Most of Appendix II, Sections 1 & 2 of this report contains coal quality data, and remains confidential under the terms of the *Coal Act Regulation*, Section 2(1). It has been removed from the public version.

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_251_2004

QUINTETTE COAL LIMITED

TRANSFER AREA

GEOLOGICAL REPORT

724

Quintette Coal Limited

P. O. Box 1500
Tumbler Ridge, B.C., Canada
V0C 2W0

Tel. (604) 242-3221

DENISON MINES LIMITED
MANAGER

April 13, 1987

File No. 4.2.1
No. 6.1.1.6

VIA COURIER

Mr. P. Hagen,
Coal Administrator
Ministry of Energy, Mines and
Petroleum Resources
412, 617 Government Street
Victoria, British Columbia
V8V 1X4

Re: Technical Assessment Report: Quintette Coal Limited 1986 Exploration

Dear Mr. Hagen:

Enclosed please find the "Transfer Area Geological Report" which is submitted in support of previously documented expenditures amounting to $777,193.84. The costs were incurred from exploration on Quintette Coal Licences during 1986 coal licence year. It would be appreciated if you would forward the report to A. Matheson after your review.

Sincerely yours,

QUINTETTE COAL LIMITED

G.P. Gormley
Chief Mine Geologist

GPG/ccw

Attachment(s)

cc: A. Matheson
J.H.H. Chamberlin

CONFIDENTIAL

Quintette Coal Limited

P. O. Box 1500
Tumbler Ridge, B.C., Canada
V0C 2W0

Tel. (604) 242-3221

DENISON MINES LIMITED
MANAGER

June 25, 1987

File No. 6.1.1.6

Mr. A. Matheson
Resource Data & Analysis Section
Ministry of Energy, Mines and
Petroleum Resources
105, 525 Superior Street
Victoria, B.C
V8V 1X4

Dear Alex:

Re: Transfer Area Geophysical Logs:

As per your request please find copies of the geophysical logs completed during our 1984, 1985 and 1986 programmes in the Transfer Area at Quintette Coal Limited.

Sincerely yours,

QUINTETTE COAL LIMITED

G.P. Gormley
Chief Mine Geologist

GPG/ccw

Enclosures

cc: J.H.H. Chamberlin

LOG NO: 0629 RD. 4
ACTION:
FILE NO:

Telecopier: (604) 242-3580 Telex: 047-7199

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QUINTETTE COAL LIMITED

TRANSFER AREA

GEOLOGICAL REPORT

TEXT

MARCH 1987

PREFACE

During 1986, geological exploration on Quintette Coal Limited property was undertaken in the following areas:

1. Transfer Area
2. Shikano
3. Mesa Extension

This report and its related appendices introduces all geological data and assessments of the geological structure, stratigraphy, coal quality and reserves of the first area only. Previous geological interpretation of the Shikano and Mesa Extension deposits resulted in their inclusion in the Quintette Coal Limited Development Plan Revision 2, in April, 1986. Results of the 1986 geological exploration in the Mesa Extension are presented in a separate report. Results of rotary drilling in Shikano have been incorporated into ongoing production planning for the mine which commenced operation in October of 1986.

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1.0 SUMMARY

Objectives of Transfer Area Exploration and Work Completed

The purpose for exploration in the Transfer Area is to develop mineable open pit reserves which may prove more economically attractive than certain portions of Quintette Coal Limited's current long term mining plan. Drilling completed to date in the two primary areas covered by this report is summarized as follows:

Summary of Transfer Area Drilling

	Number of Diamond Drill Holes	Number of Rotary Drill Holes
Transfer	8	--
Grizzly	3	7

Although drilling is limited at this stage of development, extensive surface geological mapping has confirmed the basic structural interpretation of the two primary anticlines in the Transfer and Grizzly Areas.

Structure

Resources have been estimated on anticline limbs in both the Transfer and Grizzly Area. These structures are similar in nature to the Shikano Anticline currently being mined, their limbs generally dip from 35° to 65° with northwesterly plunges from 0° to 30°. The larger resource potential estimated in the Transfer Area can be mainly attributed to near surface Middle Gates Formation combined with an abnormally flat axial plunge over a strike distance of about 1 kilometre.

Coal Seam Thickness

Seam D, E, F, G, J, K1 and K2, have been identified from drilling to date and are readily correlated to the Shikano deposit coal seams. In both anticlines, thin and or poorly developed intersections have been found in D and E coal seams resulting in their exclusion from current resource evaluation. Seams F and G are well developed, forming single, thick mining sections in both structures. The interseam partings between J, K1 and K2 are variable in thickness such that this zone may be a single mining section (including all partings) or two mining sections.

Thickness range and average values are compared to Shikano as follows:

Average Mining Section Thickness

Seam	Grizzly	Transfer	Shikano
D	-	-	2.81
E	-	-	2.12
F	3.52	4.05	4.05
G	3.19	3.70	3.27
J	-	-	4.65
J+K1	6.11	7.13	-
K1	-	-	0.87
K1+K2	-	1.12	-

Coal Quality and Yields

Coal samples taken from drill core were subjected to a full range of testing procedures which generally confirmed its acceptabiliy as metallurgical feed to the wash plant. The plant feed ash values and subsequent plant yield predicted in the preliminary evaluation of resource potential are compared to Shikano as follows:

	Grizzly		Transfer		Shikano	
Seam	Met Plant Feed Ash %	Met Plant Yield %	Met Plant Feed Ash %	Met Plant Yield %	Met Plant Feed Ash %	Met Plant Yield %
D	-	-	-	-	21.8	78.0
E	-	-	-	-	29.3	59.7
F	20.65	75.5	27.23	64.8	21.7	73.1
G	43.27	50.6	40.48	53.4	42.1	48.3
J	-	-	-	-	30.4	65.2
J+K1	27.09	70.1	32.58	62.7	-	-
K1	-	-	-	-	38.4	53.90
K1+K2	-	-	33.59	59.3	-	-
Wt.Avg	29.7	66.0	33.4	60.7	30.9	63.10

Resources

The resource potential of both structures is currently being assessed. Preliminary estimates indicate a total resource of 27.9 million tonnes of product coal. These resources are derived as follows:

	Grizzly Preliminary Pit "C"	Transfer Preliminary Pit "A"	Combined Pits
Product Met (M tonnes)	5.992	20.766	26.758
Product Thermal (M tonnes)	0.337	0.772	1.109

Conclusions and Recommendations

The results of work to date satisfy the objectives of exploration at Quintette Coal Limited in that establishing more attractive long term mine plan reserve alternatives appears probable in the area explored. To this end, further exploration efforts plus initial geotechnical and environmental concerns is recommended during 1987 in order to expedite the areas development.

1.2 INTRODUCTION

One of Quintette Coal Limited's primary long term geological objectives is to develop new reserve alternatives to those included in current long term mining plans providing both stripping ratio and capital (infrastructure) requirements can be reduced. To this end, the Transfer Area, which is named due to its proximity to the Transfer Point on the Company's overland conveyor system is being explored. The Quintette Coal Limited Development Plan - Revision 2 completed in April, 1986 referenced the Transfer Area as follows:

> "Recommendations and Further Improvements
>
> During 1985, exploratory efforts in areas within 3 km of the existing conveyor belt have indicated the possibility of developing substantial reserves at a strip ratio lower than certain portions of the Wolverine deposit. Funds have been budgeted to conduct exploration and drilling during 1986 in this area (Transfer)."

1.3 LOCATION, ACCESS AND PHYSIOGRAPHIC FEATURES

1.3.1 Location

Regional and local maps illustrating Quintette Coal Limited's location are provided as Figure 1.3.1 and Figure 1.3.2. The location of the Transfer Area relative to the properties primary infrastructure is illustrated in Figure 1.3.3. As can be seen from this illustration, the area contains a number of potential reserve areas which have had various levels of exploration completed to date. The focus of recent exploration activity (1985/86) and this report is in three relatively distinct geological structures which are listed in order of resource size as follows:

1. Transfer
2. Grizzly
3. Gething

1.3.2 Access

The 1986 Exploration Programme established 4-wheel drive access routes from existing roads into the Transfer, Grizzly and Gething areas. The location of these routes are schematically illustrated in Figure 1.3.4 and plotted in detail on the respective areas geological maps presented in Section 2.0.

The current road distance from the Preparation Plant and Mine Service Complex to the three target areas are listed as follows:

Transfer Area
Current Road Access Distances

From	To	Distance (km)
Transfer	Preparation Plant	21.5
	Mine Service Complex	13.0
Grizzly	Preparation Plant	7.2
Gething	Preparation Plant	18.5
	Mine Service Complex	10.0

Although open pit mine limits are not finalized at present, possible road routes (at approximately 7% grade) from the deposits to the overland conveyor, Preparation Plant and Service Complex are illustrated in Figure 1.3.5 and summarized as follows:

Transfer Area
Future Road Access Distances

From	To	Distance (km)
Transfer	Overland Conveyor (Transfer Bldg)	5.6
	Mine Service Complex	9.2
	Preparation Plant	14.7
Grizzly	Overland Conveyor (Transfer Bldg)	1.2
	Mine Service Complex	11.4
	Preparation Plant	10.3
Gething	Overland Conveyor (Transfer Pt)	7.2
	Mine Service Complex	10.8
	Preparation Plant	16.3
Mesa Pit*	Mine Service Complex	6.7
	Preparation Plant	23.1
Wolverine Pit*	Mine Service Complex	6.9
	Preparation Plant	23.3

*Mesa and Wolverine Pits are listed to provide a reference to current travel distances.

1.3.3 Physiography

Both the Transfer and Grizzly Areas are located below tree line in sparsely merchantable stands of Spruce and Pine with Cottonwood and Poplar. The Gething Area is located above tree line in a sub-alpine environment. The range in elevation for each area is as follows:

Transfer Area
Maximum and Minimum Elevations Above Sea Level

Area	Maximum Elevation (m)	Minimum Elevation (m)
Transfer	1650	850
Grizzly	1150	850
Gething	1650	1450

The drainage patterns and natural topographic slopes peripheral to each area in which future waste dumps will be considered are illustrated schematically in Figure 1.3.6. A summary of each "Slope Study Area" is listed as follows:

TRANSFER AREA NATURAL TOPOGRAPHIC SLOPE STUDY (PERCENTAGE OF PLAN AREA)				
NATURAL SLOPE (DEGREES)	GETHING (%)	TRANSFER (%)	GRIZZLY (%)	CATEGORY
0 to 10	17.11	31.22	18.72	Gentle
10 to 20	35.62	44.91	43.92	Moderate
20 to 30	34.54	19.42	26.63	Steep
30 to 90	12.73	4.45	10.73	Very Steep
	100	100	100	

More detailed maps of the slope study are provided in Appendix 1.1

1.4 COAL LICENCES

The location of coal licences covering the Transfer Area is illustrated in Figure 1.4.1. As development of the licences progresses, an application for a coal lease will be made to establish tenure required for mine development. A preliminary list of those licences likely to be included in this application are presented as follows:

Licence Number*	Area (ha)	Licence No.	Area (ha)
3618	297	7845	75
3660	297	3339	223
7849	297	3343	297
7848	297	3336	297
7847	297	3335	297
3346	297		
3662	297	TOTAL	3864
3661	149		

* Legal Description of the licences is presented in Appendix 1.2

1.5 EXPLORATION HISTORY

A summary of key exploration activity undertaken in the Transfer Area to the end of the 1986 field season is presented in Table 1.5.1.

1.5.1 Exploration Programmes Prior to 1986

Regional scale or geological mapping (1:5000) aided by aerial photograph interpretation was the only form of geological assessment undertaken in the Transfer Area prior to 1976 when the first three helicopter supported diamond drill holes were completed (QJD 7641, 7642, 7643.). The next phase of work involved the completion of 1 rotary drill hole (QJR8001) in 1980 to test Gates Member coal thickness in the remnant syncline structure referred to as the Hermann Syncline (see attached Figure 1.5.1). This structure had been accessed during the fall of 1980 when Nabors Drilling Limited completed a gas well (B.P. ET Al MURRAY d-83-J-93-I-14) for British Petroleum through the structure in encountering a potentially productive gas bearing horizon well below the coal measures. During 1982, six rotary drill holes (QHR8201-8206) were completed, on the forenoted well site access road, to test coal bearing thickness of both the Hermann Syncline as well as the Hermann North area where a steeply dipping Gates section extends south easterly from the Marmot subpit in the Mesa Mine. Results of this programme led to the completion of 5 rotary drill holes QHR8301-8305 in 1983 plus access road construction and detailed geological mapping at 1:2500 scale, in Hermann North. In 1984, a further 12 rotary holes and trenching were undertaken in the Hermann Syncline plus 6 rotary holes and 3 diamond holes in Hermann North. This season also saw the completion of 6 rotary holes in the Gething Area and the first rotary (6) and diamond (1) holes in the Hermann South area which is now referred to as the Grizzly Area. In 1985 limited mapping and the first 2 diamond drill holes were placed in the Transfer Anticline.

1.5.2 1986 Exploration Programme

The primary objectives of the 1986 exploration programme were:

(1) To complete detailed geological mapping of all naturally exposed outcrop as well as outcrop exposed by access route and trench construction.

(2) To complete sufficient diamond and rotary drilling to supplement the above noted mapping such that a preliminary determination of resources could be made within approximate pit limits (unscheduled mine area).

1.5.3 Project Management and Primary Contractors

Project Management

All exploration activity, planning, interpretation and report compilation has been managed by the Long Range section of Quintette Coal's Technical Services Department. Assistance in the field and office during 1985 and 1986 has been provided by the geological staff of Mitsui Mining Overseas Company. Staff involved in the preparation of this report are listed as follows:

Quintette Coal Limited Staff

H. Bartle	Geologist
G. P. Gormley	Chief Mine Geologist, Denision Mines
G. Holmlund	Geological Technician
W. R. Leeder	Manager of Product Services, Denison Mines
L. Pendleton	Geological Technician
P. Roussy	Geological Technician
P. Taylor	Geological Technician
Y. Tainaka	Geologist
K. Vandenameele	Draftsperson
B. Wong	Geological Engineer

Mitsui Mining Overseas Company Limited

I. Kakizaki	Chief Geologist
H. Wada	Geologist

Primary Contractors

Table 1.5.2 lists all contractors involved in the most significant aspects of exploration since the commencement of field activity in 1976.

1.5.4 Standards and Procedures

1.5.4.1 Geophysical Logging

Rotary and diamond drill holes have been logged by down hole geophysical methods since the commencement of drilling in 1976. However, in some instances, the caving of drill holes has either prevented the completion of geophysical logs or required the holes to be logged through the drill stem. The types of geophysical logs completed include the following:

1. Gamma
2. Neutron
3. Density
4. Caliper
5. Deviation

All mining section thickness data points used in the resource calculation from rotary drill holes were taken directly from geophysical logs and corrected for seam dip from local structural interpretation. In the case of diamond drill holes, the geophysical logs were used to confirm missing intervals within the mining sections, and as an overall apparent thickness subsequent to dip corrections made from actual core measurements. Copies of all geophysical logs are available in the administration building of Quintette Coal Limited.

1.5.4.2 Rotary Drilling

The contract rotary drill companies have drilled only vertical holes with both down hole hammer and conventional reverse circulation equipment. Through past experience, it has been found that rotary sampling <u>does not</u> provide representative samples of the coal seams because of contamination inherent in the drilling procedure. In some instances however, where near surface intersections have been made, samples normally taken at one meter intervals have been used to provide an indication of seam oxidation through Free Swelling Index tests.

1.5.4.3 Diamond Drilling

Diamond drilling contractors have mostly drilled vertical holes of H.Q. core size (64 mm diameter) using conventional wireline recovery equipment. Each drill hole was geophysically logged followed by detailed visual core descriptions and complete sampling of all mineable coal sections. Approximately 5 kilograms of coal sample was taken from each metre of mineable section and sent to "off site" laboratories for washability and related analyses as described in the following section.

The graphical presentation of all core holes is provided in correlation charts found in Section 2.0

1.5.4.4 Drill Core Analysis

Drill core samples of the mining sections in which +80% core recovery has been achieved normally provide the primary data points for the assessment of in-place ash content, washability yield predictions, and other physical and chemical tests. Normal procedures involve the segregation of any selected mining section into various sample components associated with in-seam rock partings. These samples are then combined into a single sample representing the actual section to be mined. In some instances, it is necessary to substitute equivalent components from other seams due to poor core recovery. Flow diagrams relating the types of laboratory work undertaken on the Transfer Area drill core are presented on Figures 1.5.2 and 1.5.3. Detailed sampling descriptions and test results from the drill core sampling are presented in Appendix 2.

1.5.4.5 Cartography and Survey Control

At present the topographic map coverage for the Transfer Area has been derived by enlarging the "regional" 1:5000 sheets (with 5 metre contour) to a 1:2500 horizontal scale. The "regional" topographic coverage was completed by Burnet Resource Surveys Ltd. using photography taken on September 6th, 1975 from which cartography was completed May 19, 1976. Primary survey control used in the regional work is referenced as follows:

SURVEY NOTE

> The Horizontal and Vertical Co-ordinates were established by Burnett Resource Surveys Ltd. under the supervision of D.C. Zelmer, P. Eng. and H.F.H. Neumann, M.L.S., S.L.S., using MRA3 Tellurometers, Hewitt-Packard Distance Meter and DKM2A Thoedolites. Horizontal Co-ordinates are derived from Trig. Station 2494 Lat.55°03'54.000"Long.121°05'43.150" which is within the same trig. network as Quintette E.(2374). Lat. 54°51'30.330" Long.120°52'38.310". Elevations are above Mean Sea Level and derived from Trig. Station 2494, elev.=1357.3m and were established by trig. levelling, vertical angles being read at both ends of each course simultaneously. The field survey was made between 1973 and 1976."

It was acknowledged at the start of the 1986 field season that new 1:2500-2 metre contour mapping and the required additional survey control would be necessary to support detailed mine planning and related development as is the case in Quintette's three operating areas, Mesa, Wolverine and Shikano. Considering the early stage of resource quantification it was decided to use enlarged regional mapping for 1986 and to utilize both access routes and drill sites to provide the majority of control points required to complete the new mapping early in 1987.

The 1986 field survey was completed exclusively by Stables and Associates of Dawson Creek, British Columbia. A series of "geological survey control points" were established prior to field mapping to facilitate the "tie-in" of geological field traverses. All drill holes and trench sites were also surveyed during the program. A listing of survey coordinates and details of the survey traverses and control used for these primary points is provided in Appendix 1.3.

1.5.4.6 Geological Mapping

Prior to 1986, only regional scale geological mapping (1:5000) supported by air photo interpretation was available in the Grizzly, Transfer and Gething Areas. One of the objectives of the 1986 Exploration Programme was to map outcrops in the areas of immediate interest as well as those outcrops created during road and trench construction. This objective was accomplished using a modified plane table system controlled by pre-surveyed reference points. The results of this work are included in the geological maps presented for each area in Section 2.0.

1.6 FUTURE DEVELOPMENT SCHEDULE

Geological Exploration/Development and Related Activity

It is anticipated that two more phases of exploration/development will be required to support the ultimate decision to proceed with mining in the Transfer Area. Primary objectives of the 1987 programmes will be to:

1. Obtain <u>bulk</u> samples from test adits driven in the mineable coal seams to further assess washability and to undertake pilot scale carbonization tests.

2. Undertake in-fill drilling to confirm seam continuity throughout each deposit.

3. Confirm the extent of overburden in the south eastern portion (Murray River Valley) of the Grizzly deposit.

In 1988, a small drilling programme will likely be required to confirm any areas where structural interpretation may be weak within the mine plan area.

Mine Planning and Governmental Approvals

A preliminary assessment of the possible mining areas, production levels, waste dumps and primary haulage route accessing the deposits is underway at the present time the results of which it is hoped will support a "Prospectus for mining". Geotechnical, hydrological and environmental field studies will be implemented this year in concert with the exploration programme. The first detailed mine plan will be developed subsequent to the evaluation of the 1987 geological data and preferred routing and infrastructure selected. These studies would support a "Stage 1" submission to the Government of British Columbia. This mine plan will also confirm any additional geological, geotechnical and environmental requirement necessary to obtain Government approvals, which, when met, will result in the submission of a "Stage 2" report thereafter. A tentative development schedule is depicted in Figure 1.5.4.

Table 1.5.1

QUINTETTE COAL LIMITED
HISTORY OF PRIMARY EXPLORATION ACTIVITY
TRANSFER AREA
1976 - 1986

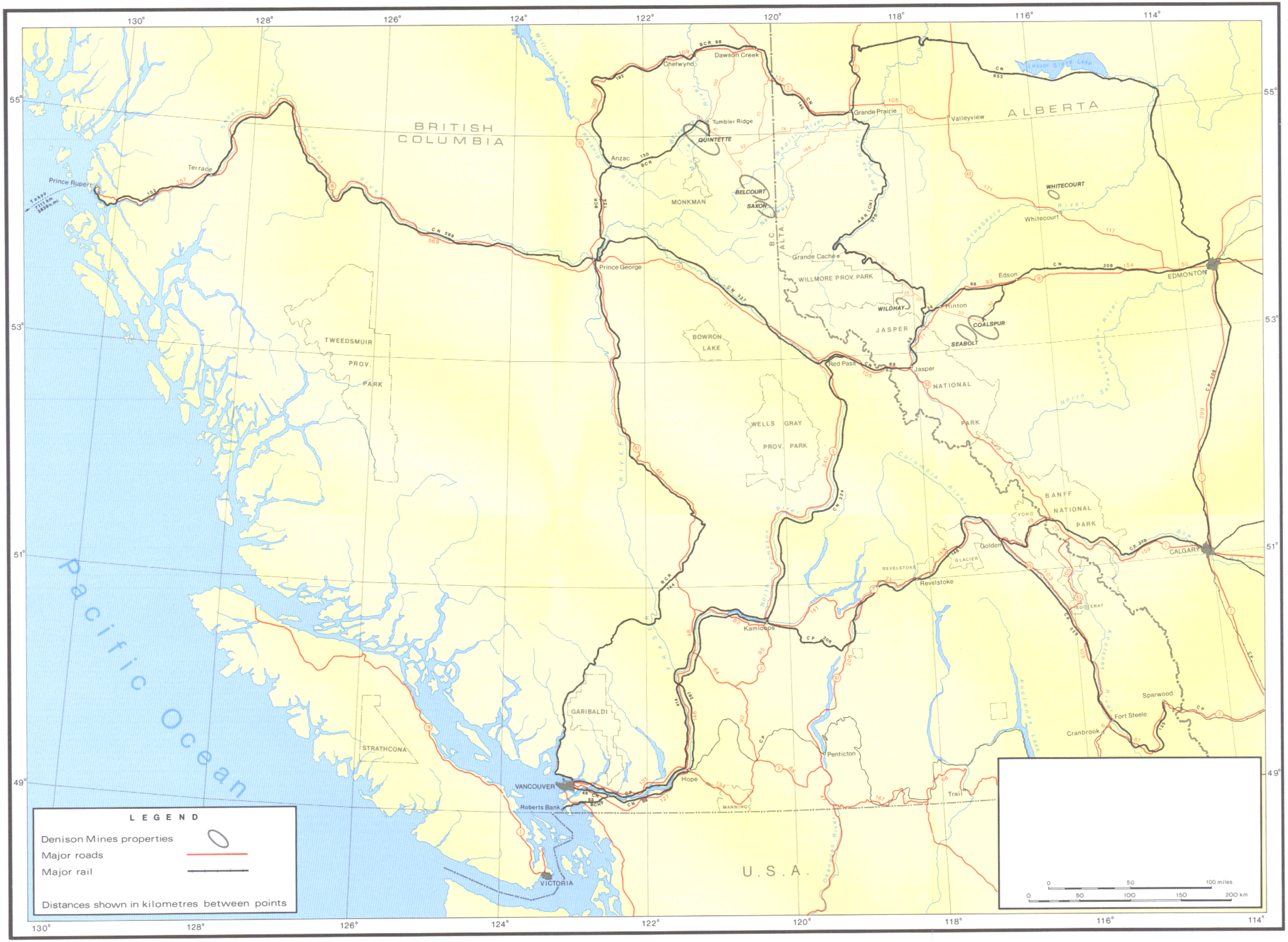
		Rotary Drilling		Diamond Drilling		Road Construction
Location	Year	Number of Holes Completed	Metres of Drilling	Number of Holes Completed	Metres of Drilling	Kilometres of Access
Hermann Syncline	1980	1	124	----	----	----
	1982	4	259	----	----	----
	1984	12	560	----	----	.5
	TOTAL	17	943	----	----	.5
Gething	1976	----	---	1	183	----
	1984	6	241	----	----	1.8
	1986	37	3,360	1	81	4.0
	TOTAL	43	3,601	2	264	5.8
Hermann North	1982	2	131	----	----	----
	1983	5	773	----	----	1.3
	1984	6	509	3	573	1.1
	TOTAL	13	1,413	3	573	2.4
Grizzly (Formerly Hermann South)	1983	1	211	----	----	----
	1984	6	686	1	110	1.5
	1986	---	---	2	268	1.5
	TOTAL	7	897	3	378	3.0
Transfer	1985	---	---	2	302	----
	1986	---	---	6	952	6.1
	TOTAL	---	---	8	1,254	6.1
	GRAND TOTAL	80	6,854	16	2,469	17.8

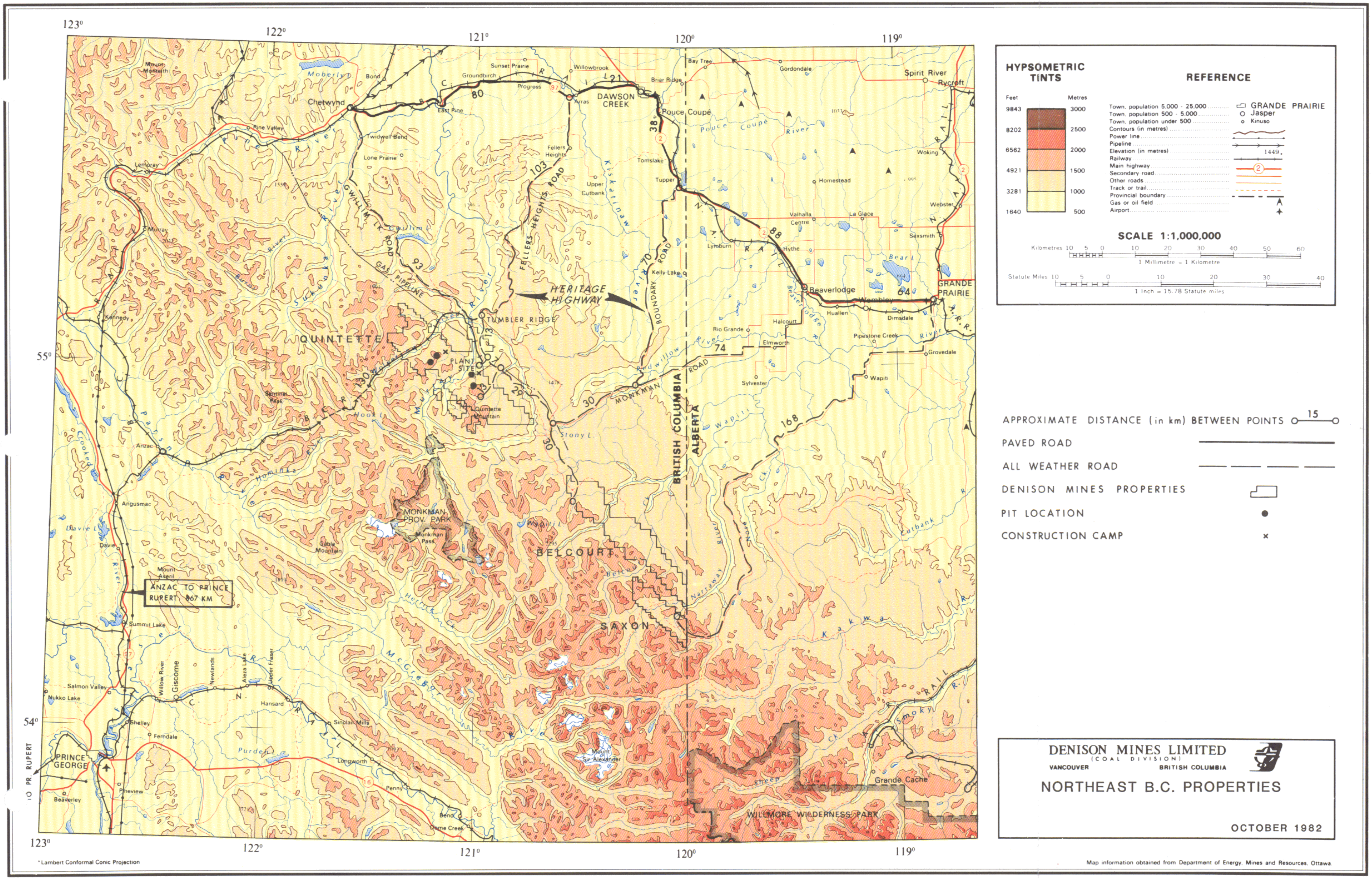
QUINTETTE

Table 1.5.2

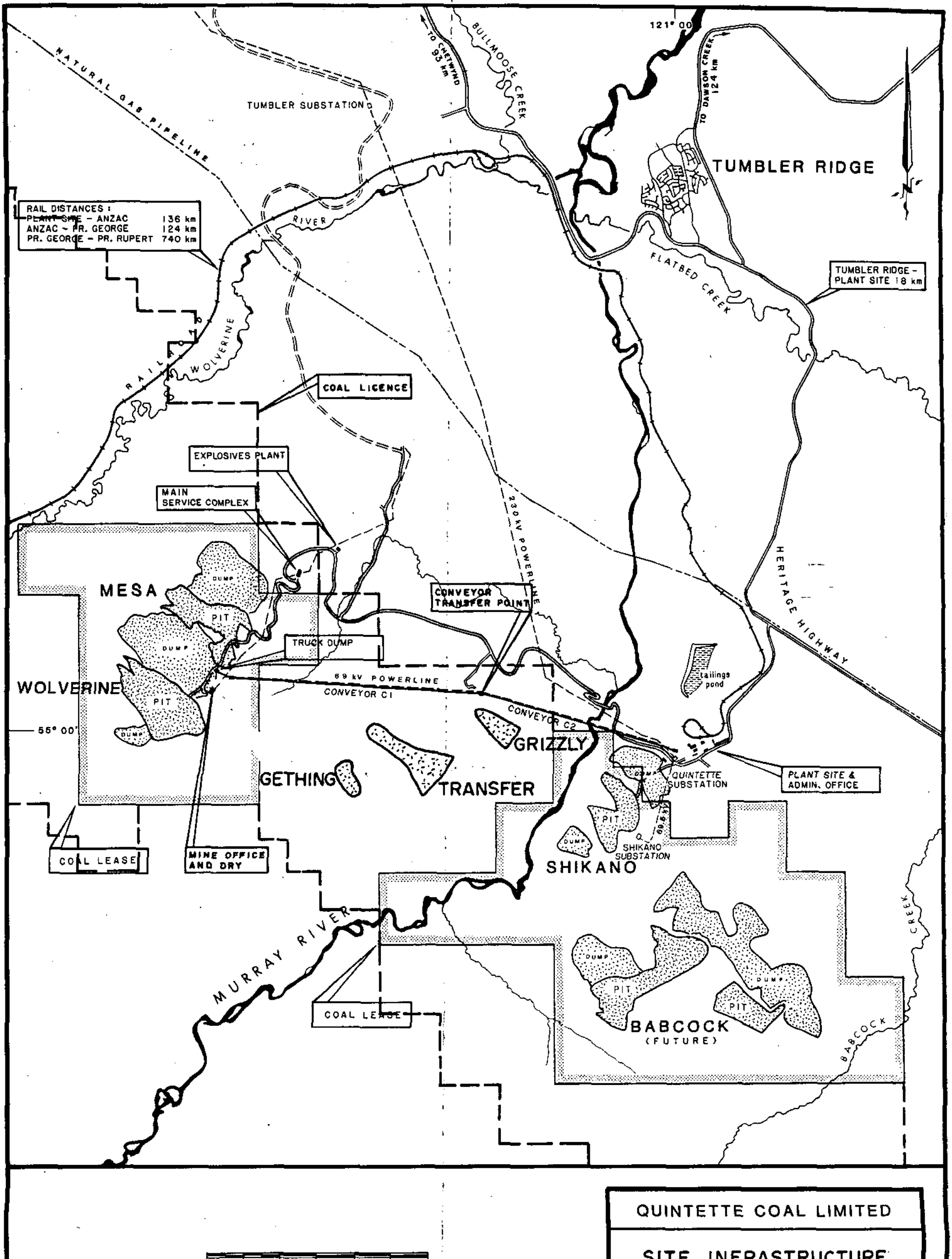
QUINTETTE COAL LIMITED
PRIMARY EXPLORATION CONTRACTORS
TRANSFER AREA
1976 - 1986

NATURE OF ACTIVITY	COMPANY	YEAR OF WORK
Road and Drill Site Construction	Lee's Ventures Ltd.	1982
	Quintette Coal Ltd.	1983
	Loiselle Contracting Ltd.	1984,1986
	Murray River Construction Ltd.	1986
Diamond Drilling	Tonto Drilling Ltd.	1976
	Acadia Drilling Ltd.	1984
	Canadian Longyear Ltd.	1985,1986
Rotary Drilling	Bertram Drilling Ltd.	1980
	Northern Wireline Coring and Grouting Ltd.	1982
	S.D.S. Drilling Ltd.	1983,1984,1986
Surveying	D. Watson & Associates	1976
	Quintette Coal Limited	1982,1983
	McElhanney Group Ltd.	1984
	Stables, Tryon and Associates	1986
Geophysical Logging	Roke Oil Enterprises	1976,1980,1982
	Quintette Coal Ltd.	1982,1983,1984
	B.P.B. Instruments Ltd.	1985,1986
Laboratory Analysis	Cyclone Engineering Sales Ltd.	1976,1985,1986
	Quintette Coal Limited	1982,1983
	General Testing Laboratories	1982,1984


BRITISH COLUMBIA
ALBERTA
Pacific Ocean
U.S.A.
Prince Rupert
Terrace
Prince George
Chetwynd
Dawson Creek
Tumbler Ridge
Anzac
Grande Prairie
Valleyview
Whitecourt
EDMONTON
Edson
Hinton
Jasper
Grande Cache
Red Pass
Kamloops
Revelstoke
Golden
CALGARY
Hope
VANCOUVER
Roberts Bank
VICTORIA
Penticton
Trail
Cranbrook
Fort Steele
Sparwood
QUINTETTE
BELCOURT
SAXON
MONKMAN
WHITECOURT
WILDHAY
COALSPUR
SEABOLT
TWEEDSMUIR PROV. PARK
BOWRON LAKE
WELLS GRAY PROV. PARK
WILLMORE PROV. PARK
JASPER NATIONAL PARK
BANFF NATIONAL PARK
GARIBALDI
STRATHCONA
LEGEND
Denison Mines properties
Major roads
Major rail
Distances shown in kilometres between points
100 miles
200 km



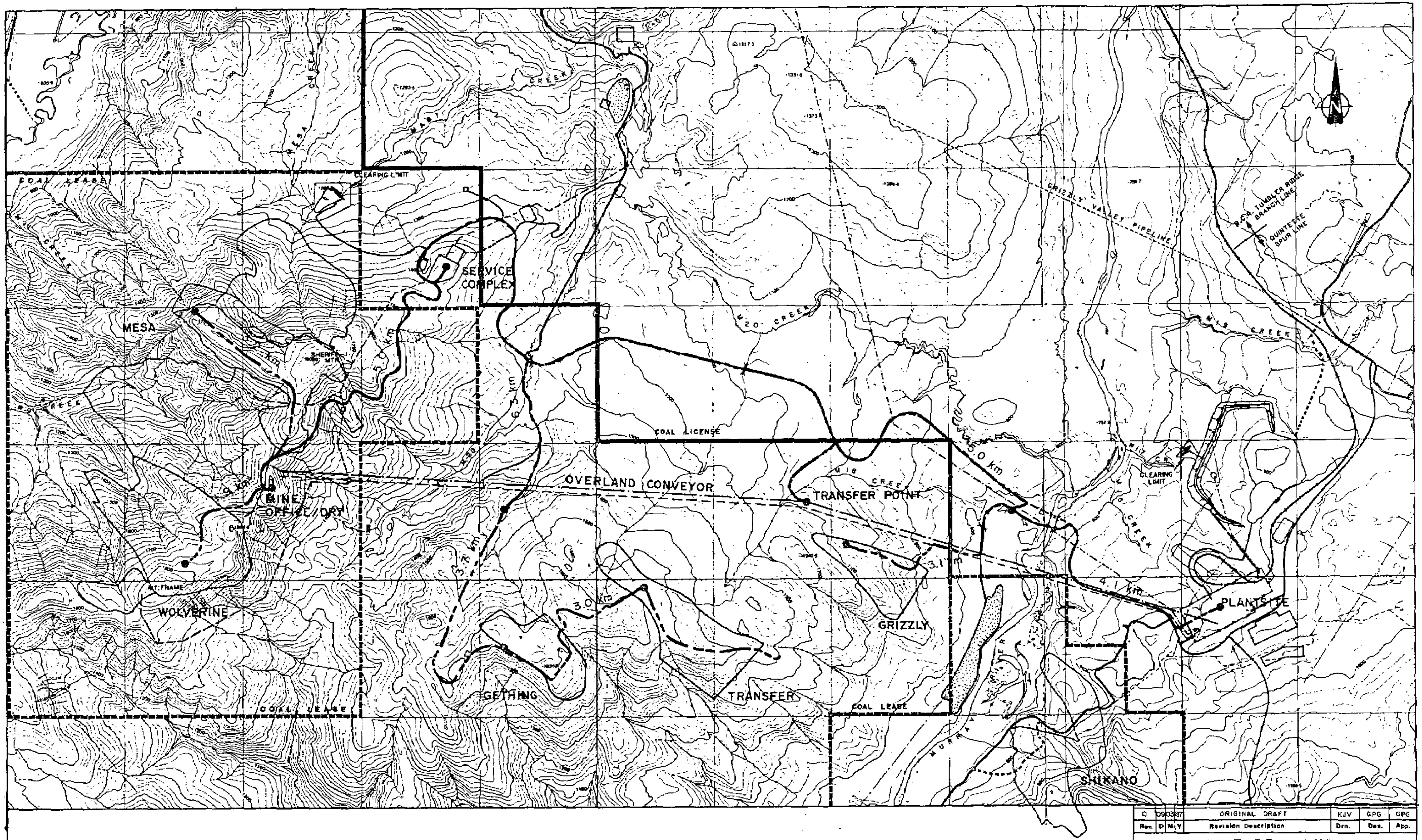
HYPSOMETRIC TINTS
Feet
Metres
9843
8202
6562
4921
3281
1640
3000
2500
2000
1500
1000
500
REFERENCE
Town, population 5,000 - 25,000
Town, population 500 - 5,000
Town, population under 500
Contours (in metres)
Power line
Pipeline
Elevation (in metres)
Railway
Main highway
Secondary road
Other roads
Track or trail
Provincial boundary
Gas or oil field
Airport
GRANDE PRAIRIE
Jasper
Kinuso
1449
SCALE 1:1,000,000
Kilometres 10 5 0 10 20 30 40 50 60
1 Millimetre = 1 Kilometre
Statute Miles 10 5 0 10 20 30 40
1 Inch = 15.78 Statute miles
APPROXIMATE DISTANCE (in km) BETWEEN POINTS
15
PAVED ROAD
ALL WEATHER ROAD
DENISON MINES PROPERTIES
PIT LOCATION
CONSTRUCTION CAMP
DENISON MINES LIMITED
(COAL DIVISION)
VANCOUVER
BRITISH COLUMBIA
NORTHEAST B.C. PROPERTIES
OCTOBER 1982
123°
122°
121°
120°
119°
55°
54°
Chetwynd
DAWSON CREEK
Pouce Coupe
Spirit River
Rycroft
GRANDE PRAIRIE
Beaverlodge
Wembley
TUMBLER RIDGE
QUINTETTE
PLANT SITE
Quintette Mountain
HERITAGE HIGHWAY
MONKMAN PROV. PARK
Monkman Pass
BELCOURT
SAXON
BRITISH COLUMBIA
ALBERTA
MONKMAN ROAD
BOUNDARY ROAD
FELLERS HEIGHTS ROAD
GWILLIM LK ROAD
GAS PIPELINE
ANZAC TO PRINCE RUPERT 867 KM
PRINCE GEORGE
TO PR. RUPERT
Mount Sir Alexander
WILLMORE WILDERNESS PARK
Grande Cache
Hudson's Hope
Moberly L.
Pine River
Murray River
Sukunka
Wapiti River
Kakwa
Smoky R.
Fraser River
McGregor River
Parsnip River
Crooked River
Anzac
Kennedy
Angusmac
Davie
Summit Lake
Salmon Valley
Nukko Lake
Shelley
Ferndale
Giscome
Willow River
Newlands
Hansard
Sinclair Mills
Longworth
Penny
Bend
Dome Creek
Purden L.
Pineview
Beaverley
Mount Averil
Gable Mountain
Sentinel Peak
Stony L.
East Pine
Groundbirch
Progress
Arras
Sunset Prairie
Willowbrook
Briar Ridge
Bay Tree
Gordondale
Tomslake
Tupper
Fellers Heights
Upper Cutbank
Kelly Lake
Twidwell Bend
Lone Prairie
Pine Valley
Lemoray
Mount Monteith
Bond
Homestead
Woking
Webster
Sexsmith
Valhalla Centre
La Glace
Lymburn
Hythe
Hualien
Dimsdale
Rio Grande
Halcourt
Elmworth
Pipestone Creek
Grovedale
Sylvester
Wapiti
Bear L.
Redwillow River
Narraway River
Cutbank
Sheep
Lambert Conformal Conic Projection
Map information obtained from Department of Energy, Mines and Resources, Ottawa.



QUINTETTE COAL LIMITED

SITE INFRASTRUCTURE

FIGURE 1.33



0	090387	ORIGINAL DRAFT	KJV	GPG	GPG
Rev.	D M Y	Revision Description	Drn.	Des.	App.

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area

Category

Drawing Title

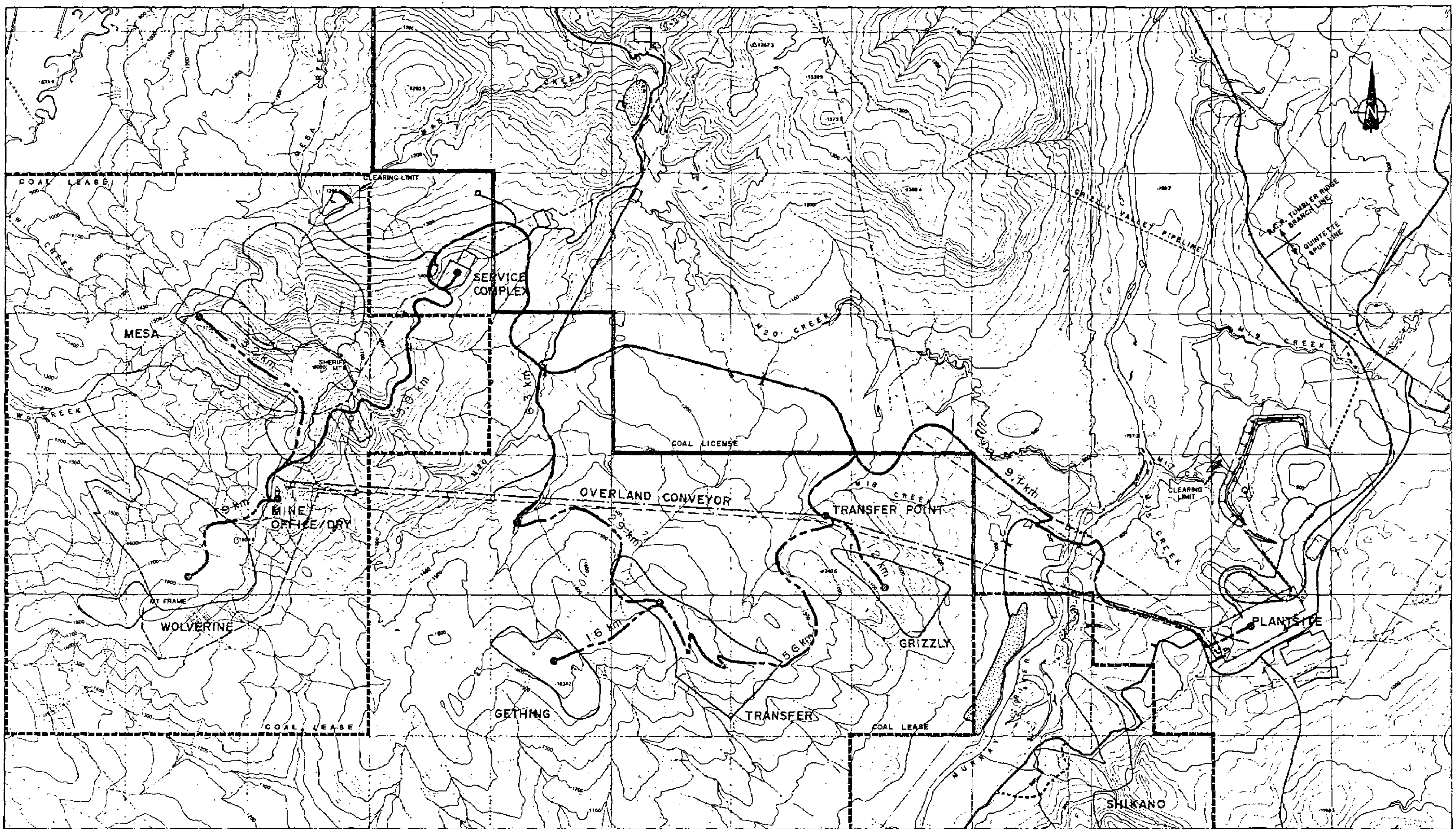
TRANSFER AREA

CURRENT ROAD ACCESS
ROUTES AND DISTANCES

Scale

Drawing No.
FIGURE 1.3.4

Rev.
0



Rev.	D M Y	Revision Description	Drn.	Des.	App.
0	09 03 87	ORIGINAL DRAFT	KJV	GPG	GPG

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

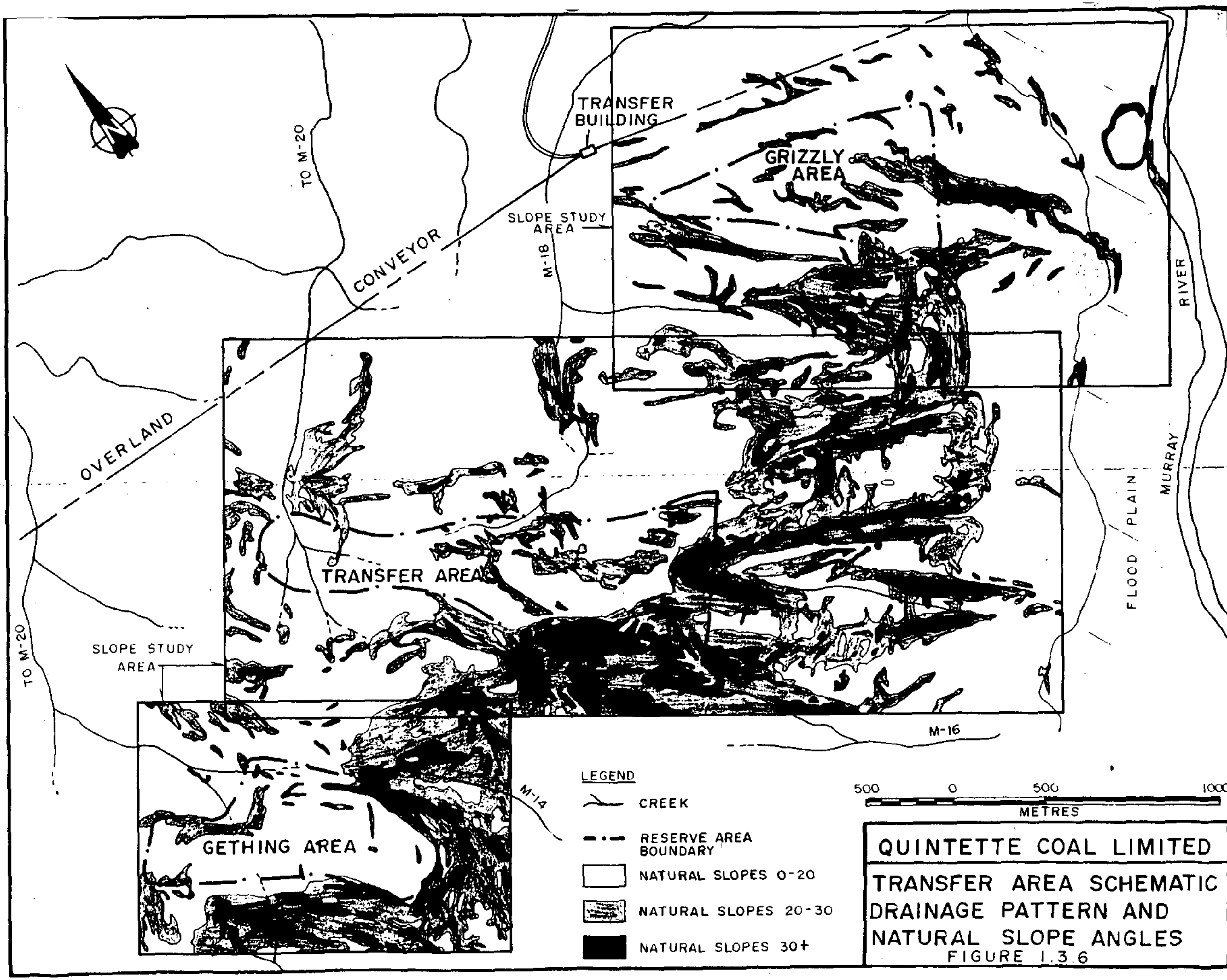
Area | Category

Drawing Title

TRANSFER AREA

FUTURE ROAD ACCESS ROUTES AND DISTANCES

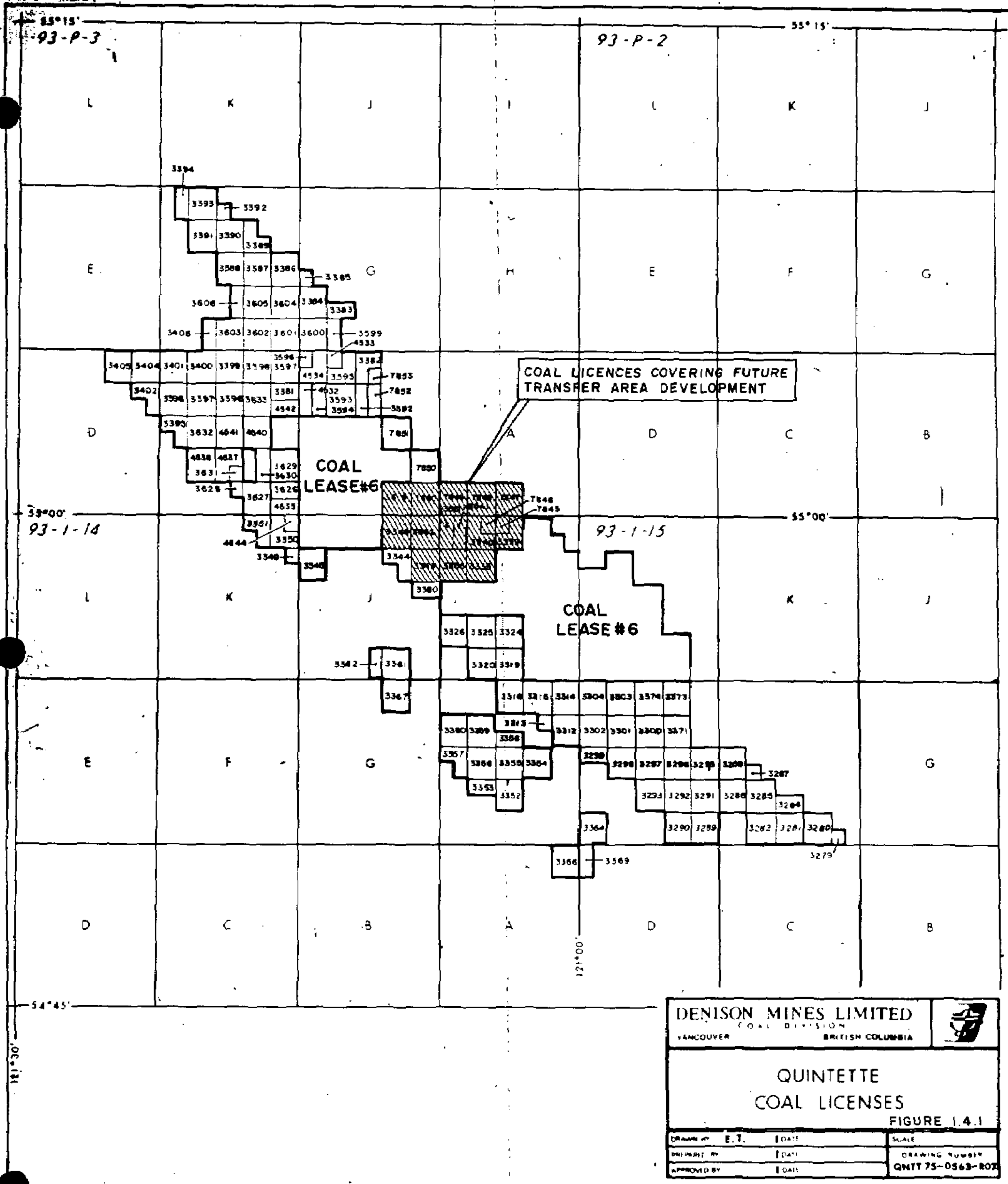
Scale | Drawing No. FIGURE 1.3.5 | Rev. 0



QUINTETTE COAL LIMITED

TRANSFER AREA SCHEMATIC DRAINAGE PATTERN AND NATURAL SLOPE ANGLES

FIGURE 1.3.6

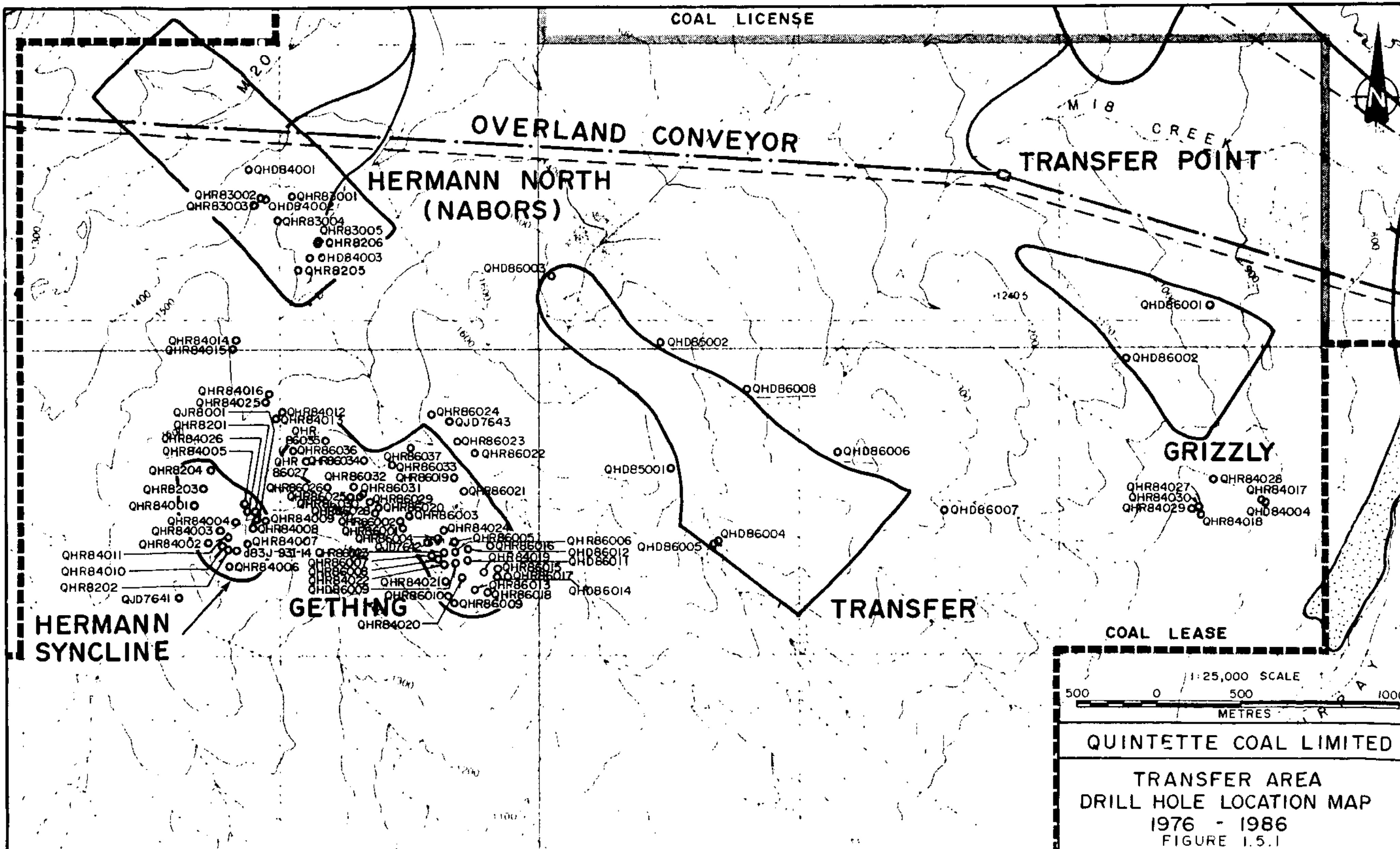


DENISON MINES LIMITED
COAL DIVISION
VANCOUVER BRITISH COLUMBIA

QUINTETTE COAL LICENSES

FIGURE 1.4.1

DRAWN BY E.T.	DATE		SCALE
PREPARED BY	DATE		DRAWING NUMBER
APPROVED BY	DATE		QNTT 75-0563-R07



QUINTETTE COAL LIMITED

TRANSFER AREA
DRILL HOLE LOCATION MAP
1976 - 1986
FIGURE 1.5.1

QUINTETTE COAL LIMITED

1984 DRILL CORE ANALYSIS FLOW DIAGRAM

(+40% Core Recovery)

