedures for the resource calculations include standard methods utilizing geological cross-sections and maps as described in Section 7.3.2.

The parameters for resource categorization generally follow those set out for the Cordillera Region by Energy, Mines and Resources Canada in Report ER79-9: Coal Resources and Reserves of Canada. The parameters utilized for the 1984 Mount Klappan Coal Project are described in Section 7.3.3.

7.3.2 Procedures

Utilizing valid data points (drill holes and selected trenches), a distribution of data points for each seam is established. Subsequently, based on maximum allowable data point spacing (Section 7.3.3), resources are calculated for a specific category.

Calculations are completed using the "polygon method" (see Lost-Fox Geologic Report for details). In the case of the Summit Area inferred resources, only one data point exists for each seam resulting in horizontal circles of influence. This influence boundary is projected onto

affected cross-sections and the seam length is then measured within these limits.

Two of the three resource areas are based solely on drilled seam intersections and are given 1.0 kilometer radii of influence. Each area consists of three seams in excess of 0.5 metres in thickness. The third resource area is based on three correlatable hand trenches and is given a similar radius of influence. Factors applied to the trenches are outlined on Table 7.3.

The third dimension required for the coal volume calculation, after the seam thickness and length have been determined, is the "influence" or "strike length" of the seam. This measurement usually equals the cross-section spacing of 500 metres although the extreme northwestern or southwestern sections may vary the value depending on their position relative to the influence boundary. In some cases, where a seam projects to surface before the assumed influence limit is reached, the influence is measured to the seam subcrop (or outcrop).

A review of the Mount Klappan Coal Project coal quality data has shown that, in general, specific gravity data provides a weight-average specific gravity of 1.70 tonnes per cubic metre. For the purposes of the 1984 resource calculations, the value of 1.70 tonnes per cubic metre was used.

The following equation summarizes the resource calculation procedure:

$$\begin{array}{l} \text{Tonnes of Coal} = \\ \text{Seam Thickness} \times \text{Seam Length} \times \text{Influence} \times \text{Specific Gravity} \\ \text{(m)} \qquad \qquad \qquad \text{(m)} \qquad \qquad \qquad \text{(m)} \qquad \qquad \qquad \text{(t/m}^3\text{)} \end{array}$$

In calculating speculative resources the areal extent of the Klappan Sequence is planimetered from the 1:50 000 geology map included in Appendix I. Any areas of higher levels of resource confidence are not included in the planimetering.

The aggregate coal seam thicknesses for the Klappan Sequence in the Lost-Fox and Hobbit-Broatch Areas have been determined to be 43.43 and 26.18 metres thick, respectively. Thus, by straight averaging these two thicknesses and conservatizing by 75 percent an aggregate thickness of 8.80 metres is calculated.

With the specific gravity remaining as previously determined the following equation summarizes the speculative resource calculation procedure:

$$\begin{array}{l} \text{Tonnes of Coal} = \text{Planimetered Area} \times 8.80 \times 1.70 \\ \qquad \qquad \qquad \text{(m}^2\text{)} \qquad \qquad \qquad \text{(m)} \quad \text{(t/m}^3\text{)} \end{array}$$

All resource tables are presented in Appendix D of this text.

7.3.3 Parameters

The minimum seam thickness used for the Mount Klappan Coal Project resource calculation was 0.5 metres. Seams were included to a maximum depth of 500 metres from surface.

The following resource parameters were used on the property though only the inferred and speculative categories apply directly to the Summit-Nass-Skeena Area. The classification scheme is illustrated in Figure 7.1.

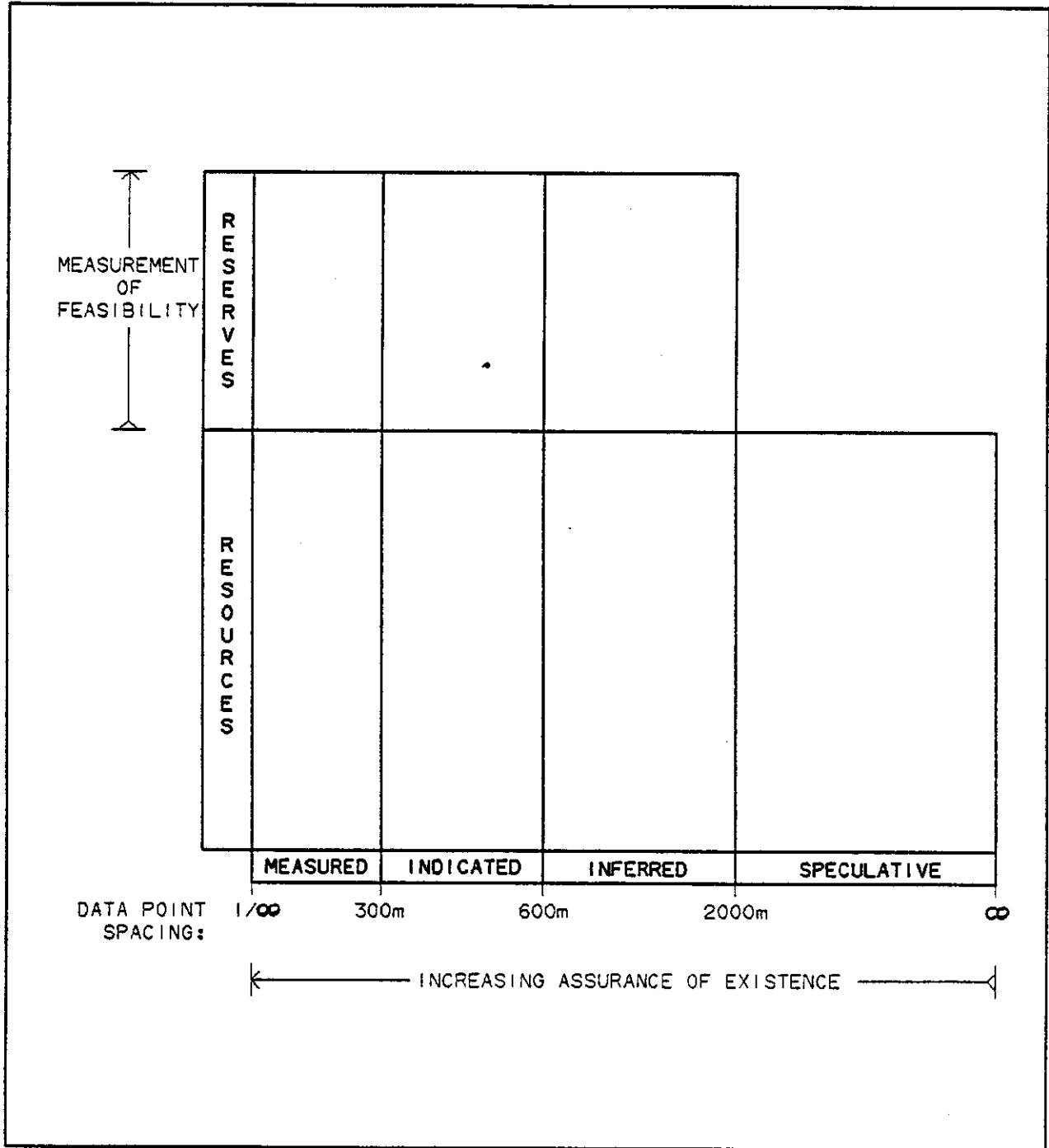
7.3.3.1 Measured Resources

Measured Resources include those resources delineated through establishment of exploration data points and therefore reported with confidence as to the character and continuity of the coal seams. The maximum distance between data points, which may include adits, drill holes, trenches and outcrops, is 300 metres.

7.3.3.2 Indicated Resources

Indicated Resources include resources which are delineated using established data points as well as reasonable geological projections. The maximum distance between data points is 600 metres.

FIGURE 7.1
MOUNT KLAPPAN COAL PROPERTY
 1984 RESOURCE CLASSIFICATION SCHEME



7.3.3.3 Inferred Resources

Inferred Resources include resources which are delineated utilizing regional geological data including data points which predict the continuity of coal seams. Report ER79-9 does not state a data point spacing for this category. For the purposes of standardization for the 1984 Mount Klappan Coal Project resource calculations, a maximum data point spacing of 2000 metres was used for the inferred level.

7.3.3.4 Speculative Resources

Speculative Resources include those resources which are calculated from a few scattered coal occurrences in areas of little or no exploration data where the coal-bearing sequence(s) is/are interpreted to exist. There is no maximum spacing in this category.

8.0 COAL QUALITY

8.1 Summary

Hand trenched samples formed the basis for the coal quality program in the Summit-Nass-Skeena Area. Of the 32 seams logged, 23 were analysed (Table 8.1) for proximate, sulphur and calorific values. Vitrinite reflectance determinations were performed on 21 samples. No washability studies were undertaken.

Laboratory results indicate that coal seams with ash levels below 20 percent are present and that reflectance values consistently increase, in a regional sense, with depth.

8.2 Procedures and Parameters

During the course of routine traverses any coal seams or spoil were trenched. Where seams were too small (less than 0.5 metres) or could not be uncovered sufficiently, grab samples were taken for reflectance determinations. Coal seams in excess of 0.5 metres, true thickness, were hand trenched, logged in detail and channel sampled. The sampling intervals chosen were guided by the seam log. Substantial partings or changes in coal character were cause for sampling of the seam by ply, so that the nature of variations across the seam could be traced. For the most part, however, a single sample was taken to transect and represent the whole seam.

Of the 32 trenches dug in the outlying Summit-Nass-Skeena Area, 23 were sampled for proximate, sulphur and calorific value

Table 8.1

SUMMIT-NASS-SKEENA AREA
1984 TRENCH AVERAGE COAL QUALITY SUMMARY

	SUMMIT	NASS	SKEENA
No. of Trenches Analysed	12	10	1
No. of Analysis	13	11	2
Proximate Analysis			
Residual Moisture (%)	5.62	4.77	4.08
Ash (%)	28.84	24.98	51.25
Volatile Matter (%)	14.28	13.81	7.10
Fixed Carbon (%)	51.26	56.44	37.57
Total Sulphur (%)	0.37	0.39	0.40
Gross Calorific Value (cal/gm)	4603	5151	3045

determinations. Vitrinite reflectance determinations were performed on 21 samples. The flow sheet for all analyses is presented in Figure 8.1. All analyses except vitrinite reflectance were performed at Loring Laboratories Ltd. of Calgary, Alberta. The reflectance measurements were done at David E. Pearson and Associates of Victoria, British Columbia.

The results of all analyses are presented in Appendix III Volume II along with all previous years trench samples.

8.3 Summit Area

Eighteen trenches were logged in the Summit Area of which five were in excess of 2.0 metres. Twelve seams were analysed for proximate, sulphur and calorific values and 10 had vitrinite reflectance determinations completed (Table 8.2).

Head ash levels range between 19.00 and 49.29 percent and average 28.84 percent. Ash levels in the south central Summit Area, west of Butler Creek (Appendix I; Drawing No. KPN84A01), have a lower average ash of 24.75 percent which applies to up to 11 of the 1984 trenches. This location also represents two of the Summit resource areas discussed in Section 7.0.

Reflectance determinations range from 3.59 to 4.60 over the Summit Area. Based on reflectance values over the entire property, the Summit results suggest that the middle to lower portion of the coal-bearing Klappan Sequence is present in the area. Reflectance also suggest that TRC84029, two kilometers west of the Little Klappan River near Butler Creek, is higher in the Klappan Sequence than any other 1984 Summit trench.

Figure 8.1
SUMMIT-NASS-SKEENA AREA
TRENCH SAMPLE ANALYSIS
FLOW CHART

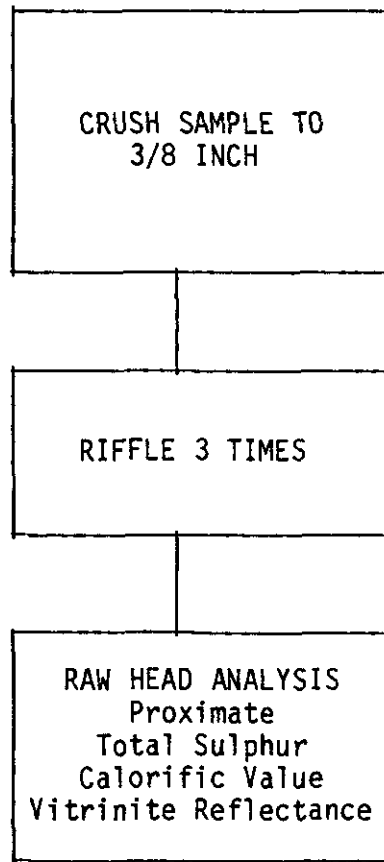


Table 8.2
 SUMMIT-NASS-SKEENA AREA
 ASH AND REFLECTANCE SUMMARY
 1984

Area	Location	Ash	Reflectance	Sequence
Summit	TRC84001	41.85		Klappan
	TRC84002			Klappan
	TRC84008	25.88	4.24	Klappan
	TRC84009			Klappan
	TRC84013	35.18	4.60	Klappan
	TRC84016	49.29	4.33	Klappan
	TRC84017			Klappan
	TRC84020	22.39		Klappan
	TRC84021	29.63	4.35	Klappan
	TRC84022	23.31	4.11	Klappan
	TRC84023	30.22	4.28	Klappan
	TRC84024			Klappan
	TRC84025			Klappan
	TRC84026	19.00	4.07	Klappan
	TRC84027	19.16, 23.41	4.18	Klappan
	TRC84028	30.96	4.26	Klappan
	TRC84029	24.63	3.59	Klappan
TRC84030			Klappan	
Nass	TRC8403	9.04		Klappan
	TRC8404	47.15, 34.62	4.18	Klappan
	TRC8405			Klappan
	TRC8406	12.51	3.31	Klappan
	TRC8407	16.43	3.35	Klappan
	TRC8410	2.94	3.11	Malloch
	TRC8411	32.37	4.38	Klappan
	TRC8412	25.21	4.62	Klappan
	TRC8414	21.31	4.61	Klappan
	TRC8415	32.31	4.27, 4.33	
	TRC8418	40.90	2.61	Malloch
	TRC8431			Klappan
	TRC8432			Klappan
	ES841806		3.08	Malloch
	ES841702		2.41	Malloch
Skeena	TRC84019	46.98, 55.51		Klappan

8.4 Nass Area

Of the 13 trenches logged in the Nass Area 10 were analysed for proximate, sulphur and calorific values and 9 had reflectance determinations completed (Table 8.2).

