GR - MT KLAPPAN 82(1)A

CONFIDENTIAL

GULF CANADA RESOURCES INC.

Mount Klappan Coal Project Geological Report

1982

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Coal Licence Number 7118 to 7177

7381 to 7392

and

7416 to 7432 inclusive

Cassiar Land District

NTS Map Number 104 H

Latitude Between 57°11' and 57°22'N

Longitudes Between 128°39' and 129°05'W

Gulf Canada Resources Inc.

November, 1982

PREFACE

The 1982 Mount Klappan Geological Report represents Gulf Canada Resources Inc.'s first major drilling and mapping program on the Mount Klappan Anthracite Property in Northwestern British Columbia.

The report, which covers the period September 1, 1981 to September 1, 1982, provides a current assessment of the geology, coal quality and resource potential of the property as well as a more detailed examination of two specific resource areas containing surface mineable coal. The geological and coal quality data presented in this report forms the basis for a concurrent mining assessment.

MOUNT KLAPPAN COAL PROPERTY

SUMMARY

Report Parts:

a) Main Geological Report
b) DDH Data
c) Power Study
d) Mine Assessment
e) Mine Assessment
f) Mine Assessment
g) Mine Assessment
h) Mine Assessment
i) Wash Plant Simulation
j) Coal Quality Data
k) Geological Maps and Sections
l) Maps and Sections 2

INTRODUCTION

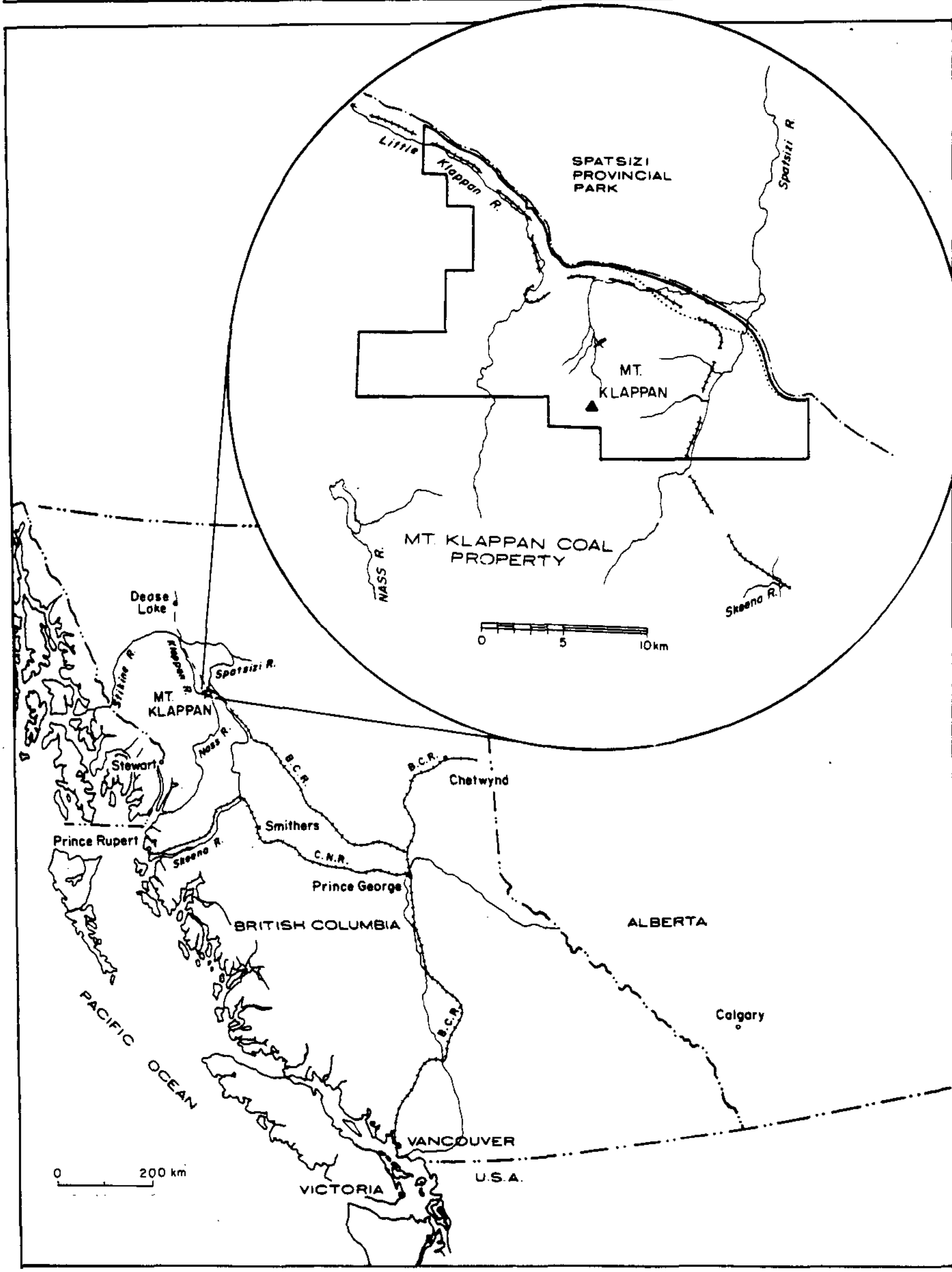
The Mount Klappan Coal Property is situated in northwestern British Columbia. The property is underlain by the coal bearing Upper Jurassic to Lower Cretaceous Klappan sequence.

A total of 12 seams with an aggregate average thickness of 25.2 metres occur within the 300 - 350 metre interval of the Middle Klappan Sequence.

The property is estimated to have a resource potential of 3 billion tonnes of coal of which 890 million is calculated to be inferred resources.

The Mount Klappan coal is an anthracite from which clean coal products with ash levels as low as 5% can be produced.

MT. KLAPPAN COAL PROPERTY
LOCATION MAP



LOCATION

The Mount Klappan Coal Property is situated in northwestern British Columbia approximately 336 km northeast of Prince Rupert. The licences, just north of the Groundhog coalfield at the northern end of the Bowser Basin, are located at the headwaters of the Little Klappan and Spatsizi Rivers. The topography is characterized by broad open subalpine valleys and generally subdued mountains with elevations ranging from 1100 to 2000 metres.

ACCESS

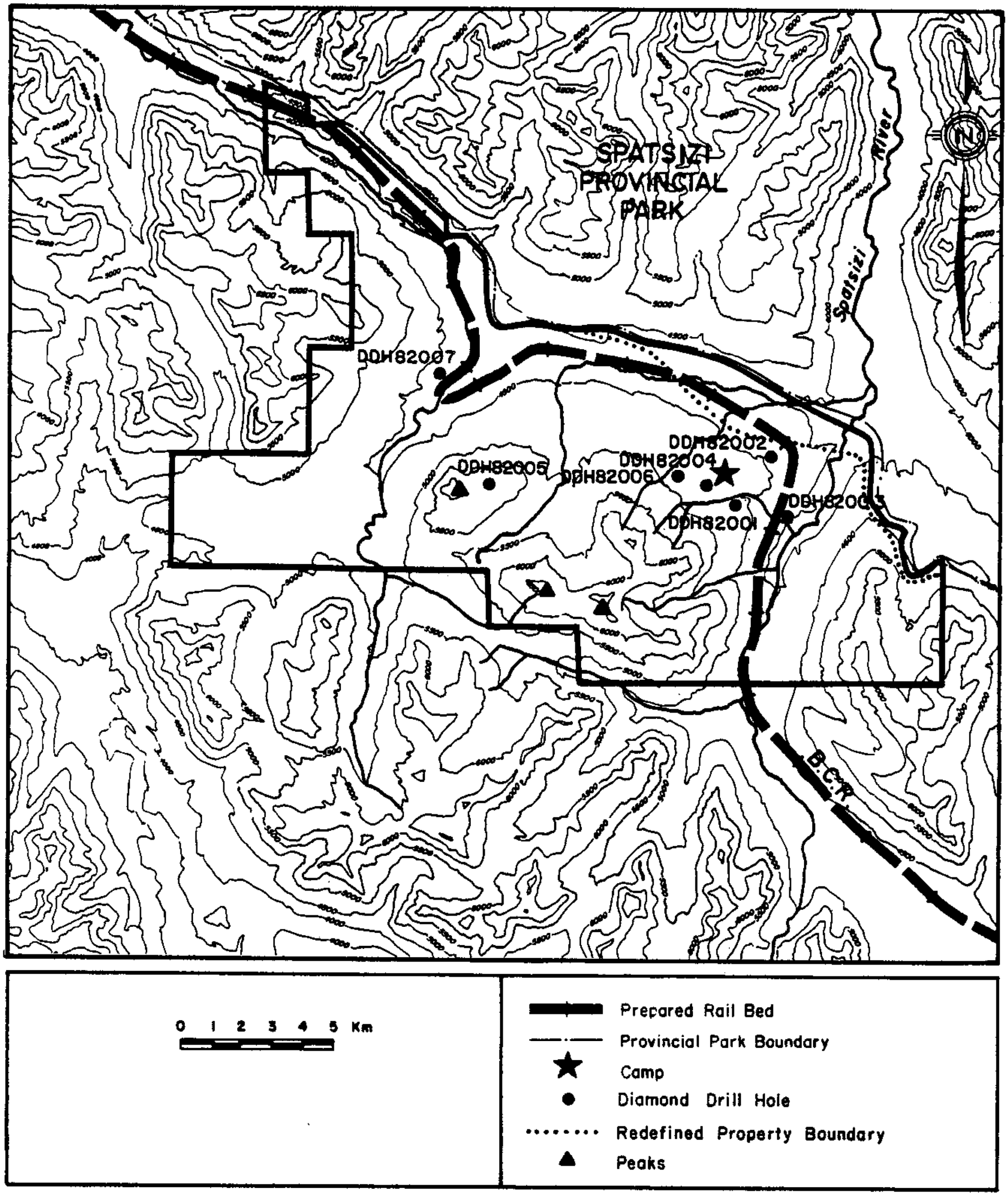
By completing one bridge and constructing another two smaller bridges on the British Columbia Railway subgrade, road access to the property could be established. The route extends northwards along Highway 37, from the Prince George - Prince Rupert Yellowhead Highway, to just south of Dease Lake and then along the existing British Columbia Railway sub-grade. The property is also accessible by air from Smithers to a 1000 metre airstrip on the property.

PROPERTY DESCRIPTION

The licences cover 22 371 hectares of land. As a result of the 1982 exploration a further 15 901 hectares is under application to the government of British Columbia resulting in a combined total of 38 272 hectares. The Mount Klappan licences are wholly owned by Gulf Canada Resources Inc. of Calgary, Alberta.

MT. KLAPPAN COAL PROPERTY

DIAMOND DRILL HOLES



HISTORY

The coal occurrences of the Bowser Basin have attracted interest since the mid to late eighteen hundreds. However, only in the last few years has serious attention been directed to the search for anthracite in the northern portion of the basin.

Since 1979 Gulf Canada Resources Inc. has undertaken a systematic program of exploration of the north portion of the Bowser Basin. This work culminated in the acquisition of the Mount Klappan Coal Property in 1981.

EXPLORATION

1982 Program

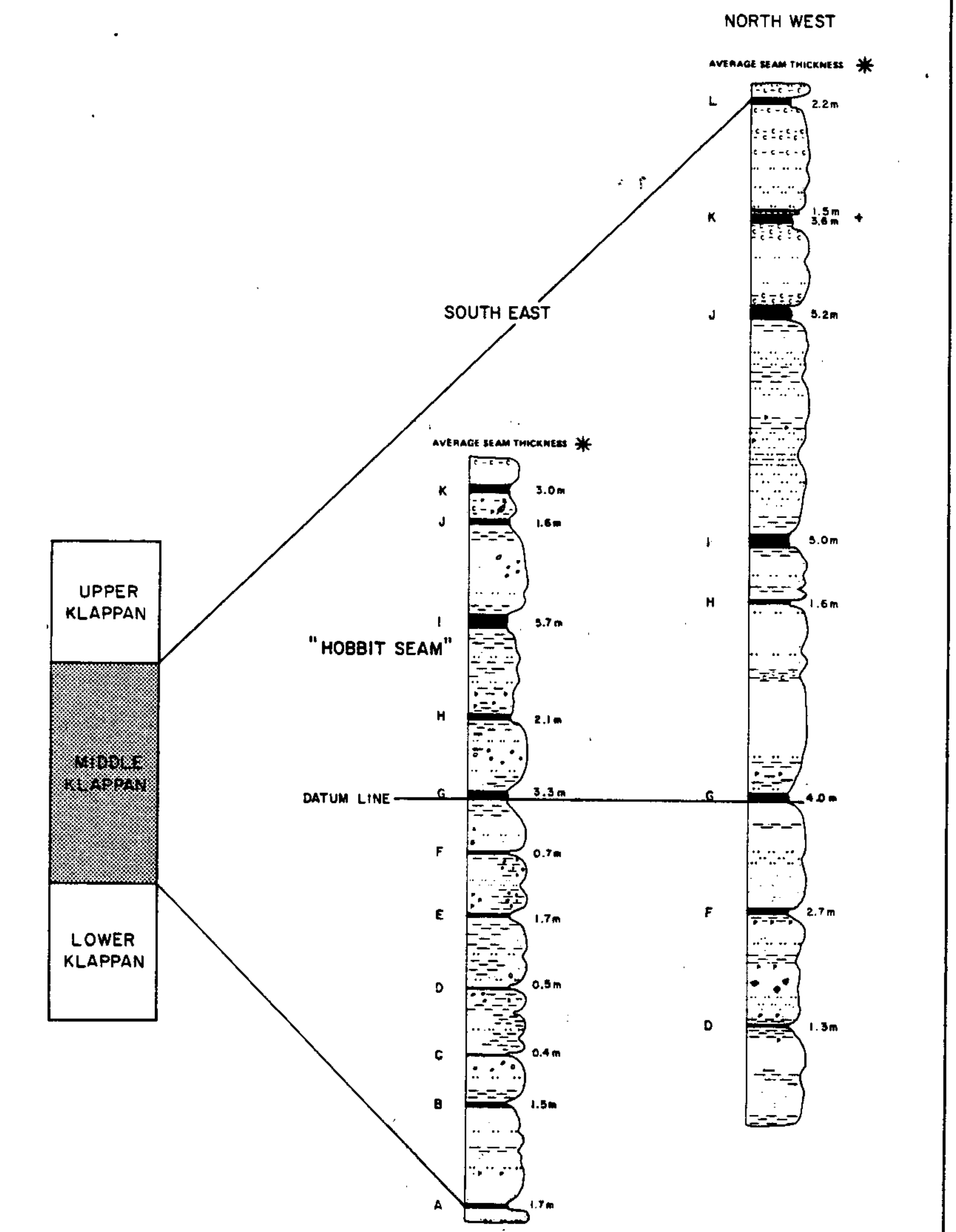
Based on the 1981 results, a detailed geological mapping, trenching and diamond drilling program was conducted during the summer of 1982. A total of 50 hand trenches, with an aggregate length of over 285 metres, were dug in coal exposures and 7 core holes were drilled for a total of 1223 metres. Coal samples taken during the coring program were subjected to detailed analytical testing and washability studies.

1981 Program

An initial geological assessment of the property was made in the late summer and early fall of 1981. Data gathered from the assessment guided the design of the 1982 exploration program.

MT. KLAPPAN COAL PROPERTY

MIDDLE KLAPPAN UNIT



SCALE - 1:2000 ✱ INCLUDES SEAM INTERSECTIONS < 0.5 m
+ EXCLUDED FROM SEAM STATISTICS DUE TO LOW COAL/ROCK RATIO NOV., 1982

STRUCTURE

The property can be subdivided into three structural blocks, the upper, middle and lower, separated from each other by the Mount Klappan and B.H.G. thrusts. The structural blocks are characterized by folds which become increasingly overturned both northeast and northwest. Minor faulting was noted on each block. Typically, the overturned folds have long gently dipping southwest limbs and short vertical to overturned northeast limbs. Regular plunge changes maintain the Middle Klappan close to the surface.

RESOURCES

The Mount Klappan property has an exploration resource potential of 3 billion tonnes, (rounded down to the nearest billion tonnes) of which 890 million tonnes is classified as inferred, 1.2 billion tonnes as speculative resources, and in excess of 1 billion tonnes as a potential resource. The inferred resource is contained within three areas, the Hobbit-Broatch, Lost-Fox and Summit Resource areas, comprising 15% of the property. The Hobbit-Broatch area, with an inferred resource of 620 million tonnes is the largest, followed by the Lost-Fox area with 240 million tonnes, and the Summit area with 30 million tonnes. The majority of this resource is extractable by surface mining methods.

PRODUCT SPECIFICATIONS
(air dried basis)

	Average Values *
PREMIUM COALS	
5 % - 6 % Ash	
Simulated Washplant Yield	40.0 %
Proximate Analysis	
Residual Moisture	0.6 %
Ash	4.9 %
Volatile Matter	6.2 %
Fixed Carbon	88.3 %
Total Sulphur	0.5 %
Calorific Value (Cal/g)	7956
Hardgrove Index	35
Volatile Matter (dmmf)	6.0 %
9 % - 11 % Ash	
Simulated Washplant Yield	46.0 %
Proximate Analysis	
Residual Moisture	0.9 %
Ash	9.6 %
Volatile Matter	6.9 %
Fixed Carbon	82.6 %
Total Sulphur	0.6 %
Calorific Value (Cal/g)	7462
Hardgrove Index	44
Volatile Matter (dmmf)	6.7 %
BRIQUETTING COAL	
Simulated Washplant Yield	82.0 %
Proximate Analysis	
Residual Moisture	1.6 %
Ash	18.6 %
Volatile Matter	8.2 %
Fixed Carbon	71.6 %
Total Sulphur	0.6 %
Calorific Value (Cal/g)	6515
Hardgrove Index	48
Volatile Matter (dmmf)	8.3 %

* Averages weighted by clean coal tonnage; results reported on an air dried basis.

COAL QUALITY

The Mount Klappan property is underlain by anthracite which can be washed to produce a variety of product coals. Low sulphur clean coal products, ranging from low ash anthracites, (5 to 6 % and 9 to 11% ash) to briquetting coal (20% ash) are available from the property.

PREMIUM COALS

Selected seams can be washed to produce anthracites with ash levels as low as 5% to 6%, and calorific values of 7800 calories per gram and greater. These low ash coals have an average simulated washplant yield of 40% although a yield of 61% was achieved for one seam in the Lost-Fox Resource area. Sulphur is consistently low; coals have an average total sulphur content of less than 0.6%. The coal is hard with average Hardgrove Indices of 35 for the 5% to 6% ash products, and 44 for the 9% to 11% ash coals.

BRIQUETTING COAL

Briquetting coal can be produced from most seams on the property. At a 19% ash level, a simulated washplant yield of 82% of 0.6% sulphur coal was attained. The calorific value for briquetting coal would average in excess of 6500 calories per gram.

Quality parameters for both the low ash and briquetting coal are presented in the table on the opposite page.

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1.1 Location

The Mount Klappan coal licences are located in northwestern British Columbia approximately 930 kilometres north of Vancouver, 530 kilometres northwest of Prince George and 336 kilometres north-northeast of Prince Rupert (Figure 1.1). Situated in the northern extremity of the Skeena Mountains between 57°11' and 57°22' north latitude, and 128°39' and 129°05' west longitude, the property covers the headwaters of the Klappan, Little Klappan and Spatsizi Rivers.

The nearest community is the Indian village of Iskut (population 500) which lies 100 kilometres northwest of the property on the Stewart - Cassiar highway.

1.2 Access

The property lies on the partially completed British Columbia Railway line from Prince George to Dease Lake (Figure 1.2). Prior to cessation of work on the line, steel was laid from Prince George to within 80 kilometres of the southern end of the licences and with the exception of a 24 kilometre stretch north of the Kluatantan River, the subgrade was constructed through and past the property to the Stikine River, just south of Dease Lake.

The northern portion of the subgrade, which is linked to Highway 37 by the Ealue Lake Road, provides vehicle access to the

APPENDIX V
Maps and Cross-Sections
1:10 000 Maps

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	Map A	KPN82001
	Map B	KPN82002
	Map C	KPN82003
	Map D	KPN82004
	Map E	KPN82005
	Map F	KPN82006
	Map G	KPN82007
	Map H	KPN82008
	Map I	KPN82009
	Map J	KPN82010
	Map K	KPN82011
	Map L	KPN82012
	Map M	KPN82013
	Map N	KPN82014
	Map O	KPN82015
	Map P	KPN82016
	Map Q	KPN82017
1:10 000 Set	Geological Cross-Sections (2 kilometre spacing)	
	15 000 N (E and W)	KPN82018
	13 000 N (E and W)	KPN82019
	11 000 N (E and W)	KPN82020
	9 000 N (East)	KPN82021
	9 000 N (West)	KPN82022
	7 000 N (East)	KPN82023
	7 000 N (West)	KPN82024
	5 000 N (East)	KPN82025
	5 000 N (West)	KPN82026
	3 000 N (East)	KPN82027
	3 000 N (West)	KPN82028
	1 000 N (East)	KPN82029
	1 000 N (West)	KPN82030
	0 000 (East)	KPN82031
	0 000 (West)	KPN82032
	1 000 S (East)	KPN82033
	1 000 S (West)	KPN82034
	3 000 S (East)	KPN82035
	3 000 S (West)	KPN82036
	5 000 S (East)	KPN82037
	5 000 S (West)	KPN82038
	7 000 S (E and W)	KPN82039
	9 000 S (East)	KPN82040
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Scale	Title	Drawing No.
1:10 000 Set	Trench and Drill Hole Locations	
	Map F	KPN82042
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1:10 000	Lost-Fox Resource Area-Geology	KPN82049
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	4 000 N (W)	KPN82050
	3 500 N (W)	KPN82051
	3 000 N (W)	KPN82052
	2 500 N (W)	KPN82053
	2 000 N (W)	KPN82054
	1 500 N (W)	KPN82055
	1 000 N (W)	KPN82056
	500 N (W)	KPN82057
1:10 000	Lost-Fox Resource Area - Trench & Drill Hole Locations	KPN82058
1:10 000	Hobbit-Broatch Resource Area - Geology	KPN82059
1:10 000	Hobbit-Broatch Resource Area - Geological Cross-Sections (500 metre spacing)	
	500 S (E)	KPN82060
	1 000 S (E)	KPN82061
	1 500 S (E)	KPN82062
	2 000 S (E)	KPN82063
	2 500 S (E)	KPN82064
	3 000 S (E)	KPN82065
	3 500 S (E)	KPN82066
	4 000 S (E)	KPN82067
	4 500 S (E)	KPN82068
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Maps and Cross-Sections
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1:20 000	Geological Maps	
	East Sheet	KPN82072
	West Sheet	KPN82073
1:20 000	Geological Cross-Sections (2 kilometre spacing)	
	15 000 N (E - W), 13 000 N (E-W)	KPN82074
	11 000 N (E - W)	KPN82075
	9 000 N (E and W)	KPN82076
	7 000 N (E and W)	KPN82077
	5 000 N (E and W)	KPN82078
	3 000 N (E and W)	KPN82079
	1 000 N (E and W)	KPN82080
	0 000 N (E and W)	KPN82081
	1 000 S (E and W)	KPN82082
	3 000 S (E and W)	KPN82083
	5 000 S (E and W)	KPN82084
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		Drawing No.
1:20 000	Lost-Fox Resource Area - Geological Cross-Sections (500 metre spacing)	
	4 000 N (W), 3 500 N (W)	KPN82092
	3 000 N (W), 2 500 N (W)	KPN82093
	2 000 N (W), 1 500 N (W)	KPN82094
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1:20 000	Hobbit-Broatch Resource Area - Geological Cross-Sections (500 metre spacing)	
	500 S (E), 1 000 S (E)	KPN82098
	1 500 S (E), 2 000 S (E)	KPN82099
	2 500 S (E), 3 000 S (E)	KPN82100
	3 500 S (E), 4 000 S (E)	KPN82101
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1:20 000	Hobbit-Broatch Resource Area - Trench & Drill Hole Locations	KPN82104

Maps and Cross-sections
1:50 000 Maps

		Drawing No.
1:50 000	Geology Map	KPN82105
1:50 000	Geological Cross-Sections (2 kilometre spacing)	
	15 000 N (E-W), 13 000 N (E-W), 11 000 N (E-W)	KPN82106
	9 000 N (E and W)	KPN82107
	7 000 N (E and W)	KPN82108
	5 000 N (E and W)	KPN82109
	3 000 N (E and W)	KPN82110
	1 000 N (E and W)	KPN82111
	0 000 (E and W)	KPN82112
	1 000 S (E and W)	KPN82113
	3 000 S (E and W)	KPN82114
	5 000 S (E and W)	KPN82115
	7 000 S (E-W), 9 000 S (E), 11 000 S (E)	KPN82116
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- Lost-Fox resource area seam correlation	KPN82124

1:20 000	Measured Sections	
	OTC-82-001	KPN82125
	OTC-82-002	KPN82126
	OTC-82-003	KPN82127
	OTC-82-004	KPN82128
	OTC-82-005	KPN82129
	OTC-82-006	KPN82130
	OTC-82-007	KPN82131
	OTC-82-008	KPN82132
	OTC-82-009	KPN82133
	OTC-82-010	KPN82134
1:50 000	Resource Area Map	KPN82135

MT. KLAPPAN COAL PROPERTY
LOCATION MAP

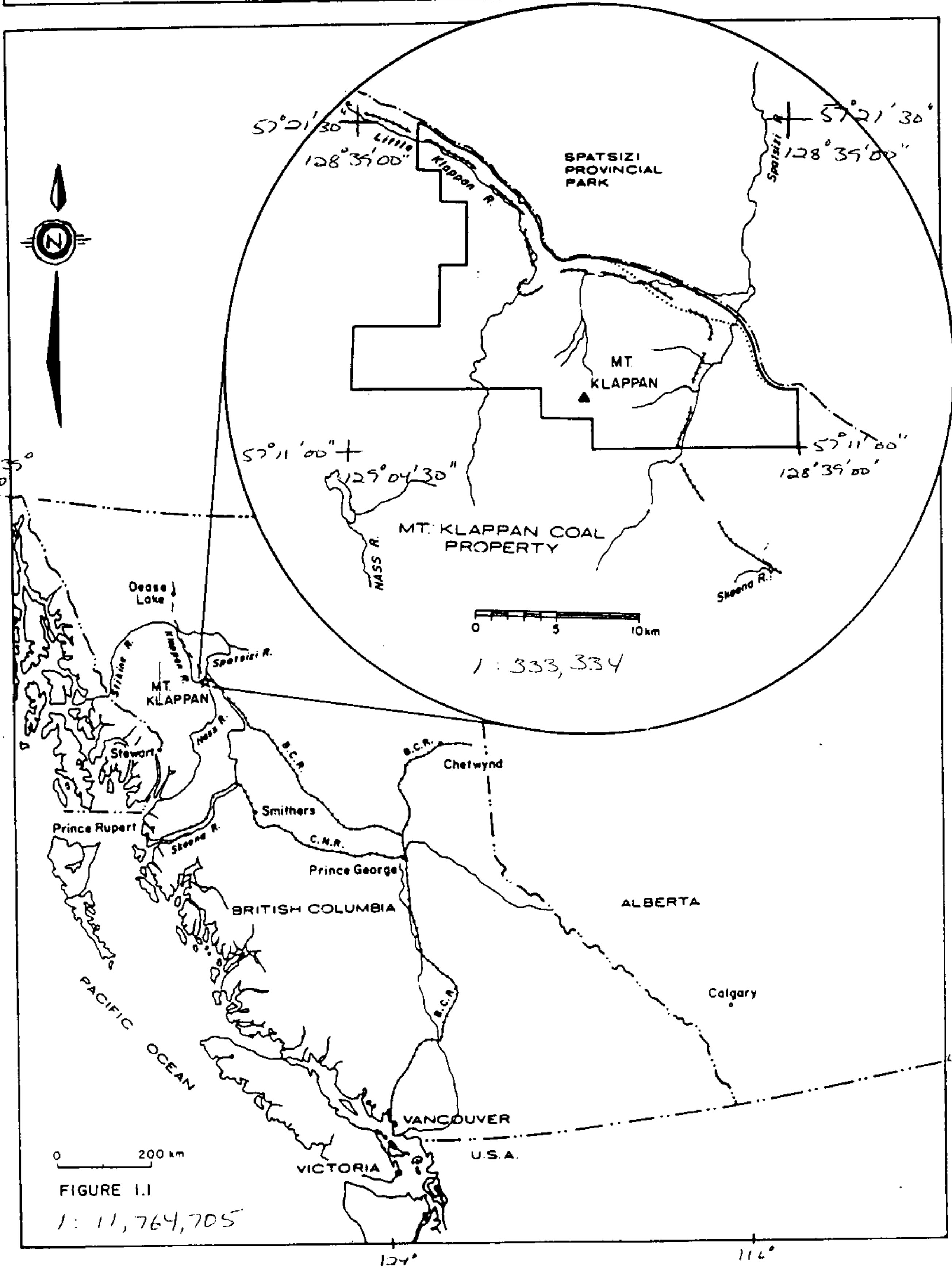
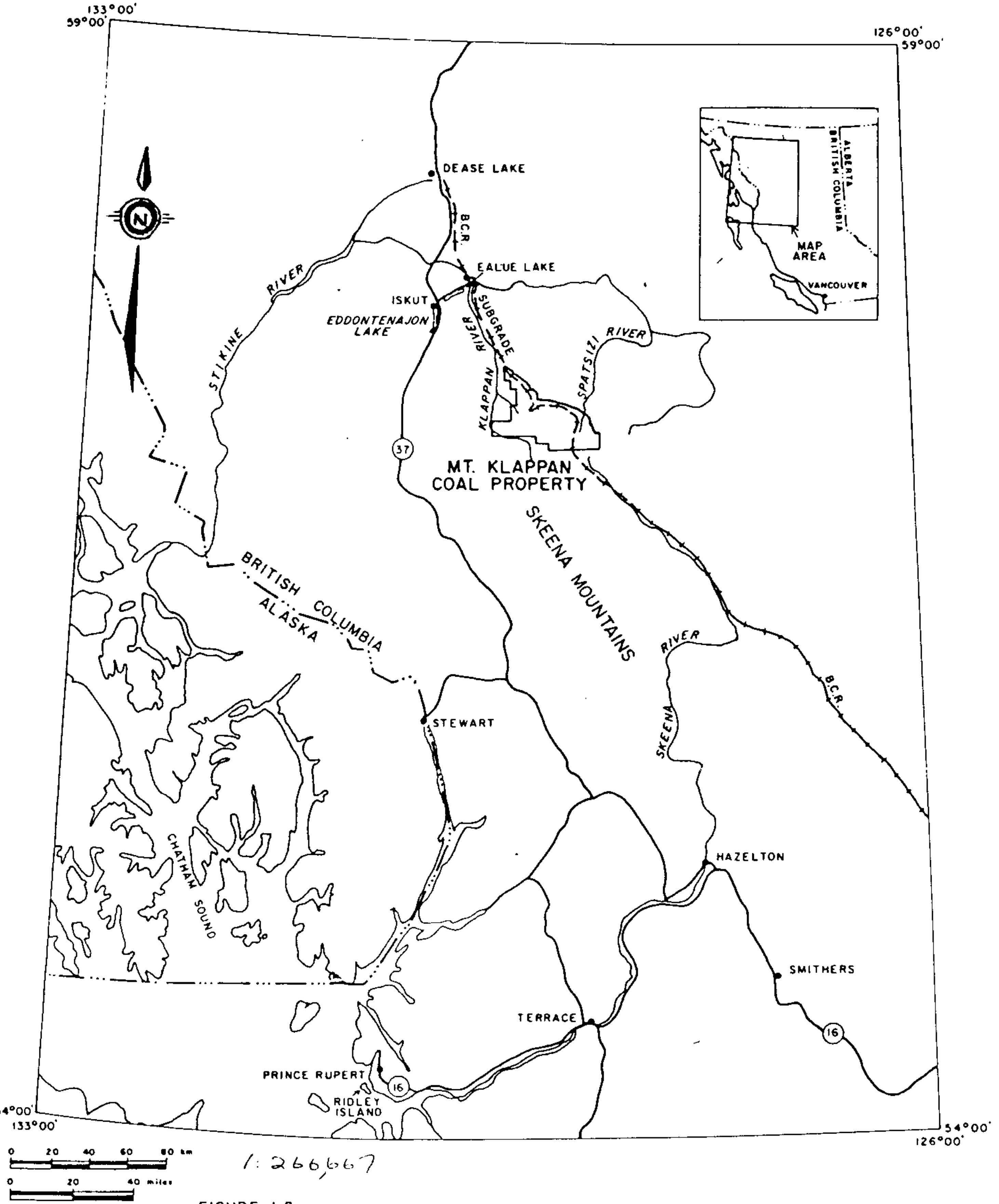


FIGURE 1.1

1 : 11,764,705

MT. KLAPPAN COAL PROPERTY

PROPERTY ACCESS



1:266,667

FIGURE 1.2

Property in the fall and winter. Year round travel by this route would require the completion of a bridge across the Klappan River, the construction of two smaller bridges and the clearing of minor mud slides blocking the subgrade. Road distances on the existing road systems to Smithers and Prince Rupert from Mt. Klappan are 670 and 800 kilometres respectively. Presently, the most convenient access to the property is by fixed wing aircraft to a 1000 metre long airstrip (Summit airstrip) located on the railway subgrade in the northern part of the licences. Both charter fixed wing aircraft and helicopter service is available from Terrace, Smithers and Stewart. In addition a scheduled twice weekly airline service exists between Terrace and Iskut.

1.3 Property Description

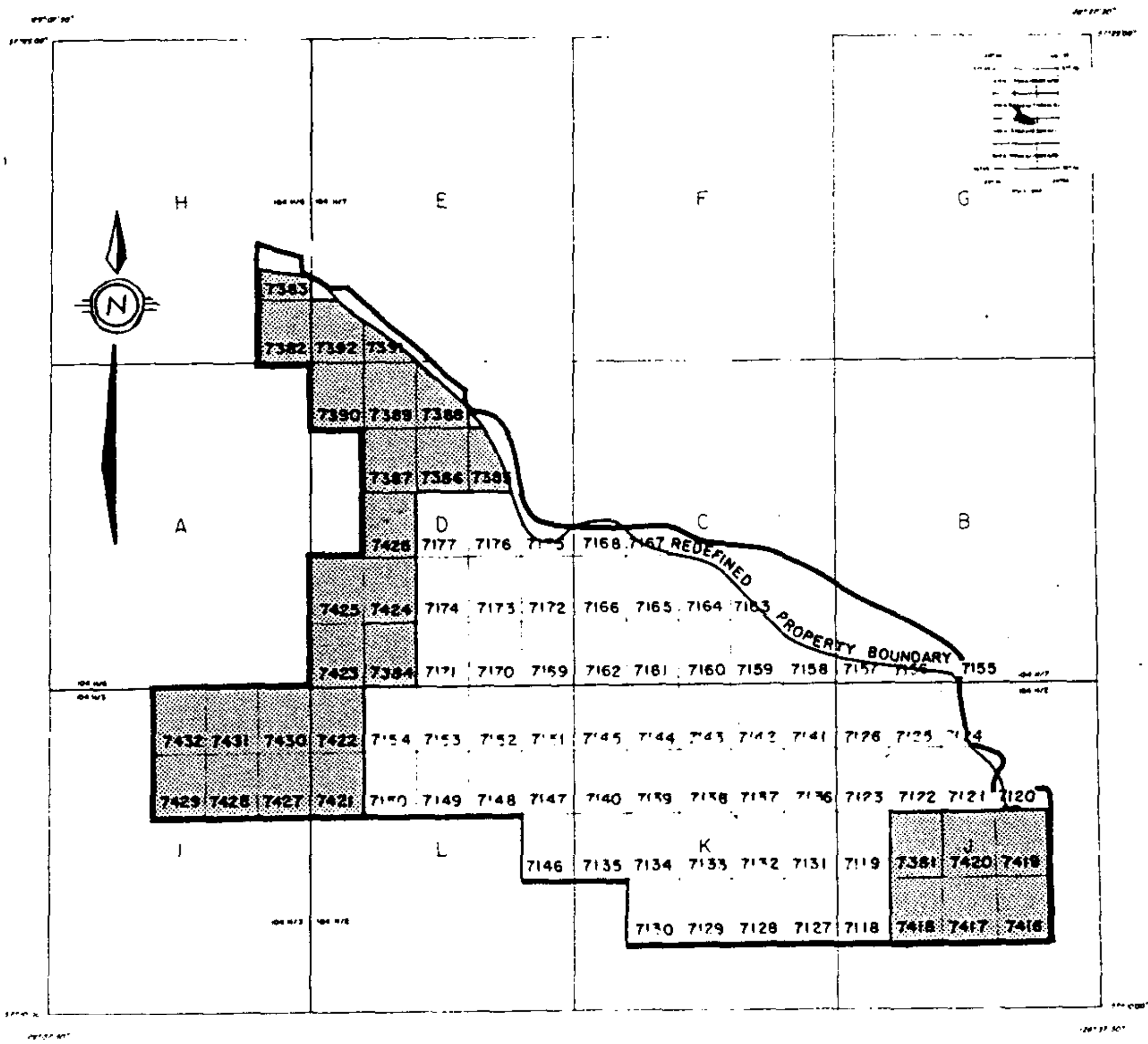
The Mt. Klappan coal property comprises licences acquired through three separate applications made by Gulf in 1981 and 1982. The original licence block, which covered the majority of known coal occurrences, was granted on September 1, 1981 and comprised 14 784 hectares of land represented by 60 whole and partial British Columbia coal licences.

Two further applications for 17 coal licences covering 4771 hectares and 12 coal licences covering 2816 hectares were granted on March 15 and March 18, 1982 respectively, bringing the grand total to 22 371 hectares of land (Figure 1.3).

As a result of the 1982 program a further application for 53 coal licences covering 14 901 hectares was made on August 16, 1982. This application is presently being processed by the

MT. KLAPPAN COAL PROPERTY

LICENCE AREA



0 1 2 3 4 5 km

FIGURE 1.3

1:200,000

LICENCES ISSUED SEPT 1, 1981

LICENCES ISSUED MARCH, 1982

Government of British Columbia and when granted will increase the property size to 37 272 hectares. The area covered by the new application was reconnoitred during the program and is discussed briefly in this report.

A redefinition of the northeastern boundary of the property has ocurred where Gulf reapplied to the Government of British Columbia, on November 16, 1982, for approximately 1000 hectares of land. The land was previously applied for but not granted to Gulf Canada Resources Inc. due to the inaccurate positioning of the Spatsizi Park's southwestern boundary. When granted, this land will increase the property size to 38 272 hectares. This area is, for the purposes of this report, included in all discussions of the geology, structure and resources of the Mount Klappan property.

1.4 Ownership

The issued Mt. Klappan coal licences are wholly owned by Gulf Canada Resources Inc. as are the coal licence applications.

1.5 Biophysical Environment

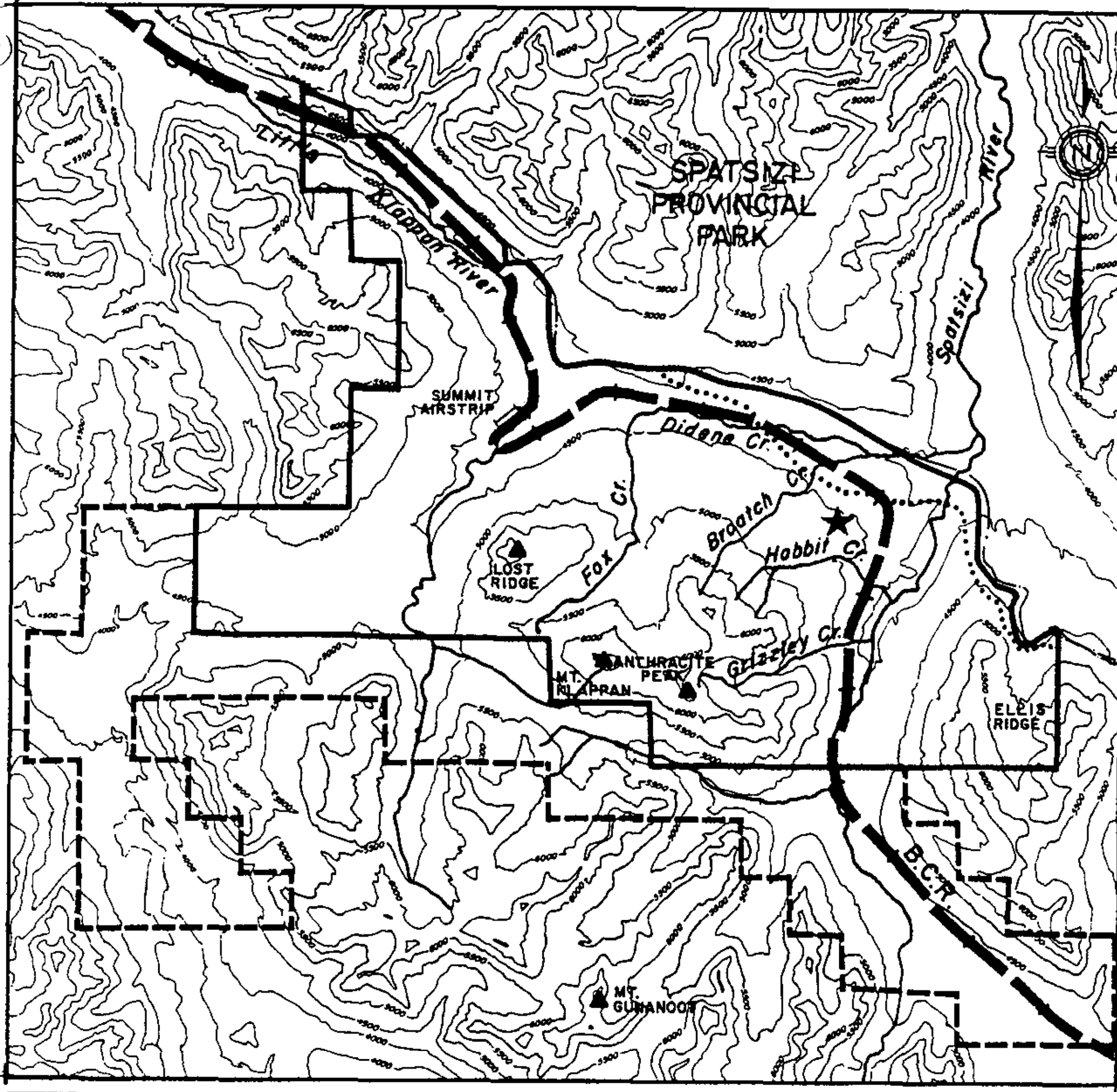
The Mt. Klappan coal licences are located near the northern end of the Skeena Mountains physiographic region, at the headwaters of the Little Klappan and Spatsizi Rivers (Figure 1.4). A broad, east-west trending valley occupies the northern part of the licences, paralleling the border of the Spatsizi Wilderness Park.

MT. KLAPPAN COAL PROPERTY

PROPERTY GEOGRAPHY

6374500 N
(57° 30' 54")
488250 E
(129° 10' 42")

6374500 N
(57° 30' 51")
540015 E
(128° 19' 23")



6327500 N
(57° 5')
488250 E
(129° 10' 42")

6327500 N
(57° 5')
540015 E
(128° 19' 23")

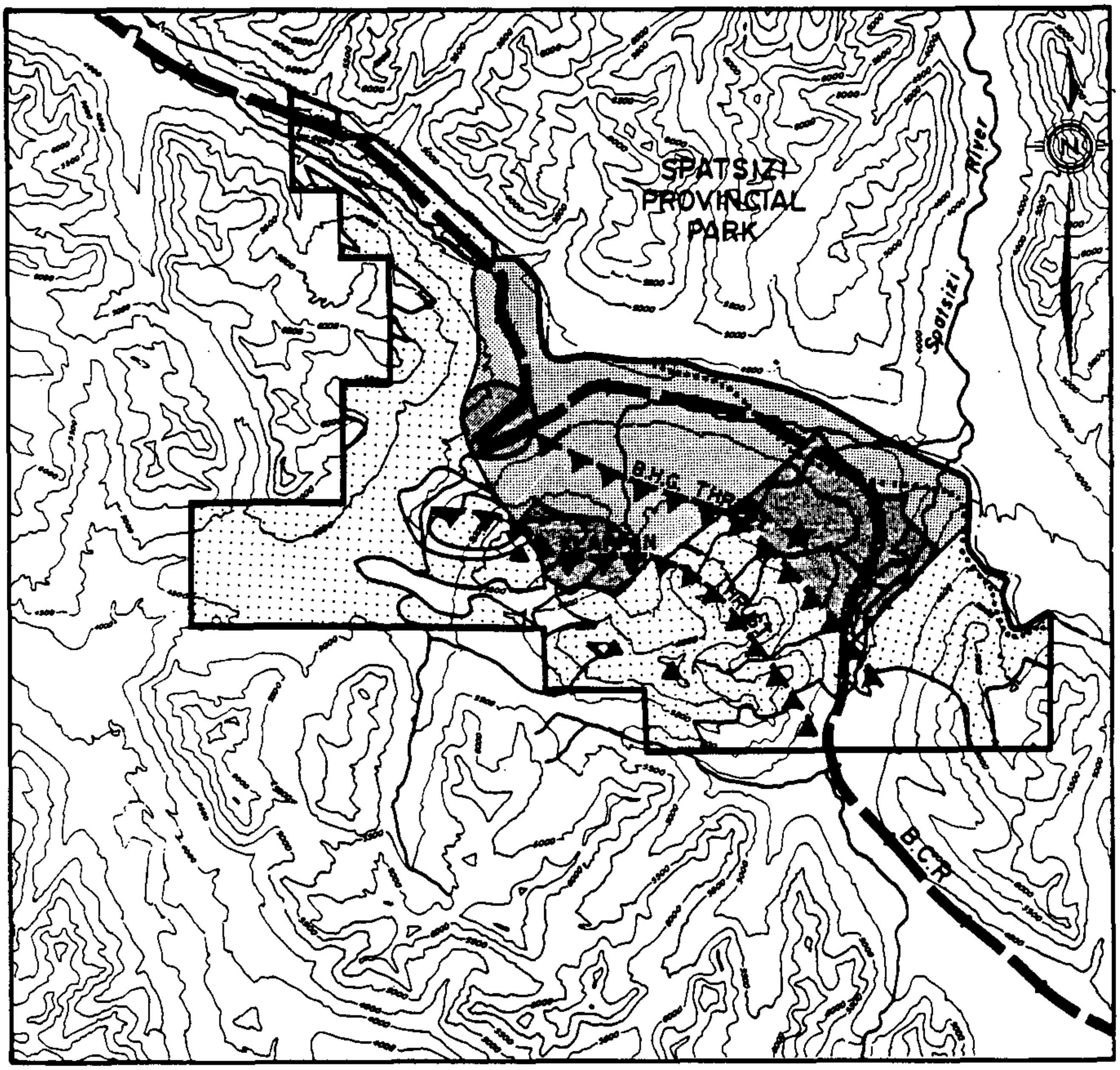
0 1 2 3 4 5 Km

FIGURE 1.4

1 : 200,000

- Prepared Rail Bed
- Provincial Park Boundary
- Camp
- Redefined Property Boundary
- Licences Under Application
- Peaks

MT. KLAPPAN COAL PROPERTY
RESOURCE AREAS



0 1 2 3 4 5 Km

- Prepared Rail Bed
- Provincial Park Boundary
- Camp
- Redefined Property Boundary
- Inferred Resource Area
- Speculative Resource Area
- Potential Resource Area
- Peaks

STRATIGRAPHY

The Klappan area is underlain by Upper Jurassic to Lower Cretaceous sediments which Gulf geologists have subdivided into four sequences. In ascending order they are: an unnamed unit, the Klappan, Malloch and Rhondda Sequences with the Klappan Sequence being the main coal-bearing unit. The licences are underlain by the Klappan Sequence with Malloch occurring off the southeastern and southwestern boundaries.

KLAPPAN SEQUENCE

The Klappan Sequence, which comprises interbedded sandstones, siltstones, claystones and coal, is subdivided into a lower, middle and upper unit on the basis of coal seam distribution within the sequence. The Middle Klappan unit, which varies from 300 to 350 metres, contains the bulk of the coal resources on the property. A total of 12 seams with an aggregate average thickness of 25.2 metres were intersected. The seams, which are named A to L in ascending order, vary from less than one metre to seven metres in thickness, although locally structural thickening has resulted in thicknesses close to eight metres.

The coal licences are located in a climatic regime known as the Northern and Central Plateau and Mountains zone. The long term mean daily temperatures are similar to those for Fort Nelson and Prince George. Precipitation values average approximately 300 mm per year which is close to that reported for Calgary, Alberta.

Topographic relief averages 1000 metres within the property. Elevations range from less than 1100 metres in Didene Creek in the north, to over 2000 metres on Mt. Klappan and the adjacent ridge tops at the south end of the property.

Tree line in the area is at an elevation of 1500 metres. Scattered coniferous forest exists in the valley bottoms interspersed with grass, shrub meadows and bogs. The higher elevations are characterized by alpine tundra, giving way to weathered bedrock.

Occasionally wildlife such as moose, caribou, goat, grizzly bear, black bear and wolves are sighted moving through the property. Area usage by these animals during winter appears to be minimal. The presence of game fish within the area is limited due to the heavy sediment load in the Little Klappan and Spatsizi Rivers.

A weather station, maintained by the British Columbia Government, is located on the northeastern edge of the property. The station has been in place for three years and is monitored monthly.

2.0 PROPERTY HISTORY

The first published description of coal in the northern Bowser Basin (Figure 2.1) was made in a report prepared by V.H. Dupont (1900) for the Canadian Department of Railways and Canals. The report describes a coal outcrop near the confluence of Didene Creek and the Spatsizi River, which is now recognized to be part of the Klappan coal occurrences.

In 1911, a Geological Survey of Canada exploration party, led by G.S. Malloch, undertook a geological evaluation (Malloch, 1914) of the Bowser Basin sediments concentrating on the Groundhog coal occurrences, 55 kilometres to the south of the Klappan coal occurrences. A later program of the Geological Survey in 1948, led by Buckham and Latour, also concentrated on the Groundhog area. Their report (Buckham and Latour, 1950) summarizes the history of exploration of the Klappan and Groundhog coal measures.

Regional geological mapping was undertaken by the Geological Survey of Canada during Operation Stikine in 1957. Eisbacher (1974, 1981) also with the GSC, published some of the first stratigraphic studies which broadly covered the Klappan coal measures and related the depositional history of the Bowser Basin to the tectonic history of the area.

Broad stratigraphic studies by Richards and Gilchrist (1979) dealt primarily with the Groundhog area but also included reference to the coal sequences of the northern Bowser Basin.

MT. KLAPPAN COAL PROPERTY

BOWSER BASIN

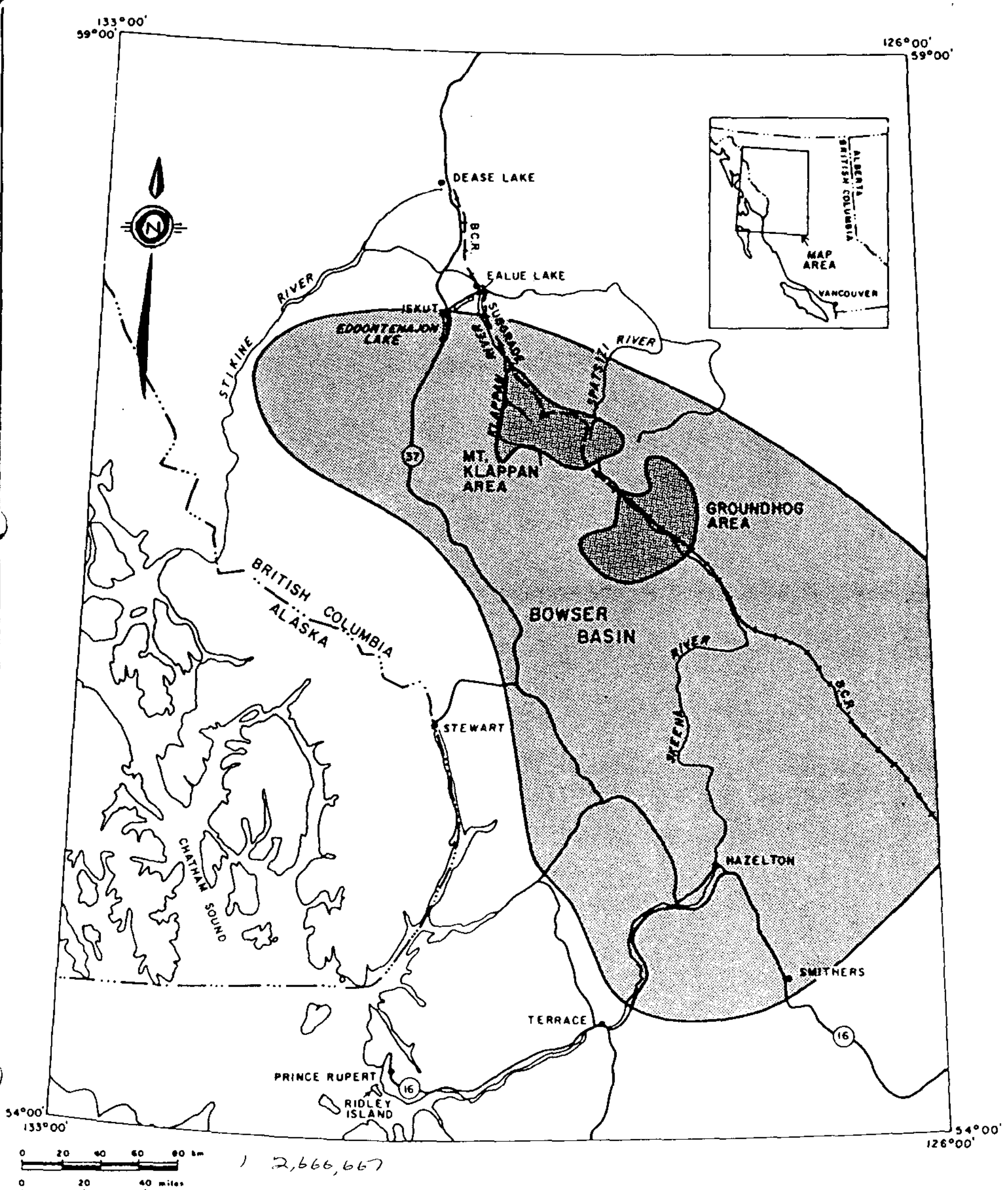


FIGURE 2.1

Interest in the Klappan coal occurrences increased during the late 1970's when Esso Minerals Canada and Petrofina both acquired coal licences in the area. After minimal geological evaluation both companies allowed their respective licences to lapse in 1980.

Gulf geologists have been active in the northern Bowser Basin primarily in the general Panorama area since 1979. Initially, work concentrated on the Groundhog coal occurrences and surrounding area. However, in 1981, based on data accumulated though work on the Panorama licences and in Regional Exploration Programs, combined with other data then available, Gulf Canada Resources Inc. acquired the Mount Klappan property.

A reconnaissance examination of the property in the late summer of 1981 comfirmed the opinion that the area was a very favourable prospect for surface mine development. The area was then given priority in Gulf's exploration program.

3.0 EXPLORATION

3.1 Summary of 1981 Exploration Program and Results

Gulf Canada Resources mounted a brief reconnaissance mapping and coal trench sampling program on the licences in the late summer of 1981 which indicated that the property could have the potential to produce from one to five million tonnes per year of anthracite product coal over a 20 year period.

An interpretation of the stratigraphy, structure and coal seam distribution indicated that up to six seams with a cumulative thickness of 18 metres of coal could occur over an interval of 200 metres.

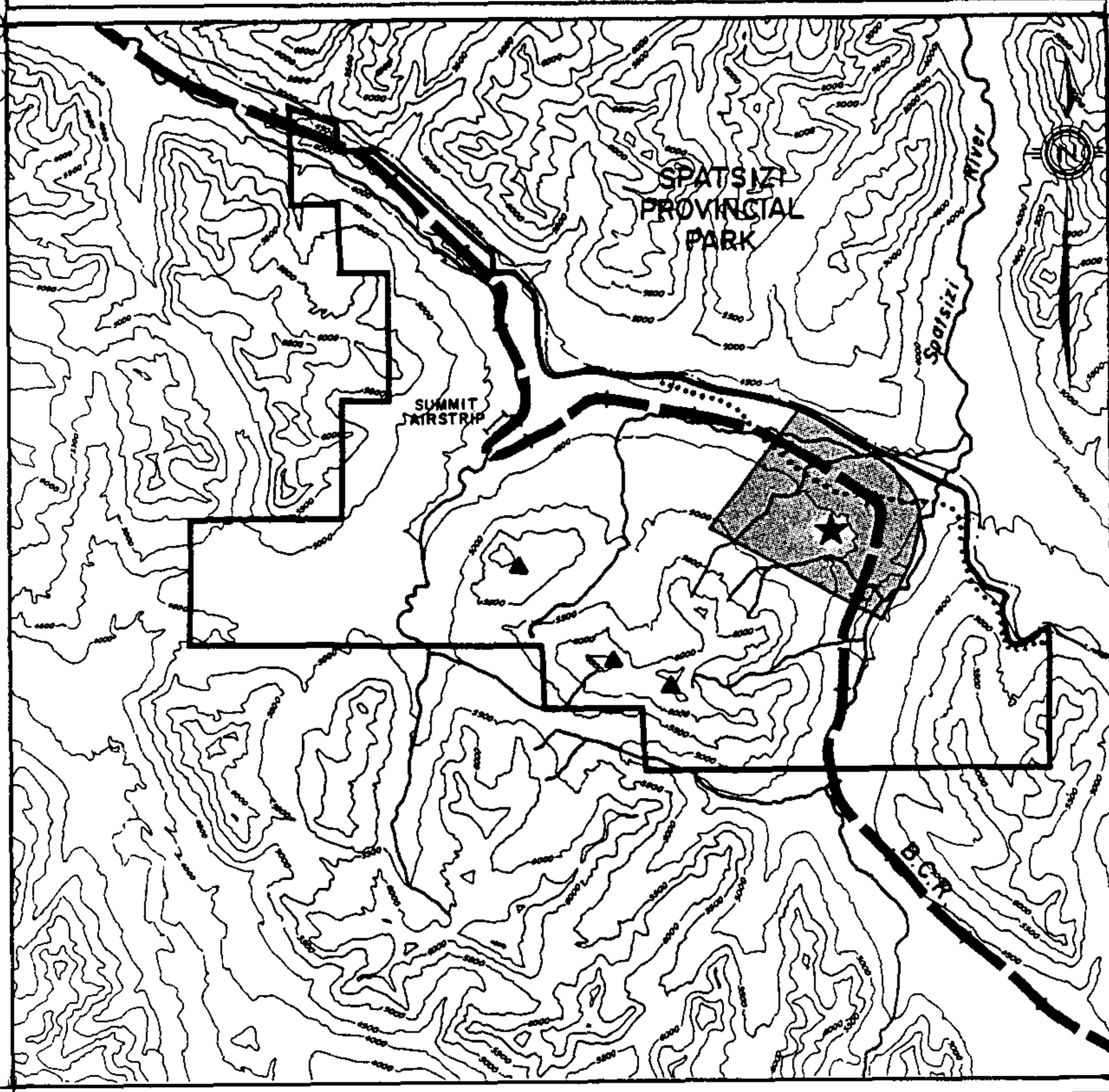
Based on the assumption that only two seams might be present, a speculative resource of 95 million tonnes of coal was estimated within a 24 square kilometre area in the southeastern part of the property (Figure 3.1). In addition, the resource potential of the total area covered by the licences was estimated to be in excess of 1 billion tonnes. Analyses of coal taken from a number of trenches indicated that the coal was of anthracite rank. The 1981 assessment included a preliminary examination of the infrastructure requirements for transportation, power and townsite development.

MT. KLAPPAN COAL PROPERTY

1981 SPECULATIVE RESOURCE AREA

6374500N
(57°30'54")
488250E
(129°10'42")

6374500N
(57°30'51")
540015E
(128°19'23")



6327500N
(57°5')
488250E
(129°10'42")

6327500N
(57°5')
540015E
(128°19'23")

FIGURE 3.1

1:200,000

- Prepared Rail Bed
- Provincial Park Boundary
- ★ Camp
- Redefined Property Boundary
- ▲ Peaks

3.2 1982 Exploration Program

The greater portion of the 1982 exploration program was directed to the eastern half of the property. Work was concentrated particularly on the Hobbit-Broatch area in the southeast, where the 1981 geological assessment indicated the presence of substantial quantities of anthracite. The program spanned the period May to November, 1982, a total of 7 months. Of this period, 2-1/2 months, late June to early September, were spent in the field. The remaining time was divided between preparation for the field season prior to late June, and to data compilation, evaluation and report writing from early September onwards.

3.2.1 Program Objectives and Methodology

3.2.1.1 Objectives

The objectives of the 1982 Mt. Klappan coal exploration program were as follows:

A. to confirm the existence of six seams totalling 18 metres in the Hobbit - Broatch Area;

B. to define a surface mineable inferred resource in the Hobbit-Broatch area;

C. to identify other surface mineable resource areas;

D. to determine coal quality and washability characteristics of the coal from fresh samples.

3.2.1.2 Methodology

To achieve the objectives as set out in section 3.2.1.1, an exploration program comprising detailed geological mapping, trenching and diamond drilling and an in depth coal quality evaluation was designed in the late spring of 1982.

Exploration work on the property was divided into two phases. During the first phase, which spanned late June and July, detailed mapping and coal seam trenching were completed on the eastern half of the licences.

In the second phase, which extended through August into early September, seven diamond drill holes were completed in the eastern part of the property at sites defined by the first phase work. In addition, geological mapping and coal seam trenching were carried out on the western licences.

Additional studies undertaken during these two phases included an assessment of the depositional environment by Gulf sedimentologists as well as the funding of the first year of a Ph.D. thesis on the structure of the area.

Data compilation, evaluation, and report writing was undertaken at Gulf Canada's Calgary office. Extensive use was made of an in-house coal data base for the storage and presentation of geologic and coal quality data, as well as processing and interpretation of the coal washability results.

3.2.2 Cartography

Specially prepared 1:10 000 scale topographic maps with a contour interval of 10 metres were utilized for geological mapping (Appendix C in text). To further assist in the control of the geological mapping, 213 photo identified points were plotted on the 1:10 000 sheets.

In the early part of September the property was flown to provide 1:30 000 aerial photography coverage for the later production of 1:5000 topographic maps and for geological interpretation. Inclement weather during the last week of the program delayed until 1983 the survey of control points for the 1:5000 maps as well as the exact surveying in of the locations and elevations of the diamond drill holes. (Current locations are based on chain and compass surveys from known points).

3.2.3 Logistics

3.2.3.1 Field Camp

The field camp, set up on June 21, 1982 was located on a roughly cleared BCR communication site centrally located in the Hobbit-Broatch area (Figure 3.2). The camp comprised 6 trailers, set up by the BCR when work on the line was in progress, as well as 12 personnel tents and three 16 x 14 foot frame tents. The trailers, rented from BCR, provided kitchen, dining, office and storage facilities while all personnel were housed in the tents. The exploration and support staff averaged 20 people for the duration of the program.

The camp, geological equipment and two Toyota trucks were mobilized from Smithers and transported to the Summit airstrip on the Mount Klappan Property by a DHC-4 Dehavilland Caribou aircraft. The Toyota four wheel drive trucks were then used to move the equipment to the camp site approximately 10 kilometres to the south (Figure 3.2). A second totally self contained camp, established by the diamond drilling company, was mobilized during the last week of July and located at the Summit airstrip itself. This camp housed a total of five persons; four drillers and a cook.

An expeditor was retained in Smithers to coordinate the supply and servicing of the Gulf camp initially, and later the drill camp as well. All supplies were flown to the Summit airstrip on the property by fixed wing aircraft.

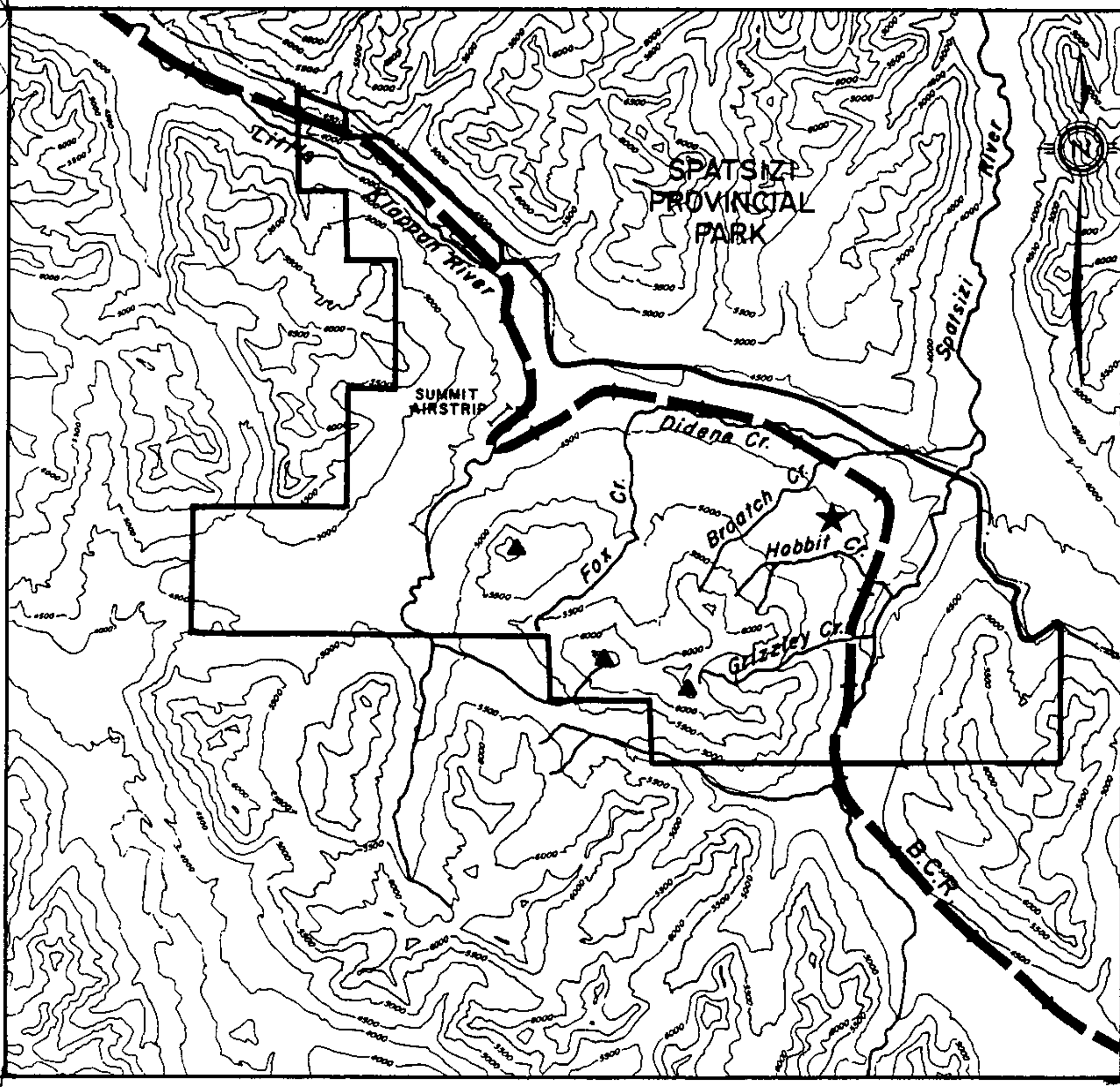
The Gulf camp was demobilized on September

MT. KLAPPAN COAL PROPERTY

CAMP LOCATION

6374500N (57°30'54") 488250E (129°10'42")

6374500N (57°30'54") 540015E (128°19'23")



6327500N (57°5') 488250E (129°10'42")

6327500N (57°5') 540015E (128°19'23")

0 1 2 3 4 5 Km

FIGURE 3.2

1:200,000

▬▬	Prepared Rail Bed
—·—	Provincial Park Boundary
★	Camp
....	Redefined Property Boundary
▲	Peaks

14, and the drill camp the following day. The wooden frames of the driller's four 16' x 14' tents were left standing to provide temporary shelter should the need arise.

3.2.3.2 Mapping and Drill Support

The mapping and drilling programs were supported by the 2 four wheel drive trucks and a Hughes 500 D helicopter. The British Columbia railway subgrade provided excellent road access in the eastern half of the property and enabled all geological mapping activities as well as two drill holes in this area, to be serviced by truck.

To facilitate the mapping of the western half of the property and the movement and support of the drill in the eastern area, a Hughes 500 D helicopter was contracted for 1-1/2 months in late July.

Initial concern that the Hughes would have difficulty moving the heavier pieces of the drill rig at elevations in excess of 1500 metres proved unfounded. The use of the same helicopter to undertake rig moves and to position mapping crews contributed greatly to the success of the program.

3.2.4 Geological Mapping

The 1982 exploration program involved detailed geological mapping at a scale of 1:10 000 (see Appendix V and VI). Four crews, each consisting of a geologist and a geological assistant, were assigned specific mapping blocks from a total of 11 blocks within the property (see Figure 3.3). The crews accessed their traverse locations by four wheel drive truck, Hughes 500 D helicopter, or by walking from the centrally located camp. A modified plane table method of mapping was utilized to control traverse station positions. This technique uses a 50 metre chain and a Silva compass attached to a portable mapping board. Errors induced by steep slopes were corrected in the field by use of a hand held clinometer.

Traverses were tied to known topographic points or to one or more of the 213 control points on the 1:10 000 base maps. These control points, picked for their ease of identification in the field, included distinctive outcrop patterns and lone trees or shrubs. The positions of the control points on the air photos were determined photogrammetrically and plotted on the 1:10 000 map sheets. At times, field positioning was assisted by 1:10 000 orthophotographs. Field observations were transferred onto 1:10 000 base maps in the field office.

In areas of good outcrop, sections were measured by the mapping teams, and drafted to true thickness at a scale of 1:200 (see Appendix VI).

3.2.5 Hand Trenching

Fifty trenches were excavated by hand, logged and

MT. KLAPPAN COAL PROPERTY
1982 EXPLORATION MAPPING AREAS

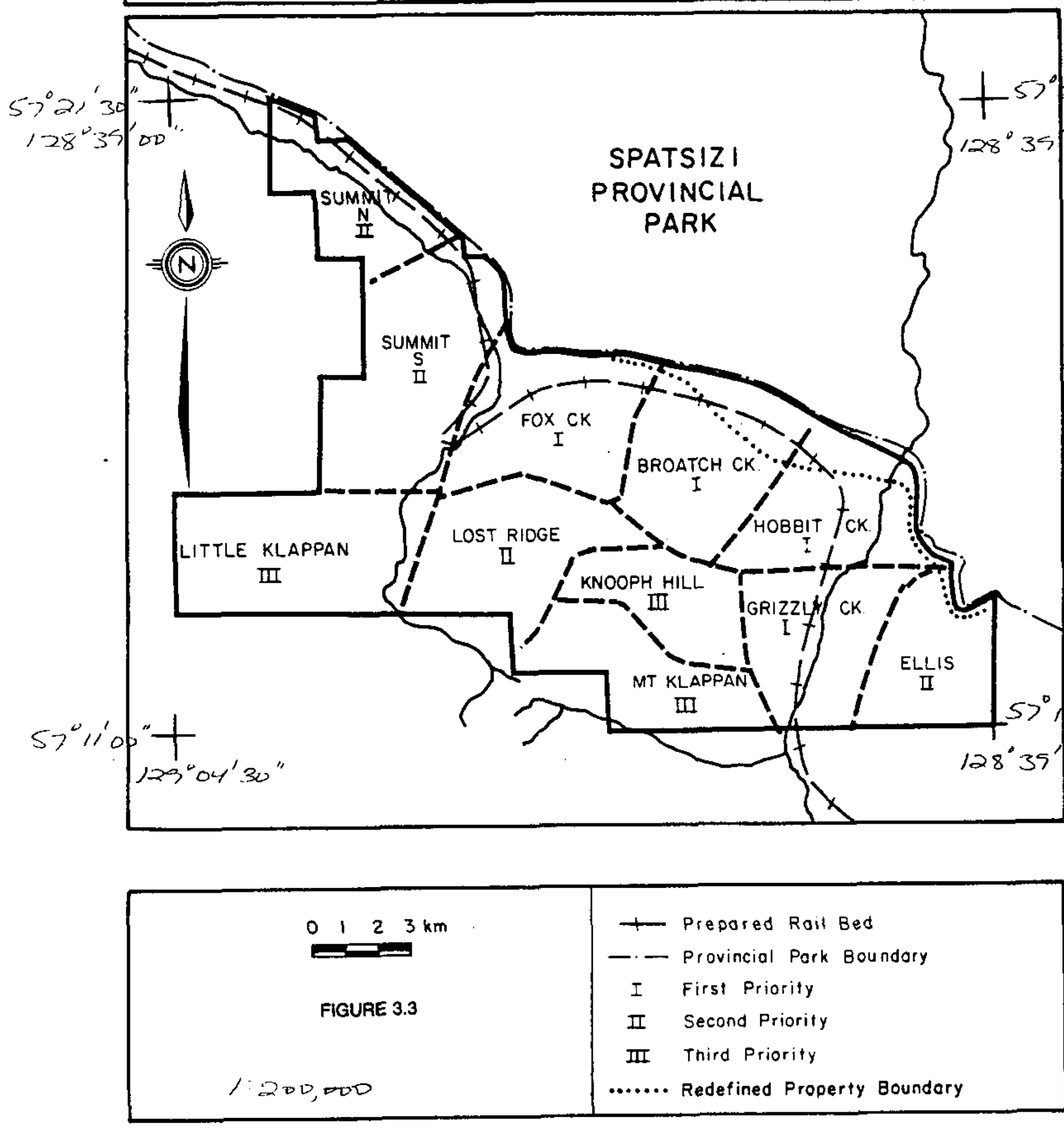


FIGURE 3.3

The logs were run at a general scale of 1:200. Detailed logs were produced at a scale of 1:40 over the coal seams utilizing the density - resistivity, gamma ray and caliper responses. A digital geophysical logging system was employed; the information from probe readings, down-hole, was recorded directly onto magnetic tape. Paper prints of the logs were produced in the field to assist in core logging and correlation. Appendix II contains a complete set of geophysical logs.

3.2.8 Drill Core Logging and Sampling

The drill core was logged and sampled by Gulf geologists who described the following parameters in detail: basic lithologies, fossil occurrences, sedimentary structures, stratigraphic marker beds, and any structural features such as larger scale folds and faults. The bedding to core angle (BCA), the angle between bedding and a line parallel to the core axis, was recorded for use in determining the true thickness of the strata intersected. The descriptive drill logs and a list of abbreviations used are found in Appendix II.

Coal core logging was based upon the percentage of the coal maceral vitrain (bright coal) contained within a measured unit of core, and upon any rock splits found contained within the coal. The following is a breakdown of the coal core description.

Bright	80%	Vitrain	C-1
Bright banded	60 - 80%	"	C-2
Dull/bright	40 - 60%	"	C-3
Dull banded	20 - 40%	"	C-4
Dull	<20%	"	C-5
Bone or stone	0%	"	C-6

All coal core in excess of 0.5 metres apparent thickness, was sampled and sent to laboratories for detailed coal quality and washability tests. Samples were selected on the basis of geophysical log traces, cross-matched with the written log. Samples were taken in intervals small enough to assist in later compositing. Rock samples were taken of the main lithologies in each drill hole for further analysis. Whenever possible, the core was photographed prior to sampling.

Strip logs illustrating the core description as drilled and as corrected to true thickness were drafted at a scale of 1:200 (see Appendix II). A sample summary for each drill hole is also found in Appendix II. The core was stacked at the camp site and covered to protect it against the elements.

3.2.9 Drill Core and Trench Sample Analysis

All drill core coal samples were submitted for preliminary analysis to an independent laboratory. The coal samples were subjected to detailed washability studies from which a variety of product coals were produced. Each product coal then underwent extensive analytical testing.

3.2.10 Data Management

A majority of the data collected for the 1982 Mt.

Klappan Exploration Program is stored in the coal data base on Gulf's AMDAHL V6 computer. The data stored includes all drill core descriptions, detailed records of each drill hole 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.

3.2.11 Reclamation

The drilling program, undertaken with helicopter support, resulted in minor disturbance to the seven drill sites as only minimal clearing of sub-alpine trees and shrubs was necessary for site preparation. All equipment and garbage has been removed from the sites. Coal seam hand trenches remain open for further inspection, and back-filling will be undertaken at a later date.

The camp area utilized a pre-existing BCR communication relay site. All camp equipment and most materials have been shipped to Smithers for winter storage, although some material has been packed inside the B.C.R. trailers on the site. All garbage has been removed and an erosion berm on the access road replaced.

3.2.12 Special Projects

3.2.12.1 Depositional Environments

In early August two sedimentologists from Gulf Canada's Geological Services Department visited the Mt. Klappan property. The purpose of their visit was to initiate studies which would lead to a paleoenvironmental interpretation of the Mt. Klappan property. Outcrops and drill core were reviewed and sampled with special attention paid to sedimentary structures, fossil content and lithologic relationships. Samples were obtained for petrologic and x-ray diffraction studies, and micro and macro fossil identification was undertaken. Preliminary results can be found in Appendix D within the text.

3.2.12.2 Regional Structure

Gulf has sponsored the first year's field work for a Ph.D. thesis on the regional structure of the northern Bowser Basin. The Ph.D. candidate is working under the supervision of the Geology Department of the University of British Columbia.

3.2.13 Project Management and Contractors

The 1982 exploration program was managed by B.P. Flynn of Gulf Canada Resources Inc. Field operations were supervised by J.M. Duford of J.M. Duford Consulting Services

Ltd. Coal quality analysis results were interpreted by K. Fujita of Norwest Resource Consultants Ltd. Coal petrology studies were performed by D.E. Pearson & Associates Ltd.

The following additional professional and technical personnel contributed to the Mount Klappan coal project.

J. Innis G. Seve E. Swanbergson	Senior Geologists
K. Jenner C. Louie	Geologists
J. Elder	Senior Geological Assistant
M. Hadley J. Sharpe K. Kosciusko A. Murphy D. Durant R. Maylor P. Watson	Geological Assistants
D. McCrea	Helicopter Pilot
K. Scarbo, D. Bombeck	Geophysical Engineers
A. Petershuk	Cook
G. Seve, J. Innis	First Aid Attendants
P. Tsavalos	Field Accountant

The following is a list of the service companies and suppliers used during the project:

SERVICES

Canadian Marconi Co.	Calgary
West Can Electronics Services Ltd.	Calgary
Camday Leasing	Calgary
Smithers Air Service	Smithers
M.R. Rentals	Smithers
Bema Industries Ltd.	Langley
Hudson Bay Motel	Smithers
Viking Helicopters Ltd.	Prince George
Maple Leaf Helicopters	Richmond
Highland Helicopters Ltd.	Smithers
Frontier Helicopters	Eddontenajon
Kelowna Flightcraft Ltd.	Kelowna
David E. Pearson & Assoc. Ltd.	Victoria
Cyclone Engineering Sales Ltd.	Edmonton
Canadian Freightways	Calgary
Central Mountain Air Services	Smithers
Western Photogrammetry	Edmonton
PBK Engineering Ltd.	Vancouver
McElhanney Engineering Ltd.	Edmonton
J.T.Thomas Diamond Drilling Ltd.	Smithers

SUPPLIERS

Economy Bookbindery Co. Ltd.	Calgary
Alberta Tent & Awning	Calgary
Neville Crosby	Vancouver
Western Scientific Services	Richmond
Smithers Hardware	Smithers
Tatlow Industries (1979) Ltd.	Smithers
Supervalu Stores	Smithers
Canadian Propane Gas & Oil	Smithers
Chevron Bulk Fuel & Services	Smithers
Alfar Industrial Supplies Ltd.	Smithers
Alpine Wiring & Plumbing Services	Smithers
Trac and Trail Equipment Ltd.	Smithers
Apollo Automotive Parts	Smithers
Dieterich Post (Alta.) Ltd.	Edmonton
Guncraft Ltd.	Calgary
Addressograph Farrington Inc.	Calgary

sampled during the 1982 exploration program (see map Appendix I). Two-man crews under the supervision of geologists were responsible for particular mapping blocks (Figure 3.3). Seams within these blocks were trenched, wherever spoil indicated the possibility of a seam thickness greater than 1.0 metre.

The trenches averaged 0.8 metres in width, 1.0 metres in depth and 5.7 metres in length. In total 285 metres of trenching was completed of which 64% was sampled. All trenched seams were measured in true thickness and described in detail. Locations of the trenches were surveyed by the chain and compass method, and plotted on the 1:10 000 base map (Appendix V).

3.2.6 Diamond Drilling

A Longyear Super 38 diamond drill, capable of being broken down for transportation by a Hughes 500 D helicopter, was utilized for the drilling. The rig was mobilized to the Summit airstrip from Dease Lake in the Caribou aircraft and then air lifted by helicopter to the drill sites. The drill rig, which has a vertical depth capacity of over 360 metres, was adequate for the program requirements which did not exceed 250 metres in any one hole.

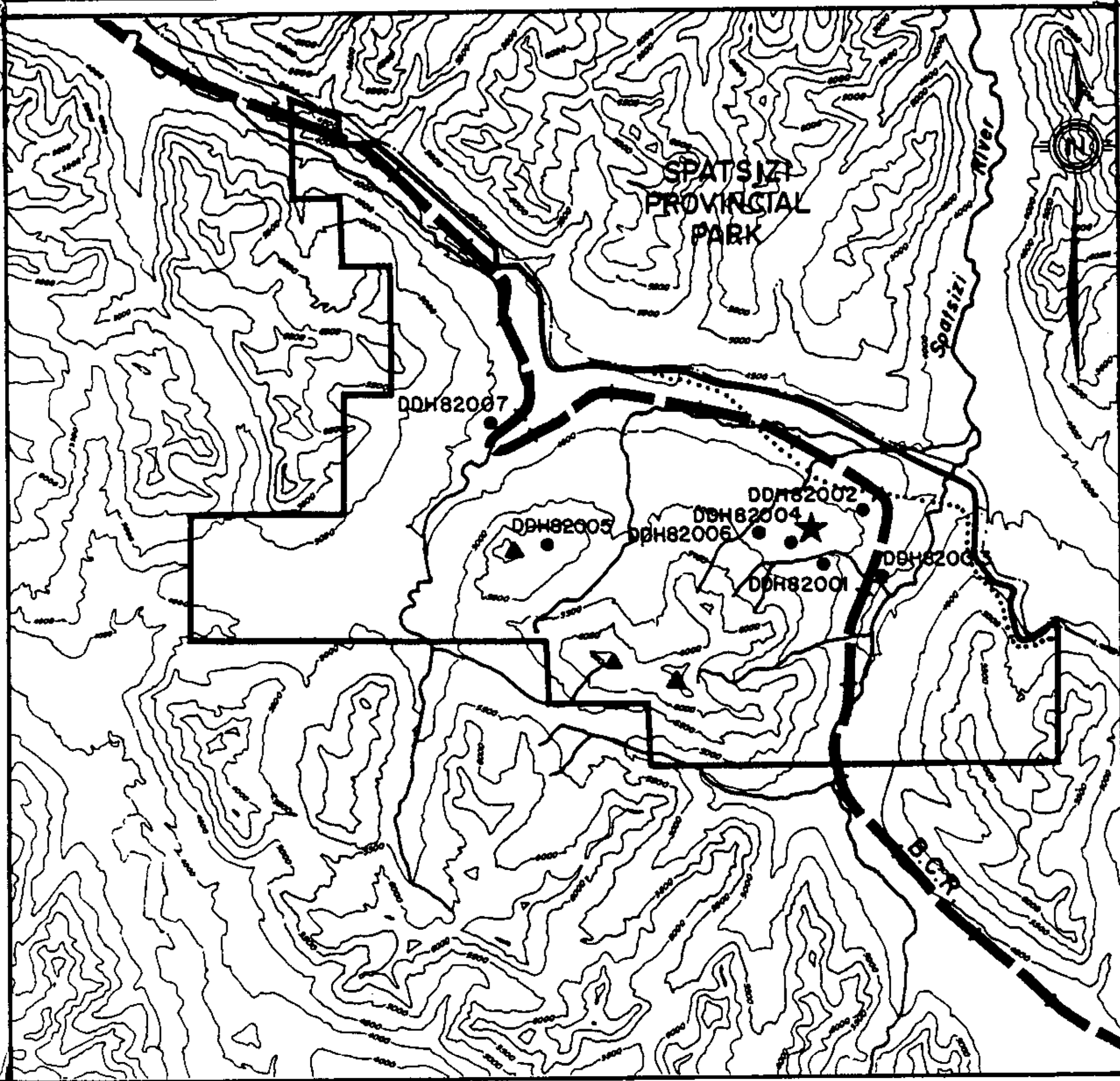
A total of 1223 metres of drilling in seven holes was completed in a 38 day period (Figure 3.4). The rig was operated on a two shift, 24 hour a day basis with a driller

MT. KLAPPAN COAL PROPERTY

DIAMOND DRILL HOLES

6374500N
(57°30'54")
488250E
(129°10'42")

6374500N
(57°30'54")
540015E
(128°19'23")



6327500N
(57°5')
488250E
(129°10'42")

6327500N
(57°5')
540015E
(128°19'23")

0 1 2 3 4 5 Km

FIGURE 3.4

1:200,000

- Prepared Rail Bed
- Provincial Park Boundary
- Camp
- Diamond Drill Hole
- Redefined Property Boundary
- Peaks

and a helper on each shift. Table 3.1 summarizes the results of the program. All drill holes have been surveyed in by chain and compass, and appear on all appropriate geological maps and cross-sections.