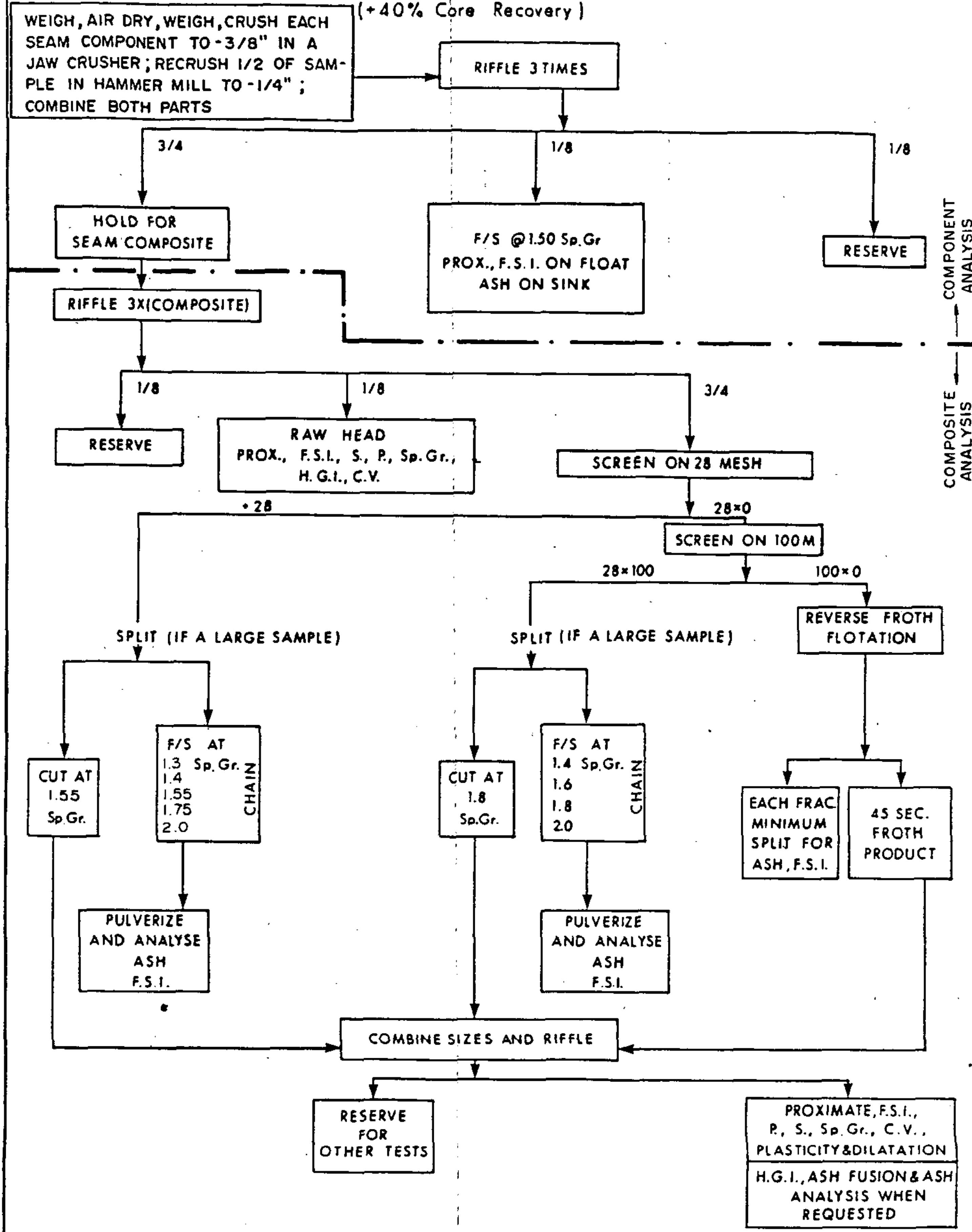


FIGURE 1.5.2

QUINTETTE COAL LIMITED

1985/86 DRILL CORE ANALYSIS FLOW DIAGRAM

(+40% Core Recovery)

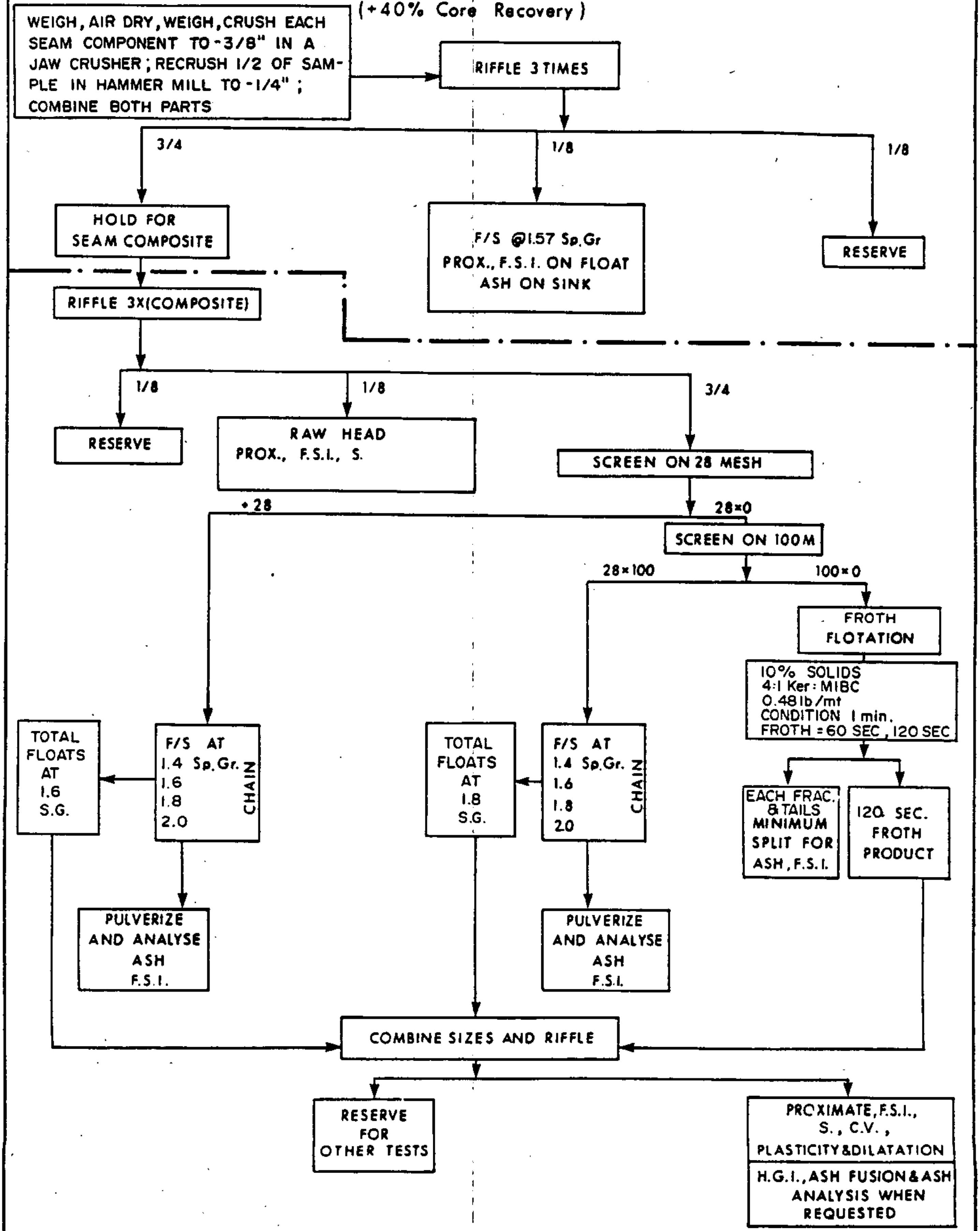


FIGURE 1.5.3

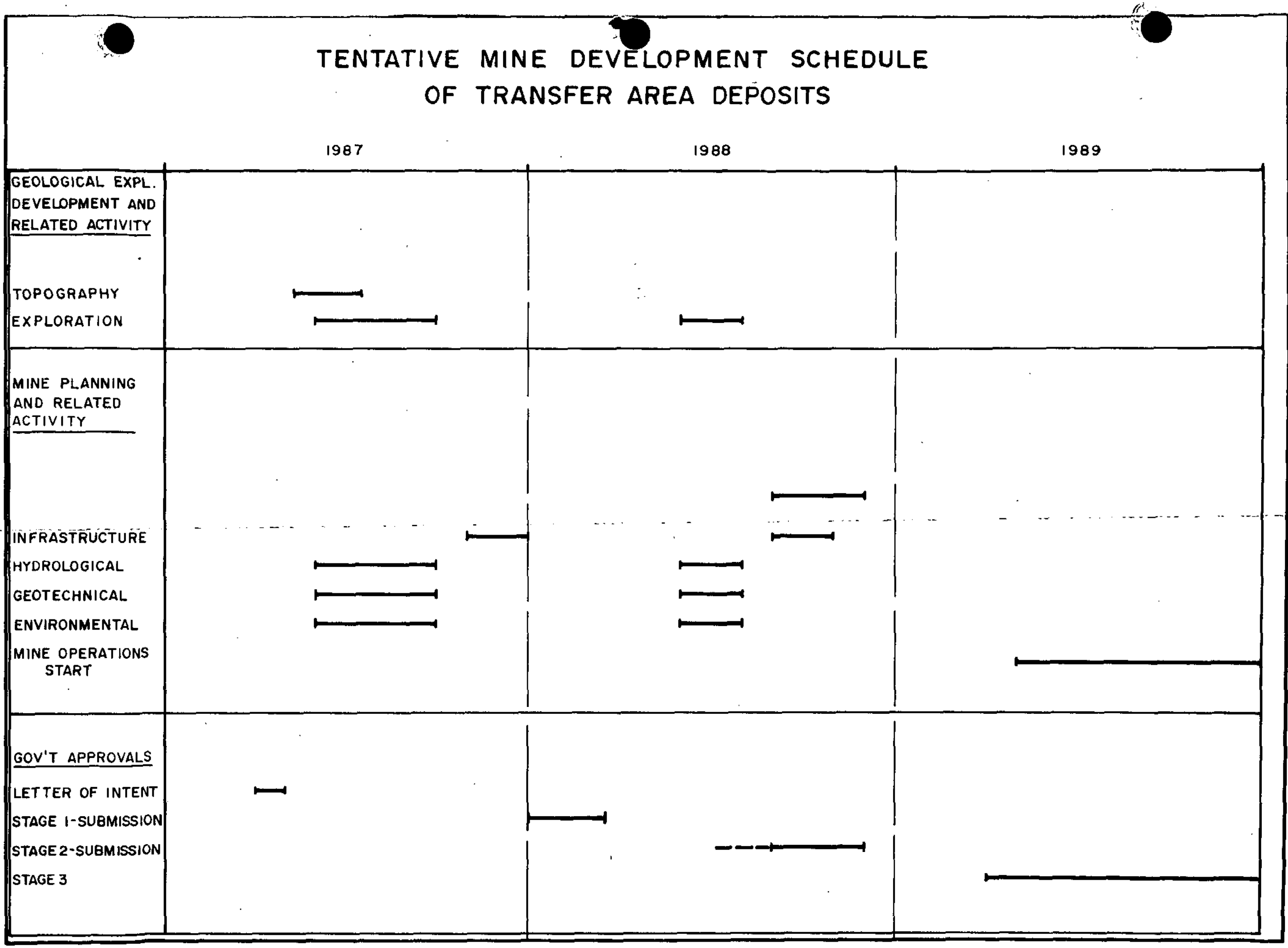

TENTATIVE MINE DEVELOPMENT SCHEDULE
OF TRANSFER AREA DEPOSITS
1987
1988
1989
GEOLOGICAL EXPL. DEVELOPMENT AND RELATED ACTIVITY
TOPOGRAPHY
EXPLORATION
MINE PLANNING AND RELATED ACTIVITY
INFRASTRUCTURE
HYDROLOGICAL
GEOTECHNICAL
ENVIRONMENTAL
MINE OPERATIONS START
GOV'T APPROVALS
LETTER OF INTENT
STAGE 1-SUBMISSION
STAGE 2-SUBMISSION
STAGE 3

FIGURE 1.5.4

2.0 STRATIGRAPHY AND STRUCTURE

2.1 REGIONAL STRATIGRAPHY

The stratigraphic succession exposed on the Quintette property ranges from Upper Jurassic to Lower Cretaceous in age. It consists of inter-tonguing shales and sands of both marine and continental origin. The table of formations for the area is outlined in Figure 2.1 and indicates general formation thickness ranges and coal zones as encountered over 16 years of exploration. The coal seams of economic thickness and quality are found in the Gates and Gething Formations. The regional distribution of these formations is illustrated in Figures 2.2 and 2.3.

2.2 LOCAL STRATIGRAPHY

2.2.1 Transfer Anticline Stratigraphy

The Transfer Area is underlain by the Boulder Creek Formation, the Hulcross Formation, and the economically coal-bearing Gates Formation. The Transfer geology map (Figure 87-903-20-001 Sheets 1 & 2) and correlation charts (Figures 86-903-26-003 & 004) illustrate the distribution of these stratigraphic units and the outcrop of the coal seams.

Boulder Creek Formation

The Boulder Creek Formation, the uppermost unit exposed in the Transfer Area, is distributed in the northeast limb of the Transfer Anticline and in the west corner of the area. This formation consists mainly of massive sandstone and conglomerate with minor shale and thin inferior coal seams, and is known as a ridge forming formation in this region. In the Transfer Area a ridge, formed by the lower part of the Boulder Creek Formation, is dominant and is easily traced both in the field and on the map. The formation thickness is estimated at approximately 130 metres.

Hulcross Formation

The Hulcross Formation is conformably overlain by the Boulder Creek Formation, and is composed mostly of medium to dark grey shale with laminations of siltstone and thin beds of bentonite. Within the top and bottom 5 metres of the formation, siltstone is dominant with interbeds of shale. Along the access road from the Gething to the Transfer Area provides good continuous exposures of the Hulcross Formation. The base of the formation is marked by a thin bed of pebbly conglomerate or coarse sandstone. The formation thickness is about 90 metres.

Gates Formation

The Gates Formation contains the economic coal seams in this area, and is widely distributed in both limbs of the Transfer Anticline. The formation can be divided into three members. These are termed the Upper, Middle and Lower. Though each of the members contains coal, seam thickness of economic interest occur only in the Middle Gates Member. The total thickness of the formation is 260 metres.

(i) Upper Gates Member

The Upper Gates Member is defined from the bottom of the Hulcross Formation to the bottom of the conglomerate just above D seam. The upper half of the member is made up mainly of shale, with sandstone beds and coal zones. In other areas of the property, usually three coal zones designated as A, B, and C seams are found in this upper portion, but these are "uneconomical" because of their thin inconsistent development. In the Transfer Area, as well as other areas, three coal or carbonaceous zones are presented in this portion. Two of them (A and C), however, are poorly developed only to be seen as carbonaceous shale. The thickness of B seam is 0.88 metres with no parting (QHD 85002).

In the lower half of the member, very fine and fine sandstone are predominant with subordinate amounts of shale and siltstone.

At the middle of this portion a tuffaceous horizon is recongized, which is used as a good marker for stratigraphic correlation. The conglomerate at the bottom of the member is stratigraphically equivalent to the so called "caprock" in the Mesa, Wolverine, and Shikano pits. The thickness of the conglomerate is relatively thin compared to other areas and ranges from 2.75 metres in the southwest of the area (QHD 86005) to less than 1 metre (0.95 - 0.15) in the rest of the area. The Upper Gates Member is approximately 75 metres thick.

(ii) Middle Gates Member

The lower limit of the Middle Gates Member is marked by the floor of K2 seam. The member contains six coal seams (D, E, F, G, J and K in descending order), these seams are directly correlated to the coal seams at the Shikano Pit. (See Fig. 2.3). Only the last four coal seams, however, should be termed "mineable" in the Transfer Area, because D and E seams have poorly developed thickness and quality, abruptly changing from hole to hole.

Interseam strata is composed mainly of shale with minor sandstone and siltstone, or of alternating beds of shale and sandstone. In some places, discontinuous channel sandstone are found at different horizons creating variations in interseam thickness (ie; between D and E in QHD 86003, and F and G in QHD 86008). The thickness ranges and general lithologies of the interseam strata are summaried on Table 2.1. The Middle Gates Member ranges in thickness from 98 to 105 metres.

(iii) Lower Gates Member

The boundary between the Lower Gates Member and underlying Moosebar Formation is the bottom of a light or pale greenish massive sandstone, below which finer facies such as shale and siltstone are predominant (Moosebar Formation). The upper part of the Member consists of fine to medium sandstone with minor shale. The lower part of this member is made up of alternating beds of sandstone, siltstone and shale. One thin coal seam designated as L seam is found in this section. The thickness of the Lower Gates Member is approximately 95 metres.

2.2.2 GRIZZLY STRATIGRAPHY

The stratigraphy underlying the Grizzly Area is identical to that of the Transfer Area. That is, the Boulder Creek, Hulcross, Gates, and Moosebar Formations in descending order. Four coal seams of mining interest, F, G, J and K seams, are found in the Middle Gates Member. Basically, the development of the Middle Gates Member is the same as that of the Transfer Area, with the following being primary differences:

i) a thick conglomerate and sandstone bed ranging from 21 to 25 metres is present between F and G seams, and the interval between these two seams is thicker than that of the Transfer area.

ii) the interseam thickness between J and K1 is relatively thin (0.38 - 0.58 metres) for most of the area.

iii) the interval between K1 and k2 is thick (3.0 - 3.7 metres) compared to that of the Transfer area.

The thickness ranges and general lithologies of the interseam strata are summarized on Table 2.2. The distribution of the various stratigraphic units is also illustrated on the Grizzly Geology Map Fig. 86-905-30-001 and the correlation charts previously noted.

2.2.3 Gething Stratigraphy

The Gething area is underlain by the Gething Formation, which is stratigraphically located about 180 meters below the Middle Gates Member. In this region, it is known that the Gething Formation contains economical coal seams at several horizons, the most prominent being termed in descending order as Bird, Skeeter and Chamberlain. The formation can be divided into two sections designated as the Upper and Lower. The thickness of the formation has not been confirmed in this area, however, judging from a core hole drilled in a nearby area, (QHD86010) it is considered that the Gething Formation is at least 280 meters in thickness. (See Gething Area General Correlation Drawing No. 86-605-26-002).

(i) Upper

THe upper Gething is defined from the bottom of a thin glauconitic sandstsone at the base of the Moosebar Formation to the bottom of a thin glauconitic sandstone conglomerate bed just above GT1 seam. The upper section is composed mainly of conglomerate and sandstone with shale and coal. At the top of this portion, a coal seam designated as the Bird seam is exposed in the northeast end of the area. It's thickness and the extent of it's distribution have not yet been well defined because of structural complexity. The thickness of the Upper Gething is estimated at about 130 meters.

(ii) Lower

The lower Gething is predominantly shale with coal and siltstone, and contains minor sandstone and conglomerate. Two coal seams of mining interest found in this section are designated as GT1 and GT2. It is possible that these seams correlate to Skeeter and Chamberlain seams of the Gething Formation. The thickness of this section is more than 150 meters.

2.2.4 Transfer Coal Seam Development and Correlations

As mentioned in the description on stratigraphy, six coal seams are present in the Middle Gates Member in the Transfer Area, although only four of these (F, G, J and K seams) are currently termed "mineable".

Both D and E seams are split into thin coal portions by partings and designated as "non-mineable" for most of the area. In some drill holes, however, these seams have a mineable thickness of more than 1 metre ie; D seam in QHD86005 and E seam in QHD86003, and further exploration may delineate areas in which D and or E seams are recoverable. Coal seam development and corresponding mining thickness are illustrated on the detailed seam correlation charts (Drawing # 86-903-26-001 & 002). The seam thickness variations are summarized on Table 2.3.

F Seam

F seam is well developed in thickness throughout the Transfer Area with an average of more than 4 metres. The columnar section depicted in Figure 2.5 shows a typical F seam development. The seam is generally divided into three portions designated as F1, Parting and F2 from Upper to Lower. In the vicinity of QHD86003, F1 is not present and the parting F1 forms the top portion of F seam (see correlation chart). In the rest of the area, F1 ranges in thickness from 0.73 to 0.92 with an average of 0.84 metres. The parting between F1 and F2 is composed mainly of high ash coal and carbonaceous shale, with a thickness range from 0.23 to 0.68 metres. F2 comprises the major portion of the seam, and consists mainly of low ash coal with two to four discontinuous thin partings. The thickness of those partings are normally less than 10 centimetres, but the parting developed at the middle of F2 is relatively thick and reaches a thickness of 26 centimeters in QHD85001. F2 ranges in thickness from 2.92 to 4.13 metres. The roof and floor of the seam consist of shale or carbonaceous shale, with coal stringers. The mining section of F seam ranges in thickness from 3.97 to 4.25 with an average of 4.15 metres.

G Seam

G seam is characterized by two major continuous partings, and divided into five portions. As seen in Figure 2.6, the three coal portions are identified as G1, G2 and G3, with the two partings denoted as G2P and G3P, in descending order. G1 ranges in thickness from 0.80 to 0.98 metres with little or no partings. G2P is composed of shale, carbonaceous shale, and inferior coal, with a thickness range from 0.10 to 0.30 metres. G2 ranges in thickness from 0.76 to 1.13 metres and occasionally contains one or two very thin partings in the lower half. G3P is composed of shale and siltstone, but in some places (QHD86001, 86007) this parting consists entirely of siltstone with very thin bands of shale at the top and bottom. The thickness of G3P ranges from 0.33 to 0.46 metres. G3 is characterized by a group of partings near the seam's floor, and ranges in thickness from 0.74 to 1.33 metres. The total collection of the above portions comprises the G seam mining section, and ranges in thickness from 2.94 to 3.76 with an average of 3.45 metres. The roof material is shale, occasionally with a thin carbonaceous layer at the bottom. The floor consists of carbonaceous shale or shale with coal stringers.

J Seam

J seam is well developed in thickness throughout the area with an average of more than 4.5 metres. Figure 2.7 shows a typical J seam section. Though no major parting appears in J seam, many thin inferior coal bands (Fusinite?) usually less than 5 centimetres thick, are found. The roof material is shale or carbonaceous shale, and the floor consists of carbonaceous shale with coal bands. J seam ranges in thickness from 3.92 to 6.04 with an average or 4.61 metres.

K Seam

K seam comprises two separate sub-seams identified as K1 for the Upper and K2 for the lower. A typical K seam section is shown in Figure 2.8.

(i) K1 Seam

K1 seam is characterized by alternating thin beds of coal and carbonaceous shale in the upper portion of the seam. The seam grades to carbonaceous shale in some areas and is therefore excluded from coal mining sections. The thicknesses of K1 Seam range from 0.84 to 1.32 metres.

For most of the Transfer Area, the interval between J and K1 is less than 1 metre, and since the structures dip is more than 30°, mining selectivity constraints will likely dictate its extraction together with J Seam. In this case, the combined mining thicknesses range from 5.63 to 8.23 metres.

(ii) K2 Seam

K2 seam may have one or two discontinuous thin partings, and ranges in thickness from 0.79 to 1.28 with an average of 1.09 metres. The interseam strata between K1 and K2 consist of shale, siltstone, and carbonaceous shale with coal stringers. In the east part of the area, sandstone appears in this section. The thickness of the interseam is normally more than 1 metre and at the east end of the area it reaches 3.5 metres (QHD86007). However, in the vicinity of QHD85001 and 85002, it is less than 1 metre (0.7 - 0.8 metres). Given constraints on mining selectivity mentioned previously, the sequence from J to K2 Seam may form a single mining section in the above area.

The cumulative mineable coal seam thickness (F, G, J, K1 and K2) in the Transfer Area is 14.34 metres.

2.2.5 Grizzly Coal Seam Development and Correlation

The characteristics of each mineable coal seam in the Grizzly Area are very similar to that of the Transfer, therefore only points of significant difference are described here.(Detailed seam correlation charts previously listed, illustrate the seams development).

F Seam

The thickness of F seam is relatively thin compared to the Transfer, ranging from 3.28 to 3.66 with an average of 3.51 metres.

G Seam

In the northeast limb of the Grizzly Structure, the thickness of the lower parting (G3P) thickens to .81 metres.

G seam is overlain directly by a thick conglomerate and sandstone bed.

The overall seam thicknesses ranges from 2.97 to 3.34 with an average of 3.20 metres.

J Seam

J seam ranges in thickness from 4.02 to 4.82 with an average of 4.41 metres.

K1 Seam

The thicknesses of K1 seam range from 0.90 to 1.38 with an average of 1.19 metres.

K1 seam may be mined together with J seam in a single mining section owing to thin interval between J and K1 seams.

K2 Seam

K2 seam is thinner, having a thickness of 0.51 to 0.72 metres.

K2 seam may not be mined in this area because of its poor thickness development and the thick interval between K1 and K2 seams.

The cumulative mineable coal seam thickness (excluding K2) is 12.31 metres in average.

2.2.6 Gething Coal Seam Development and Correlation

The southern part of the Gething Area, which was previously known as the Hermann Gething area is presently designated as Gething Flat. In this area, it had been recognized that two coal seams of mining interest, identified as GT1 and GT2, were present at shallow depth (1976 drill hole QJD7642). In 1986 drilling further confirmed this potential and in addition the above area northwest of Gething Flat was drilled and or mapped. (See Gething Geological Map Drawing No. 86-605-30-001 and Cross Sections at the end of this section). The development and extent of these coal seams are not yet fully understood in the recently explored area because of the structural complexity encountered.
The columnar sections of GT1 and GT2, which are taken from diamond holes and a trench, are shown on the detailed seam correlation chart (drawing #86-605-26-001) and coal intersections in rotary holes are seen in the geophysical correlation charts, (provided in Appendix 1). The following is a description of GT1 and GT2 Seams in the Gething Flat Area.

i) GT-1 Seam

GT1 Seam is found just below the conglomerate - sandstone bed which forms a flat table like topography in the Gething Flat Area. GT1 Seam is generally divided into two portions designated as the Upper and Lower. Figure 2.9 illustrates GT1 Seam development in a backhoe trench where bulk sampling was undertaken. The Upper GT1 is characterized by a group of partings in the Lower half, which is composed mainly of shale and carbonaceous shale. The thickness of the parting zone ranges from 0.90 to 1.34 meters in the northwest area, but toward the south it thins to be about 0.2 meters (QHR84020, 84020,84021,86009,86010). Upper GT1 has only a few thin partings and is about 4 meters in thickness. Total thickness of GT1 Seam ranges from 5.06 to 7.53 with an average of 6.44 meters.

ii) GT-2 Seam

The interval between GT1 and GT2 is about 10 meters in the northwest of the area and thins toward the south to 3 meters. GT2 Seam is generally clean coal, although a very thin carbonaceous parting is occasionally present. The seam ranges in thickness from 0.74 to 0.94 meters (Figure 2.10).

2.3 REGIONAL STRUCTURE

The regional geologic structure over the Transfer - Grizzly area is best illustrated in Figures 2.2 & 2.4. As shown in these figures, the area is characterized by northwesterly trending folds and southeasterly dipping thrust faults between the Shikano - Babcock area situated on the opposite side of the Murray River. Three pairs of folds arranged in parallel are found. These are identified as the Shikano Anticline and Syncline, the M-9 Anticline and Syncline, and the Transfer Anticline and Syncline from north to south. The Transfer area is located on the Transfer Anticline and the Grizzly area is located on the Shikano Anticline.

2.4 LOCAL STRUCTURE

2.4.1 Transfer Structure

The dominant structure in the Transfer area is the northwest-southeast trending Transfer Anticline that plunges gently (0-20°) to the northwest. The coal-bearing Gates Formation is widely distributed on both limbs of the anticline. Dips on the northeast limb of the anticline are 35° to 40° in the west half of the limb, and are getting steeper toward the southeast, with a maximum of 57° at the east end of the area. On the southwest limb, dips are relatively steep and range from 50° to 60°. No major faults have been confirmed in the area, however, minor faults should be expected with more detailed drilling density. The Transfer, Grizzly and Gething Area Structure is illustrated on geological cross sections at the end of this section and structure contour maps provided in Appendix 1

2.4.2 Grizzly Structure

The geologic strúcture of the Grizzly area is entirely controlled by the Shikano Anticline plunging (10-30°) to the northwest. This anticline has a broad or box-like top of about 100 meters in width. The strata dip 55° to 65° on the northeast limb of the anticline and about 45° on the southwest limb. No major faults have been found in the area, but one minor fault with a displacement of less than 10 meters is interpreted in the vicinity of the anticline axis. As in the case of the Transfer Area, further minor faults will likely be confirmed with increased drill density.

2.4.3 Gething Structure

i) Gething Flat Area

The Gething Flat Area is a "nappe" or overthrust sheet which was lifted up by a low angle thrust fault (see cross-section 29800). The northeast limit of the area is cut by the above fault. The structure in the area is simple and gentle, with a 10° plunge to the southeast and dips of 8 to 18° (see structure contour of GT1 and GT2). Only one minor fault has been interpreted in this area, resulting in thinned intersections of GT1 in holes QHR 86008 and QHR 84022.

ii) Remaining Area

The structure, peripheral to the flat area, is complicated by folding and faulting. The block below the Gething Flat Area has a highly complicated structure and dips of strata abruptly change form a few degrees to vertical. More than 10 faults have been interpreted in the area, and it would be expected that further exploration would result in even more structural complications.

Table 2.1

SUMMARY OF INTERSEAM STRATA IN THE MIDDLE GATES MEMBER
TRANSFER

Interval	Approximate Thickness Range (m)	General Lithology
D seam to E seam	13 - 27	Mainly shale with minor very fine sand and channel sandstone
E seam to F seam	17 - 23	Southwest limb of Transfer Anticline - dominant sandstone with shale North limb of Transfer Anticline - shale with minor sandstone and sandy shale
F seam to G seam	17 - 33	Alternating beds of shale and sandstone, channel sandstone
G seam to metres J seam	13 - 21	Shale, sandstones, a 3-4 sandstone zone occurs at 3 meters above J seam
J seam to K seam	0.6 - 1.1	Shale, carbonaceous shale

Table 2.2

SUMMARY OF INTERSEAM STRATA IN THE MIDDLE GATES MEMBER
GRIZZLY

Interval	Approximate Thickness Range (m)	General Lithology
F seam to G seam	28 - 34	Conglomerate and fine sandstone, shale with fine sandstone bed for upper 6 - 9 m
G seam to J seam	14 - 18	Alternating beds of shale, siltstone and fine sandstone
J seam to K1 seam	< 0.5	Carbonaceous shale and siltstone
K1 seam to K2 seam	3 - 4	Shale with very fine to fine sandstone beds

Table 2.3

SEAM THICKNESS SUMMARY
TRANSFER

Seam	Thickness (m) Minimum	Maximum	Range	Mathematical Average Thickness (m)
F	3.97	4.25	0.28	4.15
G	2.94	3.76	0.82	3.45
J	3.92	6.04	2.12	4.61
K1	0.84	1.32	0.48	1.04
K2	0.79	1.28	0.49	1.09
			Total	14.34

Table 2.4

SEAM THICKNESS SUMMARY
GRIZZLY

Seam	Thickness (m) Minimum	Maximum	Range	Mathematical Average Thickness (m)
F	3.28	3.66	0.28	3.51
G	2.97	3.34	0.37	3.20
J	4.02	4.82	0.80	4.41
K1	0.90	1.38	0.48	1.19
K2	0.51	0.72	0.21	0.60
			Total	14.34

Hulcross Formation

The Hulcross Formation is conformably overlain by the Boulder Creek Formation, and is composed mostly of medium to dark grey shale with laminations of siltstone and thin beds of bentonite. Within the top and bottom 5 metres of the formation, siltstone is dominant with interbeds of shale. Along the access road from the Gething to the Transfer Area provides good continuous exposures of the Hulcross Formation. The base of the formation is marked by a thin bed of pebbly conglomerate or coarse sandstone. The formation thickness is about 90 metres.

Gates Formation

The Gates Formation contains the economic coal seams in this area, and is widely distributed in both limbs of the Transfer Anticline. The formation can be divided into three members. These are termed the Upper, Middle and Lower. Though each of the members contains coal, seam thickness of economic interest occur only in the Middle Gates Member. The total thickness of the formation is 260 metres.

(i) Upper Gates Member

The Upper Gates Member is defined from the bottom of the Hulcross Formation to the bottom of the conglomerate just above D seam. The upper half of the member is made up mainly of shale, with sandstone beds and coal zones. In other areas of the property, usually three coal zones designated as A, B, and C seams are found in this upper portion, but these are "uneconomical" because of their thin inconsistent development. In the Transfer Area, as well as other areas, three coal or carbonaceous zones are presented in this portion. Two of them (A and C), however, are poorly developed only to be seen as carbonaceous shale. The thickness of B seam is 0.88 metres with no parting (QHD 85002).

In the lower half of the member, very fine and fine sandstone are predominant with subordinate amounts of shale and siltstone.

At the middle of this portion a tuffaceous horizon is recongized, which is used as a good marker for stratigraphic correlation. The conglomerate at the bottom of the member is stratigraphically equivalent to the so called "caprock" in the Mesa, Wolverine, and Shikano pits. The thickness of the conglomerate is relatively thin compared to other areas and ranges from 2.75 metres in the southwest of the area (QHD 86005) to less than 1 metre (0.95 - 0.15) in the rest of the area. The Upper Gates Member is approximately 75 metres thick.

(ii) Middle Gates Member

The lower limit of the Middle Gates Member is marked by the floor of K2 seam. The member contains six coal seams (D, E, F, G, J and K in descending order), these seams are directly correlated to the coal seams at the Shikano Pit. (See Fig. 2.3). Only the last four coal seams, however, should be termed "mineable" in the Transfer Area, because D and E seams have poorly developed thickness and quality, abruptly changing from hole to hole.

Interseam strata is composed mainly of shale with minor sandstone and siltstone, or of alternating beds of shale and sandstone. In some places, discontinuous channel sandstone are found at different horizons creating variations in interseam thickness (ie; between D and E in QHD 86003, and F and G in QHD 86008). The thickness ranges and general lithologies of the interseam strata are summaried on Table 2.1. The Middle Gates Member ranges in thickness from 98 to 105 metres.

(iii) Lower Gates Member

The boundary between the Lower Gates Member and underlying Moosebar Formation is the bottom of a light or pale greenish massive sandstone, below which finer facies such as shale and siltstone are predominant (Moosebar Formation). The upper part of the Member consists of fine to medium sandstone with minor shale. The lower part of this member is made up of alternating beds of sandstone, siltstone and shale. One thin coal seam designated as L seam is found in this section. The thickness of the Lower Gates Member is approximately 95 metres.

2.2.2 GRIZZLY STRATIGRAPHY

The stratigraphy underlying the Grizzly Area is identical to that of the Transfer Area. That is, the Boulder Creek, Hulcross, Gates, and Moosebar Formations in descending order. Four coal seams of mining interest, F, G, J and K seams, are found in the Middle Gates Member. Basically, the development of the Middle Gates Member is the same as that of the Transfer Area, with the following being primary differences:

i) a thick conglomerate and sandstone bed ranging from 21 to 25 metres is present between F and G seams, and the interval between these two seams is thicker than that of the Transfer area.

ii) the interseam thickness between J and K1 is relatively thin (0.38 - 0.58 metres) for most of the area.

iii) the interval between K1 and k2 is thick (3.0 - 3.7 metres) compared to that of the Transfer area.

The thickness ranges and general lithologies of the interseam strata are summarized on Table 2.2. The distribution of the various stratigraphic units is also illustrated on the Grizzly Geology Map Fig. 86-905-30-001 and the correlation charts previously noted.

2.2.3 Gething Stratigraphy

The Gething area is underlain by the Gething Formation, which is stratigraphically located about 180 meters below the Middle Gates Member. In this region, it is known that the Gething Formation contains economical coal seams at several horizons, the most prominent being termed in descending order as Bird, Skeeter and Chamberlain. The formation can be divided into two sections designated as the Upper and Lower. The thickness of the formation has not been confirmed in this area, however, judging from a core hole drilled in a nearby area, (QHD86010) it is considered that the Gething Formation is at least 280 meters in thickness. (See Gething Area General Correlation Drawing No. 86-605-26-002).

(i) Upper

THe upper Gething is defined from the bottom of a thin glauconitic sandstsone at the base of the Moosebar Formation to the bottom of a thin glauconitic sandstone conglomerate bed just above GT1 seam. The upper section is composed mainly of conglomerate and sandstone with shale and coal. At the top of this portion, a coal seam designated as the Bird seam is exposed in the northeast end of the area. It's thickness and the extent of it's distribution have not yet been well defined because of structural complexity. The thickness of the Upper Gething is estimated at about 130 meters.

(ii) Lower

The lower Gething is predominantly shale with coal and siltstone, and contains minor sandstone and conglomerate. Two coal seams of mining interest found in this section are designated as GT1 and GT2. It is possible that these seams correlate to Skeeter and Chamberlain seams of the Gething Formation. The thickness of this section is more than 150 meters.

2.2.4 Transfer Coal Seam Development and Correlations

As mentioned in the description on stratigraphy, six coal seams are present in the Middle Gates Member in the Transfer Area, although only four of these (F, G, J and K seams) are currently termed "mineable".

Both D and E seams are split into thin coal portions by partings and designated as "non-mineable" for most of the area. In some drill holes, however, these seams have a mineable thickness of more than 1 metre ie; D seam in QHD86005 and E seam in QHD86003, and further exploration may delineate areas in which D and or E seams are recoverable. Coal seam development and corresponding mining thickness are illustrated on the detailed seam correlation charts (Drawing # 86-903-26-001 & 002). The seam thickness variations are summarized on Table 2.3.

F Seam

F seam is well developed in thickness throughout the Transfer Area with an average of more than 4 metres. The columnar section depicted in Figure 2.5 shows a typical F seam development. The seam is generally divided into three portions designated as F1, Parting and F2 from Upper to Lower. In the vicinity of QHD86003, F1 is not present and the parting F1 forms the top portion of F seam (see correlation chart). In the rest of the area, F1 ranges in thickness from 0.73 to 0.92 with an average of 0.84 metres. The parting between F1 and F2 is composed mainly of high ash coal and carbonaceous shale, with a thickness range from 0.23 to 0.68 metres. F2 comprises the major portion of the seam, and consists mainly of low ash coal with two to four discontinuous thin partings. The thickness of those partings are normally less than 10 centimetres, but the parting developed at the middle of F2 is relatively thick and reaches a thickness of 26 centimeters in QHD85001. F2 ranges in thickness from 2.92 to 4.13 metres. The roof and floor of the seam consist of shale or carbonaceous shale, with coal stringers. The mining section of F seam ranges in thickness from 3.97 to 4.25 with an average of 4.15 metres.

G Seam

G seam is characterized by two major continuous partings, and divided into five portions. As seen in Figure 2.6, the three coal portions are identified as G1, G2 and G3, with the two partings denoted as G2P and G3P, in descending order. G1 ranges in thickness from 0.80 to 0.98 metres with little or no partings. G2P is composed of shale, carbonaceous shale, and inferior coal, with a thickness range from 0.10 to 0.30 metres. G2 ranges in thickness from 0.76 to 1.13 metres and occasionally contains one or two very thin partings in the lower half. G3P is composed of shale and siltstone, but in some places (QHD86001, 86007) this parting consists entirely of siltstone with very thin bands of shale at the top and bottom. The thickness of G3P ranges from 0.33 to 0.46 metres. G3 is characterized by a group of partings near the seam's floor, and ranges in thickness from 0.74 to 1.33 metres. The total collection of the above portions comprises the G seam mining section, and ranges in thickness from 2.94 to 3.76 with an average of 3.45 metres. The roof material is shale, occasionally with a thin carbonaceous layer at the bottom. The floor consists of carbonaceous shale or shale with coal stringers.

J Seam

J seam is well developed in thickness throughout the area with an average of more than 4.5 metres. Figure 2.7 shows a typical J seam section. Though no major parting appears in J seam, many thin inferior coal bands (Fusinite?) usually less than 5 centimetres thick, are found. The roof material is shale or carbonaceous shale, and the floor consists of carbonaceous shale with coal bands. J seam ranges in thickness from 3.92 to 6.04 with an average or 4.61 metres.

K Seam

K seam comprises two separate sub-seams identified as K1 for the Upper and K2 for the lower. A typical K seam section is shown in Figure 2.8.

(i) K1 Seam

K1 seam is characterized by alternating thin beds of coal and carbonaceous shale in the upper portion of the seam. The seam grades to carbonaceous shale in some areas and is therefore excluded from coal mining sections. The thicknesses of K1 Seam range from 0.84 to 1.32 metres.

For most of the Transfer Area, the interval between J and K1 is less than 1 metre, and since the structures dip is more than 30°, mining selectivity constraints will likely dictate its extraction together with J Seam. In this case, the combined mining thicknesses range from 5.63 to 8.23 metres.

(ii) K2 Seam

K2 seam may have one or two discontinuous thin partings, and ranges in thickness from 0.79 to 1.28 with an average of 1.09 metres. The interseam strata between K1 and K2 consist of shale, siltstone, and carbonaceous shale with coal stringers. In the east part of the area, sandstone appears in this section. The thickness of the interseam is normally more than 1 metre and at the east end of the area it reaches 3.5 metres (QHD86007). However, in the vicinity of QHD85001 and 85002, it is less than 1 metre (0.7 - 0.8 metres). Given constraints on mining selectivity mentioned previously, the sequence from J to K2 Seam may form a single mining section in the above area.

The cumulative mineable coal seam thickness (F, G, J, K1 and K2) in the Transfer Area is 14.34 metres.

2.2.5 Grizzly Coal Seam Development and Correlation

The characteristics of each mineable coal seam in the Grizzly Area are very similar to that of the Transfer, therefore only points of significant difference are described here.(Detailed seam correlation charts previously listed, illustrate the seams development).

F Seam

The thickness of F seam is relatively thin compared to the Transfer, ranging from 3.28 to 3.66 with an average of 3.51 metres.

G Seam

In the northeast limb of the Grizzly Structure, the thickness of the lower parting (G3P) thickens to .81 metres.

G seam is overlain directly by a thick conglomerate and sandstone bed.

The overall seam thicknesses ranges from 2.97 to 3.34 with an average of 3.20 metres.

J Seam

J seam ranges in thickness from 4.02 to 4.82 with an average of 4.41 metres.

K1 Seam

The thicknesses of K1 seam range from 0.90 to 1.38 with an average of 1.19 metres.

K1 seam may be mined together with J seam in a single mining section owing to thin interval between J and K1 seams.

K2 Seam

K2 seam is thinner, having a thickness of 0.51 to 0.72 metres.

K2 seam may not be mined in this area because of its poor thickness development and the thick interval between K1 and K2 seams.

The cumulative mineable coal seam thickness (excluding K2) is 12.31 metres in average.

2.2.6 Gething Coal Seam Development and Correlation

The southern part of the Gething Area, which was previously known as the Hermann Gething area is presently designated as Gething Flat. In this area, it had been recognized that two coal seams of mining interest, identified as GT1 and GT2, were present at shallow depth (1976 drill hole QJD7642). In 1986 drilling further confirmed this potential and in addition the above area northwest of Gething Flat was drilled and or mapped. (See Gething Geological Map Drawing No. 86-605-30-001 and Cross Sections at the end of this section). The development and extent of these coal seams are not yet fully understood in the recently explored area because of the structural complexity encountered.
The columnar sections of GT1 and GT2, which are taken from diamond holes and a trench, are shown on the detailed seam correlation chart (drawing #86-605-26-001) and coal intersections in rotary holes are seen in the geophysical correlation charts, (provided in Appendix 1). The following is a description of GT1 and GT2 Seams in the Gething Flat Area.

i) GT-1 Seam

GT1 Seam is found just below the conglomerate - sandstone bed which forms a flat table like topography in the Gething Flat Area. GT1 Seam is generally divided into two portions designated as the Upper and Lower. Figure 2.9 illustrates GT1 Seam development in a backhoe trench where bulk sampling was undertaken. The Upper GT1 is characterized by a group of partings in the Lower half, which is composed mainly of shale and carbonaceous shale. The thickness of the parting zone ranges from 0.90 to 1.34 meters in the northwest area, but toward the south it thins to be about 0.2 meters (QHR84020, 84020,84021,86009,86010). Upper GT1 has only a few thin partings and is about 4 meters in thickness. Total thickness of GT1 Seam ranges from 5.06 to 7.53 with an average of 6.44 meters.

ii) GT-2 Seam

The interval between GT1 and GT2 is about 10 meters in the northwest of the area and thins toward the south to 3 meters. GT2 Seam is generally clean coal, although a very thin carbonaceous parting is occasionally present. The seam ranges in thickness from 0.74 to 0.94 meters (Figure 2.10).

2.3 REGIONAL STRUCTURE

The regional geologic structure over the Transfer - Grizzly area is best illustrated in Figures 2.2 & 2.4. As shown in these figures, the area is characterized by northwesterly trending folds and southeasterly dipping thrust faults between the Shikano - Babcock area situated on the opposite side of the Murray River. Three pairs of folds arranged in parallel are found. These are identified as the Shikano Anticline and Syncline, the M-9 Anticline and Syncline, and the Transfer Anticline and Syncline from north to south. The Transfer area is located on the Transfer Anticline and the Grizzly area is located on the Shikano Anticline.

2.4 LOCAL STRUCTURE

2.4.1 Transfer Structure

The dominant structure in the Transfer area is the northwest-southeast trending Transfer Anticline that plunges gently (0-20°) to the northwest. The coal-bearing Gates Formation is widely distributed on both limbs of the anticline. Dips on the northeast limb of the anticline are 35° to 40° in the west half of the limb, and are getting steeper toward the southeast, with a maximum of 57° at the east end of the area. On the southwest limb, dips are relatively steep and range from 50° to 60°. No major faults have been confirmed in the area, however, minor faults should be expected with more detailed drilling density. The Transfer, Grizzly and Gething Area Structure is illustrated on geological cross sections at the end of this section and structure contour maps provided in Appendix 1

2.4.2 Grizzly Structure

The geologic structure of the Grizzly area is entirely controlled by the Shikano Anticline plunging (10-30°) to the northwest. This anticline has a broad or box-like top of about 100 meters in width. The strata dip 55° to 65° on the northeast limb of the anticline and about 45° on the southwest limb. No major faults have been found in the area, but one minor fault with a displacement of less than 10 meters is interpreted in the vicinity of the anticline axis. As in the case of the Transfer Area, further minor faults will likely be confirmed with increased drill density.

2.4.3 Gething Structure

i) Gething Flat Area

The Gething Flat Area is a "nappe" or overthrust sheet which was lifted up by a low angle thrust fault (see cross-section 29800). The northeast limit of the area is cut by the above fault. The structure in the area is simple and gentle, with a 10° plunge to the southeast and dips of 8 to 18° (see structure contour of GT1 and GT2). Only one minor fault has been interpreted in this area, resulting in thinned intersections of GT1 in holes QHR 86008 and QHR 84022.

ii) Remaining Area

The structure, peripheral to the flat area, is complicated by folding and faulting. The block below the Gething Flat Area has a highly complicated structure and dips of strata abruptly change form a few degrees to vertical. More than 10 faults have been interpreted in the area, and it would be expected that further exploration would result in even more structural complications.

Table 2.1

SUMMARY OF INTERSEAM STRATA IN THE MIDDLE GATES MEMBER TRANSFER

Interval	Approximate Thickness Range (m)	General Lithology
D seam to E seam	13 - 27	Mainly shale with minor very fine sand and channel sandstone
E seam to F seam	17 - 23	Southwest limb of Transfer Anticline - dominant sandstone with shale North limb of Transfer Anticline - shale with minor sandstone and sandy shale
F seam to G seam	17 - 33	Alternating beds of shale and sandstone, channel sandstone
G seam to metres J seam	13 - 21	Shale, sandstones, a 3-4 sandstone zone occurs at 3 meters above J seam
J seam to K seam	0.6 - 1.1	Shale, carbonaceous shale

Table 2.2

SUMMARY OF INTERSEAM STRATA IN THE MIDDLE GATES MEMBER
GRIZZLY

Interval	Approximate Thickness Range (m)	General Lithology
F seam to G seam	28 - 34	Conglomerate and fine sandstone, shale with fine sandstone bed for upper 6 - 9 m
G seam to J seam	14 - 18	Alternating beds of shale, siltstone and fine sandstone
J seam to K1 seam	< 0.5	Carbonaceous shale and siltstone
K1 seam to K2 seam	3 - 4	Shale with very fine to fine sandstone beds

Table 2.3

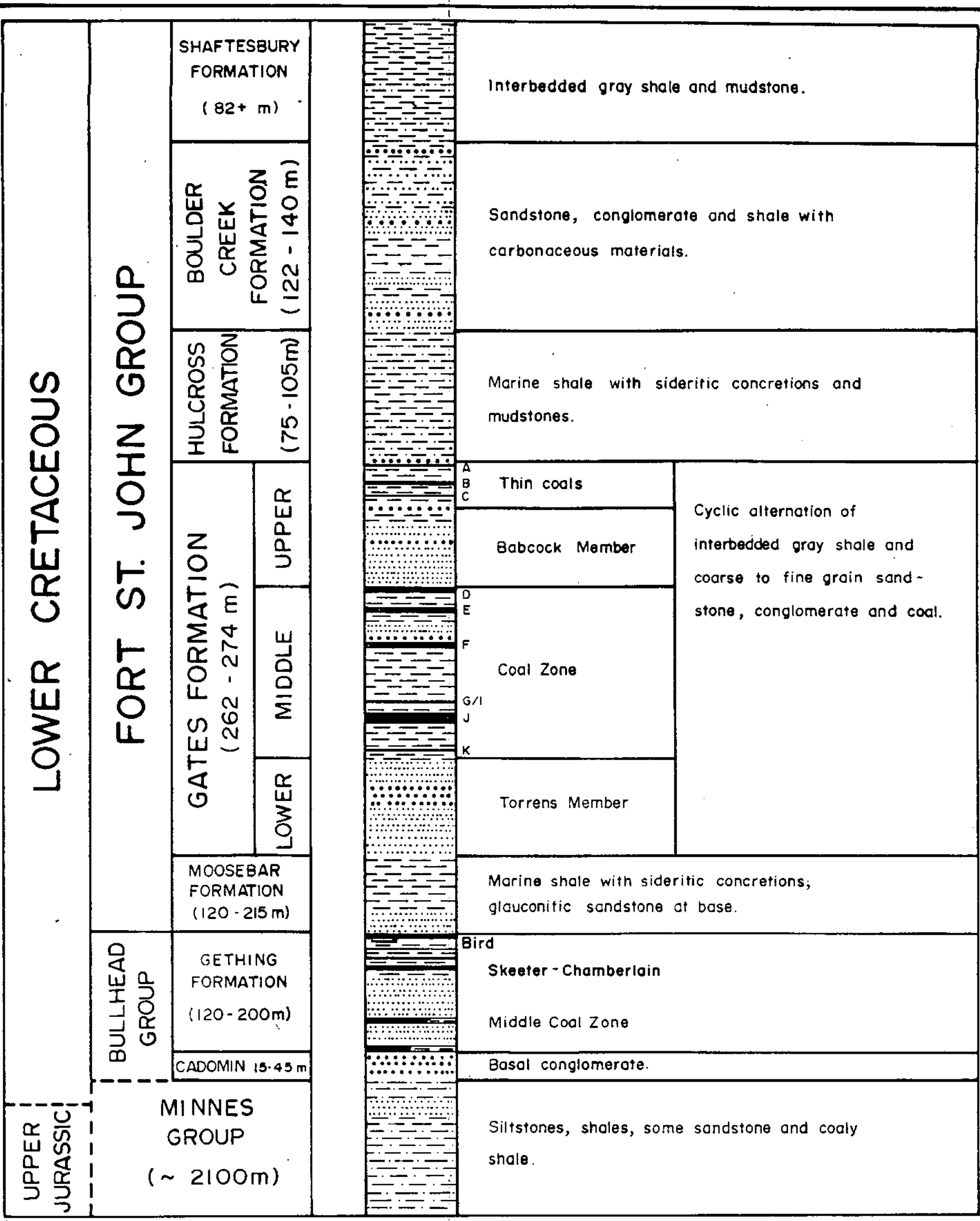
SEAM THICKNESS SUMMARY
TRANSFER

Seam	Thickness (m) Minimum	Maximum	Range	Mathematical Average Thickness (m)
F	3.97	4.25	0.28	4.15
G	2.94	3.76	0.82	3.45
J	3.92	6.04	2.12	4.61
K1	0.84	1.32	0.48	1.04
K2	0.79	1.28	0.49	1.09
			Total	14.34

Table 2.4

SEAM THICKNESS SUMMARY
GRIZZLY

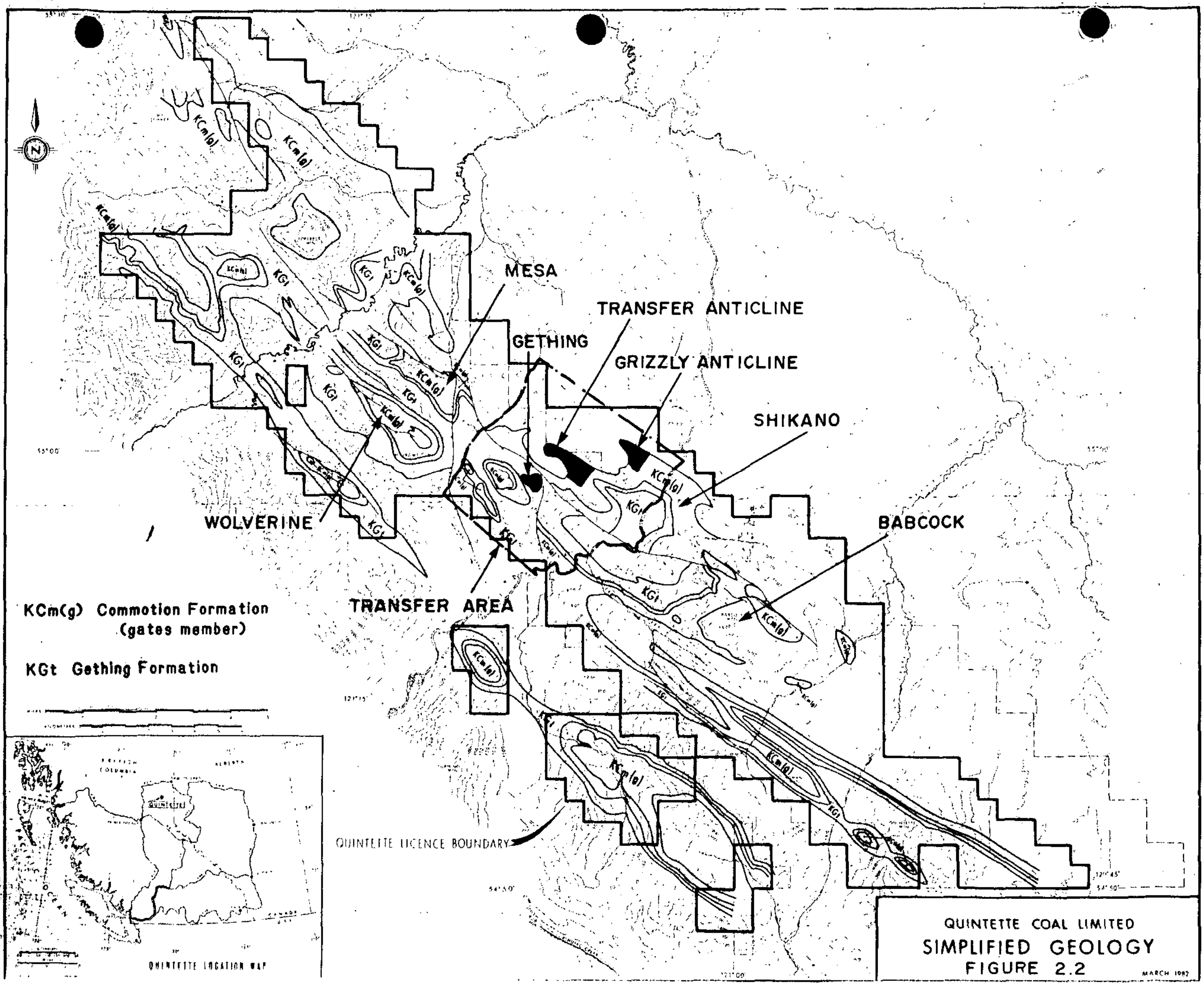
Seam	Thickness (m) Minimum	Maximum	Range	Mathematical Average Thickness (m)
F	3.28	3.66	0.28	3.51
G	2.97	3.34	0.37	3.20
J	4.02	4.82	0.80	4.41
K1	0.90	1.38	0.48	1.19
K2	0.51	0.72	0.21	0.60
			Total	14.34

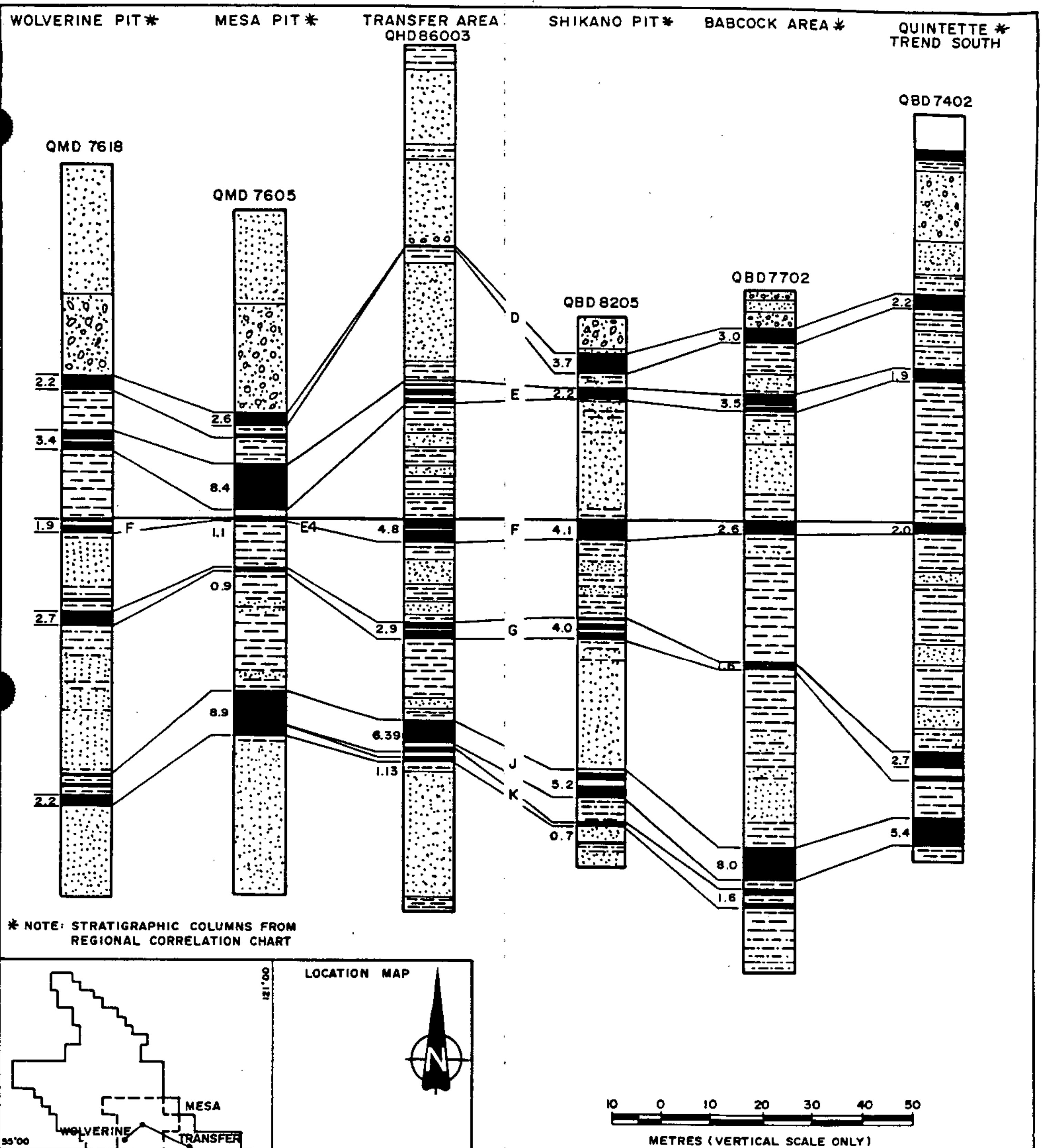


QUINTETTE COAL LIMITED

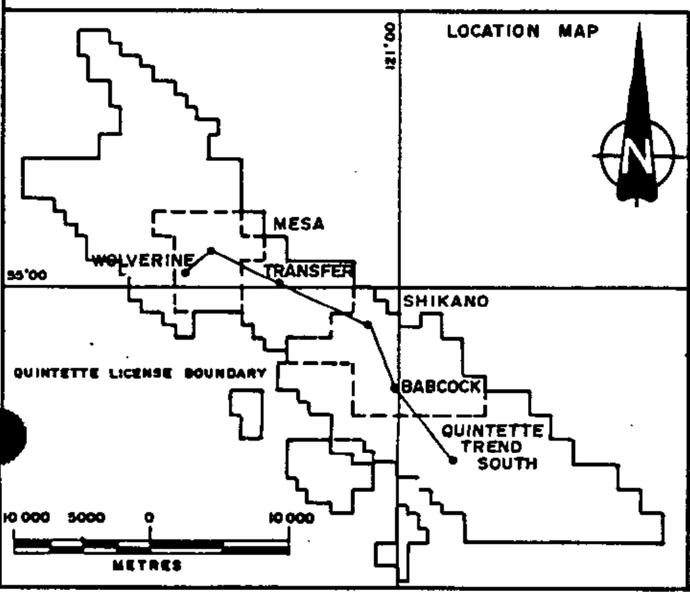
GENERAL STRATIGRAPHIC SECTION

FIGURE 2.1


MESA
TRANSFER ANTICLINE
GETHING
GRIZZLY ANTICLINE
SHIKANO
BABCOCK
WOLVERINE
TRANSFER AREA
KCm(g) Commotion Formation (gates member)
KGt Gething Formation
QUINTETTE LICENCE BOUNDARY
QUINTETTE LOCATION MAP
QUINTETTE COAL LIMITED
SIMPLIFIED GEOLOGY
FIGURE 2.2
MARCH 1982