Head ash results range from 2.71 to 47.15 percent and average 24.98 percent. Coal seams interpreted to lie either in the uppermost Klappan or lowermost Malloch Sequence, four in total, have an average ash level of 10.23 percent and a maximum coal/coal plus rock value of 1.50/1.50 metres. Five 1984 trenches grouped in the northwestern Nass Area lie within the Klappan Sequence and have an average ash level of 32.18 percent.

Reflectance results lie between 2.61 and 4.62 and represent stratigraphies from the Malloch to the Klappan Sequence. Based on six values, including two grab samples (ES841606 and ES841702), that are known to lie proximal to the Klappan/Malloch Sequence contact zone it is suggested that a reflectance of 3.15 should indicate the approximate contact between those two sequences.

The five Klappan Sequence seams trenched in the northwest range between 4.18 and 4.62 and essentially represent a similar stratigraphic section as found in the Summit Area.

8.5 Skeena Area

One hand trench was sampled in 1984 and resulted in two ash values in excess of 45 percent. No reflectance determination was completed on this seam (Table 8.2).

9.0 LIST OF REFERENCES

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APPENDIX A

STATEMENTS OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

BRIAN P. FLYNN

This is to certify that I obtained my Bachelor of Science Degree in Geology at The University of Natal, South Africa in 1971.

Since graduation I spent one year in base metal exploration in South Africa and in excess of eight years in coal exploration in Western Canada. Of this period, six and three quarter years have been in the Coal Division of Gulf Canada Resources Inc., during which time I have been responsible for the planning and supervision of evaluation programs involving diamond and rotary drilling, as well as the design of regional exploration programs in Western Canada and the Arctic. At the present time, I hold the position of Co-ordinator, Coal Projects.

STATEMENT OF QUALIFICATIONS

ERIC SWANBERGSON

This is to certify that I obtained my Bachelor of Science Degree in Geology at Concordia University in 1979.

My geological experience has been gained in mineral, petroleum and coal exploration in western Canada and the Arctic Islands. I have been employed as a Geologist with Gulf Canada Resources Incorporated since late 1980.

STATEMENT OF QUALIFICATIONS

F. SCOTT MCKENZIE

This is to certify that I obtained my Bachelor of Science Degree in Earth Sciences at the University of Waterloo in 1982.

My geological experience includes involvement in mineral, petroleum and coal exploration in the Northwest Territories, Ontario, Alberta and British Columbia. I have been employed as a Geologist with Gulf Canada Resources Incorporated since my graduation in May, 1982.

APPENDIX B

**MOUNT KLAPPAN COAL PROJECT
LEGAL DESCRIPTION OF LICENCES**

1984

Appendix B

MOUNT KLAPPAN COAL PROJECT LICENCES

1984

SUMMIT-NASS-SKEENA AREA

Summit Area				
Licence	Effective Date	Hectares	Series	Block
7171*	Dec. 31/82	140.5	104-H-7	D
7173*	Dec. 31/82	140.0	104-H-7	D
7174	Dec. 31/82	280.0	104-H-7	D
7176	Dec. 31/82	277.0	104-H-7	D
7177	Sept. 1/81	280.0	104-H-7	D
7382	Mar. 15/82	280.0	104-H-6	H
7383	Mar. 15/82	108.0	104-H-6	H
7384	Mar. 15/82	281.0	104-H-7	D
7385	Mar. 15/82	204.0	104-H-7	D
7386	Mar. 15/82	280.0	104-H-7	D
7387	Mar. 15/82	280.0	104-H-7	D
7388	Mar. 15/82	172.0	104-H-7	D
7389	Mar. 15/82	275.0	104-H-7	D
7390	Mar. 15/82	280.0	104-H-7	D
7391	Mar. 15/82	115.0	104-H-7	E
7392	Mar. 15/82	260.0	104-H-7	E
7423	Mar. 15/83	281.0	104-H-7	D
7424	Mar. 15/83	280.0	104-H-7	D
7425	Mar. 15/83	280.0	104-H-7	D
7426	Mar. 15/83	280.0	104-H-7	D
7726	Jan. 10/84	280.0	104-H-6	A
7727	Jan. 10/84	280.0	104-H-6	A
7728	Jan. 10/84	280.0	104-H-6	A
7729	Jan. 10/84	280.0	104-H-6	A
7730	Jan. 10/84	280.0	104-H-6	A

Summit Area (cont'd)

Licence	Effective Date	Hectares	Series	Block
7731	Jan. 10/84	280.0	104-H-6	A
7732	Jan. 10/84	280.0	104-H-6	A
7733	Jan. 10/84	280.0	104-H-6	A
7734	Jan. 10/84	280.0	104-H-6	A
7735	Jan. 10/84	280.0	104-H-6	G
7736	Jan. 10/84	280.0	104-H-6	G
7737	Jan. 10/84	280.0	104-H-6	G
7738	Jan. 10/84	280.0	104-H-6	G
7739	Jan. 10/84	280.0	104-H-6	G
7740	Jan. 10/84	280.0	104-H-6	G
7741	Jan. 10/84	280.0	104-H-6	G
7742	Jan. 10/84	280.0	104-H-6	G
7743	Jan. 10/84	280.0	104-H-6	G
7744	Jan. 10/84	280.0	104-H-6	G
7745	Jan. 10/84	280.0	104-H-6	G
7746	Jan. 10/84	280.0	104-H-6	H
7747	Jan. 10/84	280.0	104-H-6	H
7748	Jan. 10/84	280.0	104-H-6	H
7749	Jan. 10/84	280.0	104-H-6	H
7750	Jan. 10/84	261.0	104-H-6	H
7751	Jan. 10/84	280.0	104-H-6	H
7752	Jan. 10/84	280.0	104-H-6	H
7753	Jan. 10/84	280.0	104-H-6	H
7754	Jan. 10/84	154.0	104-H-6	H
7755	Jan. 10/84	274.0	104-H-6	H
7756	Jan. 10/84	280.0	104-H-6	D
7757	Jan. 10/84	280.0	104-H-6	D

* Licence split between Summit-Nass-Skeena and Lost-Fox Areas.

Summit Area Total Hectares = 13 582.5

Nass Area

Licence	Effective Date	Hectares	Series	Block
7150	Sept. 1/81	281	104-H-2	L
7154	Sept. 1/81	281	104-H-2	L
7421	Mar. 15/83	281	104-H-2	L
7422	Mar. 15/83	281	104-H-2	L
7427	Mar. 15/83	281	104-H-3	I
7428	Mar. 15/83	281	104-H-3	I
7429	Mar. 15/83	281	104-H-3	I
7430	Mar. 15/83	281	104-H-3	I
7431	Mar. 15/83	281	104-H-3	I
7432	Mar. 15/83	281	104-H-3	I
7487	Oct. 21/82	281	104-H-3	J
7488	Oct. 21/82	281	104-H-3	J
7505	Oct. 21/82	281	104-H-3	H
7506	Oct. 21/82	281	104-H-3	H
7507	Oct. 21/82	281	104-H-3	H
7508	Oct. 21/82	281	104-H-3	H
7509	Oct. 21/82	281	104-H-3	H
7510	Oct. 21/82	281	104-H-3	H
7511	Oct. 21/82	281	104-H-3	H
7512	Oct. 21/82	281	104-H-3	I
7513	Oct. 21/82	281	104-H-3	I
7514	Oct. 21/82	281	104-H-3	I
7515	Oct. 21/82	281	104-H-3	I
7516	Oct. 21/82	281	104-H-3	I
7517	Oct. 21/82	281	104-H-3	I
7518	Oct. 21/82	281	104-H-3	I
7519	Oct. 21/82	281	104-H-3	I
7520	Oct. 21/82	281	104-H-3	I

Nass Area (cont'd)

Licence	Effective Date	Hectares	Series	Block
7521	Oct. 21/82	281	104-H-3	I
7522	Oct. 21/82	281	104-H-3	I
7523	Oct. 21/82	281	104-H-3	I
7530	Oct. 21/82	281	104-H-2	L
7531	Oct. 21/82	281	104-H-2	L
7532	Oct. 21/82	281	104-H-2	L
7533	Oct. 21/82	281	104-H-2	L
7534	Oct. 21/82	281	104-H-2	L
7535	Oct. 21/82	281	104-H-2	L
7536	Oct. 21/82	281	104-H-2	L

Nass Area Total Hectares = 10 678

Skeena Area

7489	Oct. 21/82	282	104-H-2	G
7490	Oct. 21/82	282	104-H-2	G
7491	Oct. 21/82	282	104-H-2	G
7492	Oct. 21/82	282	104-H-2	G
7493	Oct. 21/82	282	104-H-2	G
7494	Oct. 21/82	282	104-H-2	G
7495	Oct. 21/82	282	104-H-2	G
7496	Oct. 21/82	282	104-H-2	G
7497	Oct. 21/82	281	104-H-2	G
7498	Oct. 21/82	281	104-H-2	G
7499	Oct. 21/82	281	104-H-2	G
7500	Oct. 21/82	281	104-H-2	G

Skeena Area (cont'd)

Licence	Effective Date	Hectares	Series	Block
7501	Oct. 21/82	281	104-H-2	G
7502	Oct. 21/82	281	104-H-2	J
7503	Oct. 21/82	281	104-H-3	K
7504	Oct. 21/82	281	104-H-3	K
7524	Oct. 21/82	281	104-H-2	K
7525	Oct. 21/82	281	104-H-2	K
7526	Oct. 21/82	281	104-H-2	K
7528	Oct. 21/82	281	104-H-2	L
7537	Oct. 21/82	281	104-H-2	F
7538	Oct. 21/82	281	104-H-2	F
7539	Oct. 21/82	281	104-H-2	F
7714	Jan. 10/84	281	104-H-2	G
7715	Jan. 10/84	281	104-H-2	G
7716	Jan. 10/84	281	104-H-2	G
7717	Jan. 10/84	281	104-H-2	G
7718	Jan. 10/84	281	104-H-2	G
7719	Jan. 10/84	281	104-H-2	G
7720	Jan. 10/84	281	104-H-2	G
7721	Jan. 10/84	281	104-H-2	G
7722	Jan. 10/84	281	104-H-2	G

Skeena Area Total Hectares = 9000

Summit-Nass-Skeena Area Total Hectares = 33 260.5

Appendix B

MOUNT KLAPPAN COAL PROJECT LICENCES
1984

Hobbit-Broatch Area

Licence	Effective Date	Hectares	Series	Block
7118	Sept. 1/81	281	104-H-2	J
7119	Sept. 1/81	281	104-H-2	J
7120	Sept. 1/81	32	104-H-2	J
7121	Sept. 1/81	224	104-H-2	J
7122	Dec. 31/82	281	104-H-2	J
7123	Dec. 31/82	281	104-H-2	J
7124	Sept. 1/81	98	104-H-2	J
7125	Dec. 31/82	281	104-H-2	J
7126	Dec. 31/82	281	104-H-2	J
7127	Sept. 1/81	281	104-H-2	K
7128	Sept. 1/81	281	104-H-2	K
7131	Sept. 1/81	281	104-H-2	K
7132	Sept. 1/81	281	104-H-2	K
7136	Dec. 31/82	281	104-H-2	K
7137	Sept. 1/84	281	104-H-2	K
7141	Dec. 31/82	281	104-H-2	K
7142	Dec. 31/82	281	104-H-2	K
7155	Sept. 1/81	61	104-H-7	B
7156	Sept. 1/81	167	104-H-7	B
7157	Sept. 1/81	265	104-H-7	B
7158	Dec. 31/82	281	104-H-7	C
7159	Dec. 31/82	281	104-H-7	C
7163	Dec. 31/82	257	104-H-7	C
7381	Mar. 18/82	281	104-H-2	J
7416	Mar. 15/83	281	104-H-2	J
7417	Mar. 15/83	281	104-H-2	J
7418	Mar. 15/83	281	104-H-2	J
7419	Mar. 15/83	278	104-H-2	J
7420	Mar. 15/83	281	104-H-2	J

Hobbit-Broatch Area (cont'd)

Licence	Effective Date	Hectares	Series	Block
7559	June 30/83	22	104-H-7	B
7560	June 30/83	153	104-H-7	C
7723	Jan. 10/84	281	104-H-2	J
7724	Jan. 10/84	250	104-H-2	J
7725	Jan. 10/84	7	104-H-2	J