At the completion of the drilling program, the drill rig was air lifted to the Summit airstrip where it was prepared for winter storage.

3.2.7 Geophysical Logging

With the exception of DDH82001 all holes were geophysically logged. Caving, which occurred in DDH82001, during a delay in receiving a replacement geophysical logging unit, prevented logging of this hole. The original logging unit was destroyed during transportation by helicopter. Unstable drill hole conditions encountered in DDH82004, 82005 and 82007 resulted in the holes being logged with gamma ray, neutron and density tools only for at least part of the hole.

The following is a list of the full suite of logs run during the program.

a) Gamma Ray

b) Neutron

c) Sidewall Density

d) Focused Beam resistivity

e) Caliper

f) Direction deviation

TABLE 3.1
GULF CANADA RESOURCES INC. - COAL DIVISION
15/NOV/82 PROJECT DATA SOURCE SUMMARY

DATA SOURCE	AREA	LOCATION NORTHING EASTING	ELEVATION (m)	LENGTH (m)	ANGLE	AZIMUTH	GEOPHYSICAL LOGS
KPNHCDDH82001	HOBBIT CREEK	6343645.0 514375.0	1400.0	124.1	90.0	0.0	Not logged
KPNHCDDH82002	HOBBIT CREEK	6345134.0 515445.0	1342.0	179.0	90.0	0.0	Open hole
KPNHCDDH82003	HOBBIT CREEK	6343325.0 515540.0	1271.0	215.5	90.0	0.0	Open hole
KPNBCDDH82004	BROATCH CREEK	6344510.0 513515.0	1470.0	157.6	60.0	40.0	Thru rods
KPNLRDDH82005	LOST RIDGE	6344340.0 506120.0	1815.0	243.6	60.0	55.0	Thru rods
KPNBCDDH82006	BROATCH CREEK	6344865.0 512650.0	1489.0	173.0	60.0	345.0	Open hole
KPNSSDDH82007	SUMMIT SOUTH	6347475.0 504420.0	1315.0	130.2	70.0	5.0	Mostly Open hole

4.0 GEOLOGY

4.1 Introduction

While the bulk of the property is underlain by coal bearing Middle Klappan sediments, the concentration of exploration activity: mapping, drilling, coal quality evaluation and detailed resource calculations, has to date mostly been directed towards two areas covering less than 15% of the property. These areas are the Hobbit-Broatch and Lost-Fox Resource areas. The concentration of activity in the two areas is in direct proportion to the number of coal seam exposures. These seam exposures have allowed a quantitative and qualitative examination of the Middle Klappan coals, and the structure affecting the coal measures.

As most of the available data is from these two areas, the report will, to a large extent, focus on the Hobbit-Broatch and Lost-Fox areas. However, placed in perspective, the remaining 85% of the property which is interpreted to be mostly underlain by Middle Klappan sediments, may, with further work and drilling, prove to be equivalent or better in terms of coal quality, reserves and amenability of structure to surface mining than the Hobbit-Broatch and Lost-Fox areas.

An indication of the coal potential of this area is examined in Section 5, Resources.

4.2 Regional Geology

4.2.1 Geologic Setting

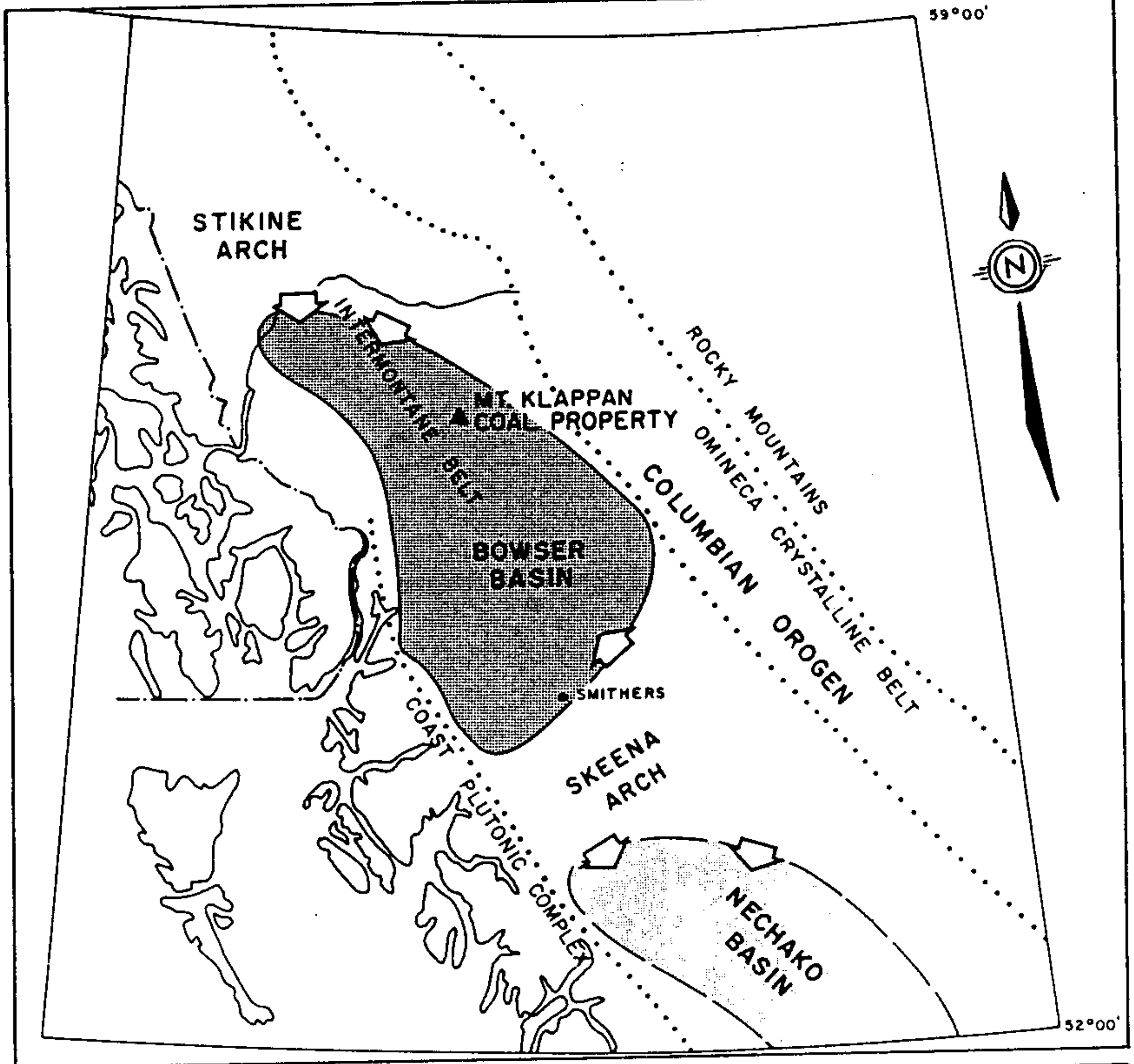
The coal measures of the Mount Klappan property are contained within a series of sediments deposited during middle Jurassic to early Cretaceous times in the Bowser Basin (Figure 4.1). The Bowser Basin conforms, in terms of its depositional setting, to the classical model of a "successor basin" (Eisbacher, 1974b, p. 274). The establishment of the Bowser Basin succeeded a period of eugeosynclinal marine volcanic activity and sedimentation. Uplift due to crustal collision from the west caused the basin to become at least partially enclosed and initiated a southwesterly progradation of coarse marine to non-marine deposits.

The Bowser Basin is bounded by the Stikine Arch to the north, in the area now occupied by the Stikine River; by the Skeena Arch to the south; and by the Columbia Orogen (Omineca Crystalline Belt) to the east (Figure 4.1). The western margin is thought to have been open to the sea at the time of Bowser sediment deposition. Paleocurrent measurements indicate a centripetal flow into the basin with material being drawn from the respective highlands to the north, south and east.

A progression through distal deltaic facies and turbidites, prodelta subsea fans, distal to proximal distributary channels and finally to paralic coal swamps and alluvial fans

MT. KLAPPAN COAL PROPERTY

JURASSIC-CRETACEOUS BOWSER BASIN



(AFTER TIPPER AND RICHARDS, 1976)

FIGURE 4.1

1: 5882353

is interpreted for the sedimentary environments of the Bowser Basin (Eisbacher, 1974b).

4.2.2 Regional Stratigraphy

In the southern portion, the assemblage contained within the basin 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 no such comprehensive work has been done, and the sedimentary package associated with the coal in the Klappan-Groundhog area has been variously named the Skeena Series (Malloch, 1914); Upper Hazelton; (Buckingham and Latour, 1950); Groundhog-Gunanoot (Eisbacher, 1974) and has been dated as Lower Cretaceous (Malloch, 1914; Buckham and Latour, 1950) and Upper Jurassic to Lowest Cretaceous (Eisbacher, 1974), Table 4.1

Gulf's geologists, until September 1982, adopted the name Skeena for the coal sequence of the Klappan-Groundhog area because of the widespread use of this term in the southern part of the basin. At that time, lacking specific fossil evidence to the contrary, Malloch's assignment of the name Skeena to the Lower Cretaceous was also accepted for the Klappan area.

REGIONAL STRATIGRAPHY
TABLE OF FORMATIONS

TABLE 4.1

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.
CRETACEOUS	UPPER		
	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.
JURASSIC	UPPER	BOWSER LAKE	FELDSPATHIC TO QUARTZOSE SANDSTONE, DARK GREY TO BLACK SHALE, SILTSTONE, GREYWACKE, CHERT PEBBLE CONGLOMERATE AND MINOR COAL SEAMS.
	MIDDLE		
	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		

In the fall of 1982, micropaleontological evidence (Gulf Laboratory - personal communication) indicated a Jurassic age for the Klappan sediments which would place these beds within the Bowser Lake Group as defined by Tipper and Richards (1976). Petrographic analyses further supported a possible Bowser Lake Group affiliation.

Pending more extensive work it was decided not to assign a specific age or Group status to the Klappan coal measures.

4.2.2.1 Klappan-Groundhog Area Stratigraphy

In the Klappan area the Upper Jurassic to earliest Cretaceous sedimentary package is subdivided into four sequences, which in ascending order are, an unnamed sequence, the Klappan, Malloch, and Rhondda sequences with the Klappan being the main coal-bearing unit (Figure 4.2). The subdivision is in many respects equivalent to the fourfold subdivision established in the Groundhog area (Gulf Canada Resources Inc. 1981 Panorama Geological Report). While the Malloch and Rhondda have been tentatively traced from the Klappan area south to the Groundhog area, correlation of the Klappan and the unnamed sequences with the equivalent units in the south is tenuous at best (Figure 4.3).

MT. KLAPPAN COAL PROPERTY
SCHEMATIC STRATIGRAPHIC COLUMN

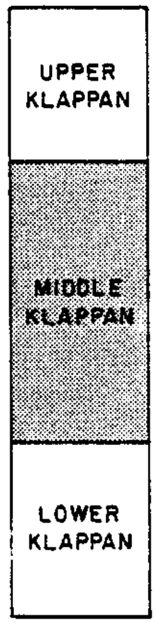


FIGURE 4.2

MT. KLAPPAN COAL PROPERTY

KLAPPAN–GROUNDHOG STRATIGRAPHY

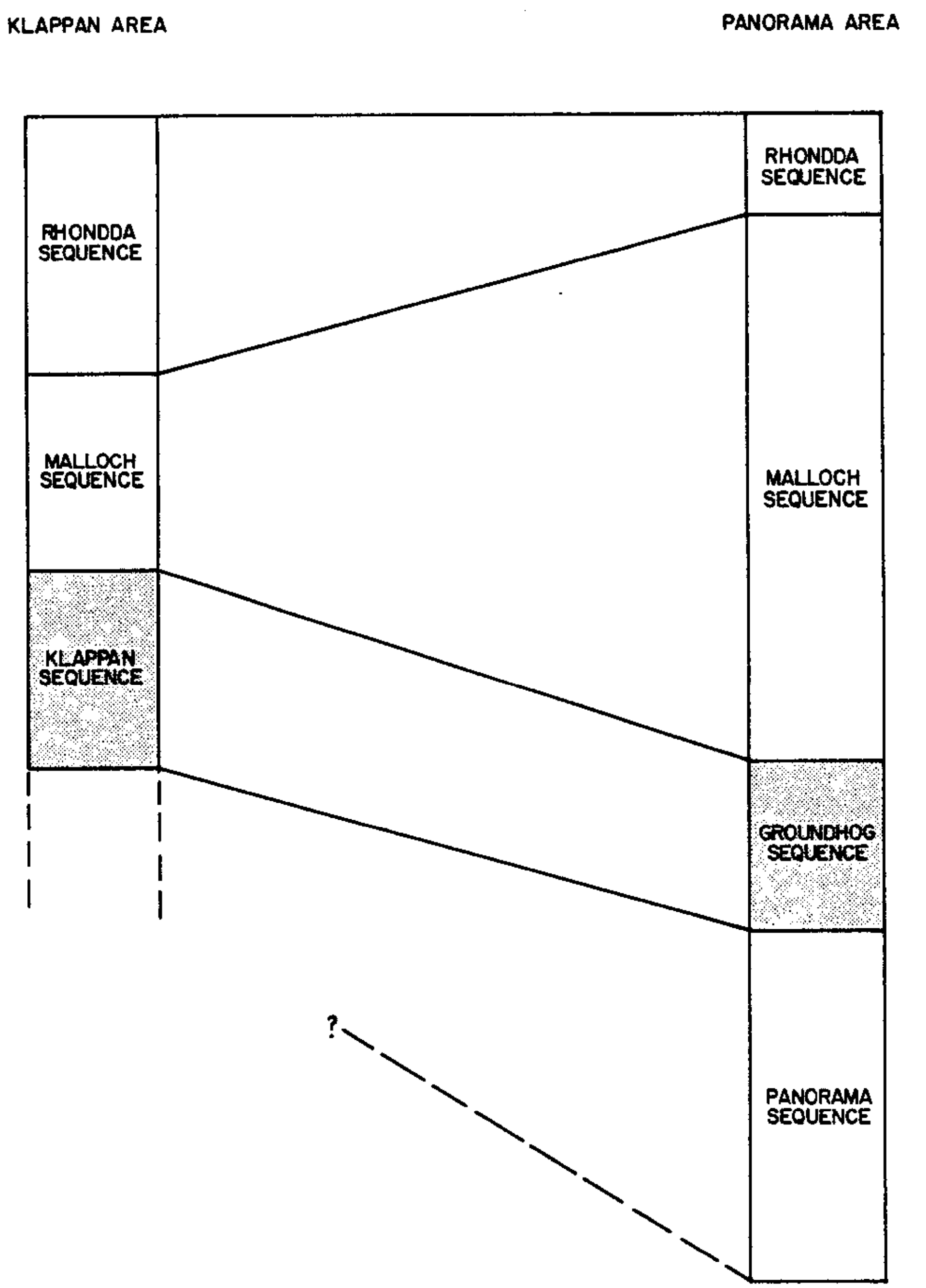


FIGURE 4.3

NOV., 1982

Thus, while it is realized that with much more work, the Klappan Sequence may be proven to be the same as the Groundhog Sequence, marked differences in coal thickness, frequency and continuity, as well as in coal quality between the two sequences has resulted in Gulf treating them as separate units.

The strata underlying the coal beds at Klappan are not well exposed, consequently it is not known if these beds correlate with the Panorama Sequence to the south. Thus, this sequence at Klappan remains unnamed at this time.

4.2.3 Structure

Structural deformation of Bowser Basin sediments resulted from intermittent tectonic stresses at the western craton margin from Cretaceous to recent time. The deformation caused an extensive, shallow decollement, recumbent folds, and local thrust faults extending a few kilometres 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 creating the general structural trend of northwest-southeast. This trend is recognized in fold axial planes, cleavages and thrust surfaces which regionally tend to dip to the southwest. Later positioning of the former volcanic arc terrain northwards along interlaced right lateral high angle faults (Eisbacher, 1981) may account for a later north-south compressional event. 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.

4.3 Property Geology

The Mount Klappan property is underlain almost exclusively by the coal-bearing Klappan Sequence (Table 4.2). Malloch sediments are exposed in the extreme southeast of the property with both Malloch and Rhondda Sequences outcropping off the southwestern boundary of the licences. Thus, while the lithologies of the Klappan Sequence are described in detail, discussion of the Malloch, Rhondda and the unnamed sequences will be brief.

4.3.1 Unnamed Sequence

Below the coal measures in the Groundhog area lies a succession of fine to medium-grained, medium to thick-bedded, grey sandstone, gradationally associated with subordinate interbeds of recessive claystone and siltstone. The coarser units may exhibit primary sedimentary structures, such as ripple marks and cross-bedding, whereas the finer units are sometimes carbonaceous and occasionally contain coal. Both fossil bivalves and fossil plants are observed locally. Interpretation of collected field data suggests that strata from below the Klappan coal sequence outcrop at some points on the property, although specific note was not made of them in the field. Consequently this unit cannot be described in detail.

MT. KLAPPAN COAL PROPERTY

TABLE OF FORMATIONS

	MALLOCH SEQUENCE
JKm	Sequences of fine to coarse to granular sandstones, siltstone and claystone with rare thin coal.
	KLAPPAN SEQUENCE
JKku	Interbedded fine to medium grained sandstone, siltstone and claystone with minor coal.
JKkm	Repeated coarsening upward sequences of fine to medium-grained sandstone, occasionally conglomeratic, siltstone, claystone and coal; sediments display cross-bedding and ripple marks and contain abundant plant fragments and rare bivalves towards the base.
JKkl	Interbedded massive, fine grained sandstone and siltstones, containing bivalve fossils, with minor coal.
	Unnamed sequence

TABLE 4.2

4.3.2 Klappan Sequence

The Klappan Sequence comprises sandstone, siltstone, claystone, coal and minor conglomerate and contains the majority of the potentially economic coal which occurs on the property. Sandstone, which is the dominant lithology, occurs in fine to medium-grained units that may sometimes be quite thick (in excess of 20 metres). Gradation upward to a grit or conglomerate is observed fairly frequently but the coarser-grained bodies are generally lenticular and do not appear continuous. Conglomerates are composed of subrounded pebbles which are matrix supported. Carbonaceous plant fossils are noted throughout the sequence, mostly in finer-grained lithologies. Pelecypod and gastropod fossils are found lower in the sequence.

Petrographic analyses of the sandstones in section give some indication of the lithologic source of the Mount Klappan sediments. The sands are uniformly dominated by detrital chert and some quartz grains with minor feldspar and virtually no muscovite. X-ray diffraction testing of rock mineral composition reveals a predominance of ankerite cement [calcium, iron, magnesium and manganese carbonate ($CaCO_3$. (Mg, Fe, Mn) CO_3)].

Coal seams are thickest, up to 7 metres, in the middle of the sequence with thinner seams on the order of 0.5 metres occurring both above and below this central zone. Although coal thicknesses vary laterally, and some splits develop, the seams appear to be continuous over large areas. The Klappan Sequence has been tentatively subdivided into a Lower, Middle and Upper unit (Table 4.2), based primarily on the concentration of thick coals within the middle portion of the sequence. The total thickness of the Klappan Sequence is approximately 550 metres.

4.3.2.1 Lower Klappan Unit

The top of the Lower Klappan Unit is at the base of the first coal seam in excess of 1 metre in thickness. At the west end of Lost Ridge this definition results in an estimated thickness for the Lower Klappan of 105 metres. The lithologies consist of massive, fine-grained well indurated sandstones, interbedded with nodular siltstones. Coal seams in the Lower Klappan Unit are less frequent and thinner than those in the Middle Klappan. Towards the base, the unit is lithologically similar to the unnamed lowest sequence described in the four unit hierarchy established for the Panorama property (Figure 4.3). Because of this transition of lithology, the base of Lower Klappan Unit has not yet been defined.

4.3.2.2 Middle Klappan Unit

The Middle Klappan Unit, which conformably overlies the Lower Klappan sediments, ranges in thickness from 300 metres, near Hobbit Creek, to 350 metres in the Lost Ridge Area.

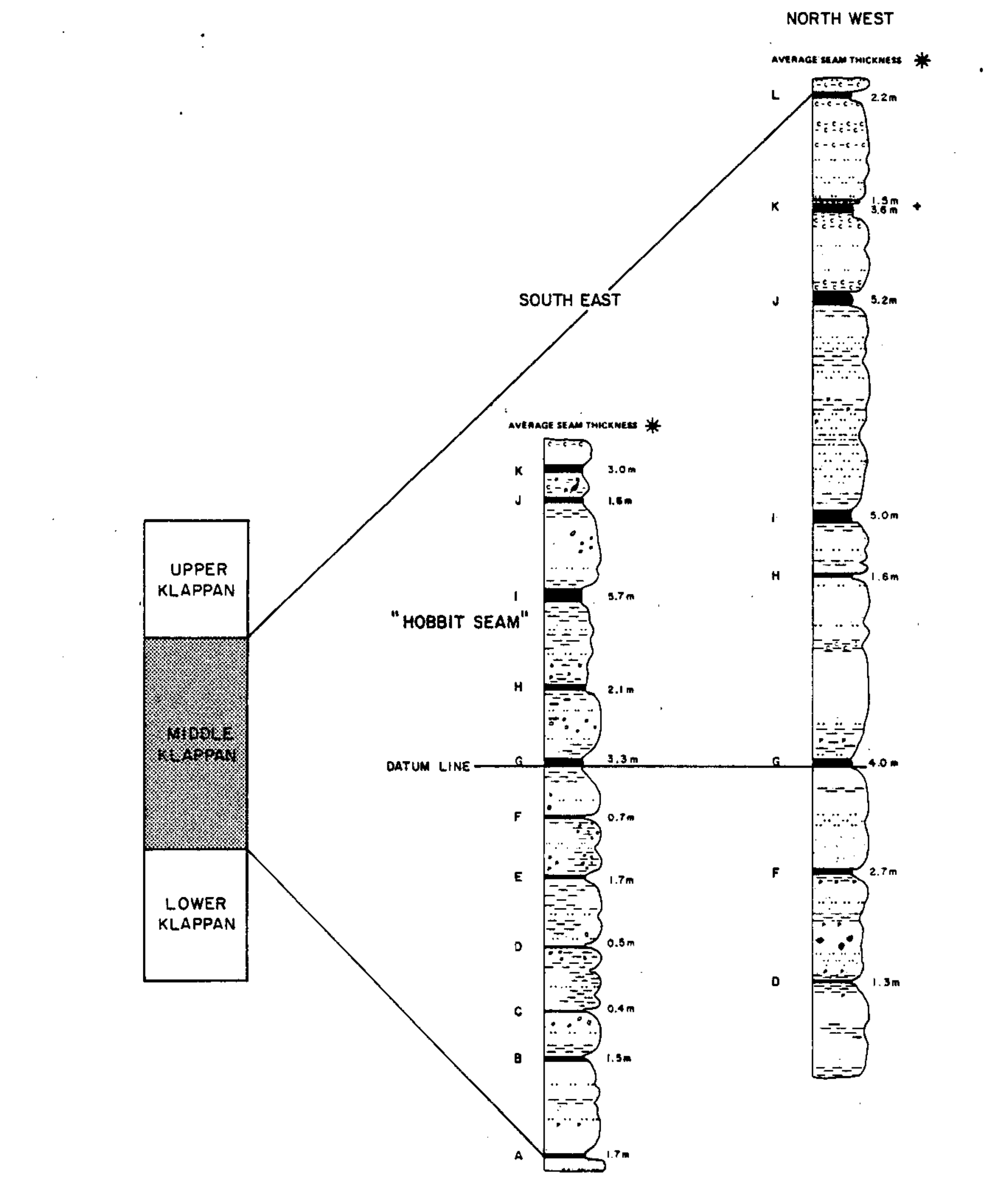
The unit, which is best exposed on Lost Ridge, in the creeks draining east off Klappan Mountain and on Klappan Mountain itself, is interpreted to be present over most of the licences. All the major coal seams found to date on the property are contained within the Middle Klappan.

The boundaries of the Middle Klappan Unit have been arbitrarily defined by the presence of thick coal seams within the unit (Figure 4.4). The first occurrence of a seam in excess of 1 metre determines the base of the unit while the top of the last seam greater than 1 metre, defines the top of the unit. The presence of a seemingly persistent conglomerate 80 metres above the top of the first thick seam may, with further drilling, assist with the positioning of the Middle Klappan Unit within the Klappan Sequence.

Drill core indicates that sandstone comprises an average of 45% of the total section although the range is from 30% to 60%. Claystone - mudstone sequences comprise 25% and siltstone 17% of the total thickness on the average.

MT. KLAPPAN COAL PROPERTY

MIDDLE KLAPPAN UNIT



SCALE - 1:2000 ✱ INCLUDES SEAM INTERSECTIONS < 0.5 m
FIGURE 4.4 + EXCLUDED FROM SEAM STATISTICS DUE TO LOW COAL/ROCK RATIO NOV., 1982

Conglomerate is prominent in a five metre interval in one drill hole and pebbly intervals do occur within sandstone units in several holes. Although rare in drill holes, conglomerate is more apparent in outcrop in the alpine areas where it forms an extensive, traceable, resistant unit. Another minor but important constituent is bentonite, which occurs as thin beds 5 to 27 cm thick in four of seven holes.

4.3.2.2.1 Coal Seam Development

The Middle Klappan Sequence contains up to 12 seams with a cumulative average thickness of 25.2 metres over a 300 - 350 metre interval, while the cumulative average thickness of seams greater than 0.5 metres is 24.3 metres (Table 4.3). The total of 12 seams and the general seam statistics to follow were derived primarily from drill hole intersections of the coal seams on the eastern half of the property. The seams, which have been labelled, in ascending order A to L (Figure 4.5), range from a minimum average thickness of 0.43 metres to maximum average thickness of 5.42 metres (Table 4.3). Structural thickening of individual seams has resulted locally in thicknesses in excess of 7.4 metres (TRC820039 and TRC820027).

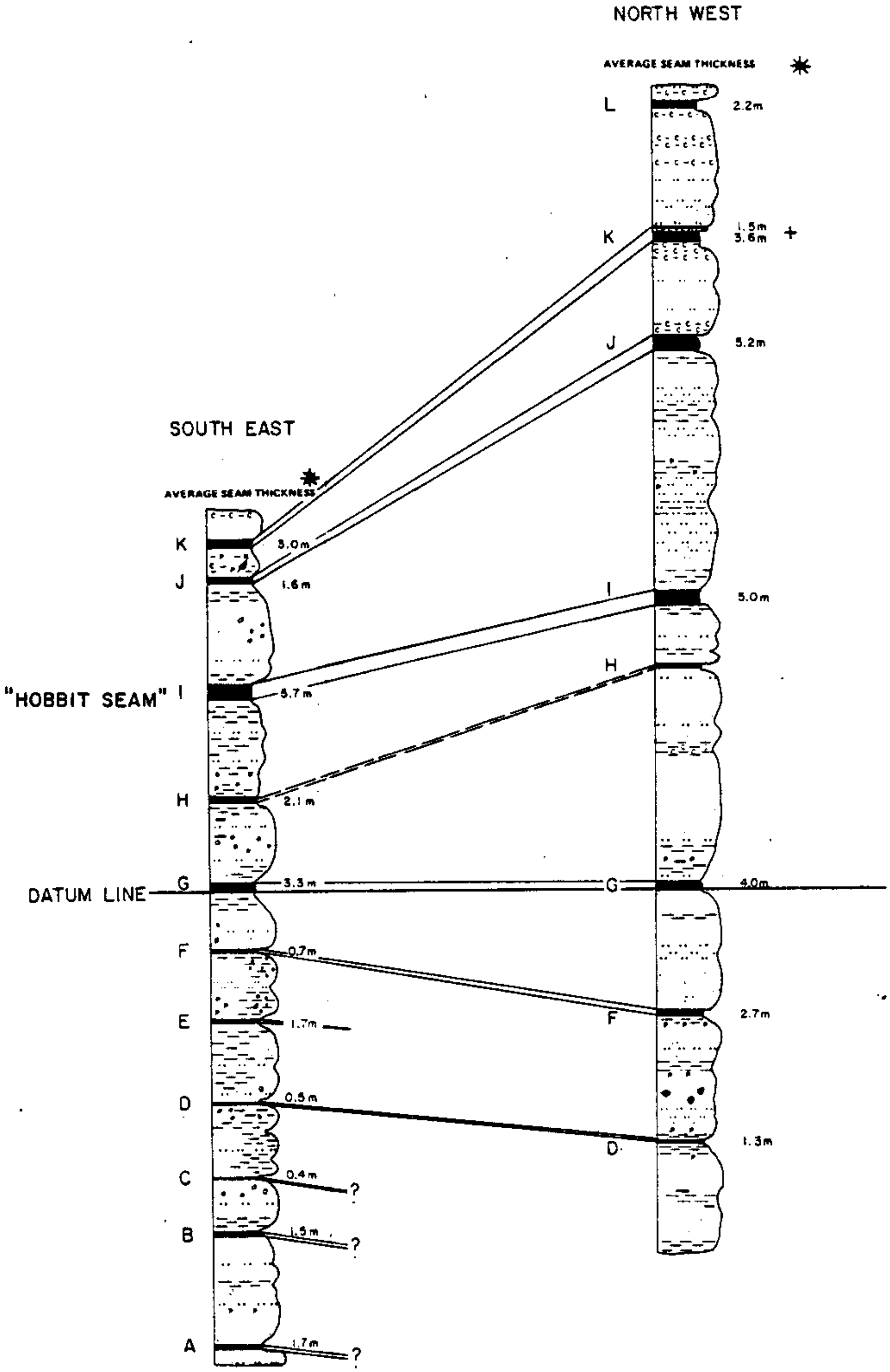
TABLE 4.3
Coal Seam Thickness Summary

Seam	HOBBIT-BROATCH AREA DDH 82001*	DDH 82002	DDH 82003	DDH 82004	DDH 82006	Average (m)	LOST-FOX AREA DDH 82005	SUMMIT AREA DDH 82007	Total Property Average (m)
L							2.24		2.24
K	3.45		2.52			2.99	†1.46		2.48
J	0.93		2.33			1.63	5.16		2.81
I	6.97		4.32			5.65	4.98		5.42
H	1.73		2.57		2.01	2.10			2.10
G	2.77	†4.03	4.22	2.88	2.45	3.27		3.91	3.38
F		0.35	2.17	0.04	0.16	0.68		2.71	1.09
E		+3.16	+2.14	0.75	0.63	1.67		1.29	1.59
D		0.53		0.35	0.59	0.49			0.49
C		0.67			0.19	0.43			0.43
B					1.50	1.50			1.50
A					1.67	1.67			1.67
Aggregate						22.08			25.20
Aggregate of Seams greater than 0.5 m						21.16			24.28

* Net thicknesses exclude core loss
+ Includes upper and lower portions
† Upper seam only

MT. KLAPPAN COAL PROPERTY

DISTRIBUTION OF COAL SEAMS



SCALE - 1: 2000 FIGURE 4.5

+ EXCLUDED FROM STATISTICS DUE TO LOW COAL/ROCK RATIO
✱ INCLUDES SEAM INTERSECTIONS < 0.5m

NOV., 1982

The cumulative average thickness of all seams (including those of less than 0.5 metre thickness) increase from an average of 2.0 metres in the southeast area to an average of 3.1 metres in the northwest area (Figure 4.5). Interseam intervals show a corresponding increase from an average thickness of 20 metres in the Hobbit-Broatch Area to 40 metres on Lost Ridge. While the interseam interval thicknesses differ between the two areas, the intervals within each area are remarkably consistent indicating a rhythmic deposition of the coal seams.

Detailed geological mapping and diamond drilling largely substantiated the concept of widespread coal seam continuity formulated as a result of the 1981 assessment. Within both the Hobbit-Broatch and Lost-Fox areas, individual seams have been traced for up to one kilometre while the correlation of a 40 metre sequence along Hobbit Creek (including seams I and J) with an almost identical sequence on Lost Ridge, suggests seam continuity over a distance of 9 km.

Diamond drilling and the relative profusion of coal seam exposures in the Middle Klappan unit underlying the eastern portion of the property, has provided a wealth of data on coal seam thicknesses, continuity and morphology. At present this is not the case for the Middle Klappan sediments underlying the western portion of the licences where extensive grass and sedge cover limits outcrop. However, the presence of thick seams, up to 3.5 metres, in the upper reaches of the Little Klappan River and in Tahtsedle Creek, suggests that seam distribution and frequency will be much the same as for the eastern portion of the property.

Where observed on Klappan Mountain the seam thicknesses were generally less than 2 metres, however while coal bloom was frequently noted on the mountain, extensive trenching has not been undertaken as yet.

4.3.2.3 Upper Klappan Unit

The Upper Klappan unit consists of sequences of interbedded sandstone, siltstone, claystone and minor coal. The sequence is approximately 100 metres thick and is best exposed on Ellis Ridge and just off the southeast edge of the property. The thickness was derived by estimating the thickness of strata between the coal seam which marks the top of the Middle Klappan unit, and the last occurrence of coal in the section. Above this last coal, the sediments were assigned to the Malloch Sequence.

4.3.2.4 Environment of Deposition

The preliminary interpretations of depositional environment by Gulf sedimentologists suggest a wave dominated deltaic environment with broad, back barrier lagoonal coal swamps. Coals developing in this setting would be laterally very widespread (in the longshore direction) though there is insufficient evidence to determine the extent of the swamp in the inshore direction. The interfingering sands and conglomerates are beach remnants and the siltstones and claystones between the major coals may be evidence of storm driven marine influxes which temporarily (and locally) interrupted the accumulation of plant material (Appendix D).

4.3.3 Malloch Sequence

The Malloch Sequence, which conformably overlies the Klappan Sequence, is composed of a series of fining upward sequences of interbedded medium-grey to tan, fine-grained sandstone, siltstone and mudstone. Thin coals were noted and plant fragments are abundant.

The sequence is best exposed east of Ellis Ridge and just off the property southeast of Tahtsedle Creek. On the Mount Klappan property the thickness has been estimated at less than 500 metres. In the Groundhog area, it is in excess of 2000 metres.

4.3.4 Rhondda Sequence

The Rhondda Sequence, which overlies the Malloch sediments, is a thick accumulation of conglomerates and conglomeratic sandstones with occasional thin beds of siltstone, claystone and coal. The lower conglomerate beds previously assigned to the Malloch (1981 Klappan Geological Report) have been reassigned to the Rhondda in keeping with the definition of the Rhondda Sequence.

4.3.5 Structure

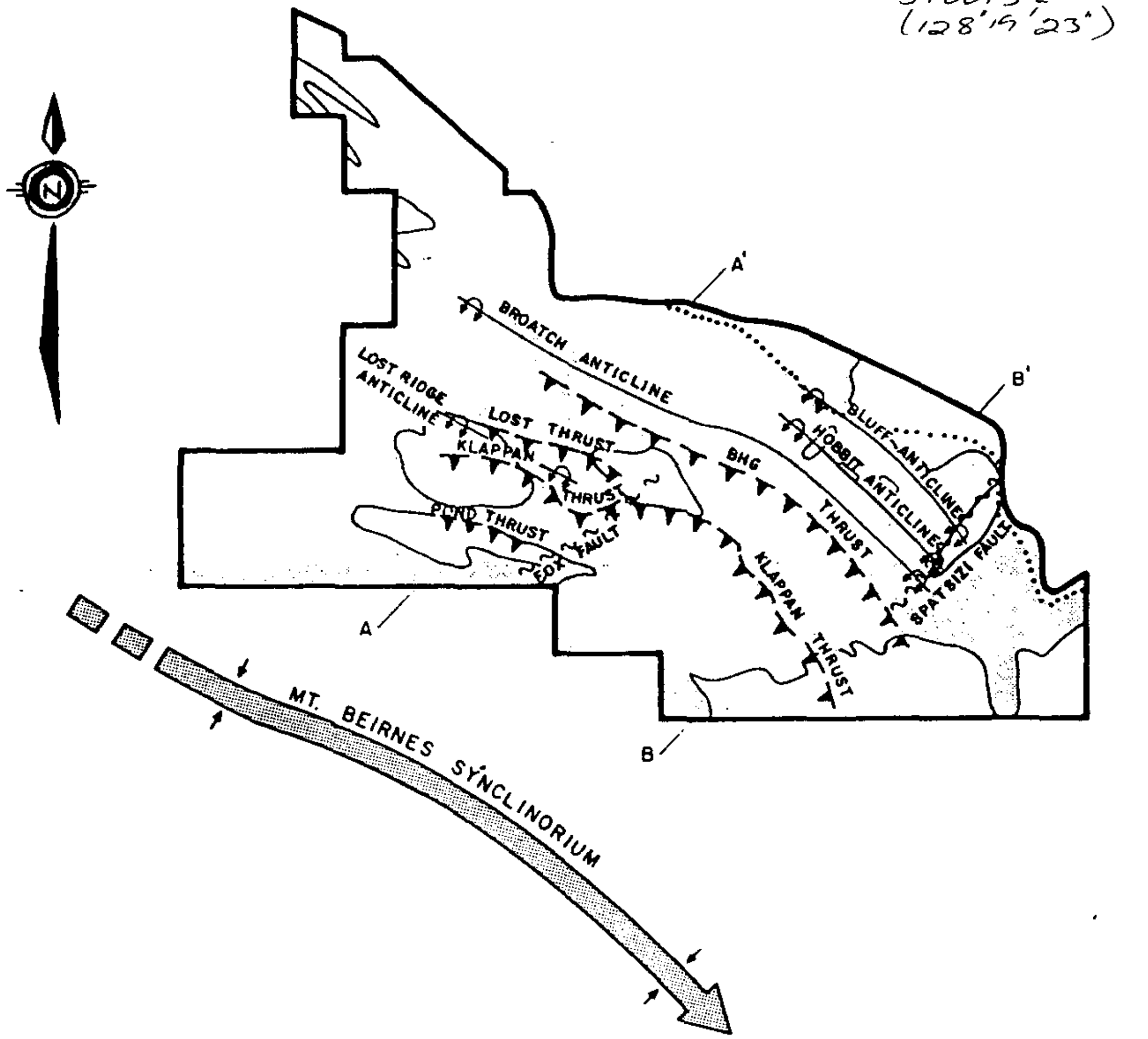
The overall structure of the Klappan area is that of a broad synclinorium - anticlinorium trending northwest- southeast (FIG. 4.6). The synclinorium, named the Mt. Beirnes Synclinorium is well defined by the massive resistant conglomerates of the Rhondda Sequence capping the Gunanoot Mountain massif southwest of the property. The anticlinorium is mostly assumed. The less competent Klappan Sequence has been folded into a number of parasitic folds which are upright to overturned to the northeast on the northeast limb of the synclinorium and overturned to the southwest on the southwest limb (Figure 4.7). The bulk of the property covers the northeast limb of the synclinorium (Figure 4.6).

MT. KLAPPAN COAL PROPERTY

SCHEMATIC GEOLOGY MAP

6374500 N (57°30' 54")
488250 E (129°10' 42")

6374500 N (57°30'54")
540015 E (128°19'23")



6327500 N (57°5')
488250 E (129°10'42")

6327500 N (57°5')
540015 E (128°19'23")

0 1 2 3 4 5 Km

FIGURE 4.6

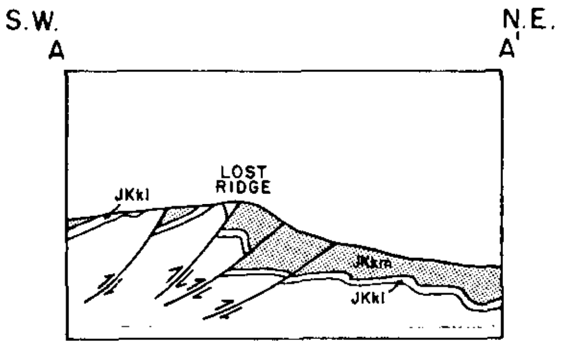
1:200,000 (1:192,308)

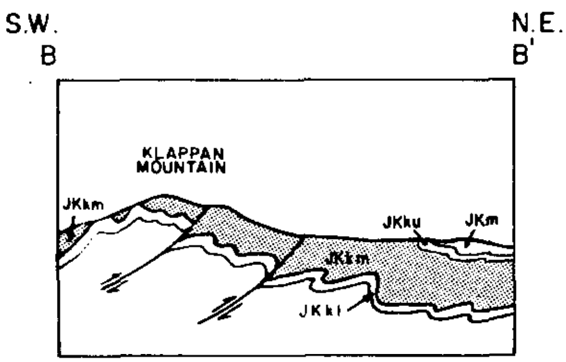
MIDDLE KLAPPAN SEQUENCE

REDEFINED PROPERTY BOUNDARY

MT. KLAPPAN COAL PROPERTY

SCHEMATIC CROSS SECTION





Moderate Vertical Exaggeration

FIGURE 4.7

JKm	Malloch Sequence
JKku	Upper Klappan Sequence
JKkm	Middle Klappan Sequence
JKkl	Lower Klappan Sequence

Folding is the dominant deformational mechanism on the property with styles ranging from broad upright folds to overturned megascopic Z folds with axes inclined as much as 45° to the northeast.

A periodic fluctuation in the plunge of the fold axis (alternately northwest and southeast) is superimposed on the above described fold pattern. The magnitude of the plunge is generally around 10°, and seldom more than 20°. The plunge changes are best observed in the Hobbit-Broatch area where Hobbit Creek parallels the fold axis and where drill hole control is best. The alternating plunge changes keep the Middle Klappan Sequence relatively close to the surface in the eastern portion of the property.

Faulting has played a relatively minor role in the deformation of the Klappan sediments. Four southwest dipping thrust faults are recognized on the Mt. Klappan property with only two, the Klappan and BHG (Broatch, Hobbit, Grizzley) being continuous over the property (FIG. 4.6 and 4.7). The Klappan Thrust, the larger of the two, with an estimated, though variable, displacement of about 350 metres, is well exposed on Grizzley Ridge and Lost Ridge. Over most of its length the fault has thrust lower Middle Klappan sediments over the upper Middle Klappan beds. An overall shallowing of the dip of this thrust, from 45° to 10° was recorded from Grizzley Ridge to Lost Ridge where the dip again increases to 45° (see cross-sections Appendix V and VI).

The B.H.G. Thrust, with an estimated displacement of 325 m is not as well exposed in outcrop as the Klappan Thrust and therefore is less well documented. The thrust has brought the lower Middle Klappan Unit in fault contact with the upper sediments of the Middle Klappan and locally the Upper Klappan. Several minor normal faults have also been mapped.

The Klappan and B.H.G. thrusts subdivide the property into 3 structural blocks (Figure 4.6). The upper or southwesterly structural block, is bounded to the northeast by the Klappan Thrust and encompasses all of the western portion of the property including Klappan Mountain. The structure of the block is characterized by open upright folds of 200 - 300 metres wavelength. Fold axes are parallel and are oriented with the regional northwest-southeast trend. The folds are well exposed across Mt. Klappan, Anthracite Peak and the southwestern ends of Grizzley and Cincies Ridge. Observed deformation is not intense with the exception of a recumbent isoclinal fold of several hundred metres amplitude on the northwest face of Mt. Klappan.

The middle structural block lies between the Klappan and B.H.G. thrusts and contains the Lost-Fox and Summit areas. Strata in this block outcrop in a band about 3 kilometres wide that includes the eastern ends of Cincies Ridge, Grizzley Ridge and Lost Ridge and the upper reaches of Fox Creek. The structural style of the southern portion of the block is similar to that of the upper structural block but, towards the northwest, the folds become progressively over turned to the northeast as is evident in the northwest face of Lost Ridge.

The tendency toward overturned folds is even more pronounced in the lowest structural block beneath the B.H.G. Thrust. The folds are characterized by long gently dipping southwest limbs, which tend to flatten out near the hinge area, and shorter, vertical or overturned northeast limbs (Figure 4.7). While the limbs are free of secondary structural complications, fracturing and structural thickening of the strata including coal, is common in the hinges of the folds. Quartz filling of the fractures in the hinge areas of folds was noted. The Hobbit-Broatch area covers the southern one third of the block.

While locally the structure can be complex, it would appear that the Mt. Klappan property is located in the distal edge of the intensely deformed structural domain prevalent in the Groundhog area. The structures in the Mount Klappan area are relatively broad and can be traced over areas that are large enough to have substantial potential for open pit mining.

4.4 Resource Area Geology

4.4.1 Hobbit - Broatch Resource Area

The Hobbit-Broatch resource area, which encompasses the southern portion of the lower structural block, is bounded to the southeast by the Spatsizi River, to the southwest by the B.H.G. Thrust and by the B.C.R. subgrade along a portion of its northeast side (Figure 4.8). The extent of the resource area northwards is currently limited by outcrop and drill hole control and the boundary is placed just north of Broatch Creek (Figure 4.8). A total of 34 trenches have been excavated in coal and five diamond drill holes have been completed in the area.

The resource area is mostly underlain by the main coal bearing unit, the Middle Klappan Sequence which is estimated to be in the order of 300 metres thick, increasing to 320 metres to the northeast.

4.4.1.1 Coal Seam Development

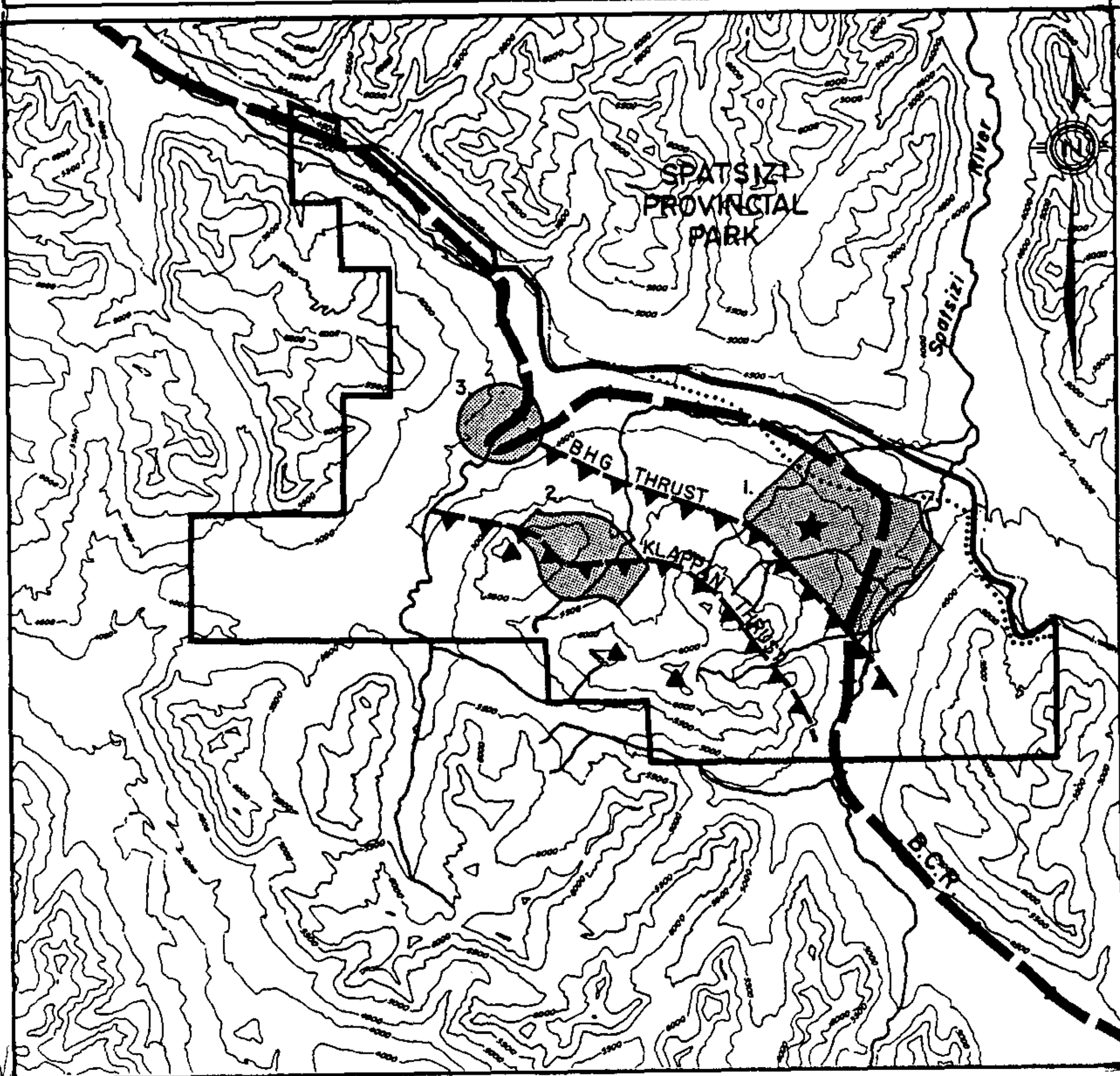
Coal seams A to K with a cumulative average thickness of 22.1 metres were intersected by drilling in the Hobbit-Broatch area (Table 4.3). The cumulative average thickness of seams greater than 0.5 metres is 21.2 metres. The seams vary from a minimum average thickness of 0.43 metres (seam C) to a maximum average of 5.65 metres (seam I).

MT. KLAPPAN COAL PROPERTY

INFERRED RESOURCE AREAS

6374500 N (57°30'54") 488250 E (128°10'42")

6374500 N (57°30'54") 540015 E (128°19'23")



6327500 N (57°5') 488250 E (128°10'42")

6327500 N (57°5') 540015 E (128°19'23")

0 1 2 3 4 5 Km

FIGURE 4.8

1 200,000

- Prepared Rail Bed
- Provincial Park Boundary
- ★ Camp
- Redefined Property Boundary
- 1. Hobbit-Broatch Area
- 2. Lost-Fox Area
- 3. Summit Area
- ▲ Peaks

Individual seam thicknesses of up to 8 metres have been recorded in trenches, where seams have been structurally thickened in the noses of anticlines (seam I). The average seam thickness (including seams less than 0.5 metres) is 2.0 metres. Drilled coal seam intersections are summarized in Table 4.4 and illustrated in the composite section of Figure 4.9. Interseam thicknesses vary from 7 metres to 37 metres but are on average about 20 metres.

Correlation between drill holes was based on lithologic markers such as bentonite beds, concentrations of bivalves and geophysical profiles (Figure 4.10). Although the correlation is based on fairly widespread drill holes, (1 to 2 km) results suggest that the seams are mostly continuous over the Hobbit-Broatch area.

Seams appear to thicken toward the southeast. This is best exemplified by seam G which increases from over 2.0 metres in DDH82006 to over 4.0 metres in DDH82003 (correlation diagrams, Appendix VI). Other seams, which were not intersected as frequently, also appear to thicken to the south.

4.4.1.2 Structure

The resource area is dominated by three main anticlines named, from west to east, the Broatch, Hobbit, and Bluff anticlines (Figure 4.11 and 4.12).

TABLE 4.4
HOBBIT-BROATCH RESOURCE AREA SEAM INTERSECTION SUMMARY

DRILL HOLE	SEAM	DRILLED INTERVAL	SEAM TRUE THICKNESS	INTERSEAM TRUE THICKNESS	COAL/ROCK
†82001 p	K	19.39 - 22.84	3.45		1.63/0.72
				7.19	
	J	30.08 - 31.02	0.93		0.85/0.08
				25.02	
	I	57.25 - 64.51	6.97		4.34/2.02
				27.34	
	H	93.95 - 95.86	1.73		0.94/0.66
				20.31	
	G	117.35 - 120.12	2.77		1.32/1.04
82002	G upper	36.03 - 40.08	4.03		2.57/1.46
				3.34	
	+G lower	43.42 - 44.55	1.13		0.56/0.57
				7.79	
	*F	52.54 - 52.89	0.35		0.35/0.00
				27.12	
	E upper	81.07 - 82.06	0.92		0.72/0.20
				4.05	
	E lower	86.51 - 89.00	2.24		1.64/0.60
				37.17	
	D	138.38 - 138.92	0.53		0.53/0.00
				25.59	
	C	165.97 - 166.66	0.67		0.67/0.00
82003	K	27.87 - 32.79	2.52		2.26/0.26
				9.84	
	J	44.06 - 46.62	2.33		2.21/0.12
				33.58	
	I	94.14 - 98.94	4.32		3.37/0.95
				27.80	
	H	127.24 - 129.81	2.57		2.23/0.34
				25.21	
	G	155.24 - 159.46	4.22		3.11/1.11
				22.75	
	F	182.38 - 184.56	2.17		1.70/0.47
				20.31	
	E upper	205.28 - 206.14	0.86		0.86/0.00
				2.01	
	E lower	208.17 - 209.45	1.28		1.16/0.12

* seam intersections less than 0.50 metres but applied to weighted average seam thickness
\+ not applied to any resource calculations due to thickness or low coal/rock ratio
† coal/rock does not include core loss

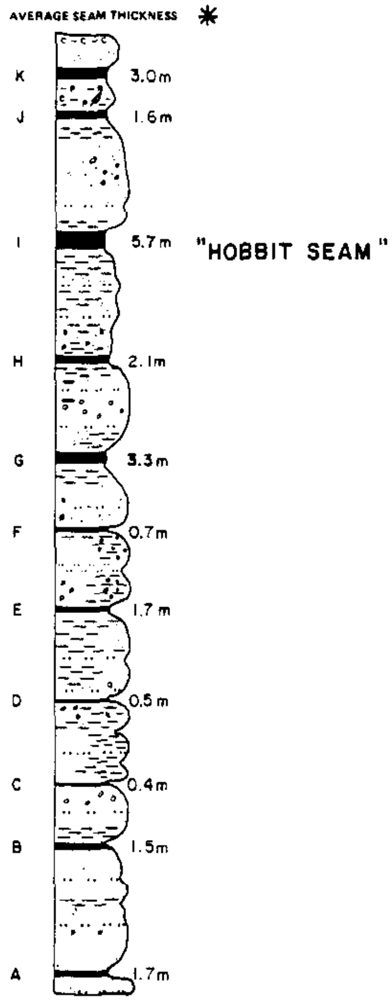
TABLE 4.4 (con't)

82004	G	24.73 – 29.60	2.88	16.39	2.62/0.26
	*F	58.10 – 58.17	0.04	16.85	0.04/0.00
	E	90.39 – 91.67	0.75	15.18	0.68/0.07
	*D	114.46 – 114.96	0.35	19.97	0.35/0.00
	+D repeat	139.84 – 140.34	0.50	9.82	0.41/0.09
	+E repeat	150.36 – 150.81	0.45		0.45/0.00
82006	H	26.09 – 28.10	2.01	22.58	1.31/0.70
	G	51.15 – 53.60	2.45	16.09	1.84/0.61
	*F	69.75 – 69.91	0.16	15.87	0.16/0.00
	E	85.88 – 86.51	0.63	12.77	0.61/0.02
	D	99.38 – 99.97	0.59	17.02	0.52/0.07
	*C	117.15 – 117.34	0.19	14.37	0.19/0.00
	B	132.35 – 133.85	1.50	14.61	1.26/0.24
	A	166.31 – 168.37	1.67		1.62/0.05

* Seam Intersections less than 0.50 metres but applied to weighted average seam thickness
\+ not applied to any resource calculations due to thickness or low coal/rock ratio

MT. KLAPPAN COAL PROPERTY

HOBBIT–BROATCH COAL SEAMS



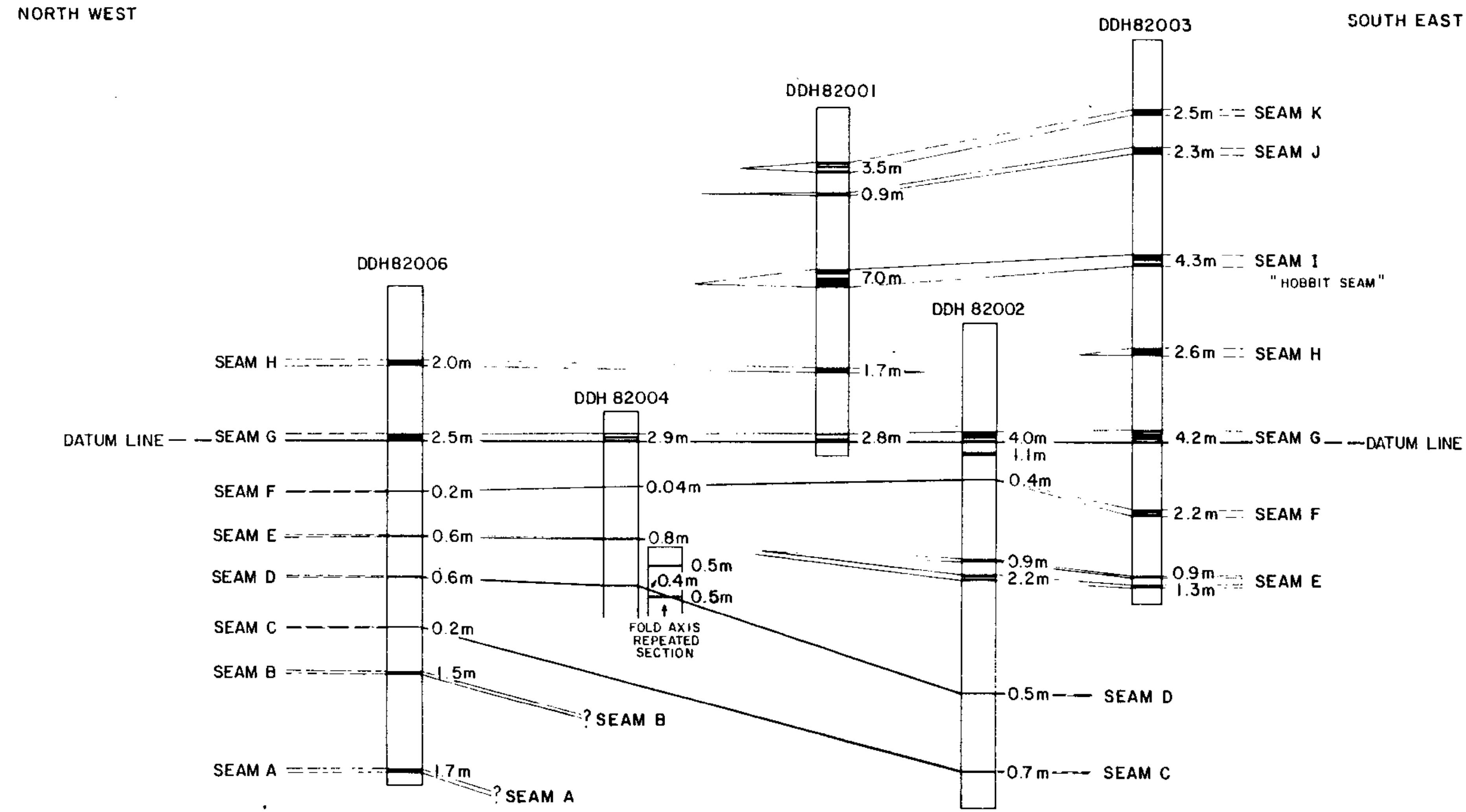
SCALE - 1 : 2000
FIGURE 4.9

* INCLUDES SEAM INTERSECTIONS <0.5m

NOV., 1982

MT. KLAPPAN COAL PROPERTY

HOBBIT–BROATCH CORRELATION



SCALE - 1: 2000 FIGURE 4.10

NOV., 1982

Each of the folds is interpreted to strike across most of the resource area in a northwest-southeast direction. The folds are characteristically overturned to the northeast with long shallow dipping southwest limbs and vertical to overturned northeast limbs.

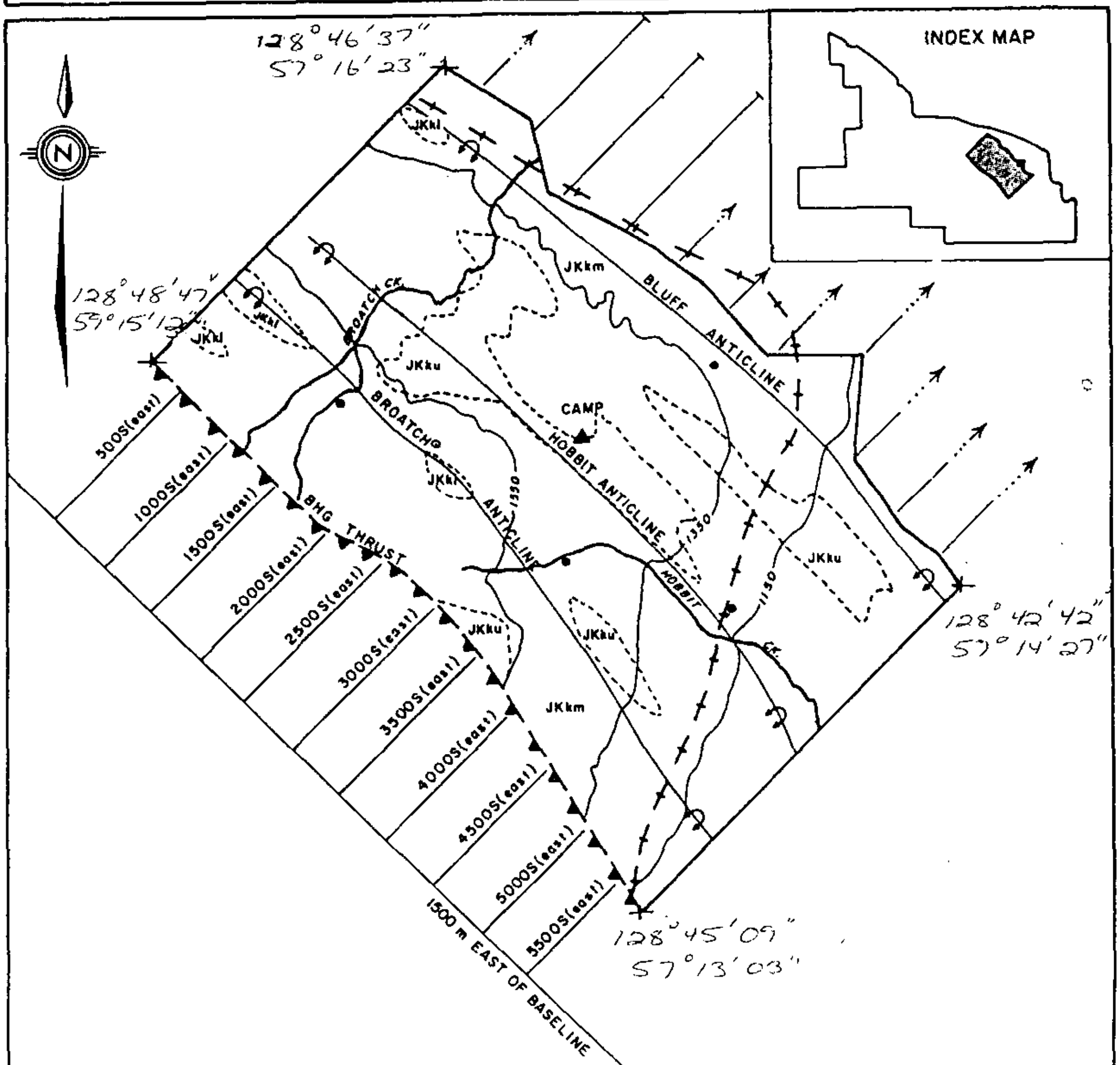
A later stage compressional event has produced almost regular plunge changes, approximately perpendicular to strike. This secondary compression of the folds has imparted a plunge change wavelength of approximately 1 kilometre. Plunge changes are readily observed on the property in areas of good exposure. The amount of plunge along the axes varies from approximately 5° to 20° although locally the plunges may be steeper.

At Broatch Creek, the Broatch anticline plunges 20° to the southeast. Elswehere along Broatch Creek the structures plunge in the same direction but the amount of plunge is not as well documented. Minor plunge changes are visible along Hobbit Creek, but generally the plunge is gently to the southeast, with a major change to the northwest near the mouth of the creek. The end result of the plunge changes is to maintain the coal bearing Middle Klappan Unit close to the surface.

The amplitude of the folding is in the order of 100 to 300 metres, while the fold wavelengths range

MT. KLAPPAN COAL PROPERTY

HOBBIT–BROATCH GEOLOGY



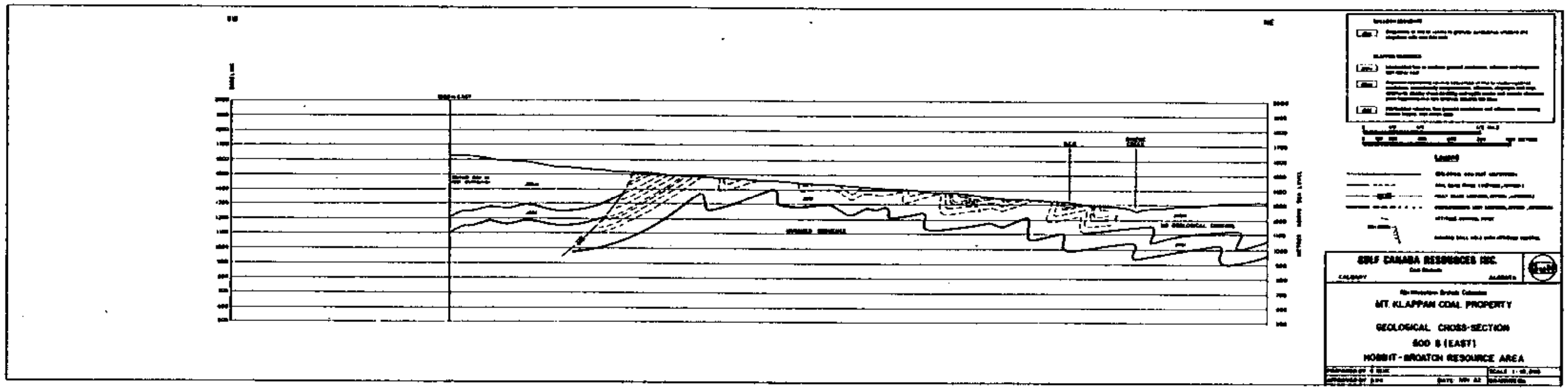
NOV. 82

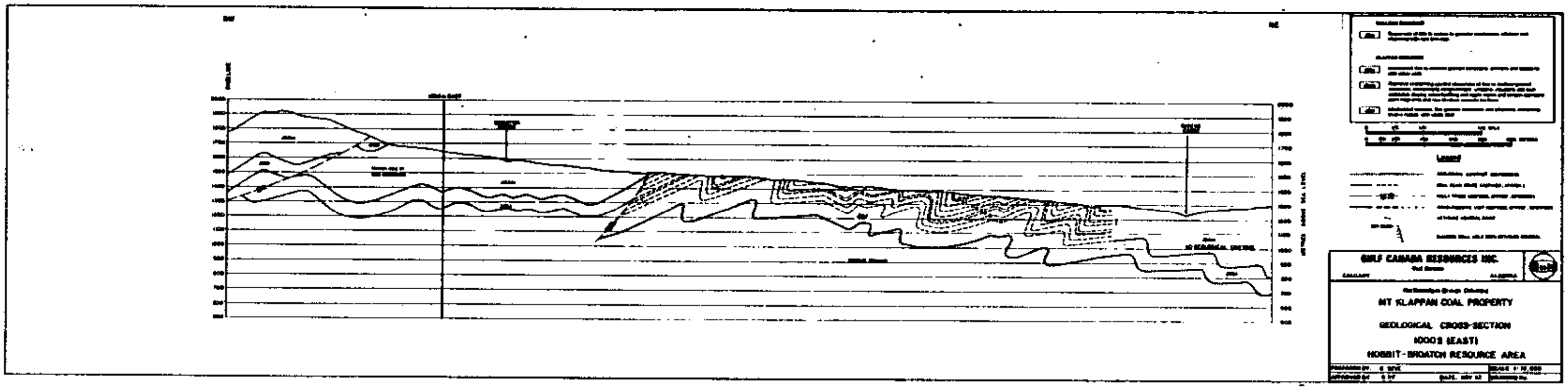
0 — 1 km

FIGURE 4.11

1:186,000

▲	Camp
JKku	Upper Klappan Sequence
JKkm	Middle Klappan Sequence
JKkl	Lower Klappan Sequence
—+—	Prepared Rail Bed
•	Diamond Drill Hole





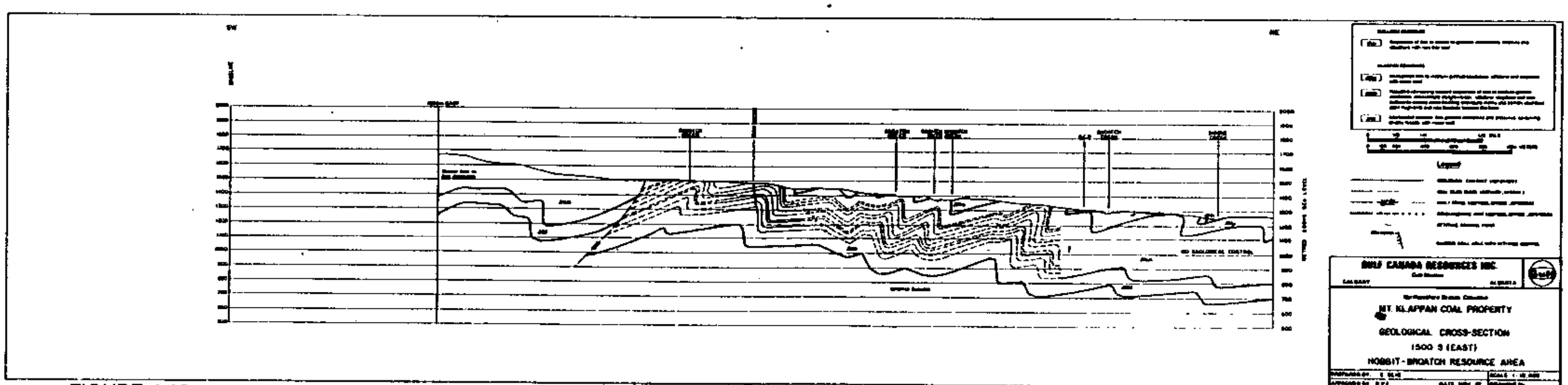


FIGURE 4.12

HOBBIT–BROATCH RESOURCE AREA CROSS–SECTIONS

SCALE: 1:50,000

-72-

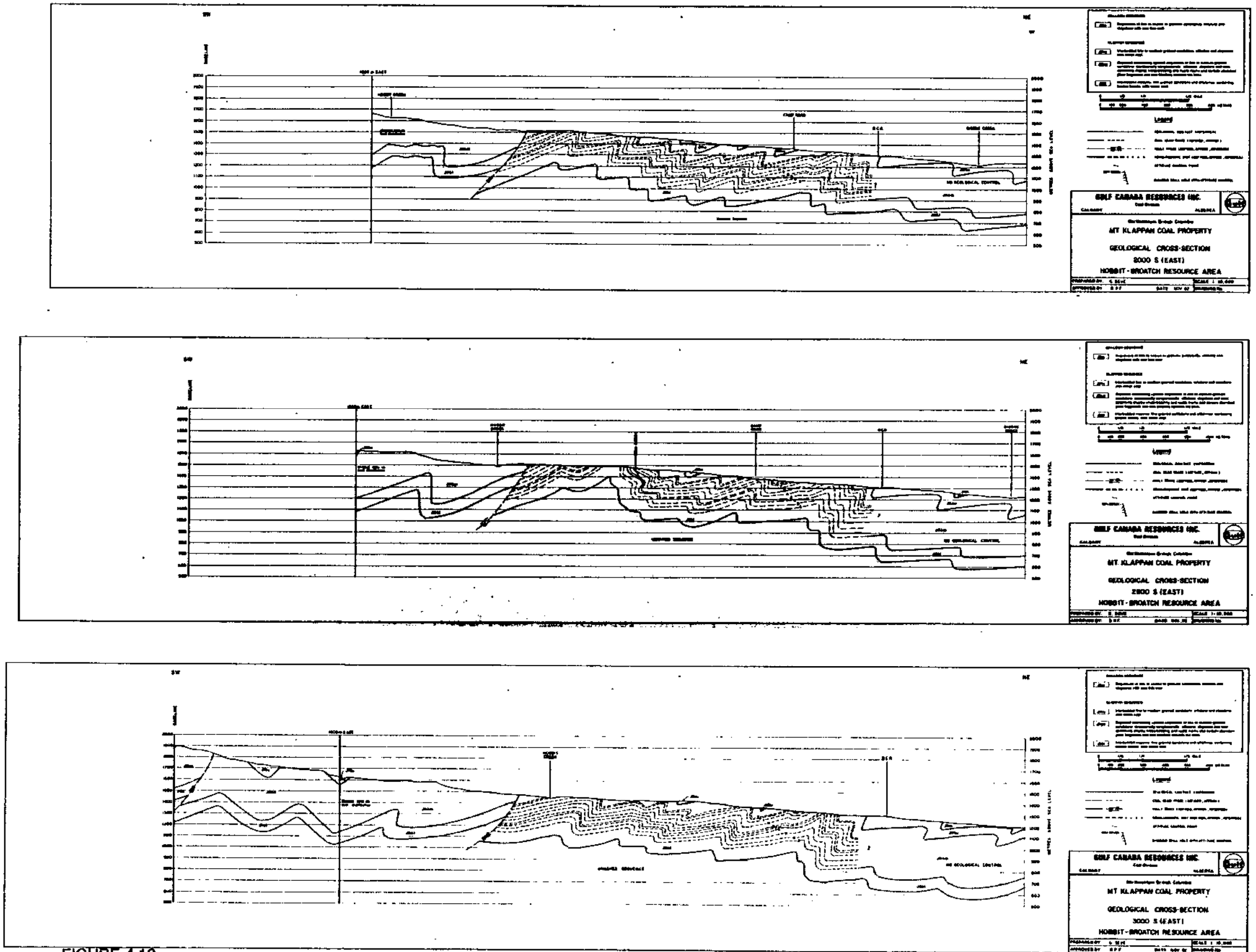
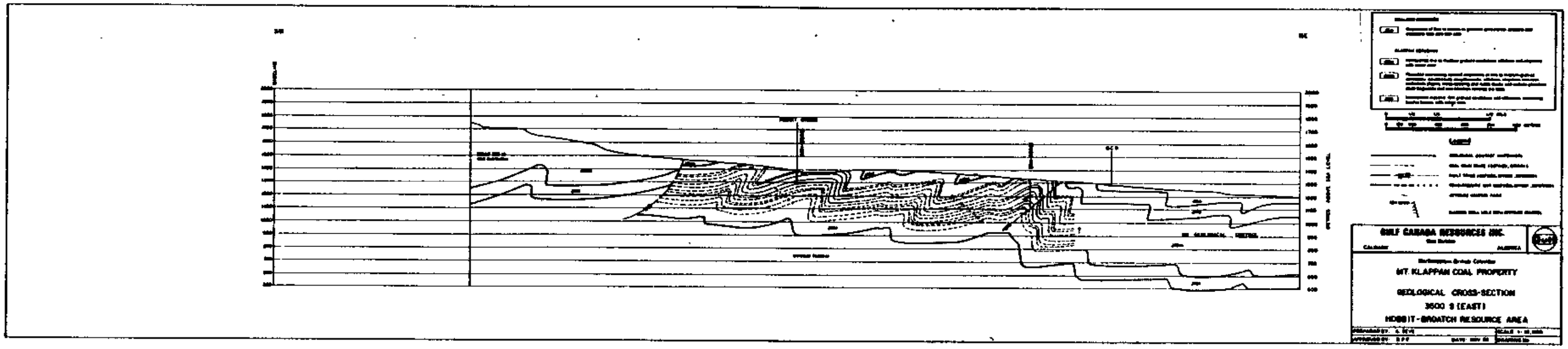
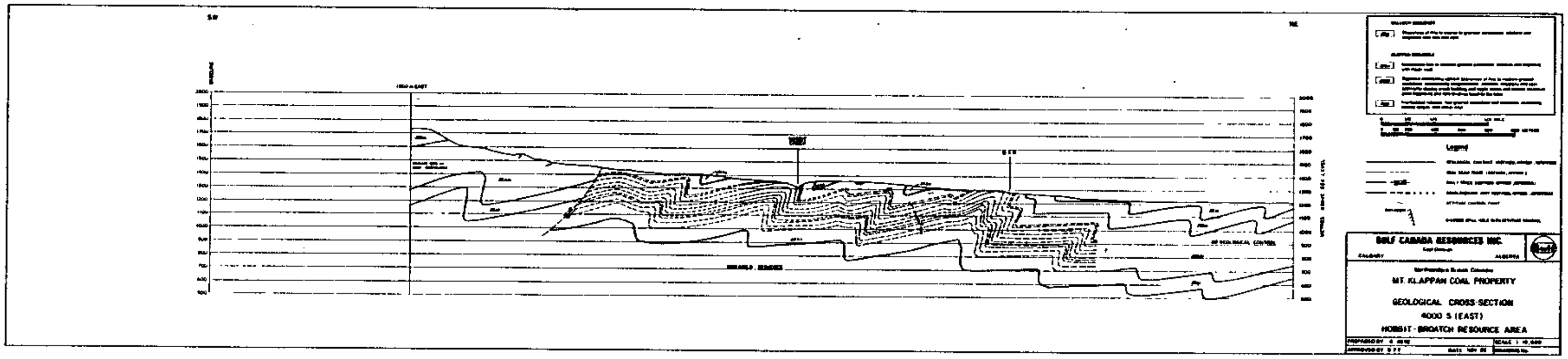


FIGURE 4.12
HOBBIT–BROATCH RESOURCE AREA CROSS-SECTIONS

SCALE: 1:50,000





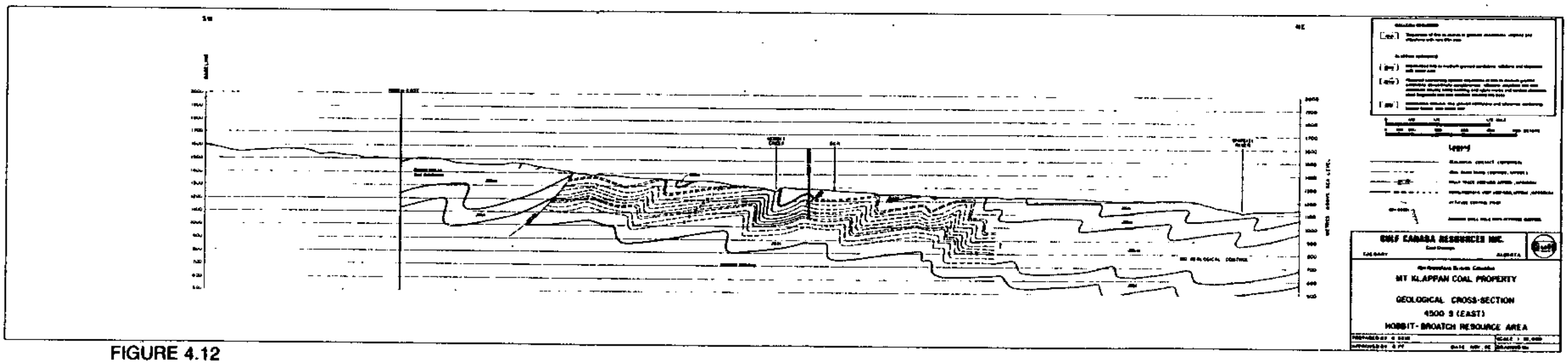
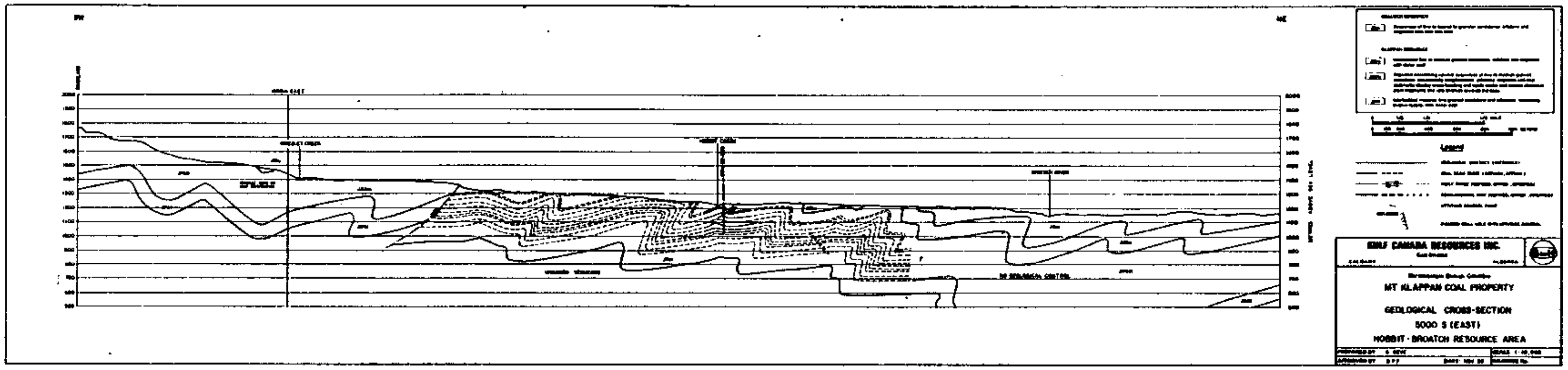
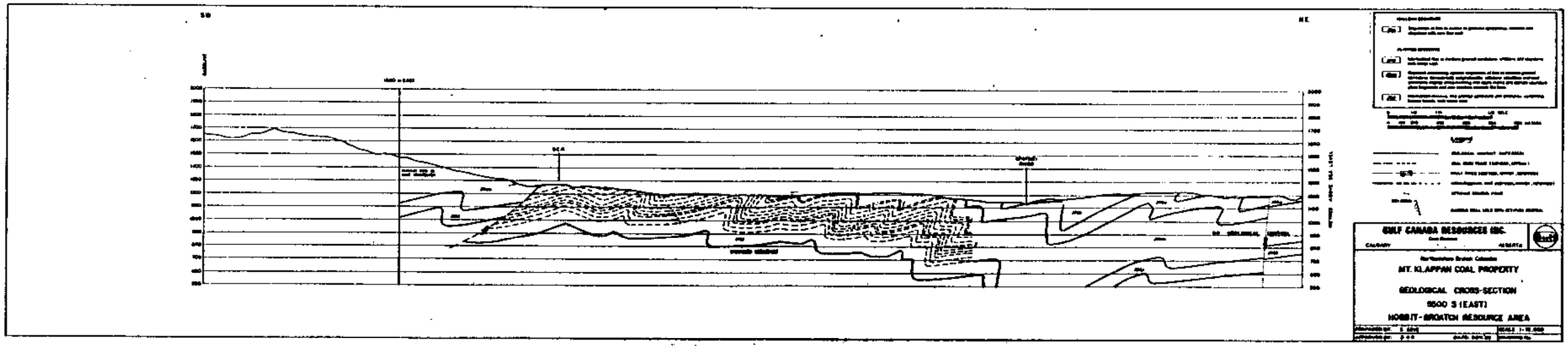


FIGURE 4.12

HOBBIT–BROATCH RESOURCE AREA CROSS–SECTIONS

SCALE: 1:50,000





SCALE: 1:50,000

FIGURE 4.12

HOBBIT–BROATCH RESOURCE AREA CROSS–SECTIONS from 300 to 900 metres. Superimposed on several folds are smaller parasitic folds which locally complicate the structure. Facies changes may be responsible for some of this local structure.

Thrust faults are the dominant fault type. The B.H.G. (Broatch, Hobbit, Grizzley) Thrust, a back limb thrust, is the major thrust in the Hobbit-Broatch area and defines the southwestern boundary. Movement along this fault is in the order of 325 metres, placing the lower part of the Middle Klappan Sequence against the upper part of the same sequence. Several forelimb thrusts of minor displacement are found in the vicinity of DDH82002 and DDH82003. These faults, where intersected, produce only minor disturbances in the drill core. Similar faults may occur elsewhere.

A normal fault was interpreted along the Spatsizi River outside the resource area. The amount of displacement along this fault is unknown.

4.4.2 The Lost Fox Resource Area

The Lost-Fox area, which essentially covers the eastern half of Lost Ridge is confined by the Klappan Thrust along its southwest and southeastern boundaries and a lack of outcrop and drill data to the northwest and northeast (Figure

4.8.). Future exploration north and east of the latter two boundaries will likely expand the Lost-Fox area north to the Summit block and east to the B.C.R. subgrade. The resource area covers the northcentral portion of the middle structural block.

One diamond drill hole (DDH82005) spudded on top of Lost Ridge, and 11 trenches, provide lithological and coal seam data. The thickness of the Middle Klappan Unit, estimated at 350 metres, is somewhat greater than in the Hobbit-Broatch area. Although the resource area is underlain mainly by the Middle Klappan Sequence the Upper and Lower Klappan sequences outcrop as does the Malloch Sequence.