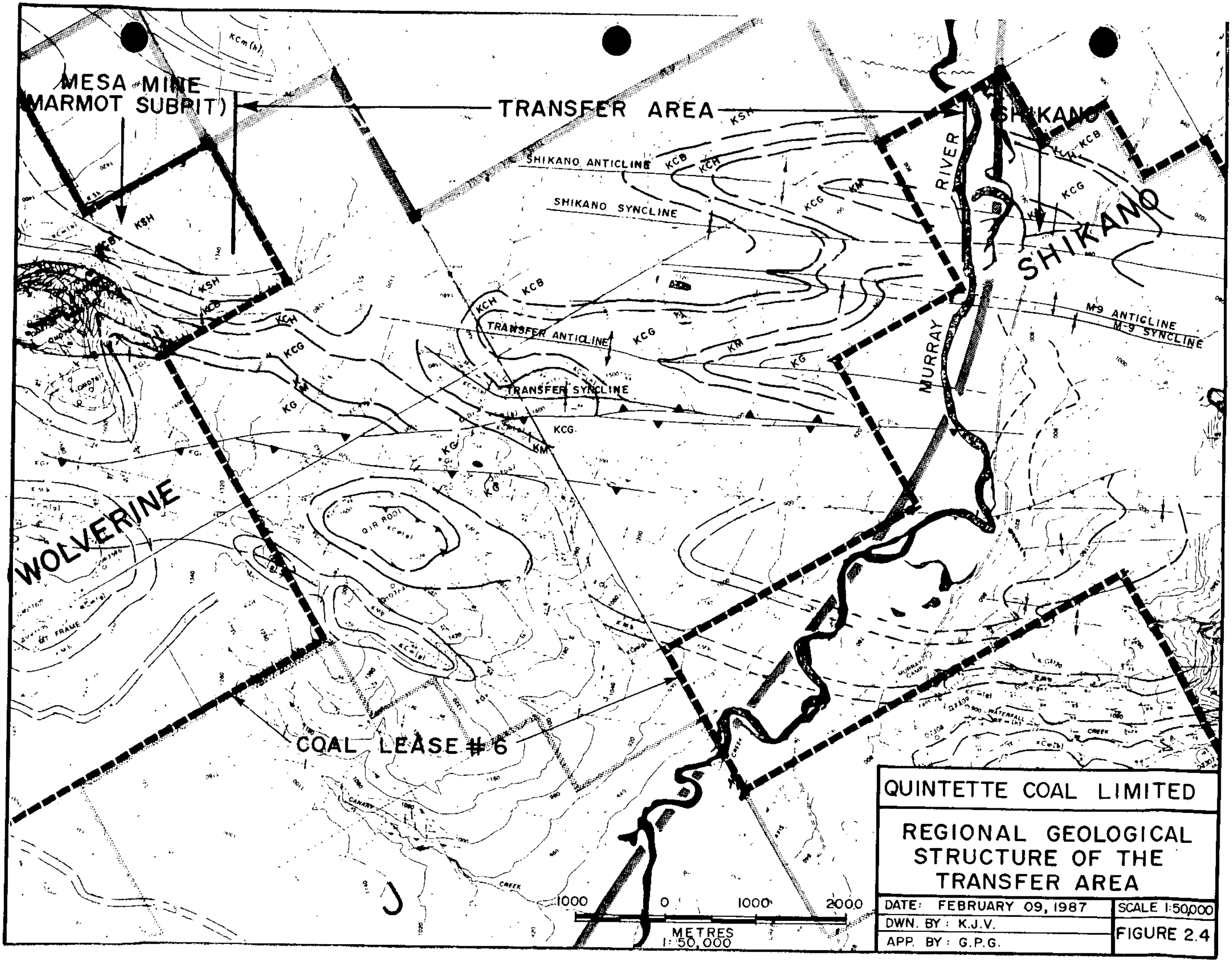
* NOTE: STRATIGRAPHIC COLUMNS FROM REGIONAL CORRELATION CHART

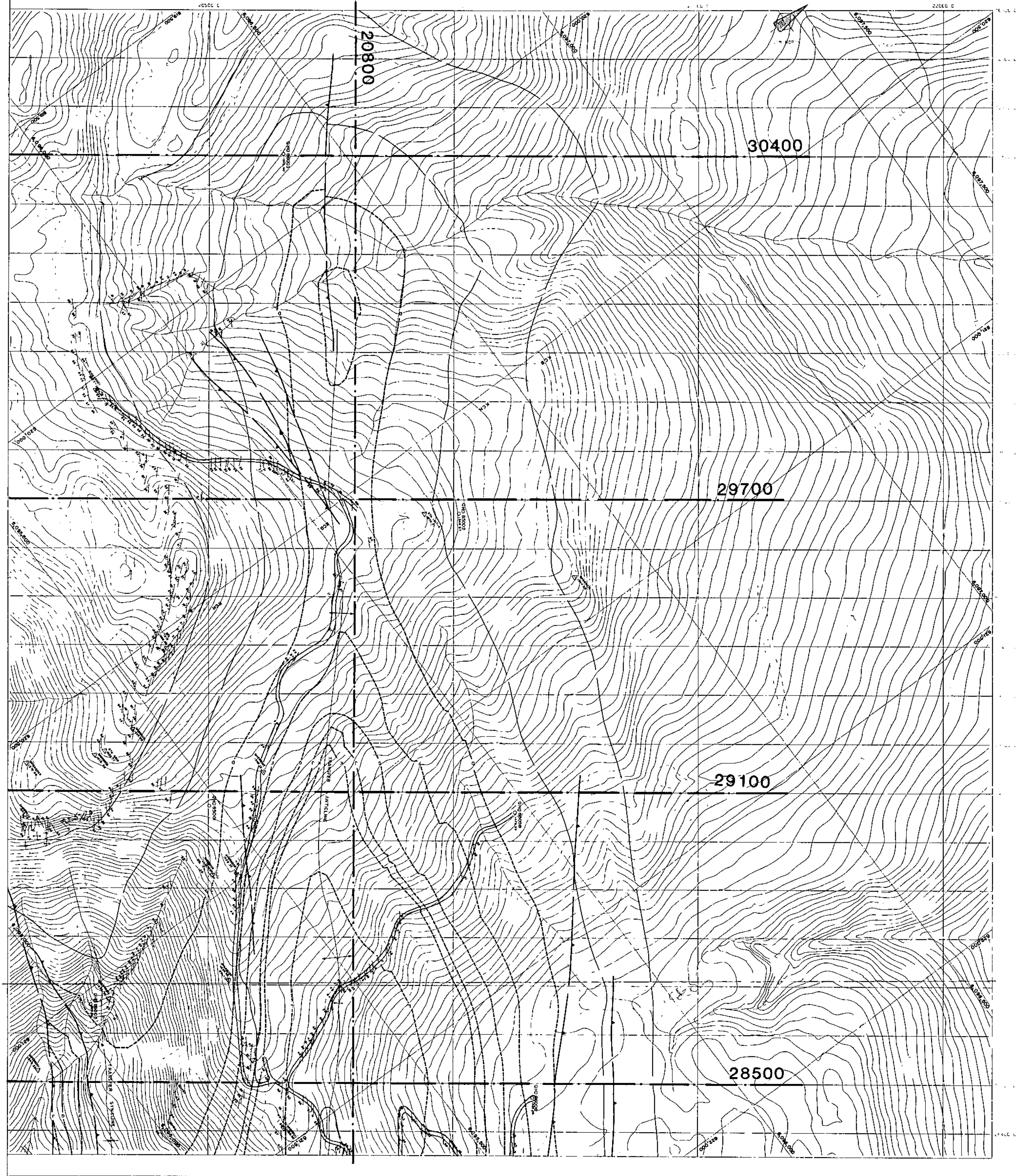


QUINTETTE COAL LIMITED

MIDDLE GATES FORMATION REGIONAL STRATIGRAPHIC CORRELATION

FIGURE 2.3


MESA MINE
(MARMOT SUBPIT)
TRANSFER AREA
SHIKANO
SHIKANO ANTICLINE
SHIKANO SYNCLINE
MURRAY RIVER
M9 ANTICLINE
M-9 SYNCLINE
TRANSFER ANTICLINE
TRANSFER SYNCLINE
WOLVERINE
COAL LEASE # 6
KSH
KCB
KCH
KCG
KM
KG
1000 0 1000 2000
METRES
1: 50,000
QUINTETTE COAL LIMITED
REGIONAL GEOLOGICAL STRUCTURE OF THE TRANSFER AREA
DATE: FEBRUARY 09, 1987
SCALE 1:50,000
DWN. BY: K.J.V.
APP. BY: G.P.G.
FIGURE 2.4

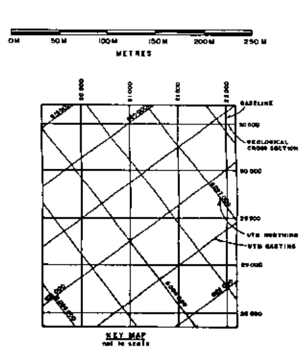


LEGEND

- TREELINE
- ROADS
- TRENCH
- ROTARY DRILL HOLE
- DIAMOND DRILL HOLE
- THRUST FAULT
- ANTICLINE
- SYNCLINE
- GEOLOGIC CONTACT
- COAL SEAM OUTCROP

GEOLOGIC FORMATIONS

KS	SHAFTSBURY
KCB	BOULDER CREEK
KCH	HULCROSS
KCG	GATES
KM	MOOSEBAR
KG	GETHING
KCD	CADOMIN



REV.	D	M	Y	REVISION DESCRIPTION	DRN.	SPS	APP.
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QUINTETTE COAL LIMITED

PROJECT MANAGER

DENISON MINES LIMITED

COAL DIVISION

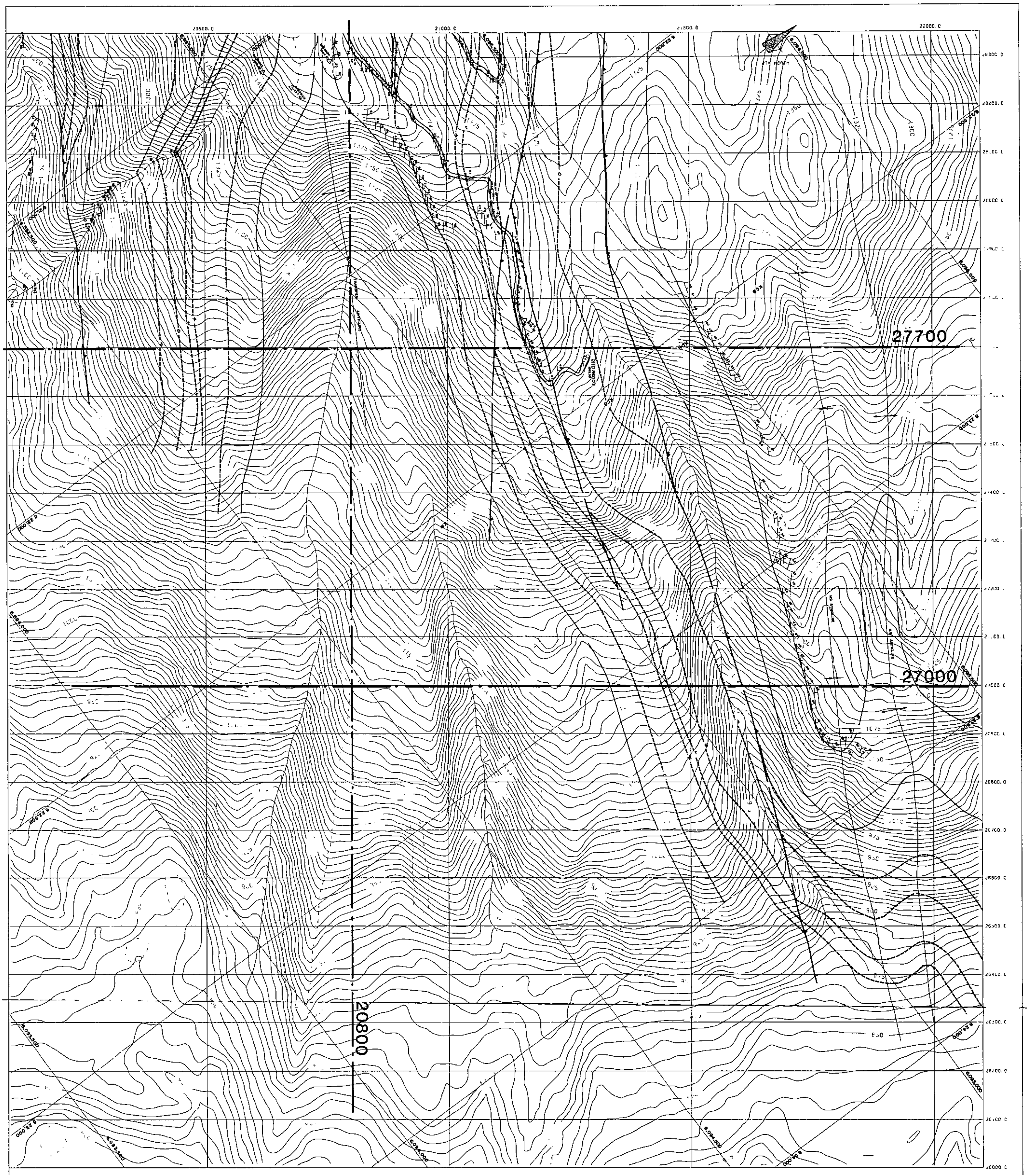
AREA TRANSFER | CATEGORY GEOLOGY

DRAWING TITLE

TRANSFER AREA GEOLOGY

SHEET 1

SCALE | DRAWING FILE 87-903-20-001

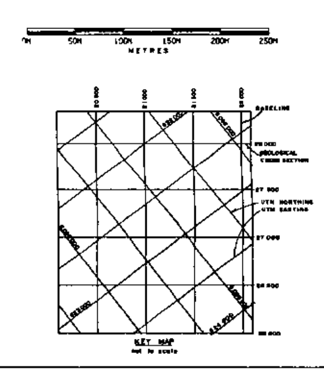


LEGEND

- TREELINE
- ROADS
- TRENCH
- ROTARY DRILL HOLE
- DIAMOND DRILL HOLE
- THRUST FAULT
- ANTICLINE
- SYNCLINE
- GEOLOGIC CONTACT
- COAL SEAM OUTCROP

GEOLOGIC FORMATIONS

KS	SHAFTSBURY
KCB	BOULDER CREEK
KCH	HULCROSS
KCG	GATES
KM	MOOSEBAR
KG	GETHING
KCD	CADOMIN



O				ORIGINAL DRAFT	R.L.R	H.W.	
REV.	D	M	Y	REVISION DESCRIPTION	DRN.	DES.	APP.

QUINTETTE COAL LIMITED

PROJECT MANAGER

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COAL DIVISION

AREA TRANSFER | CATEGORY GEOLOGY

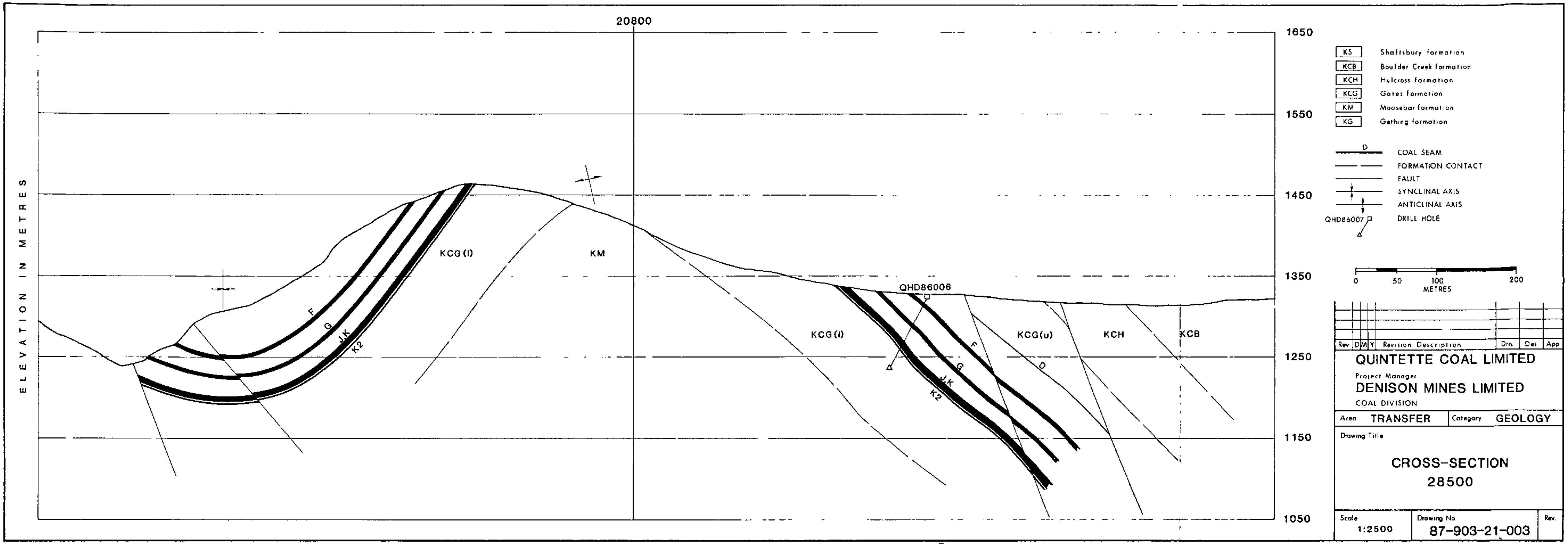
DRAWING TITLE

TRANSFER AREA GEOLOGY

SHEET 2

SCALE

DRAWING FILE 87-903-20-002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1550
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KS Shaftsbury formation
KCB Boulder Creek formation
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KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
KCG (l)
KM
F
G
J,K
K2
QHD86006
KCG (l)
KCG (u)
KCH
KCB
D
Rev DMY Revision Description Drn Des App
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area TRANSFER Category GEOLOGY
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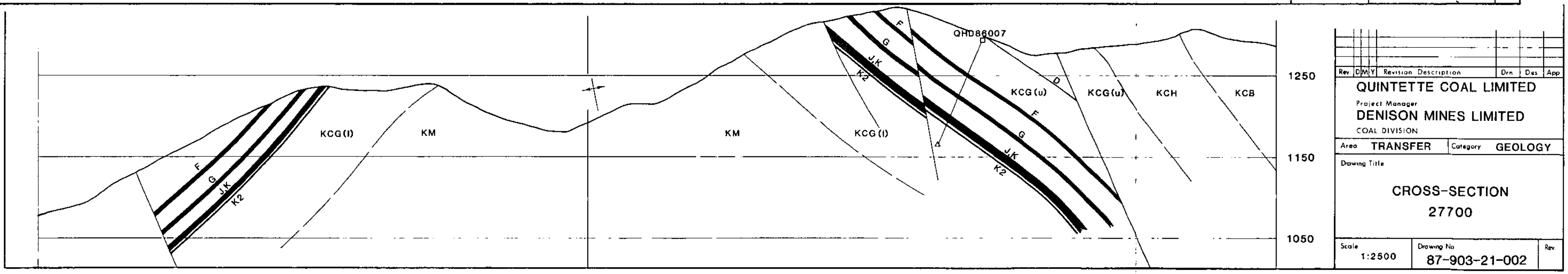
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KCG (u)
KCH
KCB
D
Rev DMY Revision Description Drn Des App
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area TRANSFER Category GEOLOGY
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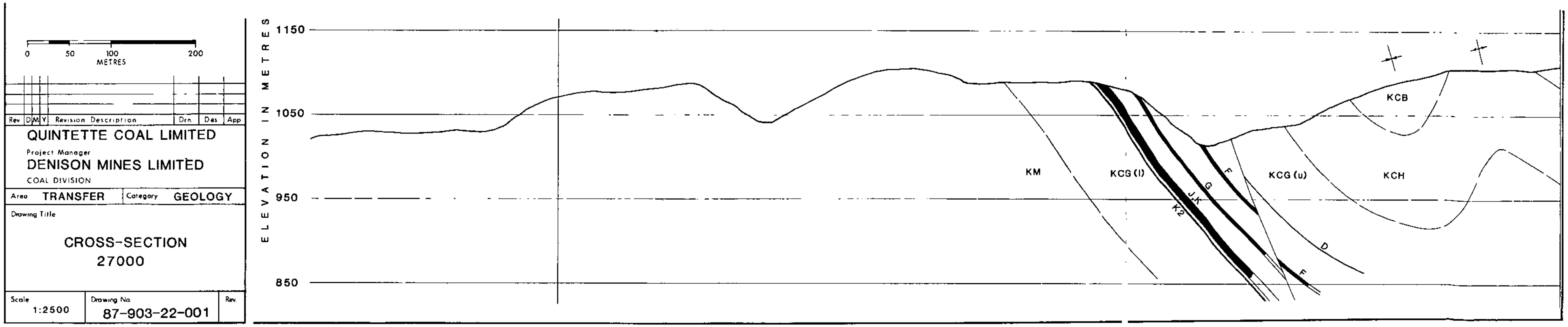
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QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area TRANSFER Category GEOLOGY
Drawing Title
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KCB
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J,K
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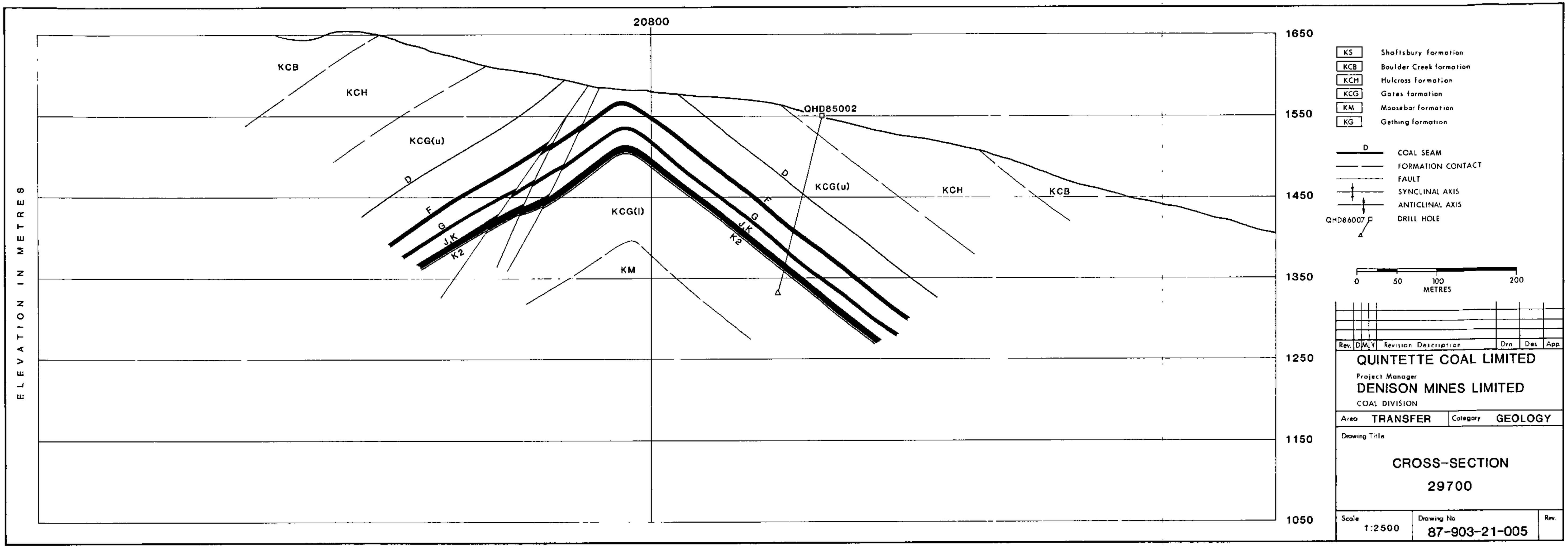
D
F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J,K
K2
KCG(l)
KM
QHD85002
KCH
KCB
KS Shaftsbury formation
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KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007
DRILL HOLE
0 50 100 200
METRES
Rev. D M Y Revision Description Drn Des App
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area TRANSFER
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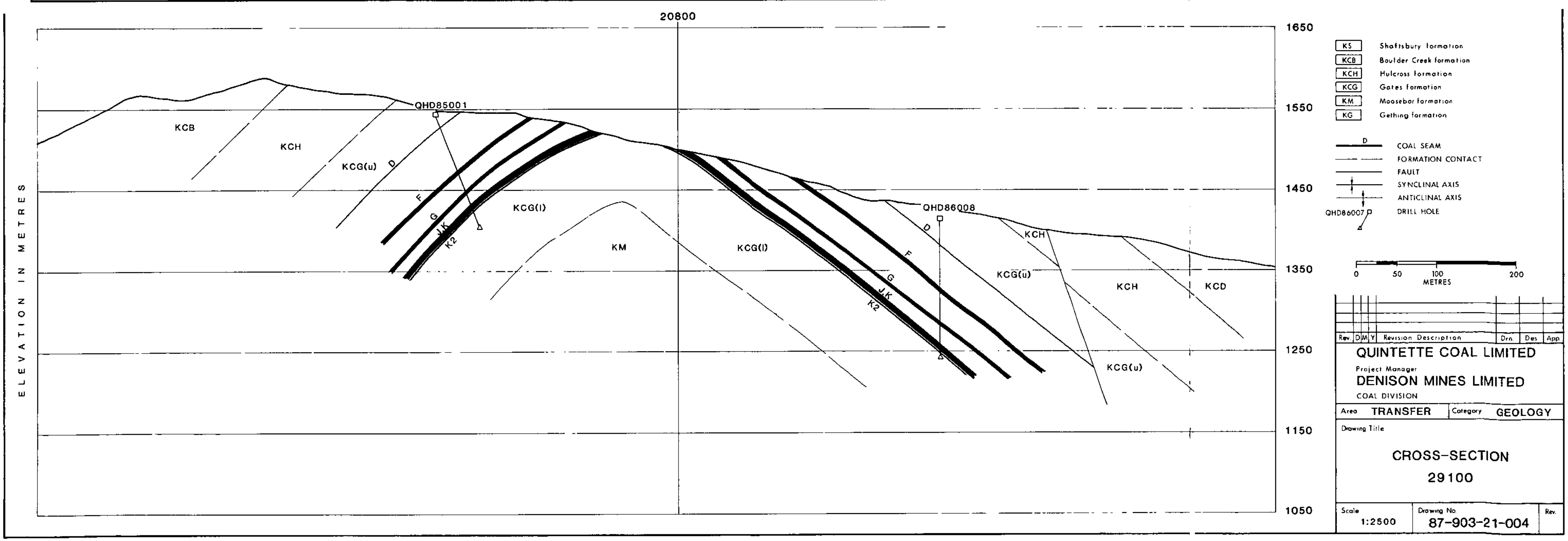
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KCG(l)
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KCG(u)
KCH
KCD
KCG(u)
KS Shaftsbury formation
KCB Boulder Creek formation
KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007
DRILL HOLE
0 50 100 200
METRES
Rev. D M Y Revision Description Drn. Des App
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
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Category GEOLOGY
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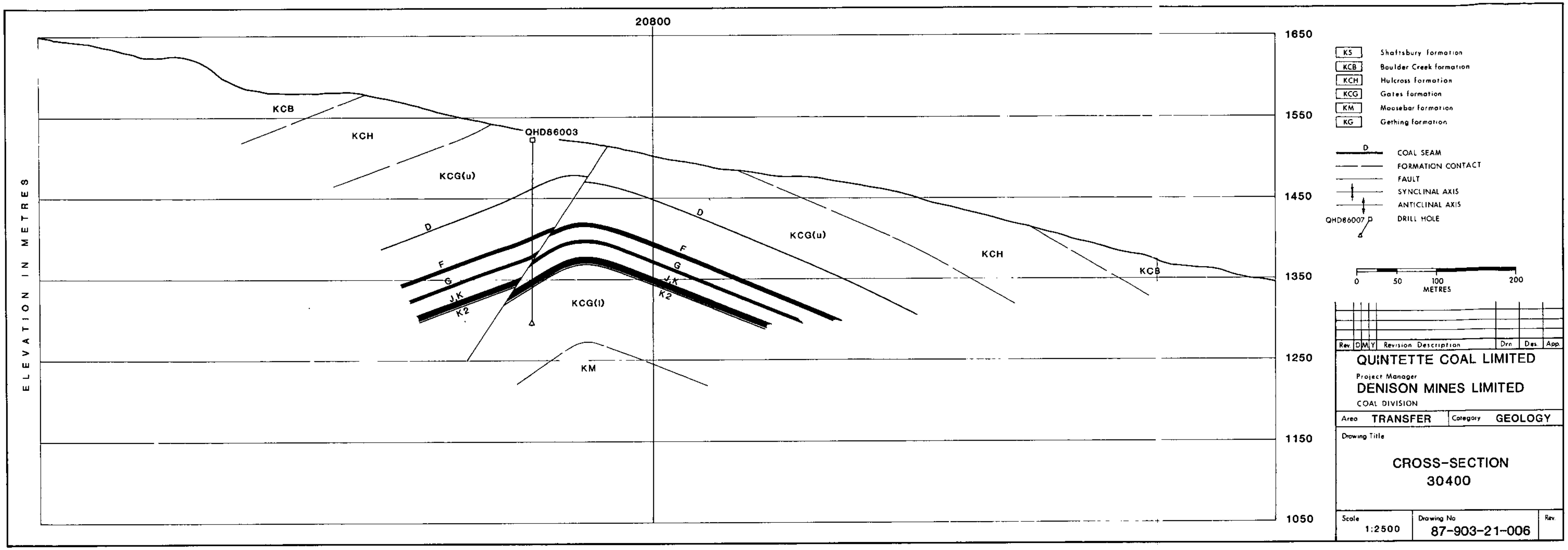
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D
F
G
J,K
K2
KCG(l)
KM
KCH
KCB
KS Shaftsbury formation
KCB Boulder Creek formation
KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
Rev D M Y Revision Description Drn Des App
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area TRANSFER Category GEOLOGY
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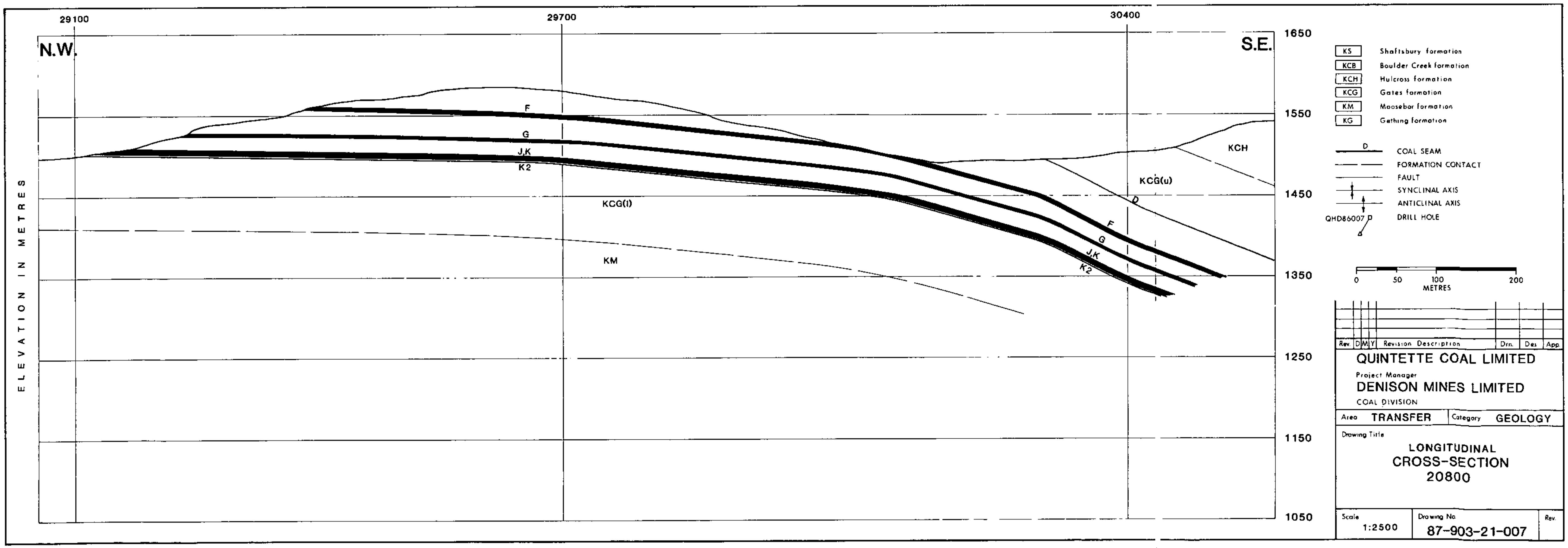
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ELEVATION IN METRES
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G
J,K
K2
KCG(l)
KM
KCH
KCG(u)
D
KS Shaftsbury formation
KCB Boulder Creek formation
KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
Rev D M Y Revision Description Drn Des App
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
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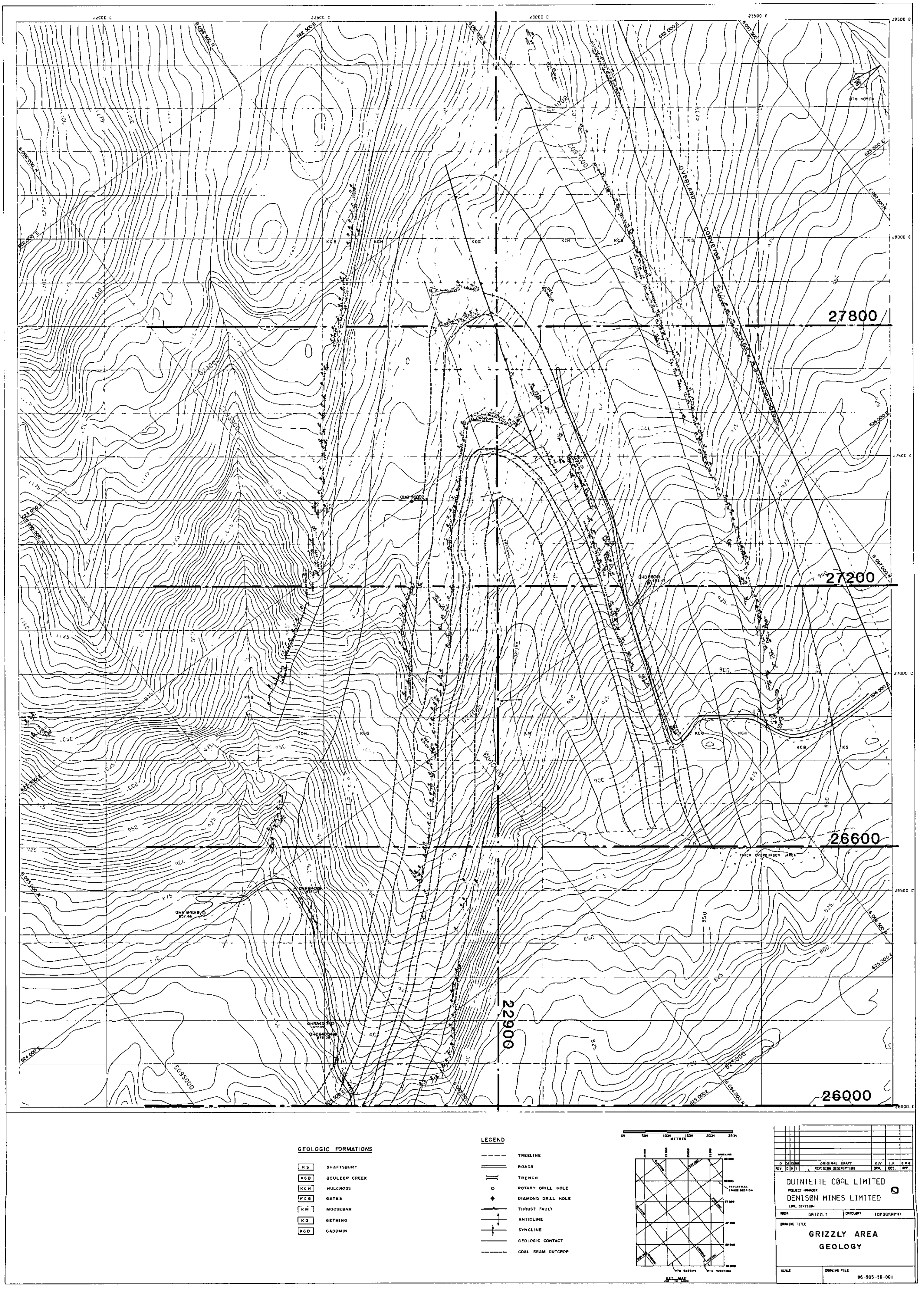
Rev.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26000
22900
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KS
KCB
KCH
KCG
KM
KCO
THICK OVERBURDEN AREA
GEOLOGIC FORMATIONS
KS SHAFTSBURY
KCB BOULDER CREEK
KCH HULCROSS
KCG GATES
KM MOOSEBAR
KG GETHING
KCD CADOMIN
LEGEND
TREELINE
ROADS
TRENCH
ROTARY DRILL HOLE
DIAMOND DRILL HOLE
THRUST FAULT
ANTICLINE
SYNCLINE
GEOLOGIC CONTACT
COAL SEAM OUTCROP
KEY MAP
ORIGINAL DRAFT
REV. REVISION DESCRIPTION DRN. DES. APP.
QUINTETTE COAL LIMITED
PROJECT MANAGER
DENISON MINES LIMITED
COAL DIVISION
AREA GRIZZLY
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GEOLOGY
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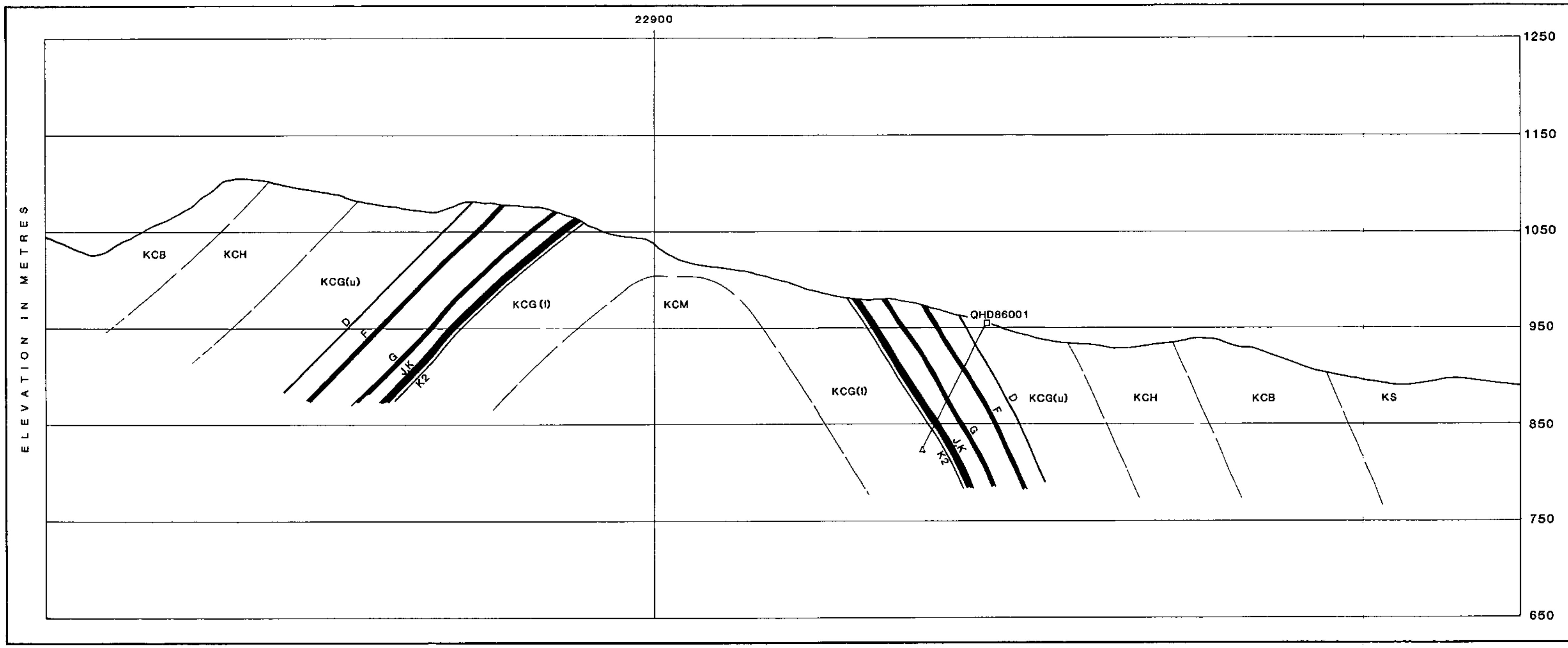

KS	Shaftsbury formation
KCB	Boulder Creek formation
KCH	Hulcross formation
KCG	Gates formation
KM	Moosebar formation
KG	Gething formation

- D — COAL SEAM
- FORMATION CONTACT
- FAULT
- SYNCLINAL AXIS
- ANTICLINAL AXIS
- QHD86007 — DRILL HOLE

0 50 100 200
METRES

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

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COAL DIVISION

Area GRIZZLY Category GEOLOGY

Drawing Title

CROSS-SECTION
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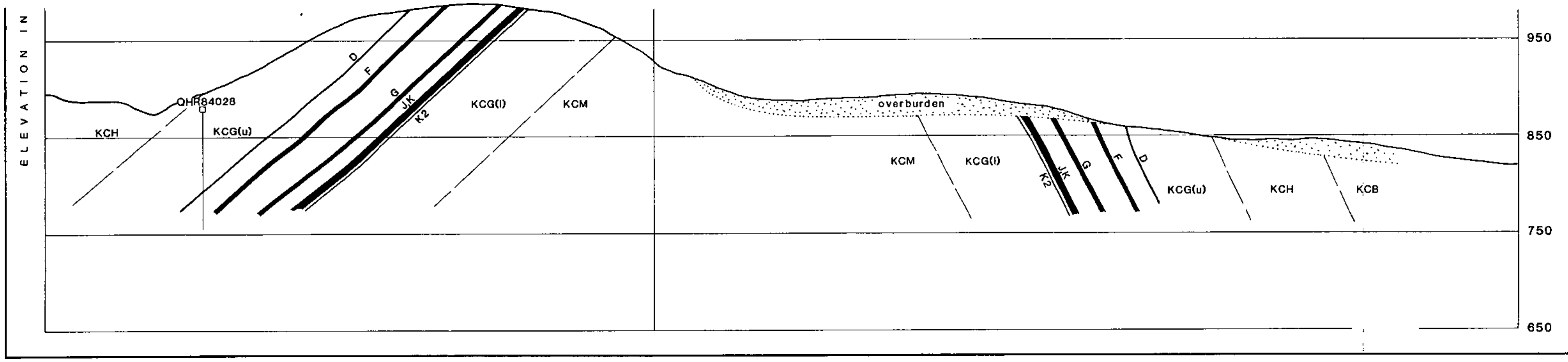

0 50 100 200
METRES

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

QUINTETTE COAL LIMITED

Project Manager
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COAL DIVISION

Area GRIZZLY Category GEOLOGY

Drawing Title

CROSS-SECTION
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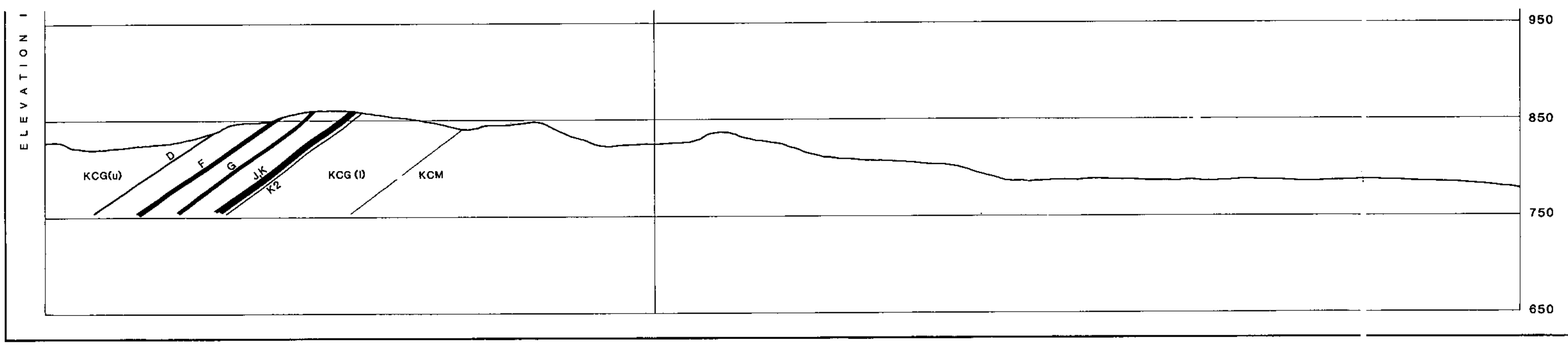

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METRES

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

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COAL DIVISION

Area GRIZZLY Category GEOLOGY

Drawing Title

CROSS-SECTION
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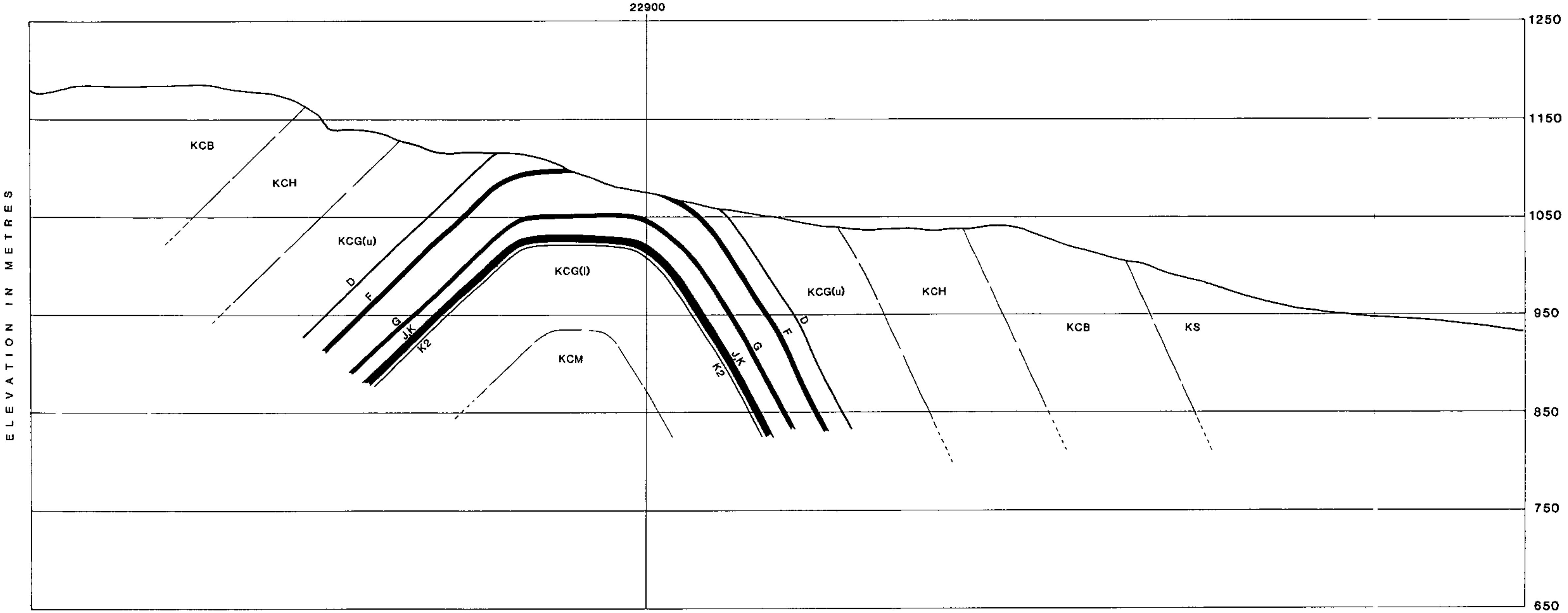

KS	Shaftsbury formation
KCB	Boulder Creek formation
KCH	Hulcross formation
KCG	Gates formation
KM	Moosebar formation
KG	Gething formation

D COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE

0 50 100 200
METRES

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

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Area GRIZZLY | Category GEOLOGY

Drawing Title
CROSS-SECTION
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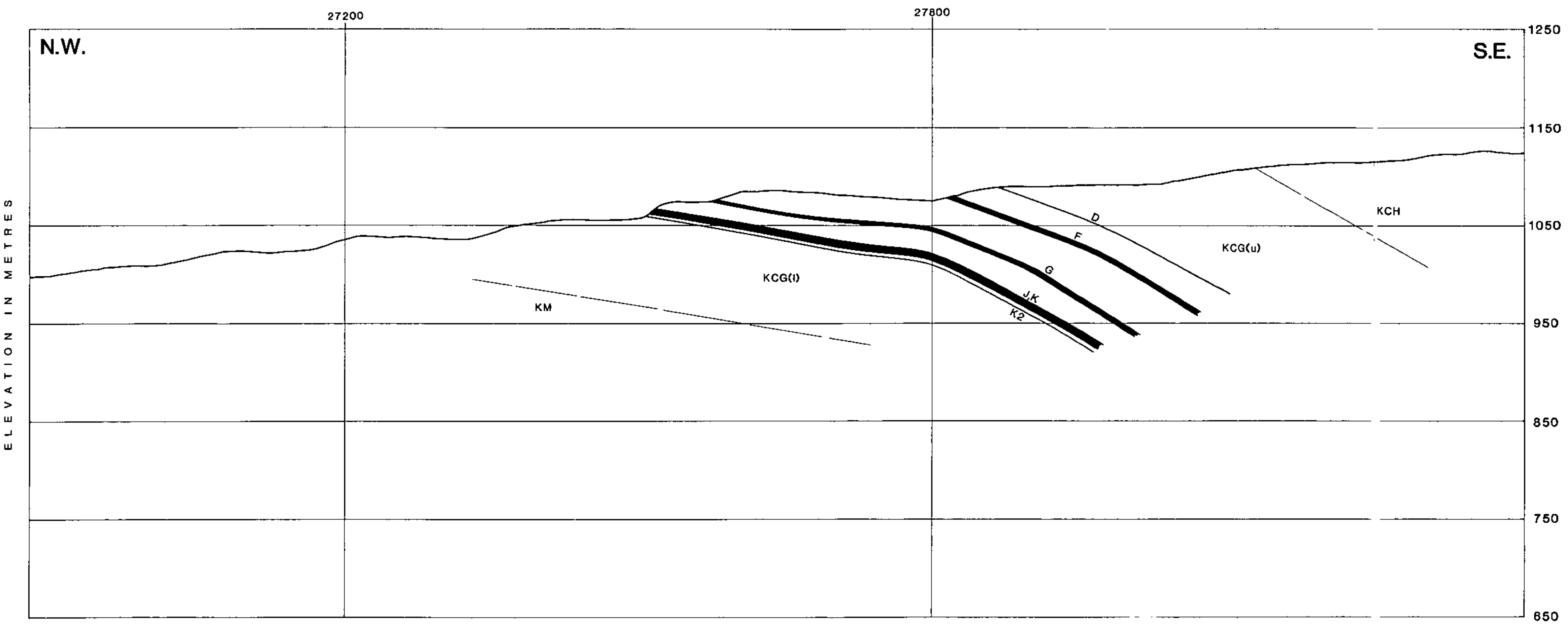

KS	Shaftsbury formation
KCB	Boulder Creek formation
KCH	Hulcross formation
KCG	Gates formation
KM	Moosebar formation
KG	Gething formation

D COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE

0 50 100 200
METRES

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

QUINTETTE COAL LIMITED
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Area GRIZZLY | Category GEOLOGY

Drawing Title
LONGITUDINAL
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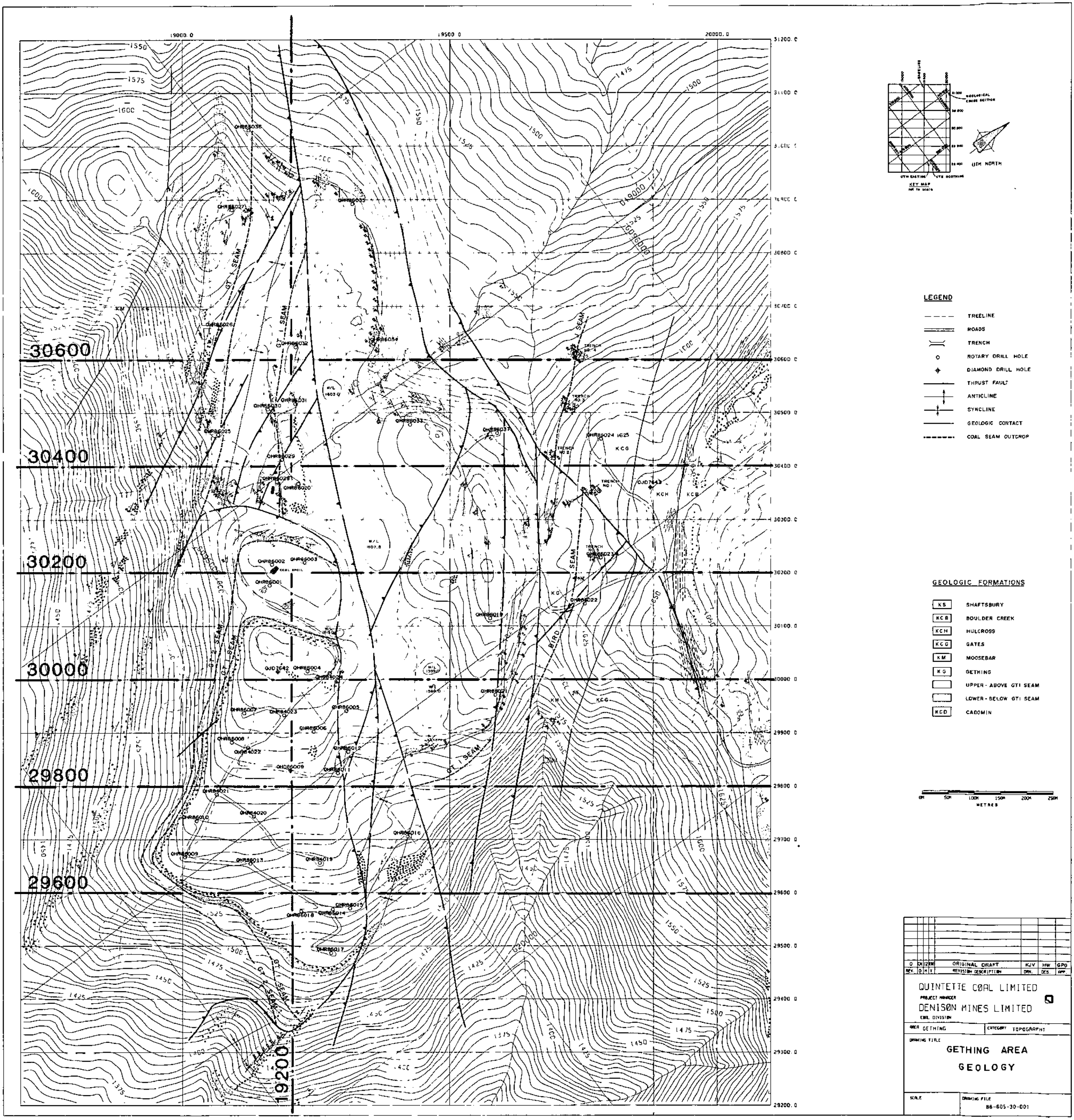

LEGEND
TREELINE
ROADS
TRENCH
ROTARY DRILL HOLE
DIAMOND DRILL HOLE
THRUST FAULT
ANTICLINE
SYNCLINE
GEOLOGIC CONTACT
COAL SEAM OUTCROP
GEOLOGIC FORMATIONS
KS SHAFTSBURY
KCB BOULDER CREEK
KCH HULCROSS
KCG GATES
KM MOOSEBAR
KG GETHING
UPPER - ABOVE GT1 SEAM
LOWER - BELOW GT1 SEAM
KCD CADOMIN
0 50M 100M 150M 200M 250M
METRES
KEY MAP
UTM NORTH
GT 1 SEAM
GT 2 SEAM
BIRD SEAM
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29600
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30000
30200
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30600
0 ORIGINAL DRAFT KJV HW GPG
REV. REVISION DESCRIPTION DRN. DES. APP.
QUINTETTE COAL LIMITED
PROJECT MANAGER
DENISON MINES LIMITED
COAL DIVISION
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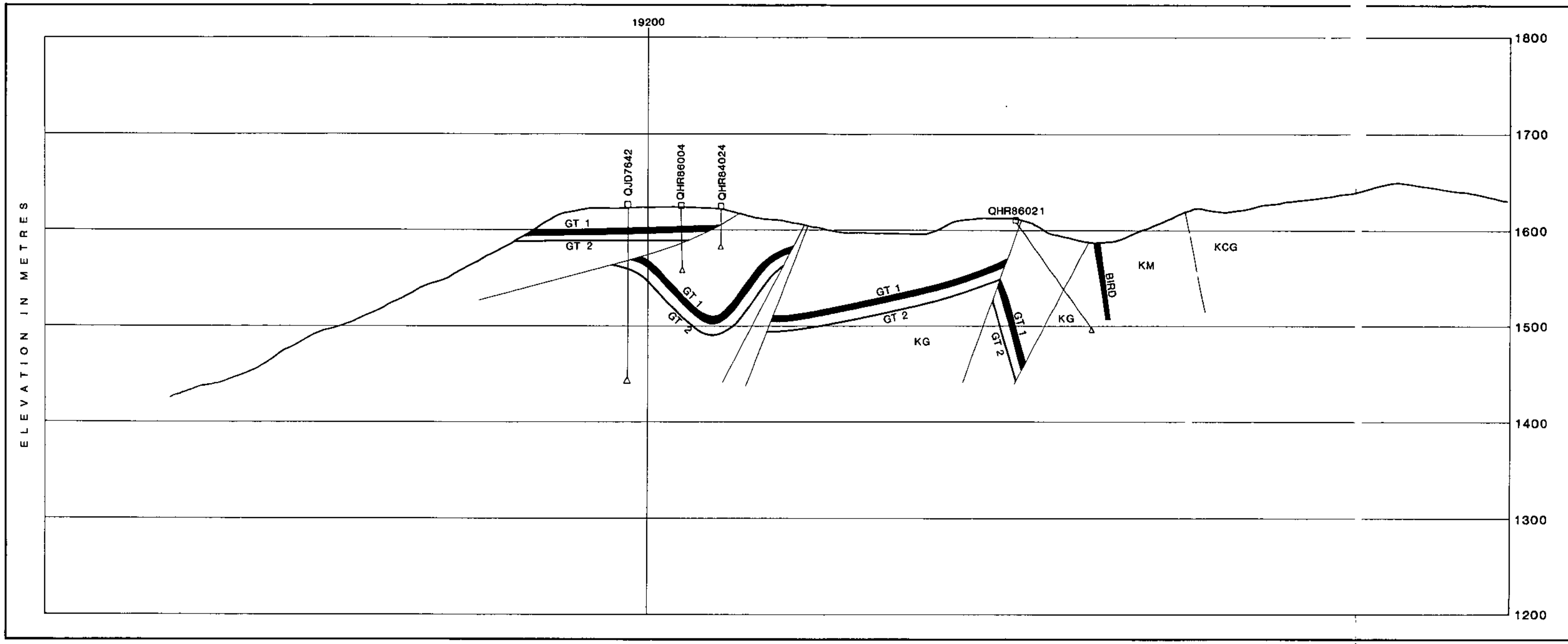

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

QUINTETTE COAL LIMITED

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COAL DIVISION

Area GETHING | Category GEOLOGY

Drawing Title

CROSS-SECTION

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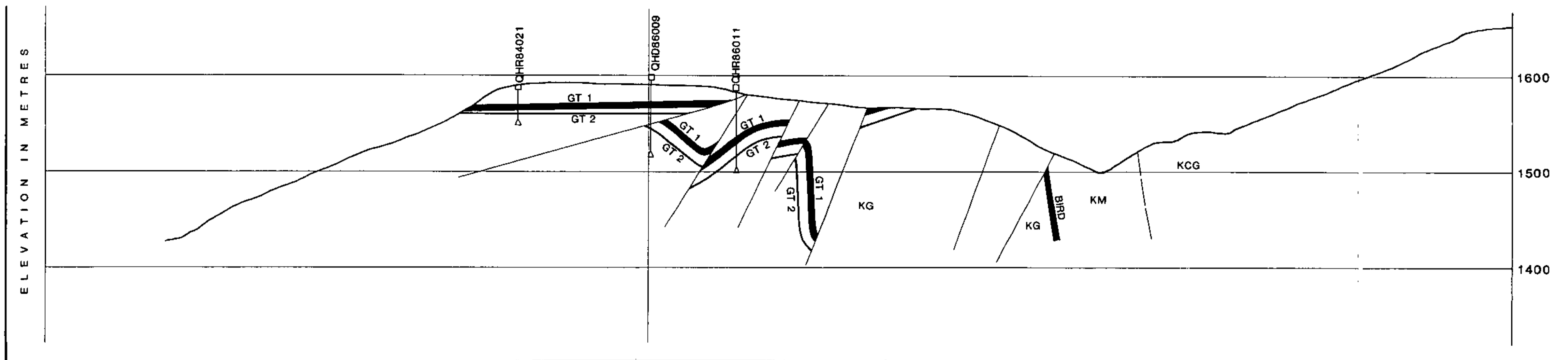

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

QUINTETTE COAL LIMITED

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COAL DIVISION

Area GETHING | Category GEOLOGY

Drawing Title

CROSS-SECTION

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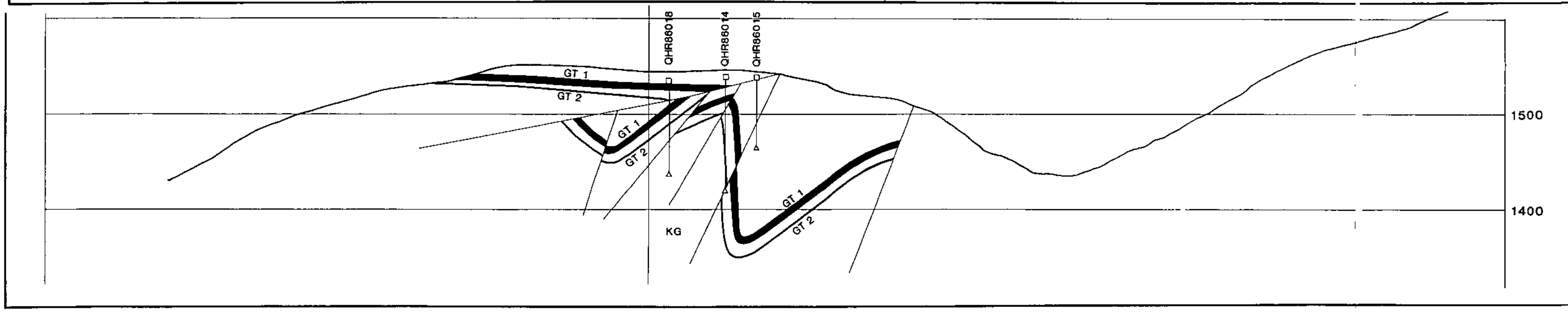

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.