Hobbit-Broatch Area Total Hectares = 7 996

Appendix B

MOUNT KLAPPAN COAL PROJECT LICENCES

1984

Lost-Fox Area

Licence	Effective Date	Hectares	Series	Block
7129	Sept. 1/81	281	104-H-2	K
7130	Sept. 1/81	281	104-H-2	K
7133	Sept. 1/81	281	104-H-2	K
7134	Sept. 1/81	281	104-H-2	K
7135	Sept. 1/81	281	104-H-2	K
7138	Sept. 1/81	281	104-H-2	K
7139	Sept. 1/81	281	104-H-2	K
7140	Dec. 31/82	281	104-H-2	K
7143	Dec. 31/82	281	104-H-2	K
7144	Dec. 31/82	281	104-H-2	K
7145	Dec. 31/82	281	104-H-2	K
7146	Sept. 1/81	281	104-H-2	L
7147	Dec. 31/82	281	104-H-2	L
7148	Sept. 1/81	281	104-H-2	L
7149	Sept. 1/81	281	104-H-2	L
7151	Dec. 31/82	281	104-H-2	L
7152	Dec. 31/82	281	104-H-2	L
7153	Sept. 1/81	281	104-H-2	L
7160	Dec. 31/82	281	104-H-7	C
7161	Dec. 31/82	281	104-H-7	C
7162	Dec. 31/82	281	104-H-7	C
7164	Dec. 31/82	280	104-H-7	C
7165	Dec. 31/82	280	104-H-7	C
7166	Dec. 31/82	280	104-H-7	C
7167	Sept. 1/81	75	104-H-7	C
7168	Sept. 1/81	142	104-H-7	C
7169	Dec. 31/82	281	104-H-7	D

Lost-Fox Area (cont'd)

Licence	Effective Date	Hectares	Series	Block
7170	Dec. 31/82	281	104-H-7	D
7171*	Dec. 31/82	140.5	104-H-7	D
7172	Dec. 31/82	280	104-H-7	D
7173*	Dec. 31/82	140	104-H-7	D
7175	Sept. 1/81	94	104-H-7	D
7527	Oct. 21/82	281	104-H-2	K
7529	Oct. 21/82	281	104-H-2	L
7561	June 30/83	21	104-H-7	C

* Licence split between Lost-Fox and Summit-Nass-Skeena Areas

Lost-Fox Area Total Hectares = 8 757.5

APPENDIX C

DISTRIBUTION OF WORK BY LICENCE

Appendix C

DISTRIBUTION OF WORK BY LICENCES

Trench Number	Licence Number
KPNSNTRC 84001	7729
KPNSNTRC 84002	7732
KPNSNTRC 84008	7740
KPNSNTRC 84009	7740
KPNSNTRC 84013	7753
KPNSNTRC 84016	7738
KPNSSTRC 84017	7730
KPNSSTRC 84020	7387
KPNSNTRC 84021	7726
KPNSNTRC 84022	7727
KPNSNTRC 84023	7727
KPNSNTRC 84024	7727
KPNSNTRC 84025	Off Property
KPNSNTRC 84026	7726
KPNSNTRC 84027	7726 56
KPNSNTRC 84028	7726
KPNSSTRC 84029	7387
KPNSNTRC 84030	7756
KPNNRTRC 84003	7518
KPNNRTRC 84004	Off Property
KPNNRTRC 84005	7519*
KPNNRTRC 84006	7530
KPNNRTRC 84007	7530
KPNNRTRC 84010	Off Property

Trench Number	Licence Number
KPNNRTRC 84011	7521
KPNNRTRC 84012	7520
KPNNRTRC 84014	Off Property
KPNNRTRC 84015	Off Property
KPNNRTRC 84018	7531
KPNNRTRC 84031	7521*
KPNNRTRC 84032	7521*
KPNSKTRC 84019	7503

* (Relogged from 1983)

APPENDIX D

RESOURCE DATA AND CALCULATIONS

SUMMIT INFERRED RESOURCE AREA

RESOURCE DATA AND CALCULATIONS

INFERRED RESOURCE SUMMARY SHEET
 NORTHERN SUMMIT RESOURCE AREA
 TOTAL SEAM TONNAGE (MILLION TONNES)

Section	9500N	10000N	10500N	11000N	Total (per seam)
Seam					
G'	1.17	0.920	1.29	--	3.38
E'	1.81	1.15	0.293	--	3.25
TRC84027	0.315	2.51	1.45	3.85	8.12
TRC83060	<u>5.11</u>	<u>6.47</u>	<u>7.31</u>	<u>--</u>	<u>18.9</u>
Total (per section)	8.40	11.0	10.3	3.85	33.6

'Upper and lower seams have been combined

SOUTHERN SUMMIT RESOURCE AREA
 TOTAL SEAM TONNAGE (MILLION TONNES)

Section	5500N	6000N	Total (per seam)
D	1.33	1.89	3.22
C	1.55	1.74	2.89
B	<u>0.647</u>	<u>1.02</u>	<u>1.67</u>
Total	3.13	4.65	7.78

TOTAL INFERRED RESOURCE FOR SUMMIT AREA

41.4 mt

Section 9500N

Seam	Seam Length (m)	Width of Influence (m)	Seam Thickness (m)	(Tonnes/m3)	Tonnes (x 10 ⁶)
G'	280	500	4.92	1.70	1.17
E'	800	500	2.66	1.70	1.81
TRC84027	7130	410	3.48	1.70	0.315
TRC83060"	790	500	7.61	1.70	5.11

Section 10 000N

G'	220	500	4.92	1.70	0.920
E'	510	500	2.66	1.70	1.15
TRC84027	850	500	3.48	1.70	2.51
TRC83060"	1000	500	7.61	1.70	6.47

Section 10 500N

G'	430	360	4.92	1.70	1.29
E'	180	360	2.66	1.70	0.293
TRC84027	490	500	3.48	1.70	1.45
TRC83060"	1130	500	7.61	1.70	7.31

Section 11 000N

Seam	Seam Length (m)	Width of Influence (m)	Seam Thickness (m)	(Tonnes/m ³)	Tonnes (x 10 ⁶)
G	--	--	--		
E	--	--	--		
TRC84027	1300	500	3.48	1.70	3.85
TRC83060	--	--	--		

' The seam described is a composite of two seams which are separated by a rock split which has a thickness greater than 0.50 metres. The thickness of the rock split was not included in the calculation of the seam thickness.

' Structural thickening was suspected in this seam at the trench where its thickness was measured. An arbitrary factor of 75 percent was applied to the measured thickness of this coal seam to give a conservative estimate of the true (not structurally thickened) thickness of the coal seam.

Section 6 000N

D	400	500	3.91	1.70	1.33
C	500	500	2.71	1.70	1.15
B	590	500	1.29	1.70	0.647

Section 5 500N

D	570	500	3.91	1.70	1.89
C	755	500	2.71	1.70	1.74
B	930	500	1.29	1.70	1.02

SUMMIT-NASS-SKEENA AREA
SPECULATIVE RESOURCES

SUMMIT-NASS-SKEENA AREA
SPECULATIVE RESOURCE CALCULATIONS

Area	Planimetered Surface Area (m ²)	Aggregate Seam Thickness (m)	Specific Gravity (t/m ³)	Tonnes of Coal
Summit	124,337,500	8.80	1.70	1,860,089,000
Nass	74,987,500	8.80	1.70	1,121,813,000
Skeena	15,525,000	8.80	1.70	232,254,000
Total	214,850,000	8.80	1.70	3,214,156,000

The Summit-Nass-Skeena Area has a Total Speculative Resource Potential of 3.21 billion tonnes.

APPENDIX E

MEASURED SECTION DESCRIPTIVE LOGS

===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPNSNOTC84001

DATE - 12/03/84

- HISTORY -

START DATE - 07/10/84
END DATE - 07/10/84

CONTRACTOR -
GEOLOGIST - MCKENZIE

OPERATOR - GCRI
SURVEYOR -

REMARKS -

- LOCATION -

PROVINCE - BC
ELEVATION - 1425.00

ZONE - 9
NORTHING - 6353600.00
EASTING - 501100.00

LICENCE/LEASE NUMBER - 7390

LATITUDE - 571938
LONGITUDE - 1285854

- ORIENTATION -

LENGTH - 0.00
SIZE WIDTH - 0.0
SIZE HEIGHT - 0.0

INCLINATION - 0.0
AZIMUTH - 0.0

ROOF STRIKE - 0
ROOF DIP - 0
ROOF DIR -

FLOOR STRIKE - 0
FLOOR DIP - 0
FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

=====

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	0.00	0.89	0.89			SANDSTONE	SLTY.FG.M.GY COARSENS UPWARDS; MODERATE CEMENTATION (SI); 334/24W
* 90	0.89	0.99	0.10			SANDSTONE	FG.LT.GY TOPS UP; PARALLEL CONTINUOUS UPPER CONTACT; PARALLEL CROSS-LAMINATION
* 90	0.99	2.25	1.26			SILTSTONE	M.GY CONCHOIDAL FRACTURE; SILTY IN THE MIDDLE; ARGILLACEOUS SILTSTONE; MASSIVE
* 90	2.25	2.30	0.05			SANDSTONE	FG.M.GY.LAM INTERNAL PARALLEL CONTACTS
* 90	2.30	2.87	0.57			SILTSTONE	M.GY.LAM HEMATITE STAINING; WAVY CONTACT ABOVE; ARGILLACEOUS
* 90	2.87	3.03	0.16			SANDSTONE	VFG.LT.GY.LAM HEMATITE STAINED; WAVY GRADATIONAL CONTACTS; SOME 1-3 CM FINE GRAINED SANDSTONE BEDS
* 90	3.03	3.62	0.59			SANDSTONE	SLTY.FG.M.GY.LAM MODERATE CEMENTATION; IRREGULAR FRACTURES
* 90	3.62	4.56	0.94			COVERED	COVERED INTERVAL

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SN DATA SOURCE: OTCB4001

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	4.56	4.79	0.23			SILTSTONE	M.GY ARGILLACEOUS; IRREGULAR FRACTURE; MODERATE CEMENTATION (SI)
* 90	4.79	5.03	0.24			COVERED	COVERED INTERVAL
* 90	5.03	5.73	0.70			SANDSTONE	FG-.GY CONCHOIDAL FRACTURE; POLYMICTIC; WAVY CONTACT BELOW; INTERBEDDED SANDSTONE AND SILTSTONE
* 90	5.73	5.79	0.06			SILTSTONE	VFG.DK.GY CONCHOIDAL AND IRREGULAR FRACTURE; PARALLEL CONTACT
* 90	5.79	6.16	0.37			SANDSTONE	FG.DK.GY.LAM LAMINAE INTERNALLY TRUNCATED; MODERATE CEMENTATION
* 90	6.16	7.74	1.58			SANDSTONE	FG.LT.BN.LAM UNDULATORY PARALLEL CONTACT; POLYMICTIC
* 90	7.74	7.80	0.06			SANDSTONE	M.GY.LAM SILTSTONE LENSES SUB-PARALLEL TO CONTACT; SANDSTONE POLYMICTIC; INTERBEDDED SANDSTONE AND SILTSTONE
* 90	7.80	8.04	0.24			SANDSTONE	M.GY.LAM POLYMICTIC; PARALLEL CONTACT

* DENOTES MEASURED BCA

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: SN DATA SOURCE: OTCB4001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	8.04	9.50	1.46			COVERED	COVERED SECTION
* 90	9.50	12.67	3.17			SANDSTONE	MG.M.GY PARALLEL CONTACT; POORLY DEVELOPED CLEAVAGE; POLYMIC TIC; HEMATITE STAINING; ROUGH IRREGULAR FRACTURE; POORLY CEMENTED
* 90	12.67	13.45	0.78			COVERED	COVERED SECTION
* 90	13.45	16.85	3.40			MUDSTONE	SLTY.DK.GY.LAM SMALL SCALE CONCHOIDAL FRACTURE; INTERNAL CONTINUOUS SUB-PARALLEL CONTACTS; MODERATELY CEMENTED
* 90	16.85	17.28	0.43			SANDSTONE	FG.M.GY PARALLEL CONTACTS; MODERATELY CEMENTED; INTERBEDDED SANDSTONE AND SILTSTONE
* 90	17.28	17.47	0.19			SILTSTONE	LT.GY MASSIVE SILTSTONE; HEMATITE STAINING; UNDULATORY SUB-PARALLEL CONTACT BELOW; MODERATELY CEMENTED
* 90	17.47	20.03	2.56			MUDSTONE	SLTY.DK.GY INTERBEDS 0.5-3.0 cm THICK; MODERATELY CEMENTED; PARALLEL CONTACTS; HEMATITE STAINING

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SN DATA SOURCE: OTCB4001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	20.03	20.13	0.10			SILTSTONE	DK.GY WELL CEMENTED; BLOCKY FRACTURE; OBSCURE CONTACTS; MASSIVE SILTSTONE
* 90	20.13	20.71	0.58			SILTSTONE	PARALLEL CONTACTS; MODERATE CEMENTATION ; ARGILLACEOUS
* 90	20.71	21.31	0.60			SILTSTONE	CONCHOIDAL FRACTURE; MODERATE CEMENTATION; SHARP CONTACTS; ARGILLACEOUS
* 90	21.31	21.73	0.42			SANDSTONE	FG.M.GY MINOR BIOTURBATION; 1-2 cm VERTICAL BURROWS; PARALLEL CONTACTS
* 90	21.73	22.79	1.06			SILTSTONE	M.GY IRREGULAR FRACTURE; POORLY DEVELOPED CONCHOIDAL FRACTURE; MODERATE CEMENTATION ; PARALLEL CONTACT; ARGILLACEOUS
* 90	22.79	22.83	0.04			SANDSTONE	FG.LAM DARK GRAY ARGILLACEOUS BANDS 2 mm THICK ; PARALLEL CONTACTS; LOW ANGLE CROSS LAMINATION
* 90	22.83	22.89	0.06			SANDSTONE	VFG.M.GY.LAM LOW ANGLE CROSS LAMINATION; LENSOID; PARALLEL CONTACT; ARGILLACEOUS