4.4.2.1 Coal Seam Development

Exploration to date has proved the presence of seam G and I thru L with a total aggregate seam thickness of 17.86 metres over an interval of 235 metres. Seam thickness varies from 1.5 to 5.2 metres with an average thickness of 3.57 metres (Table 4.5). Seams I to L were intersected in DDH82005 and seam G was trenched. While coal spoil indicated the presence of seam H, lack of an accurate thickness excluded it from both seam statistics and resource calculations (Figure 4.13). This also holds true for seam M, which is believed to be present 13 metres above L, but was not intersected in DDH82005 due to excessive hole deviation which necessitated premature drill hole shut down. (Seam M is not shown on any figures or diagrams in the report).

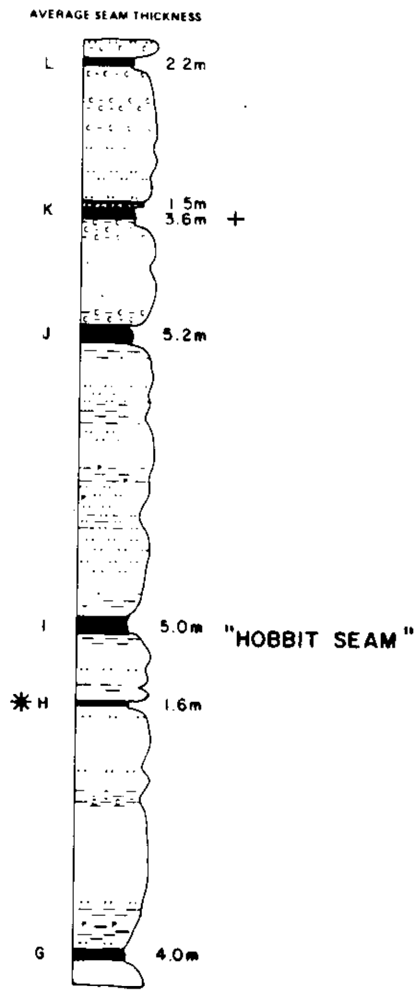
TABLE 4.5
Lost-Fox Resource Area Seam Intersection Summary

DATA SOURCE	SEAM	DRILLED INTERVAL	SEAM TRUE THICKNESS	INTERSEAM TRUE THICKNESS	COAL/ROCK
TRC82044	G		4.02		3.49/0.53
DDH82005	L	236.14 - 238.92	2.24		1.43/0.81
				34.11	
	K upper	192.09 - 193.81	1.46		0.97/0.49
				26.55	
	J	148.09 - 154.34	5.16		3.99/1.17
				69.72	
	I	54.02 - 60.30	4.98		4.26/0.72

TOTAL 17.86
AVERAGE 3.57

MT. KLAPPAN COAL PROPERTY

LOST–FOX COAL SEAMS



SCALE - 1 : 2000
FIGURE 4.13

✳ SEAM NOT DRILLED OR TRENCHED
+ EXCLUDED FROM SEAM STATISTICS
DUE TO LOW COAL/ROCK RATIO

NOV., 1982

Seam continuity is readily observed in the excellent exposures. Seam I, a seam with virtually no rock partings, can be traced along the north face of Lost Ridge for over 550 metres, then southeast down the dip slope for over 800 metres. The lower seams of the Middle Klappan Sequence are not exposed and have not yet been drilled but a tentative correlation of DDH82005 and the seams intersected by DDH82007 in the Summit area is illustrated in Figure 4.14.

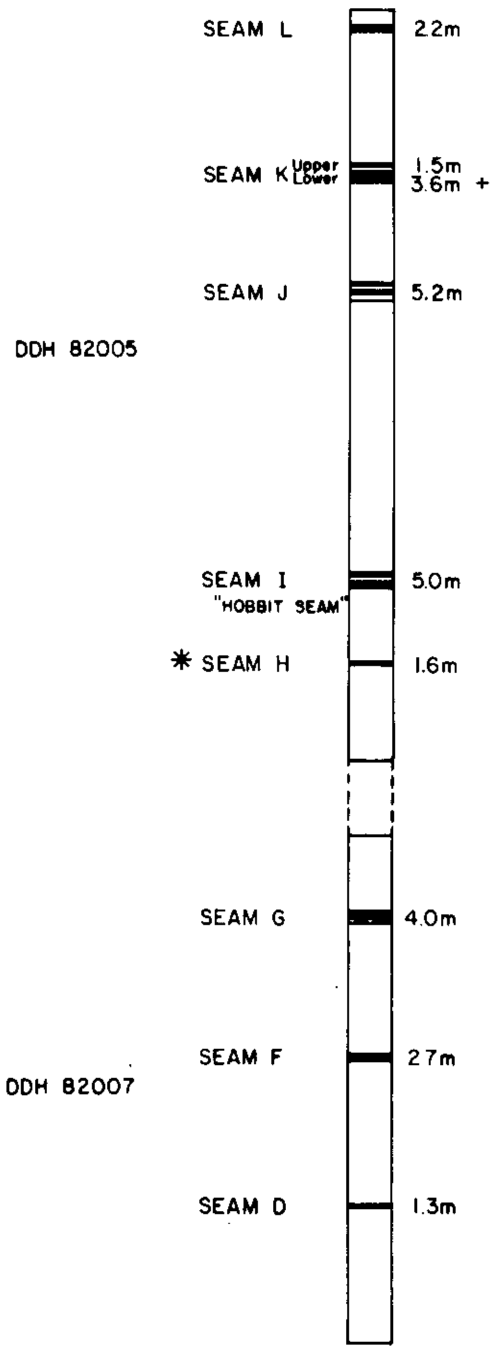
Several seams outcropping along Fox Creek have tentatively been placed high in the stratigraphic section on the basis of structure. Additional work may indicate an extension of the Lost-Fox resource area to include more of Fox Creek. In general, the coal seams in the Lost-Fox area are thicker, and in places, cleaner than the equivalents in the Hobbit-Broatch area.

4.4.2.2 Structure

Located within the middle structural block, the structure of the Lost-Fox area is characterized by a large southeasterly plunging anticline-syncline pair, named the Lost Ridge Anticline and Lost Ridge Syncline (Figure 4.15). The southwest limb of the anticline, as it begins to form a second syncline, has been truncated by the Klappan Thrust, which places lower Middle Klappan strata onto upper Middle Klappan sediments (Figure 4.16). Displacement on the thrust

MT. KLAPPAN COAL PROPERTY

LOST-FOX–SUMMIT CORRELATION



* SEAM NOT DRILLED OR TRENCHED

+ EXCLUDED FROM SEAM STATISTICS DUE TO LOW COAL/ROCK RATIO.

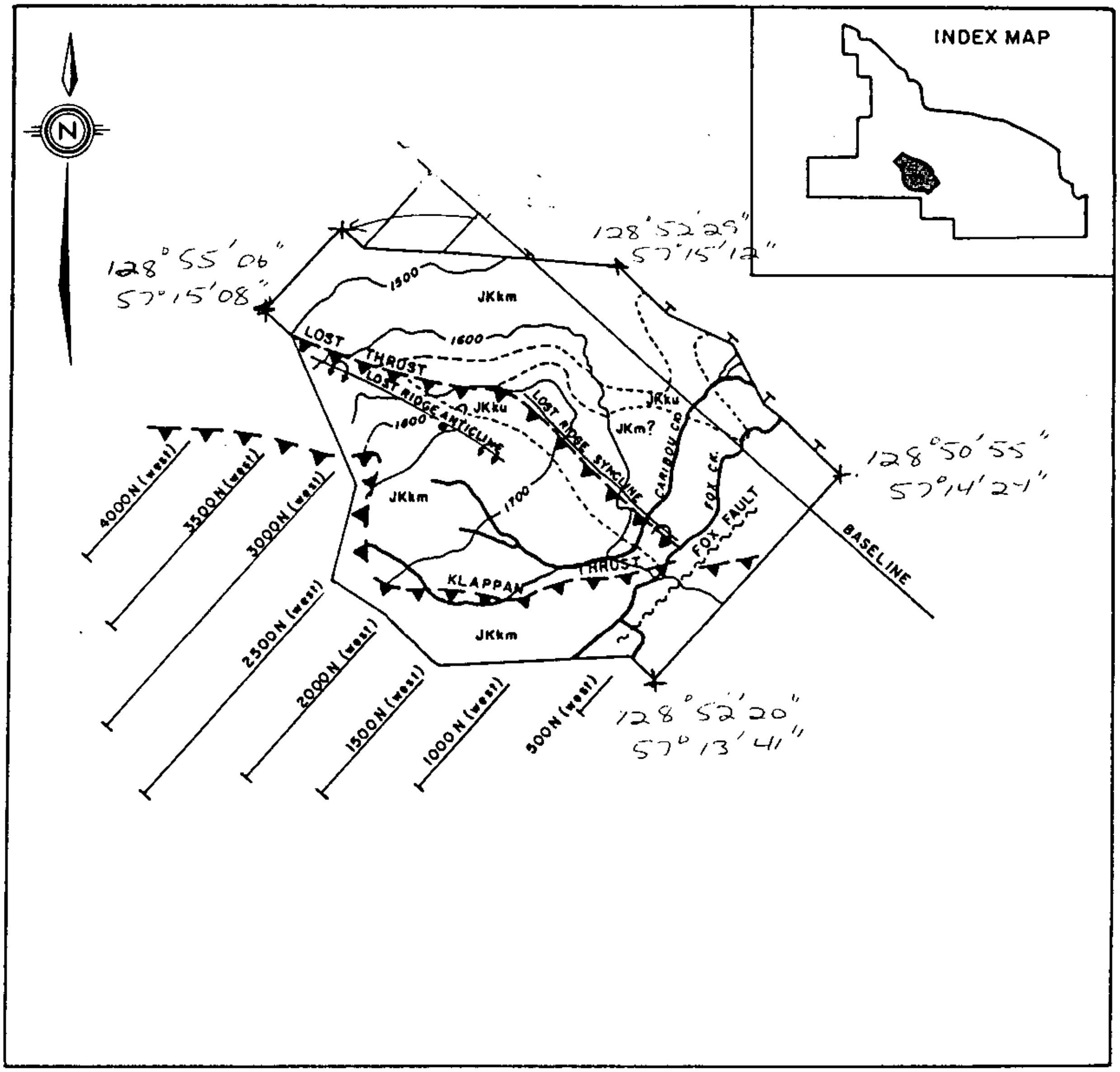
SCALE - 1: 2000

FIGURE 4.14

NOV., 1982

MT. KLAPPAN COAL PROPERTY

LOST–FOX GEOLOGY



NOV. 82

0 1 km

FIGURE 4.15

1:190,000

JKm	Malloch Sequence
JKku	Upper Klappan Sequence
JKkm	Middle Klappan Sequence
JKkl	Lower Klappan Sequence
•	Diamond Drill Hole

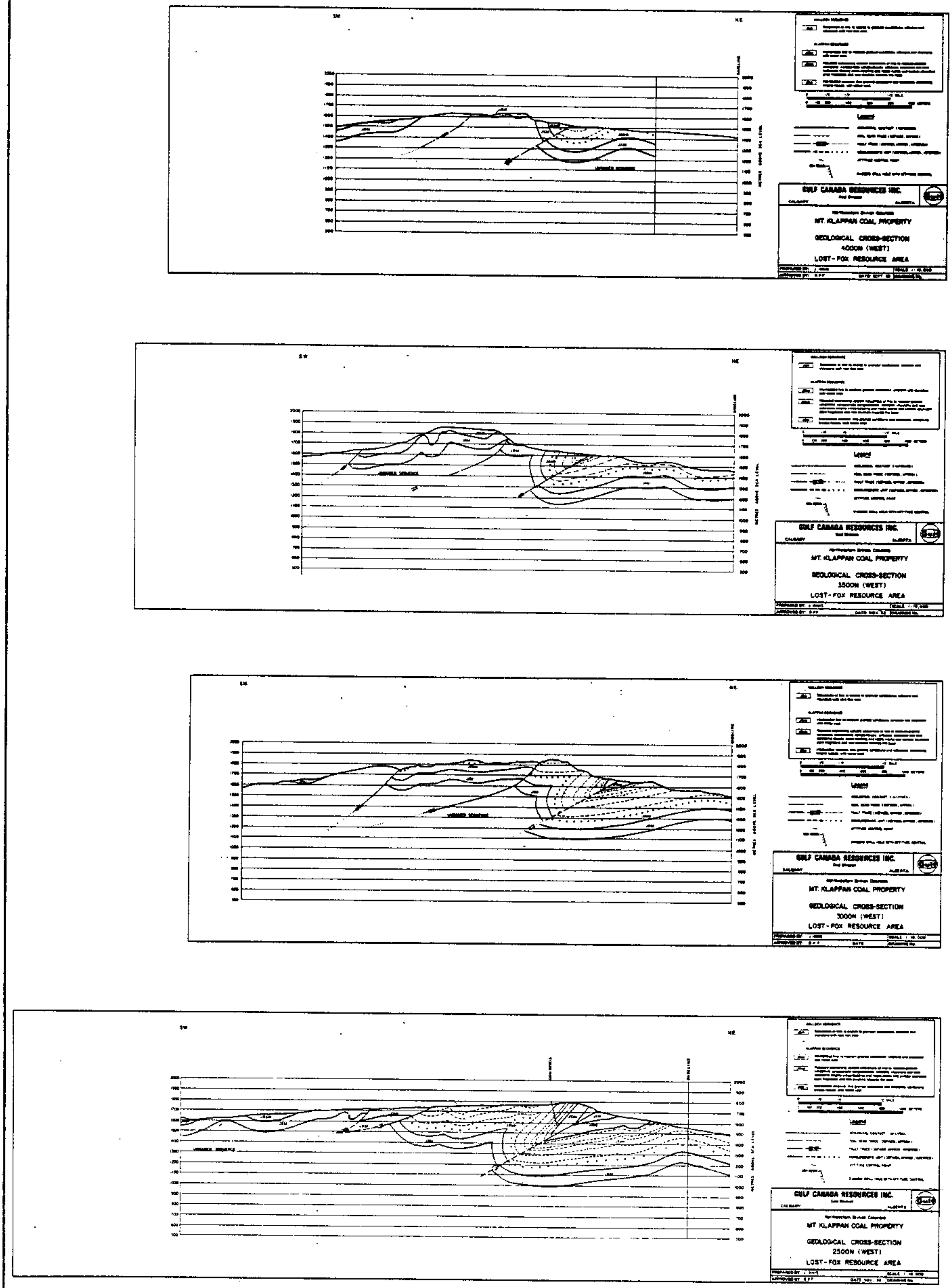
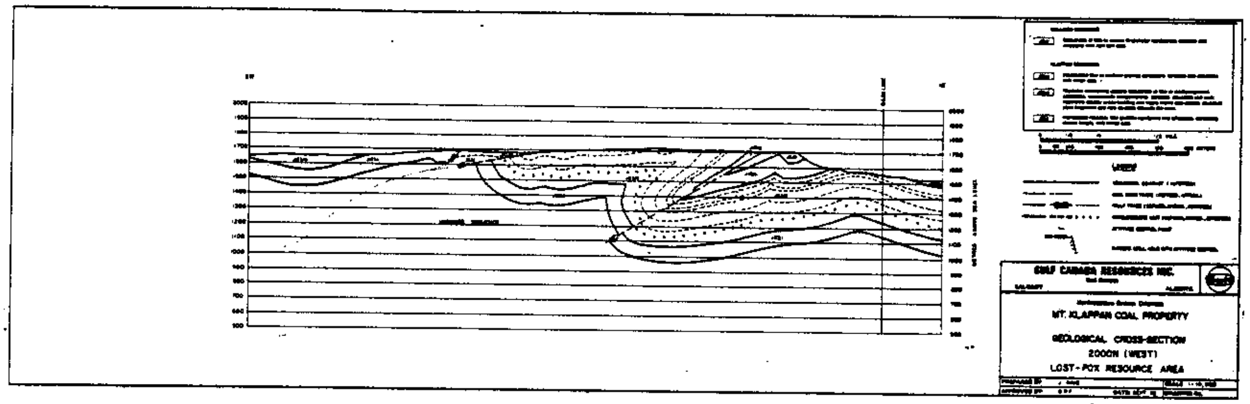
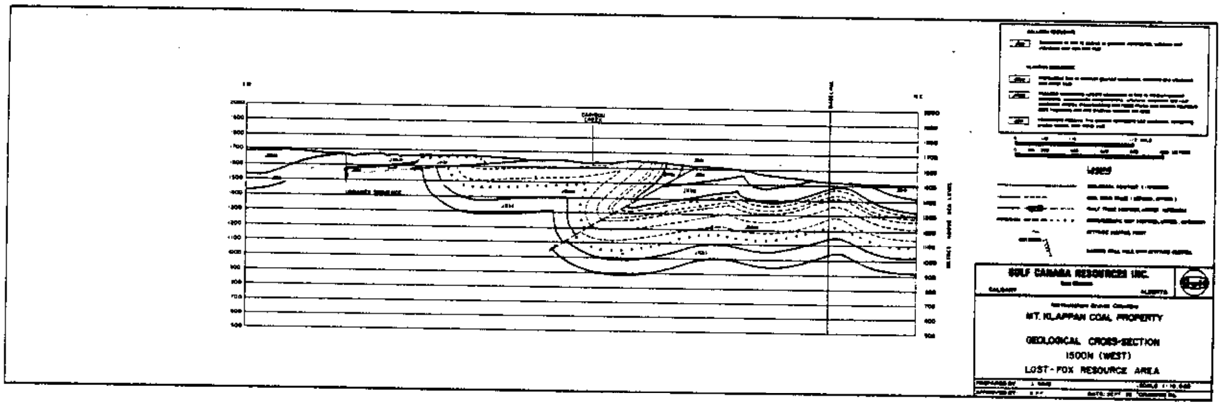
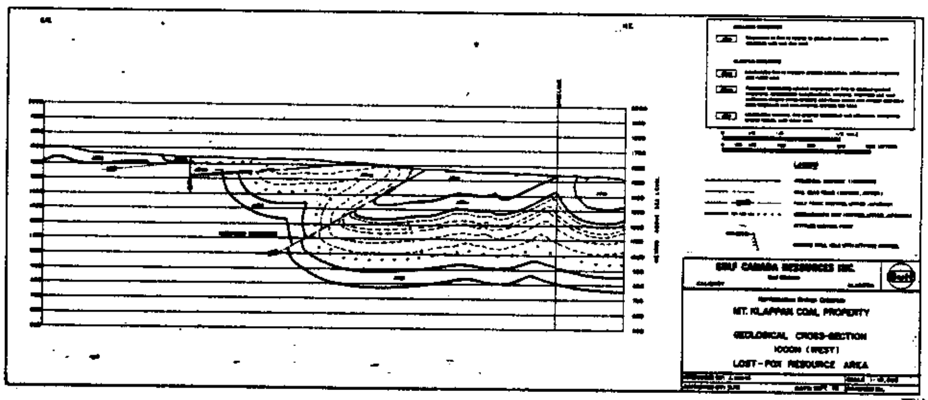


FIGURE 4.16
LOST–FOX RESOURCE AREA CROSS–SECTIONS

SCALE: 1:50,000







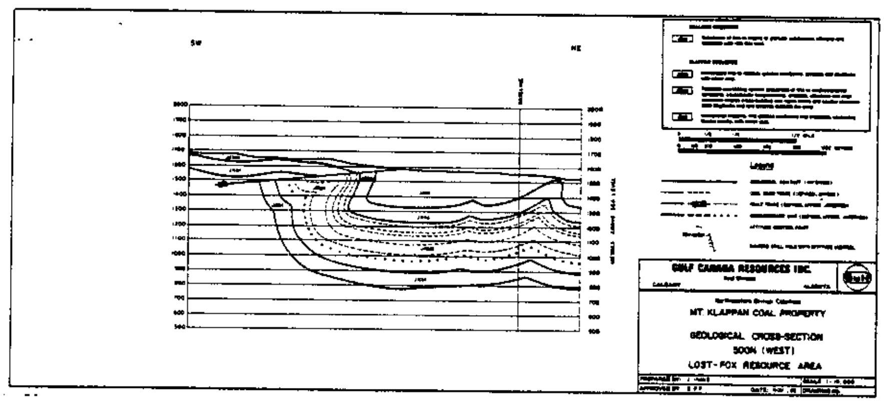


FIGURE 4.16
LOST–FOX RESOURCE AREA CROSS–SECTIONS

SCALE: 1:50,000

is estimated at 350 metres. An imbricate thrust, the Pond Thrust, is located to the west of the Klappan fault.

The Lost Ridge Anticline is overturned as much as 45° to the northeast. The southwest limb, which is relatively flat, forms a dip slope down the back of Lost Ridge as a result of a combination of plunge (10° southeast) and topography (Figure 4.15).

The overturned Lost Ridge Syncline is located at the northeast end of Lost Ridge. The northeast limb of this fold is gently dipping to the southwest with a minor fold pair of small amplitude near the axis. The structure on this limb appears to be relatively uncomplicated as it plunges into the Fox Creek area where a second large overturned anticline, with an axis parallel to the folds on Lost Ridge, is seen. The core of the Lost Ridge Syncline is broken by the Lost Ridge Thrust which has placed older Middle Klappan on younger Middle Klappan. The fault has a displacement of 85 metres, and is traced for a distance of 3 kilometres before appearing to die out at both ends.

Of the two faults occurring in the area, the Klappan and Lost Ridge thrusts, only the Klappan Thrust is continuous across the property. Of note is the change in attitude of the Klappan Thrust as it trends through the resource area. The thrust strikes northwest and dips at 45° southwest as it crosses the ridge line of Lost Ridge. Further south it strikes almost due west and dips at only 8° (approximately). Several other local changes in the orientation of this fault are documented on Grizzley Ridge.

The only other fault of note in the Lost-Fox area is a normal fault named the Fox fault. It, down drops, strata on its north side and trends east-west, south of Lost Ridge in the Fox Creek Valley. Its presence and strike are interpreted largely from air photos and it loses definition in the area of the Klappan Thrust. Several small faults with normal displacement of several metres were noted on a cliff face at the extreme east end of Lost Ridge. These faults could be either slump features associated with the cliff or post-tectonic relaxation features.

4.4.3 Summit Resource Area

The Summit resource area consists of the area within a one kilometre radius of DDH82007. The area is underlain entirely by Middle Klappan sediments.

4.4.3.1 Coal Seam Development

Three seams, G, F and D, intersected in DDH82007 have a total thickness of 7.91 metres. Maximum and minimum thicknesses are 3.91 and 1.29

metres respectively with an average of 2.64 metres. Average interseam thickness at 35.4 metres is similar to that recorded in the Lost-Fox area (Table 4.6, Figure 4.13).

4.4.3.2 Structure

DDH82007 intersected the southwestern limb of a syncline. Limited outcrop has hampered a complete structural interpretation of this area, hence the arbitary and limited 1 kilometre radius of the area.

TABLE 4.6
Summit Resource Area Seam Intersection Summary

DRILL HOLE	SEAM	DRILLED INTERVAL	SEAM TRUE THICKNESS	INTERSEAM TRUE THICKNESS	COAL/ROCK
82007	G	19.19 - 23.10	3.91		2.31/0.60
				34.55	
	F	57.14 - 59.85	2.71		1.95/0.76
				36.22	
	D	96.56 - 97.85	1.29		0.80/0.49

TOTAL 7.91
AVERAGE 2.64

5.0 RESOURCES

5.1 Summary

The Middle Klappan Unit, underlying the Mt. Klappan property, is estimated to have an exploration resource potential of 3 billion tonnes (rounded down to the nearest billion) of anthracite to a depth of 500 metres. Of this amount 890 million tonnes is classified as an inferred resource, 1.2 billion tonnes as a speculative resource, and in excess of 1 billion tonnes is the potential resource (Figure 5.1).

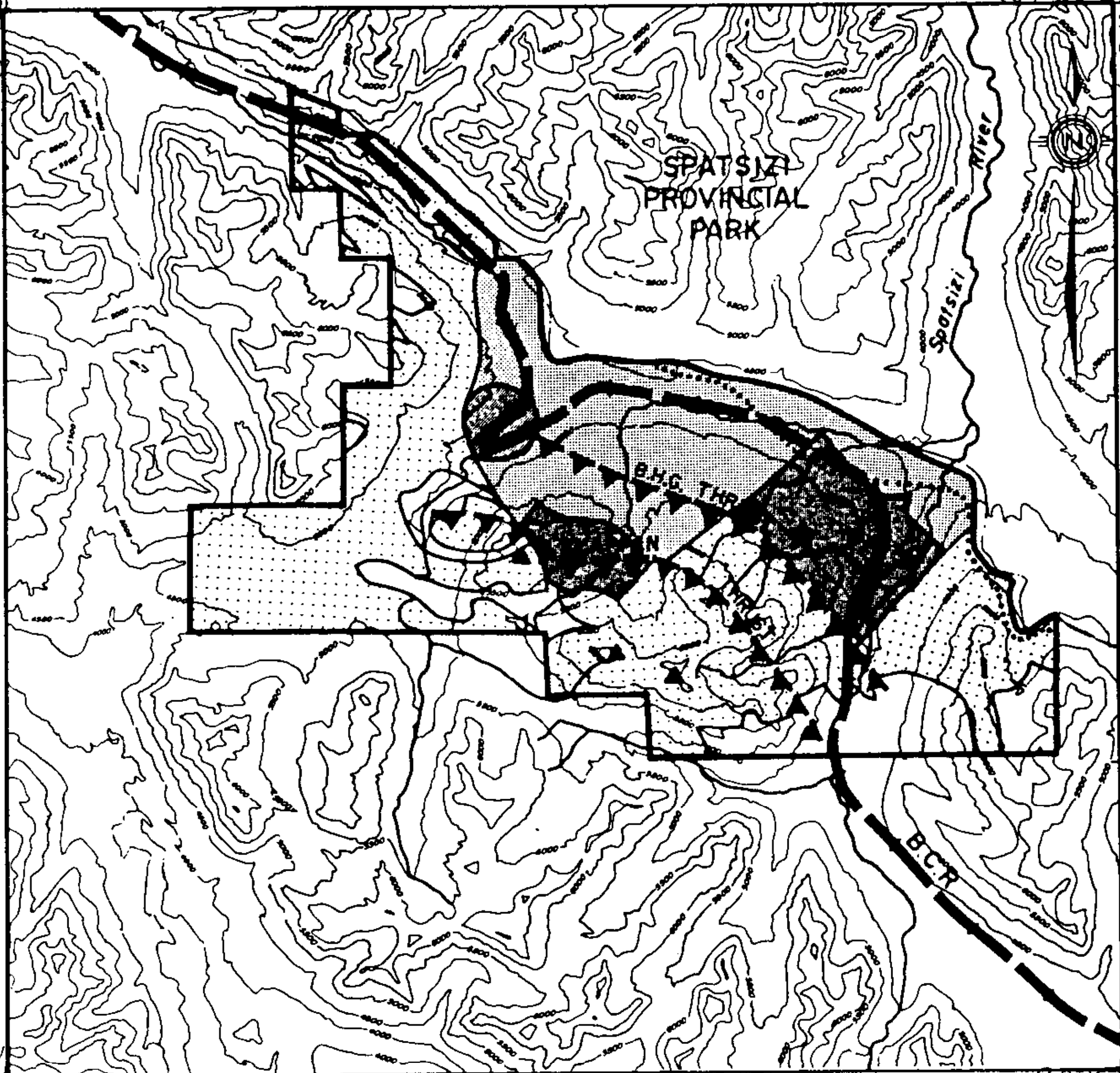
Resources	Billion Tonnes
Inferred	0.89
Speculative	1.23
Exploration Potential	1.33
Total Resource	3.45

These tonnage figures, at present, exclude about 900 million tonnes of the resource potential which may underlie the area presently under licence application.

MT. KLAPPAN COAL PROPERTY
RESOURCE AREAS

6374500 N (57°30'54")
488250 E (129° 10' 42")

6374500 N (57°30'54")
540015 E (128°15'23")



57° 11'

6327500 N (57°5')
488250 E (129°10'42")

6327500 N (57°5')
540015 E (128°15'23")

0 1 2 3 4 5 Km

FIGURE 5.1

1 : 200,000
(1 : 192,308)

- Prepared Rail Bed
- Provincial Park Boundary
- Camp
- Redefined Property Boundary
- Inferred Resource Area
- Speculative Resource Area
- Potential Resource Area
- Peaks

5.2 Inferred Resource Area

5.2.1 Summary

The in situ inferred resources are contained within three areas, the Hobbit-Broatch resource area, delineated in the 1981 assessment, and two new areas, Lost-Fox and Summit, delineated as a result of the 1982 exploration program (Figure 5.2). Of the 890 million tonnes, 620 million tonnes underlie Hobbit-Broatch, 240 million tonnes the Lost-Fox resource area and 30 million tonnes occur in the Summit resource area.

Resource Area	Million Tonnes
Hobbit-Broatch	620
Lost-Fox	240
Summit	30
Total	890

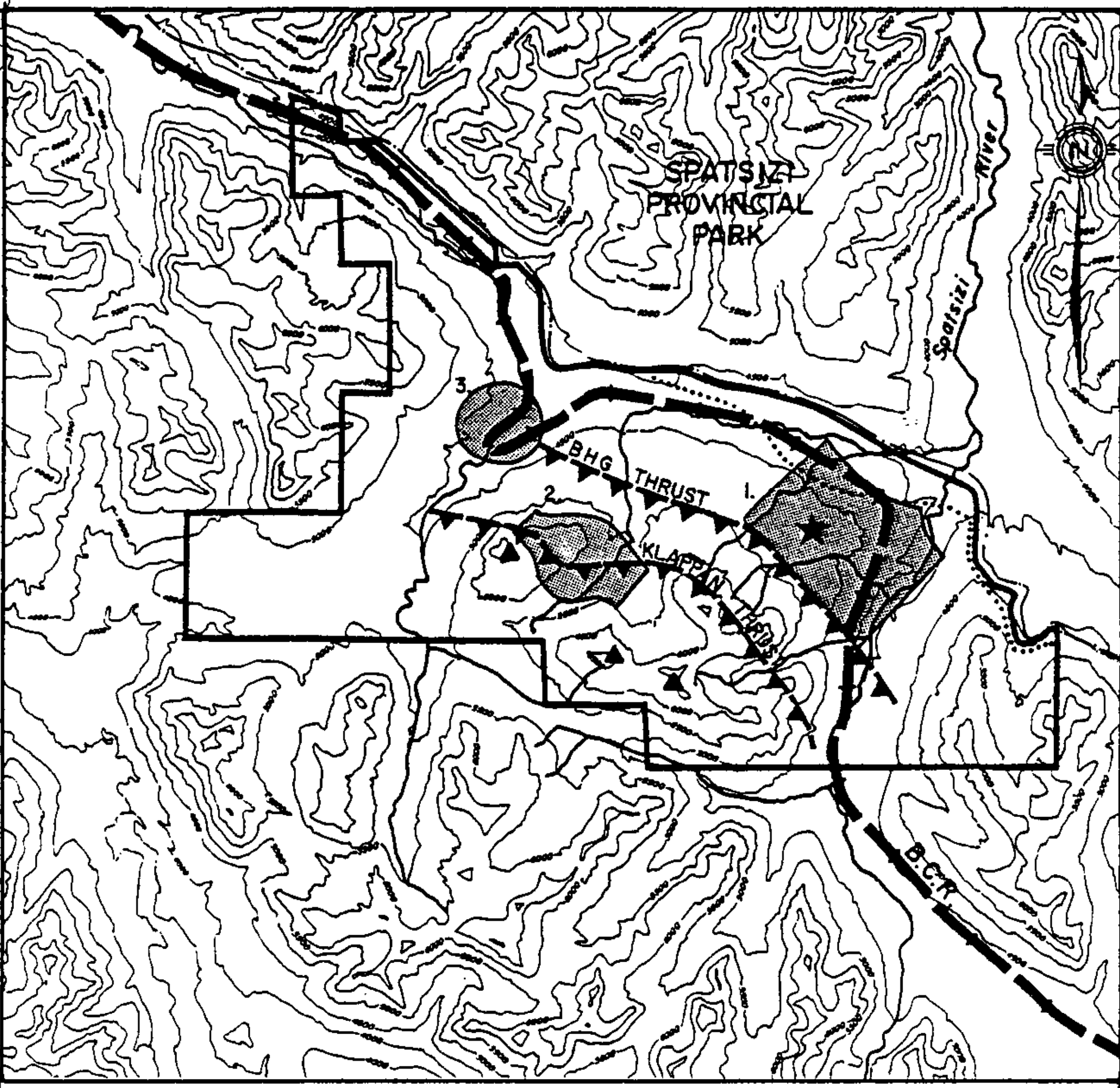
5.2.2 Hobbit Broatch Resource Area

The 1982 drilling program confirmed and significantly increased the tonnages of surface mineable coal, calculated in the 1981 assessment, to underlie the Hobbit-Broatch resource area. The resources increased from 95 million tonnes in two seams to 620 million tonnes in nine seams in a 17.8 square kilometre area covering the southern one half of the lower structural block (Table 5.1). The area is defined by the B.H.G. Thrust to the southwest and elsewhere by boundaries assigned according to the level of geologic confidence (Figure 5.2).

MT. KLAPPAN COAL PROPERTY
INFERRED RESOURCE AREAS

6374500N
(57°30'54")
488250E
(129°10'42")

6374500N
(57°30'54")
540015E
(128°15'23")



6327500N
(57°5')
488250E
(129°10'42")

6327500N
(57°5')
540015E
(128°15'23")

0 1 2 3 4 5 Km

FIGURE 5.2

1:200,000

- Prepared Rail Bed
- Provincial Park Boundary
- ★ Camp
- .... Redefined Property Boundary
- 1. Hobbit-Broatch Area
- 2. Lost-Fox Area
- 3. Summit Area
- ▲ Peaks

Summary of Hobbit-Broatch Resources

Seam Name	A	B	C	D	E	F	G	H	I	J	K	Section Total Tonnages (10^6)
Seam Thickness (metres)*	1.67	1.50	0.48+	0.40+	1.66	0.87	3.32	2.12	6.07	1.41	3.13	
Cross-Section												
500S	4.90	2.81			1.25		1.11	0.20				10.27
1000S	6.20	5.18			4.62		5.70	2.26	3.56	0.37	0.63	28.52
1500S	5.29	4.86			5.43		10.78	6.50	16.61	3.24	6.84	59.55
2000S	5.90	5.28			5.75		10.70	6.57	16.15	3.43	7.37	61.15
2500S	5.42	4.74			5.04		8.78	4.72	10.65	2.04	4.04	45.43
3000S	4.93	4.77			5.46	2.82	10.48	6.39	16.56	3.33	6.96	61.70
3500S	4.76	3.98			5.43	2.84	10.96	6.96	19.27	3.87	8.15	66.22
4000S	6.08	5.78			6.66	3.49	13.32	8.66	23.01	5.03	10.38	82.41
4500S	4.98	4.97			5.59	2.84	11.13	7.07	20.38	4.39	9.31	70.66
5000S	5.37	4.84			5.69	2.95	11.64	7.42	19.22	4.28	8.87	70.28
5500S	5.72	5.39			6.10	3.24	11.61	6.72	16.85	2.83	5.39	63.85
Seam Total Tonnages (10^6)	59.55	52.60			57.02	18.18	106.21	63.47	162.26	32.81	67.94	620.04

* Weighted average aggregate thickness is 21.75 m
\+ Weight averaged thicknesses <0.5 m excluded from resource calculation

TABLE 5.1

Seam intersections in five diamond drill holes (DDH82001, DDH82002, DDH82003, DDH82004, DDH82006) were used to calculate the resource located in this block. Numerous coal trenches were dug in this resource area, several in seams over 5 metres thick, however, seam thicknesses derived from the trenches were not used in determining weighted average seam thicknesses for resource calculation purposes. The resource includes seams A through K excluding C and D which have weighted average thicknesses less than 0.5 metres. Weighted average aggregate thickness of the seams is 21.75 metres (Table 5.2).

5.2.3 Lost-Fox Resource Area

The Lost-Fox area, located within the central structural block on the eastern portion of Lost Ridge, contains approximately 240 million tonnes in an area covering approximately 8.5 square kilometres (Figure 5.2). The area is defined by the Klappan Thrust fault to the west and by diminishing outcrop control in the areas of low relief in the other directions (Figure 5.2).

An aggregate thickness of 17.86 metres from seams I through L, intersected by DDH82005, and seam G, which was trenched, was applied in the resource calculations (Table 5.3).

HOBBIT – BROATCH RESOURCE AREA WEIGHTED SEAM THICKNESSES

Seam+	DDHB2001 Thickness (m)	DDHB2001 Area of Influence	DDHB2002 Thickness (m)	DDHB2002 Area of Influence	DDHB2003 Thickness (m)	DDHB2003 Area of Influence	DDHB2004 Thickness (m)	DDHB2004 Area of Influence	DDHB2006 Thickness (m)	DDHB2006 Area of Influence	Weighted Average Coal Thickness (m)
K	3.45	.66			2.52	.34					3.13
J	0.93	.66			2.33	.34					1.41
I	6.97	.66			4.32	.34					6.07
H	1.73	.28			2.57	.34			2.01	.38	2.12
G	2.77	.15	4.03	.18	4.22	.27	2.88	.15	2.45	.25	3.32
F			0.35	.19	2.17	.35	0.04	.21	0.16	.25	0.87
E			0.92	.19	0.86	.35	0.75	.21	0.63	.25	1.66
			2.24		1.28						
D			0.53	.40			0.35	.35	0.59	.25	0.48*
C			0.67	.43					0.19	.57	0.40*
B									1.50	1.00	1.50
A									1.67	1.00	1.67
									Aggregate Seam Thickness for seam greater than 0.5 metres		21.75 m*

*values less than 0.50 metres were omitted from resource calculations
+upper and lower seam portions summed if each had greater than 60% coal

TABLE 5.2

Summary of Lost-Fox Resources

Seam Name	G	H	I	J	K	L	Section Total Tonnages (10^6)
Seam Thickness (metres)*	4.02		4.98	5.16	1.46	2.24	
Cross-Section							
500N	3.07		9.74	8.82	2.49	3.66	27.78
1000N	6.65		14.67	13.19	3.13	4.72	42.36
1500N	11.99		15.78	11.71	3.24	4.58	47.30
2000N	11.22		15.56	10.92	3.08	3.07	43.85
2500N	11.02		16.08	11.82	2.33	3.05	44.30
3000N	8.58		6.43	4.52	1.12	1.12	21.77
3500N	5.64		3.37	2.04	0.37		11.42
4000N	1.62		0.93				2.55
Seam Total Tonnages (10^6)	59.79		82.56	63.02	15.76	20.20	241.33

* Aggregate thickness is 17.86 m

† Not trenched or intersected by Drill Hole

TABLE 5.3

5.2.4 Summit Resource Area

The Summit resource area is arbitrarily defined as having a one kilometre radius about DDH82007 (Figure 5.2). Only lack of data limits the continuation of this area in all directions. An inferred resource of 30 million tonnes occurring in seams G, F and D was calculated from an aggregate seam thickness of 7.91 metres. (Table 5.4).

5.2.5 Low Ash Resource

Due to the superior nature of the Klappan coal quality, some seams in each of the inferred resource areas, have the ability to produce a low ash anthracite product coal (Section 6.0). Washability results show that of the total in situ inferred resource of 890 million tonnes, 180 million tonnes of in situ coal can be utilized to produce a 5% ash product while an additional 320 million tonnes can be used to produce a 10% ash product (Table 5.5). Theoretical clean coal yields in both cases would vary from 40% to 70%.

Examining each of the inferred resource areas separately, the Hobbit-Broatch area, with a total inferred resource of 620 million tonnes, would contribute 130 and 225 million tonnes of in situ coal from which a portion could be produced as clean coal at 5% and 10% ash levels respectively. Of a total inferred resource of 240 million tonnes for the Lost-Fox area, 50 million tonnes could be cleaned to 5% ash and 85 million tonnes cleaned to a 10% ash coal. While not being able to produce a 5% ash clean coal with an acceptable

Summary of Summit Resources

	D	F	G	Total
Seam Thickness (m)	1.29	2.71	3.91	7.91
Seam Tonnage (10^6)	6.89	13.80	12.76	33.45

TABLE 5.4

Low Ash Tonnage Summary

Area	Millions of Tonnes Available to Produce 5% Ash Coal	10% Ash Coal
Hobbit-Broatch	130.46	225.02
Lost-Fox	49.57	84.34
Summit	—	12.76
Total	180.03	322.12

TABLE 5.5

yield, 10 million tonnes of the total inferred resource of 30 million tonnes in the Summit area, could produce a 10% ash coal.

A theoretical yield of 40% or greater, was the limiting parameter applied to each drilled seam intersection to determine its ability to produce tonnages of 5% and 10% ash coals. Coal seam intersections from which a 5% ash coal could be produced were excluded from those used to determine the tonnages of coal available to produce 10% ash clean coal. Details of the clean coal products are contained in Section 6.0.

5.3 Speculative Resource Area

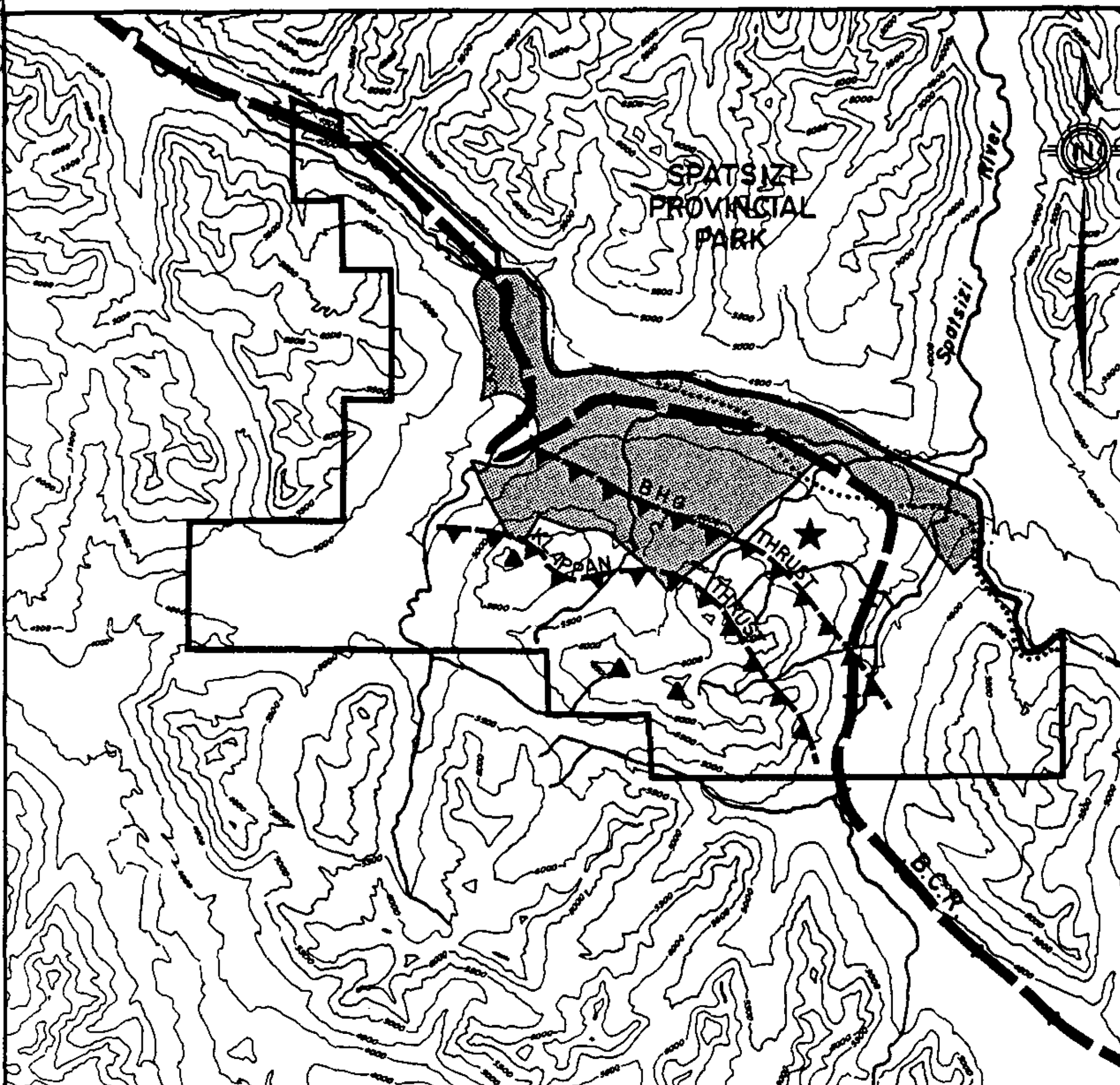
An in situ speculative resource of 1.23 billion tonnes is calculated to underlie an area covering approximately 46 square kilometers (Figure 5.3). The speculative resource area encompasses the northern continuation of the Hobbit-Broatch resource area on the lower structural block and the northern extension of the Lost-Fox resource area to the Summit resource area, on the middle structural block.

Weighted average aggregate thicknesses from the Hobbit-Broatch composite section and seam thicknesses from the Lost-Fox, Summit composite section were averaged as shown in Table 5.6 and the resulting average of 21.78 metres was applied to the entire speculative resource area.

MT. KLAPPAN COAL PROPERTY
SPECULATIVE RESOURCE AREA

6374500 N
(57°30'54")
488250E
(129°10'42")

6374500 N
(57°30'54")
540015 E
(128°19'23")



6327500 N
(57°5')
488250 E
(129°10'42")

6327500 N
(57°5')
540015 E
(128°19'23")

0 1 2 3 4 5 Km

FIGURE 5.3

1:200,000

Prepared Rail Bed
Provincial Park Boundary
Camp
Redefined Property Boundary
Peaks

SPECULATIVE AND POTENTIAL PROPERTY RESOURCE AREAS

Coal Seam Thicknesses

Seam	Hobbit-Broatch Weight Averaged Coal Thicknesses	Lost-Fox - Summit Average Coal Thicknesses
L	Not Intersected	2.24
K	3.13	1.46
J	1.41	5.16
I	6.07	4.98
H	2.12	
G	3.32	3.97
F	0.87	2.71
E	1.66	
D	0.48 *	1.29
C	0.40 *	
B	1.50	
A	1.67	
TOTAL	21.75 m	21.81 m
Average aggregate thickness for speculative resource area	21.78	
Average aggregate thickness for potential property resource area	10.9	

* Values less than 0.50 metres were omitted from resource calculations

TABLE 5.6

5.4 Potential Property Resource

Preliminary exploration outside the inferred and speculative resource areas has indicated the potential for a substantial in situ resource of 1.33 billion tonnes to occur within the Middle Klappan Sequence. Numerous coal occurrences (Appendix I) substantiate the existence of this resource which, as calculated, includes the entire area underlain by the Middle Klappan Sequence outside of the inferred and speculative resource areas (Figure 5.4). The entire upper structural block and the southern portion of the middle block constitute the bulk of the area for which potential resources were calculated. The thickness used for the potential resource (Table 5.5) is based on 50% of the average aggregate thickness used for the speculative resource area.

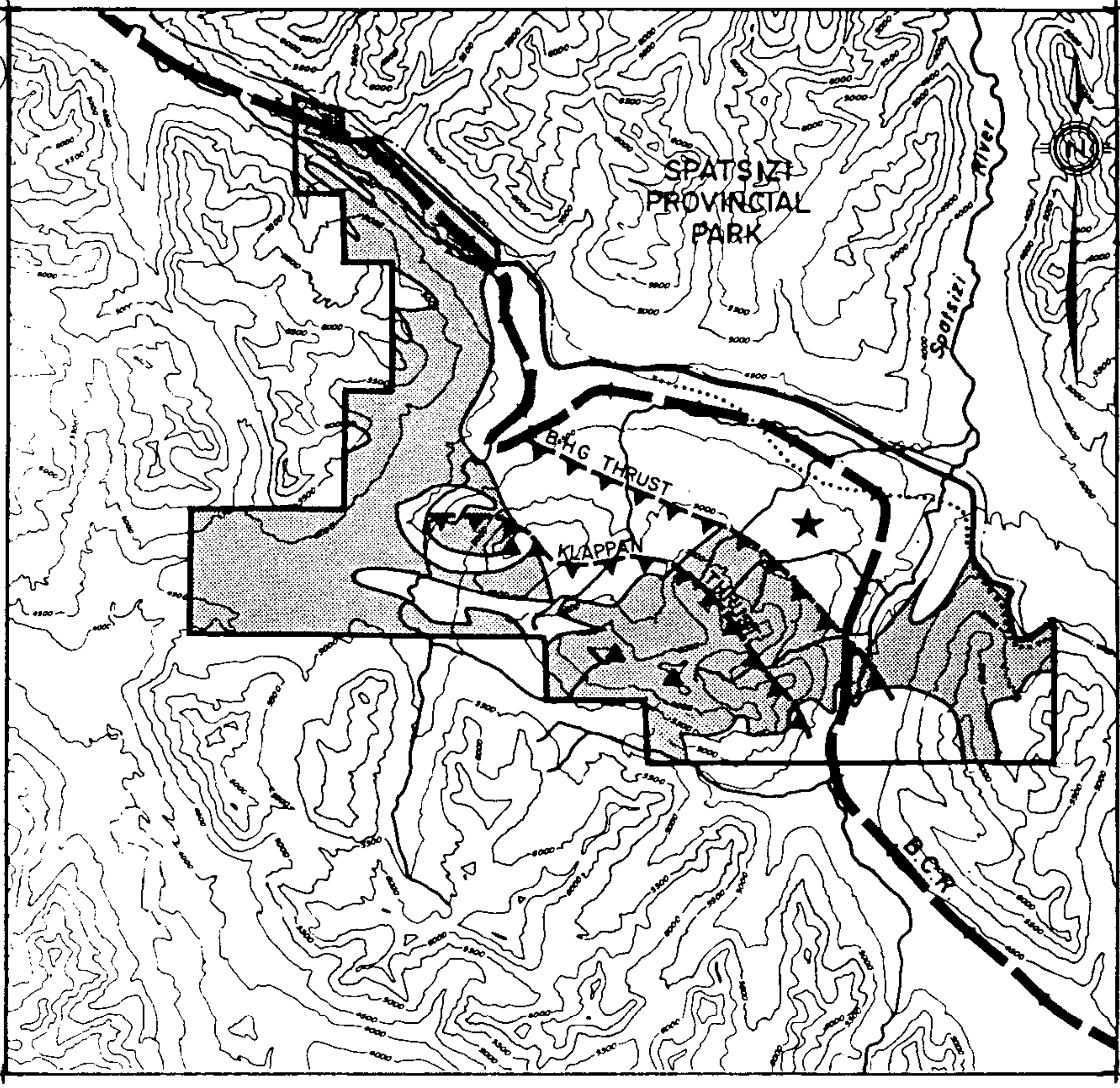
An additional potential resource underlying the area presently under licence application is estimated to be in the order of 900 million tonnes (Figure 5.5).

MT. KLAPPAN COAL PROPERTY

POTENTIAL RESOURCE AREA

6374500N (57°30'54") 540015E (128°19'23")

6374500 N (57°30'54") 488250E (129°10'42")



6327500N (57°5') 488250E (129°10'42")

6327500N (57°5') 540015E (128°19'23")

0 1 2 3 4 5 Km

FIGURE 5.4

1:200,000 (1:192,308)

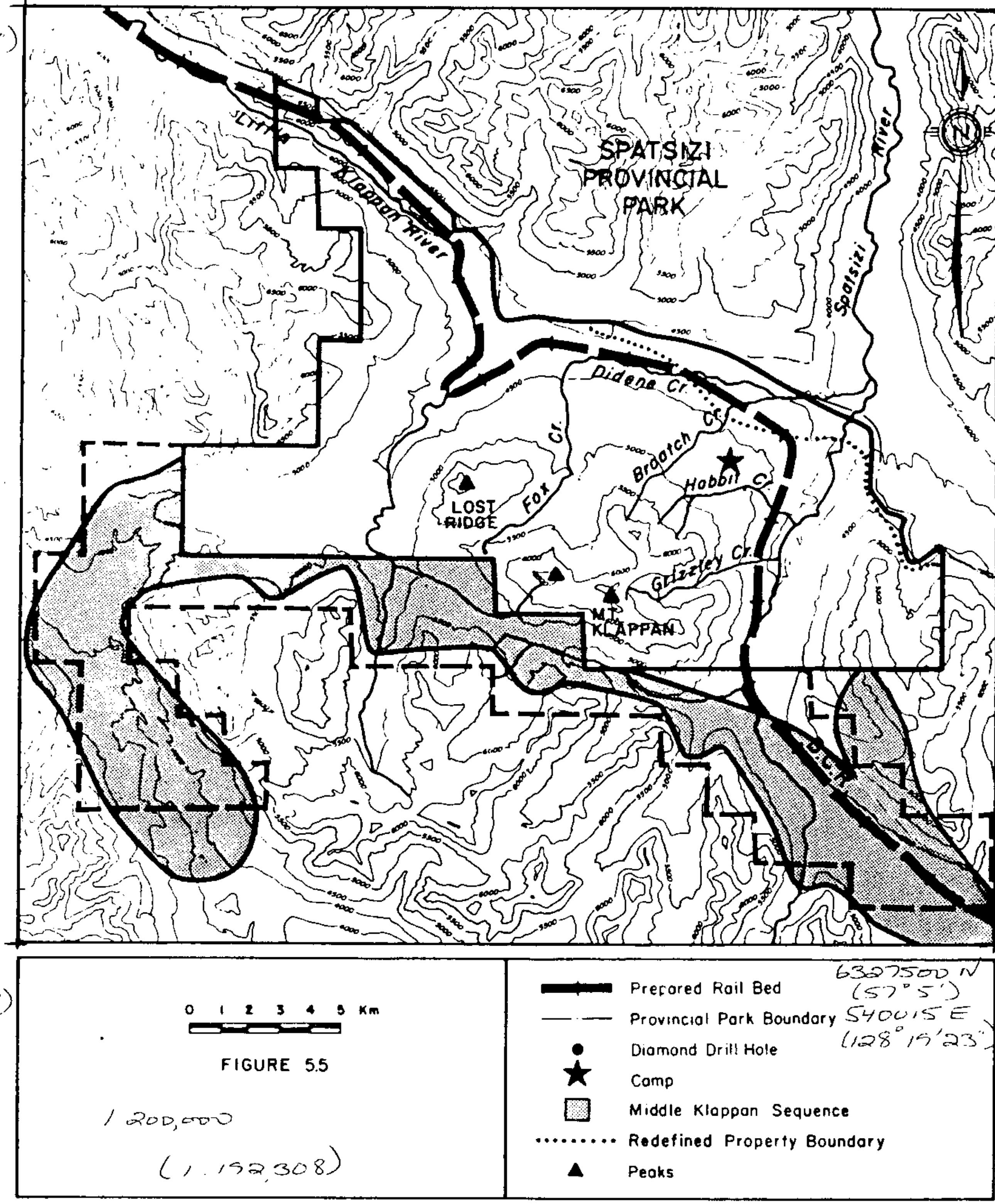
- Prepared Rail Bed
- Provincial Park Boundary
- Camp
- Redefined Property Boundary
- Peaks

MT. KLAPPAN COAL PROPERTY

6374500 N (57° 30' 54") 540015E (128° 19' 23")

MIDDLE KLAPPAN SEQUENCE ON LICENCES UNDER APPLICATION

6374500 N (57° 30' 54") 488250E (129° 10' 42")



6327500 N (57° 5') 488250 E (129° 10' 42")

6327500 N (57° 5') 540015 E (128° 19' 23")

0 1 2 3 4 5 Km

FIGURE 5.5

1 200,000

(1 : 192,308)

5.5 Total Property Resources

The total resource potential of the property has been calculated to be 3.45 billion tonnes of anthracite. The figure was derived by summing the inferred, speculative and potential resources. With the addition of the 900 million tonnes estimated for the area now under licence application, this total would increase to 4.35 billion tonnes or 4 billion tonnes rounded down to the nearest billion.

5.6 Procedures and Parameters

The property is subdivided into five resource areas based on confidence in the stratigraphy, structure, coal seam distribution, and coal thickness. Three of the areas are defined as containing inferred resources; one, as containing speculative resources and the remaining one area as having potential resources (Figure 5.1).

All resources - inferred, speculative and potential are calculated by the cross-section method, except the Summit inferred resource, where a planimetric projection method was utilized.

The planimetric projection method was applied in the Summit area due to the relatively isolated nature of DDH82007 and the limited surface control in the area. In this method the subsurface planimetric extent of each intersected seam within a 1 kilometre radius of DDH82007 was planimetered. The respective drilled thicknesses were multiplied by the planimetered area, and the specific gravity to obtain the tonnage value for the resource area.

The cross-sectional method utilized cross-sections spaced at 500 metre intervals for the Hobbit-Broatch and Lost-Fox inferred areas, and 2000 metre intervals for the speculative and potential resource areas.

Seam thickness, seam length, section width and specific gravity constituted the basic data for all resource calculations according to the following formula:

METRIC TONNES COAL = THICKNESS x LENGTH x WIDTH x SPECIFIC GRAVITY

These parameters were applied in a similar manner for all resource tonnage calculations.

The seam thicknesses used were true thickness values. A seam was defined as a coal and inseam rock interval which contained greater than approximately 60% coal (Table 5.7). Where a coal zone contained two distinct seams, the thicknesses were summed. Seam thicknesses were either weight averaged by area of drill hole influence, as in the Hobbit-Broatch resource area, applied directly to the seam length as in the Lost-Fox and Summit resource areas, or an average aggregate thickness was used, as in the speculative and potential resource calculations. In the Hobbit- Broatch area, seam intersections less than 0.5 metres thick were included in the determination of the weighted average thickness for each seam, however, seams with a weighted average thickness of less than 0.5 metres were excluded from resource calculations.

Individual seam lengths were measured and the weighted average thickness for each seam applied to calculate coal area related to individual cross-sections. A similar procedure was followed for the Lost-Fox area, with the exception that seam thicknesses derived from DDH82005 and one trench were used. A different approach had to be taken for the speculative and potential resource calculations, where the level of confidence did not permit the precise positioning of the seams in the cross-sections. Based on coal seams being equally spaced within the Middle Klappan Unit, the volume of coal was determined by calculating the volume of the Middle Klappan Unit contained in each cross-sectional area of influence.

TABLE 5.7

Coal Seam Thickness Summary

Seam	Total Seam Thicknesses							
	DDH82001*	DDH82002	DDH82003	DDH82004	DDH82005	DDH82006	DDH82007	Average
L					2.24			2.24
K	3.45		2.52		1.46†			2.48
J	0.93		2.33		5.16			2.81
I	6.97		4.32		4.98			5.42
H	1.73		2.57			2.01		2.10
G	2.77	4.03†	4.22	2.88		2.45	3.91	3.38
F		0.35	2.17	0.04		0.16	2.71	1.09
E		3.16	2.14+	0.75		0.63	1.29	1.59
D		0.53		0.35		0.59		0.49
C		0.67				0.19		0.43
B						1.50		1.50
A						1.67		1.67
Aggregate								25.20
Aggregate of seams >0.5 m								24.28

* Net thicknesses exclude core loss
\+ Includes upper and lower portions
† Upper seam only

The area of influence of each cross-section used to determine coal volume was defined as the distance between the midpoints of adjacent cross-sections. The sections were spaced 500 metres apart in the Hobbit-Broatch and Lost-Fox areas, and at 2000 metres over the remainder of the property.

A specific gravity of 1.70 for in situ coal was used throughout all resource calculations to determine coal tonnage. This figure was derived from average specific gravity determinations on the drill core samples which were available at the time of calculation.

All resources were calculated to a depth of 500 metres below ground level. Oxidation limits were not applied to any resource calculations.

Both the inferred and speculative resources are defined as in Appendix B of Coal Resources and Reserves of Canada, Report ER 79-9.

Potential resources are based on an estimation of the resources that are contained within the Middle Klappan Sequence, and the interpreted distribution of this sequence over the western portion of the property, and the area currently under licence application.

6.0 COAL QUALITY

6.1 Summary

6.1.1 Coal Quality

The Mount Klappan property is underlain by anthracite which can be washed to produce a variety of product coals. Low sulphur clean coal products, ranging from premium quality anthracites, (5 to 6 % and 9 to 11% ash) to briquetting coal (19% ash) can be produced from the property.

6.1.2 Premium Coals

Selected seams can be washed to produce low and medium ash premium quality anthracites. The low ash premium coals would have ash contents ranging from 5 to 6% and gross calorific values of 7800 to just under 8000 calories per gram on an air-dried basis. At an ash level of 5% a simulated washplant yield of 36% is obtainable with heavy-medium cyclone cleaning equipment (Table 6.2).

Medium ash premium coal, with ash levels of 9 to 11% and gross calorific values of 7400 cal/g (a.d.b.) can also be produced (Table 6.3). Simulated cleaning with heavy-medium cyclone equipment to 10% ash indicates a yield of 46%. Average total sulphur for both premium coals is 0.6% or less and the Hardgrove Grindability Index is in the range of 35 to 43. A middling product from both low and medium coals can be washed to around 25% ash to produce briquetting coal.

TABLE 6.1
LOW ASH PREMIUM COAL PRODUCT

	HOBBIT-BROATCH	LOST-FOX	PROPERTY
Simulated Wash Plant Yield			
5.0 % Ash	32 %	61 %	36 %
5.5 % Ash	38 %	67 %	44 %
6.0 % Ash	43 %	74 %	51 %
Proximate Analysis			
Residual Moisture	0.6	0.5	0.6
Ash	4.8	5.0	4.9
Volatile Matter	6.6	5.2	6.2
Fixed Carbon	88.0	89.3	88.3
Net Calorific Value (cal/g)	7800	7800	7800
Gross Calorific Value (cal/g)	7950	7950	7950
Hardgrove Grindability Index	36	33	35
Chlorine (%)	0.02	0.07	0.03
Carbon Dioxide (%)	0.1	0.2	0.2
Total Sulphur	0.6	0.4	0.5
Ultimate Analysis			
Carbon	88.1	89.4	88.5
Hydrogen	3.3	2.8	3.1
Nitrogen	1.1	1.2	1.1
Oxygen	1.5	0.7	1.3
Sulphur	0.6	0.4	0.5
Ash Composition			
SiO_2	52.5	49.1	51.7
Al_2O_3	28.1	30.5	28.7
Fe_2O_3	2.7	2.7	2.7
CaO	3.1	3.7	3.2
MgO	0.5	0.4	0.5
TiO_2	1.6	1.2	1.5
Na_2O	1.3	1.2	1.3
K_2O	0.9	0.8	0.9
SO_3	0.9	0.9	0.9
P_2O_5	3.5	3.8	3.6
Other Elements	4.9	5.7	5.0
Ash Fusion (Oxidizing Atmosphere°C)			
Initial Temp	1210	1230	1215
Softening Temp.	1365	1435	1385
Hemispherical Temp.	1460	1475	1465
Fluid Temp.	1485	1500	1490

TABLE 6.2
MEDIUM ASH PREMIUM COAL PRODUCT

	HOBBIT-BROATCH	LOST-FOX	PROPERTY
Simulated Wash Plant Yield			
9.5 % Ash	43 %	56 %	46 %
10.0 % Ash	45 %	59 %	48 %
10.5 % Ash	48 %	62 %	51 %
Proximate Analysis			
Residual Moisture	0.9	0.7	0.8
Ash	9.6	9.8	9.6
Volatile Matter	7.3	6.1	6.8
Fixed Carbon	82.2	83.4	82.8
Net Calorific Value (cal/g)	7300	7300	7300
Gross Calorific Value (cal/g)	7450	7450	7450
Hardgrove Grindability Index	46	38	43
Chlorine (%)	0.03	0.04	0.03
Carbon Dioxide (%)	0.3	0.3	0.3
Total Sulphur	0.6	0.4	0.6
Ultimate Analysis			
Carbon	82.2	83.6	82.8
Hydrogen	3.0	2.7	2.9
Nitrogen	1.1	1.0	1.0
Oxygen	2.6	1.8	2.3
Sulphur	0.6	0.4	0.6
Ash Composition			
SiO_2	56.4	54.9	56.1
Al_2O_3	22.6	23.9	23.0
Fe_2O_3	4.6	3.9	4.4
CaO	3.4	4.3	3.6
MgO	0.8	1.0	0.9
TiO_2	1.1	1.0	1.1
Na_2O	1.3	1.2	1.3
K_2O	0.8	0.8	0.8
SO_3	1.3	1.0	1.2
P_2O_5	2.4	3.2	2.5
Other Elements	5.3	4.8	5.1
Ash Fusion (Oxidizing Atmosphere°C)			
Initial Temp	1225	1235	1225
Softening Temp.	1360	1375	1365
Hemispherical Temp.	1385	1390	1390
Fluid Temp.	1415	1410	1420

6.1.3 Briquetting Coal

Briquetting coal can be produced from most seams on the property. At a 19% ash level, an average simulated washplant yield of 82% of less than 0.8% sulphur coal can be attained. The gross calorific value for briquetting coal would average in excess of 6500 calories per gram (a.d.b.). (See Table 6.3).

The Hardgrove Index averages 48 for the briquetting coal.

The tabulation of coal quality results includes ultimate analysis, ash fusion temperatures and ash mineral composition. These tests indicate a coal with carbon content (dry-ash-free basis) consistently greater than 90%, and an ash composition strongly dominated by silica and alumina with fusion temperatures for all products in a high range (1380°C to 1500°C at fluidity).

TABLE 6.3
BRIQUETTING COAL PRODUCT

	HOBBIT-BROATCH	LOST-FOX	PROPERTY
Simulated Wash Plant Yield			
19 % Ash	79 %	91 %	82 %
20 % Ash	82 %	-	84 %
21 % Ash	85 %	-	87 %
Proximate Analysis			
Residual Moisture	1.5	2.0	1.6
Ash	18.7	18.6	18.6
Volatile Matter	8.4	7.7	8.2
Fixed Carbon	71.4	71.7	71.6
Net Calorific Value (cal/g)	6400	6400	6400
Gross Calorific Value (cal/g)	6500	6500	6500
Hardgrove Grindability Index	51	39	48
Chlorine (%)	0.03	0.05	0.03
Carbon Dioxide (%)	1.2	0.8	1.1
Total Sulphur	0.8	0.5	0.7
Ultimate Analysis			
Carbon	72.0	72.2	72.3
Hydrogen	2.6	2.4	2.5
Nitrogen	0.9	0.8	0.9
Oxygen	3.5	3.5	3.4
Sulphur	0.8	0.5	0.7
Ash Composition			
SiO_2	54.8	57.8	55.3
Al_2O_3	21.1	20.7	21.3
Fe_2O_3	6.2	5.9	6.1
CaO	4.7	3.6	4.3
MgO	2.5	2.1	2.4
TiO_2	0.7	0.7	0.7
Na_2O	1.4	1.2	1.3
K_2O	1.0	0.8	1.0
SO_3	2.5	2.0	2.4
P_2O_5	1.3	1.3	1.3
Other Elements	3.8	3.9	3.9
Ash Fusion (Oxidizing Atmosphere°C)			
Initial Temp	1235	1265	1240
Softening Temp.	1320	1360	1330
Hemispherical Temp.	1345	1375	1355
Fluid Temp.	1380	1400	1385

6.2 Procedures and Parameters

6.2.1 Objectives

The objectives of the 1982 coal quality analytical program were three fold.

1) Characterize the Mt. Klappan coal.
2) Examine the washability characteristics of the coal.
3) Determine the coal quality characteristics of the premium low ash anthracite and the briquetting coals.

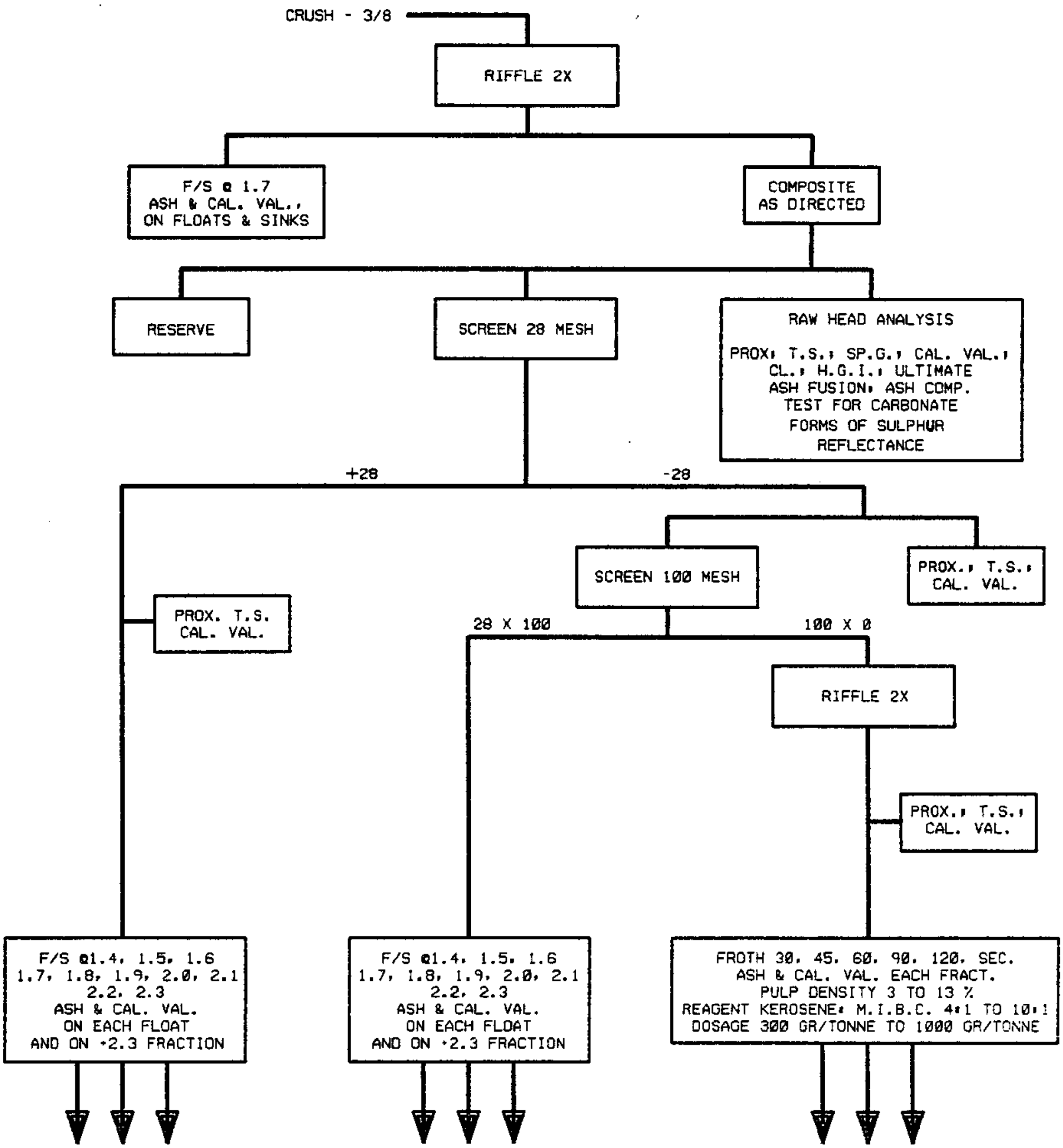
6.2.2 Methodology

Diamond drill hole coal seam samples, logged in detail and sampled by increments, (see Appendix II) were subjected to a full program of analytical tests and float sink studies, outlined on the flow sheets (Figures 6.1 and 6.2).

A concurrent trenching program (Appendix I) provided back-up samples, but the 1982 quality analysis focussed on fresh coal seams intersected by drill holes.

All analyses were done by Cyclone Engineering Sales Ltd. of Edmonton, Alberta, as per the flow sheet (Figure 6.1 and 6.2). As a check for analytical accuracy, selected samples were sent to Geochemical Testing of Somerset, Pennsylvania, and Bituminous Coal Research of Monroeville, Pennsylvania.

MT. KLAPPAN
DIAMOND DRILL CORE COAL TESTING PROGRAM
1982
PART 1



CONTINUED ON FIGURE 6.2
PART 2
SAMPLE PRODUCT ANALYSIS

FILE NO. OS1:[205.377]82E034.CHT;1

FIGURE 6.1

MT. KLAPPAN

DIAMOND DRILL CORE COAL TESTING PROGRAM

1982

PART 2

SAMPLE PRODUCT ANALYSIS

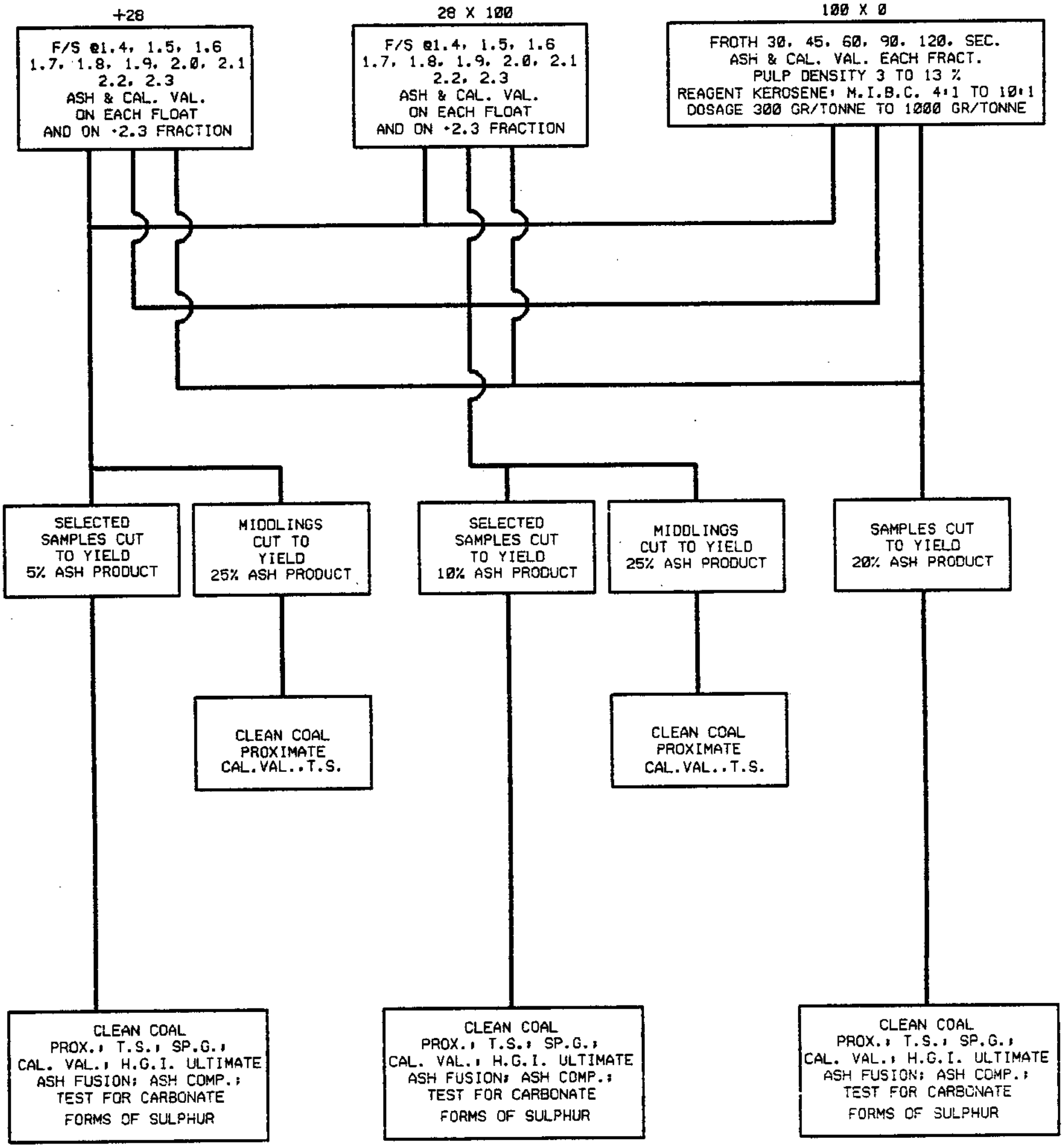


FIGURE 6.2

FILE NO. QS1:[205.377]82E034.CHT;1

6.2.3 Analytical Procedures

The flow sheet is divided into four main portions:

1) Compositing
2) Size analysis
3) Detailed washability studies
4) Product analysis

6.2.3.1 Compositing

Compositing of the incremental samples from each seam was guided by float-sink testing of a small portion of each sample to determine the yield and ash characteristics of the increment (Appendix III). Based on data available from the 1981 coal quality assessment a specific gravity of 1.7 was chosen for this initial float-sink test.

6.2.3.2 Size Analysis

Once composited, a portion of each composite sample was crushed to -3/8 inch and then screened on 28 mesh (0.6 mm) and 100 mesh (0.15 mm) screens. As the samples were from diamond drill core, which was broken up during detailed logging of the coal, an analysis of the larger size fractions will have to be done when a bulk sample is taken.

6.2.3.3 Float-Sink Data

A total of 11 specific gravity fractions ranging from 1.4 to +2.3 gm/cc were separated out of the +28 and 28 x 100 mesh size fractions of each composite. The 100 x 0 fraction underwent froth flotation for periods of 30, 45, 60, 90 and 120 seconds (Appendix III).

Yield, ash and calorific value determinations done on each specific gravity fraction were used to group the seams according to their ability to produce premium and briquetting quality products. In cases where a seam was capable of producing both a premium and a briquetting coal, each gravity fraction was split. Cut points were then determined for each composite to produce final product coals with desired ash contents (Appendix III).

6.2.3.4 Product Analysis

The clean coal and raw coal products were subjected to extensive analytical tests, which included proximate analysis, total sulphur, calorific value and ash characteristics. Middlings from the premium quality products underwent only limited tests.

6.2.4 Wash Plant Simulation

An in-house computer program has been developed by Gulf Canada Resources Inc. that is capable of simulating coal preparation plant operation and calculating potential plant yields from run-of-mine coal. The system takes into account the washability characteristics of the coal, and the efficiency of the equipment involved in cleaning. An adjustment for out-of-seam dilution to be included in the simulation is in the development stages and is nearing completion. The adjustment has not been included in the current discussion. The simulator also has the ability to calculate weight averaged quality data (Appendix IV).

In the following coal quality discussion (Section 6.6) the average values for various quality parameters were calculated using the computer simulation and are weighted by clean coal tonnage. These are designated computed averages. The yields derived from washplant simulator runs are computed yields. (Chlorine and carbon dioxide values cannot be handled by the simulation at present, and so these are weight averaged by hand. All chlorine values are from analysis of raw coal, weighted by the appropriate clean tonnages for each product.)

In most cases the computed simulation did not meet the target ash exactly; while the target ash for the low ash premium coal was 5.0%, the simulation blended a product having an ash content of 4.9% and calculated the corresponding yield. In order to calculate the yield that could be achieved at precisely 5.0%, the ash and yield values were plotted on a curve, and the yields at desired ash levels were drawn from this curve.

The yield and ash figures reported in the print-out as part of the "Yield Table - Blended Route" table (Appendix 4) and the figures reported on the "Yield Table - Contribution Route" (also Appendix 4) are both calculated from the same basic set of data, but differ slightly due to rounding error. The design of the program requires that the calculations be made at two separate stages in the simulation run.

For blending of the low and medium ash premium products the fine size fraction was discarded. The yields calculated by simulation indicate yield as a percent of the two size fractions included. These figures have been corrected to reflect yield as percent of the whole sample where they are tabulated in the text. Most quality parameters tabulated were measured from samples including all three size fractions, but have been weight averaged for blending using only the clean coal tonnages for the two size fractions included in the simulation. No adjustment to quality values can be made at this time but the average quality data will be representative because the discarded fine size fraction makes up a relatively small percentage of the total sample.

Some differences between the simulation figures and the tabulated values may be noted among proximate and ultimate elements as both these analyses have been corrected to total 100%.

Calorific values have been calculated from a linear regression generated using ash values and measured gross calorific values from all product and raw analyses. The formula derived is:

$$\text{Calorific Value (MJ/kg)} = 35.46456 - (\text{Ash \%} \times 0.43926)$$

The regression was calculated using figures on an air-dried basis without adjustment for the possible effect of different moisture values on calorific value.

Net Calorific values are calculated using the formula:

$$\text{Net C.V. (Btu)} = \text{Gross C.V. (Btu)} - 10.30 \times (\text{Hydrogen \%} \times 9)$$

6.3 Coal Rank

The Mt. Klappan coal is anthracite. The mean maximum reflectance of vitrinite in oil ranges from 2.71% to 4.70% and the dry mineral matter free (d.m.m.f.) volatile matter content of the purest washed coal available on the project, (2-5% ash), is 6% or less. A fuel ratio of 15, obtained by dividing the fixed carbon content by the volatile matter, is calculated for the same low ash coal.

Anthracite coal is characterized as having a mean maximum reflectance in excess of 2.5%, a d.m.m.f. volatile matter content of between 2% and 8% (A.S.T.M.) and a fuel ratio in excess of 9 (Japan Industrial Standards Association - J.I.S.).

A special feature of the Mount Klappan anthracite is the abundance of carbonate in the ash and partings within the seam. During tests to determine volatile matter content, the carbonates in the ash produce from less than 1% to 5% carbon dioxide, which is reported as a part of the total volatile matter. While this abundance of carbonate is beneficial in terms of its effect on combustible sulphur, it should be noted that when ranking coal by the A.S.T.M. methods, carbon dioxide in excess of 1% necessitates the direct measurement of the carbon dioxide to eliminate its influence in determining the true d.m.m.f. volatile matter content (A.S.T.M. D388) in the high ash anthracites.

6.4 Size Distribution

The average size distribution for Mt. Klappan coals is strongly skewed towards the coarse fraction. Some variation exists from area to area but the +28 mesh fraction generally contains more than 75% of total sample weight.

Coal in the Hobbit-Broatch area has the following average size distribution and Hardgrove Indices (H.G.I.). (The percentages are averages weighted by the raw coal tonnage contributed by each sample interval):

HOBBIT-BROATCH AREA

	5% Ash	10% Ash	19% Ash	Raw
+28	68%	77%	76%	76%
28 x 100	19%	15%	15%	15%
-100	13%	8%	9%	9%
H.G.I.	36	46	51	51

In the Lost-Fox area seams in hole DDH82005 have an average size distribution and H.G.I. as follows:

LOST-FOX AREA

	5% Ash	10% Ash	19% Ash	Raw
+28	87%	84%	84%	84%
28 x 100	9%	11%	10%	10%
-100	4%	5%	6%	6%
H.G.I.	33	38	39	41

All distributions indicate a hard coal with a large coarse component. The Hardgrove Grindability Index shows a clear decreasing trend in lower ash coals indicating that the ash may be the softest part of the coal. The trend in size distribution follows the H.G.I. trend in the Lost-Fox area with a greater fine fraction at higher ash levels. The correlation is not so clear in the Hobbit-Broatch area.

Examination of the relationship between the finer fractions (minus 28 mesh) and the H.G.I., through regression curve analysis, indicates that the H.G.I. will be a good indication of the size distribution of the coals on the property.

A general trend towards a lower H.G.I., and therefore harder coal, for the clean coal compared to the raw coal H.G.I. indicates that the coal is harder than the enclosing sediments.

6.5 Float Sink Data

The results of the detailed float sink studies indicate that the Mt. Klappan anthracite is a multi-product coal. Clean coal products, ranging in ash content from 5% to 25% can be produced from the property at good yields. Gross calorific values range from just under 8000 cal/gm to about 6000 cal/gm (a.d.b.) for the 5% to 25% ash products respectively.

A high confidence level is assigned to the washability data due to the good to excellent recovery of coal in the diamond drill core. Relatively subdued structure and the hardness of the coal resulted in an average recovery in excess of 80%. As detailed matching of the recovered portions of the seam with the geophysical logs indicates that the bulk of the lost core is coal, the washability will err slightly on the conservative side.

All seams on the property, with the exceptions of B, D and H, have washability characteristics allowing cleaning of the coal to very low ash contents. The overall average ash content of raw coals is just under 28%, although individual coal intervals are encountered with a head ash as low as 14%. The Lost-Fox area has a greater proportion of low ash seams than the Hobbit-Broatch area. The average raw ash content of the Lost-Fox coals is just under 24%.

By selection of coal intervals from the total resource, a range of low ash products can be produced. Cut points chosen from listings of float-sink results were designed to yield a low ash premium product and a medium ash premium product with the balance of the coal intervals, and the rejects from premium coal production being analyzed as a briquetting coal product. An alternative utilization of all coal intervals to produce briquetting coal was also considered and a separate series of cut points was chosen to provide samples for overall briquetting coal quality analysis.

To obtain premium coals, a cut point of 1.6 specific gravity or less is chosen while for briquetting coals, the cut point will be 1.8 specific gravity or greater, especially for the 28 x 100 mesh size fraction. This range in cut points is mirrored by a variation in the percentage of near gravity material from 8% for coal cut at 1.8 gm/cc to 25% or greater for coals cut at 1.6 specific gravity.

The type of equipment required to clean the coal will depend on the final ash level specified. With near gravity material of just over 7%, cleaning of the coarser fractions (+28 and 28 x 100 mesh) to produce briquetting coal, will be ideally suited to a combination of jig washer and water only cyclones, with the fine fraction (100 x 0 mesh) passing through froth flotation cells. On the other hand, cleaning of the coarser coal fractions of the premium coal is more suited to heavy medium circuitry with the fine material being combined with the middlings coal.