QUINTETTE COAL LIMITED

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COAL DIVISION

Area GETHING | Category GEOLOGY

Drawing Title

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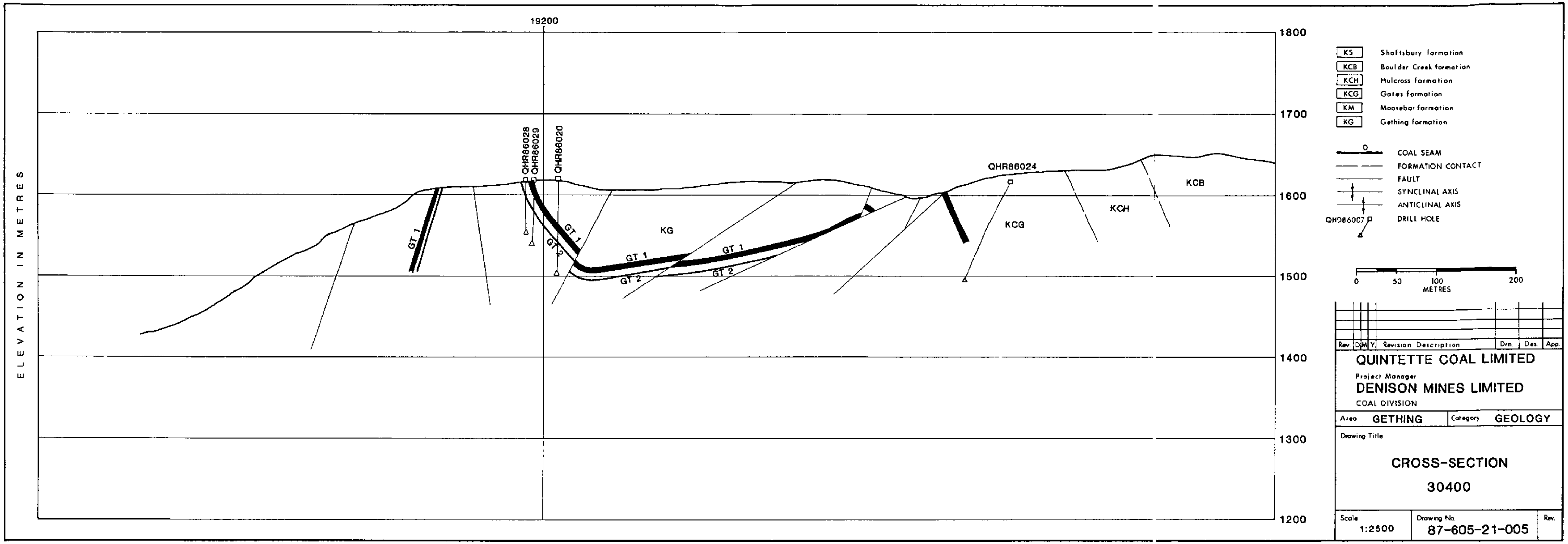
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GT 2
KG
KCG
KCH
KCB
KS Shaftsbury formation
KCB Boulder Creek formation
KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
Rev. D M Y Revision Description Drn. Des. App.
QUINTETTE COAL LIMITED
Project Manager
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COAL DIVISION
Area GETHING
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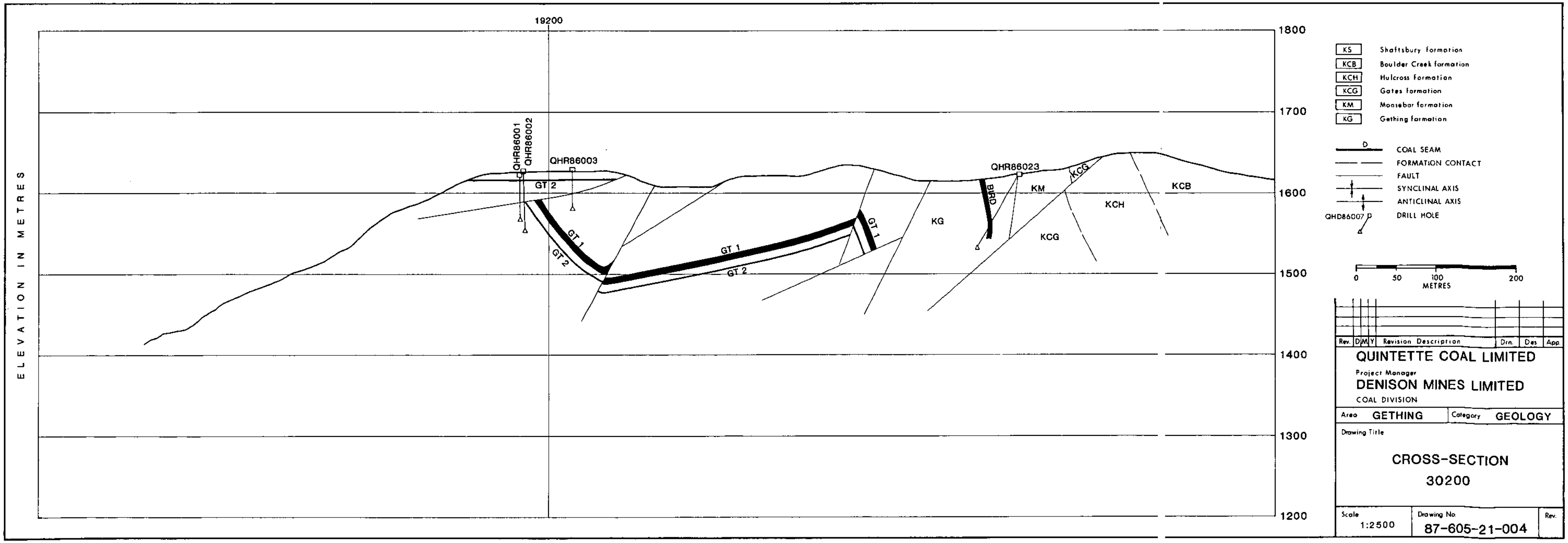
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QHR86003
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GT 2
BIRD
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KM
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KCB
KS Shaftsbury formation
KCB Boulder Creek formation
KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
Rev. D M Y Revision Description Drn. Des. App.
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
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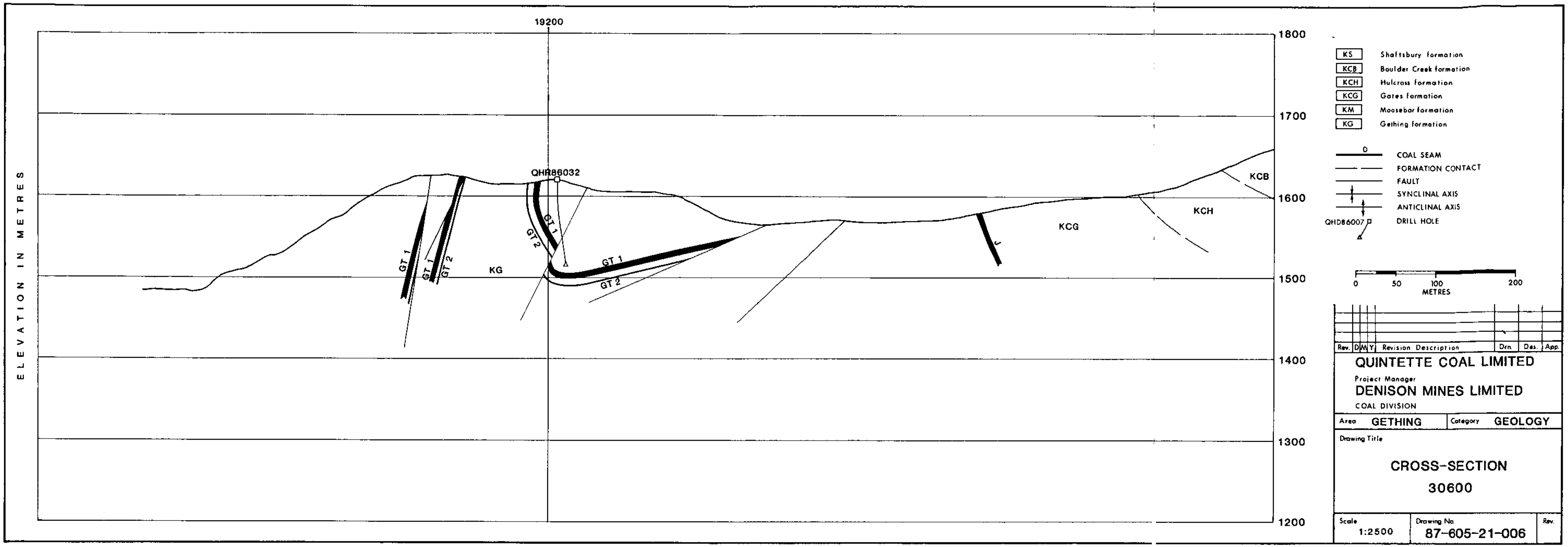
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KCB
J
KS Shaftsbury formation
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KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
Rev. D M Y Revision Description Drn. Des. App.
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
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Category GEOLOGY
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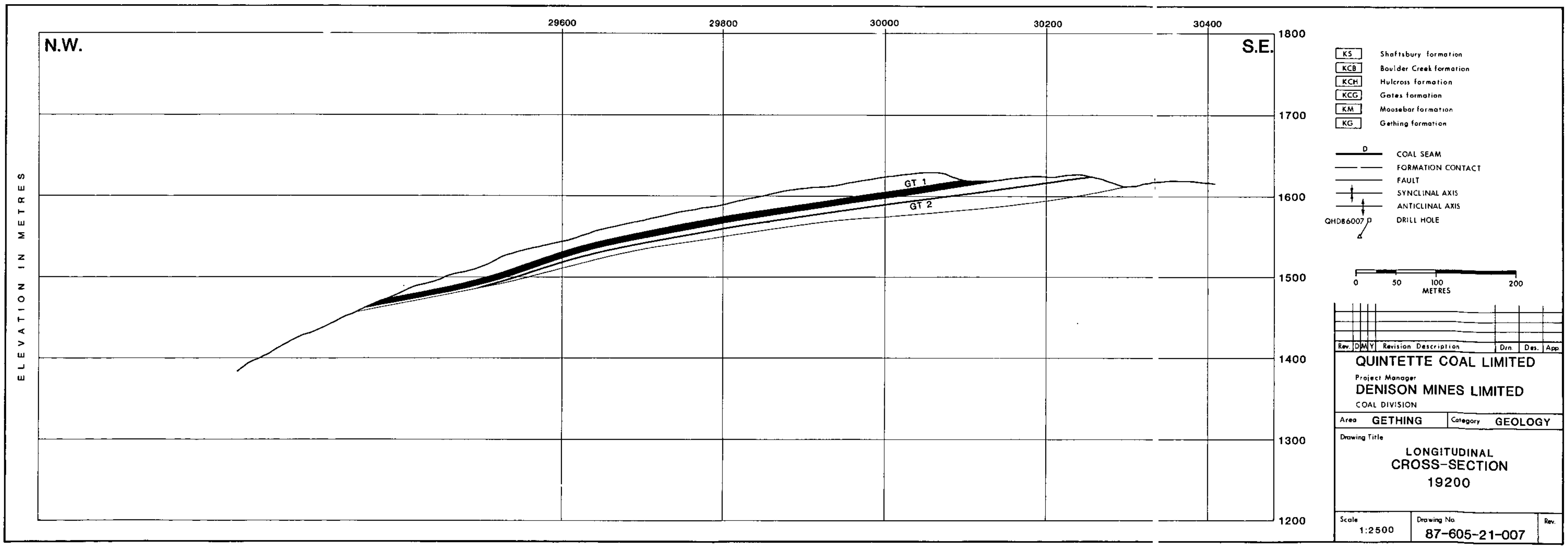
Rev.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N.W.
S.E.
ELEVATION IN METRES
1800
1700
1600
1500
1400
1300
1200
GT 1
GT 2
KS Shaftsbury formation
KCB Boulder Creek formation
KCH Hulcross formation
KCG Gates formation
KM Moosebar formation
KG Gething formation
COAL SEAM
FORMATION CONTACT
FAULT
SYNCLINAL AXIS
ANTICLINAL AXIS
QHD86007 DRILL HOLE
0 50 100 200
METRES
Rev. D M Y Revision Description Drn. Des. App.
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
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Category GEOLOGY
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CROSS-SECTION
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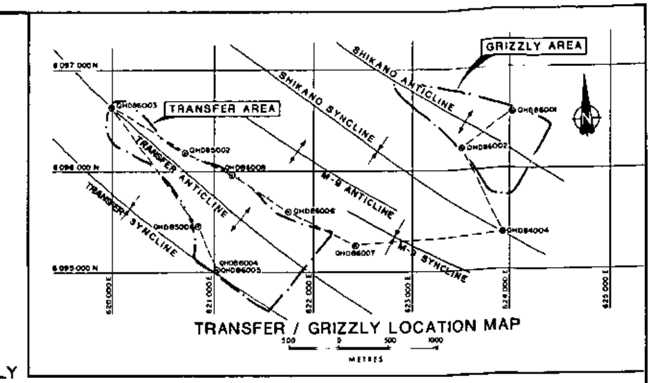

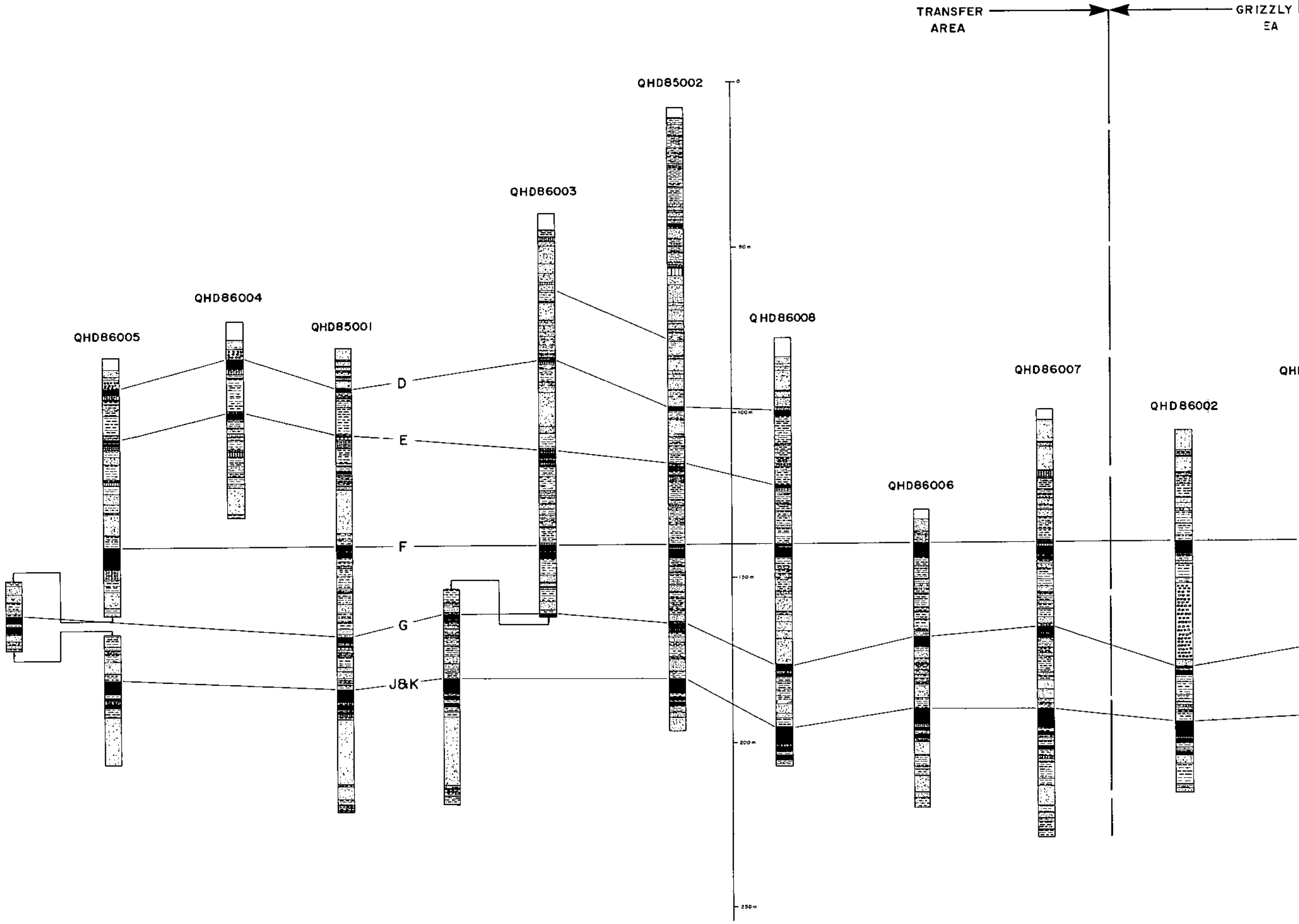

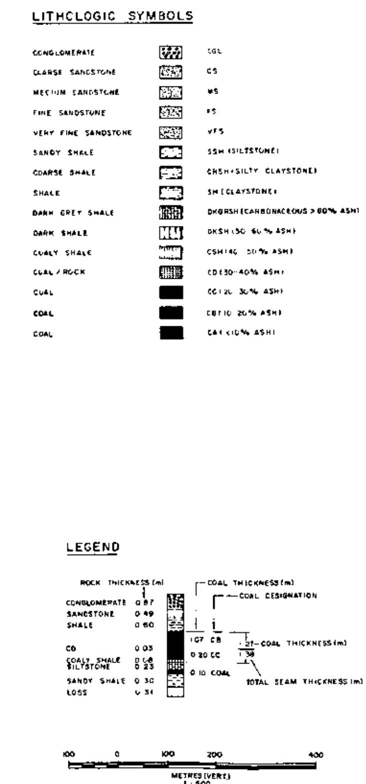

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	05	11	86	ORIGINAL DRAFT	KJV	IK/HW	GG

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area TRANSFER/GRIZZLY	Category CORRELATION

Drawing Title

TRANSFER / GRIZZLY AREA
GENERAL CORRELATION

Scale	Drawing No	Rev.
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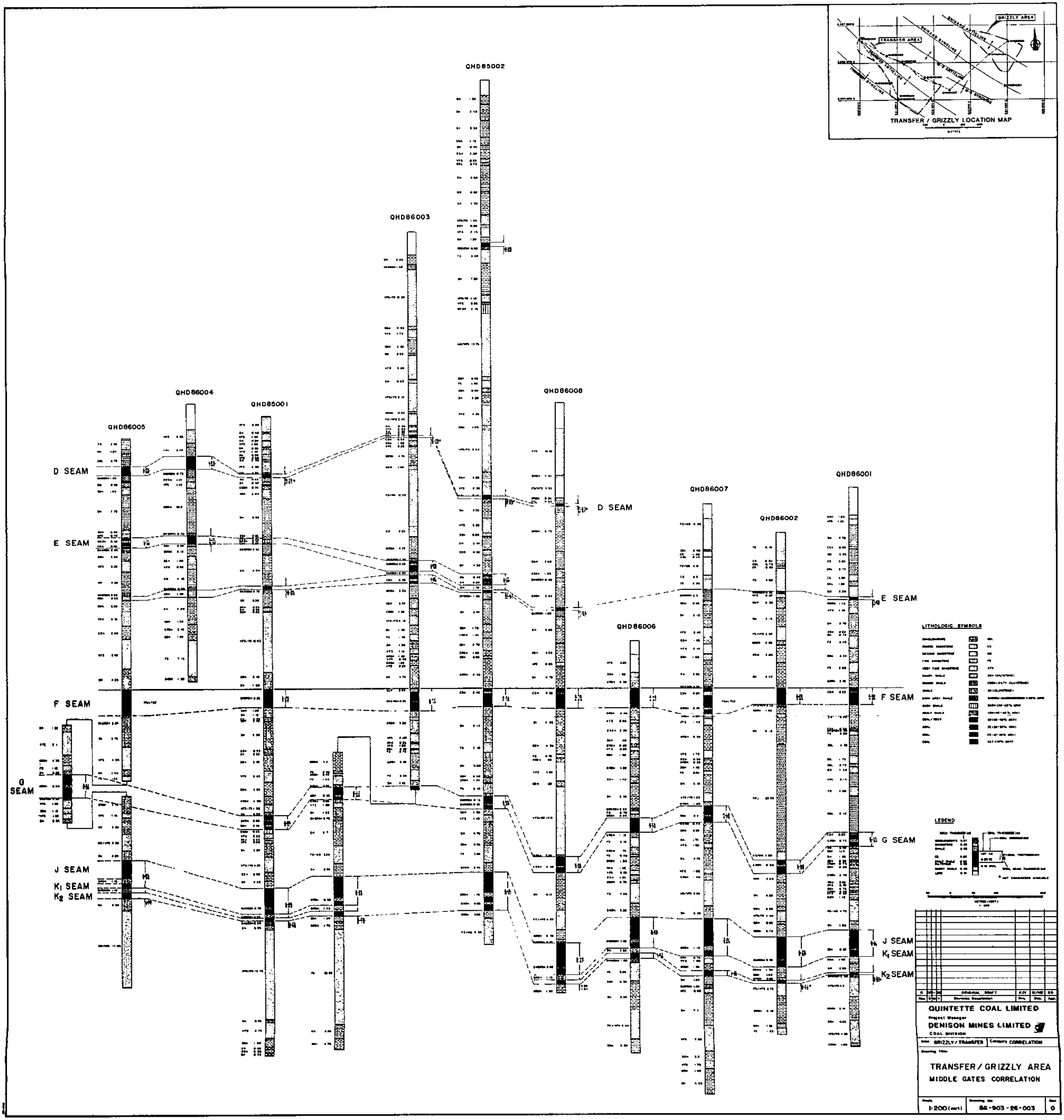
TRANSFER / GRIZZLY LOCATION MAP
TRANSFER AREA
GRIZZLY AREA
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QHD86003
QHD86004
QHD85001
QHD86005
QHD86008
QHD86007
QHD86002
QHD86006
QHD86001
D SEAM
E SEAM
F SEAM
G SEAM
J SEAM
K1 SEAM
K2 SEAM
LITHOLOGIC SYMBOLS
LEGEND
ORIGINAL DRAFT
QUINTETTE COAL LIMITED
DENISON MINES LIMITED
COAL DIVISION
GRIZZLY / TRANSFER
CORRELATION
TRANSFER / GRIZZLY AREA
MIDDLE GATES CORRELATION
1:200 (vert)
86-903-26-003
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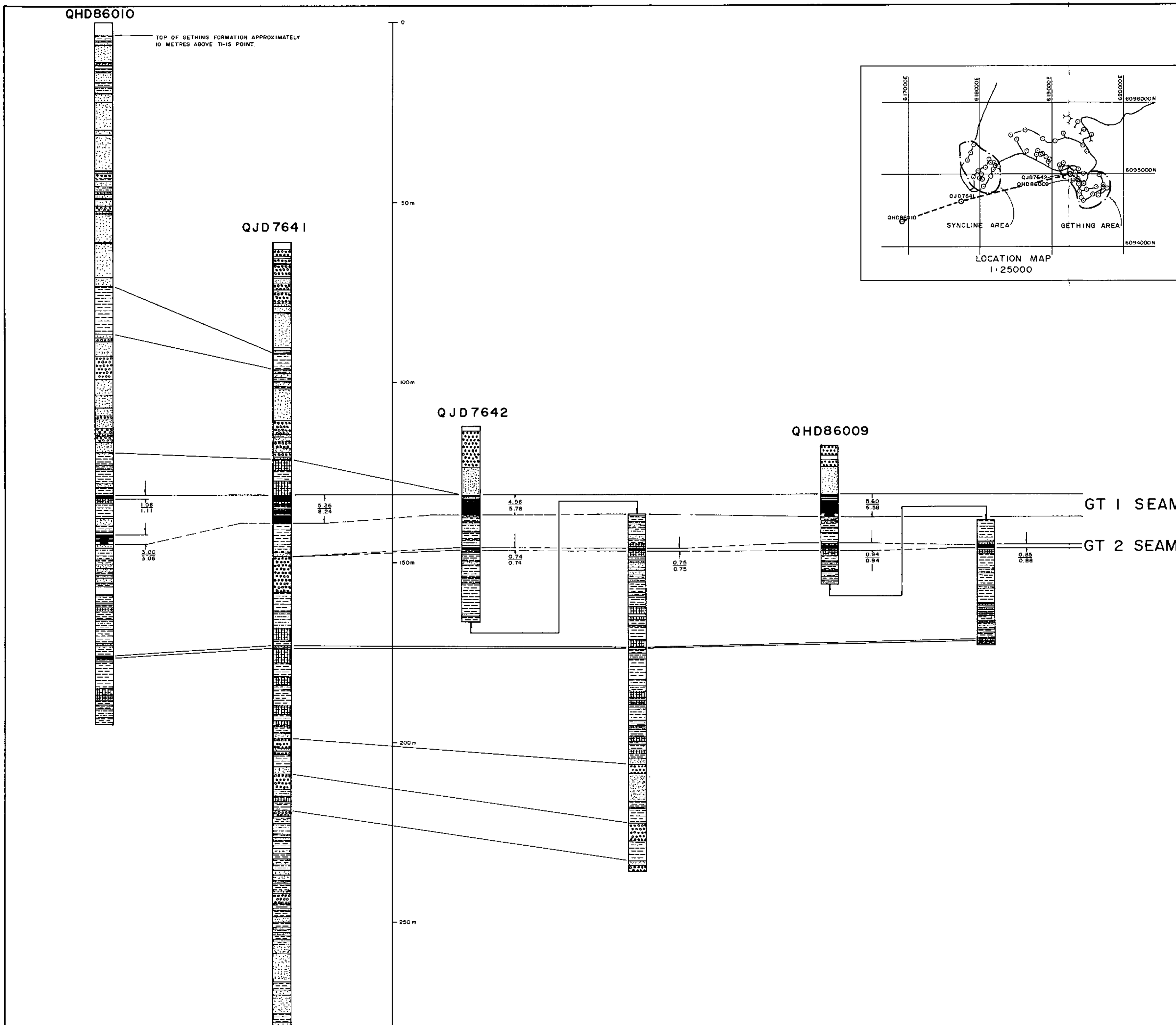
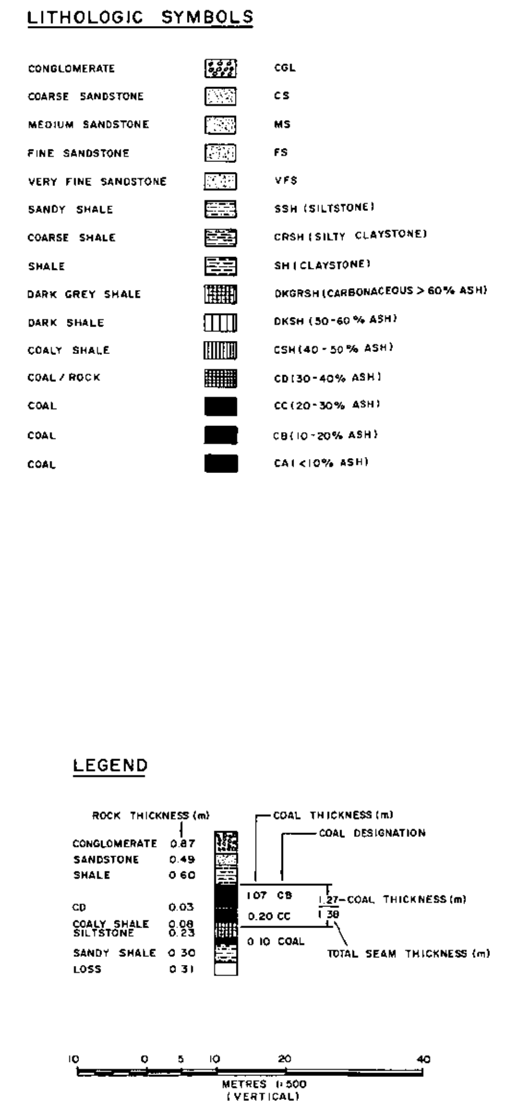




Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	05	11	86	ORIGINAL DRAFT	KJV	IK/HW	GG

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

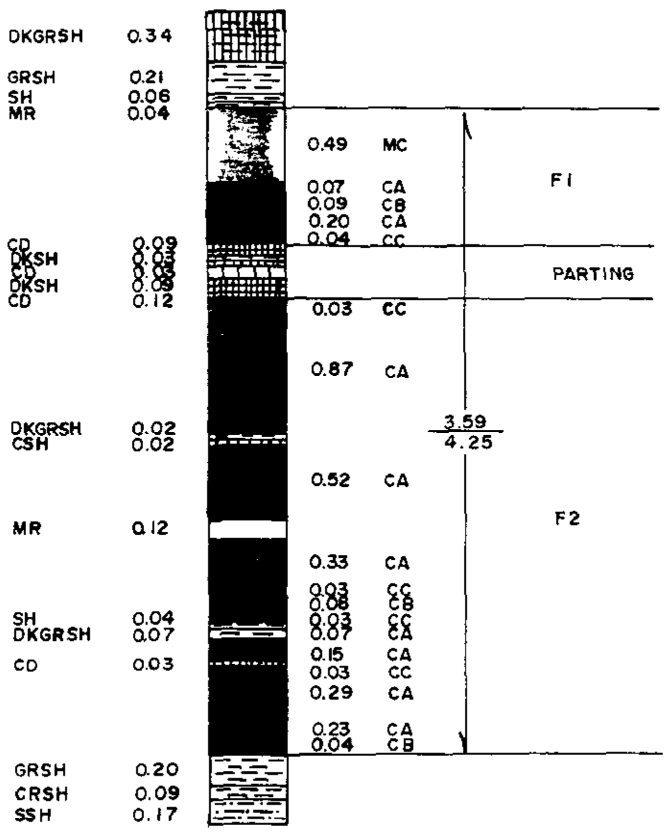
COAL DIVISION

Area GETHING | Category CORRELATION

Drawing Title

GETHING AREA
GENERAL CORRELATION

Scale 1:500 (vert.) | Drawing No. 86-605-26-002 | Rev. 0



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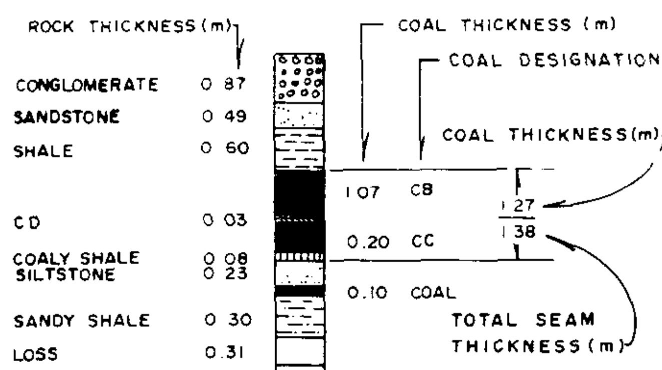

TRANSFER AREA

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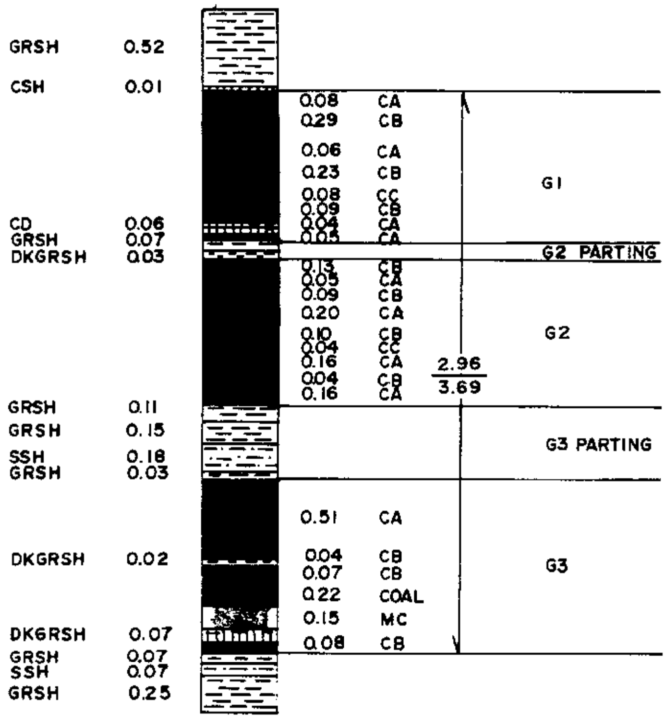
Design: HTB		TAKEN FROM QHD 86008
Drawn: KJV	Project Manager DENISON MINES LIMITED	
Scale: 1:50 (VERT.)	COAL DIVISION	FIGURE 2.5 — Rev. 0

BCIL 7/42 OCL



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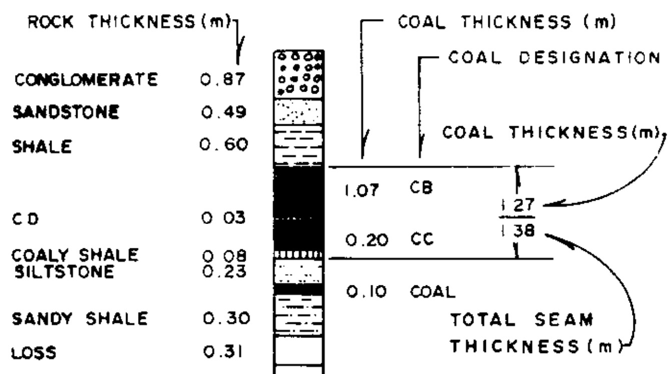

TRANSFER AREA

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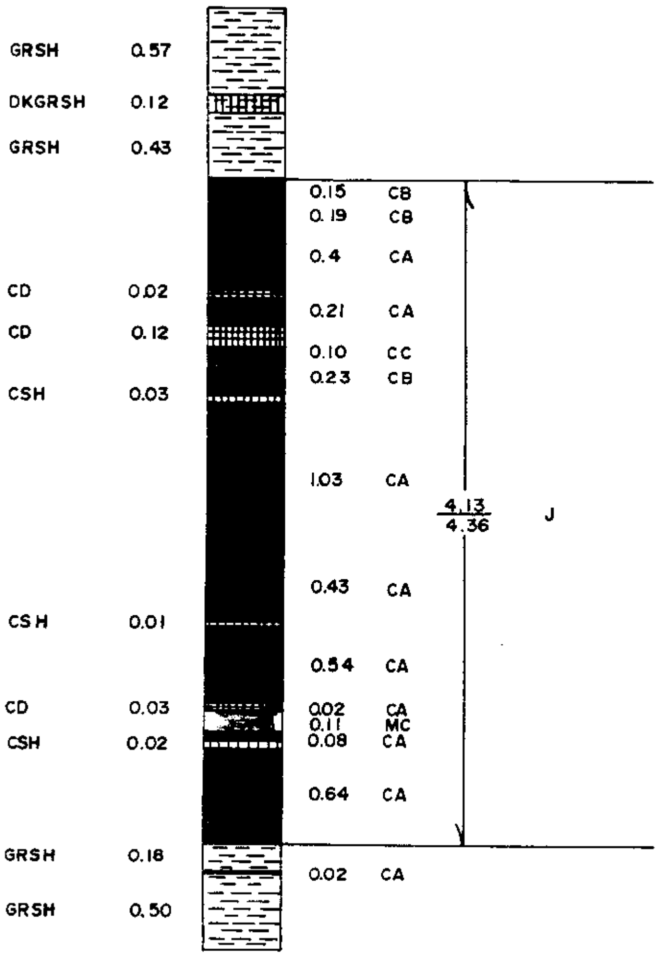
Drawn:	KJV	Project Manager DENISON MINES LIMITED COAL DIVISION	
Scale:	1:50 (VERT.)		FIGURE 2.6 — Rev. 0

BCIL 7742 OCL



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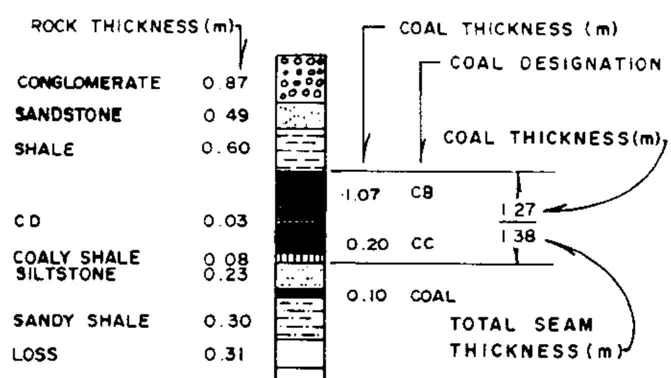

TRANSFER AREA

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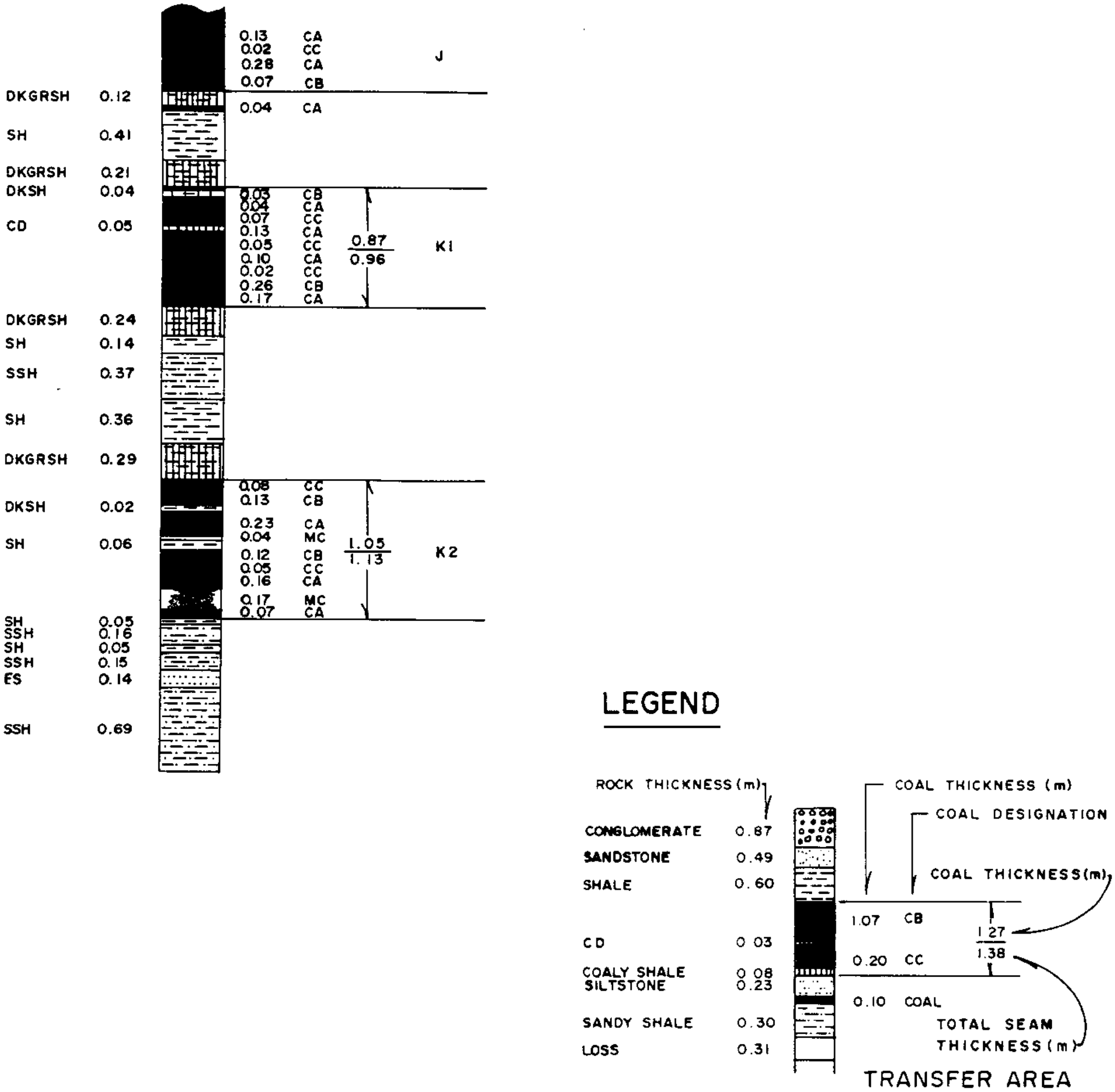
Drawn: KJV	Project Manager DENISON MINES LIMITED	TAKEN FROM QHD 85002
Scale: 1:50 (VERT.)	COAL DIVISION	FIGURE 2.7 — Rev. 0



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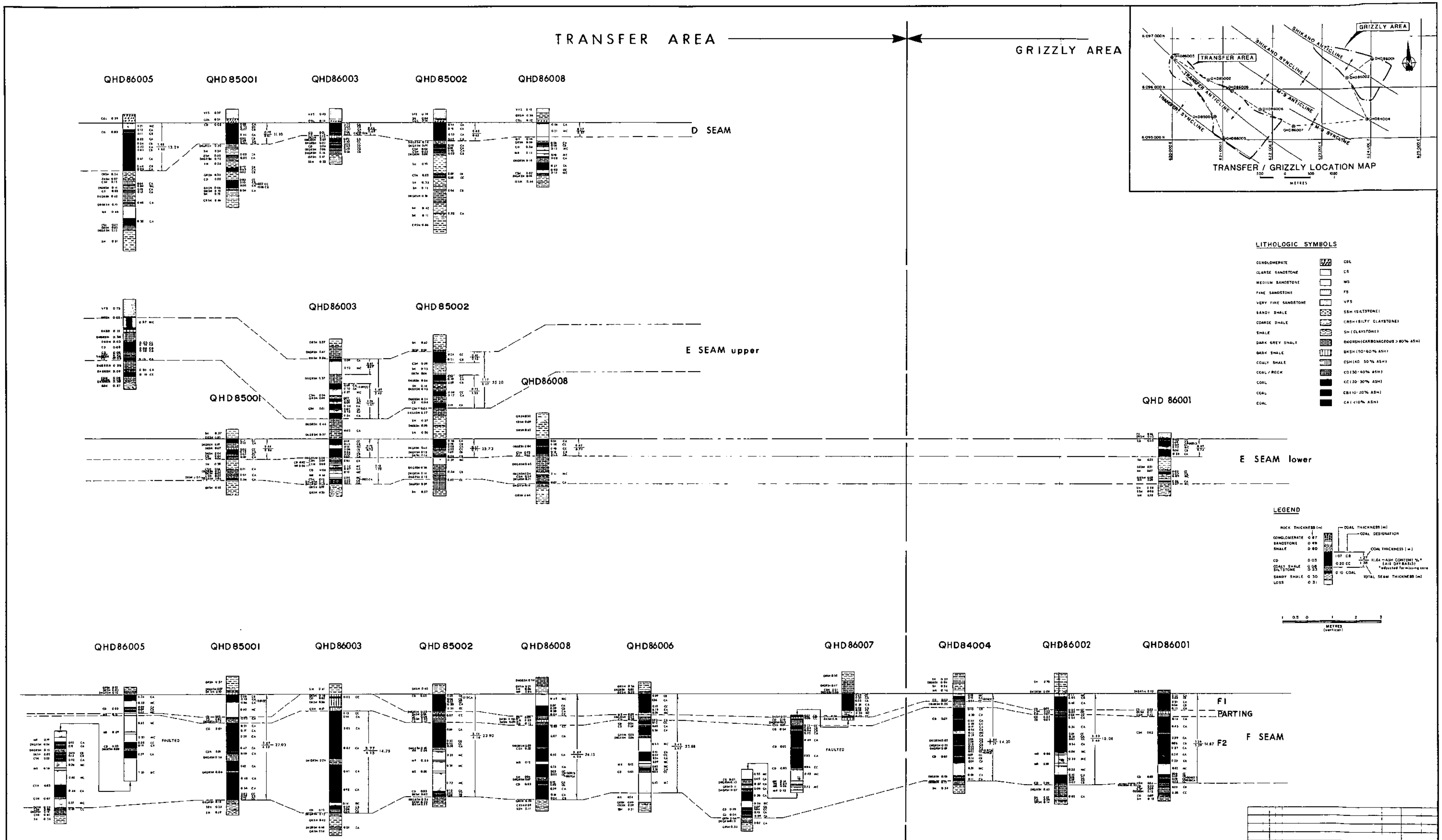
Design: HTB		TAKEN FROM QHD 86003
Drawn: KJV	Project Manager DENISON MINES LIMITED	
Scale: 1:50 (VERT.)	COAL DIVISION	FIGURE 2.8 — Rev. 0

BCIL 7/42 QCL



0	05	11	86	ORIGINAL DRAFT	EJT	HW/IK	GG
Rev	D	M	Y	Revision Description	Drn.	Des	App

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

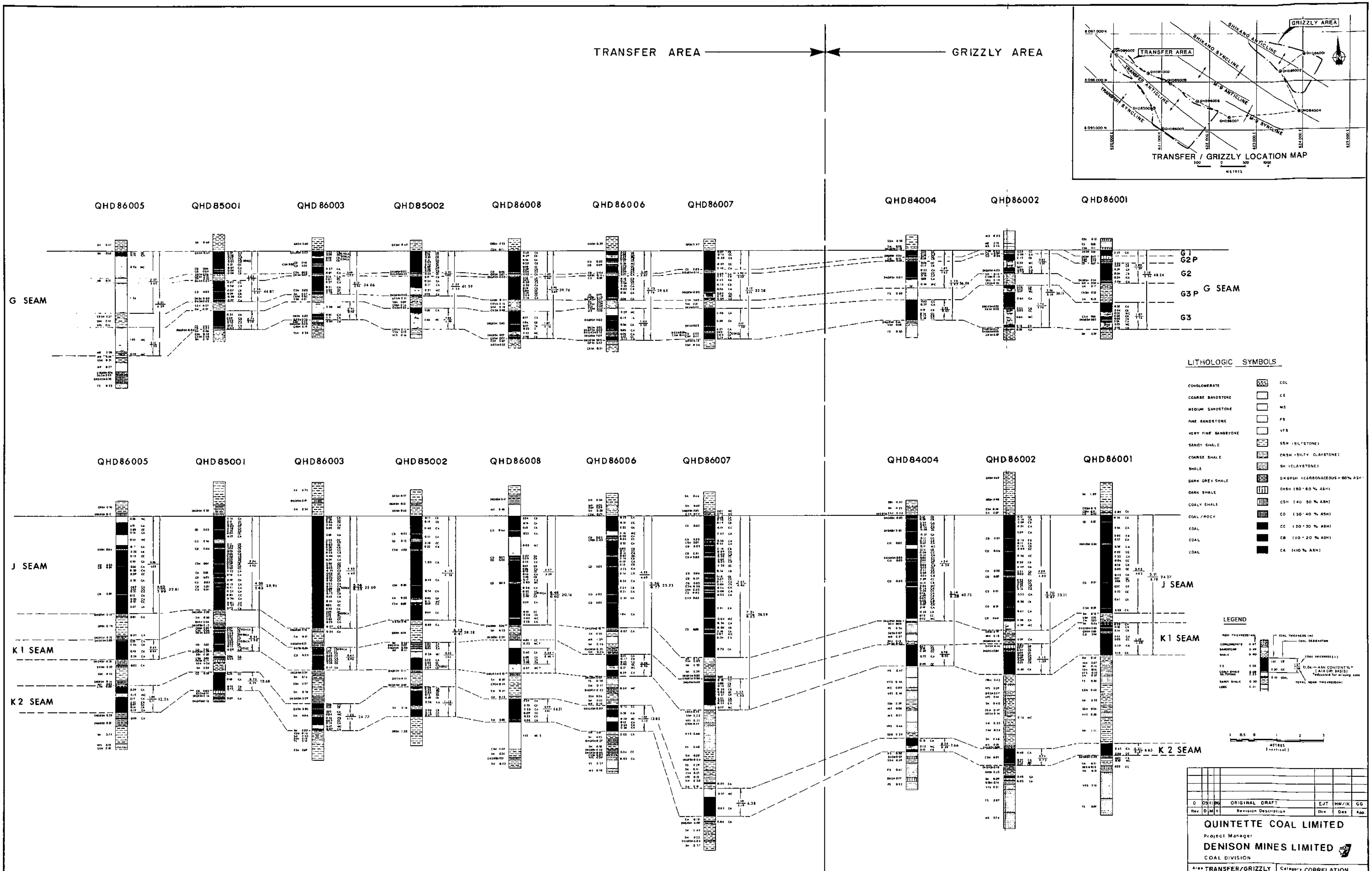
COAL DIVISION

Area TRANSFER/GRIZZLY | Category CORRELATION

Drawing Title

TRANSFER / GRIZZLY AREA
DETAILED SEAM CORRELATION
D, E, AND F SEAMS

Scale 1:50(vert.) | Drawing No 86-903-26-001 | Rev. 0



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Rev	D	M	Y	Revision Description	Drn	Des	App

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

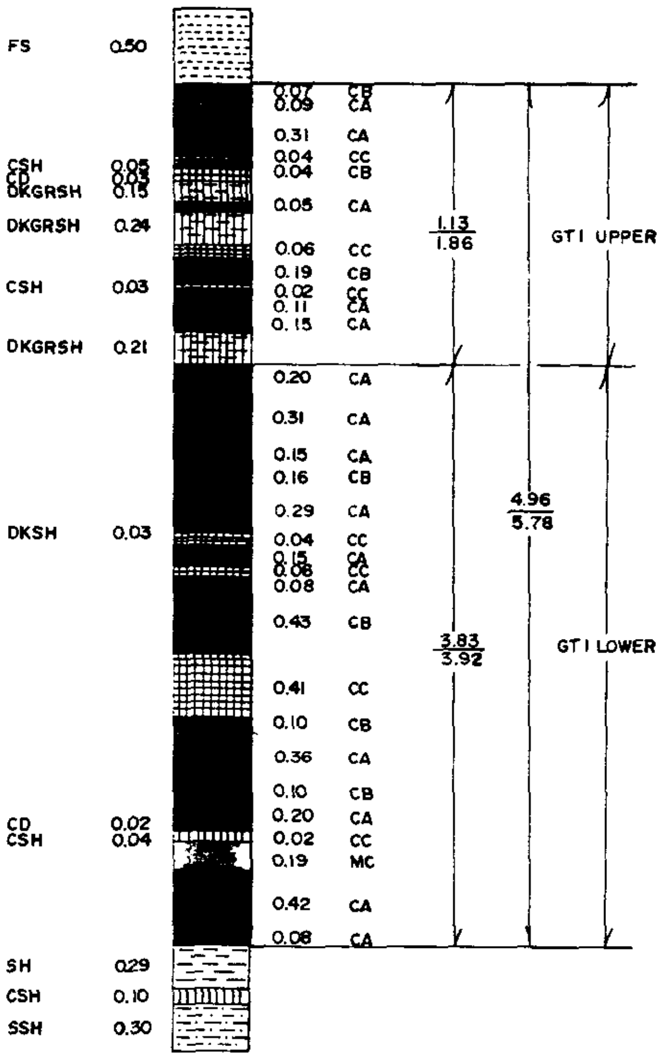
COAL DIVISION

Area TRANSFER/GRIZZLY | Category CORRELATION

Drawing Title

TRANSFER / GRIZZLY AREA
DETAILED SEAM CORRELATION
G, J AND K SEAMS

Scale 1:50 (vert.) | Drawing No 86-903-26-002 | Rev 0



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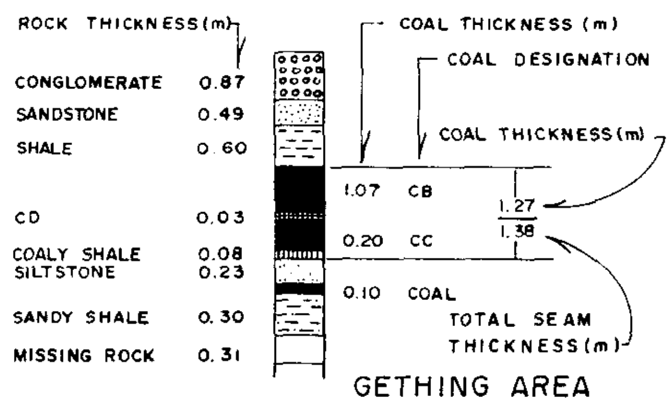
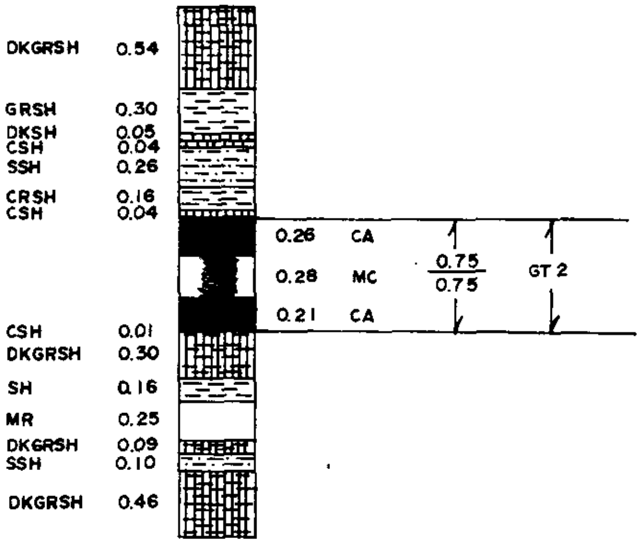