* DENOTES MEASURED BCA

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SN DATA SOURCE: DTC84001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	22.89	24.48	1.59			MUDSTONE	MG POORLY DEVELOPED CONCHOIDAL FRACTURE; OCCASIONAL VERY FINE GRAINED 4 cm LAMINATED SANDSTONE BEDS; MODERATELY-WELL CEMENTED; PARALLEL CONTACTS; ARGILLACEOUS
* 90	24.48	24.99	0.51			SANDSTONE	LAM CROSS-LAMINATED LOW ANGLE; PARALLEL CONTACTS; MODERATE CEMENT
* 90	24.99	27.71	2.72			SILTSTONE	POORLY DEVELOPED CONCHOIDAL FRACTURE; OCCASIONAL SILTY BEDS; MODERATE CEMENTATION; PARALLEL CONTACTS; ARGILLACEOUS
* 90	27.71	28.11	0.40			SANDSTONE	SLTY.VFG IRREGULAR FRACTURES; BIOCEROS BIVALVE ASSEMBLAGE ON BEDDING PLANE; INTACT 2 cm BIVALVES; DISCONTINUOUS ASSEMBLAGE
* 90	28.11	30.06	1.95			SILTSTONE	LAM LAMINATED WITH SILTY FINE GRAINED SANDSTONE; LAMINATIONS DISCONTINUOUS; ARGILLACEOUS
* 90	30.06	33.74	3.68			COVERED	COVERED SECTION

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 6

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	33.74	38.97	5.23			SILTSTONE	DK.GY.MAS IRREGULAR PENETRATIVE CLEAVAGE; MODERATE CEMENTATION; GRADATIONAL CONTACTS; ARGILLACEOUS
* 90	38.97	39.57	0.60			SILTSTONE	POOR CONCHOIDAL FRACTURING; GRADATIONAL CONTACTS; MODERATE CEMENTATION
* 90	39.57	42.27	2.70			SILTSTONE	DK.GY.MAS IRREGULAR PENETRATIVE CLEAVAGE; OBSCURE CONTACT; ARGILLACEOUS
* 90	42.27	42.85	0.58			SILTSTONE	GRADATIONAL CONTACTS
* 90	42.85	47.05	4.20			SILTSTONE	MAS GRADATIONAL CONTACTS; ARGILLACEOUS
* 90	47.05	47.77	0.72			SILTSTONE	
* 90	47.77	50.44	2.67			SILTSTONE	MAS ARGILLACEOUS
* 90	50.44	50.65	0.21			SILTSTONE	
* 90	50.65	52.54	1.89			SILTSTONE	MAS
* 90	52.54	52.62	0.08			SILTSTONE	

* DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 7

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	52.62	54.38	1.76			SILTSTONE	MAS
* 90	54.38	54.59	0.21			SILTSTONE	
* 90	54.59	55.63	1.04			SILTSTONE	MAS ARGILLACEOUS
* 90	55.63	55.73	0.10			SILTSTONE	
* 90	55.73	56.70	0.97			SILTSTONE	MAS
* 90	56.70	58.58	1.88			SILTSTONE	MAS ARGILLACEOUS
* 90	58.58	58.95	0.37			SILTSTONE	
* 90	58.95	60.82	1.87			SILTSTONE	MAS ARGILLACEOUS
* 90	60.82	61.32	0.50			SILTSTONE	
* 90	61.32	61.83	0.51			SILTSTONE	MAS
* 90	61.83	62.06	0.23			SILTSTONE	
* 90	62.06	63.68	1.62			SILTSTONE	MAS

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 8

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84001

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	63.68	65.31	1.63			SILTSTONE	
* 90	65.31	65.41	0.10			SILTSTONE	MAS ARGILLACEOUS
* 90	65.41	65.63	0.22			SILTSTONE	
* 90	65.63	65.70	0.07			SILTSTONE	MAS ARGILLACEOUS
* 90	65.70	68.25	2.55			SILTSTONE	

* DENOTES MEASURED BCA
NEWPAGE



===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPNNROTC84002

DATE - 12/03/84

- HISTORY -

START DATE - 08/12/84
END DATE - 08/12/84

CONTRACTOR -
GEOLOGIST - SWANBERGSON

OPERATOR - GCRI
SURVEYOR -

REMARKS - PRESUMED TO BE IN MALLOCH

- LOCATION -

PROVINCE - BC
ELEVATION - 2025.20

ZONE - 9
NORTHING - 6338000.00
EASTING - 499800.00

LICENCE/LEASE NUMBER - 0

LATITUDE - 571114
LONGITUDE - 1290012

- ORIENTATION -

LENGTH -

INCLINATION - 0.0
AZIMUTH - 0.0

SIZE WIDTH - 0.0
SIZE HEIGHT - 0.0

ROOF STRIKE - 0
ROOF DIP - 0
ROOF DIR -

FLOOR STRIKE - 0
FLOOR DIP - 0
FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

=====

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	0.00	2.00	2.00			SILTSTONE	SSY.FG.DK.GY.MB INTERBEDDED
* 90	2.00	9.50	7.50			SANDSTONE	SLTY.MB RARE CONIFER NEEDLES; ORANGE CONCRETIONARY BANDS
* 90	9.50	19.50	10.00			MUDSTONE	DK.GY CONIFER NEEDLES; VITRINITE LAMINATIONS; INTERBEDDED SILTSTONE
* 90	19.50	20.00	0.50			SILTSTONE	GY.LAM
* 90	20.00	20.40	0.40			MUDSTONE	SLTY
* 90	20.40	22.90	2.50			SANDSTONE	FG.LT.GY COALY WISPS IN LOWER HALF; SMALL CONCRETIONS APPROXIMATELY 1 M LONG
* 90	22.90	27.90	5.00			MUDSTONE	SSY.FG.M.GY.MB ABUNDANT PLANT DEBRIS; THIN BEDS OF ORANGE WEATHERING RESISTIVE SILTSTONES; INTERBEDDED

• DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 2

PROJECT: KPN BLOCK: NR DATA SOURCE: DTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	27.90	29.90	2.00			SANDSTONE	MB NEEDLES OF CONIFERS; INTACT LEAVES OF F ERNS; INTERBEDDED SILTSTONE; S.I.D. - E S416-1A/ES416-1B
* 90	29.90	31.40	1.50			SANDSTONE	FG MINOR NEEDLES AND LEAVES
* 90	31.40	36.40	5.00			MUDSTONE	DK.GY
* 90	36.40	40.40	4.00			SANDSTONE	MG CHERT PEBBLE LAGS; INCREASES CHERT TOWA RDS BOTTOM
* 90	40.40	44.40	4.00			CONGLOMERATE	SSY UNIT IS INCREASINGLY MORE SANDY TOWARDS BASE; SMALL BRANCHES PRESENT; BASE IS POORLY CEMENTED
* 90	44.40	50.40	6.00			MUDSTONE	DK.GY
* 90	50.40	57.40	7.00			SANDSTONE	MG.DK.GY.MAS PEBBLE LAGS (CHERT); WELL CEMENTED; BLO CKY WEATHERING; PLANT STEM FOSSILS

• DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: NR DATA SOURCE: QTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	57.40	58.90	1.50			CONGLOMERATE	SSY.VPR.MAS SLICKENSIDES; WELL CEMENTED CLASTS 2.0 cm - 0.5 cm; INTERBEDDED
* 90	58.90	64.90	6.00			MUDSTONE	DK.GY
* 90	64.90	67.40	2.50			SANDSTONE	FG.DK.GY.MAS OCCASIONAL INTERBEDS; LIGHT ORANGE WEAT HERING
* 90	67.40	69.90	2.50			MUDSTONE	DK.GY
* 90	69.90	70.90	1.00			SANDSTONE	MG.S-P.BN CROSS BEDDING; PINK TINGE TO ROCK
* 90	70.90	82.40	11.50			MUDSTONE	DK.GY
* 90	82.40	84.40	2.00			SANDSTONE	MG.S-P.BN CROSS BEDDING; PINK TINGE
* 90	84.40	86.40	2.00			SANDSTONE	MG.GY CROSS BEDDING; MINOR GRITTY PEBBLE LAGS
* 90	86.40	86.90	0.50			SHALE	CARBONACEOUS; MINOR VITRINITE

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	86.90	88.40	1.50			SANDSTONE	FG.DK.GY.MB OCCASIONAL NEEDLES; HIGHLY FRACTURED; OCCASIONAL ORANGE WEATHERING; SANDSTONE INTERBEDS
* 90	88.40	89.40	1.00			SILTSTONE	DK.GY GREEN TINGE
* 90	89.40	91.40	2.00			MUDSTONE	LT.GY.MB ORANGE TINGE; INTERBEDDED
* 90	91.40	92.40	1.00			SANDSTONE	FG.LT.GY GREEN TINGE
* 90	92.40	97.40	5.00			MUDSTONE	SLTY.THNB OCCASIONAL SANDSTONE INTERBEDS
* 90	97.40	102.40	5.00			SANDSTONE	FG.LT.GY.MAS ORANGE TINGE
* 90	102.40	117.40	15.00			MUDSTONE	DK.GY
* 90	117.40	118.90	1.50			SILTSTONE	GY.MAS FRACTURED
* 90	118.90	123.90	5.00			SILTSTONE	FG.LAM

• DENOTES MEASURED BCA

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 5

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	123.90	125.40	1.50			SANDSTONE	LT.GY.MAS ORANGE TINGE
* 90	125.40	127.40	2.00			MUDSTONE	CLYY.DK.GY.LAM CONIFER NEEDLES; SILTY LAMINATIONS TOWA RDS BASE
* 90	127.40	128.40	1.00			SILTSTONE	SSY.MB BEDS ARE TABULAR; INTERBEDDED SANDSTONE
* 90	128.40	140.40	12.00			MUDSTONE	DK.GY ABUNDANT CONIFER NEEDLES; MINOR PLANT F RAGMENTS; CARBONACEOUS BANDS
* 90	140.40	142.40	2.00			SILTSTONE	M.GY
* 90	142.40	144.90	2.50			SANDSTONE	LT.GY FOSSIL BRANCHES ON OCCASION; GREEN TING E
* 90	144.90	151.90	7.00			MUDSTONE	LT.GY.THNB MUDSTONES ARE LAMINATED; INTERBEDDED SA NDSTONE
* 90	151.90	152.90	1.00			SILTSTONE	LAM

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	152.90	153.40	0.50			SILTSTONE	ORNG CONCRETIONARY; MINOR TREE BRANCHES
* 90	153.40	159.40	6.00			MUDSTONE	DK.GY 0.5 m SANDSTONE UNIT WITHIN
* 90	159.40	172.40	13.00			MUDSTONE	DK.GY POOR OUTCROP - OBSCURED BY SURFICIAL DE BRIS
* 90	172.40	179.40	7.00			SANDSTONE	LT.GY.MB CROSS BEDDING; MINOR LAMINATED SILT AND MUDSTONE BEDS WHICH HAVE A BLUE TINGE; CONCRETIONARY LENSES AT BASE
* 90	179.40	184.90	5.50			MUDSTONE	GY MINOR CARBONACEOUS BAND IN MIDDLE WITH VITRINITE
* 90	184.90	187.40	2.50			SILTSTONE	LT.GY.THNB BEDDING IS DISCONTINUOUS- BLUE-GREEN
* 90	187.40	188.40	1.00			SANDSTONE	SLTY.M.GY.LAM LATERALLY CONTINUOUS; ORANGE WEATHERING CONCRETIONS
* 90	188.40	193.40	5.00			MUDSTONE	CONIFER NEEDLES; LATERALLY CONTINUOUS O RANGE BANDS

* DENOTES MEASURED BCA

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 7

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	193.40	213.40	20.00			MUDSTONE	DK.GY RECESSIVE
* 90	213.40	214.90	1.50			SILTSTONE	SSY.LT.ORNG SANDY INTERBEDS AT TOP; MINOR ORANGE WE ATHERING CONCRETIONS; ABUNDANT CONIFER NEEDLES
* 90	214.90	221.90	7.00			MUDSTONE	DK.GY
* 90	221.90	223.90	2.00			MUDSTONE	SLTY LATERALLY CONTINUOUS SILT INTERBEDS; FI NE GRAINED SAND INTERBEDS
* 90	223.90	230.90	7.00			SANDSTONE	DK.GY.MB LAMINATED ORANGE CONCRETIONARY SILTSTON E BEDS THAT ARE LATERALLY CONTINUOUS
* 90	230.90	237.90	7.00			MUDSTONE	GY.MB RECESSIVE UNIT
* 90	237.90	242.90	5.00			SANDSTONE	FG SILTY MUD INTERBEDS AND CONCRETIONARY B ANDS THAT ARE LATERALLY CONTINUOUS

• DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 8

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	242.90	244.90	2.00			MUDSTONE	SLTY
* 90	244.90	246.90	2.00			SILTSTONE	SSY
* 90	246.90	250.90	4.00			MUDSTONE	DK.GY
* 90	250.90	252.90	2.00			SANDSTONE	LT.GY WEATHERS ORANGE-YELLOW; FOSSILIZED TWIG S
* 90	252.90	257.90	5.00			MUDSTONE	M.GY CARBONACEOUS AT BASE
* 90	257.90	265.90	8.00			SANDSTONE	FG SILTSTONE INTERBEDS IN LENSOIDAL FORM; ORANGE-YELLOW CONCRETIONARY UNITS DISPLAY KARST TYPE WEATHERING SURFACE; SANDS ARE MASSIVE TO THINLY BEDDED; MINOR CO NIFER NEEDLES
* 90	265.90	270.90	5.00			SILTSTONE	CLYY.THNB ALL BEDS LESS THAN ONE METRE THICK