6.6 Products

A range of products from low and medium ash premium anthracites to briquetting coal can be produced from the Mt. Klappan property. The low ash premium coals, with ash contents of 5 to 6%, and gross calorific values of 7800 to just under 8000 calories per gram (a.d.b.) can be produced with a computed or simulated washplant yield of 36% at 5% ash. The medium ash premium coal at 10% ash would have a gross calorific value in the order of 7450 calories per gram (a.d.b.) with a computed yield of 48%. The middlings product of both the low and medium ash coals can be washed to produce briquetting coal.

Alternatively all the coal on the property can be washed to produce briquetting coal at 19% ash. Average total sulphur for all products is less than 0.8% and the Hardgrove Grindability Index is in the range of 35 and 48 for the low ash premium coal and briquetting coal respectively. Analytical results for the premium low and medium ash, briquetting and raw coal products are listed on Tables 6.4 through 6.15.

6.6.1 Low Ash Premium Coal Product

6.6.1.1 Computed Yield

A 5% ash premium coal product can be produced from 4 selected seam intersections on the Mount Klappan Property at a computed yield of 36%. At 6% ash the yield is over 51%. The processing of rejects

TABLE 6.4
PROPERTY
Low Ash Premium Anthracite

Size Analysis:

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
73%	16%	Discarded

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	0.6	-	-
Ash	%	4.9	4.9	-
Volatile Matter	%	6.2	6.3	6.6
Fixed Carbon	%	88.3	88.8	93.4
Total Sulphur	%	0.5	0.5	0.5
Combustible Sulphur	%	0.5	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	0.2	-	-
HGI		35		
Net Calorific Value (cal/g)		7800	7850	8250
Gross Calorific Value (cal/g)		7950	8000	8400
Ultimate Analysis				
Carbon	%	88.5	89.1	93.6
Hydrogen	%	3.1	3.1	3.3
Nitrogen	%	1.1	1.1	1.2
Oxygen	%	1.3	1.3	1.4

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1215	1385	1465	1490

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
51.7%	28.7%	2.7%	3.2%	0.5%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
1.5%	1.3%	0.9%	0.9%	3.6%	5.0%

TABLE 6.5
HOBBIT-BROATCH AREA
Low Ash Premium Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
68%	19%	Discarded

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	0.6	-	-
Ash	%	4.8	4.8	-
Volatile Matter	%	6.6	6.7	7.0
Fixed Carbon	%	88.0	88.5	93.0
Total Sulphur	%	0.6	0.6	0.6
Combustible Sulphur	%	0.5	-	-
Chlorine	%	0.02	-	-
Carbon Dioxide	%	0.1	-	-
Hardgrove Grindability Index		36	-	-
Net Calorific Value	(cal/g)	7800	7850	8250
Gross Calorific Value	(cal/g)	7950	8000	8400
Ultimate Analysis				
Carbon	%	88.1	88.7	93.1
Hydrogen	%	3.3	3.3	3.5
Nitrogen	%	1.1	1.1	1.2
Oxygen	%	1.5	1.5	1.6

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1210	1365	1460	1485

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
52.5%	28.1%	2.7%	3.1%	0.5%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
1.6%	1.3%	0.9%	0.9%	3.5%	4.9%

TABLE 6.6
LOST-FOX AREA
Low Ash Premium Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
87%	9%	Discarded

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	0.5	-	-
Ash	%	5.0	5.0	-
Volatile Matter	%	5.2	5.2	5.5
Fixed Carbon	%	89.3	89.8	94.5
Total Sulphur	%	0.4	0.4	0.4
Combustible Sulphur	%	0.4	-	-
Chlorine	%	0.07	-	-
Carbon Dioxide	%	0.2	-	-
Hardgrove Grindability Index		33	-	-
Net Calorific Value	(cal/g)	7800	7850	8250
Gross Calorific Value	(cal/g)	7950	8000	8400
Ultimate Analysis				
Carbon	%	89.4	89.9	94.6
Hydrogen	%	2.8	2.8	3.0
Nitrogen	%	1.2	1.2	1.3
Oxygen	%	0.7	0.7	0.7

Ash Fusion: °C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1230	1435	1475	1500

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
49.1%	30.5%	2.7%	3.7%	0.4%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
1.2%	1.2%	0.8%	0.9%	3.8%	5.7%

from premium coal production can produce an additional briquetting coal product (19.4% ash) at an average yield of 64%.

In the Hobbit-Broatch area, seams A, I (lower) and J produce a 32% computed yield of 5% ash premium coal. An additional 67% yield of 21.1% briquetting coal can be gleaned from low ash coal rejects.

The premium anthracite resource of the Lost-Fox Area is wholly contained within Seam I. At this locality the low ash interval is 3 metres thick and exceptionally clean with no rock partings. A computed yield of 61% of 5% ash coal can be achieved, however, because of the large amount of near gravity material in the premium coal, an insignificant amount of middlings coal can be produced.

6.6.1.2 Washplant Simulation

The washplant yield of the low ash premium coal was calculated using a computer generated simulation of the efficiency of a potential cleaning plant. An efficiency factor for a heavy-medium cyclone was applied to both the coarse (+28 mesh) and medium (28 x 100 mesh) size fraction in this simulation. The fine fraction (-100 mesh) was diverted to briquetting coal production. The average size distributions for the samples blended were:

	Hobbit-Broatch	Lost-Fox	Total
+28	68%	87%	73%
28 x 100	19%	9%	16%
-100	--	--	--

The simulated washplant blending of all low ash premium coal on the property produced yields as follows:

Ash	Computed Yield
5.0 %	36 %
5.5 %	44 %
6.0 %	51 %
6.5 %	58 %

A significant improvement in yield at 6% ash relative to 5% ash is realized because of the lower percentage of near gravity material at 6%. To maintain as high a yield as possible, cleaning of the coal is best accomplished with heavy medium cyclone equipment.

Computed yields for the 5% to 6.5% ash coals in the Lost-Fox area are greater than the average, for the property while higher head ashes in the Hobbit-Broatch resource area result in yields lower than the average. Computed yields are compared in the following table:

Ash	Lost-Fox Computed Yield	Hobbit-Broatch Computed Yield
5.0 %	61 %	32 %
5.5 %	67 %	38 %
6.0 %	74 %	43 %
6.5 %	85 %	47 %

6.6.1.3 Proximate Analysis

6.6.1.3.1 Moisture

The overall average residual moisture for the low ash premium coals is 0.6%. Moisture levels in the Lost-Fox area, at 0.5%, are somewhat less than the 0.6% in the Hobbit-Broatch area.

6.6.1.3.2 Ash

The target ash used for the washplant simulation runs was 5%. An overall computed average of 4.9% ash was achieved by the simulation. The range was from 4.8% (Hobbit-Broatch area) to 5.0% (Lost-Fox area).

6.6.1.3.3 Volatile Matter

The average volatile matter content for the low ash premium Mt. Klappan coals is 6.2% (a.d.b.) or 6.0% (d.m.m.f.).

An increase in volatile content is noted in higher ash coals relative to lower ash coals. The contribution to total volatile matter of carbon dioxide by carbonates contained within the ash is responsible for this phenomenon. The low ash premium product derived from the slightly higher ash coal of the Hobbit-Broatch area has a volatile content of 6.6% a.d.b. (6.4% d.m.m.f.) compared with 5.2% a.d.b. (4.9% d.m.m.f.) for Lost-Fox.

6.6.1.3.4 Fixed Carbon

The average fixed carbon content for low ash premium products for both areas is 88.3% a.d.b. (94.0% d.m.m.f.). Variation between the Hobbit-Broatch and Lost-Fox areas is as follows:

	F.C. (a.d.b.)	F.C. (d.m.m.f.)
Hobbit-Broatch	88.0 %	93.6 %
Lost-Fox	89.3 %	95.1 %

6.6.1.4 Total Sulphur

The average total sulphur property-wide for low ash premium coals is 0.5%. In the Hobbit-Broatch area, sulphur values average nearly 0.6%, while a decrease to 0.4% is noted for the Lost-Fox area.

6.6.1.5 Calorific Value

The washplant simulation program approximates a calorific value for coal of a target ash through a linear regression calculation. The calculated gross calorific value for the computed average 4.9% ash coal is 7950 cal/g (a.d.b.). (Net calorific value is 7800 cal/g (a.d.b.).)

6.6.1.6 Hardgrove Grindability Index

The tendency in the Mt. Klappan anthracite is for low ash products to have correspondingly low Hardgrove Indices. Increasing ash content is accompanied by a decrease in hardness, indicating that the coal is harder than the ash. The average H.G.I. for low ash premium coals on the property is 35. The Hobbit- Broatch average H.G.I. is 36, while the Lost-Fox coal is especially hard at an H.G.I. of 33.

6.6.1.7 Ultimate Analysis

Ultimate analytical results indicate an average dry ash free carbon content 93.6%. In the Lost-Fox area the carbon content (d.a.f.) rises to nearly 95% while in the Hobbit-Broatch area it is just over 93%.

The hydrogen content averages just over 3%

for the total property (measured on the air-dried basis used to calculate net calorific value). It is slightly higher in the Hobbit-Broatch area.

Nitrogen levels average just over 1% for all areas. The low nitrogen conforms with preferred industrial limits for power generation.

	Nitrogen
Mt. Klappan Anthracite	1.1 - 1.2 %
Japan Electric Power Industry (maximum)	1.8 %
Japan Electric Power Industry (preferred)	1.6 %

6.6.1.8 Ash Fusion Temperatures

For the premium products of Mt. Klappan anthracite, the average initial deformation temperature and fluid temperature of ash, as measured in an oxidizing atmosphere, are above 1200°C and 1400°C respectively - meeting the requirements for most boiler applications. Temperatures for the ash of Lost-Fox coals are in a slightly higher range than for the ash of coals from the Hobbit-Broatch area.

Oxidizing Atmosphere °C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1210	1230	1215
Softening Temp.	1365	1435	1385
Hemispherical Temp.	1460	1475	1465
Fluid Temp.	1485	1500	1490

Reducing Atmoshere °C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1195	1230	1205
Softening Temp.	1355	1425	1370
Hemispherical Temp.	1410	1460	1425
Fluid Temp.	1460	1500	1470

6.6.1.9 Ash Mineral Composition

Ash material remaining in the low ash premium coal is composed of approximately 50% silica, 30% alumina and relatively low proportions of the more basic minerals - none contributing more than 4% to the total mineral composition. Compared with the Hobbit-Broatch coal, the ash in the Lost-Fox coal has a slightly greater percentage of basic minerals, but there is no significant effect on ash fusion temperatures.

6.6.1.10 Middlings Product

The middlings briquetting coal is cleaned to an average ash content of 20 - 25%. Average quality data for both resource areas are:

	Middlings Coal
Yield	64 %
Ash	19.4%
Gross Calorific Value (cal/g)	6450

6.6.2 Medium Ash Premium Coal Product

6.6.2.1 Computed Yield

Eighteen seam intersections property-wide can be cleaned to produce a medium ash premium coal product (10% ash) at a computed yield of 48%. The rejects from premium coal production can be washed to produce a briquetting coal product (ash approximately 25%) with an average yield of 12%. The thirteen seam intervals in the Hobbit-Broatch area, capable of producing a medium ash premium coal have an average computed yield of 45% at 10% ash. Selected intervals in seams I, J, K and L in the Lost-Fox area have an average 59% computed yield at 10% ash. One additional interval, from seam G in the Summit resource area, contributes to the medium ash premium coal resource.

6.6.2.2 Washplant Simulation

The washplant simulation for medium ash premium coal was also run using heavy-medium cyclone equipment for the cleaning of the coarse and medium fractions. The fine fraction (-100 mesh) was not included. The average size distribution of medium ash premium coal, weighted by raw coal tonnage coal is as follows:

	Hobbit-Broatch	Lost-Fox	Total
+28 mesh	77%	84%	79%
28 x 100 mesh	15%	11%	13%
-100 mesh (discarded)	--	--	--

Ash	Hobbit-Broatch Yield	Lost-Fox Yield	Total
9.5%	43%	56%	46%
10.0%	45%	59%	48%
10.5%	48%	62%	51%

Variation in yield against selected ash level is relatively small, demonstrating that the percentage of near gravity material is much less than for the low ash premium coal.

6.6.2.3 Proximate Analysis

6.6.2.3.1 Moisture

The average residual moisture for medium ash premium coal is 0.8%. There is not much variation between resource areas; the Lost- Fox moisture value (0.7%) is slightly lower than the Hobbit-Broatch value (0.9%).

6.6.2.3.2 Ash

Computed ash values are based on a target ash of 10% and average 9.6% overall. They vary from 9.6% (Hobbit-Broatch area) to 9.8% (Lost-Fox area).

TABLE 6.7
PROPERTY
Medium Ash Premium Anthracite

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
79%	13%	Discarded

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	0.8	-	-
Ash	%	9.6	9.7	-
Volatile Matter	%	6.8	6.8	7.6
Fixed Carbon	%	82.8	83.5	92.4
Total Sulphur	%	0.6	0.6	0.7
Combustible Sulphur	%	0.5	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	0.3	-	-
HGI		43		
Net Calorific Value (cal/g)		7300	7350	8150
Gross Calorific Value (cal/g)		7450	7500	8350
Ultimate Analysis				
Carbon	%	82.8	83.5	92.4
Hydrogen	%	2.9	2.9	3.2
Nitrogen	%	1.0	1.0	1.1
Oxygen	%	2.3	2.3	2.6

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1225	1365	1390	1420

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
56.1%	23.0%	4.4%	3.6%	0.9%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
1.1%	1.3%	0.8%	1.2%	2.5%	5.1%

TABLE 6.8
HOBBIT-BROATCH AREA
Medium Ash Premium Coal Product

Size Analysis:

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
77%	15%	Discarded

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	0.9	-	-
Ash	%	9.6	9.7	-
Volatile Matter	%	7.3	7.4	8.2
Fixed Carbon	%	82.2	82.9	91.8
Total Sulphur	%	0.6	0.6	0.7
Combustible Sulphur	%	0.5	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	0.3	-	-
Hardgrove Grindability Index		46	-	-
Net Calorific Value	(cal/g)	7300	7400	8150
Gross Calorific Value	(cal/g)	7450	7550	8350
Ultimate Analysis				
Carbon	%	82.2	82.9	91.8
Hydrogen	%	3.0	3.1	3.4
Nitrogen	%	1.1	1.1	1.2
Oxygen	%	2.6	2.6	2.9

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1225	1360	1385	1415

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
56.4%	22.6%	4.6%	3.4%	0.8%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
1.1%	1.3%	0.8%	1.3%	2.4%	5.3%

TABLE 6.9
LOST-FOX AREA
Medium Ash Premium Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
84%	11%	Discarded

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	0.7	-	-
Ash	%	9.8	9.9	-
Volatile Matter	%	6.1	6.1	6.8
Fixed Carbon	%	83.4	84.0	93.2
Total Sulphur	%	0.4	0.4	0.5
Combustible Sulphur	%	0.4	-	-
Chlorine	%	0.04	-	-
Carbon Dioxide	%	0.3	-	-
Hardgrove Grindability Index		38	-	-
Net Calorific Value	(cal/g)	7300	7350	8150
Gross Calorific Value	(cal/g)	7450	7500	8300
Ultimate Analysis				
Carbon	%	83.6	84.2	93.4
Hydrogen	%	2.7	2.7	3.0
Nitrogen	%	1.0	1.0	1.1
Oxygen	%	1.8	1.8	2.0

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1235	1375	1390	1410

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
54.9%	23.9%	3.9%	4.3%	1.0%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
1.0%	1.2%	0.8%	1.0%	3.2%	4.8%

6.6.2.3.3 Volatile Matter

The average volatile matter content for medium ash premium coals is 6.8% (a.d.b.) or 6.5% (d.m.m.f.). Some variation can be seen between the Hobbit-Broatch area (7.3% a.d.b., 7.1% d.m.m.f.) and the Lost-Fox area (6.1% a.d.b., 5.8% d.m.m.f.).

6.6.2.3.4 Fixed Carbon

Fixed carbon levels for the medium ash coal are slightly lower than for the low ash premium coal on an air dried basis (82.8%) but in much the same range on a d.m.m.f. basis (93.5%).

6.6.2.4 Total Sulphur

The average total sulphur content for the medium ash premium coals on the property is 0.6%. The average sulphur content in the Hobbit-Broatch area is raised to slightly over 0.6% by a single anomalously high value in an intersection of seam J. In almost all other sampled intervals, sulphur levels are lower than this average.

In the Lost-Fox area the average sulphur content of the medium ash clean coal is 0.4% reflecting the generally low level of sulphur in raw coals of this area.

6.6.2.5 Calorific Value

The calculated gross calorific value of the medium ash premium coal with a computed average ash content of 9.6% is 7450 cal/g (a.d.b.) Net calorific value is 7300 cal/g (a.d.b.)

6.6.2.6 Hardgrove Grindability Index

An increase in the ash content of 5% from the low ash premium coal to the medium ash premium coal has resulted in a corresponding increase in the Hardgrove Index from an average of 35 to an average of 43. This clearly demonstrates the effect of an increase in ash on the hardness of the coal product. The average H.G.I. for the Hobbit-Broatch coal and Lost-Fox coal is 46 and 38 respectively.

6.6.2.7 Ultimate Analysis

Carbon content (d.a.f. basis) of the medium ash premium coal is above 90% for all areas. It is over 93% in the Lost-Fox area and just under 92% in the Hobbit-Broatch area.

Hydrogen content (a.d.b.) is 3% or less in all areas, 2.7% in the Lost-Fox area.

Nitrogen levels range from 1.0 to 1.1% (a.d.b.).

6.6.2.8 Ash Fusion Temperatures

The initial deformation temperature and fluid temperature (in an oxidizing atmosphere) of ash of the medium ash premium coal is in excess of 1200°C and 1400°C respectively. Temperatures are much the same in all areas. The span between the softening temperature and the hemispherical temperature in the medium ash premium coal is much less than for the low ash premium coal.

Oxidizing Atmosphere°C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1225	1235	1225
Softening Temp.	1360	1375	1365
Hemispherical Temp.	1385	1390	1390
Fluid Temp.	1415	1410	1420

Reducing Atmosphere°C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1220	1230	1220
Softening Temp.	1350	1370	1355
Hemispherical Temp.	1375	1385	1380
Fluid Temp.	1405	1400	1405

6.6.2.9 Ash Mineral Composition

The silica level of 56% is higher, and alumina level of 23% is lower for the medium ash premium coal than the values for the low ash product. The Lost- Fox medium ash coal contains slightly less iron and more calcium and phosphorous than the Hobbit-Broatch medium ash coal. The content of other elements is comparable for the two areas.

6.6.2.10 Middlings Product

A briquetting coal by-product can be derived from medium ash premium coal production everywhere except in the Lost-Fox area. The average quality reported is as follows:

	Briquetting Product
Yield	12 %
Ash	25.1 %
Gross Calorific Value (cal/g)	5850

6.6.3 Briquetting Coal Product

6.6.3.1 Introduction

Briquetting coal can be produced from the Mt. Klappan property either as an alternative to, or in addition to the premium products. When produced as an additional product, the briquetting coal would be derived from the coal intervals not included in the premium coal production. The remainder of the discussion on briquetting coals is confined to description of the briquetting coal when produced from all seams on the property.

6.6.3.2 Computed Yield

Thirty-six seam intervals property-wide can yield a briquetting coal of 19% ash content, 6 of these without cleaning. The average computed yield of 19% ash briquetting coal is 82%.

In the Hobbit-Broatch area 26 seam intervals can produce a briquetting quality coal with an average computed yield of 79%. The Lost-Fox briquetting coal resource is derived from 7 seam intervals, 3 of which have sufficiently low ash to be produced without cleaning. The average yield in this area is 91%.

Three seam intervals in the Summit resource area also contribute to the total briquetting coal resource.

6.6.3.3 Washplant Simulation

The washplant yields for briquetting coal can be tabulated as follows:

TABLE 6.10
PROPERTY
Briquetting Anthracite

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
78%	14%	8%

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	1.6	-	-
Ash	%	18.6	18.9	-
Volatile Matter	%	8.2	8.3	10.3
Fixed Carbon	%	71.6	72.8	89.7
Total Sulphur	%	0.7	0.7	0.9
Combustible Sulphur	%	0.5	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	1.1	-	-
HGI		48		
Net Calorific Value (cal/g)		6400	6500	8000
Gross Calorific Value (cal/g)		6500	6600	8150
Ultimate Analysis				
Carbon	%	72.3	73.5	90.6
Hydrogen	%	2.5	2.5	3.1
Nitrogen	%	0.9	0.9	1.1
Oxygen	%	3.4	3.5	4.3

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1240	1330	1355	1385

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
55.3%	21.3%	6.1%	4.3%	2.4%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
0.7%	1.3%	1.0%	2.4%	1.3%	3.9%

TABLE 6.11
HOBBIT-BROATCH AREA
Briquetting Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
76%	15%	9%

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	1.5	-	-
Ash	%	18.7	19.0	-
Volatile Matter	%	8.4	8.5	10.5
Fixed Carbon	%	71.4	72.5	89.5
Total Sulphur	%	0.8	0.8	1.0
Combustible Sulphur	%	0.5	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	1.2	-	-
Hardgrove Grindability Index		51	-	-
Net Calorific Value	(cal/g)	6400	6450	8000
Gross Calorific Value	(cal/g)	6500	6600	8150
Ultimate Analysis				
Carbon	%	72.0	73.1	90.2
Hydrogen	%	2.6	2.6	3.3
Nitrogen	%	0.9	0.9	1.1
Oxygen	%	3.5	3.6	4.4

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1235	1320	1345	1380

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
54.8%	21.1%	6.2%	4.7%	2.5%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
0.7%	1.4%	1.0%	2.5%	1.3%	3.8%

TABLE 6.12
LOST-FOX AREA
Briquetting Coal Product

Size Analysis:

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
84%	10%	6%

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	2.0	-	-
Ash	%	18.6	19.0	-
Volatile Matter	%	7.7	7.8	9.7
Fixed Carbon	%	71.7	73.2	90.3
Total Sulphur	%	0.5	0.5	0.6
Combustible Sulphur	%	0.4	-	-
Chlorine	%	0.05	-	-
Carbon Dioxide	%	0.7	-	-
Hardgrove Grindability Index		39	-	-
Net Calorific Value	(cal/g)	6400	6550	8050
Gross Calorific Value	(cal/g)	6500	6650	8200
Ultimate Analysis				
Carbon	%	72.2	73.7	91.0
Hydrogen	%	2.4	2.4	3.0
Nitrogen	%	0.8	0.8	1.0
Oxygen	%	3.5	3.6	4.4

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1265	1360	1375	1400

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
57.8%	20.7%	5.9%	3.6%	2.1%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
0.7%	1.2%	0.8%	2.0%	1.3%	3.9%

	Briquetting Product Yield
Total Property	82 %
Hobbit-Broatch Area	79 %
Lost-Fox Area	91 %

At the ash level of the briquetting coal, the near gravity material for all size fractions in all areas declines to less than 7%. The equipment requirements are therefore simplified and cleaning is accomplished by jig washer for the +28 mesh fraction, 2 stage water cyclone for the 28 x 100 mesh fraction and froth floatation for the -100 mesh fraction. The average size distribution of briquetting coal samples, weighted by raw coal tonnage is:

	Hobbit-Broatch	Lost-Fox	Total
+28 mesh	76%	84%	78%
28 x 100 mesh	15%	10%	14%
-100 mesh	9%	6%	8%

6.6.3.4 Proximate Analysis

6.6.3.4.1 Moisture

The residual moisture content of the briquetting coal product is 1.6%. Moisture content of the Mt. Klappan anthracite rises uniformly with ash content and it is thought that a large percentage of the residual moisture is bound in the clays of the ash rather than within the coal. The average value quoted above, however, is higher than that for the total average raw coal resource. Incomplete air drying of the briquetting coal samples prior to moisture determination is suspected; this possiblity is currently being investigated. Average values for both the Hobbit-Broatch (1.5%) and the Lost-Fox area (2.0%) are affected, though the case in the Lost-Fox area seems more extreme.

6.6.3.4.2 Ash

Washplant simulation runs were carried out with a target ash of 19%. The overall average ash content of the briquetting coal is 18.6%. The figure for the Hobbit-Broatch area is 18.7% but several low ash intervals in the Lost-Fox area reduce the average slightly in this area to just under 18.6%.

6.6.3.4.3 Volatile Matter

As discussed previously, the measure of volatile matter content for higher ash products is strongly influenced by the carbon dioxide contribution from carbonates in the ash. The elevated average values for volatile matter content of 8.2% (a.d.b.) and 8.3% (d.m.m.f.) illustrates that the problem is equally evident in both resource areas.

6.6.3.4.4 Fixed Carbon

The average fixed carbon content is reduced in the briquetting product to 71.6% (a.d.b.) but on a d.m.m.f. basis it is still found to exceed 90%.

6.6.3.5 Total Sulphur

The average total sulphur content of the briquetting coal is 0.7%. As with the other product coals, slightly higher levels are seen in the Hobbit-Broatch area (0.8%) and somewhat lower levels in the Lost-Fox area (0.5%).

6.6.3.6 Calorific Value

The average gross calorific value for briquetting coal from both resource areas exceeds 6500 cal/gm (a.d.b.).

Area	Ash%	Gross C.V. (a.d.b) cal/g	Net C.V. (a.d.b.) cal/g
Hobbit-Broatch	18.7	6500	6400
Lost-Fox	18.6	6500	6400
Total Property	18.6	6500	6400

6.6.3.7 Hardgrove Index

A relatively high H.G.I. is expected at the ash level of the Mt. Klappan briquetting coal. The average H.G.I. for both areas is 48. The H.G.I. of the Hobbit-Broatch coal is 51 while that for the lower ash Lost-Fox coal is 39.

6.6.3.8 Ultimate Analysis

The property-wide average carbon content (d.a.f.) of briquetting coal is 90.6%. This varies from 90.2% in the Hobbit-Broatch area to 91.0% in the Lost-Fox area. At the higher ash levels of the briquetting coal and raw coal products, the presence of carbonate and sulphur in the ash interfere with the linear relationships between ultimate ash elements (particularly carbon) and ash observed in the lower ash products.

Hydrogen levels in briquetting coal are 2.5% (a.d.b.) overall, varying from 2.4% in the Lost-Fox area to 2.6% in the Hobbit-Broatch area.

Nitrogen levels average just under 1% (a.d.b.).

6.6.3.9 Ash Fusion Temperatures

Ash fusion temperatures remain fairly uniform in all areas, though they are slightly higher for ash from the Lost-Fox briquetting coals.

Oxidizing Atmosphere °C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1235	1265	1240
Softening Temp.	1320	1360	1330
Hemispherical Temp.	1345	1375	1355
Fluid Temp.	1380	1400	1385

Reducing Atmosphere °C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1220	1245	1225
Softening Temp.	1300	1335	1310
Hemispherical Temp.	1325	1350	1335
Fluid Temp.	1360	1385	1370

6.6.3.10 Ash Mineral Composition

Silica levels of briquetting ash average 55% up to almost 58%, while alumina levels average 21%. In the high ash coals a slightly greater proportion of basic minerals is noted.

6.6.3.11 Additional Briquetting Product

The quality of the additional briquetting coal is represented by a suite of samples excluded from the premium coal resource, with quality reported as cleaned to 19% ash and averaged by simulation. The overall average yield is 55%. The average quality is as follows:

Proximate Analysis	
Residual Moisture	1.4 %
Ash	18.4 %
Volatile Matter	8.2 %
Fixed Carbon	72.0 %
Total Sulphur	1.1 %
Calorific Value (cal/g)	6550
Hardgrove Index	52

In general the average quality for this group of briquetting coal samples is very similar to the average quality obtained when all resources of the Mt. Klappan property are devoted to the production of briquetting coal.

6.6.4 Raw Coal Product

The same seam intervals that comprise the briquetting coal product are considered, in an uncleaned state, as the raw product. Analytical results are summarized in Tables 6.13, 6.14, and 6.15.

6.6.4.1 Proximate Analysis

6.6.4.1.1 Moisture

The total average residual moisture of raw Mt. Klappan anthracite is 1.6%.

TABLE 6.13
PROPERTY
Raw Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
78%	14%	8%

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	1.6	-	-
Ash	%	27.7	28.2	-
Volatile Matter	%	8.1	8.2	11.5
Fixed Carbon	%	62.6	63.6	88.5
Total Sulphur	%	0.8	0.8	1.2
Combustible Sulphur	%	0.4	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	2.5	-	-
Hardgrove Grindability Index		49	-	-
Net Calorific Value	(cal/g)	5450	5550	7700
Gross Calorific Value	(cal/g)	5550	5650	7850
Ultimate Analysis				
Carbon	%	64.7	65.8	91.5
Hydrogen	%	2.2	2.2	3.1
Nitrogen	%	0.8	0.8	1.1
Oxygen	%	2.2	2.2	3.1

Ash Fusion: °C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1240	1290	1315	1355

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
50.0%	21.9%	8.4%	5.3%	3.1%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
0.6%	1.3%	1.0%	3.6%	1.2%	3.6%

TABLE 6.14
HOBBIT-BROATCH AREA
Raw Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
76%	15%	9%

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	1.3	-	-
Ash	%	28.4	28.8	-
Volatile Matter	%	8.3	8.4	11.8
Fixed Carbon	%	62.0	62.8	88.2
Total Sulphur	%	1.0	1.0	1.4
Combustible Sulphur	%	0.4	-	-
Chlorine	%	0.03	-	-
Carbon Dioxide	%	2.6	-	-
Hardgrove Grindability Index		50	-	-
Net Calorific Value	(cal/g)	5400	5450	7700
Gross Calorific Value	(cal/g)	5500	5550	7800
Ultimate Analysis				
Carbon	%	64.0	64.8	91.0
Hydrogen	%	2.3	2.4	3.3
Nitrogen	%	0.8	0.8	1.2
Oxygen	%	2.2	2.2	3.1

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1240	1285	1310	1345

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
50.4%	21.1%	8.1%	5.4%	3.1%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
0.7%	1.3%	1.0%	3.8%	1.0%	4.1%

TABLE 6.15
LOST-FOX AREA
Raw Coal Product

Size Analysis:*

+ 0.6 mm	0.6 mm - 0.15 mm	0.15 mm - 0
84%	10%	6%

*crushed to 3/8"

		Air Dry	Dry Basis	Dry and Ash Free
Proximate Analysis				
Residual Moisture	%	2.2	-	-
Ash	%	23.7	24.2	-
Volatile Matter	%	7.9	8.1	10.7
Fixed Carbon	%	66.2	67.7	89.3
Total Sulphur	%	0.4	0.4	0.6
Combustible Sulphur	%	0.4	-	-
Chlorine	%	0.05	-	-
Carbon Dioxide	%	2.3	-	-
Hardgrove Grindability Index		41	-	-
Net Calorific Value	(cal/g)	5900	6050	7950
Gross Calorific Value	(cal/g)	6000	6150	8100
Ultimate Analysis				
Carbon	%	69.0	70.6	93.1
Hydrogen	%	2.1	2.2	2.8
Nitrogen	%	0.8	0.8	1.1
Oxygen	%	1.8	1.8	2.4

Ash Fusion:

°C (in oxidizing atmosphere)	Initial	Softening	Hemispherical	Fluid
	1235	1290	1320	1365

Ash Analysis:

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO
47.9%	24.0%	10.3%	5.7%	3.4%

TiO_2	Na_2O	K_2O	SO_3	P_2O_5	Trace Elements
0.5%	1.0%	0.9%	3.4%	1.8%	1.1%

This figure is slightly high for an anthracite but can be explained by the excess moisture contributed by clays in the ash. The figure for the Hobbit-Broatch area, 1.3%, is also reasonable. For the Lost-Fox area the reported average moisture content of 2.2% is considered to be much too high for the generally lower ash levels in this area. Analytical results for these samples are being reviewed.

6.6.4.1.2 Ash

The total theoretical average raw ash content is 27.7%. The ash level in the Hobbit-Broatch area (28.4%) dominates the average as most of the resource is contained in this area. Raw ash levels in the Lost-Fox area are significantly lower (23.7%).

6.6.4.1.3 Volatile Matter

Variation in volatile matter content across the property is minimal. Average levels are 8.1% (a.d.b.) or 8.2% (d.m.m.f.) again reflecting the inclusion of some carbon dioxide as a volatile.

6.6.4.1.4 Fixed Carbon

Fixed carbon content measured on an air dried basis is 62.6% but as with other products, the d.m.m.f. carbon content remains above 90% (though slightly reduced due to the inflated volatile content).

6.6.4.2 Total Sulphur

The average total sulphur content of the raw coal is 0.8%, though there is considerable variation in sulphur from area to area. The Hobbit-Broatch average raw coal total sulphur content of 1.0% is raised beacuse of the inclusion of a few intervals within seams B, G, H and J which have sulphur levels as high as 3.1%. The bulk of the sulphur in these high sulphur intervals is pyritic sulphur and is therefore non-combustible and removed with the ash when the coal is washed. The specific gravity of pyrite is high enough that even the slightest cleaning will remove it. The remaining combustible sulphur is controlled to some extent by the carbonate content of the ash.

The Lost-Fox raw coal has a 0.4% average total sulphur content. No seams in this area contain appreciable quantities of pyrite.

Generally, all seams with sulphur levels above 0.80% are found to contain more than 50% incombustible pyritic sulphur. Levels of combustible sulphur remain below 0.5% overall.

6.6.4.3 Calorific Value

The raw coal of the Mt. Klappan property, with an ash content of 27.7% has an average gross calorific value of 5550 cal/gm (a.d.b.). The gross calorific value of Hobbit-Broatch raw coal is slightly lower. The Lost-Fox raw coal at an average 23.7% ash level, has an average gross calorific value of 6000 cal/gm (a.d.b.). This coal may be mined for selected markets without cleaning.

6.6.4.4 Hardgrove Grindability Index

As expected, since raw ash levels are only very slightly higher than ash levels in the briquetting coal, the theoretical average Hardgrove Index of the raw coal product is 49.

6.6.4.5 Ultimate Analysis

The significance of raw coal ultimate

analyses is reduced because of the high ash levels involved. Overall reported average carbon content (d.a.f.) is 91.5%, ranging from 91.0% in the Hobbit-Broatch area to 93.1% in the Lost-Fox area.

Hydrogen levels range from 2.1% to 2.3%, averaging 2.2% (dl a.d.b.).

Nitrogen levels are 0.8% (a.d.b.) property-wide.

6.6.4.6 Ash Fusion Temperatures

Fusion temperatures of raw coal ash are very slightly higher in the Lost-¯ox area but are otherwise uniform. The temperature span from initial deformation to fluid point is much reduced in raw coal compared with the lower ash products.

Oxidizing Atmosphere °C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1240	1235	1240
Softening Temp.	1285	1290	1290
Hemispherical Temp.	1310	1320	1315
Fluid Temp.	1345	1365	1355

Reducing Atmosphere °C	Hobbit-Broatch	Lost-Fox	Total
Initial Temp.	1190	1180	1190
Softening Temp.	1240	1230	1245
Hemispherical Temp.	1265	1255	1265
Fluid Temp.	1305	1300	1310

6.6.4.7 Ash Mineral Composition

Raw ash includes a substantially higher percentage of basic minerals than any of the cleaned products. Iron oxide levels, for example, are 8% overall and above 10% in the Lost-Fox area. Silica levels are about 50% overall. Alumina levels average just under 22%.

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APPENDIX A

STATEMENT 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 six years in coal exploration in Western Canada. Of this period, four 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 the design of regional exploration programs in Western Canada and the Arctic. At the present time, I hold the position of Supervisor Regional Exploration.

STATEMENT OF QUALIFICATIONS

JOHN W. INNIS

This is to certify that I obtained my Bachelor of Science Degree in Geological Science at Queen's University in 1977, and a Master of Science Degree in Geology at the University of Western Ontario in 1980.

My geological experience includes involvement in mineral exploration and mapping programs in Newfoundland, Saskatchewan and British Columbia for three summers, and latterly five summers in coal exploration in northeastern and north-central British Columbia. I have been employed as a Geologist in the Coal Division of Gulf Canada Resources Inc. since 1980 and have participated in the evaluation of Gulf's Panorama and Mount Klappan properties.

STATEMENT OF QUALIFICATIONS

GLENN E. SEVE

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

I have gained my geological experience through coal property evaluations and exploration mapping and drilling programs situated in Alberta and British Columbia. I have been employed as a Geologist with the Coal Division of Gulf Canada Resources Inc. since 1979.

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 three years of geological experience have been primarily in exploration and mapping in Saskatchewan, Alberta, British Columbia and Arctic Islands in the disciplines of uranium, oil and gas and coal exploration. I have been employed as a Geologist with the Coal Division of Gulf Canada Resources Inc. since late 1980.

STATEMENT OF QUALIFICATIONS

J. MATTHEW DUFORD

This is to certify that I obtained my Bachelor's Degree in Geology at Williams College, Massachusets in 1972 and a Master's Degree in Geology at the University of Calgary in 1976.

My geological experience has been gained during exploration and mapping programs in Colorado, Wyoming, Alberta and British Columbia. Since receiving a M.Sc. degree I have spent six and one half years in coal exploration in Western Canada. During the first four of those years I was with Denison Mines Ltd., during which time I was responsible for the planning and supervision of coal exploration programs involving mapping and drilling. Since 1980, I have worked as an independent consultant on exploration programs and geologic applications of computers.

APPENDIX B

LEGAL DESCRIPTION AND LISTING OF LICENCES

MT. KLAPPAN COAL PROJECT LICENCES - 1982

LICENCE NUMBER	DATE ISSUED	HECTARES	LAND DESCRIPTION SERIES	BLOCK	UNITS
7118	Sept.1/81	281	104-H-2	J	29, 30, 39, 40
7119	"	281	"	"	49, 50, 59, 60
7120	"	32	"	"	63, 64, 73, 74 PTN
7121	"	224	"	"	65, 66, 75, 76 PTN
7122	"	281	"	"	67, 68, 77, 78
7123	"	281	"	"	69, 70, 79, 80
7124	"	98	"	"	85, 86, 95, 96 PTN
7125	"	281	"	"	87, 88, 97, 98
7126	"	281	"	"	89, 90, 99, 100
7127	"	281	104-H-2	K	21, 22, 31, 32
7128	"	281	"	"	23, 24, 33, 34
7129	"	281	"	"	25, 26, 35, 36
7130	"	281	"	"	27, 28, 37, 38
7131	"	281	"	"	41, 42, 51, 52
7132	"	281	"	"	43, 44, 53, 54
7133	"	281	"	"	45, 46, 55, 56
7134	"	281	"	"	47, 48, 57, 58
7135	"	281	"	"	49, 50, 59, 60
7136	"	281	"	"	61, 62, 71, 72
7137	"	281	"	"	63, 64, 73, 74
7138	"	281	"	"	65, 66, 75, 76
7139	"	281	"	"	67, 68, 77, 78
7140	"	281	"	"	69, 70, 79, 80
7141	"	281	"	"	81, 82, 91, 92
7142	"	281	"	"	83, 84, 93, 94
7143	"	281	"	"	85, 86, 95, 96
7144	"	281	"	"	87, 88, 97, 98
7145	"	281	"	"	89, 90, 99, 100
7146	"	281	104-H-2	L	41, 42, 51, 52
7147	"	281	"	"	61, 62, 71, 72
7148	"	281	"	"	63, 64, 73, 74
7149	"	281	"	"	65, 66, 75, 76
7150	"	281	"	"	67, 68, 77, 78
7151	"	281	"	"	81, 82, 91, 92
7152	"	281	"	"	83, 84, 93, 94
7153	"	281	"	"	85, 86, 95, 96
7154	"	281	"	"	87, 88, 97, 98

LICENCE NUMBER	DATE ISSUED	HECTARES	LAND DESCRIPTION SERIES	BLOCK	UNITS
7155	Sept.1/81	25	104-H-7	B	5, 6, 15, 16 PTN
7156	"	67	"	"	7, 8, 17, 18 PTN
7157	"	87	"	"	9, 10, 19, 20 PTN
7158	"	151	104-H-7	C	1, 2, 11, 12 PTN
7159	"	274	"	"	3, 4, 13, 14 PTN
7160	"	281	"	"	5, 6, 15, 16
7161	"	281	"	"	7, 8, 17, 18
7162	"	281	"	"	9, 10, 19, 20
7163	"	95	"	"	23, 24, 33, 34 PTN
7164	"	244	"	"	25, 26, 35, 36 PTN
7165	"	280	"	"	27, 28, 37, 38 PTN
7166	"	280	"	"	29, 30, 39, 40 PTN
7167	"	54	"	"	47, 48, 57, 58 PTN
7168	"	142	"	"	49, 50, 59, 60 PTN
7169	"	281	104-H-7	D	1, 2, 11, 12
7170	"	281	"	"	3, 4, 13, 14
7171	"	281	"	"	5, 6,15, 16
7172	"	280	"	"	21, 22, 31, 32
7173	"	280	"	"	23, 24, 33, 34
7174	"	280	"	"	25, 26, 35, 36
7175	"	94	"	"	41, 42, 51, 52 PTN
7176	"	277	"	"	43, 44, 53, 54 PTN
7177	"	280	"	"	45, 46, 55, 56 PTN
TOTAL ISSUED		14 784			

MT. KLAPPAN COAL PROJECT - 1982 LICENCES

LICENCE NUMBER	DATE ISSUED	HECTARES	SERIES	BLOCK	UNITS
7381	March, 1982	281	104-H-2	J	47, 48, 57, 58
7382	"	280	104-H-6	H	1, 2, 11, 12
7383	"	108	"	"	21, 22, 31, 32
7384	"	281	104-H-7	D	7, 8, 17, 18
7385	"	204	"	"	63, 54, 73, 74
7386	"	280	"	"	65, 66, 75, 76
7387	"	280	"	"	67, 68, 77, 78
7388	"	172	"	"	85, 86, 95, 96
7389	"	275	"	"	87, 88, 97, 98
7390	"	280	"	"	89, 90, 99, 100
7391	"	115	104-H-7	E	7, 8, 17, 18
7392	"	260	"	"	9, 10, 19, 20
7416	"	281	104-H-2	J	23, 24, 33, 34
7417	"	281	"	"	25, 26, 35, 36
7418	"	281	"	"	27, 28, 37, 38
7419	"	278	"	"	43, 44, 53, 54
7420	"	281	"	"	45, 46, 55, 56
7421	"	281	104-H-2	L	69, 70, 79, 80
7422	"	281	"	"	89, 90, 99, 100
7423	"	281	104-H-7	D	9, 10, 19, 20
7424	"	280	"	"	27, 28, 37, 38
7425	"	280	"	"	29, 30, 39, 40
7426	"	280	"	"	47, 48, 57, 58
7427	"	281	104-H-3	I	61, 62, 71, 72
7428	"	281	"	"	63, 64, 73, 74
7429	"	281	"	"	65, 66, 75, 76
7430	"	281	"	"	81, 82, 93, 94
7431	"	281	"	"	83, 84, 93, 94
7432	"	281	"	"	85, 86, 95, 96
TOTAL ISSUED		7 587			

APPENDIX C

CARTOGRAPHIC PROCEDURES

CARTOGRAPHIC PROCEDURES

A set of 17 1:10 000 map sheets covering the Mount Klappan Anthracite Property was compiled from existing federal airphoto coverage in May, 1982 by Western Photogrammetry of Edmonton. In August, 1982 McElhanney Surveying and Engineering Ltd. of Vancouver, and Western Photogrammetry were contracted to provide, respectively, a new set of air photographs and surveyed control, for the preparation of a 1:5 000 scale map set. The photography was completed on September 15, 1982, but due to inclement weather the surveying was postponed until spring of 1983.

Western Photogrammetry

17007 - 107 Avenue
Edmonton, Alberta T5S 1G3
Telephone (403) 483-7722
Telex 037-2537

1982 04 14

OUR FILE NO. Q 566

Gulf Canada Resources Inc.
9th Floor
401 - 9th Avenue, S.W.
CALGARY, Alberta
T2P 2H7

Attention: Mr. John Innis
Coal Division

Dear Sir:

Re: MOUNT KLAPPEN PROPERTY - TOPOGRAPHIC MAPPING

Following our discussions with Mr. Brian Flynn of your company we are pleased to submit our proposal and cost estimates to undertake mapping on this property.

The attached plan shows the limits of the area to be mapped. Also shown are the flight lines of existing Federal Government 1:60000 scale aerial photography, which would be used. We have researched the availability of existing ground control in the area. This is obtainable from B.C. Government, trig control division. A total of twelve stations are established and they range from 2nd to 4th order horizontally and fourth order vertically. We propose to supplement this with additional vertical values obtained from the 1:50000 map sheets - 104 H 2, 3, 6 & 7 covering the area. All coordinates will be based upon the U.T.M. grid system and Geodetic Datum. In addition we have contacted B.C. Rail to confirm that data is available on the railroad bed (to Dease Lake). This would enable us to incorporate this data onto our mapping. Any coordinates supplied through this source would be used to increase the control network.

GL. Inc.
COAL DIVISION

.../2

The resultant accuracy of mapping is not expected to be to the standards and general specifications of the Canadian Association of Aerial Surveyors. We understand that for the purposes of this mapping that this use of existing control is acceptable. Subsequently, the main areas of concern would be re-flown and mapped at a larger scale using new ground control as required.

The mapping to be produced now would be at a scale of 1:10000 with 10.0 metre contours interval. The final sheets would be supplied on a cronar positive from scribed negatives produced from the pencil manuscripts. This would result in a high quality reproducible product rather than the cheaper pencil manuscript. The final sheet layout is understood to be required on a system based upon the coal licences. At the time of plotting, we also understand that a number of field check point (± 200) are to be selected by your department. These points would be plotted onto the pencil manuscripts for later use by field staff.

Costs

a) To obtain all existing field control data and undertake aerial triangulation of 27 overlaps from 1:60000 scale photography. $1930.00

b) To compile topographic mapping in pencil manuscripts at a scale of 1:10000 showing 10.0 metre contours. 27.5¢ per hectare.

c) To produce reproducible cronar positive map sheets from b) 24¢ per hectare.

The area outlined is calculated to measure 24300 hectares and our unit prices would apply to the area actually mapped.

All mapping would be carried out in our Edmonton offices. Our facilities being the largest photogrammetric operation in Western Canada. We have successfully undertaken numerous mapping projects over the past twelve years for clients in the mining industry, with special emphasis on the coal mining area.

These clients include:

Baroid Canada Ltd.
Canadian Island Creek Coals Ltd.
Cardinal River Coals Ltd.
Dentherm Resources Ltd.
Esso Resources Ltd.
Luscar Ltd.
Manalta Coal Ltd.
McIntyre Mines Ltd.
PreCambrian Shield Resources
Suncor Inc.
Syncrude Ltd.
Union Oil Co. Canada Ltd.

.../3

Digitizing

An alternative to conventional line mapping is suggested. This being the production of digitally recorded data. This would be produced by direct recording from the same aerial photography used for line mapping. By use of our photogrammetric instruments encoded to digitizers we are able to store the ± 30,000 data points recorded on our in-house Prime computer system. We can also produce contour plots at 1:10000 scale by use of in-house software and hardware. The data can be supplied on 9 track tape or other format for use by Gulf Canada Resources as required. Costs for digital mapping would be 54¢ per hectare plus costs for control acquisition and aerial triangulation = $1930.00 (see item (a) under conventional mapping).

We would be pleased to discuss our digital methods in more detail with you. In this regard Mike Toomey of our company will be in Calgary on April 16 and would be able to elaborate on this aspect at your convenience.

We anticipate that all work on this project, either conventional mapping or digital can be completed within one month from our receipt of your acceptance of our proposal.

We appreciate this opportunity to offer our services to your company.

Yours truly,

WESTERN PHOTOGRAMMETRY

J.R. Symonds
MAPPING MANAGER

JRS/mck

Encl:

McElhanney Surveying
& Engineering Ltd

200 - 1166 Alberni Street, Vancouver, B.C.
Canada V6E 1A5 (604) 683-8521
Telex 04-51474 Cable SURVENG

McElhanney

18 August, 1982

Our Ref.# 37005-0

Gulf Canada Resources Inc.,
P.O. Box 130,
Calgary, Alberta

Attention: Mr. Brian Flynn

RE: Mt. Klappan Aerial Photography

With reference to our recent telephone conversation we would like to thank you for authorizing us to provide you with 2 extra lines of 1:30,000 black and white aerial photography.

We understand that you require 2 additional flight lines to the south of the area we had originally proposed to fly. In addition, you would like us to extend the flight lines approximately 2 miles to the west of the original designated area. Please see the enclosed map showing complete photo coverage of the revised area.

Fee Schedule

1) For the provision of 2 additional flight lines for a total of 52 line miles as described above, the firm lump sum amount of ....$1,150.00 plus applicable tax.

2) The original contract prints for the 1:30,000 black and white aerial photography was the firm lump sum of ....$5,590.00 plus applicable tax.

3) For the provision of 2 rolls of target material, the firm lump sum amount of ....$ 500.00 plus applicable tax.

The new total for the complete job is ....$7,240.00 plus applicable tax.

.../2

We understand that all targets have been set out and we are awaiting for the weather situation to improve before flying. We will contact you as soon as the area has been flown.

During our last conversation you mentioned that you would require field survey crews to tie in the photo control targets. We do have field crews working in the vicinity of your project area and it would be advantageous to transfer them to your site within the next week or two. Please contact us and let us know when the surveyors will be required.

We appreciate the opportunity of offering our services to you and look forward to a successful completion of this assignment.

Yours very truly,

McELHANNEY SURVEYING & ENGINEERING LTD.,

L. Hume

Lloyd J. Hume, C.E.T.
Business Development Representative

LJH:leo
Encl.

Western Photogrammetry

17007 - 107 Avenue
Edmonton, Alberta T5S 1G3
Telephone (403) 483-7722
Telex 037-2537

Rec'd Sept 1/82

1982 08 31

OUR FILE NO. Q 636

Gulf Canada Resources Inc.
Coal Division
9th Floor
401 - 9th Avenue, S.W.
CALGARY, Alberta
T2P 2H7

Received
Gulf Canada Resources Inc.
SEP 20 1982
CALGARY
Coal Division
FILE

ATTENTION: Mr. Brian P. Flynn
Supervisor - Regional Exploration

Dear Sir:

Re: KLAPPAN MOUNTAIN SURVEY CONTROL

Further to our telephone conversation of this morning, this letter will confirm the details of our cost estimate to carry out the field survey work.

We understand that your requirements call for a total of 35 targetted stations and 8 drill holes to be surveyed in. These points are to be surveyed into the existing survey control network established in this area. This control would meet third order standards of accuracy and would be the basis of control for future mapping showing 5.0 metre contours, and subsequently areas requiring 2.0 metre contours.

Our costs for a two man crew out of Edmonton is $560.00 per 8 hour day, including all survey equipment. Additional hours worked per day will be charged at $58.00 an hour. We estimate that a total of eleven working days (8 hours) will be required to complete all field work. We estimate a total of 4 hours of helicopter time will be required each working day. Our standby fee for an eight hour day is $464.00 for the two man crew. This rate to be charged for travelling time to and from the site. Commercial airfare to be charged from Edmonton to Smithers and return.

.../2

All accommodation, food, transportation to and from Smithers and site and helicopter charges to be paid for by Gulf Canada Resources Ltd. The crew would be available to travel to Smithers during weekend of September 4th-5th 1982 or at such time that you advise that weather conditions allow. In the event that the start up date is delayed before crew are mobilized out of Edmonton we would charge only rental costs for E.D.M. survey equipment (approximately $200.00 per week).

The survey work will be undertaken by the survey department of Underwood McLellan Ltd. Persons to contact out of office hours are A. Hasham, Chief Surveyor at 459-6122 and A. Shillingford, Party Chief at 481-4075/ 481-8513. They will be responsible for the completion of all survey work on this project and will be issuing all invoices pertaining to all costs incurred.

We greatly appreciate this opportunity to offer our services to your company on this project.

Yours truly,

WESTERN PHOTOGRAMMETRY

J.R. Symonds
MAPPING MANAGER

JRS/mck

c.c. Ali Hasham, UML

the UMA group

APPENDIX D

PRELIMINARY INVESTIGATION OF DEPOSITIONAL ENVIRONMENTS

MT. KLAPPAN

COAL PROPERTY

S.M. ROWE November 82

Table of Contents

FIGURE I: LOCATION MAP

Introduction

The Mt. Klappan study area of northern British Columbia is comprised of rocks informally named the Groundhog Sequence which is part of the Skeena Group. The Skeena Group is thought to be Upper Jurassic or Lower Cretaceous and equivalent to the Kootenay Formation of Southern British Columbia. The area under study is defined in Figure 1.

The purpose of this project is to provide a preliminary assessment of the depositional environment of the coal units in the Groundhog sequence as well as an attempt to correlate the various sand units in the area to provide ease of coal unit correlation in the future. Recommendations for further drilling projects will also be made.

Structure

Structurally this area is less complex than areas documented to the south, such as the Panorama Coal project area. It appears the study area is on the more distal edge of intense structural deformation, therefore only displaying smaller S - shaped to step-folding and minor faulting. Minor metamorphism is confined mainly to areas of intense folding and is reflected in the coals, as high-grade anthracites rather than in the sediments themselves (see Figure 2).

The object of this paper is not, at this time, a structural, but rather a depositional interpretation of the area. The coal department has spent much time and knowledge in unraveling the structure of the area and should be refered to if more structural information is required.

Sedimentology and Petrology

For simplicity and ease of correlation the stratigraphic column can be broken up into four informal rock units:

1. Coal Unit
2. Argillaceous Sandstone Unit
3. Interbedded, Sandstone, Siltstone and Shale Unit
4. Shale Unit

Each of these lithological units are readily distinguishable from one another and easily identifiable from core to core. Outcrop identification of these units is somewhat difficult due to weathering of units but upon closer examination are also readily distinguishable.

Briefly described the units are as follows:

1. Coal Unit

Coal in this area is a high grade anthracite which may appear up to 8 times in some cores with thicknesses up to 7 meters but averaging 1-3 meters. Many of these coal beds are due to repetition of the section mainly by folding and possibly minor faulting. The coal itself is a very dark, hard and clean anthracite with minor shale lenses throughout (see Figures 3) increasing the ash content somewhat. Most coal zones have sharp bases and tops and are very carbonaceous with a high ankerite content.

Five coal samples analysed for their elements contained the following:

Sample No.	Iron	Silicon	Aluminum	Calcium	Magnesium	Sodium	Pottasium
1	1.89	8.45	2.37	2.84	1.10	0.305	0.241
2	2.10	6.92	3.09	1.31	0.663	0.381	0.248
3	0.741	6.60	3.29	1.11	0.420	0.241	0.296
4	1.56	7.24	2.59	0.846	0.740	0.244	0.203
5	1.54	8.18	4.00	1.34	0.594	0.488	0.420

Note the high iron and calcium content. In addition to this - coal samples were analysed for their bulk mineral components. These results can be found in Table I. The presence of ankerite is corroborated by the high iron and calcium contents.

2. Argillaceous Sandstone Unit

Summary

The Argillaceous Sandstone unit is wide spread, recognizable in all boreholes as well as in outcrop. The entire sandstone unit is variable throughout the area ranging from a massive, even-grained sandstone in the top borehole #002, to a very coarse, poorly sorted, chert rich conglomerate near the bottom of bore-hole #003. Even though this sandstone is variable in grain size, appearance and environment of deposition, its similar composition (discussed in the next section) and the fact that all are competent sandstones makes this one unit for gross correlation purposes. This may only be done on a sequence level since bore-hole spacing makes it next to impossible to correlate individual sands in the area. At a later date, with further drilling, the sands will be able to be further broken down into individual environmental units, but at this early stage it is not possible to divide and correlate the sands.

Lithology and Mineralogy

The Argillaceous sandstone is a fine to coarse grained, chert-rich (60-90%) sandstone with quartz (5-25%), feldspar (0-5%), shale (5-10%), clays (0-10%) and coal clasts (0-1%) (see Figure 4). The matrix is composed mainly of very fine-grained chert, quartz, siderite and clays (see Figure 5). Cement seems to be dominant in several sands with up to 40% ankerite present (see Figure 6) but is present in small quantities in all sandstone. Accessory minerals make up only a trace percentage of the whole sample with glauconite, pyrite, and micas present. Whole rock and clay analyses were done on several sand samples. The results are found in Table II. For sample locations refer to Map I attachment. Illite appears to be the dominant clay mineral present but not enough variation in the bulk mineralogy is present to see differing trends for correlation purposes.

In the conglomerates, chert is the main constituent in a shaly, sandy matrix. Large clay clasts are present in most conglomerates (see Figure 7).

Sedimentary Structures

Structures in the Argillaceous sandstone units are variable from sand to sand and with a more in-depth study could possibly aid in a more detailed correlation of the sands, but for now will be used for clues for identifying the various depositional environments present.

Most sandstone units appear to comprise numerous coarsening upward cycles (see Figure 8) averaging 5-10 cm in vertical extent, with sharp tops and slightly gradational bases. These cycles in some places extend over several meters giving a structureless appearance in the sand. Overall the sandstone units contain virtually no bioturbation. This could be due to the coarseness of the sandstones limiting the number of organisms able to live there. The coarseness of the sandstone could mask any previous bioturbation. Minor thin shale breaks and flaser bedding are also common except in the more massive zones. Cross-bedding is limited but present as is ripple and wavey cross-bedding.

3. Interbedded Sandstone, Siltstone and Shale Unit

Summary

The interbedded unit also varies compositionally from place to place, but most of the variation is due to grain size differences, eg. sandstone and shale interbedding, siltstone and shale, or all three (see Figure 9).

This interbedding may be cyclical in nature and could represent large events such as storms. The average bed size is 3mm -> 2 cm thick.

Lithology and Mineralogy

The siltstone and sandstone fraction of this unit appears to be dominantly chert/quartz with minor feldspar, shales and clays (see Figure 10), indicating a similar source of origin as the Argillaceous sandstone for the sandstone and siltstone portions. Whole rock analyses done on several samples in this zone are shown in Table II.

Sedimentary Structures

The sand/silt units are coarsening upward units with sharp tops and transitional but abrupt bases. Infrequent burrows found at the base of select sandstone units penetrate the underlying shale units. Overall there is a general lack of bioturbation indicating a possible freshwater environment with an occassional marine influx killing the organisms. Extremely silty shale may potentially display a higher degree of bioturbation (see Figure 11). Paleontologic samples examined from this zone reveal no true marine fossils and a lack of micro-fossils in general suggesting a marginal to non-marine environment.

Flaser bedding was noticed in several places.

4. Shale Unit

The shales in this area tend to be very fine grained clay-rich shales of 2 types - one with cyclical "varving" of silts, and another with low silt content throughout. The low silt shales are black, greasy and carbonaceous (see Figure 12) and are closely associated with the coal zones. Although several bivalves of undetermined origin were found, little or no bioturbation was found throughout. Paleontological data from these greasy black shale zones (based on arenaceous foraminifera Trochammina and Ammodiscus) indicate brackish water to estuarine conditions. These seem to completely surround most coals. The "varved" shales (see Figure 13) contain no marine microfossils, have only minor burrowing and appear to be lacustrine in nature.

Discussion and Conclusions

With the limited data available to date, the Mt. Klappan Coal property appears to be a marginal marine to non-marine environment. Although more extensive work is necessary in the area to back up any ideas presented in this paper, the general concepts should be feasible. Several observations were made from the core and outcrop in the area.

1. No obvious channeling was noted throughout the area.

2. Minimal bioturbation throughout in the shales suggest either a lacustrine environment or an environment with water condition such that it would not be condusive to the growth of organisms, except in the swamp environments that produce the actual coals.

3. Cyclical nature of the majority of shale units. This gives the appearance of seasonal varving suggesting a possible lacustrine environment.

4. Lack of microfossils (except Trochammina and Ammodiscus), suggest a brackish, estuarine environment immediately surrounding the coals and possibly a marine influx killing and sealing the fresh water swamps.

5. The variety of sandstone types suggests a wide range of environment that may be confined in small area such as marine beach, barrier island, deltaic, beaches associated with lacustrine deposits etc.

Overall the Mt. Klappan area appears to be a fresh water restricted embayment or lake separated from the open marine conditions by beaches and barrier bars (see Figure 14). These bars and beaches were periodically breached with seawater flooding behind the beaches into the fresh water killing the plant(?) growth and sealing it with mud. These marine invasions could occur during storm surges or seasonal high tides.

In conclusion it would appear the Mt. Klappan area is quite simple depositionally but much more work is needed to determine the structure of the area, paleocurrent directions, extent of the beach barrier, lake and swamp system, and a better correlation of the area. All these would aid in determining the extent of the coals although most back-barrier or beach coals tend to be quite extensive.

The distinction and tracking of the marine/non-marine edge could define the limits of the coals in a seaward direction. Then by defining the extent and type of lacustrine system the landward extent of the coals can be traced giving a broad band of exploration targets to pursue further.

Another possibility would be digitizing the geophysical logs in order to computer compensate for structure and local drillhole directions This possibly may show more distinct similarities in the units which are now being distorted. This could help in correlation and give a more accurate picture of the original environment before tectonism disrupted it.

Possible drilling sites could be used in conjunction with the processes of defining the environmental limits of the area. With the addition of more property surrounding the Mt. Klappan area, several holes should be put down in outlying areas to determine the lateral extent of the coal and possibly a trend in the coal; such as a marine edge. Several more drillholes should be undertaken in the area immediately surrounding the camp to further enable a proper correlation of the area. If correlation in this area becomes clear, holes should be put down radiating out from this point trying to maintain correlation and to determine the exact structure.

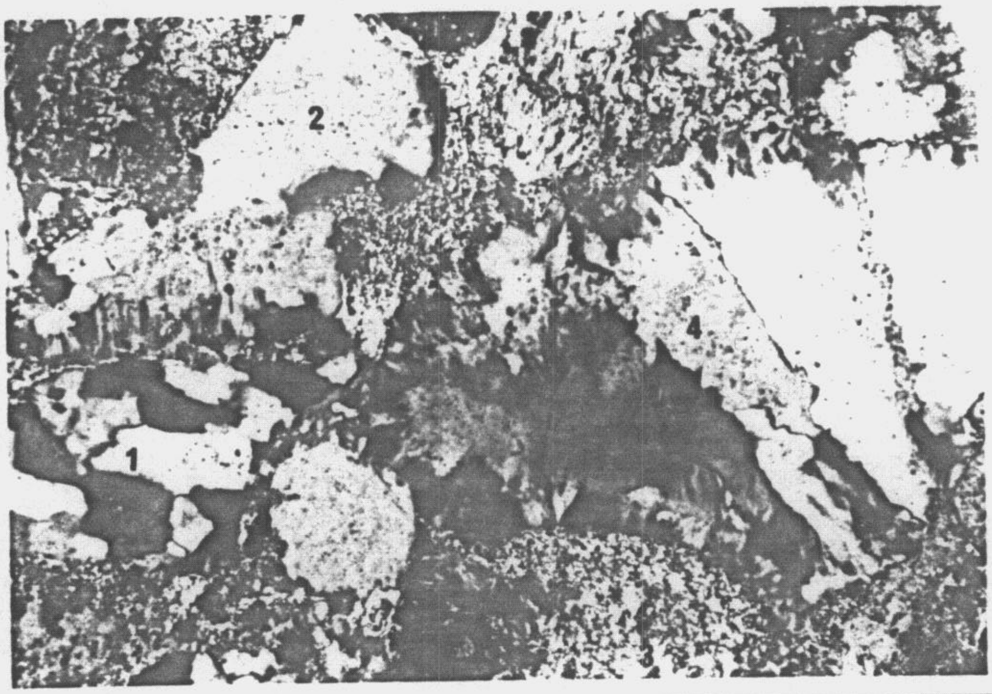


Figure 2: DDH 001, sample 7, medium power, crossed polarized light, metamorphic chert (1), quartz (2), chert (3), quartz partially altered to chalcedoney (4).

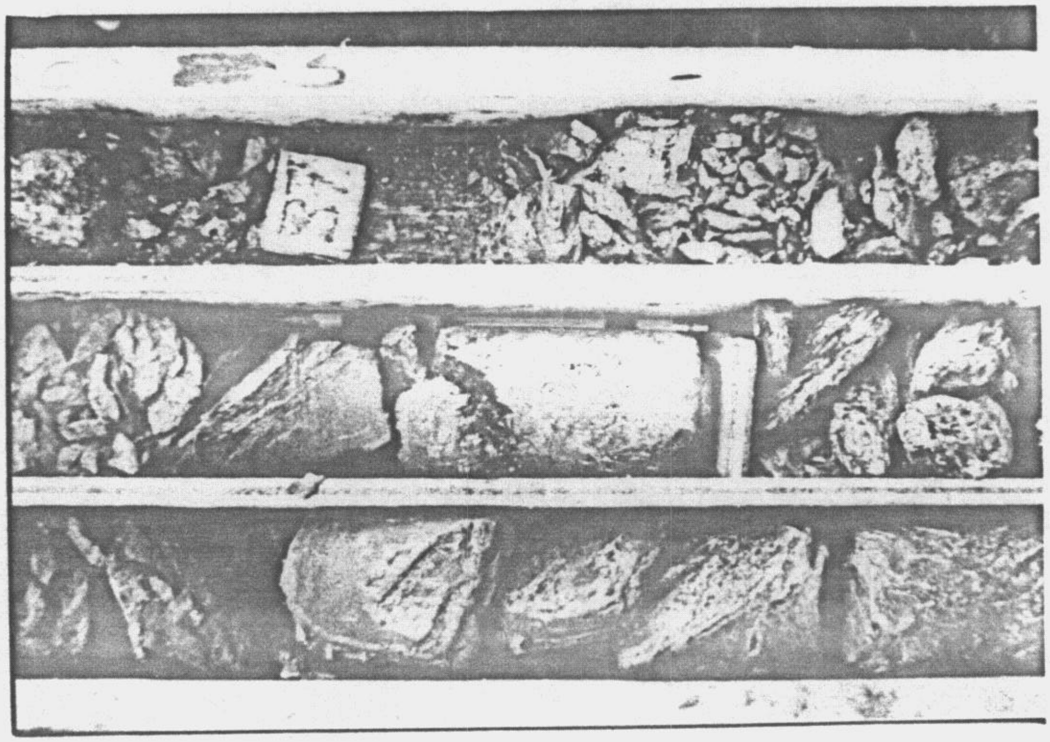


Figure 3: DDH 004, photo 16, Box 5,
Coal (with high reflectence) with interbedded shales.

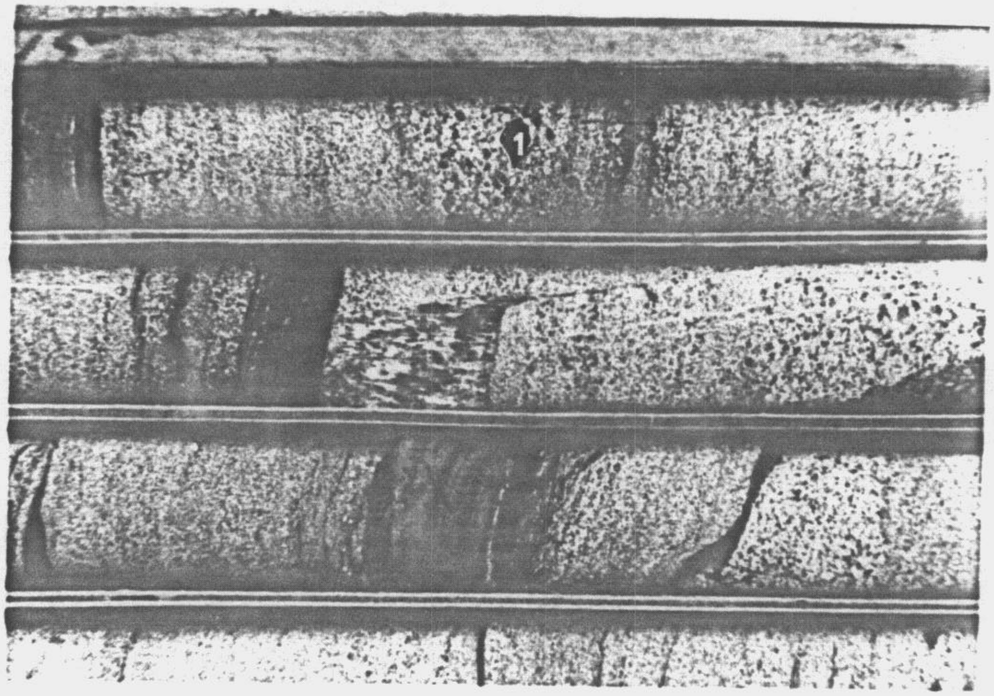


Figure 4a: DDH 001, photo 21, Box 15,
medium to coarse grained argillaceous sandstone with coal clasts (1).

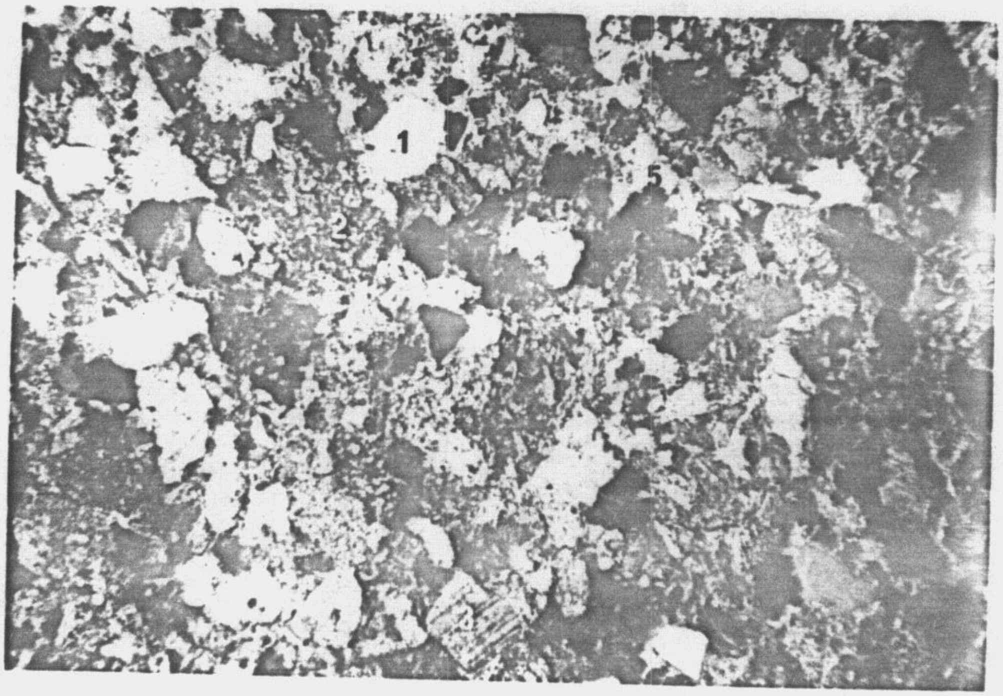


Figure 4b: DDH 002, sample 7, low power, crossed polarized light, quartz (1), chert (2), feldspar (3), siderite (4), ankerite (5).

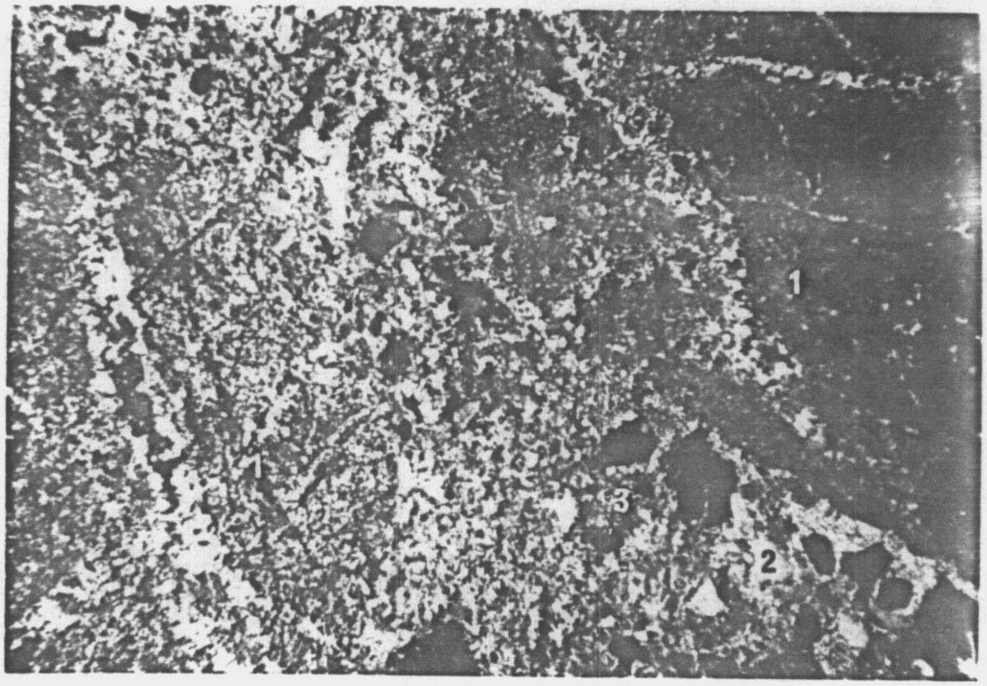


Figure 5: DDH 003, sample 18, low power, crossed polarized light, chert clasts (1), matrix: quartz (2), chert (3), siderite (4).

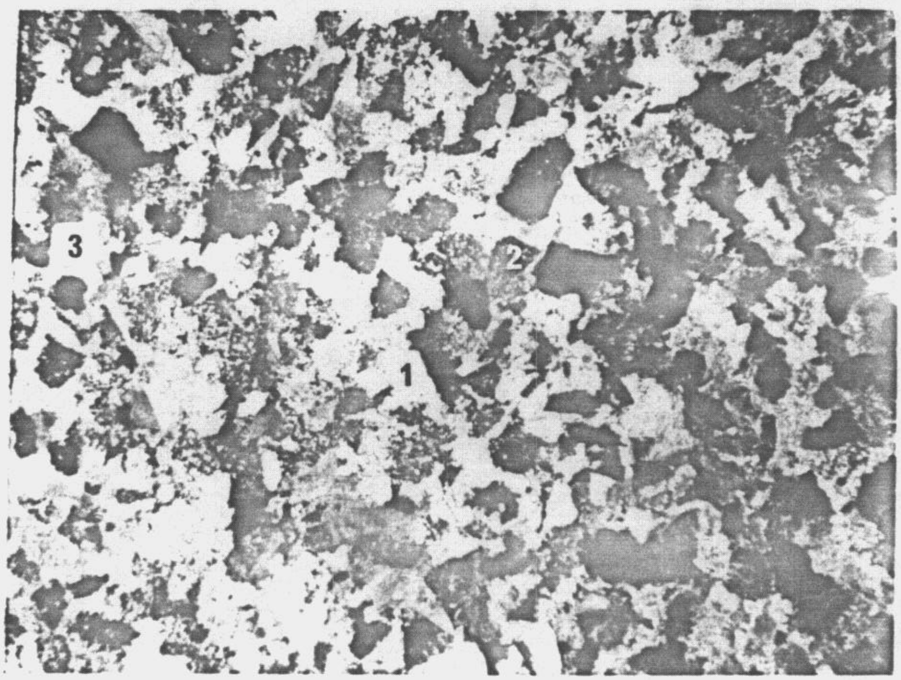


Figure 6: DDH 005, sample 2, low power, crossed polarized light, ankerite cement (1), chert (2), quartz (3).

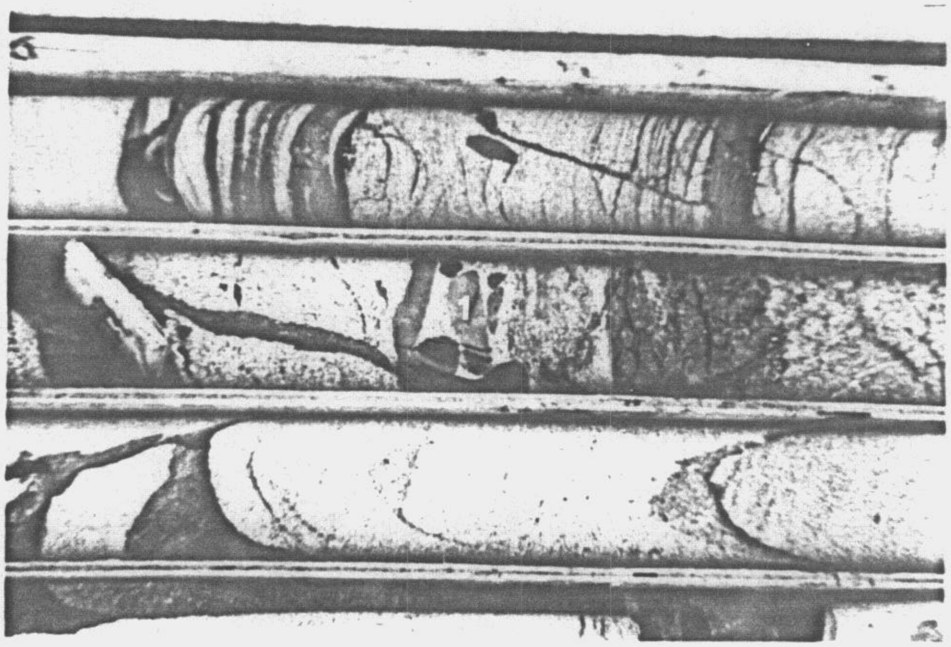


Figure 7a: DDH 001, photo 4, Box 30,
large clay clasts (1), in a coarse to fine grained sandstone.

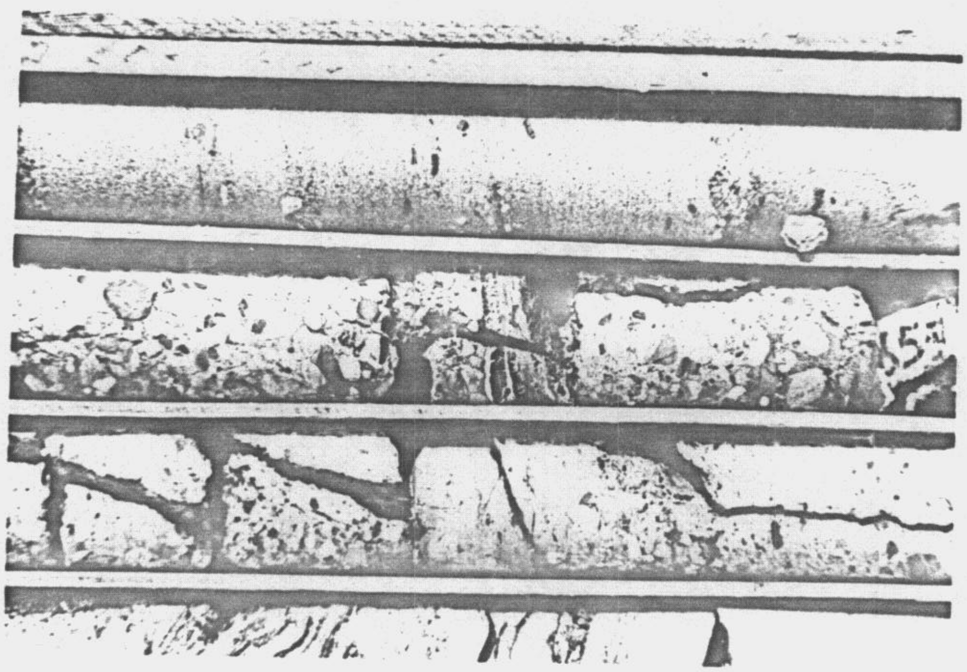


Figure 7b: DDH 003, photo 18, Box 65,
coarse conglomerate.

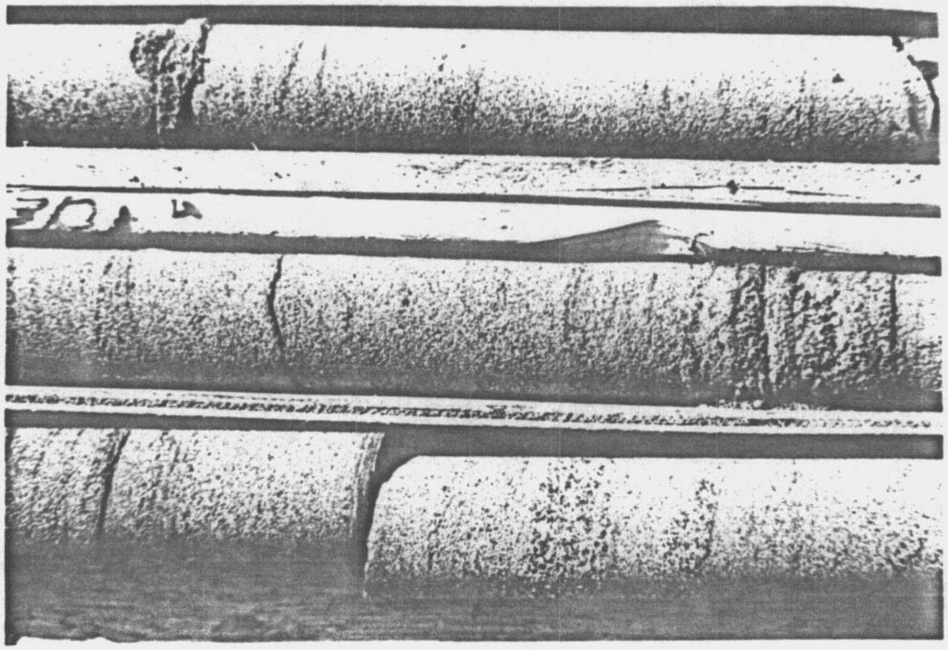


Figure 8: DDH 002, photo 15, Box 30,
coarsening upward cycles in the argillaceous sandstone.

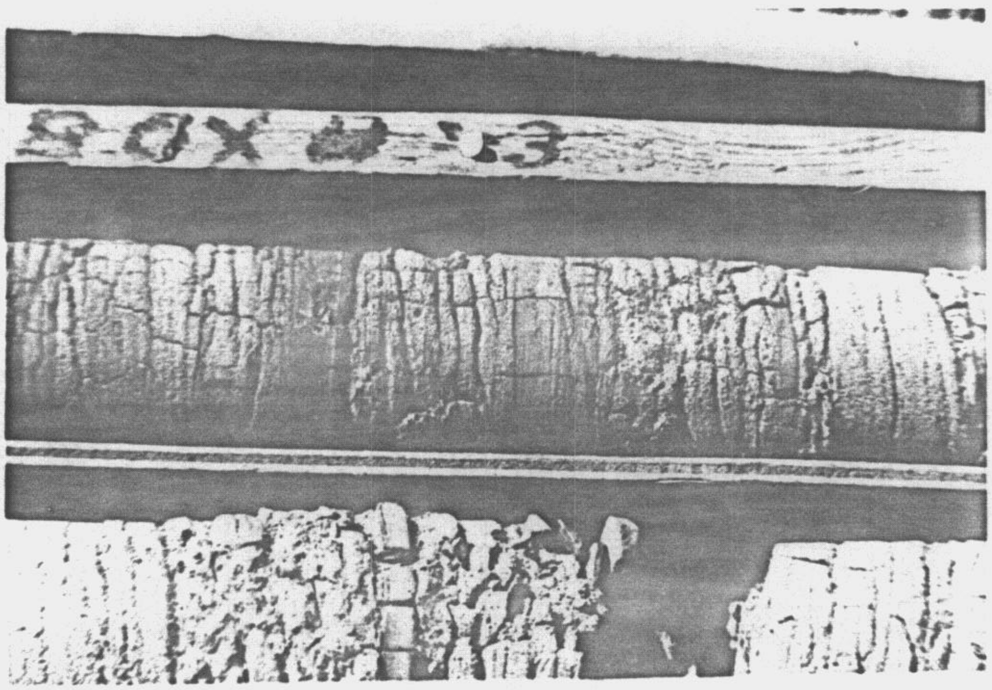


Figure 9: DDH 001, photo 8, Box 3,
interbedded sandstone, siltstone, and shale unit.

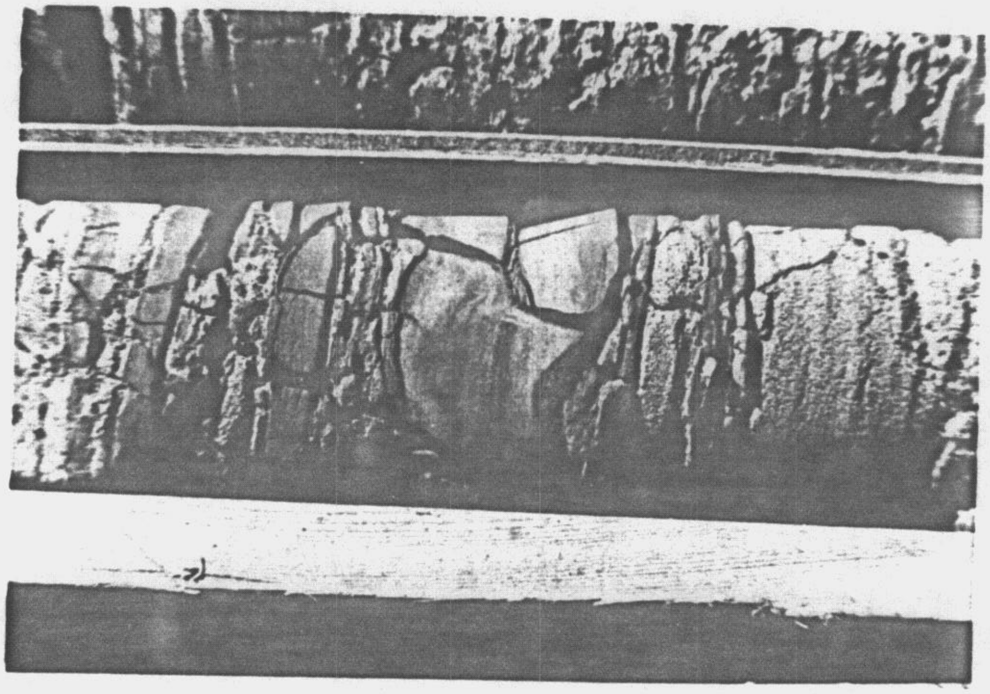


Figure 10: DDH 001, photo 7, Box 2,
interbedded sandstone and shale. Shales contain a high pyrite content.