GETHING AREA

Date: MARCH 09, 1987	QUINTETTE COAL LIMITED	TYPICAL SECTION OF GT1 SEAM
Design: HTB		TAKEN FROM QJD 7642
Drawn: DKL	Project Manager	
Scale: 1:50 (VERT)	DENISON MINES LIMITED COAL DIVISION	Drawing No. FIGURE 2.9 — Rev. 0



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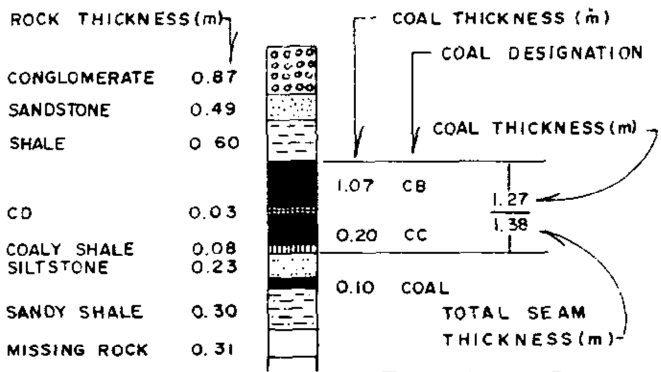
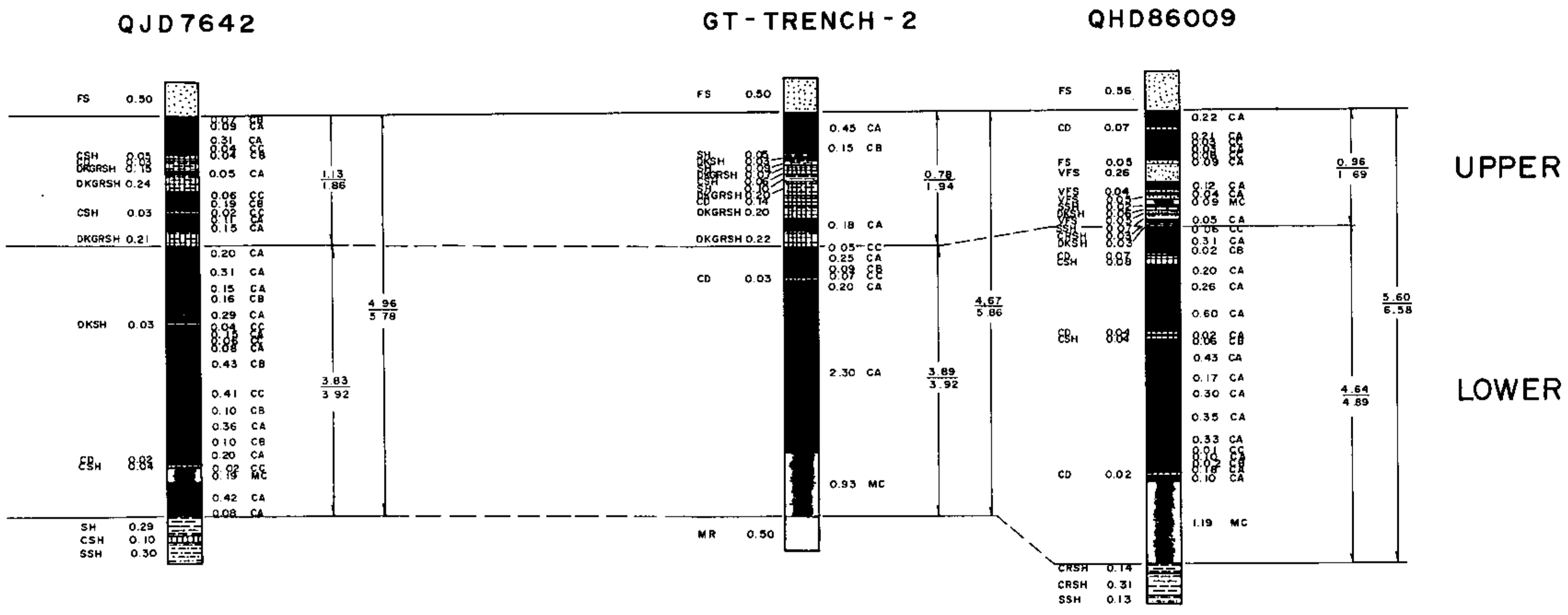
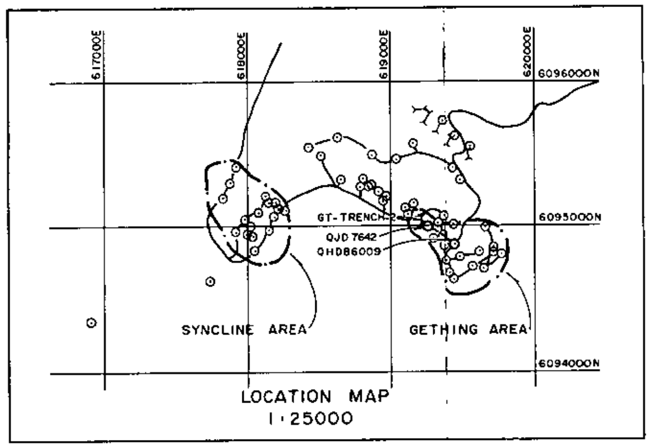


GETHING AREA

Date: MARCH 09, 1987	QUINTETTE COAL LIMITED	TYPICAL SECTION OF GT 2 SEAM TAKEN FROM QJD 7642	
Design: HTB			
Drawn: DKL	Project Manager DENISON MINES LIMITED COAL DIVISION		
Scale: 1:50 (VERT.)		Drawing No. FIGURE 2.10	Rev. 0

BCIL 7742 OCL

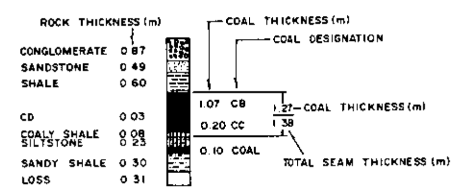


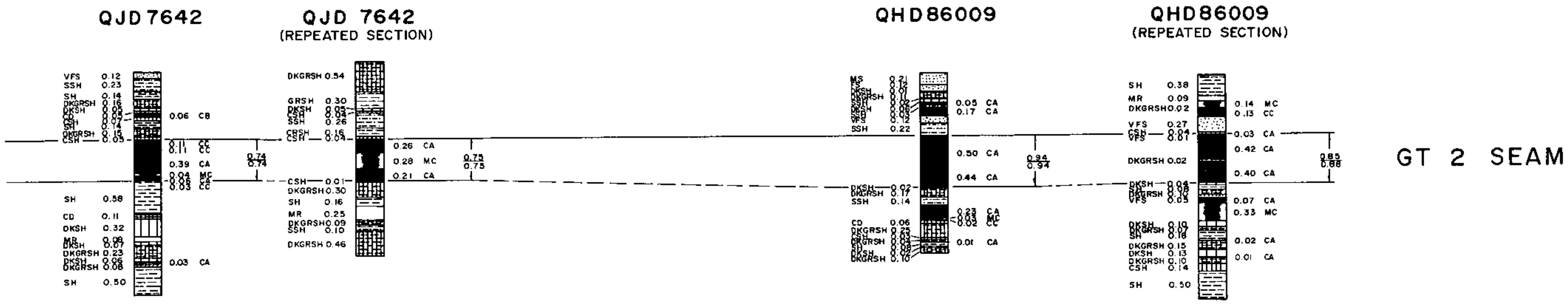


LITHOLOGIC SYMBOLS

CONGLOMERATE	CGL
COARSE SANDSTONE	CS
MEDIUM SANDSTONE	MS
FINE SANDSTONE	FS
VERY FINE SANDSTONE	VFS
SANDY SHALE	SSH (SILTSTONE)
COARSE SHALE	CRSH (SILTY CLAYSTONE)
SHALE	SH (CLAYSTONE)
DARK GREY SHALE	DKGRSH (CARBONACEOUS >60% ASH)
DARK SHALE	DKSH (50-60% ASH)
COALY SHALE	CSH (40-50% ASH)
COAL/ROCK	CD (30-40% ASH)
COAL	CC (20-30% ASH)
COAL	CB (10-20% ASH)
COAL	CA (<10% ASH)

LEGEND





Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	05	11	86	ORIGINAL DRAFT	KJV	IK/HW	GG

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area GETHING | Category CORRELATION

Drawing Title

GETHING AREA

DETAILED SEAM CORRELATION

GT I AND GT2 SEAMS

Scale 1:50 (vert.) | Drawing No. 86-605-26-001 | Rev. 0

3.0 COAL QUALITY

3.1 INTRODUCTION AND SUMMARY

During the course of the exploration work on the Grizzly/Transfer area, a number of coal samples were collected from drill cores. Laboratory analysis and washability studies were carried out on these samples in order to evaluate their properties, primarily as a source of coking coal. This section will review and discuss the results of these testing programs.

Table 3.1 summarizes the number of drill cores that have been taken from each seam in the Grizzly/Transfer area and used in the evaluation of quality. The prime criterion for the use of drill core results was usually 80% or greater core recovery. Where possible, extensive analytical studies were conducted on all samples and analysis included the following:

- Proximate Analysis
- Sulphur Content
- Ash Analysis
- Calorific Value
- Ash Fusibility
- Free Swelling Index (F.S.I.)
- Dilatation and Gieseler Fluidity
- Hardgrove Grindability Index
- Petrographic Analysis
- Washability Testing

Samples were from about 60 mm diameter core samples. Analyses have been performed on coal from all seams included in the potential mineable resources of the Grizzly/Transfer area.

The coal seams within the deposit can be ranked according to the ASTM method of coal classification as low volatile bituminous class. Using vitrinite reflectance, a more reliable method of classifying coal rank where a reflectance of 1.51 separates mvb and lvb coals, all seams but K can be classified as mvb, and K as lvb coal. On a seam-by-seam basis, Grizzly/Transfer coal is a little higher in ASTM rank than the Mesa, Wolverine or Babcock deposits and is more similar to Shikano deposits. Table 3.2 summarizes these results for each pit using vitrinite mean maximum reflectance as the prime measure of coal rank.

As might be expected, the rank of the coal increases slightly towards the basal level J and K seams, K seam being a low volatile bituminous (lvb) rank in Grizzly/Transfer.

Table 3.3 summarizes the current Quintette product specifications and compares them to expected Grizzly/Transfer average product quality. On an average basis the Grizzly/Transfer production meets the Quintette product quality specifications, except possibly for volatile matter which is close but slightly lower than specification. This would not be a problem overall as production specifications will be met since at no time will coal from any one seam comprise the plant feed. Grizzly/Transfer would be developed in conjunction with other pits and fed to the plant in a blend from a number of pits. Slight variations in product coal quality may occur but such variations are controlled by blending at the plant or port, to ensure cargo quality specifications are met.

Washability data was used with a wash plant simulator computer program to predict metallurgical coal yields. Since yield is a function of both seam washability characteristics and the ash content of the coal, equations were derived to relate the calculated yield to the plant feed ash level for each seam in each pit. Similar equations have been derived for coals currently mined in the Mesa and Wolverine deposits and are being used successfully to predict actual plant results. The empirical relationships between yield and ash for each seam permit straight forward calculation of expected yields where ash levels of feed are known, and permits easy adjustment for out-of-seam dilution, partings, breaker rejects, etc. Another advantage to this approach is that more reliable ash data are available than reliable float/sink data. The resulting increased density of yield results should lead to more reliable forecasting and is also amenable to advanced computer geostatistical averaging techniques such as Kriging.

3.2 GRIZZLY/TRANSFER RAW COAL QUALITY

Mean values of drill-core raw coal quality are summarized in Table 3.4 from detailed results in Appendix I, Section 3.1. Analyses summarized include proximate residual moisture (RM), ash and volatile matter (VM), free swelling index (FSI), sulphur (S), phosphorous (P), calorific value (CV), and Hardgrove Grindability Index (HGI).

Raw coal residual moisture values appear to be in line with those expected throughout the Quintette pits, about 0.5 to 0.7%. Volatile matter on a DMMF basis indicates the weighted average Grizzly/Transfer coal is a low volatile bituminous coal as ranked by ASTM. FSI levels are lower than would be expected for clean coal, since the excessive amount of ash in the samples depresses the FSI. Sulphur in D seam is higher than the other seam, but since it is not part of the reserves, this will not represent a problem. HGI values are in line with other experience in Quintette and indicate a relatively soft coal, somewhere between the hardness of Coal Valley and the Southeast BC coals. Phosphorous content in the two seams of raw coal analyzed appeared to be acceptable.

3.3 GRIZZLY/TRANSFER CLEAN COAL ANALYSES

This section will concentrate on examining the mean clean coal analysis of the drill core samples. Lab scale work was conducted at two commercial analytical laboratories, General Testing Laboratories and Cyclone Engineering Sales Limited. Drill core samples were used to produce a clean coal product by combining the same float-sink fractions from each sample to create the clean coal (see earlier section on procedures). This often resulted in a clean coal ash that was less than the current 9.5% Quintette specification.

3.3.1 Proximate and Ultimate Analyses

Proximate, sulphur and a few phosphorous analyses were conducted on drill core simulated clean coal. Table 3.5 contains mean values of these results.

Residual moistures (RM) of the clean coal samples was close to those currently being experienced in Quintette and found in other pits - around 0.5 to 0.7%. Mean ash level of the clean coal samples was slightly lower than the final specifications for Quintette coal. The volatile matter, on a DMMF basis, agreed with the raw coal values and indicated that these coals were all low volatile bituminous as classified by ASTM. The sulphur content of D seam was over the 0.5% quality specification of the product; however, since it will not be mined it will have no effect on the product quality.

3.3.2 Thermal Rheology

Gieseler fluidity, dilatation and free swelling index (FSI) thermal rheological testing was conducted on many of the drill cores taken from the proposed pit area. Details of these analyses appear in Appendix I, Section n3.1. A summary of the results appears in Table 3.6.

Inspection of the mean thermal rheology values for each seam in Table 3.6 indicates that the seams have caking (swelling and plastic) properties that would result in coking characteristics of these coals during the carbonization process. The weighed average maximum fluidity (12 ddpm) is similar to Canadian production coals with higher reflectance. It appears from review of the data from the Babcock, Mesa and Shikano pits, that the Grizzly/Transfer FSIs, fluidities and dilatations also tend to decrease towards the basal J and K seams.

Projections of coking properties of Grizzly/Transfer coal blended with the existing QCL product indicate that coking quality will be at least equivalent and probably better than the existing met product.

3.3.3 Ash Analysis, Ash Fusion and Calorific Value

Mean seam values of ash analysis and ash fusion appear in Tables 3.7 and 3.8. Detailed calorific values (which appear in Appendix I, Section 3.1) and ash content relationship, are seen graphically in Figure 3.1.

The results in Table 3.7 indicate that the base-to-acid ratio varies between seams in Grizzly/Transfer. The low base-to-acid weighted average ratio indicates that slagging is unlikely to be a problem at normal combustion furnace operating temperatures. Fouling should not be a problem as the Na2O + K2O content in the ash is less than 2.0%.

Results in Table 3.8 some variation in coal ash fusibility temperatures between seams in the Grizzly/Transfer area. However, on a weighted average fusibility of coal ash should not represent a problem in normal combustion furnace operations.

The calorific value results seen in Figure 3.1, indicate the usual linear relationship found between coal ash level and calorific value. The solid line in Figure 3.1 is a historical regression line derived from samples taken from a number of Quintette pits. Inspection of the figure indicates that the Grizzly/Transfer values are perhaps 100 kilocalories per kilogram higher than those for the average Quintette values. This is expected because of the slightly higher rank (ie. more carbon content) of the Grizzly/Transfer coals as compared to the other pits at Quintette. Normally oxidized (weathered) coal product would have calorific values up to 500 kilocalories per kilogram less than metallurgical coal value, which is represented by the solid line in the figure. Actual thermal coal production quality would occur somewhere between the solid and dashed line for the Grizzly/Transfer pits. Since the coal will be blended with other coals from Quintette, it is expected that the calorific value of the Grizzly/Transfer material clean coal will have no noticeable effect on the overall calorific value of the QCL clean coal product.

All regression equations had high levels of confidence (i.e. high correlation coefficient) and there were reasonable data points for F, G, J+K1 and K1K2, although not for D, or J alone. Only drill cores with about 80% recovery or greater were used in the regressions. The limit of confidence in the yield results is on average about ± 2 yield percent units.

On the figures, both the drill core and plant simulated ash/yield points fell together and were regressed together. Consequently, the regressions can be used to calculate either clean coal directly from insitu coal, or expected plant yield and clean coal using the mine planning procedure. In deriving the mine planning procedure results, the following criteria were used: 30 cm of 87% ash OSD; 30 cm loss of the mining section at $\leq$30% ash; and breaker rejects as a percentage of ROM material) = 0.5 x OSD + 0.1 x insitu ash. Rejects were estimated at 80% ash.

Yields projected in these figures are for metallurgical coal and the thermal plant yield is estimated by subtracting 9 yield percent units from the calculated metallurgical yield for a given plant feed ash. The 9% recognizes the fact that the fines (minus 0.15 mm) are currently sent to tailings as they have too high an ash to be recovered into the product.

3.5 GETHING COAL QUALITY

3.5.1 Raw Coal

Raw coal residual moisture appeared to be higher in the bulk sample than found throughout Quintette, 0.5 to 0.7%, and also higher than the QHD 86009 drill core results. Normally, higher residual moisture is associated with oxidized coal and it is probable that the bulk sample was weathered to some degree. Volatile matter on a d.a.f. basis indicates the coal is a low volatile bituminous coal as ranked by ASTM. FSI levels are lower than for Gates clean coals because of the excessive inerts (ash and inert macerals) in the samples. Sulphur was high in the raw (QHD 86009) sample at over 1%, although low in the other two samples. HGI is similar to Gates coal, indicating a relatively soft coal somewhere between the hardness of Coal Valley and South East BC coals. (See Table 3.12).

Raw samples were anlayzed for ash fusion and ash mineral composition to complete the evaluation of the use of these coals in the thermal markets. The low volatile content restricts use of this coal in the power generation thermal coal market as nearly all thermal stations are designed to use high volatile coals however a few plants do blend such high calorific, low volatile coals and a few plants are specifically designed for low volatile coals. The calorific value of the raw GTA sample was excellent at 7641 cal/gm (db) or as received at 8% moisture of about 6030 cal/gm (net). The ash fusibility and mineral composition results on GT-A or GT-Combined indicate that slagging is unlikely to be a problem at normal combustion furnace operating termperature. However, fouling would be a problem as (Na2 + K2) content in the ash is over 2.0% in most samples and blending before combustion may be required. The best marketing potential of the raw coal

is likely in the cement industry that is not concerned with ash levels up to 15% or so, or ash mineral composition, but rather with as received calorific value. For GT-A, the calorific value compares favourably with previous QCL thermal cargoes that average about 7400 ± 100 cal/gm (adb), or 6900 ± 93 cal/gm (9% moisture) at 11% ash, the ash level of the GT-A raw sample. These cargoes were well received because of the good calorific value, low moisture and ease of pulverization. (See Table 3.13A).

3.5.2 Washability Results and Conclusions

Attached is a table (3.11) of regression coefficients and a graph (Fig. 3.8) relating ash and yield. GT-2 had only 1 result which fell into the GT-1 results and consequently it was regressed with GT-1 data. Both the drill core and plant simulated ash/yield data fell together and was regressed together so that the regressions can be used to calculate either clean coal directly from insitu coal or expected plant ash. Details are included on Table 3.11(a).

Table 3.11

GETHING YIELD / ASH PREDICTION EQUATION

Theoretical Yield = A + B x (ash) - R
where A & B = regression constants

Expected Yield = Theoretical Yield x Plant Efficiency*

Seam	A	B	R. Factor met	R. Factor thermal
GT-1	114.186	-1.44	0	9
GT-2	114.186	-1.44	0	9

* Targeted at 92% for 1987 and onwards unless actual performance indicated it should be changed. Actual 1986 plant efficiency was about 91.8%.

Table 3.11 (a)

GETHING ACTUAL DRILL CORE ASH AND ESTIMATED PLANT FEED ASH VERSUS THEORETICAL YIELD

Seam	I.D.	DRILL CORE Ash	DRILL CORE Theoretical Yield	ESTIMATED Plant Feed Ash	ESTIMATED Plant Theoretical Yield
GT-1	GTA-Trench (lower)	9.63	99.15	17.98	92.13
	GTB-Trench (upper)	35.37	59.76	45.05	46.49
	GT-Comb.	18.07	84.02	21.91	86.22
	QHD 86009 GT1-L	11.85	95.10	17.20	91.43
	GT1-U	45.24	52.59	55.97	38.87
	GT1-U&L	22.84	81.82	23.02	80.94
GT-2	QHD 86009	55.36	30.98	60.80	25.09

Table 3.12

GETHING
RAW COAL QUALITY

Seam	Drill Hole	#/ID	Proximate RM	Ash	VM	FSI	c/gm	%	HGI
GT-1	GT-A Trench		1.82	11.06	19.58	1	7641	.51	62
	GT-B Trench		2.40	36.25	18.47	1.5	5128	.41	67
	GT-Comp		1.92	18.88	18.54	1	6882	.47	63
	QHD 86009	GT1-U	.79	42.61	12.7	1		1.31	
		GT1-L	.91	12.81	18.44	1		.85	
		Comb,T31	.47	22.35	15.97	1.5		1.02	74
GT-2	QHD 86009	T32	0.60	48.25	14.82	1.5		.28	71

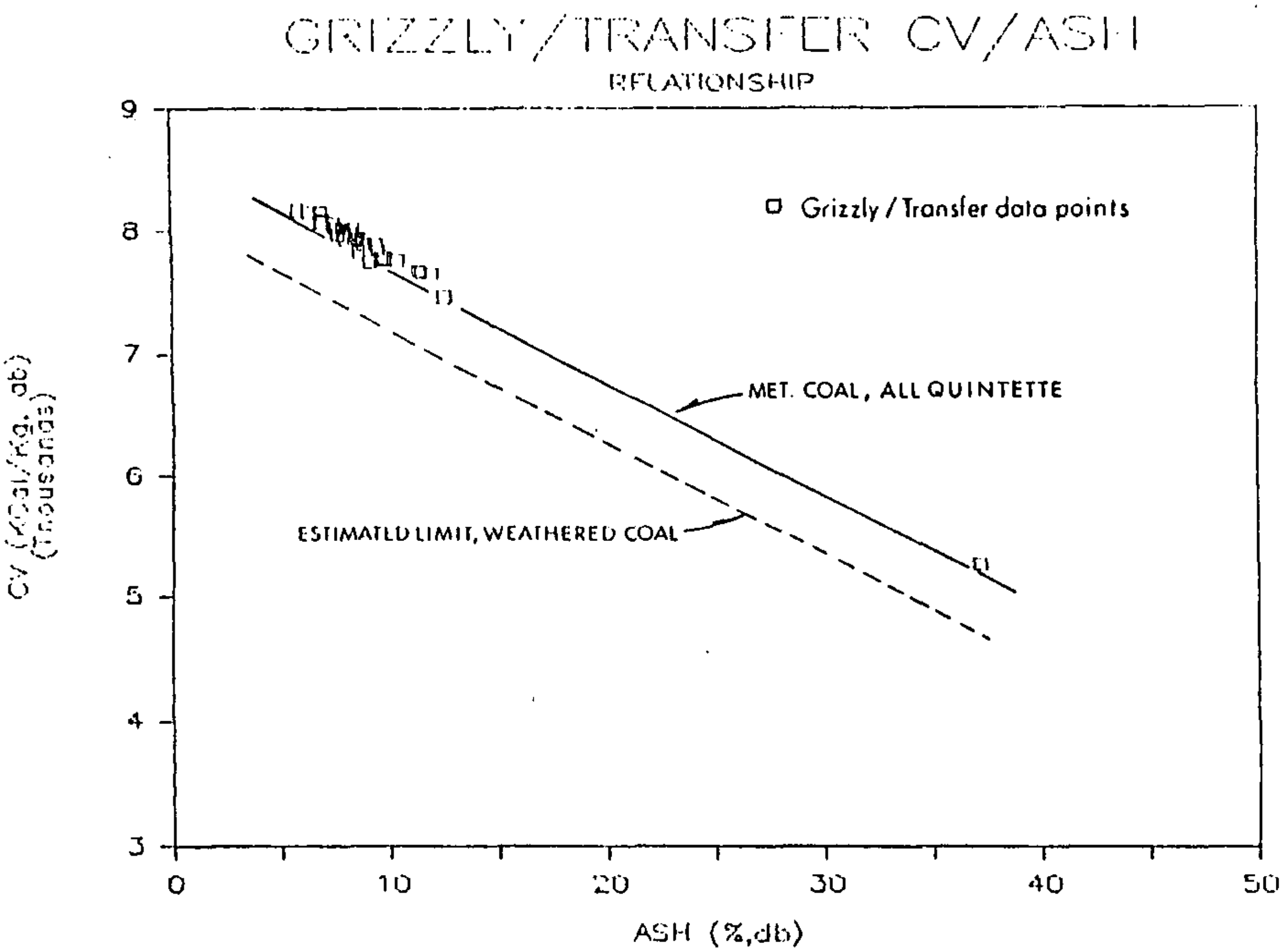
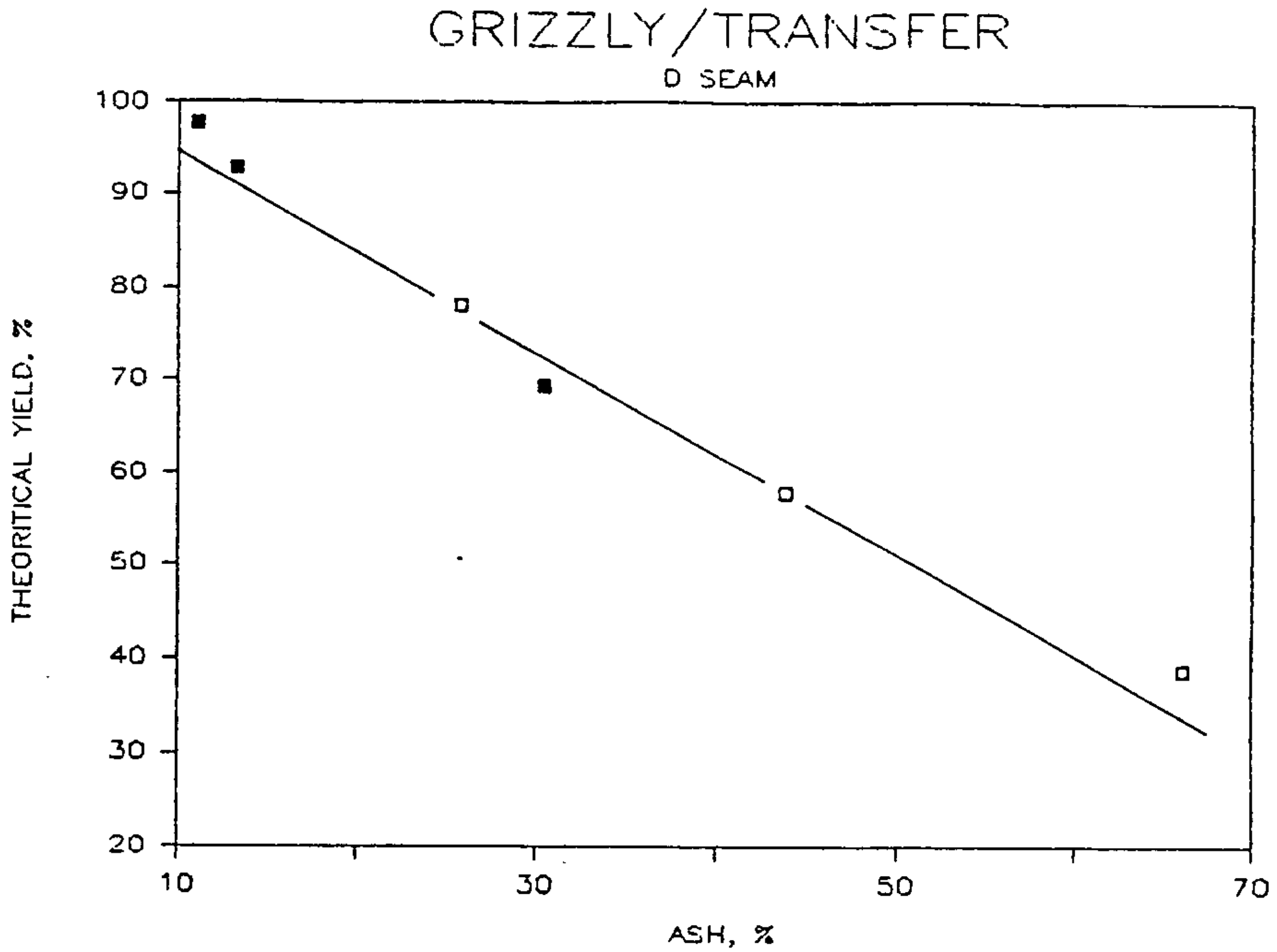

GRIZZLY/TRANSFER CV/ASH
RELATIONSHIP
Grizzly / Transfer data points
MET. COAL, ALL QUINTETTE
ESTIMATED LIMIT, WEATHERED COAL
CV (KCal/Kg, db)
(Thousands)
ASH (%,db)
9
8
7
6
5
4
3
0
10
20
30
40
50

FIGURE 3.1



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.2

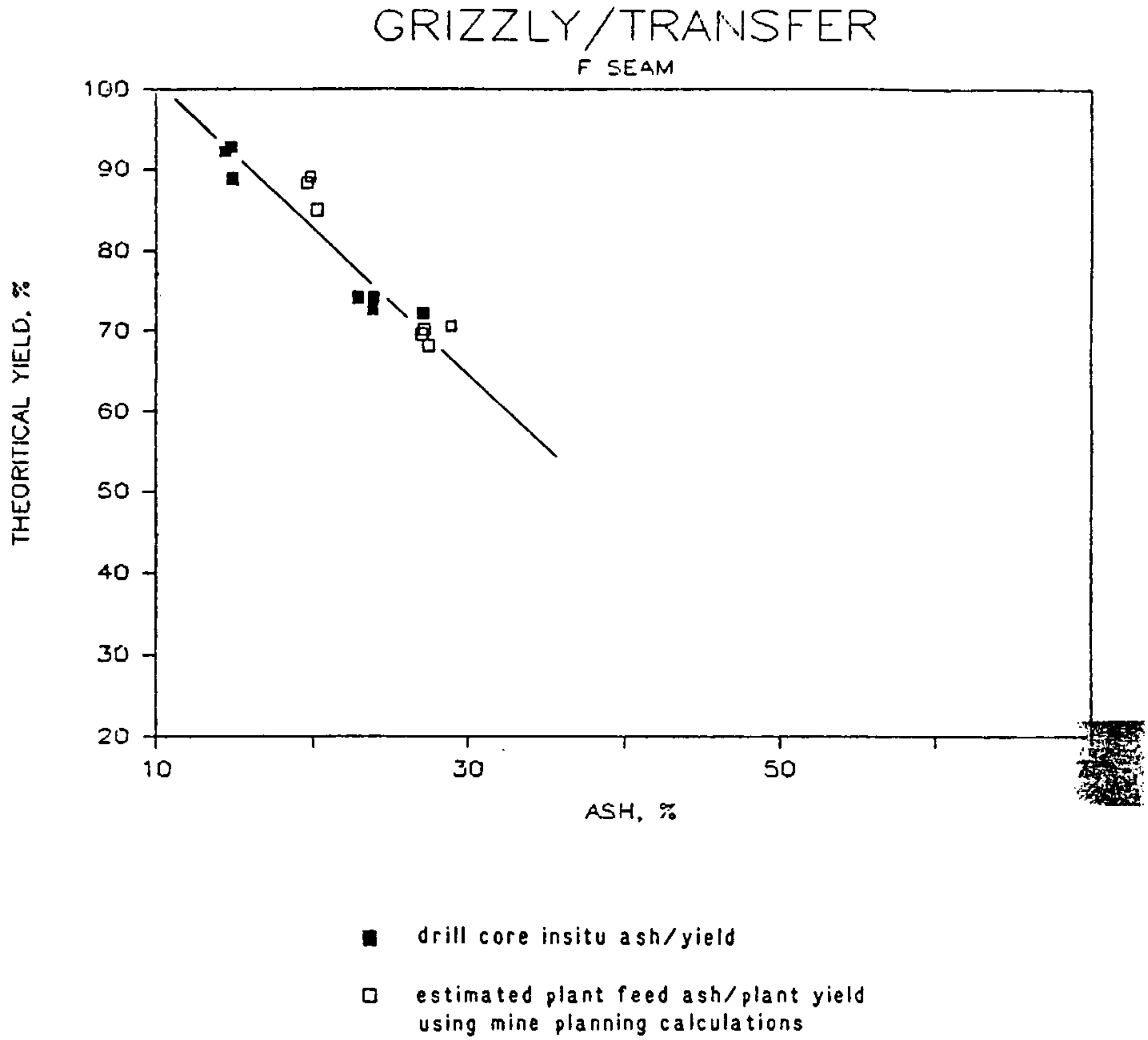
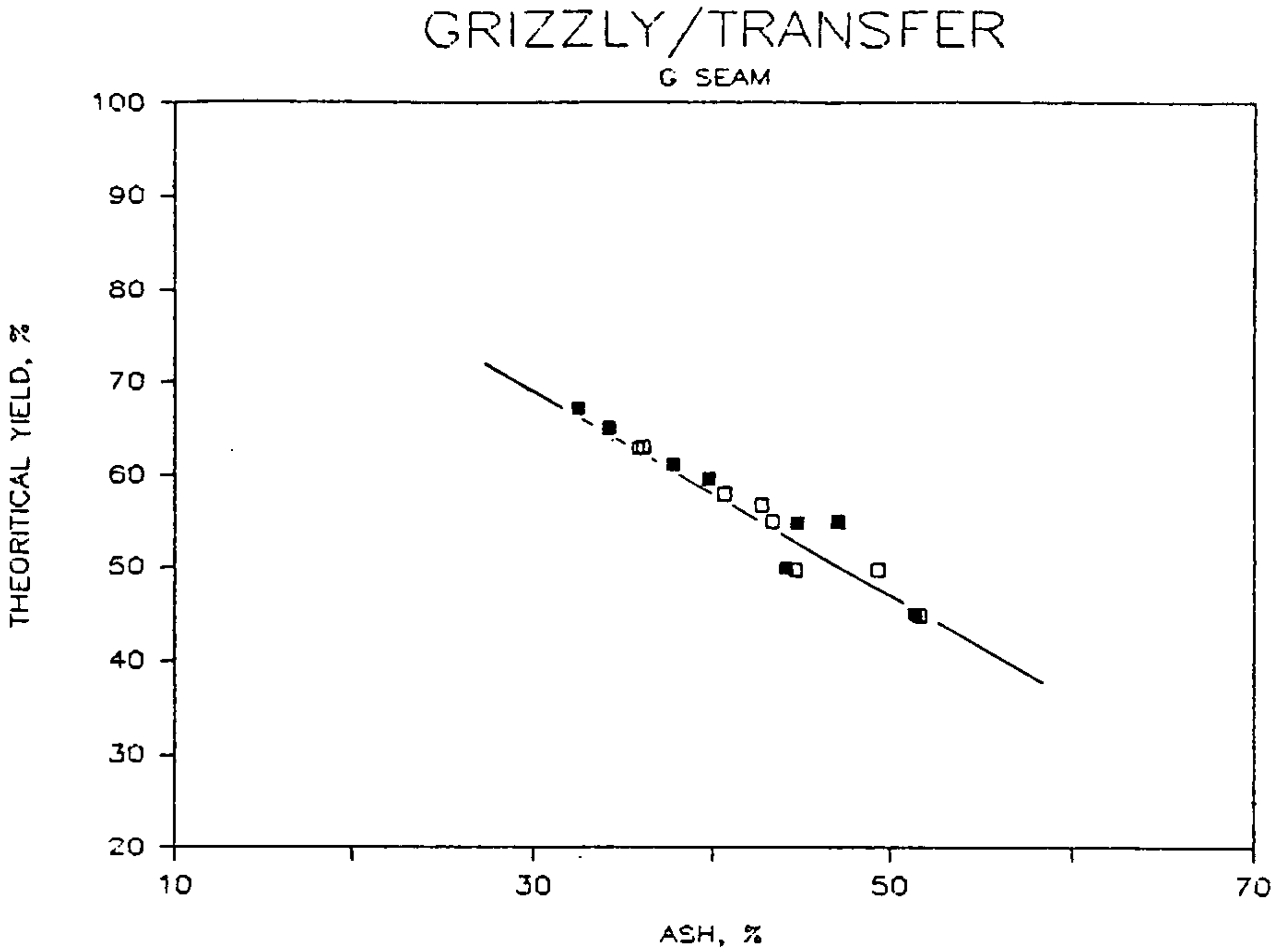

GRIZZLY/TRANSFER
F SEAM
THEORITICAL YIELD, %
ASH, %
100
90
80
70
60
50
40
30
20
10
30
50
drill core insitu ash/yield
estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.3



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.4

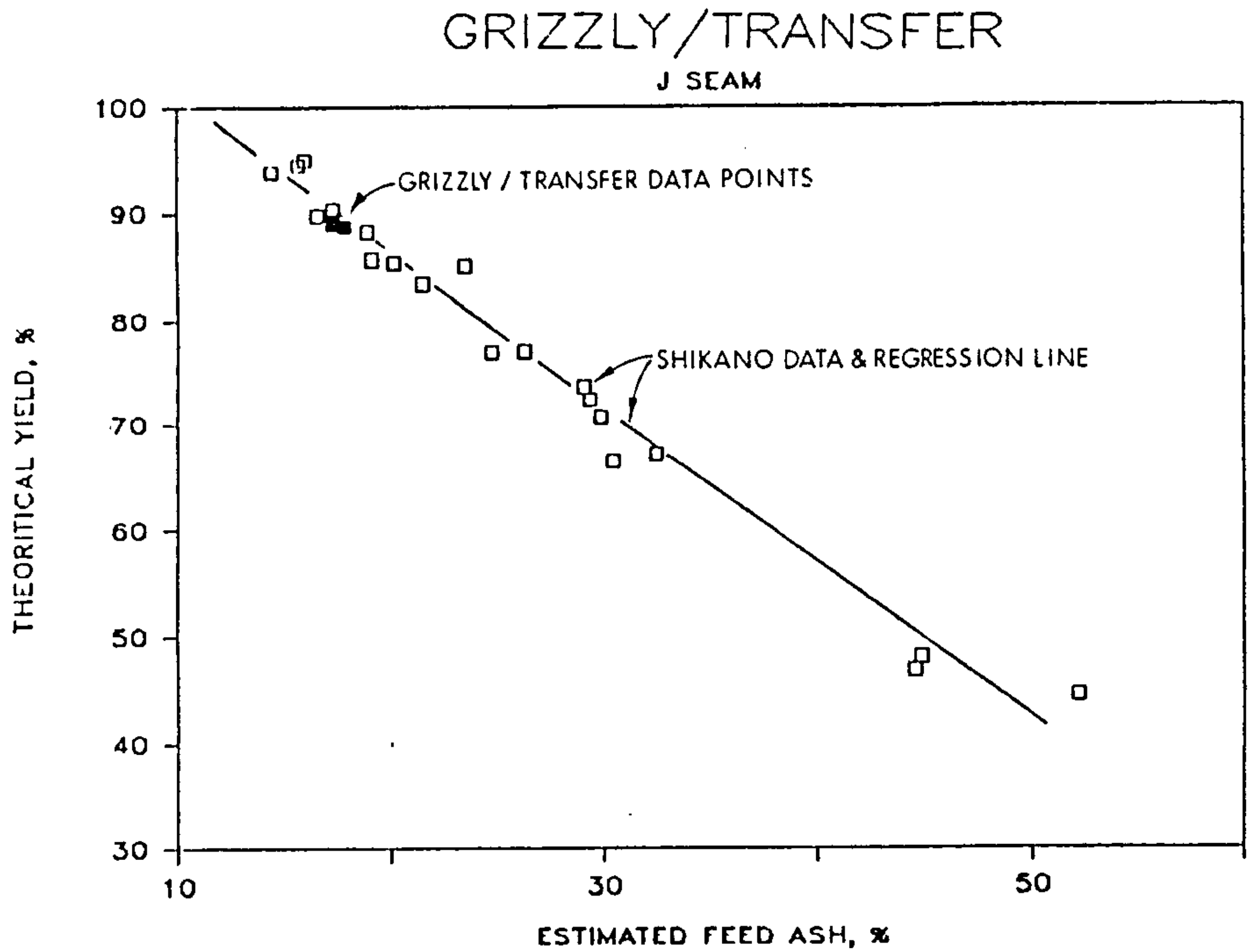
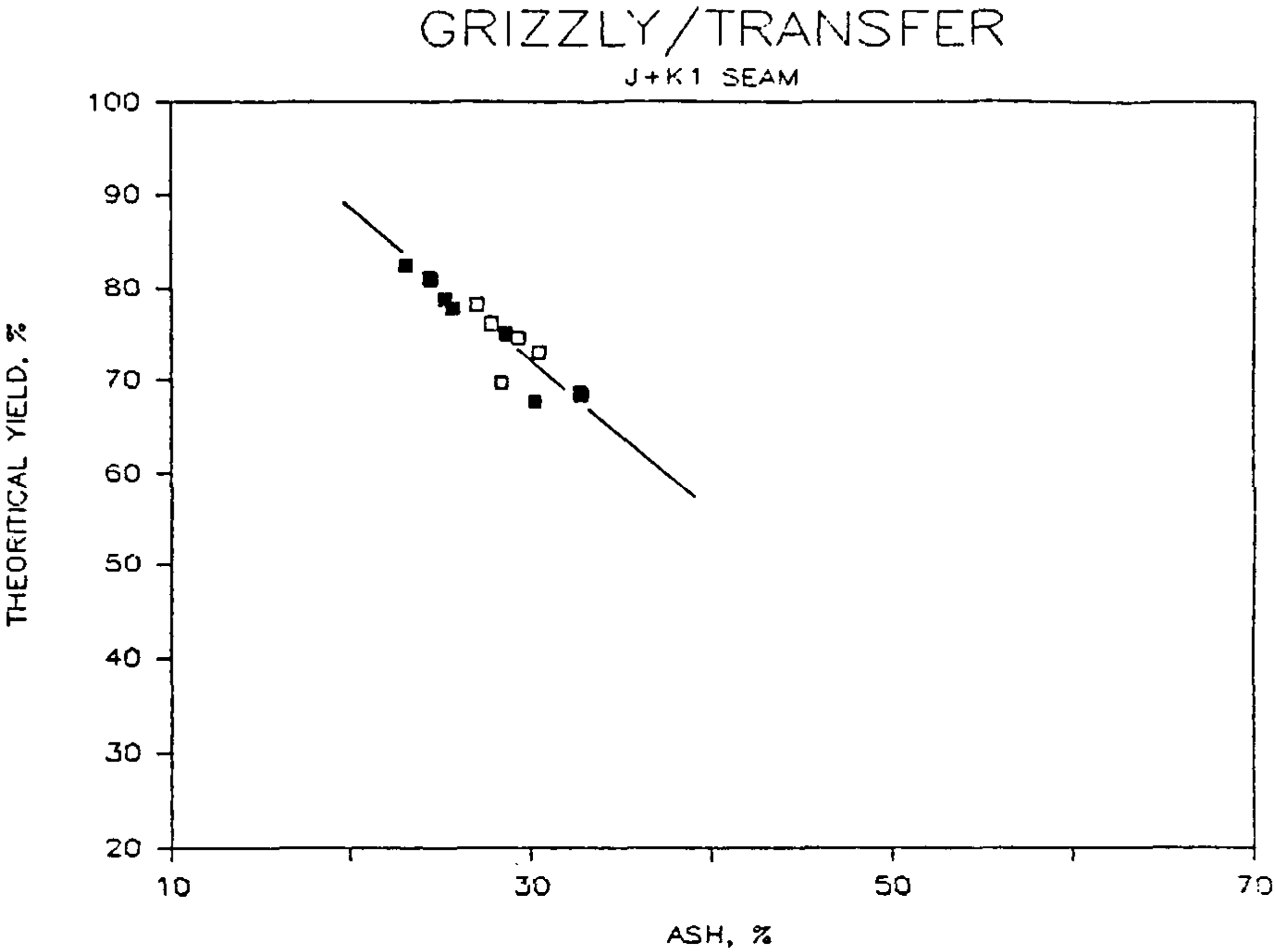

GRIZZLY/TRANSFER
J SEAM
GRIZZLY / TRANSFER DATA POINTS
SHIKANO DATA & REGRESSION LINE
THEORITICAL YIELD, %
ESTIMATED FEED ASH, %
100
90
80
70
60
50
40
30
10
30
50

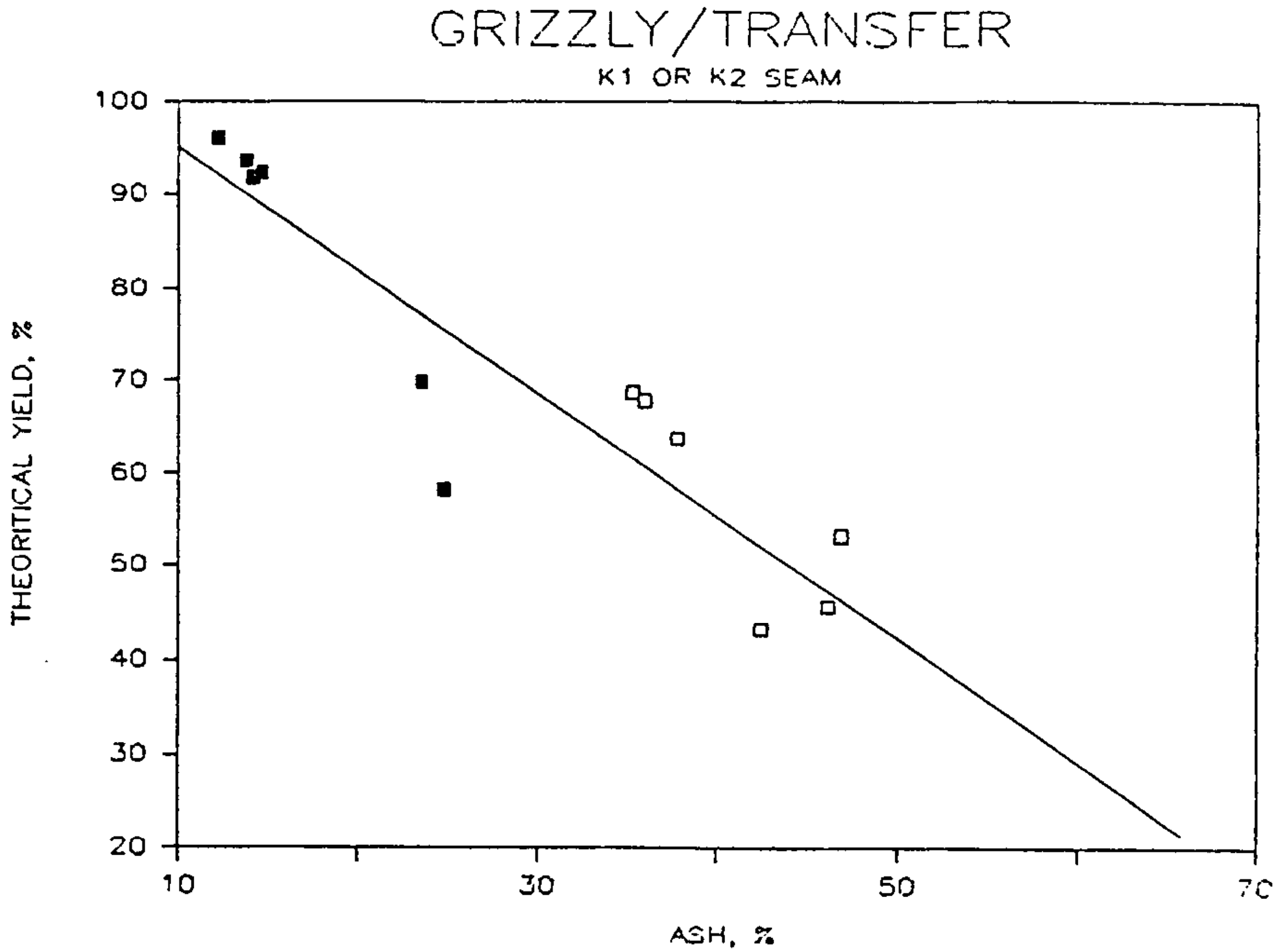
FIGURE 3.5



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield using mine planning calculations

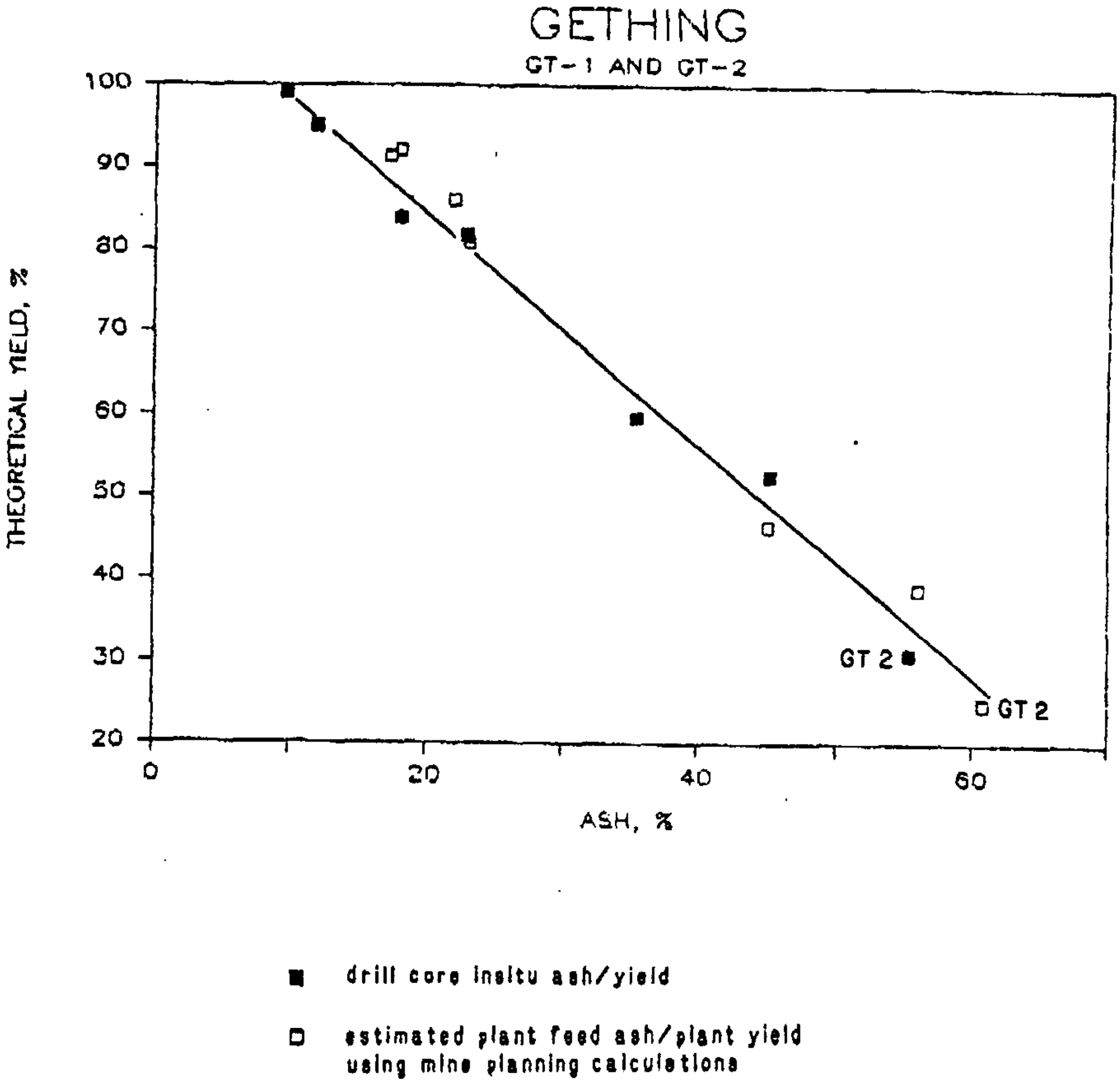
FIGURE 3.6



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.7



GETHING
GT-1 AND GT-2
THEORETICAL YIELD, %
ASH, %
100
90
80
70
60
50
40
30
20
0
20
40
60
GT 2
GT 2
■ drill core insitu ash/yield
□ estimated plant feed ash/plant yield using mine planning calculations