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: NR DATA SOURCE: OTCB4002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	270.90	272.90	2.00			SANDSTONE	FG.LT.GY.MAS ORANGE TINGE
* 90	272.90	273.90	1.00			SILTSTONE	DK.GY SANDY LAMINATIONS
* 90	273.90	275.40	1.50			SANDSTONE	FG.LT.GY.MAS ORANGE TINGE
* 90	275.40	276.40	1.00			SILTSTONE	DK.GY.LAM UNIT COARSENS UPWARDS
* 90	276.40	278.90	2.50			SANDSTONE	MG.LT.GY.MAS
* 90	278.90	280.40	1.50			MUDSTONE	MUCH OF THIS UNIT IS OBSCURED BY SURFICIAL DEBRIS
* 90	280.40	284.40	4.00			SANDSTONE	MG-.GY.MAS
* 90	284.40	286.40	2.00			SILTSTONE	SSY.LAM DISCONTINUOUS; CONCRETIONS
* 90	286.40	289.40	3.00			SANDSTONE	M.GY DISCONTINUOUS CONCRETION BANDS AT BASE

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 10

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	289.40	292.40	3.00			SILTSTONE	LAM GRADES DOWN TO MUDSTONE LAMINATIONS OF SAND THROUGHOUT
* 90	292.40	302.40	10.00			MUDSTONE	MUCH OF UNIT IS OBSCURED BY SURFICIAL DEBRIS - RECESSIVE UNIT
* 90	302.40	312.40	10.00			MUDSTONE	SOME SPOIL; COVERED
* 90	312.40	314.90	2.50			SANDSTONE	LT. BN WEATHERS BROWN-GRAY; SOME PLANT FRAGMENTS; RESISTANT
* 90	314.90	315.90	1.00			SILTSTONE	RECESSIVE
* 90	315.90	319.90	4.00			MUDSTONE	RECESSIVE
* 90	319.90	320.40	0.50			COAL	RECESSIVE; WEATHERED
* 90	320.40	321.40	1.00			SANDSTONE	MG LIGHT GRAY-BROWN; RESISTANT
* 90	321.40	325.40	4.00			MUDSTONE	SOME NEEDLE FRAGMENTS; RECESSIVE
* 90	325.40	325.90	0.50			MUDSTONE	CARB RECESSIVE
* 90	325.90	327.90	2.00			SANDSTONE	FG GRAY-GREEN WEATHERING; RESISTANT

• DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 11

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	327.90	329.90	2.00			MUDSTONE	RESISTANT; SILTSTONE INTERBEDS
* 90	329.90	330.90	1.00			SANDSTONE	FG GRAY-GREEN; RESISTANT
* 90	330.90	340.90	10.00			SANDSTONE	LT.GY SILTSTONE INTERBEDS; MINOR CONCRETIONS
* 90	340.90	344.90	4.00			MUDSTONE	TWO CARBONACEOUS ZONES
* 90	344.90	347.90	3.00			SILTSTONE	DK.GY LAMINATED; RESISTANT
* 90	347.90	350.90	3.00			SANDSTONE	M.GY RESISTANT
* 90	350.90	353.90	3.00			CONGLOMERATE	MINOR BRANCHES; ABUNDANT SANDSTONE LENS ES; PARTLY PEBBLE LAG
* 90	353.90	359.90	6.00			SANDSTONE	LT.GY RESISTANT; BRANCHES; CROSS-BEDDED
* 90	359.90	362.90	3.00			COVERED	COVERED
* 90	362.90	363.20	0.30			COAL	RECESSIVE
* 90	363.20	366.20	3.00			SANDSTONE	RESISTANT
* 90	366.20	368.20	2.00			SILTSTONE	FAIRLY RECESSIVE

• DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 12

PROJECT: KPN BLOCK: NR DATA SOURCE: OTCB4002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	368.20	373.20	5.00			MUDSTONE	WITH BANDED SILTSTONE; RECESSIVE
* 90	373.20	388.20	15.00			COVERED	COVERED
* 90	388.20	398.20	10.00			MUDSTONE	RECESSIVE
* 90	398.20	401.20	3.00			SILTSTONE	M.GY CONCRETIONS; LAMINATED; PLANT DEBRIS; BEDS PINCH AND SWELL
* 90	401.20	409.20	8.00			MUDSTONE	RECESSIVE
* 90	409.20	411.20	2.00			SANDSTONE	LT.GY MASSIVE; FAIRLY RECESSIVE
* 90	411.20	424.20	13.00			COVERED	COVERED; IN A SADDLE
* 90	424.20	428.20	4.00			SILTSTONE	MINOR SANDSTONE LENSES; FAIRLY RESISTANT
* 90	428.20	436.20	8.00			SANDSTONE	GY RESISTANT
* 90	436.20	446.20	10.00			COVERED	BOULDER TILL COVER; RECESSIVE
* 90	446.20	451.20	5.00			SILTSTONE	SANDY LAMINATIONS; MINOR SILTY MUD INTERBEDS (20cm); FAIRLY RESISTANT
* 90	451.20	453.20	2.00			MUDSTONE	SILTY INTERBEDS; RECESSIVE

* DENOTES MEASURED BCA



B4/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 13

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84002

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
• 90	453.20	455.70	2.50			SANDSTONE	MG.GY MEDIUM-DARK GRAY
• 90	455.70	458.70	3.00			COVERED	BOULDER TILL COVER
* 90	458.70	461.70	3.00			SANDSTONE	GY MEDIUM-DARK GRAY; FAINT THIN BEDS; FAIRLY RESISTANT
+ 90	461.70	471.70	10.00			MUDSTONE	BOULDER TILL COVER
* 90	471.70	478.70	7.00			COVERED	DK.GY GRAY-GREEN; THICKLY BEDDED
* 90	478.70	485.70	7.00			SANDSTONE	GY
+ 90	485.70	490.70	5.00			MUDSTONE	SANDSTONE INTERBEDS; THICKLY BEDDED MUD ; CARBONACEOUS IN PLACES; PINE NEEDLES
* 90	490.70	494.70	4.00			MUDSTONE	DK.GY CARBONACEOUS AT BASAL CONTACT
* 90	494.70	502.70	8.00			SANDSTONE	MOD.GY SILTY AT TOP; THICKLY BEDDED

• DENOTES MEASURED BCA
NEWPAGE



===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPNSNOTC84003

DATE - 12/03/84

- HISTORY -

START DATE - 08/15/84
END DATE - 08/15/84

CONTRACTOR -
GEOLOGIST - MCKENZIE

OPERATOR - GCRI
SURVEYOR -

REMARKS -

- LOCATION -

PROVINCE - BC
ELEVATION - 2035.00

ZONE - 9
NORTHING - 6353000.00
EASTING - 498330.00

LICENCE/LEASE NUMBER - 7731

LATITUDE - 571919
LONGITUDE - 1290140

- ORIENTATION -

LENGTH - 0.00
SIZE WIDTH - 0.0
SIZE HEIGHT - 0.0

INCLINATION - 0.0
AZIMUTH - 0.0

ROOF STRIKE - 0
ROOF DIP - 0
ROOF DIR -

FLOOR STRIKE - 0
FLOOR DIP - 0
FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

=====

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84003

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
• 90	0.00	8.90	8.90			SANDSTONE	MG.M.GY MASSIVE; EQUIGRANULAR; IMMATURE; HEMATITE STAINED; WELL CEMENTED; SILICEOUS; COARSENS UP TO COARSE GRAINED EQUIGRANULAR SANDSTONE; OCCASIONAL WOOD FRAGMENTS; RARE RIP UP CLASTS; LOW ANGLE CROSS-STRAATIFICATION; BASAL CONTACT OBSCURED
* 90	8.90	9.14	0.24			MUDSTONE	GY SILTY; IRREGULAR FRACTURE; INTERLAMINATED WITH VERY FINE LIGHT GRAY SANDSTONE
• 90	9.14	9.60	0.46			SANDSTONE	MG.GY IMMATURE; SILICEOUS; WELL CEMENTED; HEMATITE STAINED
• 90	9.60	10.46	0.86			SANDSTONE	CG.GY FINELY INTERLAMINATED WITH SILTY MUDSTONE AND ARGILLACEOUS SANDSTONE BANDS SHOWING LOW ANGLE CROSS-STRATIFICATION; WELL CEMENTED; BELEMNITES PRESENT
• 90	10.46	11.93	1.47			SANDSTONE	CG.M.GY POLYMICTIC; LIMONITE STAINED; SHARP; UNCONFORMABLE CONTACT WITH LOWER UNIT

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84003

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	11.93	12.56	0.63			SANDSTONE	FG.LT.GY EQUIGRANULAR; SILICEOUS; WELL CEMENTED; FINELY INTERLAMINATED WITH ARGILLACEOUS SANDSTONE
* 90	12.56	12.64	0.08			SILTSTONE	GY LIMONITE STAINED; INTERBEDDED WITH FINE GRAINED SANDSTONE WHICH FORMS DISCONTINUOUS LENSES; MINOR SOFT SEDIMENTARY DEFORMATION; GRADUAL CONTACT WITH UNDERLYING UNIT.
* 90	12.64	13.34	0.70			SANDSTONE	MG.LT.GY MINOR SCOLITHOS BURROWS; RIPPLE CROSS-LAMINATION IS BROAD AND LOW AMPLITUDE; INTERBEDDED MUDSTONE; MINOR SOFT SEDIMENT DEFORMATION; BIVALVE BURROWS
* 90	13.34	13.45	0.11			SANDSTONE	MG.DK.GY ARGILLACEOUS; HARD ;HEMATITE STAINED
* 90	13.45	13.54	0.09			MUDSTONE	DK.GY SILTY; INTERLAMINATED WITH MEDIUM GRAINED SANDSTONE
* 90	13.54	14.82	1.28			SANDSTONE	FG.LT.GY LIMONITE STAINED; MASSIVE; MINOR ARGILLACEOUS FINE GRAINED SANDSTONE LAMINATIONS ARE UNDULATORY AND DISCONTINUOUS

* DENOTES MEASURED BCA

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84003

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	14.82	15.05	0.23			MUDSTONE	DK.GY INTERBEDDED WITH VERY FINE TO FINE GRAINED SANDSTONE; POLYMICHTIC; MINOR LOW ANGLE; LOW AMPLITUDE SYMMETRIC RIPPLES; MINOR SCOLITHOS BURROWS
* 90	15.05	17.67	2.62			SANDSTONE	FG.LT.GY COARSENS UPWARDS; MASSIVE
* 90	17.67	18.67	1.00			COVERED	COVERED SECTION
* 90	18.67	22.67	4.00			MUDSTONE	M.GY 0.1-2.0 cm BEDS OF FINELY LAMINATED FINE GRAIN SANDSTONE WITH LOW ANGLE CROSS-BEDDING WITHIN UNIT
* 90	22.67	22.87	0.20			SANDSTONE	FG.M.GY WEATHERS GRAY-ORANGE
* 90	22.87	32.87	10.00			SANDSTONE	FG.LT.GY EQUIGRANULAR; MODERATELY RECESSIVE; LENSIFORM IN NATURE AND INTERBEDDED WITH LIGHT GRAY FINELY LAMINATED SILTY SANDSTONE

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SN DATA SOURCE: OTCB4003

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	32.87	36.07	3.20			SANDSTONE	FG.LT.GY.THNB WEATHERS ORANGE; APPEARS MASSIVE (FAINT BEDDING); TROUGH CROSS-BEDDING; VITRAIN BANDS UP TO 3.0 cm WIDE AND 0.5 m LONG NEAR BASE
* 90	36.07	36.10	0.03			MUDSTONE	DK.GY SILTY; DISCONTINUOUS; MINOR SOFT SEDIMENT DEFORMATION
* 90	36.10	40.70	4.60			SANDSTONE	MG.M.GY.MAS LIMONITE STAINED; ABUNDANT PLANT DEBRIS ; PLANAR CROSS-BEDS WITH TRUNCATION ANGLE OF 30 DEGREES; EQUIGRANULAR; SILICIFIED
* 90	40.70	40.75	0.05			SANDSTONE	CARB.MG.DK.GY UNCEMENTED; HIGHLY WEATHERED; VITRAIN LAMINAE UP TO 0.5 cm
* 90	40.75	50.00	9.25			SANDSTONE	MG.M.GY ABUNDANT PLANT DEBRIS UP TO 5.0 cm LONG ; EQUIGRANULAR; SILICIFIED; PLANAR CROSS-BEDDED WHICH BECAME TROUGH CROSS-BEDS TOWARDS TOP

* DENOTES MEASURED BCA

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 5

PROJECT: KPN BLOCK: SN DATA SOURCE: OTC84003

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	50.00	50.75	0.75			SANDSTONE	MG.LT.GY
* 90	50.75	55.08	4.33			SANDSTONE	FG.M.GY LIMONITE WEATHERING; COALIFIED PLANTS U P TO 2.0 cm WITH CALCITE INFILL NEAR TO P
* 90	55.08	58.20	3.12			SANDSTONE	MG.M.GY LIMONITE STAINED; INTERBEDDED WITH MEDI UM GRAY MUDDY SILTSTONE; PLANAR SUB-PAR ALLEL CONTACT WITH LOWER UNIT
* 90	58.20	59.36	1.16			MUDSTONE	CARB.BLK MINOR COALY PARTINGS
* 90	59.36	61.21	1.85			COAL	C-2.BLK
* 90	61.21	61.71	0.50			MUDSTONE	M.GY 1-3 cm BEDDING; CONTAINS FERNS; SILTY