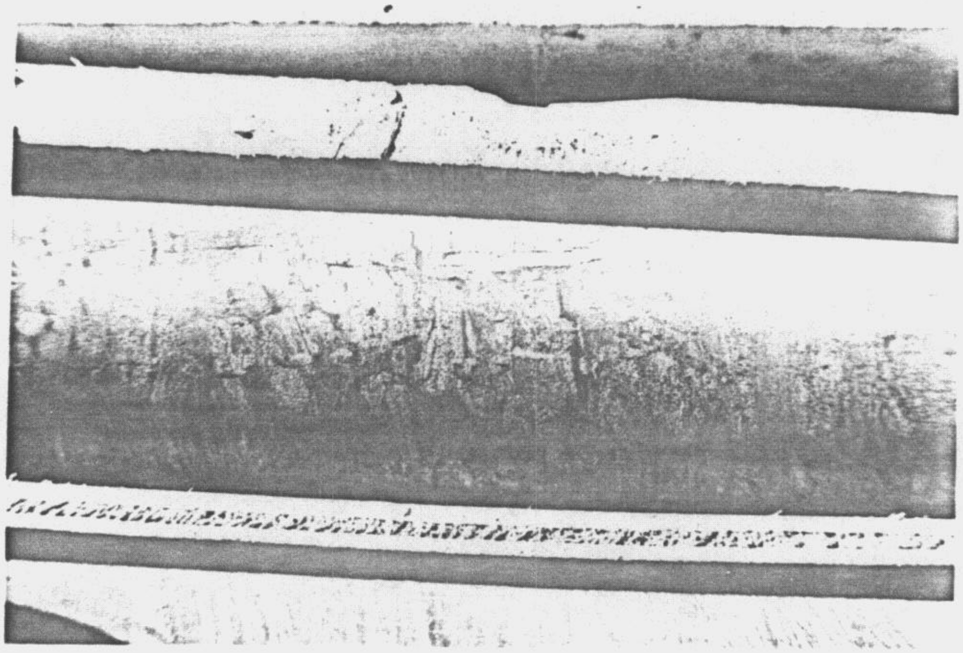


Figure 11: DDH 002, photo 8, Box 71,
bioturbation and burrowing (1) in a silty shale.

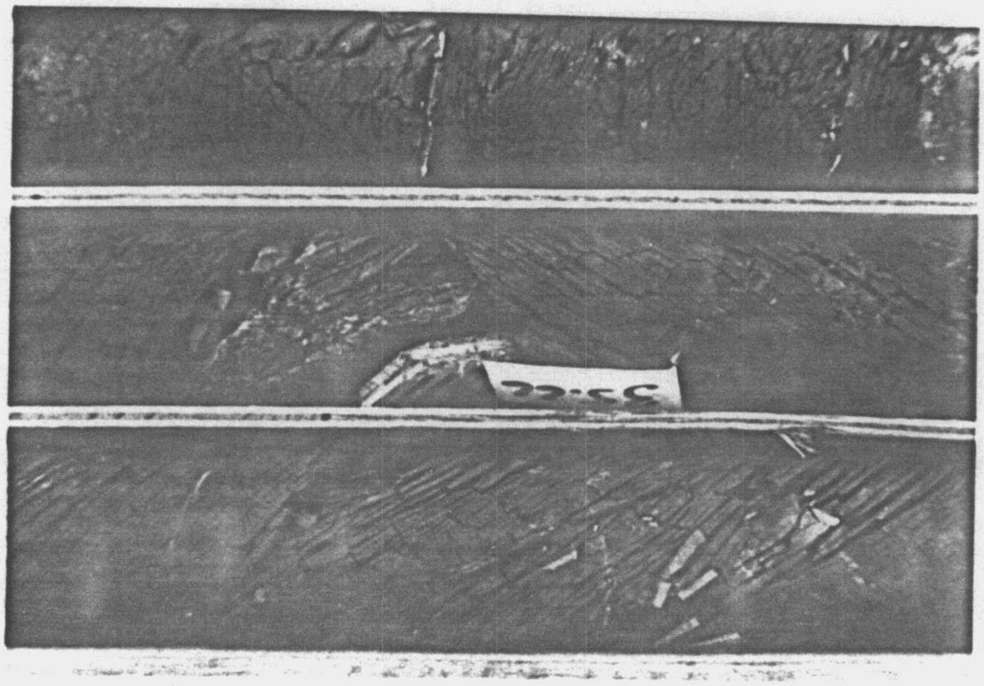


Figure 12: DDH 003, photo 13, Box 17,
black greasy shale.

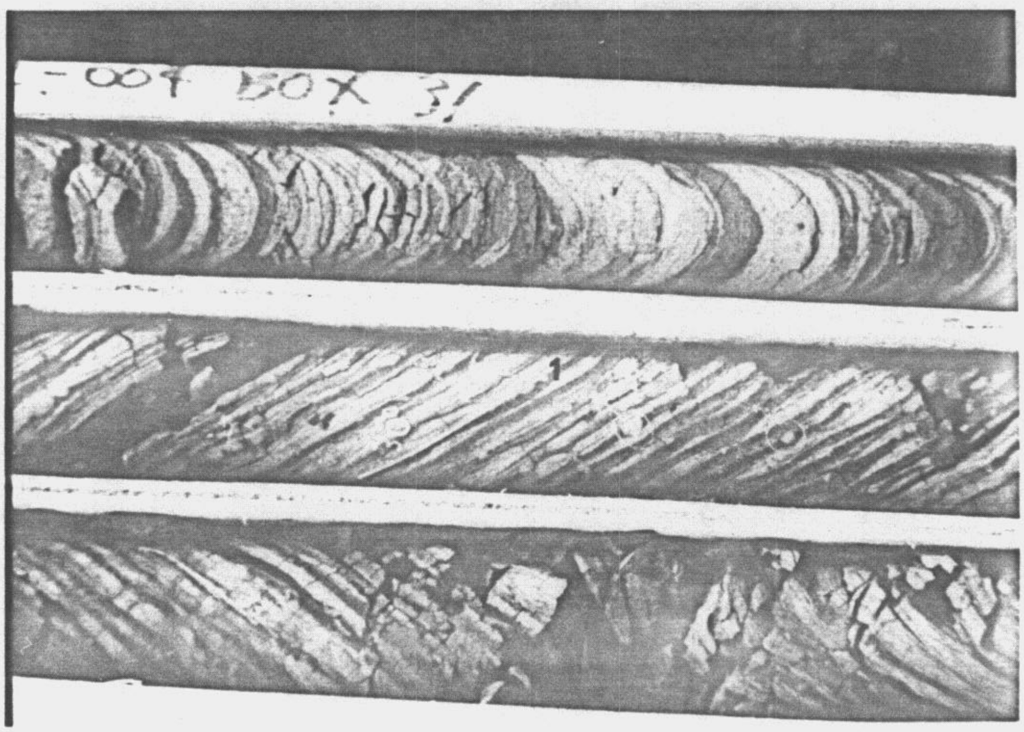
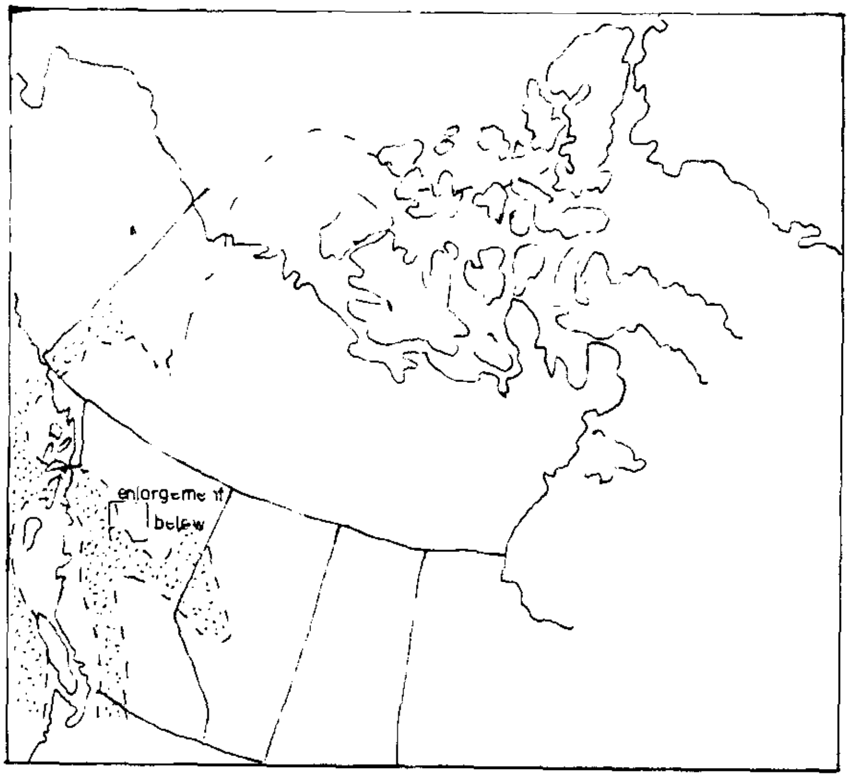


Figure 13: DDH 004, photo 21, Box 31,
Silty shale with "varving" of the sediments. Note small burrows into the shales (1).



MARINE SEAWAY DURING LOWER CRETACEOUS from jeletzky 1971

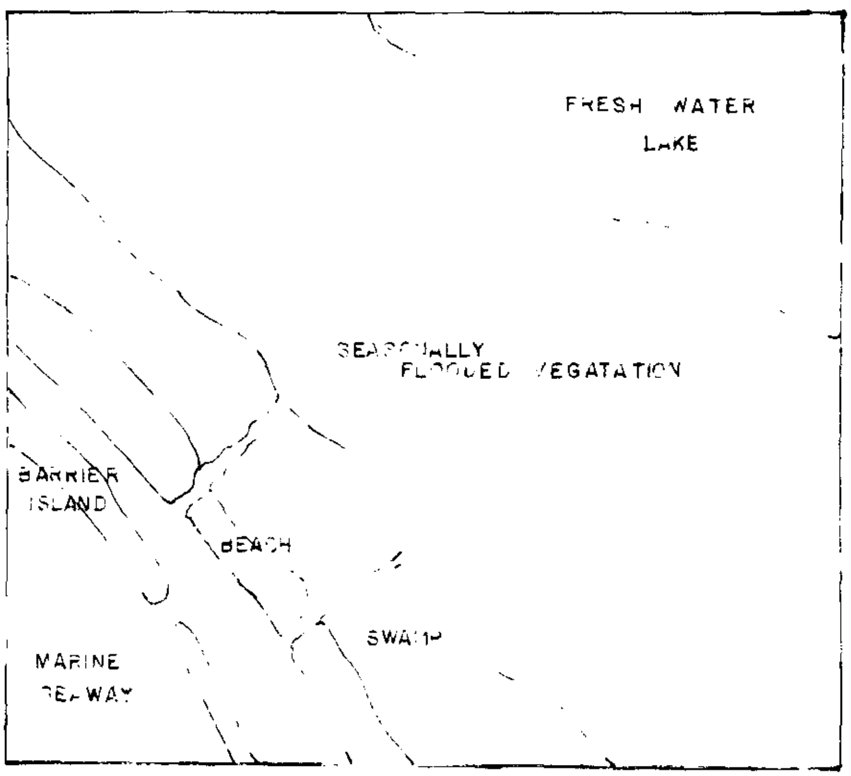


FIGURE 14: SCHEMATIC OF PALEO ENVIRONMENT

Table I

Bulk Analysis**

<u>Coal: XRD Results In %</u>

Sample No.	Quartz	Feldspar	Ankerite	Siderite	Pyrite	Graphite
3509	7	Present	Present	1		Present
4701-4704	7	Present	Present	3		Present
4706-4707	8	Present	Present	1		Present
4708-4709	13	Present	Present	3		Present
4710-4714	6	Present	Present	2		Present
4716-4720	11		Present	1	4	Present
4721-4723	11	Present	Present		Trace	Present
4854-4857	8		Present	3		Present
4862-4864	13	Present	Present	2	Trace	Present
4865	6		Present	1	2	Present
4866	7		Present	2	Trace	Present
4867-4869	10	Present	Present	3		Present
4871	3		Present	2	3	Present
4959-4961	6		Present		8	Present
4964-4966	10		Present		Trace	Present
4970-4972	9	Present	Present	2		Present
4973-4974	12	Present	Present	4	Trace	Present
4975-4977	8	Present	Present	4		Present
4978	11	Present	Present	4		Present
4979	4		Present	3		Present

** Due to the new XRD equipment not being fully set up only a qualitative analysis can be made for Feldspar, Ankerite and Graphite. Therefore no quantitative figure can be given for the clay content.

Clay analysis cannot be done at this time on the coal samples. The lengthly process includes a low temperature burning-off of the coals. At this time the lab cannot accommodate this process.

Table II

Bulk Analysis **

XRD Results In %

Sample No.	Quartz	Feldspar	Ankerite	Siderite	Pyrite
001-6	56	Present	Present	-	
001-7	58	Present	Present	5	
001-16	8	Present	-	6	
002-1	45	Present	-	8	
002-2	42	Present	-	3	
002-7	40	Present	Present	-	2
002-10	7	Present	Present	6	
002-13	36	Present	Present	-	
002-15	27	Present	Present	-	
002-17	57	Present	Present	-	
002-18	75	-	-	-	
003-1	43	Present	-	-	
003-8	4	Present	Present	-	4
003-9	-	-	Present	-	
003-12	38	Present	Present	18	
003-15	35	Present	Present	4	
003-18	49	Present	Present	-	
003-18c	47	Present	-	3	
004-1	23	Present	Present	10	
004-4	19	Present	Present	-	
004-5	16	Present	Present	-	
004-7	57	Present	Present	-	
004-8	79		Present	-	
005-2	57	Present	Present	-	
005-4	36	Present	Present	-	
005-5	5	Present	Present	-	
005-7	31	Present	Present	4	
005-8	40	Present	Present	3	

** Due to the rush in the lab, setting up the new XRD equipment to complete analysis on this project by November 4, standards for Feldspar and Ankerite have not been set up yet. Therefore a quantitative analysis of these minerals cannot be made at this time. Only a qualitative analysis to tell whether the mineral is present but not what quantities. Because of this the amount of clays and amorphous material also cannot be calculated. Since they are usually calculated as the difference between all the minerals and 100%.

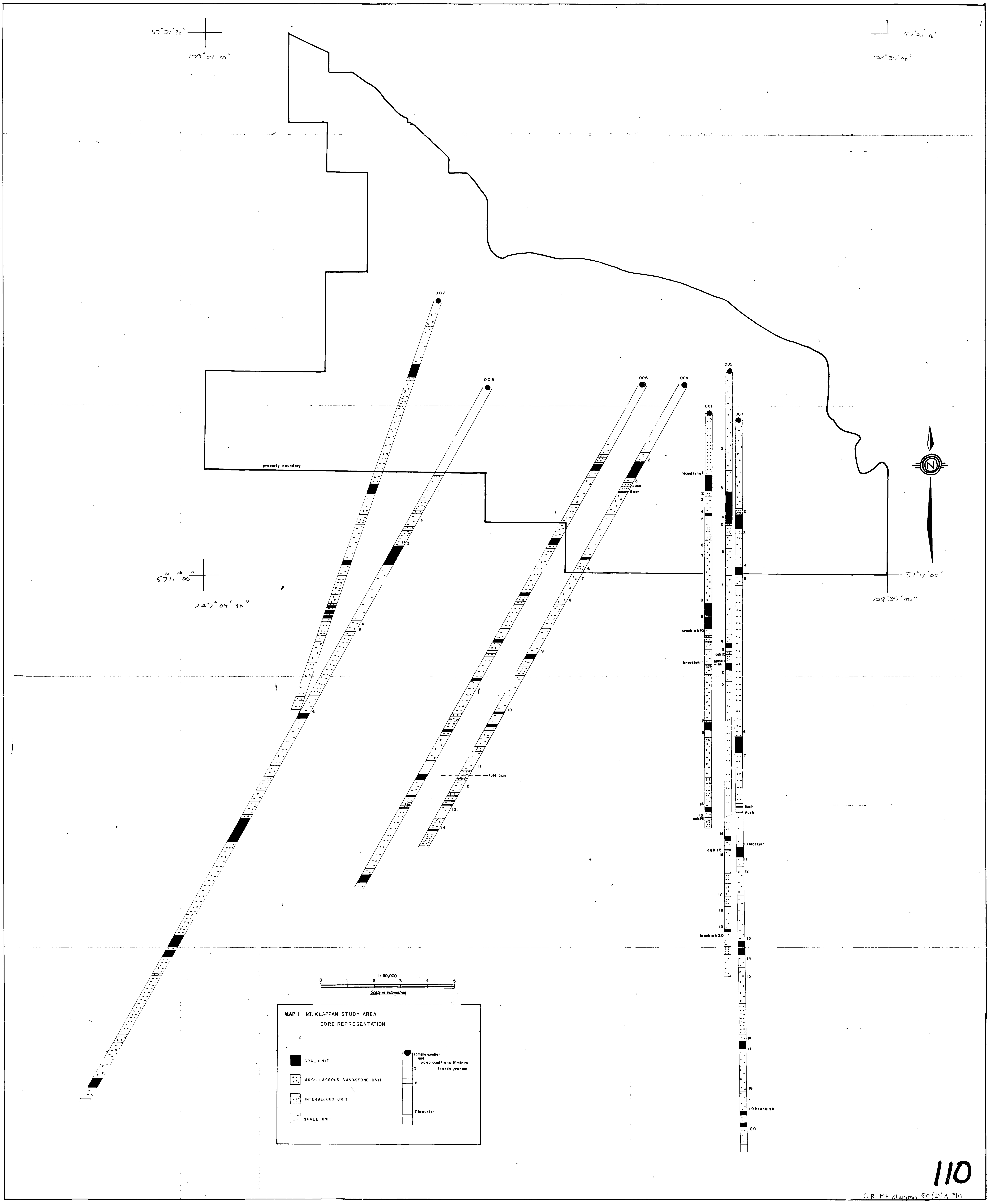
Table II (cont'd)

Clay Analysis*

XRD Results In %

Sample	Illite	Kaolinite
001-7	99	1
001-16	100	
002-1	95	5
002-2	93	7
002-7	96	4
002-10	99	1
002-13	98	2
002-15	92	8
002-17	96	4
002-18	94	6
003-1	98	2
003-8	92	8
003-9	93	7
003-12	99	1
003-15	99	1
003-18	97	3
003-18c	96	4
004-1	99	1
004-4	100	
004-5	97	3
004-7	97	3
004-8	43	57
005-2	97	3
005-5	99	1
006-7	92	8
005-8	93	7

* In all samples, mixed layered clays are preent but cannot be measured quantitatively.



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G.R. Mt Klappan 80(1*)A #(1)

APPENDIX E

RESOURCE DATA AND CALCULATIONS

HOBBIT-BROATCH RESOURCE AREA
STRAIGHT AVERAGE CALCULATIONS *

	A	B	C	D	E	F	G	H	I	J	K	L
DDH82001							2.77	1.73	6.97	0.93	3.45	
DDH82002			0.67	0.53	0.92 2.24	0.35	4.03 1.13†					
DDH82003					0.86 1.28	2.17	4.22	2.57	4.32	2.33	2.52	
DDH82004				0.35	0.75	0.04	2.88					
DDH82006	1.67	1.50	0.19	0.59	0.63	0.16	2.45	2.01				
Straight Avg.	1.67	1.50	0.43	0.49	1.67	0.68	3.27	2.10	5.65	1.63	2.99	

* Table applies to figures 4.4, 4.5, 4.9 in text and page ix in summary

† not applied to resource calculations due to thickness or low coal/rock ratio

COAL SEAM THICKNESS SUMMARY

APPLICATION	A	B	C	D	E	F	G	H	I	J	K	L	AGGREGATE
	SEAM THICKNESS (m)												
DRILLED													
DDH82001							2.77	1.73	6.97	0.93	3.45		
DDH82002			0.67	0.53	0.92 2.24	0.35	4.03 1.13†						
DDH82003					0.86 1.28	2.17	4.22	2.57	4.32	2.33	2.52		
DDH82004				0.35	0.75	0.04	2.88						
DDH82005									4.98	5.16	1.46 3.60†	2.24	
DDH82006	1.67	1.50	0.19	0.59	0.63	0.16	2.45	2.01					
DDH82007					1.29	2.71	3.91						
Average	1.67	1.50	0.43	0.49	1.59	1.09	3.38	2.10	5.42	2.81	2.48	2.24	25.20/24.28*
INFERRED													
Hobbit-Broatch													
DDH82001							2.77	1.73	6.97	0.93	3.45		
DDH82002			0.67	0.53	0.92 2.24	0.35	4.03						
DDH82003					0.86 1.28	2.17	4.22	2.57	4.32	2.33	2.52		
DDH82004				0.35	0.75	0.04	2.88						
DDH82006	1.67	1.50	0.19	0.59	0.63	0.16	2.45	2.01					
Weighted Avg.	1.67	1.50	0.40	0.48	1.66	0.87	3.32	2.12	6.07	1.41	3.13		22.63/21.75*
Lost-Fox													
DDH82005									4.98	5.16	1.46	2.24	
TRC82044							4.02						
Summit													
DDH82007				1.29		2.71	3.91						
Avg. Lost-Fox Summit				1.29		2.71	3.97		4.98	5.16	1.46	2.24	21.81
SPECULATIVE	Average of Hobbit-Broatch Area Weighted Average and Lost-Fox-Summit Average												21.78*
POTENTIAL PROPERTY	50% of Speculative Average												10.9*

* Excludes seam averages or seam weight averages less than 0.5 m

† Not applied to resource calculations due to thickness or low coal/rock ratio

COAL SEAM THICKNESS SUMMARY (cont'd...)

APPLICATION	SEAM COMPOSITE THICKNESS (m)* A	B	C	D	E	F	G	H	I	J	K	L
LOW ASH RESOURCE												
Hobbit-Broatch												
5% Ash												
DDH82001									3.21	0.93		
DDH82006	1.67											
10% Ash												
DDH82001							1.68		1.84		3.45	
DDH82002			0.67*		0.82							
DDH82003					0.86	2.17	1.05		3.92	2.33		
					1.28							
DDH82006					0.63		2.45					
Lost-Fox												
5% Ash												
DDH82005									2.99			
10% Ash												
DDH82005									1.99	3.81		0.90
Summit												
10% Ash												
DDH82007							3.91					

* Not used in resource calculations as weight averaged seam thickness for seam C was less than 0.50 metres

Inferred Resource

Calculations

Summary

Hobbit-Broatch Resource Area

Seam	Resulting Total Seam Tonnage (million tonnes)
K	67.94
J	32.81
I	162.26
H	63.47
G	106.21
F	18.18
E	57.02
D	
C	
B	52.60
A	59.55
TOTAL	620.04

Hobbit-Broatch Resource Figure

Summary

Calculation of Inferred Resources

in the Hobbit-Broatch Resource Area

Section	Resulting Total Seam Tonnage (million tonnes)
500 S	10.27
1000 S	28.52
1500 S	59.55
2000 S	61.15
2500 S	45.43
3000 S	61.70
3500 S	66.22
4000 S	82.41
4500 S	70.66
5000 S	70.28
5500 S	63.85
TOTAL	620.04

Hobbit-Broatch Resource Figure

Section 500 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K					
J					
I					
H	0.110	.500	2.12	1.70	0.20
G	0.395	.500	3.32	1.70	1.11
F					
E	0.885	.500	1.66	1.70	1.25
D					
C					
B	2.200	.500	1.50	1.70	2.81
A	3.455	.500	1.67	1.70	4.90
				TOTAL	10.27

Section 1000 S

K	0.235	.500	3.13	1.70	0.63
J	0.310	.500	1.41	1.70	0.37
I	0.690	.500	6.07	1.70	3.56
H	1.255	.500	2.12	1.70	2.26
G	2.020	.500	3.32	1.70	5.70
F					
E	3.275	.500	1.66	1.70	4.62
D					
C					
B	4.060	.500	1.50	1.70	5.18
A	4.370	.500	1.67	1.70	6.20
				TOTAL	28.52

Section 1500 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	2.570	.500	3.13	1.70	6.84
J	2.700	.500	1.41	1.70	3.24
I	3.220	.500	6.07	1.70	16.61
H	3.605	.500	2.12	1.70	6.50
G	3.820	.500	3.32	1.70	10.78
F					
E	3.850	.500	1.66	1.70	5.43
D					
C					
B	3.810	.500	1.50	1.70	4.86
A	3.725	.500	1.67	1.70	5.29
				TOTAL	59.55

Section 2000 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	2.770	.500	3.13	1.70	7.37
J	2.860	.500	1.41	1.70	3.43
I	3.130	.500	6.07	1.70	16.15
H	3.645	.500	2.12	1.70	6.57
G	3.790	.500	3.32	1.70	10.70
F					
E	4.075	.500	1.66	1.70	5.75
D					
C					
B	4.145	.500	1.50	1.70	5.28
A	4.155	.500	1.67	1.70	5.90
				TOTAL	61.15

Section 2500 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	1.520	.500	3.13	1.70	4.04
J	1.700	.500	1.41	1.70	2.04
I	2.065	.500	6.07	1.70	10.65
H	2.620	.500	2.12	1.70	4.72
G	3.110	.500	3.32	1.70	8.78
F					
E	3.575	.500	1.66	1.70	5.04
D					
C					
B	3.720	.500	1.50	1.70	4.74
A	3.820	.500	1.67	1.70	5.42
				TOTAL	45.43

Section 3000 S

K	2.615	.500	3.13	1.70	6.96
J	2.775	.500	1.41	1.70	3.33
I	3.210	.500	6.07	1.70	16.56
H	3.545	.500	2.12	1.70	6.39
G	3.715	.500	3.32	1.70	10.48
F	3.815	.500	0.87	1.70	2.82
E	3.870	.500	1.66	1.70	5.46
D					
C					
B	3.740	.500	1.50	1.70	4.77
A	3.475	.500	1.67	1.70	4.93
				TOTAL	61.70

Section 3500 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	3.065	.500	3.13	1.70	8.15
J	3.230	.500	1.41	1.70	3.87
I	3.735	.500	6.07	1.70	19.27
H	3.865	.500	2.12	1.70	6.96
G	3.885	.500	3.32	1.70	10.96
F	3.845	.500	0.87	1.70	2.84
E	3.845	.500	1.66	1.70	5.43
D					
C					
B	3.540	.500	1.50	1.70	3.98
A	3.350	.500	1.67	1.70	4.76
				TOTAL	66.22

Section 4000 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	3.900	.500	3.13	1.70	10.38
J	4.195	.500	1.41	1.70	5.03
I	4.460	.500	6.07	1.70	23.01
H	4.805	.500	2.12	1.70	8.66
G	4.720	.500	3.32	1.70	13.32
F	4.715	.500	0.87	1.70	3.49
E	4.720	.500	1.66	1.70	6.66
D					
C					
B	4.530	.500	1.50	1.70	5.78
A	4.285	.500	1.67	1.70	6.08
				TOTAL	82.41

Section 4500 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	3.500	.500	3.13	1.70	9.31
J	3.660	.500	1.41	1.70	4.39
I	3.950	.500	6.07	1.70	20.38
H	3.925	.500	2.12	1.70	7.07
G	3.945	.500	3.32	1.70	11.13
F	3.840	.500	0.87	1.70	2.84
E	3.965	.500	1.66	1.70	5.59
D					
C					
B	3.895	.500	1.50	1.70	4.97
A	3.510	.500	1.67	1.70	4.98
				TOTAL	70.66

Section 5000 S

K	3.335	.500	3.13	1.70	8.87
J	3.570	.500	1.41	1.70	4.28
I	3.725	.500	6.07	1.70	19.22
H	4.120	.500	2.12	1.70	7.42
G	4.125	.500	3.32	1.70	11.64
F	3.990	.500	0.87	1.70	2.95
E	4.030	.500	1.66	1.70	5.69
D					
C					
B	3.795	.500	1.50	1.70	4.84
A	3.780	.500	1.67	1.70	5.37
				TOTAL	70.28

Section 5500 S

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
K	2.025	.500	3.13	1.70	5.39
J	2.360	.500	1.41	1.70	2.83
I	3.265	.500	6.07	1.70	16.85
H	3.730	.500	2.12	1.70	6.72
G	4.115	.500	3.32	1.70	11.61
F	4.385	.500	0.87	1.70	3.24
E	4.320	.500	1.66	1.70	6.10
D					
C					
B	4.230	.500	1.50	1.70	5.39
A	4.030	.500	1.67	1.70	5.72
				TOTAL	63.85

Summary

Lost-Fox Resource Area

Seam	Resulting Total Seam Tonnage (million tonnes)
L	20.20
K	15.76
J	63.02
I	82.56
H	
G	59.79
TOTAL	241.33

Summary

Calculation of Inferred Resources

in the Lost-Fox Resource Area

Section		Resulting Total Seam Tonnage (million tonnes)
500 N		27.78
1000 N		42.36
1500 N		47.30
2000 N		43.85
2500 N		44.30
3000 N		21.77
3500 N		11.42
4000 N		2.55
	TOTAL	241.33

Section 500 N

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
L	1.920	.500	2.24	1.70	3.66
K	2.010	.500	1.46	1.70	2.49
J	2.010	.500	5.16	1.70	8.82
I	2.300	.500	4.98	1.70	9.74
H					
G	.9000	.500	4.02	1.70	3.07
				TOTAL	27.78

Section 1000 N

L	2.48	.500	2.24	1.70	4.72
K	2.520	.500	1.46	1.70	3.13
J	3.007	.500	5.16	1.70	13.19
I	3.465	.500	4.98	1.70	14.67
H					
G	1.945	.500	4.02	1.70	6.65
				TOTAL	42.36

Section 1500 N

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
L	2.410	.500	2.24	1.70	4.58
K	2.610	.500	1.46	1.70	3.24
J	2.670	.500	5.16	1.70	11.71
I	3.730	.500	4.98	1.70	15.78
H					
G	3.510	.500	4.02	1.70	11.99
				TOTAL	47.30

Section 2000 N

L	1.610	.500	2.24	1.70	3.07
K	2.485	.500	1.46	1.70	3.08
J	2.490	.500	5.16	1.70	10.92
I	3.675	.500	4.98	1.70	15.56
H					
G	3.285	.500	4.02	1.70	11.22
				TOTAL	43.85

Section 2500 N

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
L	1.600	.500	2.24	1.70	3.05
K	1.880	.500	1.46	1.70	2.33
J	2.695	.500	5.16	1.70	11.82
I	3.800	.500	4.98	1.70	16.08
H					
G	3.225	.500	4.02	1.70	11.02
				TOTAL	44.30

Section 3000 N

L	0.590	.500	2.24	1.70	1.12
K	0.900	.500	1.46	1.70	1.12
J	1.030	.500	5.16	1.70	4.52
I	1.520	.500	4.98	1.70	6.43
H					
G	2.510	.500	4.02	1.70	8.58
				TOTAL	21.77

Section 3500 N

Seam	Seam Length (km)	Width of Influence (km)	Thickness (m)	Specific Gravity (g/cc)	Tonnes (million)
L					
K	0.300	.500	1.46	1.70	0.37
J	0.465	.500	5.16	1.70	2.04
I	0.795	.500	4.98	1.70	3.37
H					
G	1.650	.500	4.02	1.70	5.64
				TOTAL	11.42

Section 4000 N

L					
K					
J					
I	0.220	.500	4.98	1.70	.93
H					
G	0.475	.500	4.02	1.70	1.62
				TOTAL	2.55

Calculation of Inferred Resources
in the Summit Resource Area

Seam	Thickness (m)	Surface Area (km^2)	Specific Gravity (g/cc)	Tonnes (million)
G	3.91	1.920	1.70	12.76
F	2.71	2.996	1.70	13.80
D	1.29	3.142	1.70	6.89
			TOTAL	33.45

Speculative Resource

Calculations

Summary

Speculative Resource Calculation

for Mt. Klappan Coal Property

Section	Resulting Total Seam Tonnage (million tonnes)
5500 S	44.02
5000 S	36.15
4500 S	38.05
4000 S	26.16
3500 S	26.73
3000 S	27.55
2500 S	25.78
2000 S	27.21
1500 S	28.14
1000 S	19.02
500 S	11.07
000	69.53
1000 N	260.70
3000 N	238.33
5000 N	197.97
7000 N	107.87
9000 N	47.98
TOTAL	1232.26

Section	Jkkm Contact Length (km)	Theoretical Jkkm total Present (km^2)	Planimetered Actual JKkm Present (km^2)	Jkkm Proportion Present (km^2)	Regional Aggregate Coal Thickness (m)	Proportioned Coal Thickness Present (m)	Specific Gravity (g/cc)	Width (km)	Tonnes (million)
500 S	1.36	0.476	0.210	.44	21.78	9.58	1.70	0.5	11.07
1000 S	1.30	0.455	0.360	.79	21.78	17.21	1.70	0.5	19.02
1500 S	1.52	–	–	1.00	21.78	21.78	1.70	0.5	28.14
2000 S	1.47	–	–	1.00	21.78	21.78	1.70	0.5	27.21
2500 S	1.53	0.623*	0.568	.91	21.78	19.82	1.70	0.5	25.78
3000 S	1.60	0.620*	0.577	.93	21.78	20.26	1.70	0.5	27.55
3500 S	1.90	0.728*	0.555	.76	21.78	16.55	1.70	0.5	26.73
4000 S	1.57	0.533*	0.480	.90	21.78	19.60	1.70	0.5	26.16
4500 S	2.57	0.788*	0.632	.80	21.78	17.42	1.70	0.5	38.05
5000 S	3.20	1.120	0.679	.61	21.78	13.29	1.70	0.5	36.15
5500 S	3.35	1.173	0.835	.71	21.78	15.46	1.70	0.5	44.02

*value obtained using a planimeter

Section	Jkkm Contact Length (km)	Theoretical Jkkm total Present (km^2)	Planimetered Actual JKkm Present (km^2)	Jkkm Proportion Present (km^2)	Regional Aggregate Coal Thickness (m)	Proportioned Coal Thickness Present (m)	Specific Gravity (g/cc)	Width (km)	Tonnes (million)
000	5.82	2.037	0.880	.43	21.78	9.37	1.70	0.75	69.53
1000 N	6.52	2.282	1.653	.72	21.78	15.68	1.70	1.50	260.70
3000 N	5.55	1.943	1.124	.58	21.78	12.63	1.70	2.00	238.33
5000 N east	3.59	1.257	0.741	.59	21.78	12.85	1.70	2.00	156.85
west	1.82	0.637	0.388	.61	21.78	13.29	1.70	1.00	41.12
7000 N	2.35	0.823	0.510	.62	21.78	13.50	1.70	2.00	107.87
9000 N	1.92	0.672	0.300	.45	21.78	9.80	1.70	1.50	47.98

Property Resource

Calculations

Summary

Resource Calculations Over Remaining Property

(other than inferred or speculative)

Section	Resulting Total Seam Tonnage (million tonnes)
15 000 N	31.98
13 000 N	42.31
11 000 N	41.91
9 000 N	225.22
7 000 N	181.86
5 000 N	51.45
3 000 N	17.91
1 000 N	2.55
000 N	64.31
1 000 S	141.79
3 000 S	178.25
5 000 S	112.85
7 000 S	66.24
9 000 S	86.81
11 000 S	89.37
TOTAL	1334.81

Resource Calculations Over Remaining Property
(other than inferred or speculative)

		JKkm Contact Length (km)	Theoretical Total JKkm Present (km²)	Planimetered Actual JKkm Present (km²)	JKkm Proportion Present	Regional Aggregate Coal Thickness (m)	Proportioned Coal Thickness Present (m)	Specific Gravity (g/cc)	Width (km)	Tonnes (million)
15,000 N	E	2.62	0.917	0.298	.33	10.89	3.59	1.70	2.00	31.98
	W									
13,000 N	E	4.08	1.428	0.399	.28	10.89	3.05	1.70	2.00	42.31
	W									
11,000 N	E	3.77	1.320	0.392	.30	10.89	3.27	1.70	2.00	41.91
	W									
9,000 N	E	2.22	0.777	0.389	.50	10.89	5.45	1.70	2.00	41.14
	W	7.53	2.636	1.747	.66	10.89	7.19	1.70	2.00	184.08
7,000 N	W	9.27	3.245	1.708	.53	10.89	5.77	1.70	2.00	181.86
5,000 N	E									
	W	4.09	1.432	0.483	.34	10.89	3.70	1.70	2.00	51.45
3,000 N	E									
	W	2.30	0.805	0.168	.21	10.89	2.29	1.70	2.00	17.91
1,000 N	E									
	W	0.54	0.189	0.330	.17	10.89	1.85	1.70	1.50	2.55
0,000	E	0.92	0.322	0.248	.77	10.89	8.39	1.70	0.75	9.84
	E	1.37	0.480*	0.450	.94	10.89	10.24	1.70	0.75	17.89
	W	2.20	0.770	0.380	.49	10.89	5.34	1.70	0.75	14.98
	W	2.78	0.973	0.407	.42	10.89	4.57	1.70	1.00	21.60
1,000 S	E	3.41	1.194	0.822	.69	10.89	7.51	1.70	1.50	65.30
	W	5.30	1.855	0.960	.52	10.89	5.66	1.70	1.50	76.49
3,000 S	E	3.61	1.264	1.055	.83	10.89	9.04	1.70	2.00	110.96
	W	3.43	1.201	0.637	.53	10.89	5.77	1.70	2.00	67.29
5,000 S	E	3.10	1.085	0.613	.56	10.89	6.10	1.70	1.75	56.26
	W	3.49	1.222	0.605	.50	10.89	5.45	1.70	1.75	56.59
7,000 S	E	5.89	2.062	0.559	.27	10.89	2.94	1.70	2.25	66.24
	W									
9,000 S	E	4.04	1.414	0.824	.58	10.89	6.32	1.70	2.00	86.81
	W									
11,000 S	E	3.50	1.225*	0.845	.69	10.89	7.51	1.70	2.00	89.37
	W									
									TOTAL	1334.81

*value obtained using planimeter

COAL AVAILABLE TO PRODUCE

LOW ASH PRODUCTS

TONNAGES CALCULATIONS

5% Ash
Coal Tonnage Calculations

Hobbit-Broatch Area

Seam	Drill Hole	Resulting Tonnage (millions)	Seam Thickness (m)	Composite Seam Thickness	Proportionated Tonnage (millions)	Area of Influence (%)	Actual Low Ash Tonnage (millions)
J	82001	32.81	1.41	0.93	21.64	66	14.28
I lower	82001	162.26	6.07 total	3.21	85.81	66	56.63
A	82006	59.55	1.67	1.67	59.55	100	59.55
						TOTAL	130.46

5% Ash
Coal Tonnage Calculations

Lost Fox Area

Seam	Drill Hole	Resulting Tonnage (millions)	Seam Thickness (m)	Composite Seam Thickness	Proportionated Tonnage (millions)	Area of Influence (%)	Actual Low Ash Tonnage (millions)
I	82005	82.56	4.98	2.99	49.57	100	49.57
						TOTAL	49.57

10% Ash
Coal Tonnage Calculations

Hobbit-Broatch Area

Seam	Drill Hole	Resulting Tonnage (millions)	Seam Thickness (m)	Composite Seam Thickness	Proportionated Tonnage (millions)	Area of Influence (%)	Actual Low Ash Tonnage (millions)
K	82001	67.94	3.13	3.45	74.89	66	49.42
I upper	82001	162.26	6.07	1.84	49.19	66	32.46
G	82001	106.21	3.32	1.68	53.74	15	8.06
E lower	82002	57.02	1.66 total	0.82	28.17	19	5.35
C*	82002			0.67			
J	82003	32.81	1.41	2.33	54.22	34	18.43
I	82003	162.26	6.07	3.92	104.79	34	35.63
G	82003	106.21	3.32	1.05	33.59	27	9.07
F	82003	18.18	0.87	2.17	45.35	35	15.87
E upper	82003	57.02	1.66 total	0.86	29.54	35	10.34
E lower	82003	57.02	1.66 total	1.28	43.97	35	15.39
G	82006	106.21	3.32	2.45	78.38	25	19.59
E	82006	57.02	1.66	0.63	21.64	25	5.41
						TOTAL	225.02

*weight averaged at less than 0.50 metres and not used in calculations

10% Ash
Coal Tonnage Calculations

Lost-Fox Area

Seam	Drill Hole	Resulting Tonnage (millions)	Seam Thickness (m)	Composite Seam Thickness	Proportionated Tonnage (millions)	Area of Influence (%)	Actual Low Ash Tonnage (millions)
L	82005	20.20	2.24	0.90	8.12	100	8.12
J	82005	63.02	5.16	3.54	43.23	100	43.23
I	82005	82.56	4.98	1.99	32.99	100	32.99
						TOTAL	84.34

10% Ash
Coal Tonnage Calculations

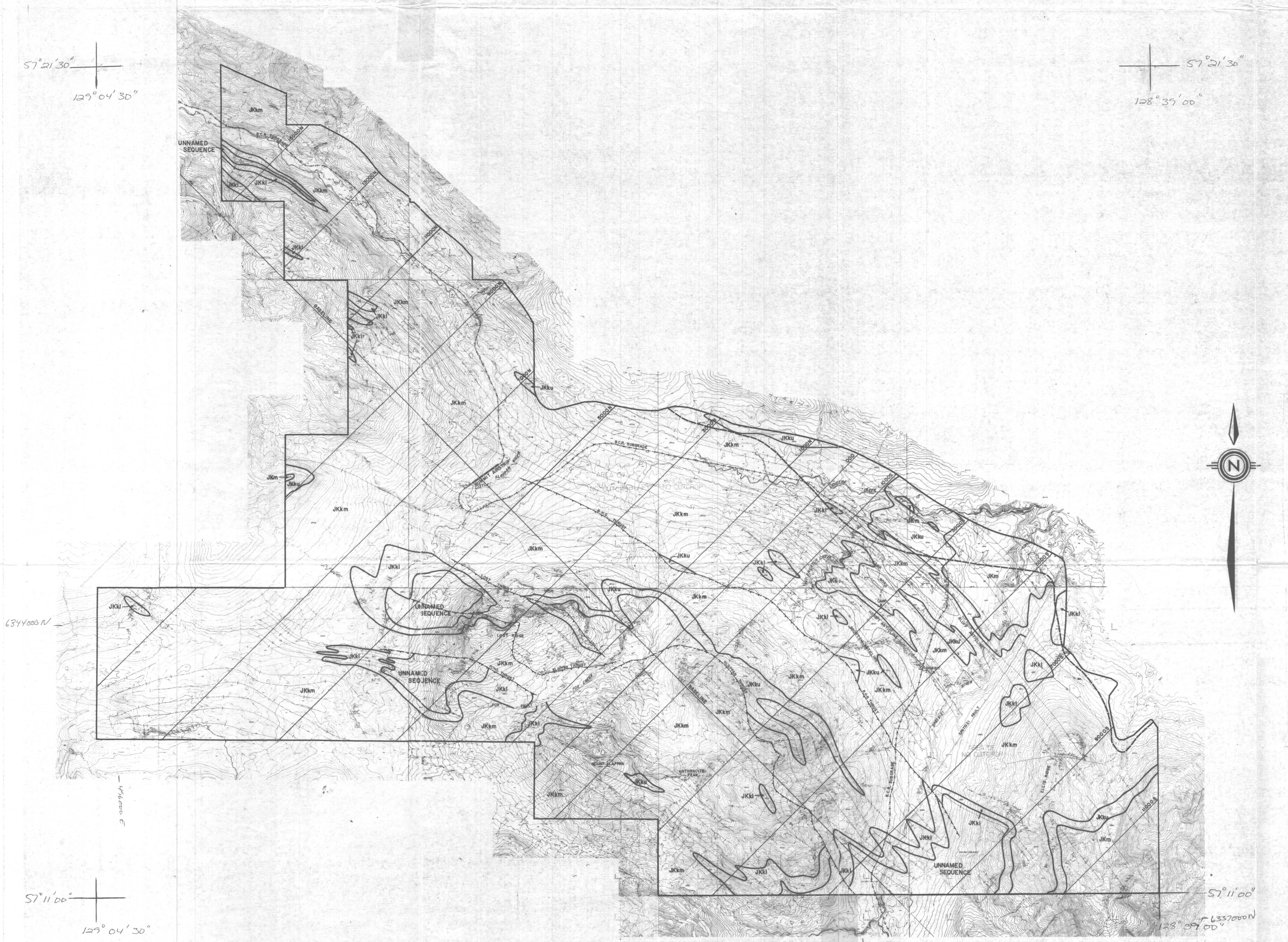
Summit Area

Seam	Drill Hole	Resulting Tonnage (millions)	Seam Thickness (m)	Composite Seam Thickness	Proportionated Tonnage (millions)	Area of Influence (%)	Actual Low Ash Tonnage (millions)
G	82007	12.76	3.91	3.91	12.76	100	12.76
						TOTAL	12.76

APPENDIX F

1:50 000 GEOLOGICAL MAP

(M1)



LEGEND

- LICENCE BOUNDARY
- GEOLOGICAL CONTACT (INFERRED)
- COAL SEAM (OUTCROP, INFERRED)
- ANTICLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
- SYNCLINE (DEFINED, APPROXIMATE) ARROW INDICATES PLUNGE DIRECTION
- OVERTURNED ANTICLINE (DEFINED, APPROXIMATE)
- OVERTURNED SYNCLINE (DEFINED, APPROXIMATE)
- BEDDING (HORIZONTAL, INCLINED, OVERTURNED, VERTICAL)
- THRUST FAULT (DEFINED, APPROXIMATE, INFERRED) TEETH INDICATE UPTHRUST SIDE
- FAULT (DEFINED, APPROXIMATE, INFERRED) SOLID CIRCLE INDICATES DOWNTHROWN SIDE
- TRENCH LOCATION — MEASURED SECTION LOCATION
- 2000 — CROSS-SECTION LOCATION
- DIAMOND DRILLHOLE LOCATION (VERTICAL, INCLINED WITH SURFACE PROJECTION)
- REDEFINED PROPERTY BOUNDARY

MALLOCH SEQUENCE

JKm	Sequences of fine to coarse to granular sandstones, siltstone and claystone with rare thin coal.

KLAPPAN SEQUENCE

JKku	Interbedded fine to medium grained sandstone, siltstone and claystone with minor coal.
JKkm	Repeated coarsening upward sequences of fine to medium-grained sandstone, occasionally conglomeratic, siltstone, claystone and coal; sediments display cross-bedding and ripple marks and contain abundant plant fragments and rare bivalves towards the base.
JKkl	Interbedded massive, fine grained sandstone and siltstones, containing bivalve fossils, with minor coal.

1: 50,000

0 1 2 3 4 5

Scale in kilometres

110

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROPERTY

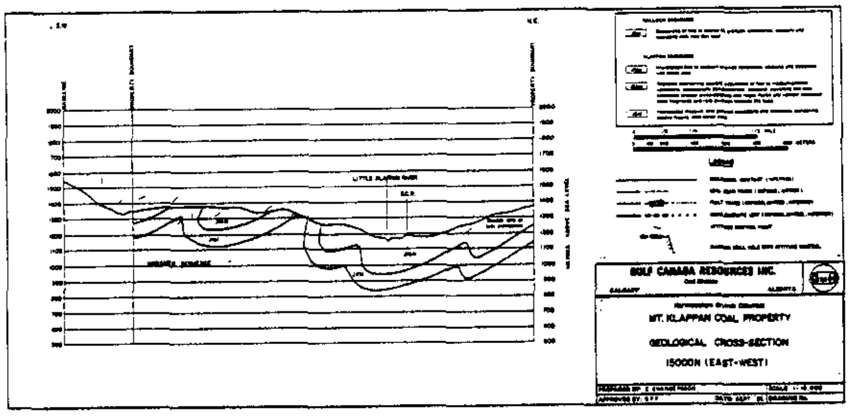
GEOLOGY

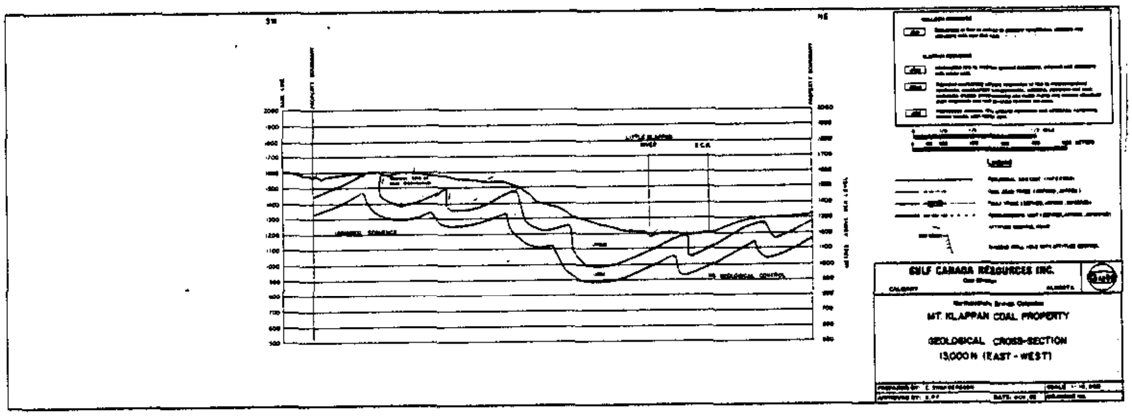
GR-Mt Klappan 82(2*)A *(4)

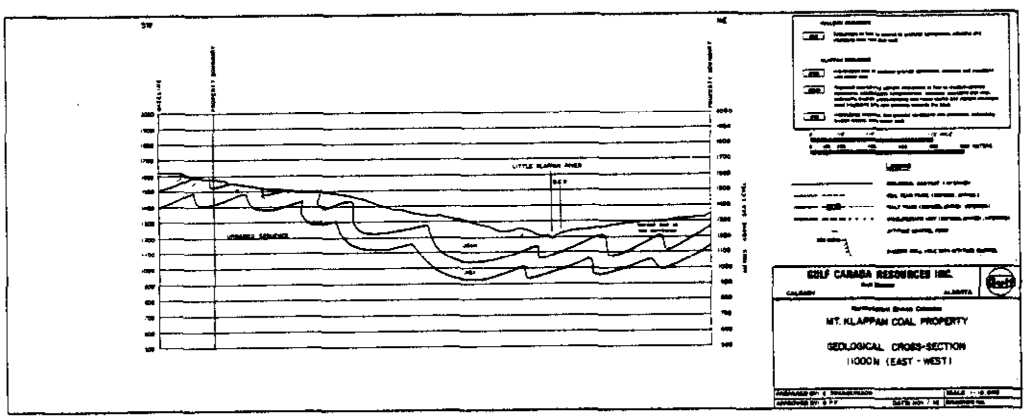
PREPARED BY: G. SEVE	SCALE 1: 50,000
APPROVED BY: B.P.F DATE: NOV., 1982	DRAWING No. KPN-82-105

APPENDIX G

1:50 000 CROSS SECTIONS

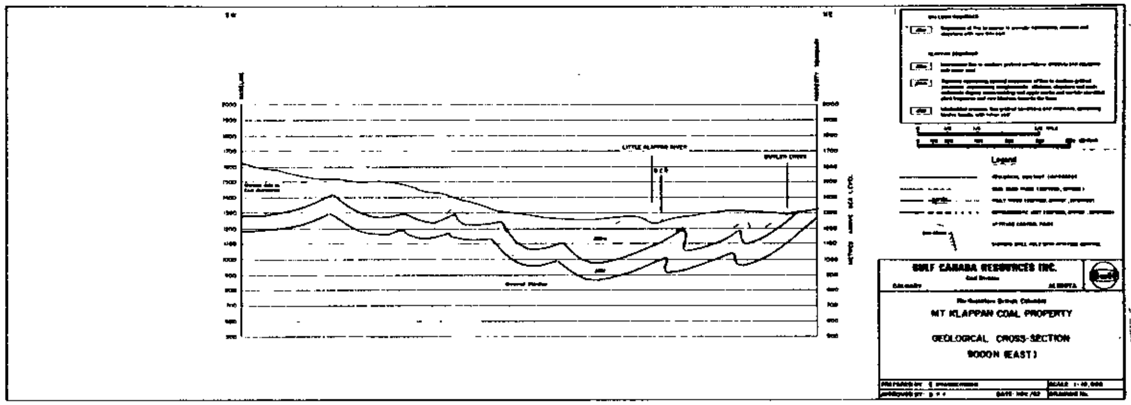


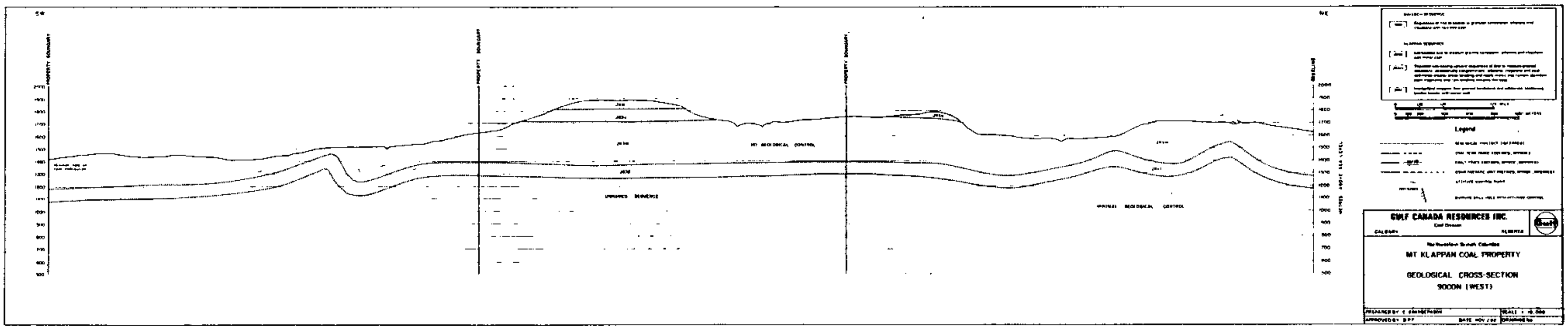




SCALE: 1 : 50,000

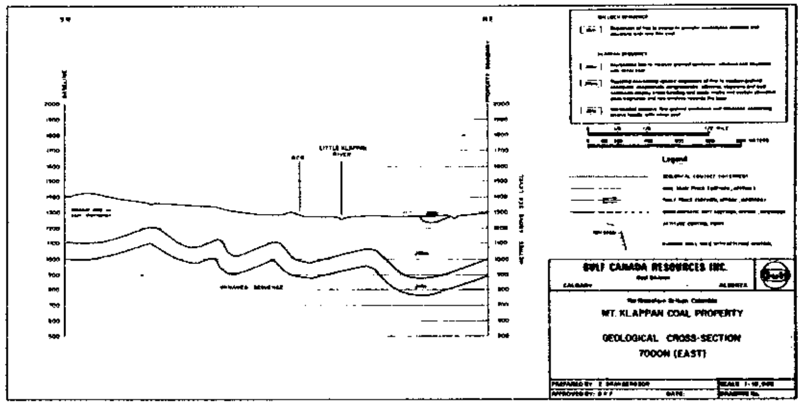
KPN-82-106

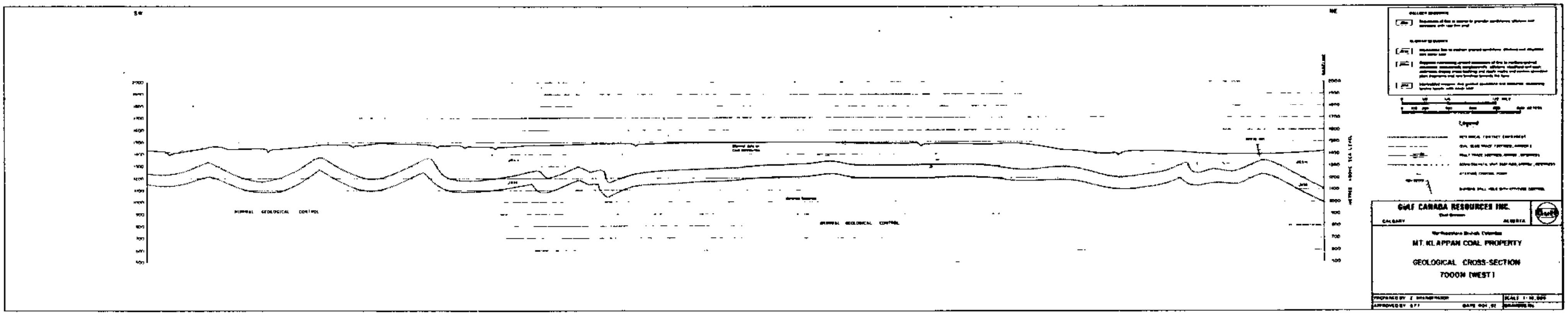




SCALE: 1:50,000

KPN-82-107





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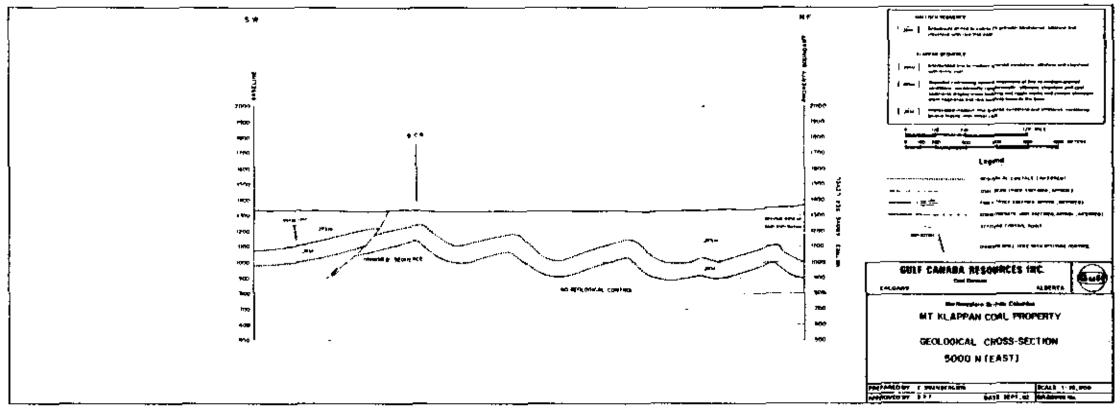
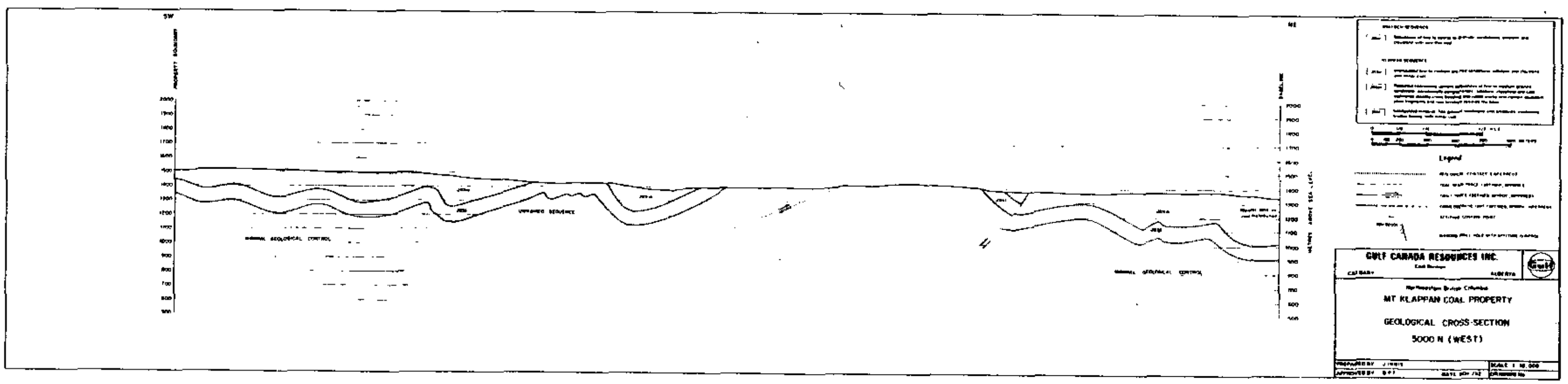
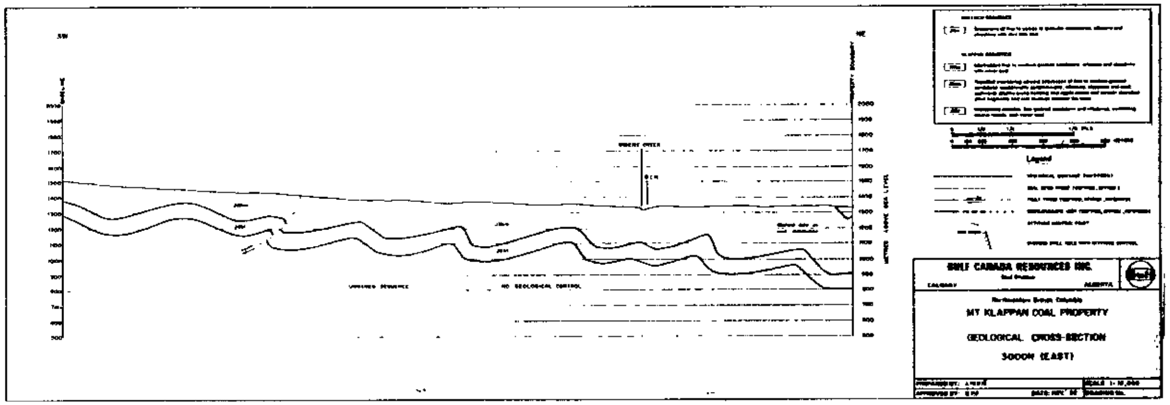
KPN-82-108

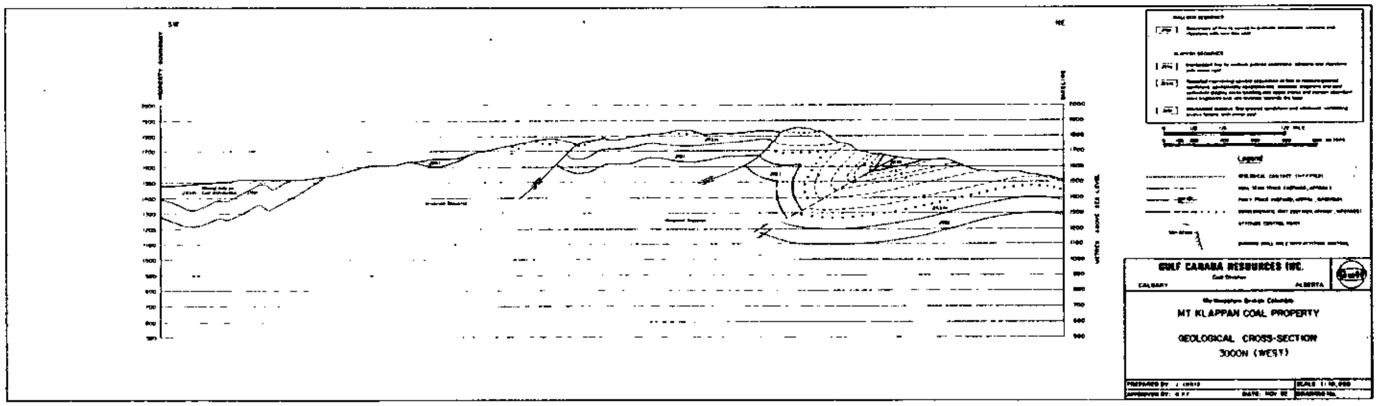




SCALE : 1 : 50,000

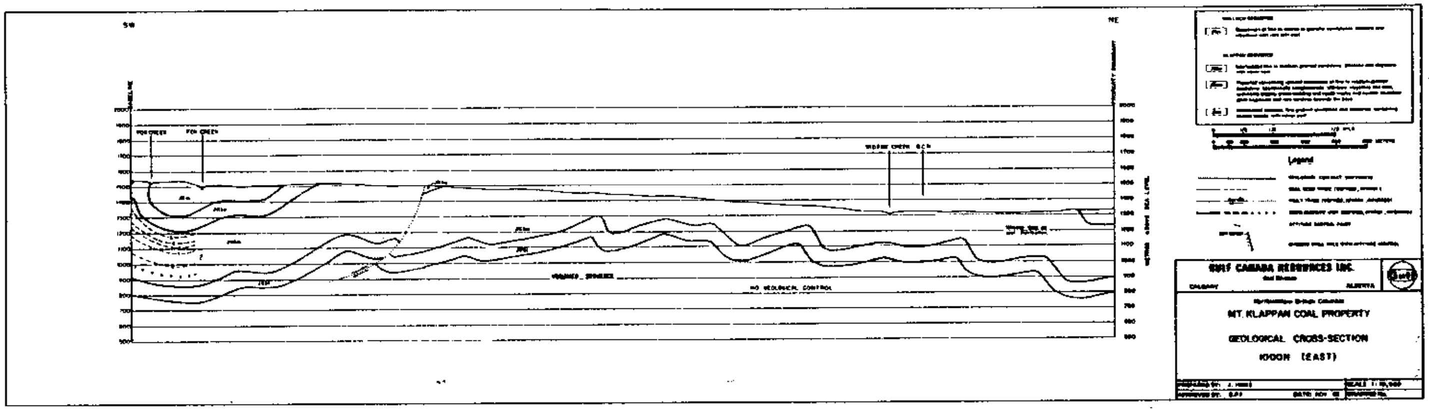
KPN-82-109

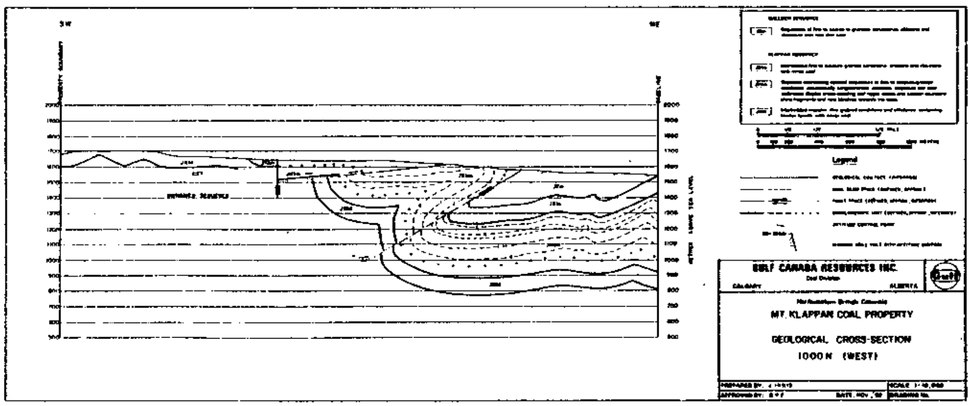




SCALE: 1:50,000

KPN-82-110





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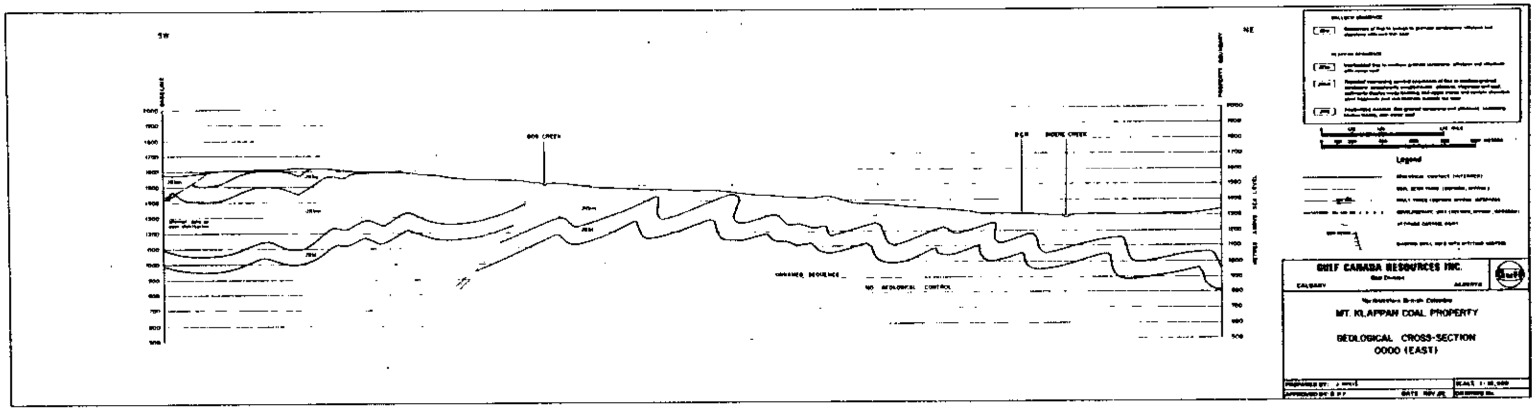
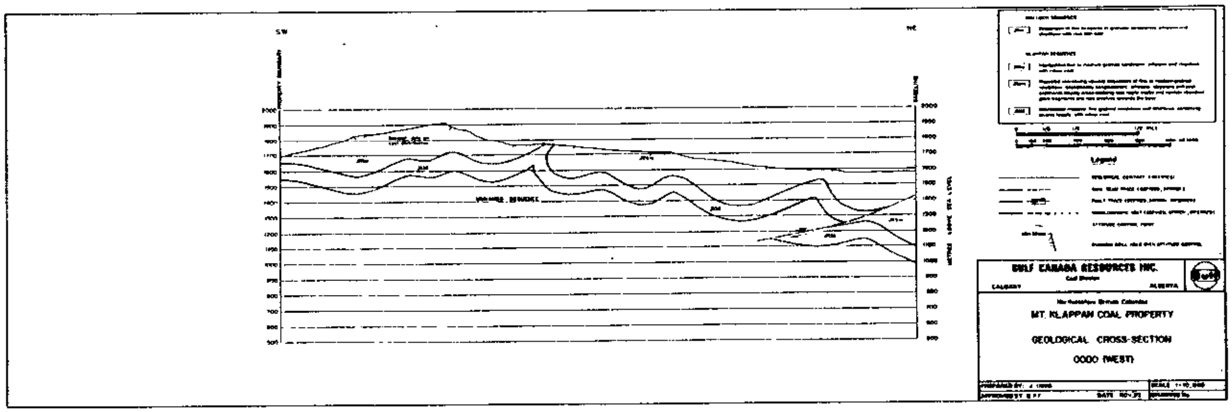
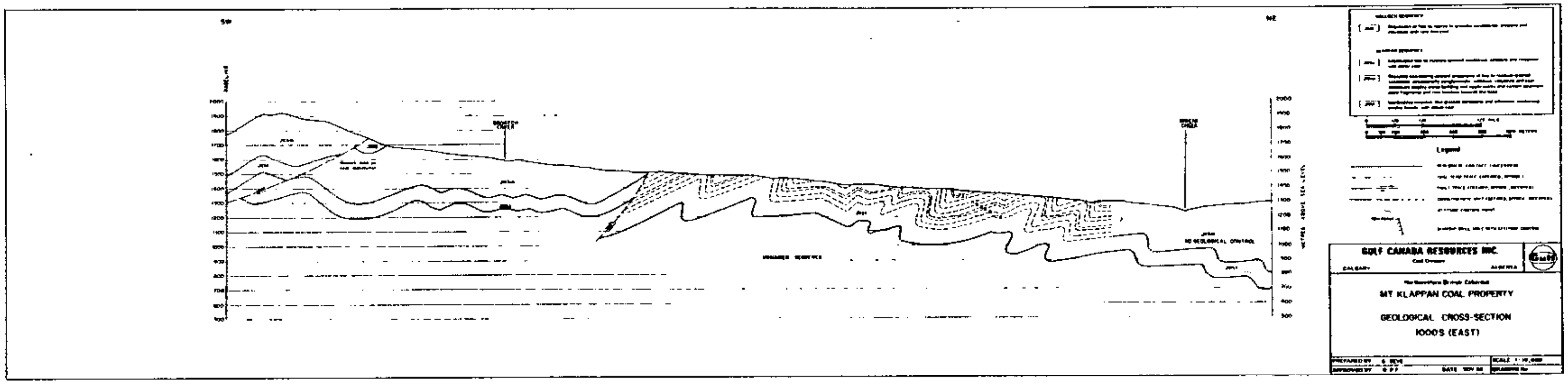
KPN-82-111

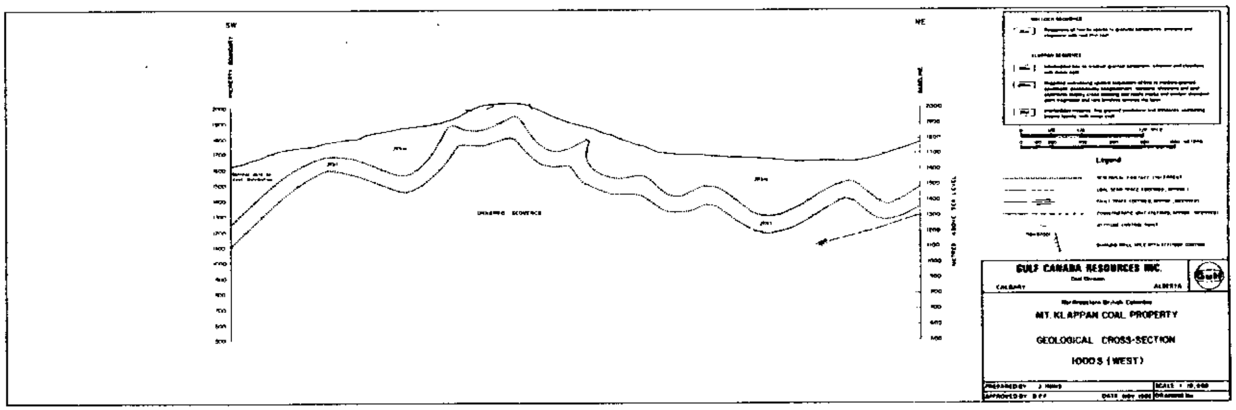




SCALE : 1:50,000

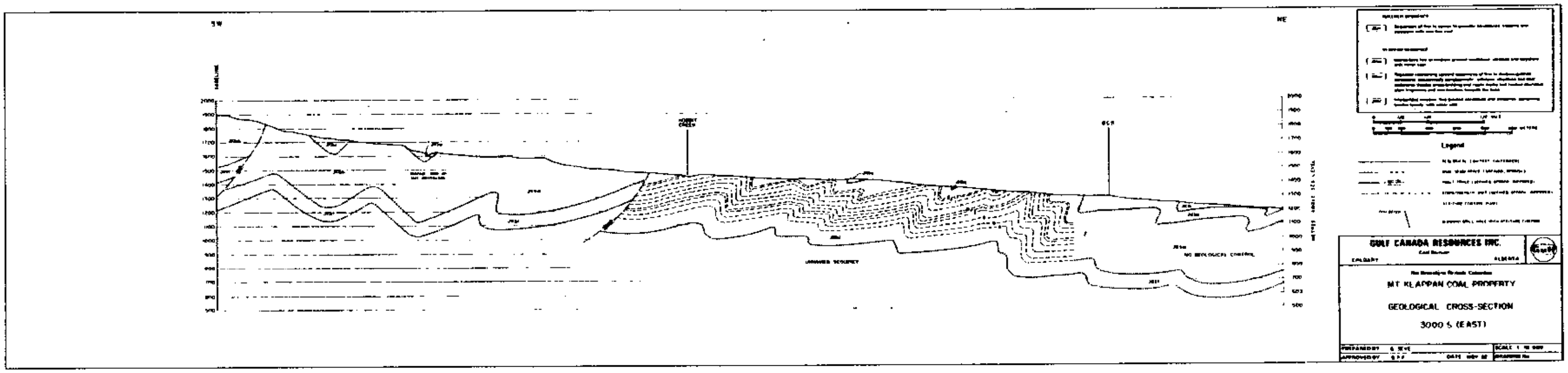
KPN-82-112

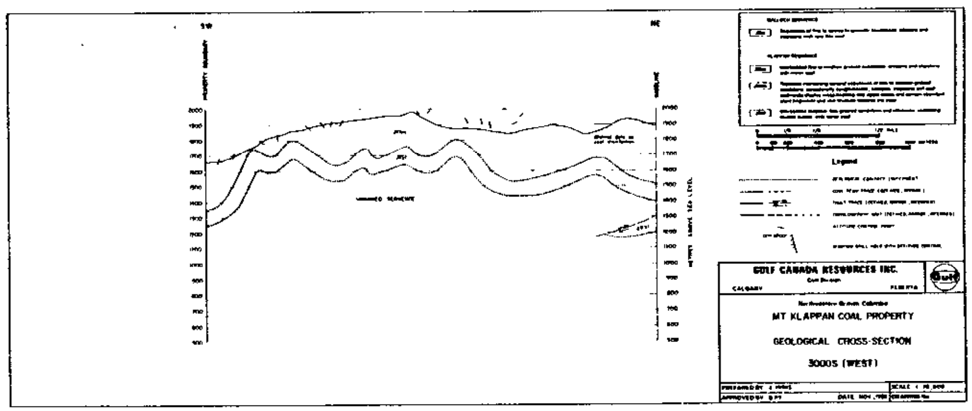




SCALE: 1:50,000

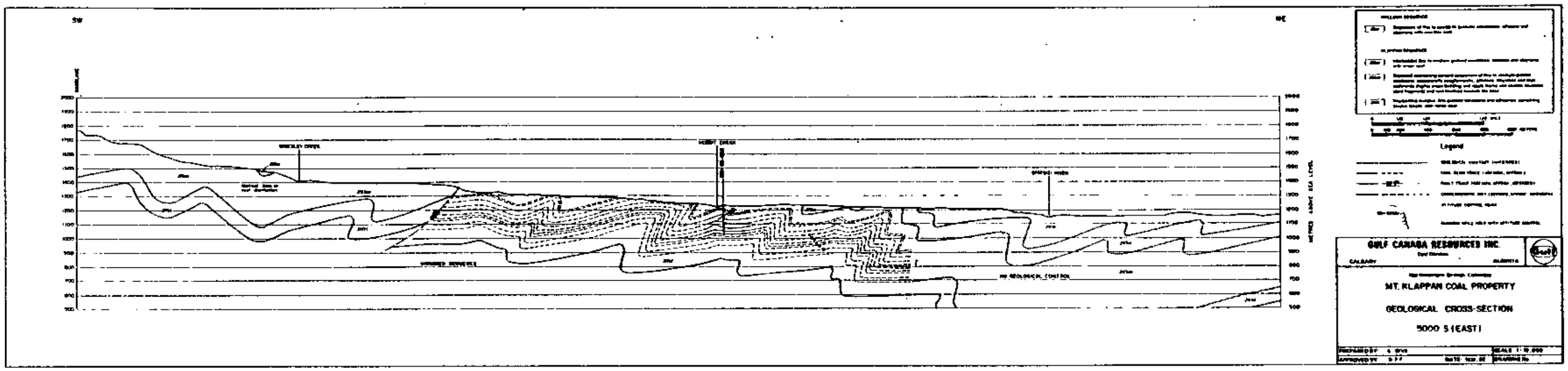
KPN-82-113

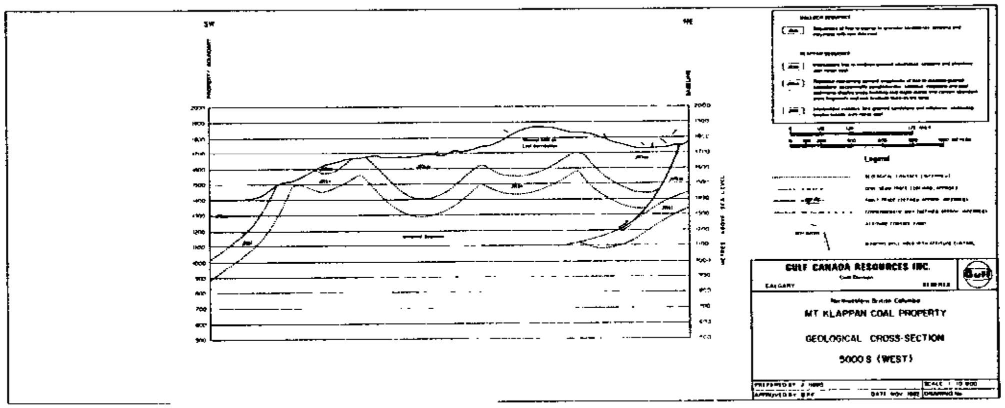




SCALE: 1:50,000

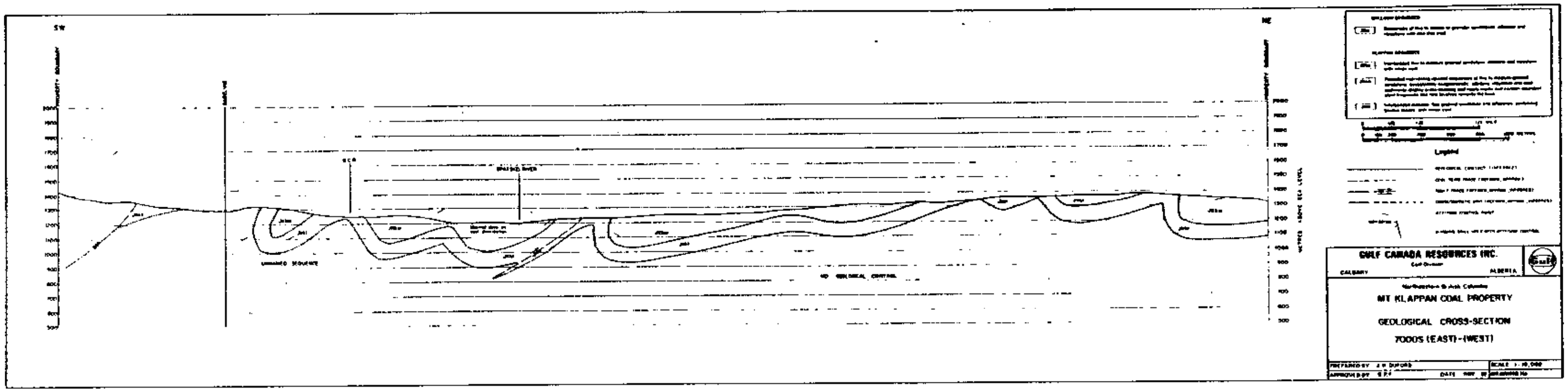
KPN-82-114

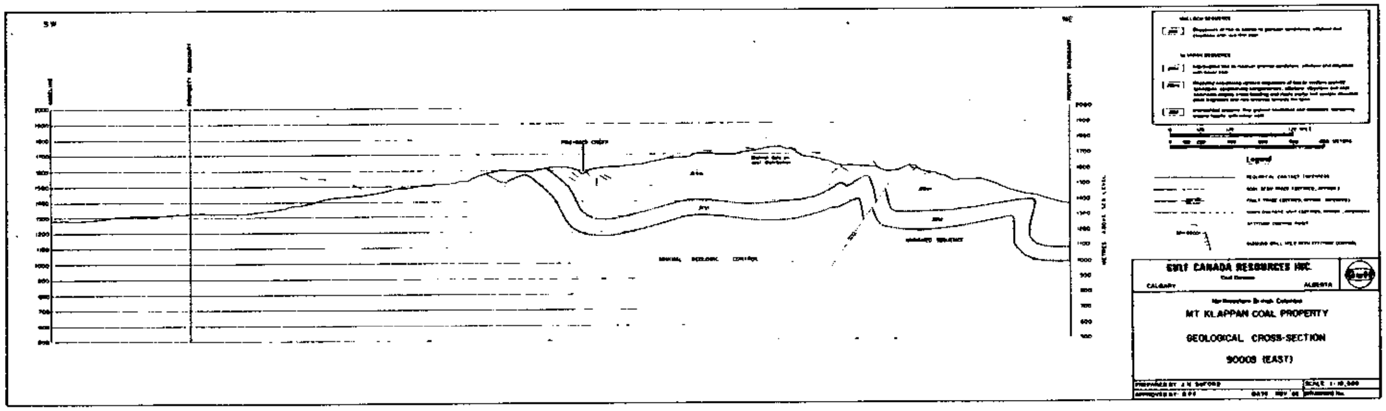


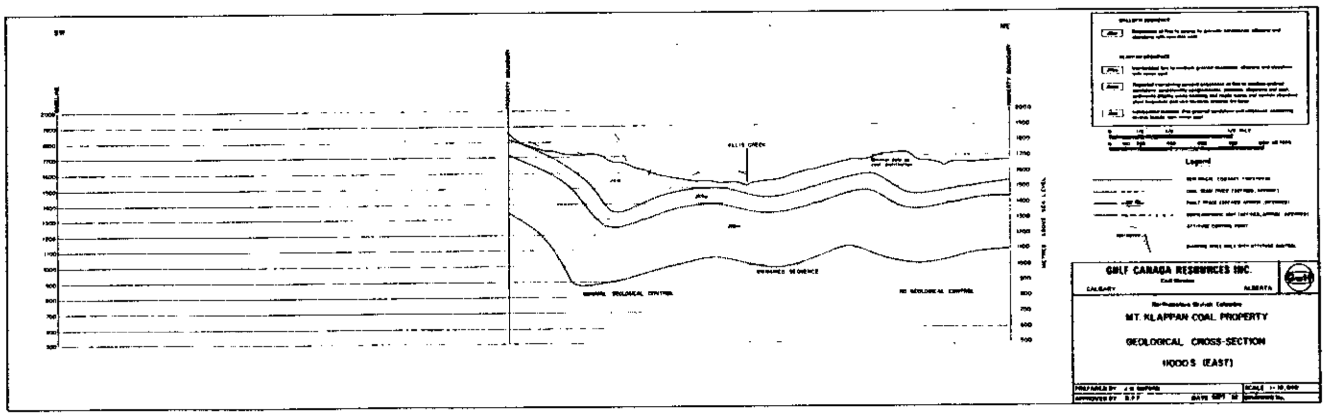


SCALE: 1:50,000

KPN-82-115



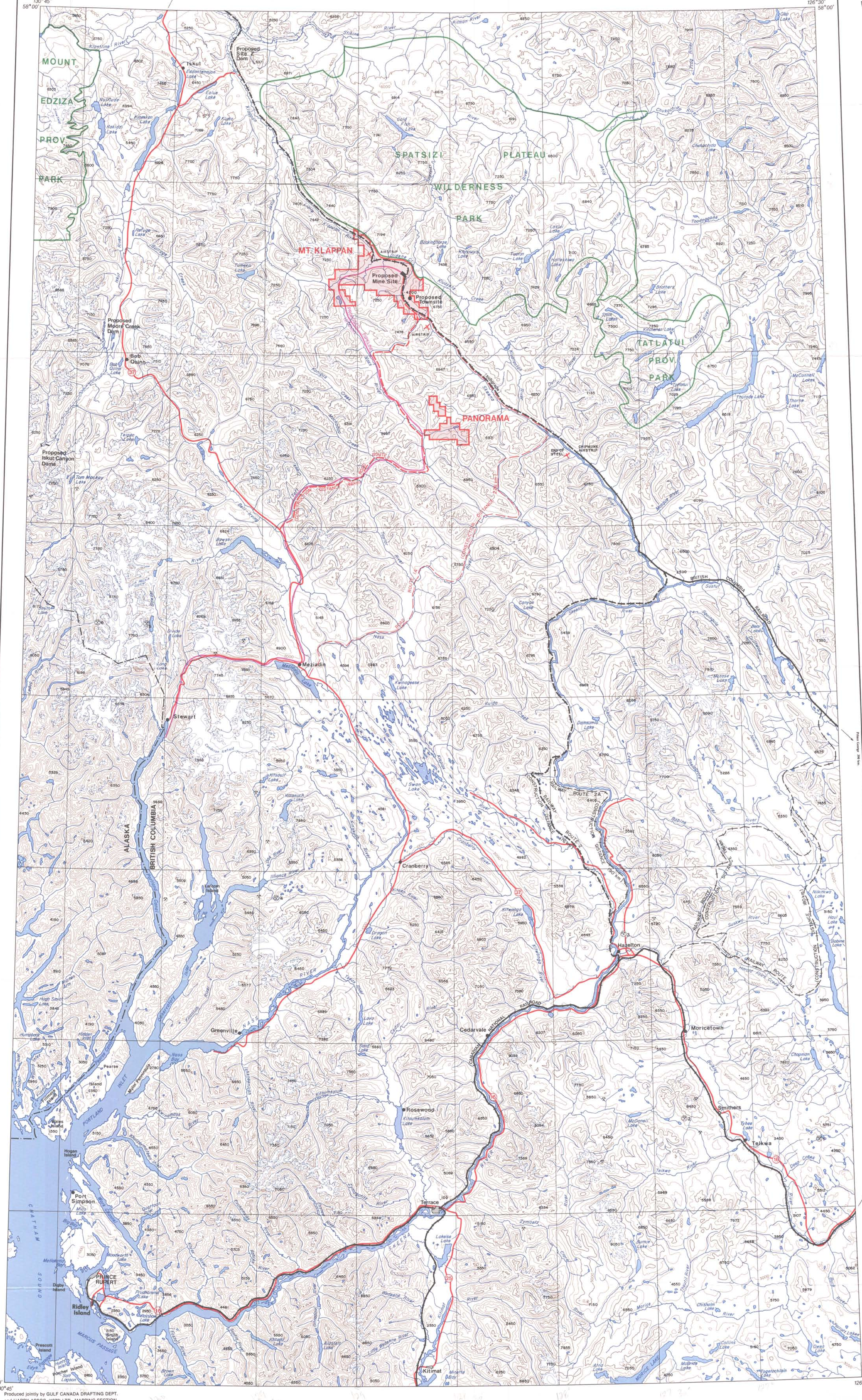




SCALE : 1:50,000 KPN-82-116

APPENDIX H

1:500 000 MAP OF N.W. B.C.