Figure 3.8

GETHING ASH/FSI RELATIONSHIP

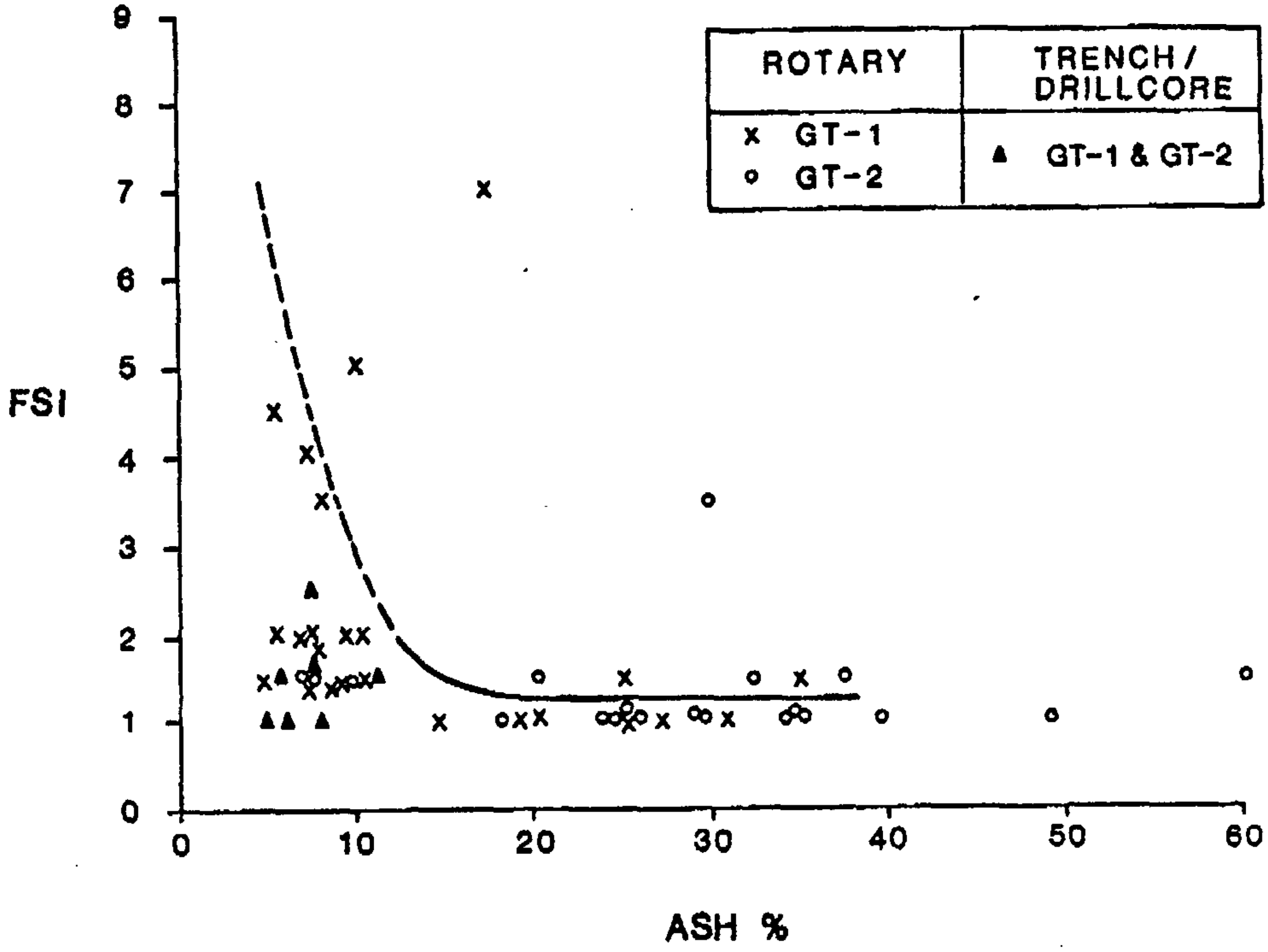


Figure 3.9

CHANGE IN COKE STRENGTH (DI 30/15)
FOR CARBONIZED BLENDS OF RAW GTA
WITH A SAMPLE OF QCL MET PRODUCT

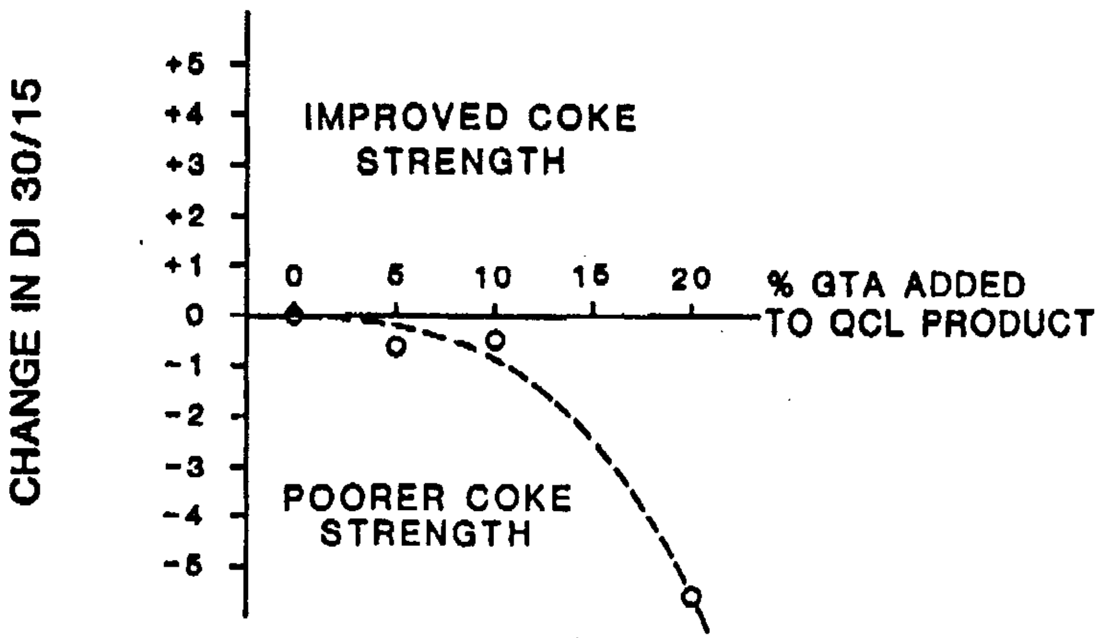


Figure 3.10

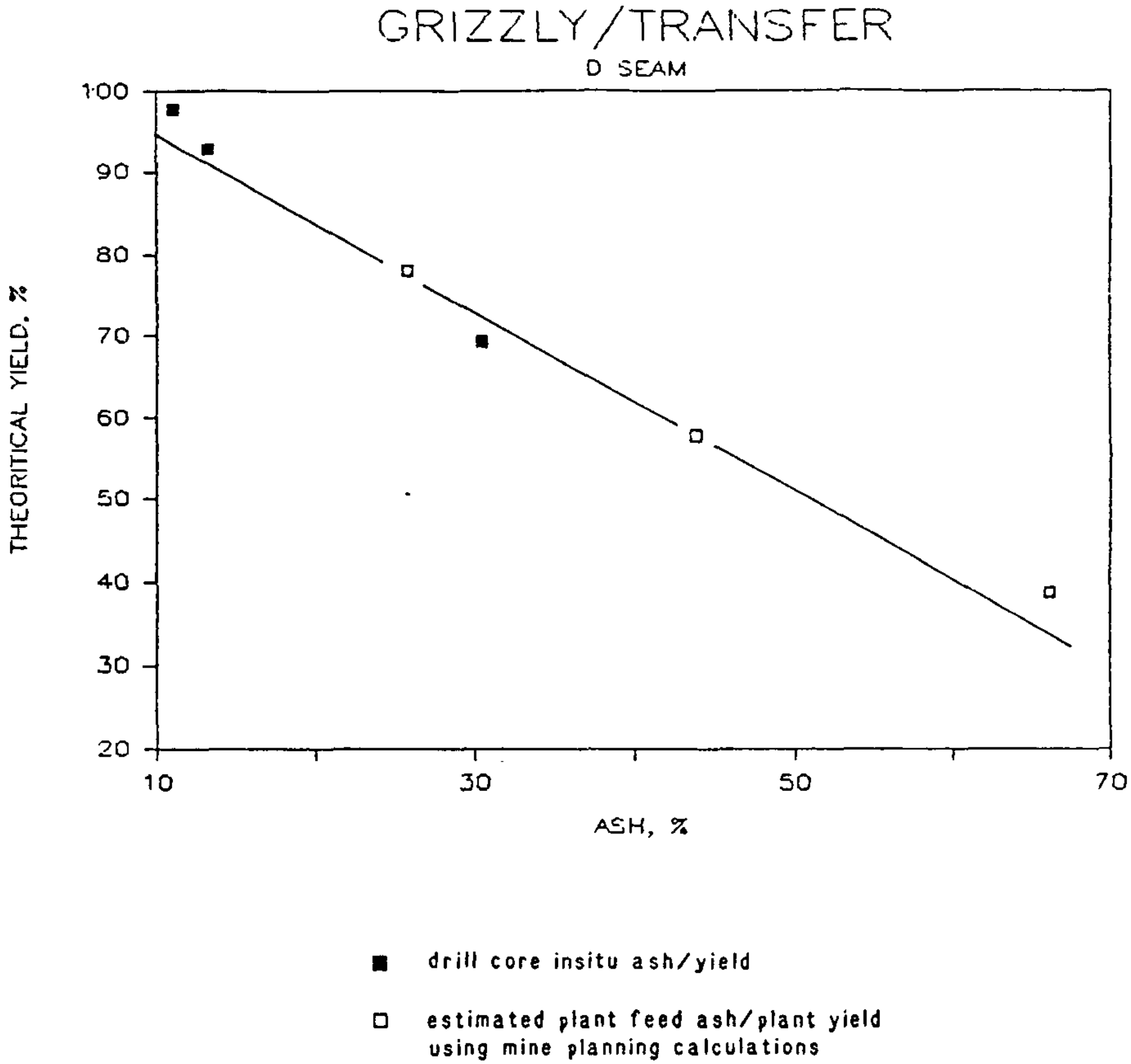
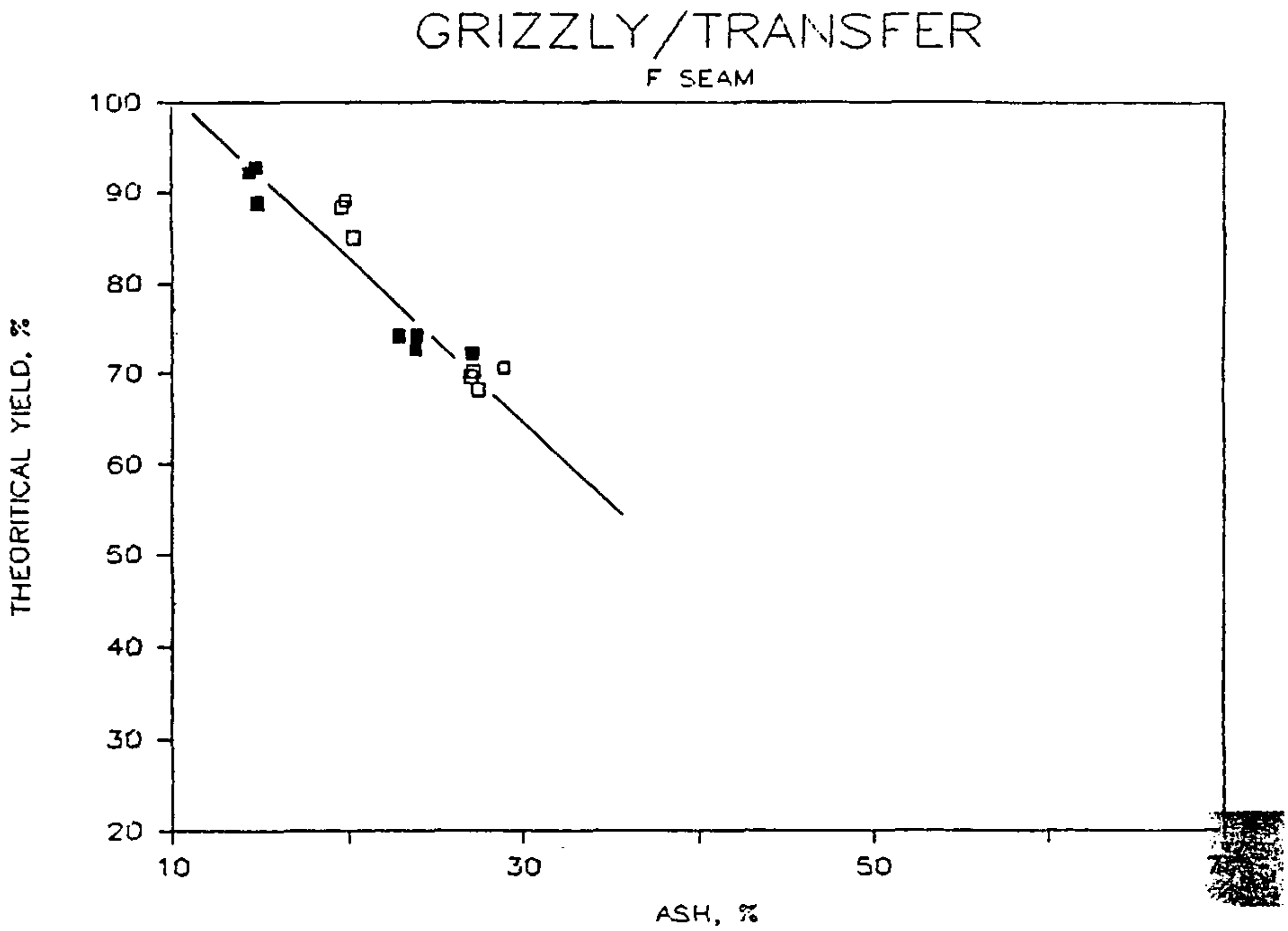

GRIZZLY/TRANSFER
D SEAM
THEORITICAL YIELD, %
100
90
80
70
60
50
40
30
20
10
30
50
70
ASH, %
drill core insitu ash/yield
estimated plant feed ash/plant yield using mine planning calculations

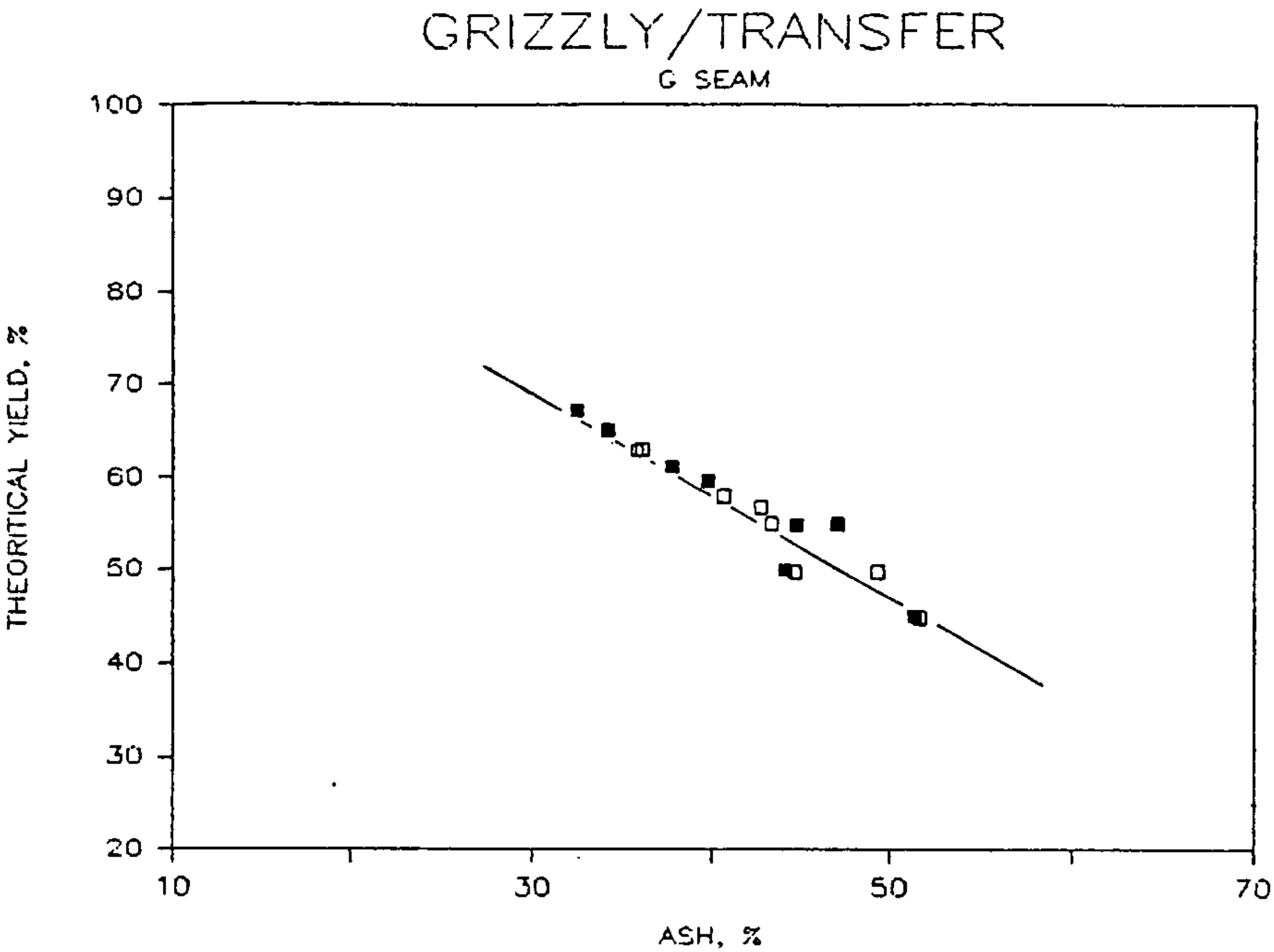
FIGURE 3.2



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield using mine planning calculations

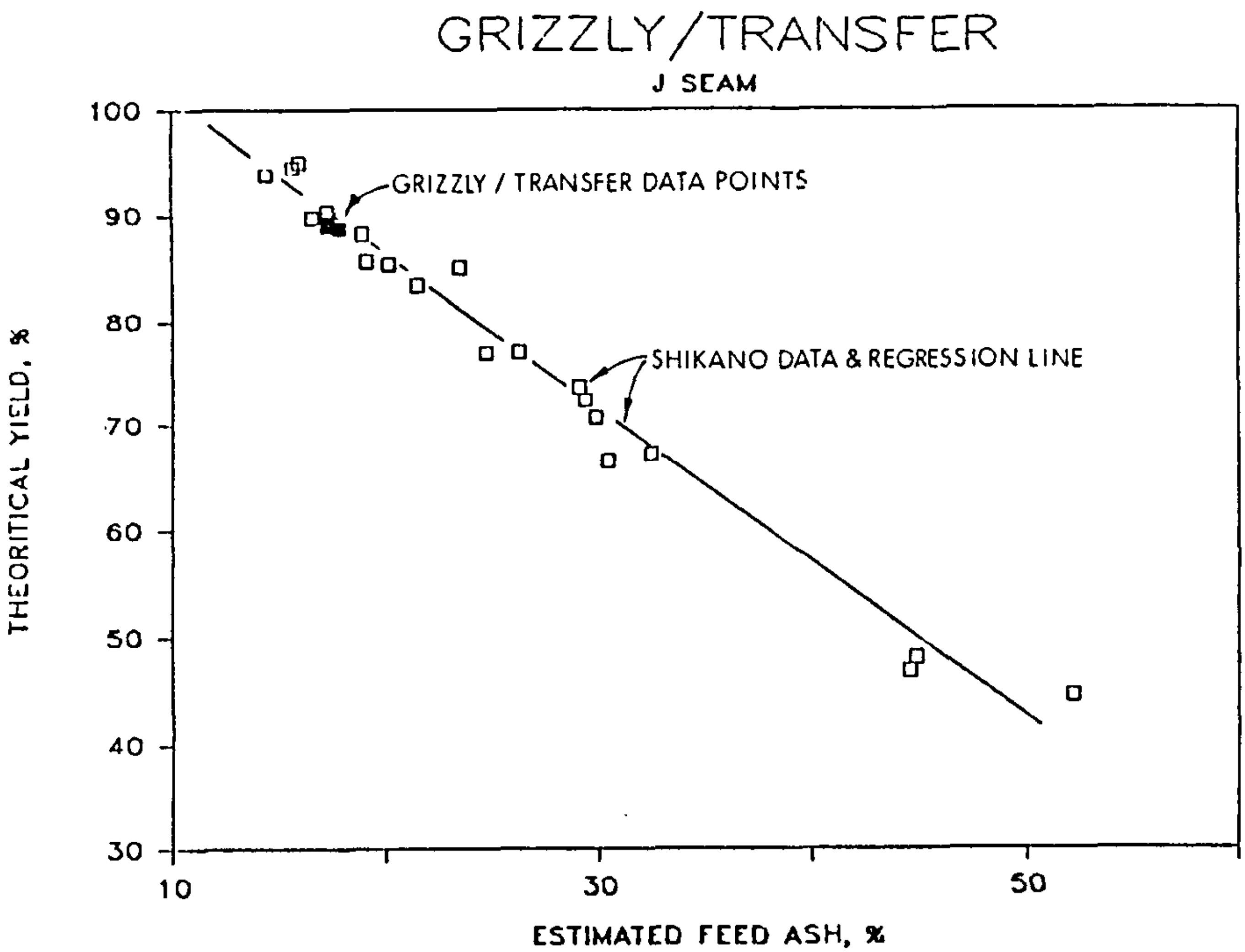
FIGURE 3.3



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.4



GRIZZLY/TRANSFER
J SEAM
GRIZZLY / TRANSFER DATA POINTS
SHIKANO DATA & REGRESSION LINE
THEORITICAL YIELD, %
ESTIMATED FEED ASH, %
100
90
80
70
60
50
40
30
10
30
50

FIGURE 3.5

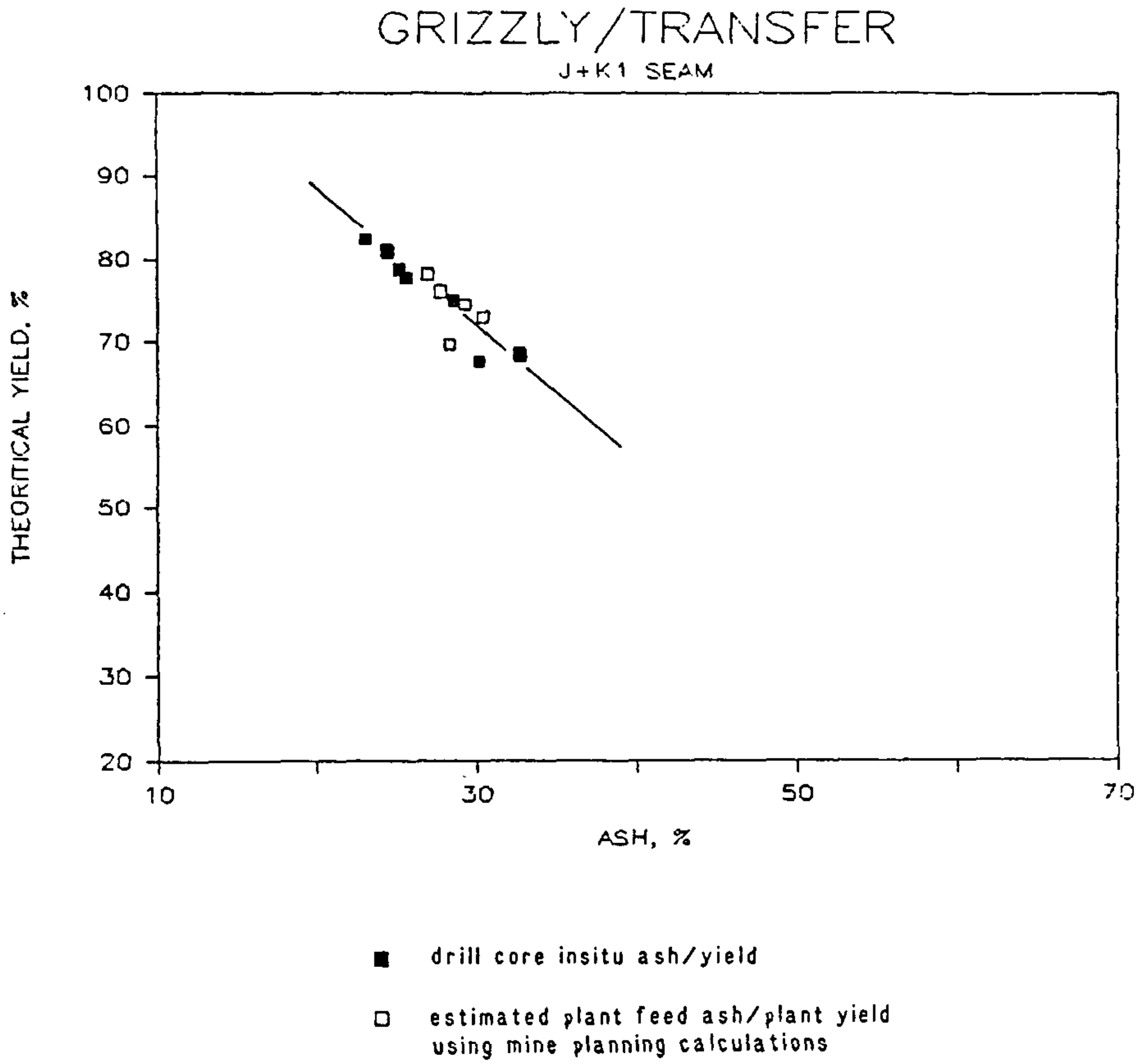

GRIZZLY/TRANSFER
J+K1 SEAM
100
90
80
70
60
50
40
30
20
THEORITICAL YIELD, %
10
30
50
70
ASH, %
drill core insitu ash/yield
estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.6

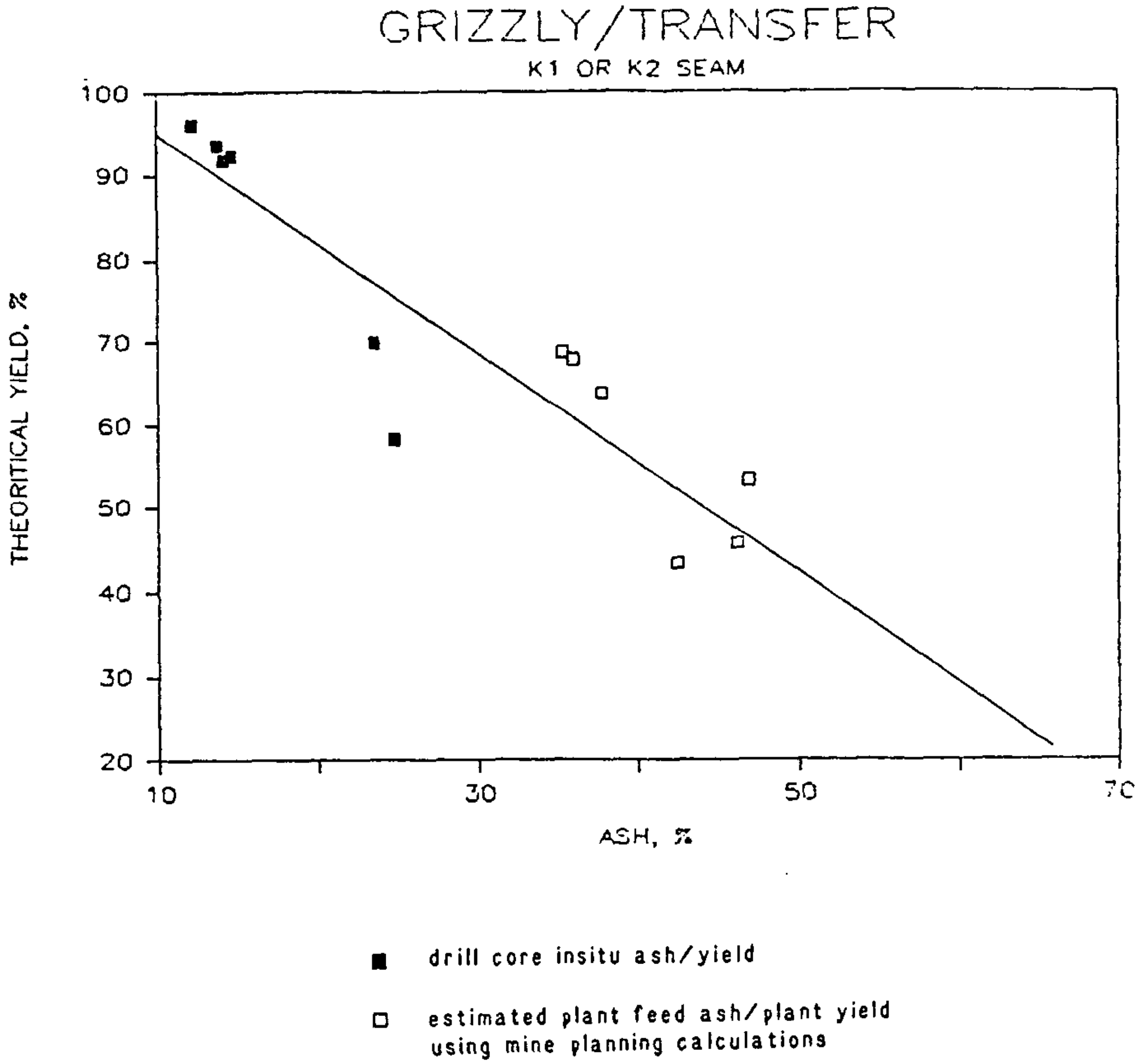
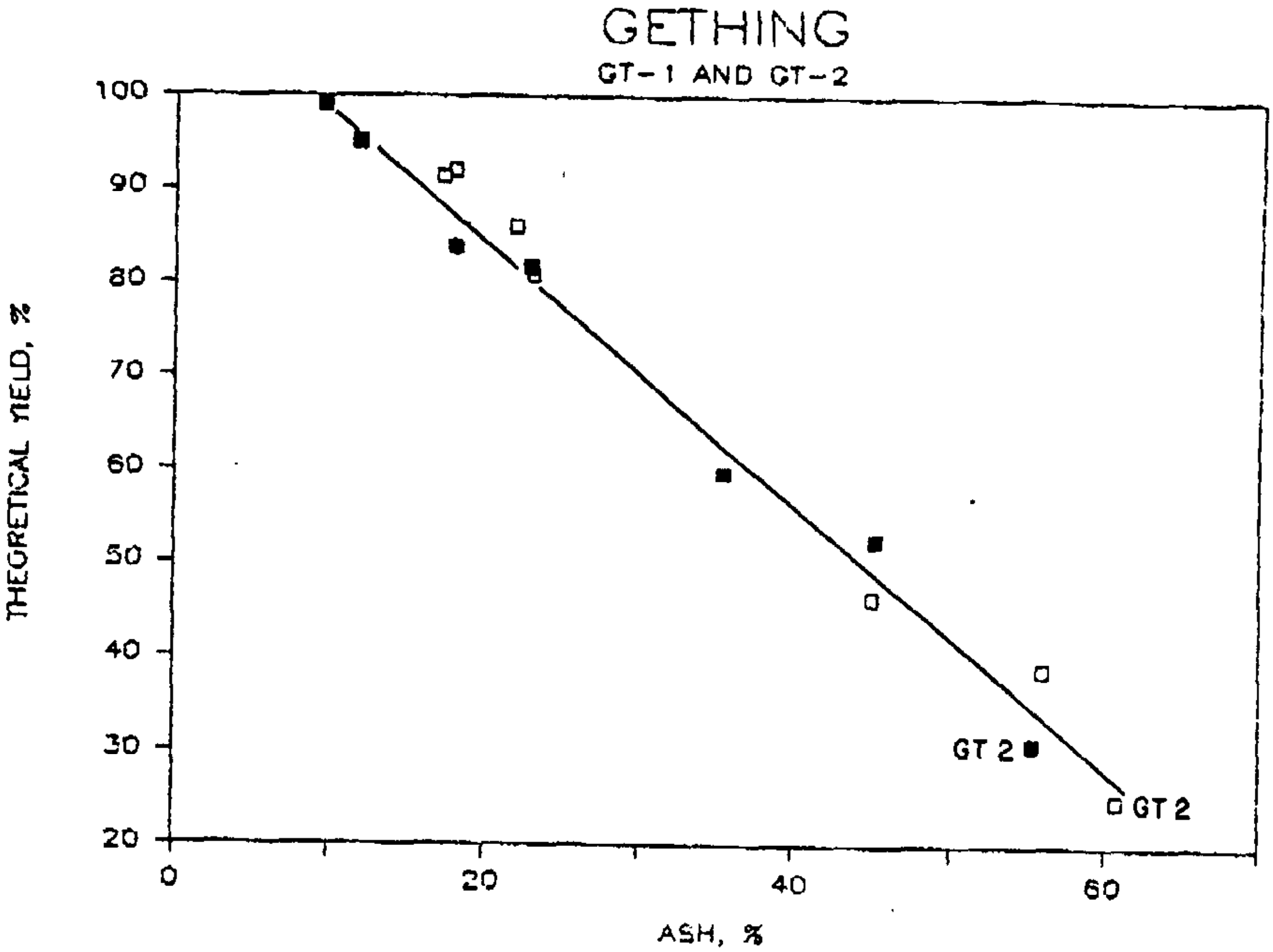

GRIZZLY/TRANSFER
K1 OR K2 SEAM
THEORITICAL YIELD, %
ASH, %
100
90
80
70
60
50
40
30
20
10
30
50
70
drill core insitu ash/yield
estimated plant feed ash/plant yield
using mine planning calculations

FIGURE 3.7



■ drill core insitu ash/yield

□ estimated plant feed ash/plant yield
using mine planning calculations

Figure 3.8

GETHING ASH/FSI RELATIONSHIP

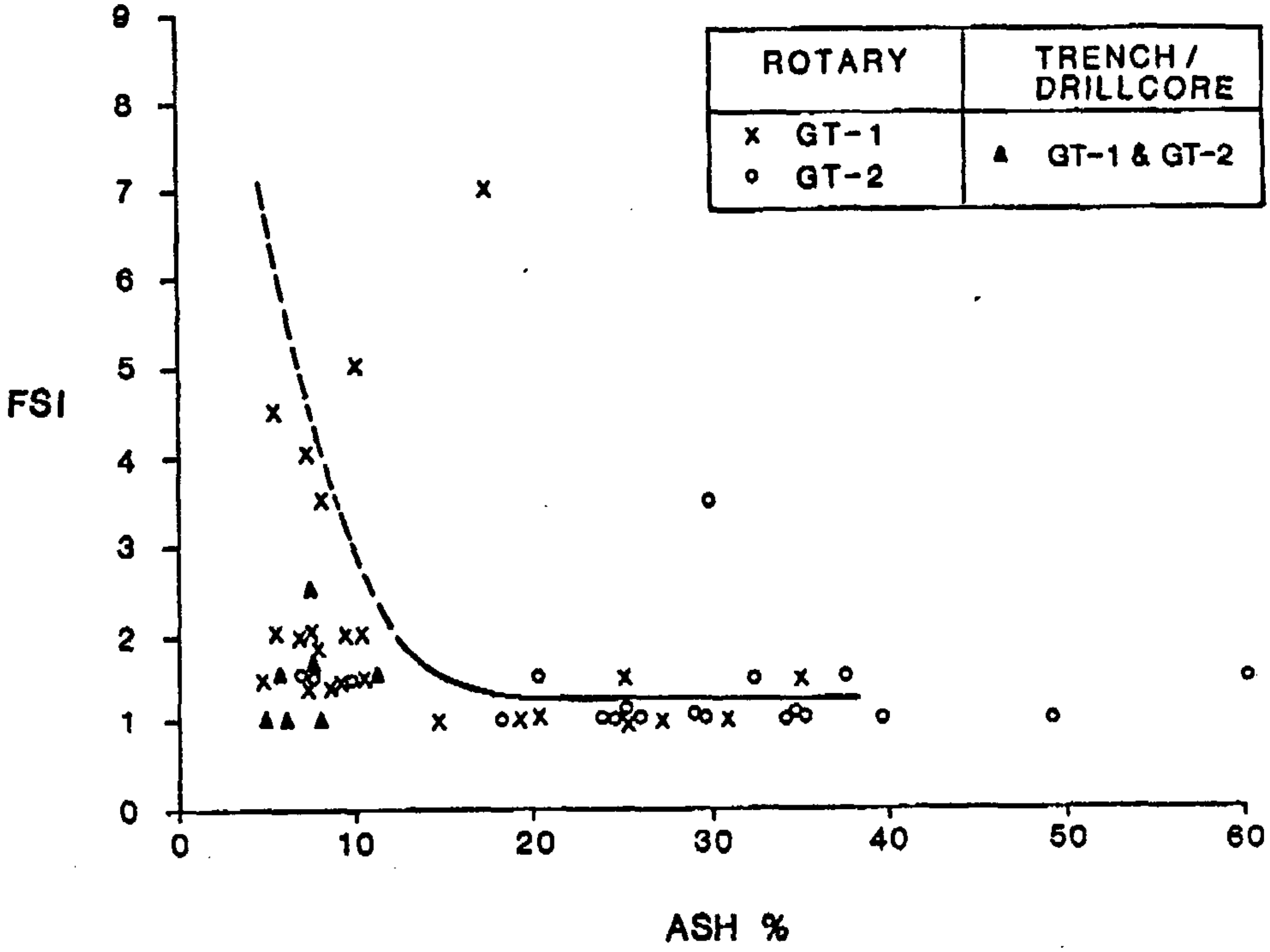
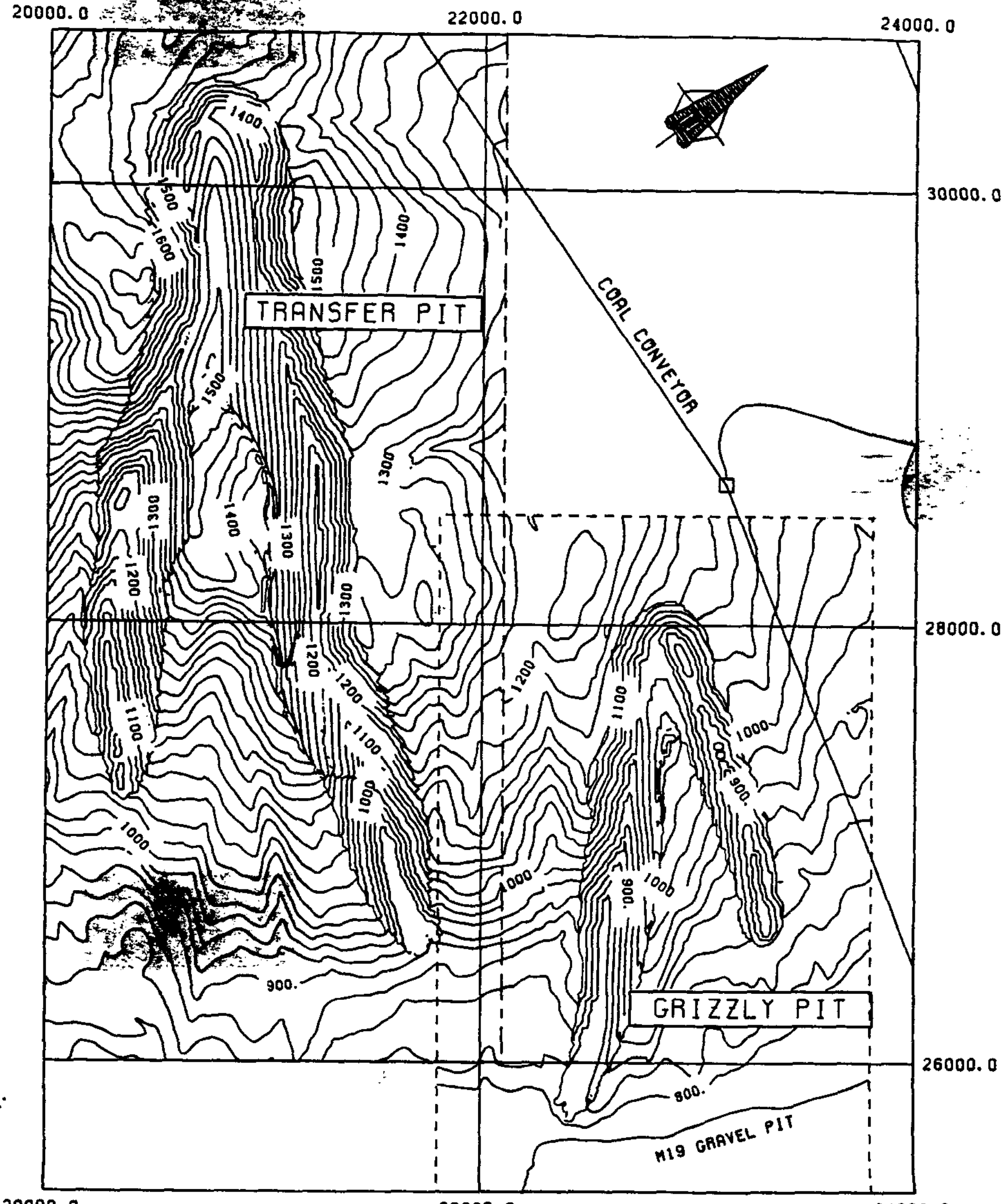


Figure 3.9

QUINTETTE COAL LIMITED
GRIZZLY-TRANSFER MINE AREA



11-MAR-87 SCALE 1:25000 FIGURE 4.1

5.0 CONCLUSIONS & RECOMMENDATIONS

5.1 CONCLUSIONS

- A preliminary evaluation of structure, coal seam development, quality, washability, and resources quantity have been made possible through the 1986 exploration programme in the Transfer and Grizzly Areas.

- The results of the work in the Transfer and Grizzly Area further supports the premise that a substantial resource potential, with stripping ratio lower than certain portions of the long term Wolverine mine plan, is probable. These resources appear to have similar quality to those of the Shikano deposit.

- During 1986, exploration work in the Gething Area allowed for the further delineation of the limits of the Gething Flat Area and for the assessment of the quality of the target seam (GT-1).

- Initial drilling, peripheral to the Flat Area, provided indications of extremely complicated structure at depths generally precluding the possibility of strip ratios of current interest.

- Most geological mapping information has now been obtained in the three target areas. future mapping information will be primarily restricted to exposure through road construction.

5.2 RECOMMENDATIONS

- During 1987, undertake exploration work consisting of diamond and rotary drilling to both "infill" existing drill sites and to "step out" from the currently drilled areas particularly in the vicinity of the Murray River valley in order to extend the limbs of both anticline structures.

- Obtain bulk samples through adits to be driven in each of the mining sections in the Transfer and Grizzly structures such that pilot scale washability and carbonization testing can be completed.

- Assess market potential for low tonnage supply of Gething Flat Area coal based on current quality results prior to undertaking any further field work.

QUINTETTE COAL LIMITED

TRANSFER AREA

GEOLOGICAL REPORT

COPY #7

TRANSFER AREA
GEOLOGICAL REPORT

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	2.2	Grizzly Area - Structure Contour Maps: Seam F,G & J
	2.3	Transfer Area - Structure Contour Maps: Seam F,G & J
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	4.2	Transfer Area Resources By Bench: Preliminary Pit Design A

APPENDIX 1

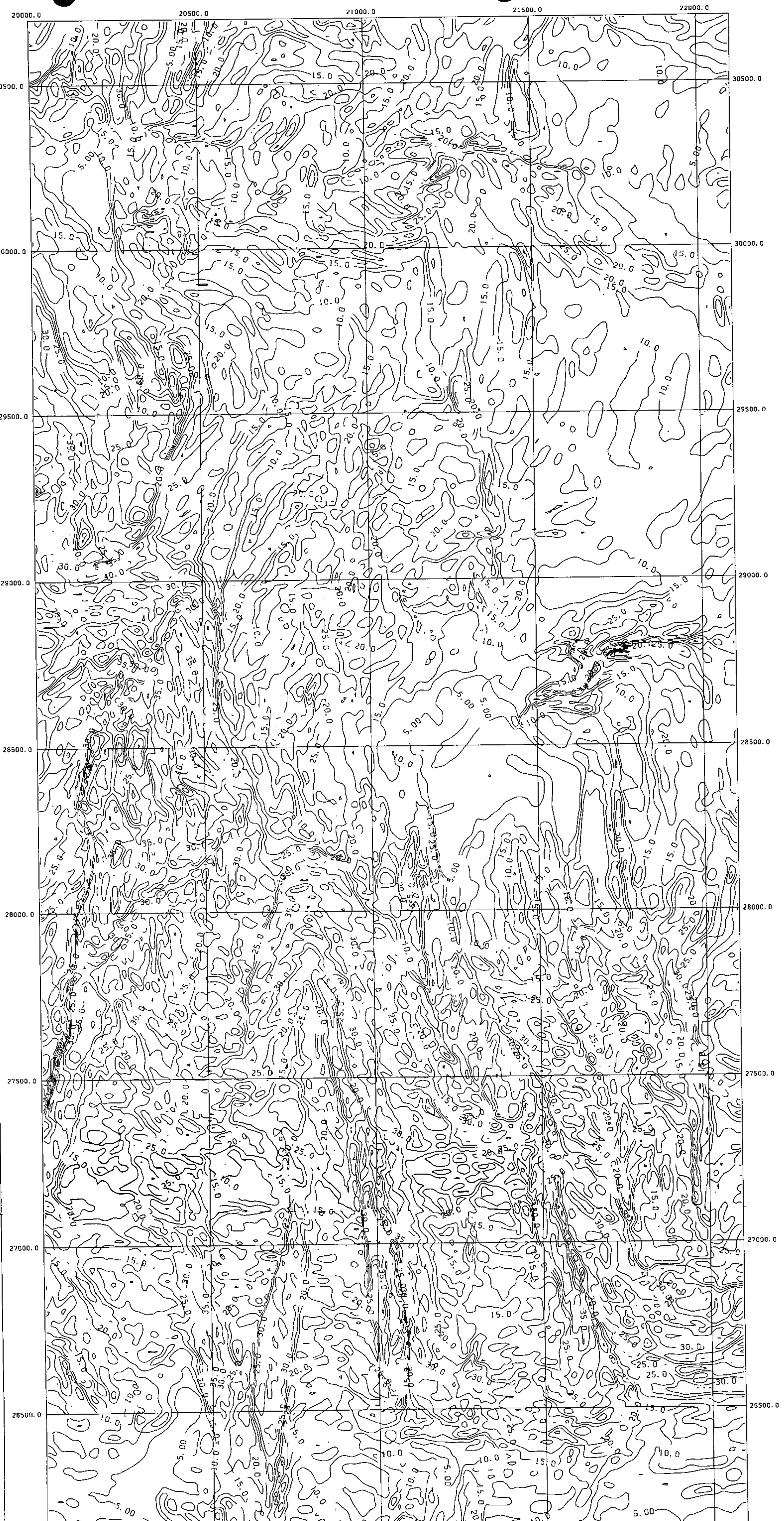
Section 1.0

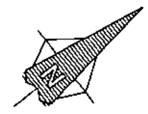
APPENDIX 1

Section 1.1

Transfer Area

Natural Topographic Slope Study





REV.	D M Y	REVISION DESCRIPTION	DRN.	DES.	APP.

QUINTETTE CØAL LIMITED

PROJECT MANAGER

DENISØN MINES LIMITED

CØAL DIVISIØN

AREA	TRANSFER	CATEGØRY	ENGINEERING

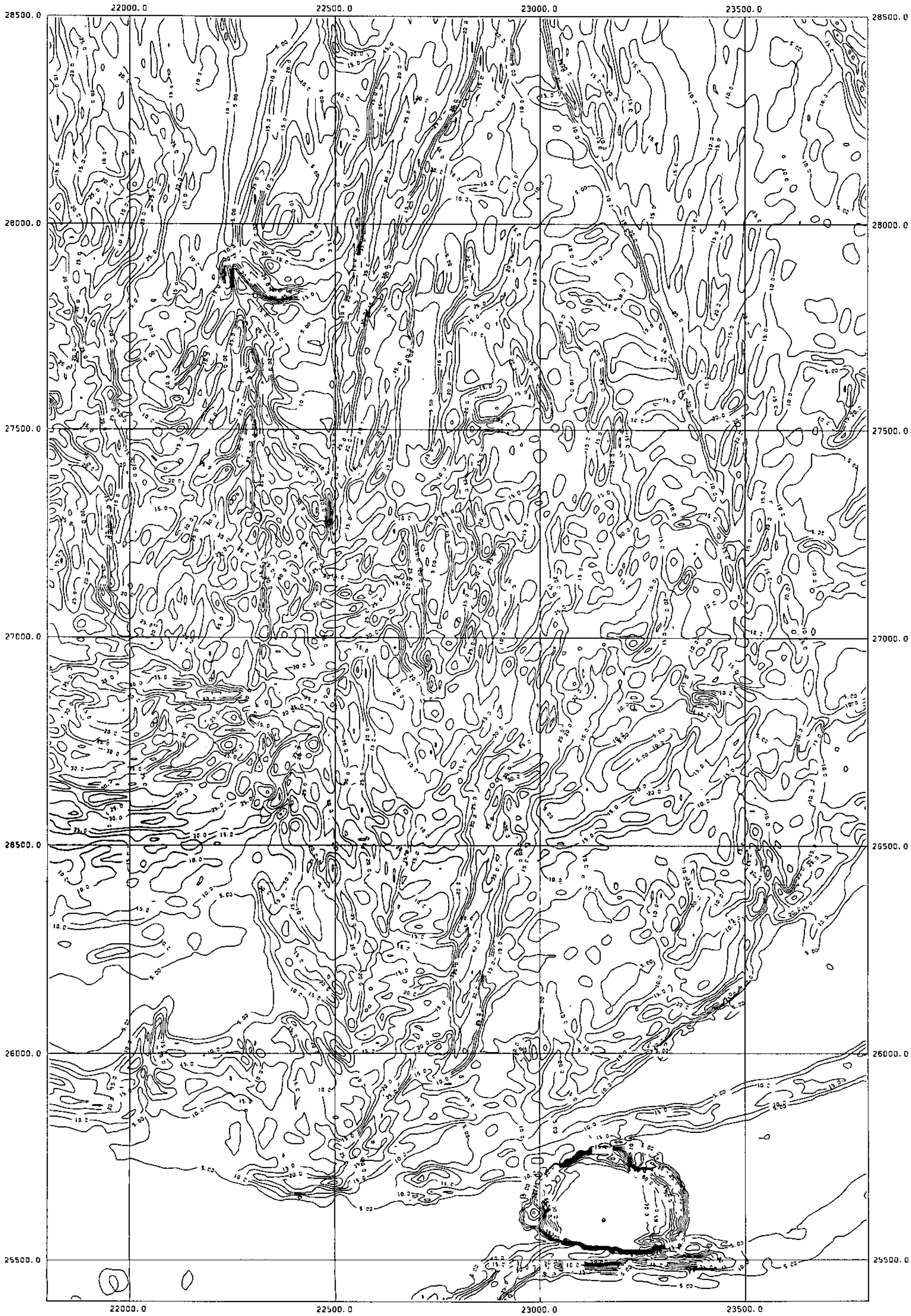
DRAWING TITLE

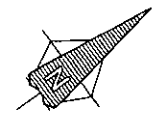
TRANSFER MINE AREA

TOPOGRAPHIC GRADIENT

5 DEGREE CONTOURS

SCALE	DRAWING FILE
1:5000	





REV.	D	M	Y	REVISION DESCRIPTION	DRN.	DES.	APP.

QUINTETTE COAL LIMITED

PROJECT MANAGER

DENISON MINES LIMITED

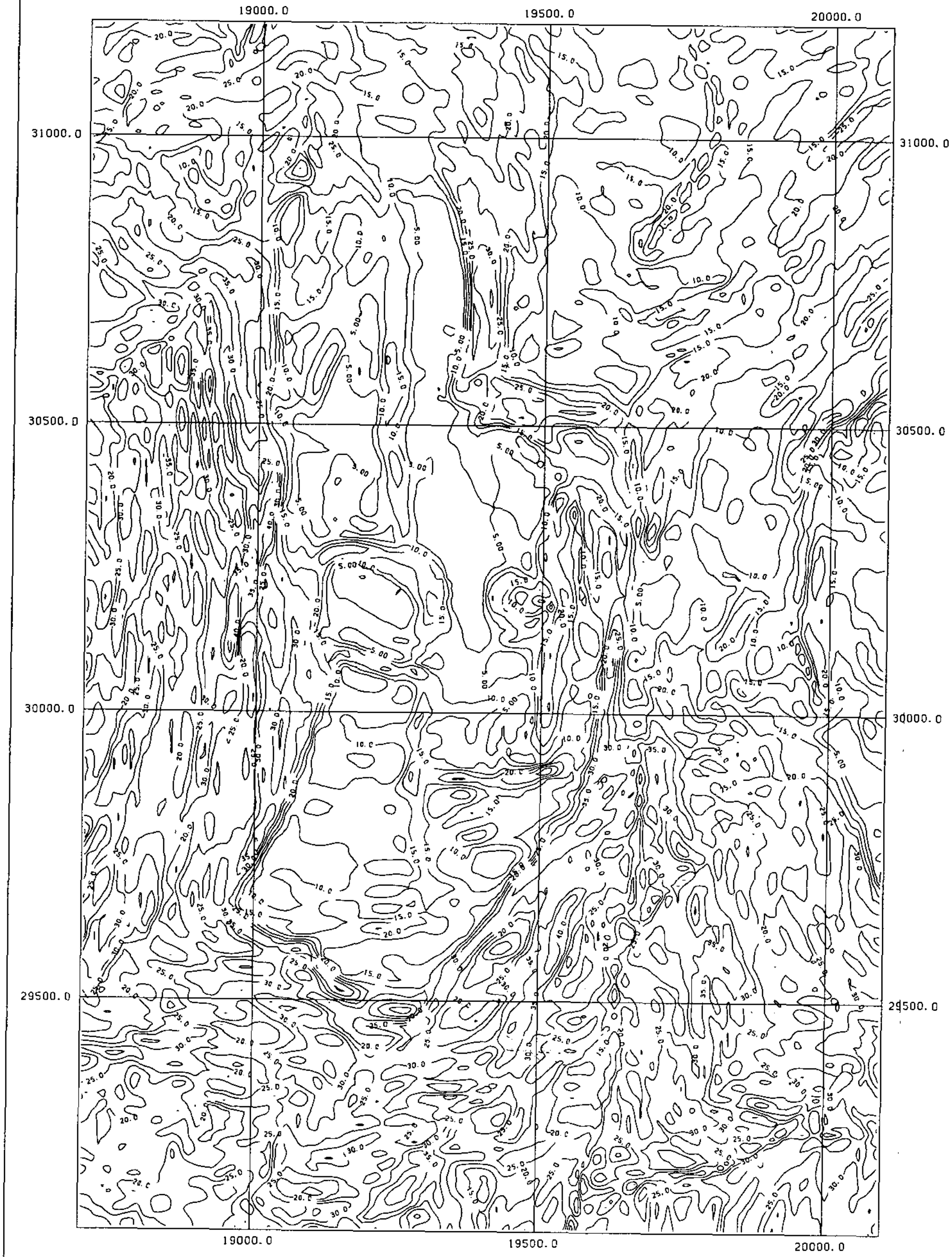
COAL DIVISION

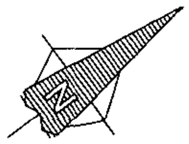
AREA GRIZZLY | CATEGORY ENGINEERING

DRAWING TITLE

GRIZZLY MINE AREA
TOPOGRAPHIC GRADIENT
5 DEGREE CONTOURS

SCALE 1:5000 | DRAWING FILE





GETHING TOPOGRAPHIC GRADIENT

20-FEB-87

REV.	D	M	Y	REVISION DESCRIPTION	DRN.	DES.	APP.

QUINTETTE COAL LIMITED

PROJECT MANAGER

DENISON MINES LIMITED

COAL DIVISION

AREA	GETHING	CATEGORY	ENGINEERING

DRAWING TITLE

GETHING MINE AREA
TOPOGRAPHIC GRADIENT
5 DEGREE CONTOURS

SCALE	DRAWING FILE
1:5000	

APPENDIX 1

Section 1.2

Legal Description of

Transfer Area Coal Licences

APPENDIX 1.2

QUINTETTE COAL LIMITED

LEGAL DESCRIPTION OF TRANSFER AREA COAL LICENCES

LICENCE NO.	DATE ISSUED	SERIES	BLOCK	UNITS	AREA
3618	May 27/75	93 P /3	B	3,4,13,14	297
3660	Sept.27/76	93 P /3	B	1,2,11,12	297
7849	Aug.24/84	93 P /3	A	9,10,19,20	297
7848	Aug.24/84	93 P /3	A	7,8,17,18	297
7847	Aug.24/84	93 P /3	A	5,6,15,16	297
3346	Oct.16/74	93 I /14	J	83,84,93,94	297
3662	Sept.27/76	93 I /14	J	81,82,91,92	297
3661	Sept.27/76	93 I /14	I	90,100	149
3341	Oct.16/74	93 I /14	I	89,99	149
3340	Oct.16/74	93 I /14	I	87,88,98	223
7846	Aug.24/84	93 I /14	I	97	75
7845	Aug.24/84	93 I /14	I	96	75
3339	Oct.16/74	93 I /14	I	85,86,95	223
3343	Oct.16/74	93 I /14	J	61,62,71,72	297
3336	Oct.16/74	93 I /14	I	69,70,79,80	297
3335	Oct.16/74	93 I /14	I	67,68,77,78	297
					3,864

APPENDIX 1

Section 1.3

Transfer Area Survey Data Tables
and Traverse Maps

GETHING AREA

Survey Station	Description	UTM Co-ordinates Northing	Easting	Elevations
QHR 86001	Rotary D.H	6095072.96	619155.10	1622.56
QHR 86002	" "	6095099.77	619125.94	1627.00
QHR 86003	" "	6095150.35	619159.36	1629.31
QHR 86004	" "	6095032.93	619326.07	1626.41
QHR 86005	" "	6095046.12	619429.14	1604.78
QHR 86006	" "	6094973.74	619423.22	1609.04
QHR 86007	" "	6094890.93	619317.76	1612.87
QHR 86008	" "	6094839.27	619347.20	1604.45
QHR 86009	" "	6094639.77	619466.96	1570.38
QHR 86010	" "	6094697.29	619424.93	1579.44
QHR 86011	" "	6094963.40	619513.03	1587.50
QHR 86012	" "	6095003.00	619492.57	1586.51
QHR 86013	" "	6094731.10	619550.24	1564.92
QHR 86014	" "	6094802.80	619712.02	1539.35
QHR 86015	" "	6094829.61	619729.99	1538.60
QHR 86016	" "	6094996.27	619685.96	1557.95
QHR 86017	" "	6094751.07	619775.69	1515.45
QHR 86018	" "	Casing not found, location by chain & compass		
QHR 86019	" "	6095364.04	619450.87	1632.26
QHR 86020	" "	6095229.27	619033.47	1619.51
QJD 7642	Diamond D.H.	6094987.64	619293.20	1627.00
QHD 86009	" "	6094896.09	619455.14	1598.15
GTT 1	Trench	6095044.10	619220.0	1620.5
GTT 2	"	6095035.0	619227.0	1625.0
GGT 1	"	6095031.5	619221.9	1621.9
QTT 86001	Trench	6095645.473	619370.128	1620.12
QTT 86002	"	6095644.367	619278.974	1603.70
QTT 86003	"	6095720.156	619215.938	1596.21

G E T H I N G   A R E A

Survey Station	Description	UTM Co-ordinates		Elevations
		Northing	Easting	
QTT 86004	Trench	6095793.886	619148.717	1574.37
QHR 86021	Rotary D.H.	6095285.770	619571.301	1610.81
QHR 86022	" "	6095522.735	619535.391	1620.59
QHR 86023	" "	6095599.208	619483.754	1622.70
QHR 86024	" "	6095732.913	619306.290	1626.43
QHR 86025	" "	6095165.472	618870.375	1610.18
QHR 86026	" "	6095288.466	618712.019	1628.64
QHR 86027	" "	6095438.991	618548.523	1649.64
QHR 86028	" "	6095199.822	619006.590	1618.35
QHR 86029	" "	6095232.411	618979.294	1618.19
QHR 86030	" "	6095268.876	618888.320	1613.15
QHR 86031	" "	6095315.091	618910.638	1615.17
QHR 86032	" "	6095379.648	618825.777	1620.62
QHR 86033	" "	6095463.003	619070.240	1616.82
QHR 86034	" "	6095501.148	618908.476	1604.73
QHR 86035	" "	6095625.501	618674.980	1613.90
QHR 86036	" "	6095553.821	618447.732	1605.34
QHR 86037	" "	6095582.881	619180.654	1604.72

G R I Z Z L Y   A R E A

Survey Station	Description	UTM Co-ordinates		Elevations
		Northing	Easting	
QG 1	Geol. Cont. Pt.	6096601.02	624420.00	877.74
QG 2	" " "	6096403.28	624295.71	893.84
QG 3	" " "	6096413.42	624161.95	927.84
QG 4	" " "	6096593.84	623644.90	1029.75
QG 5	" " "	6096609.47	623468.87	1055.48
QG 6	" " "	6096775.26	623293.48	1060.95
QG 7	" " "	6096147.85	623738.40	1074.35
QG 8	" " "	6095929.33	623986.12	1021.04
QG 9	" " "	6095727.33	624210.08	970.02
QG 10	" " "	6096546.92	623852.07	984.69
QG 11	" " "	6096514.02	623892.70	982.38
QHD 86001	Diamond D.H.	6096557.33	623975.75	953.93
QHD 86002	" " "	6096236.98	623500.76	1095.53*

T R A N S F E R   A R E A

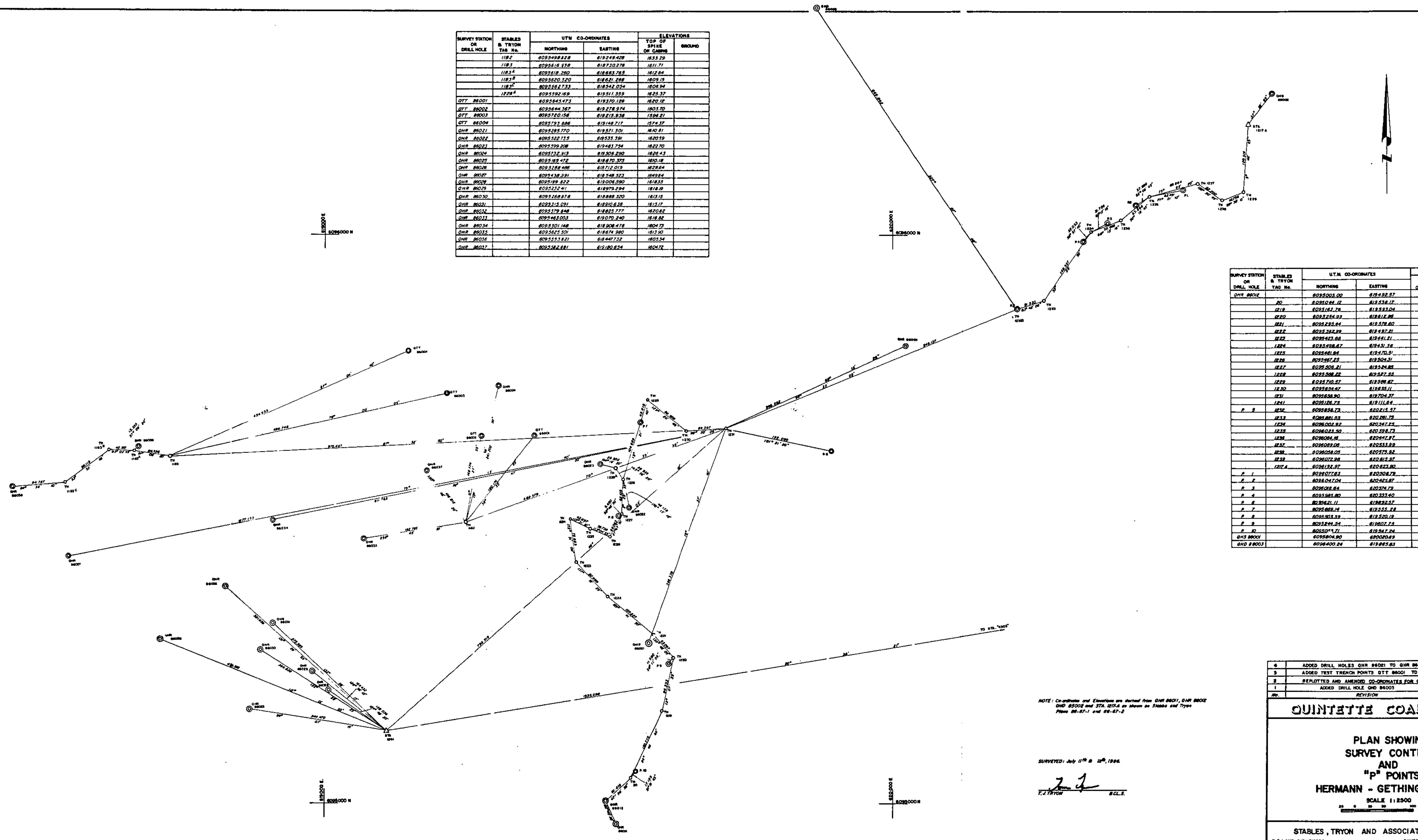
Survey Station	Description	UTM Co-ordinates Northing	Easting	Elevations
QHS 86001	Geol. Cont. Pt	6095804.90	620020.69	1619.10
QHS 86002	" " "	6095450.28	620623.85	1629.90
QHS 86003	" " "	6095236.20	621314.87	1475.59
QHS 86004	" " "	6095297.30	621153.98	1489.26
QHS 86005	" " "	6095442.51	620986.15	1526.35
QHS 86006	" " "	6095402.32	620958.73	1512.97
QHS 86007	" " "	6095611.08	620851.21	1549.12
QHS 86008	" " "	6095356.76	620619.56	1618.75
QHS 86009	" " "	6095233.87	620549.12	1570.08
QHS 86010	" " "	6095158.50	620648.23	1548.13
QHS 86011	" " "	6095204.48	621464.98	1456.00
QHS 86012	" " "	6095096.77	621555.57	1413.06
QHS 86013	" " "	6095124.88	621616.91	1427.92
QHS 86014	" " "	6095221.62	621620.67	1444.50
QHS 86015	" " "	6096359.58	620912.84	1504.38
QHS 86016	" " "	6094350.33	621321.77	1279.49
QHS 86050	" " "	6095077.41	621037.70	1335.92
QHS 86051	" " "	6094873.12	621069.58	1249.33
P 1	" " "	6096077.83	620508.79	1583.18
P 2	" " "	6096047.04	620425.87	1578.46
P 3	" " "	6096018.64	620374.79	1591.61
P 4	" " "	6095985.80	620333.40	1597.10
P 5	" " "	6095858.73	620215.57	1621.54
P 6	" " "	6095621.11	619892.57	1648.75
P 7	" " "	6095669.14	619555.28	1640.56
P 8	" " "	6095503.39	619520.19	1617.54
P 9	" " "	6095244.54	619607.75	1597.42
P 10	" " "	6095058.71	619547.24	1584.59

TRANSFER AREA

Survey Station	Description	UTM Co-ordinates		Elevations
		Northing	Easting	
QHD 85001	Diamond D.H.	6095479.72	620842.46	1543.20
QHD 85002	" "	6096247.89	620665.99	1549.97
QHD 86003	" "	6096400.24	619865.63	1532.40
QHD 86004	" "	6095039.71	621025.49	1328.95
QHD 86005	" "	6095040.51	621025.89	1329.25
QHD 86006	" "	6095648.46	621718.59	1325.06
QHD 86007	" "	6095276.73	622427.33	1292.95
QHD 86008	" "	6095971.61	621225.68	1413.39

SOUTH GETHING

Survey Station	Description	UTM Co-ordinates		Elevations
		Northing	Easting	
QGS 86001	Geol. Cont. Pt.	6093913.03	616744.15	1434.07
QGS 86002	" " "	6094537.28	616643.70	1369.73
QGS 86003	" " "	6093739.15	616643.79	1396.26
QGS 86004	" " "	6094297.63	616431.63	1323.83
QGS 86005	" " "	6092987.61	617366.42	1388.84
QGS 86006	" " "	6093317.78	617396.83	1373.12



SURVEY STATION OR DRILL HOLE	STABLES & TRYON TAG No.	UTM CO-ORDINATES		ELEVATIONS	
		NORTHING	EASTING	TOP OF SPIKE OR CASING	GROUND
	1182	6095498.828	619249.428	1633.29	
	1183	6095616.938	618730.276	1611.71	
	1183A	6095618.260	618663.765	1612.84	
	1183B	6095620.520	618621.288	1609.15	
	1183C	6095562.733	618542.054	1606.94	
	1228A	6095592.169	619511.359	1625.37	
QTT 86001		6095645.473	619370.128	1620.12	
QTT 86002		6095644.367	619278.974	1603.70	
QTT 86003		6095720.156	619215.938	1594.21	
QTT 86004		6095793.886	619148.717	1574.37	
QHR 86021		6095285.770	619571.301	1610.81	
QHR 86022		6095322.735	619535.391	1620.59	
QHR 86023		6095599.208	619483.754	1622.70	
QHR 86024		6095732.913	619306.290	1626.43	
QHR 86025		6095165.472	618870.375	1610.18	
QHR 86026		6095288.466	618712.019	1628.64	
QHR 86027		6095438.991	618548.523	1649.64	
QHR 86028		6095199.822	619006.590	1618.35	
QHR 86029		6095232.41	618979.294	1618.19	
QHR 86030		6095268.878	618888.320	1613.15	
QHR 86031		6095315.091	618910.638	1613.17	
QHR 86032		6095379.848	618825.777	1620.82	
QHR 86033		6095463.003	619070.240	1618.82	
QHR 86034		6095301.148	618908.478	1604.73	
QHR 86035		6095625.501	618674.980	1613.90	
QHR 86036		6095553.821	618447.732	1605.34	
QHR 86037		6095582.881	619180.654	1604.72	

SURVEY STATION OR DRILL HOLE	STABLES & TRYON TAG No.	U.T.M. CO-ORDINATES		ELEVATIONS	
		NORTHING	EASTING	TOP OF SPIKE OR CASING	GROUND
QHR 86012		6095003.00	619492.57	1586.51	1586.59
	20	6095044.12	619538.17	1587.89	
	1219	6095162.76	619593.04	1584.45	
	1220	6095254.93	619612.86	1599.46	
	1221	6095295.44	619578.60	1607.46	
	1222	6095362.99	619497.21	1625.65	
	1223	6095423.68	619441.21	1627.89	
	1224	6095498.67	619431.36	1614.31	
	1225	6095461.64	619470.51	1615.70	
	1226	6095467.25	619504.31	1613.17	
	1227	6095506.21	619524.85	1616.85	
	1228	6095568.22	619527.55	1625.57	
	1229	6095710.57	619568.67	1648.20	
	1230	6095654.47	619635.11	1655.90	
	1231	6095638.90	619704.37	1663.48	
	1241	6095126.75	619111.64	1629.87	
P 5	1232	6095858.73	620215.57	1621.54	
	1233	6095881.55	620281.75	1616.02	
	1234	6096002.92	620347.25	1594.35	
	1235	6096023.50	620398.73	1588.74	
	1236	6096064.16	620447.87	1580.97	
	1237	6096089.06	620533.99	1582.11	
	1238	6096058.05	620575.92	1585.08	
	1239	6096072.96	620615.97	1582.77	
	1217 A	6096192.97	620623.90	1570.51	
P 1		6096077.83	620508.79	1583.18	
P 2		6096047.04	620425.87	1578.46	
P 3		6096018.64	620374.79	1591.61	
P 4		6095985.80	620333.40	1597.10	
P 6		6095621.11	619892.57	1648.75	
P 7		6095669.14	619555.28	1640.56	
P 8		6095503.59	619520.19	1617.54	
P 9		6095244.54	619607.24	1597.42	
P 10		6095059.71	619547.24	1584.59	
QHS 86001		6095804.90	620020.69	1619.10	[illegible]
QHD 86003		6096400.24	619885.83	1532.40	1532.05

NOTE: Co-ordinates and Elevations are derived from QHR 86011, QHR 86012 QHD 85002 and STA. 1217-A as shown on Stables and Tryon Plans 86-67-1 and 86-67-2

SURVEYED: July 11th & 12th, 1986.