* DENOTES MEASURED BCA
NEWPAGE



===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPNSSOTC84004

DATE - 12/03/84

- HISTORY -

START DATE - 08/22/84

END DATE - 08/22/84

CONTRACTOR -

GEOLOGIST - SAVOIE

OPERATOR - GCRI

SURVEYOR -

REMARKS -

- LOCATION -

PROVINCE - BC

ELEVATION - 1875.00

LICENCE/LEASE NUMBER - 7756

ZONE - 9

NORTHING - 6349995.00

EASTING - 501325.00

LATITUDE - 571741

LONGITUDE - 1285841

- ORIENTATION -

LENGTH - 0.00

INCLINATION - 0.0

AZIMUTH - 0.0

SIZE WIDTH - 0.0

SIZE HEIGHT - 0.0

ROOF STRIKE - 0

ROOF DIP - 0

ROOF DIR -

FLOOR STRIKE - 0

FLOOR DIP - 0

FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

=====

B4/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84004

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	0.00	1.00	1.00			COAL	DK.GY TOP OF SECTION; TRUE THICKNESS UNKNOWN DUE TO AMOUNT OF OVERBURDEN
* 90	1.00	13.80	12.80			SANDSTONE	MG.GY.MAS.XBDG WEATHERED; LOW ANGLE LARGE SCALE PLANAR CROSS BEDS; POLYMIC TIC SILICEOUS; WELL CEMENTED; PLANT FRAGMENTS; IRON STAIN ED; MINOR BIFURCATING RIPPLES
* 90	13.80	15.20	1.40			SANDSTONE	SLTY.FG.GY.LAM INTERBEDDED SANDSTONE AND SILTSTONE; SI LTSTONE IS WEATHERED AND SHOWS CONCHOID AL FRACTURES; THE SANDSTONE IS BRIGHT O RANGE WEATHERING; MINOR BIVALVES
* 90	15.20	15.80	0.60			SILTSTONE	DK.GY BRIGHT ORANGE WEATHERING; MINOR BIVALVE S; FINELY LAMINATED; GRADATIONAL CONTACT
* 90	15.80	19.60	3.80			SILTSTONE	DK.GY WEATHERED; CONCHOIDAL FRACTURE; NODULAR ; MINOR FINE GRAINED SANDSTONE INCREAS ING IN ABUNDANCE UPWARDS; ORANGE WEATHER ING SANDSTONE CONTAINS ABUNDANT BIVALVE S

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 2

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84004

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	19.60	21.30	1.70			SANDSTONE	FG.M.GY.MAS WEATHERED; IRON STAINING; MINOR QUARTZ VEINING;
* 90	21.30	23.00	1.70			SANDSTONE	FG.GY.XBDG WEATHERED; BIVALVE SHELL HASH 0.1-8CM A VERAGING 1-2CM; MOSTLY CONCAVE DOWN; TO PS UP; RARE BELEMNITES; CROSS BEDDING PLANAR
* 90	23.00	28.50	5.50			SANDSTONE	FG.GY SAME AS BOTTOM SANDSTONE; SOME COARSER GRAINED DISCONTINUOUS PATCHES; PLANT FRAGMENTS NEAR THE TOP
* 90	28.50	28.60	0.10			SILTSTONE	DK.GY WEATHERED; BRIGHT ORANGE; SHARP CONTACT
* 90	28.60	28.70	0.10			SANDSTONE	VFG.DK.GY WEATHERED ORANGE; FINELY LAMINATED; WELL CEMENTED; SHARP PLANAR CONTACT
* 90	28.70	30.30	1.60			SANDSTONE	MG.GY WEATHERED BROWN-ORANGE; FERRUGINOUS FLECKS; DISCONTINUOUS IRON STAINING; SHEARED; BLOCKY FRACTURE; NODULAR IN PLACES

• DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84004

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	30.30	33.30	3.00			SANDSTONE	FG.LT.GY SHARP UPPER CONTACT; INTERBEDDED SANDSTONE AND SILTSTONE; SILTSTONE IS WEATHERED WITH PLANT DEBRIS AND CONTAINS DISCONTINUOUS SAND LENSES; SANDSTONE IS POLYMIC TIC AND IRON STAINED WITH MINOR BIVALVES; NEAR THE CORE OF AN ANTICLINE

* DENOTES MEASURED BCA
NEWPAGE



- DATA SOURCE SUMMARY -

DATA SOURCE - KPSSOTC84005

DATE - 12/03/84

- HISTORY -

START DATE - 08/27/84
END DATE - 08/27/84

CONTRACTOR -
GEOLOGIST - MCKENZIE

OPERATOR - GCRI
SURVEYOR -

REMARKS -

- LOCATION -

PROVINCE - BC
ELEVATION - 1981.00

ZONE - 9
NORTHING - 6355000.00
EASTING - 510000.00

LICENCE/LEASE NUMBER - 0

LATITUDE - 572023
LONGITUDE - 1285002

- ORIENTATION -

LENGTH - 0.00

INCLINATION - 0.0
AZIMUTH - 0.0

SIZE WIDTH - 0.0
SIZE HEIGHT - 0.0

ROOF STRIKE - 0
ROOF DIP - 0
ROOF DIR -

FLOOR STRIKE - 0
FLOOR DIP - 0
FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 2

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	43.50	45.50	2.00			SANDSTONE	MG HEMATITE STAINED
* 90	45.50	54.50	9.00			SANDSTONE	MG POLYMIC TIC; 30% OF GRAINS HEMATITE STAINED
* 90	54.50	59.00	4.50			SANDSTONE	FG.M.GY FAIRLY WELL CEMENTED; BLOCKY WEATHERING
* 90	59.00	60.50	1.50			SANDSTONE	MG.M.GY WEATHERS TAN; POORLY CEMENTED; MINOR CARBONACEOUS FRAGMENTS
* 90	60.50	66.50	6.00			COVERED	
* 90	66.50	68.50	2.00			SANDSTONE	FG.M.GY POLYMIC TIC; 50% GRAINS HEMATITE STAINED ; WEATHERS ORANGE BROWN
* 90	68.50	70.00	1.50			MUDSTONE	CARB HIGHLY WEATHERED
* 90	70.00	73.50	3.50			SANDSTONE	VFG.LT.GY HEMATITE STAINED; WEATHERS BUFF; STRONG FISSILITY

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	0.00	10.00	10.00			COVERED	
* 90	10.00	11.50	1.50			CONGLOMERATE	BARELY MATRIX SUPPORTED; CLASTS MAXIMIU M 3CM A AXIS LENGTH AVERAGING 3MM; SUBR OUNDED; SANDIER AT THE TOP; FINE GRAINE D SANDSTONE MATRIX; POORLY SORTED; HEMA TITE STAINED
* 90	11.50	28.50	17.00			MUDSTONE	CARB MINOR COAL FLOAT AND PLANT FRAGMENTS
* 90	28.50	35.50	7.00			COVERED	
* 90	35.50	38.50	3.00			SANDSTONE	MG.DK.GY.MAS FINELY LAMINATED; WEATHERS GREY BROWN
* 90	38.50	41.00	2.50			SANDSTONE	FG.DK.GY WEATHERS TAN; MASSIVE; MINOR CARBONACEO US FRAGMENTS
* 90	41.00	43.50	2.50			COVERED	

• DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	73.50	74.00	0.50			COVERED	
* 90	74.00	74.50	0.50			SHALE	M.GY WELL DEVELOPED FISSILITY; SAMPLE OTC84005E
* 90	74.50	79.50	5.00			COVERED	
* 90	79.50	80.50	1.00			MUDSTONE	CARB
* 90	80.50	82.75	2.25			MUDSTONE	M.GY BUFF WEATHERING
* 90	82.75	83.75	1.00			COVERED	
* 90	83.75	85.75	2.00			MUDSTONE	CARB MINOR COAL
* 90	85.75	87.75	2.00			SANDSTONE	FG.LT.GY WEATHERS DARK RED AND BRIGHT ORANGE; FA IRLY WELL CEMENTED
* 90	87.75	100.75	13.00			COVERED	

• DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: DTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	100.75	105.75	5.00			SANDSTONE	FG.LT.GY.MAS MORE STEEPLY DIPPING; COARSENING UPWARD S CYCLE FROM A FINE GRAINED SANDSTONE TO O A SANDSTONE GRIT; WEATHERS ORANGE BROWN
* 90	105.75	111.75	6.00			COVERED	
* 90	111.75	118.75	7.00			SANDSTONE	FG.LT.GY.MAS
* 90	118.75	153.75	35.00			COVERED	
* 90	153.75	155.00	1.25			SANDSTONE	MG.LT.GY MORE RECESSIVE; INTERBEDDED WITH A 10CM MUDSTONE BAND; NOT WELL CEMENTED; MINOR R CARBONACEOUS FRAGMENTS

• DENOTES MEASURED BCA

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	155.00	156.50	1.50			SANDSTONE	MG.LT.GY.MAS WELL SORTED; WEATHERS ORANGE RED; WELL CEMENTED; LARGE TREE TRUNKS
* 90	156.50	164.50	8.00			CONGLOMERATE	BARELY MATRIX SUPPORTED; DARK GREY WEATHERING; CLASTS FAIRLY CONSTANT AT 2CM A AXIS LENGTH; VFG SANDSTONE MATRIX; LOCAL HEMATITE STAINING
* 90	164.50	167.50	3.00			SANDSTONE	FG.LT.GY.MAS WEATHERS DARK RED; WELL CEMENTED; HEMATITE STAINING; MINOR CARBONACEOUS FRAGMENTS
* 90	167.50	184.50	17.00			CONGLOMERATE	SUB-ROUNDED CLASTS RANGING FROM MATRIX TO CLAST SUPPORT; MOSTLY MATRIX SUPPORT ; MOSTLY GREY AND GREEN CHERT
* 90	184.50	185.50	1.00			SANDSTONE	FG.M.GY INTENSE BRECCIATION AND INFILL OF FRACTURES
* 90	185.50	191.50	6.00			COVERED	
* 90	191.50	209.50	18.00			CONGLOMERATE	MATRIX SUPPORT; MAXIMUM A AXIS CLAST SIZE OF 4CM; FINE GRAINED SANDSTONE MATRIX; MOSTLY GREY CHERT CLASTS; ABUNDANT LARGE BRANCH FRAGMENTS AT THE TOP

• DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	209.50	212.50	3.00			SANDSTONE	FG.M.GY EQUIGRANULAR; WEATHERS RED
* 90	212.50	226.50	14.00			CONGLOMERATE	BARELY MATRIX SUPPORTED; SUB-ROUNDED TO ROUNDED CLASTS; AVERAGE A AXIS LENGTH 2.5CM; MAXIMUM 10CM; 50% DARK CHERT
* 90	226.50	231.50	5.00			SANDSTONE	FG.M.GY WEATHERS GREY BROWN; FAINTLY LAMINATED; OCCASIONAL 20CM BANDS OF HEMATITE STAI NED SILTSTONE TO FINE GRAINED SANDSTONE ; NODULAR
* 90	231.50	235.00	3.50			MUDSTONE	CARB WEATHERED; MINOR COAL IN <5CM BANDS; SA MPLE OTC84005D
* 90	235.00	240.50	5.50			SANDSTONE	FG.LT.GY.XBDG WEATHERS DARK RED; HEMATITE STAINED; IN TERBEDDED WITH 20CM BEDS OF HEMATITE ST AINED ARGILLACEOUS SILTSTONE; FINELY LA MINATED

• DENOTES MEASURED BCA

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4005

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	240.50	252.50	12.00			CONGLOMERATE XBDG	BARELY MATRIX SUPPORTED; SUB-ROUNDED CLASTS; WIDE RANGE OF CLAST SIZES FROM 0.5 TO >4CM; FINE TO MED GRAINED SANDSTONE MATRIX; EQUAL AMOUNTS OF GREY GREEN AND WHITE CHERT; SOME 30CM SANDSTONE BEDS; SHALLOW CHANNELS
* 90	252.50	258.50	6.00			COVERED	
* 90	258.50	258.90	0.40			SANDSTONE	FG HEMATITE STAINED; SHELLS BOTH FRAGMENTED AND WHOLE
* 90	258.90	261.65	2.75			COVERED	
* 90	261.65	261.80	0.15			SANDSTONE	SLTY.FG.LT.GY HEMATITE STAINED; 4CM PELECYPODS, INTACT CONVEX UP
* 90	261.80	262.60	0.80			SANDSTONE	VFG.M.GY

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	262.60	262.80	0.20			MUDSTONE	SLTY.DK.GY OCCASIONAL HEMATITE STAINING
* 90	262.80	267.05	4.25			SANDSTONE	FG.LT.GY MINOR WOODY DEBRIS ON BEDDING PLANE
* 90	267.05	267.25	0.20			SANDSTONE	VFG HEMATITE STAINED
* 90	267.25	268.25	1.00			SANDSTONE	FG WELL CEMENTED; WEATHERS GREY BROWN; FINELY LAMINATED
* 90	268.25	268.40	0.15			SILTSTONE	HEMATITE STAINED; WEATHERS ORANGE; MINOR FINE LAMINATIONS
* 90	268.40	269.90	1.50			SANDSTONE	SLTY.VFG APPEARS NODULAR IN PLACES; WEATHERS ORANGE RED
* 90	269.90	271.90	2.00			MUDSTONE	SLTY.GY.MAS HEMATITE STAINED
* 90	271.90	272.10	0.20			MUDSTONE	SLTY HEMATITE STAINED; NODULAR; ORANGE
* 90	272.10	272.12	0.02			MUDSTONE	ARGILLACEOUS

• DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
• 90	272.12	272.52	0.40			SANDSTONE	FG MINOR HEMATITE STAINING 5CM THICK
* 90	272.52	285.52	13.00			COVERED	
• 90	285.52	285.82	0.30			MUDSTONE	SLTY HEMATITE STAINED; ORANGE; NODULAR
• 90	285.82	286.82	1.00			MUDSTONE	SLTY.DK.GY ORANGE WEATHERING
* 90	286.82	286.92	0.10			MUDSTONE	SLTY HEMATITE STAINED; ORANGE; NODULAR
• 90	286.92	293.92	7.00			COVERED	
* 90	293.92	294.02	0.10			MUDSTONE	SLTY HEMATITE STAINED; ORANGE; NODULAR
• 90	294.02	297.02	3.00			COVERED	
* 90	297.02	297.52	0.50			MUDSTONE	SLTY.DK.GY WEATHERS ORANGE
• 90	297.52	297.82	0.30			MUDSTONE	SLTY HEMATITE STAINED; ORANGE; NODULAR
* 90	297.82	300.32	2.50			COVERED	

* DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	300.32	300.42	0.10			MUDSTONE	SLTY.DK.GY WEATHERS ORANGE
* 90	300.42	310.42	10.00			COVERED	
* 90	310.42	310.52	0.10			MUDSTONE	SLTY.DK.GY WEATHERS ORANGE
* 90	310.52	315.77	5.25			COVERED	
* 90	315.77	315.97	0.20			MUDSTONE	SLTY.DK.GY CARBONACEOUS PLANT DEBRIS; WEATHERS ORANGE RED; HEMATITE STAINED
* 90	315.97	316.67	0.70			COVERED	
* 90	316.67	325.17	8.50			SANDSTONE	MG.MAS WELL INDURATED; MINOR HEMATITE STAINING
* 90	325.17	326.67	1.50			SANDSTONE	FG.GY.MAS
* 90	326.67	327.07	0.40			SANDSTONE	VFG FINELY LAMINATED; WOOD FRAGMENTS ON BEDDING PLANE
* 90	327.07	328.57	1.50			SANDSTONE	FG.LT.GY.MAS MINOR BURROWING; WEATHERS PINK

* DENOTES MEASURED BCA



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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	328.57	329.57	1.00			COVERED	
* 90	329.57	330.57	1.00			SANDSTONE	LT.GY.MAS
* 90	330.57	331.57	1.00			COVERED	
* 90	331.57	331.87	0.30			SILTSTONE	FINELY LAMINATED; PLANAR CROSS LAMINATIONS; HEMATITE STAINED
* 90	331.87	338.87	7.00			COVERED	
* 90	338.87	340.87	2.00			SANDSTONE	MG.LT.GY MOTTLED; HEMATITE STAINING ON 10% OF THE GRAINS; MINOR CONGLOMERATE LENSES; PEBBLY AT THE TOP
* 90	340.87	341.07	0.20			CONGLOMERATE	CLAST SUPPORTED; MAXIMUM A AXIS LENGTH OF 1CM; SPHERICAL CLASTS; MATRIX MEDIUM GRAINED SANDSTONE; 50 % LIGHT AND 50% DARK CHERTS; MATRIX SUPPORTED TOWARDS THE TOP; WOODY FRAGMENTS
* 90	341.07	348.57	7.50			SANDSTONE	MG.LT.GY MOTTLED; HEMATITE STAINING ON 10% OF THE GRAINS; MINOR CONGLOMERATE LENSES; PEBBLY AT THE TOP

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	348.57	349.37	0.80			MUDSTONE	SLTY.M.GY WEATHERS GREY BROWN; HIGHLY WEATHERED
* 90	349.37	352.37	3.00			SANDSTONE	FG.MAS IMMATURE; WEATHERS GREY BROWN; MODERATE HEMATITE STAINING
* 90	352.37	358.37	6.00			COVERED	
* 90	358.37	363.37	5.00			SANDSTONE	FG.DK.GY WEATHERS ORANGE BROWN; MINOR HEMATITE S TAINING; EQUIGRANULAR; FAIRLY WELL CEME NTED; SMALL SCALE BLOCKY FRACTURE; FINE TO MEDIUM GRAINED
* 90	363.37	377.37	14.00			CONGLOMERATE	MATRIX SUPPORT; CLASTS FROM <0.5 TO 4CM A AXIS LENGTH; SUBROUNDED; MOSTLY DARK CHERT; LARGE TREE FRAGMENTS IN SANDIER PORTIONS
* 90	377.37	379.97	2.60			MUDSTONE	SLTY.DK.GY FINELY LAMINATED
* 90	379.97	383.97	4.00			SANDSTONE	MG.LT.GY POLYMICTIC; 10-15% GRAINS HEMATITE STAI NED

• DENOTES MEASURED BCA

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	383.97	384.72	0.75			MUDSTONE	SLTY.M.GY FINELY LAMINATED; HEMATITE STAINED
* 90	384.72	388.22	3.50			SANDSTONE	FG.LT.GY.MAS MINOR SILTSTONE INTERBEDS
* 90	388.22	388.42	0.20			SANDSTONE	VFG.LT.GY.MAS HEMATITE STAINED; WEATHERS LIGHT BROWN
* 90	388.42	388.62	0.20			MUDSTONE	DK.GY NO FISSILITY
* 90	388.62	389.02	0.40			SANDSTONE	SLTY.FG MINOR HEMATITE STAINING
* 90	389.02	401.02	12.00			SHALE	DK.GY WELL DEVELOPED FISSILITY; HIGHLY WEATHE RED; MINOR 40CM BANDS OF SILTSTONE; SIL TIER TOWARDS THE TOP; SAMPLE OTC84005C
* 90	401.02	451.02	50.00			COVERED	
* 90	451.02	459.52	8.50			SANDSTONE	MG.LT.GY.MAS MINOR 10-15CM SILTSTONE BANDS; HEMATITE STAINED; MINOR RIP UP CLASTS

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	459.52	460.72	1.20			SANDSTONE	FG.M.GY ARGILLACEOUS
* 90	460.72	462.32	1.60			SANDSTONE	FG COARSENING UPWARDS SEQUENCE FROM ARGILL ACEOUS TO FINE GRAINED SANDSTONE
* 90	462.32	463.82	1.50			MUDSTONE	SLTY.M.GY MINOR HEMATITE STAIN; 2-30CM COARSENING UPWARDS SEQUENCES FROM SILTY MUDSTONE TO MUDDY SILTSTONE
* 90	463.82	464.20	0.38			SANDSTONE	FG.M.GY HEMATITE STAINED
* 90	464.20	464.40	0.20			SILTSTONE	M.GY SANDY; ARGILLACEOUS
* 90	464.40	464.52	0.12			SANDSTONE	FG.M.GY HEMATITE STAINED; UNDULATORY BEDDING AR OUND 3MM THICK
* 90	464.52	468.12	3.60			SHALE	SLTY INTERBEDDED SILTSTONE AND SHALE; WAVY L AMINATIONS; SHALE IS DARK GREY AND HEMA TITE STAINED; SILTSTONE IS MORE MASSIVE AND LIGHT GREY WEATHERING; SAMPLE OTC8 4005B

• DENOTES MEASURED BCA

PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	468.12	468.15	0.03			QUARTZ	QUARTZ VEIN
• 90	468.15	468.70	0.55			SANDSTONE	SLTY.VFG.DK.GY INTERLAMINATED SANDSTONE AND MUDDY SILT STONE; LOW ANGLE CROSS STRATIFICATION; SANDSTONE WEATHERS BUFF; SILTSTONE WEAT HERS DARK GREY
* 90	468.70	468.80	0.10			SANDSTONE	SLTY.VFG BIOCLASTIC FRAGMENTS; TOP CONTACT IS SU BPARALLEL AND DISCONTINUOUS
* 90	468.80	471.05	2.25			MUDSTONE	DK.GY.MAS 5-8CM BEDS; CONCHOIDAL FRACTURE; INTERB EDDED WITH SILTY MUDSTONE; MINOR HEMATI TE STAINING; MINOR FRAGMENTED BIOCLASTS
* 90	471.05	471.95	0.90			MUDSTONE	SLTY MINOR FRAGMENTED BIOCLASTS; INTERBEDDED WITH VERY FINE GRAINED SANDSTONE; FINE LY LAMINATED; 5-10CM BEDS; LOW ANGLE PL ANAR CROSS STRATIFICATION
* 90	471.95	475.95	4.00			MUDSTONE	SLTY.M.GY COARSENS UPWARDS TO A MUDDY SILTSTONE; MINOR HEMATITE STAINING

* DENOTES MEASURED BCA

PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	475.95	477.95	2.00			MUDSTONE	SLTY.MAS MINOR HEMATITE STAINING; SHELL FRAGMENT S AND COLUMNAR FRAGMENTS MOSTLY INTACT; HORIZONTAL BURROWS(?)
* 90	477.95	478.00	0.05			MUDSTONE	SLTY IN PLACE BIVALVES CONVEX UPWARDS
* 90	478.00	479.75	1.75			SANDSTONE	FG.DK.GY.MAS WEATHERS DARK GREY BROWN; WELL CEMENTED ; 5% OF GRAINS HEMATITE STAINED
* 90	479.75	479.85	0.10			SANDSTONE	MG.BF COLUMNAR BIOCLASTS WITH BELEMNITES AND SHELL FRAGMENTS
* 90	479.85	480.35	0.50			SILTSTONE	M.GY WELL SILICIFIED; ONE BELEMNITE 1.5CM CR OSS SECTIONAL DIAMETER; ARGILLACEOUS
* 90	480.35	480.50	0.15			SANDSTONE	VFG.MAS VARIETY OF FRAGMENTED BIOCLASTS INCLUDI NG PELECYPODS COLUMNAR BIOCLASTS AND BI VALVES
* 90	480.50	482.25	1.75			SANDSTONE	FG.LT.GY.MAS WEATHERS GREY BROWN; WELL INDURATED; EQ UIGRANULAR; ARGILLACEOUS

* DENOTES MEASURED BCA

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	482.25	488.00	5.75			COVERED	
* 90	488.00	490.00	2.00			SANDSTONE	MG.MAS
* 90	490.00	491.25	1.25			SANDSTONE	FG SOMEWHAT MASSIVE; EQUIGRANULAR; HEMATITE STAINED MATRIX
* 90	491.25	497.00	5.75			SANDSTONE	FG.BF POLYMICHTIC; 10% GRAINS HEMATITE STAINED ; WELL CEMENTED
* 90	497.00	497.10	0.10			MUDSTONE	SLTY MODERATE BIOTURBATION WITH 1CM HORIZONTAL AND VERTICAL BURROWS
* 90	497.10	497.55	0.45			SILTSTONE	M.GY RECESSIVE; ARGILLACEOUS
* 90	497.55	499.15	1.60			SANDSTONE	FG.LT.GY WEATHERS BUFF; MINOR 1-7CM HEMATITE STAINED BANDS
* 90	499.15	499.45	0.30			MUDSTONE	SLTY.DK.GY

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84005

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	499.45	499.50	0.05			QUARTZ	QUARTZ VEIN
* 90	499.50	499.95	0.45			MUDSTONE	SLTY.M.GY.MAS WELL INDURATED
* 90	499.95	500.30	0.35			SANDSTONE	VFG.MAS HEMATITE STAINED
* 90	500.30	500.70	0.40			SANDSTONE	FG.M.GY
* 90	500.70	502.05	1.35			SANDSTONE	FG.M.GY.MAS BECOMES MEDIUM GRAINED UPWARDS; WEATHER S BUFF; POLYMIC TIC; WELL CEMENTED; 5% G RAINS HEMATITE STAINED; LOW ANGLE CROSS STRATIFICATION
* 90	502.05	503.67	1.62			SILTSTONE	ARGILLACEOUS; COARSENS UPWARD TO A FINE GRAINED SANDSTONE IN 3-30CM CYCLES; A 1CM WHITE BAND OF CALCAREOUS DEBRIS(?)
* 90	503.67	508.79	5.12			MUDSTONE	SLTY.DK.GY.MAS INTERBEDDED WITH VERY FINE GRAINED SAND STONE; POLYMIC TIC; HEMATITE STAINED; WA VY CONTACTS; CHANNELING; FINELY LAMINAT ED

* DENOTES MEASURED BCA
NEWPAGE

===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPNSS0TC84006

DATE - 12/03/84

- HISTORY -

START DATE - 07/24/84
END DATE - 07/24/84

CONTRACTOR -
GEOLOGIST - DAKIN

OPERATOR - GCRI
SURVEYOR -

REMARKS - OUTFITTERS GATE

- LOCATION -

PROVINCE - BC
ELEVATION - 1188.00

ZONE - 9
NORTHING - 6345000.00
EASTING - 505000.00

LICENCE/LEASE NUMBER - 7170

LATITUDE - 571500
LONGITUDE - 1285502

- ORIENTATION -

LENGTH - 0.00
SIZE WIDTH - 0.0
SIZE HEIGHT - 0.0

INCLINATION - 0.0
AZIMUTH - 0.0

ROOF STRIKE - 0
ROOF DIP - 0
ROOF DIR -

FLOOR STRIKE - 0
FLOOR DIP - 0
FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

=====

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GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

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PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84006

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
• 90	0.00	12.46	12.46			SANDSTONE	SLTY.GY INTERBEDDED SANDSTONE AND SILTSTONE; SANDSTONE IS POLYMICRITIC AND HEMATITE STAINED; SILTSTONE IS BLACK AND COMPACT; MINOR COALIFIED PLANT MATERIAL; RIPPLES; FLASER BEDDING; SHALE RIP UP CLASTS; CRUDE OIL; MINOR SS LENSES AT THE BASE
* 90	12.46	15.21	2.75			SHALE	SSY.DK.GY MINOR SANDSTONE LENSES AT THE BASE
* 90	15.21	15.81	0.60			SHALE	SSY.DK.GY
* 90	15.81	16.56	0.75			SANDSTONE	FLASER BEDDING AND SHALE RIP UP CLASTS; SHALEY
* 90	16.56	17.06	0.50			SHALE	DK.GY
* 90	17.06	17.41	0.35			SILTSTONE	FLASER BEDDING; SHALEY
* 90	17.41	18.21	0.80			SHALE	
* 90	18.21	18.61	0.40			SILTSTONE	MINOR FLASER BEDDING; SHALEY
* 90	18.61	19.96	1.35			SHALE	SSY MINOR SANDSTONE LENSES

• DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84006

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	19.96	20.77	0.81			SILTSTONE	DK.GY WEATHERS ORANGE-BROWN; NODULAR; RESISTANT; CONCHOIDAL FRACTURE
* 90	20.77	25.77	5.00			SHALE	SSY INTERBEDDED SHALE AND FINE GRAINED SANDSTONE; THE SHALE IS DARK GREY WEATHERING WITH CONCHOIDAL FRACTURES; THE SANDSTONE IS FINELY LAMINATED AND INCREASES IN ABUNDANCE UPWARDS
* 90	25.77	38.97	13.20			SHALE	DK.GY SOFT; SOME HEMATITE STAINING; THINLY BEDDED; SOME YELLOW (SULPHUR?) STAINING; ABUNDANT SMALL BIVALVES NEAR THE BASE
* 90	38.97	46.97	8.00			COAL SPOIL	INTERVAL TRENCHED; SEE TRCB2039
* 90	46.97	47.72	0.75			SANDSTONE	FG.GY MINOR HEMATITE STAINING
* 90	47.72	47.97	0.25			SHALE	BLK
* 90	47.97	48.27	0.30			SILTSTONE	DK.GY NODULAR; ORANGE WEATHERING
* 90	48.27	49.67	1.40			COVERED	

* DENOTES MEASURED BCA

84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: 55 DATA SOURCE: OTC84006

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	49.67	57.67	8.00			SHALE	BLK FISSILE; VERY RECESSIVE; ABUNDANT COAL LAMINAE
* 90	57.67	66.37	8.70			SHALE	SLTY.DK.GY INTERBEDDED SHALE AND SILTSTONE; THE SHALE IS PENCIL CLEAVED; THE SILTSTONE IS NODULAR AND RESISTANT; WEATHERS YELLOW-BROWN
* 90	66.37	70.37	4.00			SANDSTONE	MG MASSIVE; RESISTANT; WELL CEMENTED; HEMATITE STAINED; POLYMIC TIC
* 90	70.37	73.77	3.40			SANDSTONE	SLTY.DK.GY WEATHERS YELLOW BROWN; SLIGHTLY CARBONACEOUS
* 90	73.77	75.62	1.85			SANDSTONE	FG INTERBEDDED FINE AND MED GRAINED SANDSTONE; BEDDING 10-20CM; NOT WELL CEMENTED; GREY WEATHERING
* 90	75.62	78.32	2.70			COVERED	

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 4

PROJECT: KPN BLOCK: SS DATA SOURCE: DTC84006

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	78.32	89.62	11.30			SANDSTONE	MG.MAS WEATHERS BROWN-GREY; HEMATITE STAINED; POLYMIC TIC; WELL CEMENTED

* DENOTES MEASURED BCA
NEWPAGE



===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPSSOTC84007

DATE - 12/03/84

- HISTORY -

START DATE - 08/26/84

END DATE - 08/26/84

CONTRACTOR -

GEOLOGIST - DAKIN/KONG

OPERATOR - GCRI

SURVEYOR -

REMARKS -

- LOCATION -

PROVINCE - BC

ELEVATION - 1550.00

ZONE - 9

NORTHING - 6352050.00

EASTING - 502550.00

LICENCE/LEASE NUMBER - 7387

LATITUDE - 571848

LONGITUDE - 1285728

- ORIENTATION -

LENGTH - 0.00

INCLINATION - 0.0

AZIMUTH - 0.0

SIZE WIDTH - 0.0

SIZE HEIGHT - 0.0

ROOF STRIKE - 0

ROOF DIP - 0

ROOF DIR -

FLOOR STRIKE - 0

FLOOR DIP - 0

FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

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84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4007

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	0.00	6.10	6.10			SANDSTONE	MG.BN MOTTLED; WEATHERS GREY BROWN; MASSIVE; RESISTIVE; BLOCKY FRACTURE PERPENDICULAR TO BEDDING; MINOR CARBONACEOUS FRAGMENTS; SHARP LOWER CONTACT
* 90	6.10	6.56	0.46			SANDSTONE	FG.GY FINE GRAINED SANDSTONE TO SILTSTONE; BEDDING 1-2CM THICK; FAINTLY LAMINATED; MORE RECESSIVE; GREY BROWN
* 90	6.56	8.66	2.10			SANDSTONE	MG.GY INTERBEDDED WITH FINER GRAINED SANDSTONE; SHARP INTERBED CONTACTS; BEDDING APPROXIMATELY 7CM FOR MEDIUM SANDSTONE AND 2.5CM FOR THE FINE GRAINED SANDSTONE
* 90	8.66	9.76	1.10			SANDSTONE	FG.BN BUFF-BROWN; RESISTANT; HIGHLY CLEAVED; UNDULATORY BUT SHARP CONTACT
* 90	9.76	12.60	2.84			COVERED	
* 90	12.60	14.18	1.58			SANDSTONE	SLTY.DK.GY INTERBEDDED SANDSTONE AND SILTSTONE; FAINTLY LAMINATED; SILTSTONE HIGHLY CLEAVED; CONTACTS INDISTINCT

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 2

PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4007

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	14.18	22.81	8.63			SILTSTONE	GY WEATHERS DARK GREY BROWN; HIGHLY CLEAVED; SLIGHTLY NODULAR; LAMINATED WITH SHARP CONTACTS; SILTSTONE IS MORE RESISTANT
* 90	22.81	23.31	0.50			SANDSTONE	MG.GY WEATHERS GREY BROWN; RESISTANT; POLYMICTIC; MINOR BIVALVE IMPRINTS; MINOR SILTSTONE INTERBEDS; MINOR CARBONACEOUS FRAGMENTS
* 90	23.31	23.45	0.14			SILTSTONE	DK.GY WEATHERS BROWN BUFF; FAINTLY LAMINATED; RESISTANT; BLOCKY FRACTURE
* 90	23.45	23.68	0.23			SANDSTONE	FG.GY WEATHERS LIGHT BUFF BROWN; MODERATELY RESISTANT; BLOCKY FRACTURE
* 90	23.68	25.32	1.64			SANDSTONE	FG.DK.GY FINE GRAINED SANDSTONE TO SILTSTONE; THINLY BEDDED; HIGHLY CLEAVED; WEATHERS BROWN TO BUFF; MODERATELY RESISTANT; MINOR IRON STAINING

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 3

PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4007

BCA	DEPTH FRDM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	25.32	26.21	0.89			SANDSTONE	FG.M.GY.MAS BUFF WEATHERED; BLOCKY FRACTURE; SLIGHTLY MORE RESISTANT THAN ABOVE; MINOR LAMINAE
* 90	26.21	26.51	0.30			SILTSTONE	DK.GY.MAS RESISTANT; NODULAR; WEATHERS LIGHT BROWN TO BUFF
* 90	26.51	32.19	5.68			MUDSTONE	DK.GN CONTAINS SOME 2CM BANDS OF SILTSTONE; HIGHLY CLEAVED; LAMINATED WITH SHARP CONTACTS; MODERATELY RECESSIVE
* 90	32.19	40.19	8.00			COVERED	
* 90	40.19	43.69	3.50			MUDSTONE	GY POORLY CONSOLIDATED WITH MINOR INTERBEDS OF SANDSTONE-SILTSTONE; SHARP INTERBED CONTACTS; OBSCURE UNIT CONTACT
* 90	43.69	47.89	4.20			COAL SPOIL	INTERVAL TRENCHED; SEE TRCB4020
* 90	47.89	48.47	0.58			MUDSTONE	DK.GY FISSILE; HIGHLY CARBONACEOUS

* DENOTES MEASURED BCA



PROJECT: KPN BLOCK: SS DATA SOURCE: OTC84007

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
* 90	48.47	49.78	1.31			SILTSTONE	DK.GY NODULAR; WEATHERS ORANGE-BROWN; MINOR INTERBEDS OF SOFT MUDSTONE
* 90	49.78	51.45	1.67			MUDSTONE	DK.GY GREEN TINT; MINOR INTERBEDS OF ORANGE BROWN WEATHERING NODULAR SILTSTONE
* 90	51.45	51.93	0.48			SILTSTONE	DK.GY.MAS
* 90	51.93	52.00	0.07			SILTSTONE	DK.GY LIGHT BROWN WEATHERING; NODULAR; RESISTANT AND HARD
* 90	52.00	52.46	0.46			MUDSTONE	BN OLIVE TINT; SOFT; RECESSIVE; POORLY CONSOLIDATED; FINELY LAMINATED
* 90	52.46	56.40	3.94			MUDSTONE	LT.BN OLIVE TINT; HIGHLY WEATHERED; POORLY CONSOLIDATED; SOFT; FAINTLY LAMINATED; IRREGULAR FRACTURE; SHARP CONTACT
* 90	56.40	61.40	5.00			SILTSTONE	DK.GY WEATHERS YELLOW; IRREGULAR FRACTURE; MINOR DISCONTINUOUS LENSES OF BLOCKY FRACTURED SILTSTONE; WAVY LAMINATED

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 5

PROJECT: KPN BLOCK: SS DATA SOURCE: OTCB4007

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	61.40	69.60	8.20			MUDSTONE	DK.GY.XBDG NUMEROUS DISCONTINUOUS AND WAVY SANDSTONE LENSES; TOPS UP; THE SANDSTONE IS MEDIUM TO FINE GRAINED; DARK RED BROWN
* 90	69.60	70.30	0.70			SANDSTONE	MG.GY.MAS RESISTANT; WEATHERS YELLOW-BROWN; IRREGULAR CONTACT BELOW
* 90	70.30	75.95	5.65			MUDSTONE	DK.GY INTERLAMINATED SANDSTONE AND MUDSTONE; SANDSTONE CONTAINS NUMEROUS MUDSTONE DRAPES; MINOR BIOTURBATION AND BURROWING (SCOLITHOS)
* 90	75.95	84.15	8.20			MUDSTONE	DK.GY GREEN TINT; MINOR SMALL BEDS OF NODULAR SILTSTONE (20CM); SOME PLANT FRAGMENTS

* DENOTES MEASURED BCA
NEWPAGE



===== GULF CANADA RESOURCES INC. =====

- DATA SOURCE SUMMARY -

DATA SOURCE - KPNNROT84008

DATE - 12/03/84

- HISTORY -

START DATE - 07/13/84

END DATE - 07/13/84

CONTRACTOR -

GEOLOGIST - SWANBERGSON

OPERATOR - GCRI

SURVEYOR -

REMARKS -

- LOCATION -

PROVINCE - BC

ELEVATION - 1440.00

LICENCE/LEASE NUMBER - 7520

ZONE - 9

NORTHING - 6343100.00

EASTING - 495300.00

LATITUDE - 571358

LONGITUDE - 1290440

- ORIENTATION -

LENGTH - 0.00

SIZE WIDTH - 0.0

SIZE HEIGHT - 0.0

ROOF STRIKE - 0

ROOF DIP - 0

ROOF DIR -

INCLINATION - 0.0

AZIMUTH - 0.0

FLOOR STRIKE - 0

FLOOR DIP - 0

FLOOR DIR -

*** NOTE *** 0 INDICATES NO VALUE

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84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 1

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84008

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	0.00	0.50	0.50			CONGLOMERATE LT.GY	LIGHT TO DARK; CLASTS BIMODAL <0.5 AND <3CM AVG 2CM; RARE PINK CHERT AND ANGULAR ORANGE WEATHERED DEBRIS; MATRIX FINE TO MED GRAINED SANDSTONE; TOP OF SECTION
* 90	0.50	3.00	2.50			COVERED	
* 90	3.00	6.00	3.00			SANDSTONE PBLY.DK.GY	5-10% PEBBLES; MATRIX IS FINE GRAINED CLEAN SAND; FERRUGINOUS FLECKS; LIGHT GREY WEATHERING; GRADATIONAL CONTACT
* 90	6.00	8.00	2.00			CONGLOMERATE LT.GY.XBDG	CLASTS <1CM A AXIS LENGTH; DARK GREY AND WHITE CHERT; SUBROUNDED; MODERATELY TO WELL DEVELOPED CLEAVAGE; AVERAGE 30% CLAST CONTENT BUT VARIABLE FROM 10-50%
* 90	8.00	18.00	10.00			SANDSTONE FG.XBDG	FERRUGINOUS FLECKS; CROSS BEDDING 30CM; WEATHERS TAN; POORLY CLEAVED; THICKLY BEDDED

* DENOTES MEASURED BCA



84/12/06

GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG

PAGE 2

PROJECT: KPN BLOCK: NR DATA SOURCE: OTC84008

<u>BCA</u>	<u>DEPTH FROM</u>	<u>DEPTH TO</u>	<u>INTRVAL THICK.</u>	<u>SAMP. ID</u>	<u>SEAM ID</u>	<u>LITHOLOGY</u>	<u>DESCRIPTION</u>
* 90	18.00	19.50	1.50			SANDSTONE	FG FERRUGINOUS FLECKS; RARE SILTY INTERBED S <1CM THICK; PENETRATIVE CLEAVAGE; THI CKLY BEDDED; RARE SILTY MUD; DARK GREY CONCRETIONS