Produced jointly by GULF CANADA DRAFTING DEPT. and HARDY ASSOC. (1978) LTD., MAPPING SECTION.

Revised to January, 1983.

LEGEND

Highway	
Road, proposed	
Road, alternate	
Railway	
Proposed Railway cut-off	
Alternate Railway cut-off	
Pipeline, possible	
Proposed Dam Site	
Gulf Property	
Proposed Pit, Mt. Klappan property	
Proposed Townsite, Mt. Klappan property	
Boundary, Park or Reserve	
Boundary, International	
Spot Elevation (feet above sea level)	· 6750
Contours (1000 Foot Interval)	2000
Producing Mine (see separate list)	4
Prospect	
City, Town	

GULF CANADA RESOURCES INC.

NORTHWEST BRITISH COLUMBIA

REFERENCE NOTE

Producing Mines: from The Northwest Region — B.C. Regional Economic Study, 1982.

Prospects: from Kitimat-Stikine Regional District — 1:500,000 Regional Resource Map, 1981.

Base Map: from Dept. of Energy, Mines and Resources, Surveys and Mapping Branch, current N.T.S. series maps.

SCALE 1: 500,000

Kilometres 10 5 0 10 20 30 40 50 Kilometres

Miles 5 0 10 20 30 Miles

110

GR-Mt Klappan 82(2)A (1)

PRODUCING MINES

1 DOME MOUNTAIN — Ag, Pb, Zn
2 DUTHIE — Ag, Pb, Zn, Au, Cd, Cu
3 SILVER STANDARD — Ag, Pb, Zn, Au, Cu
4 KITSAULT — Mo
5 SCOTTIE GOLD — Au, Ag
6 GRANDUC — Cu, Ag, Au

KEY MAP

GR - MT. KLAPPAN 82(3)A

~~CONFIDENTIAL~~

APPENDIX I

Trench Data

00110 (1)

FOREWORD

The data contained within Volumes I and II represent the results of the diamond drilling program. Appendix II is arranged sequentially by drill hole, with header, core logs and geophysical logs contained in each section.

APPENDIX I
Trenches
TABLE OF CONTENTS

APPENDIX I
Trenches
TABLE OF CONTENTS

BROATCH CREEK

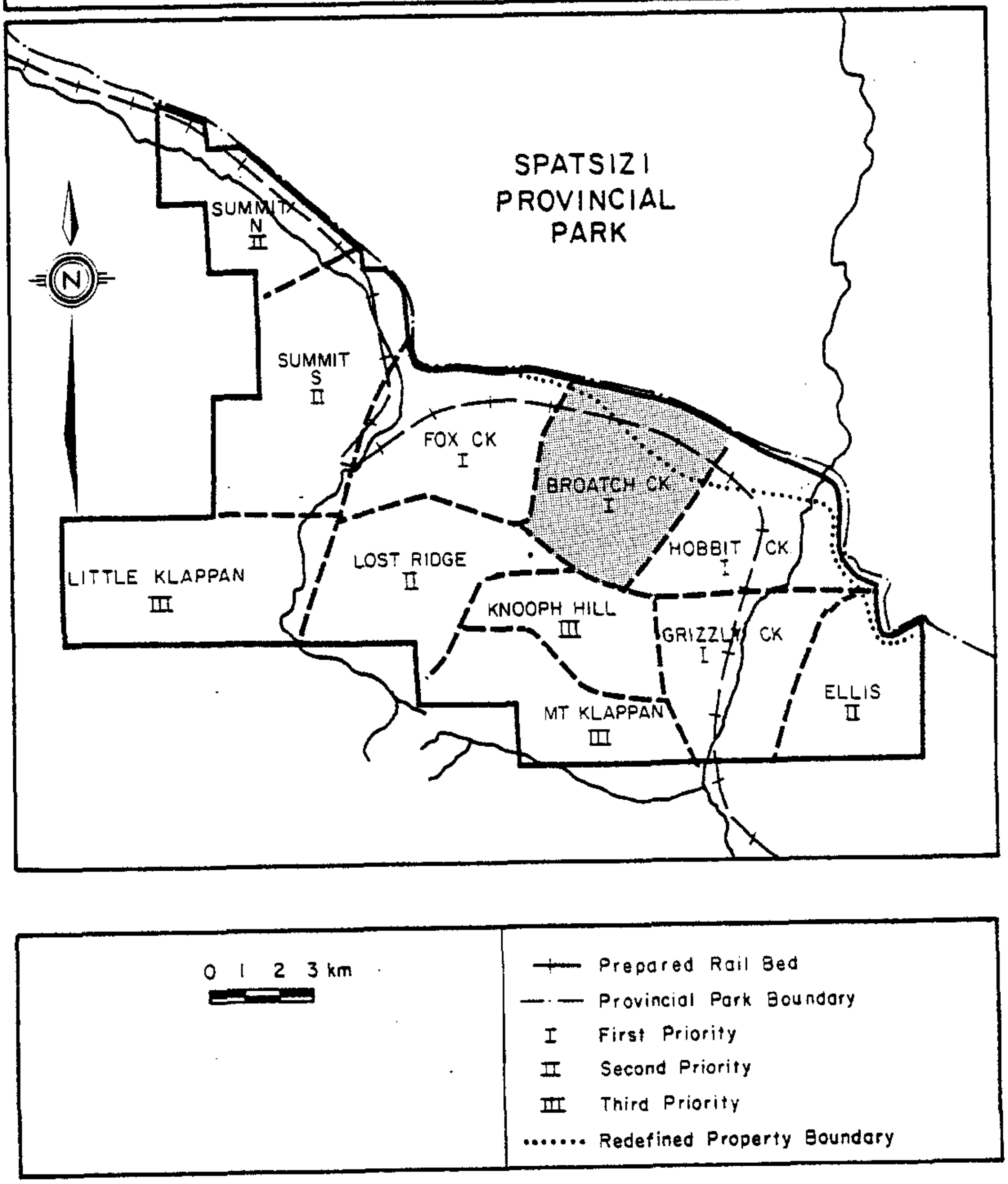
GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 PROJECT DATA SOURCE SUMMARY PAGE 1

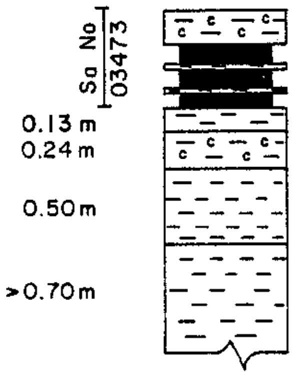
DATA SOURCE	LOCATION NORTHING	LOCATION EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNBCTRC82005	6345835.0	513640.0	1380.0	2.5	52.0	40.0	
KPNBCTRC82006	6345655.0	513495.0	1380.0	3.3	90.0	40.0	
KPNBCTRC82011	6345170.0	512625.0	1455.0	3.0	90.0	30.0	
KPNBCTRC82012	6345115.0	512615.0	1455.0	4.5	0.0	60.0	
KPNBCTRC82013	6344905.0	512245.0	1480.0	6.7	0.0	40.0	
KPNBCTRC82014	6344705.0	512410.0	1488.0	1.9	35.0	165.0	
KPNBCTRC82015	6345065.0	512770.0	1460.0	2.9	5.0	18.0	
KPNBCTRC82016	6344620.0	512338.0	1490.0	2.3	70.0	40.0	
KPNBCTRC82017	6345600.0	513425.0	1390.0	3.6	45.0	110.0	
KPNBCTRC82018	6345830.0	513540.0	1380.0	2.3	80.0	30.0	
KPNBCTRC82019	6344750.0	512100.0	1490.0	7.0	7.0	28.0	
KPNBCTRC82020	6343970.0	511030.0	1600.0	6.0	30.0	10.0	
KPNBCTRC82038	6343900.0	510130.0	1660.0	4.0	40.0	85.0	
KPNBCTRC82041	6346330.0	514400.0	1360.0	5.0	50.0	117.0	

MT. KLAPPAN COAL PROPERTY

1982 EXPLORATION MAPPING AREAS



	ROCK	COAL
0.60	0.20	
	0.01	0.15
		0.12
	0.02	0.10
TOTAL	0.23	0.37



CLAYSTONE, CARBONACEOUS WITH BRIGHT COAL BANDS
COAL, DULL AND BRIGHT
MUDSTONE, GRAY, SOFT
COAL; DULL BANDED
MUDSTONE; SOFT, BROWN
COAL, DULL
MUDSTONE; GRAY, SOFT
CLAYSTONE, CARBONACEOUS
SHALE: GRAY, FRACTURING ALONG BEDDING
MUDSTONE: DARK GRAY, FRACTURING ALONG BEDDING

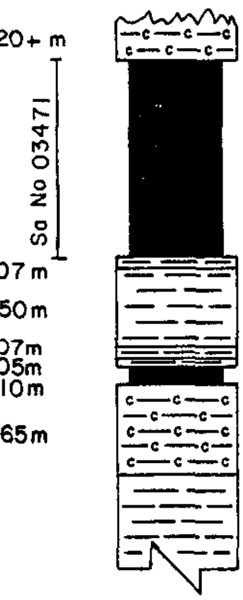
ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 130/25N
FORMATION :
UTM COORDINATES : 6345835 N, 513640E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.0 m
TRENCH WIDTH : 0.6 m
TRENCH LENGTH : 2.5 m
TRENCH BEARING : 40°
TRENCH SLOPE : 52°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–005

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 4/82
APPROVED BY:	

	ROCK	COAL
	1.25	1.18
		0.07
TOTAL	0.00	1.25



0.20+ m	CLAYSTONE : CARBONACEOUS
	COAL : HIGHLY WEATHERED
	COAL : HARD (ANTHRACITE)
0.07 m	SHALE : HARD
0.50 m	MUDSTONE : SOFT, SLIGHTLY CARBONACEOUS UPPER PART
0.07m	SHALE : HARD
0.05m	MUDSTONE : SOFT
0.10m	COAL
0.65m	CLAYSTONE : CARBONACEOUS
	SHALE : HARD, SANDSTONE INTERBEDS

ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 150/20°
FORMATION :
UTM COORDINATES : 6345655 N, 513495 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.00 m
TRENCH WIDTH : 1.00 m
TRENCH LENGTH : 3.50 m
TRENCH BEARING : 90°
TRENCH SLOPE : 75°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

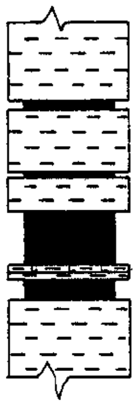
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–006

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE 82/07/04
APPROVED BY:	

	ROCK	COAL
0.57		0.35
	0.05	
	0.04	0.13
TOTAL	0.09	0.48



0.50+ m	SHALE: GRAY, FRACTURING ALONG BEDDING
0.05 m	COAL: WEATHERED
0.42 m	SHALE: GREY, SOFT, FRACTURING ALONG BEDDING
0.03 m	COAL: WEATHERED
0.22 m	SHALE: MASSIVE, RESISTIVE, GRAY
Sa No 03457	COAL: DULL AND BRIGHT, WEATHERED
	CARBONACEOUS CLAYSTONE: SOFT
	SHALE: BROWN, SOFT
	COAL: WEATHERED
0.50+ m	SHALE: INTERBEDDED HARD AND SOFT UNITS

ATTITUDE OF ROOF : 118/77° N
ATTITUDE OF FLOOR : 135/85° N
FORMATION :
UTM COORDINATES : 6345170 N, 512625 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.6 m
TRENCH WIDTH : 1.0 m
TRENCH LENGTH : 3.0 m
TRENCH BEARING : 30°
TRENCH SLOPE : 90°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

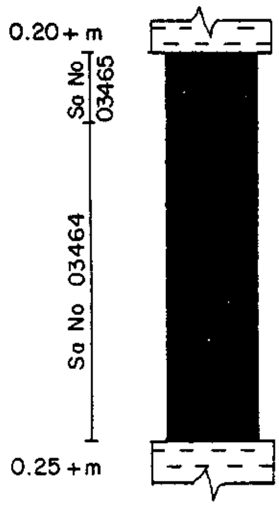
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–011

DRAWN BY:	SCALE 1 : 50
LOGGED BY:	DATE July 10/82
APPROVED BY:	

	ROCK	COAL
		0.45
2.53		2.08
TOTAL	0.00	2.53



SHALE: GRAY, HARD, MASSIVE

COAL: HARD, IRON STAINING ROCK PARTICLES IN PART

COAL: WEATHERED, MINOR IRON STAINING IN PART

SHALE: GRAY, FRACTURING ALONG BEDDING, WEAKLY BEDDED

ATTITUDE OF ROOF	:	N/A
ATTITUDE OF FLOOR	:	145/66° N
FORMATION	:	
UTM COORDINATES	:	6345115 N, 512615 E
MAP CARD NUMBER	:	
AIR PHOTO NUMBER	:	
TRENCH DEPTH	:	1.1 m
TRENCH WIDTH	:	0.5 m
TRENCH LENGTH	:	4.5 m
TRENCH BEARING	:	60°
TRENCH SLOPE	:	HORIZONTAL

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

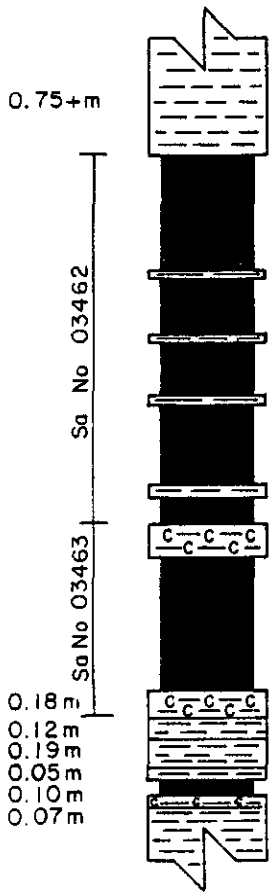
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–012

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 10/82
APPROVED BY:	

	ROCK	COAL
		0.76
	0.04	
		0.36
	0.05	
		0.33
3.42	0.05	
		0.51
	0.08	
		0.18
	0.20	
		0.86
TOTAL	0.42	3.00



SHALE: GRAY, FRACTURING ALONG BEDDING, MINOR ORANGE-BROWN INTERBEDS

COAL: WEATHERED, DULL AND BRIGHT BANDED, IRON STAINING IN PART

MUDSTONE: BROWN, SOFT

COAL: WEATHERED, DULL BANDED

MUDSTONE: BROWN, SOFT

COAL: WEATHERED, DULL BANDED

MUDSTONE: BROWN, SOFT

COAL: ANTHRACITIC IN PART, DULL AND BRIGHT

MUDSTONE: GRAY, SOFT

COAL: DULL BANDED

CARBONACEOUS CLAYSTONE

COAL: DULL BANDED

CARBONACEOUS CLAYSTONE

MUDSTONE: ORANGE-BROWN, SOFT

MUDSTONE: GRAPHITIC LUSTRE, POSSIBLY CARB.

MUDSTONE: ORANGE-BROWN, SOFT

COAL: HIGHLY WEATHERED

CARBONACEOUS CLAYSTONE

SHALE: DARK GRAY, WEATHERS TAN

ATTITUDE OF ROOF : 130/53°S
ATTITUDE OF FLOOR : 160/54°S
FORMATION :
UTM COORDINATES : 6344905 N, 512245E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.80m
TRENCH WIDTH : 0.70m
TRENCH LENGTH : 6.7 m
TRENCH BEARING : 40°
TRENCH SLOPE : Horizontal

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

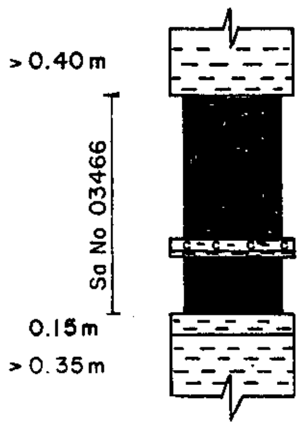
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–013

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 11, 1982
APPROVED BY:	

	ROCK	COAL
		0.94
1.40	0.07	
	0.04	
		0.35
TOTAL	0.11	1.29



MUDSTONE : DARK GRAY, MASSIVE, HARD IN PART, IRREGULAR FRACTURING

COAL : HIGHLY WEATHERED

CLAYSTONE : CARBONACEOUS
MUDSTONE : BROWN, SOFT

COAL : HIGHLY WEATHERED

MUDSTONE : DARK GRAY, CARBONACEOUS IN PART

SHALE : GRAY, MINOR CALCITIC VEINING

ATTITUDE OF ROOF : 098/65 °S (?)
ATTITUDE OF FLOOR : 065/76° N (?)
FORMATION :
UTM COORDINATES : 6344705N, 512410E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.5 m (MAX)
TRENCH WIDTH : 0.9 m
TRENCH LENGTH : 1.9 m
TRENCH BEARING : 165°
TRENCH SLOPE : 35°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

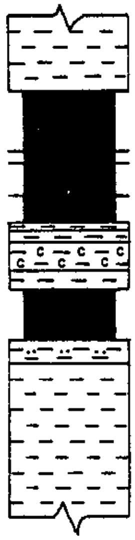
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–014

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 11, 1982
APPROVED BY:	

ROCK	COAL
	0.38
0.81	0.06
	0.20
	0.17
TOTAL 0.00	0.81



Sa No 03456

>0.50 m	SHALE: GRAY, PLANT FRAGMENTS, SUB FISSILE
	COAL: HIGHLY WEATHERED
	COAL: HARD
	COAL: DULL AND BRIGHT
	COAL: DULL BANDED
0.04 m	SHALE: DARK GRAY, SOFT
0.09 m	SHALE: LIGHT GRAY, SOFT
0.18 m	CARBONACEOUS CLAYSTONE
0.11 m	SHALE: LIGHT GRAY, SOFT
0.33 m	COAL: DULL AND BRIGHT
0.14 m	SHALE: LIGHT ORANGE-BROWN, SOFT, WEATHERED, FINELY BEDDED, IRON STAINING
>1.00 m	SHALE: GRAY, SOFT, IRREGULAR FRACTURING

ATTITUDE OF ROOF : 130/79° N
ATTITUDE OF FLOOR : 140/76° N
FORMATION :
UTM COORDINATES : 6345065N, 512770E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.25 m (Max)
TRENCH WIDTH : 0.8 m
TRENCH LENGTH : 2.9 m
TRENCH BEARING : 18°
TRENCH SLOPE : 5°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

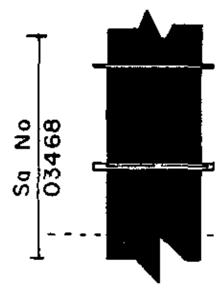
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC-82-015

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 13/82
APPROVED BY:	

	ROCK	COAL
	0.01	0.18
		0.60
1.39	0.03	
		0.57
TOTAL	0.04	1.35



ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6344620 N, 512338E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.3 m
TRENCH WIDTH : 1.2 m
TRENCH LENGTH : 2.3 m
TRENCH BEARING : 40°
TRENCH SLOPE : 70°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

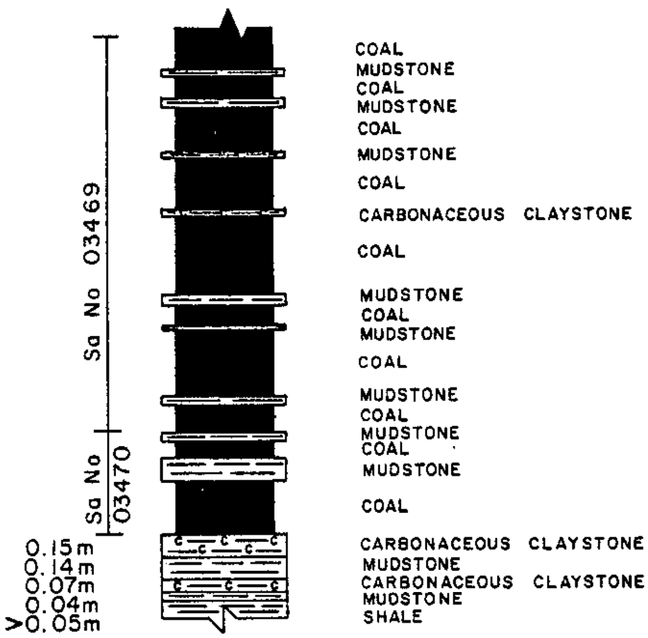
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–016

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 13/82
APPROVED BY:	

	ROCK	COAL
		0.25
	0.03	
		0.14
	0.03	
		0.32
	0.02	
		0.34
	0.02	
		0.50
3.16	0.04	
		0.16
	0.01	
		0.45
	0.03	
		0.18
	0.03	
		0.11
	0.15	
		0.35
TOTAL	0.36	2.80



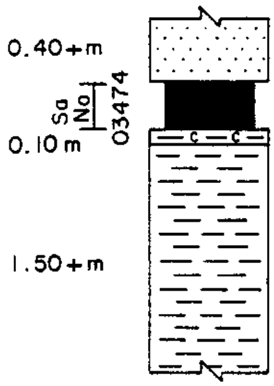
ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 200/35°E
FORMATION :
UTM COORDINATES : 6345600 N, 513425 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.8 m
TRENCH WIDTH : 0.9 m
TRENCH LENGTH : 3.6 m
TRENCH BEARING : 110°
TRENCH SLOPE : UPPER: 45°
LOWER: HORIZONTAL

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–017

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 13/82
APPROVED BY:	

	ROCK	COAL
	0.32	0.32
TOTAL	0.00	0.32



SANDSTONE: MEDIUM TO COARSE GRAIN, LIGHT GRAY, FRIABLE

COAL: HIGHLY WEATHERED

CARBONACEOUS CLAYSTONE

SHALE: DARK GRAY, HARD, FRACTURING ALONG BEDDING

ATTITUDE OF ROOF : 130/47° S
ATTITUDE OF FLOOR: 140/42° S
FORMATION :
UTM COORDINATES : 6345830 N, 513540 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.4m
TRENCH WIDTH : 0.6 m
TRENCH LENGTH : 2.3 m
TRENCH BEARING : 30°
TRENCH SLOPE : 80°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

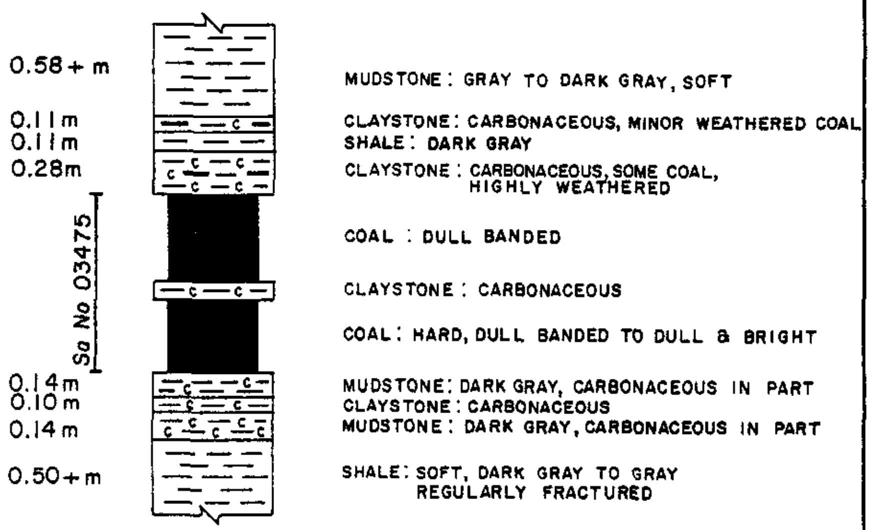
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–018

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 13/82
APPROVED BY:	

	ROCK	COAL
		0.57
1.17	0.10	
		0.50
TOTAL	0.10	1.07



ATTITUDE OF ROOF : 135/50° S
ATTITUDE OF FLOOR : 150/49° S
FORMATION :
UTM COORDINATES : 6344750 N, 512100 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.4 m
TRENCH WIDTH : 0.65 m
TRENCH LENGTH : 7.0 m
TRENCH BEARING : 028°
TRENCH SLOPE : 007°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MT. KLAPPAN COAL PROJECT

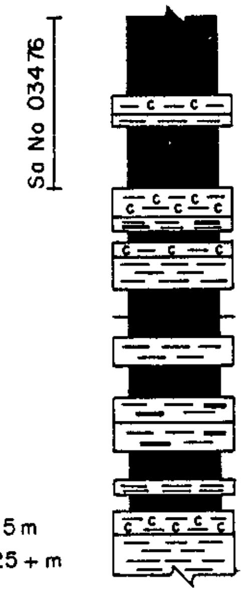
TRENCH LOG

TRC–82–019

DRAWN BY:	SCALE
LOGGED BY: E. SWANBERGSON	DATE July 19/82
APPROVED BY:	

ROCK	COAL
	0.12
	0.42
0.15	
0.05	
	0.38
0.19	
0.10	
	0.08
0.10	
0.16	
	0.16
	0.15
0.18	
	0.20
0.15	
0.20	
	0.16
0.09	
	0.10
TOTAL 1.37	1.77

3.14



COAL: HIGHLY WEATHERED
COAL : DULL BANDED
CLAYSTONE : CARBONACEOUS
SHALE : DARK GRAY, SOFT
COAL
CLAYSTONE: CARBONACEOUS
SHALE : HARD, MINOR COAL STRINGERS, DARK GRAY
COAL : HIGHLY WEATHERED
CLAY : CARBONACEOUS
SHALE
COAL: SOME HARD
COAL
SHALE: HARD, MINOR COAL STRINGERS, GRAY
COAL: DULL & BRIGHT
MUDSTONE : COAL STRINGERS UP TO 5CM; COAL INTRUDED BY (70%) CALCITE VEINS
SHALE: HARD IN PART POSSIBLE CONCRETIONS MINOR COAL STRINGERS
COAL : HIGHLY WEATHERED
MUDSTONE : SOFT
COAL : DULL & BRIGHT
CLAYSTONE : CARBONACEOUS
SHALE : HARD, GRAY, MASSIVE

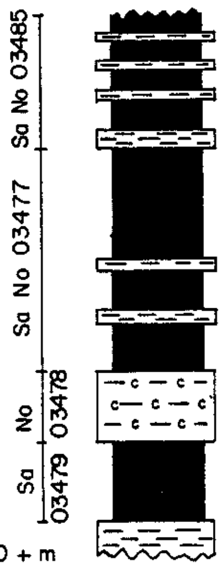
ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 095/19° S
FORMATION :
UTM COORDINATES : 6343970 N, 511030 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.1 m
TRENCH WIDTH : 0.5 m
TRENCH LENGTH : 6.0 m
TRENCH BEARING : 010°
TRENCH SLOPE : 030°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC-82-020

DRAWN BY:	SCALE
LOGGED BY: E. SWANBERGSON	DATE July 19/82
APPROVED BY:	

	ROCK	COAL
		0.10
	0.05	
		0.24
	0.05	
		0.12
	0.05	
		0.19
		0.70
3.19	0.07	
		0.24
	0.10	
		0.30
	0.48	
		0.50
TOTAL	0.80	2.39



0.20 + m

ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 145/43N(not true floor)
FORMATION :
UTM COORDINATES : 6343900N, 510130E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.4 m
TRENCH WIDTH : 0.6 m
TRENCH LENGTH : 4.0 m
TRENCH BEARING : 085°
TRENCH SLOPE : 040°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–038

DRAWN BY:	SCALE
LOGGED BY: E. SWANBERGSON	DATE July 19/82
APPROVED BY:	

	ROCK	COAL
		0.20
	0.05	
0.87		0.22
	0.05	
		0.35
TOTAL	0.10	0.77

0.35 m
0.07 m
0.13 m
Sa No 03478

MUDSTONE: DARK GRAY MINOR COAL LENSES, PLANT FRAGMENTS IRREGULAR FRACTURING
COAL: C-4, QUARTZ VEINED
MUDSTONE: BROWN, SOFT
COAL: C-4, HARD, MINOR ROCK SPLITS
MUDSTONE: GRAY BROWN, SOFT
COAL: C-4
CLAYSTONE: CARB, BLACK, SOFT, COAL FLECKS
COAL: C-3

ATTITUDE OF ROOF : 010/52° W
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6346330 N, 514400 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.0 m
TRENCH WIDTH : 0.7 m
TRENCH LENGTH : 5.0 m
TRENCH BEARING : 117°
TRENCH SLOPE : 050°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC-82-041

DRAWN BY: D. DURANT	SCALE 1:50
LOGGED BY: E. SWANBERGSON	DATE Aug. 16 /82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 SIMPLE SAMPLE SUMMARY PAGE 1

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82005										
		3455	1.50	2.10	0.60	100.00	0.37	0.23	0.00	0.00
		3471	1.50	2.10	0.60	100.00	0.37	0.23	0.00	0.00
TRC82006										
		3452	1.70	2.95	1.25	100.00	1.25	0.00	0.00	0.00
		3473	1.70	2.95	1.25	100.00	1.25	0.00	0.00	0.00
TRC82011										
		3457	1.22	1.79	0.57	100.00	0.48	0.09	0.00	0.00
TRC82012										
		3459	0.20	0.65	0.45	100.00	0.45	0.00	0.00	0.00
		3465	0.20	0.65	0.45	100.00	0.45	0.00	0.00	0.00
		3458	0.65	2.73	2.08	100.00	2.08	0.00	0.00	0.00
		3464	0.65	2.73	2.08	100.00	2.08	0.00	0.00	0.00
TRC82013										
		3460	0.75	3.11	2.36	100.00	2.14	0.22	0.00	0.00
		3462	0.75	3.11	2.36	100.00	2.14	0.22	0.00	0.00
		3461	3.11	4.35	1.24	100.00	0.86	0.38	0.00	0.00
		3463	3.11	4.35	1.24	100.00	0.86	0.38	0.00	0.00
TRC82014										
		3466	0.40	1.80	1.40	100.00	1.29	0.11	0.00	0.00
TRC82015										
		3456	0.50	1.31	0.81	100.00	0.81	0.00	0.00	0.00
TRC82016										
		3467	0.50	1.89	1.39	100.00	1.35	0.04	0.00	0.00
		3468	0.50	1.89	1.39	100.00	1.35	0.04	0.00	0.00
TRC82017										
		3469	0.06	2.58	2.52	100.00	2.34	0.18	0.00	0.00
		3470	2.58	3.22	0.64	100.00	0.46	0.18	0.00	0.00
TRC82018										
		3472	0.40	0.72	0.32	100.00	0.32	0.00	0.00	0.00
		3474	0.40	0.72	0.32	100.00	0.32	0.00	0.00	0.00

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82019										
		3475	1.08	2.25	1.17	100.00	1.07	0.10	0.00	0.00
TRC82020										
		3476	0.00	1.12	1.12	100.00	0.92	0.20	0.00	0.00
TRC82038										
		3485	0.00	0.80	0.80	100.00	0.15	0.65	0.00	0.00
		3477	0.80	2.21	1.41	100.00	1.24	0.17	0.00	0.00
		3478	2.21	2.69	0.48	100.00	0.00	0.48	0.00	0.00
		3479	2.69	3.19	0.50	100.00	0.50	0.00	0.00	0.00
TRC82041										
		3487	0.55	1.42	0.87	100.00	0.77	0.10	0.00	0.00

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82005

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	1.50	1.50			TILL	ROCK FRAGMENTS
	1.50	1.70	0.20	03473		CLAYSTONE	CARB.BLK
	1.70	1.85	0.15	03473		COAL	
	1.85	1.86	0.01	03473		MUDSTONE	GY
	1.86	1.98	0.12	03473		COAL	
	1.98	2.00	0.02	03473		MUDSTONE	BN
	2.00	2.10	0.10	03473		COAL	
	2.10	2.23	0.13			MUDSTONE	BN
	2.23	2.47	0.24			CLAYSTONE	CARB.BLK
	2.47	2.97	0.50			SHALE	GY
	2.97	4.47	1.50			MUDSTONE	DK.BN

* DENOTES MEASURED BCA

XXXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82006

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	1.50	1.50			TILL	CARB AT BASE
	1.50	1.70	0.20			CLAYSTONE	CARB.BLK
	1.70	2.88	1.18	03471		COAL	HIGHLY WEATHERED
	2.88	2.95	0.07	03471		COAL	HARD(ANTHRACITE)
	2.95	3.02	0.07			SHALE	GY HARD
	3.02	3.52	0.50			MUDSTONE	BN SOFT, CARB IN UPPER HALF
	3.52	3.59	0.07			SHALE	GY HARD
	3.59	3.64	0.05			MUDSTONE	BN SOFT
	3.64	3.74	0.10			COAL	
	3.74	4.39	0.65			CLAYSTONE	CARB.BLK
	4.39	5.89	1.50			SHALE	SS INTERBEDS,HARD

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82011

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.50	0.50			SHALE	GY FRACTURED ALONG BEDDING
	0.50	0.55	0.05			COAL	WEATHERED
	0.55	0.97	0.42			SHALE	GY SOFT.FRACTURED ALONG BEDDING
	0.97	1.00	0.03			COAL	WEATHERED
	1.00	1.22	0.22			SHALE	GY MASSIVE,RESISTIVE
	1.22	1.57	0.35	03457		COAL	DULL & BRIGHT. WEATHERED
	1.57	1.62	0.05	03457		CLAYSTONE	CARB SOFT
	1.62	1.66	0.04	03457		SHALE	BN SOFT.PUGGY
	1.66	1.79	0.13	03457		COAL	WEATHERED
	1.79	2.29	0.50			SHALE	INTERBEDDED HARD & SOFT UNITS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82012

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.20	0.20			SHALE	GY HARD & MASSIVE
	0.20	0.65	0.45	03465		COAL	HARD,FE STAINING,ROCK PARTICLES
	0.65	2.73	2.08	03464		COAL	WEATHERED,MNR FE STAINING
	2.73	2.98	0.25			SHALE	GY FRACTURED ALONG BEDDING

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82013

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.75	0.75			SHALE	GY MNR OR-BN INTERBEDS
	0.75	1.51	0.76	03462		COAL	WEATHERED,DULL-BRIGHT BANDED,FE STAININ G
	1.51	1.55	0.04	03462		MUDSTONE	BN SOFT
	1.55	1.91	0.36	03462		COAL	WEATHERED,DULL BANDED
	1.91	1.96	0.05	03462		MUDSTONE	BN SOFT
	1.96	2.29	0.33	03462		COAL	WEATHERED,DULL BANDED
	2.29	2.34	0.05	03452		MUDSTONE	BN SOFT
	2.34	2.85	0.51	03462		COAL	ANTHRACITIC IN PART,DULL & BRIGHT
	2.85	2.93	0.08	03462		MUDSTONE	GY SOFT
	2.93	3.11	0.18	03462		COAL	DULL BANDED
	3.11	3.31	0.20	03463		CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82013

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	3.31	4.17	0.86	03463		COAL	DULL BANDED
	4.17	4.35	0.18	03463		CLAYSTONE	CARB
	4.35	4.47	0.12			MUDSTONE	SOFT,ORNG-BN
	4.47	4.66	0.19			MUDSTONE	PUGGY,GRAPHITIC LUSTRE,CARB?
	4.66	4.71	0.05			MUDSTONE	SOFT,ORNG-BN
	4.71	4.81	0.10			COAL	HIGHLY WEATHERED
	4.81	4.88	0.07			CLAYSTONE	CARB
	4.88	5.23	0.35			SHALE	DK.GY WEATHERS TAN

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82014

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.40	0.40			MUDSTONE	DK.GY.MAS IRREG.FRACTURES.HARD IN PARTS
	0.40	1.34	0.94	03466		COAL	HIGHLY WEATHERED
	1.34	1.41	0.07	03466		CLAYSTONE	CARB
	1.41	1.45	0.04	03466		MUDSTONE	BN SOFT
	1.45	1.80	0.35	03466		COAL	HIGHLY WEATHERED
	1.80	1.95	0.15			MUDSTONE	DK.GY CARB IN PART
	1.95	2.30	0.35			SHALE	GY PUGGY TOWARDS BASE.MNR CALCIUM CARBONAT E VEINS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82015

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.50	0.50			SHALE	GY PLANT FRAGS,SUB-FISSILE
	0.50	0.88	0.38	03456		COAL	HIGHLY WEATHERED
	0.88	0.94	0.06	03456		COAL	HARD
	0.94	1.14	0.20	03456		COAL	DULL & BRIGHT
	1.14	1.31	0.17	03456		COAL	DULL BANDED
	1.31	1.35	0.04			SHALE	DK.GY SOFT
	1.35	1.44	0.09			SHALE	LT.GY SOFT
	1.44	1.62	0.18			CLAYSTONE	CARB
	1.62	1.73	0.11			SHALE	LT.GY SOFT
	1.73	2.06	0.33			COAL	DULL & BRIGHT
	2.06	2.20	0.14			SHALE	FG ORNG-BN,FE STAINING,WEATHERING

* DENOTES MEASURED BCA

XXXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82015

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.20	3.20	1.00			SHALE	GY IRREG. FRACTURES, SOFT

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82016

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.50	0.50			TILL	
	0.50	0.68	0.18	03468		COAL	HIGHLY WEATHERED, 58/46S
	0.68	0.69	0.01	03468		MUDSTONE	GY SOFT
	0.69	1.29	0.60	03468		COAL	DULL BANDED
	1.29	1.32	0.03	03468		MUDSTONE	
	1.32	1.89	0.57	03468		COAL	DULL BANDED, 10/88E

* DENOTES MEASURED BCA

XXXXX

82/12/01 GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG PAGE 1

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82017

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.06	0.06			TILL	
	0.06	0.31	0.25	03469		COAL	
	0.31	0.34	0.03	03469		MUDSTONE	
	0.34	0.48	0.14	03469		COAL	
	0.48	0.51	0.03	03469		MUDSTONE	
	0.51	0.83	0.32	03469		COAL	
	0.83	0.85	0.02	03469		MUDSTONE	
	0.85	1.19	0.34	03469		COAL	
	1.19	1.21	0.02	03469		CLAYSTONE	CARB
	1.21	1.71	0.50	03469		COAL	
	1.71	1.75	0.04	03469		MUDSTONE	
	1.75	1.91	0.16	03469		COAL	
	1.91	1.92	0.01	03469		MUDSTONE	
	1.92	2.37	0.45	03469		COAL	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82017

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.37	2.40	0.03	03469		MUDSTONE	
	2.40	2.58	0.18	03469		COAL	
	2.58	2.61	0.03	03470		MUDSTONE	
	2.61	2.72	0.11	03470		COAL	
	2.72	2.87	0.15	03470		MUDSTONE	
	2.87	3.22	0.35	03470		COAL	
	3.22	3.37	0.15			CLAYSTONE	CARB
	3.37	3.51	0.14			MUDSTONE	
	3.51	3.58	0.07			CLAYSTONE	CARB
	3.58	3.62	0.04			MUDSTONE	
	3.62	3.67	0.05			SHALE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82018

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.40	0.40			SANDSTONE	MG.LT.GY GRAIN SIZE IS MEDIUM-COARSE
	0.40	0.72	0.32	03474		COAL	HIGHLY WEATHERED
	0.72	0.82	0.10			CLAYSTONE	CARB
	0.82	2.32	1.50			SHALE	DK.GY HARD,FRAC. ALONG BEDDING

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82019

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
00	0.00	0.58	0.58			MUDSTONE	DK.GY SOFT, PUGGY, ORIENTATION 135/50S
00	0.58	0.69	0.11			CLAYSTONE	CARB MNR WTHRD COAL
00	0.69	0.80	0.11			SHALE	DK.GY
00	0.80	1.08	0.28			CLAYSTONE	CARB SOME HIGHLY WTHRD COAL
00	1.08	1.65	0.57	03475		COAL	C-4.BLK
00	1.65	1.75	0.10	03475		CLAYSTONE	CARB
00	1.75	2.25	0.50	03475		COAL	C-3
00	2.25	2.39	0.14			MUDSTONE	DK.GY CARB IN PART
00	2.39	2.49	0.10			CLAYSTONE	CARB
00	2.49	2.63	0.14			MUDSTONE	DK.GY CARB IN PART

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82019

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
00	2.63	3.13	0.50			SHALE	DK.GY SOFT, REGULARLY FRACTURED

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82020

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.12	0.12	03476		COAL	HIGHLY WTHRD
	0.12	0.54	0.42	03476		COAL	C-2.BLK
	0.54	0.69	0.15	03476		CLAYSTONE	CARB
	0.69	0.74	0.05	03476		SHALE	DK.GY SOFT
	0.74	1.12	0.38	03476		COAL	
	1.12	1.31	0.19			CLAYSTONE	CARB
	1.31	1.41	0.10			SHALE	DK.GY HARD, MNR COAL STRGS
	1.41	1.49	0.08			COAL	HIGHLY WTHRD
	1.49	1.59	0.10			CLAYSTONE	CARB
	1.59	1.75	0.16			SHALE	
	1.75	1.91	0.16			COAL	HARD
	1.91	2.06	0.15			COAL	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82020

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.06	2.24	0.18			SHALE	GY HARD
	2.24	2.44	0.20			COAL	C-3
	2.44	2.59	0.15			MUDSTONE	COAL STRGS UP TO 5CM
	2.59	2.79	0.20			SHALE	VERY HARD, MNR COAL STRGS, POSSIBLE CON CRETIONS
	2.79	2.95	0.16			COAL	HIGHLY WTHRD
	2.95	3.04	0.09			MUDSTONE	SOFT
	3.04	3.14	0.10			COAL	C-3
	3.14	3.29	0.15			CLAYSTONE	CARB
	3.29	3.54	0.25			SHALE	GY.MAS HARD

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82038

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.10	0.10	03485		COAL	WEATHERED
	0.10	0.15	0.05	03485		MUDSTONE	GY SOFT
	0.15	0.39	0.24	03485		COAL	C-3 MNR SOFT, GY MUDST
	0.39	0.44	0.05	03485		MUDSTONE	
	0.44	0.56	0.12	03485		COAL	MNR MUDST
	0.56	0.61	0.05	03485		MUDSTONE	
	0.61	0.80	0.19	03485		COAL	MNR MUDST
	0.80	1.50	0.70	03477		COAL	MNR MUDST, FE STAIN
	1.50	1.57	0.07	03477		MUDSTONE	GY SOFT
	1.57	1.81	0.24	03477		COAL	
	1.81	1.91	0.10	03477		MUDSTONE	GY SOFT
	1.91	2.21	0.30	03477		COAL	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82038

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.21	2.69	0.48	03478		CLAYSTONE	CARB MNR FERRUGINOUS MUDST
	2.69	3.19	0.50	03479		COAL	MNR SHALE SPLITS
	3.19	3.39	0.20			MUDSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: BC DATA SOURCE: TRC82041

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.35	0.35			MUDSTONE	DK.GY MNR COAL LENSES, PLANT FRAGMENTS,IRREGU LAR FRACTURING, ROOF ROCK
	0.35	0.42	0.07			COAL	C-4 QTZ VEINED
	0.42	0.55	0.13			MUDSTONE	BN SOFT
	0.55	0.75	0.20	03487		COAL	C-4 HARD MNR ROCK SPLITS
	0.75	0.80	0.05	03487		MUDSTONE	GY SOFT
	0.80	1.02	0.22	03487		COAL	C-4
	1.02	1.07	0.05	03487		CLAYSTONE	CARB.BLK SOFT, COAL FLECKS
	1.07	1.42	0.35	03487		COAL	C-3 MINIMUM THICKNESS, NO FLOOR

* DENOTES MEASURED BCA

BROATCH CREEK
LIST OF SAMPLES

DATA SOURCE	COMPOSITE SAMPLE ID	INCREMENT SAMPLE ID
KPNBCTRC82006	56	03471
KPNBCTRC82012	61	03464 - 03465
KPNBCTRC82013	62	03462 - 03463
KPNBCTRC82014	63	03466
KPNBCTRC82016	64	03468
KPNBCTRC82017	65	03469 - 03470
KPNBCTRC82019	66	03475
KPNBCTRC82020	67	03476
KPNBCTRC82038	85	03477 - 03479 + 03485

GCRI COAL DIVISION HEAD PROJ KPN BLK BC DS TRC82006

SAMPLE ID	56	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)		ASTM	

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	14.40	TOTAL SULPHUR %	0.55
TOTAL MOISTURE %	15.00	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	0.70	FSI	__._
ASH %	24.80	HGI	___._
VOLATILE MATTER %	7.70	CO_2 %	__.__
FIXED CARBON %	66.80		
GROSS CALORIFIC VALUE (MJ/KG)	26.23		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.31	

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **BC** DS **TRC82012**

SAMPLE ID	61	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	24.20	TOTAL SULPHUR %	1.06
TOTAL MOISTURE %	27.16	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	3.90	FSI	__._
ASH %	36.20	HGI	___._
VOLATILE MATTER %	13.60	CO2 %	__.__
FIXED CARBON %	46.30		

GROSS CALORIFIC VALUE (MJ/KG)	18.39	
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.48$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **BC** DS **TRC82013**

SAMPLE ID	62	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	21.40	TOTAL SULPHUR %	0.40
TOTAL MOISTURE %	23.68	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.90	FSI	__._
ASH %	32.10	HGI	___._
VOLATILE MATTER %	16.00	CO2 %	__.__
FIXED CARBON %	49.00		

GROSS CALORIFIC VALUE (MJ/KG)	18.99		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.46$	

GCRI COAL DIVISION HEAD PROJ KPN BLK BC DS TRC82014

SAMPLE ID	63	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	15.50	TOTAL SULPHUR %	0.59
TOTAL MOISTURE %	16.18	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	0.80	FSI	__._
ASH %	29.30	HGI	___._
VOLATILE MATTER %	7.70	CO2 %	__.__
FIXED CARBON %	62.20		

GROSS CALORIFIC VALUE (MJ/KG) 24.12

NET CALORIFIC VALUE (MJ/KG) __.__

Ro_{max}=3.50

GCRI COAL DIVISION HEAD PROJ KPN BLK BC DS TRC82016

SAMPLE ID	64	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	23.30	TOTAL SULPHUR %	0.41
TOTAL MOISTURE %	25.29	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.60	FSI	__._
ASH %	9.20	HGI	___._
VOLATILE MATTER %	18.50	CO2 %	__.__
FIXED CARBON %	69.70		

GROSS CALORIFIC VALUE (MJ/KG)	26.54	
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.74$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **BC** DS **TRC82017**

SAMPLE ID	65	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	23.50	TOTAL SULPHUR %	0.46
TOTAL MOISTURE %	24.80	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.70	FSI	__._
ASH %	23.20	HGI	___._
VOLATILE MATTER %	17.90	CO2 %	__.__
FIXED CARBON %	57.20		

GROSS CALORIFIC VALUE (MJ/KG)	21.99
NET CALORIFIC VALUE (MJ/KG)	__.__

Ro_{max}=3.17

GCRI COAL DIVISION **HEAD** PROJ KPN BLK **BC** DS **TRC82019**

SAMPLE ID **66** DATA TYPE (REAL,BORO,AVER,CALC) REAL
SPLIT SAMPLE ID **HD1** DATE ANALYSED 13/01/83
ANALYSIS BASIS TYPE (AD,DB,AR,EM) AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	12.40	TOTAL SULPHUR %	1.52
TOTAL MOISTURE %	12.93	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	0.60	FSI	__._
ASH %	24.50	HGI	___._
VOLATILE MATTER %	7.10	CO2 %	__.__
FIXED CARBON %	67.80		

GROSS CALORIFIC VALUE (MJ/KG) 25.78
NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.60$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **BC** DS **TRC82020**

SAMPLE ID	67	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	16.10	TOTAL SULPHUR %	0.28
TOTAL MOISTURE %	17.36	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.50	FSI	__._
ASH %	56.00	HGI	___._
VOLATILE MATTER %	10.90	CO2 %	__.__
FIXED CARBON %	31.60		

GROSS CALORIFIC VALUE (MJ/KG) __.__

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.15$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **BC** DS **TRC82038**

SAMPLE ID	85	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	19.50	TOTAL SULPHUR %	0.33
TOTAL MOISTURE %	21.67	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.70	FSI	__._
ASH %	34.60	HGI	___._
VOLATILE MATTER %	18.10	CO2 %	__.__
FIXED CARBON %	44.60		
GROSS CALORIFIC VALUE (MJ/KG)	17.08		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.39$	

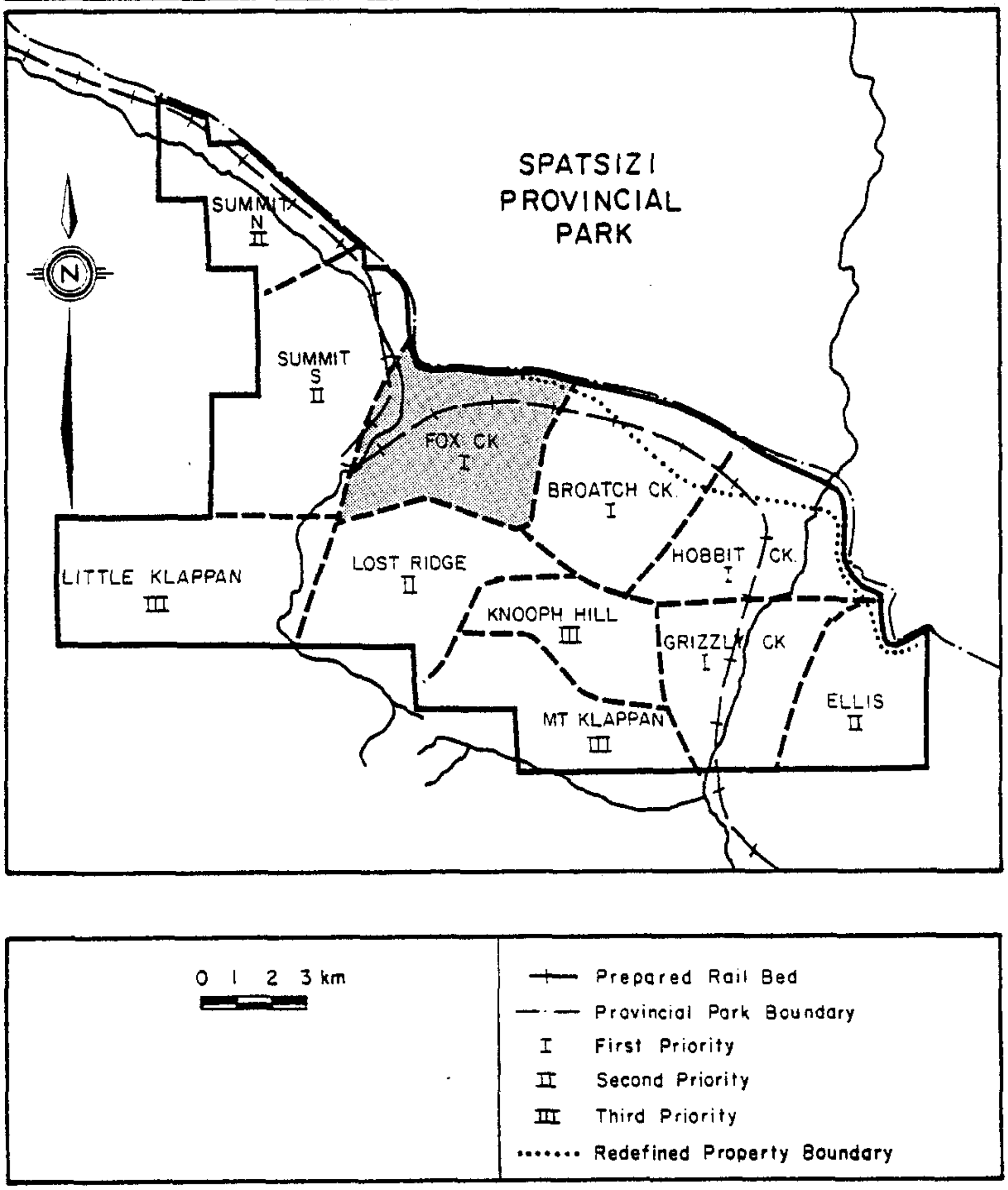
FOX CREEK

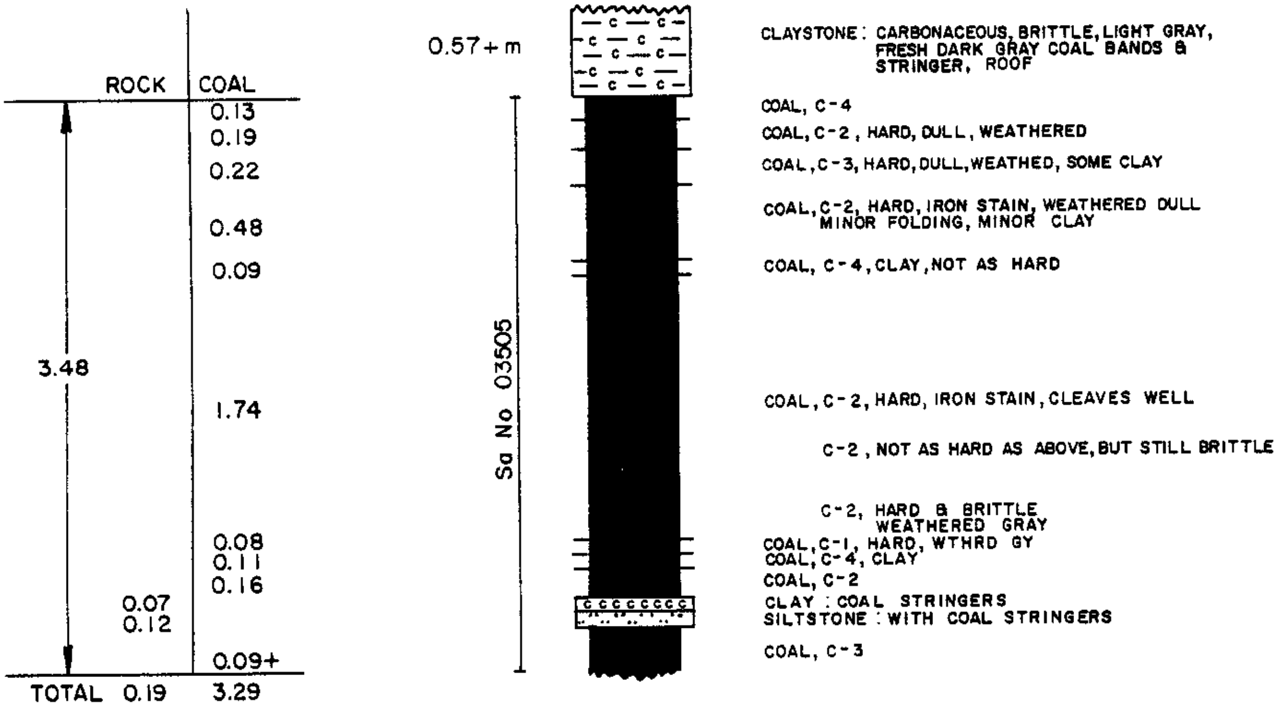
GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 PROJECT DATA SOURCE SUMMARY PAGE 1

DATA SOURCE	LOCATION NORTHING	LOCATION EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNFCTRC82035	6347505.0	504495.0	1310.0	16.8	85.0	235.0	
KPNFCTRC82046	6346980.0	504900.0	1320.0	8.0	12.0	80.0	

MT. KLAPPAN COAL PROPERTY
1982 EXPLORATION MAPPING AREAS





ATTITUDE OF ROOF 080/34° E
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6347505 N, 504495 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.7 m
TRENCH WIDTH : 1.2 m
TRENCH LENGTH : 16.80 m
TRENCH BEARING : 235°
TRENCH SLOPE : 85°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

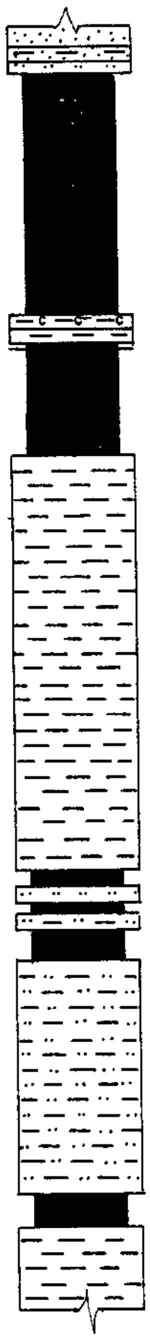
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–035

DRAWN BY: A. MURRAY	SCALE 1:50
LOGGED BY: C. LOUIE	DATE Aug. 17/82
APPROVED BY:	

	ROCK	COAL
		1.55
2.42		
	0.07	
	0.09	0.15
		0.56
TOTAL	0.16	2.26



0.18m	SANDSTONE : FINE GRAIN, MEDIUM GRAY
0.10m	CLAYSTONE : SANDY
0.05m	SILTSTONE : DARK GRAY, WITH COAL BANDS
	COAL : C-2, MINOR CLAYSTONE, POSSIBLE NOSE OF FOLD, OCCASSIONAL QUARTZ VEIN
	CLAYSTONE : CARBONACEOUS, MINOR COAL LENSES
	CLAY : UNCONSOLIDATED DARK BROWN
	COAL : WEATHERED
	COAL : C-2, FREQUENT QUARTZ VEINS, HARD
0.38m	CLAYSTONE: DARK GRAY, MINOR COAL LENSES
2.44m	CLAYSTONE
0.11m	COAL : C-3
0.07m	SILTSTONE : DARK GREY
0.04m	COAL : C-3, IRON STAINING PREVALENT
0.10m	CLAYSTONE : SILTY
0.19m	COAL : C-3, QUARTZ VEINS AND NODULES
1.70m	CLAYSTONE : SILTY
0.23m	COAL : C-2, MINOR CLAYSTONE BANDS
0.13m	CLAYSTONE
0.35m	CLAYSTONE : CARBONACEOUS, MINOR COAL LENSES

ATTITUDE OF ROOF : 144/84° N
ATTITUDE OF FLOOR : 160/69° N
FORMATION :
UTM COORDINATES : 6346980 N, 504900 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : .90 m
TRENCH WIDTH : .90 m
TRENCH LENGTH : 8.00m
TRENCH BEARING : 080°
TRENCH SLOPE : 12°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–046

DRAWN BY: R. MAYLOR	SCALE 1:50
LOGGED BY: C. LOUIE	DATE Aug. 1/82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 SIMPLE SAMPLE SUMMARY

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82035										
		3505	0.57	4.05	3.48	100.00	3.29	0.19	0.00	0.00
TRC82046										
		3851	0.33	2.75	2.42	100.00	2.26	0.16	0.00	0.00

XXXXX

PROJECT: KPN BLOCK: FC DATA SOURCE: TRC82035

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.57	0.57			CLAYSTONE	CARB ROOF,WHTRD LT GY,FRESH DK GY,BRITTLE,CO AL BANDS & STRINGERS
	0.57	0.70	0.13	03505		COAL	C-4
	0.70	0.89	0.19	03505		COAL	C-2 HARD, DULL
	0.89	1.11	0.22	03505		COAL	C-3 HARD, WTHRD DULL, MNR CLAY
	1.11	1.59	0.48	03505		COAL	C-2 HARD, WTHRD DULL, FE-STAINS, MNR CLAY, MNR FOLDING
	1.59	1.68	0.09	03505		COAL	C-4 MNR CLAY
	1.68	3.42	1.74	03505		COAL	C-2 HARD, FE-STAINS, CLEAVES WELL
	3.42	3.50	0.08	03505		COAL	C-1 HARD, WTHRD GY
	3.50	3.61	0.11	03505		COAL	C-4 CLAY

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: FC DATA SOURCE: TRC82035

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	3.61	3.77	0.16	03505		COAL	C-2
	3.77	3.84	0.07	03505		CLAY	COAL STRINGERS
	3.84	3.96	0.12	03505		SILTSTONE	COAL STRINGERS
	3.96	4.05	0.09	03505		COAL	C-3

* DENOTES MEASURED BCA

PROJECT: KPN BLOCK: FC DATA SOURCE: TRC82046

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.18	0.18			SANDSTONE	FG.M.GY
	0.18	0.28	0.10			CLAYSTONE	SANDY
	0.28	0.33	0.05			SILTSTONE	DK.GY COAL BANDS
	0.33	1.88	1.55	03851		COAL	C-2 MNR CLYST.POSSIBLE NOSE OF FOLD. OCCASS IONAL QTZ VEIN
	1.88	1.95	0.07	03851		CLAYSTONE	CARB MNR COAL LENSES
	1.95	2.04	0.09	03851		CLAY	DK.BN UNCONSOLIDATED
	2.04	2.19	0.15	03851		COAL	WTHRD
	2.19	2.75	0.56	03851		COAL	C-2 QTZ VEINS. HARD
	2.75	3.13	0.38			CLAYSTONE	DK.GY MNR COAL LENSES
	3.13	5.57	2.44			CLAYSTONE	
	5.57	5.68	0.11			COAL	C-3

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: FC DATA SOURCE: TRC82046

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	5.68	5.75	0.07			SILTSTONE	DK.GY
	5.75	5.79	0.04			COAL	C-3 IRON STAINS
	5.79	5.89	0.10			CLAYSTONE	SLTY
	5.89	6.08	0.19			COAL	C-3 QTZ VEINS AND NODULES
	6.08	7.78	1.70			CLAYSTONE	SLTY
	7.78	8.01	0.23			COAL	C-2 MNR CLYST BANDS
	8.01	8.14	0.13			CLAYSTONE	
	8.14	8.49	0.35			CLAYSTONE	CARB MNR COAL LENSES

* DENOTES MEASURED BCA

FOX CREEK
LIST OF SAMPLES

DATA SOURCE	COMPOSITE SAMPLE ID	INCREMENT SAMPLE ID
KPNFCTRC82035	82	03505

GCRI COAL DIVISION HEAD PROJ KPN BLK FC DS TRC82035

SAMPLE ID	82	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	4.00	TOTAL SULPHUR %	0.42
TOTAL MOISTURE %	4.96	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.00	FSI	__._
ASH %	29.10	HGI	___._
VOLATILE MATTER %	6.30	CO2 %	__.__
FIXED CARBON %	63.60		

GROSS CALORIFIC VALUE (MJ/KG) 23.28

NET CALORIFIC VALUE (MJ/KG) __.__

Ro_{max}=4.17

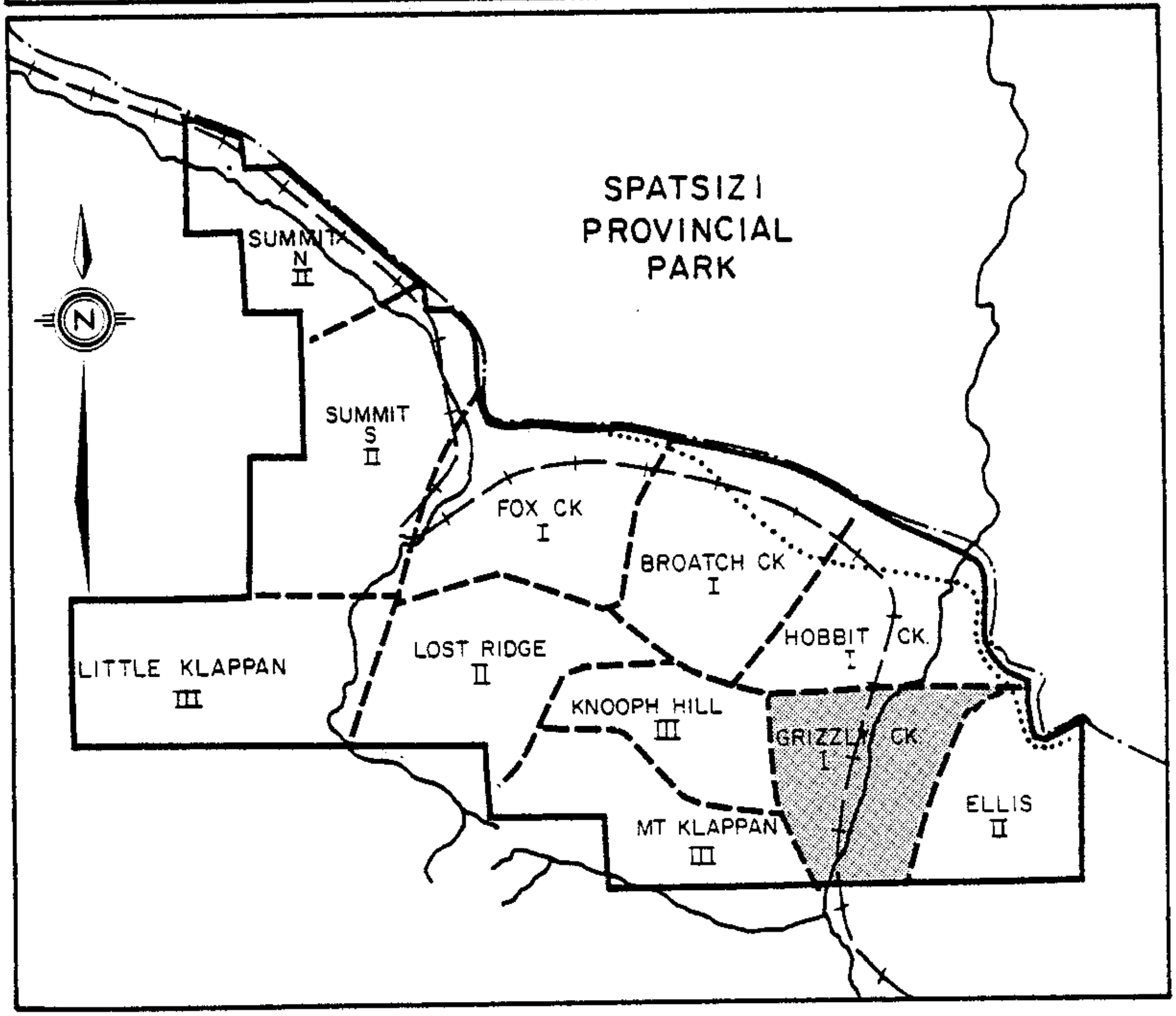
GRIZZLEY CREEK

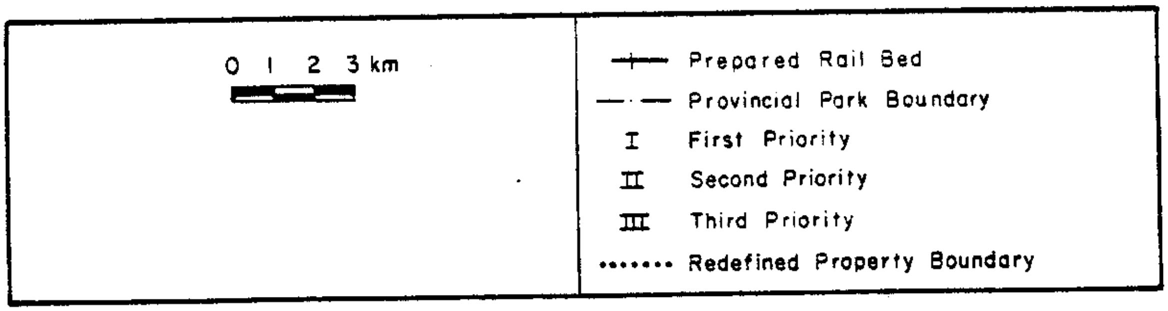
GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 PROJECT DATA SOURCE SUMMARY PAGE 1

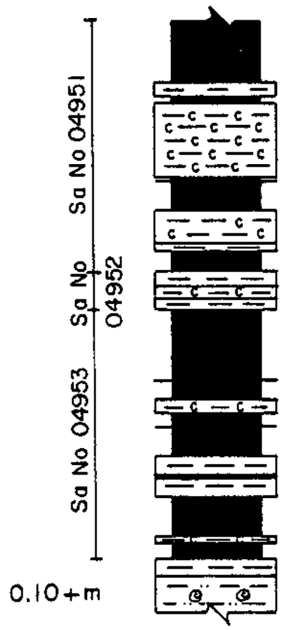
DATA SOURCE	LOCATION NORTHING	LOCATION EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNGCTRC82009	6341775.0	514825.0	1280.0	5.5	52.0	145.0	
KPNGCTRC82033	6341096.0	514168.0	1280.0	4.9	48.0	118.0	
KPNGCTRC82034	6341150.0	514537.0	1342.0	6.8	41.0	55.0	
KPNGCTRC82050	6342169.0	515014.0	1268.0	3.2	17.0	183.0	

MT. KLAPPAN COAL PROPERTY
1982 EXPLORATION MAPPING AREAS





	ROCK	COAL
		0.38
	0.10	0.01
	0.40	
		0.01
		0.20
	0.23	
		0.15
	0.08	
3.23	0.08	
	0.08	
		0.43
		0.11
	0.08	
		0.08
		0.20
	0.25	
		0.23
	0.03	
		0.10
TOTAL	1.33	1.90



COAL : UNCONSOLIDATED
CLAY : BROWN, CARBONACEOUS PLANT FRAGMENTS
COAL : IRON STAINING
CLAYSTONE : CARBONACEOUS
COAL : IRON STAINING
COAL : INTERBAND, IRON STAINING, UNCONSOLIDATED
CLAYSTONE : CARB., IRON STAINING, MINOR COAL STRINGERS
COAL : MINOR IRON STAINED BANDS
CLAY : BROWN
CLAYSTONE : CARBONACEOUS
CLAY : BROWN
COAL : IRON STAINED BANDS, MINOR CARB. CLAYSTONE BANDS
COAL : BRIGHT BANDED
CLAYSTONE : CARBONACEOUS
COAL : WEATHERED
COAL : MINOR IRON STAINED BANDS
CLAYSTONE : MINOR COAL BANDS
COAL : IRON STAINING, MINOR CARB. CLAY BANDS
CLAYSTONE : CARBONACEOUS, WEATHERED
COAL : WEATHERED, MINOR IRON STAINING
CLAY : GREY
CLAYSTONE : SILTY PARTS, CONCRETIONARY

ATTITUDE OF FLOOR : 230/30° N
ATTITUDE OF ROOF : N/A
FORMATION :
UTM COORDINATES : 6341775 N, 514825 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.5 M
TRENCH WIDTH : 1.0 M
TRENCH LENGTH : 5.5 M
TRENCH BEARING : 145°
TRENCH SLOPE : 52°

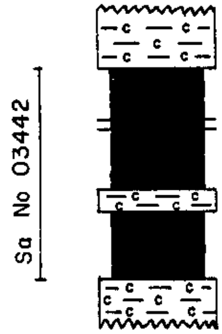
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–009

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE 06/07/82
APPROVED BY:	

	ROCK	COAL
		0.78
1.34	0.14	
		0.42
TOTAL	0.14	1.20



MUDSTONE : CARBONACEOUS , SLUMP FEATURES

COAL : UNCONSOLIDATED

COAL : C-3

COAL : W/ MINOR CARB. MUDSTONE, UNCONSOLIDATED

MUDSTONE : CARBONACEOUS

COAL : W/ MINOR CARB. MUDSTONE, UNCONSOLIDATED

MUDSTONE : CARBONACEOUS GRADING INTO MUDSTONE

ATTITUDE OF ROOF : 124/22° S
ATTITUDE OF FLOOR : 133/20° S
FORMATION :
UTM COORDINATES : 6341096 N, 514168 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 2.0 m
TRENCH WIDTH : .70 m
TRENCH LENGTH : 4.93 m
TRENCH BEARING : 118°
TRENCH SLOPE : 0.48°

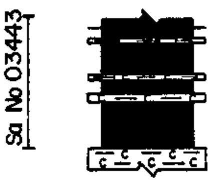
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–033

DRAWN BY: J. SHARPE	SCALE 1 : 50
LOGGED BY: G. SEVE	DATE July 16/82
APPROVED BY:	

	ROCK	COAL
		0.06
	0.02	0.08
0.85	0.03	0.20
	0.03	0.09
		0.34
TOTAL	0.08	0.77



ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6341150 N, 514537 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.5 m
TRENCH WIDTH : .70 m
TRENCH LENGTH : 6.8 m
TRENCH BEARING : 055°
TRENCH SLOPE : 41°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

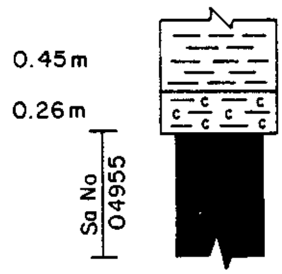
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–034

DRAWN BY:	SCALE 1:50
LOGGED BY: G. SEVE	DATE July 16/82
APPROVED BY:	

	ROCK	COAL
	0.82	0.82
TOTAL	0.00	0.82



CLAYSTONE, GRAY

CLAYSTONE, CARBONACEOUS, UNCONSOLIDATED

COAL

NO BASE

SLUMPING NOTED IN TRENCH

ATTITUDE OF ROOF : 272/26° N
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6342169N, 515014E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.2 m
TRENCH WIDTH : 0.6 m
TRENCH LENGTH :
TRENCH BEARING : 183°
TRENCH SLOPE : 17°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–050

DRAWN BY: G. SEVE	SCALE 1:50
LOGGED BY:	DATE July 10/82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82009										
		4951	0.30	1.78	1.48	100.00	0.75	0.73	0.00	0.00
		4952	1.78	2.02	0.24	100.00	0.00	0.24	0.00	0.00
		4953	2.02	3.83	1.81	100.00	1.45	0.36	0.00	0.00
TRC82033										
		3442	0.50	1.84	1.34	100.00	1.14	0.20	0.00	0.00
TRC82034										
		3443	2.00	2.85	0.85	100.00	0.77	0.08	0.00	0.00
TRC82050										
		4955	1.71	2.53	0.82	100.00	0.82	0.00	0.00	0.00

XXXXX

PROJECT: KPN BLOCK: GC DATA SOURCE: TRC82009

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.30	0.30			TILL	
	0.30	0.68	0.38	04951		COAL	UNCONSOLIDATED
	0.68	0.78	0.10	04951		CLAYSTONE	CARB.BN PLANT FRAGS
	0.78	0.79	0.01	04951		COAL	FE STAINING
	0.79	1.19	0.40	04951		CLAYSTONE	CARB
	1.19	1.20	0.01	04951		COAL	FE STAINING
	1.20	1.40	0.20	04951		COAL	UNCONSOLIDATED, FE STAIN BANDS
	1.40	1.63	0.23	04951		CLAYSTONE	CARB FE STAINING
	1.63	1.78	0.15	04951		COAL	MNR FE STAIN BANDS
	1.78	1.86	0.08	04952		CLAY	BN
	1.86	1.94	0.08	04952		CLAYSTONE	CARB
	1.94	2.02	0.08	04952		CLAY	BN

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: GC DATA SOURCE: TRC82009

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.02	2.75	0.73	04953		COAL	FE STAIN BANDS. MNR CARB CLAYSTONE BAND S
	2.75	2.86	0.11	04953		COAL	BRIGHT
	2.86	2.94	0.08	04953		CLAYSTONE	CARB
	2.94	3.02	0.08	04953		COAL	WEATHERED
	3.02	3.22	0.20	04953		COAL	MNR FE STAIN BANDS
	3.22	3.47	0.25	04953		CLAYSTONE	CARB MNR COAL BANDS
	3.47	3.70	0.23	04953		COAL	FE STAIN. MNR CARB BANDS
	3.70	3.73	0.03	04953		CLAYSTONE	CARB WEATHERED
	3.73	3.83	0.10	04953		COAL	WEATHERED. MNR FE STAIN BANDS
	3.83	3.93	0.10			CLAY	GY
	3.93	4.23	0.30			CLAYSTONE	SILTY IN PART. CONCRETIONARY

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: GC DATA SOURCE: TRC82033

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.50	0.50			MUDSTONE	CARB ROOF
	0.50	0.62	0.12	03442		COAL	UNCONSOLIDATED
	0.62	0.64	0.02	03442		COAL	FE STAIN
	0.64	0.83	0.19	03442		COAL	UNCONSOLIDATED WITH MINOR CARB MUDST FR AGS
	0.83	0.88	0.05	03442		COAL	C-3
	0.88	0.92	0.04	03442		MUDSTONE	COALY
	0.92	1.28	0.36	03442		COAL	
	1.28	1.42	0.14	03442		MUDSTONE	CARB
	1.42	1.56	0.14	03442		COAL	
	1.56	1.58	0.02	03442		MUDSTONE	COALY
	1.58	1.84	0.26	03442		COAL	
	1.84	2.34	0.50			MUDSTONE	CARB FLOOR

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: GC DATA SOURCE: TRC82034

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	2.00	2.00			OVERBURDEN	
	2.00	2.06	0.06	03443		COAL	UNCONSOLIDATED
	2.06	2.14	0.08	03443		COAL	C-3
	2.14	2.16	0.02	03443		CLAYSTONE	BN
	2.16	2.36	0.20	03443		COAL	C-3 FE STAIN
	2.36	2.39	0.03	03443		CLAYSTONE	COALY
	2.39	2.48	0.09	03443		COAL	UNCONSOLIDATED
	2.48	2.51	0.03	03443		CLAYSTONE	COALY
	2.51	2.85	0.34	03443		COAL	C-5
	2.85	2.95	0.10			CLAYSTONE	CARB WITH COAL BANDS THROUGHOUT

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: GC DATA SOURCE: TRC82050

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	1.00	1.00			OVERBURDEN	UNCONSOLIDATED
	1.00	1.45	0.45			CLAYSTONE	GY
	1.45	1.71	0.26			CLAYSTONE	CARB
	1.71	2.53	0.82	04955		COAL	UNCONSOLIDATED

* DENOTES MEASURED BCA

GRIZZLEY CREEK
LIST OF SAMPLES

DATA SOURCE	COMPOSITE SAMPLE ID	INCREMENT SAMPLE ID
KPNGCTRC82009	59	04953
KPNGCTRC82033	80	03442
KPNGCTRC82034	81	03443
KPNGCTRC82050	96	04955

GCRI COAL DIVISION	HEAD	PROJ KPN	BLK GC	DS TRC82009

SAMPLE ID 59 DATA TYPE (REAL,BORO,AVER,CALC) REAL
SPLIT SAMPLE ID HD1 DATE ANALYSED 13/01/83
ANALYSIS BASIS TYPE (AD,DB,AR,EM) AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	21.90	TOTAL SULPHUR %	0.20
TOTAL MOISTURE %	25.10	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	4.10	FSI	__._
ASH %	50.20	HGI	___._
VOLATILE MATTER %	19.50	CO2 %	__.__
FIXED CARBON %	26.20		

GROSS CALORIFIC VALUE (MJ/KG) 10.51
NET CALORIFIC VALUE (MJ/KG) __.__ Ro_{max}=3.20

GCRI COAL DIVISION **HEAD** PROJ KPN BLK GC DS TRC82033

SAMPLE ID	80	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	13.60	TOTAL SULPHUR %	0.42
TOTAL MOISTURE %	14.72	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.30	FSI	__._
ASH %	20.00	HGI	___._
VOLATILE MATTER %	13.20	CO2 %	__.__
FIXED CARBON %	65.50		

GROSS CALORIFIC VALUE (MJ/KG) 25.36

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.62$

GCRI COAL DIVISION HEAD PROJ KPN BLK GC DS TRC82034

SAMPLE ID	81	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	15.00	TOTAL SULPHUR %	0.52
TOTAL MOISTURE %	16.19	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.40	FSI	__._
ASH %	33.60	HGI	___._
VOLATILE MATTER %	10.70	CO2 %	__.__
FIXED CARBON %	54.30		

GROSS CALORIFIC VALUE (MJ/KG)	20.09		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.59	

GCRI COAL DIVISION HEAD PROJ KPN BLK GC DS TRC82050

SAMPLE ID	96	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	33.70	TOTAL SULPHUR %	0.33
TOTAL MOISTURE %	37.41	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	5.60	FSI	__._
ASH %	24.50	HGI	___._
VOLATILE MATTER %	25.50	CO2 %	__.__
FIXED CARBON %	44.40		

GROSS CALORIFIC VALUE (MJ/KG)	17.74		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.43	