T. J. TRYON B.C.L.S.

No.	REVISION	DATE
4	ADDED DRILL HOLES QHR 86021 TO QHR 86037	07/10/86
3	ADDED TEST TRENCH POINTS QTT 86001 TO QTT 86004	07/10/86
2	REPLOTTED AND AMENDED CO-ORDINATES FOR QHS 86001 & QHD 86003	19/8/86
1	ADDED DRILL HOLE QHD 86003	5/8/86

QUINTETTE COAL LIMITED

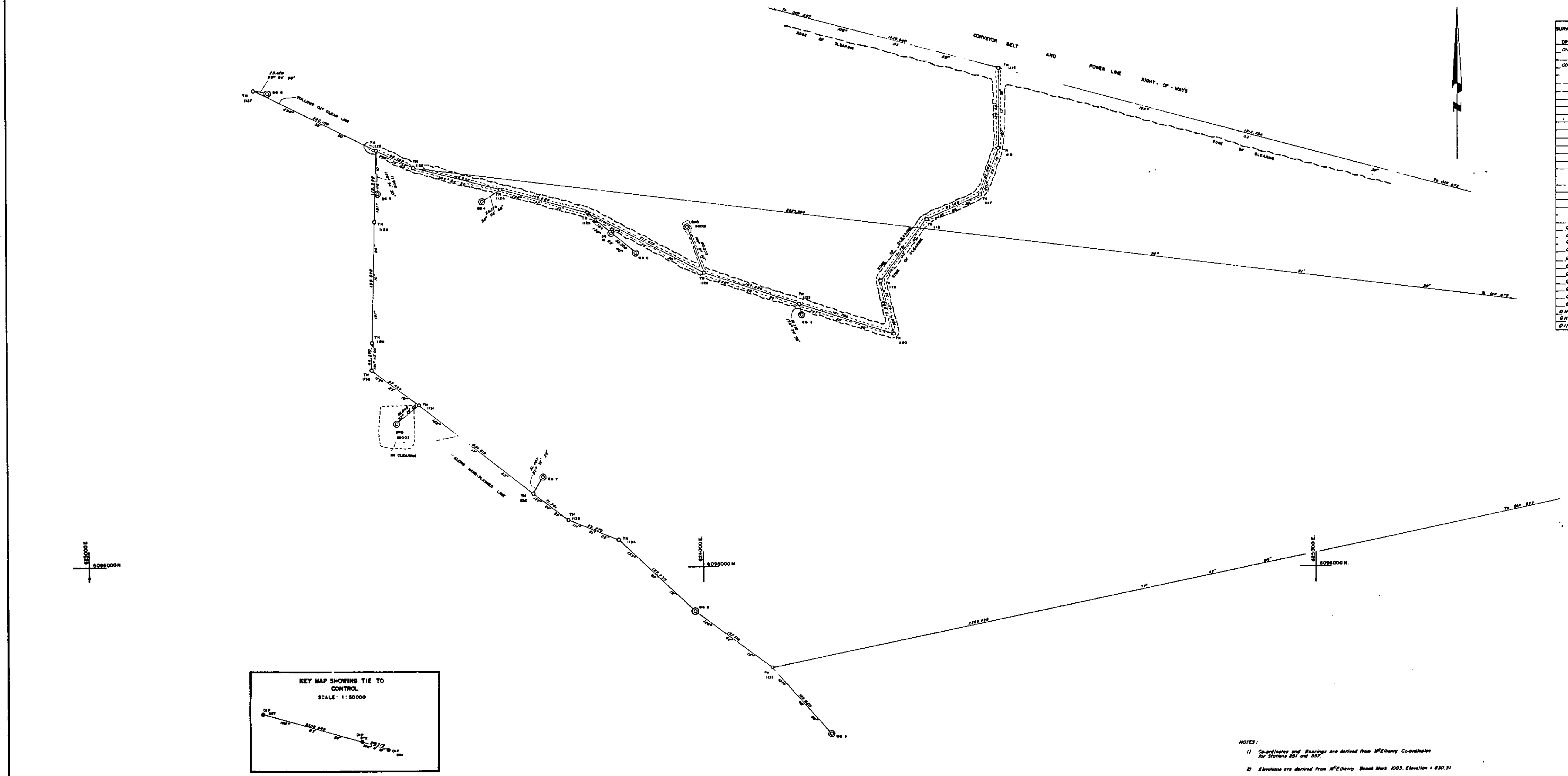
PLAN SHOWING SURVEY CONTROL AND "P" POINTS HERMANN - GETHING AREA

SCALE 1:2500

STABLES, TRYON AND ASSOCIATES

B.C. LAND SURVEYORS DAWSON CREEK, B.C.

FILE No. 86-67-4



SURVEY STATION OR DRILL HOLE	STABLES & TRYON TAG No.	U.T.M. CO-ORDINATES		ELEVATIONS	
		NORTHING	EASTING	TOP OF SPIKE OR CASING	GROUND
OIP 857		6097182.84	623105.77		
	1115	6096812.23	624482.90	858.84	
OIP 872		6096315.21	625329.19	830.34	
	1116	6096682.80	624482.31	867.88	
	1117	6096608.55	624452.29	872.21	
	1118	6096587.06	624363.11	879.57	
	1119	6096457.91	624289.72	888.11	
	1120	6096380.87	624310.38	893.55	
	1121	6096429.06	624158.09	928.30	
	1122	6096480.67	624001.62	959.54	
	1123	6096579.11	623812.30	989.99	
	1124	6096616.61	623670.24	1022.86	
	1125	6096651.95	623529.34	1044.84	
	1126	6096680.42	623467.10	1050.25	
	1127	6096778.88	623270.34	1081.69	
	1128	6096564.87	623484.81	1071.99	
	1129	6096366.35	623460.77	1097.00	
	1130	6096322.02	623459.87	1101.65	
	1131	6096265.57	623539.35	1091.86	
	1132	6096120.03	623723.84	1089.55	
	1133	6096078.44	623780.62	1059.04	
	1134	6096043.95	623863.73	1055.31	
	1135	6095835.40	624112.11	1003.45	
OG 1		6096801.02	624420.00	877.74	877.59
OG 2		6096403.88	624295.71	893.84	893.84
OG 3		6096413.42	624161.95	927.84	927.84
OG 4		6096593.84	623644.90	1029.75	
OG 5		6096609.47	623468.87	1055.48	
OG 6		6096775.26	623293.48	1080.95	
OG 7		6096147.85	623738.40	1074.35	
OG 8		6095929.33	623986.12	1021.04	
OG 9		6095727.33	624210.08	970.02	
OG 10		6096346.92	623852.07	984.69	
OG 11		6096514.02	623892.70	948.38	
GHD 86001		6096557.33	623975.75	953.93	
GHD 86002		6096236.98	623500.76		1095.53
OIP 851		6096059.11	627211.25		

NOTES:

1) Co-ordinates and Bearings are derived from McElheny Co-ordinates for Stations 851 and 857.

2) Elevations are derived from McElheny Bench Mark 1003. Elevation = 830.31

3) OG Points are Marked by 0.61 x 0.01 Rebar.

Surveyed:

July 22nd to July 25th, 1986.

T.J.TRYON B.C.L.S.

QUINTETTE COAL LIMITED

PLAN SHOWING SURVEY CONTROL AND ROTARY DRILL HOLES GRIZZLY AREA

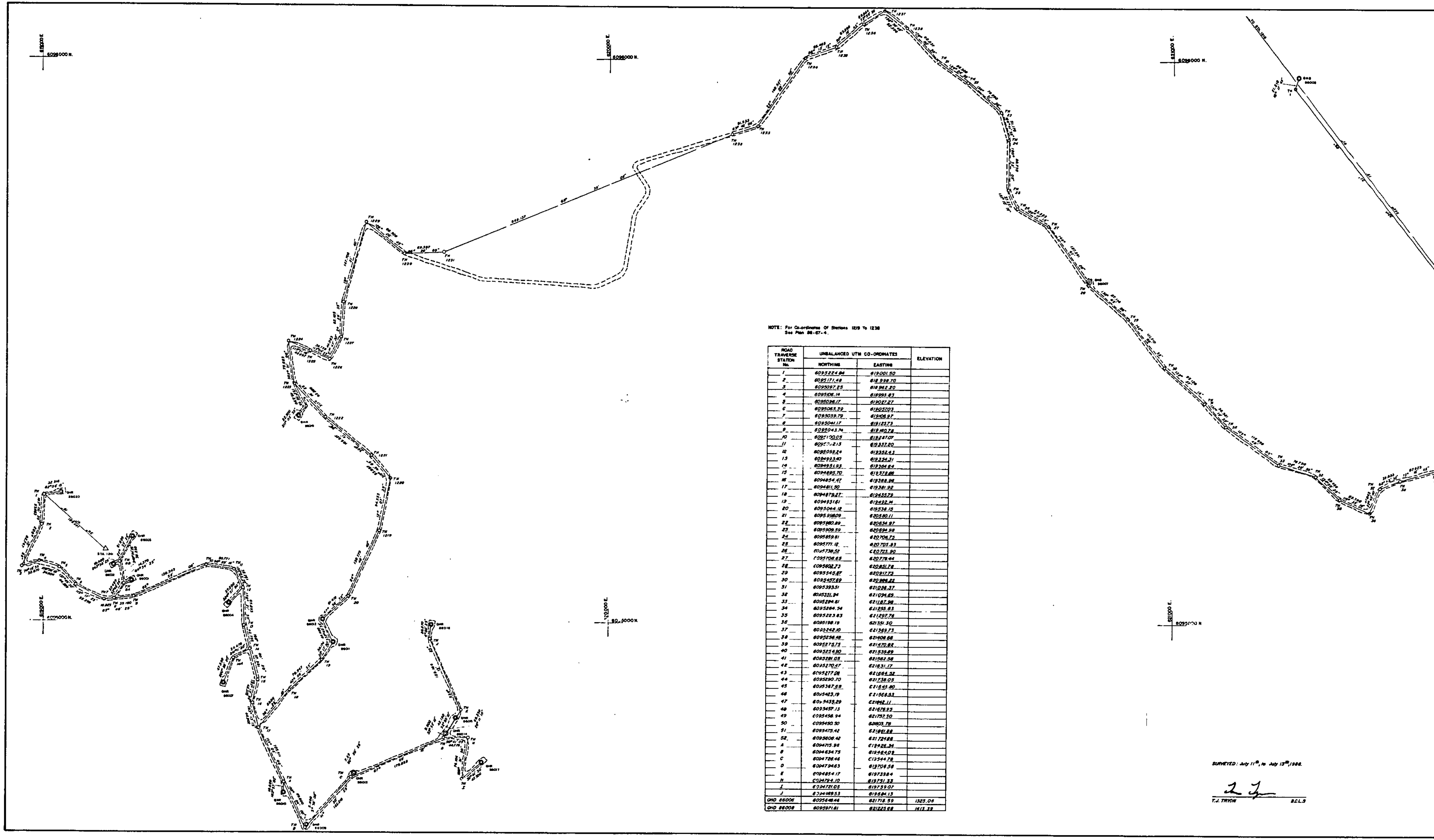
SCALE 1:2500

25 0 25 50 100 METRES

STABLES, TRYON AND ASSOCIATES

B.C.LAN[illegible] 93 DAWSON CREEK, B.C.

FILE No. 86-87-5



NOTE: For Co-ordinates Of Stations 1219 To 1238
See Plan 86-67-4.

ROAD TRAVERSE STATION No.	UNBALANCED UTM CO-ORDINATES		ELEVATION
	NORTHING	EASTING	
1	6095224.84	619001.50	
2	6095171.48	618998.70	
3	6095097.25	618962.20	
4	6095106.14	618993.83	
5	6095096.17	619027.27	
6	6095063.39	619057.03	
7	6095039.79	619108.97	
8	6095041.17	619125.73	
9	6095043.74	619160.78	
10	6095100.05	619247.07	
11	6095[illegible]2.13	619337.20	
12	6095059.24	619352.43	
13	6094993.40	619354.31	
14	6094951.93	619364.64	
15	6094895.70	619378.88	
16	6094854.47	619368.96	
17	6094811.50	619381.92	
18	6094879.27	619435.79	
19	6094931.61	619492.14	
20	6095044.12	619538.15	
21	6095998.09	620580.11	
22	6095980.89	620634.97	
23	6095909.59	620694.98	
24	6095859.81	620706.75	
25	6095771.12	620705.93	
26	6095738.52	620723.90	
27	6095708.65	620778.44	
28	6095602.73	620851.78	
29	6095545.87	620917.73	
30	6095457.69	620986.22	
31	6095393.51	621056.37	
32	6095351.94	621094.69	
33	6095284.81	621187.98	
34	6095264.54	621255.83	
35	6095223.83	621297.76	
36	6095198.19	621351.30	
37	6095242.10	621369.73	
38	6095256.48	621408.68	
39	6095275.75	621470.82	
40	6095254.90	621539.89	
41	6095281.05	621582.58	
42	6095270.47	621631.17	
43	6095277.08	621664.52	
44	6095290.70	621738.05	
45	6095367.68	621845.80	
46	6095423.19	621568.53	
47	6095435.29	621642.11	
48	6095457.13	621676.95	
49	6095456.94	621757.50	
50	6095450.50	621803.78	
51	6095475.42	621861.88	
52	6095606.42	621724.88	
A	6094715.98	619426.34	
B	6094634.75	619464.09	
C	6094726.46	619544.78	
D	6094794.63	619708.58	
E	6094854.17	619739.84	
H	6094794.10	619751.33	
I	6094721.05	619739.07	
J	6094989.53	619684.13	
OHD 86006	6095648.44	621718.59	1325.06
OHD 86008	6095971.61	621225.68	1413.39

SURVEYED: July 11th, to July 13th, 1986.

T.J. TRYON B.C.L.S

No.	REVISION	DATE
4	ADDED DRILL HOLE OHD 86008 AND CO-ORDINATES AND ROAD TRAVERSE	20/08/86
3	REPLOTTED OHD 86006 AND TH 52	19/08/86
2	ADDED CO-ORDINATES AND ELEVATIONS FOR OHD 86006	12/08/86
1	ADDED TRAVERSE STATIONS AND CO-ORDINATES	5/08/86

QUINTETTE COAL LIMITED

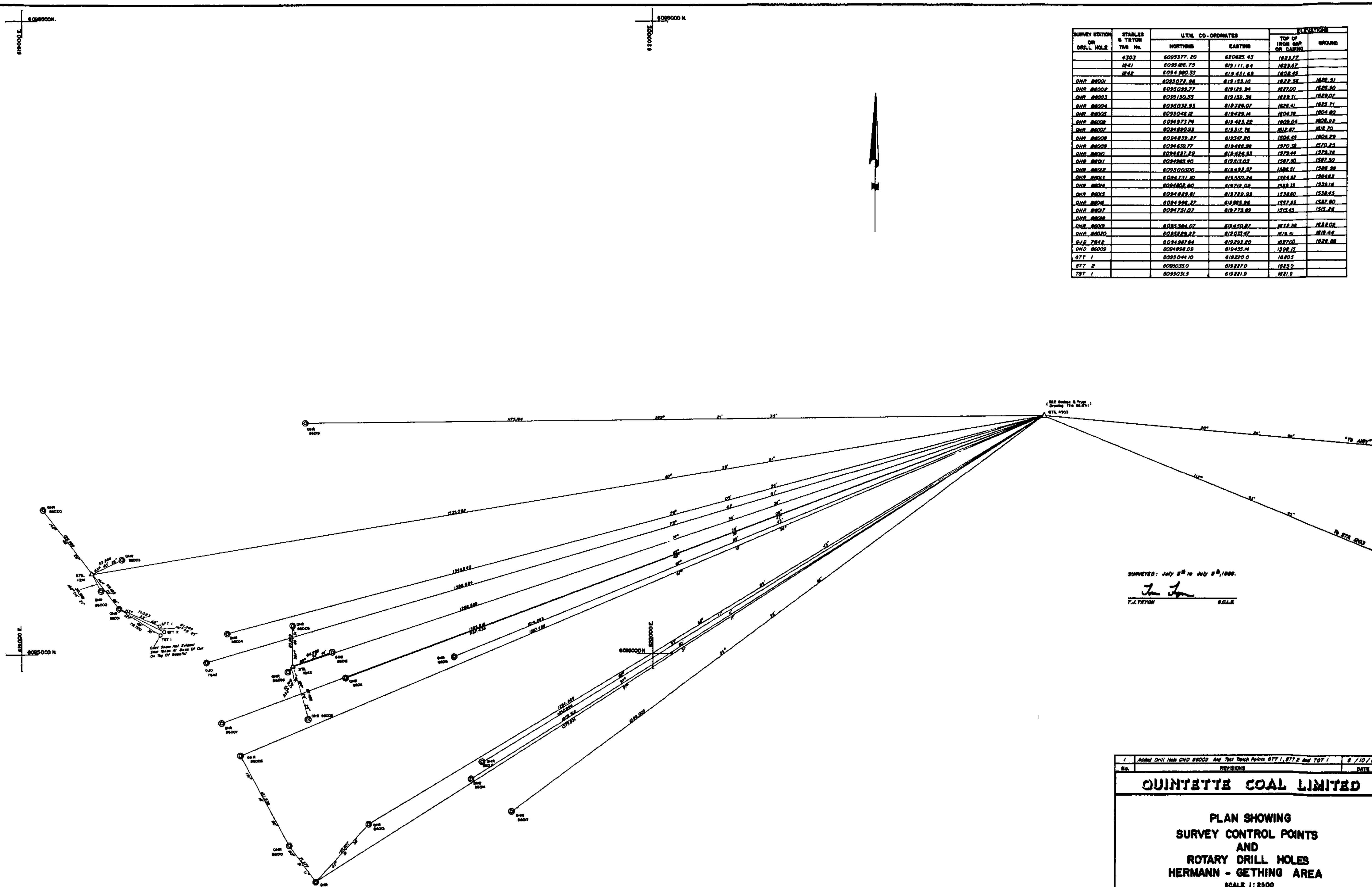
PLAN SHOWING ACCESS ROADS TO ROTARY DRILL HOLES HERMANN - GETHING AREA

SCALE 1:2500

STABLES, TRYON AND ASSOCIATES
B.C. LAND SURVEYORS
DAWSON CREEK, B.C.

FILE No. 86-67-3

SURVEY STATION OR DRILL HOLE	STABLES & TRYON TAG No.	U.T.M. CO-ORDINATES		ELEVATIONS	
		NORTHING	EASTING	TOP OF IRON BAR OR CASING	GROUND
	4303	6095377.20	620635.43	1623.77	
	1241	6095126.75	619111.64	1629.67	
	1242	6094980.33	619431.69	1608.49	
QHR 86001		6095072.96	619155.10	1622.96	1622.51
QHR 86002		6095099.77	619125.94	1627.00	1626.90
QHR 86003		6095150.35	619159.36	1629.31	1629.07
QHR 86004		6095032.93	619326.07	1626.41	1625.71
QHR 86005		6095046.12	619429.14	1604.78	1604.60
QHR 86006		6094973.74	619483.22	1609.04	1608.92
QHR 86007		6094890.93	619317.76	1612.67	1612.70
QHR 86008		6094839.27	619347.20	1604.45	1604.29
QHR 86009		6094639.77	619466.98	1570.38	1570.24
QHR 86010		6094697.29	619424.93	1579.44	1579.36
QHR 86011		6094963.40	619513.03	1587.60	1587.30
QHR 86012		6095003.00	619432.57	1586.51	1586.39
QHR 86013		6094731.10	619550.24	1564.92	1564.63
QHR 86014		6094802.60	619712.02	1539.35	1539.18
QHR 86015		6094829.61	619729.99	1538.60	1538.45
QHR 86016		6094996.27	619685.96	1557.95	1557.60
QHR 86017		6094751.07	619775.69	1515.45	1515.26
QHR 86018					
QHR 86019		6095364.07	619450.67	1632.26	1632.02
QHR 86020		6095228.27	619033.47	1619.51	1619.44
QJD 7642		6094967.64	619293.20	1627.00	1626.86
QHD 86009		6094896.09	619455.14	1598.15	
GTT 1		6095044.10	619220.0	1620.5	
GTT 2		6095035.0	619227.0	1625.0	
TGT 1		6095031.5	619221.9	1621.9	



No.	REVISIONS	DATE
1	Added Drill Hole QHD 86009 And Test Trench Points GTT 1, GTT 2 And TGT 1	6 /10/ 86

QUINTETTE COAL LIMITED

PLAN SHOWING SURVEY CONTROL POINTS AND ROTARY DRILL HOLES HERMANN - GETHING AREA

SCALE 1 : 2500

25 0 25 50 100 METRES

STABLES, TRYON AND ASSOCIATES

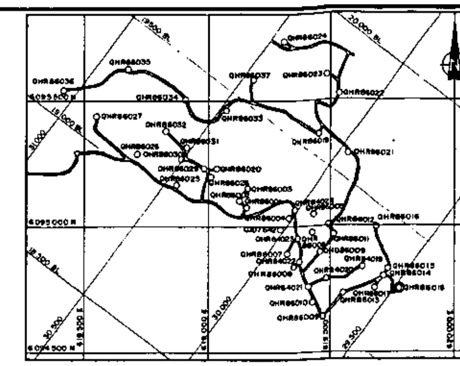
B.C. LAN[illegible] [illegible]ORS — DAWSON CREEK, B.C.

86-67-2

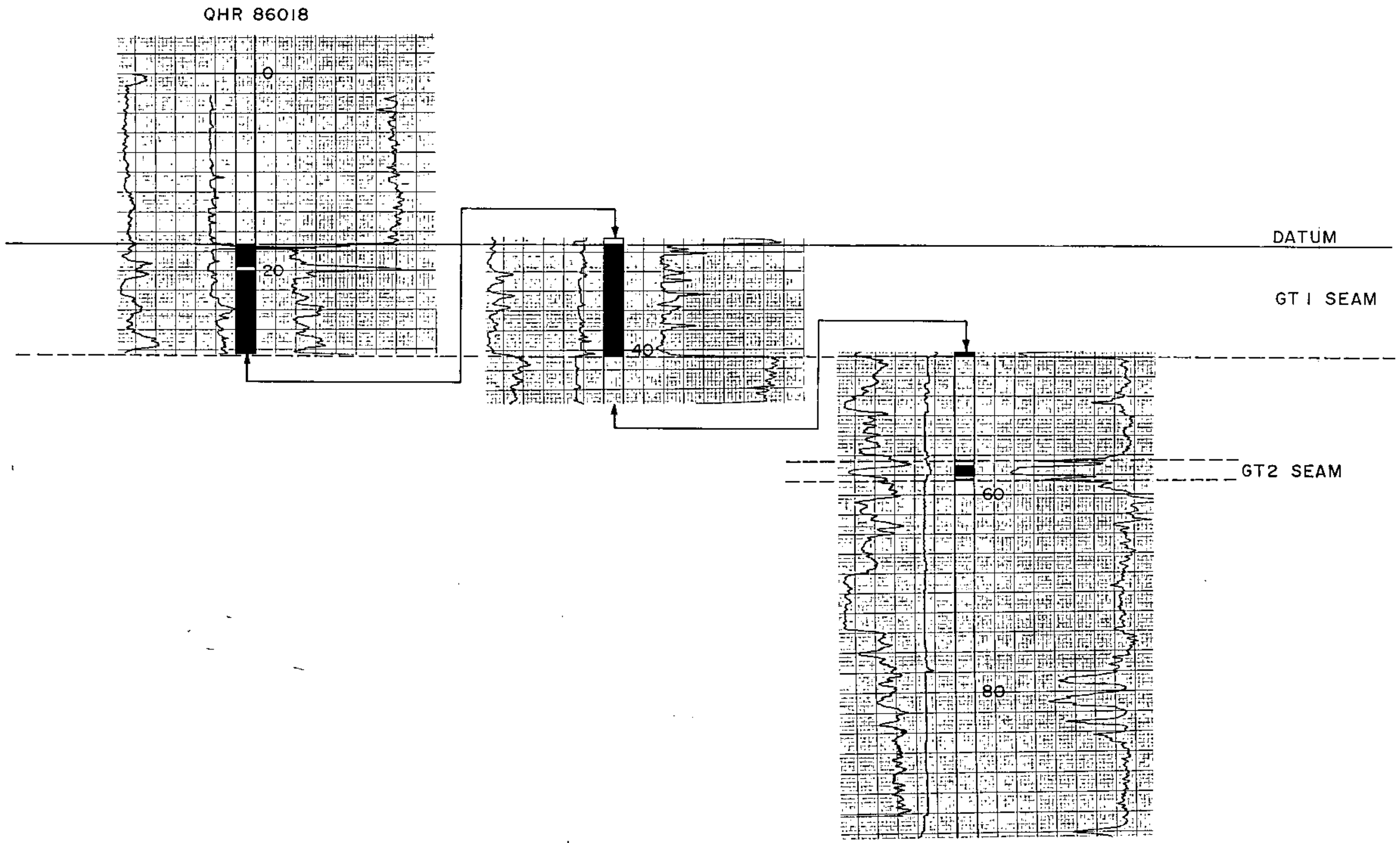
APPENDIX 1

Section 2.1

Gething Area Geophysical
Drill Hole Geophysical Log Correlation
of Coal Bearing Section



GETHING AREA LOCATION MAP
1:10000 SCALE



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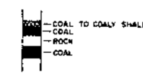
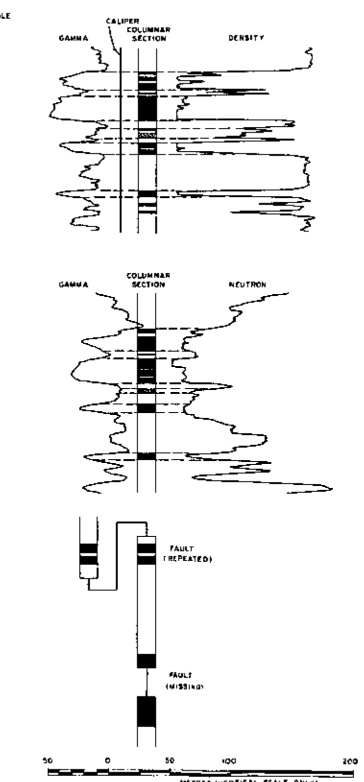


GEOPHYSICAL LOGS
1:200 SCALE



NOTE: 1) ALL THICKNESSES ARE APPARENT.
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

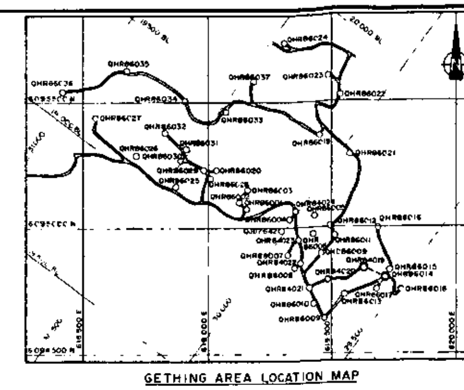
Area: GETHING — Category: CORRELATION

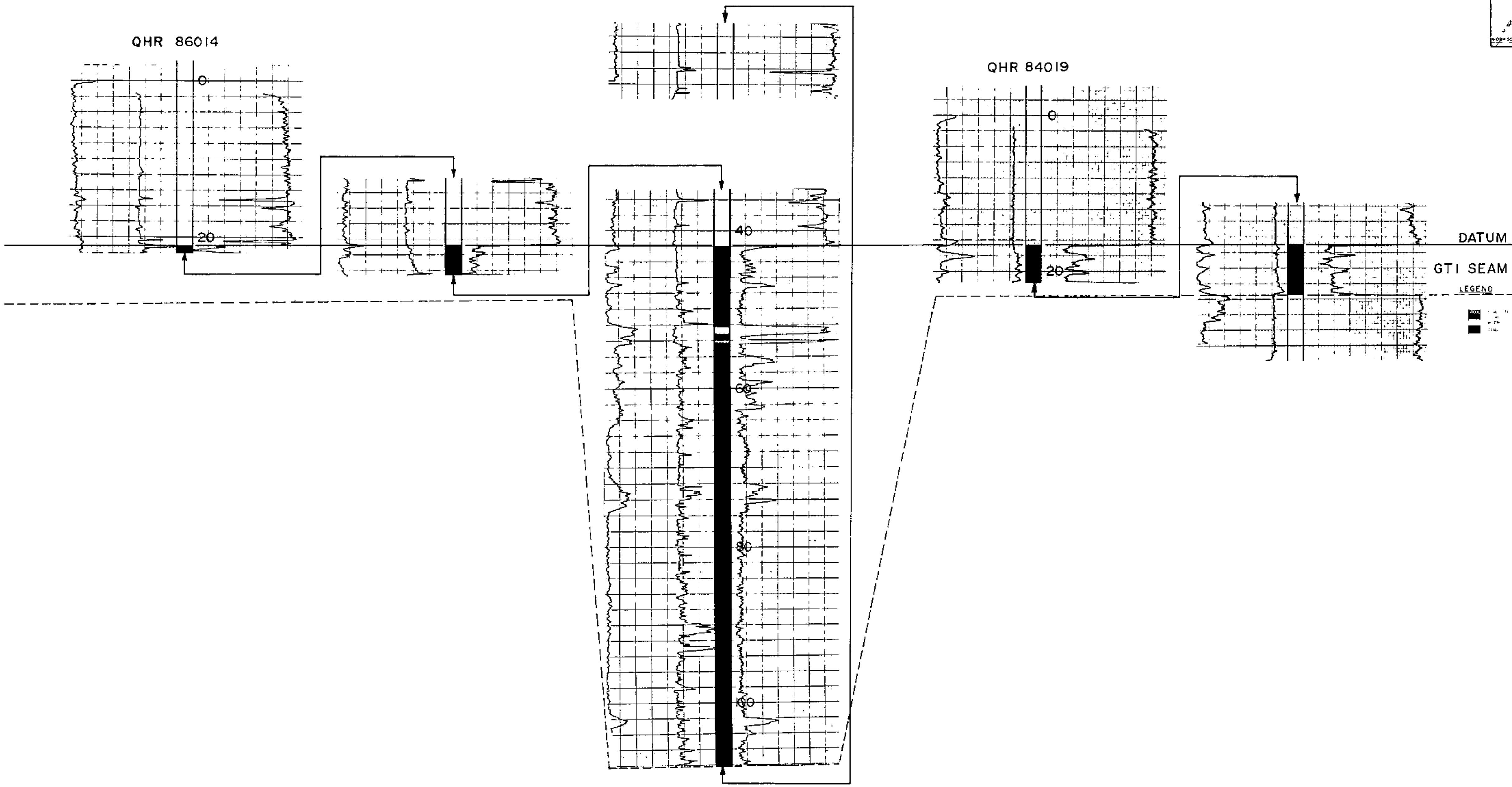
Drawing Title

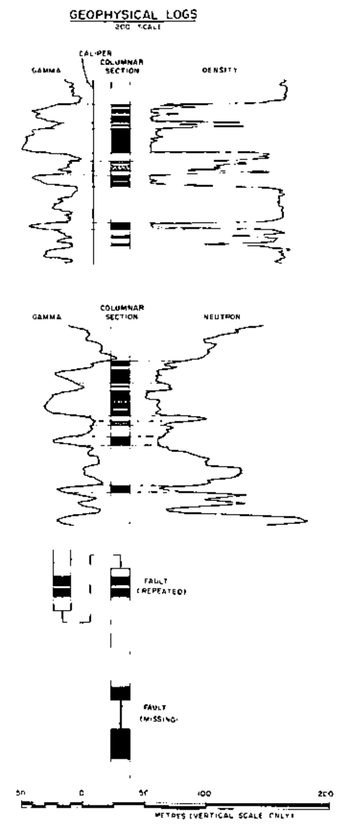
GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 1 of 12

Scale: 1:200 (VERT.) (HORIZONTAL NOT TO SCALE) — Drawing No. 86-605-26-011 — Rev. 0







NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area GETHING | Category CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 2 of 12

Scale	Drawing No	Rev.
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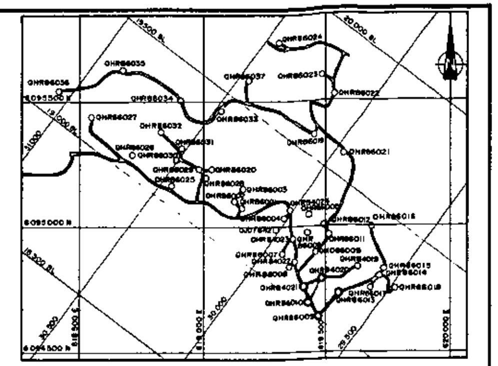
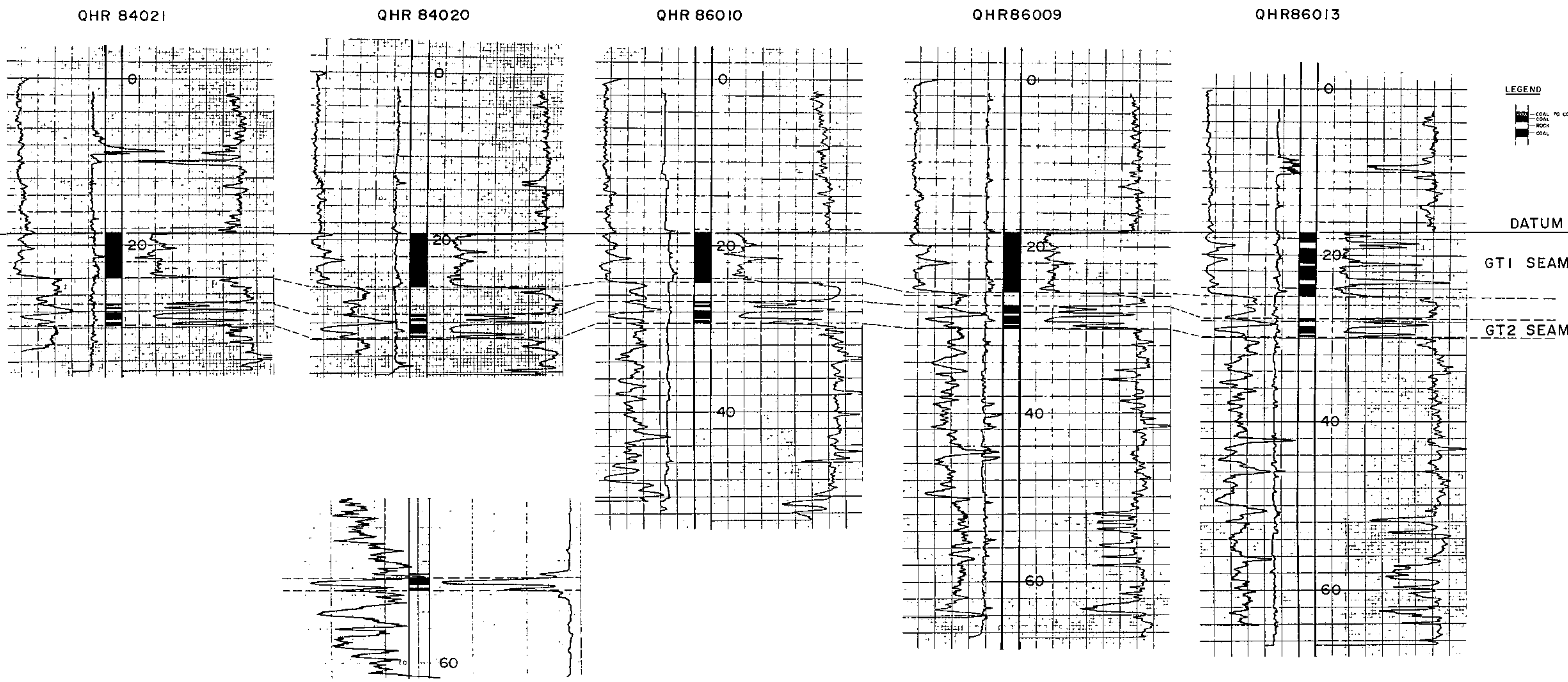
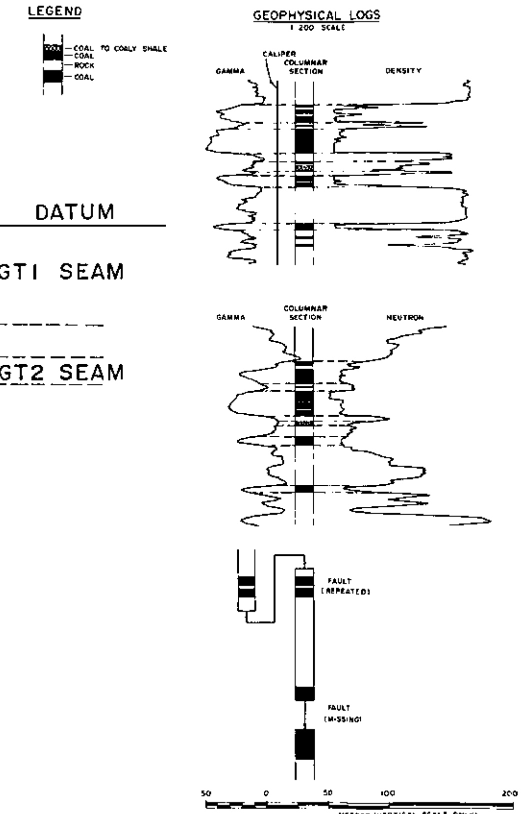






NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

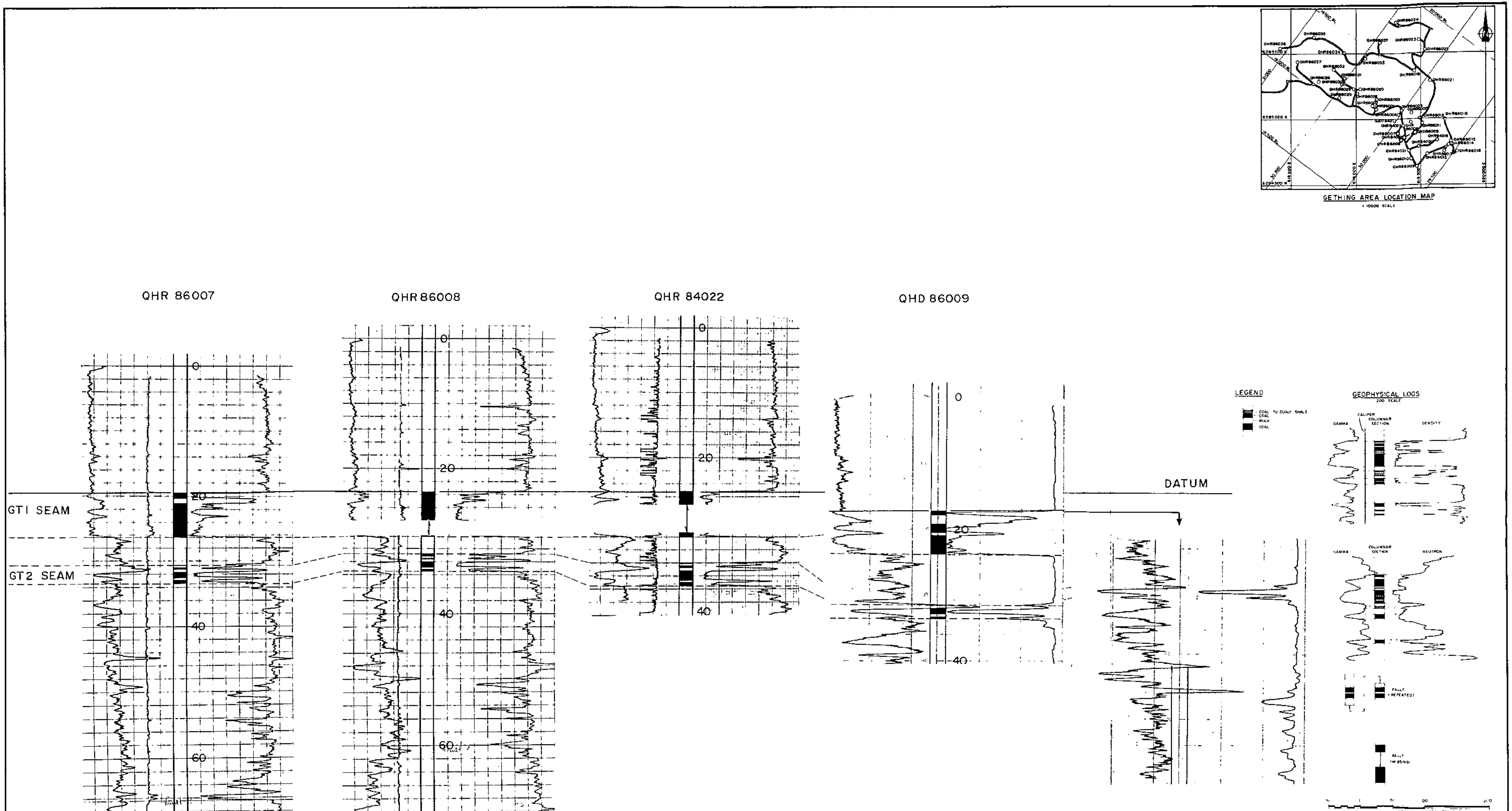
Area GETHING | Category CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 3 of 12

Scale	Drawing No.	Rev.
1:200 (VERT.) (HORIZONTAL NOT TO SCALE)	86-605-26-013	0



METRES VERTICAL SCALE ONLY

NOTE: 1. ALL THICKNESSES ARE APPARENT
2. ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3. GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

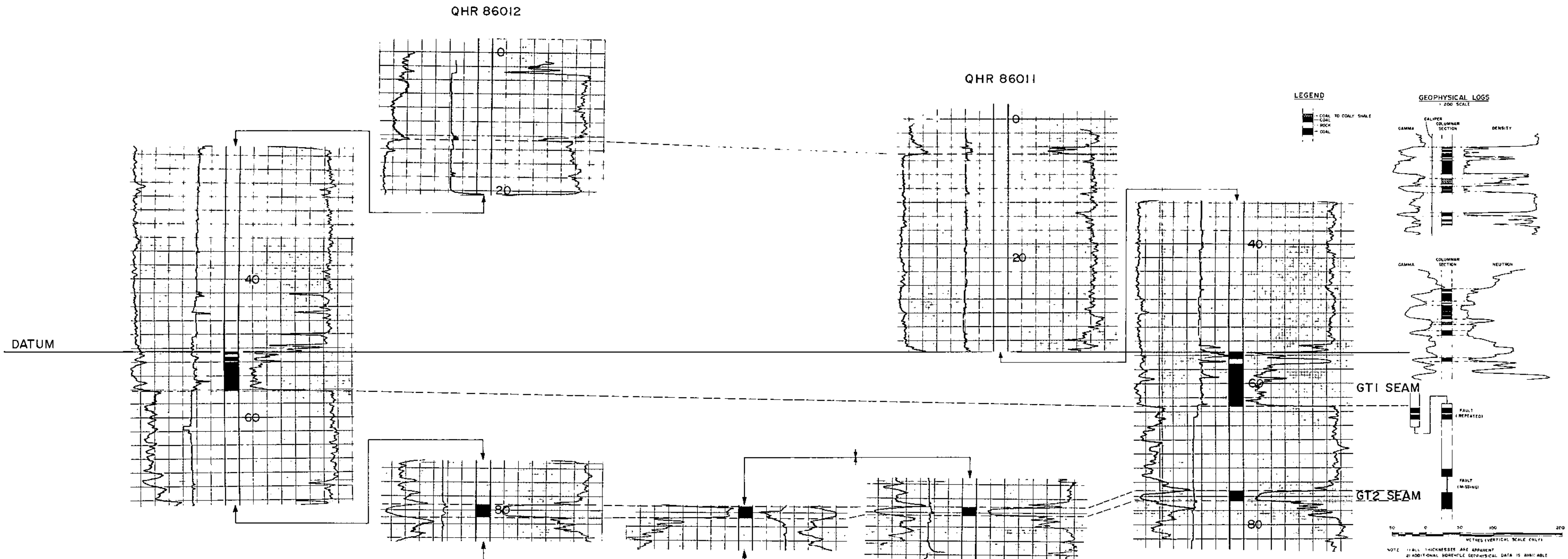
Area: GETHING | Category: CORRELATION

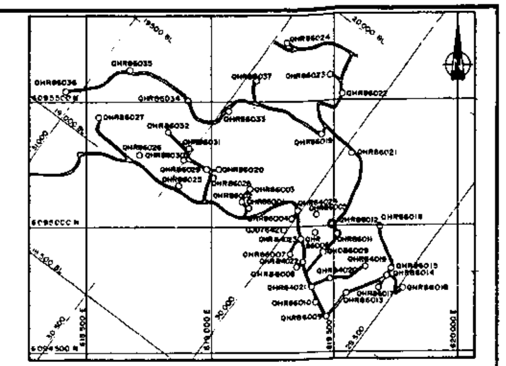
Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG
CORRELATION OF COAL - BEARING
SECTION

SHEET 4 of 12

Scale: 1:200 (VERT.) (HORIZONTAL NOT TO SCALE) | Drawing No: 86 - 605 - 26 - 014 | Rev.: 0





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METRES (VERTICAL SCALE ONLY)

NOTE: 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area: GETHING | Category: CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 8 of 12

Scale	Drawing No.	Rev.
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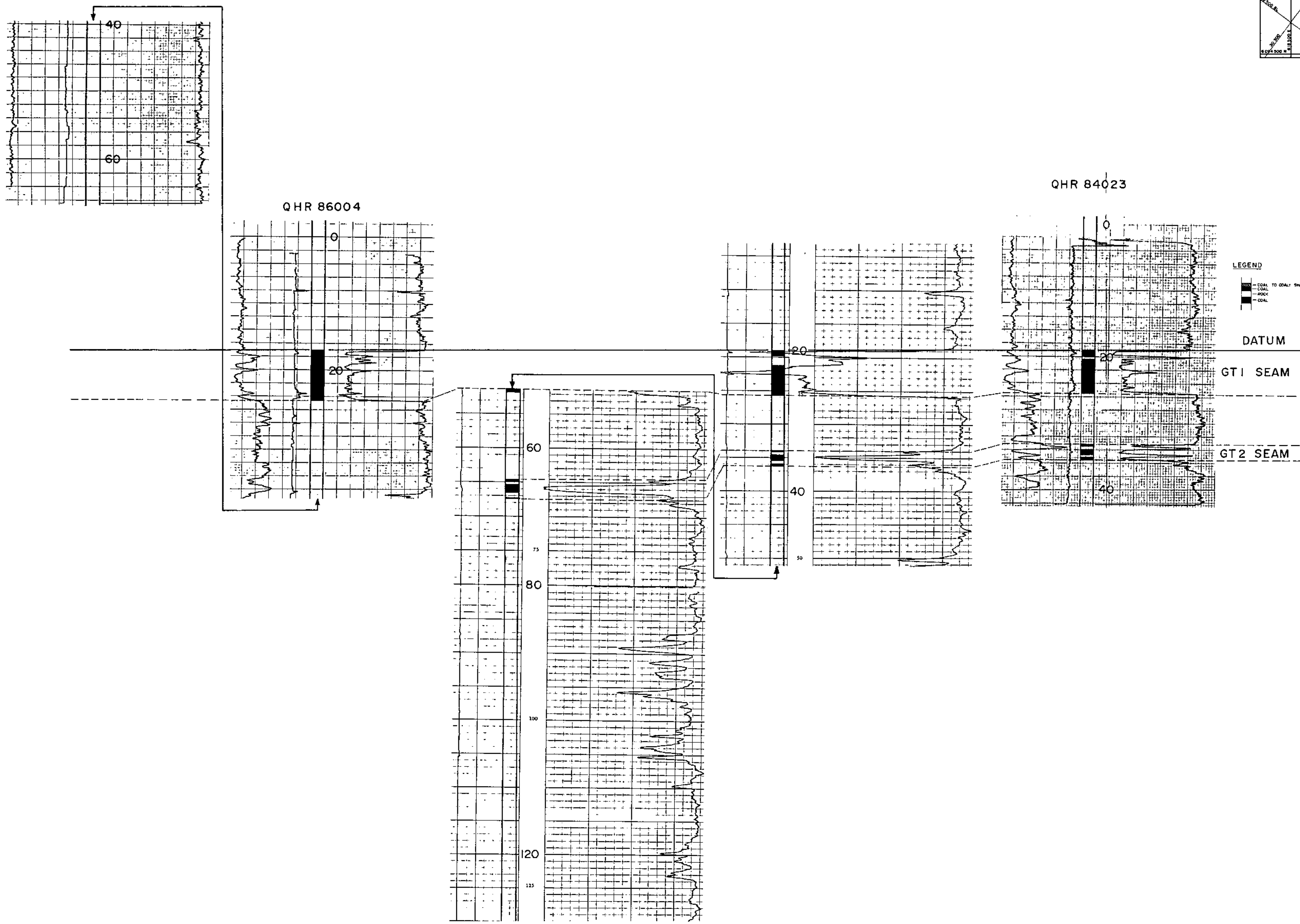
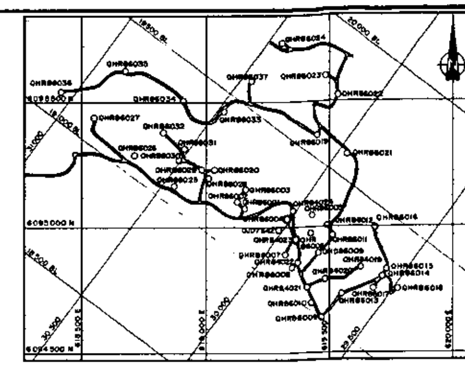
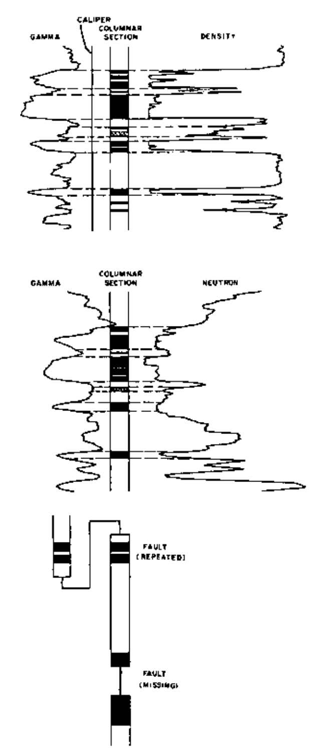




GETHING AREA LOCATION MAP
1:10000 SCALE

LEGEND



50 0 50 100 200

METRES (VERTICAL SCALE ONLY)

NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	20	11	86	ORIGINAL DRAFT	HB	NW	

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COAL DIVISION

Area GETHING — Category CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG
CORRELATION OF COAL - BEARING
SECTION

SHEET 8 of 12

Scale	Drawing No.	Rev.
1:200 (VERT.) (HORIZONTAL NOT TO SCALE)	86 - 605 - 26 - 016	0

NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

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DENISON MINES LIMITED

COAL DIVISION

Area: GETHING | Category: CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 7 of 12

Scale	Drawing No.	Rev.
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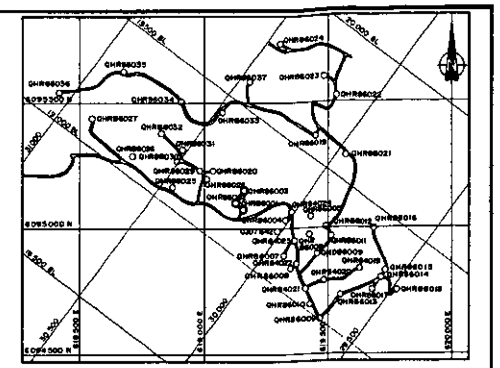
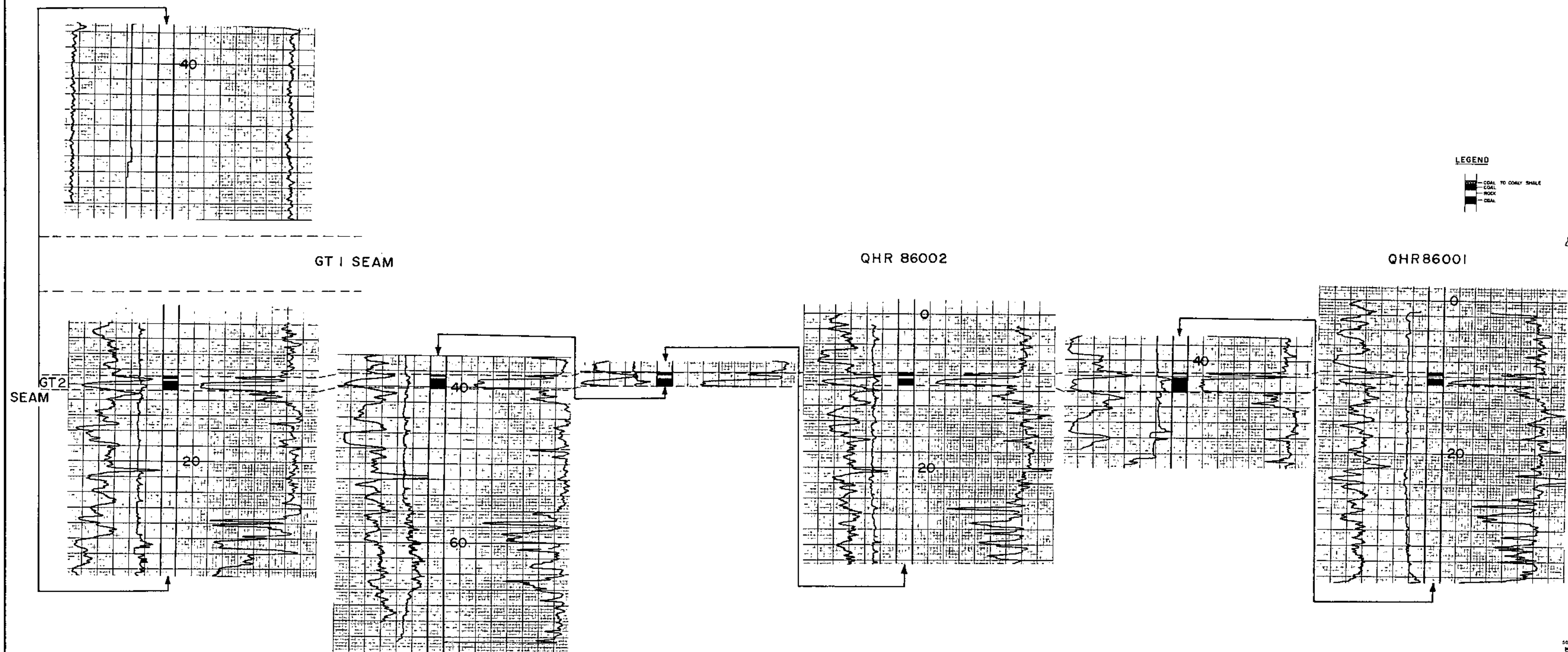


GETHING AREA LOCATION MAP

1:10000 SCALE

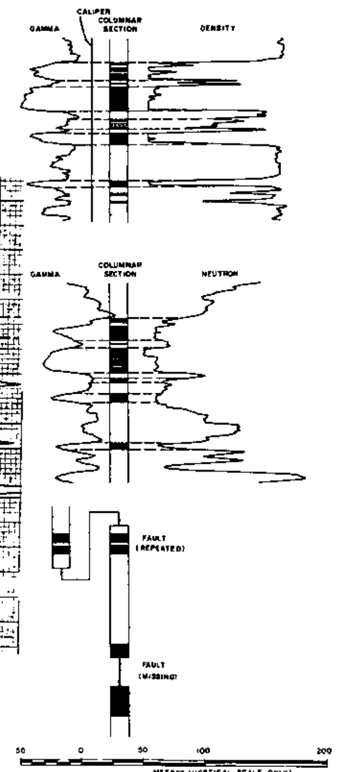


LEGEND

COAL TO COALY SHALE
COAL
ROCK
COAL

GEOPHYSICAL LOGS

1:200 SCALE



NOTE: 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area	GETHING	Category	CORRELATION

Drawing Title

GETHING AREA

DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 8 of 12

Scale	Drawing No.	Rev.
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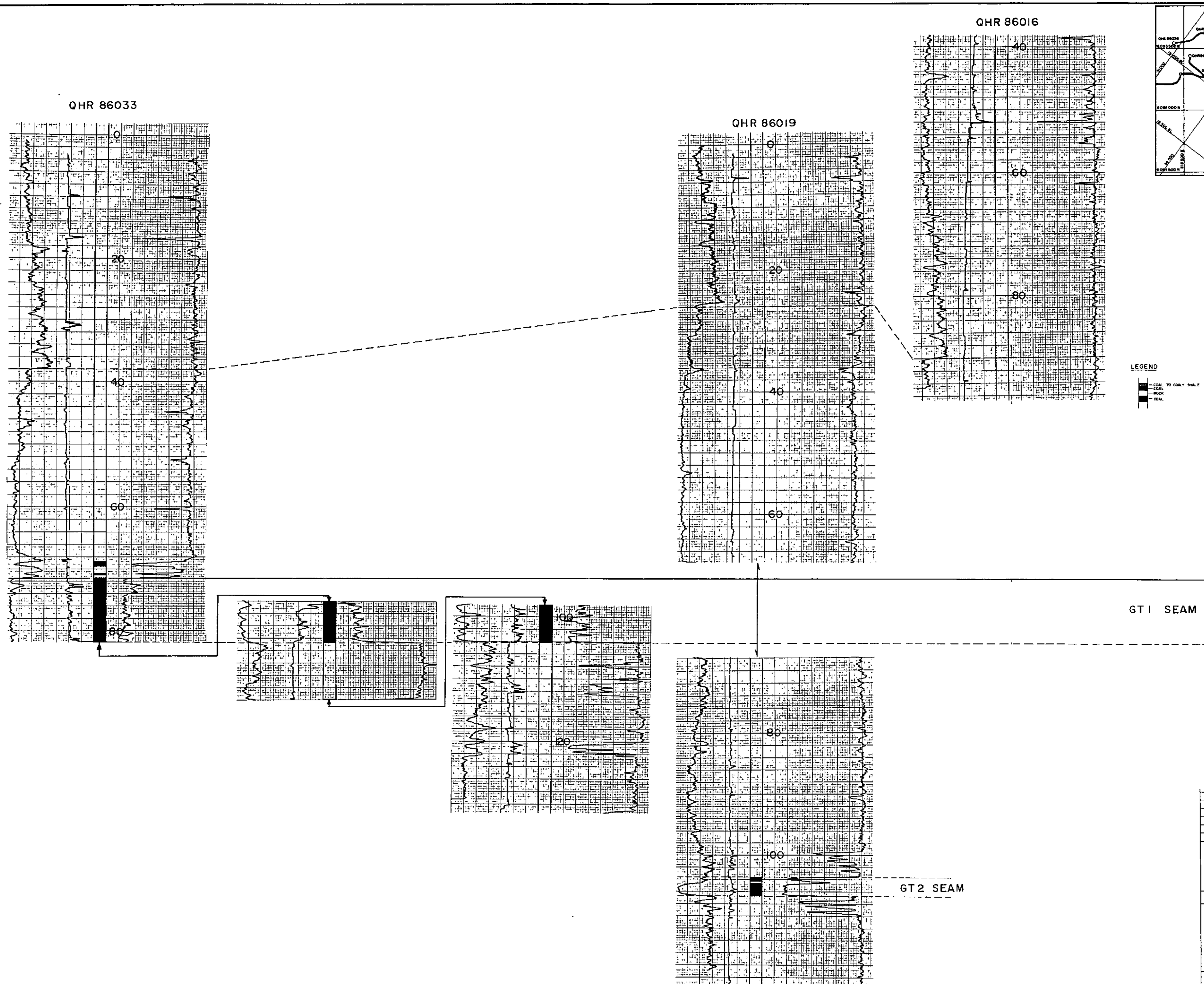

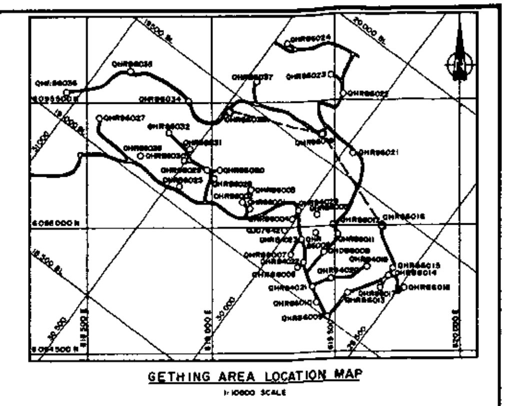

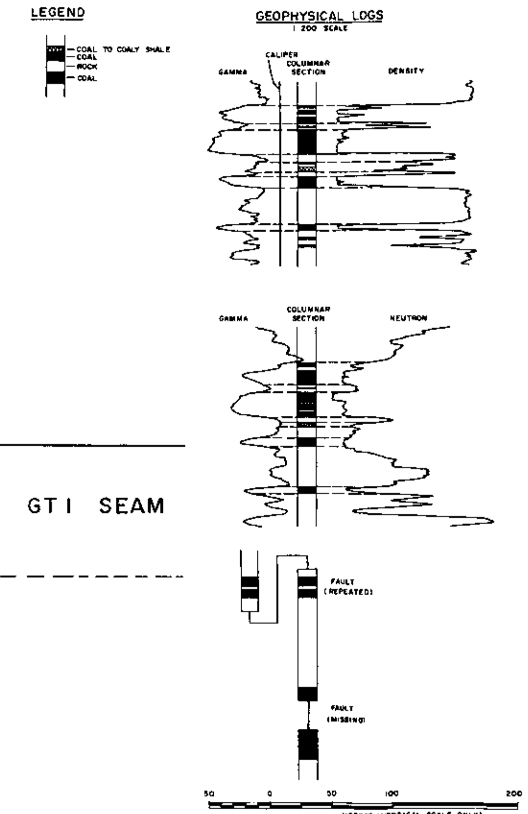

NOTE: 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area GETHING | Category CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 9 of 12

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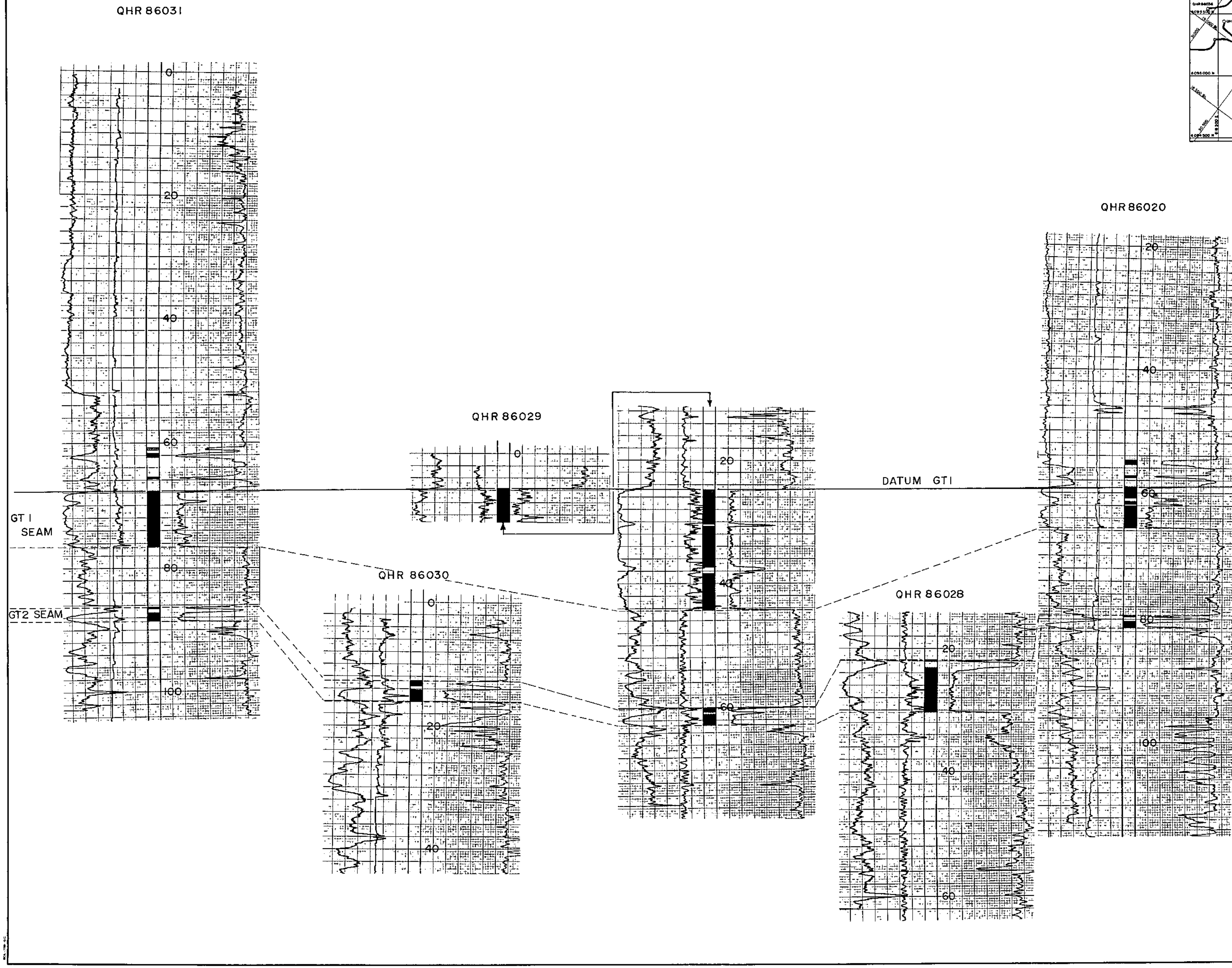
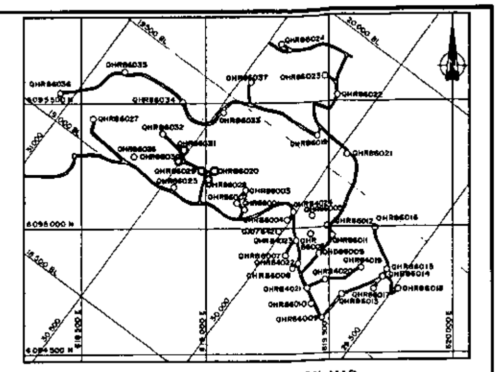
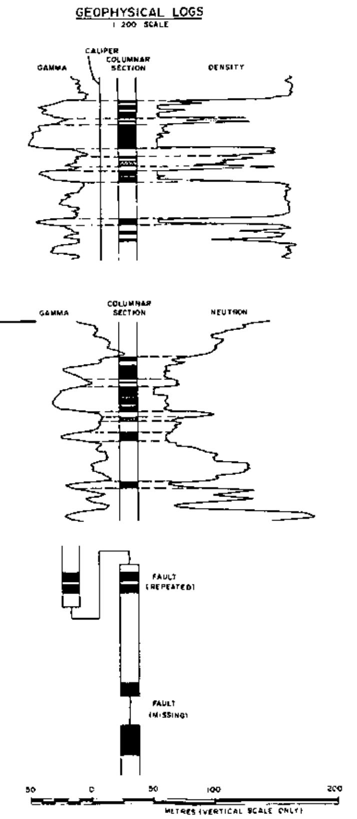



GETHING AREA LOCATION MAP
1:10000 SCALE



NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	H	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

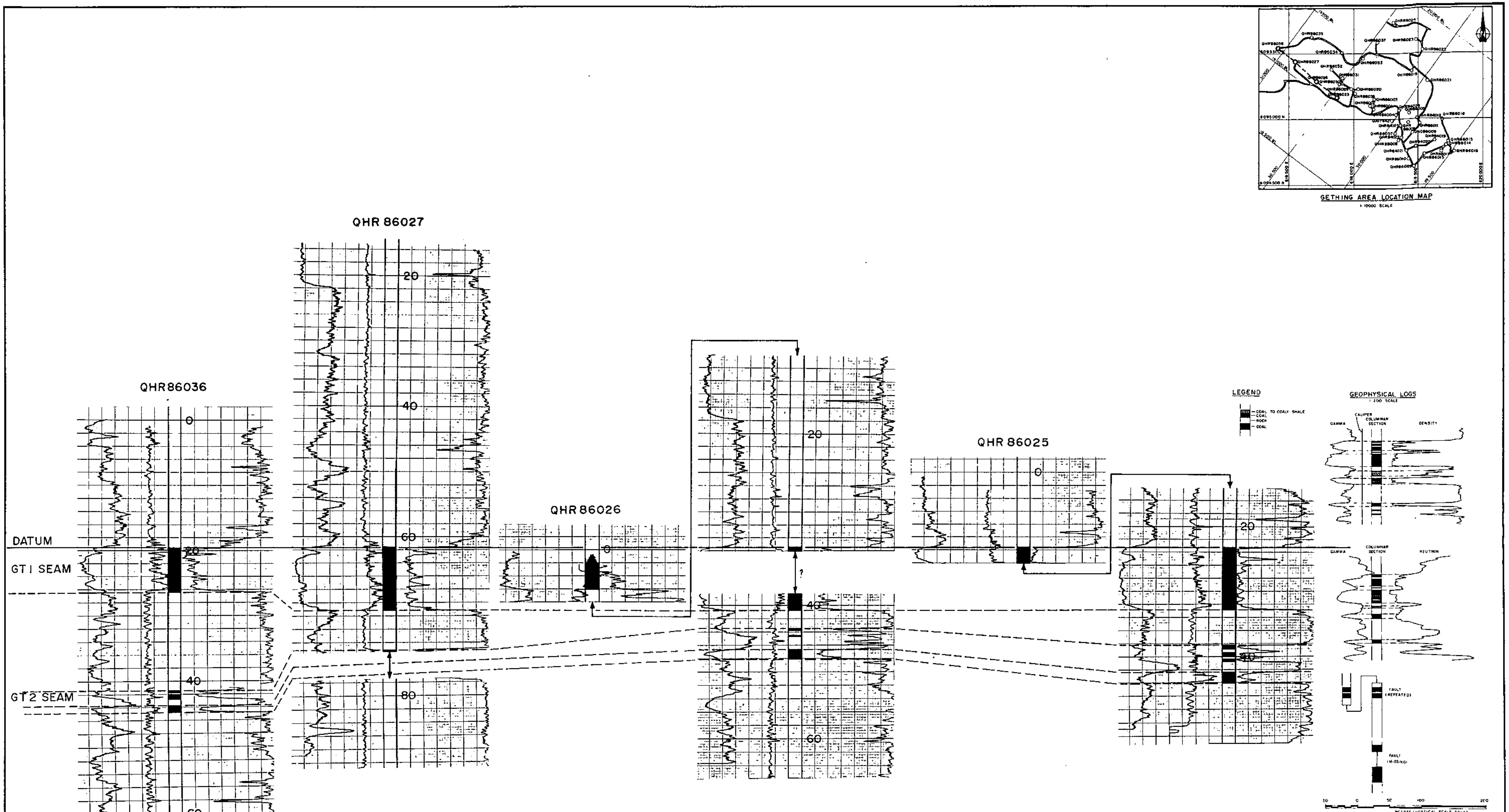
Area GETHING | Category CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL-BEARING SECTION

SHEET 19 of 12

Scale 1:200 (VERT.) (HORIZONTAL NOT TO SCALE) | Drawing No. 86-605-26-020 | Rev. 0



NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA/NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HB	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

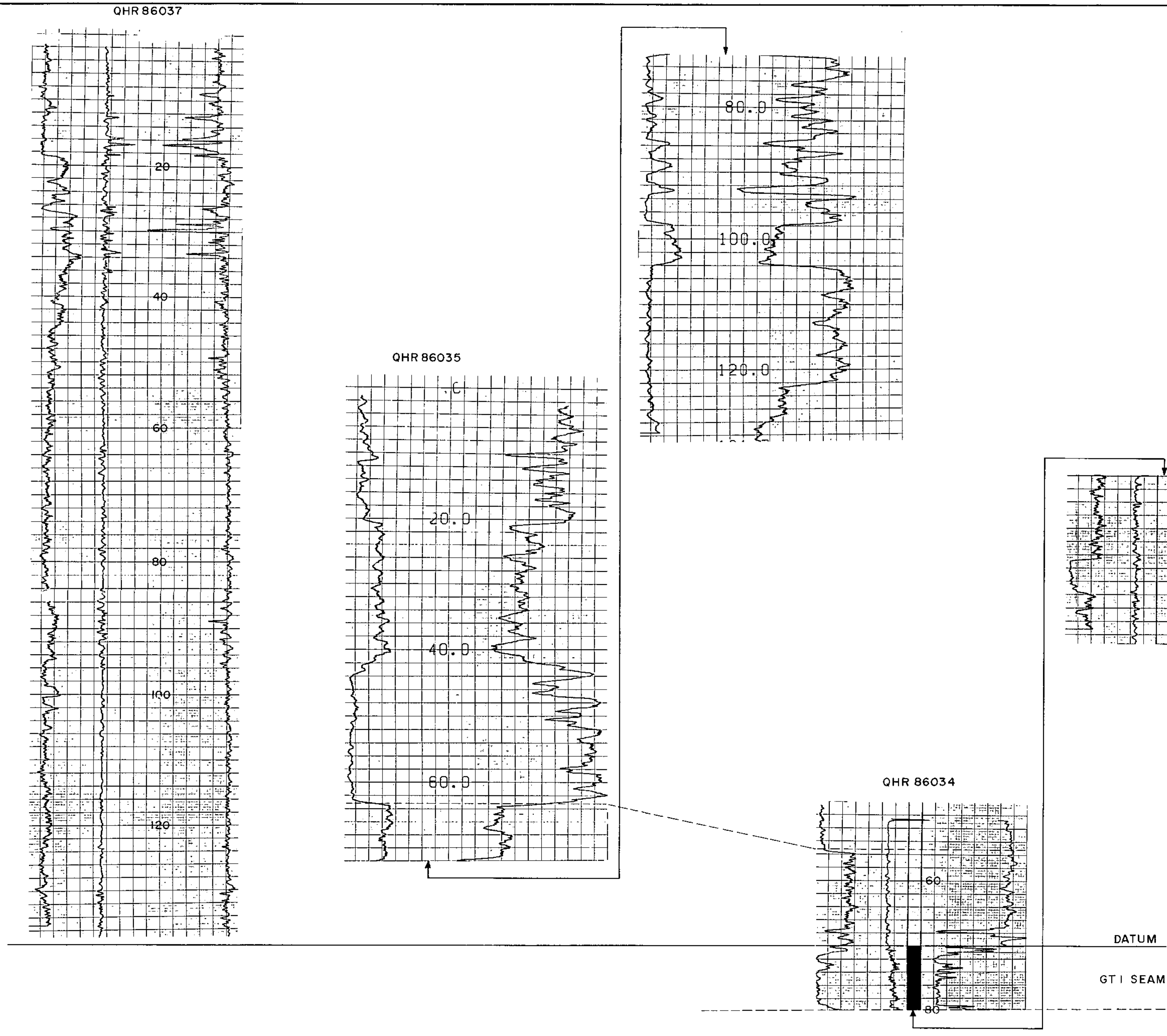
Area GETHING | Category CORRELATION

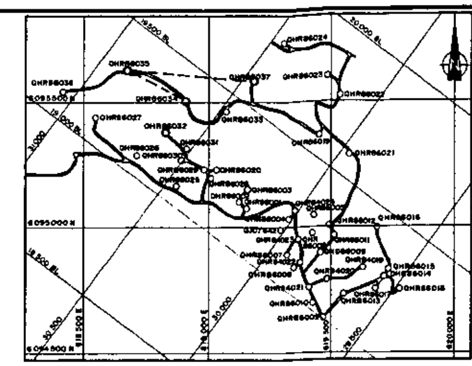
Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG
CORRELATION OF COAL-BEARING SECTION

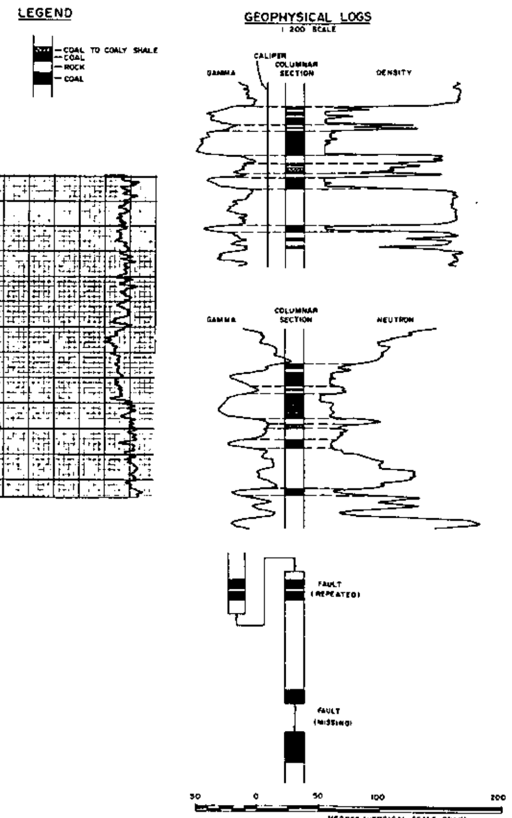
SHEET 11 of 12

Scale 1:200(VERT.) (HORIZONTAL NOT TO SCALE) | Drawing No. 86-605-26-021 | Rev. 0





GETHING AREA LOCATION MAP
1:10000 SCALE



NOTE 1) ALL THICKNESSES ARE APPARENT
2) ADDITIONAL BOREHOLE GEOPHYSICAL DATA IS AVAILABLE FOR MOST HOLES
3) GAMMA / NEUTRON LOGS USED ONLY WHEN DENSITY LOG IS NOT AVAILABLE

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
0	28	11	86	ORIGINAL DRAFT	HS	HW	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area	Category
GETHING	CORRELATION

Drawing Title

GETHING AREA
DRILL HOLE GEOPHYSICAL LOG CORRELATION OF COAL - BEARING SECTION

SHEET 12 of 12

Scale	Drawing No.	Rev.
1:200 (VERT.) (HORIZONTAL NOT TO SCALE)	86 - 605 - 26 - 022	0

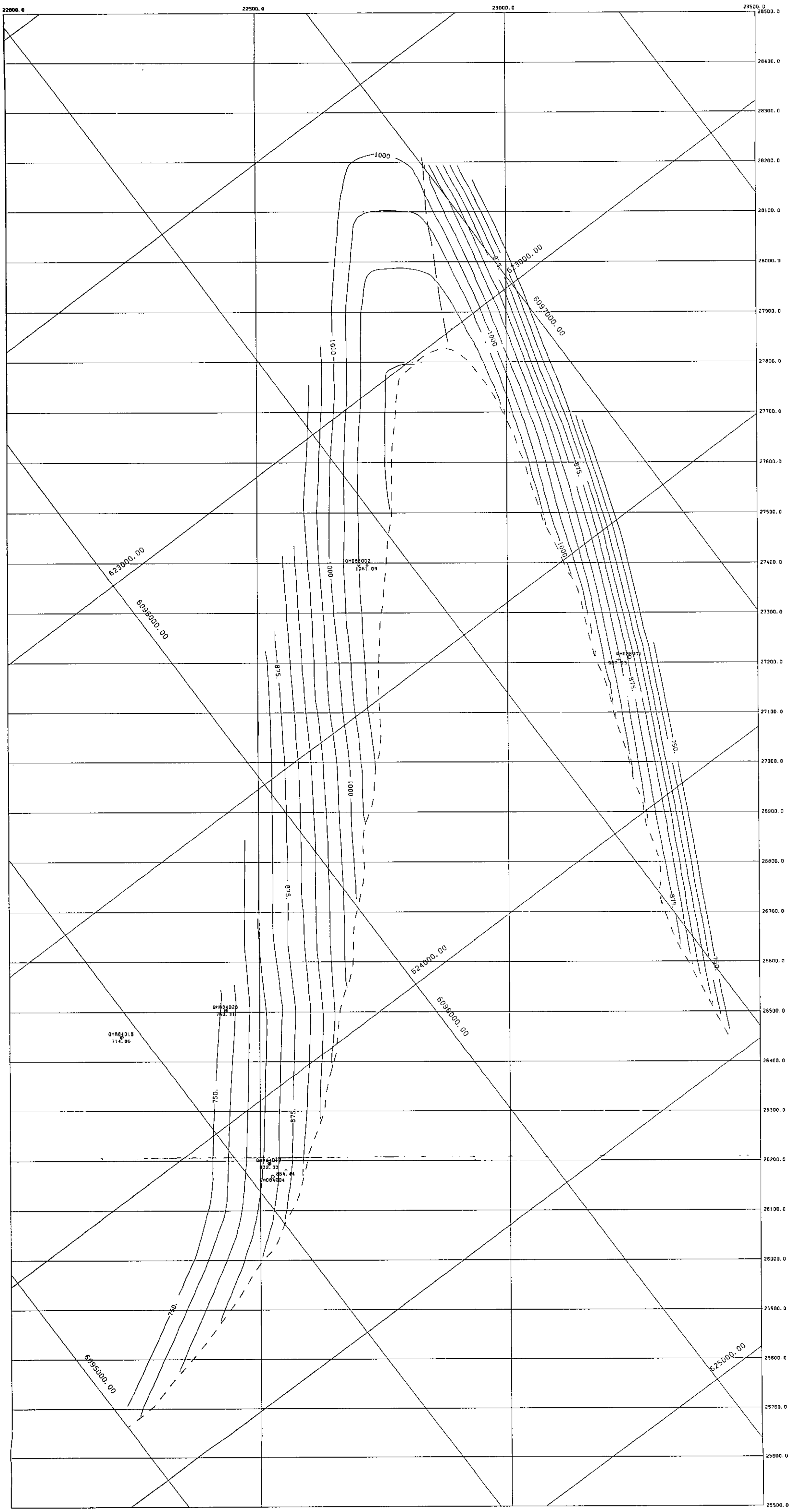
APPENDIX 1

Section 2.2

Grizzly Area

Structure Contour Maps

Seam F, G and J



NOTE:

— — — — — —	SUBCROP
——— ——— ———	FAULT TRACE
——950——	STRUCTURE CONTOUR
QHR86019 ⊕ 1095	DATASET (DRILLHOLES, TRENCHES) ELEVATION OF SEAM TOP

50 0 50 100 metres

REV.	D	M	Y	REVISION DESCRIPTION	DRN.	DES.	APP.
0	30	02	87	ORIGINAL DRAFT	KJV	DPL	GG

QUINTETTE CØAL LIMITED

PROJECT MANAGER

DENISØN MINES LIMITED

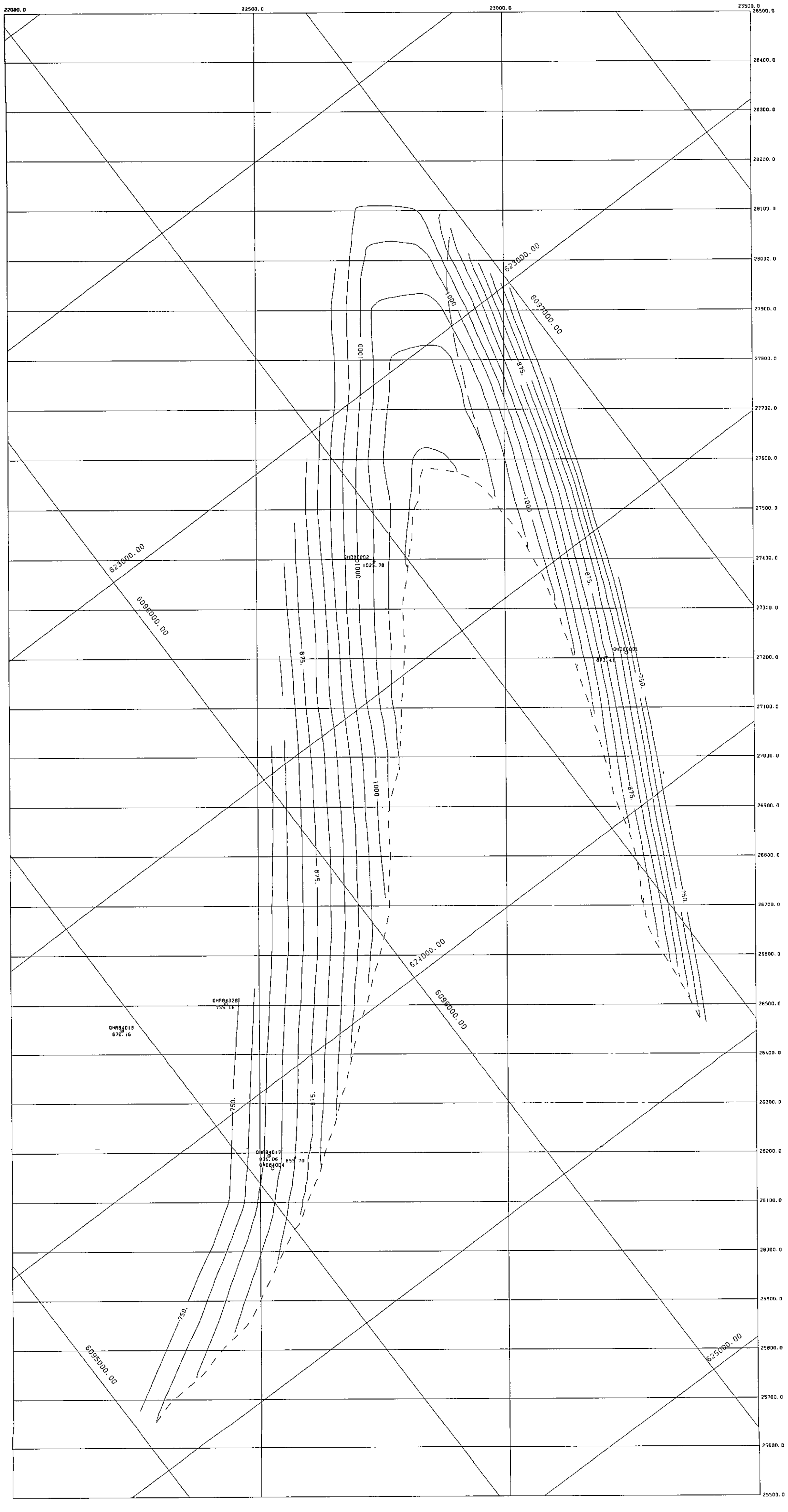
COAL DIVISION

AREA: GRIZZLY — CATEGORY: GEOLOGY

DRAWING TITLE

GRIZZLY MINE AREA
STRUCTURE CONTOUR PLOT
F SEAM

SCALE: 1:2500 — DRAWING FILE: 87-905-22-001 — Rev: 0



NOTE:

— — — — —	SUBCROP
——— ——— ———	FAULT TRACE
———950———	STRUCTURE CONTOUR
GHR86019 ⊕ 1095	DATASET(DRILLHOLES,TRENCHES) ELEVATION OF SEAM TOP

50 0 50 100 metres

0	00	02	87	ORIGINAL DRAFT	KJV	DPL	G G
REV.	D	M	Y	REVISION DESCRIPTION	DRN.	DES.	APP.

QUINTETTE CØAL LIMITED

PROJECT MANAGER

DENISØN MINES LIMITED

COAL DIVISION

AREA GRIZZLY | CATEGORY GEOLOGY

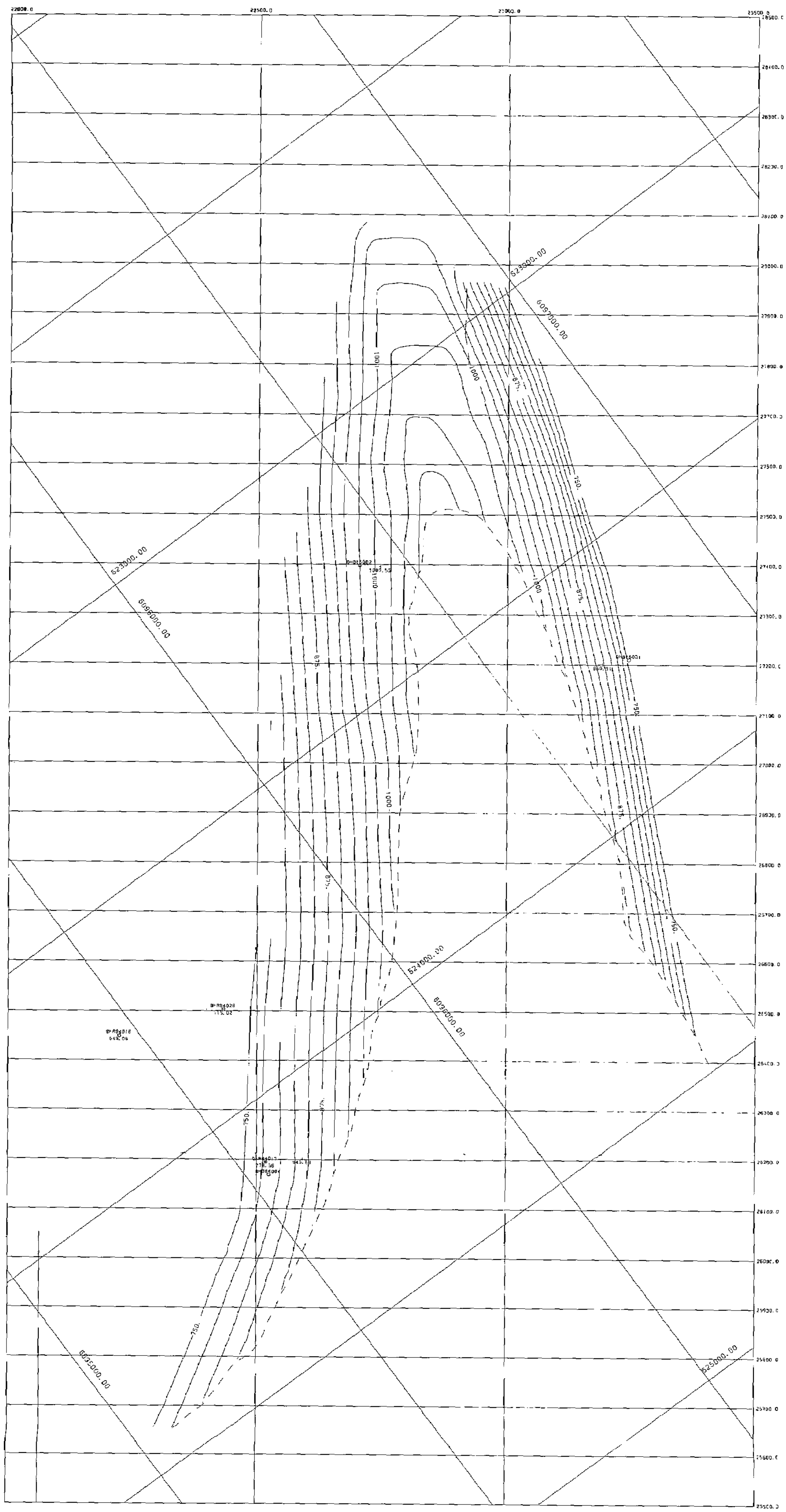
DRAWING TITLE

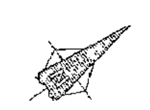
GRIZZLY MINE AREA

STRUCTURE CONTOUR PLOT

G SEAM

SCALE 1:2500 | DRAWING FILE 87-905-22-002 | REV 0





NOTE:

— — — — — —	SUBCROP
————————	FAULT TRACE
——950——	STRUCTURE CONTOUR
CHR86019 ⊕ 1095	DATASET (DRILLHOLES, TRENCHES) ELEVATION OF SEAM TOP

50 0 50 100 metres

0				ORIGINAL DRAFT	KJV	DFL	GG
REV.	D	M	Y	REVISION DESCRIPTION	DRN.	DES.	APP.

QUINTETTE COAL LIMITED

PROJECT MANAGER

DENISON MINES LIMITED

COAL DIVISION

AREA	GRIZZLY	CATEGORY	GEOLOGY

DRAWING TITLE

GRIZZLY MINE AREA

STRUCTURE CONTOUR PLOT

J SEAM

SCALE	DRAWING FILE	REV.
1:2500	87-905-22-003	0

APPENDIX 1

Section 2.3

Transfer Area

Structure Contour Maps (6)

Seam F, G and J

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
				ORIGINAL DRAFT	EJT	G.K.	

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area TRANSFER | Category STRUCTURES

Drawing Title

TRANSFER AREA
STRUCTURE CONTOURS
F SEAM

SHEET 1 of 2

Scale 1:2500 | Drawing No. 87-903-22-001 | Rev.

G.C.L. FILE No.
LONG. 20800
LONG. 20800
SEAM OUTCROP
FAULT INTERSECTION
STRUCTURE CONTOUR (25m INTERVAL)
QHD86002
1251.2
DRILL HOLE NUMBER
ELEVATION OF SEAM TOP
COLLAR
ELEVATION OF SEAM TOP
SYNCLINE
ANTICLINE
0 50 100 200 300
metres
ORIGINAL DRAFT
EJT
GK
Rev. D M Y Revision Description Drn. Des. App.
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area TRANSFER
Category STRUCTURES
Drawing Title
TRANSFER AREA
STRUCTURE CONTOURS
G SEAM
SHEET 1 of 2
Scale 1:2500
Drawing No. 87-903-22-002
Rev.

Rev.	D	M	Y	Revision Description	Drn.	Des.	App.
				ORIGINAL DRAFT	EJT	GK	

QUINTETTE COAL LIMITED

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DENISON MINES LIMITED

COAL DIVISION

Area	TRANSFER	Category	STRUCTURES

Drawing Title

TRANSFER AREA
STRUCTURE CONTOURS
J SEAM

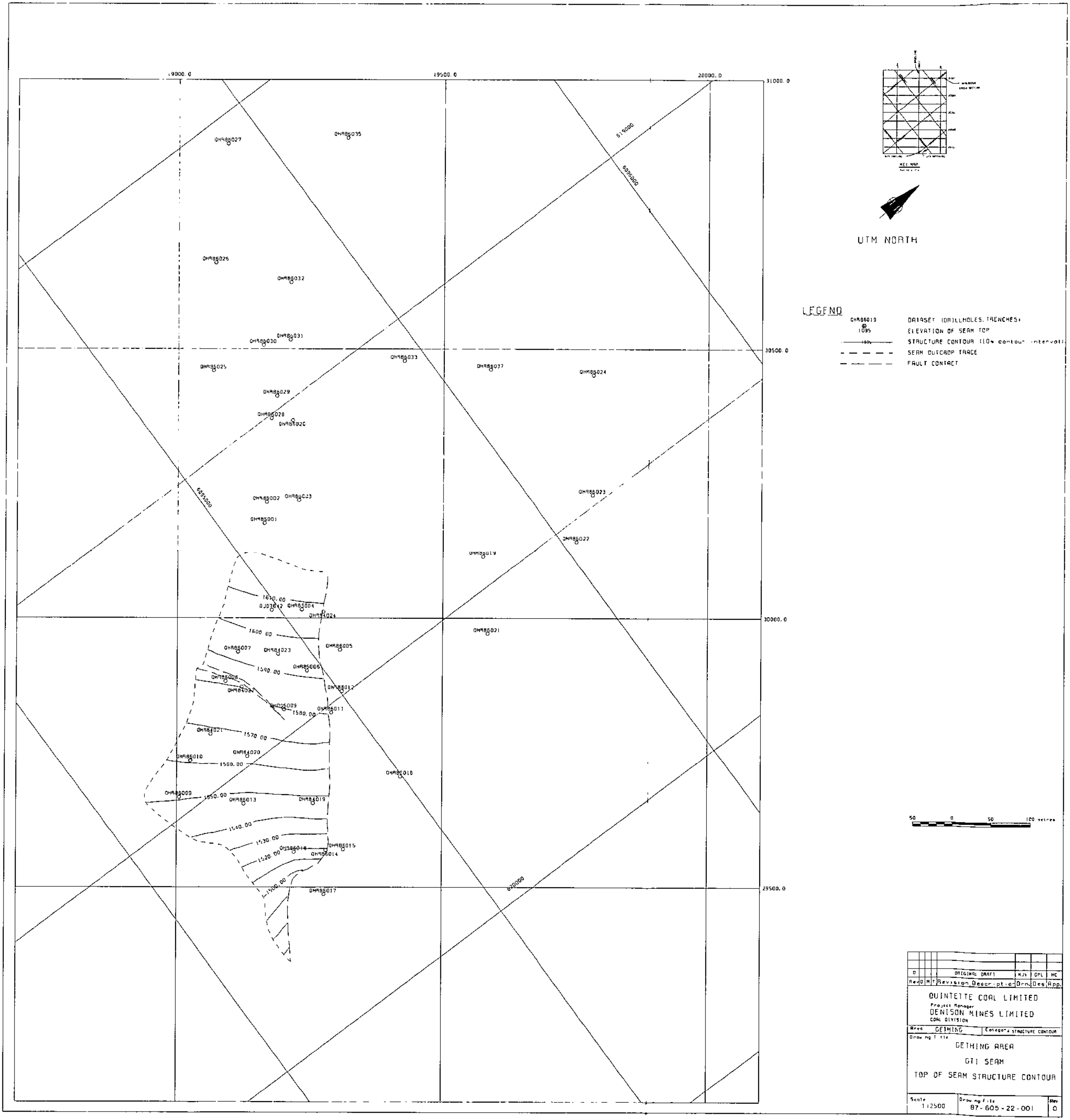
SHEET 1 of 2

Scale	Drawing No.	Rev.
1:2500	87-903-22-003	

APPENDIX 1

Section 2.4

Gething Area
Structure Contour Maps
Seam GT.1 and GT.2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19500.0
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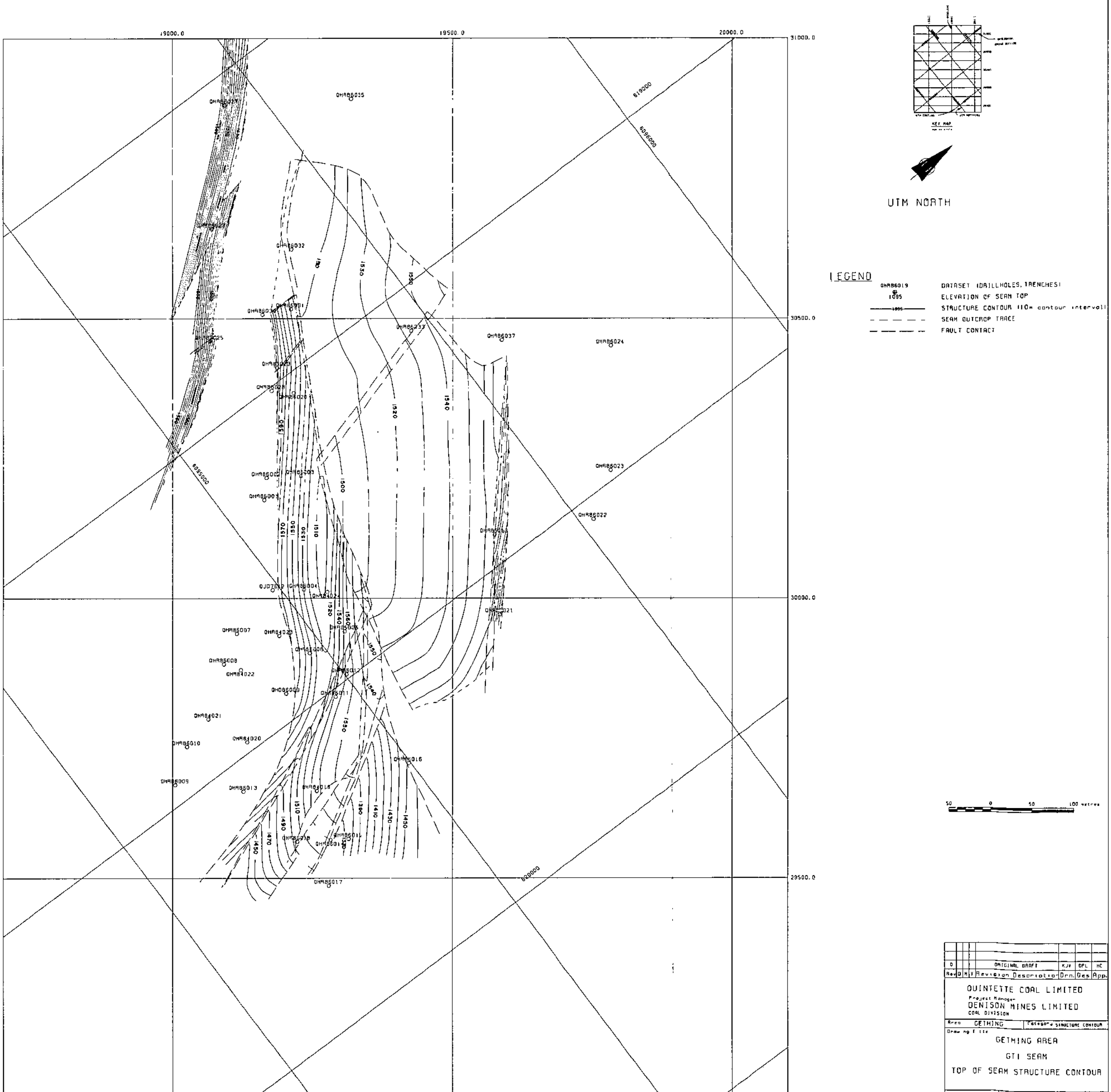
6095000
620000
UTM NORTH
LEGEND
DATASET (DRILLHOLES, TRENCHES)
ELEVATION OF SEAM TOP
STRUCTURE CONTOUR (10m contour interval)
SEAM OUTCROP TRACE
FAULT CONTACT
1610.00
1600.00
1590.00
1580.00
1570.00
1560.00
1550.00
1540.00
1530.00
1520.00
1500.00
50
0
50
100 metres
0
ORIGINAL DRAFT
Rev
D
M
T
Revision Description
Drn.
Des
App.
QUINTETTE COAL LIMITED
Project Manager
DENISON MINES LIMITED
COAL DIVISION
Area GETHING
Category STRUCTURE CONTOUR
Drawing Title
GETHING AREA
GT1 SEAM
TOP OF SEAM STRUCTURE CONTOUR
Scale 1:2500
Drawing File 87-605-22-001
Rev 0



LEGEND

QHR86019	DATASET (DRILLHOLES, TRENCHES)
1095	ELEVATION OF SEAM TOP
——1095——	STRUCTURE CONTOUR (10m contour interval)
— — — —	SEAM OUTCROP TRACE
—— —— —	FAULT CONTACT

50 0 50 100 metres

0			ORIGINAL DRAFT	KJV / DFL	HC
Rev	D	M Y	Revision Description	Drn. / Des.	App.

QUINTETTE COAL LIMITED

Project Manager
DENISON MINES LIMITED
COAL DIVISION

Area GETHING Category STRUCTURE CONTOUR

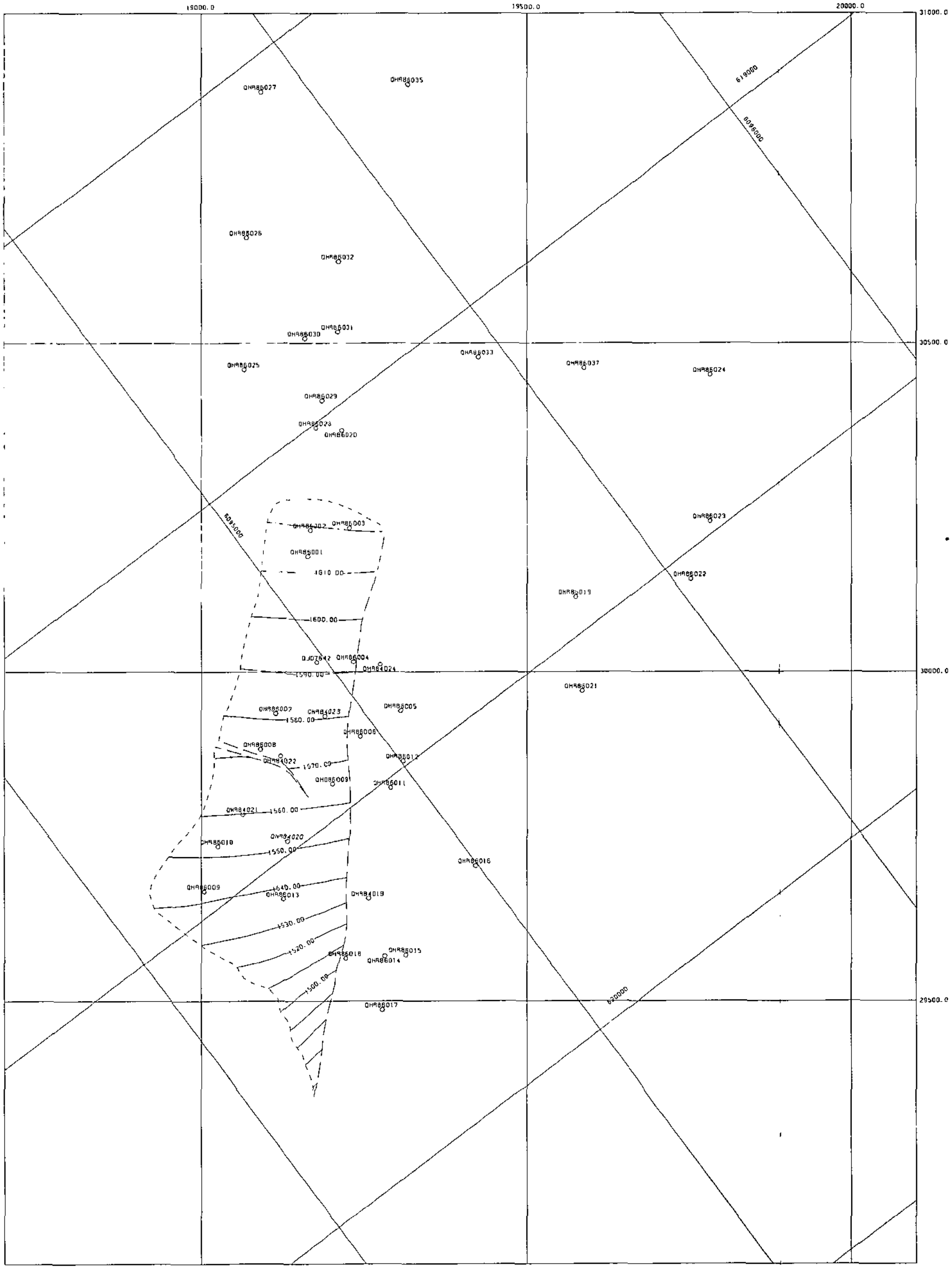
Drawing File

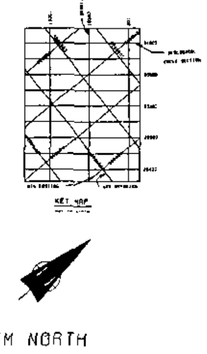
GETHING AREA

GT1 SEAM

TOP OF SEAM STRUCTURE CONTOUR

Scale 1:2500 Drawing File 87-605-22-002 Rev. 0





LEGEND

QHR86019	DATASET (DRILLHOLES, TRENCHES)
1095	ELEVATION OF SEAM TOP
	STRUCTURE CONTOUR (10m contour interval)
	SEAM OUTCROP TRACE
	FAULT CONTACT

50 0 50 100 metres

Rev	D	M	Y	Revision Description	Drn.	Des	App.
0				ORIGINAL DRAFT	KJV	DPL	HC

QUINTETTE COAL LIMITED

Project Manager

DENISON MINES LIMITED

COAL DIVISION

Area GETHING | Category STRUCTURE CONTOUR

Drawing Title

GETHING AREA

GT2 SEAM

TOP OF SEAM STRUCTURE CONTOUR

Scale 1:2500 | Drawing File 87-605-22-003 | Rev 0

APPENDIX 1

Section 3.0

Appendix I, Section 3 of this report contains coal quality data, and remains confidential under the terms of the *Coal Act Regulation*, Section 2(1). It has been removed from the public version.

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_251_2004

APPENDIX 1

Section 4.0

QUINTETTE COAL LIMITED

TRANSFER AREA

GEOLOGICAL REPORT

COPY #7

TRANSFER AREA
GEOLOGICAL REPORT

APPENDIX 2

Table of Contents

1.0 GETHING COAL ANALYSIS

1.1 South Gething Area Drill Core Analysis (QHD 86010)
1.2 Gething Area Drill Core and Bulk Sample Analysis
1.2.1 GT-1 Seam
1.2.1.1 Bulk Sample Analysis Trench 2
1.2.1.2 Drill Core Analysis QJD 7642 & QHD 86009
1.2.1.3 Carbonization Tests (CANMET), Blends of Raw GT-1 with Current QCL Product Coal
1.2.2 GT-2 Seam
1.2.2.1 Drill Core Analysis (QHD 86009)
1.2.3 Raw Ash and FSI of Selected Rotary Drill Hole Samples

2.0 TRANSFER - GRIZZLY DRILL CORE ANALYSIS

Sample Details, Component Analysis at 1.57 S.G., Raw Composite Analysis, Composite Washability, Clean Coal Proximate, Plasticity, Dilation and Petrography.

2.1 Seam B, Drill Core Analysis
2.2 Seam D, Drill Core Analysis
2.3 Seam E, Drill Core Analysis
2.4 Seam F, Drill Core Analysis
2.5 Seam G, Drill Core Analysis
2.6 Seam J, Drill Core Analysis
2.7 Seams J + K1, Drill Core Analysis
2.8 Seams J + K1 + K2, Drill Core Analysis
2.9 Seam K1, Drill Core Analysis
2.10 Seam K2, Drill Core Analysis
2.11 Compositing Instruction, Ash Fusion, Ash Analysis and Hardgrove Grindability

3.0 WOLVERINE VALLEY DRILL CORE ANALYSIS (QWD 86001)

CONFIDENTIAL

Most of Appendix II, Sections 1 & 2 of this report contains coal quality data, and remains confidential under the terms of the *Coal Act Regulation*, Section 2(1). It has been removed from the public version.

http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/10_251_2004