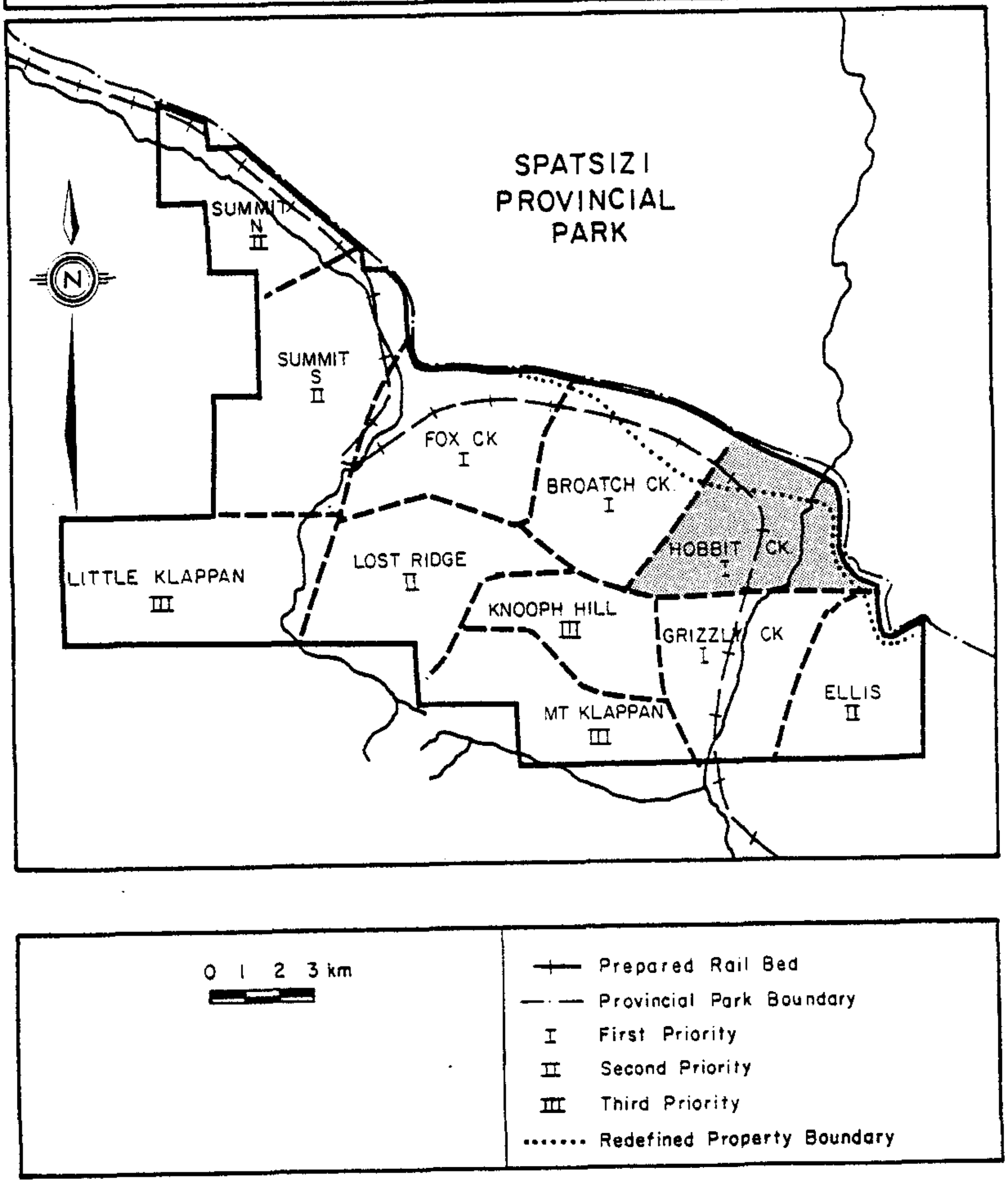
HOBBIT CREEK

GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 PROJECT DATA SOURCE SUMMARY PAGE 1

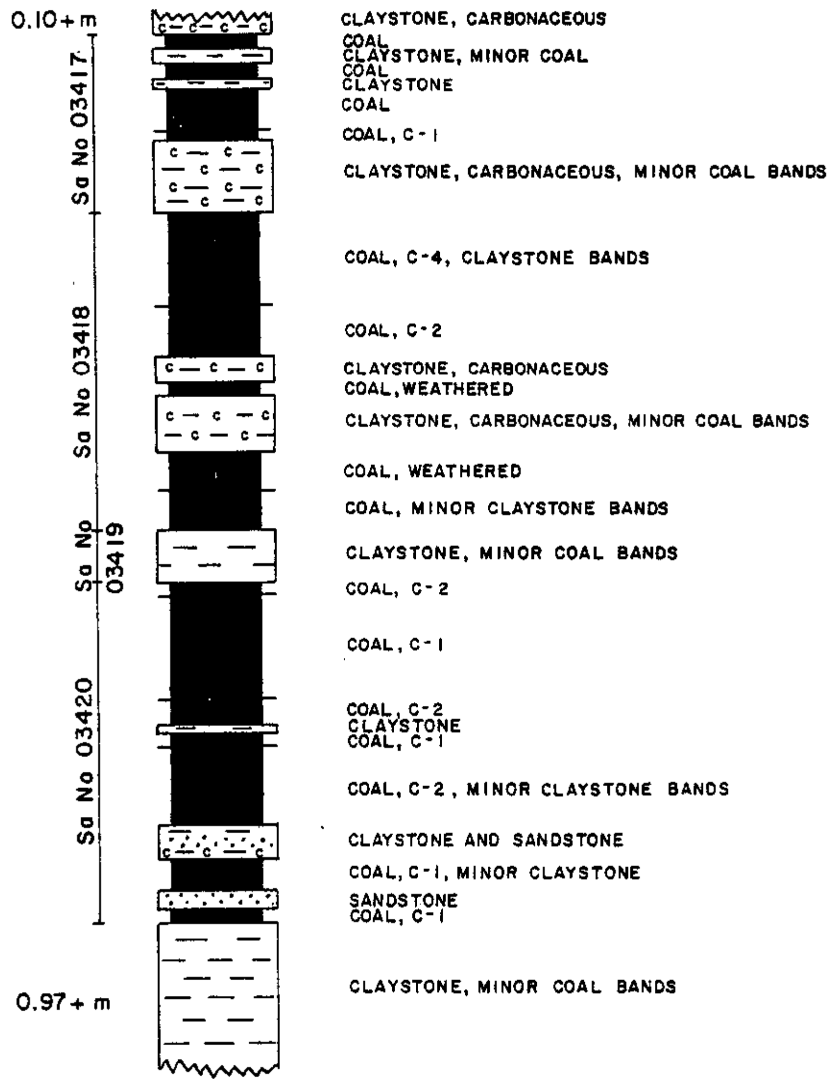
DATA SOURCE	LOCATION NORTHING	EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNHCTRC82001	6343220.0	515350.0	1290.0	9.4	34.0	207.0	
KPNHCTRC82002	6343700.0	514910.0	1340.0	7.0	32.0	20.0	
KPNHCTRC82003	6343535.0	515050.0	1330.0	6.9	32.0	47.0	
KPNHCTRC82004	6343140.0	515370.0	1270.0	6.2	36.0	9.0	
KPNHCTRC82007	6343920.0	515650.0	1290.0	2.8	32.0	20.0	
KPNHCTRC82008	6342740.0	516330.0	1185.0	10.7	31.0	162.0	
KPNHCTRC82010	6344715.0	516010.0	1300.0	5.6	29.0	69.0	
KPNHCTRC82023	6345060.0	516040.0	1297.0	3.4	7.0	200.0	
KPNHCTRC82024	6343660.0	514290.0	1402.0	5.0	58.0	173.0	
KPNHCTRC82025	6343710.0	514170.0	1400.0	6.5	44.0	118.0	
KPNHCTRC82026	6343730.0	514455.0	1390.0	4.0	35.0	5.0	
KPNHCTRC82027	6343040.0	515540.0	1250.0	8.7	44.0	60.0	
KPNHCTRC82028	6342680.0	516050.0	1200.0	2.6	28.0	16.0	
KPNHCTRC82029	6343780.0	514550.0	1360.0	8.7	39.0	33.0	
KPNHCTRC82030	6342780.0	516430.0	1180.0	7.6	36.0	146.0	
KPNHCTRC82040	6346770.0	515315.0	1238.0	3.5	51.0	17.0	

MT. KLAPPAN COAL PROPERTY
1982 EXPLORATION MAPPING AREAS



ROCK	COAL
	0.09
0.11	
	0.08
0.07	
	0.29
	0.04
0.48	
	0.59
	0.35
0.14	
	0.08
0.38	
	0.26
	0.24
0.36	
	0.09
	0.66
	0.15
0.05	
	0.08
	0.51
0.20	
	0.25
0.13	
	0.11
TOTAL 1.92	3.87

5.79



ATTITUDE OF ROOF : 136/77° N
ATTITUDE OF FLOOR : 160/72° N
FORMATION :
UTM COORDINATES : 6343220 N, 515350 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.9 m
TRENCH WIDTH : 1.0 m
TRENCH LENGTH : 3.4 m(upper) 6.0(lower)
TRENCH BEARING : 070° " 217° "
TRENCH SLOPE : 15° " 34° "

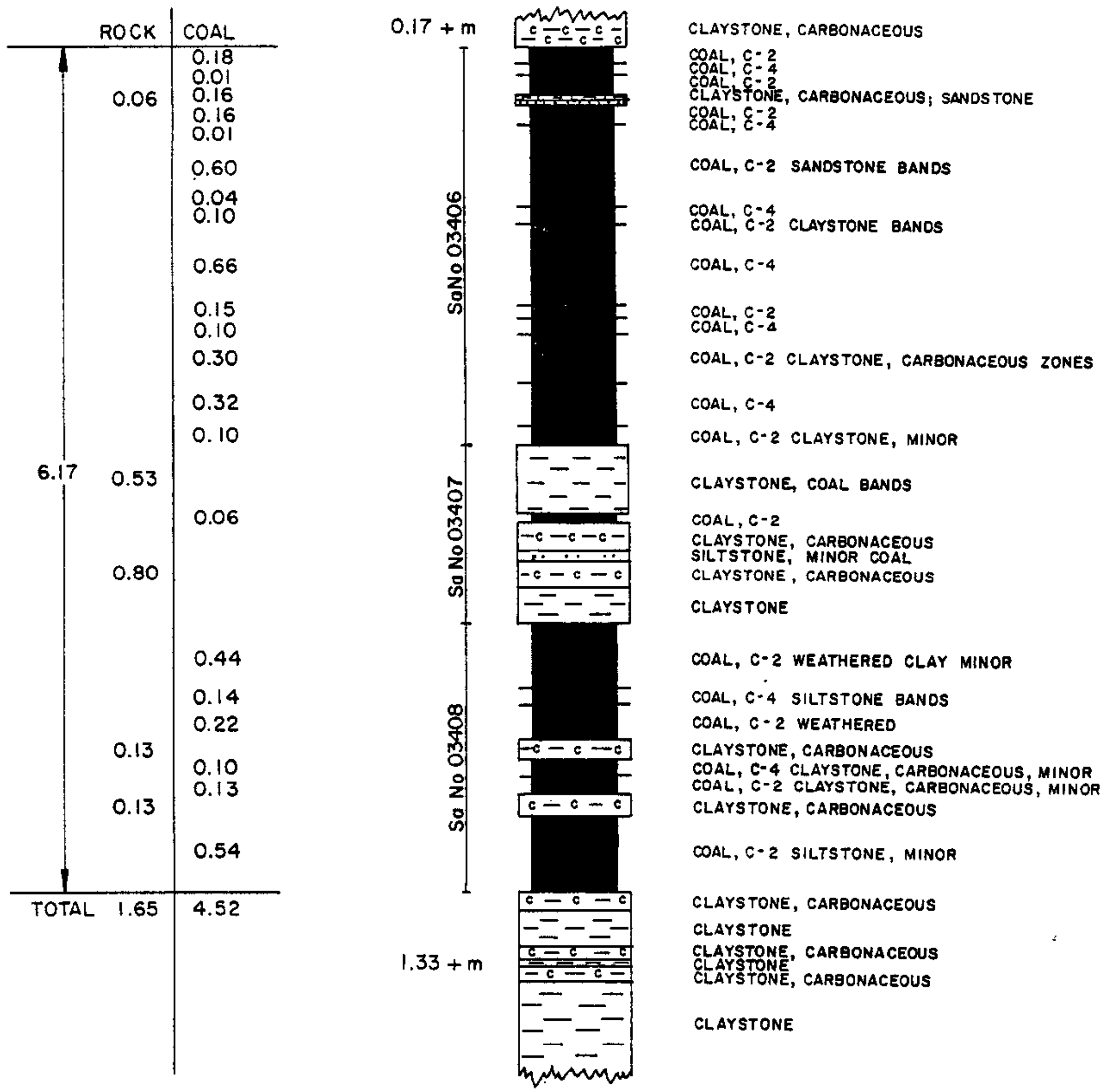
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC-82-001

DRAWN BY: P. WATSON	SCALE 1:50
LOGGED BY: K. JENNER	DATE 03/07/82
APPROVED BY:	



ATTITUDE OF ROOF : 144/34° N
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6343700N, 514910E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : .42 m
TRENCH WIDTH : .72 m
TRENCH LENGTH : 7.0 m
TRENCH BEARING : 020°
TRENCH SLOPE : 032°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

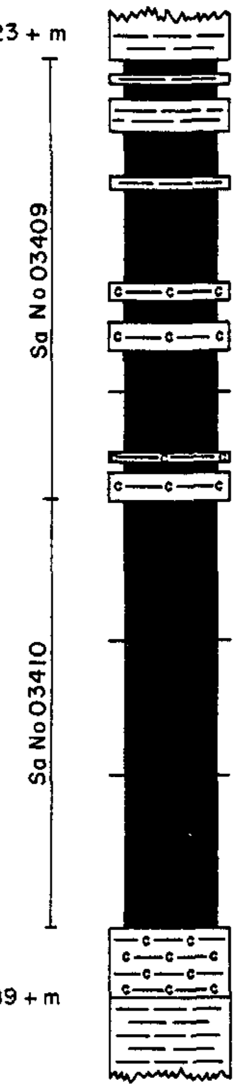
TRENCH LOG

TRC–82–002

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 3/82
APPROVED BY:	

ROCK	COAL		
		0.23 + m	CLAYSTONE
	0.11		COAL, C-2 WEATHERED CLAYSTONE MINOR
0.07			CLAYSTONE
	0.09		COAL, C-3
0.20			CLAYSTONE
	0.29		COAL, C-4
0.07			CLAYSTONE
	0.63		COAL, C-2
0.09			CLAYSTONE, CARBONACEOUS
	0.15		COAL, C-4 WEATHERED
0.19			CLAYSTONE, CARBONACEOUS
	0.27		COAL, C-2 WEATHERED CLAYSTONE, MINOR
	0.40		COAL, C-4 CLAYSTONE BANDS
0.05			CLAYSTONE, CARBONACEOUS
	0.06		COAL, C-2
0.21			CLAYSTONE, CARBONACEOUS COAL BANDS
	0.89		COAL, C-3
	0.86		COAL, C-2
	1.03		COAL, C-4
TOTAL 0.88	4.78		CLAYSTONE, CARBONACEOUS
		0.89 + m	CLAYSTONE

5.66

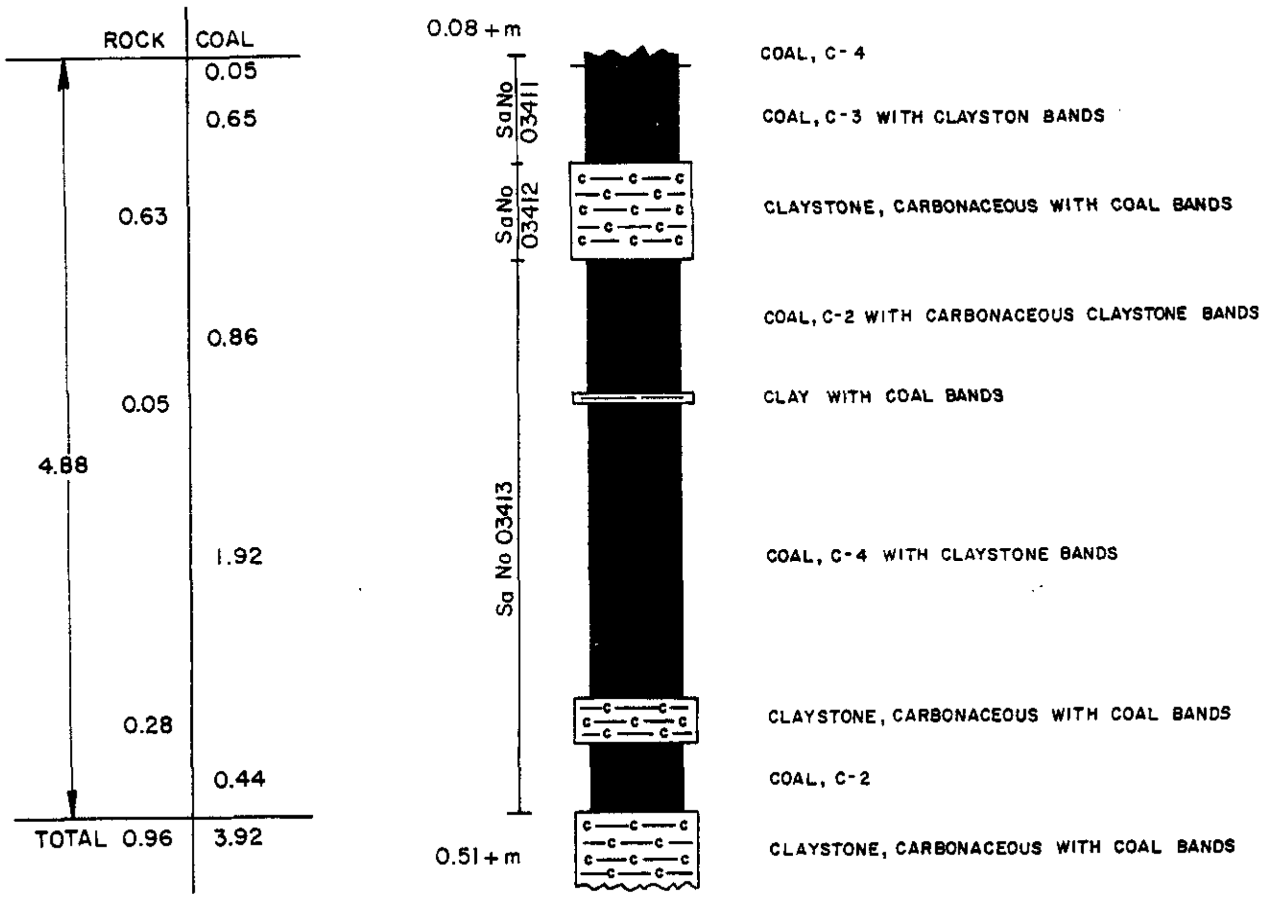


ATTITUDE OF ROOF : 136/11° N
ATTITUDE OF FLOOR : 119/47° N
FORMATION :
UTM COORDINATES : 6343535 N, 515070 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.48 m
TRENCH WIDTH : 0.74 m
TRENCH LENGTH : 6.9 m
TRENCH BEARING : 047°
TRENCH SLOPE : 32°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC-82-003

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 3/82
APPROVED BY:	



ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 094/17 N
FORMATION :
UTM COORDINATES : 6343140 N, 515370 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.97 m
TRENCH WIDTH : 0.66 m
TRENCH LENGTH : 6.15 m
TRENCH BEARING : 009°
TRENCH SLOPE : 36°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

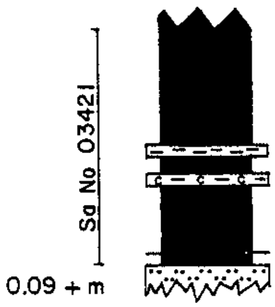
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–004

DRAWN BY: P. WATSON	SCALE 1:50
LOGGED BY: K. JENNER	DATE 03/07/82
APPROVED BY:	

	ROCK	COAL
1.54		0.75
	0.06	0.12
	0.09	0.43
		0.09
TOTAL	0.15	1.39



COAL, C-2 CLAYSTONE BANDS
CLAYSTONE, WEATHERED
COAL, C-3 WEATHERED
CLAYSTONE, CARBONACEOUS
COAL, C-4 WEATHERED, CLAYSTONE BANDS
COAL, C-3
SILTSTONE

ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 002/16° W
FORMATION :
UTM COORDINATES : 6343920 N, 515650 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.21 m
TRENCH WIDTH : 0.86 m
TRENCH LENGTH : 2.8 m
TRENCH BEARING : 095°
TRENCH SLOPE : 32°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

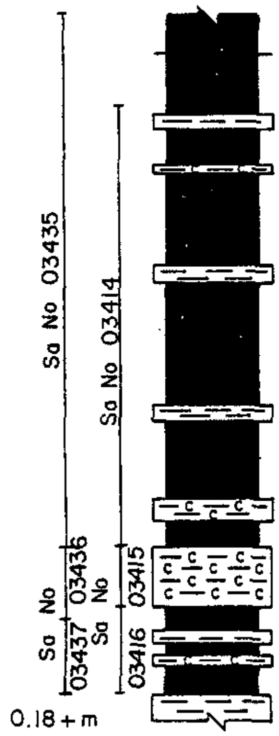
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–007

DRAWN BY:	SCALE 1:50
LOGGED BY: K. JENNER	DATE July 5, '82
APPROVED BY:	

	ROCK	COAL	
		0.26	COAL, HIGHLY WEATHERED, CLAYSTONE BANDS
		0.38	COAL, C-2, CLAYSTONE INTERBEDS
	0.11		CLAYSTONE
		0.25	COAL, C-2
	0.06		CLAYSTONE
		0.57	COAL, C-2, CLAYSTONE MINOR
	0.12		CLAYSTONE, CARBONACEOUS FE-STAIN
4.40		0.79	COAL, C-2, CLAYSTONE BANDS
	0.09		CLAYSTONE
		0.52	COAL, C-2, CLAYSTONE MINOR
	0.14		CLAYSTONE CARBONACEOUS
		0.19	COAL, C-2, CLAYSTONE INTERBEDS MINOR
	0.35		CLAYSTONE, CARBONACEOUS COAL BANDS
		0.18	COAL, C-2, FE-STAIN
	0.07		CLAYSTONE
		0.09	COAL, C-3
	0.04		CLAYSTONE
		0.19	COAL, C-2, CARBONACEOUS CLAYSTONE INTERBEDS
TOTAL	0.98	3.42	
0.18+m			CLAYSTONE

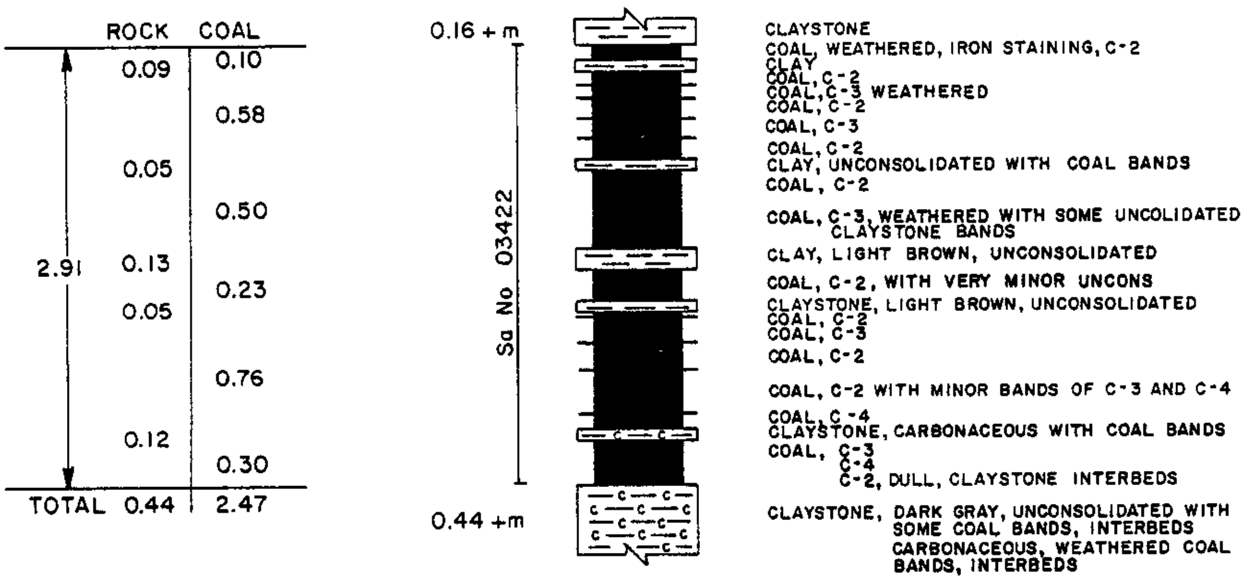


ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 060/11° N
FORMATION :
UTM COORDINATES : 6342740 N, 516330 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : .81 m
TRENCH WIDTH : .75 m
TRENCH LENGTH : 10.7 m
TRENCH BEARING : 162°
TRENCH SLOPE : 31°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–008

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 9/82
APPROVED BY:	



ATTITUDE OF ROOF	:	105/25° S
ATTITUDE OF FLOOR		116/19°S
FORMATION	:	
UTM COORDINATES	:	6344715 N, 516010 E
MAP CARD NUMBER	:	
AIR PHOTO NUMBER	:	
TRENCH DEPTH	:	.56 m
TRENCH WIDTH	:	.78 m
TRENCH LENGTH	:	5.56 m
TRENCH BEARING	:	69°
TRENCH SLOPE	:	29°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–010

DRAWN BY:	SCALE 1:50
LOGGED BY:	DATE July 12/82
APPROVED BY:	

	ROCK	COAL
		0.17
	0.05	
		0.47
		0.46
2.12		0.11
		0.26
		0.16
	0.14	
		0.06
	0.17	
		0.07
TOTAL	0.36	1.76

ATTITUDE OF ROOF : 112/55°S
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6345060N, 516040E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.39 m
TRENCH WIDTH : 0.52 m
TRENCH LENGTH : 3.39 m
TRENCH BEARING : 200°
TRENCH SLOPE : 007°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–023

DRAWN BY: D. DURANT	SCALE 1:50
LOGGED BY: K. JENNER	DATE July 11/82
APPROVED BY:	

ROCK	COAL
	0.25
0.08	
	0.25
0.01	
0.02	0.03
	0.33
0.02	
	0.17
0.12	
	0.23
	0.07
	0.28
0.10	
	0.22
0.03	
	0.24
0.05	
0.03	
0.03	0.13
0.05	
	0.16
TOTAL 0.54	2.36

2.90

0.13 + m
0.14 m

Sa No 03424

0.13 m
0.08 m
0.34 + m

SANDSTONE: FINE GRAINED, FRESH SURFACE GRAY
CLAYSTONE: DARK GRAY
COAL: C-2, MINOR CARBONACEOUS CLAYSTONE BANDS
CLAY: BROWN, UNCONSOLIDATED
COAL: C-2, MINOR IRON STAINING
CLAYSTONE: CARBONACEOUS
COAL: C-2
SILTSTONE: LIGHT BROWN
COAL: C-2
SANDSTONE: LIGHT BROWN, FINE GRAINED
COAL: C-2
CLAYSTONE: CARBONACEOUS, IRON STAINING
COAL: C-2 WEATHERED IRON STAINING
COAL: C-3 MINOR FINE GRAINED SNDST/CLYST INTERBED
COAL: C-2 IRON STAINING
CLAYSTONE: MINOR COAL BANDS
COAL: C-2
SANDSTONE: UNCONSOLIDATED, FRESH BROWN, WEATHERS ORANGE BROWN
COAL
CLAYSTONE: CARBONACEOUS, COAL BANDING
SANDSTONE: MINOR COAL BANDS
CLAYSTONE: MINOR COAL BANDS
COAL
CLAYSTONE: BROWN, SLIGHTLY FOSSILIFEROUS
CLAYSTONE: CARBONACEOUS, MINOR COAL INTERBEDS
CLAYSTONE

ATTITUDE OF ROOF 026/15° E
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6343660N, 514290E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.55 m
TRENCH WIDTH : 0.74 m
TRENCH LENGTH : 5.0 m
TRENCH BEARING : 173°
TRENCH SLOPE : 58°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

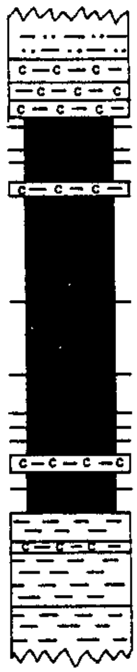
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–024

DRAWN BY:	SCALE 1:50
LOGGED BY: KIM JENNER	DATE 15/07/82
APPROVED BY:	

	ROCK	COAL
		0.07
		0.14
		0.06
	0.08	0.12
		0.72
2.43		0.43
		0.26
		0.09
		0.10
	0.08	0.05
		0.08
		0.15
TOTAL	0.16	2.27



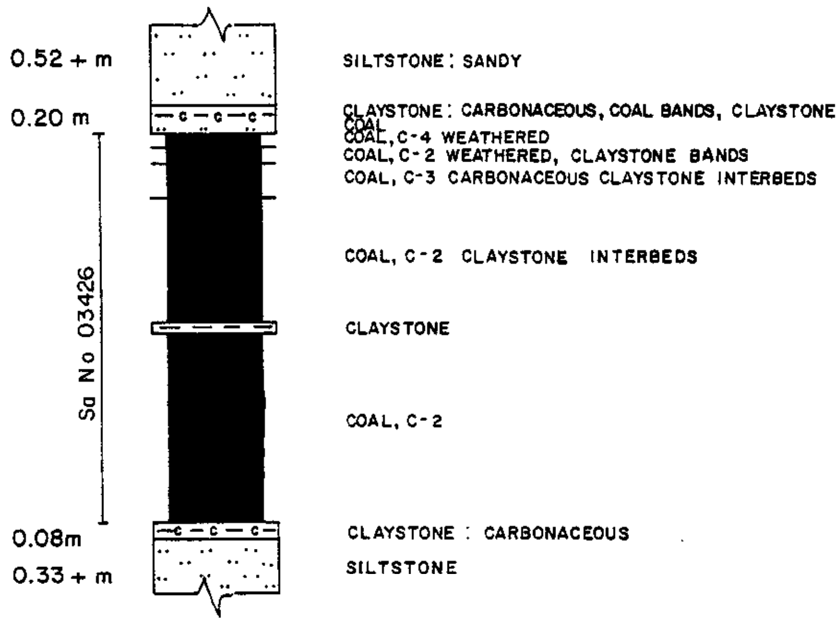
ATTITUDE OF ROOF : 103/32° S
ATTITUDE OF FLOOR : 115/19° S
FORMATION :
UTM COORDINATES : 6343710 N, 514170 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : .84 m
TRENCH WIDTH : .53 m
TRENCH LENGTH : 6.5 m
TRENCH BEARING : 118°
TRENCH SLOPE : 44°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–025

DRAWN BY: MARK HADLEY	SCALE 1:50
LOGGED BY: KIM JENNER	DATE July 26/82
APPROVED BY:	

	ROCK	COAL
		0.08
		0.08
		0.22
		0.81
2.51	0.07	
		1.25
TOTAL	0.07	2.44

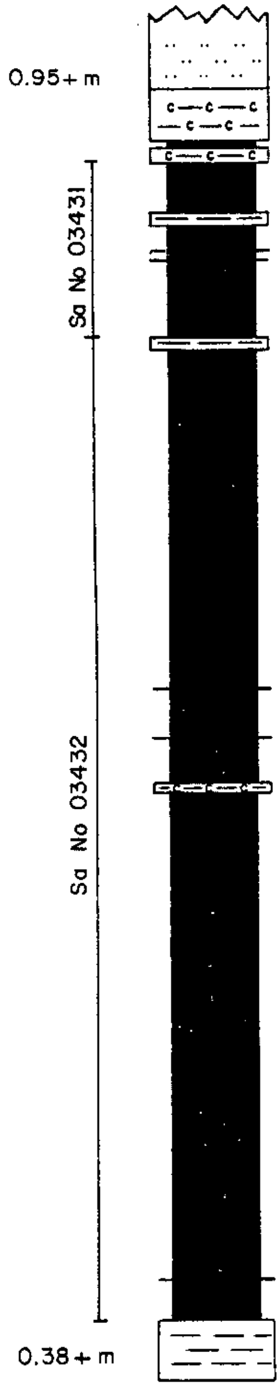


ATTITUDE OF ROOF : 007/18° E
ATTITUDE OF FLOOR : 153/03°S
FORMATION :
UTM COORDINATES : 6343730N, 514455 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.08 m
TRENCH WIDTH : 1.15 m
TRENCH LENGTH : 4.0 m
TRENCH BEARING : 005°
TRENCH SLOPE : 35°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–026

DRAWN BY:	SCALE 1:50
LOGGED BY: KIM JENNER	DATE July 26/82
APPROVED BY:	



ROCK	COAL	
		SILTSTONE
		CLAYSTONE, CARBONACEOUS, COAL BANDS
		COAL, C-2
		CLAYSTONE, CARBONACEOUS, QUARTZ VEIN
	0.31	COAL, C-2
0.06		CLAYSTONE
	0.17	COAL, C-2
	0.05	COAL, C-4
	0.51	COAL, C-2
0.06		CLAYSTONE, COAL BANDS
	2.23	COAL, C-2, UNCONSOLIDATE, CLAYSTONE INTERBEDS, CARBONACEOUS CLAYSTONE INTERBEDS
	0.33	COAL, C-1
	0.24	COAL, C-2, CARBONACEOUS CLAYSTONE INTERBEDS
0.06		CLAYSTONE, CARBONACEOUS COAL BANDS
	3.16	COAL, C-2, CARBONACEOUS CLAYSTONE AND CLAYSTONE INTERBEDS
	0.25	COAL, C-2, WEATHERED
		CLAYSTONE
TOTAL 0.18	7.25	

7.43

ATTITUDE OF ROOF : 142/89° S
ATTITUDE OF FLOOR : 118/45° S

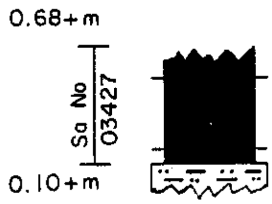
FORMATION :
UTM COORDINATES : 6343040 N, 515540 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.0 m
TRENCH WIDTH : 1.8 m
TRENCH LENGTH : 8.7 m
TRENCH BEARING : 060°
TRENCH SLOPE : 44°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–027

DRAWN BY:	SCALE 1:50
LOGGED BY: K. JENNER	DATE July 26/82
APPROVED BY:	

	ROCK	COAL
		0.07
0.63		0.46
		0.10
TOTAL	0.00	0.63



COAL, C-2, CLAY INTERBED

COAL, C-2, IRON STAINED
MINOR SILTSTONE BAND

COAL, C-2, WEATHERED, CLAYSTONE INTERBED
SILTY CLAYSTONE

ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 167/16° S
FORMATION :
UTM COORDINATES : 6342680 N, 516050 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.13 m
TRENCH WIDTH : .87 m
TRENCH LENGTH : 2.59 m
TRENCH BEARING : 016°
TRENCH SLOPE : 28°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MT. KLAPPAN COAL PROJECT

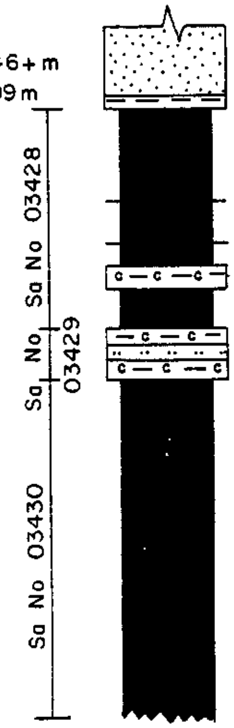
TRENCH LOG

TRC–82–028

DRAWN BY: M. HADLEY	SCALE 1:50
LOGGED BY: K. JENNER	DATE July 26/82
APPROVED BY:	

Rock	Coal	Description
0.46+ m		SANDSTONE, MEDIUM GRAINED
0.09 m		CLAY
	0.59	COAL, UNCONSOLIDATED
	0.28	COAL, C-3, CLAY INTERBEDS
	0.13	COAL, C-2, CLAYSTONE INTERBEDS
0.13		CLAYSTONE, CARBONACEOUS
	0.27	COAL, C-2
0.10		CLAYSTONE, CARBONACEOUS
0.10		SILTSTONE
0.13		CLAYSTONE, CARBONACEOUS
	2.18	COAL
TOTAL 0.46	3.45	

3.91



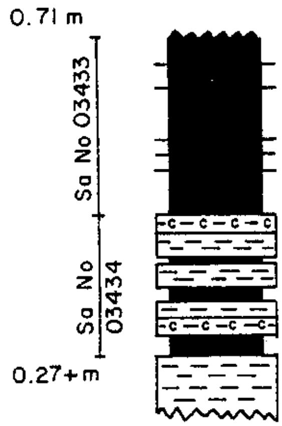
ATTITUDE OF ROOF 074/10° S
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6343780 N, 514550 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.03 m
TRENCH WIDTH : .57 m
TRENCH LENGTH : 8.68 m
TRENCH BEARING : 033°
TRENCH SLOPE : 39°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–029

DRAWN BY:	SCALE 1:50
LOGGED BY: K. JENNER	DATE July 28/82
APPROVED BY:	

	ROCK	COAL
2.05		0.19
		0.13
		0.34
		0.12
		0.10
		0.26
	0.13	
	0.15	
		0.07
	0.13	
		0.09
	0.10	
	0.10	
		0.14
TOTAL	0.61	1.44



COAL, C-2, CLAY INTERBED
COAL, C-2, CLAY INTERBED
COAL, C-2
COAL, C-3, CARBONACEOUS CLAYSTONE
COAL, C-2
COAL, C-2, CARB. CLAYSTONE INTERBEDS
CARB. CLAYSTONE, COAL INTERBEDS
CLAYSTONE, WEATHERED BROWN
COAL, C-2
CLAYSTONE, CARB. COAL INTERBEDS
COAL, C-3, CARB. CLAYSTONE INTERBEDS
CLAY, LIGHT BROWN
CLAYSTONE, CARB. COAL BANDS
COAL, C-2
CLAYSTONE, DARK GRAY

ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 019/21°E
FORMATION :
UTM COORDINATES : 6342780 N, 516430 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : .04 m
TRENCH WIDTH : 0.5 m
TRENCH LENGTH : 7.6 m
TRENCH BEARING : 146°
TRENCH SLOPE : 36°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

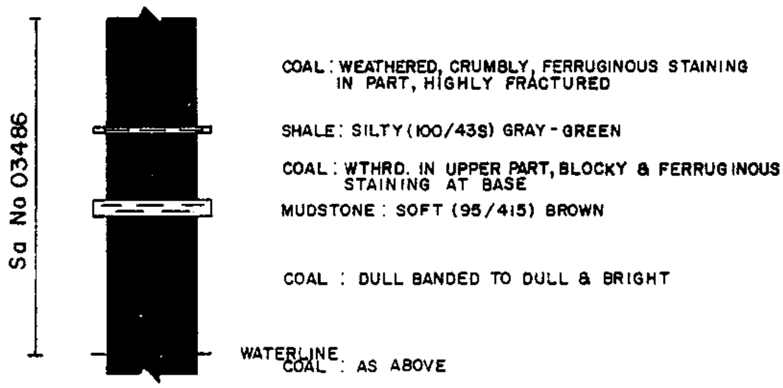
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–030

DRAWN BY: M. HADLEY	SCALE 1: 50
LOGGED BY: K. JENNER	DATE July 28/82
APPROVED BY:	

	ROCK	COAL
		0.70
	0.02	
		0.46
2.26+	0.08	
		0.90
		0.10+
TOTAL	0.10	2.16+



ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6346770 N, 515315 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1 m
TRENCH WIDTH : .85 m
TRENCH LENGTH : 3.5 m
TRENCH BEARING : 17°
TRENCH SLOPE : 51°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–040

DRAWN BY: J. SHARPE	SCALE 1:50
LOGGED BY: E. SWANBERGSON	DATE Aug. 6/82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 SIMPLE SAMPLE SUMMARY PAGE 1

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82001										
		3417	0.10	1.26	1.16	100.00	0.50	0.66	0.00	0.00
		3418	1.26	3.30	2.04	100.00	1.52	0.52	0.00	0.00
		3419	3.30	3.66	0.36	100.00	0.00	0.36	0.00	0.00
		3420	3.66	5.89	2.23	100.00	1.85	0.38	0.00	0.00
TRC82002										
		3406	0.17	3.12	2.95	100.00	2.89	0.06	0.00	0.00
		3407	3.12	4.51	1.39	100.00	0.06	1.33	0.00	0.00
		3408	4.51	6.21	1.70	100.00	1.57	0.13	0.00	0.00
TRC82003										
		3409	0.23	3.10	2.87	100.00	1.99	0.88	0.00	0.00
		3410	3.10	5.88	2.78	100.00	2.78	0.00	0.00	0.00
TRC82004										
		3411	0.08	0.78	0.70	100.00	0.65	0.05	0.00	0.00
		3412	0.78	1.41	0.63	100.00	0.02	0.61	0.00	0.00
		3413	1.41	4.96	3.55	100.00	3.14	0.41	0.00	0.00
TRC82007										
		3421	0.80	2.34	1.54	100.00	1.39	0.15	0.00	0.00
TRC82008										
		3414	0.93	3.81	2.88	100.00	2.36	0.52	0.00	0.00
		3415	3.81	4.16	0.35	100.00	0.00	0.35	0.00	0.00
		3416	4.16	4.73	0.57	100.00	0.46	0.11	0.00	0.00
		3435	0.33	3.81	3.48	100.00	2.96	0.52	0.00	0.00
		3436	3.81	4.16	0.35	100.00	0.00	0.35	0.00	0.00
		3437	4.16	4.73	0.57	100.00	0.46	0.11	0.00	0.00
TRC82010										
		3422	0.16	3.07	2.91	100.00	2.47	0.44	0.00	0.00
TRC82023										
		3423	0.17	2.29	2.12	100.00	1.76	0.36	0.00	0.00
TRC82024										
		3424	0.27	2.82	2.55	100.00	2.03	0.52	0.00	0.00

GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 SIMPLE SAMPLE SUMMARY

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82025										
		3425	0.73	3.16	2.43	100.00	2.27	0.16	0.00	0.00
TRC82026										
		3426	0.72	3.23	2.51	100.00	2.44	0.07	0.00	0.00
TRC82027										
		3431	0.95	2.05	1.10	100.00	1.04	0.06	0.00	0.00
		3432	2.05	8.38	6.33	100.00	6.21	0.12	0.00	0.00
TRC82028										
		3427	0.68	1.31	0.63	100.00	0.63	0.00	0.00	0.00
TRC82029										
		3428	0.55	1.95	1.40	100.00	1.27	0.13	0.00	0.00
		3429	1.95	2.28	0.33	100.00	0.00	0.33	0.00	0.00
		3430	2.28	4.46	2.18	100.00	2.18	0.00	0.00	0.00
TRC82030										
		3433	0.71	1.85	1.14	100.00	1.14	0.00	0.00	0.00
		3434	1.85	2.76	0.91	100.00	0.30	0.61	0.00	0.00
TRC82040										
		3486	1.00	3.26	2.26	100.00	2.16	0.10	0.00	0.00

XXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82001

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.10	0.10			CLAYSTONE	CARB
	0.10	0.19	0.09	03417		COAL	
	0.19	0.30	0.11	03417		CLAYSTONE	MNR COAL
	0.30	0.38	0.08	03417		COAL	
	0.38	0.45	0.07	03417		CLAYSTONE	
	0.45	0.74	0.29	03417		COAL	
	0.74	0.78	0.04	03417		COAL	C-1
	0.78	1.26	0.48	03417		CLAYSTONE	CARB MNR COAL BANDS
	1.26	1.85	0.59	03418		COAL	C-4 CLAYSTONE BANDS
	1.85	2.20	0.35	03418		COAL	C-2
	2.20	2.34	0.14	03418		CLAYSTONE	CARB
	2.34	2.42	0.08	03418		COAL	WEATHERED

* DENOTES MEASURED BCA

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82001

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.42	2.80	0.38	03418		CLAYSTONE	CARB MNR COAL BANDS
	2.80	3.06	0.26	03418		COAL	WEATHERED
	3.06	3.30	0.24	03418		COAL	MNR CLAYSTONE BANDS
	3.30	3.66	0.36	03419		CLAYSTONE	MNR COAL BANDS
	3.66	3.75	0.09	03420		COAL	C-2
	3.75	4.41	0.66	03420		COAL	C-1
	4.41	4.56	0.15	03420		COAL	C-2
	4.56	4.61	0.05	03420		CLAYSTONE	
	4.61	4.69	0.08	03420		COAL	C-1
	4.69	5.20	0.51	03420		COAL	C-2 MNR CLAYSTONE BANDS
	5.20	5.40	0.20	03420		CLAYSTONE	WITH SS BED

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82001

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	5.40	5.65	0.25	03420		COAL	C-1 MNR CLAYSTONE
	5.65	5.78	0.13	03420		SANDSTONE	
	5.78	5.89	0.11	03420		COAL	C-1
	5.89	6.86	0.97			CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82002

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.17	0.17			CLAYSTONE	CARB
	0.17	0.35	0.18	03406		COAL	C-2
	0.35	0.36	0.01	03406		COAL	C-4
	0.36	0.52	0.16	03406		COAL	C-2
	0.52	0.58	0.06	03406		CLAYSTONE	CARB SANDSTONE
	0.58	0.74	0.16	03406		COAL	C-2
	0.74	0.75	0.01	03406		COAL	C-4
	0.75	1.35	0.60	03406		COAL	C-2 SS BANDS
	1.35	1.39	0.04	03406		COAL	C-4
	1.39	1.49	0.10	03406		COAL	C-2 CLYST BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82002

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	1.49	2.15	0.66	03406		COAL	C-4
	2.15	2.30	0.15	03406		COAL	C-2
	2.30	2.40	0.10	03406		COAL	C-4
	2.40	2.70	0.30	03406		COAL	C-2 CARB CLYST ZONES
	2.70	3.02	0.32	03406		COAL	C-4
	3.02	3.12	0.10	03406		COAL	C-2 MNR CLYST
	3.12	3.65	0.53	03407		CLAYSTONE	CLAY BANDS
	3.65	3.71	0.06	03407		COAL	C-2
	3.71	4.51	0.80	03407		CLAYSTONE	CARB SILTSTONE BANDS
	4.51	4.95	0.44	03408		COAL	C-2 WEATHERED.MNR CLAY

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82002

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	4.95	5.09	0.14	03408		COAL	C-4 SILTSTONE BANDS
	5.09	5.31	0.22	03408		COAL	C-2 WEATHERED
	5.31	5.44	0.13	03408		CLAYSTONE	CARB
	5.44	5.54	0.10	03408		COAL	C-4 MNR CARB CLYST.
	5.54	5.67	0.13	03408		COAL	C-2 CARB CLYST
	5.67	6.21	0.54	03408		COAL	C-2 MNR SILTSTONE
	6.21	7.54	1.33			CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82003

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.23	0.23			CLAYSTONE	
	0.23	0.34	0.11	03409		COAL	C-2 MNR CLAYSTONE
	0.34	0.41	0.07	03409		CLAYSTONE	
	0.41	0.50	0.09	03409		COAL	C-3
	0.50	0.70	0.20	03409		CLAYSTONE	
	0.70	0.99	0.29	03409		COAL	C-4
	0.99	1.06	0.07	03409		CLAYSTONE	
	1.06	1.69	0.63	03409		COAL	C-2
	1.69	1.78	0.09	03409		CLAYSTONE	CARB
	1.78	1.93	0.15	03409		COAL	C-4 WEATHERED
	1.93	2.12	0.19	03409		CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82003

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.12	2.38	0.26	03409		COAL	C-2 WEATHERED. MNR CLYST
	2.38	2.78	0.40	03409		COAL	C-4 CLYST BANDS
	2.78	2.83	0.05	03409		CLAYSTONE	CARB
	2.83	2.89	0.06	03409		COAL	C-2
	2.89	3.10	0.21	03409		CLAYSTONE	CARB COAL BANDS
	3.10	3.99	0.89	03410		COAL	C-3
	3.99	4.85	0.86	03410		COAL	C-2
	4.85	5.88	1.03	03410		COAL	C-4
	5.88	6.77	0.89			CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82004

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.08	0.08			CLAY	
	0.08	0.13	0.05	03411		COAL	C-4
	0.13	0.78	0.65	03411		COAL	C-3 CLYST BANDS
	0.78	1.41	0.63	03412		CLAYSTONE	CARB COAL BANDS
	1.41	2.27	0.86	03413		COAL	C-2 CARB CLYST BANDS
	2.27	2.32	0.05	03413		CLAY	COAL BANDS
	2.32	4.24	1.92	03413		COAL	C-4 CLAYSTONE BANDS
	4.24	4.52	0.28	03413		CLAYSTONE	CARB COAL BANDS
	4.52	4.96	0.44	03413		COAL	C-2
	4.96	5.47	0.51			CLAYSTONE	CARB COAL BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82007

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.80	0.80			TILL	
	0.80	1.55	0.75	03421		COAL	C-2 CLYST BANDS
	1.55	1.61	0.06	03421		CLAYSTONE	WEATHERED
	1.61	1.73	0.12	03421		COAL	C-3 WEATHERED
	1.73	1.82	0.09	03421		CLAYSTONE	CARB
	1.82	2.25	0.43	03421		COAL	C-4 WEATHERED. CLAYSTONE BANDS
	2.25	2.34	0.09	03421		COAL	C-3

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82008

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.33	0.33			TILL	TOP NOT REACHED
	0.33	0.59	0.26			COAL	HIGHLY WEATHERED
	0.59	0.93	0.34			COAL	C-2 CLAYSTONE INTB
	0.93	0.97	0.04	03414		COAL	C-2
	0.97	1.08	0.11	03414		CLAYSTONE	
	1.08	1.33	0.25	03414		COAL	C-2
	1.33	1.39	0.06	03414		CLAYSTONE	
	1.39	1.96	0.57	03414		COAL	C-2 MNR CLYST
	1.96	2.08	0.12	03414		CLAYSTONE	CARB FE STAINING
	2.08	2.87	0.79	03414		COAL	C-2 CLYST BANDS
	2.87	2.96	0.09	03414		CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82008

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.96	3.48	0.52	03414		COAL	C-2 MNR CLYST
	3.48	3.62	0.14	03414		CLAYSTONE	CARB
	3.62	3.81	0.19	03414		COAL	C-2 CLYST INTERBEDS
	3.81	4.16	0.35	03415		CLAYSTONE	CARB COAL BANDS
	4.16	4.34	0.18	03416		COAL	C-2 FE STAINS
	4.34	4.41	0.07	03416		CLAYSTONE	
	4.41	4.50	0.09	03416		COAL	C-3
	4.50	4.54	0.04	03416		CLAYSTONE	
	4.54	4.73	0.19	03416		COAL	C-2 CARB CLYST INTERBEDS
	4.73	4.91	0.18			CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82010

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.16	0.16			CLAYSTONE	ROOF
	0.16	0.26	0.10	03422		COAL	C-2 WEATHERED, FE STAINING
	0.26	0.35	0.09	03422		CLAY	
	0.35	0.93	0.58	03422		COAL	C-2 SOME COAL C-3
	0.93	0.98	0.05	03422		CLAY	UNCONSOLIDATED, COAL BANDS
	0.98	1.48	0.50	03422		COAL	C-3 SOME COAL C-2, WEATHERED, SOME UNCONSOL IDATED CLAYSTONE INTBS
	1.48	1.61	0.13	03422		CLAY	LT.BN UNCONSOLIDATED
	1.61	1.84	0.23	03422		COAL	C-2 MNR UNCONSOLIDATED CLAY
	1.84	1.89	0.05	03422		CLAYSTONE	LT.BN UNCONSOLIDATED
	1.89	2.65	0.76	03422		COAL	C-2 SOME COAL C-3 AND C-4

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82010

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.65	2.77	0.12	03422		CLAYSTONE	CARB COAL BANDS
	2.77	3.07	0.30	03422		COAL	COAL C-2,C-3,C-4 PRESENT
	3.07	3.41	0.34			CLAYSTONE	DK.GY WEATHERED COAL BANDS
	3.41	3.51	0.10			CLAYSTONE	CARB WEATHERED COAL BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82023

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.17	0.17			CLAYSTONE	ROOF
	0.17	0.34	0.17	03423		COAL	C-2 WEATHERED
	0.34	0.39	0.05	03423		CLAY	LT.BN UNCONSOLIDATED
	0.39	0.86	0.47	03423		COAL	C-3 FE-STAINS.CARB CLYST BANDS
	0.86	1.32	0.46	03423		COAL	C-2
	1.32	1.43	0.11	03423		COAL	CARB CLYST INTERBEDS
	1.43	1.69	0.26	03423		COAL	C-4 CLYST INTERBEDS
	1.69	1.85	0.16	03423		COAL	C-3
	1.85	1.99	0.14	03423		CLAYSTONE	LT.BN
	1.99	2.05	0.06	03423		COAL	C-3 CARB CLYST BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82023

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.05	2.22	0.17	03423		CLAYSTONE	CARB MNR COAL BANDS
	2.22	2.29	0.07	03423		COAL	C-2 CARB CLYST BANDS
	2.29	2.55	0.26			CLAYSTONE	CARB MNR COAL BANDS
	2.55	2.67	0.12			SILTSTONE	NODULAR
	2.67	3.32	0.65			CLAYSTONE	CARB COAL BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82024

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.13	0.13			SANDSTONE	FG.GY WEATHERS TAN
	0.13	0.27	0.14			CLAYSTONE	DK.GY
	0.27	0.52	0.25	03424		COAL	C-2 MNR CARB CLYST BANDS
	0.52	0.60	0.08	03424		CLAY	BN UNCONSOLIDATED
	0.60	0.85	0.25	03424		COAL	C-2 MNR IRON STAINS
	0.85	0.86	0.01	03424		CLAYSTONE	CARB
	0.86	0.89	0.03	03424		COAL	C-2
	0.89	0.91	0.02	03424		SILTSTONE	LT.BN
	0.91	1.08	0.17	03424		COAL	C-2
	1.08	1.20	0.12	03424		CLAYSTONE	CARB FE STAINING

* DENOTES MEASURED BCA

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82024

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	1.20	1.43	0.23	03424		COAL	C-2 WEATHERED, FE STAINING
	1.43	1.50	0.07	03424		COAL	C-3 MNR FG SS AND CLYST INTBS
	1.50	1.78	0.28	03424		COAL	C-2 FE STAINING
	1.78	1.88	0.10	03424		CLAYSTONE	MNR COAL BANDS
	1.88	2.10	0.22	03424		COAL	C-2
	2.10	2.13	0.03	03424		SANDSTONE	BN UNCONSOLIDATED, WEATHERS OR-BN
	2.13	2.37	0.24	03424		COAL	C-2 FE STAINING
	2.37	2.42	0.05	03424		CLAYSTONE	CARB COAL BANDS
	2.42	2.45	0.03	03424		CLAYSTONE	BN
	2.45	2.58	0.13	03424		COAL	C-3 CARB CLYST INTBS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82024

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.58	2.61	0.03	03424		SANDSTONE	MNR COAL BANDS
	2.61	2.66	0.05	03424		CLAYSTONE	CARB MNR COAL BANDS
	2.66	2.82	0.16	03424		COAL	C-3 WEATHERED, CARB CLYST INTBS
	2.82	2.95	0.13			CLAYSTONE	BN SLIGHTLY FOSSILIFEROUS
	2.95	3.03	0.08			CLAYSTONE	CARB MNR COAL INTBS
	3.03	3.37	0.34			CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82025

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.38	0.38			CLAYSTONE	SILTY,FOSSILS
	0.38	0.51	0.13			CLAYSTONE	CARB COAL BANDS
	0.51	0.64	0.13			CLAYSTONE	UNCONSOLIDATED
	0.64	0.73	0.09			CLAYSTONE	CARB UNCONSOLIDATED.COAL BANDING
	0.73	0.80	0.07	03425		COAL	C-2 IRON STAINS
	0.80	0.94	0.14	03425		COAL	C-3 WEATHERED
	0.94	1.00	0.06	03425		COAL	C-2 CLAYSTONE INTERBEDS
	1.00	1.12	0.12	03425		COAL	C-3 WEATHERED,FE STAINED.CLAYSTONE BANDS
	1.12	1.20	0.08	03425		CLAY	UNCONSOLIDATED. MNR COAL BANDS
	1.20	1.92	0.72	03425		COAL	C-4 FE STAINS, CARB CLAYSTONE INTERBEDS
	1.92	2.35	0.43	03425		COAL	C-3 WEATHERED, CARB CLAYSTONE INTERBEDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82025

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.35	2.61	0.26	03425		COAL	C-2 CLAYSTONE INTERBEDS
	2.61	2.70	0.09	03425		COAL	C-2 UNCONSOLIDATED, CLAYSTONE BEDS
	2.70	2.80	0.10	03425		COAL	C-2 SS INTERBEDS
	2.80	2.85	0.05	03425		COAL	C-4 FE STAINS
	2.85	2.93	0.08	03425		CLAYSTONE	CARB COAL INTERBEDS
	2.93	3.01	0.08	03425		COAL	C-3 CARB CLAYSTONE INTERBEDS
	3.01	3.16	0.15	03425		COAL	C-2 WEATHERED
	3.16	3.33	0.17			CLAYSTONE	UNCONSOLIDATED
	3.33	3.39	0.06			CLAYSTONE	CARB COAL INTERBEDS
	3.39	3.73	0.34			CLAYSTONE	COAL INTERBEDS,WEATHERED
	3.73	4.11	0.38			CLAYSTONE	WEATHERED

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82026

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.52	0.52			SILTSTONE	SANDY
	0.52	0.72	0.20			CLAYSTONE	CARB COAL BANDS
	0.72	0.80	0.08	03426		COAL	C-4 WEATHERED
	0.80	0.88	0.08	03426		COAL	C-2 WEATHERED, CLAYSTONE BANDS
	0.88	1.10	0.22	03426		COAL	C-3 CARB CLAYSTONE INTERBEDS
	1.10	1.91	0.81	03426		COAL	C-2 CLAYSTONE INTERBEDS
	1.91	1.98	0.07	03426		CLAYSTONE	
	1.98	3.23	1.25	03426		COAL	C-2
	3.23	3.31	0.08			CLAYSTONE	CARB
	3.31	3.64	0.33			SILTSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82027

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.50	0.50			SILTSTONE	
	0.50	0.85	0.35			CLAYSTONE	CARB COAL BANDS
	0.85	0.88	0.03			COAL	C-2
	0.88	0.95	0.07			CLAYSTONE	CARB QUARTZ VEIN
	0.95	1.26	0.31	03431		COAL	C-2
	1.26	1.32	0.06	03431		CLAYSTONE	
	1.32	1.49	0.17	03431		COAL	C-2
	1.49	1.54	0.05	03431		COAL	C-4
	1.54	2.05	0.51	03431		COAL	C-2
	2.05	2.11	0.06	03432		CLAYSTONE	COAL BANDS
	2.11	4.34	2.23	03432		COAL	C-2 UNCONSOLIDATED,CLYST & CARB CLYST BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82027

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	4.34	4.67	0.33	03432		COAL	C-1
	4.67	4.91	0.24	03432		COAL	C-2 CLYST INTERBEDS
	4.91	4.97	0.06	03432		CLAYSTONE	CARB COAL BANDS
	4.97	8.13	3.16	03432		COAL	C-2 CLYST,CARB CLYST INTERBEDS
	8.13	8.38	0.25	03432		COAL	C-2 WEATHERED
	8.38	8.76	0.38			CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82028

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.68	0.68			TILL	NO ROOF
	0.68	0.75	0.07	03427		COAL	C-2 CLAY INTERBED
	0.75	1.21	0.46	03427		COAL	C-2 FE STAINED.MNR SLTST BAND
	1.21	1.31	0.10	03427		COAL	C-2 WEATHERED.CLYST INTERBED
	1.31	1.41	0.10			CLAYSTONE	SLTY

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82029

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.46	0.46			SANDSTONE	MG ROOF
	0.46	0.55	0.09			CLAY	
	0.55	1.14	0.59	03428		COAL	UNCONSOLIDATED
	1.14	1.42	0.28	03428		COAL	C-3 CLAY INTERBEDS
	1.42	1.55	0.13	03428		COAL	C-2 CLYST INTERBEDS
	1.55	1.68	0.13	03428		CLAYSTONE	CARB
	1.68	1.95	0.27	03428		COAL	C-2
	1.95	2.05	0.10	03429		CLAYSTONE	CARB
	2.05	2.15	0.10	03429		SILTSTONE	
	2.15	2.28	0.13	03429		CLAYSTONE	CARB
	2.28	4.46	2.18	03430		COAL	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82029

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	4.46	5.07	0.61			TILL	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82030

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.71	0.71			TILL,CLAY	COAL BEDS AND CARB CLYST
	0.71	0.90	0.19	03433		COAL	C-2 CLAY INTERBEDS
	0.90	1.03	0.13	03433		COAL	C-2 CLAY INTERBEDS
	1.03	1.37	0.34	03433		COAL	C-2
	1.37	1.49	0.12	03433		COAL	C-3 CARB CLYST
	1.49	1.59	0.10	03433		COAL	C-2
	1.59	1.85	0.26	03433		COAL	C-2 CARB CLYST INTERBEDS
	1.85	1.98	0.13	03434		CLAYSTONE	CARB COAL INTERBEDS
	1.98	2.13	0.15	03434		CLAYSTONE	WEATHERED BN
	2.13	2.20	0.07	03434		COAL	C-2

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82030

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.20	2.33	0.13	03434		CLAYSTONE	CARB COAL INTERBEDS
	2.33	2.42	0.09	03434		COAL	C-3 CARB CLYST INTERBEDS
	2.42	2.52	0.10	03434		CLAY	LT.BN
	2.52	2.62	0.10	03434		CLAYSTONE	CARB COAL BANDS
	2.62	2.76	0.14	03434		COAL	C-2
	2.76	3.03	0.27			CLAYSTONE	DK.GY

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: HC DATA SOURCE: TRC82040

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	1.00	1.00			OVERBURDEN	
	1.00	1.70	0.70	03486		COAL	HIGHLY WEATHERED. FERRUGINOUS STAINING IN PART
	1.70	1.72	0.02	03486		SHALE	SLTY.GY
	1.72	2.18	0.46	03486		COAL	WEATHERED. BLOCKY
	2.18	2.26	0.08	03486		MUDSTONE	BN SOFT
	2.26	3.16	0.90	03486		COAL	C-3 MODIFIER RANGES C-3 TO C-4
	3.16	3.26	0.10	03486		COAL	C-3 BELOW WATER LINE. NO FLOOR REACHED

* DENOTES MEASURED BCA

HOBBIT CREEK
LIST OF SAMPLES

DATA SOURCE	COMPOSITE SAMPLE ID	INCREMENT SAMPLE ID
KPNHCTRC82001	50	03418 - 03420
KPNHCTRC82002	51	03406
	52	03408
KPNHCTRC82003	53	03409 - 03410
KPNHCTRC82004	54	03411
	55	03413
KPNHCTRC82007	57	03421
KPNHCTRC82008	58	03435 - 03437
KPNHCTRC82010	60	03422
KPNHCTRC82023	70	03423
KPNHCTRC82024	71	03424
KPNHCTRC82025	72	03425
KPNHCTRC82026	73	03426
KPNHCTRC82027	74	03431 - 03432
KPNHCTRC82028	75	03427
KPNHCTRC82029	76	03428 - 03430
KPNHCTRC82030	77	03433
KPNHCTRC82040	87	03486

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82001

SAMPLE ID	50	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	5.90	TOTAL SULPHUR %	0.49
TOTAL MOISTURE %	12.58	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	7.10	FSI	__._
ASH %	41.50	HGI	___._
VOLATILE MATTER %	10.60	CO2 %	__.__
FIXED CARBON %	40.80		

GROSS CALORIFIC VALUE (MJ/KG) 14.59

NET CALORIFIC VALUE (MJ/KG) __.__ Ro_{max}=3.50

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82002

SAMPLE ID 51 DATA TYPE (REAL,BORO,AVER,CALC) REAL
SPLIT SAMPLE ID HD1 DATE ANALYSED 13/01/83
ANALYSIS BASIS TYPE (AD,DB,AR,EM) AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	11.40	TOTAL SULPHUR %	0.48
TOTAL MOISTURE %	12.55	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.30	FSI	__._
ASH %	26.50	HGI	___._
VOLATILE MATTER %	11.50	CO2 %	__.__
FIXED CARBON %	60.70		

GROSS CALORIFIC VALUE (MJ/KG) 23.16
NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.51$

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82002

SAMPLE ID	52	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %<AD,AR>	11.80	TOTAL SULPHUR %	0.50
TOTAL MOISTURE %	12.86	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %<AD,EM>	1.20	FSI	__._
ASH %	29.60	HGI	___._
VOLATILE MATTER %	10.60	CO2 %	__.__
FIXED CARBON %	58.60		

GROSS CALORIFIC VALUE (MJ/KG)	22.45	
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.59$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **HC** DS **TRC82003**

SAMPLE ID	53	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	14.20	TOTAL SULPHUR %	0.46
TOTAL MOISTURE %	16.09	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.20	FSI	__._
ASH %	17.40	HGI	___._
VOLATILE MATTER %	13.70	CO2 %	__.__
FIXED CARBON %	66.70		

GROSS CALORIFIC VALUE (MJ/KG) 25.33

NET CALORIFIC VALUE (MJ/KG) __.__ Ro_{max}=3.60

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82004

SAMPLE ID	54	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %<AD,AR>	20.60	TOTAL SULPHUR %	0.48
TOTAL MOISTURE %	22.11	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %<AD,EM>	1.90	FSI	__._
ASH %	10.50	HGI	___._
VOLATILE MATTER %	16.20	CO2 %	__.__
FIXED CARBON %	71.40		

GROSS CALORIFIC VALUE (MJ/KG)	27.56		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.61	

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82004

SAMPLE ID	55	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %<AD,AR>	24.80	TOTAL SULPHUR %	0.33
TOTAL MOISTURE %	27.28	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %<AD,EM>	3.30	FSI	__._
ASH %	27.40	HGI	___._
VOLATILE MATTER %	20.30	CO2 %	__.__
FIXED CARBON %	49.00		

GROSS CALORIFIC VALUE (MJ/KG)	19.02		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.75$	

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82007

SAMPLE ID	57	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	10.60	TOTAL SULPHUR %	0.50
TOTAL MOISTURE %	11.58	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.10	FSI	__._
ASH %	24.40	HGI	___._
VOLATILE MATTER %	9.50	CO2 %	__.__
FIXED CARBON %	65.00		

GROSS CALORIFIC VALUE (MJ/KG) 25.24

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.56$

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82008

SAMPLE ID	58	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	18.80	TOTAL SULPHUR %	0.39
TOTAL MOISTURE %	20.26	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.80	FSI	__._
ASH %	47.30	HGI	___._
VOLATILE MATTER %	12.90	CO2 %	__.__
FIXED CARBON %	38.00		

GROSS CALORIFIC VALUE (MJ/KG) 15.66

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.48$

GCRI COAL DIVISION **HEAD** PROJ KPN BLK HC DS TRC82010

SAMPLE ID	60	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	11.70	TOTAL SULPHUR %	0.43
TOTAL MOISTURE %	12.49	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	0.90	FSI	__._
ASH %	32.90	HGI	___._
VOLATILE MATTER %	6.70	CO2 %	__.__
FIXED CARBON %	59.50		

GROSS CALORIFIC VALUE (MJ/KG) 22.31

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.57$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **HC** DS **TRC82023**

SAMPLE ID	70	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	10.00	TOTAL SULPHUR %	0.53
TOTAL MOISTURE %	10.63	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	0.70	FSI	__._
ASH %	29.20	HGI	___._
VOLATILE MATTER %	9.70	CO2 %	__.__
FIXED CARBON %	60.40		

GROSS CALORIFIC VALUE (MJ/KG) 23.55

NET CALORIFIC VALUE (MJ/KG) __.__

Ro_{max}=3.27

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82024

SAMPLE ID	71	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	11.50	TOTAL SULPHUR %	0.48
TOTAL MOISTURE %	12.56	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.20	FSI	__._
ASH %	30.80	HGI	___._
VOLATILE MATTER %	9.10	CO2 %	__.__
FIXED CARBON %	58.90		
GROSS CALORIFIC VALUE (MJ/KG)	22.48		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.53	

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82025

SAMPLE ID	72	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	15.00	TOTAL SULPHUR %	0.32
TOTAL MOISTURE %	17.55	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	3.00	FSI	__._
ASH %	39.80	HGI	___._
VOLATILE MATTER %	18.10	CO2 %	__.__
FIXED CARBON %	39.10		

GROSS CALORIFIC VALUE (MJ/KG)	15.48	
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.41$

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82026

SAMPLE ID	73	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	18.70	TOTAL SULPHUR %	0.44
TOTAL MOISTURE %	21.14	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	3.00	FSI	__._
ASH %	19.00	HGI	___._
VOLATILE MATTER %	14.00	CO2 %	__.__
FIXED CARBON %	64.00		

GROSS CALORIFIC VALUE (MJ/KG) 24.77

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.66$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **HC** DS **TRC82027**

SAMPLE ID	74	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	19.50	TOTAL SULPHUR %	0.44
TOTAL MOISTURE %	20.22	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	0.90	FSI	__._
ASH %	21.60	HGI	___._
VOLATILE MATTER %	8.30	CO2 %	__.__
FIXED CARBON %	69.20		
GROSS CALORIFIC VALUE (MJ/KG)	26.44		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.81$	

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82028

SAMPLE ID	75	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	21.40	TOTAL SULPHUR %	0.44
TOTAL MOISTURE %	23.37	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.50	FSI	__._
ASH %	28.10	HGI	___._
VOLATILE MATTER %	14.80	CO2 %	__.__
FIXED CARBON %	54.60		

GROSS CALORIFIC VALUE (MJ/KG) 21.47

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.37$

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82029

SAMPLE ID	76	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	11.70	TOTAL SULPHUR %	0.45
TOTAL MOISTURE %	13.55	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.10	FSI	__._
ASH %	31.30	HGI	___._
VOLATILE MATTER %	15.60	CO2 %	__.__
FIXED CARBON %	51.00		

GROSS CALORIFIC VALUE (MJ/KG)	20.23
NET CALORIFIC VALUE (MJ/KG)	__.__

$Ro_{max}=3.56$

GCRI COAL DIVISION **HEAD** PROJ KPN BLK HC DS TRC82030

SAMPLE ID	77	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	16.20	TOTAL SULPHUR %	0.36
TOTAL MOISTURE %	18.46	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.70	FSI	__._
ASH %	40.30	HGI	___._
VOLATILE MATTER %	15.90	CO2 %	__.__
FIXED CARBON %	41.10		

GROSS CALORIFIC VALUE (MJ/KG) 16.35

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.18$

GCRI COAL DIVISION HEAD PROJ KPN BLK HC DS TRC82040

SAMPLE ID	87	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %<AD,AR>	16.00	TOTAL SULPHUR %	0.45
TOTAL MOISTURE %	18.69	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %<AD,EM>	3.20	FSI	__._
ASH %	26.20	HGI	___._
VOLATILE MATTER %	12.30	CO2 %	__.__
FIXED CARBON %	58.30		

GROSS CALORIFIC VALUE (MJ/KG) 22.39

NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.52$

LITTLE KLAPPAN

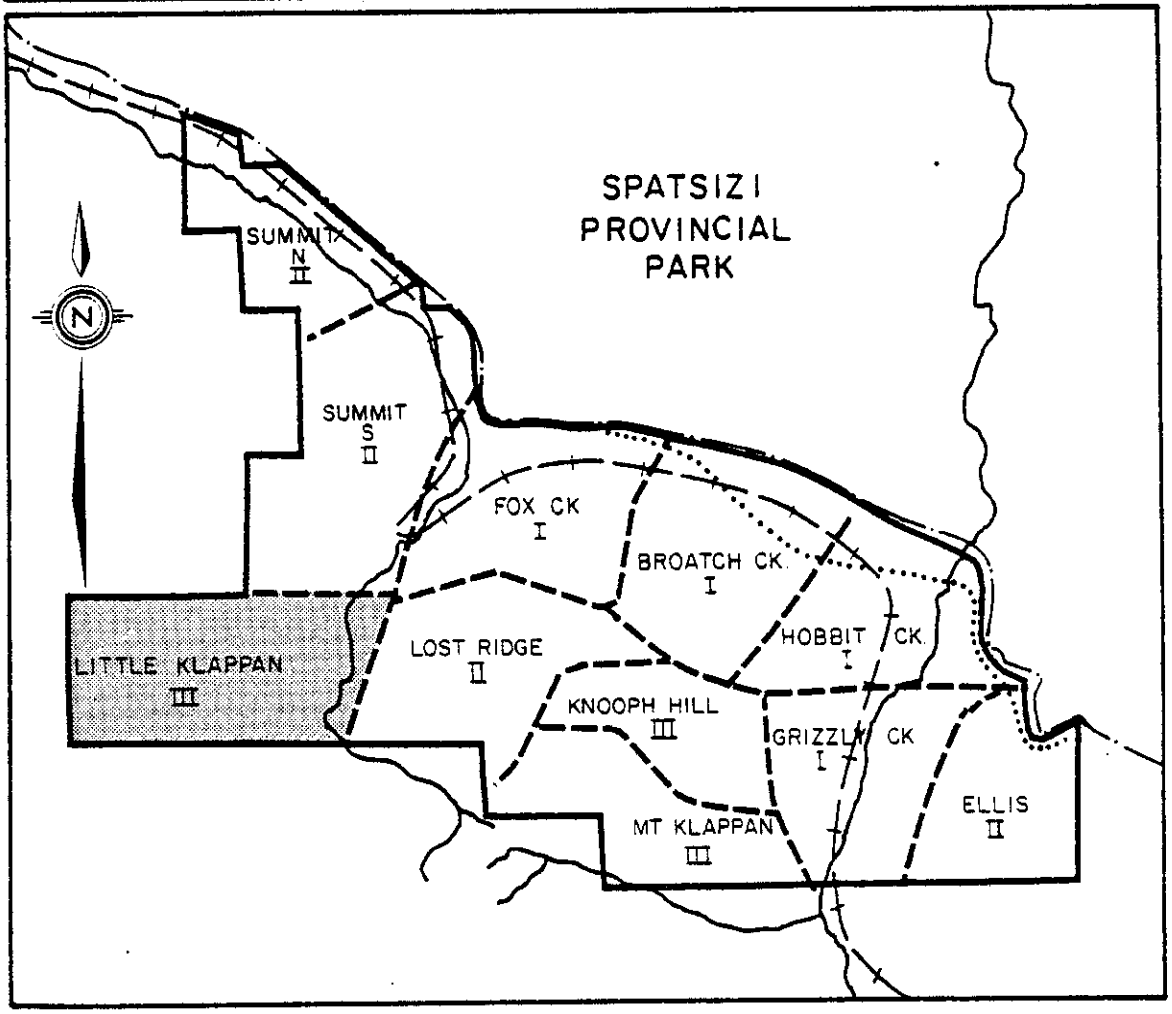
GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 PROJECT DATA SOURCE SUMMARY PAGE 1

DATA SOURCE	LOCATION NORTHING	LOCATION EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNLKTRC82021	6343130.0	502620.0	1420.0	5.0	15.0	8.0	
KPNLKTRC82022	6342140.0	501710.0	1430.0	3.8	5.0	188.0	

MT. KLAPPAN COAL PROPERTY

1982 EXPLORATION MAPPING AREAS

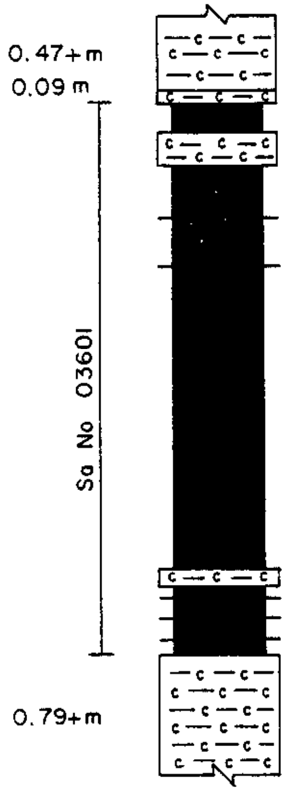


0 1 2 3 km

- Prepared Rail Bed
- Provincial Park Boundary
- I First Priority
- II Second Priority
- III Third Priority
- Redefined Property Boundary

ROCK	COAL
	0.18
0.20	
	0.34
	0.33
	1.96
0.11	
	0.09
	0.12
	0.14
	0.10
TOTAL 0.31	3.26

3.57



CLAYSTONE, CARBONACEOUS, FOSSILIFEROUS, THIN COAL BANDS
CLAYSTONE, CARBONACEOUS, WITH COAL FRAGMENTS
COAL, C-2
CLAYSTONE, CARBONACEOUS, WITH COAL BAND
COAL, C-2, WITH CARBONACEOUS CLAYSTONE BAND
COAL, HIGHLY CONTORTED
COAL, C-2, WITH CARBONACEOUS CLAYSTONE INTERBEDS
CLAYSTONE, CARBONACEOUS, WITH COAL BANDS
COAL, C-2
COAL AND CLAYSTONE INTERBEDS
COAL, C-2, IRON STAINING
COAL, C-1
CLAYSTONE, CARBONACEOUS

ATTITUDE OF ROOF : 130/90
ATTITUDE OF FLOOR : 115/83° N
FORMATION :
UTM COORDINATES : 6343130N, 502620 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.89 m
TRENCH WIDTH : 0.4 m
TRENCH LENGTH : 4.7 m
TRENCH BEARING : 008°
TRENCH SLOPE : 15°

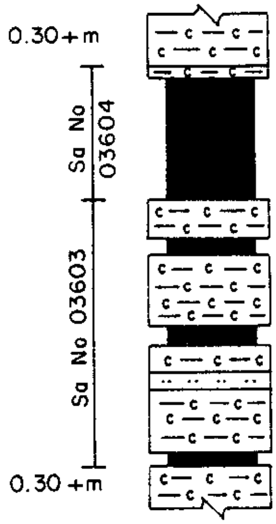
GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC-82-021

DRAWN BY: P. WATSON	SCALE 1:50
LOGGED BY: J. ELDER	DATE Aug. 9/82
APPROVED BY:	

ROCK	COAL
0.07	
	0.81
0.25	
	0.10
0.46	
	0.14
0.17	
0.11	
0.41	
	0.08
TOTAL 1.47	1.13

2.60



CLAYSTONE, CARBONACEOUS
CLAYSTONE, CARBONACEOUS, COAL BANDS
COAL, C-2, CARBONACEOUS CLAYSTONE BANDS
CLAYSTONE, CARBONACEOUS, COAL LAMINATIONS
COAL, C-1
CLAYSTONE, CARBONACEOUS, COAL BANDS
COAL, C-2, MINOR CARBONACEOUS CLAYSTONE
CLAYSTONE, CARBONACEOUS, COAL BANDS
SILTSTONE
CLAYSTONE, CARBONACEOUS, COAL BANDS
COAL, C-2
CLAYSTONE, CARBONACEOUS

ATTITUDE OF ROOF : 134/76° N
ATTITUDE OF FLOOR : 142/67° N
FORMATION :
UTM COORDINATES : 6342140 N, 501710 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.7 m
TRENCH WIDTH : 0.4 m
TRENCH LENGTH : 3.82 m
TRENCH BEARING : 188°
TRENCH SLOPE : 0.5°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–022

DRAWN BY:	SCALE 1: 50
LOGGED BY:	DATE Aug. 12/82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 SIMPLE SAMPLE SUMMARY PAGE 1

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82021										
		3601	0.56	4.13	3.57	100.00	3.26	0.31	0.00	0.00
TRC82022										
		3604	0.30	1.18	0.88	100.00	0.81	0.07	0.00	0.00
		3603	1.18	2.90	1.72	100.00	0.32	1.40	0.00	0.00

XXXXX

PROJECT: KPN BLOCK: LK DATA SOURCE: TRC82021

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.47	0.47			CLAYSTONE	CARB
	0.47	0.56	0.09			CLAYSTONE	CARB COAL FRAGMENTS
	0.56	0.74	0.18	03601		COAL	C-2
	0.74	0.81	0.07	03601		CLAYSTONE	CARB
	0.81	0.85	0.04	03601		COAL	C-2
	0.85	0.94	0.09	03601		CLAYSTONE	CARB
	0.94	1.00	0.06	03601		COAL	C-2
	1.00	1.01	0.01	03601		CLAYSTONE	CARB
	1.01	1.28	0.27	03601		COAL	C-2
	1.28	1.61	0.33	03601		COAL	HIGHLY CONTORTED

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LK DATA SOURCE: TRC82021

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	1.61	1.85	0.24	03601		COAL	C-2
	1.85	1.91	0.06	03601		CLAYSTONE	CARB
	1.91	2.18	0.27	03601		COAL	C-2
	2.18	2.20	0.02	03601		CLAYSTONE	
	2.20	3.30	1.10	03601		COAL	C-2
	3.30	3.32	0.02	03601		CLAYSTONE	CARB
	3.32	3.57	0.25	03601		COAL	C-2
	3.57	3.59	0.02	03601		CLAYSTONE	CARB
	3.59	3.61	0.02	03601		COAL	C-1
	3.61	3.65	0.04	03601		CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LK DATA SOURCE: TRC82021

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	3.65	3.66	0.01	03601		COAL	C-1
	3.66	3.68	0.02	03601		CLAYSTONE	CARB
	3.68	3.77	0.09	03601		COAL	C-2
	3.77	3.89	0.12	03601		CLAYSTONE	
	3.89	4.01	0.12	03601		COAL	C-2 IRON STAINS
	4.01	4.03	0.02	03601		CLAYSTONE	
	4.03	4.13	0.10	03601		COAL	C-1
	4.13	4.92	0.79			CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LK DATA SOURCE: TRC82022

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.30	0.30			CLAYSTONE	CARB
	0.30	0.37	0.07	03604		CLAYSTONE	CARB COAL BAND
	0.37	1.18	0.81	03604		COAL	C-2 CARB CLYST BANDS
	1.18	1.43	0.25	03603		CLAYSTONE	CARB COAL LAMINATIONS
	1.43	1.53	0.10	03603		COAL	C-1
	1.53	1.99	0.46	03603		CLAYSTONE	CARB COAL BANDS
	1.99	2.13	0.14	03603		COAL	C-2 MNR CARB CLYST
	2.13	2.30	0.17	03603		CLAYSTONE	CARB COAL BANDS
	2.30	2.41	0.11	03603		SILTSTONE	
	2.41	2.82	0.41	03603		CLAYSTONE	CARB COAL BANDS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LK DATA SOURCE: TRC82022

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.82	2.90	0.08	03603		COAL	C-2
	2.90	3.20	0.30			CLAYSTONE	CARB

* DENOTES MEASURED BCA

LITTLE KLAPPAN
LIST OF SAMPLES

DATA SOURCE	COMPOSITE SAMPLE ID	INCREMENT SAMPLE ID
KPNLKTRC82021	68	03601
KPNLKTRC82022	69	03604

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **LK** DS **TRC82021**

SAMPLE ID	68	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %<AD,AR>	4.90	TOTAL SULPHUR %	0.41
TOTAL MOISTURE %	6.61	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %<AD,EM>	1.80	FSI	__._
ASH %	27.50	HGI	___._
VOLATILE MATTER %	8.10	CO2 %	__.__
FIXED CARBON %	62.60		

GROSS CALORIFIC VALUE (MJ/KG)	22.59		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=4.93	

GCRI COAL DIVISION HEAD PROJ KPN BLK LK DS TRC82022

SAMPLE ID	69	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)		ASTM	

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	12.90	TOTAL SULPHUR %	0.30
TOTAL MOISTURE %	15.08	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.50	FSI	__._
ASH %	39.40	HGI	___._
VOLATILE MATTER %	11.80	CO2 %	__.__
FIXED CARBON %	46.30		
GROSS CALORIFIC VALUE (MJ/KG)	16.85		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=5.25	

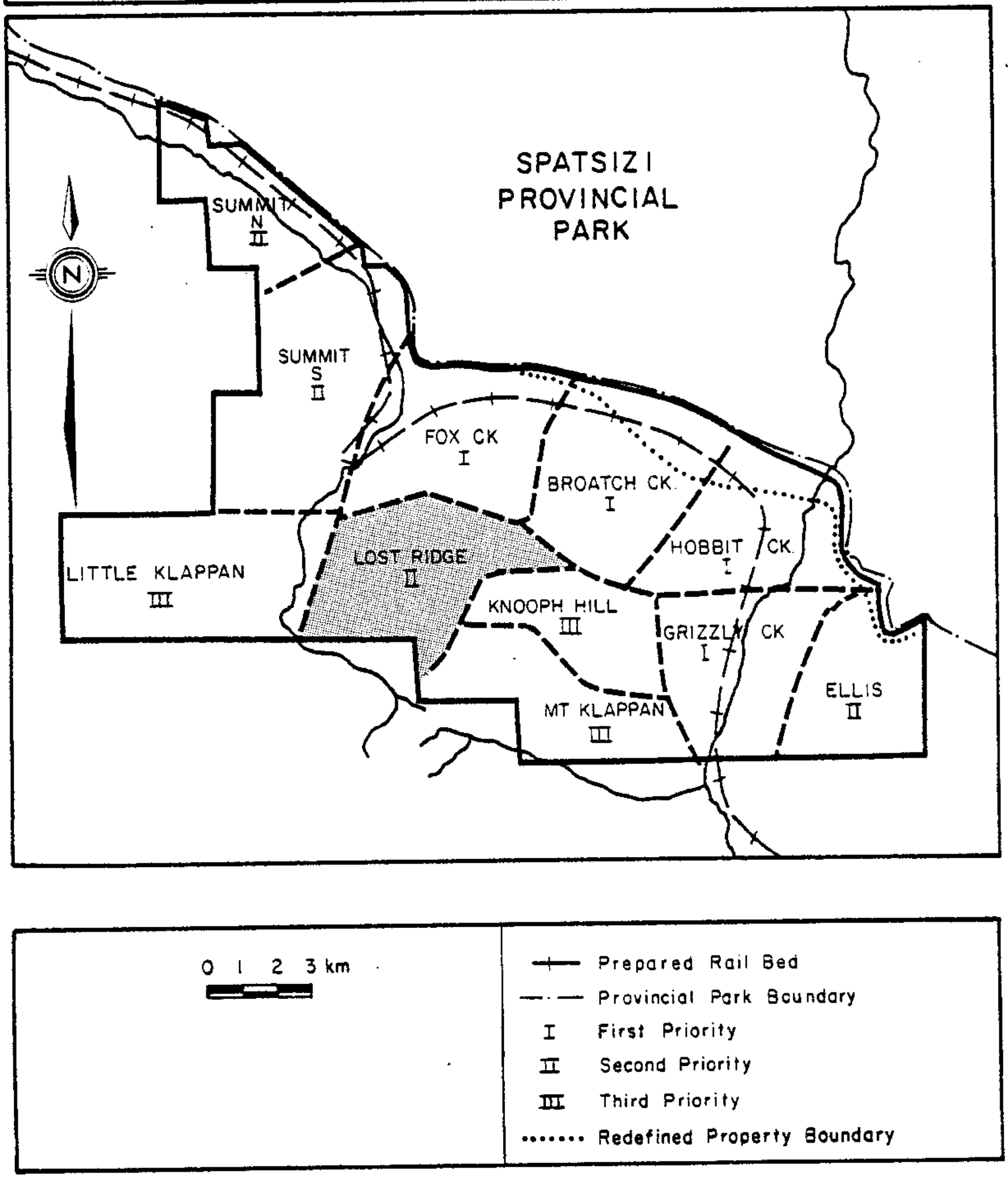
LOST RIDGE

GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 PROJECT DATA SOURCE SUMMARY PAGE 1

DATA SOURCE	LOCATION NORTHING	EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNLRTRC82031	6344483.0	506275.0	1785.0	9.1	4.0	31.0	
KPNLRTRC82032	6344420.0	506287.0	1807.0	4.5	27.0	15.0	
KPNLRTRC82036	6344150.0	508375.0	1535.0	7.6	8.0	192.0	
KPNLRTRC82037	6343837.0	508150.0	1550.0	3.2	37.0	78.0	
KPNLRTRC82042	6344396.0	506160.0	1820.0	6.9	20.0	35.0	
KPNLRTRC82043	6344350.0	505705.0	1825.0	7.4	17.0	155.0	
KPNLRTRC82044	6344350.0	505560.0	1745.0	4.2	26.0	112.0	
KPNLRTRC82045	6344100.0	505490.0	1825.0	7.0	24.0	135.0	
KPNLRTRC82047	6344150.0	505000.0	1805.0	9.8	28.0	52.0	
KPNLRTRC82048	6344410.0	504710.0	1745.0	3.3	10.0	160.0	
KPNLRTRC82049	6342950.0	508820.0	1592.0	5.5	35.0	99.0	

MT. KLAPPAN COAL PROPERTY
1982 EXPLORATION MAPPING AREAS



	ROCK	COAL
		0.16
	0.09	
		0.41
	0.07	
		2.12
4.61		
	0.05	
		1.15
		0.16
	0.12	
		0.28
TOTAL	0.33	4.28

COAL, C-2, UNCONSOLIDATED
CLAYSTONE, CARBONACEOUS, COAL BANDS
CLAYSTONE, CARBONACEOUS
COAL, C-2
CLAYSTONE, CARBONACEOUS
COAL, C-2, MINOR CLAYSTONE INTERBEDS
CLAYSTONE, CARB. COAL INTERBEDS WITH UNCONSOLIDATED CLAY
COAL, C-2, MINOR IRON STAINING, MINOR CLAYSTONE BANDS
CLAYSTONE, CARBONACEOUS, DARK GRAY
COAL, C-2, FAIRLY CONSOLIDATED WITH CARBONACEOUS CLAYSTONE INTERBEDS
COAL, C-3, UNCONSOLIDATED, WEATHERED, SOME IRON STAINING
CLAY, UNCONSOLIDATED, GRAY
COAL, C-2, VERY UNCONSOLIDATED, IRON STAINING
CLAYSTONE, MEDIUM GRAY

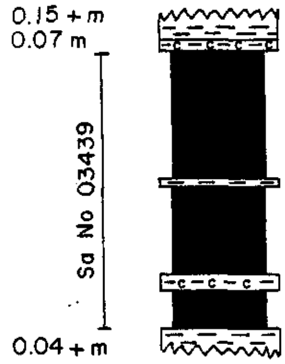
ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 146/44 S
FORMATION :
UTM COORDINATES : 6344483 N, 506275 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.16 m
TRENCH WIDTH : 1.3 m
TRENCH LENGTH : 9.1 m
TRENCH BEARING : 031°
TRENCH SLOPE : 004°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–031

DRAWN BY: D. DURANT	SCALE 1:50
LOGGED BY: K. JENNER	DATE August 3, 1982
APPROVED BY:	

	ROCK	COAL
		0.82
1.80	0.05	
		0.57
	0.11	
		0.25
TOTAL	0.16	1.64



CLAYSTONE : FLOOR
CLAYSTONE : CARBONACEOUS, WEATHERED, COAL BANDS
COAL , C-2
CLAYSTONE : DARK GRAY
COAL, C-2
CLAYSTONE : CARBONACEOUS WEATHERED
COAL, C-2 MINOR SILTSTONE INTERBEDS
CLAYSTONE : DARK GRAY, ROOF

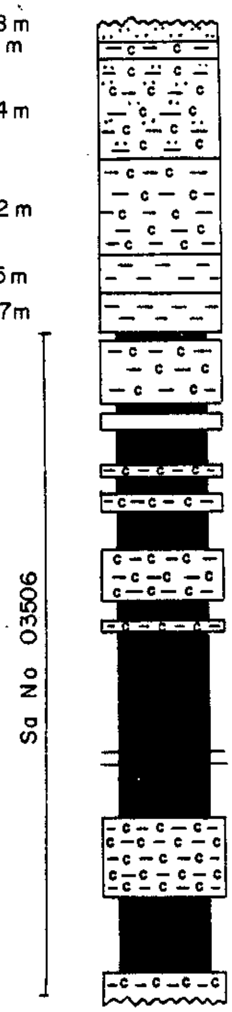
ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 137/40°S
FORMATION :
UTM COORDINATES : 6344420 N, 506287 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.86 m
TRENCH WIDTH : 0.74 m
TRENCH LENGTH : 4.45 m
TRENCH BEARING : 015°
TRENCH SLOPE : 0.27°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–032

DRAWN BY: D. DURANT	SCALE 1:50
LOGGED BY: K. JENNER	DATE Aug. 3/82
APPROVED BY:	

	ROCK	COAL
4.04	0.40	
		0.04
	0.11	
		0.22
	0.07	
		0.10
	0.10	
		0.25
	0.34	
		0.09
	0.05	
		0.78
		0.08
		0.34
	0.54	
		0.49
	0.04+	
TOTAL	1.65+	2.39



0.08 m	SILTSTONE : FINE GRAY, WEATHERS TAN, FRESH GRAY, HARD
0.12 m	CLAYSTONE : CARBONACEOUS, GRAY, SOFT
0.64 m	CLAYSTONE : INTERBEDDED WITH MINOR SILTSTONE, CARBONACEOUS, MORE RESISTANT THAN ABOVE COAL STRINGERS, SILTSTONE AS ABOVE
0.62 m	CLAYSTONE : CARB., COAL STRINGERS, WARPS AROUND A MORE MASSIVE MUDSTONE, FOSSILIFEROUS
0.25 m	MUDSTONE : HARD, MINOR COAL STRINGERS, WEATHERED ORANGE BROWN FRESH GRAY, IRON STAINING
0.27 m	CLAYSTONE : MINOR COAL STRINGERS, FOSSILIFEROUS
	COAL : C-1
	CLAYSTONE : THIN COAL STRINGERS, CARB., QUARTZ VEINED
	COAL : C-3
	CLAY
	COAL : C-3 QUARTZ VEINED, CONTORTED
	CLAYSTONE : WITH COAL STRINGERS, HARD
	COAL : C-2
	CLAYSTONE : HARD, CARBONACEOUS
	COAL : C-2 & C-3, QUARTZ VEINED, IRON STAIN, WARPED WITH THIN CLAY BANDS
	CLAYSTONE : HARD, COAL BANDS, CARBONACEOUS
	COAL : C-2 & C-3, QUARTZ VEINED, WARPED
	CLAYSTONE : COAL STRINGERS, HARD
	COAL : C-2, QUARTZ VEINED, MINOR CLAYSTONE
	COAL : C-1, WEATHERED, FRIABLE, IRON STAINING
	COAL : C-1, INTERBEDDED CLAY & COAL STRINGERS
	CLAYSTONE : MINOR COAL, IRON STAINED, CARBONACEOUS, VERY SOFT
	COAL : C-3, IRON STAINED, VERY WEATHERED
0.04+m	SILTSTONE : WEATHERED

ATTITUDE OF ROOF	:	164 /56° N
ATTITUDE OF FLOOR	:	N/A
FORMATION	:	
UTM COORDINATES	:	6344150 N, 508375 E
MAP CARD NUMBER	:	
AIR PHOTO NUMBER	:	
TRENCH DEPTH	:	.95 m
TRENCH WIDTH	:	.88 m
TRENCH LENGTH	:	7.6 m
TRENCH BEARING	:	192°
TRENCH SLOPE	:	8°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–036

DRAWN BY: A. MURRAY	SCALE 1:50
LOGGED BY: C. LOUIE	DATE Aug. 18/82
APPROVED BY:	

ROCK	COAL
0.09	
	0.26
	0.06
	0.45
0.09	
	0.33
TOTAL 0.18	1.10

1.28

Sa No 03507

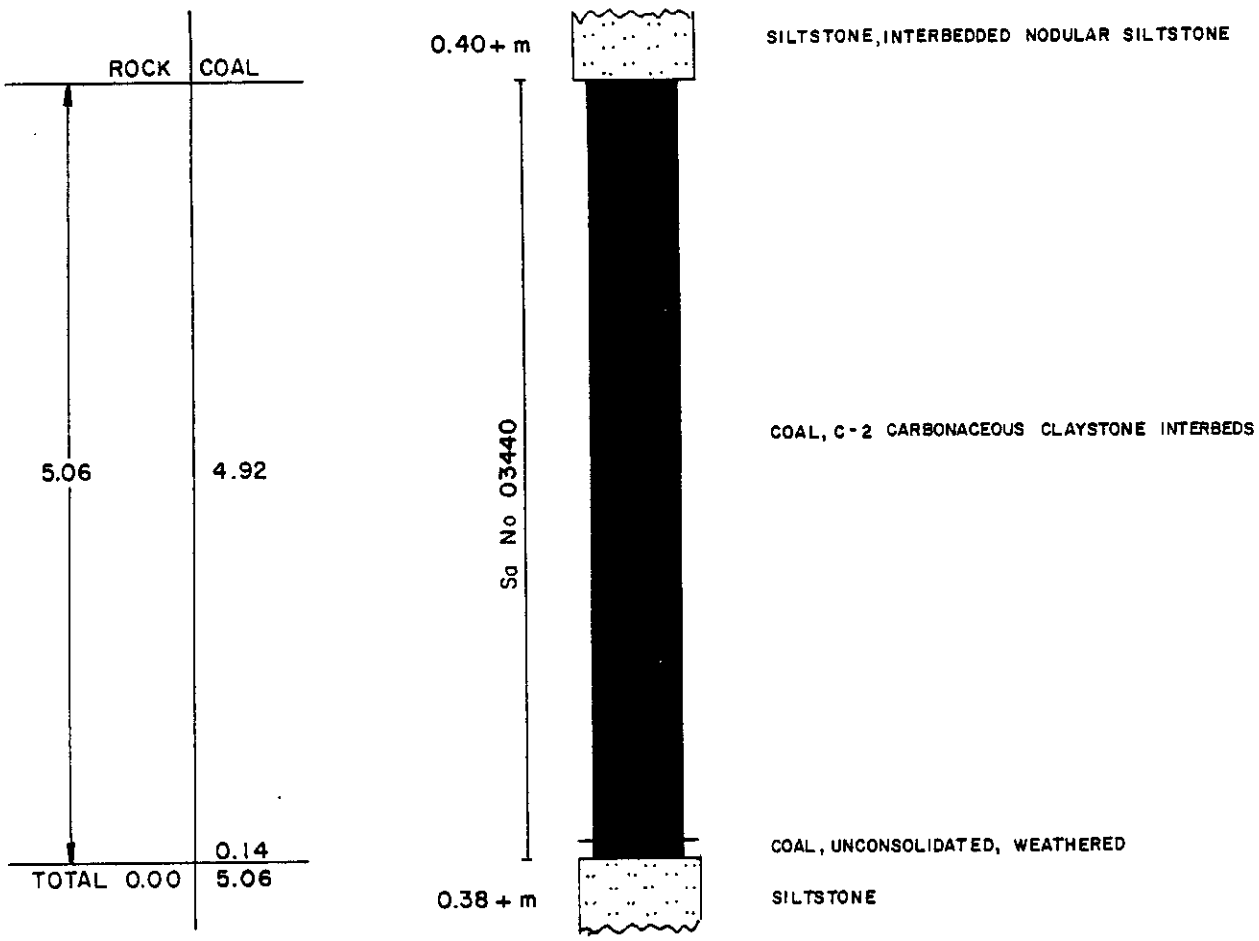
CLAY : CARB., WEATHERS TAN & GRAY, FRESH BROWN - GRAY
COAL : C-3
COAL : C-2
COAL : C-3, MINOR CARBONACEOUS CLAYSTONE BANDS
CLAY : CARBONACEOUS
COAL : C-2

ATTITUDE OF ROOF : 100/06° N
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6343837 N, 508150 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 0.96m
TRENCH WIDTH : 0.72 m
TRENCH LENGTH : 3.2 m
TRENCH BEARING : 78°
TRENCH SLOPE : 37°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–037

DRAWN BY:	SCALE 1 : 50
LOGGED BY: C. LOUIE	DATE
APPROVED BY:	



* OVERTURNED SEAM

ATTITUDE OF ROOF	:	111/49° S
ATTITUDE OF FLOOR	:	147/59° S
FORMATION	:	
UTM COORDINATES	:	6344396 N, 506160 E
MAP CARD NUMBER	:	
AIR PHOTO NUMBER	:	
TRENCH DEPTH	:	0.85 m
TRENCH WIDTH	:	0.56 m
TRENCH LENGTH	:	6.86 m
TRENCH BEARING	:	035°
TRENCH SLOPE	:	020°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

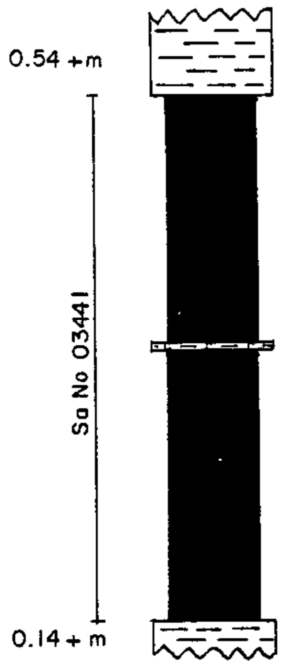
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–042

DRAWN BY: D. DURANT	SCALE
LOGGED BY: K. JENNER	DATE Aug. 3/82
APPROVED BY:	

	ROCK	COAL
		1.59
3.43	0.04	
		1.80
TOTAL	0.04	3.39



COAL, C-2, INTERBEDDED CLAY AND CLAYSTONE

CLAYSTONE, CARBONACEOUS

COAL, C-2

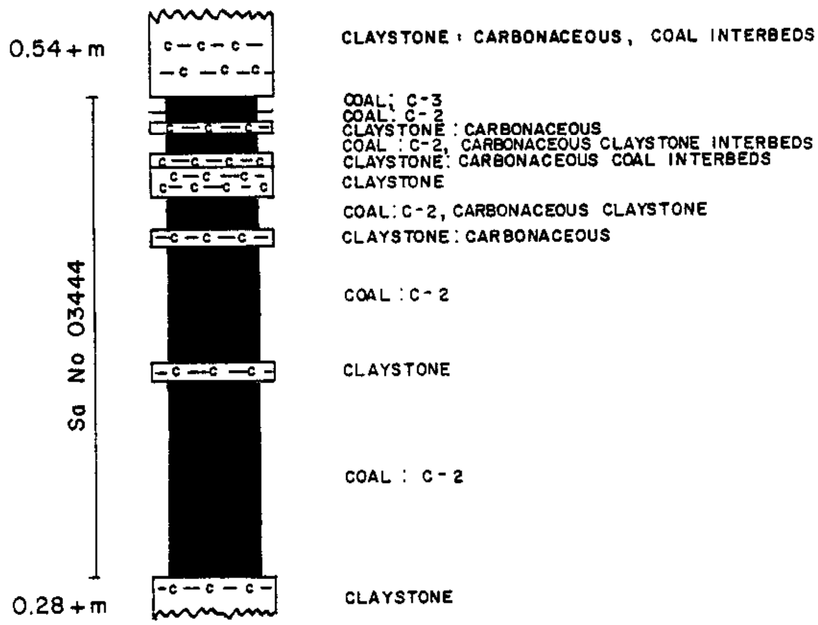
ATTITUDE OF ROOF : 018/10° E
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6344350 N, 505705 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.27 m
TRENCH WIDTH : 1.86 m
TRENCH LENGTH : 7.39 m
TRENCH BEARING : 155°
TRENCH SLOPE : 17°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–043

DRAWN BY:	SCALE
LOGGED BY: K. JENNER	DATE Aug. 2/82
APPROVED BY:	

	ROCK	COAL
		0.10
	0.07	0.05
	0.06	1.10
	0.20	
		0.20
	0.10	
		0.78
4.02		
	0.10	
		1.26
TOTAL	0.53	3.49



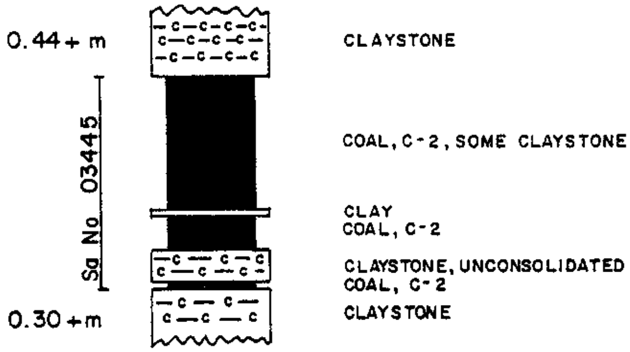
ATTITUDE OF ROOF : 149/19° N
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6344350 N, 505560 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.05 m
TRENCH WIDTH : 1.10 m
TRENCH LENGTH : 4.16 m
TRENCH BEARING : 112°
TRENCH SLOPE : 26°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–044

DRAWN BY:	SCALE 1 : 50
LOGGED BY: K. JENNER	DATE Aug. 8/82
APPROVED BY:	

	ROCK	COAL
		0.82
1.33	0.05	0.20
	0.19	0.07
TOTAL	0.24	1.09



ATTITUDE OF ROOF : 029/10° E
ATTITUDE OF FLOOR : N/A
FORMATION :
UTM COORDINATES : 6344100N, 505490 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.12 m
TRENCH WIDTH : 0.76 m
TRENCH LENGTH : 6.98 m
TRENCH BEARING : 135°
TRENCH SLOPE : 24°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

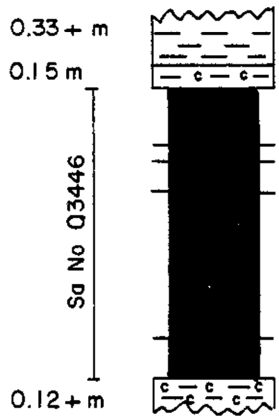
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–045

DRAWN BY:	SCALE 1:50
LOGGED BY: K. JENNER	DATE Aug. 8/82
APPROVED BY:	

	ROCK	COAL
		0.35
		0.13
		0.17
	1.88	0.95
		0.28
TOTAL	0.00	1.88



CLAYSTONE

CLAYSTONE : CARBONACEOUS

COAL : C-2, IRON STAINING

COAL: C-3, CARBONACEOUS CLAYSTONE BANDS

COAL: C-4, CARBONACEOUS CLAYSTONE BANDS

COAL : C-2, CLAYSTONE BANDS, CARBONACEOUS

COAL : C-3, CARBONACEOUS CLAYSTONE BANDS

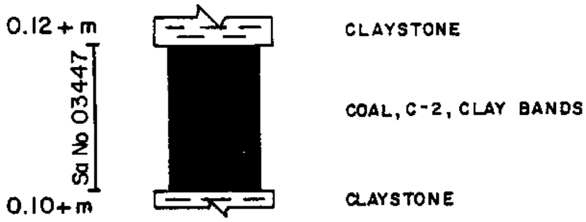
ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 041/21° S
FORMATION :
UTM COORDINATES : 6344150 N, 505000 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.09 m
TRENCH WIDTH : 0.81 m
TRENCH LENGTH : 9.80m
TRENCH BEARING : 052°
TRENCH SLOPE : 28°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–047

DRAWN BY:	SCALE 1:50
LOGGED BY: K. JENNER	DATE Aug. 8/82
APPROVED BY:	

	ROCK	COAL
	0.94	0.94
TOTAL	0.00	0.94



ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 040/05°S
FORMATION :
UTM COORDINATES : 6344410 N, 504710 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : .85 m
TRENCH WIDTH : .73 m
TRENCH LENGTH : 3.3 m
TRENCH BEARING : 160°
TRENCH SLOPE : 10°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

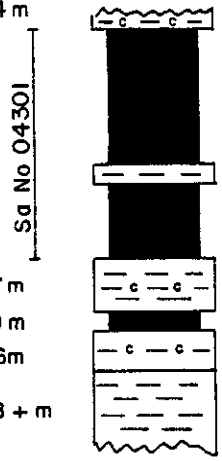
MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–048

DRAWN BY:	SCALE 1:50
LOGGED BY: K. JENNER	DATE Aug. 8/ 82
APPROVED BY:	

	ROCK	COAL
		0.89
1.49	0.11	
		0.49
TOTAL	0.11	1.38



ATTITUDE OF ROOF : N/A
ATTITUDE OF FLOOR : 077/19°
FORMATION :
UTM COORDINATES : 6342950 N, 515014 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.24 m
TRENCH WIDTH : 0.68 m
TRENCH LENGTH : 5.5 m
TRENCH BEARING : 099°
TRENCH SLOPE : 035°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT

TRENCH LOG

TRC–82–049

DRAWN BY:	SCALE 1 : 50
LOGGED BY: K. JENNER	DATE Aug. 19/82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 SIMPLE SAMPLE SUMMARY PAGE 1

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82031										
		3438	0.46	5.07	4.61	100.00	4.28	0.33	0.00	0.00
TRC82032										
		3439	0.22	2.02	1.80	100.00	1.64	0.16	0.00	0.00
TRC82036										
		3506	1.98	6.05	4.07	100.00	2.42	1.65	0.00	0.00
TRC82037										
		3507	0.35	1.63	1.28	100.00	1.10	0.18	0.00	0.00
TRC82042										
		3440	0.40	5.46	5.06	100.00	5.06	0.00	0.00	0.00
TRC82043										
		3441	0.54	3.97	3.43	100.00	3.39	0.04	0.00	0.00
TRC82044										
		3444	0.54	4.56	4.02	100.00	3.49	0.53	0.00	0.00
TRC82045										
		3445	0.44	1.77	1.33	100.00	1.09	0.24	0.00	0.00
TRC82047										
		3446	0.48	2.36	1.88	100.00	1.88	0.00	0.00	0.00
TRC82048										
		3447	0.12	1.06	0.94	100.00	0.94	0.00	0.00	0.00
TRC82049										
		4301	0.04	1.53	1.49	100.00	1.38	0.11	0.00	0.00

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82031

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.09	0.09			COAL	C-2 UNCONSOLIDATED, ROOF, STRATIGRAPHIC BOTTOM
	0.09	0.16	0.07			CLAYSTONE	CARB COAL BANDS
	0.16	0.46	0.30			CLAYSTONE	CARB
	0.46	0.62	0.16	03438		COAL	C-2
	0.62	0.71	0.09	03438		CLAYSTONE	CARB
	0.71	1.12	0.41	03438		COAL	C-2 MNR CLYST INTERBEDS
	1.12	1.19	0.07	03438		CLAYSTONE	CARB COAL INTERBEDS
	1.19	3.31	2.12	03438		COAL	C-2 MNR CLYST BANDS
	3.31	3.36	0.05	03438		CLAYSTONE	CARB

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82031

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	3.36	4.51	1.15	03438		COAL	C-2 FAIRLY UNCONSOLIDATED. CARB CLAYSTONE I NTERBEDS
	4.51	4.67	0.16	03438		COAL	C-3 UNCONSOLIDATED
	4.67	4.79	0.12	03438		CLAY	UNCONSOLIDATED
	4.79	5.07	0.28	03438		COAL	C-2 UNCONSOLIDATED
	5.07	5.27	0.20			CLAYSTONE	FLOOR, STRATIGRAPHIC TOP

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82032

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.15	0.15			CLAYSTONE	FLOOR, STRATIGRAPHIC TOP
	0.15	0.22	0.07			CLAYSTONE	CARB WTHRD, COAL BANDS
	0.22	1.04	0.82	03439		COAL	C-2
	1.04	1.09	0.05	03439		CLAYSTONE	
	1.09	1.66	0.57	03439		COAL	C-2
	1.66	1.77	0.11	03439		CLAYSTONE	CARB WTHRD
	1.77	2.02	0.25	03439		COAL	C-2 MNR SLTST INTBS
	2.02	2.06	0.04			CLAYSTONE	ROOF, STRATIGRAPHIC BOTTOM

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82036

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.08	0.08			SILTSTONE	
	0.08	0.20	0.12			CLAYSTONE	CARB
	0.20	0.84	0.64			CLAYSTONE	CARB INTERBEDDED WITH MINOR SILTSTONE,COAL S TRINGERS
	0.84	1.46	0.62			CLAYSTONE	CARB COAL STRINGERS, FOSSILIFEROUS
	1.46	1.71	0.25			MUDSTONE	HARD, FE-STAINED, MNR COAL STRGS
	1.71	1.98	0.27			CLAYSTONE	MANY COAL STRGS, FOSSILIFEROUS
	1.98	2.01	0.03	03506		COAL	C-1
	2.01	2.41	0.40	03506		CLAYSTONE	CARB THIN COAL STRGS, QTZ VEIN
	2.41	2.45	0.04	03506		COAL	C-3
	2.45	2.56	0.11	03506		CLAY	
	2.56	2.78	0.22	03506		COAL	C-3 QTZ VEINED, CONTORTED

* DENOTES MEASURED BCA

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82036

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.78	2.85	0.07	03506		CLAYSTONE	HARD, COAL STRGS
	2.85	2.95	0.10	03506		COAL	C-2
	2.95	3.05	0.10	03506		CLAYSTONE	CARB HARD
	3.05	3.30	0.25	03506		COAL	C-3 QTZ VEIN, FE-STAIN, THIN CLY BANDS, RAN GES C-2 TO C-3
	3.30	3.64	0.34	03506		CLAYSTONE	CARB HARD, COAL BANDS
	3.64	3.73	0.09	03506		COAL	C-3 QTZ VEINED, RANGES C-2 TO C-3
	3.73	3.78	0.05	03506		CLAYSTONE	HARD, COAL STRGS
	3.78	4.56	0.78	03506		COAL	C-2 QTZ VEIN, MNR CLYST
	4.56	4.64	0.08	03506		COAL	C-1 WTHRD, FE-STAINED, FRI
	4.64	4.98	0.34	03506		COAL	C-1 INTBD CLY & COAL STRGS

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82036

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	4.98	5.52	0.54	03506		CLAYSTONE	CARB MNR COAL, FE-STAIN, SOFT
	5.52	6.01	0.49	03506		COAL	C-3 V WTHRD, FE-STAIN
	6.01	6.05	0.04	03506		SILTSTONE	WTHRD

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82037

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.35	0.35			OVERBURDEN	
	0.35	0.44	0.09	03507		CLAYSTONE	CARB SOFT
	0.44	0.70	0.26	03507		COAL	C-3
	0.70	0.76	0.06	03507		COAL	C-2
	0.76	1.21	0.45	03507		COAL	C-3
	1.21	1.30	0.09	03507		CLAYSTONE	CARB
	1.30	1.63	0.33	03507		COAL	C-2

* DENOTES MEASURED BCA

XXXXX

82/12/02 GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG PAGE 1

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82042

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.40	0.40			SILTSTONE	INTERBEDDED NODULAR SILTSTONE, FLOOR, S TRATIGRAPHIC TOP
	0.40	5.32	4.92	03440		COAL	C-2 CARB. CLYST INTERBEDS
	5.32	5.46	0.14	03440		COAL	UNCONSOLIDATED,WTHRD
	5.46	5.84	0.38			SILTSTONE	ROOF, STRATIGRAPHIC BOTTOM

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82043

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.54	0.54			CLAYSTONE	ROOF
	0.54	2.13	1.59	03441		COAL	C-2 INTERBEDDED CLAY & CLAYSTONE
	2.13	2.17	0.04	03441		CLAYSTONE	CARB
	2.17	3.97	1.80	03441		COAL	C-2
	3.97	4.11	0.14			CLAYSTONE	FLOOR

* DENOTES MEASURED BCA

XXXXX

82/12/02 GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG PAGE 1

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82044

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.54	0.54			OVERBURDEN	
	0.54	0.64	0.10	03444		COAL	C-3
	0.64	0.69	0.05	03444		COAL	C-2
	0.69	0.76	0.07	03444		CLAYSTONE	CARB
	0.76	1.86	1.10	03444		COAL	C-2 CARB. CLYST INTERBEDS
	1.86	1.92	0.06	03444		CLAYSTONE	CARB COAL INTERBEDS
	1.92	2.12	0.20	03444		CLAYSTONE	
	2.12	2.32	0.20	03444		COAL	C-2 CARB. CLYST
	2.32	2.42	0.10	03444		CLAYSTONE	CARB
	2.42	3.20	0.78	03444		COAL	C-2
	3.20	3.30	0.10	03444		CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82044

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	3.30	4.56	1.26	03444		COAL	C-2
	4.56	4.84	0.28			CLAYSTONE	

* DENOTES MEASURED BCA

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82/12/02 GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG PAGE 1

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82045

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.44	0.44			CLAYSTONE	ROOF
	0.44	1.26	0.82	03445		COAL	C-2 SOME CLYST
	1.26	1.31	0.05	03445		CLAY	
	1.31	1.51	0.20	03445		COAL	C-2
	1.51	1.70	0.19	03445		CLAYSTONE	UNCONSOLIDATED
	1.70	1.77	0.07	03445		COAL	C-2
	1.77	2.07	0.30			CLAYSTONE	FLOOR

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82047

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.33	0.33			CLAYSTONE	ROOF
	0.33	0.48	0.15			CLAYSTONE	CARB
	0.48	0.83	0.35	03446		COAL	C-2 FE-STAINING
	0.83	0.96	0.13	03446		COAL	C-2
	0.96	1.13	0.17	03446		COAL	C-4 CARB. CLYST BANDS
	1.13	2.08	0.95	03446		COAL	C-2 CARB. CLYST BANDS
	2.08	2.36	0.28	03446		COAL	C-3 CARB. CLYST BANDS
	2.36	2.48	0.12			CLAYSTONE	FLOOR

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82048

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.12	0.12			CLAYSTONE	ROOF
	0.12	1.06	0.94	03447		COAL	C-2 CLY BANDS
	1.06	1.16	0.10			CLAYSTONE	

* DENOTES MEASURED BCA

XXXXX

82/12/02 GULF CANADA RESOURCES INC. - COAL DIVISION - DESCRIPTIVE LOG PAGE 1

PROJECT: KPN BLOCK: LR DATA SOURCE: TRC82049

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.04	0.04			CLAYSTONE	CARB
	0.04	0.93	0.89	04301		COAL	C-2 CARB CLYST & CLYST BANDS
	0.93	1.04	0.11	04301		CLAYSTONE	
	1.04	1.53	0.49	04301		COAL	C-2
	1.53	1.90	0.37			CLAYSTONE	W CARB CLYST
	1.90	2.00	0.10			COAL	C-2 CARB CLYST INTERBEDS
	2.00	2.26	0.26			CLAYSTONE	CARB COAL INTERBEDS, WTHRD
	2.26	2.74	0.48			CLAYSTONE	

* DENOTES MEASURED BCA

LOST RIDGE
LIST OF SAMPLES

DATA SOURCE	COMPOSITE SAMPLE ID	INCREMENT SAMPLE ID
KPNLRTRC82031	78	03438
KPNLRTRC82032	79	03439
KPNLRTRC82036	83	03506
KPNLRTRC82037	84	03507
KPNLRTRC82042	89	03440
KPNLRTRC82043	90	03441
KPNLRTRC82044	91	03444
KPNLRTRC82045	92	03445
KPNLRTRC82047	94	03446
KPNLRTRC82049	95	04301

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **LR** DS **TRC82031**

SAMPLE ID **78** DATA TYPE (REAL,BORO,AVER,CALC) REAL
SPLIT SAMPLE ID **HD1** DATE ANALYSED 13/01/83
ANALYSIS BASIS TYPE (AD,DB,AR,EM) AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	17.00	TOTAL SULPHUR %	0.37
TOTAL MOISTURE %	19.08	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.50	FSI	__._
ASH %	36.00	HGI	___._
VOLATILE MATTER %	15.10	CO2 %	__.__
FIXED CARBON %	46.40		

GROSS CALORIFIC VALUE (MJ/KG) 17.62
NET CALORIFIC VALUE (MJ/KG) __.__ $Ro_{max}=3.38$

GCRI COAL DIVISION HEAD PROJ KPN BLK LR DS TRC82032

SAMPLE ID	79	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	13.10	TOTAL SULPHUR %	0.36
TOTAL MOISTURE %	14.58	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.70	FSI	__._
ASH %	28.60	HGI	___._
VOLATILE MATTER %	10.50	CO2 %	__.__
FIXED CARBON %	59.20		

GROSS CALORIFIC VALUE (MJ/KG)	21.82		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.70	

GCRI COAL DIVISION HEAD PROJ KPN BLK LR DS TRC82036

SAMPLE ID	83	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	7.50	TOTAL SULPHUR %	0.25
TOTAL MOISTURE %	9.07	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.70	FSI	__._
ASH %	52.70	HGI	___._
VOLATILE MATTER %	8.60	CO2 %	__.__
FIXED CARBON %	37.00		

GROSS CALORIFIC VALUE (MJ/KG)	__.__		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.67$	

GCRI COAL DIVISION HEAD   PROJ KPN   BLK LR   DS TRC82037

SAMPLE ID	84	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	13.80	TOTAL SULPHUR %	0.80
TOTAL MOISTURE %	14.83	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.20	FSI	__._
ASH %	18.70	HGI	___._
VOLATILE MATTER %	8.10	CO2 %	__.__
FIXED CARBON %	72.00		
GROSS CALORIFIC VALUE (MJ/KG)	27.04		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.30	

GCRI COAL DIVISION HEAD PROJ KPN BLK LR DS TRC82042

SAMPLE ID	89	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	12.90	TOTAL SULPHUR %	0.43
TOTAL MOISTURE %	14.38	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	1.70	FSI	__._
ASH %	13.80	HGI	___._
VOLATILE MATTER %	11.80	CO2 %	__.__
FIXED CARBON %	72.70		
GROSS CALORIFIC VALUE (MJ/KG)	26.98		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.69$	

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **LR** DS **TRC82043**

SAMPLE ID 90 DATA TYPE (REAL,BORO,AVER,CALC) REAL
SPLIT SAMPLE ID HD1 DATE ANALYSED 13/01/83
ANALYSIS BASIS TYPE (AD,DB,AR,EM) AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	14.50	TOTAL SULPHUR %	0.42
TOTAL MOISTURE %	16.38	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.20	FSI	__._
ASH %	16.00	HGI	___._
VOLATILE MATTER %	13.60	CO2 %	__.__
FIXED CARBON %	68.20		

GROSS CALORIFIC VALUE (MJ/KG) 25.72
NET CALORIFIC VALUE (MJ/KG) __.__

$Ro_{max}=3.90$

GCRI COAL DIVISION **HEAD** PROJ **KPN** BLK **LR** DS **TRC82044**

SAMPLE ID	**91**	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	**HD1**	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	7.90	TOTAL SULPHUR %	0.24
TOTAL MOISTURE %	9.93	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.20	FSI	__._
ASH %	49.30	HGI	___._
VOLATILE MATTER %	10.00	CO2 %	__.__
FIXED CARBON %	38.50		

GROSS CALORIFIC VALUE (MJ/KG)	__.__	
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=3.93

GCRI COAL DIVISION HEAD PROJ KPN BLK LR DS TRC82045

SAMPLE ID	92	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED 13/01/83	
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD
NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO)	ASTM		

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	14.70	TOTAL SULPHUR %	0.33
TOTAL MOISTURE %	17.26	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	3.00	FSI	__._
ASH %	38.80	HGI	___._
VOLATILE MATTER %	13.40	CO2 %	__.__
FIXED CARBON %	44.80		

GROSS CALORIFIC VALUE (MJ/KG)	16.72		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.89$	

GCRI COAL DIVISION HEAD PROJ KPN BLK LR DS TRC82047

SAMPLE ID	94	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	10.50	TOTAL SULPHUR %	0.38
TOTAL MOISTURE %	12.29	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.00	FSI	__._
ASH %	35.60	HGI	___._
VOLATILE MATTER %	8.00	CO2 %	__.__
FIXED CARBON %	54.40		

GROSS CALORIFIC VALUE (MJ/KG)	19.79		
NET CALORIFIC VALUE (MJ/KG)	__.__	Ro_{max}=4.39	

GCRI COAL DIVISION HEAD PROJ KPN BLK LR DS TRC82049

SAMPLE ID	95	DATA TYPE (REAL,BORO,AVER,CALC)	REAL
SPLIT SAMPLE ID	HD1	DATE ANALYSED	13/01/83
		ANALYSIS BASIS TYPE (AD,DB,AR,EM)	AD

NAME OF STANDARD (ASTM,JIS,DIN,BS,AS,GOST,ISO) ASTM

TOP SIZE (MM)	___.__		
SURFACE MOISTURE %(AD,AR)	9.40	TOTAL SULPHUR %	0.49
TOTAL MOISTURE %	11.48	PHOSPHOROUS %	_.___
EQUILIBRIUM MOISTURE %	__.__	CHLORINE (PPM)	_____
		SPECIFIC GRAVITY	_.__
RESIDUAL MOISTURE %(AD,EM)	2.30	FSI	__._
ASH %	26.70	HGI	___._
VOLATILE MATTER %	13.50	CO2 %	__.__
FIXED CARBON %	57.50		

GROSS CALORIFIC VALUE (MJ/KG)	22.10		
NET CALORIFIC VALUE (MJ/KG)	__.__	$Ro_{max}=3.24$	

SUMMIT SOUTH

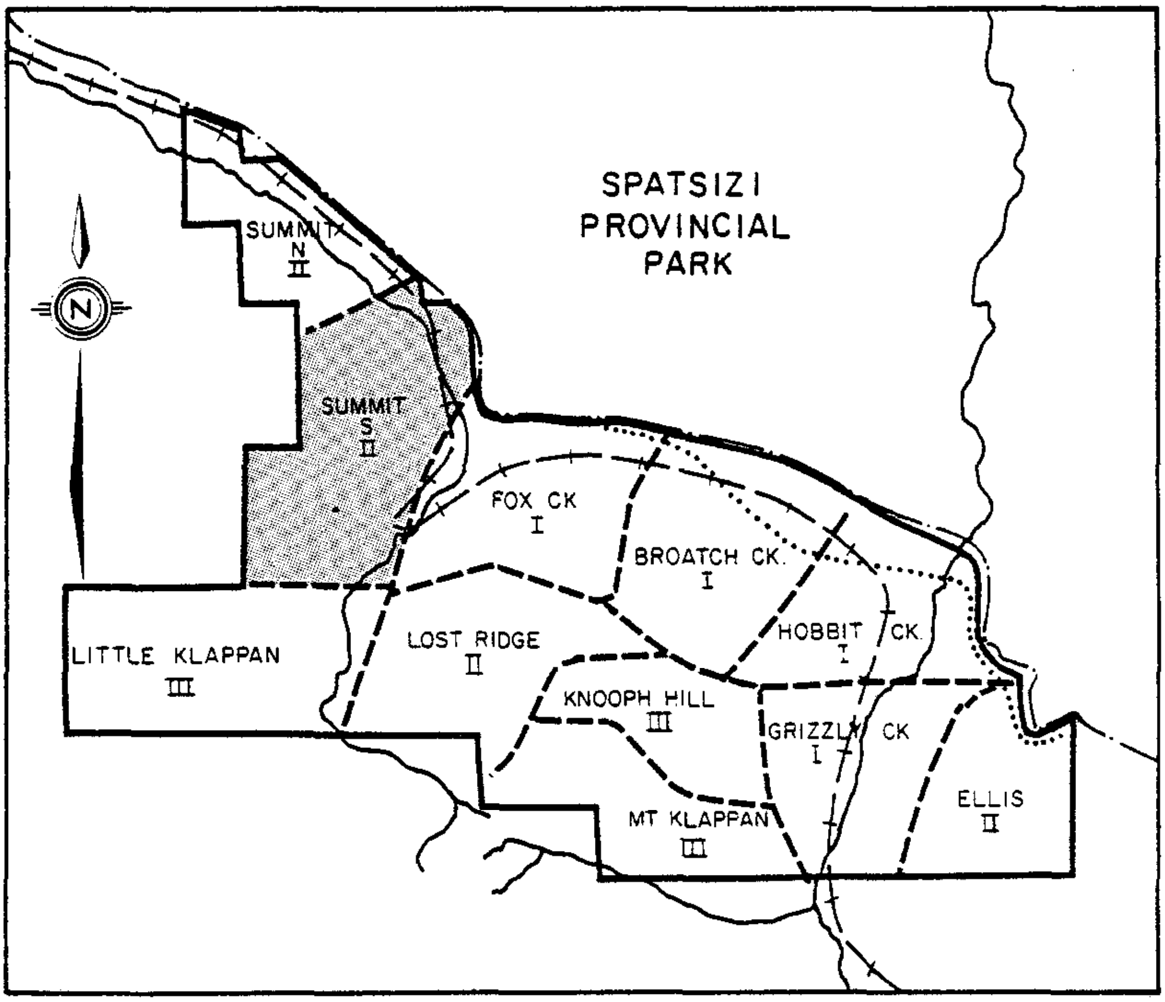
GULF CANADA RESOURCES INC. - COAL DIVISION

22/NOV/82 PROJECT DATA SOURCE SUMMARY PAGE 1

DATA SOURCE	LOCATION NORTHING	EASTING	ELEVATION	LENGTH	ANGLE	AZIMUTH	LOG TYPE
KPNSSTRC82039	6351580.0	504640.0	1255.0	8.6	15.0	125.0	

MT. KLAPPAN COAL PROPERTY

1982 EXPLORATION MAPPING AREAS



0 1 2 3 km

Prepared Rail Bed

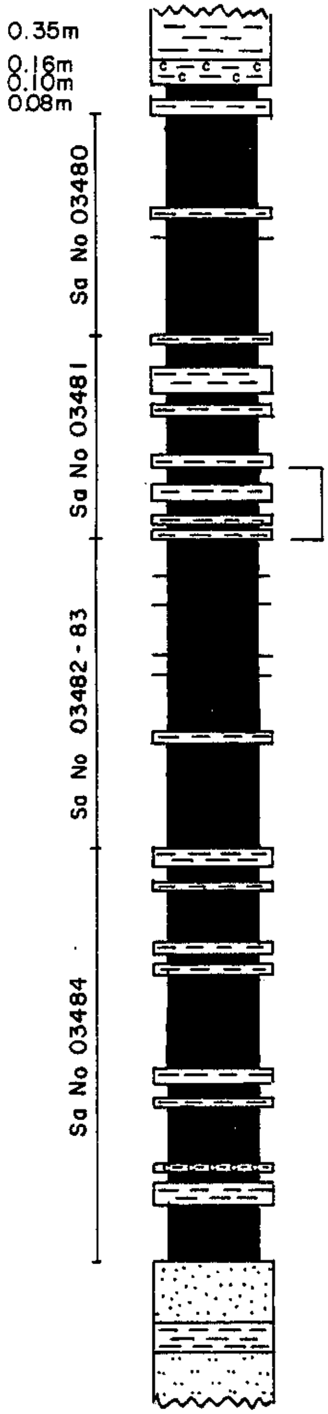
Provincial Park Boundary

I First Priority

II Second Priority

III Third Priority

Redefined Property Boundary



ROCK	COAL
	0.60
0.08	
	0.82
0.05	
	0.17
0.17	
	0.05
0.08	
	0.27
0.07	
	0.08
0.10	
	0.11
0.05	
	0.04
0.05	
	1.39
0.13	
	0.69
0.10	
	0.09
0.06	
	0.33
0.06	
	0.09
0.05	
	0.70
0.08	
	0.11
0.05	
	0.39
0.05	
	0.08
0.13	
	0.35
TOTAL 1.36	6.36

7.72

SHALE: DARK GRAY, SOFT, WEATHERS GRAY TO RUST
THINLY BEDDED, MINOR MUDST. INTERBEDS
CLAYSTONE: CARBONACEOUS
COAL: HARD, DULL BANDED
MUDSTONE: BROWN AND SOFT
COAL: FINELY BANDED AND DULL BANDED, HARD
MUDSTONE: SOFT, GRAY
COAL: SLIGHTLY CARBONACEOUS, C-3
COAL: DULL BANDED, HARD
MUDSTONE: SOFT, DARK GRAY
COAL: DULL BANDED
SHALE: LIGHT GRAY, HIGHLY FRACTURED, SLIGHLY CARBONACEOUS
COAL: DULL
MUDSTONE: SOFT, GRAY
COAL: DULL BANDED, MINOR CLAYSTONE (CARB.)
MUDSTONE: CARBONACEOUS IN PART
COAL / MUDSTONE INTERBEDS
COAL: DULL BANDED TO DULL AND BRIGHT
MUDSTONE: DARK GRAY, CONSOLIDATED
COAL: DULL
COAL: DULL BANDED
COAL: BRIGHT BANDED
COAL: DULL AND BRIGHT
COAL: DULL AND BRIGHT, LOW DENSITY
MUDSTONE: BROWN
COAL: DULL AND BRIGHT (HARD, LOW DENSITY) TO BRIGHT
MUDSTONE: DARK GRAY
COAL: DULL AND BRIGHT
MUDSTONE: SOFT, GRAY
COAL: DULL BANDED
MUDSTONE: MINOR COAL STRINGERS
COAL: DULL AND BRIGHT
MUDSTONE: SOFT
COAL: C-3, HARD, DULL & BRIGHT TO DULL BANDED
MUDSTONE: SOFT
COAL: DULL BANDED TO DULL AND BRIGHT
MUDSTONE: SOFT, GRAY
COAL: DULL BANDED, WEATHERED, IRON STAINING AT BASE
CLAYSTONE: CARBONACEOUS
COAL: DULL AND BRIGHT
SHALE: HARD
COAL: DULL BANDED TO DULL AND BRIGHT
SANDSTONE: GRAY, FINE GRAIN HARD IN PART, RUST WEATHER IN PART
SHALE
SILTSTONE

ATTITUDE OF ROOF : 085/29° S
ATTITUDE OF FLOOR : 053/39° S
FORMATION :
UTM COORDINATES : 6351580 N, 504640 E
MAP CARD NUMBER :
AIR PHOTO NUMBER :
TRENCH DEPTH : 1.0 m
TRENCH WIDTH : 0.60 m
TRENCH LENGTH : 8.6 + m
TRENCH BEARING : 125°
TRENCH SLOPE : 015°

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MT. KLAPPAN COAL PROJECT
TRENCH LOG
TRC–82–039

DRAWN BY:	SCALE
LOGGED BY: E. SWANBERGSON	DATE July 30/82
APPROVED BY:	

GULF CANADA RESOURCES INC. - COAL DIVISION

18/JAN/83 SIMPLE SAMPLE SUMMARY

DATA SOURCE	SEAM	SAMPLE ID	DEPTH FROM	DEPTH TO	REC CORE	PERCENT REC	RECOVERED COAL	RECOVERED ROCK	MISSING COAL	MISSING ROCK
TRC82039										
		3480	0.69	2.09	1.40	100.00	1.32	0.08	0.00	0.00
		3481	2.09	3.38	1.29	100.00	0.72	0.57	0.00	0.00
		3482	3.38	5.59	2.11	100.00	1.59	0.52	0.00	0.00
		3483	3.38	5.59	2.11	100.00	1.59	0.52	0.00	0.00
		3484	5.59	8.31	2.72	100.00	2.02	0.70	0.00	0.00

XXXXX

PROJECT: KPN BLOCK: SS DATA SOURCE: TRC82039

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	0.00	0.35	0.35			SHALE	DK.GY.THNB SOFT
	0.35	0.51	0.16			CLAYSTONE	CARB.BLK SOFT
	0.51	0.61	0.10			COAL	C-3 HARD
	0.61	0.69	0.08			MUDSTONE	BN SOFT
	0.69	1.29	0.60	03480		COAL	C-3.BLK HARD
	1.29	1.37	0.08	03480		MUDSTONE	GY SOFT
	1.37	1.49	0.12	03480		COAL	C-3.BLK HARD
	1.49	2.09	0.60	03480		COAL	C-3.BLK HARD
	2.09	2.14	0.05	03481		MUDSTONE	DK.GY SOFT
	2.14	2.31	0.17	03481		COAL	C-3

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: SS DATA SOURCE: TRC82039

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	2.31	2.48	0.17	03481		SHALE	LT.GY HIGHLY FRAC. SLIGHTLY CARB
	2.48	2.53	0.05	03481		COAL	C-2.BLK
	2.53	2.61	0.08	03481		MUDSTONE	BN SOFT
	2.61	2.88	0.27	03481		COAL	C-3.BLK MNR CARB CLYST SPLITS
	2.88	2.95	0.07	03481		MUDSTONE	DK.GY CARB IN PART
	2.95	3.03	0.08	03481		COAL	C-3.BLK
	3.03	3.13	0.10	03481		MUDSTONE	DK.GY SOFT
	3.13	3.24	0.11	03481		COAL	C-3.BLK
	3.24	3.29	0.05	03481		MUDSTONE	DK.GY.THNB CONSOLIDATED
	3.29	3.33	0.04	03481		COAL	C-4.BLK

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: SS DATA SOURCE: TRC82039

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	3.33	3.38	0.05	03481		MUDSTONE	
	3.38	4.77	1.39	03482		COAL	C-4.BLK SAMPLE ID ALSO CONTAINS 03483;3 BAGS NE EDED TO SAMPLE
	4.77	4.90	0.13	03482		MUDSTONE	BN SOFT. SAMPLE ID ALSO CONTAINS 03483;3 B AGS NEEDED TO SAMPLE
	4.90	5.59	0.69	03482		COAL	C-4.BLK HARD. BLOCKY. SAMPLE ID ALSO CONTAINS 0 3483;3 BAGS NEEDED TO SAMPLE
	5.59	5.69	0.10	03484		MUDSTONE	DK.GY
	5.69	5.78	0.09	03484		COAL	C-4.BLK
	5.78	5.84	0.06	03484		MUDSTONE	GY SOFT
	5.84	6.17	0.33	03484		COAL	C-3.BLK

* DENOTES MEASURED BCA

XXXXX

PROJECT: KPN BLOCK: SS DATA SOURCE: TRC82039

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	6.17	6.23	0.06	03484		MUDSTONE	DK.GY MNR COAL STRGS
	6.23	6.32	0.09	03484		COAL	C-4.BLK
	6.32	6.37	0.05	03484		MUDSTONE	GY SOFT
	6.37	7.07	0.70	03484		COAL	C-3.BLK C-4 IN PART
	7.07	7.15	0.08	03484		MUDSTONE	GY SOFT
	7.15	7.26	0.11	03484		COAL	C-3.BLK C-4 IN PART
	7.26	7.31	0.05	03484		MUDSTONE	GY SOFT
	7.31	7.70	0.39	03484		COAL	C-3.BLK WEATHERED. FERRUGINOUS AT BASE
	7.70	7.75	0.05	03484		CLAYSTONE	CARB.BLK SOFT
	7.75	7.83	0.08	03484		COAL	C-4.BLK

* DENOTES MEASURED BCA

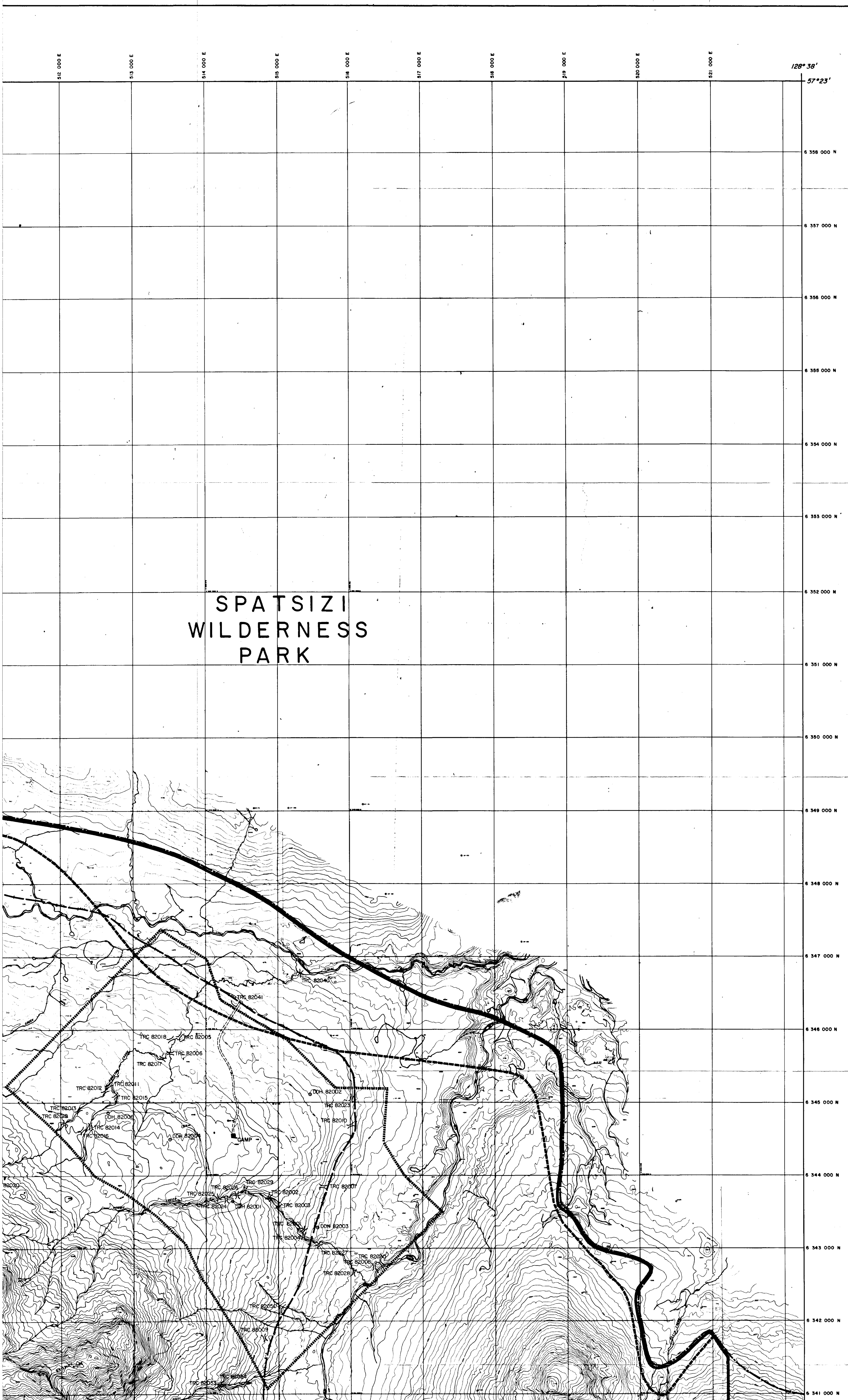
XXXXX

PROJECT: KPN BLOCK: SS DATA SOURCE: TRC82039

BCA	DEPTH FROM	DEPTH TO	INTRVAL THICK.	SAMP. ID	SEAM ID	LITHOLOGY	DESCRIPTION
	7.83	7.96	0.13	03484		SHALE	M.GY HARD
	7.96	8.31	0.35	03484		COAL	C-3.BLK C-4 IN PART
	8.31	8.71	0.40			SANDSTONE	M.GY MNR FERRUGINOUS STAINING
	8.71	8.91	0.20			SHALE	GY POORLY EXPOSED
	8.91	9.21	0.30			SILTSTONE	LT.GY POORLY EXPOSED

128° 51'
57° 23'
510 000 E
511 000 E
512 000 E
513 000 E
514 000 E
515 000 E
516 000 E
517 000 E
518 000 E
519 000 E
520 000 E
521 000 E
SPATSIZI
WILDERNESS
PARK
CAMP
57° 11'
128° 51'
TRC 82009 Trench & Trench Number
DDH 82003 Diamond Drill Hole
Resource Area Boundary

110 67
M1B



LEGEND

- BUILDING
- ROAD, HARD SURFACE
  - LOOSE SURFACE
  - CART TRACK
  - TRAIL
- RAILROAD BED
- RIVER
- STREAM, DEFINITE
  - APPROXIMATE
  - SPLIT
- LAKE
- WATER LEVEL — EL 505'
- SWAMP
- BEAVER DAM — B.D.
- TREE LINE
- CUT LINE
- CONTOURS, INDEX — 1750
  - INTERMEDIATE
  - DEPRESSION
  - APPROXIMATE
- SPOT ELEVATION — ·7654
- FIELD CONTROL POINT — CP 121
- COAL PROPERTY BOUNDARY
- PROVINCIAL PARK BOUNDARY
- REDEFINED PROPERTY BOUNDARY

NOTES

CONTOUR INTERVAL 10 METERS

SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON DATA SUPPLIED BY B C RAIL

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD
FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67
AT A SCALE OF 1 60000 (APPROXIMATE).

SCALE 1:20,000

MILES 0 — 1

METRES 0 — 1000 — 2000

110

TRC 82009 — Trench & Trench Number

DDH 82003 — Diamond Drill Hole

Resource Area Boundary

GR-Mt Klappan 82(2)A(3)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

DRILL HOLE AND TRENCH LOCATION

EAST SHEET

PREPARED BY: G. SEVE		DRAWING No.
APPROVED BY: B.P.F.	DATE: JULY 82	KPN-82-087

129°05'30"
57°23'
SPATSIZI
WILDERNESS
PARK
SUMMIT
RESOURCE
AREA
LOST FOX
RESOURCE AREA
TRC 82022
57°11'
129°05'30"
TRC 82049
Trench & Trench Number
DDH 82005
Diamond Drill Hole
Resource Area Boundary

M28

LEGEND

- BUILDING
- ROAD, HARD SURFACE
  - LOOSE SURFACE
  - CART TRACK
  - TRAIL
- RAILROAD BED
- RIVER
- STREAM, DEFINITE
  - APPROXIMATE
  - SPLIT
- LAKE
- WATER LEVEL — EL 505
- SWAMP
- BEAVER DAM — B.D.
- TREE LINE
- CUT LINE
- CONTOURS, INDEX — 1750
  - INTERMEDIATE
  - DEPRESSION
  - APPROXIMATE
- SPOT ELEVATION — · 7654
- FIELD CONTROL POINT — CP 121
- COAL PROPERTY BOUNDARY
- PROVINCIAL PARK BOUNDARY

NOTES

CONTOUR INTERVAL 10 METERS

SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON DATA SUPPLIED BY B C RAIL

COMPILED BY:
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1 60000 (APPROXIMATE).

SCALE 1:20,000

MILES 0 — 1
METRES 0 — 1000 — 2000

TRC 82049 — Trench & Trench Number
DDH 82005 — Diamond Drill Hole
Resource Area Boundary

GR-Mt Klappan 82 (2) in × (1)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MOUNT KLAPPAN COAL PROPERTY

DRILL HOLE AND TRENCH LOCATION

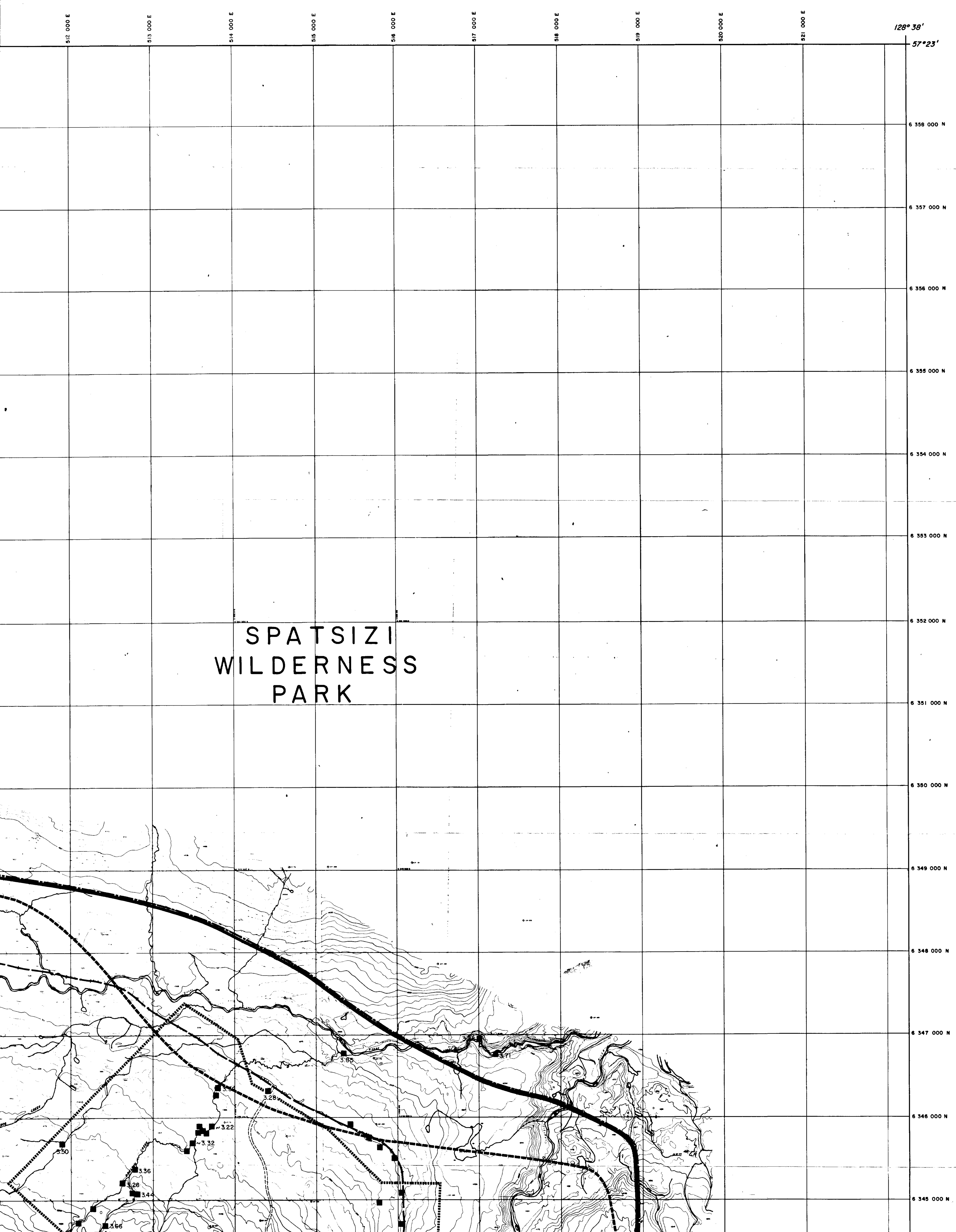
WEST SHEET

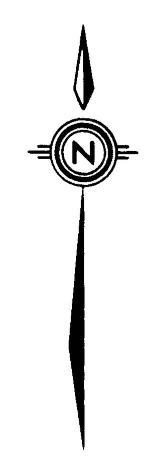
PREPARED BY: G. SEVE	DRAWING No. KPN-82-088
APPROVED BY: B.P.F. DATE: JULY 82	

110 (1)
M2

128° 51'
57° 23'
510 000 E
511 000 E
512 000 E
513 000 E
514 000 E
515 000 E
516 000 E
517 000 E
518 000 E
519 000 E
520 000 E
521 000 E
SPATSIZI
WILDERNESS
PARK
CAMP
57° 11'
128° 51'
COAL OCCURRENCE
4.70 REFLECTANCE (Rm) VALUE
RESOURCE AREA BOUNDARY

M38





LEGEND

BUILDING	
ROAD, HARD SURFACE	
LOOSE SURFACE	
CART TRACK	
TRAIL	
RAILROAD BED	
RIVER	
STREAM, DEFINITE	
APPROXIMATE	
SPLIT	
LAKE	
WATER LEVEL	EL 505'
SWAMP	
BEAVER DAM	B.D. B.D.
TREE LINE	
CUT LINE	
CONTOURS, INDEX	1750
INTERMEDIATE	
DEPRESSION	
APPROXIMATE	
SPOT ELEVATION	· 7654
FIELD CONTROL POINT	CP 121
~~COAL PROPERTY BOUNDARY~~	
PROVINCIAL PARK BOUNDARY	
REDEFINED PROPERTY BOUNDARY	

NOTES

CONTOUR INTERVAL 10 METERS

SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON DATA SUPPLIED BY B C RAIL

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1 60 000 (APPROXIMATE).

SCALE 1:20,000

MILES 0 — 1
METRES 0 — 1000 — 2000

110

■ COAL OCCURRENCE

4.70 REFLECTANCE (Rm) VALUE

▪▪▪▪▪▪▪▪▪ RESOURCE AREA BOUNDARY

GR- Mt Klappan 82 (2*)A *(3)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

MOUNT KLAPPAN COAL PROPERTY

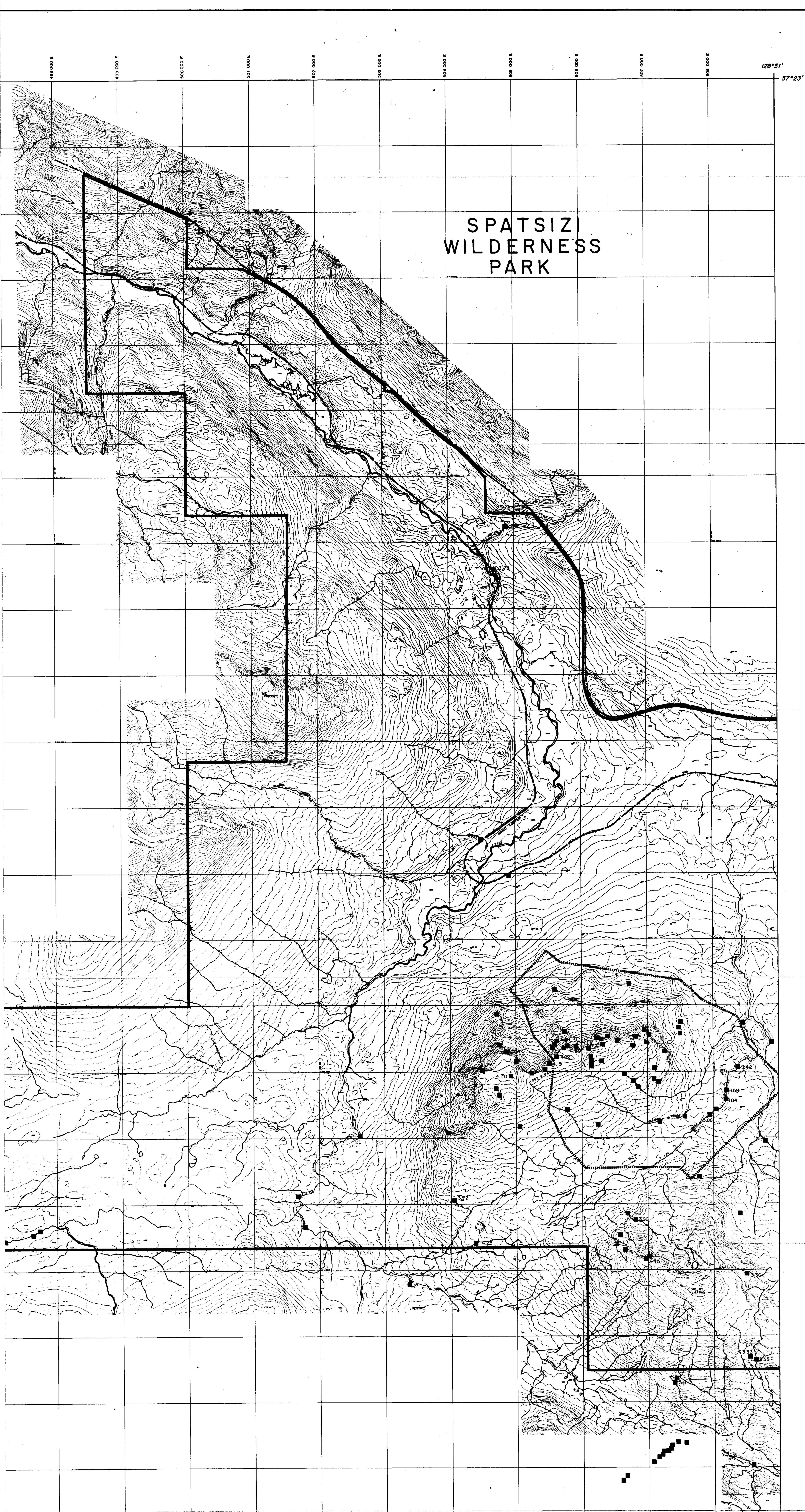
COAL OCCURRENCES

EAST SHEET

PREPARED BY: G.SEVE	DRAWING No.
APPROVED BY: B.P.F. DATE: NOV 82	

SPATSIZI
WILDERNESS
PARK
129°05'30"
57°23'
495 000 E
496 000 E
497 000 E
498 000 E
499 000 E
500 000 E
501 000 E
502 000 E
503 000 E
504 000 E
505 000 E
506 000 E
507 000 E
508 000 E
6 358 000 N
6 357 000 N
6 356 000 N
6 355 000 N
6 354 000 N
6 353 000 N
6 352 000 N
6 351 000 N
6 350 000 N
6 349 000 N
6 348 000 N
6 347 000 N
6 346 000 N
6 345 000 N
6 344 000 N
6 343 000 N
6 342 000 N
6 341 000 N
6 340 000 N
6 339 000 N
6 338 000 N
57°11'
129°05'30"
COAL OCCURRENCE
3.51 REFLECTANCE (Rm) VALUE
RESOURCE AREA BOUNDARY

M48



N

LEGEND

BUILDING	
ROAD, HARD SURFACE	
LOOSE SURFACE	
CART TRACK	
TRAIL	
RAILROAD BED	
RIVER	
STREAM, DEFINITE	
APPROXIMATE	
SPLIT	
LAKE	
WATER LEVEL	EL 505*
SWAMP	
BEAVER DAM	B.D. B.D.
TREE LINE	
CUT LINE	
CONTOURS, INDEX	1750
INTERMEDIATE	
DEPRESSION	
APPROXIMATE	
SPOT ELEVATION	· 7654
FIELD CONTROL POINT	CP 121
COAL PROPERTY BOUNDARY	
PROVINCIAL PARK BOUNDARY	

NOTES

CONTOUR INTERVAL 10 METERS

SURVEY CONTROL TAKEN FROM EXISTING PHOTO,IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON DATA SUPPLIED BY B C RAIL

COMPILED BY:
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD., FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1 60 000 (APPROXIMATE).

110

SCALE 1:20,000

MILES 0 — 1

METRES 0 — 1000 — 2000

■ COAL OCCURRENCE

3.51 REFLECTANCE (Rm) VALUE

RESOURCE AREA BOUNDARY

GR Mt Klappan 82(2)A *(3)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

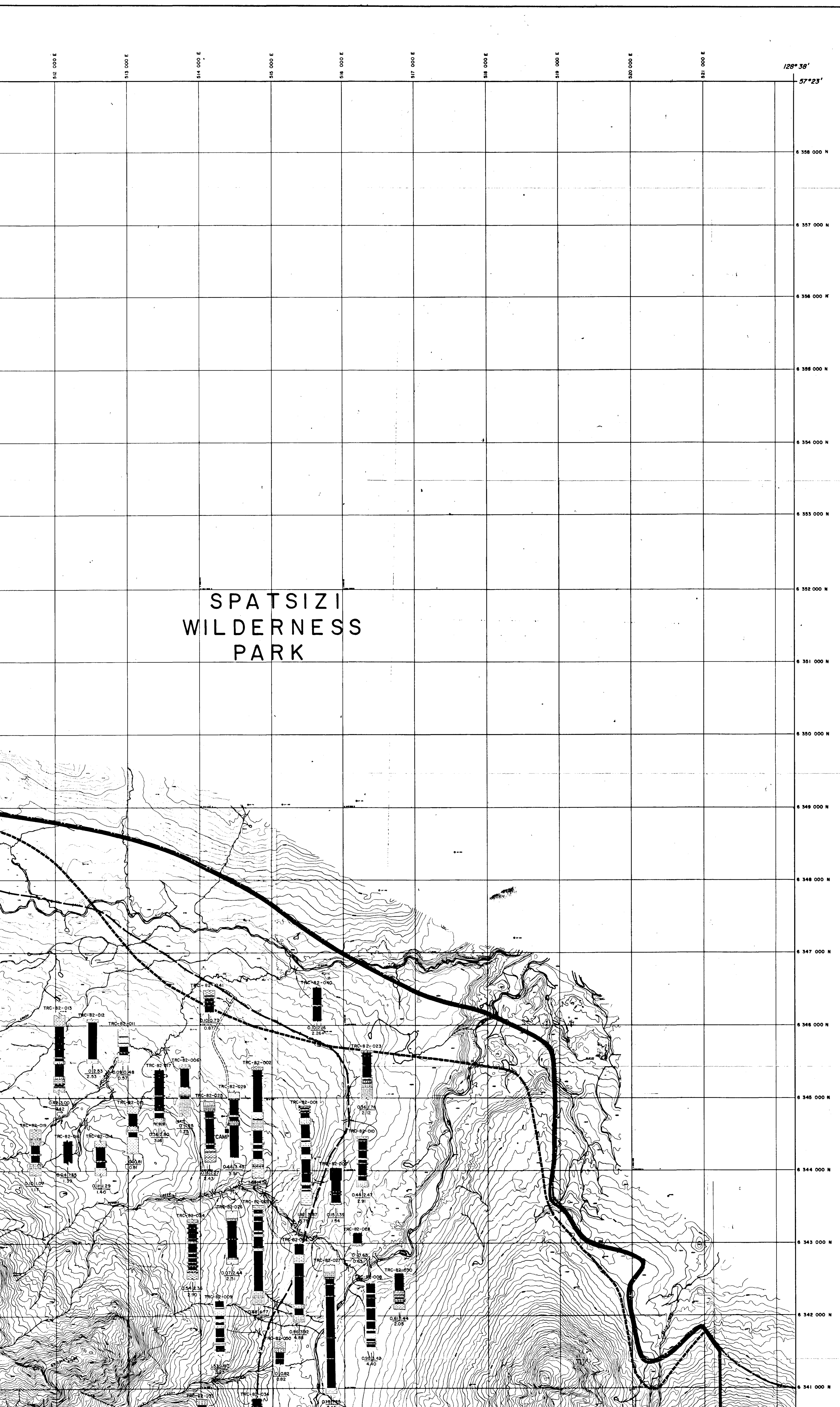
COAL OCCURRENCES

WEST SHEET

PREPARED BY: G.SEVE	DRAWING No.
APPROVED BY: B.P.F. DATE: NOV. 82	


128° 51'
57° 23'
510 000 E
511 000 E
512 000 E
513 000 E
514 000 E
515 000 E
516 000 E
517 000 E
518 000 E
519 000 E
520 000 E
521 000 E
SPATSIZI
WILDERNESS
PARK
CAMP
57° 11'
128° 51'
TRENCH LOCATION
TRC 82012
TRENCH NUMBER
TRENCH STRIP LOG (1:100)
0 | 2.53
2.53
ROCK THICKNESS | COAL THICKNESS (m)
TOTAL SEAM THICKNESS (m)

MSB



LEGEND

BUILDING	
ROAD, HARD SURFACE	
LOOSE SURFACE	
CART TRACK	
TRAIL	
RAILROAD BED	
RIVER	
STREAM, DEFINITE	
APPROXIMATE	
SPLIT	
LAKE	
WATER LEVEL	EL 505*
SWAMP	
BEAVER DAM	B.D. B.D.
TREE LINE	
CUT LINE	
CONTOURS, INDEX	1750
INTERMEDIATE	
DEPRESSION	
APPROXIMATE	
SPOT ELEVATION	· 7654
FIELD CONTROL POINT	CP 121
COAL PROPERTY BOUNDARY	
PROVINCIAL PARK BOUNDARY	
REDEFINED PROPERTY BOUNDARY	

NOTES

CONTOUR INTERVAL 10 METERS

SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

RAILROAD BED LOCATION BASED ON DATA SUPPLIED BY B C RAIL

COMPILED BY:
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1 60 000 (APPROXIMATE).

110

SCALE 1:20,000

MILES 0 1

METRES 0 1000 2000

TRENCH LOCATION

TRC 82012 — TRENCH NUMBER

TRENCH STRIP LOG (1:100)

0 | 2.53 / 2.53 — ROCK THICKNESS | COAL THICKNESS (m) / TOTAL SEAM THICKNESS (m)

GR Mt Klappan 82(2*)A *(3)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA
Gulf

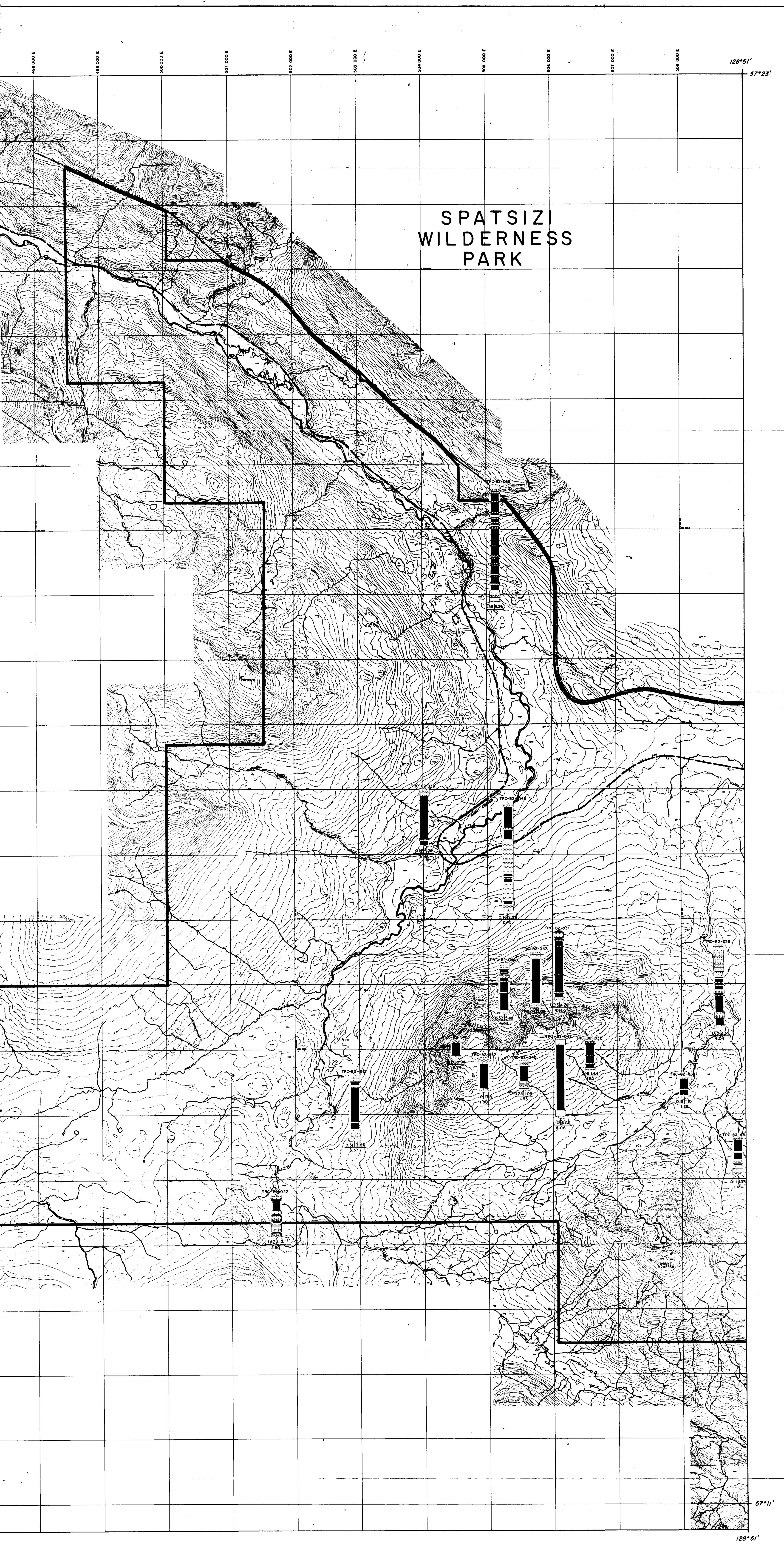
MOUNT KLAPPAN COAL PROPERTY

COAL SEAM DISTRIBUTION

EAST SHEET

PREPARED BY: C. LOUIE		DRAWING No.
APPROVED BY: B.P.F.	DATE: JULY 82	KPN-82-089


SPATSIZI
WILDERNESS
PARK
129°05'30"
57°23'
57°11'
129°05'30"
495 000 E
496 000 E
497 000 E
498 000 E
499 000 E
500 000 E
501 000 E
502 000 E
503 000 E
504 000 E
505 000 E
506 000 E
507 000 E
508 000 E
6 358 000 N
6 357 000 N
6 356 000 N
6 355 000 N
6 354 000 N
6 353 000 N
6 352 000 N
6 351 000 N
6 350 000 N
6 349 000 N
6 348 000 N
6 347 000 N
6 346 000 N
6 345 000 N
6 344 000 N
6 343 000 N
6 342 000 N
6 341 000 N
6 340 000 N
6 339 000 N
6 338 000 N
TRC 82008
0.98 | 2.82
3.80
TRENCH LOCATION
TRENCH NUMBER
TRENCH STRIP LOG (1:100
ROCK THICKNESS | COAL THICK
TOTAL SEAM THICKNESS



LEGEND

BUILDING
ROAD, HARD SURFACE
LOOSE SURFACE
CART TRACK
TRAIL
RAILROAD BED
RIVER
STREAM, DEFINITE
APPROXIMATE
SPLIT
LAKE
WATER LEVEL — EL 505'
SWAMP
BEAVER DAM — B.D.
TREE LINE
CUT LINE
CONTOURS, INDEX — 1750
INTERMEDIATE
DEPRESSION
APPROXIMATE
SPOT ELEVATION — ·7654
FIELD CONTROL POINT — CP 121
COAL PROPERTY BOUNDARY
PROVINCIAL PARK BOUNDARY

NOTES

CONTOUR INTERVAL 10 METERS

SURVEY CONTROL TAKEN FROM EXISTING PHOTO IDENTIFIABLE GOVERNMENT SURVEY MONUMENTS AND N.T.S. MAPS. MAPPING IS BASED ON UNIVERSAL TRANSVERSE MERCATOR GRID AND GEODETIC DATUM.

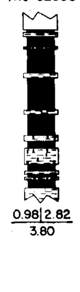
RAILROAD BED LOCATION BASED ON DATA SUPPLIED BY B C RAIL

COMPILED BY
WESTERN PHOTOGRAMMETRY, A DIVISION OF UNDERWOOD McLELLAN LTD, FROM FEDERAL GOVERNMENT AERIAL PHOTOGRAPHY FLOWN IN AUGUST/67 AT A SCALE OF 1 60 000 (APPROXIMATE).

SCALE 1:20,000

MILES 0 — 1
METRES 0 — 1000 — 2000

TRC 82008 — TRENCH LOCATION — TRENCH NUMBER



TRENCH STRIP LOG (1:100)

0.98 | 2.82 — ROCK THICKNESS | COAL THICKNESS (m)
3.80 — TOTAL SEAM THICKNESS (m)

GR. Mt Klappan 82(3)A (3)

GULF CANADA RESOURCES INC.
Coal Division
CALGARY ALBERTA

Gulf

MOUNT KLAPPAN COAL PROPERTY

COAL SEAM DISTRIBUTION

WEST SHEET

PREPARED BY: C. LOUIE		DRAWING No.
APPROVED BY: B. P. F.	DATE: JULY 82	KPN-82-090

110